ADVANCED TECHNOLOGY LABORATORIES

BIBLIOGRAPHY OF ASTIA LITERATURE ON SEALS

BY

R.L. GEORGE

R.C. ELWELL

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This is the third volume of a report describing various technical efforts applied under contract NAS 7-102, during the period Feb. 26, 1962 to Feb. 25, 1963.

This volume consists of a bibliography of 682 unclassified abstracts available from the Defense Documentation Center (Formerly the Armed Services Technical Information Agency)

A complete subject index is included.

KEY WORDS

seals, sealing, bibliography, materials, static seals, dynamic seals

INFORMATION PREPARED FOR Missile and Space Division

TESTS MADE BY --

AUTHOR R. L. George R. L. George R. C. Elwell R. C. Elwell

COMPONENT Mechanical Engineering Laboratory

APPROVED G. R. Fox, Manager, Bearing Laboratory G. R. Fox

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This volume is to large extent the result of assistance and suggestions given to the authors by many people.

Mr. John P. Laniewski performed a significant service in categorizing the content of these many references, for the ultimate construction of the Subject Index.

Miss Esther Kalis and Mr. W. J. Leahy of the Main Library assisted in the acquisition of documents and preparation of the form of the Subject Index.

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To all of the above, and the others who helped in many other ways, we would like to express our appreciation for the courtesy and helpfulness offered to us in this project.

R. L. George
R. C. Elwell

INTRODUCTION

This is a bibliography prepared by the General Engineering Laboratory of the General Electric Company under NASA contract number NAS 7-102. It contains unclassified abstracts furnished by ASTIA (Armed Services Technical Information Agency, Arlington Hall Station, Arlington 12, Va.) on static and dynamic seals.

A seal has been defined as an assembly, including sealing medium, mounted between mechanical components to prevent the interchange of fluids across an interface. When the relative motion between the mechanical components is limited to that induced by internal, thermal, elastic, or pressure effects, the seal is defined as a static seal. If the relative motion is not limited, the seal is called a dynamic seal.

The objective of this bibliography is to present abstracts of prominent seal references, and a subject index which may be used as a tool to quickly guide the reader to ASTIA literature pertinent to his particular interest.

ASTIA collects, abstracts, and files literature written under Armed Service contracts by assigning them an ASTIA number for identification and description headings for the classification of information they contain. At our request, this agency searched the literature in their possession as of June 1962 and supplied 1100 abstracts pertinent to seal technology, as classified under the descriptor headings listed below:

Carbon Seals	Hydraulic Seals	Pneumatic Packings
Cork Seals	Metal Seals	Rotary Seals
Fuel Seals	Nylon Seals	Rubber Seals
Gas Seals	Oil Seals	Rubber Gaskets
Gas Leaks	Plastic Seals	Seals
Gaskets	Plastic Gaskets	Vacuum Seals

The ASTIA bibliography number assigned to this group of references is ARB 2021.

The 1100 abstracts were read and those that did not contain information pertinent to the advancement of seal technology or to the designing and operation of seals were discarded. The remaining ASTIA document references are listed according to ascending ASTIA numbers in this volume with titles, date of publication, author, and abstract if supplied by ASTIA. At the end of this listing, a subject index is presented to increase the value of the bibliography. In the subject index are listed ASTIA numbers of documents which contain information outlined by the category heading. The letters AD which precede most document numbers have been omitted for brevity.

The major divisions of the subject index are:

1) the kind or type of seal discussed in the document and if it is a dynamic or static seal,
2) a specific area of interest in seal design such as the effect of friction, surface finish, material properties, etc.,
3) the materials used in the seal, and
4) the applications for which the seal was designed and operated.

Each of these divisions is further broken down into specific categories, which contain no more than 75 references for easy use.

The subject index is not limited to the specific headings listed. By cross referencing between categories, a new category of particular interest may be constructed. Two examples are given for illustration.

Example 1: What is in the possession of ASTIA about synthetic rubber gaskets in launch vehicles?

A cross reference is made between gaskets (p. 189) and launch vehicle seals (p. 221). It is found that document number AD 240-573 is the only publication on this subject.

Example 2: What references are available on leakage of dynamic packings in hydraulic equipment?

A cross reference is made between dynamic packings (p. 191), hydraulic equipment (p. 220), and dynamic leakage (p. 199). It is found that three ASTIA documents contain information on all three subjects: AD 036-456, AD 234-860, and AD 259-550.

This is the first edition of this bibliography, which is presented in the interest of the advancement of seal technology. It would be appreciated if the authors' attention would be drawn to any errors, omissions, or suggestions which will improve the usefulness of this bibliography.

AD-1046

Pitman-Dunn Labs., Frankford Arsenal, Philadelphia, Pa.
INJECTED METAL SEALS FOR THE T2031 FUZE, by Sala S. Lipson. Dec 52, 7p. illus. table (Memo. rept. no. MR-533)

The variables governing the injection of fusible alloy seals for joining components of the T2031 fuze were investigated. A conventional wax injector, designed for wax-pattern production for investment casting, was modified for injecting the seals. Of two methods of injection, that which involved the use of air pressure to force the metal into the sealing groove was selected. A 52.5% Bi-32% Pb-15% Sn eutectic alloy was employed. The sealing grooves were successfully filled at moderate injection pressures and temperatures. No difficulty was encountered with flashing. 22/1

AD-2011

Atomic Energy Research Establishment (Gt. Brit.).
THE PRINCIPLES OF LEAK DETECTION, by A. H. Turnbull. Mar 50 [21]p. incl. illus. tables. (AERE rept. no. G/R 478)

An attempt was made to define the optimum conditions for various methods of leak detection and to establish the ultimate sensitivities of these methods. Dynamic methods of leak detection are discussed for the condition where the surface of a continuously evacuated system is probed with a jet of a gas or vapor which is not initially present to any appreciable extent. Leak detection with the detector on the high vacuum side and on the backing side of the main diffusion pump is treated, and equations are derived for the partial pressures of air and probe gas in the system at any time. Optimum leak detection conditions are determined, and data are given enabling the minimum detectable leak to be calculated when certain detectors and probe gases are used in any system.

AD-2400

North American Aviation, Inc., Los Angeles, Calif.
DEVELOPMENT TESTS OF A HYDRAULIC POWER CONTROL SYSTEM RESERVOIR RELIEF VALVE (165-58061) APPLICABLE TO F-86D AIRPLANES (N. A. A. MODEL NA-165) CLASS-FIGHTER, by G. F. Ervin. 10 June 52 [15]p. incl. illus. tables (Rept. no. NA-52-657)
(Contract AF 33(038)9211)

A special seal was developed for the poppet of the hydraulic control reservoir relief valve which had displayed satisfactory characteristics at room and elevated temperatures and excessive leakage at -65°F. The satisfactory operation of the special molded seal was attributed to smoothness and closer tolerances.

AD-2787

Frankford Arsenal, Philadelphia, Pa.
BINOCULAR M3. EFFECT OF TROPICAL EXPOSURE ON SEAL EFFICIENCY AND LOW TEMPERATURE PERFORMANCE, by John P. Yannello. 20 Feb 53, 4p. incl. tables (Test rept. no. T53-10-1)

Three binoculars were submitted to the dew point test after exposure to high humidity conditions to test the quantitative amount of leakage. Results indicate that the binoculars are not hermetically sealed and should not be used in tropic and temperate zones if long usable life is desired. High internal humidity conditions may cause corrosion of the metallic elements and fogging of the optical elements. Lubricated with Mil-G-3278, these instruments are adequate for low temperature service without overhaul, even after exposure to tropical conditions.

AD-2991

Bjorksten Research Labs., Inc., Madison, Wis.
SEALS: DETERMINATION OF LEAKAGE VALUES. Interim engineering rept. no. 2, 26 Aug-26 Nov 52. 17p. incl. illus.
(Contract AF 33(038)15981)

The leakage rate of gases through fabricated seals is to be measured quantitatively before and after various environmental tests. A portable leak meter was constructed for measuring leakage rates from 5×10^{-4} to 0.1 cc/sec; the Gross leak meter served as the prototype in the development. Quantitative measurements of leakage rates through sealed components on the production line appears possible within these limits. All air leaking through the test specimen is made to pass through a capillary tube; the leakage rate measurement is made by timing the rate of movement of a water pellet through the glass capillary. A procedure for lapping brass and dead soft Al on a motor driven lapping plate is described. The results are superior to the hand

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AD-2991

lapping methods tried. Scratch depths are reduced by this method to less than 1 μ in 10 to 30 min.

AD-3133

Kellogg, M. W., Co., Jersey City, N.J.
PROTECTIVE COATINGS FOR EXPOSED METAL SURFACES IN THE ACID TANK AND ATO COMPARTMENTS OF THE B-47 AIRCRAFT, by F. J. Honn. Progress rept. 20 Jan-20 Apr 52. May 52, 12p. incl. tables (Rept. no. RL 52-198)
(Contract AF 33(038)21253)

Efforts were directed toward the development of a polychlorotrifluoroethylene (Kel-F) or modified Kel-F coating and sealant for the Al surfaces. The coating is to be resistant to WFNA penetration, serviceable from -65° to +160°F, and applicable to metal surfaces without affecting adversely their mechanical properties. Unplasticized Kel-F films and sheets had excellent resistance to WFNA. No molecular degradation and little weight or dimensional change occurred after 168 hr in WFNA at 194°F. No satisfactory method was found for applying Kel-F to Al. Kel-F copolymers, particularly the $CF_2=CFCl/CF_2=CH_2$ system, were

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AD-3133

investigated which could be applied to Al as lacquers or low-fusion temperature dispersions. Compositions approaching ketone solubility at room temperature (where they could be applied as lacquers) were almost as resistant to WFNA as Kel-F. WFNA penetrated plasticized Kel-F more rapidly than the unplasticized material.

AD-5181

Detroit Arsenal, Center Line, Mich.
HYDRAULIC FITTINGS WITH RUBBER SEAL, by Cameron A. Burges. Technical rept. 2 Mar 53, 6p. illus. tables (Rept. no. 2259)

(Not abstracted)

Classification cancelled by authority of Executive Order 10501 dtd by [illegible] 12/5/53
5 Nov 53

AD-6687

Bjorksten Research Labs., Inc., Madison, Wis.
SEALS: DETERMINATION OF LEAKAGE VALUES. Interim engineering rept. no. 3, 26 Nov 52-26 Feb 53, 28p. incl. illus. tables.
(Contract AF 33(038)15981)

The essential sensitivity and reproducibility requirements of an ideal seal tester for electronic equipment are discussed. An analysis of nondestructive testing methods indicated the superiority of providing access to the interior of the component rather than sealing a test gas into the component. The use of this technique for measuring the leakage rates of sealed components is described, and photographs are included of 10 different component types ready for testing. Leakage-rate measurements which were performed during a 3-mo period are summarized in a chart. (See also AD-2991)

AD-7347

Detroit Arsenal, Center Line, Mich.
LEAKAGE AROUND SHAFT OF MANUAL ELEVATION PUMP, ORD PART NO. 7363146, SERIAL NO. 2404 MD, AFTER 100 MILES VEHICULAR OPERATION AT PROVING GROUND, by Homer E. Helm. 2 Feb 53, 5p. incl. illus. (Rept. no. 2195)

The pump was pressurized to 1500 psi which produced a leakage of 1 drop in 12 min around the shaft at the switch end. The pump seal failure was caused by 1 or more of the following conditions: shaft roughness, shaft eccentricity, improper assembly of leather backup washer, or tool marks in the end cap. 22/3

AD-8640

Rock Island Arsenal Lab., Ill.
FRICTION STUDIES OF O-RING PACKINGS IN PNEUMATIC EQUILIBRATORS AT SUB-ZERO AND NORMAL TEMPERATURES, by Warren E. Peterson. 8 Apr 53, declassified 15 June 54, 14p. illus. tables. (Proj. no. TR1-1031R. rept. no. 4; RIA Lab. no. 52-6287) Unclassified report

Friction tests were made of O-ring packings in the pneumatic equilibrators of 155 m/m gun and 8-in. M1 howitzer carriages after storage at subzero temperature (ST) and normal temperature (NT) with various oils as packing lubricants. Dynamic and break-away frictions of the equilibrator increased with longtime static storage at ST and at NT. The equilibrators which were not in longtime static storage showed insignificant break-away friction at NT regardless of the oil used. At - 50° to -60°F, the break-away frictions of about 1200 to 1600 lb were more than 100% greater than the dynamic frictions. The MIL-O-5606 Hydraulic oil was the most suitable oil (over)

AD-8640

for reducing friction in both ST and NT operation. Colloidal graphite in the lubricant increased the frictions. (See also AD-6252)

AD-8669

Detroit Arsenal, Center Line, Mich.
HYDRAULIC FITTINGS WITH RUBBER SEALING ELEMENT, by Cameron Burges and Russell G. Burbridge. Technical rept. 27 Mar 53, declassified 15 June 54 [15]p. incl. illus. (Rept. no. 2329) Unclassified report

(Not abstracted)

AD-9079

Naval Proving Ground, Dahlgren, Va.
GUNFIRE QUALIFICATION TEST OF MODEL F2H-3 AIRPLANE FUSELAGE SELF SEALING FUEL CELL INSTALLATION, by H. P. Branscome. Final rept. Final rept. on Self Sealing Fuel Cells Manufactured by U. S. Rubber Co. 11 Dec 52, declassified 15 June 54, 10p. illus. tables (NPG rept. no. 1068) Unclassified report

Tests were conducted to determine the resistance of the F2H-3 fuselage fuel-cell installation to leakage, slosh resistance, and gun fire. The installation consisted of three US Rubber Co. self-sealing cells in the monocoque-type fuselage between stations 124.4 and 336.9. No leakage was observed during the application of 3.5 psi of air to the cells. The slosh test of the 2/3-full cells consisted of rocking the installation along the axis of the aircraft. After 4 hrs (a failure of the test equipment prevented the completion of the required 25 hrs), no damage or leakage was observed. Twelve 0.50-cal AP projectiles (over)

AD-9079

fired from 75 ft produced 23 qualifying wounds of which 14 sealed satisfactorily. Only a small amount of fuel was lost from the remainder, although cords which were frayed into the wounds prevented the sealant from acting quickly. A 40-mm HEP projectile detonated 2.5 ft from the port side of the installation produced 14 wounds of which 3 leaked slightly. These sealed within the specified 2 min. Only minor damage to the supporting and surrounding structure was produced by the projectiles and/or hydraulic fuel surge. The installation was considered to conform to requirements.

AD-9494

Aeronautical Electronic and Electrical Lab., Naval Air Development Center, Johnsville, Pa.
EVALUATION OF SEAMS AND GASKETS USED IN SHIELDING ENCLOSURES, AND DEVELOPMENT OF CORRECTIVES FOR IMPROVEMENT, by W. E. Stinger. Final rept. 3 Feb 53, 43p. incl. illus. (Proj. TED no. ADC EL-536; Rept. no. NADC-EL-52139)
Unclassified report

Research was directed toward the investigation and development of a method of suppressing the radio-interference leakage emanating from the seams of shielding enclosures which are used in engine ignition systems. Conclusions were obtained from test results relative to the following items: (1) RF impedance and effective pressure, (2) the point of contact, (3) the shape of the contact area, (4) resistivity of the gasket material, (5) sealing for air pressure, (6) RF current path, (7) corrosion and aging, (8) protective coatings, (9) protective sealing, (10) rapidity of field decay, and (11) compari-
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AD-9494

son of various gaskets and seams. An AEEL RF gasket and a saw-tooth seam were developed. The gasket satisfactorily attenuates the leakage from seams, including anodized or other coated surfaces. A description is given of a test method developed for type-testing gaskets and seams which gives a satisfactory evaluation of the leakages present with regard to radio-interference specification requirements.

AD-10 270

Sylvania Electric Products, Inc., Kew Gardens, N. Y.
INVESTIGATION OF TUBE STRUCTURES ADAPTED TO AUTOMATIC PRODUCTION, by W. R. Wheeler. Interim technical rept. no. 6, 1 Oct 52-1 Jan 53. 30 Mar 53, 1v. incl. illus. tables (Rept. no. YF52(B1-1464-6))
(Contract NObsr-52627)

Development of the titanium-core sealing technique is being conducted for use with various ceramic components. Among these are ceramic-to-ceramic seals for joining the stem wafer to the bulb, and metal-to-ceramic seals for sealing the pins through the ceramic stem. Glazed-zircon stem seals to 7052 tubing were made; only a few of the glass pieces cracked. The cathode design of the SN-1724B and C was modified to eliminate distortion caused by expansion and to permit easier assembly. The titanium-core BT sealing method was incorporated in SN-1593B, a redesigned SN-1593A
(over)

AD-10 270

tube. The B design also includes an eyelet-type support. The spread of dimensional tolerances of Sylvania ceramic spacers (0.0015 in.) was too great for the close grid-to-cathode spacing.

AD-10 979

Detroit Arsenal, Center Line, Mich.
[DETERMINE COMPRESSION SET AND BRITTLE POINT CHARACTERISTICS OF VARIOUS "O" AND "T" RINGS] by James K. Matter. Memo. rubber process rept. 8 May 53, 3p. tables (Rept. no. 2437)

Results are tabulated for two T-type and three O-type rings.

AD-11 080

Aberdeen Proving Ground, Md.
TEST OF JOHN CRANE FACE TYPE SEALS, by A. Bornstein. Rept. no. 2, 19 Nov 51-12 Dec 52. 28 Apr 53, 8p. illus. (Proj. no. TT1-19H, rept. no. 5)

(Not abstracted)

AD-11 484

Lockheed Aircraft Corp., Burbank, Calif.
FUEL RESISTANCE TESTS: 3/4, 1-1/2 AND 3-1/2 INCH O-RING INTERCONNECTS [MODEL F-94C] by F. O. Rick. 12 Feb 53, 10p. incl. illus. tables. (Rept. no. 9068)

Tests were conducted on O-ring interconnects providing near-maximum and -minimum cavity volumes to determine whether they were satisfactory seals when assembled with AF934 O-rings. The test fluids were (1) 100% isooctane, and (2) a 70% isooctane-30% PhMe mixture. The interconnects were subjected to a total soaking of 37 days, two dry-air bakes totaling 8 days, and a temperature reduction in 10° increments from room temperature to -65°F. No leakage resulted; the O-rings and parts showed no appreciable wear damage.

AD-11 722

[Detroit Arsenal, Center Line, Mich.].
[DETERMINE CAUSE OF LEAKAGE AND/OR LOCKING UP OF EIGHT MANUAL ELEVATION PUMPS] CODE "A," by Homer E. Helm. 20 May 53, 2p. (Rept. no. 2470)

Tests were made to determine the cause of leakage and/or locking up of 8 manual elevation pumps, Ord part no. 7363146, code "A." A table shows the performance of the pumps at 1500 psi supercharge pressure, 100 psi differential. The pump defects are listed.

AD-11 915

Aberdeen Proving Ground, Md.
QUALIFICATION TEST OF ROAD WHEEL SPINDLE SEAL, ALTERNATE TO NO. B8364672, by A. Bernstein. 14 May 53, 21p. illus. (Proj. no. TT1-19H, rept. no. 6)

(Not abstracted)

AD-12 531

Naval Supply Research and Development Facility, Bayonne, N. J.
HEAT SEALING MACHINES FOR MILITARY BARRIER MATERIALS. 15 Feb 53 [91]p. incl. illus. tables, 11 refs. (Proj. NT 003-021(A); Engineering rept. no. 2.5050)

Machines and materials used in the moisture-proof packaging of military items were evaluated according to Spec MIL-P-116. Tests were made on 4 representative moisture-vapor barrier materials utilizing a vinyl heat-sealable film laminated to aluminum foil with an adhesive. The 3 commercial heat-sealing machines studied were of the following types: (1) continuous sealer with counterrotating, roller-type, heat-sealing elements preceded by an endless chain conveyer fitted with preheaters; (2) the band or endless-belt type with 2 cartridge-type heaters and 2 forced-water coolers; and (3) a jaw-type machine equipped with a single bar heater. The sealing properties of the materials were satisfac-

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AD-12 531

tory if certain limits of temperature, pressure, and dwell time were observed. None of the machines were completely adequate for unlimited application. The present method of specifying heat-seal requirements is considered inadequate and dangerous. The development of a laboratory-standard heat sealer is recommended.

AD-13 311

Naval Proving Ground, Dahlgren, Va.
GUNFIRE QUALIFICATION TEST OF MODEL AD-5 AIRPLANE INTERNAL AUXILIARY SELF SEALING FUEL CELL INSTALLATION, by H. P. Branscome. Final rept. 2 July 53, 9p. illus. (NPG rept. no. 1145)

The fuel cells, enclosed in a framework consisting of extruded hat sections and angle corner supports, were 2/3 filled with isooctane fuel and bombarded from a range of 75 ft by eight 0.50-cal armor-piercing projectiles and one 20-mm practice projectile. Fifteen wounds were produced, 3 of which were above the fuel level and were discounted. Four of the 12 qualifying wounds sealed satisfactorily. The 8 leaking wounds sealed during the test, and only about 1 pint of fuel was lost. One 40-mm HEP projectile, exploded 24 in. from the outside of the installation, produced 26 wounds in the fuel cell. Of the 14 wounds below the fuel level, 12 sealed satisfactorily. The fuel cell installation conformed to requirements.

AD-13 714

Detroit Arsenal, Center Line, Mich.
INVESTIGATION OF GREASE COMPATIBILITY AND AND PHYSICAL PROPERTIES OF THREE RUBBER TURRET BEARING SEALS, by E. R. King. Technical rept. 18 June 53, declassified 15 June 54, 6p. tables. (Rept. no. 2405) Unclassified report

The materials tested included 1 rubber bearing seal from each of 3 suppliers and 10 lb of grease from each of 2 suppliers. The seals were tested for conformance with ASTM Spec D735-52aT, grade SC-615-ABCEFF. Seals 1 and 2 met requirements except for original elongation, compression set, and (for seal 1 only) tensile strength after aging. Grease B produced less increase in length than grease A. The dimensional stability of seal no. 3 was the best after exposure to both greases. None of the seals complied fully with requirements.

AD-14 468 Classification cancelled by authority of 1st Inde Fr Frankford by M. Sayre Arsenal date 2 Mar 54

Frankford Arsenal, Philadelphia, Pa.
COMPUTER COMPONENTS STANDARDIZATION PROGRAM. EVALUATION OF SPECIAL DRIVE WASHERS FOR 23 TYPE SYNCHROS, by Henry Moore. 25 May 53, 5p. illus. (Technical memo. no. M53-23-1)

Special drive washers were designed and evaluated by performance testing to permit gears with existing keyways to be used on splined shaft synchros without modification of the gears, as on the Director M33. Evaluation tests were performed on the washers to determine their suitability for use with the size 23 synchro with a splined shaft. Performance under the following considerations was especially considered: backlash between members, the re-use of mating members, and the shear values and deformation of the tab. The modified washer with the tapered tab, which eliminated the play between the tab and the keyway, produced satisfactory results. Half-hard sheet brass was superior

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AD-14 468

to stainless steel as the material for the washers. The tab of the washer will transmit more than 15 times the minimum applied torque before there is an indication of elastic deformation, and 100 times the amount before there is any permanent deformation. It was recommended that the original design of the special drive washer be modified to incorporate a tapered tab.

AD-15 012 Accession No.

Naval Proving Ground, Dahlgren, Va.
GUNFIRE TEST OF MODEL P2V-4 AIRPLANE CENTER SECTION SELF SEALING FUEL CELL INSTALLATION INCORPORATING A SELF SEALING OIL CELL MANUFACTURED BY U. S. RUBBER COMPANY, by H. P. Branscome. Final rept: Final rept. on Gunfire Test of Model P2V-3W Airplane and Model P2V-4 Airplane Self Sealing Fuel Cell Installations. 27 May 53, 8p. illus. table (NPG rept. no. 1133)

Six wounds, all of which sealed satisfactorily, were produced by five 0.50-cal AP projectiles fired into the oil cell. Round number 5 blew the drain plug free, and the oil was lost. Reinforcement or support was recommended for the area around the sump assembly access plate which was damaged during the test.

AD-16 330 Accession No.

Naval Proving Ground, Dahlgren, Va.
GUNFIRE QUALIFICATION TEST OF SELF-SEALING FUEL CELLS, by H. P. Branscome. Final rept. 25 Aug 53, declassified 15 June 54, 8p. illus. tables. (NPG rept. no. 1169) Unclassified report

(Not abstracted)

AD-16 848 Accession No.

Royal Aircraft Establishment (Gt. Brit.).
LEAKAGE TESTS ON SOLID AND INFLATABLE RUBBER SEALS DESIGNED FOR USE IN WIND TUNNELS, by D. I. T. P. Llewelyn-Davies and M. T. Calger. Jan 53, 9p. illus. (Technical note no. Aero 2219) (In cooperation with National Aeronautical Establishment (Gt. Brit.))

Leakage tests were conducted on an hour-glass-cross-section solid-rubber seal designed for machined flange joints and a rubber-tubing inflatable seal for gaps up to 0.10 in. between the edges of removable supersonic nozzles and the tunnel walls. The former satisfactorily sealed gaps up to 0.04 in. at +1 atm from atmospheric pressure with a 5-16/in. sealing pressure; the leakage was less than 0.1×10^{-6} lb/sec/ft. Optimum results were obtained with the number of seal joints minimized and the seal fitting loosely in its groove. A minimum inflation of 30 psig was required for the inflatable seal to ensure adequate characteristics against +1 atm dif-
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AD-16 848

ferences from atmospheric pressure. Leakage rates of 0.44×10^{-6} and 3.1×10^{-6} lb/sec/ft, respectively, were obtained for a 0.128-in. gap against a vacuum and pressure.

AD-18 810 Accession No.

Post Office Engineering Dept. (Gt. Brit.).
THE USE OF RADIOACTIVE MATERIALS TO FACILITATE THE LOCATION OF LEAKS IN THE SHEATHS OF GAS-PRESSURISED CABLES, by E. A. Speight and L. W. Hill. Feb 53, 18p. incl. table. (Research rept. no. 13112; [CRB ref. no. 53/2127])
Unclassified report

An examination was made of the possibility of using radioactive materials in the detection of leaks in the sheaths of ducted telephone cables. The study indicated that a method could be developed with the use of radioactive methyl bromide which would give an unequivocal indication of the cable length in which a leak existed. The sensitivity of the method would be several times greater than that of the best manometric methods, and would enable the whole of a 2000-m cable section to be tested in a maximum time of 24 hr.

AD-19 627 Accession No.

Lerner, Joseph, and Son, Inc., Brooklyn, N. Y.
SEALING TECHNIQUES FOR WAVEGUIDE AND COAXIAL ROTARY JOINTS, by C. R. Kuiper. Quarterly engineering progress rept. no. 3, 15 Feb-15 May 53. 15 June 53, 9p. illus. (Rept. no. D-102-3) (Contract DA 36-039-sc-42558)

(Not abstracted. See AD-12 108)

AD-21 274 Accession No.

Pitman-Dunn Labs., Frankford Arsenal, Philadelphia, Pa.
DISASSEMBLY TECHNIQUES FOR T2031 FUZES ASSEMBLED BY MEANS OF INJECTED METAL SEALS, by A. Saia and S. Lipson. Oct 53, 4p. illus. (Proj. no. TA1-6102; Memo. rept. no. MR-572)
Unclassified report

Zone heating by high-frequency induction and by a conductive method was investigated in an effort to develop disassembly techniques for fuze components joined by injected metal seals. A comparison of the heating rates obtained by the 2 methods indicated greater efficiency with the conductive method with the inductive technique. The 500-w iron of the conductive apparatus raised the temperature of the fuze body to 210° F at a distance of 1 in. from the sealing groove in approximately 21 sec. The inductive method required 27 sec to produce the same temperature rise. The separation time for the fuze components and the hazards associated with the techniques are discussed. (See also AD-1046)

AD-21 275 Accession No.

Pitman-Dunn Labs., Frankford Arsenal, Philadelphia, Pa.
MECHANICAL PROPERTIES OF INJECTED METAL SEALS FOR THE T2031 FUZE, by A. Sala and S. Lipson. Sep 53, 4p. illus. (Proj. no. TA1-6102; Memo. rept. no. MR-571) Unclassified report

Static and dynamic shear properties were determined for injected metal seals made with two Pb-Sn-Bi alloys. The results showed that the shear and impact strengths are reduced with increasing temperatures. The shear strength data for both alloys were identical. The impact values, obtained with Newton's alloys, were slightly higher than those for the ternary eutectic. An ample factor of safety was observed with regard to the shear strength at the maximum operating temperature of the fuse (165°F). At this temperature, the maximum service stresses, applied to the joint, were calculated to be 126 psi; the shear strength was approximately 1100 psi. Although a marked reduction in the impact properties

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AD-21 275

occurred at 165°F, no brittle zone or abrupt discontinuity in these properties was revealed. The rate of loading was more severe than that which will be applied to the fuse assembly in service. These considerations suggested that the elevated-temperature impact properties lie within an ample safety factor based on the service requirements of the fuse. (See also AD-21 274)

AD-22 068 Accession No.

Bendix Products Div., Bendix Aviation Corp., South Bend, Ind.
DEVELOPMENT AND TEST OF DIAPHRAMS FROM SYNTHETIC RUBBER MATERIALS, by Newton J. Lumm. Aug 53, 64p. incl. illus. tables (WADC Technical rept. no. 53-320)
(Contract AF 33(616)40; Continuation of Contract AF 33(038)3613) Unclassified report

Engineering subassembly tests, complete metering tests, and service tests were conducted on special and standard diaphragm materials. Test data were obtained which showed that the new ES-0613, ES-0616, and ES-0617 diaphragm materials are superior to the ES-0447 standard-material disphragms in regard to ozone resistance and low-temperature flexibility. The new materials are equal to or better than the standard material with respect to life cycle, burst, flange crushing, flange sealing, and vibrational wear characteristics. Carburetor metering while using the new material dia-

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AD-22 068

phragms was satisfactory down to -65°F from the high cruise range to rated take-off powers. Minor deviations (in the rich direction) existed at the lower powers below -30°F. The tests were performed in a PR-100E3 master control without a poppet valve diaphragm. Service testing, conducted through build-up, test, setting, and engine run-in, showed the new material diaphragms to be at least equal in all respects to the current production diaphragms.

AD-23 155 Accession No.

Naval Engineering Experiment Station, Annapolis, Md.
GASKET MATERIALS FOR UNION FITTINGS OF 3000 PSI OXYGEN SYSTEMS, by Thomas H. Hake. 3 Apr 53 [8]p. incl. tables (EES rept. no. 1B066735) Unclassified report

Various grades of teflon, nylon, and synthetic-rubber gasket materials were tested to determine the most suitable material for use in union fittings of oxygen systems at 3000 psi. Circular and rectangular cross-section gaskets of the materials were subjected to oxygen aging and air line performance tests. Results indicate that longest life and most effective performance will be obtained by the use of teflon or nylon gaskets.

AD-24 489 Accession No.

Rubber Lab., Mare Island Naval Shipyard, Vallejo, Calif.
EFFECT OF IMMERSION IN OIL AND IN WATER ON COLD COMPRESSION SETS OF OIL-RESISTANT GASKET STOCKS, by J. Oser. Technical rept. 12 Jan 53, 17p. illus. tables (Rept. no. 7-23 A) Unclassified report

(Not abstracted)

AD-25 808 Accession No.

Krautter-Weber Tool Co., Newark, N. J.
AN IMPROVED ROTARY, HIGH-SPEED SEAL, by A. Razdow. Quarterly rept. no. 3, 1 Mar - 19 June 53. 25 Nov 53, 1v. incl. illus.
(Contract DA 36-039-sc-5592) Unclassified report

In tests of carbon washers coated with MoS_2, the wear resistance was found to be improved. No conclusive results were obtained in test runs made with phosphate-covered steel washers. The female coupling was simplified and its weight was reduced by 0.095 oz. Special tools were designed for the assembly of the coupling to the shaft. The size of the ball bearing was decreased, and the lower bearing was replaced by a thrust bearing. Negative results were obtained in tests with stainless steel and phosphor bronze wave springs. Tests with 3 wave springs of 0.003-in. beryllium copper gave satisfactory results. The over-all weight and size of the seal were slightly reduced, and the seal housing was anodized. (See also AD-14 052)

AD-25 809 Accession No.

Krautter-Weber Tool Co., Newark, N. J.
AN IMPROVED HIGH-SPEED ROTARY SEAL, by A. Razdow. Interim rept. 1 Jan 52 - 28 Feb 53. 30 Apr 53, 52p. illus.
(Contract DA 36-039-sc-5592; Continuation of Contract W36-039-sc-44520) Unclassified report

An investigation was made to improve the leakproof bonding between the carbon washer and the retainer; test fixtures were built for this purpose. Tests were run with lubricating mixtures in an effort to decrease frictional heat and wear and to increase the life of the rotary seal. The coilspring was redesigned and replaced by a flat wave spring, and tests were made to determine the proper material. An important decrease was made in the over-all size and weight of the seal. Tests made on the miniaturized developmental model showed satisfactory results. Research was continued in an effort to simplify the operation and decrease the number of parts used in the diaphragm assembly and to eliminate, if
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AD-25 809

possible, the Teflon washer. Armstrong Cement A-6 was tested with unsatisfactory results. Adhesive Permafuse WM-35 was applied with good results. The Teflon ring could be eliminated and a larger carbon washer used which is cut down on the top in order to decrease the surface of the contact with the steel washer. The time for the manufacturing of the parts and assembly was decreased. A female coupling was simplified, and its weight was decreased. The design of the lapped steel washer was simplified, and some components were eliminated. The carbon assembly gave satisfactory results, and continuous observation of the behavior of the diaphragm is being made to study possible fatigue of the diaphragm material. (See also AD-14 052)

AD-25 907 Accession No.

Rock Island Arsenal Lab., Ill.
PNEUMATIC EQUILIBRATOR PACKINGS FOR OPERATION AT SUB-ZERO, NORMAL, AND ELEVATED TEMPERATURES, by L. R. Raisbeck. Technical rept. 7 Oct 53, 15p. illus. tables (Proj. no. TRI-1031R, rept. no. 5; RIA Lab. rept. no. 53-2767) Unclassified report

Equilibrators for the 155-mm gun were tested to determine the best synthetic rubber packings and packing lubricant, as well as the best method of lubricating the packings for equilibrators which are operated at elevated, normal, and subzero temperatures. At -70°F, each configuration was gymnasticated 20,000 c. At room temperature and 160°F, the configurations received 10,000 c. The life of O-ring packings was prolonged by continuous lubrication and the use of backup washers to prevent extrusion. Oil-saturated felt lubricators provided better packing lubrication than oil without a retaining aid. Special recoil oil, Army Spec 2-132, appeared more suitable than hydraulic Spec MIL-O-5606
(over)

AD-25 907

oil. Synthetic rubber O-rings with a Shore A durometer hardness of 75 to 80 seemed best for maximum life. Oil swelling up to 9% had no apparent effect on the performance of O-ring packings.

AD-27 587 Accession No.

Electronic Components Lab., Wright Air Development Center, Wright-Patterson Air Force Base, Ohio.
SEALING OF SYNTHETIC SAPPHIRE TO GLASS, by Emil Benz. Rept. on General Investigation of Electron Tubes. Jan 54, 6p. incl. illus. (WADC Technical rept. no. 54-18) Unclassified report

A new method of sealing synthetic sapphire to glass by using an electric arc is described. The sealing method is speedier and can be used by unskilled personnel. The process can be controlled better, which results in a more uniform sealing.

AD-27 728 Accession No.

Armour Research Foundation, Chicago, Ill.
EXPERIMENTAL INVESTIGATION OF OPTIMUM INCLOSURE FOR "O" SECTION SYNTHETIC RUBBER SEAL RING, by D. E. Gerberich, D. Kurtovich and others. Rept. for July 51-Dec 52. Aug 53, 121p. incl. illus. tables (WADC Technical rept. no. 53-319)
(Contract AF 33(038)26013) Unclassified report

For static sealing against leakage of iso-octane fuel at -65°F, 9 types of inclosures were tested by using artificially aged rings to simulate conditions after extended service. The rings were exposed to (1) extreme fluid-pressure fluctuations from 0 to 2000 psi and (2) moderate fluctuations from 0 to 100 or 1200 psi. Tests on the standard rectangular type inclosure (dimensions of Spec MIL-P-5315) show that it provides less satisfactory fuel-sealing characteristics than other types. In this inclosure the O rings appear to have insufficient squeeze (radial compression). Two inclosure types were closely equal for improved specification purposes for static
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AD-27 728

seals. These are a rectangular inclosure with 24% squeeze and an inclosure with inclined bottom. The latter shows better sealing properties for the severe laboratory test condition utilizing dry aged O rings, but is unsymmetrical in shape. From consideration of the laboratory test results alone, the inclined bottom type is recommended for future specification use. For testing of seals in dynamic application, a linear reciprocating motion was applied to the O ring test fixture, with a stroke length of 1/2 in. and a cyclic rate of 10 c/min. The recommended dynamic seal arrangement for best sealing properties includes chromium-plated metallic surfaces with 0.0005-in. radial clearance, and a rectangular inclosure shape with a 24% O ring squeeze value. Poor dynamic sealing properties were exhibited in the tests by all dry or presoaked aged O rings in all other inclosures at -65°F. (Extracted from report)

AD-27 886 Accession No.

Kearfott Co., Inc., Little Falls, N. J.
TYPE II, LOW-SPEED MECHANICAL-SEALED DRIVE, by Y. C. Shen. Nov 53, 16p. incl. illus. tables (WADC Technical rept. no. 53-476)
(Contract AF 33(038)3654) Unclassified report

"In an attempt to improve the efficiency of the mechanical sealed drive developed under this contract, a redesign was instituted in which the inner ball bearing races were made integral with the cranks and the outer races made integral with the housing. Straight sleeve bearings were used in place of the tapered inner bearings. In addition, the bellows were formed hydraulically. Tests on these units, however, showed them to be unsatisfactory. As a result, a second redesign was undertaken in which the sleeve bearings were replaced with ball bearings. Extensive tests on these units indicated that although they were capable of meeting the majority of the requirements of Exhibit No. MCREE-476, they failed to meet the following: (1) over-all length, (2) weight,
(over)

AD-27 886

(3) torque load capacity, (4) no-load torque, (5) backlash. To meet the latter requirements it will be necessary to employ a more rugged construction and replace the cantilever loaded crank with a balance loaded oscillating crank arrangement." (Contractor's abstract)

AD-28 321 Accession No.

Battelle Memorial Inst., Columbus, Ohio.
B-36 INTEGRAL FUEL- AND OIL-TANK SEALANT. RESEARCH AND DEVELOPMENT PROGRAM, R. G. Heiligmann, P. B. Stickney and others. Final rept. 11 Jan 54, 66p. incl. illus. tables.
(Subcontract to Consolidated-Vultee Aircraft Corp., Contract AF 33(038)2182) Unclassified report

Work was initiated on the development of a nonpolysulfide sealant substitute for Thiokol-based sealants. A means for obtaining excellent bond strength was applied to conventional types of sealants, and a Pb-free cure which materially increased sealant pot-life was developed. However, no satisfactory sealant compound was developed from available polymeric materials other than the polysulfide rubbers. Copolymers of butadiene with methacrylic acid or acrylic acid when added to Thiokol-based sealants offered the greatest promise in low-temperature performance, while maintaining satisfactory resistance to aromatic fuels. Copolymers of butadiene
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AD-28 321

with ethyl azodicarboxylate were oily-to-waxy rather than rubbery and were not satisfactory for sealant application. Insufficient quantities of silane-polysulfide polymers were obtained because of difficulty in producing an intermediate.

AD- 28 429 Accession No.

Electrical Engineering Research Lab., U. of Illinois, Urbana.
ELECTRICAL LOSSES IN CERAMIC-TO-METAL SEALS, by E. W. Ernst and O. T. Purl. Feb 54, 43p. incl. illus. tables (Technical rept. no. 2)
(Contract AF 19(604)524) Unclassified report

An investigation of the HF electrical losses in ceramic-to-metal seals was devoted to the problem of determining the loss of a base metal covered with a very thin coating of a material of unknown electrical properties. The property measured was the effective resistance of the interface for Mo-Mn, Ti hydride, and compression seals. The measurements were made in cylindrical cavities because of the advantageous seal geometry. The system designed to measure the interface loss is essentially an admittance bridge arrangement, and the RF test signal is supplied by a 2K25 klystron oscillator which is frequency modulated about the resonant frequency of the cavities. Details of the calibration of the (over)

AD- 28 429

bridge are discussed, and the details of the calculation of surface resistivity are appended.

AD-28 761 Accession No.

Aeronautical Materials Lab., Naval Air Experimental Station, Philadelphia, Pa.
INVESTIGATION OF USE OF ROGERS CORP. GASKETS IN FUEL SYSTEMS, by A. Dubrow. 5 Feb 54, 8p. illus. table (Rept. no. AML NAM AE 6237.1)
Unclassified report

AD-28 862 Accession No.

Picatinny Arsenal, Dover, N. J.
DEVELOPMENT OF AN IMPROVED LUTING COMPOUND FOR USE IN REUSABLE METAL CONTAINERS, by R. H. Evans and C. C. Banta. Mar 54 [26]p. incl. illus. tables (Proj. no. CX-11, item H; Technical rept. no. 1970) Unclassified report

The luting compound specified under Spec MIL-C-20551 was found unsatisfactory for general use. Forty-three compounds were evaluated for conformance to the requirements of a proposed improved luting compound. Three compounds met all these requirements, compound 1511 submitted by the Permatex Corp. and compounds 11849AZ and 11849BA submitted by the Flintkote Co. In the evaluation the samples were troweled into simulated copper glands and subjected to storage and cover removal tests from -65° to +160°F. Based on the satisfactory performance characteristics and chemical and physical tests a purchase description (PA-PD-398) was prepared.

AD-29 114 Accession No.

North American Aviation, Inc., Downey, Calif.
TEST OF NEOPRENE "W" HIGH-TEMPERATURE HYDRAULIC SEALS, by C. E. Hamlin. 1 Mar 54, 22p. incl. illus. (Rept. no. EM-612)
(Contract W33-038-ac-14191) Unclassified report

"Neoprene 'W' O-rings, in combination with various backup rings, were tested in a balanced actuator at 3000 psi in conjunction with an orthosilicate ester hydraulic fluid. The actuator piston was mechanically reciprocated at 2 cps, and tests were made at temperatures from 300 to 550 F for a maximum of 100,000 cycles. The neoprene 'W' O-rings, backed up by either 5R16 teflon rings or glass-loaded teflon rings were unsatisfactory at temperatures of 350 F or above, because of failure of the teflon. A split spiral aluminum bronze backup ring was developed and fabricated at North American Aviation, Inc. Neoprene 'W' O-rings backed up by these aluminum bronze rings are satisfactory for extended duty at temperatures up to 400 F, and for limited duty to 550 F." (Contractor's abstract)

AD-29 801 Accession No.

Material Lab., New York Naval Shipyard, Brooklyn.
INVESTIGATION OF THE APPLICABILITY OF THE SEALING PRESSURE TEST APPARATUS TO THE LOW TEMPERATURE EVALUATION OF NATURAL AND SYNTHETIC ELASTOMERS, by J. Z. Lichtman. Final technical rept. 1 Oct 53, 8p. illus. tables (Rept. no. 4855-11) Unclassified report

The test apparatus, which was investigated for use in evaluating the low-temperature properties of elastomeric gasket materials, was found to be unsatisfactory for determinations of either sealing pressure or follow-up upon decreasing the specimen indentation. The samples used consisted of 1 standard and 1 cold-resisting elastomer compound each of Neoprene, Buna-S, Perbunan-26, Hevea, Butyl, and Thiokol-FA; the samples were in slab form (12 x 12 x 0.5 in.). Sealing-pressure determinations were made by utilizing a source of high-pressure air which could be regulated and measured up to 500 psi. Long-time and short-time conditioning tests were conducted with 3 specimens of each elastomer.

AD-29 951 Accession No.

Material Lab., New York Naval Shipyard, Brooklyn.
INVESTIGATION OF THE APPLICABILITY OF THE SEALING PRESSURE TEST APPARATUS TO THE LOW TEMPERATURE EVALUATION OF NATURAL AND SYNTHETIC ELASTOMERS, by J. Z. Lichtman. Final technical rept. 1 Oct 53 [32]p. incl. illus. tables. (Rept. no. 4855-11) Unclassified report

(Not abstracted. See AD-29 801)

AD-30 136 Accession No.

Electronics Research, Inc., Evansville, Ind.
A SERIES OF HERMETICALLY SEALED FLUSH MOUNTED ECM ANTENNAS. Final engineering rept. Feb 54, 36p. incl. illus. (Rept. no. GAF-30/1) (Contract AF 33(600)6715) Unclassified report

Twelve flush-mounted ECM antennas covering the 200- to 11,000-mc range are described. An annular slot was utilized with 6 antennas to span the transmitting range of 200 to 3100 mc with a VSWR of 2.5:1 or less. A similar annular slot configuration was utilized with 6 receiving antennas to span the 270- to 11,000-mc range with a VSWR of 5:1 or less. The antennas which were designed for mounting in B-36 type aircraft were curved to a 75-in. radius and were of light-weight construction. A foam potting process was developed for hermetically sealing the larger cavities. The loss of the hermetic seal does not make the antenna inoperative. The hermetically sealed antennas were tested to a differential pressure equivalent to 50,000 ft.

AD-30 373 Accession No.

Rock Island Arsenal Lab., Ill.
PACKINGS AND CYLINDERS FOR HYDRO-PNEUMATIC RECOIL MECHANISMS, by C. E. Evans and C. Olsen. Technical rept. 5 May 54, 10p. illus. tables. (Proj. no. TR1-1031; RIA Lab. rept. no. 54-1649) Unclassified report

(Not abstracted)

AD-30 417 Accession No.

Power Plant Lab., Wright Air Development Center, Wright-Patterson Air Force Base, Ohio.
PRESSURIZED FLEXIBLE SELF-SEALING FUEL CELL DEVELOPMENT, by J. Weil. 1 Mar 54, 88p. incl. illus. tables (Technical note no. WCLP-54-40) Unclassified report

Includes AD-30 417(a).

An investigation was made to obtain self-sealing fuel cell installations operational at internal pressures as high as 7.5 psig and utilizing flexible cell constructions. Acceptance gunfire tests at a pressure of 2.5 psig indicated that the installation under development provided somewhat lesser protection against 50-cal AP ammunition than the conventional unpressurized system. No satisfactory protection was afforded under subjection to 20-mm AP projectiles. Support afforded the fuel cell by the backing board was of prime importance in obtaining a satisfactory installation. Acceptance gunfire tests (over)

AD-30 417

at a pressure of 5 psig were unsatisfactory. Results indicated that it will be extremely difficult to obtain a practical installation incorporating flexible fuel cells operational at pressures in excess of 2.5 psig.

AD-33 308 Accession No.

Detroit Arsenal, Center Line, Mich.
OIL SEALS, by Alex M. Casalnca. 7 Apr 54, 4p. illus. (Rept. no. 2889) Unclassified report

(Not abstracted)

AD-33 887 Accession No.

Instrumentation Lab., Mass. Inst. of Tech., Cambridge.
A STUDY OF SEAL FRICTION IN HYDRAULIC SERVOMECHANISMS, by M. S. Feldman and E. G. Wrieden. Master's thesis. May 54, 78p. incl. illus. tables, 21 refs. (Rept. no. T-62)
(Contract AF 33(616)2039) Unclassified report

The frictional characteristics of piston and rod seals used as hydraulic actuators were studied separately. The static and kinetic friction force levels were investigated as well as the effect of various seals on the dynamic characteristics of the servo. Seals of rubber, cast iron, and Teflon were tested. The 2-element Teflon piston rings exhibited the lowest static and kinetic frictional levels. The break-free force for the wide Teflon rings was approximately 1/2 that for the narrow Teflon rings. The narrow Teflon rings exhibited the lowest static and kinetic frictional levels for the rod seals tested. All of the rod seals affected the dynamic
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AD-33 887

response of the servo to approximately the same degree; but it was noted that a high level of static friction will strongly affect the angle resolving qualities of the servo. Consequently, the narrow Teflon rod seals gave the best results from a purely frictional standpoint. However, care must be taken in designing a servo using these seals since they may cause instability.

AD-34 171 Accession No.

Krautter-Weber Tool Co., Newark, N. J.
AN IMPROVED ROTARY, HIGH-SPEED SEAL. Final rept. 1 Jan 52-15 Dec 53. 23 Dec 53, 41p. illus.
(Contract DA 36-039-sc-5592) Unclassified report

Investigations were conducted to improve the leak-proof bond between the C washer and retainer. Tests were run with lubricating mixtures in order to obtain a decrease in wear and frictional heat, and to increase the life of the seal; improvement was attained in the lubrication in the ball bearings and on the sealing contacts. The Al nut, steel washer, Teflon ring, and 1 spanner ring were eliminated in a redesign of the lapped-steel washer. The lower ball bearing was replaced by a thrust bearing in order to cushion the thrust of the seal springs against the bearings. The coil spring was replaced by a flat wave spring formed of beryllium copper. The surface of the Al housing was anodized for adequate protection, the upper spring holder was eliminated, and the lower spring holder was simplified. The female coupling was simplified, and its weight was reduced. Tests were
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AD-34 171

run on wave springs made of steel and phosphor bronze. A unit of 3 wave springs was finally adopted. (See also AD-25 808, AD-25 809)

AD-34 750 Accession No.

Detroit Arsenal, Center Line, Mich.
TIRE VALVE CORE TEFLON BARREL GASKET PERFORMANCE TEST, by C. F. Dandareau, Jr. Final technical rept. 25 May 54, 7p. incl. illus. (Rept. no. 2944) Unclassified report

AD-35 302 Accession No.

General Electric Co., Owensboro, Ky.
THE DEVELOPMENT OF NEW SEALING TECHNIQUES FOR MINIATURE TUBES, by C. E. Horton. Quarterly interim technical rept. no. 4 for period ending 31 Aug 52. Dec 53, 57p. incl. illus. tables.
(Contract NObsr-52534) Unclassified report

"Effort was concentrated on the metal ring phase of the project during this quarter in order to bring this technique to the same state of development as the solder frit method. Two ring designs, two sealing alloys, and a number of ring glazes have been evaluated by the process of sealing 950 type 6CB6 tubes. Mechanical and electrical tests, including life tests, have been made on these tubes. Equipment for automatically sealing tubes in quantity is nearly complete. Work continues at a reduced pace on the solder frit method. New frits were tried, and a die for an improved stem design was produced." (Contractor's abstract) (See also AD-4139)

AD-36 319 Accession No.

Armour Research Foundation, Chicago, Ill.
BONDING MATERIALS, METALLIC MATING SURFACES; LOW RF IMPEDANCE, by V. Pulsifer. Summary rept. 10 May 51 - 10 May 53. Jan 54, 57p. incl. illus. tables.
(Contract AF 33(038)23583) Unclassified report

An attempt was made to develop a gasket material for containers housing RF emitting apparatus which will prevent RF energy from escaping at joints in closed containers and also form a gas-tight joint. An excellent gasket material was made by molding, spraying, and dipping card cloth in rubber and cutting away the canvas and excess wire and rubber. Tests showed that: (1) gasket materials used for RF shielding and sealing must have unconnected paths to conduct the current across a joint; (2) paths must be evenly spaced over the surface of the gasket material so as to make contact with the gasket surfaces when pressure is applied; (3) conductors used in gaskets must be relatively stable chemically (over)

AD-36 319

and have good electrical conductance; (4) conductors perform best if they are made in a hard temper to break through the surface of the flanges; (5) the number of conducting paths per square inch is important in controlling local contact pressures; (6) there is an optimum number of conductors per square inch for every combination of gasket design and conducting material; and (7) the mechanical properties of the metal elements and the sealing agent must be such that after sufficient clamping pressure has been applied to establish electrical conducting paths, the remainder shall be sufficient to provide sealing pressure. A preformed gasket design was developed which reduced the impedance at 2.6 mc to 6×10^{-7} ohm at 50-psi clamping pressure and standard testing conditions. A gasket cement was developed which reduced the impedance to the order of 6×10^{-9} ohm under the same conditions.

AD-36 428 Accession No.

Material Labs., Puget Sound Naval Shipyard, Bremerton, Wash.
INSTALLATION OF SYNTHETIC RUBBER DECK CAULKING COMPOUND ABOARD THE USS YORKTOWN (CVA-10) by W. B. Lew and J. N. Wessel. 9 Feb 53 [8]p. incl. illus. table (Technical rept. no. R-314-53) Unclassified report

AD-36 452 Accession No.

Naval Gun Factory, Washington, D. C.
SPRAYTIGHTNESS TEST OF REDESIGNED FIRING CIRCUIT TERMINAL BOX FOR ROCKET LAUNCHER MK 108 MODS, by E. L. Dickerson, Jr. and Paul D. Huffman. 24 Feb 54, 3p. (Technical rept. no. NGF-T-5-54; NAVORD no. 9902) Unclassified report

The redesigned terminal box was subjected to a 30-min spray test which simulated conditions encountered during spraying of the guide. Disassembly of the box after testing revealed about 1/2 pint of water; this presence of water was attributed to the leakage around the asbestos gasket which is used as a sealing surface between the cover and the box. Recommendations were made that (1) the cover be redesigned to form a more rigid member and (2) either a new type gasket of a softer material be provided or the present gasket be softened.

AD-36 456 Accession No.

Naval Gun Factory, Washington, D. C.
TEST OF HIGH PRESSURE HYDRAULIC PACKINGS FOR HYDROPNEUMATIC COUNTER-RECOIL SYSTEMS OF GUN MOUNTS, by W. J. Tocha and E. L. Dickerson. 27 Apr 54, 11p. illus. (Technical rept. no. NGF-T-4-54; NAVORD rept. no. 9901) Unclassified report

High-pressure hydraulic packings were tested with a 5-in/38 hydropneumatic counterrecoil cylinder Mk 1 Mod 4 in order to establish working values and friction requirements to be used in revising ordnance specifications (OS 749). A 5000-cycle leakage-endurance test, a friction-evaluation test, and a physical-properties test were conducted. Recommendations are discussed.

AD-36 564 Accession No.

Rock Island Arsenal, Ill.
PACKINGS FOR RECOIL MECHANISMS TESTS NO. 37, 37A, 37B, by Clement Olsen and Joe L. Coppersmith. Technical rept. 8 June 54, 29p. incl. illus. tables (Proj. no. TR1-1031; Rept. no. 54-2041) Unclassified report

Three 105-mm howitzer recoil mechanisms were tested to evaluate Teflon for packings and aluminum alloy cup rings for replacing leather and silver. One mechanism was subjected to 10,085 c on a shop gymnasticator, 200 c in cold room and 594 c on the powder-type testing machine. The other mechanisms were tested by firing 19,981 rounds of ammunition in one and 25,129 rounds in the other. Teflon with aluminum ring replacements showed a greater life cycle to recoil mechanisms. Teflon packing with aluminum rings was recommended to replace leather packings with silver rings on all rebuilt and new recoil mechanisms. The replacement of the non-oil-resistant rubber RIA formula S2F by RIA formula no. 441 and of the oil index rubber packing by a Teflon shroud and rubber packing was also recommended.

AD-37 093 Accession No.

Rubber Lab., Mare Island Naval Shipyard, Vallejo, Calif.
EFFECT OF EXPOSURE TO WEATHER AT POINT BARROW, PUGET SOUND, AND MARE ISLAND ON HARDNESS AND COLD COMPRESSION SET OF GR-S, NATURAL RUBBER, AND NEOPRENE VULCANIZATES, by A. E. Barrett. Technical rept. 31 July 53, 17p. illus. tables (Rept. no. 69-40)Unclassified report

(Not abstracted)

AD-37 096 Accession No.

Rubber Lab., Mare Island Naval Shipyard, Vallejo, Calif.
DEVELOPMENT OF A HYCAR 1014 STOCK FOR COLD-RESISTANT OIL-RESISTANT GASKETS, by J. Oser. Technical rept. 18 Sep 52, 8p. illus. tables. (Rept. no. 7-20) Unclassified report

"A cold-resistant oil-resistant Hycar 1014 stock, designated by the code number E-9-518, was developed by the Rubber Laboratory. This stock met the requirements of specification MIL-R-900A for hardness and compression set at -35°F; all the requirements of specification MIL-G-2765 except that pertaining to ultimate elongation; and the requirement, agreed upon by the Bureau, of a minimum tensile strength of 1000 psi and a minimum ultimate elongation of 300%. A trial run of mixing, extruding and curing of this stock was conducted in the factory of the Rubbercraft Corporation, Torrance, California. This trial proved the suitability of the stock for industrial production." (RL abstract)

AD-37 100 Accession No.

Rubber Lab., Mare Island Naval Shipyard, Vallejo, Calif.
TEST FOR EVALUATING THE TENDENCY OF SYNTHETIC RUBBER GASKET MATERIALS TO LOSE PLASTICIZERS BY VOLATILIZATION, by J. Oser. Technical rept. 31 Aug 53 [26]p. incl. illus. tables. (Rept. no. 167-3) Unclassified report

A volatilization apparatus for determining the evaporation of plasticizers from gasket materials consisted of a 6-ft-long, 1-in.-diam steel air duct in which the specimens were exposed to a warm air current. Air velocity and temperature in the apparatus, as well as the size, thickness, and number of specimens which were exposed simultaneously in the apparatus, were found to affect the rate of plasticizer evaporation. Reproducible heat-loss determinations (to about 1 mg per specimen) were obtained with the apparatus when these factors were controlled. A fair correlation was shown between the plasticizer loss from GR-S gasket stocks during 60 days of (over)

AD-37 100

weather aging and the plasticizer loss during exposure in the apparatus at 260°F for 30 min for for 3 hours. On the basis of these results, a test for evaluating the tendency of vulcanizates to lose plasticizers by volatilization is recommended for inclusion in Spec MIL-R-900A for medium-soft synthetic-rubber gaskets.

AD-37 218 Accession No.
(Unannounced report)

National Advisory Committee for Aeronautics, Washington, D.C.
COMPATIBILITY OF PENTABORANE WITH MATERIALS USED FOR SEALS, GASKETS, AND CONSTRUCTION, by Samuel Kaye and Frank V. Sordyl. 19 July 54, 16p. incl. illus. tables (Research memo. RM E54E12) Confidential report

"The compatibility of pentaborane with 24S-T and 17S-T aluminum, aluminum foil, and 50-50 tin-lead solder was tested in the temperature range -30° to -50° F, at 90° F, and at 70° F. The compatibility with Buna, butyl, GR-S, neoprene, silicone, Thiokol, and natural rubbers, and also asbestos paper, graphite asbestos, Vellumoid, and graphite gasket materials was tested. The metals, Teflon, and Kel-F were not attacked under these conditions. The gasket materials also appeared satisfactory, but pentaborane extracted some binder material from graphite packing; the rubbers deteriorated." (NACA abstract)

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Classification UNCLASSIFIED
Changed
Authority: NASA. DTD- 29 Sept 59
BY M. Stephens 1/8/60
NAME OF INDIVIDUAL MAKING CHANGE DATE

AD-37 705 Accession No.

Forest Products Lab., Madison, Wis.
PACKAGING REQUIREMENTS FOR BEARINGS. PART 6. THE PERFORMANCE OF THREE TYPES OF SEALS FOR VARIOUS INTIMATE WRAPS WITH MIL-G-3278 GREASES (SERIES E) by M. A. Taras. Mar 54, 26p. incl. illus. tables (WADC Technical rept. no. 53-38, pt. 6)
(Contract AF 18(600)103) Unclassified report

"A study of the performance of three methods of closing various intimate wraps containing ferrous bearing parts coated with grease complying with Specification MIL-G-3278 was conducted by the Forest Products Laboratory. The three methods for closing the intimate wraps included the drugstore fold, heat sealing, and the use of an aluminum band. All specimens were enclosed in water-vaporproof pouches complying with Specification MIL-B-131A and were exposed to a 3-week cycle of temperatures ranging from -65° to 160°F. Following the cyclic exposure, the specimens were stored for 60 (over)

AD-37 705

days at 160°F. and 92 percent relative humidity. Results indicate that the effectiveness of the three sealing methods investigated is largely dependent upon the compatibility of the intimate wraps and the greases used. When both greases are considered, the three sealing methods appear to be equally effective. Corrosion when present, however, was more severe in packages using the drugstore fold method. In general, the greases used hardened upon exposure. Nylon, however, was the only intimate wrap that prevented any of the greases from hardening. No reason for this reaction was apparent. The data also indicate that one of the greases was less deleterious to the vinyl coating of the pouch material used in this test than the other." (Contractor's abstract) (See also AD-27 685, AD-27 931)

AD-38 529 Accession No.

Industrial Lab., Mare Island Naval Shipyard, Vallejo, Calif.
DEVELOPMENT OF SPECIFICATION FOR LOW TEMPERATURE OIL-RESISTANT SYNTHETIC RUBBER GASKET MATERIAL. EVALUATION OF PIONEER RUBBER STOCK NO. 44/5627. MATERIAL EXHIBITED BY PIONEER RUBBER MILLS, SAN FRANCISCO, CALIFORNIA, by Y. D. Izu. 12 Mar 53 [23]p. incl. illus. tables (Rept. no. 5421-52)
Unclassified report

AD-41 362 Accession No.

Bjorksten Research Labs., Inc., Madison, Wis.
DETERMINATION OF LEAKAGE VALUES OF SEALS, by Earl A. Meyer, Robert J. Roth and others. Nov 53, 151p. incl. illus. tables (WADC technical rept. no. 54-16)
(Contract AF 33(038)15981) Unclassified report

"The rate of air leakage through various seals in aluminum, brass, and steel specimens was determined quantitatively with one side of the seal evacuated and the other side at one atmosphere. Fusion, adhesive, gasket and lapped type seals on 449 specimens were tested. Leakage rate measurements were made in both directions through the seals before and after various environmental tests of pressure, humidity, vibration and temperature cycling. The various types of seals were evaluated on the basis of their leakage both before and after specified environmental exposures. For these measurements two leakage-rate meters were designed and constructed to evaluate leakage rates of 1 to 3,000,000 standard cc. of air/year. Both meters are (over)

AD-41 362

fully described and drawings for their construction are included. An RCA-1945 Hydrogen Sensitive Ion Gauge was used to measure the smaller leakage rates; and the rate of movement of a water plug in a calibrated capillary was used for the larger leaks. The non-destructive testing of electronic components on the production line prior to a simple sealing procedure is described and a number of components supplied by WADC were tested." (Contractor's abstract)

AD-41 652 Accession No.

Naval Gun Factory, Washington, D. C.
SPRAYTIGHTNESS TEST OF FIRING CIRCUIT TERMINAL BOX FOR ROCKET LAUNCHER MK 108 MODS. 13 Sep 54, 4p. illus. (Technical rept. no. NGF-T-67-54; NAVORD rept. no. 4800)
Unclassified report

A comparison was made between the relative sealing properties of 2 gasket materials, Silastic 80 and Silastic 675, when used on the original and the redesigned firing circuit terminal boxes for the Mk 108 rocket launcher. A series of spraytightness tests were performed on 2 boxes containing 12 and 8 hold down bolts, respectively. Both of the materials formed an effective seal against water leakage. The Silastic 675 gasket was used in spraytightness tests on a redesigned firing box with 8 bolts; no leakage of water was evident. After exposure to 400°F, submersion and spraytightness tests were also conducted on the gaskets. As a result of the tests, the recommendation was made that the
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AD-41 652

original firing circuit terminal box and new gasket material, Silastic 675, be used on the Mk 108 rocket launcher.

AD-41 961 Accession No.
(Unannounced report)

Naval Engineering Experiment Station, Annapolis, Md.
VALVE-STEM PACKINGS FOR HIGH PRESSURE AND HIGH TEMPERATURE STEAM SERVICE, by R. F. Stone. 3 Aug 53, 1p. (EES rept. no. 010126)
Unclassified report

AD-42 033 Accession No.

Wichita U. School of Engineering, Kans.
TESTS OF A LABYRINTH-SEAL MOCKUP, by Richard E. Wallace and Paul Morris. July 54, 22p. incl. illus. (Engineering rept. no. 151)
(Contract AF 33(616)2330) Unclassified report

The labyrinth-seal mock-up was made of wood with the labyrinth elements cut from 1/8-in.-thick bending plywood. One side of the seal was made variable so that the overlap could be decreased from 2.25 in. to 0.75 in. in 3/8-in. increments corresponding to the element gap. The number of elements was varied by removing downstream plywood elements, which were made tight slip fits to the side-piece slots. Figures are presented of the weight-flow variation as a function of the overlap-to-gap ratio with various numbers of elements and for gage pressures from 2 to 11 in. of mercury. The curves are all similar and indicate that an overlap-to-gap ratio of 4 provides the optimum operating condition for the seal. Experiments revealed
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AD-42 033

that the weight flow and power consumed in the seal will permit satisfactory operation of the unit to critical pressure ratios. The mock-up experiments only qualitatively indicate the basis of a prototype labyrinth seal. (See also AD-16 162)

AD-42 477 Accession No.

Massachusetts Inst. of Tech., Div. of Industrial Cooperation, Cambridge.
ANALYSIS OF THE ROTARY REGENERATOR FOR GAS-TURBINE-CYCLE APPLICATIONS; AND AN ANALYSIS AND INVESTIGATION OF ROTARY REGENERATOR SEAL LEAKAGE, by D. B. Harper. Aug 54, 43p. illus. 66 refs (Technical rept. no. 5) (Contract N5ori-7862) Unclassified report

An analysis is presented of the effect of the rotary regenerator on the gas-turbine cycle, and results are reported of an experimental investigation of seal leakage flow. The analysis shows that even though a definite small leakage between high- and low-pressure sides must exist, this condition will not detract from the size advantages of this heat-exchanger type. A rotary regenerator was sized for a specific gas turbine-plant requirement, and the effect of choice of pressure drop and leakage rate are shown by design-point curves. The best over-all rotary regenerator arrangement has a

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AD-42 477

rotor containing the matrix and a system of rotating compartmented ducts leading out to small seal shoes. The seal shoes can be pressure-balanced by a diaphragm or piston which can be pressurized by a port in the seal shoe. The location of the port along the pressure gradient depends on the seal and piston areas. The loading force should be just sufficient to keep the seal in close contact with the rotor compartments without causing excessive friction.

AD-42 776 Accession No.

Detroit U., Mich.
STRESS RELAXATION OF GASKET MATERIALS AND EVALUATION OF A TEST FIXTURE, by L. S. Kowalczyk. 1954, 117p. illus. 48 refs. (Contract DA 20-089-ORD-36608) Unclassified report

A literature survey was made of methods for measuring the stress relaxation of gasket materials. Stress-relaxation values were obtained and plotted for 22 commerical gasket materials using the Farnam-Cole relaxometer, type RT, model D. All the materials gave smooth stress-relaxation curves, with the rates of stress relaxation appearing very large at the beginning of the test. The conditioning of the gasket material generally affected the curves. Study was made of the influence of the following factors on stress relaxation: temperature, major load, sample thickness, time of relaxation, time of first reading after compression, machine operator, and reloading and locking up of the sample in the capsule. The Farnam-Cole relaxometer

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AD-42 776

yielded reproducible results, was applicable to all nonmetallic gasket materials, and was recommended for stress-relaxation tests of gasket materials. A recommended procedure for laboratory relaxation tests is presented.

AD-43 419 Accession No.
(Unannounced report)

Material Lab., New York Naval Shipyard, Brooklyn.
TYPE APPROVAL EVALUATION OF SYNTHETIC RUBBER GASKET MATERIAL MANUFACTURED BY THE GARLOCK PACKING COMPANY, PALMYRA, NEW YORK. Final technical rept. 27 Mar 53 [5]p. incl. table (Rept. no. 4598-241) Unclassified report

AD-43 502 Accession No.
(Unannounced report)

Material Lab., New York Naval Shipyard, Brooklyn.
EVALUATION OF GASKET MATERIAL, STOCK NO. E-9-480 DEVELOPED BY THE RUBBER LABORATORY, MARE ISLAND NAVAL SHIPYARD, VALLEJO, CALIFORNIA. Final technical rept. 8 Apr 53 [6]p. incl. tables (Lab. proj. no. 5451) Unclassified report

AD-52 775 Accession No.
(Unannounced report)

Frankford Arsenal, Philadelphia, Pa.
SEALANT FOR THE INITIATOR T8, SEAR ASSEMBLY, by R. Garstka, Technical rept. 12 July 54, 3p. (Proj. no. TS1-15-C11; Rept. No. S-4082)
Unclassified report

AD-54 206 Accession No.

Kearfott Co., Inc., Little Falls, N. J.
A HERMETICALLY SEALED METAL-TO-METAL MECHANICAL DRIVE, by Y. C. Shen. Sep 53, 16p. incl. illus. (WADC Technical rept. no. 53-391)
(Contract AF 33(038)23311) Unclassified report

AD-55 132 Accession No.

Fairchild Camera and Instrument Corp., Hicksville, N. Y.
HIGH TEMPERATURE, NOBLE METAL FILM TYPE, SEALED VARIABLE RESISTORS, by Lawrence B. Krauss. Quarterly progress rept. 1 Aug - 1 Nov 54. 18p. incl. tables (Rept. no. 8623-1)
(Contract DA 36-039-sc-64500; [Continuation of Contract DA 36-039-sc-5568]) Unclassified report

"The mechanical design of the variable resistor, (Experimental type), was modified to include a hermetic shaft seal of proprietary design. A simulated hermetically sealed panel was devised and tested to be used for the testing phase of the contract in determining the characteristics of hermetically sealed variable resistors. The mechanical parts and materials were ordered and received with the exception of some parts whose deliveries were delayed due to manufacturing difficulties. However, sufficient testing was accomplished to verify the success of the hermetic shaft seal adaptation to the resistor. A resistance control film masking material
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AD-55 132

was selected to solve the problem of removing evaporated resistance control film material from areas of the substrate where it was undesirable, such as between the contact bars at the ends of the control film. The resistance element materials were ordered and received. Test runs were made of the required resistance values. Twenty-six of the forty-five resistance elements were made. All of the test equipment and fixtures of Schedule A of the contact were ordered, received and tested." (Contractor's abstract) (See also AD-23 075)

AD-55 695 Accession No.

Thiokol Chemical Corp., Trenton, N. J.
FUEL CELL SEALANT COMPOUNDS, by Earl H. Sorg, John P. Bowen and others. Rept. on Compounding of Elastomers. Oct 54, 109p. incl. illus. tables (WADC Technical rept. no. 54-10)
(Contract AF 33(038)30523) Unclassified report

"This work was undertaken by the Thiokol Chemical Corporation to develop integral fuel tank sealant compounds with improved properties. The hexamethylene terpolymer sealant compound, prepared and submitted to Wright Field at the end of the first year's work on this contract showed better heat resistance coupled with greatly improved low temperature properties than a comparable IP-2 compound. The 0.5 mole % of TCP and 2 mole % of TCF cross-linked pentamethylene formal copolymers showed better heat and aromatic fuel resistance than the 2 mole % of TCP cross-linked copolymer previously submitted. Compounding studies showed that IP-32 should be more suitable than IP-2 compounds
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AD-55 695

since lower moduli and higher ultimate elongation before and after heat aging and after immersion in aromatic fuel were attained. Five two-package mix experimental translucent sealant compounds prepared from the liquid polysulfide/epoxy resin system and submitted to Wright Field were tough and resistant to jet fuel but did not pass all of the Air Force specifications. However, the compounds displayed promising potentialities. The IP-2 base experimental translucent sealant compound submitted to Wright Field for evaluation showed good potentialities as an improved sealant and was more transparent during and after application and cure than an IP-2 base commercial sealant compound." (Contractor's abstract)

AD- 56 036 Accession No.

New York U., Coll. of Engineering, N. Y.
SEALING TECHNIQUES FOR WAVEGUIDE AND COAXIAL ROTARY JOINTS, by Michael B. Maccarone. Quarterly progress rept. no. 1, 1 Aug - 30 Nov 54. 28p. illus.
(Contract DA 36-039-sc-64476) Unclassified report

"A general approach to the development investigation will be along the following lines. The design of the magnetic seal basically will consist of a chamber containing a magnetic slurry in the presence of a magnetic field. The design of the magnetic chamber and the type of magnetic slurry that will be used will be determined empirically through experimental tests that will be conducted in the initial part of the investigation. Once the various parameters can be established and individualized as extensively as is needed a basic magnetic seal design will have been determined. This seal will necessarily have physical and mechanical problems which will have to be eliminated. The refinement of the basic ex-
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AD- 56 036

perimental seal will establish the necessary design information which can later be applied in a practical method to the design of magnetically sealed rotary joints for the R. G. 48/U and R. G. 51/U waveguides." (Contractor's abstract) (See also AD-25 809)

AD- 56 708 Accession No.

Naval Engineering Experiment Station, Annapolis, Md.
EFFECT OF LUBRICATING OIL ON ELECTRICAL RESISTANCE OF GASKETED JOINTS, by F. C. Sernatinger, Jr. Research and development rept. 21 Feb 55, 3p. incl. tables (EES rept. no. 070233) Unclassified report

"A series of test runs was made to determine the effect of various types of lubricating oils in lowering the electrical resistance between gasket-insulated simulated sections of diesel engine crankcases used in mine sweepers. It was concluded that the use of new, used, or contaminated lubricating oils should have no serious effect on the electrical resistance between the sections." (NEES abstract)

AD- 58 142 Accession No.

Power Plant Lab., Wright Air Development Center, Wright-Patterson Air Force Base, Ohio.
FINAL QUALIFICATION TESTS CONDUCTED ON UNITED STATES RUBBER CO. SELF-SEALING OIL CELLS CONSTRUCTION US 221-1 FOR THE C-119F AIRPLANE, by J. Weil. 11 Jan 54, 19p. incl. illus. (Technical note no. WCLP-54-1) Unclassified report

Minimum processing - no abstract

AD- 58 978 Accession No.

Royal Aircraft Establishment (Gt. Brit.).
AN EXPERIMENTAL APPARATUS FOR THE MEASUREMENT OF AIR LEAKAGE RATES OVER A WIDE TEMPERATURE RANGE, by M. R. Mead. Nov 54, 7p. illus (Technical note no. RAD 585; [CRB ref. no. 55/110; Encl. 10 to Air Attache, London, rept. no. IR-288-55]) Unclassified report

Minimum processing - no abstract

AD- 59 125 Accession No.

National Gas Turbine Establishment (Gt. Brit.).
THE REGENERATIVE HEAT EXCHANGER FOR GAS TURBINE POWER PLANT. PART VI. MECHANICAL AND SEALING TESTS ON A DISC TYPE ROTARY REGENERATOR, by M. Cox and R. K. P. Stevens. June 54, 18p. illus. (Rept. no. R-159) UNCLASSIFIED report

Minimum processing - no abstract

CLASSIFICATION
CHANGED TO UNCLASSIFIED
AUTH. CITED IN ASTIA R/B # 63A
DATED 1 October 60
Ken Buck 30 AUG 1961
(Signature & Date)

AD-48 377 Accession No.

Syracuse U. Research Inst., N. Y.
DEVELOPMENT OF ROTARY AND TRANSLATORY SEALS. Final rept. 1 July 52 - 31 Aug 54. 89p. incl. illus.
(Contract DA 30-115-ORD-363, Proj. TR5-5059T)
Unclassified report

Injection, mechanical, and stuffing-box seals for aircraft fire-control mechanisms and similar apparatus were studied. The leakage rates of all seals were reduced to very low values, in the neighborhood of 0.1 cu in./year (psi). A modified injection seal (I-30) which uses a felt packing impregnated with lubricating oil had the longest seal life, 3000 hr. The mechanism of leakage was shown to be similar to the viscous flow of gases through a capillary tube. The leakage rate or the volume (at 75°F and 1 atm)/unit time with nitrogen gas was directly proportional to the pressure drop across the seal. A rubber-base, oil-blended compound (FRL-3) was used to obtain the best design of straight
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injection seal and to establish a viscosity-extrusion criterion for seals. The mechanical and stuffing-box seals generally do not give satisfactory reproducible leakage rates.

Uniterms (cont'd)

Supporting
Gas
Flow
Vacuum
Data
Viscosity
Felt
Labyrinth
Knudsens-T-Factor
Fire
Control
Systems

AD-48 399 Accession No.

Rock Island Arsenal Lab., Ill.
OBSERVATION OF OIL LEAKS OCCURRING IN RECOIL MECHANISMS IN STORAGE, by Harry W. Brennan. Technical rept. 9 Nov 54, 13p. incl. illus. tables (Proj. no. TB5-5010B, rept. no. 1; RIA Lab. rept. no. 54-3813) Unclassified report

An inspection was made of the 105-mm howitzer recoil mechanisms stored at Rock Island Arsenal to determine the oil leakage at purge plugs, stuffing boxes, and oil heads. Results indicated that the volume of oil lost is slight and not serious in nature. Leakage rate varied from zero to approximately one reserve (4 oz)/yr.

AD-48 807 Accession No.

Naval Gun Factory, Washington, D. C.
EVALUATION OF OPTICAL SEALS AND OPTICAL SEALING METHODS. CONVENTIONAL TYPE STATIC SEALS (Unclassified title). 18 Oct 54, 7p. illus. (Technical rept. no. NGF-T-71-54; NAVORD rept. no. 4814) Unclassified report

An evaluation was made of 13 static seals and sealing methods for use in optical equipment. Six experimental test fixtures were made in 3 sizes with one each of brass and aluminum. The seals used in these fixtures were O-ring gaskets, flat gaskets of buna N rubber, flat gaskets of neoprene rubber, flat gaskets of silicone rubber, triangular molded gaskets of Hycar rubber, triangular molded gaskets of silicone rubber, triangular molded gaskets of neoprene rubber, and lead and wax. The sealing situations were subjected to a fire hose spray test, a 24-hr test at -20°F, a 24-hr test at 165°F, a 72-hr weathering test, a 150 ft-lb shock test, and a vibration test. Results indicated that the most
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AD-48 807

effective seals were the molded triangular gasket type and the O-ring type. Only one failure was attributed directly to the seal. This seal was made of 70 durometer hardness silicone rubber in flat gasket form. The 3 remaining failures were due to the porousness of the brass test fixtures. Of the 9 situations that passed all tests, 4 used flat gasket seals, 2 used molded triangular gasket seals, 2 used O-ring seals, and one used a lead and wax seal. (See also AD-48 808)

AD-48 808 Accession No.

Naval Gun Factory, Washington, D. C.
EVALUATION OF OPTICAL SEALS AND OPTICAL SEALING METHODS. ROTARY TYPE SEALS. 18 Oct 54, 7p. illus. (Technical rept. no. NGF-T-72-54; NAVORD rept. no. 4815) Unclassified report

Fourteen combinations of situations were tested in an effort to find an adequate rotary seal. The word "situation" was defined as a typical test fixture in which a bronze shaft rotates within a cylindrical bronze housing with a chamber for air. Between the shaft and housing is a ring of sealing material which seals by touching both shaft and housing while rotating against one of them. Situation 3, which used 3 Hycar rings sealing on a shaft having a 32-RMS finish, passed all tests satisfactorily. (See also AD-48 807)

AD-49 645 Accession No.

Battelle Memorial Inst., Columbus, Ohio.
B-36 INTEGRAL FUEL- AND OIL-TANK SEALANT RESEARCH AND DEVELOPMENT PROGRAM, by R. G. Heiligmann, P. B. Stickney and others.
15 Oct 54, 48p. incl. illus. tables (Suppl. to Final rept. AD-28 321)
(Subcontract to Consolidated Vultee Aircraft Corp., Contract AF 33(600)5793; Continuation of Subcontract to Consolidated Vultee Aircraft Corp., Contract AF 33(038)2182) Unclassified report

"Work has been directed toward improvement of integral fuel-tank sealants for Consolidated Vultee Aircraft Corporation by Battelle Memorial Institute. Base polymers for sealants have been investigated and new materials have been found which are advantageous as modifiers. Optimum formulations have been established for these sealants. In addition, an organic curing system has been developed which imparts excellent physical properties to Thiokol-based sealants. It has been con-
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AD-49 645

cluded that properly compounded sealants based on Thiokol LP-32 offer the greatest benefit in terms of sealant strength and elongation." (Contractor's abstract)

AD-50 626 Accession No.

General Electric Co., Schenectady, N. Y.
PROPELLANT STATIC SEAL DEVELOPMENT IN PROJECT HERMES, by T. C. Jenkins and S. E. Logan.
Summary rept. on Proj. Hermes. Nov 54, 41p. incl. illus. (Rept. no. R54AO562)
(Contract DA 30-115-ORD-23, Proj. TU1-2000) Unclassified report

Methods of improving propellant sealing devices were investigated for guided missile use. The 2-in.-diam AN type flared tube joints were replaced by the bolted joints. Pipe threads were eliminated in favor of the straight threaded fitting or a bolted-type joint. Propellant static seals under consideration included initially loaded seals, pressure sensitive seals, and temperature compensating seals. Teflon, Kel-F, and Pb failed by cold flow and contraction when used as seals in liquid O carrying components. Spiral wound gaskets of the stainless steel-Teflon variety were satisfactory in a joint which remained assembled. With repeated disassembly, the hard surfaces of the gasket scored
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or grooved the soft surfaces of the Al flange faces which resulted in leaks. However, these materials were considered undesirable for missile use. For temperature compensating seals, an O-ring (AN Spec 6230) proved to be satisfactory for ambient temperature liquids. The O-rings served as an adequate high-pressure liquid O static seal, but required high flange loading. Various elastomers were tested in contact with liquid O to determine their shock sensitivity to detonation. Of the compounds tested, type W neoprene with a P33 C black filler was the least susceptible to detonation.

AD-50 800 Accession No.

Vitro Corp. of America, West Orange, N. J.
INTEGRAL FUEL TANK LEAK DETECTOR, by E. W. Ruhl. Progress rept. on Phase 1, 8 July-7 Nov 54. 40p. incl. illus. (KLX-1733)
(Contract AF 33(600)27479) Unclassified report

"During this report period, all existing methods of determining the true location of integral fuel tank leakage have been studied and evaluated. Several new techniques were investigated experimentally and leak parameters relating to detector sensitivity have been determined. In addition, recommendations have been prepared on two methods (a Freon ionization detector and a color reaction method) to be developed during the next phase of the contract." (Contractor's abstract)

AD-51 200 Accession No.

Pitman-Dunn Labs., Frankford Arsenal, Philadelphia, Pa.
A DRY VACUUM TEST FOR AIR LEAKS IN CAD CARTRIDGES, by R. Feder and M. Mooney. Oct 54 [19]p. incl. illus. (Proj. no. TS1-15-C44; Memo. rept. no. MR-592) Unclassified report

A method of determining air leaks in cartridges is described which includes the use of a vacuum technique. A cartridge seal may be checked in a vacuum equivalent to an altitude of over 80,000 ft, i.e., the pressure differential can approach the limit of 14.7 psi. Data are tabulated on various types of cartridge cases tested for leakage. A leaky and a non-leaky cartridge can be used to check the apparatus each day.

AD-43 686 Accession No.

Naval Engineering Experiment Station, Annapolis, Md.
GARLOCK TYPE CA51A-2 MECHANICAL SEAL FOR GASOLINE-PUMP SERVICE SUBMITTED BY GARLOCK PACKING COMPANY, PALMYRA, NEW YORK, by R. F. Stone. 21 May 54, 2p. illus. (EES rept. no. 010067) Unclassified report

"Type CA51A-2 mechanical seal, manufactured by the Garlock Packing Company, was tested to determine its suitability for use in gasoline pumps operating at stuffing-box pressures between 5' and 25' head of aviation gasoline. The seal was found to be suitable for this service." (NEES abstract)

AD-46 159 Accession No.

Johns Hopkins U. School of Engineering, Baltimore, Md.
LEAKAGE TESTS FOR OPTICAL INSTRUMENTS AND LEAKAGE TESTS FOR ELECTRICAL AND ELECTRONIC INSTRUMENTS, by H. E. Hoelscher. Final rept. Sep 54, 34p. illus.
(Contract DA 36-038-ORD-5309) Unclassified report

The techniques, devices, and methods under test included the corona discharge method, the immersion technique, the Magna Flux Corp. method, the gelatin bubble method, and the agar-agar film technique. Of the film formers studied as possible strippable coatings, the gelatin solutions were the most satisfactory. Gelatin was used by adding Dow-Corning Antifoam A to reduce the amount of foaming and the formation of spurious air bubbles which could not be eliminated otherwise. Gelatin at 12.5% by weight in H_2O provided the optimum concentration; Antifoam A was added in an amount between 0.5 and 1% of the total solution by weight. The (over)

AD-46 159

gelatin film technique was useful only on flat aluminum plates; it was not useful on curved surfaces. The gelatin technique was not reproducible owing to the effect of the gelatin film on the leak pore itself and the sensitivity of the kinetics of bubble formation to film properties; the technique was useful as a primary calibration method. The agar-agar film was successful for detecting the existence of leak points in a wide variety of apparatus. The test is effected by coating the test piece as rapidly as possible with the agar-agar solution, admitting CO_2 pressure to the inside of the test piece, adjusting the pressure to 15 psi gage, and allowing the test piece to remain under pressure for the development time. This test is rapid, simple, and easy to apply, and requires no specialized apparatus nor highly skilled personnel. The test can be used as a qualitative check, and with additional effort applied to the calibration through laboratory studies can be used as a quantitative method with equal facility.

AD-47 411 Accession No.
(Unannounced report)

North American Aviation, Inc., Los Angeles, Calif.
RECOMMENDED DIMENSIONS FOR "O" RING TYPE METAL-FACED FUEL CELL FITTINGS. 21 July 52, 6p. incl. illus. (Rept. no. NA-52-793)
Unclassified report

AD-47 412 Accession No.

Society of Automotive Engineers, Inc., New York.
O-RING GROOVE CONFIGURATION FOR USE WITH MS29513 O-RINGS AS STATIC FACE SEALS, by Philip H. Jones. Rept. on Aircraft Fuel and Oil Systems and Equipment. 28 Apr 54, 4p. illus. (Rept. no. SAE-A16-54-1) Unclassified report

AD-47 671 Accession No.

Consolidated Vultee Aircraft Corp., Fort Worth, Tex.
EVALUATION OF B-36 INTEGRAL FUEL AND OIL TANK DESEALANTS, CLEANERS AND SEALANTS.
Final rept. Vols. 1 and 2, Oct 52 - Apr 54. 28 Apr 54, 2 vols. incl. illus. tables (Rept. no. FZA-36-273)
(Contract AF 33(038)2182) Unclassified report

"All leading materials available at the present time for use in descaling, cleaning, and sealing aircraft integral fuel and oil tanks were evaluated in Convair's Engineering Chemical Laboratory and their respective properties were obtained. In addition, improved materials of this same type, obtained from Turco Products, Inc., Minnesota Mining and Manufacturing Company, and Battelle Memorial Institute, were compared with standard products. These three companies were under subcontract to Convair for development of improved tank descaling, cleaning, and sealing products. As a result of this program it is concluded: (1) that satisfactory descaling and cleaning materials have been developed,
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and (2) that integral tank sealants for use in B-36 airplanes were considerably improved over those previously available. Leak-proofing qualities and service-life performance of the newly-developed sealants are expected to exceed by a considerable amount those available with current sealants. The findings of this program may also prove valuable in sealing integral tanks of all types of Air Force aircraft." (Contractor's abstract)

AD- 47 739 Accession No.

Applied Physics Lab., U. of Washington [Seattle]
AN INVESTIGATION OF CABLE SEALS I, by J. B. Morrison. 1 Mar 54, 67p. incl. illus. tables, 11 refs. (Technical rept. no. APL/UW/TE/54-41)
(Contract NOrd-12937) Unclassified report

An investigation was conducted on the fundamental mechanics of cable seals employing flexible packings. Investigation revealed that the mechanical properties of rubber make it a highly desirable packing material for cable glands. Results of testing indicate that the use of radial interference between the packing and the cable and between the packing and the gland wall brings about automatic sealing action of a rubber packing, whereas if clearance is provided the sealing action depends upon the correct initial tightening of the gland nut. No valid justification was found for the use of rubber packings of trapezoidal cross section as against those having a rectangular cross section. There is less possibility of leakage in the case where the downstream end face of
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the packing is supported directly by the gland body than in the case where a separate washer or bushing is used between these surfaces. Substitution of interference packings of rectangular cross section improved the effectiveness of existing cable glands. Tentative recommendations are given for the design of interference-type packing glands.

AD-48 310 Accession No.

Naval Proving Ground, Dahlgren, Va.
GUNFIRE TESTS OF MODEL A3D-1 AIRPLANE FUSELAGE SELF SEALING FUEL CELL INSTALLATIONS, by H. P. Branscome. Final rept. 15 Dec 54, 1v. incl. illus. tables (NPG rept. no. 1314)
Unclassified report

Gunfire resistance tests were conducted on the sections of the production fuselage of the model A3D-1 aircraft which contain the forward and after fuel-cell installations, to determine (1) whether the self-sealing performance of the fuel cells and the integrity of the cell liners, seams, and joints would satisfactorily conform to the requirements established by Spec. MIL-T-5578A when the installation is subjected to 0.50-cal AP and 20-mm practice projectile impacts; and (2) whether the supporting and surrounding structure for the fuel cells would satisfactorily resist excessive structural damage resulting from the hydraulic surge of fuel incident to projectile impacts. Each of the 17 qualifying wounds in
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the forward fuel cell and the 20 qualifying wounds in the after cell exhibited a satisfactory self-sealing performance. The forward fuselage satisfactorily resisted excessive structural damage and the forward bulkhead of the after fuselage installation suffered excessive damage as a result of the hydraulic surge of fuel incident to projectile impacts. The conclusions reached are that (1) the forward and after self-sealing fuel cells satisfactorily conformed to the requirements of Spec. MIL-T-5578A; (2) the forward fuselage section conformed to the requirements of Spec. SR-112A; (3) the structural integrity of the forward bulkhead of the after fuselage installation was unsatisfactory; and (4) the Swedlow Plastics Co. support panels employed in the installation performed satisfactorily.

AD-60 141 Accession No.

ASTIA Reference Center, Library of Congress, Washington, D. C.
SEALS AND GASKETS. A SELECTED REPORT BIBLIOGRAPHY. Feb 55, 47p. 382 repts. (Rept. no. ARC 1839) Unclassified report

Minimum processing - no abstract

AD-63 258 Accession No.

Material Lab., New York Naval Shipyard, Brooklyn.
QUALIFICATION TEST OF OIL RESISTANT SYNTHETIC RUBBER GASKET MATERIAL - SUBMITTED BY QUAKER RUBBER CORP. Final technical rept. 21 Apr 55, 4p. tables (Lab. proj. no. 5542-20) Unclassified report

Minimum processing - no abstract

AD- 61 987 Accession No.

Armour Research Foundation, Chicago, Ill.
BONDING MATERIALS: METALLIC MATING SURFACES: LOW RF IMPEDANCE, by V. Pulsifer. Final rept. Nov 54, 75p. incl. illus. tables. (Contract AF 33(038)23583) Unclassified report

Minimum processing - no abstract

AD- 63 260 Accession No.

Material Lab., New York Naval Shipyard, Brooklyn.
QUALIFICATION TEST OF SYNTHETIC RUBBER GASKET MATERIAL- SUBMITTED BY THE DAVIDSON RUBBER COMPANY. Final technical rept. 6 Apr 55, 4p. tables (Lab. proj. no. 5542-9) Unclassified report

Minimum processing - no abstract

AD- 63 064
(Unannounced report) Accession No.

Ryan Aeronautical Co., San Diego, Calif.
INTEGRAL FUEL TANK SEALING SPECIFICATION FOR THE RYAN MODEL 61 AERIAL DRONE. USAF MODEL Q-2, by B. W. Floersch. 30 Apr 54, rev. 27 Jan 55, 12p. incl. illus. (Rept. no. 6129-8) (Contract AF 33(600)27106) Unclassified report

Minimum processing - no abstract

AD-64 334 Accession No.
(Unannounced report)

Material Lab., New York Naval Shipyard, Brooklyn.
QUALIFICATION TEST OF SYNTHETIC RUBBER GASKET MATERIAL - SUBMITTED BY HEWITT-ROBINS, INC. Final technical rept. 13 Apr 55, 4p. tables (Lab. proj. 5542-11) Unclassified report

Minimum processing - no abstract

AD-64 335 Accession No.
(Unannounced report)

Material Lab., New York Naval Shipyard, Brooklyn.
QUALIFICATION TEST OF OIL RESISTANT SYNTHETIC RUBBER GASKET MATERIAL - SUBMITTED BY B. F. GOODRICH COMPANY, Final technical rept. 28 Apr 55, 3p. tables (Lab. proj no. 5542-18)
Unclassified report

Minimum processing - no abstract

AD-65 209 Accession No.
(Unannounced report)

Rubber Lab., Mare Island Naval Shipyard, Vallejo, Calif.
EVALUATION OF GOODYEAR TIRE AND RUBBER COMPANY RECIPES AND DEVELOPMENT OF OTHER RECIPES FOR SPECIFICATION MIL-R-2765A, by J. W. Hollister. 12 May 55, 7p. tables (Rept. no. 7-24) Unclassified report

AD-67 223 Accession No.

Armour Research Foundation, Chicago, Ill.
EVALUATION OF HERMETIC SEALING TERMINALS, by George A. Forster. Phase rept. no. 1, 15 July 54 - 25 Apr 55 on Improved Electronic Components. May 55, 25p. incl. illus. tables, 15 refs.
(Contract AF 33(600)27674) Unclassified report

"The first phase of this project was to determine all necessary requirements of hermetic sealing terminals for use in airborne electronic equipment and to devise tests for them. The sources of information were manufacturers and users of hermetic terminals, government agencies particularly the Air Force, and technical literature including government standards and specifications. The information was analyzed and arranged into a set of requirements with tests covering each electrical and environmental condition. The important electrical characteristics are dielectric strength, corona voltage, current capacity, and insulation resistance. The environmental conditions include temperature
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aging, temperature cycling, temperature shock, vibration, physical shock, terminal strength, salt spray and gas leakage. Limiting requirements have been set up within a system of grades for the environmental conditions and insulation resistance. A series of simulated environmental tests were designed covering each condition. The second phase of the project will be the testing of all typical types and manufacture of hermetic terminals to determine if they meet the requirements or in what respects they fail." (Contractor's abstract)

AD-67 333 Accession No.

Samuel Feltman Ammunition Labs., Picatinny Arsenal, Dover, N. J.
THERMOPLASTIC FILM AS A SEALER FOR WATERPROOF CASE LINERS, by Richard J. Chabot. July 55, 17p. incl. illus. tables (Proj. no. TB4-672; Technical rept no. 2215) Unclassified report

"Summary: Thermoplastic film-sealed case liners and conventional adhesive-sealed liners, were tested for effects of rough handling, aging, water penetration, and water-vapor penetration. In addition, both types of sealed seams were tested for compliance with the seam strength requirements of Specification MIL-A-140A 'Adhesive, Water Resistant, Waterproof Barrier Material'. Conclusions: (a) Thermoplastic-sealed case liners are approximately equal in performance to adhesive-sealed liners. (b) In the laboratory tests, case liners sealed with thermoplastic film required less fabrication time than liners sealed with adhesives. In actual assembly plant procedure, however, fabrication
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time would be about the same for both methods (See paragraph 10). (c) After heat aging, thermoplastic sealed seams are approximately as strong as adhesive sealed seams. (d) After water immersion, thermoplastic sealed seams are stronger than adhesive sealed seams (e) The adhesives and thermoplastic films used in these evaluations are approximately equal in cost, according to current market prices. (f) Thermoplastic film seals waterproof canvas and various cloth materials effectively. This information may be useful in specific packaging applications." (SFAL summary and conclusions).

AD-67 362 **Accession No.**

Aircraft Lab., Wright Air Development Center, Wright-Patterson Air Force Base, Ohio.
A METHOD FOR MORE ACCURATE DESIGN ESTIMATION OF AIR LEAKAGE FROM CABINS AND COCKPITS OF PRESSURIZED AIRCRAFT, by A. B. Nutt. Rept. on Construction Techniques and Application of New Materials and Canopy Door and Window Seal Development. Sep 54, 23p. incl. illus. tables, 25 refs. (WADC Technical rept. no. 54-446)
Unclassified report

"A review of current methods of determining air leakage from pressurized aircraft cockpits and cabins is made. An empirical method for more accurately calculating and predicting such leakage is presented. A bibliography is incorporated as a source of more detailed information on current leakage amounts and methods of determination." (AL abstract)

AD-67 600 **Accession No.**

Samuel Feltman Ammunition Labs., Picatinny Arsenal, Dover, N. J.
LOW TEMPERATURE SEAM STRENGTH OF BARRIER MATERIALS, by Richard H. DeVore. July 55, 15p. incl. illus. tables (Proj. no. TB4-672; Technical rept. no. 2211)
Unclassified report

Investigation was made to determine: (1) the practicability of incorporating requirements for seam tests of low temperatures in military specifications for barrier materials; (2) the low temperate extremes that can be satisfactorily tolerated by seams made from currently available commercially manufactured barrier materials; and (3) the effects of low temperatures (as extreme as -65°F) on the seam strength characteristics of barrier materials. Testing at low temperatures was accomplished by attaching static loads to the test specimens and suspending them so that the load was applied directly on the seams fabricated from the test materials. Some of the specimens were cut from the materials as received; others were aged, using the accelerated

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AD-67 600

aging process of Specification MIL-B-131A. All specimens were cut so as to produce a seam 1 in. wide and 3 in. long. Cylinders of 2 weights, 10 oz and 2 lb, were suspended from the seam specimens by means of clamps during the low-temperature tests. Most of the types of barrier materials currently used for military packaging can be heat sealed so as to meet the low-temperature test requirements. Saran-faced Kraft paper was, however, satisfactory at -65°F. Sealing conditions which are satisfactory for unaged materials are not always adequate for the same materials when they have been subjected to accelerated aging. Results show that polyethylene heat seal-faced materials which seal satisfactorily when unaged (using a given temperature, dwell, and pressure) often require a higher temperature, longer dwell, or different pressure to seal satisfactorily after being subjected to accelerated aging. Heat sealing conditions for vinyl heat seal-faced sheets were more constant.

AD-68 495 **Accession No.**

Naval Ordnance Test Station, Inyokern, China Lake, Calif.
LABORATORY TESTS OF HIGH-SPEED AND HIGH-PRESSURE ROTARY O-RING SHAFT SEALS, by L. E. Van Hise and F. H. Waterhouse, Jr. 21 Mar 55, [14]p. incl. illus. tables (NOTS 1067; NAVORD rept. no. 3464)
Unclassified report

"A test fixture was designed and built for laboratory evaluation of an O-ring seal for a rotating shaft operating at 500 psi and at 2,000 rpm and above. A housing incorporating a spring-type retaining ring ('Spirolox,' Ramsey Corporation, St. Louis, Mo.) to position a 1/8-inch O-ring (Buna N) and a hard chrome-plated shaft (4 1/2 to 5 1/4 microfinish) proved successful in operating under the prescribed conditions." (NOTS abstract)

AD-68 873 **Accession No.**

Naval Gun Factory, Washington, D. C.
DEVELOPMENT OF AIR LEAKAGE TESTS FOR AMMUNITION BOXES, CONTAINERS AND TANKS. 27 June 55 [10]p. incl. illus. tables (Rept. no. NGF-T-31-55; NAVORD rept. no. 5083)
Unclassified report

The following containers (in empty and in loaded condition) were submerged in water 90° warmer than the ambient temperature: (1) MK 91, Mod 0, fuze container; (2) MK 3, Mod 3, 20-mm ammunition box; (3) MK 2, Mod 0, ammunition component box; (4) MK 6, Mod 1, 5-in/38 cartridge tank; (5) MK 5, Mod 1, 3-in/50 cartridge tank; (6) MK 1, Mod 0, small arms ammunition box; and (7) MK 4, Mod 0, 16-in powder tank. Average size empty containers (approximately 100 to 2000 cu in) were easily tested in hot water; small, very large, and loaded containers were difficult to test for air leakage by submersion in hot water. A partial vacuum around the submerged container was recommended especially for testing small and medium

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AD-68 873

size containers. The incorporation of air valves was suggested in pressure testing large containers.

AD- 70 011 Accession No.

Douglas Aircraft Co., Inc., Santa Monica, Calif. EVALUATION OF HIGH TEMPERATURE HYDRAULIC SEALS, by Edward A. Webster. Rept. on Hydraulic Seal Development. Jan 55, 96p. incl. illus. tables, 39 refs. (Rept. no. DEV-1792; WADC Technical rept. no. 55-120)
(Contract AF 33(616)236) Unclassified report

An investigation was conducted in order to develop an interim seal suitable for aircraft and missile systems utilizing 3000-psi MIL-O-5606 hydraulic fluid from -65° to + 300°F. This investigation included determination of temperature limitations of approved AN6227 O-rings and AN6246 leather back-up rings, comparative qualification tests of all currently available experimental high-temperature O-ring materials, evaluations of various vendor and contractor-furnished experimental seal configurations designed for both standard and nonstandard packing glands, and tests of back-up materials and configurations suitable for high-tempera- (over)

AD-70 011

ture use. Testing results listed the upper temperature limit of AN6227 packings at approximately 200°F. Specific compounds within this group have widely divergent heat resistances, but none should be used for extended periods of time above 250°F. Of the O-ring compounds tested, only one (compound F-1) had satisfactory -65°F sealing characteristics. None were comparable at 300°F to AN6227 compounds at 120°F. None of the O-ring compounds may be used for extended periods of time at 300°F. Spiral Teflon back-ups and metallic O-rings may be safely used with certain reservations at 300°F. Leather back-up rings exhibited marginal qualities at 200°F. Currently approved AN6230 and AN6290 static seals and gaskets are not satisfactory for use at 300°F.

AD-72 231 Accession No.
(Unannounced report)

Material Lab., New York Naval Shipyard, Brooklyn. QUALIFICATION TEST OF SYNTHETIC RUBBER GASKET MATERIAL, SUBMITTED BY THE MARTIN RUBBER COMPANY, LONG BRANCH, NEW JERSEY. Final technical rept. 6 July 55 [7]p. incl. tables (Lab. proj. no. 5542-12) Unclassified report

AD-72 233 Accession No.
(Unannounced report)

Material Lab., New York Naval Shipyard, Brooklyn. QUALIFICATION TEST OF SYNTHETIC RUBBER GASKET MATERIAL, SUBMITTED BY CONTINENTAL RUBBER WORKS, ERIE, PENNSYLVANIA. Final technical rept. 6 July 55 [7]p. incl. tables (Lab. proj. no. 5542-8) Unclassified report

AD-72 267 Accession No.
(Unannounced report)

Material Lab., New York Naval Shipyard, Brooklyn. QUALIFICATION TEST OF OIL RESISTANT SYNTHETIC RUBBER GASKET MATERIAL, SUBMITTED BY THE GARLOCK PACKING COMPANY, PALMYRA, NEW YORK. Final technical rept. 17 May 55 [5]p. incl. table (Lab. Proj. no. 5542-17) Unclassified report

AD-72 268 Accession No.
(Unannounced report)

Material Lab., New York Naval Shipyard, Brooklyn. QUALIFICATION TEST OF SYNTHETIC RUBBER GASKET MATERIAL, SUBMITTED BY UNITED STATES RUBBER COMPANY, PASSAIC, NEW JERSEY. Final technical rept. 14 July 55 [6]p. incl. table (Lab. proj. no. 5542-15) Unclassified report

AD-72 269 **Accession No.**
(Unannounced report)

Material Lab., New York Naval Shipyard, Brooklyn.
QUALIFICATION TEST OF SYNTHETIC RUBBER GASKET MATERIAL, SUBMITTED BY QUAKER RUBBER CORPORATION, PHILADELPHIA, PENNSYLVANIA. Final technical rept. 7 July 55. [6]p. incl. table (Lab. proj. no. 5542-13)
Unclassified report

AD-72 503 **Accession No.**

Midwest Research Inst., Kansas City, Mo.
TESTING OF SEAL DESIGNS AND MATERIALS, by Carl C. Perkins, Jr. Final rept. 25 Feb 55, 39p. incl. illus. tables (Rept. no. AEDC TR-55-18)
(Contract AF 18(600)1122) Unclassified report

In an attempt to develop seals for the flow converter of a propulsion wind tunnel, 3 silicone rubber materials were tested in several seal configurations. Test fixtures were designed to provide full-scale duplication of each type of seal junction found in the flow converter. Data were obtained on the leakage rates and the effects of abrasion at temperatures up to 650°F. The test results indicated that Dow Corning Silastic no. 80 was the best suited material tested and that seal configuration no. 4 (a seal lug with additional seals in its side) was the most flexible and the most easily replaced design. At 650°F, the service life of the seal can be expected to be about 1 to 3 hr; at 550°F, the service life should be increased substantially, and at 500°F, the seals should
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AD-72 503

operate indefinitely. Seals joined at 90° angles to each other were bonded at the 45° intersection with satisfactory results.

AD-73 961 **Accession No.**

Midwest Research Inst., Kansas City, Mo.
TESTING OF SEAL DESIGNS AND MATERIALS, by Carl C. Perkins, Jr. 31 May 55, 19p. incl. illus. (Suppl. to Final technical rept. [Rept. no. AECD-TR-55-18] AD-72 503)
(Contract AF 18(600)1122) Unclassified report

Seals made from laminated strips of phosphorous bronze were tested against an Ni-plated plate, a stainless steel plate, and a plate coated with a heat-resistant paint. The leakage rate for this type of seal and the leakage rate of seal junctions and seal corners was established, and the abrasion effect of the seal on the various plates was determined. The results indicated that the spring-loaded metallic seal was feasible and desirable from the standpoint of maintenance in the flow converter of the propulsion wind tunnel. The abrasion test results indicated that at 650°F, the Ni-plated material provided the best results in preventing scoring. The painted surface was unsatisfactory, and the stainless steel galled during a 4-hr test at 650°F.

AD- 74 089 **Accession No.**

Aircraft Lab., Wright Air Development Center, Wright-Patterson Air Force Base, Ohio.
PERFORMANCE CYCLING TESTS OF HIGH TEMPERATURE HYDRAULIC O-RING PACKINGS, by Frank R. Straus. Jan 55, 21p. incl. illus. tables (Technical note no. WCLS-54-71) Unclassified report

The methods used to determine the mechanical performance of synthetic rubber O-ring packings in hydraulic fluids at temperatures up to +550°F are described. A total of 40,000 cycles were conducted at 300°F in MLO 8200 fluid on a commercial neoprene WRT compound with spiral Teflon back-up rings. No leakage occurred at -40°F for a 20-hr period at 10 psi. At 3000 psi and -40°F, the leakage was 25 cc in 1 hr. Subjecting a standard AN6227 O-ring compound to 50,000 cycles at room temperature in MIL-O-5606 fluid resulted in a 38-cc leakage from the right-hand seal and 5 cc from the left-hand seal. An acrylate compound used with spiral Teflon back-up rings was subjected to 5000 cycles
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AD-74 089

at room temperature and 6200 cycles between 350° to 420°F; the test was stopped when fluid poured from the right-hand seal. Test results indicated that spiral Teflon back-up rings can be used for at least 2 hr up to 550°F at 3000 psi without extruding. Teflon back-up rings are desirable on both sides of the O ring regardless of the pressure. The use of brass washers to maintain close clearances was satisfactory, although some failures could be attributed to high rate of wear on the washer. Compound 453-26C functioned satisfactorily in a -65° to +400°F range. Compound 453-9A functioned satisfactorily at 500°F for more than 5 hr. The lives of compounds 453-9A and 1203-70 at 550°F were about 1.5 hr. The removal of the initial stretch or tension on an O-ring compound resulted in longer life of the packing.

AD- 74 322 Accession No.

Aircraft Equipment Testing Co., Baltimore, Md.
TESTING OF METAL BOSS SEALS, by Harry P. Kupiec. Rept. on Aircraft Hydraulic Systems. Apr 55, 61p. incl. illus. tables (WADC Technical rept. no. 55-163)
(Contract AF 33(600)26548) Unclassified report

"The metal boss seal was conceived by Wright Air Development Center to meet the requirements of hydraulic and pneumatic systems with operating pressures up to 5,000 psi, and temperatures as low as -100°F. and as high as 600°F. Basic development on the seal was accomplished by Wright Air Development Center. Further development work and testing of the seal were performed by the Aircraft Equipment Testing Company. The application of the metal boss seal involves the use of deformable metal ring in conjunction with standard AN hydraulic fittings with AND10056 or AND10057 fitting ends in standard AND10050 bosses. It is concluded that the metal boss seal possesses the desirable characteristics for a boss seal as indicated

AD- 74 322

by tests conducted on size -5, -8, and -12. The metal boss seal is considered relatively simple and reliable. With proper choice of material, it is possible that this seal design may be suitable for operating temperatures above 600°F. This seal is being considered as a replacement for the current standard AN 6290 synthetic rubber gasket." (Contractor's abstract)

AD- 75 568 Accession No.

General Hermotic Sealing Corp., Valley Stream, N. Y.
REUSABLE SEALS FOR ELECTRONIC EQUIPMENT, by William Brown and A. Razdow. Quarterly rept. no. 1, 1 June-31 Aug 55. 37p. incl. illus.
(Contract AF 33(616)2994). Unclassified report

Progress is reported on the investigation of reusable seals and the preparation of necessary test procedures and equipment. Preliminary tests disclosed that brass as a material for the enclosures gives the best initial results. QQ-S-633 steel was found to be practical if the proper plating is applied. Heat-transfer analysis showed that nitrogen should be used as the filler gas; a small percentage of helium must be added for leak-rate testing. Studies of solders and fluxes showed that the temperature at which the solder softens must be held over 150°C. To study the heat distribution over a greater period of time and the effect of the heat on the components in the enclosure, the temperature-measure-

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AD- 75 568

ment cycle had to be increased to more than 4 minutes. Preliminary tests disclosed that the proper use of known aluminum soldering and plating methods was necessary. With correct plating, efficient leak-proof, reusable enclosures can be manufactured.

AD- 77 374. Accession No.

New York U. Coll. of Engineering, N. Y.
SEALING TECHNIQUES FOR WAVEGUIDE AND COAXIAL ROTARY JOINTS, by Michael B. Maccarone. Quarterly progress rept. no. 4, 1 June-31 Aug 55. 21p. incl. illus.
(Contract DA 36-039-sc-64476) Unclassified report

Evaluation was made of an experimental mechanical rotary seal. The rotary seal unit consists of a stationary upper component which houses 2 new departure ball bearings and a lower portion which houses the rotary seal components. The stationary component contains a C-graphite sealing ring (mating sealing surface) which is mounted in a steel housing. The rotating component consists of a small cylindrical permanent magnet of Alnico V and two O rings. One component is attached to the internal rotating member of the joint and the other is coupled to the brass housing by two O rings. A steel shaft at the top portion drives the internal member of the rotary joint and the rotating component of the seal.

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AD- 77 374

An aluminum disk attached to the shaft covers the ball bearings. In the side of the lower housing is the secondary pressure inlet and in the bottom of the housing is the primary or internal pressure inlet. The rotary seal unit utilizes applied pressure in the secondary chamber to create the force necessary to keep the sealing surfaces in contact; while the magnet keeps the sealing surfaces in contact when the unit is running unpressurized. A maximum torque of 15 in-lb was obtained with the unit running at 2200 rpm and at 90 to 100 psi (a development of about 1/2 hp). A large portion of this horsepower was developed at the sealing surfaces. The unit performance was considered satisfactory except for the heat developed at the sealing surfaces. A small amount of leakage was attributed to seal construction. The C-graphite sealing ring showed little wear after 5 hr of testing. (See also AD-69 748)

AD- 82 915 **Accession No.**

Ontario Research Foundation (Canada).
INVESTIGATION INTO THE SEALING OF QUARTZ CRYSTAL HOLDERS TYPE HC-6/U, by B. W. Schumacher. Quarterly rept. no. 3 for period ending July 55. [9]p. incl. tables (Serial no. 2-P-4-998)
Unclassified report

Efforts were concentrated on the development of a leak testing method for solder seals. Calculations showed that leaks which caused dipping failures are detectable by a pressure-rise method if each unit is put into a vacuum chamber which is evacuated to a final pressure of about 10^{-6} mm Hg. Of 5300 crystal units in HC-6/U holders, 364 were tested to obtain statistical information concerning the quality of the seals of a larger number of crystal units which had been in stock for several years. About 63% of the oldest units in stock were leakers. The ratio of bubblers to small leakers was about 1:1. (See also AD-82 914)

AD- 82 916 **Accession No.**

Ontario Research Foundation (Canada).
INVESTIGATION INTO THE SEALING OF QUARTZ CRYSTAL HOLDERS TYPE HC-6/U, by B. W. Schumacher. Quarterly rept. no. 1. Jan 55. [24]p. incl. illus. tables.
(Contract P 69-10-116) **Unclassified report**

Considerations are presented concerning the detection of small leaks in hermetic seals of small containers. The purpose of hermetically sealed containers for electric circuit components is to protect the sealed-in components from contact with deleterious gases or vapors. Hg arc rectifiers must be protected against the entrance of any gas, Ag contacts of a switch from corrosive gases such as SO_2, and transformers and piezoelectric quartz crystals from the entrance of moisture. The basic requirement in classifying leaks and sealed containers for a hermetic seal is given by the circuit element to be protected. Classification of sealed containers is outlined, and a discussion of leak
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AD- 82 916

detection methods relevant to small-sealed containers is presented. (See also AD-82 914)

AD-83 653 **Accession No.**
(Unannounced report)

Aberdeen Proving Ground, Md.
TEST OF OLDHAM COUPLING DUST SEAL, by T. R. McConnell. Partial rept. no. 3 (Final) on Production Engineering Test for Tank, 90mm Gun, M48. Oct 55, 8p. incl. illus. (Proj. no. IT2-760, Rept. no. 4)
Unclassified report

AD- 83 716 **Accession No.**

Naval Ordnance Test Station, Inyokern, China Lake, Calif.
INJECTED METAL SEALS, by Guinn E. Metzger and Robert A. Weinhardt. 26 Oct 55, 18p. incl. illus. tables (NOTS 1254; NAVORD rept. no. 4944)
Unclassified report

"A series of tests on the injection of molten metal into a groove between two mating parts to determine the relationship of injection pressure and temperature to groove fill was performed at the U. S. Naval Ordnance Test Station. The effect of injection pressure and temperature on the extent of metal flash beyond the groove confines was also established. This relationship was established with tubular specimens varying in diameter from 1-inch to 5-inches, with nominal joint clearances of 0.5 to 4.5 mils, and with two injected metals (Cerrobase and Cerromatrix). Injection pressures varied from 80 to 1600 psi. Injection temperatures varied from 280 to 480°F for Cerrobase and from 540 to 700°F for
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AD-83 716

Cerromatrix. The production of joints with injected Cerrobase or Cerromatrix appears to be feasible for the range of sizes and clearances and the joint design investigated. The evaluation of the mechanical strength and sealing effectiveness of such joints will be done at a later date." (NOTS abstract)

AD-85 114 Accession No.
(Unannounced report)

National Advisory Committee for Aeronautics, Washington, D. C.
WEAR OF TYPICAL CARBON-BASE SLIDING SEAL MATERIALS AT TEMPERATURES TO 700°F, by Robert L. Johnson, Max A. Swikert, and John M. Bailey. Feb 56, 22p. incl. illus. table (Technical note TN 3595) Unclassified report

"Wear and friction studies were made with carbon-type seal materials sliding against tool steel, stainless steel, and chromium-plated steel at temperatures to 700°F and a sliding velocity of 10,000 feet per minute. Wear was several times greater at 500°F and above than with no heat added for all carbon materials. The mating material had more effect on wear and surface failure than did the use of various impregnants in the carbon. Chromium plate gave less wear than the other mating materials under all conditions of the experiment." (NACA abstract)

AD-85 318 Accession No.

Institution of Mechanical Engineers (Gt. Brit.).
THE FLOW OF AIR THROUGH RADIAL LABYRINTH GLANDS, by W. J. Kearton. 19 Oct 54, 14p. incl. illus. tables. Unclassified report

"A theory for the flow of air through a radial gland has been worked out for both outward and inward flow. Expressions are derived for the pressure distribution in each kind of flow, and it is shown that the critical pressure ratio can be reached only in the final constriction. Experiments were made on a gland having a single ring and also on a 20-ring gland of the staggered type. The discharge coefficients in the latter gland were lower than those in the single-ring gland, possibly due to the different approach conditions. The observed pressure distribution in the multi-ring gland agreed well with the theoretical value. Finally, some experiments were made with unstaggered radial glands under various conditions. Discharge coefficients greater than unity were measured." (IME abstract)

AD-85 568 Accession No.

Aero Medical Lab., Wright Air Development Center, Wright-Patterson Air Force Base, Ohio.
LONG-TERM EMERGENCY PRESSURIZATION WITH NYLON INFLATABLE BULKHEADS, by Elizabeth Comfort. June 55, 5p. incl. illus. table. (WADC Technical note no. 55-296) Unclassified report

"An investigation has been made of the feasibility of using a nylon inflatable material known as Rigidaire to re-establish and maintain a pressure differential of 6 psi in a damaged pressure cabin aircraft. During tests in a low pressure chamber the material was found to be capable of sealing this differential over rectangle orifices 24 x 40 inches and 15 x 24 inches for prolonged periods of time." (AML abstract)

AD-86 205 Accession No.

Horizons, Inc., Cleveland, Ohio.
DEVELOPMENT OF FRICTION-SEAL MATERIALS FOR HIGH TEMPERATURE-HIGH SPEED OPERATION, by F. C. Wagner. Quarterly progress rept. no. 2. 23 Feb 56, 5p. incl. illus. table. (Contract AF 33(616)3134) Unclassified report

Research was initiated to develop materials which will perform satisfactorily as friction seals under conditions of high temperature and high rubbing speeds. desired operating conditions are: (1) 30,000-fpm surface speed; (2) 1000°F ambient temperature; (3) 200-psi air pressure differential across the seal; (4) 2 to 5 in. of oil pressure across the seal; and (5) maximum internal oil temperature of 500°F. The desired performance of such a seal is: (1) minimum wear life of 1000 hr; (2) maximum oil leakage of 1 cc/min; and (3) maximum air leakage of 1 lb/hr/6-in. diameter. A wear test machine was constructed consisting of a rotating shaft with one component of the potential seal (over)

AD-86 205

attached to the end. Specimen preparation is proceeding; 4 grades of graphite base material (Graphitar) no. 39, 67, 75, and 84) were selected. Fabrication of specimen disks from powdered metals was begun. The first specimens will consist of sintered Ni powder with additives of up to 10% CrB and 5% graphite, with approximately 30% Ag added by infiltration. Other seal materials being considered are WC-Ag and Ni-Ag.

AD-87 221 Accession No.
(Unannounced report)

Krautter-Weber Tool Co., Newark, N.J.
DRIVE, MECHANICAL, ROTARY SEAL (HIGH SPEED) by A. Rasdow. Quarterly rept. no. 8, 7 Apr 51-15 Mar 52. [23]p. incl. illus. (Contract W36-039-sc-44520) Unclassified report

AD-88 545 Accession No.

Varian Associates, Palo Alto, Calif.
VA-86 KLYSTRON AMPLIFIER ENGINEERING SERVICES PROGRAM, by Robert C. Schmidt. Final rept., 1 June 54-20 Sep 55. 24p. incl. illus. (Engineering rept. no. 155-15; [RADC TR-56-28]) (Contract AF 19(604)1190) Unclassified report

Research was conducted on high-power output windows, other ceramic-to-metal seals, air-cooling, the design and fabrication of cathodes, the use of various exhaust techniques, permanent magnet fields, and the examination of metallic bellows; these phases were evaluated with respect to the design and development of high-power, 4-cavity, tunable klystron amplifiers. Window development resulted in a design consisting of a circular ceramic window of a diameter almost as large as the wide dimension of the waveguide, which is placed in the guide at an acute angle. An RF input seal was devised which employs a ceramic cylinder with metallizing and brazed joints at the ends and uses some parts (over)

AD-88 545

of a standard type-N cable connector. A complete redesign of the mechanical structure of the cathode HV insulator appeared necessary for the best use of the properties of the ceramic seals. An analysis of air cooling of high-power klystrons vs liquid cooling revealed that the total power requirement of the prime mover of an air-cooling system would be over 3000 w; the requirement for an equivalent water-cooling system would be 1250 w. The metallic bellows for tuning the cavities of high-power klystrons was investigated. A bellows made of a nonmagnetic grade of stainless steel exhibited a minimum life of over 1500 c when cycled; individual tests yielded a life as high as 11,500 c. An exhaust technique was studied which accomplishes tube outgassing by employing a high exhaust bakeout temperature (600° to 650°C) and special handling of the cathode breakdown. (See also AD-86 410)

AD-89 072 Accession No.

Stanford Research Inst., Menlo Park, Calif.
INVESTIGATION OF NONRUBBER MATERIALS FOR O-RING SEALS (Unclassified title) by E. E. Ryskiewicz. Final rept. 21 Sep 55, 17p. incl. illus. table. Confidential report

AD-89 193 Accession No.
(Unannounced report)

Douglas Aircraft Co., Inc., Santa Monica, Calif.
INVESTIGATION OF 10° UNDERCUT GROOVE FOR "O" RING PACKING, by B. H. Vennum. 10 Dec 45, 7p. incl. illus. (Rept. no. SM-20063) Unclassified report

AD-89 198 Accession No.
(Unannounced report)

Douglas Aircraft Co., Inc., Santa Monica, Calif.
PERFORMANCE OF HOUGHTON #2216 BACK-UP RINGS WITH "O" RINGS ON LARGE STRUTS AT 3000 PSI PRESSURE, by E. R. Broadbent. 1 Jan 46, 15p. incl. illus. tables (Rept. no. SM-11155) Unclassified report

AD-89 199 Accession No.
(Unannounced report)

Douglas Aircraft Co., Inc., Santa Monica, Calif.
PERFORMANCE OF LINEAR LT2-70 HYDRAULIC "O" RING PACKING USED WITH CHROME RETANNED LEATHER BACK-UP RINGS AT 3000 PSI PRESSURE, by E. R. Broadbent. 4 Apr 46, 7p. incl. illus. (Rept. no. SM-11809) Unclassified report

AD-89 767 Accession No.
(Unannounced report)

Electrical Engineering Research Lab., U. of Illinois, Urbana.
A CRITICAL SURVEY OF METHODS OF MAKING METAL-TO-CERAMIC SEALS, by R. Wellinger. 30 Apr 49 [12]p. incl. illus.
(Contract W33-038-ac-14742) Unclassified report

AD-89 828 Accession No.

Consolidated Vultee Aircraft Corp., Fort Worth, Tex.
EVALUATION OF B-36 INTEGRAL FUEL AND OIL TANK SEALANTS. Final rept. 18 Jan 55, 65p. incl. illus. tables, (Rept. no. FZA-36-314 suppl. to Rept. no. FZA-36-273, AD-47 671)
(Contract AF 33(600)5793; [Continuation of Contract AF 33(038)2182]) Unclassified report

"A representative group of commercially available sealing materials for integral fuel and oil tanks were evaluated in Convair's Engineering Chemical Laboratory, and their respective properties were obtained. In addition, improved sealants from Battelle Memorial Institute and Commercial products from this country and England were included in the program. Battelle Memorial Institute was under subcontract to Convair for development of improved sealants during the period extending from 15 March 1954 to 15 October 1954. As a result of this program it is concluded that integral tank sealants for use in B-36 airplanes are considerably

(over)

AD-89 828

improved over those previously available. Leak-proofing qualities and service-life performance of the newly-developed sealants are expected to exceed by a considerable amount those available with current sealants. The findings of this program may also prove valuable in sealing integral tanks of all types of Air Force aircraft." (Contractor's abstract) (See also AD-47 671)

AD-90 148

design. The existing type of sealing gasket between the receptacle and housing will not provide an efficient moisture seal. A design for the sealing of the trailer-receptacle cable entrance eliminates the need for extra sealing accessories. The trailer-plug design consists of a modification of the weatherproof crimp-splice method for connecting wires. Test procedures were designed for detecting incipient failure before, during, and after aging in various environments. Protection in not complete primarily around electrical contacts and terminals, particularly when frequent disassembly is necessary. Variables which cause failure include tolerances and clearances which affect the confining volume/sealing material volume ratio; cold flow of resilient sealing materials with time and pressure; contraction and hardening of sealing materials because of low temperatures; improper material selections; and human error in assembly and maintenance. Neoprene materials had their greatest failure at -37° to -40°F.

AD-90 148

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AD-91 555 Accession No.
(Unannounced report)

Material Lab., New York Naval Shipyard, Brooklyn.
EVALUATION OF SYNTHETIC RUBBER DRUM GASKETS SUBMITTED BY VARIOUS COMPANIES, by W. K. Gondek and M. Greenberg. Final technical rept. 3 Feb 56 [8]p. incl. tables (Lab. proj. no. 5094-32) Unclassified report

AD- 92 941 Accession No.

General Hermetic Sealing Corp., Valley Stream, N. Y.
REUSABLE SEALS FOR ELECTRONIC EQUIPMENT, by William Brown and A. Razdow. Scientific quarterly rept. no. 2, 1 Sep - 30 Nov 55. 30p. incl. illus. (Contract AF 33(616)2994) Unclassified report

Progress is reported on the continuation of tests on various enclosures, on the band sealers, and the heat reflecting baffles. The electronic multilocation temperature indicating device and 2 switching thermocouple systems were completed and calibrated. The heat gradient in and on the cans was determined on a series of 50 cans for different joints on the round and rectangular brass and steel enclosures. Joints extending out from the enclosures showed lower temperature gradients. The temperature in the steel containers were generally lower than in the brass containers. The square shaped can showed lower temperatures than the round can. Comparative tests of heat-transfer methods (over)

AD- 92 941

showed the band sealer and the inductive heating method to be more efficient than the soldering iron and the torch. Temperatures were higher during the unsealing phase. The heat distribution within the enclosure showed that the temperature increased toward the cover plate and close to the side walls of the can. A simple approach for effective protection of heat sensitive components within the can was developed. A semiautomatic leakage test device determined the leakage rate of each enclosure. Test results show that the smaller heat reflecting baffle is more efficient. (See also AD-75 568)

AD-94 444 Accession No.
(Unannounced report)

Detroit Arsenal, Center Line, Mich.
TEST OF COMPENSATING IDLER DOUBLE LIP SEALS IN THE HEAVY RECOVERY VEHICLE, M51, by William L. Harrison. Final rept. 29 Feb 56 [11]p. incl. illus. (Rept. no. 3462) Unclassified report

AD- 94 590 Accession No.

North Electric Mfg. Co., Galion, Ohio.
DEVELOPMENT OF A HERMETICALLY SEALED TOGGLE SWITCH, by W. H. Blashfield and W. A. Roberts. Final rept. Oct-Dec 55. Nov 55, 5p. (Contract AF 33(600)22898) Unclassified report

Sample headers were prepared with maximum glass insulation around the terminal sleeves. Tests for dielectric strength, at 70,000 ft altitude (1.3 in. Hg) and at 50,000 ft altitude (3.4 in. Hg), substantiated the ability of the design to meet the modified requirements of 500 v rms, 60 c at 50,000 ft. Tests results taken on 12 terminals to ground checked as follows: 550 v rms at 60 c for 50,000-ft altitude and 350 v rms at 60 c for 70,000-ft altitude. Investigations were made to determine the material and method for sealing the terminals into the sleeves in the header. Test results indicated that a 97½% Pb, 2½% Ag, 581°F solder is suitable for the sealing. A 220°F temperature differential existed between the material melting temperature and the solder (over)

AD- 94 590

used to seal the containers or to attach exterior leads to the terminals. The terminals are sealed into the header sleeves by using a controlled atmosphere oven to apply the required temperatures. The switches delivered were all of DPDT characteristic and may be tested as a DPDT, as a SPDT, and as a SPST. The design objective was accomplished by providing a switch wherein the power to operate the contacts and hold them operated was obtained with the use of permanent magnets arranged in a manner that would permit hermetic sealing of the contacts separate from the operating lever and thereby eliminate the use of resilient diaphragm seals to maintain the required resistance to infiltration of ambient conditions into the contact cavity. (See also AD-66 633, AD-75 909)

AD-94 674 Accession No.
(Unannounced report)

Naval Engineering Experiment Station, Annapolis, Md.
CARBON PACKING MATERIAL, by Walter E. Grant. Specification-development rept. 20 Dec 55 [9]p. incl. illus. tables (EES rept. no. 010023) Unclassified report

AD-94 749 Accession No.
(Unannounced report)

Boeing Airplane Co., Seattle, Wash.
DESIGN DATA FOR O-RINGS AND SIMILAR ELASTIC SEALS, by R. J. Dunsmoor, E. J. Quenemoen, and others. Progress rept. 15 Oct 55-15 Jan 56. 35p. incl. illus. tables, 13 refs. (Document no. D-17416-1) (Contract AF 33(616)2867) Unclassified report

AD-94 807 Accession No.

New York U. Coll. of Engineering, N. Y.
SEALING TECHNIQUES FOR WAVEGUIDE AND COAXIAL ROTARY JOINTS, by Milton M. Sackman, Michael Maccarone, and Fred H. Posser. Quarterly progress rept. no. 5, 1 Sep-30 Nov 55. [36]p. incl. illus.
(Contract DA 36-039-sc-64476) Unclassified report

Tests are reported on original and modified experimental models of a mechanical rotary seal. Initial test series on the original carbon-graphite sealing ring showed that at high pressures the temperatures rose above safe operating limits; at lower pressures, the unit ran within the safe operating temperatures. Subsequent test series were run with a sealing area about 1/2 the original and by regulating the secondary pressure separate from the internal pressure. In these tests, with the internal pressure creating a sealing force, the temperature rose too high when the secondary pressure was above 30 psi; normal torque values
(over)

AD-94 807

went as high as 13 in.-lb, with infrequent fluctuations up to 26 in.-lb. In the third series of tests, the unit was modified so that the only sealing force would be that caused by the secondary pressure; the same carbon ring was used as in the second series of tests. During these tests, the internal pressure was kept at 60 psi and the unit was run at 900, 1400, and 2100 rpm. Results showed that the torque values and leakage rates remained constant regardless of speed, while the temperature increased with the speed. (See also AD-77 374)

AD-94 809 Accession No.

New York U. Coll. of Engineering, N. Y.
SEALING TECHNIQUES FOR WAVEGUIDE AND COAXIAL ROTARY JOINTS, by Milton M. Sackman, Michael B. Maccarone, and Fred H. Posser. Quarterly progress rept. no. 6, 1 Dec 55-29 Feb 56. [24]p. incl. illus.
(Contract DA 36-039-sc-64476) Unclassified report

Lubrication tests were conducted on the old experimental model of the mechanical rotary seal (brass experimental model). Socony-Vacuum gargoyle grease BRB no. 2, General Electric silicone grease 81482, and PD 603 grease meeting the requirements of MIL-G-3278 were each tested for 1 week with daily testing times of up to 8 hr of continuous running; maximum speeds of the tests reached 2100 rpm. These initial tests suggested that the gargoyle grease is unsatisfactory, and that more and longer tests should be conducted on the other 2 lubricants. Construction is reported on an experimental model of an RG-52 rotary joint size designed with consideration for microwave transmission needs.
(over)

AD-94 809

This unit will accomplish a seal by using a nonrotating carbon surface moving against a rotating hardened steel surface. Except for the O-rings, bearings, the valve mechanism for the secondary pressure inlet, and sealing surfaces, the unit will be made of Al. Detailed design and operation characteristics, and possible alternate design modifications of the RG-52 rotary joint unit are described. (See also AD-94 807)

AD-94 922 Accession No.

Sciaky Bros., Inc., Los Angeles, Calif.
WELDING DEVELOPMENT PROGRAM FOR MUNITIONS CLOSURES, by S. M. Robelotto. Rept. no. 7, 1-30 Apr 56. 1 May 56, 5p. incl. illus. tables [CRL rept. no. ETF 420.6-2/7]
(Contract DA 18-108-cml-5860) Unclassified report

Thin-wall munition seals: The PMCO5STK welding machine for welding thin-wall munition closure caps was installed. Heavy-wall munition seals: A total of 40 specimens consisting of AISI C-1033 tubes and AISI C-1048 shells were welded. All Specimens showed leak tightness before and after 3-cycle drop tests from 12 ft nose down on a 1/2-in-thick steel plate resting on concrete. Eight of the 40 specimens were subjected to pushout tests which consisted of ramming the tube out of the shell with a 120,000 lb testing machine; the load to rupture varied from 51,000 lb to no failure at 100,000 lb. Of the 40 specimens, 25 were cross-sectioned, polished, and examined; cracking in some areas of the weld and (over)

AD-94 922

in the zone adjacent to the weld was noted in most of the 25 specimens. Basic welding-machine settings are tabulated for the 40 specimens. Thirteen of the specimens were welded without using postheat, and 16 were welded with a postheat. Postheat treatment did not adequately prevent cracking. Thirteen specimens were welded under a high forge force. (See also AD-84 396, AD-91 885)

AD-97 258 Div. 1/2, 14/3, 26/8

Parker Appliance Co., Cleveland, Ohio.
HYDRAULIC ACTUATOR ROD SEAL FOR HIGH TEMPERATURE OPERATION, by R. B. Resek. Rept. on Aircraft Hydraulic Systems. July 56. 27p. incl. illus. tables (WADC Technical rept. no. 56-268)
(Contract AF 33(600)29703) Unclassified report

A rod seal was required for hydraulic actuators which would operate with fluid and ambient temperature as high as 700°F. A test actuator and test stand were designed and built for testing sample seals from -65°F to 400°F (limited to 400°F by temperature limitations of fluids available at the time this program was initiated). Both static and cycling tests were run with metallic foil seals, tubular metal seals, and several types of asbestos seals. The fluid was OS-45 and pressures were from 10 psi to 3000 psi. A molded scarf-cut packing ring of asbestos with a metal mesh core was the only seal tested which met all of the specified requirements. This should provide a high (over)

AD-97 258

temperature hydraulic actuator rod seal suitable for aircraft use at high temperatures, although leakage may be slightly greater than is normally permitted. (Author)

AD-97 454 Accession No.

Bendix Aviation Corp., Eatontown, N. J.
PRODUCTION REFINEMENT CONTRACT ON SD-1064B TUBE (RTMA 6094) by R. H. Kuhnapfel. Final rept. vol. 1. 22 July 54, 1v. incl. illus. tables.
(Contract AF 33(600)21623) Unclassified report

The necessary refinement of tube design for production and the additional features of mount structure necessary for tubes which are to survive repetitive high level shock (50 g) are outlined. The final tube design of the 6094 incorporated ceramic element spacers, a skip-space heater, and minor dimensional shifts. The use of ceramics instead of micas, the use of nonex glass, and the use of techniques to produce tubes capable of prolonged operation at 300°C are discussed. The results of the use of ceramics in the finished tubes seemed acceptable. Tubes made with ceramics passed the 17 volume unit AF noise test limit which was current on the prototype tubes. A discussion is given of the equipment provided and the production rates. Results of the pilot run (over)

AD-97 454

showed the equipment is capable of producing a tube superior to the prototype currently available. It was concluded that the basic equipment was capable, with some duplication and supplementation, of production in the 100,000 per month category. Manufacturing, equipment and processing specifications are appended. An improved military control type of acceptance specification is proposed for the final tube, RTMA 6094. (See also AD-46 078)

AD-97 547 Accession No.

General Hermetic Sealing Corp., Valley Stream, N. Y.
REUSABLE SEALS FOR ELECTRONIC EQUIPMENT, by William Brown and A. Razdow. Quarterly scientific rept. no. 3, 1 Dec 55-29 Feb 56. 7p. incl. illus. (Contract AF 33(616)2994) Unclassified report

Further investigations were conducted on heat-transfer methods. The tests with resistance wire imbedded in the cover of the can showed that special heat-deflecting devices were needed for the reduction of heat transmission. The results obtained for the electrical resistance heating method showed that variation of the surface of the enclosures made the method impractical. Band-heater tests were conducted with overlapped flanged covers. The solder was set up over the joint, and the heating element was wrapped around the joint. Further investigation of the application of the bandheater or preform heater showed asbestos and Fiberglas to be inadequate as insulating materials because of the high (over)

AD-97 547

temperatures required. Heating elements with ceramic beads and a heat-reflecting clamp around the can were successfully used. Heat-transfer tests with induction heating devices showed good results for the steel container, and on the average, sealing was completed in 50 sec. Brass and aluminum containers did not work out as well. New methods of soldering and plating of aluminum were tested and evaluated. No conclusive results were obtained. A general procedure for sealing and unsealing of hermetically sealed enclosures was worked out. The oscillographic temperature indicator was further improved by the application of base line clamping diodes. (See also AD-92 941)

AD-97 649 Accession No.

Chemical and Radiological Labs., Army Chemical Center, Md.
INVESTIGATION OF SOME SEALING METHODS FOR POLYETHYLENE SHEET AND FILM, by John R. Curen and Warren L. Price. 4 Oct 55, 8p. incl. table. (Special rept. no. CRLR 481) Unclassified report

By employing special techniques and procedures, high-frequency heating permits efficient and economical sealing of polyethylene, even in those instances where material thickness and complex item design present unique problems. (CRL conslusions)

AD-97 767 Accession No.

Battelle Memorial Inst., Columbus, Ohio.
INVESTIGATION OF ENCAPSULENTS FOR GROUND ELECTRONIC EQUIPMENT. Final engineering rept. July 55-June 56. 1v. incl. illus. tables [Rept. no. RADC TR-56-102])
(Contract AF 30(635)2919) Unclassified report

An evaluation was made of encapsulating materials to determine the effect of encapsulation on electronic components at high frequencies. Three types of encapsulents were selected for extensive study: epoxides, polyesters, and foam materials. During the screening program, the following results were noted: (1) anhydride-hardened epoxides have better resiliency than the amine-hardened epoxides, and are generally favored for encapsulation purposes; (2) moderate temperature cures are essential to develop optimum physical and electrical properties; (3) plasticizers and inorganic fillers tend to degrade the electrical properties of encapsulents; (4) the electrical properties of the polyamide-epoxy alloys (over)

AD-97 767

are undesirable at elevated temperatures; (5) the electrical grade polyesters are generally rigid and possess undesirable physical properties as encapsulents; and (6) the pure hydrocarbon materials are desirable dielectrics because of the absence of polar groups. Solid resins are too lossy for desirable encapsulation. Foam materials are considered more desirable for electronic equipment than the solid encapsulents because of their low dielectric constant and dissipation factor. For high-frequency encapsulation, a resin modified with urea formaldehyde microballoons proved superior to solid encapsulents. A series of resistors, capacitors, and inductors were evaluated before and after encapsulation in 3 types of resin: Castiplast, Epocast, and Eccofoam. Results indicate that foam encapsulents are the most desirable. In the other materials, a considerable change was noted in the resistance of resistors over the 5- to 100-mc range. The effect of encapsulation on capacitors was negligible above 10$\mu\mu$f. No measurable effects were noted following encapsulation of the inductors normally used for video or wide band amplifier peaking.

AD-98 106 Accession No.

Rubber Lab., Mare Island Naval Shipyard, Vallejo, Calif.
DEVELOPMENT OF O-RING AND GLAND FOR SEALING RG-14A/U CABLE IN UG-665C/U CONNECTOR-RECEPTACLE, by J. Oser. Technical rept. 29 Feb 56 [10]p. incl. illus. (Rept. no. 67-13) Unclassified report

"An O-ring and a gland developed by the Rubber Laboratory for UG-665C/U connector-receptacle and RG-14A/U cable are described. The sealing capability of the O-ring was tested at room temperature at a pressure of 1000 psi. The O-ring maintained a watertight seal against RG-14A/U cable even after the cable and the O-ring assembly had been intermittently oven aged at 158°F, with no pressure applied, for a period totaling 64 hours. The Laboratory recommends the adoption of the O-ring and the gland for use in UG-665C/U connector-receptacle with RG-14A/U cable. The use of these two parts will greatly simplify the design of the connector-receptacle by replacing 7 of its present components." (RL abstract)

AD- 98 205 Accession No.

Frankford Arsenal, Philadelphia, Pa.
MODIFICATION OF BOXES, AMMUNITION, CALIBER. .30, M19A1 AND CALIBER .50, M2A1, by H. L. Berkowitz. 25 Apr 56 [27]p. incl. illus. (Rept. no. 6; Memo. for record no. 1726) Unclassified report

Modifications in the design characteristics and specification requirements for 0.30-cal M19A1 and 0.50-cal M2A1 ammunition boxes were investigated to improve quality and facilitate manufacturing. The grooved-type gasket is superior to the solid-type gasket in meeting the performance requirements of the ammunition box. A greater load is required to compress a solid-type gasket than a grooved-type gasket. A lesser degree of convexity of box cover would result from the use of a grooved-type gasket. A greater loss in compression is obtained when using a solid-type gasket, since it affords a greater distortion of the box because of the higher reactive load exerted. A direct correlation exists between the load required to close the M2A1 ammunition

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AD- 98 205

box (equal to the load exerted by the gasket on the box) and the loss in gasket compression. Ammunition boxes fitted with both the grooved- and solid-type gaskets satisfactorily withstood environmental storage of 24 hours at 165 and -70°F. Reversal of the body seam from the hinge end to the latch end of the box and redesign of the body seam minimized the scrubbing action at the hinge end of the box and eliminated cut gaskets and the localized excessive compression caused by sharp protrusions at the top of the body seam. Modification of the body and cover hinge would have an adverse effect on the functioning of the box after rough handling. The type of paint for ammunition boxes as currently specified affords adequate coverage and protection.

AD- 98 226 Accession No.

Naval Ordnance Lab., White Oak, Md.
PROBLEMS ENCOUNTERED IN THE DEVELOPMENT OF POTTED ELECTRONIC DEVICES FOR A SPECIFIC ORDNANCE APPLICATION, by R. H. Flack and J. O. Mobley. 14 May 56, 22p. incl. illus. tables. (NAVORD rept. no. 4248) Unclassified report

"The development of three devices at the Naval Ordnance Laboratory required encapsulation of electronic assemblies for protection against shock and temperature-humidity effects. Partly, at least, due to the fact that these assemblies were somewhat larger than many encapsulated units, the original potting material cracked or caused destruction of the embedded components when subjected to the JAN Temperature-Humidity Test. The 28 day duration of this test and the necessity for providing a satisfactory material in a short time led to a program of simultaneous evaluation of a number of materials which appeared promising in generally similar applications at NOL and elsewhere. Each material

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AD- 98 226

was checked for its ability to withstand shock, vibration and temperature-humidity tests. Insulation resistance was measured both before and after temperature-humidity testing. The program eventually encompassed 27 material combinations, two of which proved to have exceptionally good properties for the application at hand. Additional experimentation was necessary to determine methods of applying pre-potting protective coatings to certain components, and to select components which would provide suitable ruggedness and stability. The case history of the program depicts the all-out effort which often must be expended in solving problems of this type in connection with accelerated development projects, and points out the need for long range accumulation of practical data on encapsulation to facilitate their solution." (NOL abstract)

AD-98 646 Accession No.
(Unannounced report)

White Sands Proving Ground, N. Mex.
NIKE. INVESTIGATION OF LEAKAGE OF NIKE FUEL-PIPE ASSEMBLY (NIKE TEST PLAN NO. 63). Oct 55 [16]p. incl. illus. tables (Technical memo. no. 265). Unclassified report

AD-99 469 Accession No.

Dugway Proving Ground, Utah.
AGENT LEAKAGE FROM THE E101R3 CLUSTER ADAPTER CONTAINING LEAKING E54R6 BOMBLETS. 23 Mar 56, 30p. incl. table (DPGR rept. no. 170; CW 27-54) Unclassified report

Tests were conducted to determine if leaking E54R6 bomblets would cause the entire E101R3 cluster adapter to be unsafe for normal storage, transportation, or handling. Eight specially constructed containers which underwent a 5-mo open-storage test were divided into 2 groups: group 1 contained complete E101R3 clusters in which 1 or more of the E54R6 bomblets leaked, and group 2 contained only the E101R3 cluster adapters with a container holding 500 cc of agent welded on the inside of the nose plate to simulate a leaking bomblet. Leaking bomblets in the E101R3 clusters are safe for normal storage.

AD-99 495 Accession No.
(Unannounced report)

Engineer Research and Development Labs., Fort Belvoir, Va.
TWELVE-INCH, BENCH-TYPE, ELECTRIC-MOTOR-DRIVEN SEAL LAPPING MACHINE AND ACCESSORIES, by Henry Wilson. 6 Aug 53, 43p. incl. illus. tables (Rept. no. 1310) Unclassified report

AD-99 706 Accession No.

Naval Ordnance Test Station, Inyokern, China Lake, Calif.
DETECTION OF O-RING ON IGNITER CUP OF 2.0-INCH GIMLET ROCKET MOTOR, by J. I. Bujes and D. C. Harms. 23 Apr 56, 13p. incl. illus. (NOTS 1440; NAVORD rept. no. 5241) Unclassified report

"A method of detecting O-rings in assembled rocket motors is described. The detection is performed by the application of cadmium sulfide or cadmium selenide crystals in the presence of X-rays. For field inspection, a 'Go no-go' gage was developed which might be combined with an automatic inspection system for ejecting the defective motor from the conveyor line." (NOTS abstract)

AD-99 741 Accession No.
(Unannounced report)

Material Lab., New York Naval Shipyard, Brooklyn.
QUALIFICATION TEST OF SYNTHETIC RUBBER GASKET MATERIAL, SUBMITTED BY BOSTON WOVEN HOSE AND RUBBER COMPANY, BOSTON, MASSACHUSETTS. Final technical rept. 16 Aug 55, [6]p. incl. table (Lab. proj. no. 5542-16) Unclassified report

AD-100 053 Accession No.
(Unannounced report)

Naval Gun Factory, Washington, D.C.
EVALUATION OF OPTICAL SEALS AND OPTICAL SEALING METHODS: ROTARY TYPE SEALS. 7 May 56 [12]p. incl. illus. table (Rept. no. NGF-T-16-56; NAVORD rept. no. 5169) Unclassified report

AD-100 300 Accession No.
(Unannounced report)

Army Medical Research Lab., Fort Knox, Ky.
THE EFFECT OF LEAKAGE FROM CLOSURES UPON THERMAL PROTECTION, by Steven M. Horvath, John E. Wagar, and Howard Golden. Rept. on Studies of Cold Weather Clothing. 14 June 44 [22]p. incl. illus. tables (Sub-proj. no. 20-1) Unclassified report

AD-100 488 Accession No.

Quartermaster Food and Container Inst. for the Armed Forces, Chicago, Ill.
VACUUM REQUIREMENTS FOR CANNED TOMATOES, Jan 56, 64p. incl. illus. tables. Unclassified report

Symposium Sponsored by the Quartermaster Food and Container Inst., 18 Feb 55.

Contents:
Introduction
Purpose of the symposium
Importance of vacuum in canned foods
Procurement and storage aspects of the problem
Results of survey of current commercial practice
Procurement of canned tomatoes
The problem of vacuum as it affects depot operations
Further considerations in attaining prolonged shelf life
Relationship of vacuum to shelf life
Extending shelf life by means of low temperature storage

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Minimum vacuum requirements - recommendations and decisions

AD-100 836 Accession No.
(Unannounced report)

Krautter-Weber Tool Co., Newark, N. J.
DRIVE, MECHANICAL, ROTARY SEAL (HIGH SPEED) by A. Razdowitz. Monthly letter rept. no. 11, 7 Oct-6 Nov 50. 15 Nov 50, 5p. (Rept. no. 16) (Contract W36-039-sc-44520) Unclassified report

AD-101 003 Accession No.
(Unannounced report)

Lincoln Lab., Mass. Inst. of Tech., Cambridge.
HIGH-PRESSURE LEAK DETECTOR, by William Paul and D. M. Warschauer. 12 May 55, 1p. [Reprint no. JA-347] (In cooperation with Harvard U., Div. of Applied Science)
[Contract AF 19(122)458, Proj. Lincoln]
Unclassified report

Reprint from Review of Scientific Instruments 26:731, July 55.

AD-101 096 Accession No.
(Unannounced report)

Power Plant Lab., Wright Air Development Center, Wright-Patterson Air Force Base, Ohio.
QUALIFICATION TESTS ON PARKER APPLIANCE CO. "O" RINGS, COMPOUND 1011-10, MIL-P-5315A, by C. D. Cannon. 11 Oct 54, 3p. incl. table (Technical note no. WCLP-54-182) Unclassified report

AD-101 097 Accession No.
(Unannounced report)

Power Plant Lab., Wright Air Development Center, Wright-Patterson Air Force Base, Ohio.
EVALUATION OF TESTS OF FUEL "O"-RINGS MANUFACTURED FROM PLASTIC AND RUBBER PRODUCTS COMPANY COMPOUND NOS. 457-60 AND 458-60 TO SPECIFICATION MIL-P-5315A, by E. J. Hildebrand. 24 Sep 53, 3p. incl. table (Technical note no. WCLP-53-256) Unclassified report

AD-101 098 Accession No.
(Unannounced report)

Power Plant Lab., Wright Air Development Center, Wright-Patterson Air Force Base, Ohio.
EVALUATION OF TESTS OF FUEL "O" -RINGS MANUFACTURED OF LINEAR INCORPORATED COMPOUND NO. LEX-60 TO SPECIFICATION MIL-P-5315A, by E. J. Hildebrand. 11 Mar 53, 3p. incl. table (Technical note no. WCLP-53-75)
Unclassified report

AD-101 099 Accession No.
(Unannounced report)

Power Plant Lab., Wright Air Development Center, Wright-Patterson Air Force Base, Ohio.
EVALUATION OF TESTS OF FUEL O-RINGS MANUFACTURED FROM ALBERT TROSTEL AND SONS COMPANY COMPOUND C-901 TO SPECIFICATION MIL-P-5315A, by E. J. Hildebrand. 10 Feb 53, 2p. (Technical note no. WCLP-53-40) Unclassified report

AD- 101 331 Accession No.

Dugway Proving Ground, Utah.
EVALUATION OF THE PRESS-FIT CLOSURE OF THE 155MM M121 AND 105MM M360 SHELL. 24 Feb 56, 272p. incl. illus. tables (Rept. no. ETLR-6-55)
Unclassified report

A total of 3378 M121 and 1582 M360 GB-filled shell were subjected to various sequences of being exposed to temperature extremes (-80° and 160°F), being dropped twice from a truck moving at 30 mph, being dropped thrice from a height of 5 ft, and being vibrated at 1 g for 10 hours. Two of the M360 shell and none of the M121 shell developed agent leakage. It is concluded that: (1) the M121 shell with the current press-fit closure design can be subjected to rough handling and environmental extremes and still remain leakproof to toxic agent. This is also anticipated to be true for the M360 shell, pending final evaluation of the cause of the two agent leakers; (2) with the retention of the 0.0030- to 0.0050-in. interference fit range specification, it can be anticipated
(over)

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that the components of regular production will exhibit the same characteristics as the shell tested at Dugway Proving Ground; (3) there is no apparent difference in respect to agent leakage between shell deviating from specification requirements and those meeting the requirement of Class A shell, as defined in this report; and (4) within the scope of these tests, the press-fit closure is satisfactory with respect to storage, transportation, handling, and safety. (Extracted from report)

AD-101 652 (Unannounced report) Accession No.

Becco Chemical Div., Food Machinery and Chemical Corp., Buffalo, N. Y.
STATIC SEALS FOR CONCENTRATED HYDROGEN PEROXIDE. [1954] 10p. Unclassified report

Presented at Symposium on Aircraft High Temperature Static Seals for All Media, Cleveland, Ohio, 18-19 May 54.

AD-102 156 Accession No.

Pacific Div., Bendix Aviation Corp., North Hollywood, Calif.
FRICTION STUDY OF HYDRAULIC SEALS, by Richard E. Tisch. Rept. on Aircraft Hydraulic Systems and Hydraulic Seal Development. June 55, 63p. incl. illus. tables (WADC Technical rept. no. 55-228) (Contract AF 33(616)183) Unclassified report

"Design of a machine to measure hydraulic packing breakout and running loads is described. Test conditions, as specified by Exhibit 'A' of Contract No. AF 33(616)-183, are described. The method of establishing the final test procedure is described. Gross loads measured in test runs are tabulated. Results of tare-load lap seal runs are tabulated, and graphs show the method of arriving at probable tare loads. Resultant net friction loads are charted to show the relative influence of controlled variables. In order to comply with the intent of the contract it was adjudged necessary to go beyond the letter of the contract. The rea-
(over)

AD-102 156

sons for and results of such additional tests are described. Significant characteristics of packing friction conditions are discussed. It is concluded that data secured in these tests, when combined with existing data on the friction of packings of various diameters, cross-sections, materials and shapes, will enable the designers of airplane and missile hydraulic systems to determine more accurately the actual breakout and running loads. Recommendations are made for additional tests of similar and related nature." (Contractor's abstract)

AD-102 222 Accession No.
(Unannounced report)

Aberdeen Proving Ground, Md.
DEVELOPMENT OF A PROCUREMENT SPECIFICATION FOR ANTILEAK, COMPOUND, RADIATOR, by Virgil O. Hatch. 28 Dec 55, 25p. incl. illus. tables. (Proj. no. TB5-8010A rept. no. 20; Engineering Lab. rept. no. 24) Unclassified report

"Seven commercially available antileak compounds, from six manufacturers were investigated and evaluated for their ability to block 1/32 inch diameter holes and hold under pressure of 15 p.s.i. when employing water or ethylene glycol coolants. A simple leak test unit simulating a vehicle cooling system was constructed for the evaluation. A procurement specification was drafted, based on the physical and chemical properties of the commercial brand compounds. All seven commercial antileak compounds were found to effectively plug 1/32 inch diameter holes and hold under a pressure of 15 p.s.i. when employing water as a coolant.
(over)

AD-102 222

Only three of the compounds were found to effectively plug 1/32 inch diameter holes and hold under a pressure of 15 p.s.i. when employing ethylene glycol antifreeze solutions." (APG summary)

AD-103 928 Accession No.
(Unannounced report)

Naval Ordnance Lab., White Oak, Md.
KINETIC AND STATIC FRICTION OF THE "O" RING TYPE GASKET, by L. E. Hoblin, S. A. Humphrey, and T. E. Dinsmoor. 25 Mar 52, 26p. incl. illus. (NAVORD rept. no. 2281) Unclassified report

"Military applications of small shaft seals are common in underwater ordnance devices. Not infrequently, installations are required where the driving power available to overcome shaft seal friction losses is small, and the design engineer must be able to predict these losses with some degree of precision. Available data from which such predictions can be made is limited. Therefore to provide supplementary data on the character of the frictional forces to expect when employing 'O' ring type gaskets, this survey was undertaken by the Torpedo Engineering Division of the Naval Ordnance Laboratory and the results are presented herein in the form of design work sheets." (NOL abstract)

AD-105 235 Accession No.
(Unannounced report)

Boeing Airplane Co., Wichita, Kans.
SEALING DOCUMENT FOR B-47B AND B-47E AIRPLANES. 16 May 49. rev. 17 Feb 56 [402]p. incl. illus. (Document no. D-9840) Unclassified report

AD-105 415 Accession No.

Rock Island Arsenal Lab., Ill.
THE DETECTION OF NITROGEN LEAKAGE IN A HYDROPNEUMATIC RECOIL MECHANISM BY MEANS OF A TRACER, by Harry C. Muffley. Technical rept. 18 July 56, 14p. incl. illus. tables. (Proj. no. TB5-5010B; rept. no. 3; RIA Lab. rept. no. 56-2077) Unclassified report

A technique was developed for determining the amount of N that leaks past the floating piston of a hydropneumatic recoil mechanism into the recoil oil. This value would be used to establish the serviceability of the mechanism. The leak detector is a GE type H-1 which operates on the basic principle of the halide torch commonly used in refrigerator work and is sensitive to halogen but not to N. The instrument will detect a leak so small that in 1 yr one-hundredth of an ounce of Freon would pass the opening. The leak detector was limited in establishing the magnitude of the leak, but it did indicate qualitatively that gas does
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AD-105 415

pass the floating piston of a hydropneumatic recoil mechanism into the coil.

AD- 105 671 Accession No.

Naval Air Test Center, Patuxent River, Md.
EGLIN AIR FORCE BASE, CLIMATIC LABORATORY COLD WEATHER TEST OF TEFLON BACK-UP RINGS AS INSTALLED IN THE HYDRAULIC AND PNEUMATIC SYSTEMS OF THE F7U-3 AIRPLANE. Rept. no. 1 (Final) 1 Aug 56 [28]p. incl. illus. tables. (Proj. TED no. PTR-AC-1301. 13. 1; Serial no. ST37-222) Unclassified report

This report covers the cold-weather evaluation of the Teflon back-up ring installed in lieu of the AN 6291 leather back-up ring in the universal fittings of the pneumatic and hydraulic systems of the F7U-3 airplane. The test program consisted of general operational tests of those systems down through -65°F. It is concluded that: (a) the Teflon back-up ring is superior to the AN 6291 leather back-up ring as used in the universal type fitting, (b) the MS "flareless" type fitting is the best fitting tested for use in 3000-psi hydraulic and pneumatic systems, (c) operation of the inverter (P/N
(over)

AD-105 671

NE5109-2) is unacceptable at cold soaked temperatures below 0°F, and (d) the Bendix selector valves are unsatisfactory for operation at 0°F and below. (Extracted from report)

AD- 105 754 Accession No.

Kentucky Research Foundation, Lexington.
AN INVESTIGATION OF SOME PROPERTIES OF SOLUTIONS OF DIPOLAR IONS IN SEVERAL NONAQUEOUS SOLVENTS, by Paul G. Sears. Final rept. for Sep 55-Aug 56. 6 Sep 56, 4p. (Contract DA 33-008-ORD-1153) Unclassified report

The dielectric properties of solutions of dipolar ions in nonaqueous solvents: The dielectric increment per mole of solute per 1000 g of solvent was determined for (1) sulfamic acid (I) in N, N-dimethylpropionamide(II), N, N-dimethylbutyramide (III) and several dimethyl sulfoxide (IV) and N, N-dimethylacetamide (V) mixtures at 25° and in IV and V at 25°, 35°, 45°, and 55°C; (2) sulfanilamide in N, N-dimethylformamide, II, acetone, 2-butanone, and 3-pentanone at 25°, in N-methylacetamide (VI) at 33°C and in V and IV at 25°, 35°, 45°, and 55°C; and (3) several other sulfa drugs in IV at 25°C and in VI at 33°C. The dielectric increment for I in each of the amides was about 13 dielectric
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AD-105 754

units/mol of solute/1000 g of solvent at 25°C but for I in IV was less than 8. At 25°C, the dielectric increment/mole of sulfanilamide/1000 g of solvent was greater than 13 in each of the amides and between 9 and 11 in the 3 ketones. Viscosities of solutions of dipolar ions and other substances in nonaqueous solutions: Absolute viscosities were determined at 25°C for (1) I, p-aminobenzoic acid, benzenesulfonamide, sulfanilamide, and urea in IV; (2) I and KSCN in V; and (3) I in II. For IV solutions, the increase in viscosity with increasing molal concentration was sulfanilamide >I>p-aminobenzoic acid >benzenesulfonamide> urea. For V solutions, the increase in viscosity with increasing molal concentration is greater for I than for KSCN. The increase of viscosity with concentration of I for II solutions is about the same as for V but is greater than that for IV. Densities and apparent molal volumes: The densities of solution of I in II, III, IV, V and H_2O were determined at 25°. The apparent molal volume of I in each solvent was calculated to be less than the theoretical value and was almost constant for the 3 amides as solvents.

AD-106 511 Accession No.

Naval Gun Factory, Washington, D. C.
IMPREGNATION OF POROUS METAL CASTINGS, by L. F. Hatakeyama. Progress rept. 19 July 56, 5p. (Technical rept. no. NGF-T-41-56; NAVORD rept. no. 5189) Unclassified report

A study is being conducted on impregnants and impregnating methods to utilize the improvements brought about by the continuing development of plastomeric materials and processes in industry. Tentatively, it is hoped that the results of the study will be used to consolidate and modernize government specifications. A review of current government specifications or impregnants and impregnating methods showed that there is a notable absence of specifications governing the impregnation of ferrous metal castings. A survey showed that the drying oils and sodium silicate solutions are being displaced by the plastomeric sealants which are mostly phenolformaldehyde and polyester-styrene types. Mention is made of a new application of plasto- (over)

AD-106 511

meric materials (expoxide resins) to impregnate, encapsulate, and pot electrical components by methods similar to those used in the impregnation of castings. Except for mention of Cu interference with polymerization of the obsolete, unstabilized polyester-styrene sealants, it was believed that there is no condition that would prevent the impregnation of any particular casting alloy by any of the existing plastomeric sealants. A vacuum-pressure apparatus was set up to impregnate porous test specimens. The impregnation procedure to be followed is roughly outlined in MIL-STD-276 (impregnation of nonferrous metal casting), and inorganic and tung oil impregnants will be used to permit a comparison. The apparatus consists of a 2-gal impregnating tank, a Victor A-375 compressed air regulator, a compound gage, a Cenco rotary vane pump, and the necessary fittings.

AD-106 719 Accession No.

Consolidated Vultee Aircraft Corp., Fort Worth, Tex.
POD, INTEGRAL FUEL TANK, SEALING SYSTEM FUEL TIGHTNESS AND STRUCTURAL EVALUATION TEST PROGRAM FOR B-58 PODS, by C. E. Sisler. 19 Dec 55, rev. 20 June 56, 5p. incl. illus. (Rept. no. FZM-4-395; Supersedes rept. no. FZM-4-395, AD-95 154)
(Contract AF 33(038)21250) Unclassified report

AD-106 754 Accession No.

Armour Research Foundation, Chicago, Ill.
DEVELOPMENT OF HIGH-LOW TEMPERATURE AIRCRAFT CANOPY SEALS. PART I. NEW MATERIAL SEALS OF CURRENT DESIGN, by Joseph S. Islinger. June 56, 44p. incl. illus. tables. (WADC Technical note no. 55-441, pt. 1)
(Contract AF 33(600)27588) Unclassified report

"Silicone rubber seals were evaluated in Part I of a program to develop high-low temperature cabin pressurization and rain seals to be used with present and future aircraft canopies. Three seal designs considered to be representative of diaphragm, inflatable and non-inflatable canopy seals on current aircraft were evaluated. The seals fabricated from recently developed silicone elastomers, were to be capable of functional operation at extreme temperatures of -85°F and +200°F. The evaluation tests were conducted with each seal installed in a test fixture simulating a 'half-size' aircraft canopy. The seals were subjected to ambient tempera- (over)

AD-106 754

tures of +75°F, -85°F, and +200°F and were checked for leakage while the canopy was pressurized. The seals were also subjected to 25 open-close pressure cycles at a temperature of -65°F and 1000 open-close pressure cycles at room temperature. The inflatable seal generally appeared to be more effective than the non-inflatable one in sealing the canopy fixture against a maximum differential pressure of 12 psi. The diaphragm seal was not evaluated because a satisfactory installation could not be obtained. All designs are capable of preventing moisture from entering the pilot enclosure when the canopy is closed. However, the inflatable seal must be inflated in order to do so."
(Contractor's abstract)

AD-106 777 Accession No.

New York U. Coll. of Engineering, N. Y.
SEALING TECHNIQUES FOR WAVEGUIDE AND COAXIAL ROTARY JOINTS, by Milton M. Sackman, Michael B. Maccarone, and Fred H. Posser. Quarterly progress rept. no. 7, 1 Mar-31 May 56. 25p. incl. illus. table.
(Contract DA 36-039-sc-64476) Unclassified report

An experimental model of an RG-52 rotary seal (AD-94 809) was subjected to 400 hr of testing. The nitrogen supply tank, the pressure regulator(s) and the values, and routing assemblages of the test set-ups are described. Results from these tests indicate the soundness of the design of this type of a rotary seal. The torque values obtained during normal running were no higher than 1 3/4 in.-lb. The temperature rise was such that there was less than 30°F differential between room temperature and the rotary seal outer wall temperature. The leakage rate amounted to 126 x 10^5 cc/yr based on 1 atm and a working pressure of 60 and 59 psi.
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AD-106 777

The grease used in the bearing was supplied by the Signal Corps (PD-603) and the grease used at the seal surfaces was manufactured by Lehigh Chemical Co and is designated L-793 synthetic instrument grease. Fabrication is reported of 2 additional RG-52 rotary seals.

AD-107 274 Accession No.

Armour Research Foundation, Chicago, Ill.
HERMETIC SEALING TERMINALS, by Geroge A. Forster. Rept. for 15 July 54-30 Apr 56 on Improved Electronic Components. 46p. incl. illus. tables.
(WADC Technical rept. no. 56-251)
(Contract AF 33(600)27674) Unclassified report

"The purpose of this project was determine the requirements for hermetic sealing terminals in military airborne electronic equipment and to compare these requirements with the capabilities of present terminals. Information from the Air Force, manufacturers, and users of hermetic terminals was analyzed to determine requirements and tests suitable for terminals. The important electric characteristics are dielectric strength, corona voltage, current capacity, and insulation resistance. Tests related to environmental conditions include temperature aging, temperature cycling, temperature shock, vibration, mechanical shock, moisture resistance, terminal strength, salt spray and gas leakage. Approximately 100 groups of 20 each, of
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AD-107 274

all typical types and manufacture of hermetic terminals, were tested. About 70 per cent of the groups failed in one or more respects. One cause of high failure rate was the high initial temperature rating of some groups. If re-tested at a lower temperature rating these groups may pass. It was found that vibration and shock tests were not necessary to evaluate hermetic terminals. Allowable gas leakage should be less than 10^{-9} cubic centimeters per second at a differential pressure of one atmosphere and a temperature of 25°C. More leakage than this indicates a seal which will deteriorate to complete failure. Surface cracks in vitreous insulations are few and do not constitute a major problem. The moisture-resistance test caused the most failures. These failures were perhaps due to the accentuating of incipient failures from previous tests. No one type or style of terminal is markedly superior nor is classed as general purpose." (Contractor's abstract)

AD-107 713 Accession No.

Naval Ordnance Lab., White Oak, Md.
EVALUATION OF SEALING METHODS FOR BASE FUZE, MK 28, by A. R. Timmins. 9 May 56 [27]p. incl. illus. tables, 17 refs. (NAVORD rept. no. 3946)
Unclassified report

"An evaluation program was conducted on two sealing methods used on the Base Detonating Fuze Mk 28. Approximately 250, 200, and 60 fuzes respectively were used in the tests on (a) metal injection sealed fuzes, (b) seam welded fuzes, and (c) regular production fuzes. Leak tests were conducted using a Mass Spectrometer Leak Detector on fuzes as received and after various types of conditioning tests. In addition, detonator safety and functioning tests (gun fired and initiated by water impact in tests conducted at the Naval Proving Ground, Dahlgren, Virginia) were made. Fuzes sealed with the metal injection method and those sealed with the seam weld method had excellent seals which were not affected by adverse environmental conditioning nor
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AD-107 713

by mechanical rough handling, transportation vibration, etc." (NOL abstract)

AD-107 802 Accession No.
(Unannounced report)

Aerojet-General Corp., Azusa, Calif.
DEVELOPMENT OF AN IMPROVED BOMB SEALANT, by J. M. Wrightson. Informal progress rept. no. 1, 10 May-9 June 56. 21 June 56, 3p. (Rept. no. L 1911-1)
(Contract DA 28-017-501-ORD-2115)
Unclassified report

"The project has been initiated and preliminary studies have been made to determine the most feasible methods to be followed in developing suitable materials for use as a bomb sealant. Procurement of raw materials and equipment is in process, and it is expected that formulation and testing work can be started in the next report period. The initial emphasis will be placed on development and evaluation of foamed-in-place polyurethane compositions." (Contractor's summary)

AD-107 960 Accession No.

Army Ballistic Missile Agency, Huntsville, Ala.
TESTS WITH INFLATABLE SEALS USING SURGICAL RUBBER TUBING, by Oscar C. Holderer and Robert A. Winkless. 10 July 56, 23p. incl. illus. (Research rept. no. 1R15) Unclassified report

"The design of the tubing connectors, the geometry of the tubing and the tubing retaining groove were found to be satisfactory for the intended application. It was observed that after deflation the tubing will retract properly into the groove to prevent damage by chafing or pinching. The relationship between gap size, inflating pressure, and pressure differential across the seal has been established; empirical equations have been presented. The following trends are deduced: (a) Each gap size is associated with a definite upper limit for the inflating pressure before extrusion occurs. This relationship can be approximated by an exponential function where the gap size appears as the exponent. (b) The minimum inflating pressure, necessary to seal
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AD-107 960

against a differential pressure, is equal to this pressure differential plus a fixed value which is essentially independent of the gap size and the pressure differential to be sealed. (c) The upper limit of pressures for which inflatable seals of this type may be used is dictated mainly by the size of the gap. At higher pressures and if gas is the medium which is to be sealed the tubing must be inflated before the pressure differential is established. Otherwise the rubber tubing will become damaged by 'burning' just prior to sealing." (Contractor's conclusions)

AD-108 632 Accession No.
(Unannounced report)

Krautter-Weber Tool Co., Newark, N. J.
DRIVE, MECHANICAL, ROTARY SEAL (HIGH-SPEED) by A. Razdowitz. Monthly letter no. 6, 7 Feb-6 Mar 50. 10 Mar 50, 5p. (Rept. no. 8)
(Contract W36-039-sc-44520) Unclassified report

AD-108 720 Accession No.

Ontario Research Foundation (Canada).
INVESTIGATION INTO THE SEALING OF QUARTZ CRYSTAL HOLDERS TYPE HC-6/U, by B. W. Schumacher. Final rept., Nov 54-Mar 56. 1v. incl. illus. tables.
(Contract P 69-10-116) Unclassified report

Solder sealing as a satisfactory method of hermetically sealing quartz crystal units in the crystal holder type HC-6/U was investigated. The investigation included (1) studies of the effects of external conditions such as temperature, humidity, and salt spray on the sealing to be followed by recommendations for refinements in the technique of solder sealing; and (2) development of a reliable method of production testing of the crystal seals. A high percentage of crystal units which were stored for some period of time showed a failure called dipping. The resason for the dips is probably the condensation of water vapor on the crystal faces; other volatile materials are also considered such as residues
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AD-108 720

of the soldering flux. Destructive tests showed that leaks were present; they were attributed to poor soldering. (See also AD-82 917)

AD-109 660 Accession No.
(Unannounced report)

Raytheon Mfg. Co., Waltham, Mass.
CERAMIC-METAL SEAL OUTGASSING STUDY, by R. J. Dyer and M. L. Weiss. Quarterly scientific rept. no. 1, 1 Apr - 30 June 56. 6p. incl. illus. (Rept. no. QK-608-51; [AFCRC TN-56-757])
(Contract AF 19(604)1826) Unclassified report

AD-110 287 Div. 8, 14, 26
(Unannounced report)

Raytheon Mfg. Co., Waltham, Mass.
CERAMIC-METAL SEAL OUTGASSING STUDY, by R. J. Dyer and M. Weiss. Quarterly scientific rept. no. 3 on QK608, Oct-Dec 56. 3p. (AFCRC-TN-57-153)
(Contract AF 19(604)1826) Unclassified report

AD-110 390 Div. 30/3

Maryland U., College Park.
VARIABLE MICROLEAK, by John L. Davis. 15 Nov 56 [4]p. incl. illus. (Technical rept. no. 59; OSR TN-56-569)
(Contract AF 18(600)1582) Unclassified report

A satisfactory method of testing helium sensitive mass spectrograph leak detectors is presented. The detector is evacuated to a pressure within its operating range and then the pressure is raised to a standard amount by admitting a gas mixture containing a known concentration of helium. The resulting indication is a direct measure of the sensitivity. A valve or leak that can be varied is essential to raise the pressure the known amount. A valve which is easily made and fulfills all the requirements for this method of testing is described as well as an apparatus for preparing a known concentration of helium. The soft brass valve body is made on a lathe and the seat is formed by reaming with a 5/0 standard taper pin reamer. It is recommended that the
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AD-110 390

reaming be done on a lathe to insure accurate centering. The threads on the stem were cut after the body was threaded, and the body was used as a gage for the diameter of the stem threads. The leakage rate was variable from 0 to 4×10^{-7} standard liters/sec with about 1/2 turn of the stem. It was possible to control the pressure in the leak detector to within $\pm 3 \times 10^{-7}$ mm Hg. With an Octoil Manometer, it is possible to measure a concentration of helium in air of about 1 part in 3000 to about 10%.

AD-110 636 Accession No.

Koppers Co., Inc. [Baltimore, Md.]
EVALUATION OF DESIGNS AND MATERIALS FOR HIGH SPEED-HIGH TEMPERATURE SHAFT SEALS FOR TURBOJET ENGINE APPLICATIONS, by Ernest J. Taschenberg. Rept. on Gas Turbine Technology. 15 May 56, 66p. incl. illus. tables (WADC Technical rept. no. 56-267)
(Contract AF 33(616)3004) Unclassified report

Includes AD-110 636(a)

"With the constant upward trend in operating conditions in aircraft turbojet engines, it has been necessary to re-design engine rubbing shaft seals and find new materials to meet these conditions. This program was initiated to facilitate the development of a shaft seal which would operate satisfactorily under extended conditions of speed, temperature and pressure. Since shaft seals necessarily involve rubbing surfaces, a large number of materials were investigated to de-
(over)

AD-110 636

termine those having promising wear characteristics at room temperature and at high temperature. The subject of shaft seal design was reviewed with respect to the adaptability of such new materials to the several designs incorporating these materials." (Contractor's abstract)

AD-111 249 Accession No.

Aberdeen Proving Ground, Md.
TEST OF T41E1 RUBBER BLADDER FUEL CELLS, by D. A. J. Misiora and J. R. Fraylick. Final rept. 30 Mar 56 [26]p. incl. illus. (Proj. no. TT1-649A, rept. no. 2) Unclassified report

AD-112 953 Accession No.

Sciaky Bros., Inc., Los Angeles, Calif.
WELDING DEVELOPMENT PROGRAM FOR MUNITIONS CLOSURES, by S. Robelotto. [Monthly progress] rept. no. 12, 1-30 Sep 56. 1 Oct 56, 42p. incl. illus. tables [CWL rept. no. 420:6-2/12] (Contract DA 18-108-cml-5860) Unclassified report

The 4 thin-wall munition geometries were successfully sealed with each closure design (a 45° double bevel, a flat disk, and a 7/8-and a 1 3/8-in. Welch plug). The 4 shell-blank geometries may be welded on the PMCO2STK Spotwelder, but the geometries with hole diameters of 1.25 in. require almost maximum current output and long welding times. The 45° double-bevel and flat-disk closure caps were the most reliable and satisfactory closures. A method of measuring current is described for use on the weld of heavy wall munition seals. The 3 primary leads are inserted in the current transformer so that their currents induce a voltage in the current transformer. An ammeter is connected to (over)

AD-112 953

the current transformer, and the primary and secondary current of the welding transformer are calculated by the use of the transformer ratio. (See also AD-107 534)

AD-113 178 Accession No.
(Unannounced report)

Engineer Research and Development Labs., Fort Belvoir, Va.
ADAPTION OF COMMERCIAL VACUUM-SEAM-TESTER FOR BOLTED STORAGE TANKS, by W. L. Nelson. 1 Sep 55, 28p. incl. illus. (Rept. no. 1424) Unclassified report

"This report covers the work done to adapt a commercial vacuum-seam-tester (normally used in locating leaks in the bottom of welded storage-tanks) for use in locating leaks in the bottom of bolted storage-tanks. The end result of this investigation was the preparation of drawings and specifications of a vacuum-seam-tester for bolted storage-tanks. The drawings appear in this report as Appendix B. The specifications are in preparation. Two commercial seam-testers were tested; both identical except that the vacuum pump of one is powered by an electric motor and that of the other by a gasoline engine. All the component parts of the com- (over)

AD-113 178

mercial model proved satisfactory except the inspection-box, the edges of which would not fit between the protruding bolts on the tank bottom. An inspection-box having dimensions that allowed the edge of the box to fit between the tank bolts was then designed and fabricated at ERDL. Service tests made on this design showed that the seam-tester will satisfactorily locate seam leaks in the bottom of bolted tanks." (Extracted from report)

AD-113 822 Accession No.

Material Lab., New York Naval Shipyard, Brooklyn.
QUALIFICATION OF SYNTHETIC RUBBER CALKING COMPOUND NO. 3C-1200 AND PRIMER NO. 3C-1200 SUBMITTED BY CHURCHILL CHEMICAL CORPORATION, LOS ANGELES, CALIFORNIA. Final technical rept. 25 June 56 [6]p. incl. tables (Lab. proj. no. 5708-3) Unclassified report

"The 3C-1200 calking compound failed to conform to the requirements of Mil Spec MIL-C-18255 (SHIPS) with respect to: (a) tensile strength (initial) of molded specimens, (b) hardness (aged) of molded specimens, and (c) average extensibility of adhesion specimens after 7 days oven aging." (ML conclusions)

AD-113 830 Accession No.

Material Lab., New York Naval Shipyard, Brooklyn. QUALIFICATION OF SYNTHETIC RUBBER CALKING COMPOUND NO. 14012 AND PRIMER NO. 21011, MANUFACTURED BY ARMSTRONG CORK COMPANY, LANCASTER, PENNSYLVANIA. Supplementary technical rept. 7 Aug 56 [6]p. (Lab. proj. no. 5708-2)
Unclassified report

"The No. 14012 calking compound failed to conform to the specifications with respect to: (a) tensile strength (initial) of molded specimens, (b) hardness (initial) of molded specimens, and (c) average extensibility of adhesion specimens after 7 days oven aging at 158°F." (ML conclusions)

AD-116 938 Div. 4/1, 14/9

Atomic Energy Research Establishment (Gt. Brit.). HIGH VACUUM SHAFT SEALS, FLANGED JOINTS AND THE GASSING AND THE PERMEABILITY OF RUBBER-LIKE MATERIALS, by R. H. V. M. Dawton. July 56 [39]p. incl. illus. tables (AERE rept. no. GP/R 1875; HD-2318)
Unclassified report

High-vacuum measurements are presented on: (1) vacuum shaft seals at 20°C and 120°C; (2) the gassing and the permeability of rubber and rubber-like substances; and (3) the effect of flanged joints (including a silastic gasket joint operating at 300°C) in a high vacuum system. (Author)

AD-116 389 Div. 11/12, 13/1, 14/1, 14/9, 30/3, 30/5

Southern Research Inst., Birmingham, Ala. DESIGN AND CONSTRUCTION OF TEST EQUIPMENT FOR EVALUATING SEALING CHARACTERISTICS OF NON-METALLIC GASKETS, by Jack S. Barr and Sabert Oglesby, Jr. Final progress rept. 5 Nov 56, 27p. incl. illus. tables, 18 refs. (Rept. no. 2905-738-8)
(Contract DA 01-009-ORD-468) Unclassified report

A test facility was sought for measuring the sealing characteristics of gasket materials ranging from cork to compressed asbestos. The tester was to be suitable for testing under such conditions as -65° to 500°F and 3 to 4000 psi. Tester traps the fluid that leaks past a gasket and measures the volume of this fluid. The loading frame for the tester consists of a manually operated jack capable of a 20,000-lb load. Tests were made on 10 representative gasket materials at room temperature; one sample was tested at 215°F against nitrogen, and another was tested at room temperature against a
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AD-116 389

silicone base oil. The range of characteristics of the materials tested is demonstrated by the shapes of the leakage rate curves. The harder materials show leakage of gas at very low locked-up pressures. The softer materials do not show appreciable leakage until much higher locked-up pressures are reached. An apparent discontinuity in the curves plotted with nitrogen as the test fluid indicates that no leakage of gas occurs up to a clearly defined pressure. Once this pressure is exceeded, the leakage rate increases at a rapid rate. The apparent critical pressure can be used as an index of the sealibility of the gasket material. The apparatus provided gives a sensitive and reproducible method for measuring leakage of both gases and liquids past a gasket. The sensitivity obtained is about 0.02 ml/min of fluid past the gasket with a 1-min sampling time.

AD-117 021 Div. 8/4, 26/1

Raytheon Mfg. Co., Waltham, Mass. CERAMIC-METAL SEAL OUTGASSING STUDY, by R. J. Dyer and M. Weiss. Final rept. 1 Apr-31 Dec 56. 10p. illus. tables (Rept. no. QK608; AFCRC TR-57-162)
(Contract AF 19(604)1826) Unclassified report

The total amount of each gas evolved and individual gas evolution rates were determined for test assemblies brazed with the following solders: Ag-Cu eutectic, 80% Au-20% Cu, Ag, and pure Cu. Attempts to braze with Incosil-15 (Ag-Cu-In alloy) solder resulted in leaky seals. Evolved gases were analyzed with a mass spectrometer. The test assemblies were baked out for about 6 hr, during which time the gas evolved was collected and analyzed. The gases evolved were H, CO, water vapor, and CO_2. The maximum rate of H evolution ranged from 2.3×10^3 to 1.1×10^4 cc μ/min at an average temperature of 400°C; the rate decreased to an average of 31 cc μ/min at the end of the 6-hr heating
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AD-117 021

period. The average maximum rate of CO was 79 cc μ/min at temperatures ranging from 651° to 702°C; the rate decreased to an average of 36 cc μ/min at the end of bakeout period. Water-vapor evolution decreased to a negligible value at the end of about 3 hr of bakeout at about 650°C. The CO_2 average maximum rate of evolution reached about 46 cc μ/min at temperatures ranging from 256° to 495°C. The CO_2 evolution rate decreased to a negligible value after about 155 min of bakeout from 651° to 704°C. (See also AD-122 254)

AD- 118 047 14/1, 2, 8 17/2 30/3, 5

Horizons, Inc., Cleveland, Ohio
DEVELOPMENT OF FRICTION-SEAL MATERIALS FOR HIGH TEMPERATURE-HIGH SPEED OPERATION, by Peter F. Mataich. Rept. for July 55-July 56, on Metallic Materials. Feb 57, 18p. incl. illus. tables (WADC Technical rept. no. 56-579)
(Contract AF 33 (616)3134) Unclassified report

A study was made in an attempt to find materials suitable for use as friction seals under conditions of high temperature and high rubbing speeds. A special test rig for screening the materials under simulated operating conditions was designed and constructed. It was found that the group of materials evaluated in the present program showed excessive wear under the severe operating conditions required. This excessive wear was attributed to the excessive temperatures reached at the mating surfaces when the lubricating oil film broke down, and it is suggested that this condition could be remedied by incorporating a lable

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AD-118 047

solid lubricant in the seal material itself. (Author)

AD-118 213 Div. 14/1, 14/8

Hydra-Power Corp., New Rochelle, N. Y.
INVESTIGATION OF HYDRAULIC LOW FRICTION TEFLON CAP SEALS, by John O. Bruno. Rept. on Aircraft Hydraulic Systems. Dec 57, 56p. incl. illus. tables (WADC Technical rept. no. 57-163)
(Contract AF 33(600)28637) Unclassified report

Test apparatus was designed and built, and a series of tests were conducted, to provide design data covering a low friction rod seal composed of a standard AN6227 O ring seal and a Teflon cap which fits around the inside periphery of the O ring. Basic requirements included the use of Mil-O-5606 hydraulic oil, a 1-in. rod (0.997 ± 0.001), a rod stroke of 4 in. minimum, and impulse pressures of zero to 3000 psi applied while the rod was cycling at 30 ± 5 cycles/min; consideration was given to temperatures in excess of 160° F. During the tests, the dimensions of the Teflon cap were varied as well as the surface finish, packing squeeze, side loads,

(over)

AD-118 213

and extrusion gap. The results of tests for the 0.031-in. Teflon cap indicate that (1) the thicker section of the cap facilitates manufacture and installation, (2) the leakage characteristics of the seal are unaffected by O-ring squeeze (0.015 to 0.028 in.), (3) the surface finish of the Teflon cap and rod may be as high as 18 rms, but the better finish should lower the break-out friction, (4) the Teflon cap must be about 0.007 in. smaller in inside diameter than the rod, (5) a 0.003-in. radial extrusion gap may be used, (6) a 55 Rockwell C hardness for the rod is suggested, (7) nominal side loads from about 2° misalignment does not affect leakage, (8) no leakage change because of temperature was indicated, (9) the impulse breakdown of the O ring as a static seal seems to limit the life of the O ring and cap, and (10) leakage with rod travel in the same direction as applied pressure was below the 1 cc/1000 cycles allowable.

AD-118 597 Accession No.

[Material Lab.] New York Naval Shipyard, Brooklyn.
VARIABLE PITCH PROPELLER SEALS; CHEMICAL ANALYSIS OF. Final rept. 21 Nov 56, 3p. (Lab. proj. no. 5901-1) Unclassified report

AD-119 330 Div. 11/2, 14/1, 14/6, 14/9, 26/6 27/1

Material Lab., New York Naval Shipyard, Brooklyn.
O-RINGS USED TO SEAL CYLINDER LINERS OF DIESEL ENGINES, by S. A. Eller and A. A. Stein. Final technical rept. 12 Dec 56, 1v. incl. illus. tables. (Lab. proj. no. 5354-9) Unclassified report

Available to U. S. Military Organizations only

An investigation was conducted to determine the suitability of Neoprene, Buna N and silicone O-ring gaskets for use in cylinder liners of diesel engines. Ten O-ring gaskets obtained from commercial sources and from stock were subjected to simulated service conditions. Following each test condition the back load, which is a measure of the sealability of the O-ring, samples, was measured with the Material Laboratory compression stress relaxation apparatus. In addition, the overall height and hardness of the samples were measured. The percent load relaxation of the samples after aging in a Geer oven for 2 weeks at 194±2F and after immersion

(over)

AD-119 330

in distilled water for 2 weeks at 194±2F while in a compressed condition were calculated. Based on these results recommendations were made regarding requirements for inclusion in a specification for this type of O-ring. (Author)

AD-119 437 (Unannounced report) Div. 27/2

National Advisory Committee for Aeronautics, Washington, D. C.
A BALANCED-PRESSURE SLIDING SEAL FOR TRANSFER OF PRESSURIZED AIR BETWEEN STATIONARY AND ROTATING PARTS, by Arthur N. Curren and Reeves P. Cochran. 9 Jan 57, 17p. incl. illus. (Research memo. RM E56I11) Unclassified report

Available to U. S. Military Organizations. Others direct requests to NACA, Wash., D. C.

A balanced-pressure sliding seal was developed to satisfy the need for a seal capable of transferring high-pressure air from stationary to rotating parts with a minimum of leakage. This seal was designed in connection with experimental investigations of air-cooled turbine rotor blades in turbojet engines where high sliding velocities and high ambient seal operating temperatures are encountered. The seal consists of two

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AD-119 437

stationary concentric carbon-base seal rings sliding on a rotating chromium-plated disk. Blade cooling air passes through the center of the rings and the disk, and pressure-balancing air is introduced into the annular space between the two rings. The seal was investigated experimentally to determine the amount of cooling-air leakage, the quantity of pressure-balancing air required, the temperatures of the sliding surfaces, and the wear of various seal parts. At sliding velocities up to 10,000 feet per minute and cooling-air pressures up to 38.3 pounds per square inch absolute, no leakage of cooling air occurred. The quantity of balance air required to operate the seal was about one-fourth to one-eighth the quantity of cooling air lost in leakage with the labyrinth seals used in this application under the same operating conditions. External cooling of the sliding surfaces was required to keep the temperatures below the oxidizing temperatures of carbon-base seal rings. The rate of wear on the seal rings was unmeasurable on the inner ring and about 0.0005 inch per hour on the outer ring. (Author)

AD-119 763 Div. 22/1, 26/1

Sciaky Bros., Inc., Los Angeles, Calif.
WELDING DEVELOPMENT PROGRAM FOR MUNITIONS CLOSURES, by S. Robelotto. Progress rept. no. 14, 1-30 Nov 56. 1 Dec 56, 29p. incl. illus. tables [CRL rept. no. ETF 420.6-2/13] (Contract DA 18-108-cml-5860) Unclassified report

Techniques for the welding of thin-wall munitions seals were investigated. A total of 330 specimens, representing various combinations of munition blanks and closure caps, were welded. The welding equipment consisted of a RMCO 5STK Spotwelder (220,000 amp maximum secondary current and 18,500 lb maximum welding pressure), a RMCO 2STK Spotwelder, and a RMCO 2ST Spotwelder (70,000 amp maximum secondary current and 4500 lb maximum welding pressure). Methods of reducing weld phase shifts and the verification of tentative weld schedules were studied, and the effectiveness of various electrode face diameters on specific specimen combinations were investigated. These weld-

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AD-119 763

ing schedules resulted in leaktight specimens of good weld strength. (See also AD-117 992)

AD-121 294 Div. 22/12

Aberdeen Proving Ground, Md.
DOUBLE LIP SEAL FOR COMPENSATING IDLER, by L. G. Bach. Final rept. Partial rept. no. 10 on Production Engineering of Components for Tank, 90mm Gun, M48. Jan 57 [17]p. incl. illus. (Proj. no. 251-037-03, rept. no. 1) Unclassified report

Available to U. S. Military Organizations. Others direct requests to Office, Chief of Ordnance, Wash., D. C., Attn: ORDTX-AR

Twelve double lip seal installations were tested to determine seal performance by using light oil (OE 10) and operating on paved, gravel, and cross-country courses. Five M48 tanks were used. Eight seals were used for 2000 miles with small additions of oil; the remainder failed at points between 620 and 1847 mi. Seal deficiencies included cutting and folding under of the outer lip and cutting of the inner lip by the spindle. The double lip seal is superior to the standard single (over)

AD-121 294

lip seal but performance is dependent on a complex installation procedure. The felt ring used in the standard seal installation provides an effective barrier against foreign materials when used in conjunction with a double lip seal. (Author)

AD-121 339 Div. 14/1, 14/9, 30/3

Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
GASKET SEALS, by C. Ross Bloomquist. Final rept. 1 July 55-30 Sep 56. 25p. incl. illus. tables (Rept. no. F-A-1858)
(Contract DA 36-034-ORD-2083, Proj. TR 5-5059T)
Unclassified report

The sealing efficiency of Buna N and cork-rubber rectangular gaskets sealed in aluminum cells with an air pressure difference of 15 psi was determined. Correlations were attempted between sealing efficiency, gasket materials and properties, and seal design parameters. It was found that the ambient temperature, type of gasket material and its compression-set characteristics probably establish the level of sealing efficiency. Generally, seals made with rectangular Buna N gaskets leaked less than comparable ones made with rectangular cork-rubber gaskets. A limited number of leak rate measurements made on rectangular Thiokol gaskets (over)

AD-121 339

show, superficially, better sealing characteristics than similar Buna N gaskets; however, this performance is believed due to creep of the Thiokol while under compression. Pyramid-shaped Buna N gaskets were found to seal at least as well as rectangular Buna N gaskets at room temperature. (Author)

AD-121 461 Div. 4/4, 20/5
(Unannounced report)

Atomics International, Canoga Park, Calif.
THE BEHAVIOR OF TETRALIN IN LIQUID SODIUM, by R. L. McKisson and K. E. Horton. 1 Feb 57, 19p. incl. illus. tables (NAA-SR-1771)
(Contract AT (04-3)49) Unclassified report

A simplified, nonequilibrium experiment designed to qualitatively study the behavior of tetralin i.e., rate of reaction or decomposition in the presence of sodium, at temperatures up to 950°F has been performed to establish the probable consequences of a tetralin leak in the Sodium Reactor Experiment. It was found that tetralin decomposition with rapidity in the presence of hot liquid sodium. The ultimate decomposition products are hydrogen, carbon, and low molecular weight aliphatic compounds. The hydrogen is rapidly absorbed by the hot sodium up to approximately 750°F. At higher temperatures, sodium tends to release hydrogen. Zirconium metal submerged in sodium irreversibly absorbs hydrogen, at least up to 950°F, so that (over)

AD-121 461

most of the hydrogen resulting from tetralin decomposition in the SRE ultimately would be absorbed in the zirconium moderator can sheaths. The carbon would circulate in the sodium, so that very slight carburization of the stainless might be expected with operation at 950°F. The hydrocarbon residues will collect in the gas space over the sodium pool and eventually decompose. (Author)

AD-121 502 Accession No.

Kidde, Walter, and Co., Inc., Bellville, N. J.
A SUMMATION OF THE PNEUMATIC HIGH TEMPERATURE SEAL EVALUATION PROGRAM, by H. E. Heigis, K. F. Peter, and J. A. Neigel. 12 June 56, 16p. incl. illus. tables.
Unclassified report

Information is presented on materials, lubricants, surface requirements, and installation of seals for pneumatic equipment to guide those who are concerned with their selection. Effort was concentrated largely upon static seals which operate in the temperature range of -65° to 225°F.

AD-120 620 Accession No.

American Lava Corp., Chattanooga, Tenn.
A STUDY AND EVALUATION OF METHODS OF PRODUCING A CERAMIC-TO-METAL SEAL BY PRESSED POWDER TECHNIQUES FOR AUTOMATIC MASS PRODUCTION, by Harry C. Dunegan. Final rept. 16 Aug-30 Nov 56. 82p. incl. illus. tables, 13 refs. (Contract AF 33(600)27329) Unclassified report

"A method was developed for producing vacuum tight ceramic to metal seals by means of a pressed powder technique. In this method, layers of ceramic and of metal powders were fabricated in one pressing operation. A single firing cycle matured the ceramic, sintered the metal and developed the bond. The difficulties in overcoming fabricating and firing problems, in selecting compatible material systems and in determining optimum bonding conditions were described. The results of over ninety-different metal, alloy and metal oxide mixtures in combination with approximately thirty ceramic formulations were listed (over)

AD-120 620

Phase changes in the metallic layers close to the interfaces were used to explain certain types of bonding." (Contractor's abstract) (See also AD-87 677)

Uniterms (cont'd)

Thermal-expansion
Polishing
Rupture

AD-120 853 Div. 8/2

Ontario Research Foundation (Canada).
INVESTIGATION INTO THE SEALING OF QUARTZ CRYSTAL HOLDERS TYPE HC-6/U, by B. W. Schumacher. Quarterly progress rept. no. 1 on phase 2, 1 Apr-31 July 56. 28 Sep 56, 6p. incl. table. Unclassified report

A study is underway to find a reliable, solder-sealed metal enclosure which can withstand exposure to low temperature without cracking of the seal. Tests were conducted to determine the significance of internal stresses and surface irregularities on HC-6/U nickel-silver crystal holder cans. Mercurous nitrate tests showed no cracks, even by force, for 12 cans of pre-tinned edge. For 12 untinned cans, no spontaneous cracks were observed; 1 can was cracked by force. For comparison, a group of older CCCN units (AD-108 720) were desoldered and tested. All (8) cans of the formerly leaking units cracked spontaneously. For 20 cans of the formerly tight units, 9 showed no cracks, 7 (over)

AD-120 853

showed 1 crack only, and 4 showed from 2 to 4 cracks. Six cans of the new group were subjected to 12 cold cycles on dry-ice slabs. A mercurous nitrate test showed no cracks for 5 cans and a very fine crack on the sixth. X-ray back-reflection pictures were used to establish the following relationships for the stresses in a can in an effort to find a nondestructive method for determining stress. If cracks occur in the mercurous nitrate test, the diffraction rings of Cu Kα radiation are not resolved into the Kα 1 and Kα 2 doublet. If no cracks occur, at least the first doublet is resolved (second doublet or second ring on the picture not resolved). Results are tabulated for 58 units (37 tight and 21 leaking) which were X-ray tested for stresses. No correlation was found between the stresses and the percentage of leaking cans.

AD-121 112 Div. 11/2, 11/5, 26/6

Aberdeen Proving Ground, Md.
BENDIX SEALED BRAKES ON TRUCK, UTILITY, 1/4 TON, 4X4, M38, by Paul Laichinger, Jr. Partial rept. no. 1. Nov 56, 1v. incl. illus. (Proj. no. TT3-T32, rept. no. 8) Unclassified report

One design of lip seals and six designs of face seals for brakes were tested by installing them on a Truck, Utility, 1/4 Ton, 4x4, M38 and driving the truck in mud. Each seal design failed. After each failure, the manufacturer developed another design which, in turn, was tested. This report discusses six different tests. None of the seals tested were capable of satisfactorily keeping mud out of the brakes. The seals failed because of the inability of the seal stator to follow eccentricities of the rotor, wiping of mud into the seal by eccentric motion, jamming of the seal mechanism by mud, mechanical failure of the seal mechanism, and/or high wear rate of the seal face material. (Author)

AD-122 254 Div. 8/4, 14/1, 14/2

Raytheon Mfg. Co., Waltham, Mass.
CERAMIC-METAL SEAL OUTGASSING STUDY, by R. J. Dyer and R. M. Adams. QK 608 Quarterly scientific rept. no. 2, 1 July - 1 Oct 56. [6]p. incl. illus. (Rept. no. QK-608-S2; [AFCRC TN-56-965]) (Contract AF 19(604)1826) Unclassified report

A study is being made of the gases which are evolved from Raytheon ceramic-to-metal seal assemblies at temperatures up to 700°C, and the rate at which such gases are produced. The test assemblies consist of a Raytheon cylindrical HV bushing, on the ends of which are applied 1/4-in. metal bands, and Kovar cups. The wall thickness of the top and bottom Kovar cups is 0.030 inch. The top cup is equipped with a Kovar exhaust stem, and a glass tube with a standard 12/30 taper joint is attached to the Kovar stem to facilitate a union with the mass spectrometer manifold. Two assemblies were made with each of the following solders: pure silver, silver-copper eutectic; 80% gold -20% copper al-

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AD-122 254

loy, and pure copper. Brazing was accomplished in an atmosphere of pure hydrogen by using a 20-kw RF induction heater. After brazing, the test assemblies were attached to the mass spectrometer manifold. Apeizon W wax was used as a sealing medium. The bakeout oven was raised around the assembly after a pumping time of 1 hr; the pressure in the assembly was about 2×10^{-5} mm Hg. Four assemblies were baked out and the evolved gases were analyzed. Curves are given which show the relationship between bakeout time, temperature, and individual gas evolution rates for a test assembly brazed with pure silver. (See also AD-109 660)

AD-123 436 Div. 8/2

Defence Research Telecommunications Establishment (Canada).
PACKAGING A 30 Mc AMPLIFIER FOR AIRBORNE USE, by G. W. Williams. July 56, 19p. incl. illus. (EL rept. no. 5046-1; [Encl. 3 to Air Attache, Ottawa, rept. no. TL 21-57]) Unclassified report

Two 30 Mc amplifiers have been packaged for airborne use in the form of sealed plug-in units. These utilize small components and subminiature tubes to achieve a gain of 50 to 60 db in units which measure 3 in. x 3 in. x 1 1/2 in. or smaller. Foamed and solid thermosetting plastics are used to protect the circuit against environmental stresses. The tubes are replaceable by removing sealed tube shields. The completed units have been subjected to environmental testing. (Author)

AD-123 604 Div. 14
(Revised 6-59)
Directorate of Materials and Explosives Research and Development (Gt. Brit.).
NOTES ON A DEMONSTRATION OF R.D. 1286, A THREAD-SEALING CEMENT, by R. W. Bryant, W. A. Dukes, and J. Gooding. Dec 56 [19]p. incl. illus. tables (Technical note no. DMXRD/SEAL/56/4)
Unclassified report

AD-123 771 Div. 10/2, 14/1

Naval Engineering Experiment Station, Annapolis, Md.
CHEMISEAL MECHANICAL SEAL FOR GASOLINE PUMP SERVICE SUBMITTED BY UNITED STATES GASKET COMPANY CAMDEN, NEW JERSEY, by R. F. Stone. (Qualification rept. 15 Aug 56, 4p. incl. illus. tables (EES rept. no. 010249)
Unclassified report

Available to U. S. Military Organizations only

Two types of Chemiseal mechanical seals, manufactured by United States Gasket Company, were tested to determine their suitability for use in gasoline pumps operating at stuffing-box pressures between 5' and 25' of aviation gasoline. One type with graphite-filled-teflon rotary-seal face was found suitable for this service. The type with glass-filled teflon rotary seal face prevented leakage but caused scoring of the stationary seal ring. (Author)

AD-123 839 Div. 14/9, 26/8

Material Lab., New York Naval Shipyard, Brooklyn.
QUALIFICATION TEST OF SYNTHETIC RUBBER O-RINGS, SUBMITTED THE INTERNATIONAL PACKING CORPORATION, BRISTOL, N. H. Final technical rept. 13 Feb 57, 4p. (Lab proj. no. 5902-1)
Unclassified report

Available to U. S. Military Organizations only

Minimum processing - no abstract

AD-123 912 Div. 14/8, 14/9, 27/1

Material Lab., New York Shipyard, Brooklyn.
INVESTIGATION OF O-RING CYLINDER LINER AND WATER FERRULE SEALS REMOVED FROM DIESEL ENGINES OF THE USS PC 560, by S. A. Eller and M. Rosenberg. Final technical rept. 9 Oct 56 [19]p. incl. illus. tables, 12 refs. (Lab. proj. no. 5354-10)
Unclassified report

Available to U. S. Military Organizations only

O-rings used for cylinder liners and water ferrule seals that had been subjected to water soaking while installed in diesel engines of the USS PC-560 were removed from the engines and forwarded to the Material Laboratory for investigation. The samples were examined in the condition "as received" by the Laboratory, then the basic elastomeric ingredient in the compound was determined by chemical analysis. Following this tests were made to determine the effects of immersing the seals in distilled water for 10 days at 194±2F on f[illegible]olume
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AD-123 912

swell, tensile strength, elongation, back load, height, and hardness of the material. The results indicated that immersing the seals in water had a beneficial effect on back load and height of the gasket material, but a detrimental effect on the tensile strength, elongation, and hardness. (Author)

AD-125 427 Div. 14/9, 22/1
(Unannounced report)

Rock Island Arsenal Lab., Ill.
AMMUNITION CAN GASKETS, by R. F. Shaw. Technical rept. no. 14 on General Development of Rubber for Ordnance Applications. 13 Apr 49 [16]p. incl. illus. tables (Proj. no. TB4-520A, RIA Lab., rept. no. 49-386)
Unclassified report

The object of this work was to evaluate a commercial gasket material; to develop suitable ammunition can gaskets from several polymers; to determine the physical requirements of a satisfactory gasket material; and to revise the procurement specification to conform to specification 20-116A for rubber and synthetic rubber compounds: automotive and aeronautical applications. The Rudy gasket and 5 RIA formulations were tested for physical properties and for their performance as gaskets in ammunition boxes. Polymers evaluated were Perbunan 18, a butadiene/acrylonitrile (82/18) copolymer, Philprene A, which is a butadiene/styrene copolymer (76/24), GR-S 454, a butadiene/styrene (90/10) copolymer, Neoprene GRM-10, and natural rubber. General purpose GR-S copolymer was suitable for the intended purpose. The Rudy gasket did not pass the low temperature flexibility test after exposure for 5 hr at -70°F, but held 10 lb air pressure for 24 hr at that temperature. All the gasket compounds tested met the water resistance and aging requirements; all held 10 lb air pressure for 24 hr at -70°F. Gasket hardness was not critical between the limits 50-62 Shore A durometer. Compression set requirements should probably be 25% maximum, consistent with good commercial practice for compression gaskets.
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AD-125 427

AD-125 957 Div. 1, 27

Reaction Motors, Inc., Denville, N. J.
A ROTARY SHAFT SEAL ASSEMBLY FOR ROCKET ON ROTOR HELICOPTER ENGINES, by Ben Schulkin. (Final rept.) 31 Mar 56, 19p. incl. illus. tables. (Rept. no. 468-F3)
(Contract NOa (s)-52-1049-c) Unclassified report

AD-127 073 Div. 14, 22

Borden Co., Philadelphia, Pa.
CRIMP AND THREAD SEALANTS, by Wolf Karo, Albin Gapsch, and E. LoPresti. Monthly rept. no. 1. 10 Apr 56, 13p.
(Contract DAI 28-017-501-ORD(P)-2043)
Unclassified report

AD- 127 079 Div. 14/1, 14/9, 26/8, 30/3, 30/5

Lincoln Lab., Mass. Inst. of Tech., Lexington
UNSUPPORTED AREA HIGH PRESSURE SEAL, by D. M. Warschauer and William Paul. 5 Oct 56, [1]p. incl. illus. (In cooperation with Harvard U.)
(Contract AF 19(122)458) Unclassified report

AD-127 094 Div. 14, 26
(Unannounced report)

Oak Ridge National Lab., Tenn.
O-RING MOUNTING OF BELLOWS, by M. L. Randolph, M. Slater, and D. L. Parrish. 23 July 56. 1p. incl. illus.
(Contract W7405-eng-26) Unclassified report

Reprint from Review of Scientific Instruments 27:878-879, Oct 56.

AD-128 326 Div. 14/9
Unannounced report)

Rock Island Arsenal Lab., Ill.
DEVELOPMENT OF AN OIL-RESISTANT SYNTHETIC RUBBER COMPOUND FOR LOW TEMPERATURE APPLICATIONS, by Robert F. Shaw. [Technical] rept. no. 9 on General Development of Rubber of Ordnance Applications. 16 June 48 [16]p. incl. tables (Proj. no. TB4-520A, rept. no. 9; RIA lab. rept. no. 48-632)
Unclassified report

The commercial elastomers Thiokol ST, Perbunan 18, and Neoprene FR were the most satisfactory in low-temperature and oil-resistance properties. Perbunan 18 had the best low-temperature properties when compound with various plasticizers and was used to develop compounds suitable for packings in petroleum fluids. Perbunan 18 base stock was compounded with 12 different plasticizers selected for improvement of low temperature properties and insolubility in petroleum oils. The physical properties of these compounds are tabu-
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AD-128 326

lated and evaluated for suitability. Packings made from compound N6-12 which ranked first in low temperature flexibility, tensile strength, and tear resistance performed best in ordnance mechanisms at -75°F in AN-W-O-366b hydraulic fluid. Tables of physical properties of vulcanizates and the effects of increased plasticizer content are included. (Author) (See also AD-124 836)

AD-128 365 Div. 27/1

Air Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
SPARK PLUG WITH GASKET RING (Zundkerze Mit Dichtungsring) by Robert Bosch. [1958] 3p. incl. illus. (Trans. no. F-TS-10025/V, of Swiss Confederate Patent Office, Patent no. 198232, 1 Sep 1938)
Unclassified report

AD-129 444 Div. 22

Rock Island Arsenal Lab., Ill.
THE EFFECT OF "O" RING GROOVE SURFACE FINISH ON PNEUMATIC EQUILIBRATOR PERFORMANCE, by L. R. Raisbeck. 16 Apr 57, 22p. incl. illus. tables (Technical rept. no. 57-956)
Unclassified report

AD-130 210 Div. 4, 14
(Unannounced report)

Products Research Co., Los Angeles, Calif.
[THE DEVELOPMENT OF SEALANTS WHICH WILL WITHSTAND EXPOSURE TO FUEL VAPOR, LIQUID FUEL AND AIR AT TEMPERATURES ABOVE 350°F AND TO DEVELOP STANDARD TEST PROCEDURES FOR EVALUATION OF THE SEALANTS]. Quarterly progress rept. no. 1, 1 Feb-1 May 57 [33]p. incl. illus.
(Contract AF 33(616)3976) Unclassified report

AD-130 661 Div. 14/1, 22/5

Aerojet-General Corp., Azusa, Calif.
IMPROVEMENT OF INERT SEALER IN BOMBS, by E. T. Leidigh, R. D. McLeod, and J. M. Wrightson. Informal progress rept. no. 11, 10 Mar-9 Apr 57. 17 Apr 57, 3p. incl. table (Rept. no. L1911/12-11)
(Contract DA[I] 28-017-501-ORD(P)-2115)
Unclassified report

The development of the polyurethane foam sealer has been completed. High-explosive loading and temperature cycling of the bombs has been completed. No exudation has been observed from either of the two bombs in which the newly developed polyurethane foam was used in place of the standard inert sealer. On the other hand, approximately 1/4 lb of TNT exuded from the bomb filled with TNT without a sealer, while exudation occurred from both bombs filled with TNT using the standard inert sealer and from the bomb in which KIMPAC was used as a sealer. (Author) (See also AD-120 147)

AD-130 772 Div. 8/2

General Hermetic Sealing Corp., Valley Stream, N. Y.
REUSABLE SEALS FOR ELECTRONIC EQUIPMENT, by William Brown and A. Razdow. Rept. for 1 June 55-31 Oct 56. May 57, 86p. incl. illus. (WADC Technical rept. no. 56-616)
(Contract AF 33(616)2994) Unclassified report

This report covers the investigation, evaluation and establishment of the most effective type of reusable seals for airborne electronic equipment. Fused seals, methods and procedures were developed for hermetically sealed enclosures of electronic assemblies, subassemblies, and equipment, so they can be opened fifteen times for repair and resealed without destroying the contents there-in. The methods developed are satisfactory for field service application. Temperature measurement techniques were worked out in order to determine the exact heat distribution in and on the seal. As a result of comparative measurements, the best
(over)

AD-130 772

possible seal joint, the most appropriate metal for the cans, and the most efficient heat transfer method was determined. A heat reflecting baffle was developed which decreases the temperature inside the sealed enclosure to below 85°C. The comparative tests on heat transfer methods showed very promising results with the electrical band heater. (Author)

AD-130 882 Div. 1/2, 26/8, 30/3

Stupakoff [Ceramic and Mfg. Co., Latrobe, Pa.]
DEVELOPMENT OF CERAMIC RODS AND SEALS FOR USE IN HIGH-TEMPERATURE HYDRAULIC SYSTEMS, by Guy F. Bernardini. Rept. on Aircraft Hydraulic Systems. July 57, 30p. incl. illus. tables, (WADC Technical rept. no. 57-324)
(Contract AF 33(600)30012) Unclassified report

Design of a ceramic rod seal intended for use in a high temperature, high pressure hydraulic system is described. Details of a test circuit incorporating the test cylinder, which includes a ceramic rod and two ceramic seals, are presented. Fabrication of the test cylinder, ceramic components, and testing apparatus is described. The testing methods and results which were employed are presented and discussed. It is concluded that the ceramic rod seal was not fabricated with sufficient accuracy to prevent leakage at a fluid pressure of 3000 psi and a temperature of 400°F. In addition, it was concluded that even if the seal had been fabricated with a
(over)

AD-130 882

much higher degree of accuracy, wear of the ceramic seal would quickly destroy the sealing relationship. During about 12,500 cycles of rod motion excessive wear of portions of both seals was noted. (Author)

AD- 130 960 Div. 10/5

Power Plant Lab., Wright Air Development Center, Wright-Patterson Air Force Base, Ohio.
PLASTIC FITTING, ACID TANK, by John M. McGarry. July 57 [7]p. incl. illus. (WADC Technical note no. TN 57-279) Unclassified report

The purpose of this report is to record the preliminary results of the testing of a Plastic Kel-F fitting for Fuming Nitric Acid tanks. The fitting assembly utilizes a serrated sealing surface and a Kel-F 300 gasket. It is concluded that a plastic acid fitting is feasible. (Author)

AD-131 091 Div. 1, 14

Coast Pro-Seal and Mfg. Co. [Los Angeles, Calif]
HIGH TEMPERATURE RESISTANT SEALANT MATERIALS, by Leonard C. Boller, Gene M. Le Fave and others. Rept. for Jan-July 56, on Rubber, Plastic and Composite Materials. Sep 57, 18p. incl. illus. tables. (WADC Technical rept. no. 56-155, Part 2) (Contract AF 33(616)2767) Unclassified report

Thorough formulation studies were made with rubber phenolic fill and drain sealants where polyacrylic, butadiene-acrylonitrile polymers constituted the rubber portion. A sealant, sample no. 35, was developed which represents a moderate variation of E-50 (AD-110 633). In the presence of jet fuel, no. 35 performs excellently at 625° to 650°F, but under dry-heat conditions the sealant will not maintain film integrity beyond 600°F. The optimum film thickness was between 0.005 and 0.008 inch. The solids content was adjusted between 18 and 22% in MeCOEt and/or methyl isobutyl ketone. Cabosil, up to 5%, controls rheolog'- -' proper- (over)

AD- 131 091

ties with no effect on ultimate film performance. Organofluorine polymers in combination with certain rubbers showed little promise, while liquid polybutadiene offered some interesting possibilities. No consistent or above marginal improvement was obtained with cover coats, antioxidants, plasticizers, crosslinking agents, adhesion promoters, curing agents, and leafing agents.

AD- 131 094 Div. 14, 25, 26

Boeing Airplane Co., Seattle, Wash.
DESIGN DATA FOR O-RINGS AND SIMILAR ELASTIC SEALS, by George E. Trepus. Rept. for May 56-Mar 57, on Rubber, Plastics, and Composite Materials. Sep 57, 106p. incl. illus. tables, 33 refs. (WADC Technical rept. no. 56-272, pt. 2) (Contract AF 33(616)2867) Unclassified report

See also AD-110 598

AD-134 181 Div. 14/1, 14/9

Material Lab., New York Naval Shipyard, Brooklyn.
OIL RESISTANT SYNTHETIC RUBBER GASKET MATERIAL SUBMITTED BY BUCKEYE RUBBER PRODUCTS, INC., LIMA, OHIO. Final technical qualification test rept. 27 Sep 56, 4p. table (Lab. proj. no. 5542-23) Unclassified report

Available to U. S. Military Organizations only

AD-134 197 Div. 14/1, 14/9

Material Lab., New York Naval Shipyard, Brooklyn.
QUALIFICATION TEST OF SYNTHETIC RUBBER O-RINGS SUBMITTED BY NATIONAL SEAL DIVISION, FEDERAL-MOGUL-BOWER BEARINGS, INCORPORATED, NEWARK, NEW JERSEY. 26 Apr 57, 6p. incl. tables (Lab Proj. no. 5902-4) Unclassified report

Available to U. S. Military Organizations only

AD-134 405 Div. 8/2

Material Lab., New York Naval Shipyard, Brooklyn. QUARTZ CRYSTAL UNIT CORROSION, by A. N. Silverstein and C. Milner. Final technical research and development rept. 26 Apr 57 [16]p. incl. illus. tables (Lab. proj. no. 4960-F-40.3-150) Unclassified report

Available to U. S. Military Organizations only

This project was undertaken to investigate suitable methods of protecting quartz crystal units from the effects of corrosion including means for improving the seal of these units. Seven hundred crystal units, whose seals have been coated with either an extra thickness of solder or one of ten corrosion resistant lacquers, were manufactured for use in this investigation. The effectiveness of the lacquers and heavier soldered seals is illustrated by the small number of frequency failures, 2 out of 428, resulting from the standard 50 hr salt spray test. It was also seen that 46 (over)

AD-134 405

of 48 units could withstand a 300 hr salt spray exposure without frequency failure. Prevention of excessive corrosion is desirable but not sufficient in itself. A good seal must withstand aging and conditioning tests as well as salt spray exposure. Lacquers C, H, J and K have best met this requirement. A chemical analysis of the lacquers showed that one of two resins was used in each lacquer. No relationship could be established between the resins used and the test results obtained. The area covered and affinity of the coating for the surface were found to be important factors in determining the effectiveness of these protective coatings. The heavier soldered seals were generally not as effective as the lacquered ones. Therefore, increasing the thickness of the solder seal is not considered to be the best method for improving the seal of quartz crystal units. (Author)

AD-134 462 Div. 10/2, 14/5, 14/9

Material Lab., New York Naval Shipyard, Brooklyn. QUALIFICATION TEST OF SYNTHETIC RUBBER DRUM GASKETS SUBMITTED BY HAMILTON RUBBER MANUFACTURING CORPORATION, TRENTON, NEW JERSEY. Final technical rept. 5 Apr 57 [6]p. incl. table (Lab. proj. no. 5094-36) Unclassified report

Available to U. S. Military Organizations only

Results of tests indicate that sample gaskets, Type VI, in both the 3/4- and 2-in. sizes, manufactured from the exhibitor's compound No. XH-63-D are in conformity with all the requirements of Spec MIL-G-432A of 30 Sept. 1952. (Author)

AD-134 463 Div. 10/2, 14/5, 14/9

Material Lab., New York Naval Shipyard, Brooklyn. TYPE APPROVAL EVALUATION OF SYNTHETIC RUBBER DRUM GASKETS MANUFACTURED BY AUBURN RUBBER CORPORATION, AUBURN, INDIANA, SUBMITTED BY RIEKE METAL PRODUCTS CORPORATION, AUBURN, INDIANA. Final technical rept. 30 Jan 57 [5]p. incl. table (Lab. proj. no. 5094-35) Unclassified report

Available to U. S. Military Organizations only

The exhibitor's Type II sample gaskets, in the 3/4 in. and 2 in. sizes, are not in conformity with MIL-G-432A (30 Sep 1952) with respect to the dimensional requirements for the inside diameter. The sample gaskets are in conformity with all the remaining specification requirements when evaluated in conjunction with the improved closures. (Author)

AD-134 493 Div. 27/1

[Material Lab.] New York Naval Shipyard, Brooklyn O-RINGS USED TO SEAL CYLINDER LINERS OF DIESEL ENGINES-INVESTIGATION. 29 Jan 57, 3p. tables (Proj. no. 5354-9). Unclassified report

Available to U. S. Military Organizations only

AD-134 497 Div. 14/8, 31/5

Material Lab., New York Naval Shipyard, Brooklyn. EVALUATION OF PLASTIC STUFFING TUBES FOR BULKHEAD PENETRATION. Final technical rept. 11 Apr 57, 12p. illus. (Lab. proj. no. 5449-2) Unclassified report

Available to U. S. Military Organizations only

AD-134 918 Div. 8/1, 8/2, 14/1

New York U. Coll. of Engineering, N. Y.
SEALING TECHNIQUES FOR WAVEGUIDE AND COAXIAL ROTARY JOINTS, by Milton M. Sackman, Michael B. Maccarone, and Fred H. Posser. Quarterly progress rept. no. 9, 1 Sep-31 Nov 56. 49p. incl. illus. table.
(Contract DA 36-039-sc-64476) Unclassified report

A basic design criteria is being determined for pressurizing, waveguide and coaxial rotating joints applying a mechanical sealing principle. The equipment for conducting the various tests on the development model of the RG-52 rotary sealed joint was readied. The tests consist of low- and high-speed tests, and pressurized and environmental conditions. The low-speed (1.5 rpm) tests will be conducted with a combination of a small drill press and a lathe; a regular drill press will be used for the high-speed tests. An environmental test chamber was modified to meet the high and low temperature conditions. Insulation was added to enable the (over)

AD-134 918

-65°F to be obtained; the temperature was obtained by cooling the chamber with dry ice. The final design and materials were established. The geometry of the internal parts gives the best choke design, and the lowest torque, temperature, and leakage are obtained; there is a seal at 0 to 60 psi. The carbon compound will be Karbate 22, and the seal piece surface will be type 303 stainless steel. The remainder of the unit will be 61-ST-6 Al, except for bearings, screws, and snap rings. (See also AD-106 777)

AD-135 272 Div. 4/4, 14/1
(Unannounced report)

Naval Research Lab., Washington, D. C.
A STUDY OF SEALING COMPOUNDS FOR INTEGRAL FUEL TANKS, by A. T. DiMasi. 18 Sep 45, 1v. incl. tables (NRL rept. no. P-2622) Unclassified report

The effect of a series of organic and inorganic reagents on the fuel resistance, application, stability and adhesiveness of butadiene-acrylonitrile, butadiene-styrene and polysulfide polymers was studied and is reported herein. These materials have been prepared and examined to determine their possible use as sealing compounds for integral fuel tanks. A few results are given as to the practicability of the same materials for use as rubber adhesives. (Author)

AD-136 762 Div. 14/9
(Unannounced report)

Material Lab., New York Naval Shipyard, Brooklyn.
EVALUATION OF SILICONE GASKET MATERIAL NO. DSRE-1584 SUBMITTED BY GENERAL ELECTRIC COMPANY. Final rept. 19 Nov 51, 5p. (Lab. proj. no. 4598-225) Unclassified report

Available only by request to BuShips, Wash., D. C.

AD-136 780 Div. 14/6
(Unannounced report)

Material Lab., New York Naval Shipyard, Brooklyn.
EXPERIMENTAL COMPOUND S-50-R9-138 SUBMITTED FOR EVALUATION BY ACADIA SYNTHETIC PRODS. DIV. WESTERN FELT WORKS, CHICAGO, ILL. Final rept. 13 June 51 [2]p. (Lab. Proj. no. 4598-209) Unclassified report

Available to U. S. Military Organizations only

AD-136 781 Div. 14/9
(Unannounced report)

Material Lab., New York Naval Shipyard, Brooklyn.
LOW TEMPERATURE GASKET COMPOUNDS, EVALUATION OF MATERIAL SUBMITTED BY GENERAL TIRE AND RUBBER CO., WABASH, INDIANA. [Final rept.] 9 Apr 52, 2p. incl. table (Lab. proj. no. 4598-229) Unclassified report

Available to U. S. Military Organizations only

AD-137 420 Div. 7/1

Sonotone Corp., Elmsford, N. Y.
INVESTIGATION LEADING TO THE DEVELOPMENT OF A NICKEL CADMIUM BATTERY HAVING A HERMETICALLY SEALED CONSTRUCTION, by Irwin M. Schulman. Quarterly rept. no. 3, 11 Feb-10 May 57, 41p. incl. illus. table.
(Contract DA 36-039-sc-73009) Unclassified report

Three cell batteries were subjected to automatic cycle service (60 minute charge - 40 minute discharge). Those of 0.45 A.H. capacity (cylindrical cells) were charged at a modified constant potential of 4.5v., and discharged at several rates between .07 and .45 ampere. The 0.1 A.H. batteries (disc cells) were charged at a modified constant potential of 4.35v, and discharged at three rates between .05 and .07 ampere. 0.45 A.H. cells were also cycled under 1 mm Hg vacuum. These cells were charged at a modified constant potential of 1.50v, and discharged at several rates from 0.07 to 0.45 ampere. Data are reported for end of discharge voltages for all batteries being cycled. An
(over)

AD-137 420

evaluation was made of "D" size cylindrical cells at 80°, 0°, and -40°F at two discharge rates (0.4 and 2.0 amperes). Characteristic discharge curves are shown for the various rates at the three temperatures. (Author)

AD-140 116 Div. 6/1, 14/1

Electrical Testing Lab., Portsmouth [Naval Shipyard], N. H.
METHOD OF BLANKING SUBMARINE SONAR STUFFING TUBES, by M. W. Varrell. 15 May 57, [3]p. incl. illus. (Evaluation rept. no. ETL-2541)
Unclassified report

Available to U.S. Military Organizations only

An evaluation was made of the performance of methods of blanking unused sonar stuffing tubes to seal-off entrance of water up to and including pressures of 1000 psi. Three of each of the following items were used in the tests: (1) MS-18691, type 1 plug bodies for sizes A, B, C, D, and E tubes; (2) type 5 stuffing tubes, sizes A, B, C, D, and E with gland nuts, gland rings and 73902-5 packing rings; (3) rubber O rings of proper dimensions to fit the tube; (4) ring packings 73902-5 of proper dimensions to fit the tubes; and (5) steel plates of proper size to fit porthole openings in hydrostatic
(over)

AD-140 116

pressure tank. The type 1 plug bodies satisfactorily sealed the stuffing tubes, employing either the O rings or the 73902-5 packing rings on the seat against leakage up to and including 1000 psi hydrostatic pressure.

AD-140 117 Div. 6/1, 14/1

Electrical Testing Lab., Portsmouth Naval Shipyard, N. H.
SUITABILITY TESTS ON COMMUNITY STUFFING TUBE ASSEMBLIES AND NEOPRENE PACKING IN STEEL STUFFING TUBES, 5 Mar 57 [9]p. incl. illus. table (Suppl. to Evaluation rept. no. ETL-2564, AD-140 118) Unclassified report

Available to U. S. Military Organizations only

A report is presented of the results of supplementary testing of neoprene packing in steel bulkhead stuffing tubes. The neoprene packing did not prove entirely satisfactory as an effective seal.

AD-140 118 Div. 6/1, 14/1

Electrical Testing Lab., Portsmouth [Naval Shipyard] N. H.
SUITABILITY TESTS ON COMMUNITY STUFFING TUBE ASSEMBLIES AND NEOPRENE PACKING IN STEEL STUFFING TUBES. 8 Apr 57 [6]p. incl. illus. (Evaluation rept. no. ETL-2564(Final))
Unclassified report

Available to U. S. Military Organizations only

An evaluation of the effectiveness of neoprene packing in steel bulkhead stuffing tubes showed that neoprene packing is not entirely satisfactory as an effective seal with rubber covered cables. (See also AD-140 117)

AD-140 125 Div. 7/3, 14/9

Materials Testing Lab., Portsmouth Naval Shipyard, N. H.
METHODS OF APPLYING END SEALS TO NEOPRENE-JACKETED CABLE, by Jeremiah F. Sullivan. 1 Oct 56, 1v. incl. illus. tables (Evaluation rept. no. E56-30F) Unclassified report

Available to U. S. Military Organizations only

Four methods of forming pressure proof end-sealed packings on Neoprene-sheathed cables were tested to determine which was the cheapest and most satisfactory. These methods were: (1) Method of molding end seals prescribed by Drawing 9000-S6202-F-73903. (2) Method using a straight Neoprene compound outlined in a Beneficial Suggestion by Morris & Hollister of the Mare Island Laboratory. (3) Method using a Polyblend-Neoprene blend. (4) Method using a casting resin and a throw-away mold. The test results show that none of these methods is completely satisfactory. (over)

AD-140 125

The standard method should be revised to give better adhesion between the molded packing and Neoprene cable sheaths. The methods using straight Neoprene and a Polyblend-Neoprene blend are unsatisfactory. The use of a cold setting casting resin holds promise of being satisfactory, while cutting costs by one-half to two-thirds. (Author)

AD-140 180 Div. 11/2, 11/5, 14/9

Aberdeen Proving Ground, Md.
TEST OF FIFTY GALLON, SELF-SEALING, AUXILIARY OR JETTISONABLE FUEL CELLS, by James F. Hansen. Aug 57 [36]p. incl. illus. (Proj. no. TT1-649H, rept. no. 5) Unclassified report

Available from ASTIA-DSC. Not releasable to foreign nationals or their representatives.

Three cells were installed in racks on various vehicles and were subjected to 38,440 miles operation over road surfaces ranging from paved highway to cross-country. A gunfire test was carried out on three other cells. Gum content of gasoline in the seventh cell was analyzed periodically during storage in the open. The auxiliary or jettisonable self-sealing fuel cells satisfactorily withstood endurance testing when carried in a truck body. When folded for storage or shipping, the collapsible cell occupies approximately one-fifth the space required for the standard fifty gallon metal fuel (over)

AD-140 180

tank. Gum formed in the fuel cell at an excessive rate under open storage conditions. Generally the self-sealing qualities of these cells were considered satisfactory. (Author)

AD-140 572 Div. 14/1, 22/1, 22/5

Aerojet-General Corp., Azusa, Calif.
DEVELOPMENT OF AN IMPROVED BOMB SEALER FOR ELIMINATION OF INERT-SEALER EXUDATION, by E. T. Leidigh, R. D. McLeod, and A. A. Stenersen. Final rept. 10 May 56-5 June 57. 1v. incl. illus. tables. (Rept. no. 1282)
(Contract DA 28-017-501-ORD-2115, Proj. PA-2-1) Unclassified report

Preliminary studies were made to determine the most feasible methods for developing suitable materials for use as a bomb sealer. Polyurethane foam was selected as the most promising material for the sealer. The adopted foam formulation was: 120.0g Multron R-18, 17.5g Mondur TD (TDI), 0.9g H_2O, and 0.133g FeAA. The material can be foamed in place without the generation of appreciable heat and is self-curing at 80°F in 72 hr, or can be cured at 110°F in 24 hr. High-explosive loading and temperature-cycling tests were conducted with 13 bombs which were loaded with TNT by using various inert sealers; eleven were subjected (over)

AD-140 572

to 4-wk temperature-cycling tests between -65° and +160°F (MIL-STD-304). The polyurethane-foam sealer passed the temperature-cycling tests in perfect condition. No exudation occurred from any of the bombs in which either the polyurethane foam or Celite were used as sealers. However, when Celite alone was used as a sealer, sufficient pressure was transmitted to force calking from the seams around the base of the bombs. Exudation occurred from all other bombs that were temperature-cycled. The polyurethane foam met the physical requirements and was compatible with the standard explosives. (See also AD-135 528)

AD-140 613 Div. 22/8

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
RESEARCH ON HEAT TRANSFER AND OBTURATION FOR SMALL ARMS WEAPONS (Unclassified title) by Gerald A. Sterbutzel. Monthly progress rept. no. 25 for July 57, 15 Aug 57, 31p. incl. illus. tables (Rept. no. CA-948-c-25)
(Contract DAI 30-115-504-ORD(P)-596) Unclassified report

UNCLASSIFIED

The problem of making the heat-transfer and durability characteristics of ring-seal designs optimum was studied. Tests were conducted on ring seals (8D-1, 8D-2, and 8D-3) and on barrel seals and Ford skirted seals. The 8D-1 seal design showed excellent durability characteristics. It was possible to fire over 5000 rounds without the failure of any of the seals. Over 420 rounds could be fired without cookoff in a ring-seal drum if either IMR or ball propellant were used at an ambient gun temperature of 150°, and at least 420 rounds could be fired without cookoff in a retrofitted drum if the am-
(over)

AD-140 613

bient temperature was 145° for IMR propellant and more than 150° for ball propellant. The 8D-2 seals tended in the initial test to have extremely good temperature characteristics but the temperature advantage diminished considerably as the tests progressed. Six tests of 8D-3 ring seals were completed. No real difference was determined in the erosion of 2 designs, and each of the designs maintained their dimensions quite well after 1457 rounds were fired. Temperature data indicated that the barrel seal holds tremendous promise for improving the cookoff characteristics of the M-39 gun.
(See also AD-139 901)

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(Signature & Date)

AD-142 079 Div. 1/2

Douglas Aircraft Co., Inc., Santa Monica, Calif.
EVALUATION OF HIGH TEMPERATURE HYDRAULIC SEALS TO TEMPERATURE OF 550°F PART 1. MECHANICAL EVALUATION, by Charles W. Galloway. Rept. on Aircraft Hydraulic and Pneumatic Systems. Feb 58, 143p. incl. illus. tables (WADC Technical rept. no. 57-76, pt. 1)
(Contract AF 33(616)3026) Unclassified report

The high temperature hydraulic seal research and development program (AD-70 011) was extended to include investigations of hydraulic seals for use with OS-45 and MLO-8200 fluids at temperatures up to 400° and 550°F, respectively. The mechanical tests and the results of the evaluation of experimental elastomeric materials are summarized. Twelve basic test procedures were used: (1) chew resistance screening test; (2) backup screening tests, 400°F; (3) O-ring and backup endurance life, 400°F, OS-45; (4) O-ring temperature cycling endurance life, -65° to 400°F, OS-45; (5) high-low
(over)

AD-142 079

temperature performance test, OS-45; (6) O-ring endurance life, 550°F, MLO-8515; (8) static elastomeric seal, 400°F, OS-45; (9) static elastomeric seal endurance life with temperature cycling, -65° to 400°F, OS-45; (10) metallic static seal, OS-45, 400°F; (11) static seal endurance life, 550°F, MLO-8200; and (12) backup endurance life with no mechanical actuation, 400°F, OS-45. Two polymers performed promisingly at 400°F. No seals were acceptable at 550°F, but Viton A had good thermal resistance at 550°F.

AD-142 604 Div. 10/2, 14/9
(Unannounced report)

Aerojet-General Corp., Azusa, Calif.
EVALUATION OF POLY-FBA O-RINGS IN JP-X, by F. H. Cassidy. 26 Apr 55 [4]p. incl. tables (Rept. no. MA-337, Suppl. no. 1) Unclassified report

AD-143 542 Div. 7/1

Sonotone Corp., Elmsford, N. Y.
INVESTIGATION LEADING TO THE DEVELOPMENT OF A NICKEL CADMIUM BATTERY HAVING A HERMETICALLY SEALED CONSTRUCTION, by Irwin M. Schulman and Paul F. Ritterman. Quarterly rept. no. 4, 11 May-10 Aug 57. 56p. incl. illus. tables.
(Contract DA 36-039-sc-73009) Unclassified report

Additional 3-1x1 (0.45 A.H.) batteries were subjected to automatic cycling (60 minute charge - 40 minute discharge) at discharge rates 0.07 to 0.20 ampere. These batteries have received 656 cycles. The 3-1/4x1 (0.1 A.H.) batteries were normalized with constant current charge-discharge cycles and replaced on cycle service. These batteries have received 414 cycles at discharge rates of 0.05 to 0.06 ampere. The vacuum cycling of the 0.45 A.H. cells was extended from 1149 cycles to 2256 cycles during this quarter at discharge rates from 0.07 to 0.15 ampere. The cadmium oxygen reaction, which is supposedly the rate controlling step in the re-
(over)

AD-143 542

action mechanism of the sealed cell, was investigated at the low pressures of oxygen. Some reactions were run isothermally while others were allowed to proceed without temperature control. It was found that the reaction rates of the isothermal reactions were approximately 100 times less than the others. (Author) (See also AD-137 420)

AD-143 735 Div. 8/1, 8/2, 14/1, 26/1

New York U. Coll. of Engineering, N. Y.
SEALING TECHNIQUES FOR WAVEGUIDE AND COAXIAL ROTARY JOINTS, by Milton M. Sackman, Michael B. Maccarone, and Fred H. Posser. Quarterly progress rept. no. 8, 1 June - 31 Aug 56. 16p. incl. illus.
(Contract DA 36-039-sc-64476) Unclassified report

AD-143 970 Div. 14/1, 22/8, 22/12

Aberdeen Proving Ground, Md.
TEST OF NEW FACE-TYPE OIL SEALS CODE A PART NO. X16507-X16509, by L. G. Bach. 20 Sep 57, [18]p. incl. illus. (Proj. no. TT1-198, rept. no. 10)
Unclassified report

The sealing performance was evaluated of Code A face-type seals, numbers X16507 and X16509 as installed on the M48 90-mm-gun tank. These seals retain the lubricant by a barrier established between 2 face-loaded rings which slide relative to one another during rotation. OES arctic oil was used for the test. Two X16509 seals installed on the compensating idler wheel spindles operated 5037 mi on various proving ground courses. Four X16507 seals installed at the no. 1 and no. 6 road-wheel positions operated 4024 mi. One oil addition was required in the left compensating idler during this period. Eight standard road-wheel seals, part no. 7364672, were modified and tested concurrently as control items. Seven of these seals
(over)

AD-143 970

operated 5037 mi with minor oil additions; the eighth failed after 3930 mi. Code A face-type seals are concluded to be superior in sealing efficiency to the standard seal and similar to the performance standard established by the modified standard seals. Face-type seals operate satisfactorily with CES Arctic lubricant under normal ambient conditions. The recommendation is made that (1) the Code A seals be redesigned to attain interchangeability and cartridge construction, and (2) the standard road-wheel seal be modified by bonding or cementing the seal ring-spring adaptor gasket assembly.

AD-144 596 Div. 7/1, 14/1

Burgess Battery Co., Freeport, Ill.
PLASTIC SEALS, by C. J. Broughton, Quarterly engineering progress rept. no. 1, 31 May-31 Aug 57. 11p.
(Contract [DA] 36-039-[sc]-10527) Unclassified report

The purpose of this contract is to establish the production technique necessary to produce a plastic sealing material for dry batteries that will permit the molding and/or extruding of the material into discs which will include brass anode caps. The properties of the material must be such as to preclude leakage at the cathode or anode of the cell after the can has been mechanically spun tight over the plastic disc and hot solder has been applied to the cathode where it crimps to the disc and to the carbon cap on the anode. Equipment will be made for a pilot run of cells for "N", "A", and "B" size sealing discs. (Author)

AD-145 239 Div. 6/1, 14/1

Electrical Testing Lab., Portsmouth Naval Shipyard, N. H.
INVESTIGATION OF COMMUNITY STUFFING TUBE ASSEMBLIES, by E. Shea. 12 Dec 56 [44]p. incl. illus. (Evaluation rept. no. ETL-2564) Unclassified report

Available to U. S. Military Organizations only

Various types of community stuffing tube assemblies were evaluated. The tests included (1) accelerated aging, (2) high impact shock, (3) vibration, and (4) air pressure at 25 psi at room temperature. The sample was tested for simulated cable slippage under bulk-head deflections. The tubes were examined for pressure effectiveness. Bulkhead deflection and deformation tests were also conducted. A 12-tube assembly with aluminum packing plates, 6 armored cables, and 6 rubber cables with improved rubber grommets was considered satisfactory provided the packing pressure was maintained at 75 psi or over. The connection between the pressure reservoir (over)

AD-145 239

and the packing plates must have at least a 3/8-in. id to permit and maintain adequate flow of packing material at indicated pressures. Modifications were necessary to reduce the over-all weight of the assembly to a degree sufficient to permit conductance of the tests. The inability of an assembly to maintain a minimum of 75 psi might result in leakage around the cables. The use of nylon stuffing tubes with split silastic grommets of approximately 50 durometer hardness was relatively effective in maintaining a seal when rubber cables were used.

AD-145 284 Div. 14/9, 26/6

Materials Testing Lab., Portsmouth Naval Shipyard, N. H.
EXAMINATION OF RUBBER ARTICLES ABOARD THE USS SEA ROBIN (SS407) by Jeremiah F. Sullivan and William R. Sheehan. 1 May 56, 5p. incl. table. (Inspection rept. no. S56-407) Unclassified report

Available to U. S. Military Organizations only

The over-all condition of the rubber articles aboard the USS SEA ROBIN (SS407) was satisfactory. Much of the equipment was mounted with felt pads which were in poor-to-good shape. Gaskets, in general, were in good condition, the most notable exception being those on the torpedo tube muzzle doors. Although these rubber gaskets were still serviceable, they were worn and damaged and should be replaced. The main deck was covered with plastic (polyvinylchloride) tile in poor condition at points of most traffic and wear. It is recommended that wider use of rubber shock mountings (over)

AD-145 284

of the newer types be considered, especially to replace many of the felt pads now used, and also on the main engines to aid in noise reduction. (Author)

AD-145 307 Div. 14/9

Rubber Lab., Mare Island Naval Shipyard, Vallejo, Calif.
DEVELOPMENT OF O-RINGS FOR SEALING OIL AT 300°F, by R. D. Ford. Progress rept. no. 1. 28 May 57, 8p. incl. illus. tables (Rept. no. 7-27) Unclassified report

Available to U. S. Military Organizations only

Stocks prepared from Paracril D, Hycar 4021, Silicone W-96, and from a blend of Kel-F 3700 and Hycar 4021 were evaluated for suitability for use in seals subjected to air and ASTM Oil No. 2 at 300°F. All of the stocks except the silicone stock had compression sets greater than 100% after 14 days at 350°F in air, and were therefore considered unsuitable for this service. The compression set of the silicone stock under the same conditions was only 47%. This stock also showed good retention of tensile strength, ultimate elongation, and hardness after aging in hot air or in hot oil. Swell after 7 (over)

AD-145 307

days at 300°F in ASTM Oil No. 2 was only 11%. Seals prepared from this stock should be satisfactory for use under static conditions in air and/or oil at 300°F. Further work will be done to see if other silicone rubbers will give stocks having better properties than was obtained with the Silicone W-96 stock. Seals made from the best silicone rubber stock will be subjected to a simulated service test. If they prove to be satisfactory, specification tests and requirements will be proposed on the basis of the properties of the selected stock. (Author) (See also AD-145 308)

AD-145 357 Div. 7/3, 14/1, 14/9

Rubber Lab., Mare Island Naval Shipyard, Vallejo, Calif.
MODIFICATION OF UG-1083A/U CONNECTOR-RECEPTACLE TO IMPROVE SEALING OF RG-160/U CABLE, by J. Oser. 9 Oct 56 [14]p. incl. illus. tables (Rept. no. 67-14) Unclassified report

Available to U.S. Military Organizations only

The Rubber Laboratory has been developing improved seals for RG cables in connector-receptacles by incorporating thick rubber O-rings in the outboard end of the connector-receptacle. The latest work deals with the RG-160/U cable and the UG-1083A/U connector-receptacle. The outboard end of the UG-1083A/U connector-receptacle has been modified by incorporating two thick rubber O-rings, so that satisfactory seals are now obtained with RG-160/U cable. One of the O-rings creates a seal against the outer jacket of the cable; the other O-ring creates a seal against the inner jacket of
(over)

AD-145 357

the cable. When tested, these seals withstood 1700 psi water pressure even after aging the assembly under no pressure for 78 hours at 158°F. The modified connector-receptacle contains three fewer parts than the original UG-1083A/U connector-receptacle. (Author)

AD-145 360 Div. 14/9, 31/5

Rubber Lab., Mare Island Naval Shipyard, Vallejo, Calif.
DEVELOPMENT OF RUBBER STOCKS FOR USE IN SEALS FOR HYDRAULIC SYSTEMS CONTAINING CELLULUBE 220, by J. M. Holloway. Progress rept. no. 2. 12 Aug 57 [25]p. incl. tables (Rept. no. 90-8) Unclassified report

Available to U. S. Military Organizations only

The Rubber Laboratory was requested by the Bureau of Ships to develop improved butyl rubber stocks for use in seals for hydraulic systems containing Cellulube 220. The new curing systems for butyl rubber described in Patent Nos. 2,726,224, 2,727,874, 2,734,039, 2,734,877, and variations of these systems were studied. Basically, the new curing systems comprise a bifunctional phenolic resin as the curing agent and an acid-yielding material, such as a metal chloride, polychloroprene, chlorosulfonated polyethylene, chlorinated wax,
(over)

AD-145 360

etc., as the accelerator of the curing reaction. Stocks accelerated with ferric chloride gave outstandingly low compression set values as well as good tensile properties, but were not suitable because they corroded the mixing equipment and molds. Two improved stocks were developed containing Hypalon 20 as the accelerator, which gave low compression set values and good tensile properties, and which did not stain or corrode the processing equipment. The results of static sealing tests indicate that both stocks would be suitable for gasket service in hydraulic systems under pressures up to 1500 psi and at temperatures of -20°F and above. The development of butyl rubber stocks for this application is being continued. (Author)

AD-145 361 Div. 14/9, 26/8

Rubber Lab., Mare Island Naval Shipyard, Vallejo, Calif.
DEVELOPMENT OF STOCK AND SPECIFICATION FOR GASKETS FOR HIGH PRESSURE PIPE AND TUBE UNIONS, by A. E. Barrett. 14 Sep 56 [26]p. incl. illus. tables (Rept. no. 90-6) Unclassified report

Available to U. S. Military Organizations only

A satisfactory stock was developed for the gaskets for unions in pipes carrying petroleum-base or phosphate-ester hydraulic fluids at pressures up to 10,000 psi, or air at pressures up to 3000 psi. The gasket sizes and shape and the pipe unions are described in BUSHIPS Drawing 5000-S4823-841337, Rev. E. The stock developed was a Hycar 1041 (high acrylonitrile) stock plasticized with Hycar 1312 (liquid acrylonitrile rubber), having a Shore A hardness of 90, a tensile strength of 3990 psi, and an ultimate elongation of
(over)

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75%. Gaskets of this stock conditioned in test jigs containing petroleum base fluid (MIL-O-5606) or phosphate ester (Cellulube 220) for 36 days at 220°F sealed against 10,000 psi pressure applied for 30 minutes and against 5000 psi pressure applied for 60 days. Gaskets contained in the test jigs containing no fluid and aged for 36 days at 220°F. sealed air at 3000 psi pressure. Specification tests, procedures, and requirements are recommended based on the results of tests performed on the stock developed. (Author)

AD-145 362 Div. 14/9, 31/5

Rubber Lab., Mare Island Naval Shipyard, Vallejo, Calif.
INVESTIGATION OF PROPERTIES OF STOCK USED BY STANDARD PRODUCTS COMPANY FOR LVT P5 TRACK SEAL, DRAWING NO. 1199607 ALT. 1, by J. Oser. 20 May 57, 7p. incl. tables (Rept. no. 154-5)
Unclassified report

Available to U. S. Military Organizations only

The Bureau of Ships stated that the rubber seals for LVT-P5 amphibious tank treads, described in drawing no. 1199607 Alt 1, were being made satisfactorily by the Standard Products Company from their compound number H541-1. It was desired that the Rubber Laboratory determine certain physical properties of the vulcanizate used in these seals in order that a specification could be prepared. The Laboratory was informed of the recipe and cure (7 minutes at 330°F) used for the seals, and was given tensile sheets and 1/2-inch thick compression set specimens supposedly
(over)

AD-145 362

made according to this recipe. The Laboratory also prepared tensile sheets and compression set plugs according to the recipe. Some sheets and plugs were cured for 7 minutes at 330°F; others were cured for longer times at 330°F and 310°F. The results of tests on these specimens, from the standpoint of comparison between the Company specimens and the Laboratory specimens, were as follows: specific gravity, same; tensile properties, laboratory better; tensile properties after oven aging, approximately the same; tensile properties after oil immersion, approximately the same; oil swelling, same, hot compression set, company better; cold compression set, same. (Author)

AD-145 399 Div. 14/1, 14/9, 33/1

Material Labs., Puget Sound Naval Shipyard, Bremerton, Wash.
TESTING OF TWO COLD-APPLIED CONCRETE JOINT SEALING COMPOUNDS, by W. B. Lew. 22 Mar 57. 4p. incl. table (Rept. no. R-233-57)
Unclassified report

Available to U. S. Military Organizations only

Two commercial sealants were evaluated to determine their suitability for use in joints of concrete paving on airfields according to Spec SS-S-170 of 23 May 1955. Sealant A, a cold-applied, jet-fuel-resistant material, consisted of 16 parts by weight of a dry powder catalyst and 44 parts of a viscous liquid base material. Sealant B was a similar material mixed in a ratio of 25 parts by weight of catalyst to 42 parts of base material with the liquid component heated to about 190°F. A penetration test was conducted with sealant A mixed at 70° to 80°F. Tests were also conducted
(over)

AD-145 399

with the compound mixed at about 160°F. Tests on sealant B were conducted with the compound mixed at about 190°F. The sealants were tested for penetration on materials, solubility, flow, bond strength, and flame resistance. The results of these tests indicated that the over-all requirement is more nearly met by sealant A than by sealant B.

AD-145 518 Div. 14/1, 14/7, 14/8

Bjorksten Research Labs., Inc., Madison, Wis.
DEVELOPMENT OF SEALER FOR POTABLE WATER TANK INTERIORS, by L. L. Yeager. Final technical rept. Sep 57, 1v. incl. illus. tables.
(Contract DA 11-022-ORD-2120, Proj. TT1-789)
Unclassified report

Includes AD-145 518(a).

Protective coating systems for corroded metal surfaces are being studied to prevent further corrosion of the underlying improperly prepared surfaces. The systems were to be resistant to prolonged exposure, fresh water, and gasoline. No taste or toxicity was to be imparted to the water. The specimens which were tested consisted of low carbon steel, 24S-T3 aluminum alloy, or FS-1-H24 magnesium alloy. Polyurethane based enamels applied over properly prepared metal surfaces were more suitable for prolonged exposure to potable water and gasoline than coatings of epoxy or acrylic
(over)

AD-145 518

resins. Pickled, mild-steel panels, primed with MIL-C-15328A wash primer and top coated with polyurethane enamel withstood 3300 hr of immersion in fresh water without failure. Dow no. 7 treated magnesium panels with or without MIL-C-15328A primer beneath the enamel also successfully passed 3300 hr of water immersion. The enamel adhesion to the Dow no. 7 layer exceeds the Dow no. 7 coating's adhesion to magnesium. Aluminum prepared with MIL-C-10578 acid-type cleaner and Alodine no. 1200 (MIL-C-5541) showed good enamel adhesion; 1560 hr of fresh-water immersion caused no failure in this protection system. The application of protective coatings over rusted, improperly prepared metal surfaces did not give stable systems with resistance to further corrosion. Proper cleaning, and passifying of the metal surfaces prior to enameling is strongly recommended for good service life of the coated interiors. The polyurethanes when properly compounded and cured are highly resistant to moisture and gasoline, but there is some permeability to every coating regardless of type or thickness.

AD-145 832 Div. 14/9, 17/2, 26/8, 27/1, 31/2

Rubber Lab., Mare Island Naval Shipyard, Vallejo, Calif.
DEVELOPMENT OF STOCKS AND MOLD FOR SPECIAL CYLINDER LINER SEALS, by A. E. Barrett. Technical rept. 22 Oct [11]p. incl. illus. tables (Rept. no. 165-10) Unclassified report

Available to U. S. Military Organizations only

Serious pitting of the cooling chambers in the aluminum blocks of Packard diesel engines used in minesweepers has been observed. The pitting was apparently due to either corrosion, cavitation, or both. The use of a rubber absorber to prevent cavitation by absorbing the vibrational or shock energy in the cooling water was suggested in Bureau of Ships correspondence. The rubber absorber was to be in the form of a special O-ring having a sleeve which would extend into the cooling chamber. The special O-ring would replace one of the stand-

(over)

AD-145 832

ard O-ring cylinder liner seals. At the request of the Bureau, the Rubber Laboratory has developed nitrile rubber stocks of two hardnesses and a mold for the special cylinder liner seal, and has successfully fabricated 20 seals of each stock for trial. (Author)

AD-145 833 Div. 14/9, 26/1, 26/8

Rubber Lab., Mare Island Naval Shipyard, Vallejo, Calif.
EFFECT OF HEAT TREATMENT OF CARBON BLACK MASTERBATCH ON PROPERTIES OF BUTYL VULCANIZATE, by R. Chow and R. R. James. Technical rept. 23 Mar 56 [12]p. incl. tables (Rept. no. 12-5) Unclassified report

Available to U. S. Military Organizations only

The Rubber Laboratory was requested by the Bureau of Ships to determine whether a new mixing procedure developed by Esso Laboratories for processing butyl rubber stocks would improve the physical properties of butyl stocks designed for naval applications. The new processing method involved vigorous heat treatment of a butyl rubber-carbon black masterbatch prior to the final mixing of the stock. It was found that the heat treatment caused a significant reduction in ultimate elongation, tear resistance, and Shore hard-

(over)

AD-145 833

ness, significant increases in modulus and resilience and minor reductions in hot and cold compression set of vulcanizates produced from the masterbatches. The heat treatment did not improve the hot compression set of the vulcanizates to a point where they would be suitable for use in gaskets or mountings. (Author)

AD-145 846 Div. 14/9, 26/8

Rubber Lab., Mare Island Naval Shipyard, Vallejo, Calif.
DEVELOPMENT OF O-RINGS FOR SEALING OIL AT ELEVATED TEMPERATURES, by R. D. Ford. Final technical rept. 18 Sep 57 [16]p. incl. illus. tables (Rept. no. 7-28) Unclassified report

Available to U. S. Military Organizations only

Stocks prepared from Viton A, Silastic 432, Silastic LS-53, Silicone W-96, and SE-30 Silicone Gum were evaluated for suitability for use in seals subjected to air and ASTM Oil No. 2 at 300°F. Only the Silicone W-96 stock had the necessary physical properties for use under these conditions. In simulated service tests, only the seals molded from the Silicone W-96 stock sealed satisfactorily. The Silicone W-96 stock was also evaluated for use as seals subjected to air and ASTM Oil No. 3 at 212°F. Both physical and simulated service tests showed it to be satisfactory. (Author) (See also AD-145 307)

AD-146 228 Div. 14/9, 31/5

Pearl Harbor Naval Shipyard, T. H.
EXAMINATION OF RUBBER GOODS ON THE USS HASSAYAMPA (AO 145) by V. E. Hargrave. 1 July 57 [12]p. incl. tables (Rept. no. 75726) Unclassified report

Available to U. S. Military Organizations only

The problem: To obtain information on the service life of rubber goods on the USS HASSAYAMPA (AO 145). Findings: The ship has been in commission a little over two years. The hatch and door gaskets are beginning to show ozone cracking but slight grooving. Fuel hoses are less than three years old and are in good condition. A few of the larger diameter hoses have been partially crushed during handling. Latex mastic deck covering in wet spaces is giving excellent service. Type II latex decking material is currently being applied to the weather deck. Gray, diamond pattern synthetic rubber deck matting is preferred over the corrugated type for comfort and ease of cleaning. (Author)

AD-146 229 Div. 14/9, 31/4

Pearl Harbor Naval Shipyard, T. H.
EXAMINATION OF RUBBER GOODS ON THE USS STERLET (SS-392) by V. E. Hargrave. 20 July 56 [10]p. incl. table (Rept. no. 71981)
Unclassified report

Available to U. S. Military Organizations only

The problem: To obtain information on the service life and suitability of rubber goods aboard the USS STERLET (SS-392). Findings: The USS STERLET has not experienced appreciable cold water service. The thiokol on the underwater appendages is four years old and shows 10 to 20% peeling. The Type I shaft covering is also four years old and appears to be in good condition. The M-G sets and pump units are well mounted on compression and other standard type mounts. Gage and instrument panels and torpedo room hydraulic units are on felt mounts. The torpedo breech gaskets are badly oil softened and need for an oil resistant gasket stock is indicated. (Author)

AD-146 231 Div. 31/3, 31/5

Pearl Harbor Naval Shipyard, T. H.
EXAMINATION OF RUBBER GOODS ON THE USS SILVERSTEIN (DDE-534) AND THE USS McGINTY (DE-365) by V. E. Hargrave. 27 Nov 56, 8p. (Rept. no. 72996)
Unclassified report

Available to U. S. Military Organizations only

The problem: To obtain information on the service life of rubber goods on the USS SILVERSTEIN and the USS McGINTY. Findings: Rubber articles which showed failure in service were sponge rubber pads on earphones, fabric covers on 15 lb. CO_2 fire extinguishers and high durometer dock expansion joints. Fuel and suction hoses are showing a service life of 12 years or more. Training of ship's personnel in the use of hose repair compound would extend the useful life of these hoses even more. Greater emphasis on proper stowage of RBA masks and proper repair procedures would be of value. (Author)

AD-146 232 Div. 31/3, 31/4

Pearl Harbor Naval Shipyard, T. H.
EXAMINATION OF RUBBER GOODS ON THE USS TIRU (SS-416) by V. E. Hargrave. 5 Sep 56 [10]p. incl. tables (Rept. no. 72175)
Unclassified report

Available to U. S. Military Organizations only

The problem: To obtain information on the service life and suitability of rubber goods aboard the USS TIRU (SS-416). Findings: The shaft coatings were Type I rubber and had been in service eight years. Leakage was found at some waterstops and these were a few surface snags. Failure at the waterstops deserves further attention. The neoprene battery compartment linings were also eight years old and still giving good service. Natural rubber torpedo breech gaskets showed oil swelling and should be changed to an oil resistant type. ARL mountings were found to be unevenly loaded and exhibited a fair amount of set after five years of service. Many of the gage panels are still mounted on felt. (Author) (See also AD-146 229)

AD-146 748 Div. 14/1, 14/9

Material Lab., New York Naval Shipyard, Brooklyn.
QUALIFICATION OF SYNTHETIC RUBBER O-RINGS, SUBMITTED BY STILLMAN RUBBER COMPANY, CULVER CITY, CALIFORNIA. Final technical rept. 8 Aug 57 [5]p. incl. table (Lab. proj. no. 5902-5)
Unclassified report

Available to U. S. Military Organizations only

The sample material was composed of a nitrile type synthetic rubber compound. The free sulfur content was found to be 0.2% as against a specified maximum of 0.3%. The sample O-ring material, compound No. SR 866-70 is not in conformity with the requirements of specification with respect to elongation in the initial condition and after oil immersion, and tensile strength after oven aging. Also, the inside diameter of size 19 O-rings exceeds the specified maximum. (Author) (See also AD-146 749)

AD-146 749 Div. 14/1, 14/9

Material Lab., New York Naval Shipyard, Brooklyn.
QUALIFICATION TEST OF SYNTHETIC RUBBER O-RINGS, SUBMITTED BY E. F. HOUGHTON AND COMPANY, PHILADELPHIA, PENNSYLVANIA. Final technical rept. 16 July 57 [6]p. incl. table (Lab. proj. no. 5902-6)
Unclassified report

Available to U. S. Military Organizations only

The sample material was composed of a nitrile type synthetic rubber compound. The free sulfur content was found to be 0.5% as against a specified maximum of 0.3%. The sample O-ring material, compound No. 10V70-215 is not in conformity with the requirements of specifications with respect to free sulfur content. (Author) (See also AD-146 748)

AD-147 092 Div. 4/1, 14/5

Naval Engineering Experiment Station, Annapolis, Md.
JOHN CRANE STYLE 140. METAL-COVERED STERN-TUBE PACKING (SYMBOL 1405) SUBMITTED BY CRANE PACKING COMPANY, MORTON GROVE. ILLINOIS. by R. F. Stone. Qualification rept. 23 Sep 57, incl. tables (EES rept. no. 010367)
Unclassified report

Available to U. S. Military Organizations only

A qualification test of John Crane Style 140, metal-covered, stern-tube packing, product of Crane Packing Company, was conducted under Military Specification MIL-P-16374A. Satisfactory performance was obtained from the packing under simulated-service conditions, but the oleic acid content of the tallow lubricant is higher than allowed by the specification. The packing would be satisfactory for naval use if the tallow lubricant for the fibrous portion were of a quality complying with the specification requirements. (Author)

AD-147 837 Div. 12/1, 12/3, 12/4, 14/1

North American Aviation, Inc., [Downey, Calif.].
FILL AND DRAIN TYPE SEALING OF PRESSURIZED FUEL TANKS AND COMPARTMENTS. 17 Sep 57, 44p. incl. illus. tables (Rept. no. AL-2603)
(Contract AF 33(600)28469) Unclassified report

The state-of-the-art of fill-and-drain sealing which can be utilized to seal minute cracks in missile fuel tanks and compartments is reported. The process consists essentially of filling the tank with a relatively thin sealing compound, applying pressure to force the sealant into all cracks, draining the sealing compound, drying, and allowing the residual film to cure (generally by heating) to a tough elastic seal. In view of the simultaneous high temperature air/fuel conditions imposed on these sealants, the study was limited to Buna N/phenolic resin compounds and silicone-base sealing compounds. Compounds belonging to both groups of sealants were suitable. Established methods for fill-and-drain sealing on a production scale were set up for fuel tanks and (over)

AD-147 837

compartments of the X-10 and XSM-64. The XSM-64A process specification for fill-and-drain sealing was tentatively set up. Necessary changes and revisions of the fill-and-drain procedure for fuel tanks and compartments of XSM-64A were made on a laboratory scale to be later established on the production scale.

AD-147 856 Div. 7/4, 10/5, 12/4, 27/3

North American Aviation, Inc. [Downey, Calif.].
LOX TANK VENT VALVE ELECTROFILM HEATER. 15 Sep 57, 8p. incl. illus. (Rept. no. AL-2668)
(Contract AF 33(600)28469) Unclassified report

Preliminary qualification tests were conducted on a 250-w electrofilm heater to determine (1) the compatibility of the electrofilm material with liquid and gaseous oxygen and (2) the operating characteristics of the heater when exposed to temperatures down to -320°F, with liquid nitrogen as the medium. The tests include impact sensitivity, temperature control, thermal shock, and arcing and hazard tests. The heater had unlimited possibilities for low-temperature applications, but the usage in liquid and gaseous atmospheres depended on the installation. The heater passed all tests satisfactorily; operating from 140° to -320°F. The O-ring seals were maintained within the operating range when the heater operated in a gaseous oxygen environment. In preparing the heater for exposure to LOX, the surface should be cleaned with trichlorethylene to remove grease.

AD-147 990 Div. 10/2, 14/8, 14/9

North American Aviation, Inc. [Downey Calif.].
FUEL AND HIGH TEMPERATURE RESISTANT ELASTOMERS. 15 Sep 57, 12p. incl. tables (Rept. no. AL-2600)
(Contract AF 33(600)28469) Unclassified report

Two samples of silicon-base polyurethane were cured (450°F, 1 hr), postcured (540°F, 4 hr), and exposed to JP-5 fuel, simultaneously, in the same test pot for 2 hr. One sample was in the liquid phase and the other in the vapor phase. The sample which was exposed to the liquid phase (400° ± 10°F) had a 0.5% weight loss; the other (540°F) suffered a 0.1% weight loss. Two sets of 4-in.-diam panels were coated under positive pressure, with modified and pure silicon-base polyurethanes. No leakage was noted with the modified resin and only slight leakage at 750°F. The initial leakage of the uncoated panels was approximately 600 cu in./min. Triethanol amine and DMP-10, -14, and -30 were the most promising catalysts for resins in curing tests of 200°F for 8 hr followed by 12 hr at 250°F, 12 hr at 300°F, and 4 hr at (over)

AD-147 990

400°F. A study was undertaken of catalysts which would not affect room temperature stability and at the same time reduce cure time and temperature. Panels with catalysts were exposed to liquid vapors at 700°F and 45 psig for 3.1 hr and fuel vapors up to 585°F and 40 psig for 3.1 hr without suffering leakage. Dimethyldiisocyanatosilane, pure silicone isocyanate resin (SIR), and unmodified and modified hybrid SIR were synthesized.

AD-149 681 Div. 14, 17, 26

Ministry of Supply (Gt. Brit.)
WETTING PROPERTIES AND MECHANICAL STRENGTH OF GLASS-TO-METAL SEALS (Benetzungseigenschaften und Mechanische Festigkeit bei Glas-Metall-Werschmelzungen) by W. Weiss. Nov 57 [13]p. incl. illus. tables, 18 refs. (Trans. no. TIL/T 4824 of Glastech. Ber. 29:386-392, 1956; [JSRP Control no. 571617]) Unclassified report

AD-149 799 Div. 22/1

Samuel Feltman Ammunition Labs., Picatinny Arsenal, Dover, N.J.
CONTROL OF EXUDATION IN THE 90mm M71 TNT LOADED SHELL, by Robert W. Heinemann and George J. Horvat. Dec 57, 17p. incl. illus. tables. (Technical rept. no. 2463) Unclassified report

Available to U. S. Military Organizations only

From the time when TNT and TNT-containing explosives were first used in ammunition, the Ordnance Corps was beset with the formidable problem of how to deal with the exudate which stems from them. Sealants and gaskets were experimentally tried as remedies, but they were not completely effective in preventing the flow of exudate into the threaded shell-fuze joint and to the outside of the shell. Absorbents were much more successful. Of the absorbents tested to date, Kimpak, a cellulosic material, and Celite FC, a nearly pure amorphous diatomaceous silica, have been shown to have high absorbing capacities and to be able to effec- (over)

AD-149 799

tively prevent the flow of the exudate into the shell fuze threads of 90 mm M71 shell. Of the two absorbents Celite FC is easier to apply and appears to have a slightly greater absorbing capacity. It can be used either by itself or in combination with Kimpak. This report shows that the use of absorbents effectively inhibits the flow of exudate in the 90 mm M71 shell. Optimum quantities of absorbent, methods of application, and safety and functioning test requirements for artillery shell and for other types of ammunition still remain to be investigated. (Author) (See also AD-103 502, AD-138 117)

AD-149 981 Div. 22, 26

Rock Island Arsenal Lab., Ill.
TEST OF KEL-F PLASTIC PACKING SHROUDS IN A 75 mm PACK HOWITZER RECOIL MECHANISM, by L. R. Raisbeck. 30 Sep 57, 14p. incl. illus. tables. (RIA Lab. rept. no. 57-2368) Unclassified report

AD-150 474 Div. 27

Naval Ordnance Test Station, China Lake, Calif.
LOCKSEAL JOINT FOR ROCKET COMPONENTS, by Sydney R. Crockett. 11 Oct 57, 53p. incl. illus. tables. (NOTS 1492; NAVORD rept. no. 5275, Supersedes NOTS TM 1968, AD-43 804) Unclassified report

In response to the need for an improved means of uniting the components of a rocket, the Lockseal Joint has been conceived and developed. It locks and seals one component to another by forcing metal from the wall of one into a rubber-lined, circumferential groove in the surface of the other. In work to date it has been applied to 1- to 3-in., soft-steel and hardened-steel motor tubes, and to 1- to 5-in., soft-aluminum and hardened-aluminum tubes--the walls of both steel and aluminum tubes being of varying thicknesses. Numerous tests have demonstrated its superiority in many respects, including strength, axial alignment, and producibility, to joints now commonly used in rocket design. (Author)

AD-150 973 Div. 1

Douglas Aircraft Co., Inc., Santa Monica, Calif.
EVALUATION OF HIGH TEMPERATURE HYDRAULIC SEALS TO TEMPERATURES OF 550°F. PART II. POLYMER COMPOUNDING AND EVALUATING, by R. G. Larkin and F. W. Bickel. Rept. for Aug 55-May 57, on Aircraft Hydraulic Systems. Feb 58, 108p. incl. illus. tables (WADC Technical rept. no. 57-76, pt. 2)
(Contract AF 33(616)3026) Unclassified report

Research toward the development of elastomeric compounds suitable for use in seals for silicate ester hydraulic fluids at 400°F and 550°F is described. Several elastomer gums were compounded and tested for resistance to the subject fluid at the target temperature. Only one polymer, Viton A, exhibited a balance of properties which offer a possible successful solution to the problem. All other polymers evaluated have one or more objectionable characteristics which limit their usefulness for this application. A new app h for (over)

AD-150 973

weighing the merits of compounds, by use of true stress and strain data was developed. Theoretical basic chemical and structural requirements for polymers suitable for the subject application are reviewed and references are cited to substantiate these views. A device for physical testing O-ring specimens in fluid at elevated temperatures was designed and fabricated. A new test tube for fluid aging specimens at high temperature was designed. No specific compound is presented in the report for the proposed application. However, basic compounds having encouraging physical properties, and fair mechanical properties were developed. (Author) (See also AD-142 079)

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AD-153 546 Div. 8/4, 14/2

General Electric Co., Schenectady, N. Y.
ADVANCES IN CERAMICS RELATED TO ELECTRONIC TUBE DEVELOPMENT, by Louis Navias. Apr 53, 89p. incl. illus. tables, 31 refs. (Rept. no. RL-833) Unclassified report

Some of the older vacuum tubes operating at 1-Mc frequency or less used glass envelopes and porous ceramic refractories for internal supports. Some of the more modern "electronic tubes" operating at 10,000 Mc (3-cm wave length) require vacuum-tight ceramic envelopes having: (1) physical stability at operating temperatures (preferably a highly crystalline composition); (2) good mechanical strength; (3) surfaces which will take metallizing; (4) metal or alloy components of comparable thermal expansions; (5) low dielectric losses, even after being heated in a reducing atmosphere such as hydrogen, or in a vacuum. After some historical background, the report discusses changes in properties of a few crystals and glasses and gives many detailed composition studies of four types of bodies, including
(over)

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such properties as linear thermal expansion and dielectric properties at 3-cm wave length, viz.:

Alumina	K 8.4	PF 0.0006
Forsterite	K 6.3	PF 0.0006
Zircon-talc	K 7.5	PF 0.0026
Steatite	K 6.6	PF 0.0005

A brief account is given of the development of sealing techniques and some details are given for three modern methods of making ceramic-metal seals by using (1) Mn-Mo, (2) MoO_3, (3) TiH_2 as the active metallizing agents. (Author)

AD-153 553 Div. 7/1

Sonotone Corp., Elmsford, N. Y.
INVESTIGATION LEADING TO THE DEVELOPMENT OF A NICKEL CADMIUM BATTERY HAVING A HERMETICALLY SEALED CONSTRUCTION, by Irwin M. Schulman. Final rept. 10 Aug 56-30 Nov 57. 74p. incl. illus. tables.
(Contract DA 36-039-sc-73009) Unclassified report

The reaction mechanism of the sealed-type sintered-plate Ni-Cd cell was investigated. Cycle-service data indicated that, for an extended cycle life under the 60 min charge - 40 min discharge duty cycle, discharge rates under 0.150 amp should be used when charging at a constant potential of 1.50 v/cell. This applies to an 80% voltage regulation. A greater number of cycles may be obtained if the voltage regulation is reduced to 77%. The 1X1 cells cycled at 120°F and at 1 to 2 mm Hg pressure received only 100 cycles. The 1/4 x 1 cell fell below 80% regulation because of charging efficiency.
(over)

AD-153 553

The low temperature characteristics of D size cells were investigated. These will give about 85% of room-temperature capacity at 0°F at a discharge rate of 0.4 amp and 55% of room temperature capacity at -40°F at the same rate. At a discharge rate of 2.0 amp about 83% of room-temperature capacity can be expected at 0°F, and 43% at -40°F. The complete reaction which occurred at the charged Cd negative in the presence of O and KOH solution was considered as
$2\,Cd + O_2 + 2H_2O \rightarrow 2Cd(OH)_2$ and as $2Cd + O_2 \rightarrow 2CdO$.
A comparison of rate of change with rate of reaction indicated that no simple relation exists between the two. An investigation into temperature coefficient yielded a value of 5.5×10^{-7} mol of O consumed/min/°K. The reaction rate of the negative Cd plate decreased with increased concentration of the electrolyte solution in which it had been charged. Low concentration of hydroxide which resulted in an increased concentration of H_2O appeared to cause an increase in the rate at which $Cd(OH)_2$ is produced.

AD-153 642 Div. 14, 22, 30

Rock Island Arsenal Lab., Ill.
INVESTIGATION OF GLASS FOR RECOIL MECHANISM CYLINDER COATINGS, by L. R. Raisbeck. 12 Nov 57, 25p. incl. illus. tables (Proj. no. TR1-1031; Technical rept. no. 57-2695) Unclassified report

Friction and wear properties were determined for glass, chromium plate and uncoated alloy steel in sliding contact with leather, Teflon, aluminum alloy and silver. Oils, Specification 2-132, and Specification MIL-0-5606 were used for lubrication. Tests were conducted at normal room temperature using a load of 500 psi and a velocity varying from 0 to 4 inches per second. There was no significant difference in friction due to cylinder material. There was a highly significant difference in friction due to packing material. Teflon had the lowest and leather the highest coefficient of friction. Dynamic friction decreased as the number of rubbing cycles increased from 100 to 34,000. Teflon plastic produced the least wear on the cylinder materials. Leather wore
(over)

AD-153 642

deep grooves in the glass. Silver was more wear resistant than Teflon and aluminum. Leather could not be quantitatively evaluated. Glass and chromium plating were more wear resistant than uncoated steel except when used with leather. Slightly lower frictions and slightly less wear of the cylinder and packing materials were obtained when specimens were lubricated with oil, Specification 2-132, that when lubricated with oil, Specification MIL-0-5606. (Author)

AD-154 494 Div. 22, 26

Springfield Armory, Mass.
DEVELOPMENT OF DRUM SEALS FOR GUN, AUTOMATIC, 30mm, T182, by M. W. Pastore. Technical rept. on Gun, Automatic, 30mm, T182. 20 June 56, 26p. incl. illus. (Rept. no. SA-TR7-2015) Unclassified report

Effort was made to eliminate stoppages caused by failure of drum seals in the 30-mm T182 automatic gun to extend the barrel life. Firing tests demonstrated that an adequate barrel breech face life and seal life could be obtained by using experimental drum seal no. 7 (a modification of the original cylindrical seal with the outer diameter reduced and 2 sealing rings added) in combination with a fluted cartridge chamber and a drum cradle reinforced between side arms and gas cylinder housing.

AD-154 814 Div. 4/1, 30/5

Atomic Energy Research Establishment (Gt. Brit.).
BUBBLE LEAK DETECTION, by J. G. S. Biram. Mar 57 [14]p. incl. illus. tables, 20 refs. (AERE rept. no. CE/R 2066; HX. 2797) Unclassified report

Some preliminary work was carried out (August 1954) to find the sensitivity of leak detection by gas bubbles in some organic fluids. The method was several hundred times more sensitive than with water for a given gas pressure and at about 15 p. s. i. (gauge) was comparable with ordinary vacuum testing, and it was used by unskilled personnel. Hydrogen-ether was the most sensitive combination, but hydrogen or helium and methanol were usually employed for safety reasons; bottled compressed air can be used, with some loss of sensitivity. (Author)

AD-154 972 Div. 14/1, 31/3

Directorate of Materials and Explosives Research and Development (Gt. Brit.).
THE SEALING OF THREADED JOINTS: PART I: SEALING COMPOSITIONS AND JOINT DESIGN, by R. W. Bryant and W. A. Dukes. Oct 57 [25]p. incl. illus. tables (Rept. no. DMXRD/SEAL/57/3; [JSRP Control no. 580271]) Unclassified report

The most important signal factor in the sealing of threaded joints is the quality of the sealing composition. Cements which dry merely by evaporation of solvent are greatly inferior to solvent-free cements and to lutings. R. D. 1151B is the least, and R. D. 1286 the most, satisfactory cement tested. The next most important factor is the combination of joint design with mode of application of the sealing composition. Application to both threads is preferable, if it is permissible to force composition into the assembly. Sealing is also improved by screwing on to either (a) an external shoulder if composition is applied to the male threads, or (b) an internal shoulder if composition is applied to the female

(over)

AD-154 972

threads. A joint not screwed on to a shoulder is relatively difficult to seal. The metal and dimensions of the joint, and even incorrect application of the sealing composition, are individually of minor importance. (Author)

AD-155 541 Div. 1/2, 27/1

Propulsion Lab., Wright Air Development Center, Wright-Patterson Air Force Base, Ohio.
INVESTIGATION OF FIVE HYDRAULIC PUMPS REMOVED FROM KC-135 AIRPLANES WHICH EXPERIENCED HIGH TEMPERATURE INCIDENTS, by P. J. Strick. 19 Feb 58, 20p. incl. illus. (WADC Technical note no. 58-130) Unclassified report

The case return flow of these pumps was above normal acceptable limits. The pumps were not in serviceable condition because of high internal leakage rates, O ring deterioration, and scored valving surfaces. The unsatisfactory condition of these pumps was caused by operation in KC-135 airplanes with fluid at temperatures above 300°F. It is recommended that (1) the airframe manufacturer provide adequate cooling provision to dissipate heat input of hydraulic pump which raises the fluid temperature in the reservoir, pump fluid supply line, and pump case return line, and (2) the pump manu-

(over)

AD-155 541

facturer take action to improve pump wear characteristics by redesign or improved quality control procedures. (Author)

AD-155 606 Div. 14

Products Research Co., [Los Angeles] Calif.
DEVELOPMENT OF HIGH TEMPERATURE SEALANTS, by Irvin P. Seegman, William Cheorvas and others. Rept. for 1 Feb 57-1 Feb 58, on Rubber, Plastics, and Composite Materials. June 58, 160p. incl. illus. tables (WADC Technical rept. no. 58-89) (Contract AF 33(616)3976) Unclassified report

Fill and drain sealants from Viton A: The system consisted of a dilute solution of Viton A with phenolic resins as a primer; the Viton A sealant was compounded with silicone-coated SiO_2 and MgO_2 at 28% solids in methyl isobutyl ketone and an amine curing solution. The system had excellent resistance to fuels at 450°F, and good adhesion to stainless steel and Ti which was retained after oven-aging and immersion in salt H_2O. Filleting sealants for fuel tanks: An 80% solids sealant with excellent fuel and dry-heat resistance at 450°F was developed from Viton A cured with hexamethylenediamine. A 100% solids formulation (over)

AD-155 606

based on PAH-1 had excellent resistance to JP-5 fuels at 350°F when cured with Bz_2O_2, but its initial tensile properties were poor. After this exposure, good adhesion was retained to stainless steel primed with either DC-A-4014 or phenolic-triallyl cyanurate. Formulations based on Viton A, LS-53 or 1F4 plasticized with either PAH-1 or reverted LS-53U, had good tensile properties but poor adhesion to stainless steel. Groove sealants from fluorinated polymers: A sealant formulated from LS-53U and 1F4 had the required temperature properties of the proposed 250° specification and was capable of reinjection after prolonged immersion. Development of pressurization sealants: Room-temperature vulcanizing compounds were developed which had outstanding high-temperature properties after a stepwise post cure. Other investigations included: evaluation of fluorinated polyesters, evaluation of Silastic S-2077, recuring of silicones with fuel resistant materials, and inorganic polymers. (See also AD-144 877, AD-151 257)

AD-155 689 Div. 14, 17

Horizons, Inc., Cleveland, Ohio.
A RESEARCH PROGRAM ON THE INVESTIGATION OF SEAL MATERIALS FOR HIGH TEMPERATURE APPLICATION, by Raymond H. Baskey. Rept. for 1 Jan 57-31 Mar 58 on Ceramic and Cermet Materials. June 58, 64p. incl. illus. tables (WADC Technical rept. no. 58-181) (Contract AF 33(616)3891) Unclassified report

A systematic study was made of the wear behavior of (1) pure refractory hard metals (high-melting hard substances with a metallic character such as CrB_2, CrN, or $CrSi_2$), (2) binary alloys of pure refractory hard metals, bonded with Ni, and (3) ternary alloys of pure refractory hard metals, bonded with Ni and infiltrated with Ag. These materials were screened to determine wear mechanisms at speeds up to 30,000 fpm at loads of 14 psi without liquid lubricant. Such brittle pure refractory hard metals as VB_2, VSi_2, WSi_2, and MoB have fairly low wear rates against both (over)

AD-155 689

tool steel and Inconel, but are too brittle for most applications. Alloys of Ni and refractory hard metals were not satisfactory. Ternary alloys containing WB or CrN showed excellent low wear rates. Tool steel is limited to temperatures up to 1050°F, and Inconel may be too soft for top temperature performance. A ZrC-coated, unimpregnated graphite seal had good wear properties at 1050°F and sliding speeds of 14,000 fpm against stainless steel type 303. Kentanium K162B when run dry against Kentanium K162B at sliding speeds of 14,000 fpm at 1100°F gave the finest wear performance. (See also AD-97 235)

AD-156 311 Div. 20, 14

Atomic Energy Research Establishment (Gt. Brit.)
AN APPARATUS FOR SEALING ALPHA-ACTIVE SAMPLES IN EVACUATED GLASS AND SILICA CAPSULES, by J. P. Evans and M. B. Waldron. May 57, 4p. illus. (AERE rept. no. M/M 160; HX. 2974) Unclassified report

An apparatus is described for sealing α-active samples in glass and silica capsules. The capsule is rotated at speeds from ½ to 1 r.p.m. for silica and 20 to 60 r.p.m. for glass; a simple carbon arc makes an annular weld between the full diameter of the capsule and a closely fitting re-entrant closure. The capsule is then evacuated through a tube which forms the other end of the capsule, suitably constricted for sealing by means of another arc. This procedure allows sealing without over-heating the specimen. If desired a thermocouple can be located subsequently in the re-entrant cap for accurate temperature measurement. (Author)

AD-156 416 Div. 14, 26

Detroit Arsenal, Center Line, Mich.
SEALING OF SLIP COVER CONTAINER ASSEMBLIES, by Alexander A. Zadrozny. Final informal rept. 11 Nov 57 [11]p. incl. illus. table (Rept. no. 4017) Unclassified report

A total of twenty-one (21) experimental sealers were tested with reference to subject application under extreme pressure, temperature, and humidity conditions. Of these sealers, numbers 8 and 20 were most versatile for good all-around performance. From a general standpoint, sealers could be classified basically into two categories: those capable of optimum sealing performance, such as numbers 7, 14, 19 and 21; and those easiest to handle (apply and remove) such as numbers 1 and 16. In the former case, sealers 7, 14, 19 and 21 were capable of withholding internal pressures up to 7 psi and could effect a proper closure through temperature extremes of -65 F to 212 F. Sealers 1, 8, 16 and 20 fell somewhat below these

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AD-156 416

optimum performance limits. However, considerable flexibility was exhibited in handling which indicated that subject compounds could be readily applied and removed in service. (Author)

AD-156 901 Div. 8

New York U. Coll. of Engineering, N. Y.
SEALING TECHNIQUES FOR WAVEGUIDE AND COAXIAL ROTARY JOINTS, by Milton M. Sackman, Michael B. Maccarone, and Fred H. Posser, Sr, Rept. no. 10 (Final) 1 Aug 54-31 Mar 57. 169p. incl. illus. tables.
(Contract DA 36-039-sc-64476) Unclassified report

Studies were completed on the determination of sealing techniques for waveguide and coaxial rotary joints. A complete discussion of all pertinent design data and related information is included with emphasis on a design approach utilizing techniques obtained in this study. Performance and design features of the developed rotary seal installed in an RG-52 rotary joint are discussed with respect to related parameters and the methods which were applied in reaching a final design meeting the specified requirements. Information is included regarding the work performed in applying the established sealing techniques to 2 existing coaxial rotary

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AD-156 901

joints. The appendixes contain the following information: data from the experimental work on the magnetic fluid and the magnetic mechanical seals, history with recorded data on the experimental work performed in the development of the final design, developed design criteria, and final testing data of the development models. (See also AD-134 918)

AD-157 356 Div. 7/1, 14/1, 14/8

Burgess Battery Co., Freeport, Ill.
PLASTIC SEALS, by C. J. Broughton. Quarterly progress rept. no. 2, 1 Sep-30 Nov 57. 10p.
(Contract [DA] 36-039-sc-10527) Unclassified report

See also AD-144 596, AD-157 357

AD-157 357 Div. 7/1, 14/1, 14/8

Burgess Battery Co., Freeport, Ill.
PLASTIC SEALS, by C. J. Broughton. Quarterly progress rept. no. 3, 1 Dec 57-28 Feb 58. 1 Mar 58, 11p.
(Contract [DA] 36-039-sc-10527) Unclassified report

Various thermosetting and thermoplastic materials were investigated. Polyester resins appear suitable for seals for dry cells. The only thermoplastic material that appears suitable for seals is irradiated polyethylene. (See also AD-144 596, AD-157 356)

AD-157 699 Div. 22, 26

Sciaky Bros., Inc., Chicago, Ill.
DESIGN AND FABRICATION OF A PILOT WELDER FOR BONDING AND SEALING THE CLOSURE OF LARGE SIZE TOXIC CHEMICAL MUNITIONS, by Henry James. Progress rept. no. 1, 1-31 Jan 58. 19 Feb 58, 2p.
(Contract DA 18-108-cml-6437) Unclassified report

The objective of this contract is to design and fabricate a Pilot Welder for bonding and sealing the closure of large size toxic chemical munitions. The Pilot Welder will accommodate Chemical and Ordnance type munitions as follows: 105-mm. Shell, M360 and T302; 155-mm. Shell, M121 and M122; 175-mm. Shell, T223; 8-in. Shell, T174; and 4.5-in. Rockets, T164. The Pilot Welder will accommodate such other munitions as are within the size range defined by the preceding types. (Author) (See also AD-157 700, AD-204 462)

AD-157 761 Div. 27/1

Armour Research Foundation, Chicago, Ill.
METALLIC SEAL AND GLAND FOR STATIC SEALING APPLICATIONS IN AIRCRAFT POWER PLANT FLUID SYSTEMS, by S. F. Fausce. Final rept. 22 Mar 55-1 June 56. 51p. incl. illus. tables (WADC Technical rept. no. 56-378)
(Contract AF 33(600)29636) Unclassified report

Results are given for the testing and development of differently shaped metallic seals which are to be used at high temperatures with the Marmam V-band clamp as the flange fastener. The initial phase of this work, the design study, established in a qualitative manner the surface finish and pressure that must be maintained at the sealing surface as a function of the sealing material and the fluid to be sealed. It was found that a truly gas-tight seal with metal seals appears to be extremely difficult to obtain. However, satisfactory gas sealing of the joint was attained for static pressures with the seal developed;
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AD-157 761

but the seals failed during the pressure cycling phase of the test. These failures were due to the fatigue stresses in the seal which occurred due to the relative movement of the flanges. The flange movement during cycling was due to movement of the V-retainer of the clamp. Tests indicate that this movement is very much dependent upon the "relative fit" between the V-retainer and the flanges. Recommendations given for further study of metallic seals include a stress analysis of the seals, an investigation of surface phenomena, the determination of maximum amounts of gas leakage to be expected, and further investigation into impregnated fiber metal seals. (Author)

AD-157 911 Div. 14/1, 26/7

Huff, M., and Co., Newark, N. J.
INVESTIGATION OF SEALING QUALITIES OF GREASEPROOF BARRIER MATERIALS, by Leonard C. Drabant. Monthly progress rept. no. 2. Jan 58, 4p.
(Contract DA 28-017-501-ORD-2699, Proj. PA-4-20)
Unclassified report

AD-157 912 Div. 14/1, 26/7

Huff, M. and Co., Newark, N. J.
INVESTIGATION OF SEALING QUALITIES OF GREASEPROOF BARRIER MATERIALS, by Leonard C. Drabant. Monthly progress rept. no. 3. ~~Jan 58~~ [16]p. incl. illus. 1958
(Contract DA 28-017-501-ORD-2699, Proj. PA-4-20)
Unclassified report

A brief summary of evaluations made of the following items is presented: (1) backings; (2) films including cellulosic compounds, nylon, vinyl compounds, polycarbonates, polychlorotrifluoroethylene, polymethylmethacrylate, polyvinyl alcohol, polypropylene, rubber hydrochloride, low- and high-density polyethylenes, styrene (oriented), acrylonitrile styrene, polyvinylbutyral, polyesters, cellophane, and foil; and (3) coatings and adhesives. (See also AD-157 911, AD-157 530)

AD-158 530 Div. 14/1, 26/7

Huff, M. and Co., Newark, N. J.
INVESTIGATION OF SEALING QUALITIES OF GREASEPROOF BARRIER MATERIALS, by Leonard C. Drabant. Monthly progress rept. no. 1. 1958, 4p.
(Contract DA 28-017-501-ORD-2699, Proj. PA-4-20)
Unclassified report

See also AD-157 912

AD- 158 661 Div. 14, 22

Borden Co., Philadelphia, Pa.
INVESTIGATION OF THREADED JOINT SEALANTS AND CRIMPED JOINT SEALERS, by Wolf Karo. Monthly rept. no. 14 (Final) 30 Dec 55-31 Oct 57. 10p. incl. illus. tables.
(Contract DAI 28-017-501-ORD(P)2043, Proj. nos. PA-9-11A and PA-9-11-B) Unclassified report

Attempts were made to supply formulations of sealants for crimped and threaded joints on fuzes. Early experiments indicated that the pot life of polysulfide sealants could be extended by modification of the accelerator mix, although this modification made the preparation of a uniform composition difficult. The breakout torques obtained was about 35 in.-lb, calculated on the basis of a 1-1/8-in. bolt diameter. Studies were made of MPL-monomer thread sealants. Primary efforts involved developing additives to MPL-monomer and new monomers related to MPL that would reduce the breakout torque, and testing various
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AD-158 661

compositions both after aeration and after cure by a highly reactive initiator system. Three methods of polymerization of MPL monomer were studied: (1) self-sealing polymerization, (2) a process in which MPL-monomer compositions are both activated and inhibited by an air stream, and (3) by incorporating various polymeric materials in MPL-monomer.

AD-159 156 Div. 14/1, 14/6, 14/8, 22/5

Aerojet-General Corp., Azusa, Calif.
DEVELOPMENT OF AN IMPROVED BOMB SEALER FOR ELIMINATION OF INERT-SEALER EXUDATION, by R. D. McLeod and J. D. Sohl. Addendum 1 to Final rept. for 13 Jan-31 Mar 58. [16]p. incl. illus. (Addendum 1 to rept. no. 1282)
(Contract DA 28-017-501-ORD-2115) Unclassified report

A new end-sealing compound of polyurethane foam was developed and subjected to rigid temperature-cycling tests. The sealing material was loaded in bombs filled with TNT and compared with other materials. Of the materials tested, only Celite (diatomaceous earth) and the polyurethane foam prevented exudation. Two bombs sealed with polyurethane foam and 2 bombs sealed with Celite were subjected to drop tests from a 40-ft tower onto 6-in.-thick steel resting on 24 in. of concrete. Each of the 4 bombs was dropped from 3 positions: horizontal, base down, and nose down. All drops were satisfactory, without detonations, and only normal damage
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AD-159 156

to the bomb casings was experienced. (See also AD-140 572)

AD-160 124 Div. 8/2

Acton Labs., Inc., Mass.
DEVELOPMENT OF HIGH TEMPERATURE FILM TYPE ROTARY POTENTIOMETERS, by Robert Alger. Scientific rept. no. 3, 1 Dec 57-28 Feb 58. 1v. incl. illus. table.
(Contract AF 33(616)3977) Unclassified report

Efforts were concerned with the potentiometer design and materials selection. The design was finalized, and 5 potentiometers were built. The design greatly reduced the problems of ganging potentiometer units; all units are identical except for the second shaft (for rotating the hollow shaft) which comes in various lengths depending on the number of units in the gang. Three potentiometers were placed on high-temperature stability test. Results, after about 300 hr, were satisfactory. Five films (70% of Rh and 30% Ge, by weight) were evaporated to investigate a high contact noise characteristic. Results indicated that inadequate control existed during deposition. With the elimination of this charac-
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AD- 160 124

teristic, the film passed all contract requirements. A Silastic RTV-501 material proved satisfactory for use in the capsule contact; the Silastic formed an airtight seal while withstanding temperatures up to 260°C without deterioration. (See also AD-150 247)

AD-160 402 Div. 31, 14

Material Lab., New York Naval Shipyard, Brooklyn. DECK CALKING DEVELOPMENT PROGRAM (NS 033-200) SUBTASK 2. Final rept. [18 Nov 57] [1]p. (Lab. proj. no. 4969-45) Unclassified report

Available from ASTIA. An expanded version is available to U. S. Military Organizations only as AD-160 452.

160 452

AD-~~160 402~~ Div. 31, 14

Material Lab., New York Naval Shipyard, Brooklyn. DECK CALKING DEVELOPMENT PROGRAM (NS 033-200) SUBTASK 2. Final rept. [18 Nov 57] [1]p. (Lab. proj. no. 4969-45) Unclassified report

Available from ASTIA. An expanded version is available to U. S. Military Organizations only as AD-160 452.

161 638

AD-~~161 694~~ Div. 14, 27

Material Lab., New York Naval Shipyard, Brooklyn. EVALUATION OF O-RINGS USED TO SEAL CYLINDER LINERS OF DIESEL ENGINES SUBMITTED BY PRECISION RUBBER PRODUCTS CORPORATION, DAYTON 7, OHIO, by S. A. Eller. Final rept. 18 Feb 58, 9p. illus. tables (Lab. proj. no. 5354-13) Unclassified report

Available from ASTIA. An expanded version is available to U. S. Military Organizations only as AD-161 638.

AD-161 694 Div. 14, 27

Material Lab., New York Naval Shipyard, Brooklyn. EVALUATION OF O-RINGS USED TO SEAL CYLINDER LINERS OF DIESEL ENGINES SUBMITTED BY PRECISION RUBBER PRODUCTS CORPORATION, DAYTON 7, OHIO, by S. A. Eller. Final rept. 18 Feb 58, 9p. illus. tables (Lab. proj. no. 5354-13) Unclassified report

Available from ASTIA. An expanded version is available to U. S. Military Organizations only as AD-161 638.

AD-161 745 Div. 30, 14, 27

Material Lab., New York Naval Shipyard, Brooklyn. COMPRESSION STRESS RELAXATION APPARATUS, DESCRIPTION OF APPARATUS AND PROCEDURE FOR INCLUSION IN A SPECIFICATION FOR DIESEL ENGINE O-RING LINER SEALS. Final rept. 8 May 57, 3p. illus. (Lab. proj. no. 5354-12) Unclassified report

Available to U. S. Military Organizations only

AD-161 932 Div. 26, 14

Directorate of Materials and Explosives Research and Development (Gt. Brit.).
THE STRENGTH OF THREADED JOINTS: PART I: RESISTANCE TO MECHANICAL SHOCK, by R. W. Bryant and W. A. Dukes. May 58 [11]p. incl. illus. tables (Rept. no. DMXRD SEAL 58 1; [JSRP Control no. 580621]) Unclassified report

The strength (that is, the failing torque) of a cemented threaded joint is the sum of the tightening torque and the contribution of the cement. The resistance of steel threaded joints (assembly weighing 2 lb; thread 1 inch in diameter) to a single axial impact when dropped 4 ft. 6 in. on to concrete has been investigated. For joints screwed on to the external shoulder: (i) a tightening torque of 30 ft lb is necessary to resist one impact if there is no sealing composition in the joint, (ii) a tightening torque of 10 ft lb is necessary is the joint is luted and (iii) less than 10 ft lb (perhaps nil) is necessary if the joint is cemented. Similar, but perhaps higher, tightening torques are required if the joint is screwed on to the internal shoulder. (Author) (See also AD-123 804, AD-146 589)

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AD-161 932

AD-161 971 Div. 29, 16, 26
(Unannounced report)

Massachusetts Inst. of Tech. [Div. of Sponsored Research] Cambridge.
PROCUREMENT OF SERVICES PERTINENT TO THE DETERMINATION OF BACTERIAL RESISTANCE OF PACKAGES, by B. E. Proctor. Annual rept. 26 Sep 56-30 Sep 57, on Investigation of Bacterial Resistance of Packages. 11p. tables.
(Contract DA 19-129-qm-758) Unclassified report

See also AD-200 862

AD-161 951 Div. 7, 14

Burgess Battery Co., Freeport, Ill.
PLASTIC SEALS, by C. J. Broughton. Quarterly progress rept. no. 4, 1 Mar-31 May 58. 18 June 58, 13p.
(Contract DA 36-039-57-10527) Unclassified report

Investigations of the material "gunk" and the thermoplastic material "Irratiated Polyethlene" as suitable seals for dry cells has been carried. It was decided that the effort would be concentrated on the thermosetting material "gunk". A mold was made for 'N' size seals and seals were molded using the polyester "gunk". 'N' size cells were than fabricated using these seals. The majority of the seals failed, due to cracks which developed in the molded "gunk" material. after aging for a few days. Good cells were selected and stored at 130° F. The spinning tools were used in making the 'N' cells and proved very effective with no difficulty encountered. (Author) (See also AD-157 357)

AD-162 329 Div. 22

Frankford Arsenal, Philadelphia, Pa.
MODIFICATION OF DESIGN OF GASKETS USED IN BOXES, AMMUNITION, CALIBER 30, M19A1, T38E1 AND T38E2, by William J. Rose. Jan 58, 21p. incl. illus. tables (Proj. no. TS1-2; Rept. no. 103) Unclassified report

Not releasable to Foreign Nationals

Method: Gaskets employing three sizes of grooves were compared with solid gaskets for load vs. compression characteristics, compression distribution and environmental storage characteristics when inserted in caliber .30, T38E1 ammunition boxes. Conclusions: A grooved gasket, when used in place of a solid gasket, improves load versus compression characteristics and compression distribution without affecting the environmental storage characteristics of caliber .30, T38E1 ammunition boxes. Recommendations: (1) A gasket employing a 1/8 inch wide by 1/16 inch groove on the underside be specified for use in caliber .30, T38E1, T38E2 and M19A1 ammunition boxes. (2) The groove shape shall be either semicircular or rectangular with corner radii. (3) A grooved gasket be utilized in all future ammunition box designs employing a gasket in the cover. (Author)

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AD-162 329

AD- 162 472 Div. 31, 14

Materials Labs., Puget Sound Naval Shipyard, Bremerton, Wash.
OBSERVATIONS ON THE PROPELLER HUB OIL LEAKAGES ON THE USS WINDHAM COUNTY (LST-1170) NAD THE USS WESTCHESTER COUNTY (LST-1167), by W. B. Lew. Mar 58, 21p. illus. (Technical rept. no. R-387) Unclassified report

Notice: Only Military Offices may request from ASTIA.

It is concluded that: (1) Although "O" ring dimensions are reported in nominal or AN-1227 sizes, it is preferred that actual size plus tolerances and stock numbers be used on plans. (2) Checking "O" ring dimensions, width or cross-section diameter, and circumference (O.D.) is necessary to insure proper fit into the groove; because a seal, to be effective against internal pressure, requires that the O.D. of the "O" ring be equal to the O.D. of the groove. (3) "O" ring, piece 71, and blade sealing ring, piece 521, are (over)

AD-162 472

vulnerable to oil leakage from the hub. (4) Before assembly, final check of the clearances involving the retainer plate, thrust ring, and crank ring may be made by measuring the dimensions S_1, S_2, $S_1 + S_2$, and S_3 as described in paragraph on "Assembling Procedures for Components that Affect Hub Sealability". (5) Teflon-coating of the retainer plate, piece 47, does not appear to be effective in reducing wear of the latter in the installation on the USS WESTCHESTER COUNTY. (Author)

AD- 162 475 Div. 31, 14

Material Labs., Puget Sound Naval Shipyard, Bremerton, Wash.
EVALUATION OF BLADE SEALS FOR CONTROLLABLE PITCH PROPELLERS, by W. B. Lew. Nov 57, 8p. illus. tables (Progress rept. no. R-369) Unclassified report

Notice: Only Military Offices may request from ASTIA.

Conclusions: The laboratory tests indicate that a seal cavity clearance of 0.375 inch would probably cause rapid wear of the blade seal with the design "A" because that blade seal stalled the rotation of the test apparatus indicating that excessive frictional resistance or drag would develop between the rubber lip and the retainer plate of the hub assembly. Enlarging the seal cavity clearance in a service installation, as recommended by the supplier "A" to between 0.390 and 0.410 inch, is not desirable unless that blade seal is finally adopted as the standard blade seal. Meanwhile, any (over)

AD-162 475

enlargement of the seal cavity would result in excessive clearance for the blade seals of the designs "B" and "C". (Author)

AD-162 479 Div. 31, 14

Material Labs., Puget Sound Naval Shipyard, Bremerton, Wash.
EVALUATION OF NO. 57-0007-8 DECK SEALER SUBMITTED BY PRESSTITE ENGINEERING COMPANY, by J. R. Freeborn. Mar 58, 3p. illus. (Rept. no. R-382) Unclassified report

Available to U. S. Military Organizations only

The calking material has possible application for calking decks of minesweepers if there is a practical way of mixing and applying such a quick-set type of compound. (Author) (See also AD-145 501)

AD-162 481 Div. 31, 14

Material Labs., Puget Sound Naval Shipyard, Bremerton, Wash.
LATEX UNDERLAY FOR FLIGHT DECKS ON USS LEXINGTON (CVA-16) by W. H. Miles and D. S. Peterson. Apr 58, 8p. illus. (Development rept. no. E-379) Unclassified report

Available to U. S. Military Organizations only

A latex underlayment was installed as a sealer and filler under flight deck planking in areas undergoing alterations. Installation methods, coverage weight and costs were considered. The use of underlayment appears to be a definite improvement in eliminating leaks and water pockets. In areas not undergoing repairs, a gunning compound was used to seal leaks. (Author) (See also AD-65 188)

AD-162 726 Div. 30

Naval Research Lab., Washington, D. C.
A NEW THERMAL CONDUCTIVITY LEAK DETECTOR AND ITS APPLICATIONS, by Clarke C. Minter. 29 May 58, 6p. incl. illus. table (Rept. no. 5150)
Unclassified report

The report points out the reasons for the failure of the Pirani tube as a sensitive leak detector and describes a simple thermal conductivity apparatus of special design having several advantages over the mass spectrometer so widely used for this purpose. Procedures are described for using the new apparatus to locate leaks in vacuum or pressure systems using hydrogen or helium as probe gas. Experiments to determine the sensitivity of the apparatus toward small changes in concentration of Freon in air are described, and it has been concluded that leaks in refrigeration equipment can be located even when appreciable concentrations of Freon are present in the ambient air. (Author)

AD-162 882 Div. 26, 14

[Air Technical Intelligence Center]
Wright-Patterson Air Force Base, Ohio.
SEALING OF HYDRAULIC UNITS WITH METALLIC SLOT RINGS (Uplotneniye Gidravlicheskikh Agregatov Razreznymi Metallicheskimi Kol'tsami) by T. M. Bashta. [1958] 9p. incl. tables (Trans. no. F-TS-9397/III of Vestnik Mashinostroyeniya, No. 9, 1957, pp. 20-24)
Unclassified report

Metallic slot piston rings, which have found wide application in various machines, prove to be the simplest and longest-lasting of all sealings used in hydraulic units. This metallic (most often made of cast iron or bronze) ring with a rectangular cross section and a joint of arbitrary configuration is fitted into a groove cut into the surface of the piston. The advantage of such a sealing is the cheapness and adaptability to work in the heaviest of hydraulic systems under temperature conditions, and also the long period of service, which
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AD-162 882

runs to many years for work in these systems. The principle drawback is the need for precise machining of the opening of the cylinder. The difficulty is that piston rings are not free to compensate, as are soft elastic packings, for local irregularities in the surface or variations from the geometrical form of the cylinder towards oval, cone, or barrel-shaped forms. Another shortcoming is the impossibility of obtaining complete hermeticity, principally because the sealing ring itself has play at the joint which needs packing. (Author)

AD-163 020 Div. 14, 12,

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
A REVIEW OF SEAL MATERIALS FOR GUIDED-MISSILE APPLICATIONS, by Robert J. Berg. 7 Mar 58, 16p. incl. tables (Progress rept. no. 20-340) (Contract DA 04-495-ORD-18, ORDCIT Proj.)
Unclassified report

A survey was made of the available seal materials to select those most usable for present and immediate future needs in guided-missile programs. The development was undertaken of a series of laboratory or bench-type tests which might be used to evaluate new seal materials. The plastic materials studied included (1) polyethylene, (2) Teflon, (3) Kel-F, (4) nylon, and (5) polyvinyls. Rubber-like materials studied included (1) GR-S, (2) natural rubber, (3) Buna-N, (4) silicon rubber, (5) neoprene, (6) butyl rubber, and (7) Hypalon. The change in the physical properties of seal materials as a result of exposure to various substance was measured. Tests are given which are intended to serve
(over)

AD-163 020

as a guide to the selection of O-ring seal materials. The tests include: (1) tensile strength and elongation of O-rings, (2) compression set under constant deflection, (3) determination of O-ring cross section and volume, and (4) property change in liquids.

AD-200 381 Div. 1

Kett Corp., Cincinnati, Ohio.
SELF SEALING TANK PROGRAM, by W. F. Savage and M. G. Ginzberg. Summary rept. 29 Apr 55, 1v. incl. illus. table (Rept. no. KX-37)
(Contract AF 33(600)27046) Unclassified report

This report summarizes work done to develop self-sealing fuel cells of other than the conventional chemical self-sealing construction. An initial theoretical analysis evaluated sixteen methods and variations thereof for obtaining mechanical seals. Eight of these designs were subjected to preliminary gunfire tests and/or static tests. Two methods, flexible flapper valves and a spring actuated curtain, showed most promise for future development and these devices were subjected to additional static and gunfire tests. The curtain demonstrated ability to seal gunfire wounds on flat surfaces to a slow seep. In the final gunfire tests the flexible flapper valves failed to achieve satisfactory seals. (Author)

AD-200 382 Div. 1, 14

Kett Corp., Cincinnati, Ohio.
SELF-SEALING TANK PROGRAM, by W. F. Savage and M. G. Ginzberg. Summary rept. on Phase 1. 5 Oct 54, 1v. incl. illus. tables (Rept. no. KX-31)
(Contract AF 33(600)27046) Unclassified report

Designs for construction of self-sealing fuel cells of other than conventional self-sealing construction were studied. The program followed included an initial theoretical analysis (of sixteen possible designs), preliminary gunfire tests of small panels, static tests, and further gunfiring of test panels. Two constructions were evolved which show promise of satisfactory sealing characteristics. Design and construction of fuel cubes embodying these two methods is recommended. (Author)

AD-200 385 Div. 1

Firestone Tire and Rubber Co. of Calif. Los Angeles.
HIGH TEMPERATURE EFFECTS ON FUEL CELL MATERIALS, by John L. Dum. Final rept. for Nov 55-July 56 [on Phase 1]. Aug 56, 75p. incl. illus. tables. (WADC Technical rept. no. 56-428)
(Contract AF 33(616)31288) Unclassified report

A study was made of the effects of high temperature on the fuel container properties of self-sealing, bladder (E-107A), and nonrip tanks (NR-1173) and fittings. Experiments were performed at 200°, 250°, 300°, and 500°F to determine tensile strength, puncture resistance sealant swelling rates, flex cracking resistance, diffusion of fuel, and fitting torque. The tensile strength dropped gradually with increasing aging temperatures up to 350°F. The most serious result was a stiffening and eventual embrittlement of the coating materials which eventually become so severe that any flexing produced a stock rupture which would permit

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AD-200 385

fuel leakage. At 450°F, the tensile strength dropped faster with aging than stock embrittlement. Swell rates were mildly affected by sealant heat exposure. Diffusion rates showed little change except at elevated temperatures where they increased rapidly. Aging tests with JP-5 fuel showed that service life of the materials was longer than that indicated by hot air aging tests. (See also AD-200 386)

AD-200 850 Div. 3, 22

Army Chemical Corps Engineering Command, Army Chemical Center, Md.
INSTALLATION AND OPERATION OF LINE FOR THE REHABILITATION OF DEFECTIVE SHELL, CHEMICAL, GB, 155mm, M121, by Abraham Rednor, Thomas F. Bradley, and Joseph S. Carrion. June 56, 45p. incl. illus. tables (Rept. no. ENCR-23)
Unclassified report

This report describes the installation and operation of equipment, conveyors and associated inspection facilities for reworking defective M121 chemical shell bodies by machining fresh radii at the press-fit shoulder and honing to remove superficial imperfections in the shell press-fit surface. Magnetic particle inspection was included to screen out shell with sub-surface forging cracks. The program is covered from initial organization and preliminary engineering phases through design, installation and operation of the line and process improvements incorporated to increase recovery rate of

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AD-200 850

reworked shell. Photos, drawings and operating instructions are included in the appendixes for further clarification of the extent of the project. (Author)

AD-200 028 Div. 22/1, 22/8, 25/8

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
RESEARCH ON HEAT TRANSFER AND OBTURATION FOR SMALL ARMS WEAPONS, by Gerald A. Sterbutzel. Monthly progress rept. no. 34, for June 58. 15 July 58, 52p. incl. illus. tables (Rept. no. GA-948-C-34)
(Contract DAI 30-115-504-ORD(P)-596)
Unclassified report

Series 10, 12, and SAR-1 ring seals were tested. Series 10 seals were in satisfactory condition after almost 10,000 rounds of firing. Tests were completed on the first set of series 12 rings seals. The performance of the seals was satisfactory from a temperature standpoint. Tests were conducted on the SAR-1 ring seals. The SAR-1 drum permits the use of an insert in the present production drums. The insert is installed so that the rear edge of the insert is behind the leading edge of the case. The insert in this situation is pinned in place and between the insert and the drum is bonded
(over)

AD-200 028

an aluminum filled epoxy resin. This drum was instrumented for temperature readings, and 16 tests were completed. The temperature rise at the front of the instrumented round in the fuze detonator for this configuration equalled in the first tests the cookoff susceptibility for a regular nonretrofitted drum.

AD-200 082L Div. 14, 7

Aeronautical Material Lab., Naval Air Material Center, Philadelphia, Pa.
PROPOSED REVISION OF MILITARY SPECIFICATION MIL-S-8516B, SEALING COMPOUND, SYNTHETIC RUBBER, ACCELERATED (FOR ELECTRIC CONNECTORS AND ELECTRIC SYSTEMS) by C. Nadler and J. F. Turner. Partial rept. 31 Mar 58, [23]p. incl. illus. (Proj. TED no. NAM AE-42127; Rept. no. NAMC AML AE-1055) Unclassified report

Submit request via Bureau of Aeronautics, Navy Dept., Wash. 25, D. C.

An investigation was conducted for the purpose of revising Specification MIL-S-8516B to cover compounds having a variety of cure rates and to rectify any existing deficiencies or discrepancies in the specification. Sample compounds were obtained from presently qualified manufacturers. Based on the test results obtained with these materials, requirements for fast, dium
(over)

AD-200 082L

and slow curing type compounds were developed. Functional characteristics of these compounds are equivalent to those of present Specification MIL-S-8516B materials and in addition, the compounds possess improved working properties. Two suppliers for fast type compounds and one for the medium and slow type are available. (Author)

AD-200 230 Div. 7 14

Material Lab., New York Naval Shipyard, Brooklyn.
DEVELOPMENT OF CABLES, TYPE TCTX-3 UTILIZING VARIOUS SEALERS SUBMITTED BY ANACONDA WIRE AND CABLE COMPANY, HASTINGS-ON-HUDSON, N. Y. by S. S. Pigman. Final rept. 10 Apr 58, 6p. tables (Lab. proj. no. 5845-6)
Unclassified report

Tests were conducted on type-TCTX-3 cables to determine (1) the effects of the use of silicone-based and duxseal-type sealants on cable performance and (2) the effects of armor paint on silicone rubber cable sheathing. One sample contained a duxseal-type sealer, (Code A); and the other sample was filled with a silicone based sealer, (Code B). Painted specimens were coated with aluminum paint, (Code C). No significant difference in performance under the gas flame was indicated between samples sealed with Code A or B sealants, or between painted and unpainted cables. Exposure in the air convection oven for various periods up to 96 hr at 500° F
(over)

AD-200 230

caused little change in the insulation resistance of both painted and unpainted specimens filled with a Code B sealant. Both the painted and unpainted specimens filled with a Code A type sealant showed an increase in insulation resistance. The duxseal-type (Code A) material was unsatisfactory for TCTX cables. Prolonged aging did not indicate any further reduction in the physical properties of the sheath material after the first 24 hrs in either painted or unpainted samples. Painted samples containing the Code A filler showed the greatest deterioration after aging. Armor paint applied directly upon the outer surface of the sheath produced very little change in the physical properties after 1 mo at room temperature.

AD-200 862 Div. 29, 16, 26

Massachusetts Inst. of Tech. [Div. of Sponsored Research] Cambridge.
PROCUREMENT OF SERVICES PERTINENT TO THE DETERMINATION OF BACTERIAL RESISTANCE OF PACKAGES, by B. E. Proctor. Progress rept. no. 7, 1 Oct-30 Nov 57. 6p. tables.
(Contract DA 19-129-qm-758) Unclassified report

An investigation was made of the frequency of penetration of flat sheets of film (plain, creased and 1/8" heat seals) by Monascus purpureus. Statistical analysis of the data showed no significant difference in the frequency of penetration by M. purpureus of unirradiated and irradiated films that were either heat sealed, plain or creased. A significant difference (5%, 1%, or 0.1% level) was found when results for M. purpureus were compared with similar results for Serratia marcescens, Rhodotorula rubra and Escherichia coli. It was found that there was less penetration of laminated films sealed with a packaging
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AD-200 862

industries' heat sealer than of laminated films sealed with a Vertrod sealer. Tests were carried out with Clostridium sporogenes to determine the frequency of penetration of flat sheets. Preliminary work was carried out with Fusarium culmorum. (Author)
(See also AD-161 971)

AD-200 898 Div. 14, 31

Directorate of Materials and Explosives Research and Development (Gt. Brit.).
THE SEALING OF THREADED JOINTS. PART 2. THERMAL CYCLING AND MECHANICAL SHOCK, by R. W. Bryant and W. A. Dukes. July 58 [20]p. incl. illus. tables (DMXRD rept. no. SEAL 58/2; [JSRP Control no. 581054]) Unclassified report

The effect of mechanical stresses caused either by cyclic changes of temperature, or by impact, on the sealing of various threaded joints has been determined. Thermal cycling does not affect the sealing of joints unless the components are made of dissimilar metals. The most important single factor is the joint design (external, internal, or no shoulder), coupled with mode of application of sealing composition. The next most important factor is the quality of the sealing composition. R.D.1286 is the best cement, and R.D. 1284 (Luting Mk. 8) the best luting, examined. There is no significant difference between the performance of joints
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AD-200 898

made of different bimetallic combinations. A single axial impact caused by dropping steel threaded assemblies "end-on" through 4 ft. 6 in. on to concrete has little effect on the sealing. (Author) (See also AD-159 095)

AD-201 024 Div. 26, 17, 31
(Unannounced report)

Naval Engineering Experiment Station, Annapolis, Md.
SYNTRON CARTRIDGE UNIT - FAILED SEAL RING OF HASTELLOY B, by Martin W. Rausch. 2 Oct 52, 3p. incl. illus. (EES rept. no. 4G(2)101717)
Unclassified report

Failure of a Hastelloy B face ring contained in a Syntron cartridge unit for 5-5/8" diameter shaft was cause for comparative corrosion tests to be made of discs of Hastelloys B and C. Sample discs in contact with graphite washers were exposed in Severn River water and in sea water. No appreciable damage was sustained by Hastelloy C as a result of these tests. Discs of Hastelloy B, however, showed susceptibility to contact corrosion and also suffered corrosion attack and roughening beyond the contact area. The surface roughening of the test samples was similar to that exhibited by the contact face of the seal ring. (Author)

AD-201 047 Div. 14
(Unannounced report)

Westinghouse Electric Corp., Essington, Pa.
FAWICK ROTORSEAL TEST, by E. F. Miller. 28 Nov 49, 2p. incl. illus.
(Contract NObs 34224, Proj. Wolverine)
Unclassified report

The Fawick Rotorseal designed for a maximum speed of 2500 r.p.m. and air pressure of 150 p.s.i.g. was tested at 10,000 r.p.m. and 200 p.s.i.g. The packing grease heated in few min. and extruded from the bearing. After 10-min. operation with pressure reduced to 50 p.s.i.g. the grease was smoking. A thermocouple inserted in the housing to indicate abnormal temperatures was used as an index of deterioration of the moving parts. Another test under similar conditions but using a continuous lubrication resulted in overheating after 39 3/4 hrs. The Rotorseal is not recommended for applications in the range of the test conditions without auxiliary cooling and continuous lubrication.

AD-201 085 Div. 7, 8
(Unannounced report)

Aeronautical Electronic and Electrical Lab., Naval Air Development Station, Johnsville, Pa.
TEST OF LIMIT SWITCH SEALS ON TYPE X2875 METAL BELLOWS SEALED SWITCHES, by H. B. Sullivan. 26 Aug 48, 5p. illus. (TED no. ADS EL-602; AEEL rept. no. 4-49) Unclassified report

Aircraft switches X2875 and BZE7RNT2 were tested simultaneously in accordance with specifications AN-N-9 and AN-8-50. The following tests were carried out: ozone resistance, oil aging, dust and sand, altitude and temperature, icing, and condensation. The switches were actuated to simulate service conditions except during the ozone resistance and oil-aging tests. Type X2875 switch is superior to the standard BZE7RNT2. The metal bellows of the X2875 should be sealed to prevent ice and foreign particles from accumulating in the bellows pleats. The rubber gasket of the cover plate

AD-201 085

provides sufficient sealing; no additional sealing is required at any conduits. (Author)

AD-201 201(serial) Div. 14, 26

Huff, M. and Co., Newark, N. J.
INVESTIGATION OF SEALING QUALITIES OF GREASEPROOF BARRIER MATERIALS, by Leonard C. Drabant. Monthly progress rept. nos. 4-6 [1958]. 3 nos.
(Contract DA 28-017-501-ORD-2699, Proj. PA-4-20)
Unclassified reports

Unabstracted reports with this title include:
Monthly progress rept. no. 4, [1958], AD-201 201
Monthly progress rept. no. 5, [1958], AD-201 202
Monthly progress rept. no. 6, [1958], AD-201 203
(See also AD-157 912, AD-201 204, AD-202 445)

AD-201 202 Div. 14, 26
(Unannounced report)

Huff, M. and Co., Newark, N. J.
INVESTIGATION OF SEALING QUALITIES OF GREASEPROOF BARRIER MATERIALS, by Leonard C. Drabant. Monthly progress rept. no. 5. [1958] 3p.
(Contract DA 28-017-501-ORD-2699, Proj. PA-4-20)
Unclassified report

Collected on AD-201 201

(See also AD-201 201)

AD-201 203 Div. 14, 26
(Unannounced report)

Huff, M. and Co., Newark, N. J.
INVESTIGATION OF SEALING QUALITIES OF GREASEPROOF BARRIER MATERIALS, by Leonard C. Drabant. Monthly progress rept. no. 6 [1958] 7p. incl. tables.
(Contract DA 28-017-501-ORD-2699, Proj. PA-4-20)
Unclassified report

Collected on AD-201 201

AD-201 204 Div. 14, 26

Huff, M. and Co., Newark, N. J.
INVESTIGATION OF SEALING QUALITIES OF GREASEPROOF BARRIER MATERIALS, by Leonard C. Drabant. Monthly progress rept. no. 7. [1958] 11p. incl. tables.
(Contract DA 28-017-501-ORD-2699, Proj. PA-4-20)
Unclassified report

Samples were made of barrier combinations of 0.00035-in.-gage Mylar and cotton with thread counts 44 x 40, 28 x 26, and 56 x 44. These were coated with the N-1 coating previously used on the M-6 barrier. Five additional production samples of the M-6 type barrier were made to check for reproduceability. Two hundred and fifty samples of barrier combinations M-6, M-21, M-22, and M-23 were tested by the Picatinny Arsenal adhesion test method to determine the effects of different quantities of coating. Sixty adhesion tests were run on M-6 reproduction. Testing of Mylar and acetate combinations for establishing the correlation of WVTR/lb of wax
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AD-201 204

was completed. Quick leak tests (138) were conducted on method IA-1 and IA-2 packages both dipped and undipped and from a variety of materials. Further evaluations of various microcrystalline waxes and wax blends were conducted. A new wax blend, which indicated promising results, was used in the production of a sample barrier material for tests of effectiveness as compared to that of the N-1 coating used on the M-6. (See also AD-201 203)

AD-201 273 Div. 26

Feltman Research and Engineering Labs., Picatinny Arsenal, Dover, N. J.
PROPOSED NEW SEAM STRENGTH TESTS FOR MIL-B-117A INTERIOR PACKAGING BAGS, by Richard H. DeVore. Aug 58, 17p. incl. illus. tables.
(Proj. no. TB4-006G; Technical rept. no. 2534)
Unclassified report

Available from ASTIA. An expanded version is available to U. S. Military Organizations only as AD-202 446.

Seams made from various types of heat-sealable barrier materials were tested at room temperature and at 100°F and 160°F to determine whether or not a 5-minute room temperature test could be substituted for the usual 1-hour elevated temperature test. In the 5-minute test, only 2 weights were used instead of the several weights required by the conventional tests. In this test the weights were suspended from the test specimens so that
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AD-201 273

the load would be applied directly on fin-type seams fabricated from the test materials. At least 5 specimens of each material, cut from the material as received, were used in each phase of the tests. All of the weights used (3.5 lb, 2 lb, 24 oz, 12 oz, 10 oz, 7.5 oz, and 3.75 oz) were suspended from the specimens by means of clamps. The 5-minute room temperature test was found satisfactory when a 3.5-lb weight was used for Class b, c, and e bag material specimens (Specification MIL-B-117A) and a 2-lb. weight for Class d (MIL-B-117A) bag material specimens. (Author)

AD-201 321 Div. 8, 26

Bulova Research and Development Labs., Inc., Woodside, N. Y.
AUTOMATIC MACHINE FOR SEALING OF QUARTZ CRYSTAL UNITS, by R. Giglio Tos. Quarterly progress rept. no. 4, 25 Mar-24 June 58. [11]p. incl. illus.
(Contract DA 36-039-sc-72775) Unclassified report

Tooling difficulties on the HC-6/U holder were resolved. A Raytheon #1103 DC welder and Model K welding head were ordered. Evacuation chamber and controls are being assembled. Test samples of HC-6/U holders welded using the DC welder were evaluated. Welding of units using AC welder was not fully satisfactory. Photomicrographs of a weld and an expression for years of "seal life" are shown. (Author) (See also AD-157 394, AD-157 395, AD-158 639)

AD- 201 739 Div. 13

Army Engineer Research and Development Labs., Fort Belvoir, Va.
SLEEVE-TYPE MECHANICAL SEALS FOR DIRECT-DRIVEN, MULTI-STAGE, PETROLEUM PIPELINE PUMPS, by Bryant L. Johnson. 2 June 58, 40p. incl. illus. (Rept. no. 1527-TR) Unclassified report

The investigation, selection and testing of a sleeve-type mechanical seal of commercial design for Corps of Engineers, direct-driven, petroleum pipeline pumps are covered by this report. Mechanical seal manufactures were invited to submit proposals on a seal design to meet requirements established by the Petroleum Equipment Branch. Crane Co., Chicago, proposed designed which was modified to evolve the seal that was fabricated and tested. The report concludes in part that: (a) the seal is suitable for Corps of Engineers, direct-driven, petroleum pipeline pumps; (b) this type seal is suitable for use in other similar pumps for petro-
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AD-201 739

leum distribution service; (c) a substantial reduction and simplification in spare seal parts stocks will be possible by the adoption of this seal. (Author)

AD- 201 835 Div. 14

Pitman-Dunn Labs. Group, Frankford Arsenal, Philadelphia, Pa.
SEALING OF ANODIZED ALUMINUM, by F. Pearlstein. May 58, 11p. incl. illus. tables (Proj. no TB4; Memo rept. no. MR-671) Unclassified report

A number of sealing treatments utilizing boiling aqueous solutions and/or dispersions were applied to anodized 24S-T3 aluminum panels. The treated panels were coupled with copper discs and exposed to salt spray. Dichromate-sealed panels exhibited higher resistance to galvanic corrosion than any of the other singly sealed panels. Several double sealing systems, incorporating dichromate for either the first or second seal, increased the corrosion resistance over panels which were dichromate-sealed only. Some improvement was achieved by presealing in water or post-sealing in waterglass, but more significant improvement was obtained with panels presealed in 0.5 per cent Antarox A-400 or 0.5 per cent nickel acetate. Some of the sealing
(over)

AD- 201 835

treatments considerably increased the lubricity of the surface of anodized panels. Five-minute immersion in hot Teflon, polyethylene, wax, or diglycol stearate dispersions decreased the coefficient of friction of the surface by 75 to 88 per cent. (Author)

AD-202 438 Div. 22, 25

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
RESEARCH ON HEAT TRANSFER AND OBTURATION FOR SMALL ARMS WEAPONS, by Gerald A. Sterbutzel. Monthly progress rept. no. 32 for Apr 58. 15 May 58, 59p. incl. illus. tables (Rept. no. GA-948-C-32)
(Contract DAI 30-115-504-ORD(P)-596)
Unclassified report

Tests are discussed which were conducted on series 10 ring seals, SA-2 ring seals, and series 11 ring seals. Each has an outside diameter of 1.289 in. and uses the standard washer-type seal retainer. (See also AD-158 762)

AD-202 439 Div. 22, 25

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
RESEARCH ON HEAT TRANSFER AND OBTURATION FOR SMALL ARMS WEAPONS, by Gerald A. Sterbutzel. Monthly progress rept. no. 33 for May 58. 15 June 58, 31p. incl. illus. tables (Rept. no. GA-948-C-33)
(Contract DAI-30-115-504-ORD(P)-596)
Unclassified report

The study of ring seals was continued for the optimization of heat transfer and durability characteristics. Testing was confined to seals with an outside diameter compatible with drums being used for the SA type ring seals. Each had an outside diameter of 1.289 in. and could use the standard washer-type retainer. The first set of Springfield Armory ring seals (designated SA-1) were tested to 10,477 rounds without failure. The total number of rounds fired through these seals is now 12,585. The temperature performance of SA-2 ring seals was superior to SA-1 ring seals (See also AD-202 438)

AD-202 445 Div. 14, 26

HUFF, M., and Co., Newark, N. J.
INVESTIGATION OF SEALING QUALITIES OF GREASEPROOF BARRIER MATERIALS. Monthly progress rept. no. 8. [1958] 1v. incl. illus. tables.
(Contract DA 28-017-501-ORD-2699, Proj. PA-4-20)
Unclassified report

The performance of new barrier combinations with new coatings was compared with the N-1 coating previously used on the M-6 barrier. The Picatinny Arsenal adhesion test method and a modified version of that method were used to determine the effect of variations in barrier combinations. Tests were conducted in the machine and cross directions on all materials. All samples were conditioned for a minimum of 4 hr in a constant-temperature room prior to testing. New coatings, designated N-12, N-13, and N-14, which indicated promising results, were used in the production of sample barrier materials. These samples were made of the same materials used in th 6,
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AD-202 445

except for the new coatings. Quick-leak tests were conducted on IA-2 packages made with QPL and newly developed materials. Cyclic tests were performed on method IA-2 packages. The M-35-28 combination failed to meet the 20-lb tensile-test requirements; tensile-test values averaged 18 lb in the unaged and aged conditions. Four sets of 5 samples each of G-85 yielded 5 failures in a total of 20 tests and resulted in averages of 4.2, 8.4, 9.0, and 10.8 in., respectively, for the destruction test. Inspection of the method IA-2 package interiors revealed failure in the cyclic exposure tests as evidenced by the presence of moisture. (See also AD-201 204, AD-203 833)

AD-203 011L Div. 26, 14

Industrial Lab., Mare Island Naval Shipyard, Vallejo, Calif.
STANDARDIZATION OF REQUIREMENTS FOR BUTYL RUBBER TO BE USED WITH NONFLAMMABLE HYDRAULIC FLUID, by Arthur W. Scott. Specification-Development test rept. 30 Apr 58 [12]p. incl. tables.
(Rept. no. 3118-58) Unclassified report

Notice: Only Military Offices may request from ASTIA.

To establish limits for specification requirements for hydraulic seal materials to be used with nonflammable Cellulube 220 hydraulic fluid, a butyl stock (submitted by one of the manufacturers participating in this standardization requirement project) was evaluated at temperatures of 77°F, 158°F and 212°F, and for differerent lengths of time. Results indicate that this stock is very poor in compression set at elevated temperatures both before and following immersion in the hydraulic fluid
(over)

AD-203 011L

although the other properties were considered to be normal and comparable to other butyl stocks treated. (Author)

AD- 203 143L Div. 14

Material Lab., New York Naval Shipyard, Brooklyn.
QUALIFICATION TEST OF MARINE BRAND NO. 8 GASKET CEMENT, SUBMITTED BY L. W. FERDINAND AND COMPANY, INCORPORATED, NEWTON LOWER FALLS, MASSACHUSETTS. Final rept. 23 Apr 58, 4p. table (Lab. Proj. no. 5448-24) Unclassified report

Available to U. S. Military Organizations only

AD- 203 158L Div. 14, 11, 27

Material Lab., New York Naval Shipyard, Brooklyn.
EVALUATION OF O-RINGS USED TO SEAL CYLINDER LINERS OF DIESEL ENGINES, SUBMITTED BY GOSHEN RUBBER CO., INC., GOSHEN, INDIANA, by S. A. Eller. Final rept. 23 Apr 58, 9p. illus. (Lab. Proj. no. 5354-14) Unclassified report

Available to U. S. Military Organizations only

AD- 203 833 Div. 14, 26

Huff, M. and Co., Newark, N. J.
INVESTIGATION OF SEALING QUALITIES OF GREASE-PROOF BARRIER MATERIALS. Monthly rept. no. 9. [1958] [23]p. incl. tables.
(Contract DA 28-017-501-ORD-2699, Proj. PA-4-20) Unclassified report

Samples were made of the new barrier combinations M-05-26-2380-1, -2, and-3. Water vapor transmission tests were made on the flat, lock-seam, and end-closure areas of M-6 reproductions and other barrier combinations. Quick-leak tests were conducted on method IA-2 packages made with newly developed barrier materials. Additional cyclic exposure tests were conducted on method IA-2 packages. Coating M-05-26-2331 exhibited a transmission rate of moisture twice that previously obtained when compared with other improved coatings; this result was attributed to additives. Although changes in coatings did not show

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AD- 203 833

any significant effect on water vapor transmission, improvements were apparent in flexibility, formability, and adhesion. Results obtained from water vapor transmission tests on the M-6 reproductions were consistent with previous results. (See also AD-202 445)

AD-204 016L Div. 14, 26

Rubber Lab., Mare Island Naval Shipyard, Vallejo, Calif.
PRELIMINARY EVALUATION OF SEVERAL ELASTOMERS FOR USE IN HYDRAULIC SYSTEMS, by J. M. Holloway. Technical rept. 20 Apr 55 [14]p. incl. tables (Rept. no. 90-4) Unclassified report

Notice: Only Military Offices may request from ASTIA.

Screening tests were performed on thirteen elastomers to determine the most promising materials for use as gaskets, diaphragms and packings in noninflammable hydraulic fluids, such as Houghtosafe, Arochlor 1248, Pydraul F-9, as well as in inflammable MIL-O-5606 petroleum base fluid. The qualifying tests used were: a. Tensile strength, ultimate elongation, and volume change after immersion in each fluid for 94 hours at 158°F. b. Compression set, in air, after 46 hours at 194°F. The test data indicate that only Kel-F elasto-

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AD-204 016L

mer might be satisfactory for use in hydraulic systems containing any one of the four fluids. All of the butadiene-acrylonitrile copolymers, with the possible exception of Hycar 1014, might be satisfactory in hydraulic systems using Houghtosafe or MIL-O-5606 oil. GR-S-1023, if used in Houghtosafe only, was judged the most satisfactory of all the elastomers for use in hydraulic systems. Thiokol ST, Thiokol FA, M-5400, Philprene VP-15; and Philprene VP-25 were considered unsatisfactory because of high hot compression set. (Author)

AD-204 064L Div. 14

Rubber Lab., Mare Island Naval Shipyard, Vallejo, Calif.
DEVELOPMENT OF GASKET STOCKS COMPLYING WITH REQUIREMENTS OF SPECIFICATION MIL-G-18586B, CLASSES 1 AND 2, by R. R. James. Technical rept. 16 Oct 57 [25]p. incl. tables (Rept. no. 87-3) Unclassified report

Notice: Only Military Offices may request from ASTIA

The Rubber Laboratory has developed three stocks for use in the manufacture of O-ring gaskets complying with the requirements of Military Specification MIL-G-18586B for gaskets for electrical junction boxes. One stock, 275-433, is for use in gaskets required to conform with Class 1 requirements. Two stocks, 260-195 and 260-196, are for use in gaskets required to conform to Class 2 requirements. Hot compression set tests were performed on these stocks in addition to the specification tests. (Author)

AD-204 065L Div. 14, 31

Rubber Lab., Mare Island Naval Shipyard, Vallejo, Calif.
DEVELOPMENT OF RUBBER STOCKS FOR USE IN SEALS FOR HYDRAULIC SYSTEMS CONTAINING CELLULUBE 220, by A. E. Barrett. Progress rept. no. 3. 29 Nov 57 [15]p. incl. tables, 12 refs. (Rept. no. 90-9) Unclassified report

Notice: Only Military Offices may request from ASTIA.

The Rubber Laboratory was requested by the Bureau of Ships to develop rubber stocks for the manufacture of seals to be used in hydraulic systems containing Cellulube 220. It was shown in earlier work that butyl rubber was affected less by Cellulube 220 than any other elastomer. By means of the compounding information given in Patent No. 2,734,039, it was possible to obtain butyl rubber vulcanizates with low hot compression set. This patent describes the vulcanization of (over)

AD-204 065L

butyl rubber with a dimethylol phenolic resin, a chlorosulfonated polyethylene and a zinc compound. The Laboratory has continued the investigation of this curing system. The variables studied were the type of zinc oxide and the type of butyl rubber. It was found that the type of zinc oxide had no effect on the properties of the vulcanizate, except that untreated French-process zinc oxide did not disperse well. Butyl 215 yielded vulcanizates with better physical properties than Butyl 035 or Butyl 325. The Laboratory investigated the effect of variable channel-black loading and variable oil-content on the physical properties of Butyl 215 cured by the phenolic resin system. Stocks having nominal durometer hardnesses of 40, 60 and 80 were developed. (Author) (See also AD-145 [illegible])

AD-204 937 Div. 13
(Unannounced report)

Naval Engineering Experiment Station, Annapolis, Md.
TEST OF HIGH PRESSURE, HIGH TEMPERATURE STEAM FLANGE TYPE JOINT SEALED WITH A FLEXITALLIC GASKET (TYPE 347SS, 900 LB, SPECIAL CG) by N. L. Navarre and R. W. Stevens. 5 Feb 51, 9p. incl. illus. (Rept. no. EES 6A66781) Unclassified report

A flange-type joint sealed with a Flexitallic gasket was subjected to thermal shock under simulated steam conditions of 1025°F and 900 p.s.i. One gasket (with no bending movement applied) withstood 100 c. of thermal shock. Tests were conducted on 3 other gaskets with a bending moment of 40,000 in.-lbs. applied to the joint externally. One failed after 51 c.; the other 2 withstood 100 c. of thermal shock. The results indicated that the Flexitallic gasket seal between flat-face flanges withstands 50 c. and possibly 100 c. of thermal shock between 1025° and 530°F under 90[illegible] [illegible].i.

AD-205 020 Div. 31, 14
(Unannounced report)

Material Lab., New York Naval Shipyard, Brooklyn.
APPROVAL EVALUATION OF CABLE END SEALS UTILIZING AN ASPHALTIC HYDROCARBON OF THE MINERAL RUBBER TYPE EXHIBITED BY GENERAL CABLE CORP., PERTH AMBOY, N. J. Final rept. 21 July 52 [6]p. incl. illus. (Lab proj. no. 5287-13) Unclassified report

The asphaltic hydrocarbon of the "mineral rubber" type sealing compound used on these end seals adheres tightly to the sheath of the cable forming a compact and non-porous layer around the end of the cable. The satisfactory results obtained from the evaluation of the subject end seals indicate that the type of material and construction used by the manufacturer provides an end seal with serviceability, which compares favorably with the end seal specified in Mil-C-915 of 15 Nov 1949 with amendment 5 of 15 July 1951. (Author)

AD-205 179L Div. 14, 10

Naval Engineering Experiment Station, Annapolis, Md.
IMPROVED DURA SEAL BRAND OF MECHANICAL SEAL FOR GASOLINE PUMP SERVICE, SUBMITTED BY DURAMETALLIC CORPORATION, KALAMAZOO, MICHIGAN, by R. F. Stone. Qualification rept. 14 Oct 57, 6p. incl. illus. tables (EES rept. no. 010329) Unclassified report

Available to U. S. Military Organizations only

Improved Dura Seal brand of mechanical seal, manufactured by Durametallic Corporation, was tested to determine its suitability for use in gasoline pumps operating at stuffing box pressures between 5' and 25' head of aviation gasoline. The seal was found to be suitable for this service. (Author)

AD- 205 478L Div. 14

Rubber Lab., Mare Island Naval Shipyard Vallejo, Calif.
DEVELOPMENT OF RUBBER STOCKS FOR USE IN SEALS FOR HYDRAULIC SYSTEMS CONTAINING CELLULUBE 220, by J. M. Holloway. Progress rept. no. 4. 6 June 58, 12p. tables (Rept. no. 90-11)
Unclassified report

Available to U. S. Military Organizations only

AD-205 587L Div. 22, 14, 27

Naval Ordnance Test Station, China Lake, Calif.
LABORATORY PERFORMANCE TESTS OF STANDARD AND EXPERIMENTAL O-RINGS AS ROCKET MOTOR SEALS, by H. C. Hunnel and R. W. Conover. Summary rept. July 54-Jan 58. 11 Aug 58, 37p. incl. illus. tables (NOTS 2062; NAVORD rept. no. 6380)
Unclassified report

Submit request via Naval Ordnance Test Station, China Lake, Calif., Attn: Code 7506

In a continuing search for a satisfactory pressure-seal gasket for rocket motors, O-rings made of various formulations and shapes were tested and evaluated. Performance tests developed as reported in NAVORD Report 3401, NOTS 988 are affirmed for use as a basis for a specification for rocket motor O-ring seals. Tests reported cover a wide variety of materials and modified formulations of standard materials. Various shapes of O-ring seals are evaluated. (Author) (See also AD-82 306)

AD-205 810 Div. 29, 14, 26
(19 Nov 58)

Midwest Research Inst., Kansas City, Mo.
DEVELOPMENT OF NEW METHODS OF SEALING FLEXIBLE CONTAINERS, by B. W. Beadle. Progress rept. no. 6, 17 Feb-16 Apr 58. 23 June 58, 12p. incl. tables.
(Contract DA 19-129-qm-923) Unclassified report

Analysis of the data from the expanded statistical peel seal experiment brought out the following points: (1) The surface representing the effect of sealing conditions on the strength of the resultant seals is apparently highly complex, with one or more critical regions existing. (2) Differentiation of the second degree equation approximating this surface indicated that the optimum condition for sealing the FX-3886 (vinyl-foil-mylar) was a "minimum-maximum", thus supporting (1) above. (3) The use of the resilient silicone rubber pad decreases the standard deviation by about one-third. (4) In no case was there any evidence of sealer position effect. The
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AD-205 810

experiment does give weight to the existence of areas with high peel strengths although it failed to exactly define the surface. The existence of several seals having above average strengths at the optimum sealing condition as determined by the experiment suggests that there may be major differences in the appearance and function of these seals. Microscopic examination of mounted seal specimens confirmed this. Those seals having the highest strength were considerably different in physical appearance. Some extrusion of the thermoplastic layer was noted along with irregular fusion of this layer. (Author) (See also AD-205 693, AD-205 951)

AD-205 951 Div. 29, 14, 26
(19 Nov 58)

Midwest Research Inst., Kansas City, Mo.
DEVELOPMENT OF NEW METHODS OF SEALING FLEXIBLE CONTAINERS, by B. W. Beadle. Progress rept. no. 7, 17 Apr-16 June 58. 21 July 58, 12p. incl. tables.
(Contract DA 19-129-qm-923). Unclassified report

Further evaluation of the rounded jaw sealer has shown this method to be very effective. Seals produced on the FX-3886, vinyl-foil-Mylar, laminate have given efficiencies as high as 88 per cent. The average seal strength obtained at an apparent optimum set of sealing conditions was 11.4 lb/in. This is equivalent to 74 per cent efficiency. Examination of the data suggests that further work toward increasing the flow of the vinyl layer during sealing might produce 100 per cent efficient seals. Work on an additional vinyl-foil-Mylar laminate has produced seals of 18.0 lb/in strength. This material, 0.001 in. vinyl - 0.001 in. foil - 0.001 in. Mylar,
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AD-205 951

did not give as high efficiencies as the FX-3886, 69 per cent being the maximum, However, this material has a tensile strength of 26.2 lb/in, about twice that of the FX-3886 laminate. Attempts to use the rounded bar sealer on Pliofilm-containing laminates met with failure; little or no improvement in seal strength was obtained. In general, the rounded jaw sealer appears very promising and is simple in operation and would be readily adaptable to existing packaging equipment. (Author) (See also AD-205 810).

AD-206 106 Div. 7, 14

Electrical Testing Lab., Portsmouth Naval Shipyard, N. H.
RUBBER GROMMETS FOR SEALING ELECTRICAL CABLE, PROPOSED BY LONG BEACH NAVAL SHIPYARD. Evaluation rept. 9 Apr 58 [9]p. incl. illus. tables (Rept. no. ETL-2800) Unclassified report

AD-206 224 Div. 29

Ekco-Alcoa Containers, Inc., Wheeling, Ill.
DEVELOPMENT OF AN EXPENDABLE HERMETICALLY SEALED CONTAINER FOR PRE-COOKED MEALS, by R. J. O'Brien. Rept. no. 9, (Final) 30 Mar 56-30 Sep 57. 4p.
(Contract DA 19-129-qm-594) Unclassified report

The design and development of an hermetically sealed container for pre-cooked dehydrated meals and the further development of a package to accommodate the container were presented. Aluminum foil was found to meet the temperature and barrier specifications of the projected packages. In making up the package, it was found that three individual units would be better than one single compartmented container. The aluminum foil containers were rectangular and heat sealed. The sealant used was a .004 in. polyethylene coating.

AD-206 374 Div. 29, 14, 26

Midwest Research Inst., Kansas City, Mo.
DEVELOPMENT OF NEW METHODS OF SEALING FLEXIBLE CONTAINERS, by B. W. Beadle. Progress rept. no. 4, 17 Oct-16 Dec 57. 12p. incl. tables.
(Contract DA 19-129-qm-923) Unclassified report

The urethane adhesive has produced the strongest and most efficient adhesive peel seals obtained to date. Peel strengths of 10.3 lb/in were obtained on vinyl-foil laminates. This material and adhesive produced a peel seal package of 32 per cent efficiency. Strong peel seals were also produced on acetate and polyethylene laminates. Three new mylar-foil laminates have been received and are being used in a statistical study of the effect of variable sealing conditions on the strength of peel and lap seals. The first part of these experiments has been completed. The variance in results on peel-sealed mylar-foil-vinyl laminates has been disconcerting. A numerical analysis of these data is being performed. It appears that expansion of the ex-

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AD-206 374

perimental design will be required to obtain statistically significant data. (Author) (See also AD-200 224, AD-205 951).

AD-206 446 Div. 8, 14

Raytheon Mfg. Co., Newton, Mass.
CERAMIC MINIATURE SEVERE ENVIRONMENT ELECTRON TUBE, by Edmund Mockus. Quarterly progress rept. no. 5, 1 Mar-31 May 58. [9]p. incl. illus. table.
(Contract DA 36-039-sc-73192) Unclassified report

High heater currents were traced on finished tubes to a large gas volume. This was caused by parts outgassing when the main seal was being made. A new pre-processing schedule was arrived at which solved the large volume gas problem. Large scale tests are now being run to establish if any further problems exist. Metal solders for "glueing" the grid side rod tothe ceramic spacer have been abandoned in favor of ceramic or non-conducting cements. (Author) (See also AD-200 841)

AD-206 622 Div. 30
(2 Dec 58)

Naval Ordnance Test Station, China Lake, Calif.
AN EVALUATION OF LEAK-DETECTION METHODS, by Robert H. Martin and Wm. C. Shaw. 15 Oct 58, 34p. incl. illus. (NOTS 1993; NAVORD rept. no. 5868)
Unclassified report

The following industrial techniques for finding and measuring small leaks are described: bubble methods, volume-sharing method, and halogen, radioactive, and helium tracers. The use of the helium leak detector is discussed in detail as it was found to be the most suitable for working with small, sealed items of ordnance. (Author)

AD-206 707 Div. 14, 10
(10 Oct 58)

Material Lab., New York Naval Shipyard, Brooklyn. RUBBER HOSE, DIAPHRAGMS AND GASKETS RESISTANT TO SPECIAL FUELS, REPORT OF DEVELOPMENT AND STANDARDIZATION OF SCREENING TESTS FOR EVALUATION OF. Final rept. 10 July 58, [7]p. incl. illus. (Lab. proj. no. 5998-2)
Unclassified report

Standardized screening tests are presented which were developed for the evaluation of elastomeric materials for use in the fabrication of hoses, gaskets, and diaphragms for shipboard handling of rocket propellant chemicals.

AD-206 773L Div. 14
(24 Nov 58)

Coast Guard, Washington, D. C.
BUOY POCKETS, by C. F. Scharfenstein, Jr.
[3 Nov 58] 1v. incl. illus. tables (Rept. no. 177)
Unclassified report

Notice: Only Government Agencies may request from ASTIA. Others request approval of U. S. Coast Guard, Washington, D. C.

Three types of gasketing material (a noncuring polysulphide caulking compound, a rubber gasket with cloth insert, and 6 sizes of a neoprene-cork composition gasket) were tested in 3 types of buoy pocket closures. The torque readings made from a direct reading needle were 97% accurate. The narrower gaskets were the easiest with which to make the watertight joint closure. The spraying by a high-pressure fire hose test, the 21-day awash test, and the 7-day submergence test proved nothing more than the 1-atm submergence test.
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AD-206 773L

If the closure passed the 1-atm test, it passed the other longer tests at less pressure. The noncuring, polysulphide, caulking compound was a satisfactory sealer. It was easily applied, required no precision fitting, was adaptable to nonuniformly flat mating surfaces, and had sufficient body to withstand 1-atm of air pressure without seal violation. The rubber-cloth insert gasket sealed the closure only 2 out of 6 times under 85 to 140 ft-lb of torque in the 1-atm air pressure tests. No water was found in the pocket after the fire hose, 21-day awash, and 7-day submergence tests. The neoprene-cork composition gaskets all passed the 1-atm air pressure/submergence test. The neoprene-cork composition and polysulfide gaskets performed better than the rubber.

AD-207 016L Div. 14, 11, 27

Material Lab., New York Naval Shipyard, Brooklyn. EVALUATION OF O-RINGS USED TO SEAL CYLINDER LINERS OF DIESEL ENGINES SUBMITTED BY ACADIA SYNTHETIC PRODUCTS, DIVISION OF WESTERN FELT WORKS, CHICAGO, ILLINOIS, by S. A. Eller. Final rept. 22 Aug 58 [18]p. incl. illus. (Lab. proj. no. 5354-17)
Unclassified report

Notice: Only Military Offices may request from ASTIA. Others request approval of Chief, Bureau of Ships, Navy Dept., Wash. 25, D. C.

AD-207 035L Div. 14, 27

Material Lab., New York Naval Shipyard, Brooklyn. EVALUATION OF O-RINGS USED TO SEAL LINERS OF DIESEL ENGINES SUBMITTED BY GARLOCK PACKING COMPANY, PHILADELPHIA, PENNSYLVANIA. Final rept. 26 Sep 58 [16]p. incl. illus. tables. (Lab. proj. no. 5354-19)
Unclassified report

Notice: Only Military Offices may request from ASTIA. Others request approval of Chief, Bureau of Ships, Navy Dept., Wash. 25, D. C.

AD-207 190L Div. 14, 27

Material Lab., New York Naval Shipyard, Brooklyn. EVALUATION OF O-RINGS USED TO SEAL CYLINDER LINERS OF DIESEL ENGINES SUBMITTED BY NATIONAL SEAL DIVISION, FEDERAL-MOGUL-BOWER BEARINGS, INCORPORATED, NEWARK, NEW JERSEY. Final rept. 29 Sep 58 [19]p. incl. illus. tables (Lab. proj. no. 5354-20)
Unclassified report

Available to U. S. Military Organizations only.

AD-207 191L Div. 14, 27

Material Lab., New York Naval Shipyard, Brooklyn. EVALUATION OF O-RINGS USED TO SEAL CYLINDER LINERS OF DIESEL ENGINES SUBMITTED BY RUBBER LABORATORY, MARE ISLAND NAVAL SHIPYARD, by S. A. Eller and A. A. Stein. Final rept. 28 Aug 58 [17]p. incl. illus. tables (Lab. proj. no. 5354-18) Unclassified report

Available to U. S. Military Organizations only

AD-207 538L Div. 14, 27

Material Lab., New York Naval Shipyard, Brooklyn. EVALUATION OF O-RINGS USED TO SEAL CYLINDER LINERS OF DIESEL ENGINES SUBMITTED BY RAYBESTOS-MANHATTAN, INC., MANHATTAN RUBBER DIVISION, PASSAIC, NEW JERSEY, by S. A. Eller. Final rept. 30 July 58 [16]p. incl. illus. tables (Lab. proj. no. 5354-16) Unclassified report

Available to U. S. Military Organizations only.

AD-207 505 Div. 22, 25
(18 Dec 58)

Cornell Aeronautical Lab., Inc., Buffalo, N. Y. RESEARCH ON HEAT TRANSFER AND OBTURATION FOR SMALL ARMS WEAPONS, by Gerald A. Sterbutzel. Monthly progress rept. no. 38 for Oct 58. 15 Nov 58, 53p. incl. illus. tables (Rept. no. GA-948-C-38)
(Contract DAI 30-115-504-ORD(P)-596)
Unclassified report

Two systems have been developed which in themselves are complete solutions of the cook-off problem in fighter aircraft currently being considered. One of these systems utilizes air flow over the drum to make possible the firing of at least 420 rounds at an ambient temperature of 150° without cook-off. The other - and the simpler solution - requires only a modification of the drum and seal design to make possible the firing of 420 rounds without cook-off under the severest flight conditions in any of the latest fighters. The study of this
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AD-207 979L Div. 26, 14, 22

Rock Island Arsenal Lab., Ill. INVESTIGATION OF G-T RING PACKINGS FOR 155 MM GUN EQUILIBRATORS, by L. R. Raisbeck. 1 Dec 58, 16p. incl. illus. tables (RIA Lab. rept. no. 58-3290) Unclassified report

Available to U. S. Military Organizations only

Two sets of Palmetto G-T Ring packings were tested in 155 MM Gun Equilibrators. One set of packings was equipped with phosphorous bronze backup rings and the other set with Teflon backup rings. The two sets of packings also differed slightly in the dimensions of the elastomer sections. The equilibrators were subjected to friction and gymnastication tests at sub-zero, normal and elevated temperatures to determine if the packings were superior to conventional O-rings. The equilibrator with packings utilizing phosphorous bronze backup rings completed 40, 150 cycles of gymnastication without failure but the polished plunger ace
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AD-207 505

type seal - known as ring seals - is continuing for optimization of heat transfer and durability characteristics. Ring seals are very small compared with the standard production seals. They have been tested with a number of variations in dimensions. All present testing is confined to seals with an outside diameter of 1.289" which can use the standard washer type seal retainer. The work discussed this month concerns tests of P-2 ring seals at temperatures between -48 and -67°F, and tests of the SAR-2 and SAR-3 retrofitted drums. (Author) (See also AD-205 837)

AD-207 979L

was severely worn. The equilibrator with packings utilizing Teflon backup rings failed after 7,275 cycles due to loss of nitrogen pressure. Both of the equilibrators had higher frictions than standard equilibrators with O-ring packings. It was concluded that G-T rings when used in the 155 MM Gun Equilibrator do not seal as well as O-rings, have higher frictions than O-rings, reduce or eliminate spiral twisting, and produce excessive wear on the mating surface when phosphorous bronze backup rings are used. (Author)

AD-208 687 Div. 29

Little, Arthur D., Inc., Cambridge, Mass.
VAPOR-PROOF CLOSURE. Final rept. 5 Nov 58, 16p. incl. illus. (Rept. no. C-60613)
(Contract DA 19-129-qm-839) Unclassified report

Efforts were made to develop an improved closure system for special clothing. The closure system is to be erosion proof against guided-missile propellants; gas-, liquid-, and air-tight; durable; fail-safe; and easily operated. Gluing, pneumatic, purse-string, snapspring, zipper, bayonet, and continuous-locking closures were considered. The newly developed continuous-locking closure was considered the most promising system. This system embodies 2 molded rubber portions that act as seals. Right-and left-wound springs vulcanized in the rubber, when brought together, mesh and form a hole through their common centers for the entire distance of the closure. Into this hole, a flexible wire is inserted by means of a winding device located at one end of the closure. Although additional improve-
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AD-208 687

ment of the mechanism is considered necessary, the continuous-locking concept shows promise because of the following features: (1) it can be manufactured in any length; (2) it is practically indestructible; (3) it is flexible in all directions and jam-free; (4) it has a unique emergency release mechanism; (5) when closed, it is air-and liquid-tight up to 15 psi; and (6) it could be designed to withstand much higher pressures.

AD-208 838 Div. 14

Rubber Lab., Mare Island Naval Shipyard, Vallejo, Calif.
PRELIMINARY INVESTIGATION OF GENTHANE-S, by J. W. Hollister and R. E. Morris. Technical rept. 9 Jan 59 [16]p. incl. illus. tables (Rept. no. 79-3) Unclassified report

The Rubber Laboratory has investigated a urethane rubber, Genthane-S, to determine in a preliminary way its suitability for the manufacture of mountings, hoses and gaskets. In the crude form, this rubber, unlike other urethane prepolymers, is a solid and in general is processed like other crude synthetic rubbers. Notable features of Genthane-S vulcanizates are the following: (1) Excellent tensile properties and good tear resistance. (2) Excellent resistance to hot air at temperatures up to 250°F. (3) Excellent resistance to petroleum oils and aromatic gasoline. (4) Excellent resistance to weather. (5) Good resistanc compression set at 212°F and to drift under load a m temperature. (6) Good resistance to water, salt water and dilute acids at temperatures up to 130°F. (7) Good resilience. (8) Poor resistance to hot water, caustic solutions and phosphate plasticizers. (9) Poor resistance to compression set at temperatures below 30°F. Genthane-S does not appear to be particularly suitable for use in mountings, but does appear to be suitable for use in hoses and gaskets not subjected to hot water, caustic solutions, ester plasticizers, or, in the case of gaskets, to temperature below 30°F. (Author)
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AD-208 838

AD-209 169L Div. 30

Atomic Energy Research Establishment (Gt. Brit.).
THE 1441A OXYGEN LEAK DETECTOR, by R. S. Barton. Sep 57, 5p. illus. (AERE rept. no. GP/M 189; H. 24502) Unclassified report

Submit request via Technical Information Service, Oak Ridge, Tenn.

An auxiliary power pack, designed for use in conjunction with the 1075 ionization gauge control unit, has been developed for the purpose of rapidly converting an ionization gauge, used in a vacuum system for pressure measurements, into a diode for leak detection using O_2 as the probe gas. Entrance of the gas into the vacuum envelope leads to a decay of electron emission from the hot cathode of the diode and this is observed on a meter suitably positioned in the gauge circuit. A description is given of experiments made to obtain the information necessary for the design of the above mentioned pack followed by a brief description type finally built for stores issue. (Author)

AD-209 179 Div. 22, 11, 14

[Aberdeen Proving Ground, Md.]
ENVIRONMENTAL (DESERT) TEST OF TWO OE-10 LUBRICANT SEALING SYSTEMS FOR M48A2 TANK ROADWHEEL BEARINGS, by Duane R. Bade. 14 Aug 58 [14]p. incl. illus. table (Proj. no. TB5-1401/Y316, memo. rept. no. 1) Unclassified report

Removal of the "O" ring from the standard seal allows oil leakage at two different areas. To halt leakage between the seal and road arm it is necessary to have a machined gasket bearing surface on the external dust shield and to cement gasket TD 11763 to this surface. No satisfactory means of stopping leakage between the dust shield and the spring adaptor assembly has been determined. Application of Code A elastic cement failed to completely halt the leakage. It has been noted that contact of gasket TD 11763 with OE 10 oil for approximately 24 hours causes an increase in size of approximately 4%. The conditions encountered by road

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AD-209 179

wheel seals necessitate a high standard of installation, as improper handling of the seal before installation may influence seal performance. In an attempt to minimize leakage, all corrosion and dirt particles should be brushed from the bearing spacer. New "O" rings should also be used since contact with lubricant swells and deforms the rings and also causes partial loss of the material's elasticity. All new "O" rings should be closely inspected for defects prior to installation. See Inclosure 6. The Code A seal does not have interchangeability on the road-wheel arms or provision for bearing inspection without removal of the seal retaining screws. (Author)

AD-210 323 Div. 26, 8

Stanford Electronics Labs., Stanford U., Calif.
ELECTROFORMED CERAMIC-TO-METAL SEAL FOR VACUUM TUBES, by M. D. Hare, H. F. Keller, and H. A. Meneses. 17 Nov 58, 11p. incl. illus. (Technical rept. no. 453-3)
(Contract DA 36-039-sc-73178) Unclassified report

An electroformed ceramic-to-metal seal was developed to bond a large number of components such as an external--circuit TWT. The seals are electroformed with Cu by means of a plating bath. The process is as follows: (1) the ceramic components are metallized by the standard Mo-Mn process; (2) the metalized areas are plated with Ni and sintered; (3) Cu is plated on the Ni and fired to the sintering or flow temperature; (4) Au plating may then be put on and diffused to the Cu at 400°C; (5) the parts are jigged together with provision being made for electrical contact to the internal components and the metalized portions of the ceramics; (6) Lucite solution may be used as a sealer at the inter-

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AD-210 323

faces of the components, evaporated, and pumped out of the assembly during bakeout; (7) any electrically conductive area which is not to be plated is masked off with acid-resistant tape or lacquer; (8) the assembly is put through a cleaning cycle; and (9) the assembly is immersed in an acid-Cu bath at a current density of about 40 amp/sq ft for 30 sec, after which the current density is reduced to 10 amp/sq ft. for a 24-hr period. A deposit of 0.008 in. of electroformed Cu in 24 hr is sufficient to assure a vacuum-tight seal. This method of bonding tube components forms the bond at room temperature with materials which can be subsequently fired to high temperatures. (See also AD-135 048)

AD-210 822L Div. 14, 4

Atomic Energy Research Establishment (Gt. Brit.).
THE PERMEABILITY OF A NATURAL RUBBER AND SOME RUBBER-LIKE MATERIALS TO H_2, He, N_2, O_2 AND A, by R. S. Barton. Nov 58, 4p. illus. (Rept. no. AERE Z/M 210; HL 58/3140) Unclassified report

Submit request via Technical Information Service, Oak Ridge, Tennessee

See also AD-116 938

AD- 211 410 Div. 14, 4

Industrial Lab., Mare Island Naval Shipyard, Vallejo, Calif.
BUTYL RUBBER COMPOUND NO. X-1150-30 SUBMITTED BY PARKER SEAL COMPANY, by Arthur W. Scott. 25 Feb 59, 3p. incl. tables (Suitability rept. no. 0179-59) Unclassified report

AD-212 518L Div. 14, 31

Material Lab., New York Naval Shipyard, Brooklyn.
CALKING AND WEATHERING COMPOUND, TAPES FOR BIMETALLIC FAYING SURFACES, SUITABILITY OF. Progress rept. no. 2. 23 Mar 59, 5p. incl. tables (Lab. proj. no. 5540-4) Unclassified report

Notice: Only Military Offices may request from ASTIA. Others request approval of Chief, Bureau of Ships, Navy Dept., Wash. 25, D. C.

See also AD-208 732.

AD-212 634L Div. 14

Industrial Lab., Mare Island Naval Shipyard, Vallejo, Calif.
STANDARDIZATION OF REQUIREMENTS FOR BUTYL RUBBER TO BE USED WITH NONFLAMMABLE HYDRAULIC FLUID (ONE STOCK) by Arthur W. Scott. Specification-Development test rept. 19 Nov 58 [8]p. incl. tables (Rept. no. 6466-58) Unclassified report

Notice: Only Military Offices may request from ASTIA. Others request approval of Chief, Bureau of Ships, Navy Dept., Wash. 25, D. C.

To establish limits for specification requirements for hydraulic seal materials for use with non-flammable pure phosphate ester type hydraulic fluid, a butyl stock designated as B-5 was evaluated at temperatures of 77, 158 and 212 degrees F, and for different time periods. Test results indicate that this stock is satisfactory for the intended purpose, particularly in its having low (over)

AD-212 634L

compression set at 212 degrees F. (Author) (See also AD-203 011)

AD-212 661 Div. 26, 14

Huff, M., and Co., Newark, N. J.
INVESTIGATION OF SEALING QUALITIES OF GREASPROOF BARRIER MATERIALS, by Leonard C. Drabrant. Monthly progress rept. no. 14, 1-28 Feb 59 [25]p. incl. illus. tables (Contract DA 28-017-501-ORD-2699, Proj. PA4-20)

Mechanical, semimechanical, and manual techniques were applied for closing packages made from M-6 and M-05-26-2380-3 barrier materials. The time required to fabricate the packages with each of these techniques was recorded, and each package was then subjected to the vacuum quick-leak test, MIL-P-116C, Amend. 1 (Navy). Tests showed that the M-6 barrier material can be fabricated into a Method IA-2-type package by the use of the new method of closure with any one of the sealing techniques. (See also AD-208 926)

AD-212 866L Div. 14, 31

Material Lab., Puget Sound Naval Shipyard, Bremerton, Wash.
EVALUATION OF A NEOPRENE COMPOUND FOR CALKING OF FLIGHT DECKS (NS-033-200) by J. R. Freeborn. Jan 59, 2p. (Technical rept. no. R-419) Unclassified report

Available to U. S. Military Organizations only

AD-213 564L Div. 31, 14

Materials Labs., Puget Sound Naval Shipyard, Bremerton, Wash.
OBSERVATIONS ON MODIFICATIONS FOR CORRECTING HUB OIL LEAKAGE ON CONTROLLABLE PITCH PROPELLERS ON THE USS TERRELL COUNTY (LST 1157) AND USS WHITFIELD COUNTY (LST 1169) (NS-033-200) by W. B. Lew. Nov 58 [12]p. incl. illus. tables (Technical rept. no. R-413) Unclassified report

Available to U. S. Military Organizations only.

AD-213 568L Div. 14, 31

Rubber Lab., Mare Island Naval Shipyard, Vallejo, Calif.
DEVELOPMENT OF A SYSTEM FOR SPLICING O-RINGS ABOUT THE PROPELLER SHAFTS OF LST CLASS 1156 VESSELS (NS-033-200) by J. W. Hollister. 10 Oct 58 [12]p. incl. illus. tables (Rept. no. 90-10) Unclassified report

Notice: All requests require approval of Chief, Bureau of Ships, Navy Dept., Wash. 25, D. C.

AD-213 956 Div. 27, 14, 31

Naval Engineering Experiment Station, Annapolis, Md.
ENDURANCE TEST OF A PACKARD MODEL 1D-1700 DIESEL ENGINE FITTED WITH EES SPECIAL CYLINDER LINER SEALS, by William H. Barnes, III. Summary rept. 6 Mar 59, 69p. incl. illus. tables (EES rept. no. 510002AJ) Unclassified report

An expanded version is available to USMO only as AD-213 959L

The aluminum crankcases of Packard diesel engines in Fleet use have been subject to varying degrees of cavitation-erosion damage near the cylinder liner seal ring area. In Fleet and Station tests, special seal bands developed by the Engineering Experiment Station for use in the top seal ring groove of the cylinder liners have reduced erosion in the critical water seal area for engine operating periods up to 1800 hours. This re- (over)

AD- 213 956

port summarizes the results of a 2851-hour test to evaluate improved seal band materials produced by the Mare Island Naval Shipyard. Some of the new bands were reinforced with nylon inserts. The performance of the seal bands was excellent, and no significant cavitation-erosion occurred in the critical crankcase seal areas. High crush and low crush connecting rod bearings and Flexitallic cylinder head gaskets were evaluated concurrently in the 2851-hour test. The high crush bearings performed satisfactorily; those with low crush were unsatisfactory, due to loosening and movement in the rod. The Flexitallic cylinder head gaskets proved superior to the standard flat cylinder head gaskets previously used in this engine. Flexitallic head gasket life, under the severe Station test conditions, averaged approximately 1000 hours. (Author)

AD- 214 003L Div. 22

Rock Island Arsenal Lab., Ill.
TEST OF KEL-F PLASTIC PACKING SHROUDS IN A 105 MM HOWITZER RECOIL MECHANISM, by L. R. Raisbeck. 3 Apr 59, 14p. incl. illus. tables (RIA Lab. rept. no. 59-899) Unclassified report

Notice: Only Military Offices may request from ASTIA. Others request approval of Diamond Ordnance Fuze Labs., Wash. 25, D. C. Attn: ORDTL 06.33

Not releasable to Foreign Nationals

A 105 MM Howitzer Recoil Mechanism was assembled with heat-treated Kel-F plastic packing shrouds, synthetic rubber fillers and aluminum alloy cup rings. Optimum floating piston Belleville spring loads were established by comparing the radial packing pressure obtained with a Kel-F packing shroud to that obtained with a standard Teflon shroud. The mechanism was gymnas- (over)

AD-214 003L

ticated a total of 25,000 cycles at ambient temperatures of -70F, 75F and 220F and was considered to be still in serviceable condition. After completion of the gymnastication tests, the recoil oil was slightly emulsified, and the rod and cylinder surfaces were in good condition. However, the Kel-F plastic packing shrouds were all badly cracked. It was concluded that the Kel-F plastic material was not suitable for recoil mechanism packing shrouds due to possible cracking in service. (Author) (See also AD-6252, AD-149 981)

AD-214 082 Div. 26, 8, 14

Corning Glass Works, N. Y.
PILOT PRODUCTION OF GLASS CRYSTAL HOLDERS (HC-(XM-2)/U; HC-(XM-3)/U; HC(XM-4)/U, by R. K. Whitney. Quarterly progress rept. no. 3, 22 Nov 58-27 Feb 59. 1v. incl. illus. tables. (Contract DA-36-039-sc-81255) Unclassified report

Preproduction sample glass crystal holders were manufactured, and equipment was applied to develop a satisfactory sealing technique. Covers (or bulbs) as base assemblies were fabricated for HC-(XM-2)/U, HC-(XM-3)/U, and HC-(XM-4)/U crystal holders. Sealing experiments with varying cycle times, frequencies, and power settings indicated that satisfactory seals can be produced. Alloys of known melting points, 230°, 250°, 285°C, which were attached to mounting springs as well as soldered to the centers of actual quartz crystals, melted and flowed under optimum sealing conditions. Various samples were sealed with equipment having ratings of a 20-kva input and a 16-kw maximum output. (See also AD-211 019)

AD-214 101L Div. 20, 30

United Kingdom Atomic Energy Authority (Gt. Brit.). BURST CARTRIDGE DETECTION. A STUDY OF MIXING IN A CALDER CHANNEL, by T. Burgoyne. 1959, 7p. illus. (Technical note no. IGR-TN/W-1016)
Unclassified report

Submit request via Technical Information Service, Oak Ridge, Tenn.

If the gaseous fission products associated with can failure are not fully mixed with the coolant, a low concentration at the sampling hole could make the damage less sensitive to detection. To investigate this effect, nitrous oxide was injected into the air flow in a model Calder channel and then detected downstream with an infra-red gas analyser. Mixing along the fuel elements was found to be slow, and the distribution by no means complete even after half the length of a channel, but this is largely compensated by good mixing between the end of the top fuel element and the sampling position.
(over)

AD-214 101L

In the worst case, when failure occurs near the outlet end of a channel, the sensitivity may be reduced by a factor of 2. This is unlikely to have a serious effect on efficiency of detection. (Author)

AD- 214 262L Div. 6, 14, 31

Electrical Testing Lab., Portsmouth Naval Shipyard, N. H.
SUITABILITY TESTS ON NYLON STUFFING TUBES FOR BULKHEAD APPLICATION -NSS-687-017-FRANKLIN PLASTIC INCORPORATED-EXHIBITOR, by E. Shea. Evaluation rept. 19 Sep 58, 5p. illus. (Rept. no. ETL-2955)
Unclassified report

Notice: Only Military Offices may request from ASTIA. Others request approval of Chief, Bureau of Ships, Navy Dept., Wash. 25, D. C.

Available on loan only

Samples complied with the vibration test requirements of Military standard 167 of 20 Dec 1954. Samples complied with the high impact shock requirements of Spec MIL-S-901B of 19 Dec 1955. Samples were satisfactory with respect to torsion requirements. Samples were not consistent with respect to impact test requirements. Samples contained moisture in amounts ranging from
(over)

AD-214 262L

2.3% to 4.8% by weight. Samples were satisfactory with respect to specific gravity and melting point requirements of Spec MIL-M-19098 of 11 Nov 1955. Samples exhibited relative viscosity values below that considered acceptable by the Bureau of Ships for the types Z-35A and Z-35B black nylon stuffing tubes. (Author)

AD-214 269 Div. 7

Electrical Testing Lab., Portsmouth Naval Shipyard, N. Y.
TERMINALS AND END SEALS FOR MINERAL INSULATED (MI) CABLES-NSS672-200. Evaluation rept. 31 Dec 56, 6p. illus. tables (Rept. no. ETL-2452)
Unclassified report

Representative samples of ceramic insulated end seals purchased from the Advance Vacuum Products Company, Stamford, Connecticut, together with suitable lengths of mineral filled (ML) cable, were submitted to evaluation tests. Results of tests revealed end seal cable assemblies to be generally unsatisfactory with respect to water leakage tests at 200 pounds per square inch and erratic with respect to performance during the dielectric strength tests on units which were silver soldered together. Cause of leakage was attributed to excessive heat required to obtain a satisfactory silver-soldered joint. The sample assemblies which were lead-tin soft soldered together were satisfactory when
(over)

AD-214 269

exposed to the 200 pounds per square inch water leakage tests. (Author)

AD-214 848L Div. 22

Rock Island Arsenal Lab., Ill.
LUBRICATORS FOR RECOIL MECHANISM FLOATING PISTON PACKINGS, by F. Biessin. 23 Apr 59, 17p. incl. illus. tables (Rept. no. 59-1115)
Unclassified report

Notice: Only Military Offices may request from ASTIA. Others request approval of Diamond Ordnance Fuze Labs., Wash. 25, D. C. Attn: ORDTL 06.33

Not releasable to Foreign Nationals

Fifteen materials were selected for consideration as lubricators for recoil mechanism packings. Samples of each material were subjected to screening tests to determine sub-zero and elevated temperature effects and oil wicking action. A polyester fiber felt was selected for test as a packing lubricator. Two tests were conducted with a 105 MM Howitzer Recoil Mechanism, one with a lubricator of the selected felt on each side of the
(over)

AD-214 848L

nitrogen end packing on the floating piston, and the other without lubricators. Total gas leakage past the nitrogen packing on the floating piston was approximately the same in both tests during 25,000 cycles of gymnastication at sub-zero, normal and elevated temperatures. However, visual examination indicated that the nitrogen end floating piston packing in the latter test was worn more than in the former test in which lubricators were used. The lubricators were not damaged by the test. Additional recoil mechanism tests, with and without lubricators on the floating piston, are currently in progress. Information obtained in these tests will be considered before conclusions are drawn or recommendations are made. (Author) (See also AD-6252)

AD-215 094 Div. 14, 31

Material Labs., Puget Sound Naval Shipyard, Bremerton, Wash.
EVALUATION OF RUBBER SEAL OF A SPLIT DESIGN FOR OVERSHAFT HUB OIL INJECTOR ON THE USS TIOGA COUNTY (LST 1158) (NS-033-200) by Wah B. Lew. Apr 59, 4p. (Rept. no. R-421)
Unclassified report

AD-216 630 Div. 1, 9
(9 Oct 59)

Bendix Products Div., Bendix Aviation Corp., South Bend, Ind.
STUDY AND PRELIMINARY DESIGN OF A HIGH TEMPERATURE AIRCRAFT WHEEL, BRAKE, AND TIRE ASSEMBLY, by Gilbert T. Stout. Rept. for 5 May 58-4 May 59, on An 800°F Wheel, Brake and Tire System. 1v. incl. illus. tables, 67 refs. (WADC Technical rept. no. 59-210)
(Contract AF 33(616)5503) Unclassified report

Design of a wheel, brake, and tire capable of operating from an ambient temperature of 800°F appears feasible. However, there are many areas which necessitate intensified study. Most prominent are mechanical tire approaches, bearings and lubricants, and hydraulic or pneumatic dynamic seals. The mechanical tire and tread material is the most revolutionary and challenging region to be conquered. Various mechanical tire approaches were considered. [illegible]igns [illegible]r)

AD-216 630

utilizing spring configurations were more acutely investigated. Initial studies indicate that a mechanical tire possessing a spring configuration will involve a considerable weight penalty in comparison to the conventional wheel and casing presently being used for low temperature applications. (Author) (See also AD-142 117, AD-150 973)

AD-216 838 Div. 8

McCoy Electronics Co., Mt. Holly Springs, Pa.
GLASS INCLOSED MINIATURE CRYSTAL UNITS, by Howard C. Long. Quarterly rept. no. 2, 1 Nov-31 Jan 59. 1v. incl. illus. tables.
(Contract DA 36-039-sc-74942) Unclassified report

Vacuum bake-out with cold traps in bake-out oven and sealing machine appears to improve yield of sealed units. The stainless steel loop springs have been considered unsatisfactory and their use has been dropped at least temporarily. The Philips clips are unsatisfactory for use with crystal units of frequency less than 30 m.c. Temperature cycling results in general are encouraging the overall width of the S-curves being appreciably less than ± 0.003% nominal frequency for all units tested except for three units for which the odd shaped S-curve indicated an otherwise faulty unit. The major problem continues to be that of finishing the crystal after sealing to a frequency falling within the range-0.0005 to + 0.001% nominal frequency. (Author) (See also AD-210 080)

AD-218 038 Div. 17, 14, 31

Coast Guard, Washington, D. C.
CORROSION TESTS OF METALLIC JOINTS, by C. F. Scharfenstein, Jr. 18 May 59, 30p. incl. illus. tables (Rept. no. 183) Unclassified report

An evaluation was conducted of different means and materials to effectively insulate bimetallic joints of the design being used in boat construction at the Coast Guard YARD using YARD production procedures. Aluminum-to-aluminum and aluminum-to-steel joints were made up using steel, cadmium-plated steel and aluminum Huck Lockbolts as fasteners. Insulating materials under consideration included: Chrome Lock Tape, Type N, MIL-G-20241, Symbol 2291; 3M Insulating Type, EC1202 1" x 1/16" manufactured by Minnesota Mining and Manufacturing Company. All liquid materials were afforded two hours curing time at 70°F before fasteners were tightened. Samples were caulked with PRC 1201-T compound around edges after assembly. Samples were subjected to a thirty-day
(over)

AD-218 038

immersion test in a 10% aqueous sodium-chloride solution and to 200 hours of accelerated weathering. It was concluded that the use of Chrome-Lock Tape insulating material between faying surfaces with all faying edges caulked with the polysulfide rubber caulking compound was the most satisfactory method under the conditions of application and testing. Aluminum fasteners were best for aluminum-to-aluminum joints. Stainless steel fasteners were best for aluminum-to-steel joints. (Author)

AD-218 730 Div. 8, 26

Ontario Research Foundation, (Canada).
INVESTIGATION INTO THE SEALING OF QUARTZ CRYSTAL HOLDERS TYPE HC-6/U, by B.W. Schumacher. Final rept. on Phase 2 for 1 Apr 56-31 May 58 on ECDC Proj. C 19. 72p. incl. illus. tables. Unclassified report

Solder sealing was investigated in an attempt to improve this technique as a method of hermetrically sealing quartz crystal units in metal holders. Differences in the quality of some commercial units were examined. None of the factors such as stress in the cans or differences in thermal expansion coefficients were shown to be a source of failure. However, there were some indications of poor bonding in older units. With respect to the bases for the HC-6/U holder, a reliable product can be made if the manufacturing process is properly controlled and risky shortcuts are avoided. Good workmanship and observing the simple rules in the soldering
(over)

AD-218 730

process appear to be the decisive factors in obtaining good units. The time between pre-tinning the cans and assembling the units should be short to avoid oxidation. A handling method was studied for an ultrasonic soldering process; fluxes are avoided, and the penetration of the solder appeared to be good. A simple, fast, and sensitive leak test method is described for glass enclosed units. (See also AD-219 139)

AD-218 903 Div. 22

Lake City Arsenal, Independence, Mo.
STUDY OF GAS LEAKS, M52A3 SERIES PRIMER, by D. L. Stonger. Final rept. June 59, 36p. incl. illus. tables, 15 refs. (IED rept. no. 59-3) Unclassified report

Conclusions: Primer gas leaks encountered during Ordnance acceptance testing of contractors primers is not the result of poor product design, but is attributed to use of substandard components and/or inadequate quality procedures (since approximately 98 per cent of the primer gas leaks occurred in primers produced by one contractor). The type of propellant (i.e., IMR 4903, IMR 7005, or WC 870) cannot be correlated with the incidence of primer gas leaks. Component parts of the firing contact pin assembly - M39 gun, and the bolt assembly - M61 gun, are replaced most often as the result of expected wear or fatigue. Conclusive information on primer gas leaks at extreme temperature
(over)

AD-218 903

ranges (i.e., - 65F, 165F) is not available on ammunition fired through the M39 or M61 gun. Primer gas leaks cannot be correlated with the existence or nonexistence of the crimp which is used to secure the primer in the primer pocket of the case. The probability that primer gas leaks will occur is greatest when ammunition is fired through the M39 gun. Primer gas leaks are not currently considered a problem when firing electric primed ammunition through the M39 or M61 gun when the ammunition is conditioned at - 65F ambient or 165 F. (Author)

AD-219 109 Div. 27
(27 July 59)

Koppers Co., Inc. [Baltimore, Md.]
EVALUATION OF DESIGNS AND MATERIALS FOR HIGH SPEED-HIGH TEMPERATURE SHAFT SEALS FOR TURBOJET ENGINE APPLICATIONS, by John J. Brenza, John H. Fuchsluger and others. Rept. for 1 May 57-31 Dec 58 on Gas Turbine Technology. 88p. incl. illus. tables (WADC Technical rept. no. 56-267, pt. 2)
(Contract AF 33(616)5015 [Continuation of Contract AF 33(616)3004]) Unclassified report

This development program was undertaken to develop rubbing seals that would operate for 1000 hours, at 1000°F, and at a rubbing speed of 30,000 feet per minute. Accordingly, new materials were investigated; these materials were incorporated in seals; and their performance as seals was evaluated. In all, one hundred and sixty-three materials were screened on the basis of room temperature and 1000°F, dry, rub- (over)

AD-219 109

bing, wear tests and 1000-hour, 1000°F oxidation tests. Material combinations found to be promising were next evaluated as seals under increased operating conditions, and eventually under conditions duplicating those existing in a jet engine. (Author) (See also AD-110 636)

AD- 219 139 Div. 8, 26

Ontario Research Foundation (Canada).
INVESTIGATION INTO THE SEALING OF QUARTZ CRYSTAL HOLDERS TYPE HC-6/U, by B. W. Schumacher. Quarterly progress rept. no. 4 on Phase 2, 1 June 57-15 Mar 58. 24 Mar 58 [9]p. incl. illus. table. Unclassified report

The long term studies of existing units were finished by tabulating the results and by preparing some graphs showing the changes in leak size over the period of observation. Solder tests with model joints and special units were continued. An improvement by using other materials than customary seems to be unlikely, since good workmanship seems to be the most important factor for obtaining a high quality seal. At present, ultra sonic soldering techniques are being investigated. A number of commercial units were cut and diamond polished. Pictures of the solder seam were taken with a magnification of 50. They show that improvements in (over)

AD-219 139

workmanship may still be possible. In some cases a poor bond between glass and metal base was revealed. A series of tests was prepared with the objective of determining the effect of leaks on the crystal and reducing these effects by placing a drying agent inside the enclosure of the crystal. Serious experimental difficulties were encountered and the tests were discontinued. On the new type of glass enclosed crystals we studied the possibility of leak tests by means of an induced glow discharge. A reliable leak test seems possible. (Author) (See also AD-141 968, AD-218 730)

AD-220 048

during the sealing operation was assembled. A 250-w. tunable (15 to 50 kc.) signal source, a magnetrostrictive transducer, and focusing horn were attached to the controlled condition heat sealer. The transducer and focusing horn were substituted for the lower sealing jaw. This equipment subjected the seal area to high frequency vibration during the sealing operation. Definite improvement in the strengths of contaminated seals was obtained with certain laminate-contaminant combinations, while others failed to improve in strength. The greatest effect noted was an improvement of low order seal strengths. Equivalent improvement in higher order seal strength was not generally observed. (Author) (See also AD-205 951)

AD-220 048

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AD-220 293 Div. 14, 7
(27 July 59)

Burgess Battery Co., Freeport, Ill.
PLASTIC SEALS, by C. J. Broughton. Quarterly progress rept. no. 8, 1 Mar-1 May 59. 1 June 59, 11p.
(Contract DA 36-039-sc-10527) Unclassified report

Battery seals were made of regular polyethylene, polypropylene, and ethylcellulose. Regular polyethylene was used in determining the effectiveness of crimping of the tools. Half of all polyethylene samples, which had passed the soldering vacuum test, leaked under the vacuum test after being soldered to the side of a Zn can. Polypropylene was 70% effective after crimping. A fairly effective seal of ethylcellulose was obtained, but only by precrimp heating. Heat treatment of the 3 types of substances (which had passed the presoldering vacuum test) prior to crimping resulted in 95% of the seals passing the vacuum test after soldering. (See also AD-203 976, AD-208 026)

AD-220 698 Div. 8
(18 Aug 59)

McCoy Electronics Co., Mount Holly Springs, Pa.
GLASS INCLOSED MINIATURE CRYSTAL UNITS, by Howard C. Long. Quarterly rept. no. 3, 1 Feb-30 Apr 59, on Development of Glass Inclosed Miniature Quartz Crystal Units. 1v. incl. illus. tables.
(Contract DA 36-039-sc-74942) Unclassified report

Test results obtained during sealing using slotted supports are discussed. Overall yield figures including initial fabrication and sealing range from 65% to 85%, rough estimate. This calculation counts as satisfactory only those units finishing after seal to within -0.0005% to +0.0001% nominal frequency. The percentage yield when considering temperature cycling only ranges from 60% to 100%, the average figure being 79%. Vacuum bake-out of the crystal units was eliminated. All glass parts are cured at 175°C for 3 hr in a ventilated oven. The cold trap has become an integral part of the sealing operation. Tightened specifications are being asked for
(over)

AD-220 698

on the glass parts, with probably the selection of a better grade glass tubing for manufacture of the bulbs. (Author) (See also AD-216 838)

AD-221 401 Div. 22, 10, 29
(10 Dec 59)
(Unannounced report)

[Naval Weapons Lab., Dahlgren, Va.]
GUNFIRE TEST OF GOODYEAR SELF SEALING FUEL CELLS WITH 20mm PRACTICE AND .60 CALIBER BALL AMMUNITION, by B. K. Lloyd. Final rept. 28 July 48, 1v. incl. illus. (Proj. TED no. NPG AE 537041; NPG rept. no. 73) Unclassified report

Descriptors: Fuel tanks*; Seals; Vulnerability.

Open-ended Terms: 20mm, Cal 60.

AD-221 404 Div. 10, 22
(10 Dec 59)
(Unannounced report)

[Naval Weapons Lab., Dahlgren, Va.]
GUNFIRE TEST OF SELF SEALING FUEL HOSE WITH VARIOUS NEW TYPE FUELS, by B. K. Lloyd. Final rept. 28 July 48, 1v. incl. illus. (Proj. TED no. NPG AE 626001; NPG rept. no. 70)
Unclassified report

Descriptors: Fuel hose*; Vulnerability; Tests; Seals*.

AD-221 461 Div. 14
(4 Dec 59)

Material Lab., New York Naval Shipyard, Brooklyn.
SHELF AGING OF SYNTHETIC AND NATURAL RUBBER MATERIALS; INVESTIGATION OF. Progress rept. no. 2. 3 Dec 59. [17]p. incl. illus. (Lab. proj. no. 5974, pt. 3 and 4)
Unclassified report

Descriptors: Rubber*; Synthetic rubber*; Gaskets; Rubber gaskets*; Vibration isolators*; Packaging*; Mechanical properties; Temperature; Aging.

Packaged and unpacked specimens of natural rubber hatch door gasket and neoprene GR-T shock mount material, Mare Island stocks 13-383 and N-31-1, respectively, were aged in a Greer oven at 140° ± 2°F. At aging intervals of 3 weeks during an elapsed period of 18 weeks, packaged and unpackaged specimens of both stocks were removed from the oven and tested for tensile strength, elongation, tensile product, modulus at 300%, swelling ratio, compression set, and stress relaxation. The tests indicated that the packaging had no beneficial effect on hatch door and shock mount materials subjected to accelerated aging. (See also AD-229 186L)

AD-221 803 Div. 7 U
(10 Feb 61)
(Unannounced report)

Naval Civil Engineering Lab., Port Hueneme, Calif.
INSTRUMENTATION OF SAN NICOLAS DIESEL ENGINE POWER PLANT ENGINES WITH BOILING CONDENSING COOLING, by Earl J. Beck. 7 May 58. rev. 16 June 58, 12p. incl. illus. tables (Proj. NY 012 015-3; Technical note no. N-337, suppl. to Technical rept. no. 008, AD-163 134)
Unclassified report

DESCRIPTORS: *Auxiliary power plants, Tests, *Diesel engines, Starting, Temperature, *Electric power production, Fuel seals, Alternating current, Temperature control, Cooling, Heat transfer,

The U. S. Naval Civil Engineering Laboratory, Port Hueneme, California, cooperated in the instrumentation of an engine at the plant of the supplier for the San Nicolas power plant expansion engines, and cooperated in conducting exploratory testing of the engine at elevated steam pressures. The initial instrumentation was designed primarily to detect possible sealing ring problem areas, but allowed partial analysis of the heat transfer and temperature distribution in the area of junction of cylinder and head, including the upper portion of the piston ring travel. The analysis, with isothermal plots under four conditions of loading and cooling is given, including one run with forced circulation of low temperature coolant. A proposal for simple but more precise instrumentation of one of the two 8-cylinder engines to be installed on San Nicolas Island is made. From the tests made, it was concluded that probably critical metal temperatures were well within established safety limits. (Author)

AD-221 803

AD-222 071 Div. 27, 1, 4 U
(Unannounced report)

Pesco Products Div., Borg-Warner Corp., Bedford, Ohio.
RESULTS OF A STUDY OF THE BEST PUMPING SYSTEM FOR A LIQUID PARA HYDROGEN AIRCRAFT FUEL SYSTEM, by G. H. Caine and S. Prelowski. Dec 58, 1v. incl. illus. table, 21 refs. (Pesco engineering rept. no. 3042; Document no. 276)
(Contract AF 33(616)3642)
(WADC TR 58-679) Unclassified report

DESCRIPTORS: Pumps, *Fuel pumps, Centrifugal pumps, Design, Aviation fuels, Liquefied gases, *Hydrogen, *Cryogenics, Fuel tanks, Heat transfer, Seals, Thermal insulation, Fluid flow, Friction, Bearings, *Fuel systems, *Aircraft equipment, Materials, Rotary seals.

Open-ended Terms: SF-1.

Problems in pumping liquid para H (SF-1), pumping from low liquid levels in a tank, some useful constructions, and configurations of tank-mounted SF-1 boost pumps and their inter-relations with tank configurations are illustrated and discussed. Boost pump requirements for pumping SF-1 from a tank to give net position suction head (NPSH) for a main pump at the end of a 100-ft. (typical) insulated line are defined. A general solution of this problem is derived. Using real data on liquid H, the general solution is also presented in a graphical nomographic form from which particular solutions are obtained by entering particular values of variables (line diameter, length, heat leak rate, flowrate, NPSH needed at far end of the transfer line, etc). Means of boost drive, thermal isolation and static rotative sealing are illustrated and discussed. (Author)

AD-222 071

AD-222 593 Div. 27 U
(TISTA/SEB)
(Unannounced report)

Rocketdyne, Canoga Park, Calif.
MODIFICATION INSTRUCTION NUMBER NINE. DELETION OF XLR101-NA-1 VERNIER ENGINE PROPELLANT VALVE POSITION INDICATOR ON MA-1 ENGINE.
21 Oct 57, 14p. incl. illus. (Rept. no. R469-9)
(Contract AF 04(647)98)
Unclassified report

DESCRIPTORS: (Liquid rocket propellants, Rocket motors, Fuel systems, *Valves, Seals, Fuel seals, Gas leaks, Reliability, Design.)

Identifiers: Vernier engines, LR 101 engines.

The change consists of removing the present vernier propellant valve's Kel-F lip seal, microswitches, shaft, and end cap to eliminate the problem of leakage; replacing the existing fuel poppet spring with a different one to increase closing reliability; and making wiring changes to the GSE to make it compatible with the changed engine. (Author)

AD-222 684 Div. 14, 25 U
(TISTM/GEC)
(Unannounced report)

Naval Research Lab., Washington, D. C.
A STUDY OF GLASS SEALERS, by Peter King and Allen L. Alexander. 9 Sep 42, 11p. illus. (NRL rept. no. P-1934)
Unclassified report

DESCRIPTORS: (*Glass, *Coatings, *Optical coatings, Adhesion, Seals, *Films, Acrylic resins, Textiles, cellulose.) (Tests, Test methods, Impact shock, Explosion damage, Climatic factors.)

To protect ordinary glass from scattering as a result of bomb blast and gun blast, a restraining material was needed for emergency application to the surface of the glass. This report described a study made on 19 such materials by several methods of test. Recommendation was made that 4 materials be further evaluated by testing at the Naval Proving Grounds. (Author)

AD-222 849 Div. 3, 30 U
(TISTB/AW)
(Unannounced report)

Biological Labs., Frederick, Md.
ENGINEERING CONSTRUCTION, OPERATION, MAINTENANCE AND DEVELOPMENT IN RESTRICTED AREA. SECTION XIII. GASKETS,
by James F. Matousek. 15 Nov 45. 36p. incl. illus. tables (Special rept. no. 42, Section no. 13)
Unclassified report

No automatic release to Foreign Nationals.

DESCRIPTORS: (*Biological laboratories, Construction, Maintenance, Operation, Structures, Buildings, Military engineering.) (Gaskets, Seals, Flanges.)

AD-222 852 Div. 3, 30 U
(TISTB/AW)
(Unannounced report)

Biological Labs., Frederick, Md.
ENGINEERING CONSTRUCTION, OPERATION, MAINTENANCE AND DEVELOPMENT IN RESTRICTED AREAS. SECTION XVI. SHAFT SEALS,
by James F. Matousek. 15 Nov 45. 19p. incl. illus. tables (Special rept. no. 42, Section no. 16)
Unclassified report

No automatic release to Foreign Nationals.

DESCRIPTORS: (*Biological laboratories, Construction, Maintenance, Operation, Structures, Buildings, Military engineering.) (Hydraulic seals, Centrifugal pumps.)

AD-225 213 Div. 4, 26
(4 Sep 59)

Reaction Motors Div., Thiokol Chemical Corp., Denville, N. J.
EVALUATION OF BEARINGS AND SEALS IN 90% HYDROGEN PEROXIDE, by H. O. Pedersen, S. R. Matos, and J. Hyll. Rept. for 1 June 58-28 Feb 59. 1v. incl. illus. tables (Rept. no. RMD 103F, Vol. 2)
(Contract NOas 56-506-c) Unclassified report

The results show that it is feasible to run a bearing submerged in room temperature 90% hydrogen peroxide, and submerged in 90% hydrogen peroxide when decomposition of hydrogen peroxide is taking place in a large capacity catalyst bed located adjacent to the bearing housing. A sleeve bearing consisting of a compatible material such as teflon with glass as an additive will give better performance than a stainless steel roller or needle bearing which tend to contaminate the peroxide. Face seals and segmented shaft seals which have the stationary sealing elements made of teflon with
(over)

AD- 225 213

glass as an additive will perform well in peroxide at room temperature, but not as well under high temperature conditions produced by peroxide decomposition in the catalyst bed. The teflon elements disintegrate quickly under the high temperature environment, particularly on the segmented shaft seals. An S-Monel France type shaft seal will perform well in combination with a Ni-resist sleeve under the high temperature conditions. However, the leakage rate is high because this is a "controlled gap" type seal. Test results indicate that the best sealing arrangement for the high temperature conditions is one which uses a positive seal (either a face or shaft type with a teflon-glass stationary sealing element, which is shielded from the high temperature gases by a series of all metal "controlled gap" seals. (Author) (See also AD-217 364)

AD-225 495 Div. 14

Products Research Co., Los Angeles, Calif.
[DEVELOPMENT OF SEALANTS WHICH WILL WITHSTAND EXPOSURE TO FUEL, VAPOR, LIQUID FUEL AT HIGH TEMPERATURES] by I. P. Seegman. Quarterly progress rept. no. 5, 1 Apr-1 July 58, 15 July 58, 56p. incl. tables.
(Contract AF 33(616)3976) Unclassified report

Properties of the best fill and drain system developed in the first year were determined after exposure to JP-5 fuel and to air at 500°F and 550°F. Efforts to increase solids content of Viton A formulation G-59 were unsuccessful. Solvent based Viton A formulations were investigated as faying surface sealants. Good adhesion to stainless steel was retained after exposure to fuel at 450°F with a 6 day open time. For titanium a different formulation is required and results were unsatisfactory with a 6 day open time. Filleting sealants have been prepared and evaluated before and after exposure
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AD-225 495

to JP-5 for up to 30 hours at 550°F. Adhesion to stainless steel and titanium has been retained following 120 hours exposure in JP-5 at 450°F plus 18 hours in JP-5 at 550°F. A literature survey was made of the effects of nuclear radiation on plastic and elastomeric materials. Preliminary work with various organic antirads indicates that they either inhibit the cure of Viton A or they are fuel extractible. (Author) (See also AD-151 257, AD-207 052)

AD-225 501 Div. 26, 3, 22
(8 Sep 59)

Sciaky Bros., Inc., Los Angeles, Calif.
WELDING DEVELOPMENT PROGRAM FOR MEDIUM CARBON HEAVY WALL MUNITIONS CLOSURES, by J. W. Christensen. Summary rept. 10 July 59, 31p. incl. illus.
(Contract DA 18-405-cml-211) Unclassified report

The problem was to develop leakproof resistance weld sealing of the shell and burster casing of 155 mm munitions for the containment of the toxic agents. Resistance welds attained within the subject munitions parts were of high strength and leakproof. Basic weld tooling and standard test equipment used during development is adaptable to production application. Resistance weld joining of the munitions does not require the use of any material other than the as is munition components. The feasibility of the leakproof resistance welding of 155 mm medium carbon heavy wall munitions has been demon-
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AD-225 501

strated. Utilization of the developed techniques and basic tooling designs requires only the pre-weld machining preparation of shells and burster casings to commercial tolerances. (Author) (See also AD-204 080)

AD-226 294 Div. 8
(5 Oct 59)

Eitel-McCullough, Inc., San Bruno, Calif.
CERAMIC TUBE REFINEMENT, by John Richter and Jack W. White. Scientific rept. no. 4, 1 Apr-30 June 59. [15]p. incl. illus.
(Contract AF 33(600)36699) Unclassified report

Tube life at high temperatures: The evaluation of sealing procedures and seal surface treatments was made with the Unodes described previously (AD-217 534). The Unode proved to be an impractical test vehicle and its use was discontinued. Five CD-19 tubes were flame-sprayed with Al_2O_3 as a deterrent against high-temperature seal failure and tested along with 5 standard CD-19 tubes. The coatings were uniform, but too porous to be effective. Grid evaluation: The grid evaluation structure was equipped with an indirectly heated unipotential grid-simulating element which provided uniform element temperature a uniform potential. Two
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AD-226 294

structures incorporating Ti grid-simulating elements were made and tested. There are 2 phases to the test procedure: (1) pretreatment of the surface by cleaning or contamination, and (2) setting test conditions and plotting the data to determine the equilibrium point. Comparison of emission current density vs temperature curves will be the basis for grid material evaluation. Getter evaluation: The demountable vacuum system for evaluation of getters in ceramic tubes was completed. Tests indicated that fresh Ceralloy solutions must be used to coat the electrodes in order to avoid flaking.

AD-226 195 Div. 8, 26
(2 Oct 59)

Knights, James, Co., Sandwich, Ill.
GLASS HOLDER CRYSTAL UNITS, by Robert E. Christian. Quarterly rept. no. 2, 1 June-31 Aug 59. 7p.
(Contract DA 36-039-sc-81274) Unclassified report

The development and production of one machine suitable for sealing quartz crystal units in miniature glass holders is being attempted. The induction heater frequency was increased to 4 mc, producing a decrease in work-coil losses and adequate heat for sealing. A satisfactory heating fixture was also designed. The single position sealing unit was assembled and preliminary testing was completed.

AD-226 521 Div. 8
(2 Oct 59)

Amphenol-Borg Electronics Corp., Chicago, Ill.
RESEARCH ON R. F. COAXIAL CONNECTORS, BROADBAND, HIGH TEMPERATURE, RADIATION RESISTANT, by J. V. Malek. Scientific rept. no. 2, 1 June-1 Sep 59. 75p. incl. illus. tables, 24 refs. (Contract AF 33(616)6243) Unclassified report

Syntheses of connector dielectric configurations: Combination sectoral-annular insulator structures of fused silica and air were devised which yielded effective dielectric constants of 2.5 or less. A homogeneous fused silica insulator was designed with a relatively low fabrication cost and is capable of hermetic sealing. A fused silica insulator based on the application of Brewster's Angle was devised which has low insertion loss and is also capable of hermetic sealing. All three of these insulators possess various disadvantages such as cost, insertion loss, and variance of the voltage stand-

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AD-226 521

ing wave ratio. Metals: Experimentation with metals to be used for particular connector components led to the following recommendations: (1) the center contact (male) should be silver-plated, nickel-clad copper; (2) the center contact (female) should be silver-plated Iconel X; (3) the shell material should be stainless steel type 347, silver plated on the inside; and (4) the gasket material should be aluminum or stainless steel. Effects of radiation on materials: The use of an over-design factor of about 25% should eliminate the effect of radiation-induced air ionization on the electrical performance of the RF coaxial connector. This correction should be added to corrections for temperature and pressure. Sealing study: Although seals currently exist which will operate at temperatures of 500°C, the high-temperature seals are generally not reusable. (See also AD-217 940)

AD-228 239L Div. 14, 8
(19 Aug 59)

Hughes Aircraft Co., Culver City, Calif.
DEVELOPMENT OF ULTRA HIGH TEMPERATURE DIELECTRIC MATERIALS FOR EMBEDDING ELECTRONIC PARTS, by John B. Rust and Charles L. Segal. Quarterly progress rept. no. 1, 10 Feb-10 May 59, on a Program to Develop and Evaluate Silicone or Modified Silicone Dielectric Materials. 30 May 59, 28p. incl. illus. tables, 19 refs. (Contract NObs-77054) Unclassified report

Notice: All requests require approval of Chief, Bureau of Ships, Navy Dept., Wash. 25, D. C.

This report describes the work on a program to develop and evaluate silicone or modified silicone dielectric materials which will be useful for embedding electronic parts which must function continuously at 350°C ambient temperature. Two monomeric arylenesilane compounds were prepared: 1, 4 bis(dimethylethoxysil-

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AD-228 239L

yl)benzene and 1, 4 bis(methylvinylethoxysilyl)benzene. These monomers were subsequently cohydrolyzed with either methylvinyldiethoxysilane or dimethyldiethoxysilane. The cohydrolysis products were viscous fluids containing a multifunctionality of vinyl groups appended to a polyarylenesiloxane chain. The monomers and 'prepolymers' were identified by infrared absorption spectroscopy. Dibutyltin dihydride was prepared for use as a potential crosslinking agent. A commercially available polysiloxane polymer was identified as being similar to the cohydrolysis products prepared during this program. The commercial resin, DC 7521, was combined with either dibutyltin dihydride or silicon oxyhydride, in the presence and absence of several catalysts, in an attempt to crosslink the polymers. Crosslinking did not appear to proceed under the conditions used in these experiments. (Author) (See also AD-130 798, AD-217 190)

AD-228 320 Div. 11, 22
(18 Nov 59)

Aberdeen Proving Ground, Md.
DESERT TEST OF COMPONENTS ON AN M48A2 TANK, by P. J. Moravec. Automotive rept. Nov 59, iv. incl. illus. (Proj. IT-5057, rept. no. 8) Unclassified report

An expanded version is available to U. S. Military Organizations as AD-228 319L

The evaluation is reported of six of 23 non-standard components (Road Wheel Bearing Seals, Aluminized Mufflers, Sprocket Hub without Dowels, Improved End Connectors, Teflon Road Arm Bearing, and Reduced Quantity of Road Wheel Mounting Nuts) for tracked vehicles in the 50-Ton class, during 4,000 miles of M48A2 tank operation on surfaced and off-road test courses in ambient temperatures to 116°F. The concept, design, or material in the road wheel mounting nuts and the teflon road wheel arm bearing, was inade-

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AD-228 320

quate or unsatisfactory. Suitability and durability of the remainder were generally as good or better than the standard item. (Author)

AD-228 846 Div. 26, 14
(16 Nov 59)

Huff, M. and Co., Newark, N. J.
INVESTIGATION OF SEALING QUALITIES OF GREASEPROOF BARRIER MATERIALS. Monthly progress rept. no. 22, 1-31 Oct 59. 6p.
(Contract DA 28-017-501-ORD-2699, Proj. PA4-20)
Unclassified report

Results obtained on the four additional water vapor transmission tests which were run on the CM-20 reproduceability series showed no significant difference from those obtained on previous water vapor transmission tests run on the CM-20 experimental barrier composite. The examination of the interiors of each group of ten IA-1 and IA-2 packages at the conclusion of the cyclic exposure tests showed no staining and, therefore, no evidence of entry of water into the packages. This is further evidence that packages fabricated with the improved barrier (CM-20) using the newly developed closures will effect satisfactory seals. Comparison of these
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AD-228 846

cyclic test results obtained on Method IA-2 packages fabricated with CM-20 barrier composite with those obtained with M-6 show the performance of both to be satisfactory and comparable. (Author) (See also AD-226 516)

AD-229 115 Div. 14, 12
(4 Dec 59)

Douglas Aircraft Co., Inc., Santa Monica, Calif.
EFFECTS OF USING MPD-2067 LOW TEMPERATURE HYDRAULIC OIL IN NIKE SYSTEM. MODEL 1310, by M. H. Holjer. 6 Feb 59, rev. 1 Apr 59, 1v. incl. illus. tables (Rept. no. SM-27931)
(Subcontract to Bell Telephone Labs., Inc., Contract DA 30-069-ORD-1092, Proj. TU1-3070)
Unclassified report

Descriptors: Hydraulic oils*; Hydraulic systems*; Hydraulic valves; Hydraulic cylinders; Hydraulic seals; Guided missiles; Surface to Air; Launching; Maintenance equipment.

An investigation was made of the problems associated with the field use of MPD-2067 hydraulic oil in Nike equipment. The main problems were concerned with the overheating of the hydraulic ground equipment and an excessive amount of leakage throughout the entire Nike hydraulic system. Except for color and viscosity, the physical and chemical properties are the same for MIL H5606 and MPD-2067. Tests with MPD-2067 showed that the overheating problems with this oil will be eliminated by adhering to the recommended program of oil changes and to the recommended duty cycle. Exter-
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nal lap leakage will be greater with MPD-2067 than with MIL-H-5606. Tests conducted on the 1001177 launcher cylinder indicate that the problems associated with spiral failure of launcher cylinder O-rings are no more severe with MPD-2067 than with MIL-H-5606. The valve wear tests conducted an 3020773 valve assembly indicate no excessive wear associated with MPD-2067. A procedure for changing to the low viscosity oil is outlined. Systematic maintenance of the Nike hydraulic system was discussed. In general, the use of MPD-2067 should be limited to use in that equipment directly involved in checking out the entire missile. Component test equipment should use MIL-H-5606 at all times, and any components tested with MIL-H-5606 should have oil drained from them prior to installation in a system which is using MPD-2067.

Open-ended Terms: Nike.

AD-229 115

AD-229 186L Div. 14
(23 Sep 59)

Material Lab., New York Naval Shipyard [Brooklyn]
SHELF AGING OF SYNTHETIC AND NATURAL RUBBER MATERIALS; INVESTIGATION OF, by D. H. Kallas. Progress rept. no. 2 [18 May 59] [19]p. incl. illus. tables (Lab. proj. no. 5974, pts. 1 and 2)
Unclassified report

Notice: Only Military Offices may request from ASTIA. Others request approval of Chief, Bureau of Ships, Navy Dept., Wash. 25, D. C.

Descriptors: Rubber*; Synthetic rubber; Gaskets; Aging*;

Packaged and unpackaged specimens of the low-temperature gasket and O-ring materials, Mare Island stocks 162-1100 and 275-31, respectively, were aged in a Geer oven at 140 ± 2°F. At weekly intervals for 17 wk, the specimens were removed from the oven and tested. In addition, specimens of both stocks were tested after they had been shelf-aged for periods up to 1 yr at 74 ± 2°F and at about -100°F. The effect of Geer oven aging at 140 ± 2°F on the tensile
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strength, elongation, tensile product, modulus at 300%, swelling ratio, compression set and stress relaxation of packaged and unpackaged specimens were plotted vs time. The physical properties of packaged specimens of the low-temperature gasket and the O-ring that were shelf-aged for ½- and 1-yr were tabulated. In addition, the physical properties of both elastomers after exposure for ½- and 1-yr at -100°F while in the unpackaged and packaged conditions were tabulated. Results indicated that packaging has a slightly beneficial effect on the low-temperature gasket material, and no apparent effect on the O-ring material. Packaging cannot prevent thermal effects, however, it may be beneficial in retarding or preventing the volatilization of ingredients from the elastomer by building up a high concentration of these materials within the package. Self-aging for 1 yr had less effect on the low-temperature gasket and O-ring than Geer oven aging for 1 wk at 140 ± 2°F. Conditioning specimens at -100°F apparently retards aging. (See also AD-220 970L)

AD-229 186L

AD-229 662 Div. 26
(18 Dec 59)

Feltman Research and Engineering Labs., Picatinny Arsenal, Dover, N. J.
PRODUCT ENGINEERING TO IMPROVE MATERIALS AND DESIGN MODIFICATION OF FIBER CONTAINERS AND HERMETICALLY SEALED CONTAINERS, by Theodore Fruchtman. Final engineering rept. no. FR-3-60. Oct 59, 6p. Unclassified report

Descriptors: Containers*; Packaging*; Seals; Fibers.

AD-229 700 Div. 7
(22 Dec 59)

Amphenol-Berg Electronics Corp., Chicago, Ill.
RESEARCH ON R. F. COAXIAL CONNECTORS, BROADBAND, HIGH TEMPERATURE, RADIATION RESISTANT, by J. V. Malek. Scientific rept. no. 3, 1 Sep-1 Dec 59. 52p. incl. illus. tables.
(Contract AF 33(616)6243) Unclassified report

Descriptors: Electric connectors*; Radiofrequency cables; Coaxial cables; Dielectrics; Broadband; Design; Seals; Metals; Insulating materials; Radiation effects.

Emphasis was shifted from theoretical study and literature surveys to initiation of development, testing, and evaluation of the component parts of the connector. Fused silica insulator samples were partially evaluated with respect to their physical and electrical properties. To date, fused silica is still considered the best insulator material in conjunction with the contract requirements. The design of insulator-contact structure is under laboratory refinement yielding a good VSWR of the developed structure. A study was made of the effect of contact to cable center conductor fastening methods and the resulting VSWR of (over)

the UG-21D/U connector. Crimping and staking as compared to soldering had minor effects on the VSWR of the connectors tested. An experimental outer contact of stainless steel, type 347F was high temperature and endurance tested and satisfactorily met these requirements. Sealing studies and sealing development were advanced. Silver-magnesium-nickel alloy was reconsidered as a possible center contact material because it has high conductivity, oxidation resistance, and fair mechanical strength at elevated temperatures. A survey of radiation test facilities is presented. (Author) (See also AD-226 521)

AD-229 700

AD-229 707 Div. 26, 14
(22 Dec 59)

Huff, M. and Co., Newark, N. J.
INVESTIGATION OF SEALING QUALITIES OF GREASEPROOF BARRIER MATERIALS. Summary rept. Dec 59, 1v. incl. illus. tables.
(Contract DA 28-017-501-ORD-2699) Unclassified report

Descriptors: Packaging*; Materials; Seals*; Organic coatings*; Corrosion; Adhesion; Tests.

Grade C flexible, greaseproof barrier materials are used to make method IA-1 and IA-2 packages, as prescribed by MIL-P-116C. The functional performance of these barriers is improved by subsequently dip-coat sealing the wrapped package to provide a high degree of water vaporproofness. New barrier materials were developed which make possible the fabrication of adequate method IA-1 and IA-2 packages without the need of dip-coat sealing. An initial investigation proved the feasibility of developing such materials. Further work and laboratory testing resulted in the development of a new barrier material capable of producing water vaporproof packages without the need (over)

for dip-coat sealing, grade A for method IA-1 packages, or an outer-wrap for method IA-2 packages. (Author) (See also AD-217 417)

AD-229 707

AD-231 223L Div. 1, 12
(29 Jan 60)

Chance Vought Aircraft, Inc., Dallas, Tex.
MODULAR HYDRAULIC SYSTEM DEVELOPMENT (PROJECT HYDRATOY) by R. W. Burden, B. L. Evans and others. Quarterly progress rept. no. 4, pt. 1, 5 Sep-5 Dec 59. 28 Dec 59, 1v. incl. illus. tables (Rept. no. AER-E9R-12467)
(Contract NOa(s) 59-6019-c) Unclassified report

Notice: Only Government Agencies may request from ASTIA. Others request approval of Chief, Bureau of Naval Weapons, Navy Dept., Wash. 25, D. C. Attn: RAAE-322

Descriptors: Hydraulic systems*; Hydraulic actuators*; Standardization; Design; Alloys; Machining; Aircraft; Guided missiles; Space ships; Metal seals; Seals.

Work was continued on the development of a circumferential seal and on a Hi-Ceal. Tests of the Chance Vought X-seal was begun, the results were inconclusive. Tests of the High Pressure engineers Hi-seal revealed that the installation forces are higher than desirable (over)

and that there is considerable dimensional variation between seals that are supposedly identical. Preliminary test results on metallic O-rings indicated that they would be suitable as alternate seals in case of unexpected failure or delay in Hi-Ceal development and qualification. Effort is being made to establish a series of standard modular hydraulic components which will be used in packaging aircraft hydraulic systems. The package or manifold will fulfill the requirements of a particular given system. An CVS-54175-1 Ti manifold simulating an arresting gear control package was fabricated. Detail drawings for number 2 package (a manifold actuator) and layout plans for the number 3 package (second actuator) are described. An investigation is being made of methods and configurations for using airframe structure to carry fluids. The tests of fluid carrying structure continue to be encouraging, new configurations are being constructed. A mounting base for the commercial high temperature hydraulic pump was built. The pump and its driving motor were installed on the base. The remainder of the equipment required for this set-up is being installed on the base. (See also AD-231 501L)

Open-ended Terms: Project Hydratoy.

AD-231 223L

AD-231 501L Div. 1, 12
(3 Feb 60)

Chance Vought Aircraft, Inc., Dallas, Tex.
MODULAR HYDRAULIC SYSTEM DEVELOPMENT [PART II] by O. A. Moelk. Material and Process Development progress rept. no. 2, 5 June 59-5 Dec 59. 1v. incl. illus. tables (Rept. no. AER-E9R-12467)
(Contract NOa(s) 59-6019-c) Unclassified report

Notice: Only Government Agencies may request from ASTIA. Others request approval of Chief, Bureau of Naval Weapons, Navy Dept., Wash. 25, D. C., Attn: Code RAAE-322

Descriptors: Hydraulic systems*; Hydraulic actuators*; Seals; Standardization; Design; Alloys; Machining; Aircraft; Guided missiles; Space ships; Extrusion; Brazing; Metal seals.

Progress is reported on the development of modular hydraulic system components and concepts. Producibility limitations for stainless steel extrusions were established; tubular aspect in an extrusion is currently not considered extrudable. Roll-bonding of (over)

ferrous materials was considered a remote possibility and the project was terminated. A manifold of annealed Ti-6Al-4V alloy was successfully fabricated from a forged billet. No difficulties were experienced during the machining of the manifold and all specified tolerances and finishes were met. Spray brazing work is being developed. The process utilizes powdered alloys which can be applied to the work piece by spraying the powder through an oxyacetylene flame. The use of AM-350 steel for hydraulic tubing is expected to reduce the weight of the high pressure systems. Metallic seals will require additional testing to determine an optimum hardness range for a specific application. For optimum operating conditions, a proposed material and hardness range was established for the modular hydraulic system. (See also AD-231 223L)

Open-ended Terms: Project Hydratoy

AD-231 501L

AD-231 622 Div. 29, 20
(5 Feb 60)

Dewey and Almy Chemical [Co.] Cambridge, Mass.
EFFECT OF RADIATION ON THE PHYSICAL PROPERTIES AND THE SEALING OF CANS. Final rept. 1 Nov 56-30 July 58. 2p.
Unclassified report

Descriptors: Radiation effects*; Physical properties; Seals; Containers*; Ionization; Sealing compounds*; Rubber; Vulcanizates; Polymerization; Gamma rays.

A study of the effect of ionizing radiation up to 5.6 Megarad on the physical properties of a variety of can sealing compounds has shown that: (1) compounds based on unvulcanized butadiene-styrene rubber, butadiene-acrylonitrile rubber, or natural rubber are cross linked and toughened; (2) compounds based on neoprene or vulcanized rubber are not noticeably changed; (3) compounds based on butyl rubber are softened, apparently as a result of depolymerization; (4) there is no measurable difference in the sealing performance of irradiated and non-irradiated cans as determined by vacuum retention; and (5) there is no measurable difference in sealing performance between cans irradiated by 2 Mev electrons and cans irradiated by gamma rays. (Author)

AD-232 073 Div. 20, 30
(12 Feb 60)

Blaw-Knox Co., Pittsburgh, Pa.
INVESTIGATION AND STUDY OF PRIMARY LOOP IMPROVEMENTS FOR NUCLEAR POWER PLANTS. Rept. for 11 Feb-11 Dec 59. Dec 59, 111p. incl. illus. tables.
(Contract AF 30(602)2006)
(RADC TR 59-235) Unclassified report

Descriptors: Nuclear power plants*; Power reactors; Pressurized water reactors; Boiling water reactors; Design; Pipe fittings; Gaskets; Valves; Pumps; Materials; Corrosion research.

Design and selection features are reviewed for pipe connectors and gaskets, valves, circulating pumps, and pipe material pertaining to the primary loop of a prepackaged nuclear power plant. Limitations of size and weight for air transport, and factors of field assembly and dis-assembly are discussed. Discussion of primary coolants indicated that the pressurized water or boiling water cycles are preferred. Pipe connectors with related gasket types are discussed. Two-bolt connectors with special forms of metallic gaskets are rec-
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ommended in preference to standard ASA flanged joints. Zero leakage and controlled leakage valves are described. Valve operating and control systems are discussed outlinining factors of dependability and the effect of total leakage on design of auxiliary water system. Circulating pumps of conventional design with manufacturers standard or special mechanical seals are discussed and compared with canned rotor pumps on the basis of leakage rates, dependability, maintenance and cost. Operating experience and test data for both types are reported. Simplified flow sheets of pressurized water and boiling water reactor systems are presented for discussion of corrosion. Factors affecting corrosion are emphasized. Induced radioactivity on the secondary effects on corrosion products is discussed. (Author)

AD-232 073 N

AD-232 964 Div. 8, 14, 30
(2 Mar 60)

United States Testing Co., Inc., Hoboken, N. J.
TEST PROCEDURE UNDER SPECIFICATION MIL-C-26086 (USAF) CAPACITORS, FIXED, PLASTIC OR PAPER-PLASTIC (HERMETICALLY SEALED IN METALLIC CASES). Dec 59, 1v. incl. illus. tables.
(Contract AF 33(616)6177)
(WADC TR 59-578) Unclassified report

Descriptors: Fixed capacitors*; Plastics; Paper capacitors; Paper; Seals*; Specifications; Tests; Test methods.

A step by step procedure for qualification approval testing of specific types of capacitors under Military Specification MIL-C-26086 (USAF), MIL-C-26086/1, MIL-C-26086/2, MIL-C-26086/3, MIL-C-26086/4, MIL-C-26086/5 and MIL-C-26086/6 is presented. Reference is made to each test and the specification paragraph under which the test is accomplished. The criteria for meeting or failure to meet the specification requirements are detailed. Although reference is made to specific types of equipment to be used, this does not preclude the use
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of other equipment which has the required accuracies and electrical characteristics. (Author)

AD-232 964 N

AD-232 977 Div. 14
(2 Mar 60)

Rubber Lab., Mare Island Naval Shipyard, Vallejo, Calif.
EFFECT OF SHELF AGING ON MIL-P-5516 O-RINGS, by J. M. Holloway. Progress rept. no. 1. 29 Feb 60, 3p. table. (Proj. no. NSM-033-200; Rept. no. 92-6) Unclassified report

Descriptors: Synthetic rubber; Rubber seals*; Tests; Physical properties; Storage; Aging; Gaskets*.

O-rings originally complying with Military Specification MIL-P-5516, which had been scrapped because they had reached the maximum allowed age of 48 mo after manufacture, were tested before and after an additional 12 mo aging. During the original 48 mo they were kept in sealed envelopes; but during the subsequent 12 mo some were kept in sealed envelopes, some were exposed to air in the dark, and some were exposed to air and artificial light. No significant changes in tensile strength, ultimate elongation, modulus at 100% elongation, permanent set at 50% elongation or specific gravity were found to have occurred after the additional 12 months aging. The results were the same no matter how the O-rings were stored during this period. (Author) (See also AD-204 017)

Open-ended Terms: O-rings.

AD-232 977 N

AD-233 471 Div. 8
(14 Mar 60)

Eitel-McCullough, Inc., San Carlos, Calif.
CERAMIC TUBE REFINEMENT, by John Richter and Jack W. White. Scientific rept. no. 5, 1 July-31 Dec 59. [20]p. incl. illus. (Contract AF 33(600)36699) Unclassified report

Descriptors: Electron tubes*; Ceramic materials*; Cathodes (Electron tubes)*; Seals; Heating; Temperature; Design.

Seal Evaluation: Two samples of ten CD-16 tubes were subjected to life testing at ambient temperatures of 400°C and 500°C respectively. The test at 400°C was terminated after 500 hours and none of the tubes sustained air leaks during test or after cooling, subsequent to removal. In the life test conducted at 500°C, seal failures occurred after 16 hours, 23 hours, 72 hours, 88 hours and 97 hours (two). After 160 hours, all of the remaining tubes had failed. Getter Evaluation: A further revision of the getter evaluation sub-manifold was necessary, and as a final solution to the leakage problem, the original sub-manifold was replaced with a completely heliarced sub-manifold. The new sub-manifold was incorporated into the pump system, and the entire system was satisfactorily checked out. Grid (over)

Evaluation: A Keithly electrometer, capable of measuring currents as low as 10^{-14} amperes, was procured. Efforts to measure emission currents from gold grid simulating elements, at a sensitivity of 10^{-9} amperes with the Keithly electrometer, were frustrated by inherent circuit interference. To solve this problem a test circuit was designed and built to provide a means of measuring currents of the order of 10^{-13} amperes. (Author) (See also AD-226 294)

AD-233 471

AD-234 109 Div. 10, 9, 12
(30 Mar 60)

Pesco Products Div., Borg-Warner Corp., Bedford, Ohio.
STUDY AND PRELIMINARY EXPERIMENTAL EVALUATION OF MISSILE FUEL SYSTEMS AND COMPONENTS USING LIQUID HYDROGEN. Summary rept. on Phase 1. July 59, 1v. incl. illus. 23 refs. (Pesco engineering rept. no. 3094) (Contract AF 33(616)5810) (WADC TR 59-426) Unclassified report

Descriptors: Fluid flow*; Rocket fuels*; Hydrogen*; Liquified gases*; Heat transfer; Fuel tanks; Fuel pumps; Pressure; Thermodynamics; Guided missiles*; Induction motors; Design; Liquid rocket propellants*; Rocket motors; Bearings; Seals.

The work included in this report covers the accomplishments during the first year on an anticipated three-year program to study and evaluate SF-1 fuel system flow phenomena and system components needed between the fuel tank and the missile engine high pressure pump. The report includes an analysis of two phase flow in SF-1 transfer lines, a discussion of the fluid conditions in the (over)

supply tank, a discussion of the booster pump application to a missile fuel system, and a study of possible methods of measuring vapor-liquid ratio in SF-1. Descriptions of components and test equipment for use in later phases of the program are presented. These include: a single phase flow loop, a 7000 gallon dewar and a 1500 gpm, 250 psi circulation pump for the flow loop. The experimental phases discussed in the report include the performance of a 24,000 rpm booster pump, a 24,000 rpm submerged electric motor drive for a booster pump, and preliminary results on the effect of fluid stratification in a missile tank on the performance of a tank-mounted booster pump. (Author) (See also AD-214 257)

Open-ended Format SF-1

AD-234 109 N

AD-234 140 Div. 29
(30 Mar 60)

Quartermaster Research and Engineering Command, Natick, Mass.
AN INVESTIGATION TO DETERMINE A PRACTICAL, PRECISE AND RELIABLE METHOD FOR DETECTING LEAKS IN RUBBER HANDWEAR, by James C. Perkins, Jr. Mar 60, 36p. incl. illus. tables (Technical rept. no. R-6) Unclassified report

Descriptors: Rubber gloves*; Protective clothing; Guided missile personnel; Detectors; Gas leaks; Test methods; Detection.

Research indicated three methods as being potentially suitable for use in detecting leaks in rubber handwear under field testing conditions (1) high definition fluoroscopy; (2) halogen detector; and (3) infrared nitrous oxide analyzer. Each of these methods employs a tracer gas and a detector or sensing element. Some of the characteristics for which these systems were evaluated, included adequate sensitivity, reliability of response, simplicity of operation, freedom from toxicity, contamination and explosion hazards, portability, and economy of operation. The three experimental inspection methods were evaluated in comparison with the standard water bath technique (over)

in field tests at the Agency's Simulated Missile Servicing Course, and at the Agency's Accelerated Handwear Testing Course. The leak detector tracer gas (Halogen) was found to be the most satisfactory method for making determinations of rubber handwear serviceability. It is more precise and reliable and requires substantially less time per inspection than the standard technique and is superior to the other experimental methods with regard to practicability for use in field testing. (Author)

AD-234 140 N

AD-234 516 Div. 8
(6 Apr 60)

Stanford Electronics Labs., Stanford U., Calif.
ALUMINO-SILICATE GLASS-TO-MOLYBDENUM-[COAXIAL] SEAL, by James F. Margiotta. 4 Feb 60, 11p. incl. illus. (Bull. no. 103)
(Contract Nonr-22524) Unclassified report

Descriptors: Glass seals*; Metal seals*; Traveling wave tubes; Containers.

This bulletin describes a technique for the fabrication of a coaxial seal between molybdenum and an alumino-silicate glass (Corning No. 1720). The materials used in this seal are advantageous because they are non-magnetic and will withstand a subsequent brazing temperature of 780°C and bakeout temperature of 700°C. These particular seals were used as r-f connections in a traveling-wave tube. It was found necessary to maintain a minimum wall thickness of 0.017" for this size (0.187") molybdenum outer conductor in order to eliminate the frequent development of leaky lateral cracks in molybdenum tubing of lesser wall thickness. It was also found necessary to examine with a microscope the inside of the molybdenum outer conductor around the area to be sealed and to reject all parts that showed evidence of having (over)

lateral striations. This was done to prevent leaking at the glass-to-metal interface of the seals. The coaxial seals withstood subsequent furnace brazing (at 779°C) into a molybdenum-traveling-wave-tube envelope, using silver-copper eutectic solder. Corning No. 1723 glass may be substituted for Corning No. 1720 glass without changes in techniques or temperatures. (Author) (See also AD-225 955)

AD-234 516 N

AD-234 669 Div. 14, 17, 26
(11 Apr 60)

Sperry Gyroscope Co., Great Neck, N. Y.
METAL-TO-CERAMIC SEAL TECHNOLOGY STUDY, by S. Cole, Jr., H. Larisch, and E. Cheatham. Quarterly technical note no. 1, 30 June-30 Sep 59. Oct 59, 82p. incl. illus. tables, 26 refs. (Rept. no. NA-8240-8184-1)
(Contract AF 30(602)2047, Proj. 4506)
(RADC TN 59-370) Unclassified report

Descriptors: Seals*; Metal seals*; Tests; Tensile properties; Materials; Ceramic materials; Stresses; Bonding; Thermodynamics; Adhesion; Metals.

After a preliminary literature study, an intensive metalizing investigation was planned and is now in progress. Initially, four ceramic bodies of varying Al_2O_3 content have been selected and are now being used in this program. Over 200 metallizing compositions were formulated after consideration of thermodynamic principles, and chemical and physical adherence mechanisms. A testing investigation was planned, two phases of which are in progress (peel testing and com- (over)

pression testing). These programs are designed to render data which is to be correlated with standard ASTM tensile tests. New tensile test specimen des. , have been accomplished. A stress investigation was planned and is in progress. Theoretical considerations for both thin and thick wall seals have been postulated. A test seal specimen has been fabricated and is under investigation for experimental data. (Author) (See also AD-235 381)

AD-234 669 N

AD-234 721L Div. 14, 26
(11 Apr 60)

Rock Island Lab., Ill.
THE EFFECT OF VOLATILE CORROSION INHIBITORS ON MIL-B-131 BARRIER MATERIALS, by E. S. Burke. 2 Feb 60, 23p. incl. illus. tables (Proj. TB4-006G; Rept. no. 60-294) Unclassified report

Notice: Only Military Offices may request from ASTIA. Others request approval of Diamond Ordnance Fuze Labs., Wash. 25, D. C., Attn: ORDTL 06.33.

Descriptors: Corrosion inhibition*; Packaging*; Plastics*; Vinyl chlorides; Polymers; Ethylenes; Esters; Films*; Seals*; Water vapor; Tests.

MIL-B-131 barrier materials with polyvinyl chloride, polyethylene and metallized polyethylene-polyester heat sealing films, respectively, and unsupported films of these plastics were placed in contact with paper impregnated with dicyclohexyl ammonium nitrite; a mixture of urea, sodium nitrite and monoethanolamine benzoate; dicyclohexylamine caprylate; and an amine carboxylate and exposed to temperature (over)

cycling for various periods of time. The effect of these conditions on the water resistance of the seal, moisture vapor transmission rate, delamination of the plastic film and sealability of the barrier material was measured as well as the effect of this exposure on the tensile and elongation properties of the unsupported plastic films. The results indicate that at least one of the above properties of polyvinyl chloride and polyethylene coated MIL-B-131 barriers are adversely affected by all of the volatile corrosion inhibitors except the one consisting of a mixture of urea, sodium nitrite and monoethanolamine benzoate. The MIL-B-131 material utilizing a metallized polyester-polyethylene heat sealing film was adversely affected only by the dicyclohexylamine caprylate inhibitor. (Author) (See also AD-160 468)

AD-234 721L

AD-234 860 Div. 22
(13 Apr 60)

Rock Island Arsenal, Ill.
105mm RECOIL MECHANISM (NITROGEN VENT) by E. C. Gere. 15 Feb 60, 17p. incl. illus. tables (Proj. no. TW-109) (Rept. no. 60-302) Unclassified report

Descriptors: Recoil mechanisms*; Howitzers*; Tests; Pneumatic packings*; Pressure.

A 105-mm recoil mechanism (nitrogen vent) was manufactured and tested, which was designed to allow any nitrogen, leaking past the first high pressure seal in the floating piston, to escape rather than contaminate the oil. The recoil mechanism was tested at Rock Island Arsenal by shop hydraulic test, on powder-type testing machine and in laboratory cold room test. The 105-mm recoil mechanism (nitrogen vent) with pressure packings functioned satisfactorily at normal temperatures but not at sub-zero temperatures. Chevron packings failed at normal temperature; therefore, they were not tested at sub-zero temperature. It was recommended that a study be made to determine the adaptability of a metallic bellows-type recuperator, similar to that in use in the 115-mm, XM70 and XM70E1 boosted rocket launchers. (over)

Open-ended Terms: 105mm, M2A1 howitzer.

AD-234 860 N

AD-234 862 Div. 22, 3, 26
(13 Apr 60)

Feltman Research and Engineering Labs., Picatinny Arsenal, Dover, N. J.
PRESS-FIT CLOSURES FOR 8-INCH T174 CHEMICAL SHELL, by Walter J. Puzia. Mar 60, 23p. incl. illus. table (Ord. proj. TW-125; DA proj. 504-03-074) (Technical rept. no. 2678) Unclassified report

Descriptors: Chemical projectiles*; Seals; Projectiles; Manufacturing methods; Lubrication; Thickness; Surfaces; Pressure; Interference.

This report presents the results of a study to establish the optimum burster casing wall thickness at the press-fit for the 8-inch T174 chemical shell. Since it is known that leakage of the shell filler is usually associated with "galling," or abrasion, of the press-fit surfaces, it is the objective of this study to determine the burster casing wall thickness which produces the least amount of galling of the press-fit surfaces when assembled. As this study does not cover variations in degree of interference, surface finishes, or entrance radii, these were kept as nearly constant as possible and representative of established practice for chemical shell press-fits. Only the wall thickness (over)

was varied. Rate of pressing the parts together and lubrication of surfaces were also representative of actual practice. Traces were made of assembling load versus travel, using electrical strain gage equipment, to determine smoothness of assembling and magnitude of assembling load. The assemblies were then sectioned longitudinally, and the press-fit surfaces were photographed to note the degree of abrasion. (Author)

Open-ended Terms: 8 in., T174 Projectiles.

AD-234 862 N

AD-234 940 Div. 14, 7, 22
(14 Apr 60)

Naval Civil Engineering Lab., Port Hueneme, Calif.
PARAFFIN AS A CONDUIT SEAL AGAINST BLAST PRESSURE, by H. G. Aggas. Final rept. on type C. 18 Feb 60, 13p. incl. illus. (Technical rept. no. 074) (Proj. NY 340 030-11) Unclassified report

Descriptors: Waxes*; Sealing compounds*; Blast; Pressure; Tests; Seals*; Explosions; Countermeasures; Resistance.

The blast resistance of paraffin as a sealing compound in Crouse-Hinds explosion-proof sealoffs was investigated. These sealoffs, which had approximately one-half of their cross-sectional area filled with standard electrical wire, were sealed with paraffin and tested in the blast simulator. Paraffin is an effective seal for resisting dynamic and static pressures to at least 150 psi at an average temperature of 68°F. The sealoffs were subjected to dynamic pressures up to 170 psi with no damage to the wax seal. (Author)

Open-ended Terms: EZS2 Sealoffs, EZS6 Sealoffs, EZS8 Sealoffs, EZS10 Sealoffs, Aristowax.

AD-235 024 Div. 26, 1, 12
(18 Apr 60)

North American Aviation, Inc., Downey, Calif.
HYDRAULIC AND PNEUMATIC FITTING AND TUBING TEST PROGRAM, by L. L. Seibel and V. W. McGillen. Final rept. Nov 59, 184p. incl. illus. tables.
(Contract AF 33(600)36168)
(WADC TR 59-267) Unclassified report

Descriptors: Pipe fittings*; Steel tubing*; Stainless steel; Pipes; Seals; Vibration; Temperature; Tests; Pressure; Pneumatic systems; Hydraulic systems; Joints.

This report describes and gives results of a 4-year fitting and tubing test program. Comparative tests were conducted of different types of tube fittings under conditions of severe vibration and extreme temperature. Most of the results are for the MS flared, the MS flareless, and the "super" flareless types. Test specimens were composed of two fittings of the same type and a tubing configuration considered typical of the needs for a missile system. Results for different combinations of materials are also given. Metal boss seals of stainless steel (cres) material were included in these tests to evaluate the effect (over)

of the test conditions on the seals. Development work accomplished on the flared-type fitting is described along with the results of a limited test program. Also, incidental studies are described dealing with flaring methods, stress analysis of the tube specimen, and metallurgical properties of tubing at high temperature. In general, it was found that the MS fittings were superior to the commercial types tested. Another finding was that specimens with MS flared fittings in the small sizes performed better than those with flareless fittings; however, a tendency for the reverse of this was found for larger size specimens. None of the specimen types were found to be satisfactory under all the test conditions imposed. (Author) (See also AD-115 248) (AD-131 845)

AD-235 024 N

AD-235 052 Div. 22, 25
(18 Apr 60)

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
M-39 COOK-OFF SUMMARY REPORT, by Gerald A. Sterbutzel. 15 Jan 60, 84p. incl. illus. tables (Rept. no. GA-948-C-49)
(Contract DAI 30-115-504-ORD(P)-596) Unclassified report

Descriptors: Automatic weapons*; Aircraft guns*; Heat transfer*; Rings; Seals*; Safety*; Temperature; High explosive ammunition*; Incendiary ammunition*; Projectiles*; Sensitivity; Tests; Flight testing; Jet fighters*; Armament*; Aircraft ammunition*.

Two systems have been developed which are in themselves complete solutions of the cook-off problem in fighter aircraft currently being considered. One of these systems utilizes air flow over the drum to make possible the firing of at least 420 rounds at an ambient temperature of 150° without cook-off. The other - and the simpler solution - requires only a modification of the drum and seal design to make possible the firing of 420 rounds without cook-off under the severest flight conditions in any of the latest fighters. The study of this type seal - known as ring seals - produced the basic solution to the cook- (over)

off problem. Flight tests were conducted on an F-101 fighter aircraft to prove out the safety of ring seals in this type of aircraft. (Author) (See also AD-313 519)

Open-ended Terms: M39 guns, Cook off, F-100, F-101, 20 mm.

AD-235 052 N

AD-235 381 Div. 14, 26
(25 Apr 60)

Sperry Gyroscope Co., Great Neck, N. Y.
METAL-TO-CERAMIC SEAL TECHNOLOGY STUDY, by S. Cole, Jr., H. Larisch, and E. Cheatham. Quarterly technical note no. 2, 30 Sep-30 Dec 59. Jan 60, 31p. incl. illus. tables (Rept. no. NA-8240-8184-2)
(Contract AF 30(602)2047)
(RADC TN 60-53) Unclassified report

Descriptors: Seals*; Metal seals*; Materials; Tests; Stresses; Heat treatment; Tensile properties.

A study was conducted to advance ceramic-to-metal seal technology to the point where stronger seals (seals with bond strengths approaching tensile strengths of 25,000 psi, the strength of the ceramic member) can be developed and produced with a higher degree of uniformity and reliability than has been previously attained. The demands for seals with increased electrical, mechanical, and thermal requirements are being imposed by present and future high-power microwave applications, e.g., electron tubes. A literature survey of metal-ceramic seals was completed. Two hundred metallizing mixtures were (over)

milled and sintered at various temperatures. Samples sintered at 1500°C were adherence tested; relatively good results were obtained. At least 22 compositions provided better adherence than standard Mo-Mn mixtures. Although scratch testing is only a limited measure of ultimate metal-ceramic seal strength, it indicates that the metallizing composition should lead to an optimum mix to high seal strengths. Adherence tests verified the principle that low Al_2O_3 bodies (94-96%) more easily form metallizing bonds than high Al_2O_3 (99.5%), but in all bodies, metallizing composition can affect bonding within a wide range. Preliminary data indicate that Mo-oxide additions do not observably improve bonding. Other additives appear promising including Ca, Mn, SiO_2, Fe, Zr, Ti, CeO, Li, and various glass additives. The seal stress investigation has predicted the exact stress condition in a circumferential seal. Equipment to measure and predict residual seal stress was assembled and an investigation was begun.

AD-235 381 N

AD-235 681 Div. 26, 8
(2 May 60)

Bulova Research and Development Labs., Inc., Woodside, N. Y.
AUTOMATIC MACHINE FOR SEALING QUARTZ CRYSTALS IN TYPE HC-6/U, HC-13/U AND HC-18/U CRYSTAL HOLDERS, by R. F. Giglio Tos. Final engineering rept., 24 June 57-30 Apr 60. 1v. incl. illus. tables.
(Contract DA 36-039-sc-72775) Unclassified report

Descriptors: Quartz crystals*; Crystal holders*; Welding*; Seals; Machines*; Automatic; Tests; Instruction manuals; Design.

This document includes:
Raytheon Mfg. Co., Waltham, Mass.
INSTRUCTION MANUAL 2-206. MODEL K WELDING HEAD. Aug 58, 13p. incl. illus.
Raytheon Mfg. Co., Waltham, Mass.
INSTRUCTION MANUAL 2-214. MODEL 1103, DC WELDING POWER SUPPLY. Sep 56 (rev. 1) 18p. incl. illus. tables.
[Dudco Div., New York Air Brake Co., Hazel Park, Mich.]
COMPOUND HIGH VACUUM PUMPS KC-15 AND KC-46. 1 June 59, 22p. incl. illus.

(over)

Veeco Vacuum Corp., New Hyde Park, N. Y.
THERMOCOUPLE CONTROLLER TYPE TC-1, TC-2, 22 Oct 59, 2p. incl. illus.

An automatic sealing machine is described for the resistance welding of Quartz Crystal Holder types HC-6/U, HC-13/U and HC-18/U, while in an inert atmosphere. The machine consists of an automatic evacuation and nitrogen flushing chamber, an inert atmosphere chamber, welding head, D. C. welding power supply and controls. A history of the project is given with pilot run data, test results evaluation of 50 each HC-6/U and HC-18/U holders, as well as a discussion of design and manufacturing problems for both machine and holders. Installation, operation and maintenance instructions are given. (Author) (See also AD-231 359)

AD-235 681 N

AD-236 006 Div. 7
(5 May 60)

Bell Telephone Labs., Inc. [Whippany, N. J.]
RESEARCH AND DEVELOPMENT WITH HERMETICALLY SEALED CONTACTS, by O. M. Hovgaard. Quarterly progress rept. no. 11, 15 Sep-14 Dec 59. 14 Jan 60, 12p. incl. illus. tables.
(Contract DA 36-039-sc-72835) Unclassified report

Descriptors: Electric switches*; Design; Model tests; Electric relays*; Miniature electronic equipment; Seals.

Studies of exploratory coordinate arrays of latching relays using G29 miniature switches have been completed. A 3-by-3 array of 4-wire crosspoints showed promising transmission characteristics at 0.5 megacycles and the possibility of usefulness up to 4 or 5 megacycles. The 8-by-8 switching array exhibited restrictive margins with respect to magnetic interference between crosspoints and the need for close selection of switches for individual crosspoints. Magnetically latching relays providing 2 and 4 make contacts were also studied. (Author) (See also AD-230 935)

AD-236 067 Div. 8, 26
(9 May 60)

Eitel-McCullough, Inc., San Bruno, Calif.
PILOT LINE OF AUTOMATIC PROCESSING AND ASSEMBLY MACHINES FOR CD RECEIVING TUBES AND TESTING AND EVALUATION OF CD TUBES, by Michael M. Filmer. Final engineering rept. [1960] 1v. incl. illus.
(Contract AF 33(600)32483) Unclassified report

Descriptors: Electron tubes*; Production; Manufacturing methods; Machines; Cathodes (Electron tubes); Test equipment; Ceramic materials; Brazing; Diffusion; Seals; Spot welds.

A line of automatic processing and assembly equipment for CD receiving tubes was designed and constructed to prove the feasibility of high-volume automatic production. The four assembly machines are of the rotary indexing type, and each stacks the parts of a particular sub-assembly in jigs. The final assembly step for a complete tube is also performed on one of these machines. The additional machines constructed were a machine to size grid assemblies, a machine to pump and seal the tubes by the diffusion sealing process, an electrical testing machine to perform 13 tests automatically, and an electrical aging machine. A production ceramic metalizing machine and a cathode spray machine were constructed. Investigations were conducted to select the strongest available ceramic bodies, and a change was made from a very high to a lower alumina content body. Metalized ceramic rings cleaned in hot acid lost flexural strength, therefore, change was made to ultra-sonic cleaning. A barrel plating process was able to plate the ceramic within the tolerances required. Testing and evaluation of CD-16's showed that the tube performed satisfactorily except for instability of the cathode assembly which severely limits useful life, particularly under cycling and shock conditions. Design changes are necessary in the cathode structure to produce a satisfactory tube. Refinement and evaluation of the CD-18 was performed, and an objective specification in MIL-E format was prepared. Preliminary studies were made of CD-19 and CD-22 production refinement, and drawings were prepared. (Author) (See also AD-231 863)

AD-236 067 N

AD-236 184 Div. 8, 7
(10 May 60)

Texas Instruments, Inc., Dallas.
HIGH VOLTAGE SILICON RECTIFIERS, by Waylon D. Bryan. Final rept. (Life and Environmental Test rept.) on Phase 1-3, 1 Jan 58-16 Nov 59. 16 Dec 59, 96p. incl. illus. tables. (Contract AF 33(600)36110) Unclassified report

Descriptors: Crystal rectifiers*; Silicon*; Diodes*; Voltage; Tests; Production; Manufacturing methods; Coatings; Seals; Packaging; Semiconductors; Diffusion; Phosphorous; Boron.

The first diffusion runs of the contract period were made with P-type grown silicon in the 200 Ωcm range. With 45-hour phosphorous diffusions and 6- to 8-mil π-layer thicknesses, the yield of 2,000-volt rectifiers was about 50%. The yield of high voltage cells was considerably increased by using 2,000 Ωcm float-zone starting material and increasing π-layer widths to about 18 mils. The optimum phosphorous bake time at 1250°C was found to be 24 hours. Boron diffusions were standardized as 10 hours at 1250°C. Various configurations of rectifier wafer geometry were investigated. The (over)

most successful configuration was found to be the round wafer of 58 mils diameter. Etch studies indicated that optimum results are obtained with a 10-second phosphate No. 1 stream etch and a 5-second re-etch when necessary. Studies of surface coatings for the rectifying cells showed that optimum results are obtained by using one full-strength coating of silicone varnish and one coating of silicone rubber. It was found unnecessary to pressurize the 3,000-volt units if they were silastic coated. A dimple closure, applied by hydraulic pressure, was found to give a higher percentage of tabulation seals with the X-286B rectifier than did resistance welded seals. (Author) (See also AD-232 837)

AD-236 184

AD-236 837 Div. 26, 22
(23 May 60)

Rock Island Arsenal, Ill.
INVESTIGATION OF HYDROPNEUMATIC RECOIL MECHANISM PACKING SPRING LOADS, by L. R. Raisbeck. Technical rept. 14 Apr 60, 31p. incl. illus. tables (Rept. no. 60-1149) Unclassified report

Not releasable to Foreign Nationals.

Descriptors: Howitzers*; Recoil mechanisms*; Pneumatic packings*; Pistons; Tests; Seals*; Effectiveness; Springs*; Hydraulic seals*; Temperature.

Conventional packings for the 75 MM Pack, 105 MM, 155 MM and 8 in. Howitzer Hydropneumatic Recoil Mechanism floating pistons were tested in a laboratory fixture to determine the relationship between axial packing load and radial packing pressure at sub-zero, normal and elevated temperature. Tests were conducted with leather-silver-rubber, and Teflon-aluminum-rubber packings. Results indicated that: (1) the pressure factor (radial packing pressure/axial spring load) varies directly with temperature for both type packings; however, (over)

sub-zero temperature reduces the pressure factor considerably more than elevated temperature increases it; and (2) the axial spring load on the packings varies directly with temperature if no adjustment in Belleville spring height is made. Both types of the above packings were tested in a 105 MM Howitzer Hydropneumatic Recoil Mechanism to determine the relationship between Belleville spring load and their sealing effectiveness at sub-zero, normal and elevated temperatures under dynamic conditions. Results indicated that: (1) leakage decreases as the packing spring load is increased up to 150% of standard packing spring load; however, the decrease is very small above 125% spring load; (2) leakage is greater at sub-zero temperature than at normal and elevated temperatures for any packing spring load; and (3) Teflon shrouded packings form a more positive seal than leather shrouded packings. (Author)

Open-ended Terms: 75mm, 105mm, 155mm, 8 in.

AD-236 837

AD-237 405 Div. 16, 1
(7 June 60)

Air Crew Equipment Lab., Naval Air Material Center, Philadelphia, Pa.
ENVIRONMENTAL REQUIREMENTS OF SEALED CABINS FOR SPACE AND ORBITAL FLIGHTS. A SECOND STUDY PART 6: EVALUATION OF POTASSIUM SUPEROXIDE CLOSED CIRCUIT REBREATHING SYSTEM DURING PROLONGED CONFINEMENT, by D. A. Mancinelli and E. L. Michel. 24 May 60 [17]p. incl. illus. tables (Rept. no. NAMC-ACEL-418) Unclassified report

Descriptors: Pressurized cabins*; Space flight*; Potassium compounds*; Oxides; Respiration*; Seals; Altitude chambers; Simulation; Oxygen equipment*; Moisture; Carbon dioxide; Oxygen.

An investigation was conducted to evaluate the use of potassium superoxide (KO_2) in a closed breathing system. The successful completion of an 8-day, 6-man, confinement study using KO_2 in a closed breathing system demonstrates the possible application of such a system in space flights involving sealed cabins. By utilizing a specific canister design and chemical granule size and by carefully controlling the temperature and moisture content of the inlet gas to the canister, a system (over)

tem can be operated wherein the proper rate of carbon dioxide absorption and evaluation of oxygen is achieved without the use of a second expendible chemical (LiOH or cardoxide). Since the proper moisture content of the gas for this balance system is on the low side, this should ameliorate the moisture condition in the habitability compartment and in the KO_2 bed which resulted in increased pressure drop with time encountered in this investigation. Within the limits of this experiment it appears that, in a closed respiratory system, KO_2 demonstrates the following desirable characteristics: (a) evolution of oxygen; (b) absorption of carbon dioxide; (c) removal of some H_2O vapor; (d) removal of odoriferous compounds; and (e) possible removal of carbon monoxide and other contaminants. The following other characteristics were encountered: (a) increased pressure drop with time through KO_2 bed, and (b) inability to control the confined space humidity unless additional equipment is used. (Author) (See also AD-229 593)

AD-237 405 N

AD-237 500 Div. 10, 12
(23 May 60)

Borg-Warner Corp., Chicago, Ill.
INVESTIGATION OF PROPELLANT SYSTEMS AND COMPONENTS UTILIZING A HIGH-ENERGY OXIDIZER, by Thomas Lock and Clarence E. Albertson. Quarterly rept. no. 4, 16 July-15 Oct 59, May 60, 88p. incl. illus. tables.
(Contract AF 33(616)6039)
(AFFTC TR 59-44) Unclassified report

Descriptors: Fluorine*; Liquefied gases; Rocket oxidizers*; Handling; Ceramic materials; Cermets; Corrosive liquids; Fluid flow; Test equipment; Heat transfer; Cryogenics; Guided missiles*; Seals.

A series of experiments were made to determine the feasibility of rapidly sintering small fluoride (Combo) ceramic compacts which show promise as bearing and seal materials. A sintering time of about 16 hr at a maximum temperature of 1650° F is required in a continuous tunnel kiln to produce dense structures with hard, smooth surfaces, sharp edges, and high strength. X-ray diffraction studies of the sintered fluoride ceramics revealed a structure consisting of a heterogeneous mixture of Ca_2F_6 and BaF_2 glassy matrix. Fluo-
(over)

ride cermets with additions of Sb metal exhibited much improved tensile properties. An analytical heat transfer study of the one-phase flow of liquid F in tubes with friction and heat addition is presented to show that the absolute pressure available will be the principle limiting factor in test conditions selection. To maintain a single (liquid) phase heat transfer test, the temperature of the F should not exceed its vapor pressure temperature. This will limit the permissible wall temperature and determine the maximum permissible flow frictional pressure drop if simultaneous heating is applied. The second limiting factor in test condition selection will be the capability of the Lincoln Weld energy supply units. Descriptions are given of the single pass flow rig and the seal and bearing test rig. (See also AD-313 806)

AD-237 500 N

AD-237 833 Div. 14
(15 June 60)

Boeing Airplane Co. [Seattle, Wash.]
DESIGN DATA FOR O-RINGS AND SIMILAR ELASTIC SEALS, by George E. Trepus, Robert S. Roper, and William R. Hickman. Rept. for 1 July-31 Dec 59 on Non-Metallic and Composite Materials. Mar 60, 137p. incl. illus. tables, 39 refs.
(Contract AF 33(616)5722, Proj. 7340)
(WADC TR 56-272, pt. 5) Unclassified report

Descriptors: Seals*; Hydraulic seals; Plastic seals; Rubber seals; Design; Physical properties; Temperature; Tests; Cryogenics.

The study to develop design criteria applicable to O-rings, back-up rings, and other elastomeric seals, and of the groove configurations for these seals was continued. Correlation of the physical properties of the seal material with the seal design was included. Seals fabricated from silicone, Viton A, Viton A-HV, and Viton B(LD234) were used for testing. Ultimate tensile strength, ultimate elongation, and tensile modulus at 20% elongation were determined at room temperature and 400°F. Compounds which were functionally tested at 500°F were tensile tested at 500°F. Measurements were made of compres-
(over)

sion set at 400°, 500°, and 600°F (2 hr exposures) for a number of compounds. Compression deflection and stress relaxation measurements were made on several O-ring samples with unique designs and compared with a solid Viton O-ring. Static and dynamic pneumatic seal tests, dynamic hydraulic seal tests, and high temperature static annulus seal tests were made on a variety of materials. Acceleration of 35 g for 10 min had no adverse effects on AN6290-6 O-rings. The effects of 2 levels of X-radiation [5×10^5 ergs/g carbon (C) and 8×10^5 ergs/g (C)] on O-rings conforming to AN6227B-19(MIL-P-5516A) were studied. A review of the literature concerning the effects of ozone on elastomeric seal materials, a cryogenic seal study by NBS, a literature review of age control techniques, and abstracts of current published and unpublished information on seals are appended. (See also AD-230 656)

AD-237 833

AD-237 928L Div. 22, 14
(17 June 60)

Aberdeen Proving Ground, Md.
OBTURATOR PADS, SYNTHETIC RUBBER, by Donald J. Mavis. June 60, 1v. incl. illus. tables (Proj. WVLT-I/43, rept. no. 1)
Unclassified report

Notice: Only Military Offices may request from ASTIA. Others request approval of Diamond Ordnance Fuze Labs., Wash. 25, D. C. Attn: ORDTL 06.33.

Descriptors: Synthetic rubber*; Materials*; Rings; Obturation; Howitzers*; Tests; Gas seals; Physical properties; Temperature; Corrosion.

The object of this test was to determine the suitability of pads and materials when fired at ambient temperatures (above 50°F) and -40°F. Four series of pads, each with different physical properties, were tested. Five rounds of various zones, generating pressures from 8,000 to 32,000 psi, were fired on each type pad at both the normal and low temperatures, with an additional ten rounds on the last pad of each series, if it appeared to be in good condition. The pads were
(over)

visually inspected before and after each round in order to estimate leakage, if any, and the percentage of seat contact. All pads with the exception of the Code C series (which were not fired at ambient temperature because of their failure at subzero temperatures) performed obturation satisfactorily at both ambient temperature and -40°F. However, the material of the pads was unable to resist cutting by the split rings and the erosive action of the powder gases. Although this condition is not serious after these limited firings, it is not known to what extent the pads would deteriorate upon additional firing. The special "staggered joint" type split rings were unsatisfactory, as they failed to seal the chamber adequately. (Author)

Open-ended Terms: 8 in, M2 howitzers.

AD-237 928L

AD-238 020 Div. 14, 17, 26
(20 June 60)

Armour Research Foundation, Chicago, Ill.
COMPOSITE INORGANIC RESILIENT SEAL MATERIALS, by M. Sabanas. Rept. for Dec 58-Dec 59 on Non-Metallic and Composite Materials. Apr 60, 34p. incl. illus. tables.
(Contract AF 33(616)5793)
(WADC TR 59-338, vol. 2) Unclassified report

Descriptors: Metal seals*; Fibers; Metallic textiles*; Impregnation; Temperature; Mechanical properties; Metals; Ceramic materials; Polymers; Elastomers; Refractory materials; Manufacturing methods; Seals*; Gaskets*.

The principal objective of this research program is to investigate and develop new concepts for novel and unconventional material combinations which would have resilience, recovery, strength, and chemical resistance at temperatures up to 1000°F. Major emphasis was given to configurations that would enable these materials to be used as static and dynamic reciprocating shaft seals. Composite material combinations consisting of stainless steel and molybdenum fibers impregnated with tin, indium, magnesium 'ver, and polymeric (over)

materials were produced. Composites ma. d molybdenum fibers impregnated with silver were evaluated as static seals and showed good ability to seal air heated to 1000°F and retained pulsating pressures from zero to 5000 psi. The relationship between the fiber structure, impregnant, and final composite were studied. Impregnation techniques and secondary work processes like machining are outlined in this report. (Author) (See also AD-231 003)

AD-238 020

AD-238 164 Div. 25, 30
(21 June 60)

Laboratory for Insulation Research, Mass. Inst. of Tech., Cambridge.
SOME DEVELOPMENTS IN HIGH-PRESSURE TECHNIQUE, by P. W. Forsbergh, Jr. June 60, 39p. incl. illus. (Technical rept. no. 151)
(Contract Nonr-184110) Unclassified report

Descriptors: High pressure research*; Pressure; Solids; Gases; Metals; Hydraulic seals; Seals; Measurement.

Various research problems requiring high-pressure techniques were investigated. Consideration is given to solids and gases as pressure media, typical metals used in high-pressure design and methods of making seals (hydraulic and electrically insulating seals). Examples of high-pressure design are presented which include 2-dimensional pressure holders, precompressors, systems with lapped quartz seals, systems with optically flat quartz seals, systems with hydraulically loaded closures, and systems with hydraulically loaded piston gaskets. The measurement of pressure, length, and lattice parameters is discussed.

AD-238 200 Div. 7
(22 June 60)

Bell Telephone Labs., Inc. [Whippany, N. J.]
RESEARCH AND DEVELOPMENT WITH HERMETICALLY SEALED CONTACTS, by O. M. Hovgaard, Quarterly progress rept. no. 12, 15 Dec 59-14 Mar 60. 14 Apr 60, 11p. incl. table.
(Contract DA 36-039-sc-72835, Proj. 3-26-01-000)
Unclassified report

Descriptors Electric switches*; Electric relays*; Miniature electronic equipment; Seals; Design; Model tests.

Preliminary life tests of G29 miniature sealed contacts operated under conditions simulating those to be experienced in latching types of relays indicate that the life expectancy may be less than previously reported for the nonlatching conditions. The phenomenon appears to be related to the continuous presence of magnetic flux which may increase the opportunity for particles to bridge the open contacts. (Author) (See also AD-236 006)

AD-238 431 Div. 22
(28 June 60)

Aberdeen Proving Ground, Md.
ARCTIC WINTER ENVIRONMENTAL TEST OF OBTURATOR SYSTEM FOR BAG-LOADED CANNON, by E. W. Wagner. July 60 [21]p. incl. illus. table (Proj. OMS 5610.11.701, rept. no. 1)
Unclassified report

Descriptors: Arctic regions; Obturation*; Tests; Asbestos fiber; Guns*; Seals; Gas leaks; Silicones; Design; Effectiveness; Howitzers.

Silicon oil-asbestos pads were tested in arctic environment. No satisfactory fit was obtained even though the pads remained soft and pliable. The pads failed to seal the front split ring and were themselves only partially sealed. No firing was conducted. No further consideration should be given to testing these pads. (Author) (See also AD-202 759)

Open-ended Terms: M1 Howitzers, 8 in, 175 mm, T256 guns.

AD-238 482 Div. 7, 8
(29 June 60)

Amphenol-Borg Electronics Corp., Chicago, Ill.
RESEARCH ON R. F. COAXIAL CONNECTORS, BROADBAND, HIGH TEMPERATURE, RADIATION RESISTANT, by J. V. Malek. Scientific rept. no. 5, 1 Mar-1 June 60. 42p. incl. illus. tables, 10 refs. (Contract AF 33(616)6243) Unclassified report

Descriptors: Electric connectors*; Coaxial cables; Broadband; Radio-frequency cables; Radiation effects; Temperature; Design; Seals.

Study and development of hermetically sealing the shell-insulator-contact structure was expanded. In addition to fused silica 3 more materials were studied; Corning No. 1723 glass, forsterite, and alumina. New center contact design configurations were studied, developed, and partially tested and evaluated. Methods for attaching the center contact to the cable center conductor were studied. Brazing of the cable outer conductor to simulated connector shells was studied. Brazing of samples and testing were initiated. Additional study and testing of seals for use at the connector mating faces was accomplished. Experimental plating studies were conducted to obtain a silver coat-
(over)

ing over the base materials of Inconel and stainless steel for the purpose of maintaining high electrical surface conductivity at elevated temperatures. (Author) (See also AD-234 209)

AD-238 482

AD-238 832 Div. 10, 12
(1 July 60)

Borg-Warner Corp., Chicago, Ill.
INVESTIGATION OF PROPELLANT SYSTEMS AND COMPONENTS UTILIZING A HIGH-ENERGY OXIDIZER, by Clarence E. Albertson and Thomas Lock. Final rept. 1 July 58-15 Jan 60. May 60, 1v. incl. illus. tables (Suppl. to AD-317 577)
(Contract AF 33(616)6039)
(AFFTC TR 60-9, vol. 2) Unclassified report

Descriptors: Fluorine*; Liquefied gases; Rocket oxidizers*; Handling; Fluid flow; Heat transfer; Seals; Friction; Test facilities; Test equipment; Guided missiles*; Ceramic materials.

Contents:
Appendix V. Single pass flow rig. Analytical study of one-phase flow of liquid F in tubes with friction and heat addition
Appendix VI. Progress reports 1-4, Aug-Dec 1959, and Final report, 10 Feb 1960, on Determination of thermal conductivity of liquid F by the Engineering Experiment Station of The Ohio State University, Columbus, Ohio
Appendix VII. Detailed operational procedure for the static F com-
(over)

patibility apparatus
Appendix VIII. Proposed operational sequence for friction and wear apparatus
Appendix IX. Proposed ICC specifications for F tank truck
Appendix X. Inventory of single-pass flow rig equipment
Appendix XI. Single-pass flow rig. List of drawings
Appendix XII. Instrumentation: Single-pass flow rig - flow-transfer investigation
Appendix XIII. Cleaning procedures for liquid O system components. Pesco engineering process specification P-144, June 17, 1959
Appendix XIV. Flow-transfer rig passivation
Appendix XV. Single-pass flow rig. Friction factor and pressure drop tests. Sequence of operation
Appendix XVI. Seal and bearing test rig - inventory of equipment
Appendix XVII. Seal and bearing rig. List of drawings
Appendix XVIII. Seal and bearing test rig. Passivation and operational sequence

AD-238 832 N

AD-239 180L Div. 26, 1, 12
(7 July 60)

Chance Vought Aircraft, Inc., Dallas, Tex.
MODULAR HYDRAULIC SYSTEM DEVELOPMENT (PROJECT HYDRATOY) by R. W. Burden, J. W. Browne and others. Quarterly progress rept. no. 8, 5 Dec 59-5 Mar 60. 28 Mar 60, 1v. incl. illus. tables. (Rept. no. AER-EOR-12636)
(Contract NOa(s) 59-6019-c) Unclassified report

Notice: Only Government Agencies may request from ASTIA. Others request approval of Chief, Bureau of Naval Weapons, Navy Dept., Wash. 25, D. C.

Available on loan only.

Descriptors: Hydraulic systems*; Hydraulic actuators*; Seals; Standardization; Design; Alloys; Machining; Aircraft; Guided missiles; Jet planes; Metal seals*.

Development is continuing on the following metallic static seals (1) Bendix wedge seals, (2) Hi-Cesl (C-seal), and (3) CVA-X seals. Hydraulic package development is reported. Design and fabrication was
(over)

completed of the Ti manifold which houses a 3-way selector valve, 2-way restrictor, and check valve. Design was completed and fabrication is progressing of the actuator with modular end-cap which houses a pressure relief valve, a shuttle valve, and 1-way restrictor. Final design is reported of the stainless steel manifold which houses a priority valve, thermal relief valve, pressure-operated shut-off, solenoid-operated sequence, and a cartridge 4-way, 3-position selector valve. The modular filter envelope was determined, and a detailed procurement specification was released. Engineering efforts on the fluid-carrying structure are reported. The brazed and seam-welded floor panel assembly was satisfactorily pressure tested. Rotary seal testing for swivel joint development was stopped because of leakage resulting from excessive seal wear. The sealed groove beam assembly was completed. Fabrication was completed of the swivel bolt assembly. Consideration was given to joining methods of tubing and sheets. (See also AD-231 223L)

Open-ended Terms: Project Hydratoy.

AD-239 180L

AD-239 384 Div. 25, 7
(13 July 60)

General Electric Co., Utica, N. Y.
RESEARCH AND DEVELOPMENT OF THERMOCOUPLE ENERGY CONVERTERS. Quarterly rept. no. 2, 1 Mar-31 May 60. 12p. incl. illus.
(Contract DA 30-069-501-ORD-2855, Proj. TN2-8106)
Unclassified report

Descriptors: Thermoelectricity*; Seals; Generators; Design; Thermocouples*; Conductivity; Materials; Temperature; Thermal expansion; Tellurides; Lead compounds.

The development of encapsulated thermoelectric (TE) components for use in a TE generator and yielding a specific electrical power output of 0.46 W/cm^3 is continuing. A hot terminal plate, for improved thermal and electrical contact to the hot junction of the capsule, was developed. Several methods for filling capsules with TE materials were investigated. Of these, a neutral atmosphere oven type filling technique, offering the best potentialities, was developed and tested successfully. (Author) (See also AD-237 966)

AD-239 509 Div. 22
(14 July 60)

Watervliet Arsenal, N. Y.
ANALYTIC DEVELOPMENT OF DESIRABLE STRESS DISTRIBUTION CHARACTERISTICS IN SEALING RINGS LEADING TO RECOMMENDATION OF RING NO. 5 FOR APPLICATION TO CLOSED BREECH LAUNCHERS, by M. A. Sadowsky. Mar 60, 1v. incl. illus. tables (DA Proj. no. 5W46-07-034-01; Technical rept. no. WVT RR 6006)
Unclassified report

Descriptors: Seals; Gas seals*; Rings; Mathematical analysis; Stresses; Design; Tests; Guns*.

Laboratory testing of closed breech sealing rings Nos. 1 and 4 and the mathematical analysis of those rings showed that they are prone to elliptic buckling and plastic flow due to stress concentration at the lips. Ring No. 5 was then designed on the basis of mathematical shell theory. It is believed that it will be as nearly free from those faults as possible. It is suggested that ring No. 5 be produced and evaluated experimentally. (Author)

AD-240 357 Div. 1, 14
(2 Aug 60)

Narmco Industries, Inc., San Diego, Calif.
RESEARCH OF TECHNIQUES AND METHODS ON WHICH TO BASE DEVELOPMENT OF HIGH TEMPERATURE GLAZING ATTACHMENTS, by Gerald K. Partain, Floyd A. Piscopo, and Roger E. Wilson. Mar 60, 63p. incl. illus. tables.
(Contract AF 33(616)5783, Proj. no. 1368)
(WADD TR 60-119)
Unclassified report

Descriptors: Transparent panels*; Glass; Windshields; Attachment; Mechanical properties; Thermal expansion; Adhesion; Metal glass adhesives*; Joints; Seals; Spaceships.

This report describes the development of processes for the integral bonding of low expansion glasses (primarily aluminosilicate) to provide for either a load carrying attachment system or a means of accomplishing an airtight seal at the glazing edge. Tests of two types of attachments (a fused glass-to-metal and a brazed glass-to-metal) for Corning Glass Works Code 1723 and Pittsburgh Plate Glass Co. Code 6695 aluminosilicate glasses had bondline shear values exceeding 400 psi at -80°F and 900°F. Thus, the feasibility of these methods (over)

of attachment has been demonstrated although the degree of practicality is not yet known. Discussions of various aspects of mechanically held and free floating designs are also presented. (Author) (See also AD-110 900)

AD-240 357 N

AD-240 573 Div. 14, 10
(8 Aug 60)

Material Lab., New York Naval Shipyard, Brooklyn.
THE SUITABILITY OF ELASTOMERIC MATERIALS FOR USE IN THE DEVELOPMENT OF HOSES, GASKETS, AND DIAPHRAGMS FOR HANDLING ROCKET PROPELLANTS, by J. Mironov and A. D. Deiman. Final rept. 8 May 60. 8p. incl. tables (Lab. Proj. no. 5008-3)
Unclassified report

Descriptors: Rocket propellants*; Rocket oxidizers; Handling; Nitric acid; Amines; Elastomers*; Rubber hose; Rubber gaskets; Fuel hose; Fuel seals; Diaphragms (Mechanics).

Thirty-two different elastomeric materials were investigated to determine their potential suitability for use in the fabrication of hoses, gaskets, and diaphragms necessary for shipboard handling and storage of red fuming nitric acid and mixed-amines. Results indicate that a fluorinated polymer is suitable for prolonged use with red fuming nitric acid, and three other materials are suitable for short term exposure to this oxidizer. While none of the materials show suitability for use involving prolonged contact with mixed-amines, six material types are indicated to be suitable for limited or short term contact (over)

with mixed-amines. All of the materials are unsatisfactory for applications requiring prolonged contact with mixed-amines. In addition, these data show that three other specimens are suitable for short term use with red fuming nitric acid, while six of the elastomeric materials are suitable for interim use with mixed-amines. (Author) (See also AD-206 707)

AD-240 573 N

AD-240 838 Div. 26, 14, 22
(11 Aug 60)

Rock Island Arsenal Lab., Ill.
INVESTIGATION OF QUAD RING PACKINGS FOR 155 MM GUN CARRIAGE EQUILIBRATORS, by L. R. Raisbeck. 2 June 60, 16p. incl. illus. tables (Rept. no. 60-1795) Unclassified report

Not releasable to Foreign Nationals.

Descriptors: Gun mounts*; Packaging*; Equilibrators*; Effectiveness; Tests; Rubber seals*; Pneumatic packings*; Synthetic rubber.

Two sets of Minnesota Rubber and Gasket Company Quad Rings were tested as dynamic packings in 155 MM Gun Carriage Equilibrators. All other components in the mechanisms were standard. The equilibrators were subjected to friction and gymnastication tests at subzero, normal and elevated temperatures to determine if the packings were superior to conventional O-rings. Both equilibrators completed 40,000 cycles of gymnastication without failure. The experimental equilibrators had slightly higher frictions than standard equilibrators with O-ring packings. All components were in good condition after completion of the tests. It was concluded that Quad Rings, when used (over)

in the 155 MM Gun Carriage Equilibrator: (1) seal as well or better than O-rings; (2) have slightly higher frictions than O-rings; (3) eliminate spiral twisting and thereby extend packing life; and (4) do not produce any adverse effects on other components or performance. (Author) (See also AD-25 907)

Open-ended Terms: 155 mm, Gun mounts.

AD-240 838

compression values are higher for those bodies of the lower alumina content except mixtures of R-39 and R-50 containing SiO_2. Maximum values were slightly over 5000-lb loads. The tensile test specimen was redesigned with a radius of 21/64. Preliminary tensile stress-strain tests were performed at room temperature on several transverse specimens machined from nickel tube and both 18-8 stainless steel bar and sheet stocks. The sheet stock test results were more reproducible. A comparison of test methods indicated that a tensile value of 25,000 psi is equivalent to a compression test value of 5200 lb, drum peel of 17.25 lb, and torque peel value of 6 1/8 in.-lb. The compression test displayed the smallest coefficient of variation. Seal strengths of about 25,000 psi are expected when tensile tests are performed. (See also AD-235 381)

AD-240 969 N

compression values are higher for those bodies of the lower alumina content except mixtures of R-39 and R-50 containing SiO_2. Maximum values were slightly over 5000-lb loads. The tensile test specimen was redesigned with a radius of 21/64. Preliminary tensile stress-strain tests were performed at room temperature on several transverse specimens machined from nickel tube and both 18-8 stainless steel bar and sheet stocks. The sheet stock test results were more reproducible. A comparison of test methods indicated that a tensile value of 25,000 psi is equivalent to a compression test value of 5200 lb, drum peel of 17.25 lb, and torque peel value of 6 1/8 in.-lb. The compression test displayed the smallest coefficient of variation. Seal strengths of about 25,000 psi are expected when tensile tests are performed. (See also AD-235 381)

AD-240 969 N

AD-241 564L Div. 26, 30
(30 Aug 60)

Douglas Aircraft Co., Inc., Santa Monica, Calif.
NON-DESTRUCTIVE LEAK TESTING OF SEALED PACKAGES. Monthly progress rept. no. 2, for May 60. 15 June 60, 9p. incl. illus. tables.
(Contract NOa(a)s 60-6037-c) Unclassified report

Notice: Only Government Agencies may request from ASTIA. Others request approval of Chief, Bureau of Naval Weapons, Navy Dept., Wash. 25, D. C.

Descriptors: Electronic equipment; Packaging*; Non-destructive testing*; Test methods; Halogen compounds; Gases; Radioactivity; Scintillation counters; Test equipment; Seals; Gas leaks; Hydrocarbons; Fluorides; Diffusion; Chlorides; Benzenes; Toluenes.

Attempts are being made to establish non-destructive test methods for determining leakage in sealed packages. An investigation was made of a Radiflow unit which uses radioactive gas for leak-testing hermetically sealed electronic items. A package test chamber will be pressurized with radioactive gas and subsequent check with a geiger (over)

counter will determine which package leaked and, therefore, contains radioactive material. The physical and chemical properties of halogenated compounds were screened to determine those suitable to be inserted in each package just prior to sealing. A halogen detector will be used to detect the presence of halogen gas in an evacuation chamber containing the package being tested. For flexible packages only, the use of a vacuum chamber was investigated with detection of leaks made possible due to pillowing of the packages that do not leak.

Open-ended Terms: Freon, Radiflow.

AD-241 564L

AD-241 565L Div. 26, 30
(30 Aug 60)

Douglas Aircraft Co., Santa Monica, Calif.
NON-DESTRUCTIVE LEAK TESTING OF SEALED PACKAGES.
Monthly progress rept. no. 3, for June 60. 15 July 60, 6p.
(Contract NOa(s) 60-6037-c) Unclassified report

Notice: Only Government Agencies may request from ASTIA. Others request approval of Chief, Bureau of Naval Weapons, Navy Dept., Wash. 25, D. C.

Descriptors: Packaging*; Non-destructive testing*; Test methods; Gas leaks; Seals; Halogen compounds; Gases; Radioactivity; Scintillation counters; Hydrocarbons; Test equipment; Electronic equipment; Fluorides; Diffusion; Chlorides; Benzenes; Toluenes.

A diffusion cell is being fabricated to be used with a vapor fractometer in checking permeability of barrier materials to the various gases used in the leak tests. In addition to the Freons and other halogenated compounds, a non-radioactive type of Kr will be used. Toxicity determinations of the halogenated compounds indicated that toxicity will not be a problem under the contemplated conditions. A feasibility (over)

study is to be made of the radioactive gas method. Bags made of 10 packaging materials are to be subjected to gas absorption studies. A simple lever apparatus was built to quantitatively measure the pillowing produced in packages upon evacuation of the surrounding atmosphere. Sample 4- x 4-in bags were tested, some of which were left flat, some half filled, and others filled completely before sealing. All sealed bags showed significant pillowing in the test apparatus. Tests indicated that a reasonably fast evacuation rate will not produce a pillowing effect on flexible packages with small leaks, such as pinhole or seam leaks of approximately 0.010-in. diameter. Tin cans also exhibited detectable pillowing under the same vacuum conditions suitable for checking flexible packages. (See also AD-241 564L)

Open-ended Terms: Freon, Radiflow

AD-241 565L

AD-241 589 Div. 30, 14, 20, 26
(30 Aug 60)

Lockheed Aircraft Corp., Marietta, Ga.
GAMMA IRRADIATION OF AN ELECTRO-HYDRAULIC SERVO TEST LOOP USING ORONITE 8515 HYDRAULIC FLUID, by A. MacCullen. Rept. for Aug 58-June 59, on Nuclear Radiation Effects. May 60, 116p. incl. illus. tables, 13 refs.
(Contracts AF 33(600)32055 and AF 33(600)38947, Proj. 2133)
(WADC TR 59-592) Unclassified report

Descriptors: Hydraulic servomechanisms*; Hydraulic fluids*; Radiation damage; Radiation effects; Gamma rays; Plastic seals; Hydraulic seals; Rubber seals.

The effect of gamma radiation was studied on a specific high-temperature hydraulic fluid, Oronite 8515, and test system components operated in an electro-hydraulic servo test loop. Oronite 8515 fluid meets the requirements of MIL-H-8446A for hydraulic fluids in the -65° to 400°F range. Tests were conducted for 260 hr with an average dose rate of 1.1×10^7 ergs/g-hr (C). The fluid temperature was maintained at 275°F, and the nominal pressure was 3000 psi. (over)

The Oronite 8515 fluid and the hydraulic loop components with some exceptions performed satisfactorily within the temperature limits and total radiation dose received. Viton A O-rings did not perform the sealing function in a satisfactory manner. The servo valve, in as much as it was the most vulnerable of the components used, could not be considered as completely satisfactory for its intended use. Teflon backup rings in the hydraulic pump and filter performed satisfactorily after receiving radiation doses of 10^9 ergs/g (C) and 1.3×10^9 ergs/g (C), respectively. However, during post-irradiation examination, the Teflon rings were found to be brittle and could not be removed. Buna N O-rings performed satisfactorily; no abnormal leakage with these seals was indicated. (See also AD-211 733)

AD-241 589

AD-241 629 Div. 8, 14, 26
(29 Aug 60)

Raytheon Mfg. Co., Newton, Mass.
INVESTIGATION ON CERAMIC SEALS FOR ELECTRON TUBES, by Austin H. King. Final rept. 9 Apr 59-31 Mar 60. 25 Apr 60, 25p. incl. illus.
(Contract AF 19(604)5706)
(AFCRC TR 60-151) Unclassified report

Descriptors: Electron tubes*; Vacuum seals*; Ceramic materials; Seals*; Brazing.

CONCLUSIONS: A study of ceramic sealing techniques, separate from a device design, has greatly simplified the exploration of known sealing techniques. As a result, two practicable sealing techniques have been developed. Primarily, the program has demonstrated the use of an inexpensive test vehicle readily adaptable to any type of seal and testing. The tensile strength testing is a perfectly valid measure, as the compressive force required to hold the part has been found to be very small in comparison to the tensile strengths. Secondly, a lithium-molybdenum metallizing and copper brazing method has been developed that has as good tensile strength as the (over)

ceramic itself, excellent repeatability, and ability to withstand severe environments. Fabrication is fast, at low temperature, with a minimum of steps and in low-cost equipment. This method is applicable to a very wide variety of metals and ceramics, on most types of seal configurations. The metallizing is applicable to very small holes or a flat surface, and has a negligible depth of penetration. Thirdly, a low vapor pressure sealing technique with excellent strength and reliability has been developed for butt seals, employing double nickel clad titanium in the optimum eutectic proportions. Troublesome parts cleaning has been minimized and again considerable tolerance of parts can be accomodated. This seal is accomplished at a lower temperature in a vacuum than the copper melting point, so that sub-assemblies can be made using the lithium molybdenum and copper brazing, and the final seals made by using the double nickel clad titanium reactive seal, without hazard of affecting the copper braze. The seals can be made at suitable temperatures for use with oxide-coated emitters for vacuum tube use. (Author)

AD-241 629 N

AD-241 830 Div. 26, 1, 12
(30 Aug 60)

Chance Vought Aircraft, Inc., Dallas, Tex.
MODULAR HYDRAULIC SYSTEM DEVELOPMENT. PROJECT HYDRATOY. PART I, by R. W. Burden, B. L. Evans and others. Quarterly progress rept. no. 6, pt. 1, 5 Mar-5 June 60, 1v. incl. illus. tables. (Rept. no. AER-EOP-12909)
(Contract NOa(s) 59-6019-c) Unclassified report

Available on loan only.

Descriptors: Hydraulic systems*; Hydraulic actuators*; Seals; Standardization; Design; Alloys; Machining; Aircraft; Metal seals*; Guided missiles; Spaceships.

METALLIC SEAL PROGRAM: Development is continuing on (1) a Bendix wedge seal consisting of a 2-part solid ring metallic seal; and (2) a Hi-Ceal consisting of a 1-piece formed steel ring with a C-shaped 0.093 in. cross section. Qualification tests on the Bendix seal are being performed with a 6-seal assembly conforming to the 4-gpm, 4-way selector valve envelope. Hi-Ceal samples were fabricated from Inconel and AM350 stainless steel. Tests on these seals (over)

in closely backed, minimum squeeze cavities resulted in excessive wear. PACKAGE DEVELOPMENT: Design and fabrication were completed on a titanium manifold (housing for 3-way selector valve, 2-way restrictor, and check valve) and an actuator with modular end cap (the end cap houses a pressure relief valve, a shuttle valve, and a 1-way restrictor). Design is complete and fabrication is 90% complete on the stainless steel manifold (housing for a priority valve, thermal relief valve, pressure-operated shutoff, solenoid-operated sequence, and a cartridge 4-way, 3-position selector valve). MODULE DEVELOPMENT: Development is reported on check valves, 1- and 2-way restrictors, shuttle valves, thermal relief, pressure switches, priority valves, press shutoff valves, relief valves, 2-, 3-, and 4-way solenoid selectors, solenoid sequence valves, and filters. FLUID CARRYING STRUCTURE: Three shapes for a rotary seal in 5 different materials were fabricated for the rotary swivel joint. Various methods of permanently interconnecting 2-fluid-carrying structural members and fluid-carrying members to a section of conventional tubing were studied. (See also AD-239 180L, AD-241 831)

Open-ended Terms: Project Hydratoy.

AD-241 830 N

AD-241 831 Div. 26, 1, 12
(30 Aug 60)

Chance Vought Aircraft, Inc., Dallas, Tex.
MODULAR HYDRAULIC SYSTEM DEVELOPMENT. PROJECT HYDRATOY. PART II, by J. W. Browne. Material and process development quarterly progress rept. no. 6, pt. 2 (Semi-annual rept. no. 3) 5 Dec 59-5 June 60. 30 June 60, 23p. incl. illus. tables. (Rept. no. AER-EOR-12909)
(Contract NOa(s) 59-6019-c) Unclassified report

Descriptors: Hydraulic systems*; Hydraulic actuators*; Seals; Design; Alloys; Machining; Aircraft; Guided missiles; Spaceships; Extrusion; Brazing; Metal seals.

Work has progressed on both the selection of materials and the development of satisfactory processes. It can be considered that suitable materials have been tested, evaluated and selected for various module components. For these areas it is recommended that 17-4PH steel be utilized. 440C alloy may be substituted in certain applications not involving hoop tension loads. Type 416C steel although not equivalent to 17-4PH material can be substituted for module housings. This material is somewhat less corrosion resistant than the 17-4PH alloy. (over)

The module housings will of necessity incorporate a hardened valve seat. The metallic seals for such systems will also require plating to reduce the inherent friction. A redesign of the seal to provide more bearing surface and reduce the point loading should alleviate the galling and fretting corrosion problem. The manifold housing exteriors will be plated utilizing cadmium plate or chrome plate to provide the necessary corrosion resistance. The investigation of thread lubricants will be continued. However, there is a certain amount of question that a satisfactory thread lubricant can be obtained which will not flake off in the system. Therefore clearances within servo valves and close tolerance parts must be adequate or satisfactory filters developed to remove these particles. (Author) (See also AD-239 180L, AD-241 830)

Open-ended Terms: Project Hydratoy.

AD-241 831 N

AD-241 906 Div. 8, 14, 26
(6 Sep 60)

Knights, James, Co., Sandwich, Ill.
GLASS HOLDER CRYSTAL UNITS, by Charles W. Snyder. Quarterly progress rept. no. 4, 1 Dec 59-15 June 60. 30 June 60 [17]p. incl. illus. tables.
(Contract DA 36-039-sc-81274) Unclassified report

Available on loan only.

Descriptors: Seals; Crystal holders*; Quartz crystals*; Glass seals*; Vacuum seals; Industrial equipment; Industrial production.

The main effort was spent in evaluating the existing single sealing unit setup and adding improvements and techniques commonly used in the vacuum tube industry. To make a good glass seal that conforms to sizes required, a forming and alignment fixture was fabricated from boron nitride. These jigs and fixtures work well with the limited sealing experiments done so far. A "V. M. F." diffusion pump was installed in this setup. It's pumping speed is rated at 5 liter per second, and could produce an ultimate pressure of 1×10^{-6} mm h.g. The improvements made to the existing single unit setup and the limited (over)

number of units sealed so far indicate this technique should suffice for sealing requirements stipulated in the contract. (Author) (See also AD-233 431)

AD-241 906 N

AD-242 285 Div. 10, 4, 25
(9 Sep 60)

Little, Arthur D., Inc., Cambridge, Mass.
HYDROGEN HANDBOOK. A COMPILATION OF PROPERTIES, HANDLING AND TESTING PROCEDURES, COMPATIBILITY WITH MATERIALS, AND BEHAVIOR AT LOW TEMPERATURES. Apr 60, 246p. incl. illus. tables.
(Subcontract to Parker Aircraft Co., Los Angeles, Calif., Contract AF 33(616)6710)
(AFFTC TR 60-19) Unclassified report

Descriptors: Hydrogen*; Gases; Low temperature research; Cryogenics; Nitrogen; Helium; Thermodynamics; Physical properties; Handling; Hazards; Safety; Liquefied gases*; Valves*; Gas valves; Gas leaks; Transportation; Storage; Sources; Liquid rocket propellants*; Handbooks.

This report summarizes (1) experience with and the available technical information on the development of two prototype valves, one for a cryogenic gas service and the other for a cryogenic liquid service (these valves are under development by Parker Aircraft Co. for a Government agency); (2) bibliographical information on the physical (over)

and mechanical properties of specific construction materials for a temperature range of -420° F to +200° F (these materials include some austenitic stainless steels and Teflon plastics); (3) the thermodynamic properties of helium, hydrogen, and nitrogen fluids with which the valves may be used or tested; (4) the hazards associated with the transportation and storage of hydrogen and with its use for testing the prototype valves for leakage across the seals; and (5) the sources and availability of hydrogen, and the Los Angeles regulations that apply to its transportation and use. (Author)

AD-242 285 N

AD-242 347 Div. 26
(13 Sep 60)

Naval Weapons Plant, Washington, D. C.
IMPREGNATION OF POROUS METAL CASTINGS, by L. F. Hatakeyama and P. Tarver. Final rept. 15 June 60, 12p. incl. illus. tables (Rept. no. TWPW-T-17-60)
(NAVORD rept. no. 6957) Unclassified report

Descriptors: Porous metals*; Castings; Impregnation*; Porosity; Polymers; Esters; Silicone resins; Seals.

This investigation was conducted to develop a specification for a single impregnant suitable for porous metal castings of various alloys, to replace several existing specifications and to correct current specification deficiencies. A study was made to determine the basic requirements for an impregnant, and tests were performed on various materials to evaluate them against these requirements. It was concluded that there were at least two commercially available resins - American Metaseal 19V5 and Dow-Corning R-7501 - which met the requirements of the proposed specification, appendix A. These materials showed curing weight loss percentages of 1.37 and 2.40, respectively. (over)

These values were well within the 5 percent limit tentatively set forth in the proposed specification. These materials showed no curing inhibition in the presence of fine, dry chips of aluminum, copper, iron, magnesium, and zinc. The suitability of these materials also was indicated by their ability to maintain an impervious seal in the test specimens after they were conditioned in various environments and machined to reduce their wall thickness. It was further concluded that an impregnant meeting the following requirements would be satisfactory for the intended application: (1) That it be compatible with the usual casting metals - aluminum, copper, iron, magnesium, and zinc alloys. (2) That it be a liquid of low viscosity to facilitate movement of the impregnant into the casting porosity. (3) That it contain no inert solvents, viscosity reducers, or filterable solids in suspension. (4) That it produce no gaseous or liquid by-products on curing or thermosetting to form an impervious seal throughout the porosity of the casting. (Author) (See also AD-152 770)

AD-242 347 N

AD-242 744 Div. 7
(16 Sep 60)

Sonotone Corp., Elmsford, N. Y.
DESIGN AND MANUFACTURE OF SEALED NICKEL-CADMIUM CELLS OF CYLINDRICAL DESIGN TO SIGNAL CORPS TECHNICAL REQUIREMENT SCL-7504, by Francis J. Alliegro and Herbert Bilsky. Quarterly progress rept. no. 2, 1 Mar-31 May 60. 47p. incl. illus. table.
(Contract DA 36-039-sc-84496) Unclassified report

For reference at ASTIA Hq. only. This report cannot be satisfactorily reproduced; ASTIA does not furnish copies.

Descriptors: Alkaline cells*; Nickel; Cadmium; Design; Manufacturing methods; Seals; Cylindrical bodies.

The first prototype cells were completed and initial cycling data was obtained from these cells. Life cycling equipment completed. Second series of prototypes are under construction. Plates in these cells will be overloaded approximately 35%, and positive plates will contain cobalt. These cells are designed to meet a proposed general specification on sealed nickel-cadmium cells. Promising results was obtained (over)

on substitute for paper separator. Program for testing of glass and teflon seals was begun. (Author) (See also AD-239 280)

AD-242 744 N

AD-242 962 Div. 26, 12, 27
(28 Sep 60)

Rocketdyne, Canoga Park, Calif.
DESIGN, DEVELOPMENT, AND TESTING OF ADVANCED HELIUM PRESSURE REGULATOR PART NO. 551302. VOLUME 1, by R. L. Kenyon. July 60, 1v. incl. illus. tables (Rept. no. R-2356, vol. 1) (Contract AF 04(647)160)
(AFBMD TR 60-74, vol. 1) Unclassified report

Descriptors: Pressure regulators*; Helium; Propellant tanks; Pressure; Vibration; Temperature; Seals; Tests; Design; Vapor pressure.

The ability of the 551302 regulator to meet the requirements of the model specification was demonstrated by the successful completion of the Performance, Flight Rating, and Qualification Tests. The inability to effectively damp the controller sensor led to the development of a vibration-tolerant pilot valve to minimize the errors introduced into the controller by environmental random and sine wave vibration. The bleed regulator vibration error was minimized by a metal-to-metal coulomb friction damper to simulate the damping usually obtained from O-rings and sliding seals in conventional designs. Metal-to-metal coulomb friction damping was also effectively adapted to the pi-
(over)

lloted inlet valve. The extreme ambient and gas temperature range forced the use of metal-to-metal valve seats, which proved thoroughly reliable under all conditions tested. Temperature compensation over a 500°F range was achieved with an adjustable compensator utilizing the difference in the coefficients of linear expansion of two materials. Compensation for forces exerted on the controller sensor due to acceleration was successfully achieved using a counterweighted beam. Pressure energized seals with seat forces that vary in inverse proportion to the applied pressure to provide sufficient force to seal at low pressures and to prevent destructive loading at high pressures were designed. A packing type seal was also developed for low pressures to seal the regulator adjusting screw and at the same time permit freedom of adjustment. (Author) (See also AD-243 963)

AD-242 962 N

AD-243 454 Div. 1, 4, 9
(3 Oct 60)

Air Crew Equipment Lab., Naval Air Material Center, Philadelphia, Pa.
DESIGN CRITERIA FOR EFFICIENT FILLING OF LIQUID OXYGEN CONVERTERS; DEVELOPMENT AND EVALUATION OF, by Francis A. Florio. 29 Aug 60 [15]p. incl. illus. tables (Proj. TED no. NAM AE 51143; Rept. no. NAMC ACEL 439) Unclassified report

Descriptors: Liquefied gases*; Design; Oxygen equipment*; Oxygen; Vaporization; Containers; Storage; Pressure; Temperature; Seals; Vapor pressure.

A proposed method of filling liquid oxygen converters is presented and demonstrated as being feasible in principle and operation. Filling of 5, 10, and 25 liter Dewar flasks are performed under various service and design conditions. In addition, effects of filling pressure, component pre-cooling, and Dewar volume are also investigated. The total loss of liquid oxygen resulting in transfers performed by the proposed method are extremely small and represent approximately .5 to 3.5 per cent of the total amount of liquid transferred. The proposed method is offered as a possible substitute for standard Navy methods
(over)

of filling liquid oxygen converters for aircrew breathing. (Author) (See also AD-206 910)

AD-243 454 N

AD-243 685 Div. 26, 7, 8
(5 Oct 60)

McCoy Electronics Co., Mount Holly Springs, Pa.
INDUSTRIAL PREPAREDNESS MEASURE. MANUFACTURE OF GLASS HOLDER CRYSTAL UNITS CR-(XM-17)/U. Quarterly progress rept. no. 4, 1 May-31 July 60. [11]p. incl. table.
(Contract DA-36-039-sc-81269) Unclassified report

For reference at ASTIA Hq. only. This report cannot be satisfactorily reproduced; ASTIA does not furnish copies.

Descriptors: Quartz crystals*; Crystal holders*; Glass; Production*; Manufacturing methods*; Generators*; Power supplies; Design; Industrial equipment*; Industrial production; Seals.

Processes were designed for the manufacture of the CR-(XM-17)/U glass holder crystal units in accordance with technical requirements. Multiple sealing machinery was constructed and placed into operation. The sealing equipment employs a 2.5 kw high frequency generator specifically designed to satisfy the need of an intermediate RF power generator of high production capability. Preliminary tests with experimental units were made which proved to be successful.
(over)

Open-ended Terms: CR-(XM-17)/U.

AD-243 685 N

AD-243 897 Div. 14
(12 Oct 60)

Battelle Memorial Inst., Columbus, Ohio.
CHARACTERISTICS GOVERNING THE FRICTION AND WEAR BEHAVIOR OF REFRACTORY MATERIALS FOR HIGH-TEMPERATURE SEALS AND BEARINGS, by Lewis B. Sibley, Arthur E. Mace and others. Rept. for 1 Mar 58-31 May 59 on Ceramic and Cermet Materials. May 60, 47p. incl. illus. tables.
(Contract AF 33(616)3995, Proj. 7350)
(WADD TR 60-54) Unclassified report

Descriptors: Refractory materials; Seals*; Bearings*; Thermal stresses; Friction; Erosion; Cermets*; Aluminum compounds; Oxides; Chromium; Molybdenum; Ceramic materials*; Silicon compounds; Carbides; Titanium compounds; Nickel.

Ceramic and cermet materials were evaluated for unlubricated wear resistance at high sliding speed (100 to 200 fps) and low unit load (5 to 50 psi) in 1000 to 1800° F air. A statistical correlation was obtained between the measured wear rates under these conditions and the coefficient of friction, the thermal-stress-resistance, and the thermal diffusivity of the mated materials on which wear predominated. A (over)

mechanism of wear has been evolved based on the above correlation and on the study of friction and wear surface temperature fluctuations using special transducers and color-motion-picture photography. During high-speed sliding, wear appears to be induced by the inability of ceramic and cermet materials to resist thermal stresses produced by temperature gradients within each rubbing surface between small asperities or hot spots in frictional contact and the body of the respective materials. The wear rate is influenced by the configuration of the rubbing parts and by the thermal-stress-resistance properties of the materials. Promising materials for high-temperature high-speed sliding bearings and seals include Al_2O_3-Cr-Mo cermets, SiC ceramics, and TiC-Ni-Mo cermets. (Author) (See also AD-203 787)

AD-243 897 N

AD-243 966 Div. 14, 29
(12 Oct 60)

Wyandotte Chemicals Corp., Mich.
DEVELOPMENT OF A FABRIC TO PROVIDE PERSONAL PROTECTION FROM TOXIC MATERIALS, by Raymond G. Spain and Alexander V. Sanger. Rept. for 1 May 59-30 Apr 60 on Air Force Textile Materials. June 60, 39p. incl. illus. tables.
(Contract AF 33(616)6501, Proj. 7320)
(WADD TR 60-198) Unclassified report

Descriptors: Protective clothing*; Dacron*; Coatings*; Jet engine fuels; Handling; Hazards; Textiles; Nylon; Cotton textiles; Elastomers; Fluorides; Seals; Synthetic fibers*; Tests; Vulcanization.

Research directed to the development of a coated fabric to resist the chemical effects of and be impermeable to high energy fuels (HEF) is described. The program included the design and fabrication of special test equipment and of laboratory fabric coating apparatus. A base fabric (Dacron) was selected on the basis of resistance to HEF, and the majority of the effort was directed toward the coating of this fabric with fluoroelastomer based compositions and the necessary subsequent (over)

testing. A coated fabric was approved and 100 yds.^{2} of this material were prepared and delivered. (Author)

Open-ended Terms: HEF fuels.

AD-243 966 N

AD-244 668 Div. 26, 8, 14
(25 Oct 60)

Corning Glass Works, N. Y.
PILOT PRODUCTION OF GLASS CRYSTAL HOLDERS (HC-XM-2)/U; HC-(XM-3)/U; HC-(XM-4)/U, by R. K. Whitney. Quarterly progress rept. no. 7, 1 Dec 59-31 Aug 60. [24]p. incl. illus. tables.
(Contract DA 36-039-sc-81255) Unclassified report

Descriptors: Crystal holders*; Quartz crystals*; Production; Industrial production; Manufacturing methods*; Glass; Seals.

Research was continued on equipment and processing techniques for the production of pilot run quantities of glass crystal holders HC-(XM-2)/U, HC-(XM-3)/U, and HC-(XM-4)/U. Samples of the HC-(XM-2)/U holders were sealed with quartz crystals having frequencies of 2.85, 40, and 70 mc; HC(XM-4)/U holders were sealed with 10 and 70 mc crystals; samples of each type were sealed without crystals. Frequency and resistance before and after sealing were tabulated. The units passed the following environmental tests per MIL-C-3098B, MIL-H-10056B, and MIL-H-10056C: visual and mechanical inspection, thermal shock, immersion, leakage (performed on units without quartz), pin alignment, seal strength, insulation resistance, leakage, (over)

glass seal visual, mechanical shock, vibration, moisture resistance, and salt spray resistance.

AD-244 668 N

AD-245 318 Div. 8, 25
(3 Nov 60)

Keystone Electronics Co., Newark, N. J.
CRYSTAL UNITS CR-XM-30/U MINIATURE GLASS HOLDER, by Herbert Plumhoff. Quarterly rept. no. 1, 30 June-30 Sep 60. 5p.
(Contract DA 36-039-sc-85940) Unclassified report

For reference at ASTIA Hq. only. This report cannot be satisfactorily reproduced. ASTIA does not furnish copies.

Descriptors: Crystal holders*; Crystals; Semiconductors; Transistors; Glass; Seals; Production; Manufacturing methods; Quartz crystals; Miniature electronic equipment*.

Development was begun on techniques and equipment for sealing quartz crystal units in miniature glass crystal holders at a rate of 120 units per 8-hour day. Equipment for sealing miniature glass crystal holders was set up and placed into operation. A limited amount of crystal units have been sealed. (Author)

Open-ended Terms: CR-XM-30/U.

AD-245 377L Div. 26, 30
(4 Nov 60)

Douglas Aircraft Co., Inc., Santa Monica, Calif.
NON-DESTRUCTIVE LEAK TESTING OF SEALED PACKAGES. Monthly progress rept. no. 4 for July 60. 15 Aug 60 [6]p. incl. illus.
(Contract NOa(s) 60-6037-c) Unclassified report

Notice: Only Government Agencies may request from ASTIA. Others request approval of Chief, Bureau of Naval Weapons; Navy Dept., Wash. 25, D. C.

Descriptors: Electronic equipment; Packaging*; Non-destructive testing; Test methods; Containers*; Gas leaks; Diffusion; Test equipment.

Work with the vacuum chamber method of testing resulted in development of a device with which measurement of expansion of a sealed metal can in a vacuum is graphically indicated on a scale. This method of leak-testing looks very promising, since it has now been shown that it may be used on metal cans as well as on envelopes made of flexible materials. Tests were made on leak detection by electronically "sniffing" traces of various crystalline organic halogen com-
(over)

pounds which had been sealed into packages. A better appreciation of practical problems associated with the use of each has been gained. One compound melted too close to ambient room temperature and spread as a liquid, damaging the package. A diffusion cell for use with the Perkin-Elmer Vapor Fractometer in checking gas permeability of barrier materials has been made. Some minor problems involving choice of packing and carrier gas to be used with this instrument were met, but are expected to be overcome shortly. (Author)

AD-245 377L

AD-245 424 Div. 14
(4 Nov 60)

Trionics Corp., Madison, Wis.
HEAT RESISTANT, ELASTOMERIC MATERIAL COMBINATIONS AND FORMS, by Otto L. Forchheimer. Final rept. 8 Jan 59-7 Jan 60. 31 Jan 60, 42p. incl. illus. tables.
(Contract NOa(s) 59-6083-c; Continuation of contract NOa(s) 58-437-c) Unclassified report

Descriptors: Silver compounds*; Chlorides*; Physical properties; Chemical properties; Mechanical properties; Deformation; Elastomers*; Glass textiles; Temperature; Gaskets; Radiation effects; Heat resistant polymers.

Additions of small amounts of certain inorganic materials (e.g., potassium dichromate), in conjunction with annealing, have been found to greatly enhance the ductility of silver chloride. The resultant compositions are proposed for use with metal and inorganic (glass) fiber elastic elements to provide heat resistant-elastomeric material combinations and forms. Such composites with silver chloride matrix materials will be serviceable in the temperature range of 600 to 750 degrees F, which is a considerable extension over the service range of present metal- and glass-organic combinations. (Author)

AD-245 449 Div. 20
(7 Nov 60)

General Electric Co., Cincinnati, Ohio.
FOURTH RADIATION EFFECTS SYMPOSIUM, 15-16 SEPTEMBER 1959. VOLUME IV. [1960] 1v. incl. illus. tables.
(Sponsored by Air Research and Development Command, U. S. Air Force.) Unclassified report

Descriptors: Radiation damage*; Electronic equipment; Metals; Corrosion; Fuel tanks; Seals; Sealing compounds; Organic materials; Stresses; Nuclear power plants; Nuclear propulsion*; Test methods; Symposia.

Contents:
Gamma irradiation of X-211 engine accessory systems
Airborne electronics for nuclear powered vehicles
The influence of nuclear radiation on the corrosion of metals
Dynamic radiation effects testing methods
O-ring testing in mixed field irradiation
Designing for minimum activation
Combined effects of nuclear radiation and dynamic mechanical stress fields in organic materials
(over)

Radiation effects - a major influence in designing electronic systems for use in nuclear powered aircraft
Radiation effects on aircraft pressure and fuel tank sealants

AD-245 449 N

AD-246 034L Div. 26, 30
(17 Nov 60)

Douglas Aircraft, Co., Inc., Santa Monica, Calif.
NON-DESTRUCTIVE LEAK TESTING OF SEALED PACKAGES.
Monthly progress rept. no. 5 for Aug 60. 15 Sep 60 [9]p. incl. illus.
(Contract NOa(s) 60-6037-c) Unclassified report

Notice: Only Government Agencies may request from ASTIA. Others request approval of Chief, Bureau of Naval Weapons, Navy Dept., Wash. 25, D. C.

Descriptors: Packaging*; Seals; Electronic equipment; Non-destructive testing; Test methods; Containers*; Gas leaks; Diffusion; Test equipment.

A small AN can (AN 8029-42) was subjected to vacuum conditions of approximately 1 cm. of mercury in a bell-jar and expansion was easily detectable by the same procedures previously used in testing for leakage in ordinary tin cans and flexible envelopes. More sensitive expansion detection techniques are possible and are being developed. Work is now progressing at a st pace in the evaluation of gas transmission rates of flexible barrie erials. Problems
(over)

with the chromatograph have been smoothed and no further delays are anticipated. In view of encouraging res f testing either by the straight vacuum method, or by the use of halogen compounds, work on the inherently more complicated and costly method of testing with radioisotopes has, at least for the present, been discontinued. (Author)

AD-246 034L

AD-246 574 Div. 14
(29 Nov 60)

Material Lab., New York Naval Shipyard, Brooklyn.
INVESTIGATION OF VITON A ELASTOMERS FOR USE WITH OXYGEN AT A PRESSURE OF 3,000 PSI, by S. A. Eller and A. A. Stein. Final technical rept. 15 Nov 60, 9p. illus. tables.
(Lab. Proj. no. 6172-1) Unclassified report

Descriptors: Elastomers*; Gaskets*; Fluoro carbons; Oxygen equipment*; Pressure; Physical properties; Aging; Oxygen*; Test equipment; Test methods; Effectiveness; Gas seals.

Apparatus and test procedures were developed to condition specimens of elastomeric material in high pressure oxygen. Following this, 5 samples of Viton A material were subjected at room temperature to oxygen at a pressure of 3,000 psi for 500 hours. Tests made on the samples after this aging period indicated that the Viton A materials had suffered a loss in tensile strength, considerable volume swell, a decrease in hardness and an increase in compression set. These effects are apparently due to absorbed oxygen which is released from the specimens at a slow rate at room conditions but at an accelerated rate when aged in oil at 212F. In addition, three of the five samples
(over)

aged in high pressure oxygen were cracked following the compression set test. As the Viton A samples tested herein are unsuitable for use as O-ring gaskets in high pressure oxygen systems, development work will continue using other types of elastomers compounded by the Material Laboratory. (Author)

Open-ended Terms: Viton A.

AD-246 574 N

AD-246 644 Div. 14, 8
(28 Nov 60)

Sperry Gyroscope Co., Great Neck, N. Y.
METAL-TO-CERAMIC SEAL TECHNOLOGY STUDY, by S. S. Cole, Jr., H. W. Larisch and others. Quarterly technical note no. 4, 31 Mar-30 June 60. July 60, 48p. incl. illus. tables (Rept. no. NA-8240-8184-4)
(Contract AF 30(602)2047, Proj. 4506)
(RADC TN 60-192) Unclassified report

Descriptors: Electron tubes*; Seals*; Ceramic materials*; Metals; Mechanical properties; Tensile properties; Metal seals*.

Adherence and torque peel tests indicated that the majority of the metallizing mixtures yield optimum strengths when sintered at 1600 C. The compression testing program indicated those mixtures which will produce high ceramic-to-metal seal strengths. An individual value of 25,400 psi and an average of 3 duplicate specimens of 21,400 psi in tension were obtained. A photoelastic investigation indicated that (1) Sperry's Tensile Design No. 1 is not subject to the shoulder breaks that are common in the ASTM tensile specimens and (2) in the seal area of all three tensile designs considered, a bending moment
(over)

is present which produces nonlinear stress at the seal, giving low values in tension. It was thought that a more realistic tensile strength value from Tensile Design No. 1 would be given by a factor of 1.33 times the indicated strength.

AD-246 644 N

AD-247 023 Div. 12
(7 Dec 60)

Aberdeen Proving Ground, Md.
ROAD SHOCK, VIBRATION AND FORDING TEST OF MISSILE TEST SHOP AND ASSAULT FIRE COMMAND CONSOLE OF THE HAWK MISSILE SYSTEM, by O. B. Ford. Dec 60, 1v. incl. illus. tables (Rept. no. DPS-103) Unclassified report

Descriptors: Guided missiles*; Test equipment; Tests; Shock; Vibration; Trailers; Accelerometers; Transportation; Moistureproofing; Surface to air; Shock resistance; Seals*; Effectiveness; Maintenance vehicles; Fire control systems*.

The missile test shop and the assault fire command console for the Hawk missile system were tested. These later models incorporate improvements over the prototypes; therefore additional vibration and fording tests were required. The objectives of the test were to measure the magnitude and frequency of acceleration imparted to the two units during transportation over the standard Mamson vibration course and to determine the ability of these units to withstand the shock and vibration to which they were subjected. Through fording operation, (over)

the effectiveness of the sealing methods provided for water protection were also determined. (Author)

Open-ended Terms: HAWK.

AD-247 023 N

AD-247 172L Div. 26, 1, 12
(8 Dec 60)

Chance Vought Aircraft, Inc., Dallas, Tex.
MODULAR HYDRAULIC SYSTEM DEVELOPMENT (PROJECT HYDRATOY) by R. W. Burden, J. W. Browne and others. Quarterly progress rept. no. 7, 5 June-5 Sep 60. 1v. incl. illus. table (Rept. no. AER-EOR-13104)
(Contract NOa(s) 59-6019-c) Unclassified report

Notice: Only Government Agencies may request from ASTIA. Others request approval of Chief, Bureau of Naval Weapons, Navy Dept., Wash. 25, D. C.

For reference at ASTIA Hq. only. This report cannot be satisfactorily reproduced; ASTIA does not furnish copies.

Descriptors: Hydraulic systems*; Hydraulic actuators*; Seals; Standardization; Design; Alloys; Metal seals*; Packaging; Aircraft; Guided missiles; Spaceships.

METALLIC SEAL PROGRAM: The qualification of class A size Bendix wedge seals was completed. Indications of wear on the class (over)

A seals influenced the decision to increase the hardness of class C seals for comparison evaluation. Efforts on Hi-Ceal configurations included interim testing and qualification of the 0.015-in. wall thickness 30455 Hi-Ceal; testing with AM350 material Hi-Ceals and with electroless Ni and electrolized Hi-Ceals in an effort to reduce wear problems of the AM350 seal; and an investigation of seat material tests with 17-4 ph, 440C, and 416 stainless steels and seals for comparison of wear properties. Tests indicated that 440C and 416 materials are less susceptible to seal wear. PACKAGE DEVELOPMENT: Designs were completed for a stainless steel manifold. Additional research is being conducted on thread lubricants in an effort to reduce the installation torque required for installation of the modular valves into the packages. MODULE DEVELOPMENT: The determination of unit envelopes and preparation of a detailed procurement specification, and the receipt and evaluation of competitive proposals and selection of vendors were completed. (Author)

Open-ended Terms: Hydratoy Project.

AD-247 172L

AD-247 750L Div. 20, 14
(20 Dec 60)

Industrial Lab., Mare Island Naval Shipyard, Vallejo, Calif.
RUBBER O-RING MATERIAL FOR HYDRAULIC SERVICE, by Arthur W. Scott. Specification development progress rept. 13 Dec 60 [12]p. incl. tables (Rept. no. 5163-60) Unclassified report

Notice: Only Military Offices may request from ASTIA. Others request approval of Chief, Bureau of Ships, Navy Dept., Wash. 25, D. C.

Descriptors: Rubber seals*; Vulcanizates; Effectiveness; Tests; Hydraulic seals*; Elastomers; Hydraulic fluids; Phosphates; Esters.

The Problem: Can fluoro-rubber vulcanizates based on Viton B be used as seal materials for both triaryl phosphate ester (TPE) and petroleum base hydraulic fluids at test temperatures of 212F and 300F? How do the last three Viton B's received (up to November, 1960) compare with the best one of those tested in the previous work? Findings: All the Viton B formulations tested in ASTM No. 3 oil were very little affected by it, so that the Code 12 Material (the best from the previous tests) is considered suitable as a seal material for either fluid at test temperature of 300F. The later three Viton B's, Codes (over)

14, 17 and 18, are considered unsuitable at 300F because of excessive compression set. For all these materials, compression set at 300F increased with the time compressed, which has not been so with some other types of polymers tested. (Author)

Open-ended Terms: Viton B.

AD-247 750L

AD-248 037L Div. 26, 30
(28 Dec 60)

Douglas Aircraft Co., Inc., Santa Monica, Calif.
NON-DESTRUCTIVE LEAK TESTING OF SEALED PACKAGES.
Monthly progress rept. no. 6 for Sep 60. 15 Oct 60 [6]p. incl. illus.
(Contract NOa(s) 60-6037-c) Unclassified report

Notice: Only Government Agencies may request from ASTIA. Others request approval of Chief, Bureau of Naval Weapons, Navy Dept., Wash. 25, D. C.

Descriptors: Packaging*; Materials, Paper; Plastics; Plastic coatings; Seals, Vacuum systems, Tests; Test methods; Halogen compounds; Gas leaks; Diffusion; Containers*; Non-destructive testing.

Because of the relatively high diffusion rate of gases through some plastic and plastic-coated paper barrier materials, when compared with metal foil and foil laminates, work is being done to determine these rates quantitatively and also to establish for comparison the effusion rates of the same gases through small, measured pinholes in foil. A test chamber has been fabricated to study techniques of leak detection, using heat lamps to force effusion of a halogenated (over)

gas through small measured pinholes in Kraft-foil (MIL-B-131) envelopes, and positioning the detector probe at various distances and locations relative to the package. Heat lamp positioning and length of exposure of the package to this heat source are controlled to limit the temperature rise in the package to approximately 50 F. A large vacuum reservoir tank has been put in-line with a small vacuum chamber (Bell-jar). This will permit studies of the effect of vacuum rate changes on "pillowing" of sealed packages. Detection devices for measuring vacuum, rate of change of vacuum, and package pillowing are being refined. With the refinement of detection devices it may be possible to detect package expansion at lower vacuums than heretofore. (Author)

AD-248 037L

properties. Parkene No. 2 silicone O-rings are not recommended for Naval ordnance applications. Linear ZB-70 silicone O-rings are suitable for static seals. This latter material is resilient at temperatures as low as -73 C (-100 F). Silicone O-rings are not recommended for dynamic seals because of their low abrasion and tear resistances. (Author)

AD-248 647 N

AD-248 647 Div. 14 U
(10 Jan 61)

Naval Ordnance Lab., White Oak, Md.
O-RING MATERIALS FOR NAVAL ORDNANCE APPLICATIONS,
by Doris V. Steele and A. N. Timmins. 1 Aug 60.
13p. incl. illus. tables.
(NAVWEPS rept. no. 7284) Unclassified report

DESCRIPTORS: *Rubber seals, Temperature, *Silicone resins, Military requirements, Elastomers, Hydraulic seals, Silicones, *Seals, Silicon compounds, Tests.

A study was made of O-ring materials conforming to Military Specification MIL-P-5516A to determine their suitability for pneumatic applications in Naval ordnance. Two types of silicone elastomers were also included in the study. Results indicate that MIL-P-5516A O-rings may be suitable for many applications but that low temperature stiffening at -54 C (-65 F) could permit leakage or breathing of ordnance under adverse conditions. It is recommended that MIL-P-5516A O-rings be lubricated with DC-55 silicone pneumatic grease (MIL-L-4343A) to obtain optimum aging (over)

AD-248 535 Div. 14, 8 U
(6 Jan 61)

Sperry Gyroscope Co., Great Neck, N. Y.
METAL-TO-CERAMIC SEAL TECHNOLOGY STUDY,
by S. S. Cole, Jr., H. W. Larisch and others.
Final technical rept. 22 June 59-22 Sep 60.
Oct 60, 105p. incl. illus. tables, 29 refs.
(Rept. no. NA-8240-8216)
(Contract AF 30(602)2047, Proj. 4506)
(RADC TR 60-236) Unclassified report

DESCRIPTORS: Aluminum compounds, Analysis, *Ceramic materials, *Electron tubes, *Seals, Tensile properties, Mechanical properties, Thermodynamics, *Metal seals, Sintering, Stresses, Metals, Oxides, Brazing, Tests, Glass, Bonding.

A literature survey on ceramic-to-metal sealing techniques, adherence theory, and allied systems disclosed limited published work and no procedures for achieving ultra-high-strength seals or seals to pure high alumina. Two additional theories were formulated for this study--one proposing the migration of the glass in the ceramic (over)

into the metallizing mixture, and the other recognizing the need for promoting metallized sintering. Three sintering temperatures were chosen, depending on composition, for each of the 200 metallizing mixtures. Each mixture was applied to specimens of 94-, 96-, and 99.6-percent alumina. Testing involved a screening technique whereby the most promising compositions were carried through to increasingly refined test techniques (scratch and peel, circumferential seal, and finally tensiles tests). The tensile test specimen was redesigned to eliminate shoulder breaks when evaluating ultra-high-strength seals. Extremely strong seals were developed for all the ceramic bodies considered. A wide variety of sealing compositions was disclosed which produced seals stronger than those previously reported. A method to calculate stresses in ceramic-to-metal seals is theorized. Measurements of the properties of the metal and of residual stresses in seals were made, showing excellent agreement with calculated stresses. (Author)

AD-248 535 N

AD-249 144L Div. 14 U
(17 Jan 61)

Douglas Aircraft Co., Inc., Santa Monica, Calif.
NON-DESTRUCTIVE LEAK TESTING OF SEALED PACKAGES,
Monthly progress rept. no. 8 for Nov 60.
15 Dec 60, 8p. incl. table.
(Contract NOs(s) 60-6037-c)
Unclassified report

Notice: Only Government Agencies may request from ASTIA. Others request approval of Chief, Bureau of Naval Weapons, Navy Dept., Wash. 25, D. C.

DESCRIPTORS: *Packaging, *Non-destructive testing, Seals, Effectiveness, Test methods, Test equipment, Gas diffusion, Tests, Halogen compounds, Materials, Gas leaks.

Various packaging materials were compared to their premeability to Freon 12. Materials which showed no diffusion on the basis of a 20-min diffusion time were tested for longer periods of time. Tests were made on p-dichlorobenzene, one of the most volatile solid halogenated hydro-
(over)

carbons, in the vapor fractometer to see whether it could be detected; negative results were obtained. Six-to seven-mil polyethylene was found to be more permeable to Freon 12 than was approximately 1/2-mil polyethylene layer in Poly-Kraft. Kraft paper was about 136 times as permeable as Poly-Kraft. Further investigation of the halogen method of leak detection indicated that the synthetic Freon compounds provide the highest degree of detectability, and the highest degree of reliability and reproducibility. Tentative conclusions were: (1) that in a package containing 100% Freon-22 it is possible to detect a hole as small as 0.000001 inch, (2) it is possible by using Freon-114, to distinguish between a leak in, and diffusion through a Poly-Kraft package; and (3) on a statistical basis, the size of the smallest hole detectable can be varied by changing the amount of heat absorbed by the package, the molecular weight of the Freon used, and the Freon concentration, based on the chamber volume.

AD-249 144L

AD-249 262L Div. 14 U
(17 Jan 61)

Nonmetallic Materials Lab., Wright Air Development Div., Wright-Patterson Air Force Base, Ohio.
HIGH TEMPERATURE FUEL TANK SEALANTS,
by Philip A. House. Rept. on Nonmetallic and Composite Materials Sep 60. 15p. incl. tables.
(Proj. 7340)
(WADD TN 60-154)
Unclassified report

No automatic release to Foreign Nationals.

DESCRIPTORS: *Seals, *Sealing compounds, *Fuel tanks, Fluorides, Elastomers, *Production, Materials, Temperature, High temperature research.

The Air Force has investigated the area of integral fuel tank sealants for advance design air weapons and has obtained materials which significantly advance the state-of-the-art. Fuel tank sealants are now available that will withstand considerable periods of aging in fuel and
(over)

air at temperatures up to 600 F. A room temperature cure for fluoroelastomers has been discovered and efforts are now being directed toward suitable sealants using this curing system. (Author)

AD-249 262L

AD-249 349 Div. 7 U
(19 Jan 61)

Gulton Industries, Inc., Metuchen, N. J.
THE TESTING OF HERMETIC SEALS AND SEPARATORS, POSITIVE PLATE STUDIES, AND INVESTIGATIONS ON THE UNIFORMITY OF SEALED NICKEL-CADMIUM CELLS,
by H. N. Seiger. Quarterly progress rept. no. 1, 1 July-30 Sep 60 on Investigations Leading to the Development of Improved Sealed Nickel-Cadmium Batteries. 27p. incl. illus.
(Contract DA 36-039-sc-85390, Proj. 3G18-03-001)
Unclassified report

For reference at ASTIA Hq. only. This report cannot be satisfactorily reproduced; ASTIA does not furnish copies.

DESCRIPTORS: *Alkaline cells, Seals, Battery separators, Electrodes, Ceramic materials, Electrolytes, Absorption, Reliability.

Investigations are to be conducted which will lead to improved hermetically sealed nickel-cadmium batteries having a high level of reliability
(over)

and performance. Efforts will be directed towards: (1) development of a ceramic-to-metal seal for 5 ampere-hour cells; (2) development of a good separator; and (3) development of greater uniformity between cells, and test methods for rapidly determining uniformity; (4) a fundamental study of the positive electrode directed at increasing its stability and reducing self-discharge; and (5) fabrication of improved 5 ampere-hour hermetically sealed cells. Work has been started on the hermetic seal, separators, and uniformity of cells. Twenty separators were wetted with electrolyte and subjected to an acceleration of 25 G for 2 minutes. The results of this test are tabulated in the report. Some separators can absorb up to 10 times their own weight of electrolyte, and retain a goodly portion after acceleration. (Author)

AD-249 349 N6

AD-249 387L Div. 14 U
(19 Jan 61)

Goodrich, B. F., Co., Brecksville, Ohio.
NUCLEAR RADIATION RESISTANT POLYMERS AND POLYMERIC COMPOUNDS,
by John W. Born. Rept. for 1 Apr 59-31 Mar 60, on ANP Airframe and General Support. Oct 60, 101p. incl. illus. tables, 56 refs.
(Contract AF 33(616)6442, Proj. 1448; Continuation of Contract AF 33(616)5646)
(WADC TR 55-58, Pt. 6) Unclassified report

No automatic release to Foreign Nationals.

DESCRIPTORS: Polymers, *Elastomers, Radiation damage, *Synthetic rubber, Temperature, *Heat resistant polymers, Sensitivity, Synthesis, Gamma rays, Isomeric transisters, *Rubber seals, Additives, Butadienes, Acrylic resins, Mechanical properties, Molecular structure.

This research includes the following: fundamental studies of radiation energy transfer and of the (over)

mechanisms of radiation damage in high polymers; the selection, design, and synthesis of special new monomers to produce new high polymers with outstanding inherent radiation resistance and heat stability; polymerization of said monomers, identification of the resulting polymers, and evaluation of their radiation and heat stabilities; applied studies of the effect of gamma irradiation in air at room temperature on the compression set properties of various rubber compounds, with and without potential antirads present; and static and semi-dynamic radiation testing of O rings with attempts to protect the military-approved rubber compounds against radiation damage with antirads. (Author)

AD-249 387L

AD-249 542 Div. 10 U
(24 Jan 61)

Bell Aerosystems Co., Buffalo, N. Y.
STORABLE PROPELLANT DATA FOR THE TITAN II PROGRAM,
by Ralph R. Liberto. Quarterly progress rept. no. 1, 15 June-15 Sep 60. Oct 60, 70p. incl. illus. tables, 51 refs.
(Contract AF 04(611)6079, Proj. 6753)
(AFFTC TR 60-62) Unclassified report

DESCRIPTORS: *Methylhydrazines, Nitrogen compounds, *Tetroxides, Handling, Storage, *Liquid rocket propellants, *Rocket fuels, *Rocket oxidizers, Safety devices, Hazards, Physical properties, Containers, Metals, Plastics, Elastomers, Lubricants, Sealing compounds, Gaskets.

Open-ended Terms: Titan II.

Physical properties, materials compatibility, handling techniques, flammability and autoignition limits, and procedures for storing, (over)

cleaning, and flushing of 50/50 UDMH-N2H4 blend and N2O4 are summarized in this report. The source material of this information was obtained during a one-month literature and industry survey. During this time users of these propellants and companies participating in the Titan II program were contacted. The materials compatibility data for N2O4 was found to be reasonably complete. The known materials compatibility data for the 50/50 UDMH-N2H4 blend is limited and is presented with a summary of metals compatible with N2H4. Data regarding the handling of N2O4 is based on user experience, but limited information is available for the 50/50 UDMH-N2H4 blend. Information presented on the handling of the fuel blend is based on experience in dealing with UDMH and N2H4 individually. The appendix is a U. S. Bureau of Mines report covering work done under a working agreement with Bell Aerosystems to determine the flammability and autoignition limits of the propellants. (Author)

AD-249 542 N6

AD-250 028 Div. 14 U
(1 Feb 61)

Rubber Lab., Mare Island Naval Shipyard, Vallejo, Calif.
EFFECT OF SHELF AGING ON MIL-P-5516 O-RINGS,
by J. N. Holloway. Progress rept. no. 2. 26 Jan 61. 4p. incl. table (Proj. no. S-F013-01; Rept. no. 92-7)
Unclassified report

DESCRIPTORS: *Rubber seals, *Gaskets, Aging, Mechanical properties, Physical properties, Military requirements, Synthetic rubber, Light, Oxygen, Tests, Storage,

O-rings originally complying with Military Specification MIL-P-5516 and which had reached the maximum allowed age of 48 months, were tested after an additional 24 months of shelf aging. During the original 48 months the rings were kept in sealed envelopes, but during the subsequent 24 months, some were kept in sealed envelopes, some exposed to air in the dark, and some exposed to air and artificial light. No significant (over)

changes in tensile properties, permanent set, or specific gravity due to the additional 24 months shelf aging were observed. It is concluded that O-rings meeting the requirements of Specification MIL-P-5516 will give satisfactory service after at least 6 years shelf aging at moderate room temperatures. (Author)

AD-250 028 N1

AD-250 163L Div. 31 U
(7 Feb 61)

Coast Guard, Washington, D. C.
STRENGTH TEST OF VINYL PAD INSERTS.
6 Jan 61. 8p. incl. illus. table. (Proj. CGTD J28-3/3-5-6; Rept. no. 219)
Unclassified report

Notice: Only Military Offices may request from ASTIA. Others request approval of U. S. Coast Guard, Wash. 25, D. C.

DESCRIPTORS: *Life preservers, Sealing compounds, Seals, Bonded joints, Mechanical properties, Adhesion, Test methods, Tests, Effectiveness, Vinyl radicals, Polymers, Plastics.

Coast Guard Specification for Kapok Buoyant Vests (160.047) calls for a test on the forming and sealing of the vinyl pad inserts. The requirement states that the heat-sealed pad seams shall show an adhesion of not less than 8 pounds when one-inch strips cut across and perpendicular to the seams are pulled apart at a rate of separa- (over)

tion of the clamping jaws of the test machine of 12 inches per minute. This report covers the above strength tests on four samples of vinyl pad inserts manufactured by the Atlas Manufacturing Company. (Author)

AD-250 163L

AD-250 231 Div. 22, 33 U
(6 Feb 61)

Ogden Air Material Area, Hill Air Force Base, Utah.
T-46 AMMUNITION BOX.
by Lipman M. Singer. Airmunitions test rept. Jan 61, 30p. incl. illus. tables (Rept. no. OOI TR 61-2)
Unclassified report

DESCRIPTORS: Ammunition, *Containers, Air transportation, Airborne, Tests, Seals.

Open-ended Terms: T-46 ammunition box.

Altitude chamber tests were performed on T-46 Ammunition Boxes for the purpose of determining if this container was suitable for airborne ammunition transportation. Six instrumented box assemblies were tested in an altitude chamber to study the following parameters: reduced pressure at constant temperature and reduced pressure at reduced temperature. It was found that combined low temperature and pressures (e.g. air trans- (over)

portation) effect the plasticity and sealing ability of the rubber gasket, therefore, the box will leak resulting in a vacuum developed in the container. Upon return to sea level conditions, the vacuum will be retained in the box and may render it difficult to open. In most cases this vacuum may be broken on release of the cover hasp. After a short warming up period, the box will again leak and equilibrium pressure will be attained. No modification to the T-46 Ammunition Box is required, however, it is recommended that the ammunition be protected from air leakage by: utilization of heated air cargo space to improve the sealing properties of the rubber; insertion of desiccant with the contents, to absorb water vapor (e.g. top and bottom cardboard spacers impregnated with desiccant). If a new box is developed, it is recommended that a pressure relief device be installed and altitude chamber tests be made to insure that the box will be suitable for air lift. (Author)

AD-250 231 N1

AD-250 399 Div. 8 U
(8 Feb 61)

McCoy Electronics Co., Mount Holly Springs, Pa.
PRODUCTION ENGINEERING MEASURE, MINIATURE GLASS HOLDER CRYSTAL UNITS CR-(XM-31)/U.
Combined progress rept. 1 June-30 Nov 60. 14p. incl. illus.
(Contract DA 36-039-sc-85939; Continuation of Contract DA 36-039-sc-74942)
Unclassified report

DESCRIPTORS: *Crystal holders, *Miniature electronic equipment, Quartz crystals, Production, Manufacturing methods, Seals, Crystals.

Development of efficient production methods for the crystal unit type CR-(XM-31)/U along with equipment and techniques for sealing 120 or more per eight hours is reported. Fabrication of the preproduction units was nearly completed; both material and cultured quartz plates were processed in identical fashion. No significant differences between natural and cultured quartz (over)

plates were found; this opinion is based upon a study of 30 units at 40 megacycles. The units appeared to meet specification requirements with a margin of safety; frequency calibration after sealing measured, on the average, between 0.001 and 0.002% above pre-seal readings; at 40 megacycles the resistance decreased approximately 5 or 6 ohms, going from atmosphere to a vacuum of 20 to 40 microns. The sealing equipment met the production requirements.

AD-250 399 N1

AD-250 736 Div. 22 U
(15 Feb 61)

Atlas Powder Co., Tamaqua, Pa.
DEVELOPMENT OF MINIATURE, HERMETICALLY-SEALED SQUIB SWITCH,
by G. N. Bills. Narrative summary rept. (Final) Aug 60, 111p. incl. illus.
(Contract DA 36-034-501-ORD-86, Proj. TN 2-8107)
Unclassified report

DESCRIPTORS: *Electric detonators, Design, *Electric switches, Materials, Switches, Miniature electrical equipment, Seals,

The report covers the progress of the design and development of hermetically-sealed miniature squib switches. This includes two types of switches, a 4-pole and an 8-pole switch. The problems encountered in the general design during development, assembly and testing are discussed. The test results included indicate the 4-pole and 8-pole miniature squib switch designs meet military requirements. (Author)

AD-250 742 Div. 30, 14 U
(17 Feb 61)

Battelle Memorial Inst., Columbus, Ohio.
FUEL O-RING TESTING PROCEDURES,
by W. A. Hartig, R. A. Clark, and R. G. Heiligmann. Final rept. 31 Mar 54, iv. incl. illus. table.
(Contract AF 33(038)25618)
Unclassified report

DESCRIPTORS: Seals, Test equipment, Test methods, *Fuel seals, *Gaskets, Military requirements, Pressure, Tests, Specifications, Rubber gaskets, Temperature, Rubber seals,

Studies were made of the rates of swelling and drying of fuel-type O-rings at 250 degrees F and the effects of pretreatment on the leakage of such O-rings at -65 F when subjected to fluid pressures from 15 to 1500 psi. In the swelling of fuel O-rings at 250 F, about the same maximum and equilibrium (constant) swell values were obtained as at -65 to 212 F, except that the rate of swelling increased with temperature. The same trend was found for drying O-rings at 250 F. Preconditioning O-rings at 250 F, by both swelling and drying to equilibrium conditions, was more harmful to rubber physical properties than at 160 to 212 F. Two qualification test procedures for fuel O-rings are detailed. The one procedure utilizes preconditioning at 250 F and tests low-temperature leakage in a jig meeting Spec MIL-P-5315, except that the gland in the rotating jig stem is eccentric by 0.0005 inch. The other procedure utilizes preconditioning at 250 F and involves eccentric jig-stem glands which were made shallower to provide more O-ring squeeze and fluid pressures of 15 to 1500 psi.

AD-250 742 N1

AD-250 749 Div. 7 U
(16 Feb 61)

Bell Telephone Labs., Inc., Whippany, N. J.
RESEARCH AND DEVELOPMENT WITH HERMETICALLY SEALED CONTACTS,
by O. M. Hovgaard. Final rept. 15 Feb 57-14 Aug 60. 14 Oct 60, 57p. incl. illus. tables.
(Contract DA 36-039-sc-72835, Proj. 3-26-01-000)
Unclassified report

DESCRIPTORS: Design, *Electric relays, Miniature electronic equipment, Seals, Life expectancy, Switching circuits, *Electric switches, Switches, Miniature electrical equipment,

Consideration was given to the selection from several experimental designs of dry-reed switches of the one most suitable to use as the basis for this study. This proved to be the Bell Laboratories G-29 design and its life performance at 28 volts dc was explored in detail. It also served as the means for studying a large variety of possible miniature relays. Models examined contained from 1 to 4 switches within a single operating coil and the problems of providing make, break and transfer contact combinations were explored. Magnetic latching types of relays providing make contacts were studied as was their application to switching arrays for frequencies up to 10 megacycles. This contract has provided fundamental information on the characteristics and life expectancy of G-29 switches and indicated many of the problems which must be considered in the design of relays and switching structures. (Author)

AD-250 749 N1

AD-251 130L Div. 14 U
(23 Feb 61)

Rubber Lab., Mare Island Naval Shipyard, Vallejo, Calif.
EVALUATION OF EPOXY AND THIOKOL VULCANIZATES FOR GASKETS OF SOLVENT CONTAINERS.
14 Feb 61, 4p. tables. (Rept. no. 119-7)
Unclassified report

Notice: Only Government Agencies may request from ASTIA. Others request approval of Bureau of Ships, Navy Dept., Wash. 25, D. C.

DESCRIPTORS: *Plastic gaskets, Elastomers, Vulcanizates, Epoxy resins, Containers, Hydrocarbons, Ketones, Petroleum, Esters.

The purpose of this investigation was to find an elastomeric material for container gaskets which would be suitable for use with all of the following types of fluids: aromatic compounds, ketones, mixtures of aromatic compounds with esters and ketones, and petroleum fuels and oils. Three epoxy elastomeric compounds and three vulcanizates of Thiokol FA and Thiokol ZR-300 were evaluated for this purpose. It was tentatively concluded on the basis of the results of swelling and compression set tests that none of these materials would be suitable. (Author)

AD-251 130L

AD-251 145L Div. 11 U
(24 Feb 61)

Aberdeen Proving Ground, Md.
AUXILIARY ENGINE-GENERATOR KIT AND CARGO HATCH DOOR SEALS FOR M59 ARMORED PERSONNEL CARRIER,
by L. F. Gerner. Feb 61, 1v. incl. illus. tables (Rept. no. DPS/OTA-101)
Unclassified report

Notice: Only Military Offices may request from ASTIA. Others request approval of Diamond Ordnance Fuze Labs., Wash. 25, D. C. Attn: OWDTL 06.33

DESCRIPTORS: *Internal combustion engines, *Cargo vehicles, *Armored vehicles, *Seals, *Motor generators, *Power supplies, *Hatches, Electrical equipment, Voltage regulators, Maintenance, Reliability, Effectiveness, Installation, Operation, Direct current,

Open-ended Terms: M59 personnel carriers.

A 100-ampere auxiliary engine-generator kit was tested to determine the ease of installation, adequacy of installation instructions, ease of maintenance, mechanical reliability and operating characteristics. The engine failed to cool when the kit was installed in the M59 vehicle. A similar portable unit was tested outside the vehicle and delivered approximately 50% of the rated output. It is concluded that the command post vehicle power requirement exceeds 100 amperes. It is recommended that a portable unit of 150-ampere capacity be developed. An improved cargo hatch door seal tested to determine sealing ability was found to be satisfactory. (Author)

AD-251 145L

AD-251 453 Div. 30 U
(1 Mar 61)

Naval Research Lab., Washington, D. C.
THE NRL MODEL E-5753 LEAK DETECTOR,
by C. C. Winter, S. F. Andersen, and R. W. Dolk.
18 Jan 61, 7p. incl. illus. (NRL rept. no. 5593)
Unclassified report

DESCRIPTORS: *Gas leaks, Gas detectors, Thermoelectricity, Circuits, Design, Heat transfer, Sensitivity, Detection, *Gases.

Open-ended Terms: Freon-12.

A 21-pound portable Freon leak detector has been developed. Air from the vicinity of a probe is pumped through tubing so as to first pass two of the four cells of a thermal conductivity bridge and then through a length of tubing around to the other pair of cells. Thus if the probe is moved past a leak, the bit of Freon-containing air unbalances the bridge first in one direction and then in the other. These unbalances cause the successive flashing of a red light and a white light in the Lucite probe head, where the operator's attention is focused. While the indicator gives a clear response for a Freon concentration of 4 to 5 ppm, such sensitivity is not needed under service conditions, where detection of the signal produced by changing the concentration of Freon by 50 ppm is satisfactory in most cases. (Author)

AD-251 453 N2

AD-251 669 Div. 31, 14 U
(7 Mar 61)

Material Labs., Puget Sound Naval Shipyard, Bremerton, Wash.
LATEX MASTIC INJECTED AS SEALANT UNDER FLIGHT DECKING. 1st TRIAL INSTALLATION,
by W. H. Miles and D. S. Peterson. Jun 61, 7p. incl. illus. (Development rept. no. E-379-3)
Unclassified report

DESCRIPTORS: *Flight decks, *Sealing compounds, Seals, Rubber seals, Weather proofing, Deck coverings, Coatings, Effectiveness, Tests.

Open-ended Terms: Yorktown, CVS-10.

Methods were investigated to stop leaks through flight decks, without plank removal, by use of a sealant injected between wood deck and underlying steel pan. A survey of possible sealing materials including polysulfides, epoxies, epoxy-tar, latex mastic, and bitumen compounds indicated neoprene latex-microballoon-hydraulic cement mastic of BUSHIPS NOTICE 9140 to be the

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most suitable from standpoint of sealing ability, weight, cost, and handling characteristics under adverse weather and temperature conditions. In a trial installation on the flight deck of the USS YORKTOWN (CVS-10), all leaks over a 6,000 sq. ft. area were stopped by pneumatic injection of latex mastic through the wood deck. The latex mastic injection system represents a low cost repair for leaks in wood flight decks. Due to the presence of an interfering coating of rust preventive grease between planks and steel pan, continuous bonding to both surfaces is not obtained. Subsequent movement of the deck may open new water channels requiring repetition of the injection in some areas. There is evidence that complete filling of void areas may not be essential due to the ability of the latex portion itself to penetrate cracks and seal leaks. (Author)

AD-251 669 N2

AD-252 077 Div. 25, 8 U
(10 Mar 61)

Philco Corp., Philadelphia, Pa.
ELECTROQUENCHABLE PHOSPHOR INVESTIGATION,
Interim technical rept. no. 3, 1 Sep-30 Nov 60, 31 Dec 60, 13p. incl. illus. (Rept. no. 9005-3)
(Contract NObsr-81189)
Unclassified report

DESCRIPTORS: *Display systems, *Phosphors, *Fluorescence, Luminescence, Sulfides, Ultraviolet radiation, *Electric fields, Cadmium compounds, Vacuum systems, Films, Electrical properties, Silicones, Seals,

A vacuum system was revised to permit electrical contact to be made to a cell within the bell jar of the vacuum system both during and after evaporation of the final contact. Tests were performed to determine if water vapor or oxygen is responsible for changes in cell characteristics. The results indicate the need for sealing completed cells against atmospheric effects. Silicone varnishes were used to coat completed cells but had a deleterious effect on quenching and in some cases, have disrupted top contact conductivity. Excellent extinction characteristics have been obtained by using films of sodium fluoride and magnesium fluoride. Cells with a final copper oxide contact show far less moisture sensitivity than those with final indium-tin oxide contacts. (Author)

AD-252 077 N3

AD-252 607 Div. 6, 14, 20 U
(20 Mar 61)

Radiation Effects Information Center, Columbus, Ohio.
THE EFFECT OF NUCLEAR RADIATION ON ELECTRON TUBES AND TUBE MATERIALS,
by W. E. Chapin. 15 Feb 61, 36p. incl. illus. tables, 79 refs. (REIC rept. no. 14)
(Contract AF 33(616)7375), Proj. 4458)
Unclassified report

DESCRIPTORS: *Radiation damage, Gamma rays, *Electron tubes, *Miniature electron tubes, *Subminiature electron tubes, Thyratrons, Photomultipliers, Voltage regulator tubes, Triodes, Beam power tubes, Pentodes, Magnetrons, Traveling wave tubes, Photometers, Iconoscopes, Klystrons, Cathode ray tubes, Glass, Ceramic materials, Metals, *Glass seals, *Metal seals, Bibliography.

The report concerns studies of radiation effects as reported for electron tubes and tube materials during the past 8-10 years. These studies indi-

cate that the primary damage mechanism which limits prolonged use or storage of electron tubes in high-intensity fluxes is the failure of the glass envelope. Much has been written concerning failures in the glass-to-metal seals. These damages were observed at integrated neutron fluxes in the range of 10 to the 15th power to 10 to the 16th power (nv)t. for most borosilicate envelopes and Kovar seals. Boron-free glasses are more radiation resistant and can withstand integrated fluxes as high as 10 to the 18th power (nv)t. Tubes necessitating large glass envelopes are more prone to radiation damage. Miniature and sub-miniature tubes sealing areas and use less glass, thus enabling the tube to withstand prolonged exposures. Ceramic tubes exhibit one disadvantage; the level of residual radioactivity after irradiation is much higher than for the glass-tube type. Gamma radiation does not cause any appreciable effect on most electron tubes. The exception to the case is mainly tubes that rely on light transmission. Magnetrons and similar devices are not suited for use in high-intensity radiation fields. (Author)

AD-252 607 N3

AD-252 786 Div. 24, 8 U
(20 Mar 61)

Bulova Research and Development Labs., Inc., Woodside, N. Y.
OPERATION AND MAINTENANCE MANUAL. SEALING MACHINE,
1961, 1v. incl. illus.
(Contract DA 36-039-sc-54667)
Unclassified report

DESCRIPTORS: *Quartz crystals, Instruction manuals, Operation, Maintenance, *Manufacturing methods, Processing, Seals, Machines, Automatic, Crystal holders.

A base sealing machine a component of the quartz crystal manufacture mechanization system, is described. It was designed to seal the assembled crystal bases and covers automatically. During this process all air is evacuated and the inert gas nitrogen, with a trace of helium added, is introduced into the cover prior to sealing. (Author)

AD-252 992L Div. 14, 22 U
(24 Mar 61)

Ammunition Group, Picatinny Arsenal, Dover, N. J.
INVESTIGATION OF THREADED JOINT SEALANTS AND CRIMPED JOINT SEALANTS,
by W. Gaston. Final engineering rept. Dec 60, 1v. incl. illus. tables, 20 refs.
(Technical rept. no. BC-TR:2-60)
Unclassified report

Notice: Only Military Offices may request from ASTIA. Others request approval of Diamond Ordnance Fuze Labs., Wash. 25, D. C. Attn: ORDTL 06.33

DESCRIPTORS: *Seals, *Sealing compounds, Rubber seals, *Ammunition, Production, Joints, Manufacturing methods, Oxygen, Design, Metals, Torque, Rubber, Polymers, Sulfides, Storage, Explosives.

None of the anaerobic thread sealants submitted were suitable for general use in ammunition items. At present, the formulation of an anaerobic thread sealant that is generally applicable to ammunition items is impracticable. The commercial grades of one thread sealant are suitable for some ammunition applications. However, for each application considered, it will be necessary to make a separate determination of compatibility with the explosive used, method of application to obtain satisfactory penetration, and acceptable setting time and permissible torque range with the metals involved. (Author)

AD-252 992L

AD-252 996 Div. 26, 14 U
(24 Mar 61)

Rubber Lab., Mare Island Naval Shipyard, Vallejo, Calif.
SUITABILITY OF VITON B O-RINGS FOR USE IN 3000 psi HYDRAULIC SYSTEMS CONTAINING PETROLEUM BASE OR PHOSPHATE ESTER FLUIDS,
by A. E. Barrett. Progress rept. no. 1, 10 Mar 61. 7p. illus. tables. (Rept. no. 92-4)
(Proj. S-F013-13-01)
Unclassified report

DESCRIPTORS: *Hydraulic seals, Materials, Rubber, Tests, *Hydraulic fluids, Phosphates, Esters, Petroleum, Hardness, *Hydraulic systems, Polymers, Ethylenes, Fluorides, Synthetic rubber, Cyclohexanes.

Open-ended Terms: Viton.

The Bureau of Ships is interested in determining whether or not seals made from Viton B will be suitable for use in 3000 psi hydraulic systems containing either petroleum base or phosphate ester fluids. Accordingly, a simulated dynamic service test was devised and Viton B O-rings of 70 and 90 Shore-A hardness were tested therein in comparison with O-rings conforming with Specification MIL-P-5516B, Class A (90 Shore-A) and Class B (70 Shore-A). The results obtained to date indicate that Viton B O-rings of either 70 or 90 Shore-A hardness with Teflon backup rings will perform satisfactorily at 140 F in 3000 psi hydraulic systems containing phosphate ester fluids. The Teflon backup rings do not stand up at higher temperatures under conditions of this test. (Author)

AD-252 996

AD-253 211 Div. 8 U
(29 Mar 61)

Westinghouse Electric Corp., Elmira, N. Y.
SCAN-CONVERSION STORAGE TUBE BASED UPON THE PERMACHON,
by W. S. Riel. Quarterly progress rept. no. 2, 1 Oct-31 Dec 60. 31 Dec 60, 21p. incl. illus.
(Contract DA 36-039-sc-85051)
Unclassified report

DESCRIPTORS: Photoconductivity, *Storage tubes, Cathode ray tubes, Coatings, Test equipment, Electron guns, *Image tubes, Design, Electron tubes, Tests *Image converter tubes, Seals.

Open-ended Terms: Permachon.

Two experimental tubes of the second design version were started, both of which were completed through tip-off. RF sealing techniques for envelope assemblies were established. Three experimental CRT's were constructed to study writing gun characteristics. The test equipment is capable of 800 TV line resolution overall using magnetically deflected write and read guns. (Author)

AD-253 211 N4

AD-253 527 Div. 30 U
(3 Apr 61)

Louisiana State U., Baton Rouge.
HIGH-PRESSURE AND VACUUM SEALS AT LIQUID HELIUM TEMPERATURES,
by K. S. Balain and C. J. Bergeron. Aug 59. 1p. incl. table.
(OOR rept. no. 1579:5) Unclassified report

Reprint from the Review of Scientific Instruments 30:1058-1059, Nov 59. (Copies not supplied by ASTIA)

DESCRIPTORS: Epoxy resins, *Plastic seals, *Vacuum seals, Design, High pressure research, *High temperature research, *Liquefied gases, Helium, Temperature.

AD-253 753 Div. 14, 26 U
(13 Apr 61)

Rubber Lab., Mare Island Naval Shipyard, Vallejo, Calif.
DEVELOPMENT OF RUBBER GASKETS WHICH ARE RESISTANT TO NUCLEAR RADIATION,
by R. E. Morris. Final rept. 28 Feb 61, 1v. incl. illus. tables. (Rept. no. 149-4)
(Proj. NS-033-200)
Unclassified report

DESCRIPTORS: Gaskets, *Rubber gaskets, Seals, Radiation damage, Radiation tolerance, *Synthetic rubber, *Rubber, Additives, *Butyl rubber, *Vulcanizates, *Rubber seals, Mechanical properties, Tests, Test methods, Gamma rays, Packaging.

An investigation was conducted to develop rubber gaskets and seals capable of operating for extended periods in nuclear radiation fields. The tendency of a compressed vulcanizate to undergo compression set when exposed to gamma radiation was chosen as a criterion. Vulcanizates have been developed which are capable of satisfactory gasket service in gamma radiation fields to a dosage of 10 to the 8th power roentgens and beyond. The rubbers which are the most satisfactory for manufacture of gaskets to be used in gamma radiation fields are natural rubber, styrene/butadiene copolymers and acrylonitrile/butadiene/methacrylic acid terpolymers. The resistance of these vulcanized rubbers to compression set engendered by gamma radiation can be enhanced by compounding the rubbers with certain antioxidants or antiozonants and/or with certain chemicals containing aromatic rings or condensed ring structures. The resistance of a styrene/butadiene vulcanizate to gamma radiation is better if dicumyl peroxide is used as the vulcanizing agent in lieu of sulfur. (Author)

AD-253 753 N5

AD-254 020 Div. 7 U
(13 Apr 61)

Gulton Industries, Inc., Metuchen, N. J.
THE TESTING OF HERMETIC SEALS AND SEPARATORS, POSITIVE PLATE STUDIES, AND INVESTIGATIONS ON THE UNIFORMITY OF SEALED NICKEL-CADMIUM CELLS,
by H. N. Seiger. Quarterly progress rept. no. 2, 1 Oct-31 Dec 60, on Investigations Leading to the Development of Improved Sealed Nickel-Cadmium Batteries. 31 Dec 60, 36p. illus.
(Contract DA 36-039-sc-85390, Proj. 3G18-03-001)
Unclassified report

For reference at ASTIA Hq. only. This report cannot be satisfactorily reproduced; ASTIA does not furnish copies.

DESCRIPTORS: *Alkaline cells, Test methods, *Seals, *Battery separators, Electrodes, Ceramic materials, Metal seals, Design, *Anodes (Electrolytic cells), *Storage batteries, Nickel, Cadmium.

The use of the halogen leak detector for testing of the ceramic-to-metal seal was not satisfactory, and a helium leak detector was resorted to after it was deemed satisfactory. Six new separators were included into the testing program. Difficulties encountered with the measurement of electrical resistance were overcome using a voltage drop method. Separators were tested after storage at -40 F and also at 125 F for chemical resistance, dimensional stability and electrical resistance. Separators were also tested in 3-plate cells at 125 F. The voltage stabilizes more rapidly than the pressure during overcharge of sealed cells. During discharge the pressure in a cell decays more rapidly than it would on open circuit. From a cell with an extra positive and extra negative electrode (not electrically connected to the other electrodes within the cell) it was found that the negative electrode could not be used as a reference electrode for the sealed cell. Difficulties encountered when the gas evolution apparatus for the positive plate studies was placed in a thermostatted bath were overcome by modification of the apparatus to eliminate a ball joint and changing two stopcocks from glass to teflon. (Author)
AD-254 020

AD-254 493 Div. 7 U
(21 Apr 61)

Eagle-Picher Research Labs., Joplin, Mo.
RESEARCH INVESTIGATIONS LEADING TO THE DEVELOPMENT AND EVALUATION OF A CADMIUM - SILVER OXIDE BATTERY HAVING A HERMETICALLY SEALED CONSTRUCTION,
by J. K. Wilson. Quarterly progress rept. no. 2, 1 Oct-31 Dec 60. 31 Dec 60, 1v. incl. illus.
(Contract DA 36-039-sc-85370, Proj. 3G18-03-001-02)
Unclassified report

DESCRIPTORS: *Storage batteries, Design, Seals, Cadmium, Cadmium compounds, Silver compounds, Oxides, Electrolytes, *Battery separators, Recombination reactions, Electrodes, Alkaline cells.

Seven hundred shallow cycles have been obtained from cadmium - silver oxide sealed cells. The data obtained indicate that 0.040 ampere is the maximum continuous overcharge rate that can be applied to the cells of the present design. Cell containers and covers were designed for use in the final design sample cells. (Author)

AD-254 496 Div. 14, 22 U
(21 Apr 61)

Frankford Arsenal, Philadelphia, Pa.
STANDARDIZATION OF ELASTOMER FOR BOOT SEAL AND DUST COVER. EVALUATION OF CHLOROPRENE COMPOUNDS,
by S. H. Kalan. Mar 61, 17p. incl. illus. tables.
(Memo. rept. no. M61-19-1)
Unclassified report

DESCRIPTORS: *Chloroprenes, *Elastomers, *Seals, *Sealing compounds, *Rubber seals, Mechanical properties, Temperature, Tests, Fire control, Materials, Protective coverings, Standardization, Test methods, Silicones, Manufacturing methods.

An investigation was made of elastomeric materials used in the manufacture of boot seals and dust covers for fire control material operating at temperatures between -40 degrees F and 125 degrees F. The investigation of chloroprene rubber shows that MIL-STD-417 Type 3, Class SC 615 A1B1C2F2S1 material, which is commercially available, will provide the required sealing and stability in air, oil, and ozone over this temperature. It is recommended that this investigation be continued for all configuration designs, since it appears that the modulus at low extensions, low temperature elastic recovery rate and the -40 degrees F Gehman stiffness limiting values require establishment to guarantee satisfactory performance. (Author)

AD-254 496 N6

AD-254 607 Div. 14 U
(24 Apr 61)

Material Lab., New York Naval Shipyard, Brooklyn, N. Y.
INVESTIGATION OF THE EFFECTS OF PHOSPHATE ESTER-PETROLEUM OIL MIXTURES ON THE PHYSICAL PROPERTIES OF NITRILE RUBBER O-RINGS,
by L. G. Hess. Final rept. 20 Apr 61, 8p. table. (Lab. proj. no. 6326)
Unclassified report

DESCRIPTORS: *Phosphates, *Esters, *Petroleum, Mixtures, *Nitrile rubber, *Oils, Hydraulic fluids, *Rubber gaskets, Physical properties, *Hydraulic seals, Submarines, Rubber, Gaskets, Seals, Rubber seals, Synthetic rubber.

The effects of phosphate ester-petroleum oil mixtures on the physical properties of nitrile rubber O-rings, were determined. Mixtures containing 5% and 10% concentrations of Cellulube 220 in each of the oils 2190 TEP and 2110 H, as well as the pure Cellulube 220, 2190 TEP and 2110 H oils, were used as the immersion media. It was found that 5% concentrations of the phosphate ester in each of the oils produced tolerable swelling and softening of the rubber. However, 10% concentrations of the ester in each of the oils, as well as the pure ester itself, produced excessive swelling and softening to a degree which is expected to render the rubber O-rings unserviceable for use in petroleum oil hydraulic systems aboard FBM submarines. It was recommended that phosphate ester impurities in these systems be kept to a minimum concentration of less than 5%. It was also recommended that in view of the observed extraction effects of the petroleum oils, themselves, on the O-rings, that the Laboratory be authorized to develop an improved elastomer O-ring compound. (Author)

AD-254 607 N6

AD-254 614L Div. 27, 31 U
(24 Apr 61)

Naval Boiler and Turbine Lab., Philadelphia, Pa.
LABORATORY PERFORMANCE OF DD-931 CLASS HP-IP TURBINE,
by L. F. VanSciver and D. H. Cooke. Evaluation and development rept. 1960, 1v. incl. illus. tables (NBTL rept. no. T-181)
Unclassified report

Notice: All requests require approval of Bureau of Ships, Navy Dept., Wash. 25, D. C.

DESCRIPTORS: *Destroyers, Marine engines, Propulsion, *Steam turbines, Instrumentation, Diaphragms (Mechanics), Seals, Design, Tests, Operation, Thermal stresses, Deformation, Steam turbine blades, Steam turbine rotors.

The performance and reliability of the DD-931 Class HP-IP turbine were investigated. Tests indicated that the original performance was 11.2 and 12.8% below the expected levels at 20 kn and full power, respectively. With modifications, the turbine developed the original design HP-IP turbine share of the guaranteed full power output at the design flow. However, the 20-kn performance (top of series range) remained about 8% deficient. Nearly half of the original full power deficiency was caused by diaphragm packing rings blowing open radially due to lack of sufficient closing pressure. This was corrected by an improved ring design. The major cause of original and remaining deficiency was unexpected wear of interelement, diaphragm and end gland packing. The irregular wear pattern of the packing indicates local distortion other than that caused by casing hog and sag. The minimum average radial diaphragm and interelement clearance that can be held is 18 to 20 mils. Considerable by-pass leakage between the HP and IP elements due to thermal distortion of the packing rings and/or sealing surfaces was evident. This is responsible for about 1/4 of the remaining deficiency at 20 knots. The reliability and maneuverability of the turbine are good, with no mechanical weaknesses. (Author)

AD-254 614L

AD-254 803L Div. 1, 12 U
(25 Apr 61)

Chance Vought Aircraft, Inc., Dallas, Tex.
MODULAR HYDRAULIC SYSTEM DEVELOPMENT. PROJECT HYDRATOY, PART I,
by R. W. Burden, D. R. Chamberlain and others. Quarterly progress rept. no. 8, pt. 1, 5 Sep-5 Dec 60. 5 Dec 60. 1v. incl. illus. tables. (Rept. no. AER-EOR-13270, pt. 1)
(Contract NOa(s) 59-6019-c)
Unclassified report

Notice: Only Government Agencies may request from ASTIA. Others request approval of Bureau of Naval Weapons, Navy Dept., Wash. 25, D. C.

DESCRIPTORS: *Hydraulic systems, *Aircraft, *Satellite vehicles, *Spaceships, Design, *Hydraulic actuators, *Hydraulic valves, Seals, Packaging, Metal seals, Materials, Test methods, Rotary seals, *Guided missiles, Tests.

Open-ended Terms: Hydratoy project.

Progress was continued on modular hydraulic system development. The 2 static metallic seals presently being qualified are the Bendix Wedge Seal and the Hi-Seal (C-Seal). Four hydraulic test packages were designed and fabricated. They are the titanium manifold, the actuator with modular end cap, and 2 stainless steel manifolds. The integrated system design was concerned with review of tube to structure gaining methods, evaluation of bending, welding, and brazing applications, study of actuator technology, ball joint actuator design and evaluation, and study of connection methods for permanently attached fluid lines.

AD-254 803L

AD-254 804L Div. 1, 12 U
(25 Apr 61)

Chance Vought Aircraft, Inc., Dallas, Tex.
MODULAR HYDRAULIC SYSTEM DEVELOPMENT. PROJECT HYDRATOY. PART II. MATERIAL AND PROCESS DEVELOPMENT PROGRESS,
by J. W. Browne and E. Jimenez. Quarterly rept. no. 8, pt. 2, 5 June-5 Dec 60, 5 Dec 60, 26p. incl. illus. (Rept. no. AER-EOR-13270, pt. 2)
(Contract NOs(s) 59-6019-c)

Unclassified report

Notice: Only Government Agencies may request from ASTIA. Others request approval of Bureau of Naval Weapons, Navy Dept., Wash. 25, D. C.

DESCRIPTORS: *Hydraulic systems, Materials, Packaging, Metal seals, *Hydraulic valves, Lubricants, *Guided missiles, *Spaceships, *Satellite vehicles, *Aircraft, Processing, *Hydraulic actuators, Rotary seals, Tests, Brazing, Coatings, Seals.

Materials and process investigations were continued. Investigations were conducted upon static seals of the Hi-Seal type. The investigation of various lubricants, coatings and surface treatments to reduce friction and increase wear resistance was continued. One coating material, a Teflon, appeared to have promise of reducing galling tendencies during installation. No further investigations were conducted with stainless steel extrusions for use as fluid-carrying structures. Various methods of fabricating fluid-carrying structures are under consideration. The various materials being considered for such construction are magnesium, aluminum, titanium, and stainless steel alloys. (Author)

AD-254 804L

AD-254 806 Div. 14, 30 U
(26 Apr 61)

Naugatuck Chemical Div., United States Rubber Co., Conn.
DEVELOPMENT OF SELF-LUBRICATING AND NON-ADHERING ELASTOMERIC MATERIALS,
by A. S. Krivitsky and W. E. Galwardy. Quarterly rept. no. 1, 1 June-1 Sep 60, 31 Oct 60, 26p. incl. illus. table, 18 refs.
(Contract NOw 60-0123-c)

Unclassified report

DESCRIPTORS: Butyl rubber, *Elastomers, Rubber, *Synthetic rubber, Vulcanizates, Butadienes, Acrylonitriles, *Friction, Mechanical properties, Lubrication, Seals, Adhesion, Bearings, Metals, Measurement, Stainless steel, Surface properties, Test equipment, Test methods, Rubber seals, Nitrile rubber, Antiseize compounds.

A simple test apparatus which measures quantitatively the static surface friction properties of elastomeric materials in contact with metals was developed. Preliminary tests were made investigating the effect of variable applied loads on the coefficient of friction of a butadiene-acrylonitrile O-ring compound. A comprehensive literature search on the friction properties of all materials, particularly those with elastomeric properties, was conducted. (Author)

AD-254 806

AD-255 145 Div. 10, 26, 27 U
(4 May 61) OTS price $7.60.

Wyle Research Corp., El Segundo, Calif.
PROBLEMS ENCOUNTERED DURING INSTALLATION AND OPERATION OF A STORABLE PROPELLANT FACILITY FOR TESTING OF TITAN II COMPONENTS AND SYSTEMS.
7 Mar 61, 66p. incl. illus. 27 refs. (Technical note no. 10235)
(Contract AF 04(647)398)
(AFBMD TN 61-32)

Unclassified report

DESCRIPTORS: *Liquid rocket propellants, *Storage, Handling, Safety, Protective clothing, *Hydrazines, *Methyl hydrazines, Nitrogen compounds, Tetroxides, *Rocket oxidizers, *Rocket fuels, Contamination, Corrosion, Lubricants, Seals, Gaskets, Polymers, Ethylenes, Fluorides, Materials, Test equipment, Test facilities.

Open-ended Terms: Titan.

The design and operation of a storable propellants test facility utilizing N2O4 and the Titan II UDMH-N2H4 fuel blend as the fluid media are discussed. Two 6,000-gal stainless steel tanks provided fuel blend storage and similar tanks to store the N2O4. The blending system consisted of a 6,000-gal tank, two 260-gpm pumps for recirculation, and a high turbulence blender. The toxicity of the storable propellants necessitated the inclusion of aspirators, N purge connections, liquid drain valves and isolation valves to facilitate removal of components from the test sections. Similar precautions were provided for component removal from the fuel and oxidizer systems. Waste propellant liquid and vapor neutralization, material compatibility, contamination, leakage, lubricants, seals, and materials are discussed.

AD-255 145 N1

AD-256 161 Div. 2, 3, 12 U
(22 May 61) OTS price $3.60

Geophysics Corp. of America, Bedford, Mass.
DEVELOPMENT AND TESTING OF IGNITION SYSTEM FOR ROCKET-BORNE SODIUM VAPORIZER,
Nov 60, 33p. incl. illus. tables. (GCA Technical rept. no. 60-1-N)
(Contract NAS5-215)

Unclassified report

DESCRIPTORS: *Igniters, *Ignition systems, Explosives, Pyrotechnics, Thermochemistry, Pellets, *Thermite, Tests, Seals, Rockets, *Sodium, Vaporization, Upper atmosphere, Flares, Booster rockets, Meteorology, Wind.

Open-ended Terms: Sodium vaporizers, Nike-Asp.

The ignition failure of two thermite vaporizer payloads, resulted in an investigation of the ignition parameters of the systems. It was quickly determined that the basic starter thermite ignition system depended upon the integrity of the vaporizer seals and would fail at low pressure. A self-pressurizing ignition system was therefore devised which would be initiated at ambient pressure in order to avoid the seal problem. A commercial hermetically-sealed igniter is used to initiate a large booster which, in turn, initiates the main charge. Limited venting is provided for both booster and canister. The system was test-fired successfully at 3 mm Hg after vibration and shock tests. Canister pressure measurements indicated the ignition sequence to be independent of ambients below 3 mm Hg. It is concluded that the ignition system now developed will prove reliable. (Author)

AD-256 161 N2

AD-256 214 Div. 26, 8, 14 U
(18 May 61) OTS price $4.60

Radio Corp. of America, Somerville, N. J.
MICRO-MODULE CRYSTAL UNITS,
by R. R. Bigler, E. Cohen, and W. H. Liederbach.
Final rept. 1 July 60-31 Mar 61. 31 Mar 61, 1v. incl. illus. tables.
(Contract DA 36-039-sc-85046, Proj. 3A 99 15-001-02)

Unclassified report

DESCRIPTORS: *Quartz crystals, Crystals, *Piezoelectric crystals, *Subminiature electronic equipment, Packaging, *Containers, Ceramic materials, Electroplating, Nickel plating, Copper coatings, Seals, Soldering, Tests, Aging, Manufacturing methods, Design.

A ceramic crystal-microelement package was demonstrated to be a practical package capable of meeting all requirements of the Signal Corps Micro-Module program. The packages were made from metallized-ceramic layers. Electrical connections from the notches to the crystal plate were laminated laterally between the layers of ceramic. After firing, the electrical connections and the seal ring were electroplated with nickel, then with copper. The units were tested for hermeticity and solder dipped. Quartz plates with a nominal frequency of 10 mc were used to evaluate the package. The plates were mounted; then, metal caps were ultrasonically soldered in place to seal the packages. A tip-off hole was required in the cap to allow entrapped gas to escape during sealing. This hole was subsequently sealed in a hand-soldering operation. Ultrasonic welding of the cap was also demonstrated. Sealed microelements successfully passed vibration and shock, and temperature-characteristic tests. Two units were encapsulated in element-test Micro-Modules and subjected to 30-day aging tests. Both units remained within the specified limits. (Author)

AD-256 214 N2

AD-256 218 Div. 14, 26, 31 U
(18 May 61) OTS price $1.60

Materials Testing Lab., Portsmouth Naval Shipyard, N. H.
DEVELOPMENT OF SYNTHETIC RUBBER MATERIAL FOR GASKETS AND PACKINGS IN DEEP SUBMERGENCE SUBMARINES,
by Billy H. Swift and Frederick L. Downs. Progress rept. no. 1, 28 Mar 61, 9p. incl. tables.
(Proj. no. SF 013 13 01)

Unclassified report

DESCRIPTORS: *Gaskets, *Rubber gaskets, *Synthetic rubber, Rubber, Nitrile rubber, Elastomers, Submarines, Pressure, Tests.

A total of 9 rubber stocks were tested to determine their various physical properties pertinent to the function of gasket material for deep submergence submarines. Of these 9 stocks, 5 were formulations already available, and the other 4 stocks were formulations developed in the laboratory. An analysis of test data compiled at this time indicates that one of the stocks already available and 2 of the newly developed stocks should be put through a pressure cell, or simulated service test for evaluation as deep submergence gasket material. (Author)

AD-256 218 N2

AD-256 590L Div. 14 U
(25 May 61)

Industrial Lab., Mare Island Naval Shipyard, Vallejo, Calif.
RUBBER O-RING MATERIAL FOR HYDRAULIC SERVICE, by Arthur W. Scott. Specification development Final rept. 18 May 61, 8p. incl. tables (Rept. no. 5163-60)
Unclassified report

Notice: Only Military Offices may request from ASTIA. Others request approval of Bureau of Ships, Navy Dept., Wash. 25, D. C.

DESCRIPTORS: Seals, *Rubber seals, Tests, *Hydraulic fluids, *Specifications, Esters, Elastomers, Phosphates, Petroleum.

Open-ended Terms: Viton B.

THE PROBLEM: Can Precision Rubber Products Corporation's fluro-rubber vulcanizate No. 19007, based on Viton B, be used as a seal material for both triaryl phosphate ester and petroleum base hydraulic fluids at temperatures approaching 300 F. How does this Viton B compound compare with the best reported one (coded No. 12) tested in previous work. FINDINGS: This formulation is considered unsuitable for use at both temperatures in both fluids, because of excessive softening and modulus decrease. In addition, the hardness as received (15-sec durometer readings) is lower than the generally recommended value. In all these respects, this compound compares unfavorably with the best one (coded No. 12) reported on in previous work, and also does not conform to the limits of the Tentative Specification proposed in Report No. 0879-60 dated 27 June 1960 and added to in the present report. (Author)

AD-256 590L

AD-256 649 Div. 26, 22 U
(26 May 61) OTS price $8.10

Lake City Arsenal, Independence, Mo.
HYDRAULIC CRIMPING UNIT FOR LARGE CALIBER SMALL ARMS AMMUNITION, by H. L. McLean. May 61, 85p. incl. illus. tables. (IED rept. no. 60-12)
(Proj. 56-242)
Unclassified report

DESCRIPTORS: Hydraulic fluids, Pressure, Seals, Test equipment, Machining, *Crimping tools, *Small arms ammunition, *Projectiles, *Cartridge cases, Rubber, Synthetic rubber, Statistical analyses, Automatic, *Quality control, Ammunition, Attachment, Hydraulic systems, Production.

Open-ended Terms: 20mm, Disogrin.

An investigation was made of the feasibility and adaptability of the basic principles of hydraulic crimping unit for use in mass production in crimping 20mm cartridges. Test equipment was designed and constructed for testing various types of resilient materials. Several design variations were produced and materials tested prior to obtaining a suitable design and material for the crimp ring and seal ring. It was demonstrated that the principles of hydraulic crimping were feasible for adaptation to the V40 Automatic Machine for use in mass production in crimping 20mm cartridges. This method of crimping 20mm cartridges maintains projectile extraction loads, torsion requirements between case and projectile, and moisture sealing qualities within control limits; minimizes cold-working of the case metal. (Author)

AD-256 649 N2

AD-256 678 Div. 10 U
(29 May 61) OTS price $18.50

Bell Aerosystems Co., Buffalo, N. Y.
RESEARCH AND DEVELOPMENT ON THE BASIC DESIGN OF STORABLE HIGH-ENERGY PROPELLANT SYSTEMS AND COMPONENTS, by Ralph N. Liberto. Final rept. 6 July 59-30 Sep 60. 19 May 61, 281p. incl. illus. tables, 92 refs.
(Contract AF 33(616)6689, Proj. 3058)
(AFFTC TR 60-61) Unclassified report

DESCRIPTORS: *Liquid rocket propellants, Storage, *Nitrogen compounds, *Tetroxides, *Hydrazines, *Methyl hydrazines, Decomposition, Stability, Contamination, Impurities, Temperature, Stainless steel, Titanium alloys, Aluminum alloys, Physical properties, Bearings, Lubrication, Seals, Pumps, Handling, Solubility.

Studies were made of nitrogen tetroxide (N_2O_4), unsymmetrical dimethylhydrazine (UDMH), and hydrazine (N_2H_4). Pertinent physical property data is presented for each propellant. Data concerning propellant decomposition caused by such contaminants as aluminum and stainless steel chips, lint, constituents of air and hot pressurizing gases is included. High temperature, low temperature, and cycling temperature tests were conducted with each propellant in tanks made of type 347 stainless steel, 6061-T6 aluminum, PH 15-7 Mo stainless steel and C 120 AV titanium. Three explosions were encountered with N_2H_4 in stainless steel tanks (347 stainless steel and PH 15-7 Mo stainless steel) at temperatures above 290 F. Other than slight decomposition, no problems were encountered with UDMH stored at temperaturbs up to 300 F. If N_2O_4 is maintained in the anhydrous state and high vapor pressure can be tolerated, no problems will be expected with N_2O_4 stored in type 347 stainless steel, PH 15-7 Mo stainless steel, and 6061-T6 aluminum tanks up to 270 F. (Author)

AD-256 678 N2

AD-257 025 Div. 14 U
(6 June 61) OTS price $4.60

Convair, Fort Worth, Tex.
THE EFFECTS OF REACTOR RADIATION OF ELASTOMERS AND SEALANTS. IV.
by L. L. Morgan. 9 May 61, 46p. incl. tables.
(Document no. NARF-61-6T; Rept. no. NR-N-174-4)
(Contract AF 33(600)38946)
Unclassified report

DESCRIPTORS: *Elastomers, *Synthetic rubber, Nitrile rubber, Rubber, Urethanes, Polymers, Cyanates, Polymerization, Synthesis, Radiation damage, Gamma rays, Temperature, Mechanical properties, Tensile properties, Neutron bombardment, Tests, Seals.

Polyurethane elastomers are produced through the reaction of certain diisocyanates and polyhydroxy compounds (polyesters and polyethers). Thirteen polyurethane elastomers from 3 manufacturers were irradiated to various doses at several temperatures. The highest dose was 7 x 10 to the 10th power ergs/gm(C) gamma plus accompanying neutrons. The irradiation temperatures ranged from -45 F to 260 F. Following irradiation, stress-strain measurements were made on all of the materials. Compression-set tests were performed on certain selected elastomers. The data tend to indicate that materials from any particular manufacturer were sufficiently similar so that their percentage change from control values were of the same order of magnitude under the same conditions. (Author)

AD-257 025 N3

AD-257 228 Div. 14 U
(13 June 61) OTS price $4.60

Aberdeen Proving Ground, Md.
TX-200 TRANSMISSION OIL COMPATIBILITY PROGRAM,
by R. C. Kleinfeld. June 61, 1v. incl. illus. tables (Rept. no. DPS-235)
Unclassified report

DESCRIPTORS: Transmission, Fluids, *Oils, Transmission gears, *Automatic transmissions, Lubrication, Specifications, Tests, Test methods, Effectiveness, Plastic seals, Failure (Mechanics), Acrylic resins, Clutches, Gaskets, Lubricants.

A procedure was developed for laboratory compatibility tests with the TX-200 transmission. Using this procedure a referee base-line condition was established for the TX-200-2X transmission with MIL-L-2104A, OE-10, M14500, REO-148-61 oil. The objectives of the tests were to evaluate MIL-O-10295, OE-S arctic engine oil and MIL-L-2104A, OE-30 engine oil as automatic transmission fluids and to compare the results of the laboratory tests with actual cross-country test-course operation. These tests showed that with reference to the established base line, MIL-O-10295, OE-S, REO-127 oil is incompatible. However, the laboratory test cycle is less severe on clutch wear and more severe on low-range gearing than the 5000-mile cross-country test. Thus it is recommended that a 5000-mile cross-country test be run in a cold climate with arctic engine oil as the transmission fluid to determine whether or not low-sun-gear failures could occur during actual field operation. The MIL-L-2104A, OE-30, M14804 oil was compatible with the transmission except for breakdown of the polyacrylate piston seals. Bench-type investigations should be conducted to determine the cause of seal failure. (Author)

AD-257 228 N3

AD-257 411L Div. 14, 29 U
(12 June 61)

Douglas Aircraft Co., Inc., Santa Monica, Calif.
NON-DESTRUCTIVE LEAK TESTING OF SEALED PACKAGES.
Final rept. 1 Feb 61, 1v. incl. illus. tables, 11 refs.
(Contract NOa(s) 60-6037-c)
Unclassified report

Notice: Only Government Agencies may request from ASTIA. Others request approval of Bureau of Naval Weapons, Navy Dept., Wash. 25, D. C.

DESCRIPTORS: *Packaging, Seals, Tests, *Non-destructive testing, Test methods, Gas diffusion, Instrumentation, Gas leaks, Test equipment, Non-leakage probability, Vacuum pumps, Vacuum systems, Materials, Plastics, Laminates, *Containers, Pressure.

The feasibility was investigated of proposed non-destructive test methods for detection of leaks in sealed packages. These were: (1) Insertion of a detectable contaminant in packages prior to sealing; (2) Use of a pressure chamber to force a radioactive gas into leaking packages, with subsequent detection of contaminated packages with a scintillation counter; and (3) Use of a vacuum chamber to effect detectable expansion of tightly sealed packages. The first method, using Freon gas and a General Electric Halogen Detector, has practical application for testing: (1) long high-production runs of a single type and size of sealed package and (2) large sealed containers, and particularly pressurized containers, at relatively low production rates. The third method can be adapted for use for packaging operations where short runs of a wide variety of sealed packages (excluding large, re-usable type containers) are produced. In the use of the second method, it could be determined that cost factors involved in development and use would be prohibitive, as compared with those for other methods evaluated. (Author)

AD-257 411L

AD-257 940 Div. 26, 1 U
(20 June 61) OTS price $10.50

Republic Aviation Corp., Farmingdale, N. Y.
DESIGN AND DEVELOPMENT OF A 1000 F HYDRAULIC SYSTEM. PART III. PHASE II INVESTIGATION,
by William E. Mayhew. June 60. 125p. incl. illus. tables.
(Contract AF 33(616)6411, Proj. 8128)
(WADD TR 59-430, pt. 3) Unclassified report

DESCRIPTORS: *Hydraulic actuators, *Hydraulic systems, *Hydraulic valves, Design, High temperature research, Hydraulic fluids, Servomechanisms, *Hydraulic servomechanisms, Control systems, Aircraft equipment, *Hydraulic seals, Hydraulic reservoirs, *Hydraulic fluid filters, *Pumps, Materials, Test facilities.

Information is presented on the design and fabrication of the components to be used in a hydraulic system where a significant portion of the system will operate at a fluid temperature of 1000 F in an ambient temperature of 1200 F. Further work with regard to the phenoxyphenyl ether previously chosen as the most promising fluid for this system is described. The results of a seal test program, including static and dynamic seals, are also included. In addition, the facilities designed, fabricated, and procured to evaluate the system mockup in the required environments are described. (Author)

AD-257 940 N4

AD-257 978 Div. 14, 7, 26 U
(19 June 61)

Army Signal Research and Development Lab., Fort Monmouth, N. J.
SEALING MOLYBDENUM LEADS TO ALUMINO-SILICATE GLASS,
by Morris Liebson. 5 Oct 60. 1p.
Unclassified report

Reprint from Review of Scientific Instruments 32:204-205, Feb 61. (Copies not supplied by ASTIA

DESCRIPTORS: *Glass, Aluminum compounds, Silicates, Molybdenum compounds, Conductors, Silicon compounds, Seals, *Glass seals, *Metal seals, High temperature research, Molybdenum, Manufacturing methods, Bonding, Molybdenum wire.

A method was devised for fabricating Mo to alumino-silicate glass leads without the use of ovens or elaborate plating methods applied to the Mo. In this method, Mo leads are first beaded with alumino-silicate glass in the usual manner. Close fitting Ni sleeves are then slipped over the Mo wire and pinched into place so that no part of the Mo is exposed. These beaded leads are then sealed into the glass in the usual manner of glassworking. After forming the seal, the Ni sleeve is removed, and the Mo is cleaned. The glass part forming the seal may now be sealed to another piece of alumino-silicate glass; the insulating properties of the glass already in place about this seal will prevent the Mo from reaching the temperatures at which copious quantities of molybdenum oxide vapors form. (Author)

AD-257 978

AD-258 535L Div. 14 U
(27 June 61)

Cleveland Graphite Bronze Div., Clevite Corp., Ohio.
SILICONE LUBRICANT-CARBON SEAL INTERACTION AT ELEVATED TEMPERATURES,
by Thomas H. Koenig and E. James Vargo. Rept. for July 59-Sep 60 on Aviation Lubricants.
Dec 60, 41p. incl. illus. tables.
(Contract AF 33(616)6714, Proj. 3044)
(WADD TR 60-757) Unclassified report

No automatic release to Foreign Nationals.

DESCRIPTORS: *Lubricants, Seals, *Silicones, Oils, *Carbon seals, High temperature research, Chemical reactions, Esters, Viscosity, Tests, Stability, Carbon, Temperature, Deposits, Deterioration.

Static immersion tests using 18 grades of C in combination with 3 silicone oils, one ester, and one silicone-ester blend at both temperatures of 400, 500, and 550 F gave no indication that C has an effect on viscosity increase or high temperature breakdown of the oils tested. In the tests where radical changes occurred in samples containing C, there were also radical changes in control samples not containing C; this point was also confirmed in dynamic tests. In a test setup simulating sealing conditions, silicone sludges were formed at indicated interface temperatures of 280 F. This temperature is considerably below the oxidation and thermal decomposition temperatures of the lubricants. Localized hot spots were found to be the source of the high temperature. In one case, temperatures 300 F higher than the average were recorded. Bench rig tests of shaft and face seals produced silicone sludge under conditions far less severe than those encountered in the field. Tests run with an N blanket show that excluding O from the seal interface inhibits or stops the formation of silicone sludge. This method of seal protection will be satisfactory until the seal interface temperature reaches the thermal decomposition limit of the silicone oil, approximately 620 F. (Author)
AD-258 535L

AD-258 784 Div. 8, 7, 14 U
(29 June 61) OTS price $3.60

Battelle Memorial Inst., Columbus, Ohio.
SERVICES, INVESTIGATIONS, AND TESTS ON STANDARD AND NONSTANDARD PARTS AND MATERIALS,
by W. E. Chapin. Final summary rept. 1 May-30 Nov 60 on Resistors, Evaluation of Body Enclosures, 30 Nov 60, 38p. incl. illus. tables. (Contract DA 36-039-sc-85294)
Unclassified report

DESCRIPTORS: *Resistors, Films, *Seals, Encapsulation, Ceramic capacitors, Ceramic materials, Plastic seals, Glass seals, Glass resistors, Soldered joints, Moisture-proofing, Test methods, Phthalates, Tests, *Sealing compounds, Metal seals.

An investigation was made (1) to determine which moisture-resistance-test method or test sequence of pretreatments is most sensitive in differentiating between molded plastics and ceramic resistor body enclosures, (2) to determine whether leak-detection procedures outlined in military specifications can be used with moisture-resistance cycling as a pretreatment and a performance test, and (3) to explore the possibility of whether the static-humidity test can discriminate effectively between 2 distinctly different types of resistor body enclosures. Film-type resistors from 6 sources were subjected to (1) extensive moisture-resistance tests, (2) lead-strength tests, (3) solder-dip application, (4) temperature cycling, (5) salt-water immersion, (6) lead-strength test followed by salt-water immersion, and (7) static-humidity effects. Ten moisture-resistance cycles were sufficient to indicate that resistors with epoxy-tube enclosures and conformal coatings were different from and inferior to other body-enclosure types. Separating the glass, ceramic, and diallylphthalate enclosures in accordance with their differences in degradation rate under repeated moisture-resistance cyclings was not feasible.

AD-258 784 N5

AD-258 865 Div. 14 U
(29 June 61)

Frankford Arsenal, Philadelphia, Pa.
A PRELIMINARY INVESTIGATION OF A THREAD LOCKING COMPOUND,
by James H. Wiland. Mar 61, 25p. incl. illus. tables (Technical memo. M61-20-1)
Unclassified report

For reference at ASTIA Hq. only. This report cannot be satisfactorily reproduced; ASTIA does not furnish copies.

DESCRIPTORS: Screw threads, *Sealing compounds, Seals, Effectiveness, Tests, Metal screws, Self-locking fasteners, Vibration, Impact shock; Test methods, Test equipment, Bolted joints, Self-locking nuts.

An investigation was made to determine the efficiency of Loctite, a liquid sealant, in preventing screws from loosening under shock and vibration. The Loctite was applied to screws in test plates of aluminum, steel, and bronze which were then subjected to combined shock and vibration tests. Breaking and running torque values were measured on the screws both before and after the tests. None of the bonded screws walked out during the tests. The results show that Loctite is a very efficient thread locking device, but a more severe test condition must be found to allow a quantitative evaluation. (Author)

AD-258 865

AD-258 893 Div. 26 U
(3 July 61) OTS price $1.60

Coast Guard, Washington, D. C.
TESTS OF PARKER RING SEAL FOR BUOY POCKETS.
26 June 61, 10p. incl. illus. (Rept. no. 242) (Proj. CGTD J24-2/1-2-6(c))
Unclassified report

DESCRIPTORS: *Seals, *Gaskets, *Rubber gaskets, *Rubber seals, Aluminum, *Buoys, Rings, Tests, *Metal seals, Design.

Tests were conducted to determine the suitability of a Parker Ring Seal for use as a closure gasket in buoy pockets. The gasket assembly consists of an aluminum flat ring having a 24-inch I. D. and 30-1/2-inch O. D. with a neoprene rubber ring insert. The ring seal was installed in a mock-up buoy pocket and air tested to one atmosphere. Fire hose and water submergence tests were also performed. It was concluded that the Parker Ring Seal gasket was adequate for use in Coast Guard buoy pockets. (Author)

AD-259 086 Div. 27, 10 U
(6 July 61) OTS price $5.60

Parker Aircraft Co., Los Angeles, Calif.
DESIGN, DEVELOPMENT, AND TESTING OF A LIQUID HYDROGEN TANK VENT AND RELIEF VALVE,
by A. E. Neal and R. N. Warren. Dec 60, 143p. incl. illus. 10 refs. (Rept. no. S6CR1616)
(Contract AF 33(616)6710, Proj. 6753)
(AFFTC TR 60-71) Unclassified report

DESCRIPTORS: *Valves, *Propellant tanks, Liquid rocket propellants, Rocket propulsion, Design, Tests, Liquefied gases, Hydrogen, Control valves, Helium, Gas valves, Gas leaks, Gas seals, Low temperature research, Materials, Reliability, *Safety valves.

A summary is presented of the design and development of a liquid H propellant tank vent and relief valve for use in rocket propulsion systems, missiles, and space vehicles. A study was made of the physical properties of liquid H and the properties of materials at liquid H temperatures. Materials were chosen to ensure the reliability, minimum weight, and low leakage of

this component. The validity of the valve concept as a pressure control device was well established. A valve was developed with a high degree of steady state accuracy, adequate response characteristics, and consistent crack and reseat characteristics within the specified operating temperature range. An adequate and simple means of thermal compensation of an absolute pressure reference device was developed. Satisfactory operation at -420 F of a valve seat with low seating force and of mylar diaphragms was demonstrated. (Author)

AD-259 086 9 N6

AD-259 160 Div. 7 U
(11 July 61) OTS price $1.10

Army Arctic Test Board, Fort Greely, Alaska.
EVALUATION OF IMPROVED BATTERY FILLER CAPS FOR USE WITH WINTERIZATION KIT FOR M48A2 TANK.
9 July 61, 4p. illus. (Proj. ATB 2-331)
Unclassified report

DESCRIPTORS: *Storage batteries, Arctic regions, *Tanks, Seals, Tests.

Open-ended Terms: M48A2 tank.

Service tests were made to determine the extent the improved battery filler caps corrected the battery heating system deficiency. The Improved Battery Filler Cap is a battery cell cover that provides an acid tight seal of the cell opening. It contains two vent openings that baffle the gases and prevents loss of electrolyte when splashed against the underside of the cap. The cap is threaded and contains a rubber gasket that seals between the top of the cell opening and the cap when the cap is screwed into the opening. It is fabricated from a hard rubber material

capable of withstanding more heat than the standard cap. (Author)

AD-259 160 9 N6

AD-259 550L Div. 22 U
(14 July 61)

Rock Island Arsenal Lab., Ill.
INVESTIGATION OF SOME FACTORS AFFECTING HYDRO-PNEUMATIC RECOIL MECHANISM FLOATING PISTON PACKING PERFORMANCE.
Technical rept.,
by F. K. Blessin and L. R. Reisbeck, 10 Mar 61, 29p. incl. illus. tables, 10 refs. (Rept. no. 61-998)
(Projs. 80304231-15-48401 and 484-58 (ORD))
Unclassified report

Notice: Only Military Offices may request from ASTIA. Others request approval of Rock Island Arsenal Lab., Rock Island, Illinois.

DESCRIPTORS: *Recoil mechanisms, *Howitzers, *Hydraulic seals, *Pneumatic packings, Plastic seals, Tests, Lubrication fittings, Ethylenes, Fluorides, Polymers, Nitrogen, Rubber seals, Silicones, Nitrile rubber.

Open-ended Terms: 105 mm.

An investigation was made to evaluate the effect of packing configuration, filler material, shroud material, lubricators and venting the floating piston void on the performance of floating piston packings in 105 mm howitzer recoil mechanisms. Gymnastication tests were conducted, at ambient temperatures of 225, 75, and -65F. Evaluations, were made of the packing wear and the volume of nitrogen leakage. Results indicated the following: (1) A 3 piece shroud configuration without cup rings were less and permitted less nitrogen leakage than the standard configuration; (2) More packing shroud wear and nitrogen leakage occurred with fillers made of silicone rubber than of standard nitrile rubber, (3) Packing shrouds made of a filled Teflon material were less than those of unfilled Teflon, but did not reduce nitrogen leakage, (4) The addition of polyester felt lubricators to the floating piston reduced packing wear and nitrogen leakage, and (5) Less packing wear and nitrogen leakage occurred when the floating piston void was vented to the atmosphere than when 500 psi pressure was maintained. (Author)
AD-259 550L 9

AD-259 574 Div. 26 U
(14 July 61) OTS price $1.10

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
CENTRIFUGAL PUMP FOR AMALGAM.
by L. I. Gel'man. 27 Mar 61, 8p. incl. illus.
(Trans. No. MCL-884 of Energomashinostroyeniye 9:23-25, Sep 56)

Unclassified report

DESCRIPTORS: USSR, Technological intelligence, *Centrifugal pumps, *Mercury alloys, Test methods, Pumps, Shafts, Hydraulic seals, Mercury, Construction, Tests.

A description is given of a pump for the pumping of amalgam in which the principle of airtight shaft packing of original construction was employed. Data on testing shaft packing of this pump are given. The construction of shaft packing for a centrifugal pump was made for the purpose of eliminating contact between the amalgam and atmospheric air and a test was made to determine the efficiency of pump shaft packing. The obtained results were satisfactory. (Author)

AD-259 653 Div. 7 U
(17 July 61) OTS price $2.60

Eagle-Picher Research Labs., Joplin, Mo.
RESEARCH INVESTIGATIONS LEADING TO THE DEVELOPMENT AND EVALUATION OF A CADMIUM - SILVER OXIDE BATTERY HAVING A HERMETICALLY SEALED CONSTRUCTION.
Quarterly progress rept. no. 3, 1 Jan-31 Mar 61, by J. K. Wilson. 31 Mar 61, 23p. incl. illus. tables.
(Contract DA 36-039-sc-85370, Proj. 3G18-03-001-02)

Unclassified report

DESCRIPTORS: *Storage batteries, *Battery separators, Seals, Alkaline cells, Cadmium, Cadmium compounds, Silver compounds, Oxides, Electrolytes, Design, Recombination reactions, Electrodes.

Several types of regenerated separator materials have become available for test, and some appear promising. Preliminary capacity tests indicate a longer cycle life for the present series of control cells than was obtained from the series of cells previously tested. Preliminary tests indicate that negative plate configurations are available that will increase the maximum allowable overcharge rate many times. The present design of cells is not suitable for long life operation at 165 F. (Author)

AD-259 653 9 N6

AD-259 803 Div. 20 U
(19 July 61) OTS price $1.60

Army Engineer Reactors Group, Fort Belvoir, Va.
PRELIMINARY INVESTIGATION OF SM-1 CONTROL ROD SEAL FAILURE.
by G. W. Knighton. 18 Apr 61, 13p. incl. illus.
(Rept. no. OSM 15)

Unclassified report

DESCRIPTORS: Research reactors, *Control rods Rods, Neutron absorbers, *Seals, *Metal seals, *Reactor safety systems, Reactor control, Chromium plating, Corrosion, Failure (Mechanics), Nuclear power plants.

Open-ended Terms: SM-1 reactors.

On 26 March, the SM-1 plant experienced excessive control rod drive seal leakage rate. During a vapor container entry for instrumentation check, the leakage rate from each seal was measured. The maximum rate was found to be 6.3 gallons per hour compared to a normal value of approximately .7 gph. Two seals were replaced with rebuilt assemblies. This reduced leakage rates to an allowable operating rate. Skim no. 3 seal was found plugged, and back flushing eliminated the plugging. Visual inspection of the disassembled Rod-B seal indicated leakage increase was due to the increased clearance probably caused by overheating due to loss of cooling water at various times in the operating period. (Author)

AD-259 803 9 N6

AD-260 114 Div. 8, 26 U
(25 July 61) OTS price $9.10

RCA Defense Electronic Products, Camden, N. J.
DEVELOPMENT OF DIODE MICROELEMENTS.
Formal engineering rept. on Micro-Module Production Program.
17 Mar 58, 101p. incl. illus. tables.
(Contract DA 36-039-sc-75968)
Unclassified report

DESCRIPTORS: *Diodes, Semiconductors, *Subminiature electronic equipment, Electron tubes, Germanium, Silicon, Variable capacitors, Computers, *Manufacturing methods, Electrical properties, Mechanical properties, Tests, Design, Reliability, Seals, Production, Life expectancy, Specifications.

The task of preparing diodes to meet the objectives of the Micro-Module Program was centered around four basic diode types: general-purpose germanium diodes (F-1), diffused silicon computer diodes (F-2), silicon junction zener diodes (G), and silicon-alloy variable-capacitance diodes (H). Specifications were prepared for each group, delineating the electrical, mechanical and environmental performance requirements necessary for a complete evaluation of the diodes. The F-1 diodes were constructed by bonding a fine gold wire to a germanium pellet. The pellet was cleaned and the junction coated with a protective silicone resin. The device was then mounted on the metallized ceramic wafer and soldered to a metal cap. Following this, the top cap was circumferentially sealed, providing the second diode electrode. The diode microelement was then tested for hermeticity, and aged and inspected for electrical and mechanical properties. Prototype and final-grade F-2, silicon diffused diodes featured a surface passivation treatment. The F-2 diode program was completed satisfactorily. The F-2 and Group H diodes were processed from silicon pellets. After the processes of bonding the leads and baking, the pellets were subjected to surface-passivating treatment and high-temperature aging. The diodes were then mounted on metallized wafers and the electrical and mechanical properties of the devices were determined. The preparation of type G regulator diodes was discontinued. (Author)
AD-260 114 K1

AD-260 235 Div. 31, 4 U
(27 July 61) OTS price $2.75

Naval Research Lab., Washington, D.C.
THE PRESENT STATUS OF CHEMICAL RESEARCH IN ATMOSPHERE PURIFICATION AND CONTROL ON NUCLEAR-POWERED SUBMARINES.
Annual progress rept.,
ed. by V. R. Piatt and E. A. Ramskill. 14 July 61, 134p. incl. illus. tables, 128 refs. (NRL rept. no. 5630)
Unclassified report

DESCRIPTORS: *Submarines, Nuclear propulsion, *Carbon dioxide, *Oxygen, Contamination, Atmosphere, Purification, Controlled atmospheres, Sampling, Chemical analysis, Carbon compounds, Monoxides, Aerosols, Hydrocarbons, Photosynthesis, Algae, Sea water, Ventilation, Chromatographic analysis, Gases, Arsines, Ozone, Antimony compounds, Hydrides, Ammonia, Ethylenediaminetrile tetracetates, Hydrogen, Gas leaks, Detection.

OXYGEN SOURCES: The sulfate-cycle system; Algae in a photosynthetic gas exchanger; Chlorate candles; Weight economics of CO2 and O equipment for closed spaces; The analysis of sea water for atmospheric gas content. CO2 REMOVAL: The use of versene to improve MEA performance; Alkazid M. ATMOSPHERE SAMPLING AND ANALYSIS: Gas chromatography in the study of trace organic vapor contaminants; The Mk III and Mk IV atmosphere analyzers; Concentrations of hydrocarbon vapors in submarine atmospheres by carbon sampling; Arsine and stibine analysis; Analysis for ozone; Liquid-O contaminants; Determination of monoethanolamine and ammonia in submarine atmospheres; Description of NRL Model E-5753 leak detector. ELIMINATION OF CONTAMINANTS: The CO/H2 burner; Water-thinned paints for submarine interiors; Aerosols in nuclear submarines; Catalytic combustion of aerosols; Thermal degradation of tricryl phosphates.

AD-260 235 9 M1

AD-260 368 Div. 7, 25 U
(31 July 61) OTS price $5.60

General Electric Co., Syracuse, N. Y.
OPTIMIZATION OF THERMOELECTRIC ENERGY CONVERTERS.
Bimonthly progress rept. no. 2, 15 June-14 Aug 60, ed. by Philipp H. Klein. 14 Aug 60, 49p. incl. illus. tables.
(Contract NObs-78403)
Unclassified report

DESCRIPTORS: *Thermoelectricity, *Generators, *Thermal conductivity, Encapsulation, Oxides, Magnesium compounds, Titanium compounds, Seals, Dioxides, Ceramic materials, Lead compounds, Tellurides, Antimonides, Materials, Digital computers, Thermal insulation, Electric power production, Conversion, Cooling, Simultaneous equations, Coolants, Sea water.

A preliminary analysis of the first thermal system to be investigated was nearly completed. This system consists of saturated steam at 533 K (500 F), a thermoelectric generator utilizing thermoelectric materials representative of the present state of the art, and a sea-water heat sink at 291 K (65 F). A magnesia-titania ceramic body was tested and found to be a material suitable as a high-temperature encapsulating medium in conjunction with iron end-caps. Improvements in sealing technology include the construction of an improved sealing apparatus and its use for sealing an easily-filled cell that will facilitate the study of thermoelectric properties of encapsulated materials. Encapsulation of p-type lead telluride was successfully accomplished. (Author)

AD-260 368 9 K1

AD-260 385 Div. 13, 31 U
(31 July 61) OTS price $.75

Naval Research Lab., Washington, D. C.
A PORTABLE THERMISTOR-BRIDGE GAS LEAK DETECTOR,
by A. Hafner. 3 July 61, 18p. incl. illus. (NRL rept. no. 5647)

Unclassified report

DESCRIPTORS: *Gas leaks, Detection, *Detectors, Mobile, Sensitivity, Gases, *Thermal conductivity, Reliability, *Submarines, Safety devices, Design, *Thermistors, Measurement, Gas flow, Refrigerants, Refrigeration systems, Air conditioning equipment, Shipborne.

A new portable gas leak detector useful for locating leaks in pressurized systems containing any gas having a thermal conductivity different from that of air is described. The detector is uncoupled and hence does not respond to the gas concentration in the ambient air but only to the change in concentration encountered in the vicinity of a leak. Investigations and experiments led to a choice of a thermistor bridge in which optimum response time and minimum sensitivity to gas flow rate variations is obtained by using thermistors shielded from the turbulence of the direct gas flow by glass envelopes but with a hole in each envelope to admit the gas by diffusion. Care was taken in the circuit design to prevent blocking of the high-gain amplifier by noise. Sensitivity of the gas leak detector was checked against a calibrated leak of Freon-12, and the device proved to be useful in locating Freon F-12 leaks of as small as 2 ounces per year. It was used with marked success during submarine operation. (Author)

AD-260 385 9 N1

AD-260 465 Div. 26, 14 U
(31 July 61) OTS price $1.10

Rubber Lab., Mare Island Naval Shipyard, Vallejo, Calif.
SUITABILITY OF VITON B O-RINGS FOR USE IN 3000 psi HYDRAULIC SYSTEMS CONTAINING PETROLEUM BASE OR PHOSPHATE ESTER FLUIDS.
Progress rept. no. 2,
by A. E. Barrett. 24 July 61, 4p. tables (Rept. no. 92-10)

Unclassified report

DESCRIPTORS: *Hydraulic seals, Materials, *Hydraulic systems, Hydraulic fluids, Rubber, Phosphates, Esters, Petroleum, Ethylenes, Fluorides, Polymers, Tests, Effectiveness, Synthetic rubber, Cyclohexanes.

Open-ended Terms: Viton, Teflon.

Results of dynamic performance tests of Viton B O-rings indicate that Viton B O-rings of 70 Shore A hardness with Teflon backup rings will perform satisfactorily at 180 F in 3000 psi hydraulic systems containing phosphate ester fluids. In addition, the results indicate that the O-rings will perform equally as well under these conditions in hydraulic systems containing petroleum base fluids. As reported previously, the Teflon backup rings do not stand up at 300 F under the test conditions. Backup rings made of a 90 Shore A Viton B stock showed even greater wear. (Author)

AD-260 465 9 N1

AD-260 526L Div. 26, 14 U
(2 Aug 61)

Douglas Aircraft Co., Inc., Santa Monica, Calif.
NON-DESTRUCTIVE LEAK TESTING OF SEALED PACKAGES.
Monthly progress rept. no. 7 for Oct 60, 15 Nov 60, 8p. incl. illus. table.
(Contract NOa(s) 60-6037-c)

Unclassified report

Notice: Only Government Agencies may request from ASTIA. Others request approval of Bureau of Naval Weapons, Navy Dept., Wash. 25, D. C.

DESCRIPTORS: Gas leaks, Gas diffraction, *Packaging, Seals, Plastics, Films, Resins, Paper, Fluorides, Methanes, Gases, Vacuum seals, Halogens, Test methods, Detection, Reliability, *Non-destructive testing.

Equipment and instrumentation for running the various study programs is now available and in operation. Accumulation of data is progressing at a much accelerated pace. Studies in progress include: gas transmission through flexible barriers and through measured holes in foil; vacuum effect studies with equipment available for varying the rate of vacuum application and for accurate detection and measurement of very slight expansion of packages; and studies of chamber design and probe positioning for detection of halogen leakage through measured holes in flexible barrier envelopes. (Author)

AD-260 526L 8

AD-260 629 Div. 7 U
(4 Aug 61) OTS price $5.60

Gulton Industries, Inc., Metuchen, N. J.
THE TESTING OF HERMETIC SEALS AND SEPARATORS, POSITIVE PLATE STUDIES, AND INVESTIGATIONS ON THE UNIFORMITY OF SEALED NICKEL-CADMIUM CELLS.
Quarterly progress rept. no. 3, 1 Jan-31 Mar 61, on Investigations Leading to the Development of Improved Sealed Nickel-Cadmium Batteries,
by H. N. Seiger. 31 Mar 61, 45p. incl. illus. tables.
(Contract DA 36-039-sc-85390)
Unclassified report

DESCRIPTORS: *Alkaline cells, *Seals, Design, *Battery separators, Electrodes, Ceramic materials, Metal seals, Test methods, *Anodes (Electrolytic cells), Nickel, Cadmium, *Storage batteries.

Ceramic-to-metal seals are now produced consistently. Accelerated testing of separator materials was completed, and the properties of separators are reviewed. Overcharge data were obtained on 6 cells. The data consists of the capacity, Tafel slope and pressure slope. Several cells with a ratio of negative to positive capacity near unity, were brought into several different states of charge. These cells were then pressured with oxygen and the pressure decrease obtained. The question of oxygen adding capacity to a cell was investigated, and a negative answer obtained. The oxygen evolution data was analyzed on a phenomenological basis. The theory of the analysis was developed. It appears that pure nickel has 2 sources of oxygen which have half-times of 9 and 102 minutes respectively. A third self-discharge process is also occurring, but no data has been obtained on this. The doped electrodes have 2 self-discharge processes which are suspected of being one oxygen source undergoing sequential decay. The potential decay data is reported as the Tafel slopes. (Author)

AD-260 629 9 N1

AD-260 791 Div. 25 U
(4 Aug 61) OTS price $1.60

Oklahoma U. Research Inst., Norman.
THE MELTING CURVES OF TIN AND SELENIUM TO 10,000 BARS,
by Stanley E. Babb, Jr. June 61, 18p. incl. illus. 10 refs. (Technical rept. no. 1)
(Contract Nonr-96205)
Unclassified report

DESCRIPTORS: *High pressure research, Laboratory equipment, Pressure vessels, Pressure gages, Metal seals, Heaters, Circuits, *Tin, *Selenium, *Melting, Temperature, Pressure, Design.

Melting studies were made on Sn and Se, and equations are given which can be used to calculate the melting pressure of these substances at any temperature to pressures of 10,000 bars. The intensifier for the generation of pressure consisted of a ram of about 4.5-in. inner diameter and 6-in. outer diameter which drives a 0.654-in.-diam piston. The steel pressure cell has a 0.5-in. inner diameter and a 3.0-in. outer diameter with a usable bore of 6-in. Pressure measurements were obtained with a manganin wire resistance gage. A 1000-w electric heater was used to heat a bath of Na, K, and Li nitrates which remained fluid below 150 C and did not cause corrosion of the steel parts immersed in it. Details of the heater and gage circuits and pressure scale are presented.

AD-260 791 4 N1

AD-260 920 Div. 14, 26, 31 U
(8 Aug 61) OTS price $1.60

Rubber Lab., Mare Island Naval Shipyard, Vallejo, Calif.
DEVELOPMENT OF SEALS FOR HIGH PRESSURE AIR SYSTEMS IN SUBMARINES.
Progress rept. no. 5,
by R. D. Ford. 31 July 61, 12p. incl. table.
(Rept. no. 28-7)
(Proj. no. S-F013-13-01)
Unclassified report

DESCRIPTORS: *Seals, *Rubber seals, Synthetic rubber, Submarines, *Pneumatic systems, High pressure research, Effectiveness, Tests, Physical properties, Mechanical properties, Air, Compressed air, Materials.

Studies were conducted to develop a formulation for rubber seals to be used in the high pressure air systems of FBM submarines. The best stock which the Laboratory had developed previously for this service was a Viton A-HV stock identified as Compound A. An objectionable feature of this stock was its tendency to backrind when molding. A new Viton A-HV stock (377-89) was developed which does not backrind and which is also suitable for use in seals for high pressure gas service. Four sets of O-rings submitted by the Parker Seal Company were tested for resistance to swelling caused by rapid release of 5000 psi air pressure. Two of the sets of O-rings were fairly resistant to swelling, but were not equal to Compound A or 377-89 in this regard. O-rings made by Linear Incorporated and conforming to Classes A and B of specification MIL-P-5516B were tested for swelling. Both the Class A (88 shore) and Class B (68 Shore) O-rings were seriously swollen, and the Class B)O-rings exhibited many small blisters after decompression. The Class A O-rings were considered to be of marginal utility in high pressure air systems. The Class B O-rings were considered to be unsuitable for this purpose. (Author)

AD-260 920 9 N2

AD-261 561 Div. 26, 14, 31 U
(21 Aug 61) OTS price $1.60

Rubber Lab., Mare Island Naval Shipyard, Vallejo, Calif.
DEVELOPMENT OF SEALS FOR HIGH PRESSURE AIR SYSTEMS IN SUBMARINES.
Progress rept. no. 1,
by R. D. Ford and R. E. Morris. 28 Dec 60, 11p. incl. tables (Rept. no. 28-3)
(Proj. S-F013-13-01)
Unclassified report

DESCRIPTORS: *Rubber seals, *Seals, Rubber, Synthetic rubber, Submarines, High pressure research, High pressure compressors, Lubricants, Petroleum, Esters, Phosphates, Fluorides, Vulcanizates, Nitrile rubber, Elastomers, Mechanical properties, Fluorocarbons, Hardness, Tests, Materials.

Rubber O-ring seals for high-pressure submarine air systems were tested for their ability to withstand sudden pressure drops from 4500 to psig. Stocks were prepared from nitrile, carboxylated nitrile, polyurethane, and polysulfide rubbers for service with petroleum-based fluids; stocks prepared from fluoro rubbers were also tested for service with phosphate-ester fluids. Hardness ranged from 83 to 96 Shore A. Damage was appraised by the volume changes of O-rings from these vulcanizates. The results indicated that nitrile, carboxylated nitrile, polyurethane, and fluoro rubber vulcanizates would be satisfactory seals. It appeared that seal stock for service with either type of lubricant could be developed from the fluoro rubber.

AD-261 561 9 N3

AD-261 562 Div. 26, 14 U
(21 Aug 61) OTS price $1.60

Rubber Lab., Mare Island Naval Shipyard, Vallejo, Calif.
DEVELOPMENT OF SEALS FOR HIGH PRESSURE AIR SYSTEMS IN SUBMARINES.
Progress rept. no. 2,
by R. D. Ford. 2 Feb 61, 6p. incl. tables (Rept. no. 28-4)
(Proj. S-F013-13-01)
Unclassified report

DESCRIPTORS: *Rubber seals, *Seals, Rubber, Synthetic rubber, Submarines, High pressure compressors, High pressure research, Lubricants Petroleum, Esters, Phosphates, Fluorocarbons, Vulcanizates, Nitrile rubber, Elastomers, Carbon black, Carboxylic acids, Mechanical properties, Hardness, Materials, Polymers, Tests.

Stocks were prepared from Hycar 1071 loaded with different high-structure carbon blacks. These were intended for use with petroleum-based lubricants. The hardness of the various vulcanizates ranged from 70 to 90 Shore A. The damage to the vulcanizates caused by a sudden drop of air pressure from 5000 to 0 psig was appraised by measuring the change in volume of O-rings made from the vulcanizates. The results of the tests indicated that all of the stocks are satisfactory for this service. These findings are to be tested by simulated service tests. The development of stocks for O-rings for use with either petroleum or phosphate-ester lubricants is being continued. (Author)

AD-261 562 9 N3

AD-261 563 Div. 26, 14, 31 U
(21 Aug 61) OTS price $1.60

Rubber Lab., Mare Island Naval Shipyard, Vallejo, Calif.
DEVELOPMENT OF SEALS FOR HIGH PRESSURE AIR SYSTEMS IN SUBMARINES.
Progress rept. no. 3,
by R. D. Ford. 11 Apr 61, 13p. incl. illus. tables (Rept. no. 28-5)
(Proj. S-F013-13-01)
Unclassified report

DESCRIPTORS: *Rubber seals, *Seals, Rubber, Synthetic rubber, Vulcanizates, Nitrile rubber, Elastomers, Submarines, High pressure compressors, High pressure research, Lubricants Petroleum, Esters, Phosphates, Fluorides, Fluorocarbons, Carbon black, Mechanical properties, Hardness, Materials, Tests.

Stocks were prepared from both Viton A-HV and Viton B loaded with various high-structure carbon blacks. All stocks had a nominal hardness of 80 Shore A. The damage to the vulcanizates caused by a combination of immersion in either the phosphate-ester or petroleum-base oils and a sudden drop in air pressure from 5000 to 0 psig. was appraised by measuring the change in volume of O-rings made from the vulcanizates. Vulcanizates of Viton B and Viton A-HV appeared equal in resistance to these conditions. After conditioning for 46 hr or more in 5000 psig air followed by rapid decompression, the best Viton A-HV O-rings developed to date were observed on occasion to develop blisters on the surface of the O-rings. The development of improved Viton stocks having greater resistance to swelling and blistering is being continued. (Author)

AD-261 563 9 N3

AD-261 564 . Div. 26, 14, 31 U
(21 Aug 61) OTS price $1.60

Rubber Lab., Mare Island Naval Shipyard, Vallejo, Calif.
DEVELOPMENT OF SEALS FOR HIGH PRESSURE AIR SYSTEMS IN SUBMARINES.
Progress rept. no. 4,
by R. D. Ford and R. E. Morris. 9 June 61, 18p. incl. illus. tables (Rept. no. 28-6)
(Proj. S-F013-13-01)
Unclassified report

DESCRIPTORS: *Rubber seals, *Seals, Rubber, Synthetic rubber, Vulcanizates, Nitrile rubber, Elastomers, Fluorocarbons, Submarines, High pressure compressors, High pressure research, Lubricants, Petroleum, Esters, Phosphates, Silicones, Fluorides, Carbon black, Mechanical properties, Tensile properties, Materials, Tests.

Viton A-HV (Compound A) stocks and a Viton B stock were tested for tensile properties, and for swelling after lengthy exposure to air at 5000 psi pressure followed by rapid decompression.

One of these Viton A-HV stocks proved to be outstanding in all respects. Its swelling after decompression was again checked, this time after prior immersion in petroleum-base oil and in phosphate-ester oil. The swelling was found to be very moderate (10% at most). A formulation prepared from fluorosilicone rubber was tested for tensile properties and for decompression swelling after prior immersion in the oils and lengthy exposure to air at 5000 psi pressure. Its tensile properties were poor, but its resistances to the oils and to decompression swelling were excellent. It was considered to be suitable for static service only. O-rings made from a Hycar 1071 stock were installed in the air compressor on the USS THEODORE ROOSEVELT, which is lubricated by petroleum-base oil. The O-rings have sealed satisfactorily for at least 341 hours. (Author)

AD-261 564 9 N3

AD-261 886 Div. 22 U
(11 Sep 61)

Aberdeen Proving Ground, Md.
PRELIMINARY ENGINEERING TEST OF AN O RING AS A LOADING-PLUG SEAL FOR CASE, CARTRIDGE, 90-mm, XM114E1,
by R. N. Dempsey, Aug 61, 15p. incl. tables.
(Rept. no. DPS-320)
Unclassified report

No automatic release to Foreign Nationals.

DESCRIPTORS: Projectiles, *Cartridge cases, Loading, Cartridges, Tests, *Seals, *Cartridge case plugs, High explosive ammunition, Antitank ammunition, Obturation, Fin stabilized ammunition.

Open-ended Terms: M41 Gun, T300 Projectile, M114 cartridge case, O Rings, 90-mm, M36 Gun.

The 90-mm, XM114E1 cartridge case was designed for use with the T300 series projectile. Gas leakage, limiting the retention of the loading plug (with possible resultant damage to the breechblock), was experienced in case-acceptance and complete-round firings. To eliminate this problem an O ring used as a loading-plug seal was tested. One hundred and eighty cases were fired at chamber pressures of from 34,000 to 56,000 psi and at conditioning temperatures of -40 F, 70 F, and +140 F. Less than 5% of the cases failed to eject, and even these cases extracted from 12 to 22 inches and were hand free. There was slight extrusion of the O ring on all rounds fired over 50,000 psi chamber pressure, but this office deems it not objectionable. There was no gas leakage around the loading plug or the primer, no cracks or splits, internal or external fluting in the case side wall, no loosening of the loading plugs, no damage to the breechblock, or other defects. It is recommended that the O ring be immediately incorporated in the manufacture of the XM114E1 cartridge cases. (Author)

AD-261 886 9

AD-261 958 Div. 22, 26, 13, 30 U
(28 Aug 61) OTS price $9.60

Armour Research Foundation, Chicago, Ill.
TESTS ON ATLAS BLAST VALVES.
Final test rept. no. 20 (Preliminary) on Blast Effects on Buildings and Structures and Protective Construction Operation of Six-foot and Two-foot Shock Tubes,
by James J. Swatosh, Jr., 30 Apr 61, 112p. incl. illus. tables.
(Contract AF 29(601)796, Proj. 1080)
(AFSWC TN 61-16) Unclassified report

DESCRIPTORS: *Underground structures, *Shock tubes, *Air blast, *Blast, Seals, *Valves, Nuclear explosions, Atomic bomb explosions, Pressure vessels, Loading, Shock waves, *High pressure valves, Hydraulic systems, Pistons, Plastic seals, High temperature research, Low temperature research, Test facilities, Tests, Failure (Mechanics).

Open-ended Terms: Atlas.

The WS-107A-1 Silo Blast Closures, 16- and 42-in. were subjected to a series of performance experiments. These performance experiments were designed to simulate the actual operating conditions and/or environments to which the closures would be subjected during normal operation. The 16-in. closures reacted satisfactorily to all the performance experiments with the exception of cold environments. They were subjected to maximum test blast load without failure. During the cold environment experiments, pressure leaks in the hydraulic system of the closures developed at approximately [illegible] F. These pressure leaks resulted from the shrinkage of the teflon seals in the system. The 42-in. closures responded satisfactorily only to the hot environment experiments. The temperature of the 42-in. closures was raised to 3[illegible] F before any failures occurred. Pressure leaks in the hydraulic system occurred when the closures were air-blast loaded. Extensive damage developed during repeated cycling experiments. (Author)

AD-261 958 [illegible] N2

AD-262 015 Div. 14, 26 U
(28 Aug 61) OTS price $3.60

Frankford Arsenal, Philadelphia, Pa.
THREADED FASTENERS LOCKING DEVICES EVALUATION OF LOCTITE SEALANT,
by S. M. Kalan. May 61, 34p. incl. illus. tables (Memo. rept. no. M61-29-1)
Unclassified report

DESCRIPTORS: *Seals, *Detents, Effectiveness, Tests, Shock resistance, Vibration.

This report covers a study of the effectiveness of LOCTITE sealant as a locking method for the prevention of loosening of threaded fasteners under shock and vibration conditions. The weakest grade, LOCTITE H, was found to be as effective as the dab type materials MIL-V-173 varnish and MIL-S-11031 sealing compound under the test conditions used. However, LOCTITE sealant compounds should not be relied upon for fastening under high frequency, high amplitude vibration conditions. Application after fastener insertion is undesirable since extent of penetrability is unpredictable. (Author)

AD-262 196 Div. 27, 10 U
(30 Aug 61) OTS price $1.60

Thompson Ramo Wooldridge, Inc., Rocky Mount, Va.
PUMPING HYDRAZINE WITH A TURBOPUMP,
by I. Sheer. 14 Aug 61, 17p. incl. illus.
(ER-4152)
(Contract AF 33(616)6774)
(AFFTC TR 60-53) Unclassified report

DESCRIPTORS: Pumps, *Fuel pumps, *Centrifugal pumps, *Hydrazines, Feasibility studies, Temperature, Materials, Stainless steel, Polymers, Fluorides, Ethylenes, Seals, Cavitation, Design, Tests, Liquid rocket propellants, Rocket fuels.

Feasibility studies of pumping hydrazine with a turbopump are reported. The results show that vapor lock, cavitation, and dead ending can be tolerated with hydrazine. Careful attention must be paid to the temperature rise which results from dead ending or flow stoppage due to vapor lock, however the rise in the case of the pump tested was gradual enough to allow corrective action by an observer. Materials chosen for construction of impeller, housing, seals, and shaft stood up well under a wide range of conditions of operation for a total running time of 55 minutes and 33 seconds. (Author)

AD-262 196 9 N3

AD-262 398 Div. 22 U
(5 Sep 61)

Aberdeen Proving Ground, Md.
SPECIAL BALLISTIC TEST OF 105-MM CARTRIDGE CASES, M115B1, XM148E1 AND XM148B1,
by R. N. Dempsey. Aug 61, 16p. incl. tables.
(Rept. no. DPS-315)
Unclassified report

No automatic release to Foreign Nationals.

DESCRIPTORS: *Cartridge cases, Projectiles, Tests, Seals, Cartridge case plugs, Ballistics, Steel, Loading, High explosive ammunition, Antitank ammunition.

Open-ended Terms: O rings, 105-mm, M115 cartridge case, M148 cartridge case, T384 projectiles.

The M115 and XM148 105-mm cartridge cases were designed for use with projectile, APDS-T, M392E1 and projectile, HEAT, T384, respectively. This ballistic test was conducted to determine the feasibility of substituting steel for the currently used brass M115 and XM148 cases, the effectiveness of an O ring as a loading-plug seal on the XM148 cases, and the most satisfactory loading plug for the XM148 cases with regard to material and thread design. The M115B1 (steel) cases performed satisfactorily when fired at excess pressure (62,000 psi) at 70 F. There was slight gas leakage around the primer of one case at -40 F. The XM148E1 (brass) cases generally performed satisfactorily, but there was slight gas leakage around the loading plug on six of the cases when they were fired at a pressure of 54,000 psi at 70 F. All the XM148B1 (steel) cases performed satisfactorily in every respect. The use of O rings reduced gas leakage significantly. (Author)

AD-262 398 9

AD-262 566 Div. 12, 31 U
(7 Sep 61) OTS price $4.60

Naval Weapons Lab., Dahlgren, Va.
TARTAR STRUCTURAL FIRING TEST ABOARD THE USS CHARLES F. ADAMS (DDG-2),
by J. W. Loving, T. I. Dodson, and others.
15 Aug 61, 47p. incl. illus. tables (NWL rept. no. 1770)
Unclassified report

DESCRIPTORS: *Guided missiles, Surface to air, Guided missile launchers, Test vehicles, Launching, Shipborne, Rocket motors, *Blast, Measurement, Tests, Test methods, Structures, Gas leaks, Safety, Destroyers, Guided missile personnel, Damage control, *Explosion damage, Poisonous gases, Noise, Temperature, Exhaust flames, Ship decks, Hazards, Booster rockets, Guided missile boosters.

Open-ended Terms: Tartar, DDG-2.

Eight TARTAR Mk 1 Mod 0 dual-thrust rocket motors with concrete slugs were fired aboard the USS Charles F. Adams (DDG-2) to investigate the adequacy of the protection for the Tartar launching system personnel against blast effects and to determine the effects of the booster blast on the ship's structure. The test vehicles were fired at various angles such that the exhaust stream was directed at areas thought to impose the most severe conditions on the ship's structural components and equipment. Measurements were made of structural strains, toxic gas concentrations, noise levels, flame penetrations at door and port seals, temperature changes inside the ship and in the blast area of the O1 level and the main deck. High-speed motion pictures were taken on all tests. The results indicated severe gas leakage into mount 52 and other areas adjacent to the launcher and minor damage to mechanical parts of the launching system. A detailed description of all data obtained and ship damage incurred is included. (Author)

AD-262 566 9 N4

AD-262 580 Div. 8 U
(6 Sep 61)

Sperry Gyroscope Co., Great Neck, N. Y.
INVESTIGATION OF MICROWAVE WINDOW FAILURE MECHANISMS AND THEIR ELIMINATION.
Quarterly progress rept. no. 2, 1 Jan-1 Apr 61, by D. B. Churchill and E. W. Cheatham. Apr 61, 29p. incl. illus. (Rept. no. NA-8220-8235-2) (Contract DA 36-039-sc-87389; Continuation of Contract DA 36-039-sc-78314)
Unclassified report

No automatic release to Foreign Nationals except Gt. Britain and Canada.

DESCRIPTORS: *Waveguide windows, *Microwave equipment, Seals, *Electron tubes, Dielectrics, Materials, Waveguide filters, Electron bombardment, Electron transitions, Cavity resonators, Sapphires, Measurement, Reflection, Wave transmission, Beryllium, Waveguides, Waveguide irises, Design, Tests, Ceramic materials, Propagation.

The high-energy electron bombarder was repaired and reassembled. Comparative breakdown tests showed that the rectangular block window has a threshold of breakdown lower than that of a disc window with suitably contoured transition corners. Breakdown on the dielectric surface of the block is a disadvantage and may be a factor responsible for having a lower threshold than the disc, in which breakdown occurs at the transitions rather than at the dielectric surface. The graphical design of a double-resonator filter window using a sapphire disc was confirmed by measurements on an experimental model. Measurements of the reflection coefficient of a sandwich window using a beryllia slab indicated that the structure has somewhat less bandwidth than a self-resonant block window in rectangular waveguide. (Author)

AD-262 580 9

AD-262 718L Div. 1 U
(11 Sep 61)

Aeronautical Engine Lab., Naval Air Material Center, Philadelphia, Pa.
EVALUATION OF WIGGINS PART NO. GSS121B-3 COUPLING FOR USE WITH AIRCRAFT GROUND COMPRESSOR DUCTS.
Rept. on Phase 1,
by Donald B. McCormick. 16 Aug 61, 9p. illus.
(Rept. no. NAMC-AEL-1689)
Unclassified report

Notice: Only Government Agencies may request from ASTIA.

DESCRIPTORS: *Couplings, Disconnect fittings, Tests, Test methods, Compressors, Ducts, Aircraft, Gas turbines, Ground support equipment, Seals.

The purpose of the assignment was to determine the suitability of quick-disconnect couplings for use in connecting flexible ducting to normally ground stationed gas turbine compressors and to aircraft aboard which pneumatically powered equipment is located. It was concluded from the results of the tests that: (1) the coupling is unsafe for service use because the mechanism which locks the coupling to the mating nipple periodically malfunctions and because the end fitting attached to the coupling body is not secured positively; (2) O-ring seal durability and pressure lock functioning are unsatisfactory; and (3) the pressure lock assembly will function as a safety device despite failure of the O-ring seal. (Author)

AD-262 718L 9

AD-263 029L Div. 1, 29 U
(18 Sep 61)

Air Crew Equipment Lab., Naval Air Material Center, Philadelphia, Pa.
MERCURY SPACE SUIT. TEST AND EVALUATION OF MERCURY HELMET VISOR SEAL BOTTLE.
Test rept.,
by Donald F. Hughes. 21 Aug 61, 21p. incl. illus. tables (Rept. no. NAMC-ACEL-458)
(Problem Assignment no. C44AE22-29)
Unclassified report

Notice: All requests require approval of Bureau of Naval Weapons, Navy Dept., Wash. 25, D. C.

DESCRIPTORS: *Pressure suits, *Helmets, *Vacuum bottles, Oxygen, *Hoses, Materials, *Rubber hose, Silicones, Tests, Vibration, Pressure, Vacuum seals, Heat, Spin, Deterioration, Storage.

Twelve silicone hose and bottle units were submitted to an oxygen weight leakage loss over a fixed time period by filling the bottles with oxygen to 1800 psig pressure, weighing them and setting them aside for the required 72 hour time period and then reweighing them. The condition of these units while being tested was that eight units were tested with a capped male fitting on the hose disconnect, one without the cap, three with the regulator in the off position, and one with the hose removed from the swivel fitting and the fitting opening soldered closed. By deduction from analysis of the data obtained from this above mentioned oxygen weight leakage loss over a 72 hour time period test, it was found that the silicone hoses had excessive porosity and exceeded the allowable loss of 5 per cent by weight of oxygen in 72 hours for the complete hose, regulator and bottle assembly as one integral unit. (Author)

AD-263 029L 9

AD-263 298 Div. 26, 14 U
(TIPSN/BRW) OTS price $1.10

Aeronautical Materials Lab., Naval Air Material Center, Philadelphia, Pa.
MIL-F-22191 (AER) QUALIFICATION TEST RESULTS ON THE RAP-IN-WAX COMPANY PRODUCT FILM-O-RAP 5500.
by E. J. Lion. 20 Apr 61, 1p. (Rept. no. NAMC-AML-1230)
Unclassified report

DESCRIPTORS: *Packaging, Materials, Films, Thin films, Ethylenes, Esters, Polymers, Military requirements, Specifications, Tests, Seals, Storage.

The test results indicate that the transparent material, designated Film-O-Rap 5500, is in conformance with the Type II requirements of MIL-F-22191 (Aer) except the one year storage which will be completed March 1962. The sealing conditions are as follows: 350 F, 30 psi, 3-sec dwell time for Packaging Industries, Inc., Portable Heat Sealer, Model 6, 1.5-sec impulse time, 3.0-sec cooling time, 30% of nominal 110 v, 25-lb line pressure, 30 psi effective jaw pressure for Packaging Industries, Inc., Impulse Sealer, Model 12BC and a dial setting of 8 for Vertrod Corporation, Impulse Sealer, Model 13A. (Author)

AD-263 298 9 N5

AD-263 306 Div. 14 U
(TIPSN/BRW) OTS price $1.10

Aeronautical Materials Lab., Naval Air Material Center, Philadelphia, Pa.
QUALIFICATION TEST REPORT ON DODGE CORK COMPANY'S 711-BN AND 100-N GASKET MATERIALS TESTED IN ACCORDANCE WITH MIL-G-6183, AMENDMENT-4, GASKETS AND SHEET GASKET MATERIAL; SYNTHETIC RUBBER AND CORK COMPOSITION. CLASS I. FIRM; AND CLASS II. MEDIUM, RESPECTIVELY OF 22 AUGUST 1947.
by E. J. Colacicco. 8 Dec 60, 3p. (Rept. no. NAMC-AML-22090-61)
Unclassified report

DESCRIPTORS: (*Gaskets, Sheets, Seals, Military requirements, Specifications, Tests.) (*Cork gaskets, Gaskets, Materials, Synthetic rubber.)

Test data indicated that Dodge Cork Company's sheet gasket materials 711-BN and 100-N conform with all the qualification requirements of Military Specification MIL-G-6183, Amendment-4, Class I, Firm; and Class II, Medium, respectively. (Author)

AD-263 391 Div. 8, 14 U
(TIPSE/CRJ) OTS price $3.60

Sperry Gyroscope Co., Great Neck, N. Y.
HIGH AVERAGE-POWER R-F WINDOW STUDY.
Quarterly memo. no. 2, 26 Apr-26 July 61,
by D. B. Churchill and E. W. Cheatham. Aug 61,
25p. incl. illus. (Sperry rept. no. NA-8220-8261-2)
(Contract AF 30(602)2428, Proj. 5573)
Unclassified report

DESCRIPTORS: (*Waveguide windows, Dielectrics, Ceramic materials, Single crystals, Synthetic gems, Sapphires, Aluminum compounds, Beryllium compounds, Wave transmission, Electron bombardment, Seals, Design, Tests.) Microwave equipment, Broadband, Electron tubes, Waveguides. (Cavity resonators, Waveguide couplers; Design.)

The literature study and survey of the commercially available dielectric materials for window applications was completed. It was found that single-crystal synthetic sapphire, cut with the axis of the disc parallel to the C-axis of the crystal, is the best available material from the standpoints of mechanical strength and dielectric loss factor. High-energy electronic bombardment tests on sample windows of sintered alumina and crystalline synthetic sapphire were completed. The final oven brazes of the hybrid coupler assembly, a component of the high-power resonator, were completed. Also, the high-directivity monitor coupler was designed, and a prototype model was satisfactorily tested. The high-power water load was designed, and a prototype model was completed. A nearly perfect match at the specified operating frequency was exhibited by the model. An investigation was made of the problems of sealing rectangular block windows. Satisfactory transmission characteristics were achieved on 2 prototype models of broadband disc windows. The operation frequency bands overlap slightly, with the test frequency of 8.35 kmc in the region of overlap. (Author)

AD-263 391 4 N5

AD-263 457 Div. 10, 27, 30 U
(TIPSH/REB)

Beech Aircraft Corp., Boulder, Colo.
HIGH TEMPERATURE FUEL SYSTEMS INVESTIGATIONS.
Summary rept. 1 Apr 60-31 May 61 on Propulsion Fluid and Heat Transfer Subsystems,
by R. W. Burgess, V. E. Isakson and others.
Aug 61, 54p. incl. illus. tables (Engineering rept. no. 11152)
(Contract AF 33(616)7073, Proj. 3084)
(ASD TR 61-312) Unclassified report

No automatic release to Foreign Nationals.

DESCRIPTORS: (*Jet engine fuels, Aviation fuels, Hydrocarbons, Fuel additives, High temperature research, Thermal stresses, Fuel filters, Deposits, Chromatographic analysis, Spectrographic analysis, Tests.) (Jet engine fuels, Vapors, Corrosion, High temperature research, Tests, *Fuel systems, *Fuel tanks, Valves, Seals, Gaskets, Plastics, Metals, Steel, Aluminum alloys, Titanium alloys.)

High-temperature hydrocarbon fuels were subjected to coker, gas chromatographic, and IR spectrophotometric analysis to determine the effects of various additives and thermal stressing. Aircraft fuel system components were installed in the preconditioning system to determine their suitability for operation under the test conditions, particularly with respect to elastomeric seals. Metal samples were physically stressed and subjected to the higher temperature ranges, both immersed in liquid and suspended in the vapor space. The tendency of the fuels to produce solids and the accumulation of the solids in the preconditioning system were continuously monitored. Appreciable solids accumulation was encountered. No accelerated stress corrosion occurred. It is thought that the duration of the exposure was insufficient to produce concrete results. Proper containment and restraint can extend the operating range of elastomeric seals considerably over their normal high temperature rating. (Author)

AD-263 457 9

AD-263 485L Div. 1 U
(TIPSE/CDM)

Chance Vought Aircraft Inc., Dallas, Tex.
INTEGRATED FLIGHT CAPSULE COCKPIT SEALING AND ENCLOSURE STUDY.
Interim rept., 1 June 59-1 Mar 60,
by W. F. Goehring and W. R. Ockels. 25 Mar 60,
18p. incl. illus. (Rept. no. AER-EOR-12826)
(Contract NOas(s) 59-6150-c)
Unclassified report

Notice: Only Government Agencies may request from ASTIA. Others request approval of Bureau of Naval Weapons, Navy Dept., Wash. 25, D. C. Attn: Code RAAE-2312.

DESCRIPTORS: (*Jettisonable cockpits, Naval aircraft, Jet fighters, Jet planes.) (Cockpits, Seals, *Jettisonable cockpits, Design, *Aircraft canopies.) (Airframes, Sandwich construction, Aluminum, Steel, Glass textiles.)

Open-ended Terms: Integrated flight capsule, F8U.

A study was made of zero cavity sealing within the cockpit and what is involved in the system in terms of occupant safety, arrangement and design, construction and materials required, and recommended tests and development work in conjunction with the program. Various types of cockpit enclosures are discussed with emphasis placed on the one which appears to meet all the objectives necessary for a desired cockpit enclosure. (Author)

AD-263 485L 0

AD-263 640 Div. 8 U
(TIPSE/DLW)

Westinghouse Electric Corp., Elmira, N. Y.
HIGH TEMPERATURE MATCH-BOX ELECTRON TUBES.
Quarterly progress rept. no. 2, 1 May-31 July 61 on Phase 2,
by Joel H. Fink. 31 July 61, 14p. incl. illus.
(Rept. no. 8)
(Contract DA 36-039-sc-87404; Continuation of Contract DA 36-039-sc-75076)
Unclassified report

No automatic release to Foreign Nationals.

DESCRIPTORS: *Electron tubes, *Triodes, Glass seals, *Glass, Cathodes (Electron tubes), Metal seals, Oxide cathodes, Materials, Structures, Test equipment, High temperature research, Design, Tests.

Open-ended Terms: Pyroceram, Nucleated glass.

Investigations were continued on the use of pyroceram as a universal high temperature (500 C) tube envelope material. The cathode structure was modified to provide better thermal efficiencies and more uniformity from tube to tube. Some difficulties were encountered in sealing the tubes without ruining the cathode emissivity but it is believed that this can be overcome in a newly built sealing and exhaust position. Only preliminary trials were made on this equipment. (Author)

AD-263 640 9

AD-263 722 Div. 14, 7 U
(TIPSM/EET)

Burgess Battery Co., Freeport, Ill.
PLASTIC SEALS.
Final rept.,
by C. J. Broughton. 28 Apr 61, 23p. incl. illus.
(Contract DA 36-039-sc-72758)
Unclassified report

For reference only at each of the ASTIA Offices. This report cannot be satisfactorily reproduced; ASTIA does not furnish copies.

DESCRIPTORS: Dry cells, Seals, *Plastic seals, Thermosetting resins, Ethyl cellulose, Production, Manufacturing methods, Automation, Machines.

A summary is presented of efforts to produce a plastic sealing material suitable for mechanical sealing dry battery cells. Both thermo setting and thermo plastic compounds were investigated. Investigation and experimentation proved that the thermo plastic compound ethylcellulose was found to be effective. The material is identified by Dow Chemical as Dow P8-N60-I-5168-Flow - no. 2 formula no. 860. Production equipment and special tooling was used to produce pilot run quantities of 'N', 'A', and 'B' cells using ethylcellulose seals. No difficulty was encountered in making the pilot run quantities of the dry cell seals or cell blocks. (Author)

AD-263 722 3 ref.

AD-263 990 Div. 26, 17 U
(TIPSN/BRW)

Battelle Memorial Inst., Columbus, Ohio.
INVESTIGATION OF HYDROSTATIC EXTRUSION.
Interim technical engineering rept. no. 1, 1 June-31 Aug 61,
by R. J. Fiorentino, A. M. Sabroff, and F. W. Boulger. Sep 61, 12p. incl. illus. (Interim rept. no. 61-7-916 vol. 1)
(Contract AF 33(600)43328)
(ASD TR 61-7-916) Unclassified report

DESCRIPTORS: (*Steel, *Titanium alloys, Aluminum alloys, Vanadium alloys, *Extrusion, Hydrostatic pressure, Feasibility studies, *Machine tools, Hydraulic presses, Design.) (High pressure research, Hydraulic presses, Hydraulic fluids, Dies, Hydraulic seals, Metal seals, Rubber seals.)

Tooling is being designed for hydrostatic extrusion of SAE 4340 steel and Ti-6Al-4V Ti alloys into T-sections which can be inscribed in a 1-in. circle. The tooling is expected to be capable of withstanding extrusion pressures up to 250,000 psi at temperatures up to 500 F. Initial extrusion tests with the equipment will be made with materials such as lead and aluminum which can be extruded at lower pressures. Effective seals must be maintained at the die-liner and ram-liner interfaces. The seal design being considered employs variations of Bridgman's principle of unsupported area. Water will probably be the liquid medium used for the initial tests. Fluid for extrusion temperatures near 500 F will be selected on the basis of their stability at both temperature and high pressure. (Author)

AD-263 990 9

AD-264 762L Div. 7, 27 U
(TIPSN/BRW)

Aeronautical Engine Lab., Naval Air Material Center, Philadelphia, Pa.
QUALIFICATION TESTS OF GENERAL ELECTRIC MODEL 2CM270D3 ELECTRIC STARTERS, BUAER MODEL E-5.
Final rept.,
by J. R. Cipparrone. 5 Oct 61, iv. incl. illus. tables (Rept. no. NAMC-AEL-1691)
Unclassified report

Notice: Only Government Agencies may request from ASTIA.

DESCRIPTORS: (*Airplane engine starters, Power supplies, Clutches, Seals, Armatures, Electric motors.) (Tests, Helicopter engines, Turbopropeller jet engines.)

Open-ended Terms: T58 engines.

The results of qualification tests of General Electric Co. model 2CM270D3 electric starters designed for use on General Electric model T58 turbo-shaft engines are discussed. The model 2CM270D3 starter incorporated modifications which were designed to correct deficiencies which existed in model 2CM270D2 starters. The results of tests established that the starter meets all of the performance and durability requirements specified for a BUAER type E-5 starter in Amendment 2 of Military Specification MIL-S-7780B(Aer) of 25 June 1958. However, suitable modifications to permit disassembly of the clutch are considered mandatory; in addition, improvement in the stability of the clutch assembly is considered desirable. (Author)

AD-264 762L 9

AD-265 170 Div. 7 U
(TIPSN/EET)

Gulton Industries, Inc., Metuchen, N. J.
THE TESTING OF HERMETIC SEALS AND SEPARATORS, POSITIVE PLATE STUDIES, AND INVESTIGATIONS ON THE UNIFORMITY OF SEALED NICKEL-CADMIUM CELLS.
Quarterly progress rept. no. 4, 1 Apr-30 June 61 on Investigations Leading to the Development of Improved Sealed Nickel-Cadmium Batteries,
by H. N. Seiger. 30 June 61, 56p. incl. illus. tables.
(Contract DA 36-039-sc-85390, Proj. 3G18-03-001)
Unclassified report

No automatic release to Foreign Nationals.

DESCRIPTORS: (*Seals, *Alkaline cells, *Battery separators.) (Ceramic materials, Metal seals, Soldering alloys, Design, Manufacturing methods, Tests.) (Electrodes, Anodes (Electrolytic cell), Nickel, Cadmium, *Storage batteries.)

Ceramic-to-metal seals are being made using a batch process using two furnaces. Plate formation in the pilot plant has been made automatic. Additional methods of making the cover to can closure are being investigated. Separator tests on polypropylene from American Felt and Pellon's PVC and polypropylene at 125 and -40 F were completed. The separators which seemed most promising were tested for strength and resistance after storage in electrolyte at 165 F. New cells were fabricated to improve uniformity between cells. Pressure and voltage characteristics were determined. Additional experiments on the oxidation of Cd were made. (Author)

AD-265 170 9

AD-265 360 Div. 8 U
(TIPSE/WD) OTS price $8.10

Westinghouse Electric Corp., Pittsburgh, Pa.
HEAT DIODE CONVERTER.
Interim scientific rept. no. 1, 1 May-31 July 61. 20 Aug 61, 86p. incl. illus.
(Contract AF 33(616)8262)
Unclassified report

DESCRIPTORS: (*Thermoelectricity, Electric power production, Space flight.) (Diodes, Seals, Life expectancy.) (Life expectancy, Space charges, *Thermionic emission, *Diodes, Voltage, Distribution, Cesium.) (Electrons, Scattering, Cesium, Atoms.) (Refractory materials, Metals, Cesium, Vapors, Electrons, Thermionic emission, Tantalum, Molybdenum.)

Contents:
emission of cesium coated refractory metals
Scattering of electrons by Cs atoms
Space charge limited currents in thermionic diodes at high cesium pressure
Potential distributions in high pressure cesium thermionic diodes
Thermionic diodes, carnot efficiency, and anomalous Richardson constants
Theoretical efficiencies of thermionic diodes
Life testing of seals for thermionic diodes

AD-265 360 9 N1

AD-265 443 Div. 14 U
(TIPSM/SEB)

Boeing Airplane Co., Seattle, Wash.
DESIGN HANDBOOK FOR O-RINGS AND SIMILAR ELASTIC SEALS.
Rept. for June 59-Jan 61 on Materials Applications.
by William R. Walker. Apr 61, 105p. incl. illus. tables, 24 refs.
(Contract AF 33(616)5722)
(WADC TR 59-428, pt. 2)
Unclassified report

No automatic release to Foreign Nationals.

DESCRIPTORS: (*Seals, *Fuel seals, *Hydraulic seals, *Plastic seals, *Rubber seals, *Vacuum seals, Gaskets, High temperature research, Low temperature research, Cryogenics, Storage, Aging, Dynamics, Physical properties, Mechanical properties, Impact shock, Sensitivity, Design.) (Hydraulic systems, Pneumatic systems.) (Materials, Elastomers, Polymers, Synthetic rubber, Silicones, Fluorides.) *Handbook.

Open-ended Terms: Compatibility, Teflon.

Data is presented on the mechanism of O-ring sealing in hydraulic and pneumatic systems utilizing static and dynamic type seals at temperatures exceeding 275 F and static applications at cryogenic temperatures. Fuel system seals are discussed in relation to material compatibility with hydrocarbon fuels and propellants. The effects of vibration, pressure cycling, seal materials and fluids on the operational efficiency of seals and back-up rings also are discussed. The limitations of organic seals and the design of vacuum seals are presented. Physical properties of fluorinated rubber elastomers at high temperatures are given. Aging and procedures for controlling aging are discussed in terms of storage. (Author)

AD-265 443 9

AD-265 555 Div. 14, 26, 31 U
(TIPTB/CCH) OTS price $2.60

Materials Testing Lab., Portsmouth Naval Shipyard, N. H.
DEVELOPMENT OF SYNTHETIC RUBBER MATERIAL FOR GASKETS AND PACKINGS IN DEEP SUBMERGENCE SUBMARINES.
Progress rept. no. 2,
by Billy H. Swift. 25 Oct 61, 21p. incl. illus.
(Rept. no. RD61-10M/a)
(Proj. SF-013-13-01)
Unclassified report

DESCRIPTORS: (Design and Tests of *Gaskets, *Rubber gaskets, *Synthetic rubber, Nitrile rubber, Elastomers in Submarines.) (Test methods, Pressure, Underwater.)

A second phase in the development of deep submergence gasket material has been completed. Three rubber stocks, selected on the basis of tests described in Progress Report No. 1, have now been evaluated in a high-pressure test tank. One of the stocks performed satisfactorily in all aspects, but may be too high in hardness for certain applications. A third phase of the project is nearly complete. A group of seven stocks in the 60-80 durometer hardness range are being tested in the Laboratory, and current data indicate that at least two of them should be evaluated in the pressure test tank as candidate materials. (Author)

AD-265 555 9 N2

AD-265 582 Div. 20 U
(TIPTN/BRW) OTS price $2.60

Alco Products, Inc., Schenectady, N. Y.
INSPECTION OF SM-1 CONTROL ROD SEAL COMPONENTS.
Final rept. on Investigation of SM-1 Control Rod Seal Failure,
by R. A. Chittum, R. N. Saccecio and others.
16 June 61, 16p. incl. illus. tables (AP Note no. 362)
(Contract DA 44-192-eng-17)
(Rept. no. OSB 15, rev. 1) Unclassified report

DESCRIPTORS: (Nuclear power plants, Research reactors, Liquid cooled, *Control rods, Neutron absorbers, Drive shafts, Seals, *Metal seals, Failure (Mechanics) of Chromium plating on Stainless steel, Shafts, Corrosion, Microscopy, Scale, Chemical analysis, Radiographical analysis.) (Seals, Coolants, Water, Pressure, Tests.)

Identifiers: SM-1 reactors.

A laboratory test was completed to check leakage rates of a control rod drive seal assembly (shaft, seal rings and diaphragms) which had been in operation in the SM-1 since its original startup. The testing was performed at simulated reactor operating pressure (1200 psi) and room temperature to determine the leakage rate with the seal correctly assembled and with it assembled as it had been during reactor operation i.e., the first diaphragm and seal ring turned around on the seal shaft. No measurable wear was found when the components were measured. Micrographical examination of the Cr plate on a seal shaft removed from the SM-1 showed considerable pitting, corrosion and erosion under and adjacent to some of the stellite ring areas. The most likely cause of removal of the Cr plate was the poor quality plating and inadequate preplate cleaning which resulted in non-metallic inclusions in the material. (Author)

AD-265 582 9 N2

AD-266 158 Div. 8, 14, 26, 17 U
(TIPTE/NTN) OTS price $2.60

Sperry Gyroscope Co., Great Neck, N. Y.
CERAMIC-METAL SEALS FOR HIGH-POWER TUBES.
Technical note no. 1, 10 Apr-9 July 61,
by S. S. Cole, Jr. and J. E. McLinden. July 61,
18p. illus. (Rept. no. NA-8250-8268-1)
(Contract AF 30(602)2371, Proj. 5573)
(RADC TN 61-217) Unclassified report

DESCRIPTORS: (Seals, *Metal seals, *Ceramic materials, *Electron tubes.) (Materials, Aluminum compounds, Ceramic materials, Oxides, Rupture, Tensile properties, Heat treatment, Bonding, Metals, Stresses, Reliability.)

The ceramic-to-metal seal technology study is a continuation study in which 200 metallizing compositions were examined. Ceramic specimens for tensile and modulus of rupture tests were ordered, and equipment for spray and roller-coat metallizing is being fabricated. The experimental sintering furnace and the Baldwin tester are being modified. A study of the variables which effect seal strength was planned. These variables include method of application; metallizing particle size, thickness, and compositions; sintering temperature, time, and rate; impurities; furnace dew point and atmosphere; and type of plate. The study of leak paths was initiated using a dye-impregnation technique. (Author)

AD-266 158 4 N3

AD-266 246 Div. 8, 14, 26 U
(TIPTE/NTN) OTS price $2.60

Knights, James, Co., Sandwich, Ill.
GLASS HOLDER CRYSTAL UNITS.
Quarterly progress rept. nos. 5 and 6, Aug 60-July 61,
by C. W. Snyder. July 61, 25p. incl. illus.
(Contract DA 36-039-sc-81274)
Unclassified report

DESCRIPTORS: (*Glass seals, *Crystal holders, *Quartz crystals, Vacuum seals, Design, *Manufacturing methods.) (Seals, Industrial equipment, Industrial production.) Production.

Research was concerned with: a check-out of the production type glass-sealing machine; the determination of the effect on frequency and resistance of the crystal resulting from the glass-sealing operation; and attempts to produce a crystal design at 800 kc which when mounted in the HC-6/U glass holder would meet the performance specifications. Small batch runs of HC-6/U glass parts on the production sealing machine produced yields of approximately 75% free of cracks or excessive strains. It was determined that line voltage changes detuned the system sufficiently to interfere with the heat programming. The temperatures reached in sealing to provide seals sufficiently free of strains were found to be marginally high for silver plated 9 and 20 mc crystals but not too high if gold electrodes were used. (Author)

AD-266 246 10 N3

AD-266 351 Div. 7, 12 U
(TIPTN/EJH) OTS price $3.00

Delco-Remy Div., General Motors Corp., Anderson, Ind.
SILVER OXIDE-ZINC BATTERY PROGRAM.
Rept. 30 June-31 Oct 60,
by John Rhyne, Jr. May 61, 152p. incl. illus. tables, 223 refs.
(Contract AF 33(600)41600, Proj. MR 3145)
(WADD TR 61-36) Unclassified report

DESCRIPTORS: (*Storage batteries, *Electrolytic cells, *Wet cells, Design, Materials, Operation.) (Electrodes, Silver compounds, Oxides, Zinc.) (Electrolytes, Potassium compounds, Hydroxides.) (Electrochemistry, Gases, Pressure, Voltage, Electric currents.) (Containers, Packaging, Seals, Plastic seals, Membranes, Plastics.) (Spaceships, Satellite vehicles, Electric power production.) Bibliography.

A study was made of the Ag ion migration within the cell during cycling. Distribution of Ag in the various layers of separator was determined as a function of the number of cycles. A comprehensive study of the Zn electrode was partially completed. The effect of current density and certain addition materials was determined in terms of Zn particle size increase during cycling. Methods of controlling Zn penetration of the separator material were established. Other investigations included gas producing reactions at both the negative and positive plates, pressure control, effect of alloying elements on the voltage characteristics of the positive plate, production of a molded terminal seal resistant to KOH leakage. A sealed cell was constructed and cycled over a 20% capacity range for 590 cycles. The pressure change was from a 10 psi vacuum to a 9 psi positive pressure.

AD-266 351 11 N3

AD-266 502 Div. 8, 26 U
(TIPTW/DLW) OTS price $2.60

General Electric Co., Owensboro, Ky.
DEVELOPMENT OF AN IMPROVED JAN 6299.
Quarterly progress rept. no. 1, 1 May-31 July 61, 31 July 61, 21p.
(Contract DA 36-039-sc-85953)
Unclassified report

DESCRIPTORS: (*Electron tubes, Cathodes (Electron tubes), Ceramic materials, Seals, Silver solders, Aluminum compounds, Temperature, Coatings, Humidity, Reliability, Test methods; Processing, *Manufacturing methods, Production.)

Investigations are being made to obtain better performance and greater reliability from the JAN 6299 by evaluating and adapting the latest tube technological advancement. Seven projects are outlined which are designed to improve some specific part of the tube. Progress made on each of the projects is listed. Some expected problems are discussed with the steps planned for their solution. (Author)

AD-266 719 Div. 10, 26 U
(TIPTW/EJH)

Aerojet-General Corp., Sacramento, Calif.
DESIGN HANDBOOK FOR LIQUID FLUORINE GROUND HANDLING EQUIPMENT,
by L. E. White, P. S. Gaile and others. Dec 60, 1v. incl. illus. tables.
(Contract AF 33(616)6586, Proj. 8119)
(WADD TR 60-159) Unclassified report

DESCRIPTORS: (*Liquefied gases, *Fluorine, Helium, Oxygen, Nitrogen, Liquid rocket propellants.) (Gases, Fluorine, Hydrogen compounds, Fluorides.) (Production, Handling, Transportation, Storage, Safety, Toxicity, Disposal.) (Chemical properties, Physical properties.) (Storage tanks, Fuel storage tanks, Pressure vessels, Containers, Pressure tanks, Propellant tanks, Pumps, Valves, Pipes, Seals, Instrumentation.) (Gas detectors, Chemical indicators.) (*Handbooks, Fluorine.) Materials, Cryogenics.

This handbook is a compilation of available design data and methods of operation representing present technical experience levels as it applies to F. It includes design and operational data for liquid He, liquid O, and liquid N systems in areas likely to be of use to a designer of a liquid F facility. It contains considerable design information to assist in scaling up current sizes of F and cryogenic systems to meet specific requirements. No optimum system is selected, though several F systems are discussed. Advantages and disadvantages of the components are discussed to enable designers to choose the best system for particular needs. Bases for comparison include cost, availability, length of operation, F loss and location. (Author)

AD-266 719 9

AD-266 768 Div. 20, 25 U
(TIPTP/MFA) OTS price $8.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ATOMIC ENERGY (SELECTED ARTICLES).
Sep 61, 89p. incl. illus. tables (Trans. no. FTD-1208 of Atomnaya Energiya 10:pp. 343-346, 372-373, 377-392, 396, 403-404, 406-407, 412-415, 420-422, 1961)
Unclassified report

DESCRIPTORS: (*Atomic energy, Scientific reports.) (Translations, USSR.) (Fission, Nuclear energy to Electricity, Thermionic emission, Diodes, Cathodes, Plasma physics, *Research reactors.) (Isotopes, Uranium, Plutonium, *Alpha particles.) (*Statistical analysis, Distribution theory.) (*Monochromatic light, Measurement, Thermal radiation, *Neutron spectrum, Graphite moderated reactors.) (*Liquid metals, Heat transfer, Turbulent flow.) (*Shafts, Torque couplings, Power, Seals.) (*Gamma rays, Scattering, Aluminum.) *Radioactive isotopes, *Atomic energy engineering.

Contents:
Thermionic energy converters; Ternary fission of U-233, U-235, Pu-239, and Pu-241 Nuclei; Measurement of the kinetic characteristics of a reactor by a statistical p-Method; Distribution of the number of counts recorded by a neutron detector located in a reactor; Use of a monochromator to measure the thermal-neutron spectra of a nuclear reactor; Turbulent-flow heat transfer in liquid metals; Power losses and initial shaft torque in a seal of frozen sodium; Calculation of the passage of fast neutrons through cylindrical channels in biological shielding; Spectrum of scattered gamma-radiation; Monte-Carlo calculation of the passage of gamma-radiation from a plane Cs-137 source through aluminum under conditions of barrier geometry; Synthesis of uranium dodecaborides; A change in the activity of fission products of U-235 and Pu-239 with time; and News of science and technology.

AD-266 768 9 N3

AD-266 936 Div. 25, 14 U
(TIPTM/GEC)

Bendix Products Div., Bendix Corp., South Bend, Ind.
MATERIALS PROPERTY DATA.
Quarterly progress rept. no. 2 on Phase 1 and Monthly summary rept. no. 6 on Phase 2, 1 Apr-30 Sep 61,
by James W. Yates. Oct 61, 2 nos. in 1v. incl. tables.
(Contract AF 33(616)8086)
Unclassified report

DESCRIPTORS: (*Friction brakes, Friction, *Materials, High temperature research, Graphite, Silicon compounds, Dioxides, Tests, Tables.) (Friction, Materials for Bearings, Seals, Low temperature research, Magnesium compounds, Oxides, Flame spraying, Tests.) (Abrasive coatings, High temperature research, Flame spraying, Tests.) (Structures, Materials, High temperatur research, Tests, Tensile properties, Deformation, Low temperature research, Bearing, Seals.)

Identifiers: Composite materials.

There are three areas of coverage. The first area, High Temperature - High Friction, is the development in the aircraft brake field and is one-third complete in this report. The second area is that of Seals and Bearing, Low Temperature - Low Friction Materials. This data is complete. The third is Abradable Coatings, similar to seals and bearings, though quite different in mechanical properties. This data also is complete. (Author)

AD-266 936 4

AD-267 051 Div. 7 U
(TIPTM/BRW) OTS price $2.00

Inland Testing Labs., Dayton, Ohio.
ALKALINE BATTERY EVALUATION.
Rept. for 30 June 60-15 Apr 61,
by I. F. Luke, W. G. Ingling, and W. W. Clark.
Oct 61, 70p. incl. illus. tables.
(Contract AF 33(616)7529, Proj. 3145)
(ASD TR 61-236) Unclassified report

DESCRIPTORS: (*Alkaline cells, Wet cells, Storage batteries for Spaceships, Satellite vehicles.) (Anodes (Electrolytic cells), Cadmium compounds, Hydroxides.) (Cathodes (Electrolytic cells), Nickel compounds, Hydroxides.) (Battery separators, Cellulose.) (Electric insulation, Ethylenes, Fluorides, Polymers, Nylon.) (Electrolytes, Potassium compounds, Hydroxides.) (Containers, Stainless steel, Magnesium.) (Seals, Rubber seals.) (Valves, Check valves.) (Design, Tests, Failure (Mechanics), Analysis.) (Cadmium, Nickel, Silver, Zinc.)

The report covers the first period of an alkaline battery applied research and failure analysis program to establish a broad base of battery test data for the design of electrical systems of future space vehicles. Another objective is to determine techniques and/or materials to prevent these failures while increasing the usable watt-hours-per-pound capability and cycle life of the battery. Cycle-life tests were conducted on 1 type of 12-amp-hr, sealed, Ni-Cd cell in 2 temperature environments and 4 depths of discharge. Initial results show that (1) cell cycle-life with shallow discharges is considerably longer than cycle-life at deep discharges, and (2) cycle-life is reduced by high ambient temperatures. The program will include as future work evaluation of Ag-Cd and Ag-Zn type cells. (Author)

AD-267 051 29 N3

AD-267 111 Div. 14 U
(TIPTM/TCG) OTS price $1.00

Physics Lab., Wright Air Development Div., Wright-Patterson Air Force Base, Ohio.
EVALUATION OF BUNA-N (NBR) GASKETS IN PROTOTYPE APPLICATIONS UNDER GAMMA FLUX.
Rept. for Sep 57-Jun 59, on The Chemistry and Physics of Materials,
by John A. Parker and Denver Hale. Feb 61, 31p. incl. illus. tables.
(Proj. no. 7360)
(WADD TR 59-661) Unclassified report

DESCRIPTORS: (*Rubber gaskets, *Acrylonitriles, *Butadienes, Rubber, Chemical properties, Quantitative analysis, Seals, Sealing compounds under Gamma rays.) (Radiation effects on Physical properties and Bonding in Polymerization, Ferrocenes, Effectiveness in Reduction, *Radiation damage.) (Laboratory equipment, Measurement, Gas leaks, Gaskets.) Tensile properties, Flanges, Pressure.

Qualitative and quantitative sealability tests were evaluated to test the theoretical prediction of the stability of certain acrylonitrile-butadiene rubber stocks. Reasonable agreement between sealability coefficients was obtained from the seal tester and relative replacement times over a dose range from 2 x 10 to the 9th power to 2 x 10 to the 10th power ergs/g C (one roentgen = 87.7 ergs). Evaluation criteria for these compositions were established by application of the Bopp-Sisman relationship to observed changes in the elastic modulus previously reported. The effect of ferrocene as a potential anti-rad was investigated and found to improve the radiation resistance of these stocks. The apparatus described for determining sealability of gasket materials consist of a method of applying a load on the gasket, equipment for pressurizing one side of the gasket seal and a method for measuring gas leakage. (Author)

AD-267 111 4 N4

AD-267 121 Div. 26, 14, 31 U
(TISTM/EET) OTS price $1.10

Rubber Lab., Mare Island Naval Shipyard, Vallejo, Calif.
DEVELOPMENT OF SEALS FOR HIGH PRESSURE AIR SYSTEMS IN SUBMARINES.
Progress rept. no. 5,
by R. D. Ford. 21 Sep 61, 10p. incl. illus.
(Rept. no. 28-8)
(Proj. no. S-F013-13-01)
Unclassified report

DESCRIPTORS: (*Rubber seals, *Pneumatic systems for Submarines, Effectiveness.) (Synthetic rubber, *Seals, Materials, Physical properties, Mechanical properties, High pressure research.) (Compressed air, High pressure compressors.)

The Laboratory was requested to develop a formulation for rubber seals to be used in the high pressure air systems of fleet-ballistic-missile submarines. The two best stocks reported previously were highly resistant to both the petroleum and phosphate-ester lubricants used in the air compressors. Seals made from both stocks had excellent resistance to swelling by high pressure air. O-rings prepared from the first stock, showed moderate backrinding when removed from hot molds. The second stock cured without backrinding. (Author)

AD-267 121 9 N4

AD-267 122 Div. 8 U
(TISTE/CDN)

Sperry Gyroscope Co., Great Neck, N. Y.
INVESTIGATION OF MICROWAVE WINDOW FAILURE MECHANISMS AND THEIR ELIMINATION.
Quarterly progress rept. no. 3, 1 Apr-1 July 61,
by D. B. Churchill and E. W. Cheatham. July 61, 39p. incl. illus. (Rept. no. NA-8220-8235-3)
(Contract DA 36-039-sc-87389; continuation of Contract DA 36-039-sc-78314)
Unclassified report

Not releasable to Foreign Nationals except Great Britain and Canada.

DESCRIPTORS: (*Waveguide windows, *Microwave equipment, *Electron bombardment, Tests.) (Dielectrics, Materials, *Ceramic materials, Waveguides, Waveguide irises, Design.) (Sapphires, Aluminum compounds, Oxides, Seals, Radiation damage.)

High-energy electronic bombardment tests on sample windows of sintered alumina and crystalline synthetic sapphire were conducted. Both samples were bombarded for several hours with electron beams of energy levels up to 140 kv. The sapphire target showed no signs of damage; the alumina target was slightly eroded in the impact area, but no measurable crater was formed. In a second series of tests, each target was bombarded with an electron beam on one side and an unfocused ion beam on the other. Both targets were severely damaged on the electron beam side. Thin-disc S-band windows were tested at the 12-megw level using an SAS-139 tube as a driver. A 3-section window assembly was constructed, baked, and exhausted to a high vacuum. The window assembly performed satisfactorily in the first few hours of operation. Life-test data are being taken. The design criteria for thick-disc windows were studied. (Author)

AD-267 122 9

AD-267 145 Div. 25, 14 U
(TISTP/NFA)

Chance Vought Corp., Dallas, Tex.
COMPOSITE ELASTOMER-METAL O-RING SEALS.
Rept. for 6 Apr 60-31 May 61 on Exploratory Design and Prototype,
by L. E. Doughty. June 61, 36p. incl. illus. tables.
(Contract AF 33(616)7079; Proj. 7381)
(WADC TR 59-749, pt. 2)
Unclassified report

DESCRIPTORS: (Rubber seals, *Elastomers, Rubber gaskets, *Design.) (Tests, Materials, Physical properties, Shear stresses, Tensile properties, Hardness.) (Processing, Manufacturing methods.) (Experimental data, Photographic analysis, Tables.)

The objectives of this program were elastomer-metal composite O-ring seals with superior physical properties and evaluation of the performance of the prototype O-ring seals in adverse environments. A revised fabrication procedure, which improved the acceptability rate of composite O-ring seals, was developed to embed a metal spring concentrically in an elastomeric O-ring. Two adhesives to bond the elastomer to the spring core were found suitable. Hydraulic dynamic cycling tests were performed at 4000 psi and temperatures up to 500 F. Performance of composite O-rings installed on a test piston without back-up rings was not satisfactory for practical use at elevated temperatures and pressures. Performance of composite O-ring seals used with back-up rings was comparable to that of conventional O-ring seals. Because of the severe degradation of elastomeric properties at high temperatures, the dynamic sealing performance of elastomeric O-ring seals, conventional or composite, appears to be dependent on back-up ring performance. (Author)

AD-267 145 9

AD-267 501 Div. 14 U
(TISTM/TCG)

Boeing Co., Seattle, Wash.
DESIGN DATA FOR O-RINGS AND SIMILAR ELASTIC SEALS.
Rept. for 16 Feb-31 Dec 60 on Materials Applications,
by George E. Trapus, Robert S. Roper and others.
May 61, 163p. incl. illus. tables, 17 refs.
(Contract AF 33(616)5722, Proj. 7381)
(WADC TR 56-272, pt. 6) Unclassified report

DESCRIPTORS: (*Seals, *Hydraulic seals, *Plastic seals, *Rubber seals, Elastomers, Silicones, Physical properties, Mechanical properties, Temperature, Tests, Cryogenics, Design.) (Thermal expansion, Tensile properties, Friction, Deformation, Stresses, Compression shock, Aging, Viscosity, Stability.) (High pressure research, Low temperature research.) Bibliography.

Identifiers: TEFLON.

A study was made to obtain and develop seal design information so that a handbook could be prepared concerning seals for extreme and/or unusual environments. A survey of current literature concerning seals and seal materials was conducted. Emphasis was placed on seals for extreme environments and on the aging of seals and its effects. These properties, including thermal expansion, compression modulus, compression set, frictional characteristics, and tensile strength, elongation, and modulus, tensile and compression stress relaxation were determined at temperatures from -425 to 600 F. Functional test data reported include information from static and dynamic pneumatic seal tests at temperatures from room temperature to 1000 F, hydraulic rod seal tests at temperatures from -65 to 800 F at pressures from 1000 to 4000 psig, and static and dynamic seal tests at cryogenic temperatures. (Author)

AD-267 501 9

AD-267 890 Div. 14, 20, 21 U
(TISTM/GEC) OTS price $21.00

Radiation Effects Information Center, Columbus, Ohio.
THE EFFECT OF NUCLEAR RADIATION ON ELASTOMERIC AND PLASTIC COMPONENTS AND MATERIALS,
by R. W. King, N. J. Broadway and S. Palinchak,
1 Sep 61, 370p. incl. illus. tables, 205 refs.
(REIC rept. no. 21; Supersedes rept. nos. 3, AD-149 551; 3A, AD-210 759; 3-2A, AD-239 264; 9, AD-229 487; 13, AD-241 430 and memo. nos. 1, AD-207 043; 3, 8, 15, AD-225 504 and 17, AD-219 511)
(Contract AF 33(616)7375, Proj. 1448)
Unclassified report

DESCRIPTORS: (*Radiation effects, *Radiation damage, Organic materials, *Plastics, *Elastomers, *Polymers, Laminates, Nuclear propulsion.) (Seals, Gaskets, Hoses, Coatings, Electric insulation, Optical materials, Optical plastics, Structural shells.) (Theory, Tests, Controlled atmosphere, Mechanical properties, Physical properties, High temperature research.) *Bibliography.

Organic materials are susceptible to damage from all types of nuclear radiation. Consequently, plastics and particularly elastomers, present serious problems in connection with the development of components and systems for nuclear-powered vehicles. In addition to being susceptible to damage by radiation, many of these rubber and plastic materials are adversely affected by environmental conditions, such as extreme temperatures (-100 to +500 F), vacuum, oxidizing atmospheres (ozone), and various types of fuels, lubricants, and hydraulic fluids. Although there are a number of organic materials which have radiation resistance in the range required, they are not useful in the construction of many components and systems because they are lacking in some other needed property. For example, polystyrene has very good radiation resistance but low strength and heat resistance. Therefore, the major problem is to develop materials which will resist radiation and which are also satisfactory in the environments mentioned above. (Author)

AD-267 890 9 N4

AD-268 381 Div. 14 U
(TISTM/TCG)

Chance Vought Corp., Dallas, Tex.
PHYSICAL PROPERTIES OF SOME ENGINEERING MATERIALS. UNPUBLISHED DATA FROM COMPANY SPONSORED PROGRAMS.
Quarterly rept. no. 3, vol. 1 on Phase 1, 1 Sep-30 Nov 61,
by J. H. Pinn and J. J. Petersen. 15 Dec 61,
90p. incl. illus. tables (Rept. no. ARR-E1R-354)
(Contract AF 33(616)7986)
Unclassified report

DESCRIPTORS: (Materials, Physical properties, Mechanical properties, Test methods.) (*Glass textiles, *Resins, Laminates.) (*Hydraulic fluids, Viscosity, Hydrolysis, Corrosion inhibition.) (*Magnesium alloys, Aluminum alloys, Corrosion.) (Rubber gaskets, Insulating materials, Stability.) (*Sealing compounds, Stresses, High temperature research.) *Rubber.

Contents:
Heat resistance of reduced resin laminated cones reinforced with E type fiberglass
OS-45-1 hydraulic fluid: lubricity tests
Evaluation of GE 81717 hydraulic fluid for system temperature ranges of 0 to 500 F and 0 to 700 F
Evaluation of Oronite 8515 hydraulic fluid per piloted aircraft spectrum A
Corrosion test on Mg fittings for fuel system applications
Evaluation of physical properties of O-ring compounds in OS-45-1 hydraulic fluid at 400 F and in dry air at 350 F
Evaluation of rubber compounds conforming to specification MIL-P-18017A
Evaluation of high-temperature sealants

AD-268 381 9

AD-268 416 Div. 8, 14, 26 U
(TISTE/NTM) OTS price $1.60

Chatham Electronics Div., Tung-Sol Electric, Inc., Livingston, N. J.
PRODUCTION ENGINEERING MEASURE FOR POLYOPTIC SEALING OF HYDROGEN THYRATRON TUBES.
Quarterly progress rept. no. 9, 1 July-30 Sep 61 by Ward W. Watrous. 27 Oct 61, 14p. incl. illus.
(Contract DA 36-039-sc-81289)
Unclassified report

DESCRIPTORS: (*Thyratrons, *Glass seals, Hydrogen, Sealing compounds, Production, *Manufacturing methods.) (*Miniature electron tubes, Electron tubes, Seals, Enamel coatings, Electrical properties, Mechanical properties, Temperature, Life expectancy, Tests.)

Research was continued on the polyoptic sealing of hydrogen thyratron tubes. Life tests were continued. All tubes required to have been made on the automatic exhaust machine have either completed life test or are being tested. The present results show no essential difference in survival rates between the 2 types of seals. No further work on variations in sealing techniques was done but consideration is given to an extension of the high temperature bake process investigation. Initial work was begun in determining the proper techniques for polyoptic sealing on trolley exhaust. (Author)

AD-268 416 9 N5

AD-268 419 Div. 26, 27, 12 U
(TISTA/VGW)

Component Evaluation Labs., South El Monte, Calif.
AIR FORCE EVALUATION TESTING OF ATLAS ''D'' COMPONENTS TWO PROPELLANT TANK PNEUMATIC CHECK VALVES GD/A PART NUMBER 27-08114-1 B. H. HADLEY PART NUMBER 10588-1 SERIAL NUMBERS 56-399.
Oct 61, 28p. incl. illus. tables (Test rept. no. 2015)
(Contract AF 04(647)703)
(AFBSD TR 61-38)
Unclassified report

DESCRIPTORS: (*Check valves, Pneumatic devices, Plastic seals for Propellant tanks of Guided missiles, Surface to surface, Tests.) (Ethylenes, Fluorides, Polymers.)

Identifiers: Teflon, Atlas-D.

The performance characteristics of two propellant tank pneumatic check valves were evaluated. During the test program which is described in detail, each unit failed as described below: (a) After 17,000 cycles of a 20,000 cycle life test, the teflon seat in Unit 1 cold flowed to the extent that the poppet would no longer seal in the check flow direction. (b) After passing the 20,000 cycle life test, Unit 2 failed after 100 cycles of the contaminated endurance test. The contamination, introduced during testing, resulted in failure of the teflon seat to seal against the poppet in the check flow direction. (Author)

AD-268 419 2

AD-268 420 Div. 12 U
(TISTW/EET)

Component Evaluation Labs., South El Monte, Calif.
AIR FORCE EVALUATION TESTING OF ATLAS D COMPONENTS TWO HYDRAULIC RELIEF VALVES GD/A PART NUMBER 27-08588-1 VICKERS INC. MODEL EA 50094 SERIAL NUMBERS C-29064 AND C-14975.
Nov 61, 23p. incl. illus. (Test rept. no. 2001-2)
(Contract AF 04(647)703)
(AFBSD TR 61-69) Unclassified report

DESCRIPTORS: (*Guided missiles, Surface to surface, *Hydraulic systems, *Hydraulic valves, Seals, Hydraulic sealing, Erosion, Reliability, Tests, *Safety valves.)

Identifiers: Atlas.

The performance characteristics of 2 hydraulic relief valves currently in operational use in D series Atlas missiles, are presented. Two problem areas were discovered during testing. First, due to improperly applied torque, the valve poppet housing assembly became loose during testing and, subsequently, excessive internal leakage occurred. Second, during the contaminated portion of the Life Test, undue erosion of the poppet sealing surface caused excessive internal leakage when the valve was in the closed condition. A detailed discussion of the test program along with the test equipment employed in the performance of the program, is included. (Author)

AD-268 420 2

AD-268 426 Div. 25, 30 U
(TISTM/GEC) OTS price $2.60

Engineering Supervision Co., New York.
INVESTIGATION OF STRESS DISTRIBUTION AND STRENGTH CHARACTERISTICS OF LOAD MAGNIFICATION ANVILS FOR ULTRA HIGH PRESSURE APPARATUS.
Quarterly scientific rept. no. 2, 1 Apr-30 June 61 on Photoelastic Investigation of Axially Compressed Cone Frustums,
by Herbert Becker. 30 June 61, 19p. incl. illus
(Technical rept. no. SN 61-10)
(Contract AF 19(604)7438; In cooperation with New York U. Coll. of Engineering)
(AFCRL-727) Unclassified report

DESCRIPTORS: (*High pressure research, Laboratory equipment, Installation, Gaskets, Load distribution, Photoelasticity, Stresses, Shear stresses, Pressure, Temperature, Fracture (Mechanics), Tests, Theory.)

Identifiers: Anvils.

Photoelastic studies were made of the stresses induced in conical frustums by uniform pressure applied to the small bases. One cone was investigated for uniform pressure applied to the small base and to a region of the conical surface adjacent to the small base. The data are reported in the form tau sub max/p where tau sub max is the principal shear stress at a point and p is the nominal uniform pressure applied to the cone base (axial force/base area). In addition, a room temperature test was performed on one cone to determine the fracture mode. The experimental method and results of these investigations are described and contain comparison with theory. (Author)

AD-268 426 9 N5

AD-268 507 Div. 8, 14 U
(TISTM/TCG) OTS price $3.60

Sperry Gyroscope Co., Great Neck, N. Y.
HIGH AVERAGE POWER R-F-WINDOW STUDY:
Quarterly memo. no. 3, 26 July-26 Oct 61,
by D. B. Churchill and E. W. Chesthum. Nov 61, 16p. incl. illus. (Rept. no. NA-8220-8261-3)
(Contract AF 30(602)2428)
Unclassified report

DESCRIPTORS: (*Waveguide windows, Dielectrics, Ceramic materials, Single crystals, Synthetic gems, Sapphires, Aluminum compounds, Beryllium compounds, Oxides, Wave transmission, Electron bombardment, Seals, Design, Tests.) (Cavity resonators, Waveguide couplers, Design.) Microwave equipment, Broadband, Electron tubes, Waveguides.

The arc-detector and protective circuit was modified to achieve a faster response time and positive operation in the event of a waveguide arc; a special test system was developed to measure the response time. A system of automatic attenuation was developed to reduce the high-power drive signal in the presence of a severe load mismatch. A heterodyne arrangement was devised to permit the low-power c-w oscillator signal to be used as a fixed-frequency marker on the swept-frequency response pattern of the ring resonator. The first test window structure was tested at high levels of c-w power in the ring resonator. The structure consisted of a compression-sealed disc of sintered BeO ceramic in a cylindrical waveguide joined by conical mode transducers. The window transmitted 75 kw of power without evidence of breakdown or change of electrical characteristics. Internal arcing occurred in the ring resonator at the 75 kw level. A compression sealed double-disc window structure using thin sapphire discs was developed and cold tested. Some modifications were made to the BeO-disc water load to improve its bandwidth, and to increase the rate of water flow. (Author)

AD-268 507 9 N5

AD-269 034 Div. 7, 25 U
(TISTE/CRJ) OTS price $1.60

General Electric Co., Utica, N. Y.
RESEARCH AND DEVELOPMENT ON THERMOCOUPLE ENERGY CONVERTERS (PHASE II).
Quarterly progress rept. no. 2, 12 July-1 Oct 61, on phase 2,
by W. J. van der Grinten. 1 Nov 61, 13p. incl. illus.
(Contract DA 30-069-501-ORD-3294, Proj. TN2-8106)
Unclassified report

DESCRIPTORS: (*Thermocouples, *Thermoelectricity, *Power supplies, Lead compounds, Tellurides, Manufacturing methods, Design.) (Generators, Seals, Materials.)

Efforts are being made to develop techniques for fabricating, in quantity, good quality n- and p-type thermoelectric lead telluride cells and to assemble these cells to form 2 thermoelectric devices which will meet the following requirements: (a) each of the 2 thermocouple energy converters will consist of 9 couples and will have an output of 7.5 watts/cubic inch or better at a minimum load current of 20 amp when a temperature gradient of at most 600 K/cm exists across the thermoelectric material; (b) the converters will be capable of operation with the hot side of the thermoelectric material near its melting point (917 C) and the performance indicated should be attainable at a hot side temperature of at least 1000 K; and (c) the devices should be operable for a minimum of one hour. Current effort has resulted in perfecting the casting technique so that n- and p-type cells can be manufactured in quantity. Also, the design and fabrication of the complete cell assembly including a hermetic seal at the cold junction side, having a maximum temperature capability of 780 C, was realized. (Author)

AD-269 034 9 N6

AD-269 310 Div. 14, 26, 10 U
(TISTW/EJH)

Reaction Motors Div., Thiokol Chemical Corp., Denville, N. J.
ELASTOMERIC AND COMPLIANT MATERIALS FOR CONTACT WITH LIQUID ROCKET FUELS AND OXIDIZERS.
Rept. for May 60-May 61 on Nonmetallic and Composite Materials,
by Joseph Green and Nathan B. Levine. Sep 61, 42p. incl. illus. tables, 16 refs.
(Contract AF 33(616)7227, Proj. 7340)
(ASD TR 61-76, pt. 1) Unclassified report

DESCRIPTORS: (*Liquid rocket propellants, Rocket oxidizers, *Hydrazines, Methylhydrazines, Nitrogen compounds, *Tetroxides, *Chlorine compounds, *Fluorides, Seals, *Rubber seals, Coatings.) (Polymers, *Elastomers, *Synthetic rubber, Vulcanizates, Silicones, Laminates, *Plastic coatings, Ethylenes, Fluorides, Resins, *Metal coatings, Films, Aluminum, Gold.) (Manufacturing methods, Test methods, Test equipment.)

Identifiers: Composite materials, Compatibility.

Various techniques were employed to provide elastomeric composites suitable for use in contact with hydrazine type fuels, N2O4, and ClF3. Through the use of compounding studies and investigations of resinous and metallic coating systems several elastomeric materials were recommended for field testing in contact with N2H4 type fuels and N2O4. A polyethylene coating was applied to an elastomeric O-ring. The elastomer base was protected from NO2 and N2O4 for 24 hr by this coating. Preliminary investigations were initiated for development of elastomeric composites which are compatible with ClF3. (Author)

AD-269 310 9

AD-269 404 Div. 8, 26 U
(TISTW/DLW) OTS price $3.60

General Electric Co., Owensboro, Ky.
DEVELOPMENT OF AN IMPROVED JAN 6299.
Quarterly progress rept. no. 2, 1 Aug-31 Oct 61, by Francis A. Harris. 31 Oct 61, 29p. illus.
(Contract DA 36-039-sc-85953)
Unclassified report

DESCRIPTORS: (*Electron tubes, Seals, Coatings, Design, Processing, *Manufacturing methods, Life expectancy, Humidity, Tests.)

The study to evaluate certain areas of advanced tube manufacturing techniques and to apply them where feasible to the JAN 6299 was continued. Tables are presented listing eccentricity data and humidity test results for present production tubes. A description of the proposed redesign of three seals from lead to hard solder is included. Life results of the cathode spray density evaluation are summarized. (Author)

AD-269 783 Div. 3, 1 U
(TISTW/RD)

Armament Research and Development Establishment (Gt. Brit.).
SEALING OF CHARGED FLUORESCEIN CONTAINERS USING RADIO FREQUENCY SEALING EQUIPMENT,
by T. I. J. Toler, W. N. Peacock, and N. N. English. Dec 61, 13p. illus. (ARDE memo. no. (NX) 65/61)
Unclassified report

DESCRIPTORS: (Sealing compounds, Organic compounds, *Containers, *Seals, *Pyrotechnics, Naval equipment.) (Containers, Polymers, Ethylenes.) (Test methods, Heating by Radio-frequency.) Great Britain.

A polyethylene container of fluorescein incorporated in a Naval pyrotechnic store was occasionally found to leak at the screwed filling plug. In order to remedy this fault an investigation was undertaken into the technique of sealing by radio frequency heating after liquid charging. A description is given of the equipment and components used to achieve a satisfactory seal. (Author)

AD-269 783

AD-270 222 Div. 8 U
(TISTE/NTM)

Power Information Center, U. of Pennsylvania, Philadelphia.
PROCEEDINGS OF THE ROUND TABLE DISCUSSION ON CATHODE EMISSION INVESTIGATIONS AND EXPERIMENTAL TECHNIQUES FOR FABRICATING AND OPERATING THERMIONIC CELLS, 1 AND 2 JUNE 1961.
30 June 61, 201p. incl. illus. table, 20 refs.
(PIC-ELE-TI-3/3)
Unclassified report

No automatic release to Foreign Nationals.

DESCRIPTORS: (*Thermionic emission, Atoms, Ions, Electrons, Metals, Seals, Insulating materials.) (Diodes, Cathodes, Crystals, Anodes, Alkali metals, Vapors.) (Refractory materials, Metals, Cesium, Vapors.)

Contents:
Seal and insulator problems in thermionic energy converters
Carbide cathode performance
Arc mode vapor thermionic converter
Thermionic emission of refractory metals in cesium vapor
Saturated emission or ion-limited
Measurements of thermionic emission from single crystal cathodes in alkali vapors
Basic experimental studies of the close-spaced thermionic diode
Experimental techniques of fabricating and operating in pile thermionic cells
Investigation of refractory compounds as thermionic emitters
A new approach to thermionic energy conversion
Techniques of fabricating a thermionic cell
Fabrication and operation of in pile cesium plasma cells
Can some standardization of thermionic terms and concepts be achieved now
Thermionic emission and surface equilibration
Presentation on cesium compatibility
Discussion of experimental I-V curves
Fabrication of the type E solar thermionic diode
A frangible all metal cesium capsule
Presentation of thermionic power conversion

AD-270 222 9

AD-270 582 Div. 8, 14, 26 U
(TISTE/CRJ) OTS price $2.00

Eitel-McCullough, Inc., San Bruno, Calif.
CERAMIC RECEIVING TUBE REFINEMENT PROGRAM.
Rept. for 16 June 58-31 Dec 60,
by Bruce E. Bernsby, Nov 61, 65p. incl. illus. tables, 10 refs.
(Contract AF 33(600)36699, Proj. 4156)
(ASD TR 61-268) Unclassified report

DESCRIPTORS: (*Electron tubes, Twin triodes, Triodes, Pentodes, *Ceramic materials, Processing, Production, *Manufacturing methods, High temperature research, Life expectancy, Reliability.) (Oxide cathodes, *Cathodes (Electron tubes), *Thermionic emission, Materials.) (Electron tubes, Degasification, Gases, Reduction, Materials.) (*Electrodes, Materials.) (Electron tubes, Metal seals, Ceramic materials, Vacuum seals.)

Identifiers: Getters.

Some of the materials and processing problems associated with the development and operation of ceramic vacuum tubes were investigated experimentally. The tubes were designed for operation where superior performance is required at ambient temperatures as high as 500 C. The following problems were investigated: cathode emission, vacuum seal, grid material, getter material and ceramic outgassing. Loss of emission from the oxide cathode is not a direct cause of tube failure as long as the cathode is processed carefully. A hot oxidizing atmosphere causes extensive oxidation of the seal elements. At ambient temperatures in excess of 400 C, seals begin to leak after a few hundred hours, but this failure cannot be attributed to oxidation alone. Gold grids inhibit adverse grid emission when exposed to hot oxide cathodes for grid temperatures up to 600 C. CerAlloy 400 operated at 500 C is an effective getter for the gases encountered in ceramic tubes. Heat treatment of ceramic under high vacuum causes the evolution of carbon monoxide, hydrogen, methane and water vapor. Heating to 1000 C effectively reduces the outgassing rate of the ceramic. (Author)

AD-270 582 29 N1

AD-270 746 Div. 26, 14, 30 U
(TISTN/BRW) OTS price $1.60

Rubber Lab., Mare Island Naval Shipyard, Vallejo Calif.
SUITABILITY OF VITON B O-RINGS FOR USE IN 3000 PSI HYDRAULIC SYSTEMS CONTAINING PETROLEUM BASE FLUID OR CELLULUBE 220.
Progress rept. no. 3,
by R. D. Ford, 29 Nov 61, 8p. illus. table.
(Rept. no. 92-11)
(Proj. S-F013-13-01)
Unclassified report

DESCRIPTORS: (*Hydraulic seals, Oil seals, *Rubber seals, Synthetic rubber, Phosphates, Organic compounds, Petroleum, Ethylenes, Fluorides, Polymers, Cyclohexanes, Effectiveness.) (Test methods, *Hydraulic systems, Hydraulic fluids.)

Identifiers: Viton, Teflon.

Efforts were made to develop a performance test for Viton O-rings to be used in 3000 psi hydraulic service. The service fluid may be either petroleum base or Cellulube 220. The test apparatus consisted of a piston with two O-rings which reciprocates 100 times/min in a vertical cylinder of 2.63-in. internal diameter. The piston travel is 7-1/2 in. The cylinder is held at 160 F. Teflon back-up rings are used on the downstream side of the O-rings. The pressure-on cycle lasts for 9 min; the pressure-off cycle lasts for 1 min. Leakage at both ends of the piston is collected. Difficulty was experienced in obtaining reproducible results with this equipment when the criterion was time required for a definite leakage (20 cc) to occur at 3000 psi fluid pressure. The test results show that Viton O-rings seal Cellulube 220 satisfactorily under these conditions and are not damaged by this treatment. The investigation is being continued with the criterion changed to the number of cycles before the leakage in a 24-hr period exceeds 150 cc for either O-ring. (Author)

AD-270 746 9 N1

AD-270 870 Div. 7 U
(TISTN/EJH) OTS price $1.50

Gulton Industries, Inc., Metuchen, N. J.
NICKEL-CADMIUM BATTERIES,
by Guy Rampel, R. Dagnall and others. Jan 61,
51p. incl. illus. tables.
(Contract AF 33(600)41670, Proj. 3145)
(WADD TR 61-34) Unclassified report

DESCRIPTORS: (*Alkaline cells, Nickel electrodes, Cadmium, *Storage batteries, Electrolytic cells, Manufacturing methods, Electrodes Impregnation, Nickel compounds, Cadmium compounds, Hydroxides, Sealing compounds, Seals, Ceramic materials, Aluminum alloys, Design, Test methods.) (Electrochemistry, Recombination reactions, Oxygen.) (Satellite vehicles, Power supplies.)

Research and development leading to improved, long life, reliable, high watt-hour-per pound, sealed nickel-cadmium batteries are reported. Fundamental studies on electrode mechanisms were treated theoretically. Improved techniques were developed to impregnate active material into electrodes so as to gain increased output. Studies were made of the parameters involved in assembling sealed cells so as to achieve high overcharge capability without sacrificing capacity. Development progressed on techniques to produce ceramic-to-metal terminal seals; mechanical configurations and designs of prototypes were worked out. Five possible designs of sealed cells to meet the desired performance requirements are discussed. (Author)

AD-270 870 9 N1

AD-271 561 Div. 26, 8, 25 U
(TISTE/REB) OTS price $1.60

Knights, James, Co., Sandwich, Ill.
GLASS ENCLOSED MINIATURE CRYSTAL UNITS
CR(XM-29/U).
Rept. no. 2, Feb-Oct 61.
Oct 61, 16p. incl. illus.
(Contract DA 36-039-sc-81298)
Unclassified report

DESCRIPTORS: (*Crystal oscillators, Quartz crystals, Glass seals, Vacuum seals, *Seals, *Crystal holders, *Heating elements, Manufacturing methods.) Miniature electronic equipment.

Identifiers: Globar.

Three methods of sealing glass enclosures, type HC-26, were tried. A gas flame method was found to be best, since control of crystal unit heating is more satisfactory. A sealing machine was developed around the well-known vertical lathe but with an improved gas flow control and vacuum chuck. The operating procedure for this equipment is described. (Author)

AD-271 561 3 N2

AD-271 643 Div. 8, 26 U
(TISTN/DLN)

Georgia Inst. of Tech. Engineering Experiment Station, Atlanta.
AGING CHARACTERISTICS OF QUARTZ CRYSTAL RESONATORS.
Quarterly rept. no. 3, 15 Aug-15 Nov 61,
by R. B. Belser and W. H. Hicklin. 15 Nov 61,
23p. incl. illus.
(Contract DA 36-039-sc-87407)
Unclassified report

No automatic release to Foreign Nationals.

DESCRIPTORS: (*Quartz resonators, *Quartz crystals, Crystals, Aging, Frequency stabilizers, Bonding, Temperature, Seals, Processing, Quality control, Test methods.)

An apparatus for sealing the glass HC-6/U containers was developed. The container and base held in mated position in a jig in vacuo were preheated by a gas ring burner around the pyrex tube vacuum chamber. The Kovar ring in the base was heated by induction and the envelope and base compressed under the action of a spring. A dial gauge measured the relative motion between the parts. A relative movement of 0.020 in. was found to give consistently leakproof seals. Approximately 75 resonators previously fabricated remained on storage at a temperature of 85 C. However, frequency measurements were largely interrupted due to the extensive equipment modifications. (Author)

AD-271 643 9

AD-271 918 Div. 8, 26, 14 U
(TISTM/EJH) OTS price $1.60

Corning Glass Works, N. Y.
PILOT PRODUCTION OF GLASS CRYSTAL HOLDERS (HC-(XM-2)/U; HC-(XM-3)/U; HC-(XM-4)/U).
Quarterly progress rept. nos. 13-14, 1 June-30 Nov 61,
by R. K. Whitney. 30 Nov 61, 15p.
(Contract DA 36-039-sc-81255)
Unclassified report

DESCRIPTORS: (*Crystal holders, Quartz crystals, Glass, Seals, *Glass seals, Industrial production, Manufacturing methods, High temperature research.) (Gold plating, Bronze, Wire, Soldering, Soldering fluxes.)

A change in base suppliers for the HC-(XM-2)/U holder necessitated another preproduction sample for sealing and testing. This testing was completed. Preproduction sealing of the HC-(XM-3)/U holder has yet to be satisfactorily accomplished. The attainment of the specified temperature limit of 250 C. appears beyond attainment with the specified glass and metal and current sealing method. Pilot production of the HC-(XM-4)/U holder was completed. (Author)

AD-271 918 9 N3

AD-272 431L Div. 14, 26, 30 U
(TISTM/TCT)

Rubber Lab., Mare Island Naval Shipyard, Vallejo, Calif.
SUITABILITY OF VITON B O-RINGS FOR USE IN 3000 PSI HYDRAULIC SYSTEMS CONTAINING PETROLEUM BASE FLUID OR CELLULUBE 220.
Progress rept. no. 4,
by R. D. Ford. 20 Feb 62, 19p. incl. illus. tables (Rept. no. 92-12)
(Proj. S-F013-13-01)
Unclassified report

Notice: Only Military Offices may request from ASTIA. Others request approval of Bureau of Ships, Navy Dept., Wash. 25, D. C.

DESCRIPTORS: (*Hydraulic seals, Oil seals, *Rubber seals, Synthetic rubber, Seals for Organic compounds, Phosphates, Esters or Petroleum, Fluids, Hydraulic fluids.) (Polymers, Eyhylenes, Fluorides.) (Test methods, *Hydraulic systems.) (Aging, Tensile properties, Deformation, Hardness, Corrosion.)

Identifiers: Viton.

The objectives of this investigation are: (1) to develop a simulated service test for evaluating seals for use in 3,000 psi hydraulic service, (2) to develop a suitable Viton stock for making such seals for use in both Cellulube 220 and petroleum-base fluid, and (3) to prepare a specification covering the procurement of such seals. The simulated-service test apparatus consists of a piston fitted with two O-rings which reciprocates 100 cycles/min in a heated (160 F) vertical cylinder. The space between the O-rings is filled with hydraulic fluid at 3,000 psig pressure for 9 min and at 0 psig for 1 min. Leakage past each O-ring is measured. Viton B O-rings of commercial origin were tested with Cellulube 220 and found to withstand as many as 5,000,000 without failure. Only slight wearing of the O-rings was observed. (Author)

AD-272 431L 9

AD-272 493 Div. IDEP U
(TISTE/GEC)

Martin Co., Denver, Colo.
INTRODUCING FLUOROGREEN MATERIALS FOR CRYOGENIC GASKET APPLICATIONS.
Mar 61, 27p. incl. illus. (Rept. no. JDM T-1)
(IDEP rept. no. 345.10.13.85-F3-01)
Unclassified report

DESCRIPTORS: IDEP-Titan. (*Gaskets, Materials, Ethylenes, Fluorides, Polymers, Cryogenics, Liquefied gases, Oxygen.) (*Guided missiles, Surface to surface, Liquid rocket propellants.)

Identifiers: Titan, J. L. Dore' Co. E-600, Compatability.

Gaskets were tested under temperature and pressure conditions anticipated in the operational configuration of the SM 68, Titan Propellant Loading System. The sealing properties throughout a temperature range of 20 to -322 F and throughout a differential pressure range of 0 to 140 psi were tested. The gasket was subjected to extremes of thermal shock experienced in rapid cooldown of cryogenic components prior to flow and the effluent liquid from the line containing the gasket was tested for contamination level. It was subjected to high liquid and gaseous flow rates and checked for possible erosion of inner exposed surface. (Author)

AD-272 493 10

AD-273 046 Div. 17, 26, 14 U
(TISTM/BRW)

Royal Aircraft Establishment (Gt. Brit.).
THE PROTECTION OF MAGNESIUM ALLOYS BY THE M.E.L. FLUORIDE ANODISING AND SURFACE SEALING PROCESSES,
by H. C. Davis and J. Housemen. Nov 61, 12p. illus. tables, 2 refs. (Technical note no. Met Phys 342)
Unclassified report

DESCRIPTORS: (*Corrosion inhibition, Sheets, Castings, Metal plates, *Magnesium alloys, Magnesium castings.) (Effectiveness, Cleaning, Cleaning fluids, *Fluorides, Coatings, Chromates, Anodes (Electrolytic cell), Thin films.) (Seals, *Plastic coatings, Thermosetting resins, Epoxy resins, Paint primers, Paints.) Corrosion by Sea water, Tests, Test methods.

The results are given for sea-water spray tests to determine whether fluoride anodising and/or surface sealing with an epoxy resin could be used to replace or supplement chromate treatment as a protective for Mg-base alloys. Sheet and cast alloys conformed to Specifications D.T.D. 626A, 742, 690 and 721A, and the processes were compared with and without subsequent painting. Surface sealing at 180 and 200 C after chromate treatment gave better protection than chromate treatment alone, there being little difference between the results with either of these temperatures. Fluoride anodising was detrimental if the anodic film was retained, but when the anodic film was removed, subsequent chromate treatment and surface sealing gives slightly better protection than when the anodic process is omitted. Tests on fluoride anodised castings surfaces sealed at 220 C indicate a slight advantage in using the higher temperature. (Author)

AD-273 046 6

AD-273 212 Div. 1 U
(TISTA/WAW) OTS price $13.50

Chance Vought Corp., Dallas, Tex.
MODULAR HYDRAULIC SYSTEM DEVELOPMENT. PROJECT HYDRATOY. PART IV.
Final engineering rept. on Modular Hydraulics,
by G. Gilder. 31 Aug 61, 189p. incl. illus. tables, 72 refs. (Rept. no. AER-E1R-13120, pt. 4)
(Contract NOa(s)59-6019-c)
Unclassified report

DESCRIPTORS: (*Jet planes, *Rocket planes, *Hypervelocity vehicles, Naval aircraft, *Hydraulic systems, Control systems, Servo systems, Hydraulic servomechanisms, Design, Packaging, High temperature research, Installation.) (Metal seals, Hydraulic seals, Hydraulic valves, Hydraulic conduits, Hydraulic actuators, Materials, Manufacturing methods, Tests, Reliability.) (Metals, Stainless steel, Physical properties.)

Identifiers: Hydratoy project.

This report is published in 4 separately bound parts. Part IV is a report of materials and process development which occurred in conjunction with and as a result of development effort in metallic seals, packages, components, and system integration. (Author)

AD-273 212 7 N9

AD-273 284 Div. 14, 12 U
(TISTM/BRW)

Nonmetallic Materials Lab., Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio.
SELF-SEALING OF AEROSPACE SHIPS BY THE DOUBLE HOLLOW WALL CONCEPT.
Rept. for Mar-Oct 61 on Nonmetallic and Composite Materials,
by Philip A. House. Feb 62, 14p. incl. illus. (Proj. 7340)
(ASD TDR 62-248) Unclassified report

DESCRIPTORS: (Particles, Meteorites, Penetration, *Spaceships, Satellite vehicles.) (Seals, *Sealing compounds, Polymers, Catalysts, Propenes, Oxides, Toluenes, Cyanates, Ethylenes, Amines, Silicon compounds, Dioxides.) Test equipment.

The system devised is capable of automatically sealing aerospace vehicles in case of puncture by foreign objects such as micrometeoroids. This system repeatedly sealed punctures caused by 22 caliber bullets. The evaluation was aided by the use of an outer elastomeric rubber sheet which elongated before being punctured, resulting in a hole approximately 0.075 in. in diameter. Such may not be the case in a space ship punctured by a micrometeoroid traveling at such speed that the rubber sheet would not elongate and the puncture would probably be at least the size of the particle. The system consists of two fluids separated by a membrane. When the system is punctured, the two fluids mix, immediately solidify, and seal the puncture. The two fluids which demonstrated the greatest success were a polypropylene oxide-toluene diisocyanate adduct thickened with a colloidal silica and triethylene tetramine. (Author)

AD-273 284 29

AD-273 336 Div. 8 U
(TISTE/CDM) OTS price $2.60

Westinghouse Electric Corp., Baltimore, Md.
PHOTOGENERATOR POWER CONVERSION STUDY.
Interim rept. no. 1, Dec 61-Feb 62,
by I. Limansky, E. F. Wood, and A. B. Jensen.
Feb 62, 27p. incl. illus. tables.
(Contract AF 33(657)7865, Continuation of
Contract AF 33(616)7910)
Unclassified report

DESCRIPTORS: (*Phototubes, *Solar cells, Solar energy, *Power transformers, *Generators, Design, Production, Manufacturing methods.) (Electron tubes, Cathodes (Electron tubes), Photosensitivity, Photoemission, Anodes (Electron tubes), Glass, Insulating materials, Vacuum seals, Processing, Cleaning, Test methods.)

Ways and means of constructing developmental models of a close-spaced, thin, solar power converter using the photoemissive principle were investigated. The report discusses the merits of several designs; the equipment and techniques available to fabricate, process and test these devices; and anticipated problems. In particular, the criticalness of the in-vacuum sealing is treated and a sealing fixture, wherein different sealing methods may be tested reproducibly, is described. A demountable process tube is described and compared with the WX-4220, an early process control tube. Chemical processing and vacuum processing techniques and problems are discussed. Using these processes, several component parts for the design were constructed. (Author)

AD-273 336 24 N5

AD-273 481 Div. 7, 14 U
(TISTM/GEC) OTS price $2.25

Armour Research Foundation, Chicago, Ill.
SEAL AND INSULATOR PROBLEMS IN THERMIONIC CONVERTERS.
Summary rept., 15 Feb 61-15 Feb 62.
12 Mar 62, 82p. incl. illus. tables, 44 refs.
(Rept. no. ARF 2215-6)
(Contract Nonr-344100, Proj. NR 099 354)
Unclassified report

DESCRIPTORS: (*Power supplies, *Thermionic emission, Seals, Electric insulation, Ceramic materials, Refractory materials, Metallic compounds, Oxides, Boron compounds, Nitrides, Zirconium compounds, Silicates.) (Physical properties, Density, Mechanical properties, Electrical properties, Resistance, Thermodynamics, Neutron cross sections, Neutron capture, Thermal conductivity, Stability.) Bibliography.

A discussion of the materials requirements for seals and insulators for thermionic energy converters is presented. Based on the requirements and published physical property data, Al2O3 appeared to be the most desirable insulator material at temperatures below its melting point. The study includes a discussion of metal ceramic sealing technology and a bibliography of publications in the field covering 1959, 1960, and part of 1961. The insulator was required to possess a reasonable value of electrical resistivity at temperatures which may reach as high as 2000 K and the specific resistivity of candidate oxides was required to be as high above 100 ohm-cm as possible at any temperature at which it is to function. The thermal conductivity of the insulator was less important than the electrical conductivity but low thermal conductivity was desirable. The insulator-seal combination must be stable in the presence of fission products and have a low capture cross section for slow and fast neutrons. It must be a dense material with reliable physical and mechanical properties. (Author)

AD-273 481 9 N6

AD-273 880 Div. 14, 12, 1 U
(TISTM/BMW) OTS price $3.50

Southwest Research Inst., San Antonio, Tex.
HANDBOOK OF DESIGN DATA ON ELASTOMERIC MATERIALS USED IN AEROSPACE SYSTEMS.
Rept. for 5 Feb 60-30 June 61 of Design Data on Aircraft Elastomeric Materials and Products,
by A. G. Pickett and N. N. Lemcoe. Jan 62, 222p.
incl. illus. tables, 233 refs.
(Contract AF 33(616)7093, Proj. 7381)
(ASD TR 61-234) Unclassified report

DESCRIPTORS: (*Elastomers, Design, Data, *Handbooks, Processing, Casting, Plastic coatings, Vulcanization.) (Mechanical properties, Physical properties, Thermal conductivity, Electrical properties, Aging, Heat, Oxidation, Ozone.) (Compatibility with Petroleum, Fuels, Lubricants, Hydraulic fluids, Liquid rocket propellants, Rocket oxidizers, Rocket fuels.) (Radiation effects, Low pressure research, Vibration isolators, Seals, Springs.) (Elasticity, Plasticity, Stresses, Deformation, Shock resistance.) Airframes, Spaceships, Satellite vehicles.

This handbook provides aerospace weapons system design engineers with useful data on the materials properties of elastomers. The data sources are Department of Defense research reports and the technical literature of engineering design and elastomer technology. The elastomeric materials considered are compounds of high polymers currently available in the U. S. A. The properties considered are original mechanical and physical properties and their changes that result from aging and exposure to environments of aerospace weapons systems. Elastomer compounding is only briefly treated because the handbook is intended for use by structural and mechanical engineers rather than by rubber chemists and technologists. A selected bibliography of the technical literature is included. (Author)

AD-273 880 19 N6

AD-274 085L Div. 14, 12 U
(TISTA/SEB)

Armour Research Foundation, Chicago, Ill.
RESEARCH AND DEVELOPMENT OF DESIGN CONCEPTS FOR SEALING APPLICATIONS IN AEROSPACE VEHICLE CABINS.
Rept. for 1 Apr 60-15 Dec 61, on Design Technologies and Structural Configuration Concepts for Aerospace Vehicles,
by Joseph S. Islinger. Feb 62, 67p. incl. illus. tables, 17 refs.
(Contract AF 33(616)7194, Proj. 1368)
(ASD TR 61-696) Unclassified report

Notice: Only military offices may request from ASTIA. Others request approval of Aeronautical Systems Div., Wright-Patterson AFB, Ohio.

DESCRIPTORS: (*Seals for Maintenance of Controlled atmospheres in *Spaceship cabins, Pressurized cabins.) (Materials for Vacuum seals, Rotary seals, Rubber seals, Plastic seals.) (*Sealing compounds, Rubber, Synthetic rubber, Nitrile rubber, Butadienes, Urethanes, Silicone resins.) (Acceleration, Shock, Vibration, Abrasion, Stability, Space environmental conditions, Pressure.) (Design of Sealing techniques for Spaceships, Satellite vehicles.)

Near absolute sealing techniques are described for small openings, such as for electrical conductors, and hatches in the walls of flight vehicle cabins. The need for absolute sealing stems from the requirement of a habitable environment in such vehicles for as long as one year under differential pressure and temperature extremes from -100 to +500 F. Considerations underlying selection of suitable seal materials for resistance to space environment are discussed. The mechanical design and material factors are also discussed. Investigations concerned with effect of elastomer permeability upon seal behavior and with techniques for sealing electrical wires and cables are described. Concepts for the four sealing applications considered are described. Recommendations are made regarding actual sealing concepts. (Author)

AD-274 085L 9

AD-274 112 Div. 8 U
(TISTE/CAM)

Microwave Associates, Inc., Burlington, Mass.
LONG LIFE K-BAND MAGNETRON.
Quarterly progress rept. no. 1, 1 Oct-31 Dec 61, by Norman Balmuth and David Hobbs. 31 Dec 61, 18p. illus. 2 refs.
(Contract DA 36-039-sc-87359)
Unclassified report

No automatic release to foreign nationals.

DESCRIPTORS: (*Magnetrons, *Miniature electron tubes, K band, Microwave frequency, Theory, Design, Model tests.) (Electron tubes, Cathodes (Electron tubes), Anodes (Electron tubes), Electron guns, Electron beams, Focusing, Magnetic fields, Heating, Life expectancy.) Metal seals, Tungsten.

Research concerns the design and development of a 5000 hr life, 50 kw, K band, fixed frequency pulsed magnetron, incorporating injection gun electron sources, for use with ASDE radar equipment. The initial magnetron design was completed; detailing was accomplished with the exception of the ion pump and some packaging parts. Assembly jigging has begun. The electron gun design has progressed through the selection and initial design processes. Efforts to obtain a sufficiently high fringing magnetic field within and at the mouth of the gun were successful, and gun parameters are being calculated. (Author)

AD-274 112 9

AD-275 443 Div. 8 U
(TISTE/CAM) OTS price $7.60

General Electric Co., Owensboro, Ky.
DEVELOPMENT OF AN IMPROVED JAN 6299.
Quarterly progress rept. no. 4, 1 Feb-30 Apr 62, by F. S. Sawicki. 30 Apr 62, 69p. incl. illus. tables.
(Contract DA 36-039-sc-85953)
Unclassified report

DESCRIPTORS: *Electron tubes, *Manufacturing methods, Anodes (Electron tubes), Cathodes (Electron tubes), Seals, Coatings, Design, Processing, Electrical properties, Temperature, Humidity, Life expectancy, Tests.

Effort continued towards the evaluation of certain areas of advanced tube manufacturing techniques and their application where feasible to the JAN 6299 to result in a more reliable and better performing tube. Tubes were fabricated with the one piece cathode support clip. Thirteen tubes from the lot of 250 tubes fabricated with hard solder anode seals were tested electrically and mechanically. The tubes and associated data have been submitted for Qualification Approval and the results are presented in tabular form. Life test data of two tubes fabricated with hard solder anode is also included. (Author)

AD-275 443 9 N4

AD-302 156 Div. 1/3, 1/11

Ballistic Research Labs., Aberdeen Proving Ground, Md.
PASSIVE DEFENSE FOR AIRCRAFT FUEL TANKS (Unclassified title) by John C. Harris and Roland G. Bernier. June 58, 44p. incl. illus. tables. (Proj. no. TB3-0238; BRL Memo. rept. no. 1150)
Confidential report

Two means of providing passive defense for the air craft fuel system were tested: (1) a mechanical-seal cell for preventing fuel loss and (2) some inerting units for preventing fires. Incendiary and high explosive projectiles (up to 40mm) were fired against mock-up and actual aircraft fuel targets. General principles of aircraft fuel vulnerability are discussed and pertinent firing test summaries are appended. (Author) (Unclassified abstract)

AD-304 961 Div. 22/1, 22/13

Naval Ordnance Lab., White Oak, Md.
METHODS OF ATTACHING ACCESSORIES TO PLASTICS MAGNETOMETER CANS, by A. Fisher. 9 Oct 58, 30p. illus. (NAVORD Rept. no. 6141)
Confidential report

Techniques have been devised for the attachment of "Pentor", "Cycolac" and "Kel-F" plastics accessories to their respective plastics magnetometer can bodies by heat sealing. These accessories consist of a cover, cable housing, cable clamp and flanged permalloy slug supports. Sealing of oil filler hole bosses in the covers is also included. Sealing devices, surface preparation and heating cycles are described. The techniques presented have been shown to provide attachments of accessories to magnetometer cans capable of meeting current environmental test requirements for firing mechanisms Mk 25 Mod 0 and Mk 15 Mod 0 wherein the magnetometer cans are employed. (Author) (Unclassified abstract)

AD- 303 513 Div. 29/6, 3/4, 14/10

Forest Products Lab., Madison, Wis.
PROTECTIVE ENCLOSURE PROJECT (Unclassified title) by Alfred J. Stamm and Harold Tarkow. Progress rept. no. 3 on Thermal Degradation of Fiberboards and Protective Enclosure Boards. 1 May 55, 2p. illus. [CWL rept. no. ETF 624-10/18-SA] (In cooperation with Chemical [Warfare] Labs., Army Chemical Center, Md.)
([Contract] CP4-3943; [Continuation of Contract DA 18-108-cml-2487])
Confidential report

See also AD-87 646, AD-303 514

AD-310 520 Div. 3/4, 3/7 U
(15 Aug 61)
(Unannounced report)

Southwest Research Inst., San Antonio, Tex.
NEW PROTECTIVE METHODS FOR COMBAT TROOPS (U).
Technical rept. no. 3, 1-30 Sep 54.
8 Oct 54, 42p. incl. illus. tables.
(Contract DA 18-108-cml-5526)
Confidential report

For reference only at each of the ASTIA Offices. This report cannot be satisfactorily reproduced; ASTIA does not furnish copies.

DESCRIPTORS: *Shelters, Military personnel, Combat, *Chemical warfare agents, Countermeasures, Vehicles, Fortifications, Buildings, Gas seals, Tents, Joints, Adhesive tapes.

AD-303 514 Div. 29/6, 3/4, 14/10

Forest Products Lab., Madison, Wis.
PROTECTIVE ENCLOSURE PROJECT (Unclassified title) by Alfred J. Stamm and Harold Tarkow. Progress rept. no. 4 on Thermal Degradation of Fiberboards and Protective Enclosure Boards. 1 Aug 55 [11]p. incl. tables [CWL rept. no. ETF 624-10/18(SA)] (In cooperation with Chemical [Warfare] Labs., Army Chemical Center, Md.)
([Contract] CP4-3943)
Confidential report

See also AD-87 646, AD-303 513

AD-310 114 Div. 3/4, 29/6
(4 Jan 60)
(Unannounced report)

Institute of Research, Lehigh U., Bethlehem, Pa.
EQUIPMENT AND METHODS FOR COLLECTIVE PROTECTION. [U] Summary rept. no. 4 on Phase 3 a-b Classification System for Collective-Protective Shelters and Directions for Conversion.
30 June 54, 28p. incl. illus. tables, 11 refs.
(Contract DA 18-108-cml-4504)
(ETF 620-14/Summary rept. no. 4)
Confidential report

Descriptors: Protective shelters*; Design; Ventilation; Seals; Chemical warfare agents.

See AD-310 130

AD-316 146L Div. 12/1, 12/3
(14 Apr 60)

Aberdeen Proving Ground, Md.
VIBRATION TESTS OF THE SECOND INDUSTRIAL PROTOTYPE HAWK MISSILE SYSTEM (U). by G. Hicb. Mar 60, 1v. incl. illus. tables (Engineering labs. rept. no. 103) Confidential report

Notice: Only Military Offices may request from ASTIA. Others request approval of Diamond Ordnance Fuze Labs., Wash. 25, D. C. Attn: ORDTL 06.33

Descriptors: Guided missiles*; Surface to air; Mobile; Transportation; Vibration; Tests; Reliability; Seals*; Effectiveness; Radar trailers*; Electronic equipment*; Cargo vehicles*; Shock resistance; Guided missile launchers*; Radar equipment*.

The purpose of test was to determine the reliability of the mounted electronic and mechanical equipment and to measure the magnitudes and frequencies of forces imparted to various predetermined locations and to determine the effectiveness of the sealing provided for water protection. Modifications are recommended [illegible] an endurance test as outlined in OPM 60-116 be conducted on the [illegible] battery to more (over)

accurately establish the equipment reliabi[illegible] (U) (Author) (See also AD-316 146L)

Open-ended Terms: Hawk.

AD-316 146L

AD-316 397 Div. 22/1
(5 May 60)

Bulova Research and Development Labs., Inc. [Woodside, N. Y.]
DESIGN AND DEVELOPMENT OF FUZE, BD, SD, T300 [U] by M. Brandon and I. McRae. Quarterly progress rept. no. 11, 1 Nov 59-31 Jan 60. 12p. incl. tables.
(Contract DA 30-069-501-ORD-2417) Confidential report

Descriptors: Base detonating fuzes*; Projectile fuzes*; Design; Temperature; Humidity; Tests; Quality control; Production*; Reliability; Antiaircraft ammunition; Projectiles; Seals.

See also AD-314 158, AD-314 521

Open-ended Terms: T300 fuze.

AD-316 580 Div. 3/5, 12/5
(6 May 60)

Vickers, Armstrong, Ltd. (Gt. Brit.).
NOTES ON VISIT TO A.R.D.E. LANGHURST ON 27th JULY, 1959 TO DISCUSS VIGILANT FLARE [U], comp. by S. A. Johnson. 5 Aug 59, 3p. (Rept. no. GW2/B/08/211) Confidential report

Descriptors: Guided missiles*; Surface to surface; Great Britain; Pyrotechnics*; Materials*; Powders; Colored flares*; Containers*; Design; Seals.

Open-ended Terms: Vigilant.

AD-321 271 Div. 12/1, 12/2, 12/4, 6/1, 6/3, 6/6, 8/6, 25/3 U
(24 Jan 61)

Institute of Science and Tech. U. of Michigan, Ann Arbor.
TRANSACTIONS OF THE BAMIRAC 1960 SUMMER STUDY (U).
Oct 60, 1v. incl. illus. tables. 267 refs. (Rept. no. 3768-6-X)
(Contract AF 19(604)7350)
Secret report

DESCRIPTORS: *Guided missiles, Launching, Guided missile trajectories, *Re-entry aerodynamics, Re-entry vehicles, Infrared radiation, *Electromagnetic waves, Measurement, Acoustics, Exhaust gases, Ionization, *Shock waves, Boundary layer, Microwaves, Scattering, Ionospheric disturbances, Mathematical analysis, Instrumentation, *Bibliography, *Symposia, *Antiaircraft defense systems, *Detection.

Open-ended Terms: Bamirac, Press Project, Do- (over)

fender Project.

An unedited collection is presented of memoranda and papers prepared during the course of two-week study session on missile phenomenology. The study session undertook to review the state of the air of studies in missile phenomenology, to construct and evaluate mathematical models for studying ballistic missiles as objects in space from launch to impact, and to compare the fit of these models with experimental data. The group's working papers were divided into three aspects: launch, mid-course, and re-entry. Participants in the study session were drawn from a number of research and industrial organizations and included specialists in problems of plume structure, plume radiation, radar cross-sections, radar measurements, ionospheric disturbances caused by missiles, re-entry radar and infrared measurements, nose-cone design, and atmospheric structure. (U) (Author)

AD-321 271

AD-321 948 Div. 27/3, 1/5, 22/1 U
(6 Mar 61)

Ogden Air Materiel Area, Hill Air Force Base, Utah.
SERVICEABILITY OF UNOPENED ROCKET MOTORS, 16-NS-1000, M15 AND M15A1 WITH IGNITERS. (U)
by Samuel H. Welch. Jan 61, 28p. incl. illus. tables (Rept. no. OOY TR 61-5)
Confidential report

DESCRIPTORS: *Rocket motors, *Igniters, Tests, Seals, *Jet bombers, Shipping, Statistical analysis, Reliability, *JATOS, Pellets, Ignition, Storage, Stability.

Open-ended Terms: 16-NS-1000 Rocket motor, B-47.

This test program was initiated as a result of a malfunction of a Rocket Motor, 16-NS-1000 at Dyess AFB, Texas causing the crash of a B-47 Aircraft. The motors and igniters were static fired. The ignition delay times, burning times, maximum chamber pressures and average chamber pressures recorded from the static firings were statistically analyzed and determined to be within the limits of the design specifications for the motors and igniters. The Air Force stocks of Rocket Motors, 16-NS-1000, M15 and M15A1, which have not had the hermetic seal broken by removal of the shipping plug for installation of the igniter and which have not exceeded the established shelf life or failed to meet the inspection criteria, are serviceable and would function satisfactorily. It is further concluded that the igniters that were manufactured using the B-73 formulation pellets were of doubtful reliability and should not be used for ignition of the rocket motors. (U) (Author)

AD-321 948

AD-322 684 Div. 12/3 U
(17 Apr 61)

Naval Ordnance Test Station, China Lake, Calif.
LAUNCH-VALVE DESIGN FOR 1/5 SCALE POLARIS MODEL TESTS IN VAT (U)
by D. N. Nelson. 14 Dec 60, 48p. incl. illus. tables. (Rept. no. NOTS TP 2593)
(NAVWEPS rept. no. 7602) Confidential report

DESCRIPTORS: Underwater, Underwater to surface, Surface to surface, Guided missiles, Model tests, Guided missile launchers, Launching, Pressure, Seals, Mathematical analysis, Theory, Tests, Thermodynamics, Equations, Test facilities, Calibration, Hydraulic systems, Hydraulic accumulators, Hydraulic valves, Hydraulic seals, Ejection, Air ejectors.

Open-ended Terms: Polaris, O-rings, VAT.

A detailed description of the development of the model launch-valve system for the 1/5 scale Polaris tests in the Variable-Atmosphere Tank is given, including design of the launch-valve contour, modifications of the basic launch-valve hardware and hydraulic system to improve launcher performance, and comparisons of desired and actual-launcher performance for the various phases of development. (U) (Author)

AD-322 684

AD-323 114 Div. 1/9, 1/9, 1/11 U
(15 May 61)

Ballistic Research Labs., Aberdeen Proving Ground, Md.
EFFECTIVENESS OF LIGHTWEIGHT SELF-SEALING FUEL CELL MATERIAL AGAINST CAL. 0.30 BULLETS (U)
by Walter S. Vikestad. Jan 61, 20p. incl. illus. tables. (BRL memo. rept. no. 1324)
(Proj. 503-05-010)
Confidential report

DESCRIPTORS: *Liaison planes, *Helicopters, *Fuel tanks, *Fuel seals, Test methods, *Armor piercing ammunition, Ammunition, Effectiveness, Antiaircraft ammunition, Vulnerability, Tests, Seals, USSR, Rubber seals, Nylon, Cordage.

Open-ended Terms: Cal 30.

Firing tests were conducted on a new type of lightweight self-sealing fuel cell material. The 7.62mm AP (Cal. 0.30) ammunition was fired at four types of self-sealing material under various striking conditions. These four types were approximately half the thickness and half the weight of conventional lightweight self-sealing materials for aircraft fuel cells. (U) (Author)

AD-323 114

AD-323 670 Div. 12/5, 22/10 U
(14 June 61)

Diamond Ordnance Fuze Labs., Washington, D. C.
PRODUCTION ENGINEERING OF THE T3019 BOMARC FUZE (U).
by J. J. Cullinane and C. K. Eve. 10 Mar 61, 31p. incl. illus. (DOFL rept. no. TR-855)
(Proj. 77260)

Confidential report

DESCRIPTORS: *Guided missiles, *Surface-to-air, Engineering, Design, Arming devices, *Guided missile fuzes, Quality control, Reliability, Cooling, Costs, Fuzes, Seals, Production, Standardization, *Auxiliary detonating fuzes, *Proximity fuzes, Guided missile antennas, Radar.

Open-ended Terms: Bomarc; T3019 fuzes.

The activities of the T3019 Bomarc fuze production-engineering program are summarized. The objectives of this program were to modify fuze design to assure reproducibility and to prepare a technical data package for procurement of the fuze. To attain these objectives, it was necessary to perform cost, tolerance, and interchangeability studies; to improve the sealing and cooling capabilities of the fuze packages; and to perform reliability engineering. These activities resulted in a production-engineered fuze design and a technical data package that provided to the potential fuze manufacturer the information necessary to produce fuzes of consistent quality and predictable reliability. (U) (Author)

AD-323 670

AD-324 132 Div. 27/3, 14/2, 14/8 U
(18 July 61)

Naval Ordnance Test Station, China Lake, Calif.
SOME RESULTS OF APPLIED RESEARCH ON MATERIALS AND PROCESSES FOR PROVIDING HEAT-RESISTANT ROCKET COMPONENTS. SUPPLEMENT 2 (U).
May 61, 128p. incl. illus. tables, 12 refs.
(Rept. NOTS TP 2666)
(Suppl. no. 2 to NAVORD rept. no. 6390, AD-309 172)

Confidential report

DESCRIPTORS: *Rocket motors, *Rocket motor nozzles, Materials, Metalorganic compounds, Polymers, Aldehydes, Phenoxy radicals, Resins, Refractory materials, Pyrolysis, Binders, Phenolic resins, Solid rocket propellants, Hybrid rocket propellants, Synthesis, Metals, Oxides, Carbides, Guided missiles, Plastic seals, Servo mechanisms, Nozzles.

Open-ended Terms: Sidewinder, Vector control systems, Subroc.

Procedures for synthesis of refractory-metal phenoxyaldehyde high polymers are described, along with evaluation data and possible applications. The following developments are described: (1) a large (SUBROC) nozzle evaluating secondary injection for vector control; (2) a special nozzle for the sustainer motor of the sidewinder (SW) IC Target Rocket; (3) a method of protecting the wiring of the SW IC servo; and (4) a meaningful performance test for evaluating O-rings in a dynamic application. Data are presented on: (1) reinforced plastics; (2) materials for the SW IC Mod 0 booster nozzle; (3) nozzle materials for the hybrid system; and (4) potential nozzle materials. (U) (Author)

AD-324 132 U

AD-326 200 Div. 10/6, 12/3, 12/4 U
(TIPSW/EJH)

Redstone Div., Thiokol Chemical Corp., Huntsville, Ala.
DEVELOPMENT OF PROPULSION SYSTEM FOR NIKE ZEUS MISSILE (U).
Monthly progress rept. for Sep 61.
26 Oct 61, 15p. incl. illus. tables (Rept. no. C-A-61-288A)
(Subcontract to Douglas Aircraft Co., Santa Monica, Calif.)

Confidential report

DESCRIPTORS: (*Guided missiles, Surface to air, *Rocket propulsion.) (*Rocket motors, *Solid rocket propellants, *Booster rockets, Boosters, Rocket cases, Loading, Storage, Low temperature research, Combustion, Ignition, Flight testing.) (*Rocket motor nozzles, Seals.) *Solid rocket propellants, Polymers, Sulfides, Propellant properties, Pyrogens, Butadienes, Acrylic resins, Ferrocenes.

Identifiers: Nike-Zeus.

First stage motor: 4 motors were flight tested, all of them operated successfully; 9 motors were shipped; 3 motors were loaded; and the pyrogen seal for the tactical nozzle closure was tested for leakage. Second stage motor: 2 motors were flight tested, both operated successfully; 5 motors were shipped; 7 motors were loaded; the first phase of a study to determine effects of loss of ferrocene from sustainer propellant at elevated temperatures was completed; 16 pyrogens were loaded. Third stage motor: 3 polysulfide motors were inspected and accepted; 8 pyrogens were manufactured; low temperature capabilities of the polysulfide motor were determined; a study showed that the polysulfide third stage propellant would not be materially affected by acceleration loads. (U)

AD-326 200 U

AD-326 483 Div. 22/1 U
(TIPTW/DLW)

Hamilton Watch Co., Lancaster, Pa.
SSS, MINE, APERS T-52 W/INTEGRAL FUZE (U).
Monthly progress rept. no. 17 for Sep 61,
by R. C. Slover. Sep 61, 28p. incl. table.
(Contract DA 28-017-ORD-3911, Proj. 5507-06-
011-01)

Confidential report

DESCRIPTORS: *Antipersonnel ammunition, *Mine fuzes, *Mines, Fuzes, Mine cases, Plastics, Seals, Moistureproofing, Design, Production, Temperature, Humidity, Vibration, Tests, Reliability, Epoxy resins.

Identifiers: T52 mines.

AD-327 982 Div. 27/3, 10/5, 12/4, 26/1, 30/4 U
(TISTA/VGW)

Rocketdyne, Canoga Park, Calif.
F-1 (U).
Quarterly progress rept. no. 12, 1 Oct-31 Dec 61, on NASA F-1 Engine Development Program (U). 12 Feb 62, 223p. incl. illus. tables (Rept. no. R-1555-12)
(Contract NASw-16)

Confidential report

DESCRIPTORS: (*Rocket motors, Heat resistant alloys, *Combustion chambers, Fuel injectors, Orifices, Rocket motor nozzles, Vane diffusers, Turbines, Fuel pumps, Thrust bearings, Seals, Fuel seals, Design, Tests, Effectiveness, Gas generating systems, Control valves, Control systems, Hydraulic couplings, Hydraulic actuators, Gimbals.) (Configuration, Manufacturing methods, Ignition systems, Vibration, Stability, Reliability, Fuel systems, Liquid rocket propellants, Combustion, Explosions.)

Identifiers: F-1 engines, Nova.

A description is presented of the progress made in the twelfth quarter of the NASA F-1 engine development program. Results of studies, tests, and fabrication procedures are discussed and graphically presented, and problems encountered are described. (U) (Author)

AD-327 982 9

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MISSING FROM

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SUBJECT INDEX

I. KINDS OF SEALS

Bushing - Sleeve fitted with close clearance over a shaft or rod.

140-613	201-739	225-213	235-052

Caulking and In Place Sealing - Sealing by injecting a fluid into a cavity.

Dynamic

239-180	241-830

Static

001-046	021-274	021-275	028-321
028-862	036-428	041-362	047-671
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239-180	239-384	241-830	242-347
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Diaphragm - Dividing membrane which spans the gap between two mechanical components to prevent interchange of a fluid between two separate areas or chambers.

General

254-614

Dynamic

025-809	204-016	259-086	265-582

Diaphragm - (Cont'd)

Static

022-068	098-646	106-754	204-016
206-707	240-573		

Face or Mechanical Axial Seal - Two flat sealing faces contacting at right angles to the axis of rotation, with an axial force applied to cause the faces to contact each other.

Dynamic

011-080	025-808	025-809	043-686
048-377	060-141	094-807	094-809
119-437	121-112	123-771	134-918
143-970	201-024	202-438	202-439
205-179	207-505	225-213	232-073
258-535			

Static

047-412	060-141	232-073	258-535

Freeze Seal - Dynamic seal of a bushing type which also serves as a static seal by solidification of the fluid in the clearance in the absence of friction due to motion.

Dynamic

266-768

Gaskets - Piece of material which is clamped between static faces

General

029-951	123-839	134-197	136-780
146-232	146-748	146-749	205-587
232-977	238-164	246-574	249-542
250-028	250-742	255-145	

Dynamic

037-218	060-141	068-495	070-011
103-928	116-938	147-856	153-356
204-016	209-179	232-073	238-020
265-443			

Gaskets (Cont'd)

Static

Plastic Gaskets

023-155	034-750	037-100	145-284
213-956	251-130	265-443	268-381
272-493			

Natural Rubber Gaskets

036-319	037-093	060-141	116-389
116-938	125-427	136-781	142-604
145-284	146-228	146-229	153-356
162-329	201-085	206-707	221-461
229-186	251-130	253-753	256-218
259-160	265-555	267-890	

Synthetic Rubber Gaskets

023-155	024-489	037-096	037-100
038-529	043-419	063-258	063-260
064-334	064-335	065-209	072-231
072-267	072-268	072-269	074-322
080-814	091-555	099-741	116-938
121-339	125-427	134-181	134-462
134-463	145-360	145-361	145-833
204-016	204-064	206-773	208-838
220-831	220-832	221-461	229-186
240-573	253-753	256-218	265-443
265-555	268-381		

Gaskets made of other materials

009-494	014-468	028-761	029-801
036-452	041-362	041-652	042-776
043-502	048-807	050-626	056-708
061-987	070-011	072-233	090-148
098-205	101-096	101-652	119-330
128-365	130-960	136-762	149-799
157-761	203-143	204-937	209-179
222-849	226-521	232-073	245-424
250-231	258-893	262-566	262-580
263-306	263-457	264-111	268-426

Hermetic Seal - A permanent seal by fusion or adhesion primarily for moisture and air-tightness.

Dynamic

054-206	055-132

Static

002-787	012-531	030-136	036-452
037-705	041-362	041-652	067-223
067-333	082-914	082-916	083-716
090-148	092-941	094-590	097-547
098-106	106-719	106-754	107-274
107-713	108-720	130-772	134-405
137-420	153-347	153-553	201-085
206-224	206-773	208-687	218-730
226-521	228-239	228-846	229-662
229-707	232-964	234-721	236-006
238-200	238-482	241-564	242-744
249-349	250-736	250-749	252-077
254-020	254-493	256-161	256-214
256-649	258-784	258-893	259-653
260-114	260-629	263-722	265-170
266-351	267-051	269-034	270-870
316-146	321-948	326-483	

Labyrinth - A device employing a tortuous leakage path, usually by fins on either the stationary or rotating member.

Dynamic

042-033	085-318

Lip or Radial Seal - Seal producing positive line contact circumferentially between the seal's inside diameter and a shaft or a rod.

Dynamic

094-444	121-112	122-294	222-593

Magnetic Seal - A seal produced by applying a magnetic field to concentrate magnetic particles suspended in the fluid.

056-036	156-901

Packing or Stuffing Box - Deformable material compressed into a cavity surrounding a rod or a shaft.

General

128-326	254-614

Dynamic

008-640	025-907	030-373	036-456
036-564	037-218	041-961	043-686
048-377	070-011	074-089	089-193
089-198	089-199	094-674	102-156
123-771	147-092	149-981	153-033
153-356	153-642	204-016	205-179
207-979	214-003	214-848	234-860
236-837	240-838	242-962	259-550
259-574			

Static

047-739	048-399	070-011	089-198
089-199	097-258	134-497	140-116
140-117	140-118	140-125	145-239
153-356	204-016	214-262	256-218
265-555			

Ring Seal - A positive contact seal whose primary component is an independent ring-proportioned element.

Felt, Quad, Delta, X, or other cross sections of ring seals.

Dynamic

048-808	240-838	259-550

Static

010-979	048-807	231-223	238-431
239-509	247-172		

"O" Ring - A ring seal with a circular cross section

General

027-728	029-114	078-234	089-193
089-198	123-839	127-094	131-094
134-197	145-846	146-748	146-749
150-973	155-541	162-472	163-020
205-587	213-568	232-977	241-589
246-574	247-750	250-028	250-742
254-607	254-806	256-590	260-920
261-561	261-562	265-443	267-121

Ring Seal (Cont'd)

Dynamic

008-640	025-907	070-011	074-089
077-374	089-199	094-809	103-928
118-213	129-444	145-307	147-856
151-181	207-979	209-179	229-115
237-833	240-838	248-647	249-387
252-996	260-465	262-398	265-443
267-145	267-501	270-746	272-431

Static

010-979	011-484	027-728	047-412
048-807	050-626	070-011	089-072
089-198	089-199	094-749	098-106
099-706	101-096	101-097	101-098
101-099	119-330	123-912	134-493
140-116	142-079	142-604	143-542
145-357	145-832	151-181	161-638
161-694	161-745	203-158	204-064
207-016	207-035	207-190	207-191
207-538	209-179	229-186	231-223
237-833	245-449	248-647	249-387
261-385	261-564	262-718	267-145
267-501	268-381	269-310	

Piston Ring - A one piece ring seal with a discontinuous circumference.

General

238-164

Dynamic

033-877	105-415	153-356	162-882
221-803	257-228		

Static

033-877	142-079	153-356

Segmental Ring - A ring seal composed of several butting or interlocking segments.

Dynamic

154-494	225-213	239-180	241-830

Static

239-180	241-830	247-172

Ring Seal (Cont'd)

"V" Ring - A ring seal having a "V" shaped cross section.

Dynamic

234-860

"U" Ring - A ring seal having a "U" shaped cross section.

Dynamic

077-374

Special Sealing Concepts (self sealing fuel tanks, injection seals, ceramic to metal seals, etc.)

Dynamic

002-400	048-377	077-374	097-258
118-213			

Static

In Aircraft (self sealing fuel tanks, canopies, etc.)

003-133	015-012	028-321	030-136
047-671	048-310	049-645	050-800
055-695	058-142	063-064	074-322
078-224	106-754	123-436	131-091
200-381	200-382	200-385	225-495
302-156	323-114		

In Munitions

001-046	021-274	021-275	094-922
107-713	107-802	112-953	130-661
140-572	149-799	158-661	159-156

In Launch Vehicles

083-716	147-837	150-474	240-357
242-285			

In Electrical and Electronic Equipment

030-136	088-545	109-660	110-287
122-254	226-195	256-214	260-114
274-112			

Special Sealing Concepts (Cont'd)

Static (Cont'd)

In other Applications

009-079	010-270	013-311	016-330
027-587	028-429	030-417	089-767
089-828	097-454	097-649	097-767
098-226	100-488	101-331	102-222
106-511	107-960	117-021	120-620
130-210	135-272	140-180	145-518
149-681	151-257	151-729	153-456
155-606	208-687	210-323	221-401
221-404	222-684	226-294	228-239
234-516	234-669	235-381	239-384
240-969	241-629	246-644	248-535
249-262	249-349	252-607	257-978
263-640	265-170	266-158	266-502
268-416	269-404	270-582	273-284
273-481	274-085		

Screw Seal - A device comprising a threaded shaft rotating in a close clearance plain bore (or plain shaft in threaded bore), sometimes called visco-seal or screw pump.

II. SPECIFIC INTEREST AREAS IN SEALING

Aging or Shelf Testing

009-494	013-714	023-155	027-728
037-100	055-695	067-223	067-333
067-600	090-148	098-106	107-274
113-822	113-830	119-330	125-427
134-405	145-239	145-307	145-357
145-361	146-748	150-973	151-257
155-606	161-951	200-230	200-385
201-085	202-445	221-461	229-186
232-977	236-067	246-574	248-647
249-262	250-028	256-214	260-114
265-443	267-501	273-880	

Back-up Rings - A washer type of reinforcement placed on the side of a packing, ring seal, or similar seal opposite the sealing interface.

007-347	025-907	029-114	070-011
074-089	089-198	089-199	105-671
142-079	151-181	207-979	237-833
241-589	252-996	260-465	265-443
267-145	270-746		

Balancing of Forces - The balancing of forces due to pressure on a face seal to reduce contact pressure at the sealing interface.

042-477	119-437

Bellows - Used alone or as a component of another seal in static or limited motion application.

201-085	234-860

Cavitation

213-956	262-196

Compatibility

Material-Fluid: the ability of a material to exist in intimate contact with a fluid without detrimental chemical, bacterial, radiation, or other effects.

022-068	024-489	037-096	037-705
038-529	063-258	064-335	067-333
072-267	125-427	134-181	134-405
145-399	145-518	147-990	151-257
153-356	155-606	157-911	157-912
158-530	161-971	200-862	201-085
201-202	201-203	201-204	202-445
203-011	203-833	208-687	212-661
218-038	220-832	226-521	228-846
229-700	229-707	234-721	238-020
238-482	241-831	243-966	247-750
249-387	253-753	254-607	256-590
261-561	261-562	261-563	261-564
267-111	268-381		

Material-Fluid-Material: the ability of relative motion to exist at the sealing interface in the presence of a seal material, fluid, and mating material.

003-133	011-484	013-714	028-321
037-218	037-705	055-695	078-224
080-889	120-620	128-326	130-210
135-272	140-572	142-079	145-846
147-856	163-020	201-024	203-011
204-016	204-065	205-478	206-707
208-838	212-634	225-495	240-573
242-285	242-347	246-574	249-542
251-130	252-992	252-996	254-496
255-145	256-678	257-228	260-465
265-443	267-121	267-890	269-310
270-746	272-431	273-880	274-085

Chemical Properties

028-862	037-705	072-231	118-597
134-405	150-973	201-835	220-860
245-424			

Endurance Testing

023-155	025-809	025-907	034-171
035-302	036-456	036-564	048-377
074-089	140-180	142-079	154-494
207-979	213-956	233-471	238-200
240-838	242-744	250-749	267-122
268-420	275-443	316-146	

Faces - Effect of face surface contours or other face characteristics on the sealing capabilities.

123-771	154-494	258-535

Flange Design

009-494	116-938	157-761	222-849
232-073			

Flange Serrations

009-494	130-960

Floating Types - Sealing without directly fastening the seal to any other component. (excluding ring seals)

105-415	153-033	214-003	214-848
234-860	236-837	259-550	

Friction - A general discussion of friction and its effect upon sealing.

008-640	033-877	036-456	086-205
102-156	103-928	118-213	123-604
153-033	201-835	207-979	222-071
238-832	240-838	241-831	254-806
266-936	267-501		

Friction, Torque or Power Loss Due to Friction

094-807	134-918	158-661	161-932
206-773	247-172	252-992	256-649
258-865	266-768		

Gas Sealing Applications

002-991	006-687	018-810	023-155
036-319	041-362	042-477	048-377
059-125	067-223	068-873	075-568
082-916	085-318	086-205	105-415
106-777	107-274	107-960	110-636
113-178	116-389	119-437	128-365
140-613	147-856	157-761	162-726
200-028	202-438	204-937	207-505
207-979	208-687	210-822	213-956
214-848	219-109	234-860	234-940
235-052	237-928	238-020	238-164
238-431	239-509	240-357	241-565
242-285	242-962	245-377	246-034
246-574	248-037	248-647	249-144
252-786	259-086	259-550	260-368
260-526	260-920	261-561	261-562
261-563	261-564	261-886	262-398
262-439	263-029	267-111	267-121
268-416	272-493	310-520	

Heat Transfer - The ability of a seal to conduct heat and/or withstand thermal cycling.

037-705	041-362	067-223	075-568
082-914	092-941	097-547	102-222
107-274	120-853	130-661	130-772
140-572	140-614	142-079	159-156
200-028	200-898	202-438	202-439
204-937	207-505	216-838	221-803
222-071	234-109	234-721	235-052
237-500	238-832	258-784	268-381
272-493			

Installation

036-428	121-294	121-502	162-481
209-179	231-223	247-172	254-804
268-426			

Leakage - a general discussion of seal leakage, a specific value of leakage is given, or a comparison of leakage rates is made.

002-400	002-991	006-687	007-347
009-079	010-822	011-722	016-848
042-477	050-800	067-362	072-503
073-961	082-915	086-205	094-922
099-469	100-300	101-003	101-331
106-677	110-390	117-021	119-437
119-763	120-853	121-461	130-882
134-918	144-596	147-990	155-541
162-472	200-381	201-204	202-445
203-833	213-564	214-269	218-903
219-139	225-501	228-320	234-516
234-862	236-837	241-562	241-589
244-668	248-037	249-144	254-614
255-145	259-803	260-526	261-886
261-958	263-029	266-158	268-420
269-783	270-582	273-046	

Dynamic Seal Leakage

036-456	048-377	074-809	077-374
094-807	105-415	118-213	123-771
209-179	214-848	222-593	225-213
229-115	232-073	234-860	239-180
248-647	259-086	259-550	262-398
270-746	272-431		

Static Seal Leakage

009-494	011-484	036-452	041-362
041-652	048-399	050-626	078-224
082-914	082-916	089-914	097-258
098-646	107-274	108-720	116-389
121-339	123-604	130-661	140-116
140-572	145-239	146-232	149-799
153-347	157-761	159-156	209-179
228-846	232-073	238-431	239-180
248-647	250-231	251-669	262-566
266-351			

Leakage Test Techniques or Detection

002-011	002-991	006-687	010-822
018-810	041-362	046-159	050-800
058-978	068-873	082-914	082-915
082-916	092-941	101-003	105-415
106-511	110-390	113-178	120-853
154-814	162-726	206-622	209-169
214-101	218-730	234-140	241-564
241-565	245-377	246-034	248-037
249-144	251-453	257-411	258-784
260-235	260-385	260-526	

Leakage by Molecular Diffusion or Permeation

116-938	210-822	236-067	241-565
242-347	243-897	245-377	246-034
248-037	249-144	260-526	263-029
247-085	303-514		

Leakage Testing Results

002-787	002-991	006-687	013-311
016-848	036-452	041-362	046-159
048-807	048-808	051-200	068-873
072-503	074-089	075-568	082-914
082-915	092-941	106-754	107-713
121-112	206-773	212-661	218-730
219-139	220-293	233-471	237-928
241-564	241-565	242-285	245-377
246-034	248-037	249-144	250-742
257-411	254-020	260-526	265-582
267-111	272-493	326-200	

<u>Inverted Type</u> - (seal rotates with the shaft)

048-808

<u>Loading and Sealing Characteristics</u> - The installation or loading requirements and their influence upon seal life, wear, performance, etc. (degree of compression, tolerances, etc.)

036-319	042-033	047-739	050-626
077-374	089-193	098-205	102-156
107-960	116-389	118-213	157-761
162-329	236-837	242-962	

Lubrication

Fluid Film

094-809	097-649	118-047	273-046

Solid

086-205	094-807	118-047	155-689
201-024	266-936		

Lubricant Materials

008-640	013-714	025-809	025-907
034-171	037-705	056-708	094-809
121-502	153-642	163-020	214-848
216-630	241-589	241-831	247-172
247-750	249-542	252-996	254-804
255-145	256-590	258-535	259-550
260-465	267-890	268-381	

Magnetic - A method of affecting the contact pressure at the sealing interface by magnetic force.

Dynamic

077-374	156-901	200-028

Manufacturing Methods

002-991	010-270	082-914	094-922
097-454	108-720	120-620	144-596
147-837	151-729	151-747	153-347
200-859	201-321	214-082	218-730
225-501	234-862	235-681	236-067
236-184	243-685	244-668	245-318
250-399	252-786	254-496	256-649
263-722	265-170	266-246	267-145
268-416	269-034	269-310	269-404
270-222	271-918	275-443	323-670

Material Properties - (Mechanical and Physical)

of Elastomers (Buna-N, GR-S, Butyl, etc.)

119-330	121-339	123-912	128-326
150-973	151-181	151-257	155-606
163-020	204-016	204-065	225-495
229-186	238-020	240-357	245-424
247-750	248-647	249-572	251-130
254-496	256-218	261-561	261-562
261-563	261-564	265-443	267-145
267-501	267-890		

of Fluoro-Elastomers (Kel-F, Teflon, Viton)

070-011	145-307	145-846	150-973
151-257	155-606	163-020	225-495
237-833	242-285	246-574	256-590
260-920	261-563	261-564	265-443

of Natural Rubber

010-979	013-714	036-319	037-093
049-645	125-427	145-362	153-356
155-606	161-745	163-020	221-461
229-186	231-622	232-977	237-833
247-750	248-647	249-387	250-028
250-742	251-130	253-753	254-496
254-607	254-806	256-218	256-590
257-025	260-920	261-561	261-562
261-563	261-564	267-501	267-890
268-381			

of Plastics (Nylon, etc.)

037-705	049-645	055-695	067-333
067-600	097-767	098-226	140-572
159-156	163-020	202-445	204-065
205-810	205-951	206-374	214-262
220-048	225-495	234-721	237-833
238-020	249-542	251-130	258-784
259-086	265-443	268-381	

of Other Materials

021-275	024-489	028-862	035-302
036-456	037-096	067-223	074-089
107-274	113-822	113-830	118-213
119-763	120-853	145-360	145-361
145-572	145-833	149-681	153-456
155-689	161-932	200-230	200-385
201-273	203-011	204-064	208-838
212-634	220-832	220-860	225-501
229-700	231-501	234-669	235-024
236-067	237-500	237-928	240-969
241-629	243-897	244-668	246-644
247-172	248-535	250-163	260-114
266-158	266-936	267-111	267-121
268-417	273-481	273-881	275-443

Molding - The "potting" or packaging of electronic equipment or the molding of a seal itself.

002-400	036-319	097-767	098-226
107-802	113-822	113-830	123-436
140-125	145-832	161-951	228-239
260-920	266-351	267-121	

Pressure Above 5000 psi

145-361	237-928	261-886	262-398

Pressure Gradient

042-477	085-318	116-389

Pressure-Velocity Relationships - An optimum combination of the two parameters at which the seal can effectively perform.

094-807

Radiation Effects

151-181	161-971	200-862	220-832
225-495	231-622	237-833	238-482
241-589	245-424	245-449	252-607
253-753	257-025	267-122	273-880
267-111	267-890		

Reciprocating Motion

027-728	029-114	074-089	097-258
103-928	130-882	151-181	162-882
238-020	221-803	267-145	270-746
272-431			

Reliability and Service Life

022-068	072-503	086-205	089-828
121-112	140-613	145-307	145-846
146-228	146-229	146-231	146-232
151-181	200-028	200-385	201-321
202-439	214-003	214-848	219-109
222-593	236-067	254-614	259-086
267-051	270-582	272-431	316-146
321-948	323-670		

Rotary Motion

007-347	011-080	011-722	011-915
019-627	025-808	025-809	034-171
042-477	043-686	048-377	048-808
054-206	056-036	059-125	060-141
068-495	077-374	082-045	086-205
087-221	094-807	094-809	094-444
100-053	100-836	106-777	108-632
110-636	116-938	119-437	121-294
123-771	125-957	134-918	143-735
143-970	153-356	154-494	156-901
160-124	162-475	200-028	201-047
201-739	202-438	202-439	205-179
207-505	213-568	219-109	222-071
222-852	225-213	232-073	239-180
241-830	257-228	259-574	258-535
262-196			

Selection - A choice has been made from a field of parameters based on test results or analytical studies.

078-224	086-205	094-749	118-047
120-620	160-124	163-020	201-739
206-707	232-073	236-067	241-831
245-377	249-387	274-085	

Shaft Eccentricity, Misalignment, Whirl, Vibration, Whip

007-347	121-112

Shaft Surface Finish and Hardness

007-347	048-808	068-495	118-213
121-502	129-444	157-761	254-804
254-806			

Speed, High - (Greater than 4000 fpm)

085-114	086-205	100-836	108-632
119-437	155-689	201-047	219-109

Spring Loaded Types - A spring used to increase the contact pressure at the sealing interface.

011-080	025-808	025-809	034-171
043-686	048-377	060-141	073-961
094-807	094-809	123-771	134-918
143-970	153-033	202-438	202-439
205-179	207-505	214-003	222-593
225-213	232-073	236-837	258-535

Standards in Sealing

012-531	014-468	067-223	130-210
147-837	153-356	203-011	206-707
212-634	231-223	242-347	254-496
270-222			

Stresses in Sealing Elements

021-275	042-776	120-853	153-347
157-761	161-745	200-898	218-730
220-048	234-669	235-024	235-381
239-509	241-831	243-897	245-449
246-644	248-535	263-990	268-426
273-880			

Suspended Solids and Abrasives in Fluids

008-640	056-036	156-901	242-347

Temperatures Below -65°F

025-907	074-322	090-148	101-331
106-754	125-427	128-326	147-856
214-003	222-071	229-186	234-109
237-833	238-832	240-357	242-285
243-454	248-647	259-086	265-443
266-719	267-501	267-890	272-493
274-085			

Temperatures Above +1000°F

122-254	155-689	204-937	234-516
243-897	269-034		

Testing, Specification, Evaluation, and Performance

of Aircraft Seals (Canopies, fuel tanks, etc.)

002-400	009-494	011-484	013-311
015-012	028-761	030-417	047-671
048-310	055-695	058-142	067-223
070-011	078-224	085-568	094-590
102-156	105-671	106-719	106-754
107-274	121-502	123-436	123-771
125-427	130-772	130-882	131-091
145-399	157-761	200-381	200-382
201-085	202-439	225-495	235-052
241-830	241-831	247-172	254-803
257-940	262-718	263-457	268-381
273-212	302-156	323-114	

of Bearing Seals

011-915	013-714	025-808	077-374
143-970	201-047	209-179	228-320

of Cryogenic Seals

147-856	234-109	243-454	259-086

of Electrical Cable Entry Gland

041-362	067-223	077-374	088-545
090-148	094-590	094-807	106-777
134-497	134-918	140-117	140-118
145-239	200-230	204-064	205-020
214-269	229-700	238-482	

of Exclusion Sealing

121-294	209-179	254-496

of Jet Engine Seals

110-636	142-604	219-109	264-762

of Launch Vehicle Sealing

036-452	041-652	050-626	070-011
102-156	147-856	151-747	205-587
225-213	229-115	234-109	234-860
235-024	240-573	241-830	241-831
247-172	254-803	259-086	261-958
268-419	268-420	269-310	273-212
321-948	324-132	326-200	327-982

of Munition Sealing

025-907	036-456	036-564	094-922
098-205	107-713	119-763	125-427
140-613	143-970	149-981	153-033
153-642	202-439	225-501	234-860
235-052	238-431	250-231	254-496
259-550	261-886	262-398	304-961
316-397			

of Pneumatic Equipment

025-907	036-456	105-671	121-502
145-307	145-361	145-846	151-747
153-033	153-642	235-024	248-647
259-550	260-920	268-419	

of Vacuum Seals

041-362	094-590	120-620	201-321
210-323	236-067	241-906	273-336

of Valve Seals

034-750	147-856	241-830	241-831
242-962	261-958	268-419	268-420
322-684			

Theoretical or Analytical Evaluation

042-477	085-318	150-973	157-761
200-381	200-382	200-862	205-810
206-374	221-803	229-700	234-669
235-024	237-500	239-509	243-897
248-535	267-111	267-890	268-426

Thermal Effects - The effect of heat upon the parameters affecting the sealing capabilities of the seal.

010-270	085-114	094-807	094-922
106-777	118-047	147-856	153-347
218-730	229-186	240-357	243-897
244-668	249-144	254-614	267-501

Wear and Wear Particles - A discussion of wear other than that caused by rubbing.

011-484	022-068	025-808	073-961
086-205	110-636	119-437	121-112
130-882	153-033	155-541	214-848
219-109	239-180	241-830	247-172
254-614	259-550	260-465	265-582

Wear Due to Rubbing

025-809	034-171	077-374	085-114
118-047	153-642	155-689	162-475
207-979	238-832	243-897	254-804

III. SEALING MATERIALS.

Asbestos and Asbestos Compositions

028-761	036-452	037-218	097-258
116-389	153-356	238-431	

Carbon and Graphites

008-640	025-808	025-809	027-587
077-374	085-114	086-205	094-674
094-807	094-809	119-437	123-771
134-918	143-735	145-833	155-689
201-024	258-535	261-563	261-564
266-936			

Cements, Lutings, and Adhesives

010-822	028-862	036-319	041-362
055-695	061-987	067-333	078-224
089-828	107-802	127-073	130-210
131-091	135-272	140-572	145-399
145-518	147-837	149-799	151-257
154-972	155-606	157-912	158-661
161-932	200-082	200-230	200-898
203-143	206-374	206-446	210-323
225-495	231-622	242-347	245-449
249-262	252-992	258-865	262-015
267-145	268-381		

Ceramics and Cermets

010-270	028-429	060-141	088-545
089-767	097-454	109-660	110-287
117-021	120-620	122-254	130-882
153-456	206-446	210-323	214-269
226-294	233-471	234-669	235-381
236-067	237-500	238-020	238-832
240-969	241-629	243-897	246-644
248-535	249-349	252-607	254-020
256-214	258-784	260-114	260-629
262-580	263-391	265-170	266-158
266-502	267-122	268-507	270-582
270-870	273-481		

Cork and Cork Compositions

116-389	121-339	206-773	263-306

Felt

048-377	121-294	153-033	214-848

Fibers

036-319	067-600	147-092	201-204
229-662	238-020	243-966	248-037
249-144	251-669		

Glass and Glass Fibers

010-270	027-587	060-141	082-914
082-915	082-916	097-754	120-853
123-771	134-405	149-681	151-747
153-347	153-456	153-642	156-311
201-321	214-082	216-838	218-730
219-139	220-698	222-684	225-213
226-195	226-521	234-516	235-381
235-681	238-164	238-482	240-357
241-906	242-744	243-685	244-668
245-318	245-424	248-535	250-399
252-607	257-978	263-640	265-582
266-246	268-381	268-416	271-561
271-643	271-918		

Leathers

036-564	153-642	236-837

Metallic Seals

Aluminum

002-991	003-133	012-531	037-218
037-705	041-362	050-626	077-374
078-224	121-339	145-239	150-474
153-642	201-835	206-224	214-003
218-038	226-521	236-837	240-969
248-535	256-678	258-865	258-893
267-122			

Brass

002-991	041-362	077-374

Bronze

048-808	073-961	162-882	258-865

Metallic Seals (Cont'd)

Ferrous Alloys

025-808	025-809	033-877	034-171
037-218	041-362	050-626	073-961
085-114	094-809	106-511	134-918
140-117	140-118	150-474	151-257
153-642	162-882	218-038	242-285
256-678	258-865		

Metal Fiber Composites

097-258	157-761	238-020

Plated Metal Coatings

027-728	068-495	073-961	075-568
085-114	119-437	153-642	218-038
241-831	256-214	265-582	267-145

Other Metal and Alloys

Used in Caulking

001-046	021-274	021-275	061-987
075-568	083-716	088-545	092-941
094-590	097-547	107-713	127-073
145-518	154-972	158-661	200-898
225-495	239-384	242-347	254-803
254-804			

Used in Face Seals

025-808	060-141	201-024	225-213
232-073			

Used in Gaskets

036-319	050-626	060-141	061-987
070-011	074-322	149-799	153-356
157-761	201-085	226-521	232-073
238-020	245-424		

Used in Hermetic Seals

054-206	082-914	083-716	092-941
094-590	097-547	107-713	108-720
134-772	134-405	153-347	201-085
218-730	225-495	226-521	234-721
249-349	254-020	256-214	256-649
260-114	265-170	270-870	

Other Metal and Alloys (Cont'd)

Used in Special Sealing Concepts (self sealing fuel tanks, injection seals, ceramic to metal seals, etc.)

001-046	010-270	021-274	021-275
028-429	074-322	088-545	089-767
094-922	101-331	107-713	109-660
110-287	112-953	117-021	120-620
122-254	145-518	149-681	149-799
153-456	155-606	158-661	210-323
225-495	234-516	234-669	235-381
239-384	240-357	241-629	246-644
249-349	252-607	256-214	257-978
260-114	265-170	266-158	269-404
270-582	273-481	274-112	

Organic, Synthetic Materials

Chloroprene (Neoprene)

029-114	029-801	037-093	037-218
050-626	074-089	090-148	119-330
123-912	125-427	127-094	128-326
140-117	140-118	140-125	146-232
151-747	162-481	163-020	206-773
212-866	221-461	231-622	251-669
254-496	258-893		

Elastomers (Buna-N, GR-S, Butyl, etc.)

029-801	029-951	037-218	047-671
068-495	080-889	089-198	089-199
094-749	101-097	116-389	119-330
121-339	123-912	128-326	142-079
147-837	147-990	150-973	151-181
151-257	155-606	157-912	163-020
204-016	204-065	207-979	214-848
225-495	229-186	238-020	240-573
241-589	245-424	247-750	248-647
249-262	249-387	249-542	251-130
254-496	254-806	256-218	257-025
261-561	261-562	261-563	261-564
263-298	263-457	265-443	267-145
267-501	267-890	269-310	273-880
274-085			

Organic, Synthetic Materials (Cont'd)

Fluoro-Elastomers (Kel-F, Teflon, Viton)

003-133	023-155	025-809	033-877
034-171	034-750	036-564	037-218
050-626	070-011	105-671	123-771
130-960	142-079	145-307	145-846
149-981	150-973	151-257	153-033
153-642	155-606	163-020	201-835
206-707	214-003	222-593	225-213
225-495	236-837	237-833	241-589
242-285	242-744	243-966	246-574
249-262	252-996	254-804	256-590
259-550	260-465	260-920	261-563
261-564	261-958	265-443	268-419
269-310	270-746	272-431	304-961

Plastics (nylon etc.) Used in

Gaskets

023-155	034-750	034-100	145-284
213-956	231-956	238-020	251-130
265-443	272-493		

Hermetic

012-531	030-136	037-705	067-333
228-239	232-964	234-721	258-784
263-722	266-351		

"O" Rings

101-097	131-094	237-833	241-589
265-443	268-381	269-310	

Caulking

028-321	049-645	055-695	067-333
078-224	097-767	098-226	106-511
107-802	123-436	130-661	145-518
158-661	159-156	160-402	160-452
228-239	251-669	268-381	

Other Seals

067-600	085-568	121-112	134-497
140-125	140-572	144-596	145-239
157-356	157-357	157-912	161-951
163-020	201-204	201-835	202-445
204-065	205-810	205-951	206-224
206-374	210-323	214-262	214-848
220-048	220-293	222-684	225-213
225-495	248-037	249-144	250-163
253-227	259-086	261-958	267-493
268-419	269-783	273-284	273-880
274-085	304-961	324-132	

Silicones

037-218	059-550	072-503	080-814
106-754	119-330	136-762	145-239
145-307	145-846	147-837	147-990
151-257	151-747	155-606	200-230
205-810	228-239	236-184	237-833
238-431	242-347	248-647	254-496
258-535	261-564	263-029	265-443
267-501	269-310	273-284	274-085

Rubber, Natural Used in

Gaskets

029-951	036-319	037-093	037-218
060-141	116-387	116-938	123-839
125-427	136-781	142-604	145-284
146-228	146-229	153-356	162-329
201-085	206-707	221-461	229-186
232-977	250-028	250-231	250-742
251-130	253-753	256-218	259-160
265-555	267-890	268-381	

Hermetic Seals

098-106	201-085	267-051

"O" Rings

010-979	011-484	078-234	098-106
123-839	131-094	140-116	142-604
145-357	145-832	161-745	162-472
163-020	229-186	232-977	237-833
240-838	241-589	248-647	249-387
250-028	254-607	254-806	256-590
260-920	261-561	261-564	267-501
268-381			

Other Seals

005-181	008-669	013-714	016-848
033-308	033-877	036-564	047-739
048-377	049-645	083-653	107-960
135-272	140-180	145-239	145-362
146-231	146-232	150-474	151-747
155-606	156-416	206-106	210-822
215-094	218-038	231-622	234-140
236-837	247-750	251-669	252-992
254-496	257-025	259-550	261-562
261-563	274-085		

Rubber, Synthetic (a specific synthetic compound is not stated) Used in

Gaskets

023-155	024-489	037-096	037-100
038-529	043-419	063-258	063-260
064-334	064-335	065-209	072-231
072-267	072-268	072-269	074-322
080-814	091-555	116-938	121-339
125-429	134-181	134-197	134-462
134-463	145-360	145-361	145-833
146-748	146-749	204-016	204-064
206-773	208-838	220-831	220-832
221-461	229-186	240-573	253-753
256-218	263-306	265-443	265-555

"O" Rings

027-728	074-089	129-444	131-094
134-197	134-493	145-307	145-846
146-748	146-749	161-638	161-694
163-020	203-158	204-064	205-587
207-016	207-190	207-191	207-538
207-979	213-568	229-186	232-977
240-838	249-387	250-028	254-607
254-806	260-920	261-561	261-562
261-564	265-443	267-121	269-310

Other Seals

022-068	024-652	028-327	036-428
072-232	072-503	073-961	082-306
099-741	111-249	113-822	113-830
118-597	127-079	131-091	153-033
157-912	160-124	162-475	200-082
200-230	203-011	204-065	205-020
205-478	205-810	207-035	210-822
211-410	212-634	212-866	214-003
231-622	236-184	237-928	257-025
259-550	263-029	267-111	273-284
274-085			

IV. APPLICATIONS

Aircraft Jet Engines

110-636	119-437	125-957	142-604
219-109	264-762		

Aircraft Sealing - (fuel tanks, airframes, canopies, etc.)

002-400	003-133	009-097	009-494
011-484	013-311	015-012	028-321
028-761	030-136	030-417	036-319
047-111	047-412	047-671	048-310
048-377	049-645	050-800	055-695
058-142	061-987	063-064	067-223
067-362	070-011	074-322	078-224
080-814	085-568	094-590	097-258
099-469	101-652	102-156	105-235
105-671	106-719	106-754	107-274
111-249	121-502	123-436	123-771
125-427	125-957	130-772	130-882
131-091	145-399	154-494	155-541
157-761	162-882	200-028	200-381
200-382	200-385	201-085	202-438
202-439	207-505	216-630	222-071
225-495	231-223	231-501	235-052
239-180	241-830	241-831	245-449
247-172	254-803	254-804	257-940
262-718	263-457	263-485	266-936
268-381	273-212	273-880	302-156
323-114			

Automobile Sealing

011-915	034-750	090-148	094-444
102-222	121-112	125-427	140-180

Battery Sealing

137-420	143-420	144-596	151-729
153-553	157-356	157-357	161-951
220-293	242-744	249-349	252-077
254-020	254-493	259-160	259-653
260-629	263-722	265-170	266-351
267-051	270-870		

Bearing Sealing

011-915	013-714	025-808	034-171
077-374	143-970	201-047	209-179
228-320			

Chemical Industry Sealing

003-133	130-960	251-130	269-783

Compressor, Sealing

262-718	267-121

Cryogenic Fluid, Sealing

147-856	222-071	234-109	237-500
237-833	238-832	242-285	243-454
253-227	259-086	265-443	266-719
267-501	272-493		

Engines, Internal Combustion and Diesel

022-068	056-708	119-330	123-912
134-493	145-832	161-638	161-694
161-745	203-158	207-016	207-035
207-190	207-191	207-538	213-956
221-803			

Electric Machine, Sealing

099-495

Electrical Cable Entry Gland, Terminals, etc.

018-810	019-627	041-362	047-739
056-036	067-223	077-374	088-545
090-148	094-590	094-807	094-809
098-106	106-777	134-497	134-918
140-117	140-118	140-125	143-735
145-239	145-357	156-901	200-082
200-230	204-064	205-020	206-106
214-269	226-521	229-700	234-516
238-482	274-085		

Electronic Tube Sealing

010-270	027-587	028-429	035-302
097-454	117-021	153-456	206-446
210-323	226-294	233-471	235-381
236-067	240-969	241-629	241-906
246-644	248-535	252-607	253-211
260-114	263-640	266-158	266-502
268-416	269-404	270-582	274-112
275-443			

Equipment - (electrical, electronic, etc.)

006-687	009-494	030-136	036-319
036-452	041-362	041-652	055-132
067-223	075-568	082-914	082-915
082-916	088-545	090-148	092-941
094-590	097-547	107-274	108-720
109-660	110-287	120-853	122-254
128-365	130-772	134-405	153-347
160-124	200-082	201-085	201-321
214-082	216-838	218-730	219-139
220-698	226-195	232-964	234-940
235-681	236-006	236-184	238-164
238-200	243-685	244-668	245-318
245-449	250-399	250-738	250-749
252-786	256-214	258-784	260-114
266-246	271-561	271-643	271-918
274-112			

Exclusion Sealing

083-653	121-294	209-179	254-496

Ground Equipment - (Armed Forces)

083-653	121-294	140-180	143-970
145-362	209-179	228-320	251-145
259-160			

Hose and Pipe Connections and Quick Disconnects

005-181	008-669	011-484	023-155
047-411	050-626	074-322	098-646
105-671	107-960	130-960	145-361
146-228	146-231	206-707	208-838
214-262	221-404	231-223	231-501
232-073	235-024	239-180	240-573
241-830	241-831	247-172	254-803
262-718	263-029	266-719	268-381

Hydraulic Equipment, Sealing

002-400	005-181	007-347	008-669
011-722	029-114	030-373	033-877
036-456	037-096	038-529	048-399
060-141	070-011	074-089	074-322
080-889	086-205	089-198	089-199
097-258	102-156	105-415	105-671
121-294	130-882	140-117	142-079
145-307	145-360	145-361	145-846
147-092	149-981	150-973	153-033
153-642	155-541	162-882	203-011
204-016	204-065	205-478	212-634
216-630	222-852	229-115	231-223
231-501	234-860	235-024	237-833
238-164	239-180	241-589	241-830
241-831	247-172	247-750	252-996
254-607	254-803	254-804	256-590
257-228	257-940	259-550	260-465
261-564	261-958	265-443	267-501
267-890	268-420	270-746	272-431
273-212	322-684		

Instruments, Precision - (Optical & Electrical)

002-787	046-159	048-808	070-011
078-688	082-044	100-053	222-684

Launch Vehicle Sealing - (Rockets, Missiles)

036-452	037-218	041-652	050-626
070-011	078-688	082-306	083-716
089-072	098-646	099-706	102-156
125-957	147-837	147-856	150-474
151-747	163-020	205-587	206-707
222-593	225-213	229-115	231-223
231-501	234-109	234-860	235-024
237-500	238-832	239-180	239-509
240-573	241-830	241-831	242-285
247-172	249-542	254-803	254-804
256-145	256-161	256-678	259-086
261-958	262-196	262-566	268-419
268-420	269-310	272-493	273-212
273-880	316-146	316-580	321-271
321-948	323-670	324-132	326-200
327-982			

Liquid Metal Sealing

121-461	259-574	266-768

Microwave Guide Sealing

019-627	056-036	077-374	094-807
094-809	106-777	134-918	143-735
156-901	262-580	263-391	267-122
268-507			

Mixers and Agitators, Sealing

151-729

Munitions Sealing

001-046	008-640	010-822	021-274
021-275	025-907	030-373	036-456
036-564	048-399	051-200	052-775
068-873	094-922	098-205	099-469
101-334	105-415	107-713	107-802
112-953	119-763	125-427	130-661
140-572	140-613	143-970	149-799
149-981	153-033	153-642	154-494
157-699	158-661	159-156	162-329
200-028	200-859	202-438	202-439
207-505	207-979	214-003	214-848
218-903	225-501	234-860	234-862
235-052	237-928	238-431	239-509

Munitions Sealing - (Cont'd.)

240-838	250-231	252-992	254-496
256-649	259-550	261-886	262-398
304-961	316-397	316-580	323-670
326-483			

Naval Ships - (Submarines)

036-428	056-708	103-928	113-822
113-830	118-597	123-912	134-497
140-116	140-117	140-118	145-239
145-284	145-360	145-832	145-833
146-228	146-229	146-231	146-232
147-092	160-402	160-452	162-472
162-475	162-479	162-481	201-024
206-703	203-143	206-773	212-518
212-866	213-564	214-292	215-094
218-038	251-669	254-607	254-614
256-218	258-893	260-385	260-920
261-561	261-562	261-564	265-555
267-121	322-684		

Nuclear Plant, Sealing

121-461	232-073	241-101	245-449
257-025	259-803	260-235	265-582
266-768			

Packaging - (munition, electronics - "potting," etc.)

012-531	028-862	030-136	037-705
067-333	092-941	097-547	097-767
098-205	098-226	100-488	123-436
156-311	156-416	157-911	157-912
158-530	161-971	200-862	201-201
201-202	201-203	201-204	201-273
202-445	203-833	205-810	205-951
206-224	206-374	212-661	220-048
221-461	228-239	228-846	229-662
229-707	231-223	231-622	234-721
239-384	241-564	241-565	243-454
245-377	246-034	247-172	248-037
249-144	253-753	256-214	257-411
260-526	263-298	269-783	

Petroleum, Petrochemical Industries Sealing

009-079	011-484	013-311	015-012
016-330	027-728	028-321	028-761
030-417	033-308	037-096	038-529
043-686	047-411	047-671	048-310
049-645	050-800	055-695	056-708
058-142	063-064	078-224	086-205
089-828	091-555	106-719	111-249
123-771	128-326	134-462	140-180
142-604	143-970	151-257	200-381
200-382	200-385	201-739	205-179
221-401	221-404	225-495	250-742
251-130	265-443	302-156	323-114

Pneumatic Equipment Sealing

008-640	025-907	030-373	034-750
036-456	058-978	059-125	060-141
074-322	085-318	105-415	105-671
121-502	129-444	145-307	145-361
145-846	151-747	153-033	153-642
162-726	207-979	216-630	235-024
237-833	240-838	246-574	248-647
259-550	260-920	261-561	261-562
261-563	261-564	265-443	267-121
267-501	267-979	268-419	

Pressure Range - 0-100 psi

011-722	027-728	077-374	086-205
094-807	098-106	134-918	140-116
145-239	145-357	145-360	201-047
204-937	214-269	234-109	234-940
250-742	259-550	263-029	265-582
272-493			

Pressure Range - 0-5000 psi

023-155	029-114	070-011	074-089
074-322	089-198	089-199	097-258
105-671	116-389	130-882	238-020
241-589	246-574	252-996	260-465
260-920	261-561	261-562	261-563
261-564	267-145	267-501	270-746
272-431			

Pressure Range - 0-10,000 psi

145-361	237-928	261-886	262-398

Pressure Vessel Sealing

140-116

Propeller (Marine) Shaft Seals (see also Naval Ships)

213-568

Pump Sealing

007-347	011-722	043-686	123-771
155-541	201-739	205-179	222-071
222-852	232-073	234-109	241-589
259-574	262-196	266-719	

Railway Vehicle Sealing

107-802

Satellite and Space Vehicle Sealing

231-223	231-501	237-405	240-357
241-830	241-831	247-172	254-803
254-804	259-086	266-351	267-051
273-284	273-880	274-085	

Temperature Range - 0 to 2000°F

243-897	269-034	273-481

Temperature Range - 0 to 1000°F

072-503	073-961	085-114	086-205
097-258	097-454	121-461	122-254
131-091	147-990	151-747	155-689
216-630	219-109	204-937	226-521
228-239	233-471	234-516	238-020
240-357	245-424	249-262	257-940
263-640	267-501	268-381	270-582

Temperature Range - -70 to 300°F

003-133	025-907	028-862	037-705
070-011	074-089	074-322	090-148
097-258	098-205	101-331	106-754
116-389	121-502	140-572	142-079
156-416	214-003	240-357	241-589
242-285	250-742	257-025	259-550
265-443	267-501	267-890	274-085

Temperature Range - -300 to 0°F

050-626	147-856	222-071	234-109
237-500	237-833	238-832	242-285
243-454	253-227	259-086	265-443
266-719	272-492		

Thermo-energy Converter - (electrical, couples, thermionic emission, etc.)

239-384	260-368	265-360	266-768
269-034	270-222	273-336	273-481
274-085			

Turbine Sealing - (Steam & Gas)

042-477	059-125	082-045	254-614

Vacuum Sealing

016-848	041-362	060-141	094-590
100-488	116-938	120-620	153-456
154-814	156-311	162-726	201-321
210-323	210-822	236-067	241-629
241-906	253-227	265-443	266-246
266-351	267-122	267-890	270-582
271-643	273-336		

Valve Sealing

002-400	034-750	041-961	147-856
222-593	232-073	241-830	241-831
242-285	242-962	259-086	261-958
266-719	268-419	268-420	322-684

BIBLIOGRAPHY OF ASTIA LITERATURE ON SEALS

R. L. George
R. C. Elwell

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