

REPORT GDC-DBG67- 001

ONSET OF CREEP STRESS MEASUREMENT OF METALLIC MATERIALS

**CREEP TESTS WITH TITANIUM ALLOYS, PRECIPITATION
HARDENING STAINLESS AND MARAGING STEELS**

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FOREWORD

This report was prepared by Convair division of General Dynamics under NASA Contract NASw-739. The contract was initiated under Control Number 10-1159 (A-1631). Work was administered by NASA Headquarters Material Research Section with Mr. R. H. Raring, project engineer. The project engineer at Convair was Mr. C. W. Alesch.



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ABSTRACT

Continuous, tension-loaded, creep tests of 150 and 1000 hours duration were made in the 450 to 650° F range with apparatus constructed for measurement of average creep deformation in increments of 0.00000015 in. per in. Materials tested were annealed Ti 8Al-1Mo-1V, Ti 6Al-4V and Ti 5Al-2.5 Sn titanium alloys, PH 15-7 Mo Condition RH 1100, PH 14-8 Mo Condition RH 1050, AM-350 SCT and AM-355 CRT stainless steels, and an 18 percent nickel maraging steel. The tests were made to determine whether halt in creep deformation occurs when metallic materials are stressed at stress levels in the neighborhood of the 0.01 percent elastic limit which prevails at various temperatures to which the materials may be exposed. Test results showed that creep deformations in small amounts occur under the conditions of stress and temperature tested. Experimental difficulties arising from insufficient sophistication in testing apparatus, as revealed by experience with the apparatus provided, prevented obtaining data of rigorous design significance. Recommendations for apparatus improvements necessary for establishing the extreme precision of temperature control required for fine creep deformation increment measurements are made. These improvements incorporate newly available electronic rather than formerly available electromechanical temperature-regulating apparatus.

SECTION 1

INTRODUCTION

Metallic creep is an irreversible, time-rate-controlled, deformation process which occurs in metallic materials and structures when they undergo loadings of continuous or cumulative duration. Creep deformation rates are dependent on the composition and microstructural condition of the material undergoing creep, the temperatures at which the material is maintained, and the loadings imposed on the materials involved in creep.

Current airframe structural designs are predicated on the reversible and predictable elastic behavior of metallic materials and structures. Conventional design practice, however, recognizes the occurrence of small, irreversible, time-rate independent deformations which occur during initial loadings. The extent of these deformations is limited in metallic materials by imposition of the yield strength criterion. This criterion restricts initial loading deformations to 0.2 percent of an original two-inch length. Structural designs rarely take advantage of the deformation range permitted in materials evaluation practice because structural deformations are governed by aeroelastic and loading design requirements which intend that aerodynamic and structural shapes be preserved by use of structures primarily designed to satisfy stiffness criteria.

Two considerations currently mitigate against incorporation of metallic-creep-rate data into airframe structural designs. One is that aerodynamic shapes be maintained so that aircraft flight characteristics are not altered in service, and the other is that allowing creep to enter designs will permit conditions conducive to constant dimensional change in structures to occur during service. As a consequence of dimensional changes load introduction joint positions would shift and, necessarily, load distributions could be expected to shift accordingly to establish distributions not considered in the original design. Thus, analytical procedures which anticipate dimensional changes with respect to time would be required. These procedures would be difficult to establish unless flight performances could be accurately predicted.

Aerodynamic heating effects encountered in current supersonic aircraft designs are being satisfied by changing from materials which have proven useful in subsonic service to alternate materials which possess heat resistance as a principal attribute. Overaging which results from working the 7000 series aluminum alloys at temperatures in excess of 250°F, for example, has required their replacement with aged 2000 series aluminum alloys. Continuing increases in aircraft speed thus cause structural material selections to move into the titanium alloy and nickel-base alloy areas. At some stage in airframe development, it can be expected that payload fraction reductions

and increased fabricating costs entailed in the use of heavier metals will generate economic pressures sufficient to warrant critical reconsiderations of limits to which the uses of lighter metals can be extended.

In future reconsiderations of lighter metals, demands for information which delineate fields of utility wherein creep processes are negligible can be expected.

SECTION 2

ONSET-OF-CREEP STRESS MEASUREMENT

As mentioned earlier, the onset-of-creep stress concept arises from considerations of the utility of creep-rate-versus-stress information in structural design. At present, these considerations are tempered by requirements for 30,000-hour guarantees of transport aircraft structures. These guarantees imply that designer demand for information will require data extending out to 50,000 to 60,000 hours. Accordingly, eventual demands for information based on creep-rate-versus-stress data obtained from tests which measure deformations to a degree of fineness not yet achieved are expected to evolve. These measurements are also expected to require incursions into fields of dimensional measurement of heated materials and precise temperature control, which are not yet thoroughly explored.

The onset-of-creep stress concept resulted from study of a large variety of available time-versus-creep-deformation curves of various metallic materials. The study was made in response to structural designer demand for "better" creep data for input into structures analysis method development. The curves studied were derived from tests made with equipment which permits latitude in ranges of accuracy of temperature and strain measurement as specified in applicable American Society for Testing Materials specifications. The curves studied were parametric with respect to temperature. They plotted creep deformation versus time data for individual tests made with a variety of applied stresses. Each curve family was distinguished by curve shapes which flattened as stresses were reduced. Generally, at some stress in the neighborhood of the elastic limit of the materials involved, the creep rates diminished to zero. The suggestion in these data is that either the creep processes are not energized at various temperatures by the stresses at which the creep rates are zero, or the equipment was not sensitive enough to detect creep activity which may have been in progress under the conditions stated.

Knowledge of the influence of stress-temperature conditions upon activation of creep processes is important because it will inform designers of those stress-temperature limitations which should not be exceeded to avoid introducing creep considerations into designs. Stress-temperature data which indicate creep activity initiation can serve to reduce or eliminate the need for long-term structural component tests to establish the validity of designs which do not directly include consideration of the activating influence of critical stress-temperature combinations. In brief, forewarning of critical stress-temperature combinations which activate creep processes can reduce or eliminate longtime structural test requirements for proofing design integrities.

For convenience, those stress-temperature combinations which are sufficient to activate creep processes have been termed onset-of-creep conditions. The testing described in Sections 4 through 6 was intended to establish those stress-temperature combinations in the 450 to 650° F temperature range that would be expected to activate creep processes in the materials tested.

From the beginning of testing, the formidable task of measuring creep deformation increments in the magnitude of a micro-inch was encountered. The magnitude of the increment to be measured was determined by distributing a 0.2 percent total deformation over a span of 30,000 hours. The measured increment magnitude was found to be in the same order as the thermal expansion magnitude; hence, the requirement for extremely close control of testing temperatures within the range of $\pm 1^\circ$ F was established.

SECTION 3

MATERIALS

The following eight materials were tested:

- a. Ti-8Al-1Mo-1V, Duplex annealed.
- b. Ti-6Al-4V, Mill annealed.
- c. Ti-5Al-2 1/2 Sn, Mill annealed.
- d. AM-350, Condition H.
- e. AM-355 CRT.
- f. PH 15-7 Mo, Condition A.
- g. PH 14-8 Mo, Condition A.
- h. 18% Nickel Maraging Steel.

These materials were in the form of 0.050 by 36 by 96-inch sheets. All materials were procured on a commercial basis to obtain production run rather than sample lot representations. Each material was supplied in the scale-free condition customary in the supply of commercial product. Any straightening or flattening represented by the sheets was that normal to commercial production. Except for the PH 15-7 Mo and PH 14-8 Mo steels (which were identified as 2D finish) and the AM-355 with its cold-rolled finish, all materials were supplied with an annealed, de-scaled, and flattened finish.

Chemical compositions of the materials are shown in Table 1. Mechanical properties of the materials in the various conditions reported by sources are listed in Table 2.

3.1 MATERIALS CONDITIONING

The material conditioning steps required by the various materials were accomplished by laboratory personnel. All furnaces used were surveyed for temperature uniformity in the empty condition prior to use. Furnaces operating at less than 1000° F were within 5° F and those operating in the 1000 to 1850° F range were within 15° F. In view of the short time that any material was at temperatures over 1000° F, air atmospheres were used. In all cases, the heat-treat scale observed was light and distinguished only by discoloration. To avoid difficulties from variations in scale-removal processes, pickling or etching was not used to improve the appearance of the heat-treated materials. Conditioning at sub-zero temperatures, where required, were carried out in isopropyl alcohol/dry ice baths maintained at -100 to -105° F. All

tempering and aging treatments at temperatures under 1000° F were carried out in air atmospheres. Air quenching or cooling as required was used throughout conditioning treatments. In all cases, the materials were suspended from rods during heat treatment and separated to provide free circulation of room air.

3.2 HEAT TREATMENTS

Ti-8Al-1Mo-1V. Some early tension and preliminary creep tests were made with material TMCA Heat V-1555, which was supplied in the single-annealed (1450° F, 8 hours, furnace cooling) condition. Prior to use, this material was duplex-annealed by treating it at 1450° F for 10 minutes and by air cooling. The duplex-annealed material (TMCA Heat D4539) used for onset-of-creep stress testing was obtained from the mill in this condition.

Ti-6Al-4V. This material was tested in the as-received, mill-annealed condition.

Ti-5Al-2 1/2 Sn. This material was tested in the as-received, mill-annealed condition.

AM-350. The two sheets of this material were received in Condition H, which represents solution treatment at 1900 to 1975° F and air cooling. Conditioning after receipt consisted of re-solutionizing at 1710° F for 10 minutes and air cooling, hardening by sub-zero cooling at -100° F for 3 hours, and tempering at 850° F for 3 hours and air cooling.

AM-355. This material was received in the CRT condition and was tested in the as-received condition.

PH 15-7 Mo. All tests with this material were made with Condition RH-1100 material processed at Convair. This processing involved austenite conditioning (1750° F, 15 minutes, air cooling) the mill-annealed, Condition A, as-received material. One hour after the austenite-conditioned material cooled to room temperature, it was hardened at -100° F for 8 hours, then aged at 1100° F for 1 hour and air cooled.

PH 14-8 Mo. The Condition A, mill-annealed, as-received, PH 14-8 Mo used for tests was processed to the RH-1050 condition at Convair. The conditioning included austenite treatment (1700° F, 1 hour, air cooling) hardening (-100° F for 8 hours within one hour after the austenite-treated material cooled to room temperature) and aging (1050° F, 1 hour, air cooling).

18 Percent Nickel Maraging Steel. The mill-annealed, as-received, 18 percent nickel maraging steel was conditioned for test by aging at 950° F for 3 hours and air cooling. This aging treatment follows producer recommendation for obtaining 230,000 psi minimum yield strength material.

SECTION 4

TENSION TESTS

Tension tests were performed at 450, 500, 550, 600, and 650°F to determine the stress required to obtain 0.01 percent tensile strain. This strain conventionally indicates the elastic limit in materials which do not display true elastic limits. Materials tested were:

- a. Ti 8Al-1Mo-1V Duplex annealed.
- b. Ti 6Al-4V annealed.
- c. Ti 5Al-2.5 Sn annealed.
- d. AM-350 SCT.
- e. AM-355 CRT.
- f. PH 15-7 Mo, Condition RH-1100.
- g. PH 14-8 Mo, Condition RH-1050.
- h. 18% Nickel Maraging Steel.

4.1 PROCEDURE

All tension tests were made in a 60,000-pound capacity, electromechanical, universal testing machine. This machine has a Tinius Olsen electronic strain rate controller which can automatically control the strain rate within predetermined limits (ordinarily 0.003 to 0.007 inch per minute). Automatic strain rate control, however, was not used in making these tests. Instead, the unit was used as a strain pacer. By manually adjusting drive speeds with the infinitely variable speed control, tests were made at a strain rate of 0.0045 to 0.0055 inch per inch per minute. Calibrations with Morehouse proving rings showed the weighing accuracy of the machine to be within 0.5 percent.

All elevated-temperature tension tests were heated in a 10-inch wide by 18-inch high by 24-inch deep, electrically heated, forced convection, box-type, testing machine furnace. Temperature control for this unit was effected by a thermocouple attached to the test specimen. This thermocouple actuated a strip-chart potentiometer-controlled of 1/3 of 1 percent full scale accuracy which had its on-off mercury switches adjusted for operation within 2°F. These switches regulated the on-off power supply for the furnace heaters. The furnace was held to within 5°F temperature variation when surveyed in the empty condition. The iron-constantan thermocouples used were point-checked against Bureau of Standards secondary standard thermocouples in a Leeds and Northrup deep-well furnace. Leeds and Northrup K-2 potentiometers were used throughout calibrations.

Strain pick-up in tension testing used modified clamp-on reach-rod assemblies to actuate ASTM Type B differential transformer extensometers. These extensometers have an accuracy of one part in ten thousand, and are calibrated with an extensometer calibrating, super-micrometer device.

In the performance of tests, a tare load was applied to assure takeup of slack in gripping devices and proper seating of spherical grip mounts. Then the extensometer was attached and the test was performed out at the desired strain rate throughout the desired range of strain. The extensometer was then removed and fracture was accomplished with a cross-head travel rate of 0.05 inch per minute. The tension test specimen configuration is shown in Figure 1.

4.2 RESULTS

Tension test results with the eight materials listed are shown in Tables 3 through 10. Table 11 lists the stresses required to produce 0.01 percent offset in tension tests. These data were obtained from the stress strain curves shown in Figures 2 through 9, which chart the averages of data shown in Tables 3 through 10. The moduli of elasticity used were taken from Mil-Hdbk-5 or vendor data.

SECTION 5

CREEP TESTS

Fifty-hour creep tests were performed at stresses required to produce 0.05, 0.10, and 0.15 percent offset at the various temperatures (450, 500, 550, 600, and 650°F) at which the tension tests were made. These tests were run to facilitate a selection of stresses for long-term onset-of-creep stress measurement tests. These selections were desired to avoid abortion of long-term tests by excessive onset-of-creep stress specimen deformation or breakage caused by overloading specimens.

The materials used for 50-hour creep tests were the same as those used for tension tests (Section 4).

5.1 PROCEDURE

Arcweld Model J and XJ 12,000-pound capacity creep test machines were used in 50-hour creep testing. The calibration of these machines with Morehouse proving rings showed their accuracy to be 0.5 percent or better. The heat for testing was supplied by Arcweld cylindrical vertical tube, electrically heated furnaces. Temperature surveys with normal furnace arrangements showed these furnaces capable of maintaining temperatures within 5°F. When furnace covers were augmented with additional external insulation and plugs inserted in the top and bottom openings, temperature variations within 2°F were attainable. Temperature regulation during creep test was accomplished by a chromel-alumel thermocouple attached to the center of specimen gage lengths. This thermocouple actuated a 1/3 of 1 percent full-scale-accuracy potentiometer controller which governs the on-off input of furnace power. In addition to the control thermocouple, recording thermocouples were attached at each end of the gage length of the specimens. The recording thermocouples serve chiefly to advise need for improved external insulation and plugging to optimize furnace temperature distribution.

The strain pick-up from creep specimens was accomplished with Arcweld Model A-210 creep extensometers. These units consist of clamp-on reach-rod devices which mechanically transfer strain indications to an externally positioned differential transformer extensometer. The extensometer output was amplified and modulated to provide input to a multi-point 1/3 of 1 percent full-scale strip-chart recorder which maintains a continuous record of the creep strains.

Loads were applied to the creep test machines by dead weights. In normal operation, dead weight loading is accomplished by a weight elevator which provides full support of dead weights where they are applied, and then permits slow lowering of the weights for applying their force to the specimens. In this series of tests, the application of weights by the elevator was found unsatisfactory. To overcome the disadvantage of

elevator loading, the dead weights were counterbalanced; after the elevator retracted to free the weights, the counterweights were slowly removed. The counterweight consisted of a hopper-bottomed container fitted with an adjustable opening at the bottom of the hopper. In use, this container is filled with small lead shot metered to provide a very slow rate of load application. Load application times ranged four to seven minutes by use of this method.

Figure 1 shows the specimen configuration used for the 50-hour creep tests.

5.2 RESULTS

Results of the 50-hour creep tests at stresses in the neighborhood of the 0.01 percent offset stress are summarized in Figures 10 through 49. Tables 12 through 19 summarize the primary creep strains observed from study of the autographic creep strain curves and the times throughout which primary creep was evidenced. Plots of the primary creep portions of the creep curves are not presented because the autographic curves were too abrupt in most cases to trace the unfaired course of the individual curves. The data presented in Figures 10 through 49 were obtained by projecting the transition point at which the secondary and faired-in primary creep portions of the creep curve intersected to the ordinate and by considering the difference between the intersection of this projection with the ordinate and the point of departure of the creep curve from the ordinate. This is indicative of the primary creep strain which appeared during test. The creep times shown were obtained by projecting the point of intersection of the primary and secondary creep portions of the creep to the abscissa and noting the times indicated by this intersection.

The short primary creep times shown for materials loaded at stresses near their elastic limits is in keeping with primary creep behavior shown in the literature for other similarly loaded materials. The primary creep data shown in Tables 52 through 59 did not prove helpful in relation to onset-of-creep stress data discussed below. This situation occurred because the time required to obtain mechanical and electrical zero of the differential transformers was greater than the time of primary creep. This adjustment time was required to gain high sensitivity of strain indication and involved extremely delicate manual adjustment.

The secondary creep rate data shown in Figures 10 through 49 were used for obtaining those stresses used in onset-of-creep test specimens. Where slopes in the data could be obtained, the data were enveloped and the average stress enveloped at 0.000001 in./in./hr creep rate was taken. Where slopes in the data could not be established because of a preponderance of nil creep tests, the highest stress at which nil creep occurred was taken. In each test case, stresses 2.5 or 5.0 ksi above and below (according to the steepness of the secondary creep stress versus strain-rate curves) were used for the two complementary onset-of-creep tests.

SECTION 6

ONSET OF CREEP STRESS MEASUREMENT TESTS

Creep tests of 150 and 1000 hours duration were made with multiple-test, high-sensitivity creep test apparatus designed and built for the task of determining those stresses at various temperatures at which halt in creep processes, as indicated by zero or negligible creep rate, would occur. These creep tests were made with the eight materials (listed in Section 4) which had been tension tested and screened through 50-hour conventional creep tests. A set of three specimens represented each material, and each material was tested at 450, 500, 550, 600, and 650°F. The stresses used for the 150- and 1000-hour creep tests were selected as described in the 50-hour creep test results discussion in Section 5.

6.1 PROCEDURE

The apparatus used for performance of 150- and 1000-hour creep tests for onset-of-creep stress measurement is described in detail in Convair report GD/C-64-213, March 1965, Onset of Creep Stress Measurements in Metallic Materials, Creep Test Machine Construction and Operation. This report summarized work under NASA Contract NASw-491 and was submitted upon task completion. Creep-test procedures used for the 150- and 1000-hour tests are described on pages 34 and 35 of the report referenced.

6.2 RESULTS

Temperatures recorded in performance of the 150-hour creep tests are tabulated in Tables 20 through 34; those recorded in performance of 1000-hour creep tests are listed in Tables 35 through 49. The stresses applied in performance of the 150- and 1000-hour creep tests are shown in Tables 50 through 58. The strain-gage readings recorded in 150-hour creep tests are tabulated in Tables 58 through 72; those recorded in 1000-hour creep tests are listed in Tables 73 through 87.

In each of the 540 test cases, creep deformation versus time curves were plotted to obtain secondary creep-rate data. These curves are not presented here, but a summary of the creep-rate data obtained is shown in Tables 98 through 102.

The undesired trend in the temperature data shown in Tables 20 through 49 were traced in the course of the creep test campaign to:

- a. Changes in heater unit insulating material characteristics.
- b. Lack of reliability and uniformity in operation of electromechanical power relays.
- c. Limited adjustment capability (for purposes of this task) of temperature controllers which employ mercury-type impulse switches.

- d. Inability of an on/off control of power input to provide the sensitivity of power regulation required for the task.

The scatter tendency in strain-gage indications tabulated in Tables 58 through 87 were also traced to:

- a. Inadequate heater temperature regulation.
- b. Inadequate temperature regulation of externally mounted differential transformer strain gaging elements used subsequent to breakdown of the internal mounted units.
- c. Induction effects arising out of heating element performance.
- d. Thermal gradient and heat transfer influences on reach-rod characteristics.

The equipment inadequacies mentioned were brought out as operating experience with the apparatus accumulated and study of the emergent data progressed. The information gained thereby was used as a basis of inquiry into the feasibility and current availability of replacement and supplementary equipment items suitable for producing data for design purposes. The results of this inquiry are discussed below.

The data listed in Tables 89 through 95 resulted from a data reduction method which detracted the quantitative value of these data. The method required segregation of temperature data into groups which fell within a 1° F temperature range, plotting the strain-gage indication versus time relationships which occurred in each temperature range, enveloping the resultant data for determination of its average slope, and averaging the slopes of the several curves representative of each temperature increment. In several cases, scatter in the data precluded data analysis; these cases are noted indeterminate.

The data tabulated in Tables 89 through 95 qualitatively indicate decreases in creep rate as stresses at given temperatures diminish. In those cases where nil creep conditions appeared, available data were inadequate for rigorously defining the conditions where a halt in creep mechanism operations could be predicted. Also, where full complements of test data were obtained in various test cases, disparities in the numerical data were present. These disparities could be attributed to results where characteristic of positioning in the heating unit and the strain-gaging apparatus used. The condition of the data precluded plotting useful strain rate versus stress curves in the conventional manner.

SECTION 7

RECOMMENDED APPARATUS REVISIONS

This section briefly reiterates the initial design features of the temperature regulating and indicating strain gaging and loading systems incorporated in the onset-of-creep stress measurement apparatus. Operating experience with the apparatus is also reiterated and related to initial design concept. On the basis of this review, changes necessary to improve the apparatus sufficiently to meet its originally intended operational standards are proposed.

7.1 HEATING UNIT AND CONTROLS

The heating unit consists of a metal core, a heat distributor sheath, and a set of heating elements. The heater core is a 6- by 30- by 96-inch block of Monel Metal weighing 5000 pounds. The metal mass is pierced longitudinally with nine rectangular channels for instrumented test specimen insertion. The massive heater core is used as a thermal flywheel to even and distribute heat inputs. Concentrated heat inputs from strip heater elements attached to the exterior surfaces of the heater core are smoothed and distributed into the core mass by a 0.2-inch-thick copper heat distributor sheath which envelopes the core. The ability of this composite metallic mass to provide a temperature distribution of within 1°F throughout a full complement of nine test specimens was demonstrated in initial temperature surveys made shortly after heating unit construction was finished.

The heating unit assembly rests on a 6-inch-thick block of high-density, load-supporting, asbestos insulating board. The heater ends also are enclosed by a 2-inch thickness of this material. The heater top surface is insulated with a 2-inch-thick layer of insulating board and a 2-inch-thick layer of high-efficiency rock wool insulation. In initial assembly of the insulation, it was fitted to avoid gaps; however, the insulating board material shrank and gaps appeared at joints as initial heating progressed. At the end of the initial 1500 hours of use, shrinkage gaps of 1/8 to 3/16-inch in width appeared, and at this time the unit was partially disassembled for ramming macreated asbestos grout into the gaps. Upon reassembly, a 1/2-inch layer of asbestos was applied to the aluminum alloy sheet metal cover of the heating unit. At the end of about 3000 hours operation, an additional 1/2-inch-thick layer of asbestos was applied in an effort to reduce temperature distribution irregularities.

In future constructions or repairs, insulating boards should be thoroughly oven dried before they are machined to dimension. Also, the use of grouting cement during lay-up and fitting to attach and seal asbestos board insulating pieces can be advocated.

7.2 INPUT HEAT CONTROL

Electrical power for heating is provided from a 3-phase, 440-volt substation source. When the heater unit was first used, substation loads were moderate and day-to-night and work-week-to-week-end power characteristic variations were slight. Later, however, substation loads increased to the extent that variations in input power voltage were encountered. Although input voltage to the apparatus was supplied through a voltage-regulating device, the source voltage variations affected the stability of this unit to the extent that the fine control desired at the heater unit was disturbed.

The initial thermal design of the heating unit incorporated enough metal and insulation to accommodate itself to on/off controls as they apply in industrial oven applications. Experience showed that on/off controls, when worked in conjunction with a burdened power source, were not sensitive or responsive enough to input power variations to provide fine temperature regulation.

The electromechanical relays used to control current input were also found undesirable. Contact wear caused by arcing during make-or-break operations contributed to irregularities in the cycling characteristics of the contactor relays, and sometimes resulted in contact sticking in the on position. The voltage supplied to the relay solenoids (along with dust accumulations and spring aging) also influenced relay operations, particularly during periods when prompt relay opening was required.

The unfavorable experience in use of on/off power control systems for fine temperature control indicates that they should be abandoned for the use at hand. Replacement with a system which is immediately and continuously responsive to temperature variations is desirable to avoid the irregular pulsing of heat inputs inherent in relay actuated on/off control systems. The availability and use of resistance-thermometer-controlled, silicon control rectifier units for regulating heater current inputs in the rapid and continuous manner required for fine temperature control are recommended. These units will throttle the current input into heater banks rather than turning it on and off to depend on the heater core mass to smooth out pulsed heat inputs.

The heater core mass and construction with insulating material interleaved between heater-core laminations were intended to introduce of thermal lag characteristics into the unit to prevent overshooting temperatures upon heating and to reduce thermal damping which follows overshooting. These objectives were thwarted by the on/off control system characteristics. Overshooting and damping tendencies were not initially apparent in temperature data, but their influences became apparent upon study of strain or deflection, particularly because primary creep evidence was obscured. To obtain control of overshoot and damping in temperature regulation, the use of proportional input control is recommended in addition to resistance-thermometer-activated, silicon control rectifier apparatus for regulating heat inputs. The resistance-thermometer actuation operates to provide null electrical balance indications which activate silicon power controllers without the use of electromechanical instrument relays. Because

of the small currents handled, instrument relays are not subject to difficulties associated with power relays. They are, however, subject to irregularities introduced in manually setting contact point gaps. These gaps must be wide enough to allow for contact movement, and the gaps required by individual relay characteristics can significantly affect the span of temperatures through which instrumentation effectiveness is transmitted. Proportional input control devices are used to throttle power inputs in proportion to the difference between desired and actual temperatures. They thus effect reduction of power inputs in areas of control where overshooting and damping tendencies arise.

Each end of the heating unit is provided with an independently controlled array of heater elements. These provisions were made to permit greater amounts of heat input into end zones than is required to maintain central zone temperatures. These provisions are made to compensate the greater heat loss in these zones resulting from end-wall exposures. End zone thermal balance with central zone heating is maintained by more frequent operation of the on/off controls and by setting the end-zone temperatures at a slightly higher temperature than the central zone. Initial planning provided that the end zones be maintained at the same temperature as the central zones, but this provision did not provide the even temperature distribution desired. Experience with the unit showed that the differential temperature setting was inadequate because frequent manual adjustments of control instrument settings were required to maintain temperature balances. The frequency of readjustment was not predictable because ambient temperature conditions were not closely enough controlled to provide constancy in heat loss through the heating-unit ends. Although the heating unit was housed in an insulated room, leakage through vents, door openings, and the operation of additional creep-test units in the same room tended to offset the advantage sought in its use.

To provide desired effectivity in end-zone heating, it is recommended that the end-zone heating units be operated as slave units mastered by the central-zone heating unit. This can be done by controlling the end-zone heat inputs with a silicon-control rectifier driven by temperature controllers which are required to maintain constant temperature differentials between the end zones and the central heating zone.

7.3 SPECIMEN TEMPERATURE INDICATING SYSTEM

The specimen-temperature-indicating system measures specimen temperatures by thermocouples which contact the test specimens. The temperature-indicating system is independent of the heating control system.

The specimen temperature-indicating system uses thermocouple hot junctions to sense specimen temperatures and ice-water-immersed cold junctions to provide a reference for the hot-junction outputs. The read-out of thermocouple outputs is magnified by partially cancelling their outputs with a reverse polarity current and amplifying the resultant differential outputs for recording.

The ice-water cold junction requires daily ice replenishment, stirring of ice-water mixtures, and stabilization prior to each use. The arrangement is cumbersome and subject to error if improperly used. The mercury cell voltage dividers which provide opposing currents for partially canceling thermocouple currents are adjustable, but become fixed after adjustments are made. Differential temperature recording is accomplished by a multiple-point, thermocouple-type temperature controller. The wide swings of the recording pen which result from recording small temperature differences can result in error because the period of swing can, at times, be longer than the interval through which the chopper bar operates. The recording pen can thus be depressed too soon, resulting in erroneous recordings. Consequently, multiple recordings must be made to ensure that all points are correctly recorded. Each thermocouple was found to have some error, necessitating individual corrections to each recorded temperature. This creates a burden and delays receipt of data.

To reduce specimen temperature-indicating system difficulties and recording labor, it is proposed that ice-water cold junctions, mercury cell voltage dividers, and the multiple-point recorder be deleted from the system. Instead, the thermocouple outputs will be sequentially switched into a dc proportional output controller with digital setpoint and automatic ambient temperature compensation. This unit will be used to provide opposing current for obtaining differential temperatures and adjustment for thermocouple error compensation. Compensated differential temperature currents will then be amplified and read-out on a single point recorder.

7.4 STRAIN GAGING SYSTEM

The strain gaging system is a high-precision, differential-transformer-actuated apparatus capable of accurately indicating a total linear displacement of 0.0003 inch. Digital read-out indicators provided in read-out apparatus permit reading the total displacement in 1000 increments. The unit read-out interval thus spans a displacement of 0.000003 inch. A 20-inch-long specimen gage length is used in testing, and thus the average unit deformation of 0.0000015 inch per inch can be read.

In initial testing, differential transformer strain sensors intended for operation at temperatures of 450 to 600° F were used. These transformers proved servicable for about 600 hours. At this time, the potting compounds in the transformers degraded, resulting in internal short circuiting which immobilized each transformer. As a result of this experience, the transformer manufacturer refused to furnish exact replacements and made replacement with units satisfactory for room temperature operation.

The change from high to low temperature differential transformers required using reach-rods for transmitting specimen gage length displacements to the externally mounted units. This change proved disadvantageous because minor temperature gradient changes in the heating unit end zones and temperature changes in transformer mountings that result from heat flow through the reach-rods apparently occurred. Also, the external mounting of differential transformers subjected them to unfavorable drifts in the room-temperature environment which was not tempered against night-time

chill. Precautions to circumvent effects of air currents were taken to provide stability of the transformer environments. Forced air convection in the transformer mounting areas was employed to maintain this region within 2° F day-time temperature range, but this was not entirely effective in stabilizing transformer temperatures as indicated by strain-gage readings.

Proposals for stabilizing differential transformer temperatures include (in addition to the master/slave end-zone temperature control mentioned) installation of thermal insulators in the reach-rods to block heat flow into the transformers, and mounting the transformers in an enclosure which is controlled at constant temperature to offset effects of day-to-night room temperature drifts. These objectives will be approached by inserting lengths of fused silica rods into the reach-rod assemblies and by installing the differential transformers in chambers kept under forced convection air maintained at $120 \pm 1^\circ \text{ F}$.

7.5 LOADING SYSTEM

A non-indicating, dead-weight loading system is used for applying specimen loads. The non-indicating feature of the system requires initial calibration by electrical-strain-gage instrumented dummy specimens which were incrementally loaded to obtain load-deflection data for calibration chart preparation. The calibration charts thus require interpolation for selecting specific test loads and dead weights for developing the loads.

The loading system consists of a set of weight-multiplying levers and bell cranks. The bell cranks contribute to weight multiplication and translate vertical into horizontal motion. Several pivots and changes from linear to curvilinear paths of force direction are thus present.

In practice, 0.050-inch-thick by 0.500-inch-wide test specimen cross sections are used. A factor of about 40 is thus involved in translating force into stress values.

Interpolation error, variations in pivot bearing contacts, and the influence of the multiplying factor in magnifying experimental error affect the accuracy of stress (loading) data. Accordingly, the non-indicating load system can be reconsidered to include the insertion of dynamometers in the loading systems to measure the actual loads present during test with the same rigor that creep deformations and testing temperatures are measured.

7.6 ELECTROMAGNETIC SHIELDING

Electromagnetic induction effects resulting from the rise and fall of electrical currents during on/off periods of heater control operation were observed in thermocouple and strain gage behavior. To avoid induction instability in temperature and strain gage readings, the practice of interrupting the power supply while taking readings was followed; this may have detracted from temperature stability.

To minimize induction effects and avoid repetitive power interruptions, it is proposed that soft iron liners be provided for shielding each strain gage instrumentation installation, each thermocouple well, and the heater unit itself. These liners should be bonded to an earth ground connection.

SECTION 8

CONCLUSIONS

Onset-of-creep stress measurements of metallic materials require performance of creep tests in new fields of testing technology. Obtaining information pertinent to design of long-term items (such as 30,000-hour airframes) requires strain-gaging sensitivity in micro-inch increments at elevated temperatures and temperature regulation of 0.2 percent accuracy. This accuracy is at the limit of available temperature sensors and temperature controlling equipment. The testing campaign reported showed that rigorous creep testing over long periods was not feasible when electro-mechanical temperature control of heating units and unsophisticated temperature regulation of high-precision, differential-transformer, strain gages are attempted.

Long-term thermal degradation of potting compounds used in high-precision, elevated-temperature, differential-transformer strain gages results in performance inaccuracies and malfunctions which preclude their use. Room-temperature-operating, high-precision, differential-transformer strain gages display critical response to the temperature of the environment in which they are maintained. Carefully chosen and regulated room environments proved inadequate for consistent environmental control of the strain gages. The use of rigorously controlled, thermostatic chambers for differential transformer housing is indicated.

Intermittent-operating, non-throttling, independent heating-zone control regulation of heating-unit power inputs is inadequate because it does not regulate temperature transients in the heating unit mass which result from non-synchronous zone controller system operation. Continuous-operating, throttling, master-slave interconnected regulation of heating-unit power inputs is required for minimizing temperature transients which superimpose thermal expansion effects upon creep deflections. Moderate-cost, commercially procurable equipment for implementing desired temperature-regulation systems is now available and adaptable to the existing heating unit.

Temperature overshoot and damping during test-initiation periods and the times required for critical mechanical adjustments of differential-transformer strain-gage elements precluded the production of primary creep data from the onset-of-creep stress measurement apparatus. Strain-gage adjustment experience showed that although good temperature control was obtained, the strain-gage stroke (0.003 or 0.0003 inch) was restrictive for measurement throughout the primary deformation range and the readjustments required were too time consuming to keep pace with the deformation progress. Special autographic-recording testing machine equipment capable of loading-rate control and the maintenance of predetermined loads were investigated for obtaining primary creep information pertinent to onset-of-creep stress measurements and were found suitable and available for use.

Secondary creep curve blending procedures were used for compensating irregularities in test data caused by temperature variations in the heater unit or in the differential-transformer elements. These procedures involved enveloping and curve-slope averagings for curve fairing purposes. The approximations thus introduced preclude presentations of secondary creep-rate data or conclusions derived from them as being sufficiently rigorous for design considerations.

FIGURES

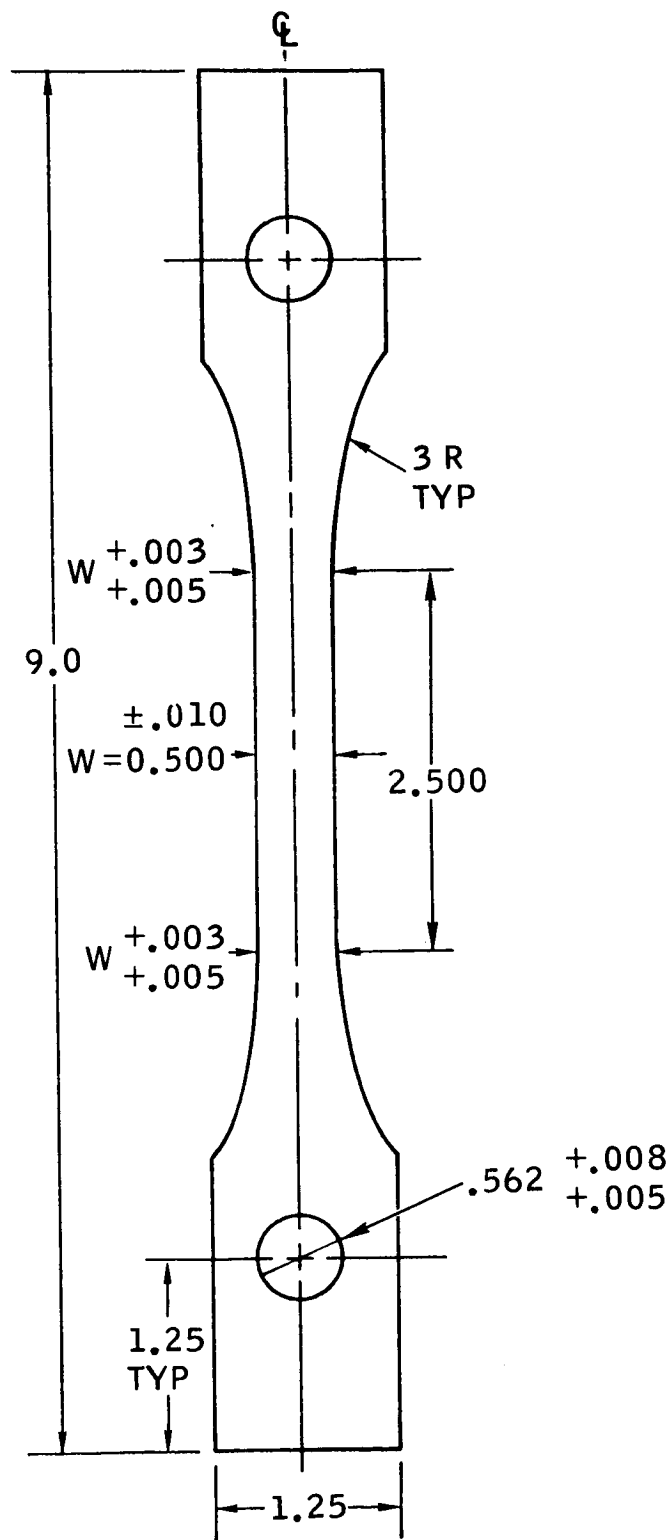


Figure 1. Tension Test Specimen

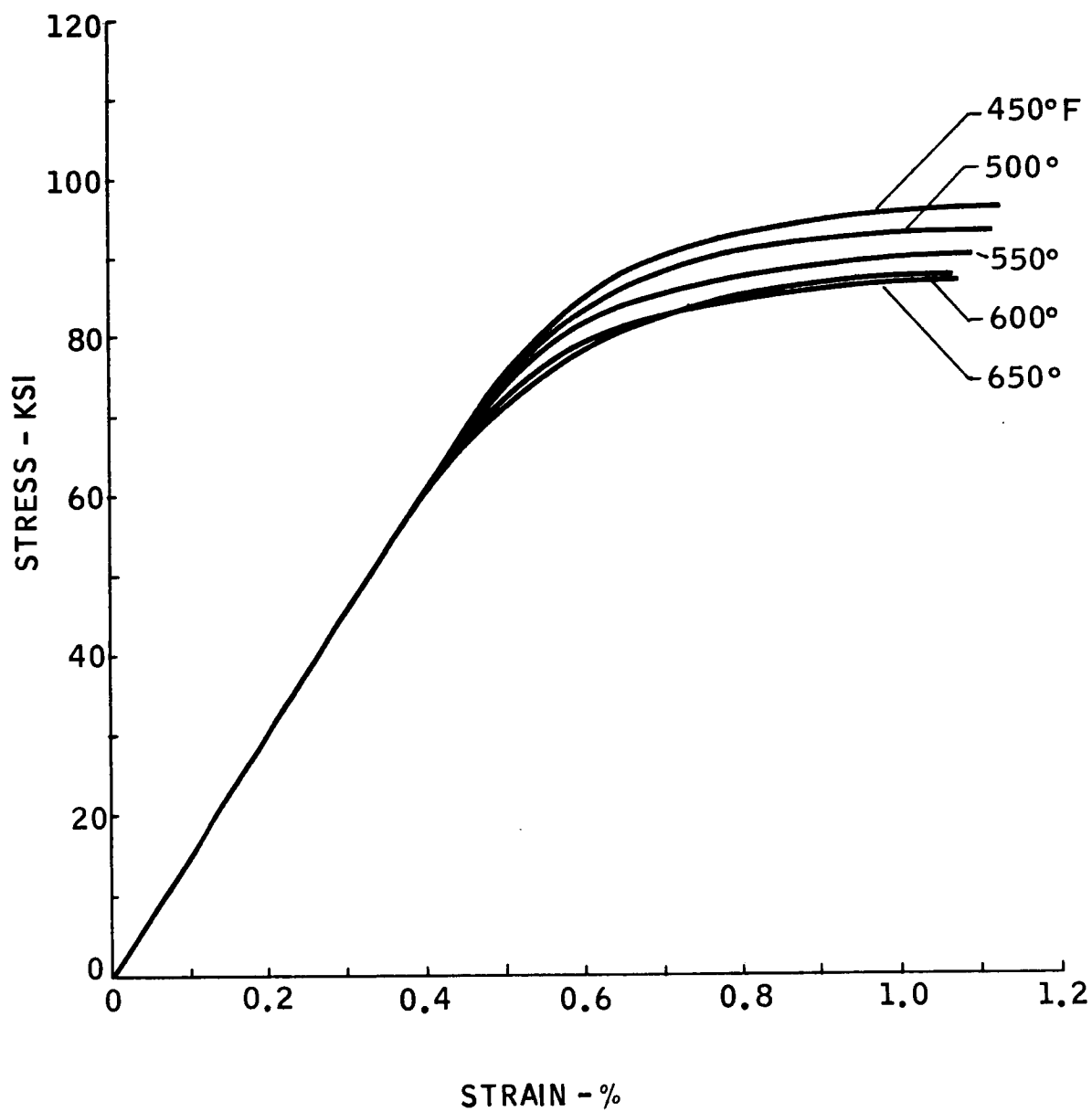


Figure 2. Elevated Temperature Stress Strain Diagrams for 0.050" Thick Ti-8Al-1Mo-1V Duplex Annealed Sheet, Titanium Metals Corporation of American Heat V-1555

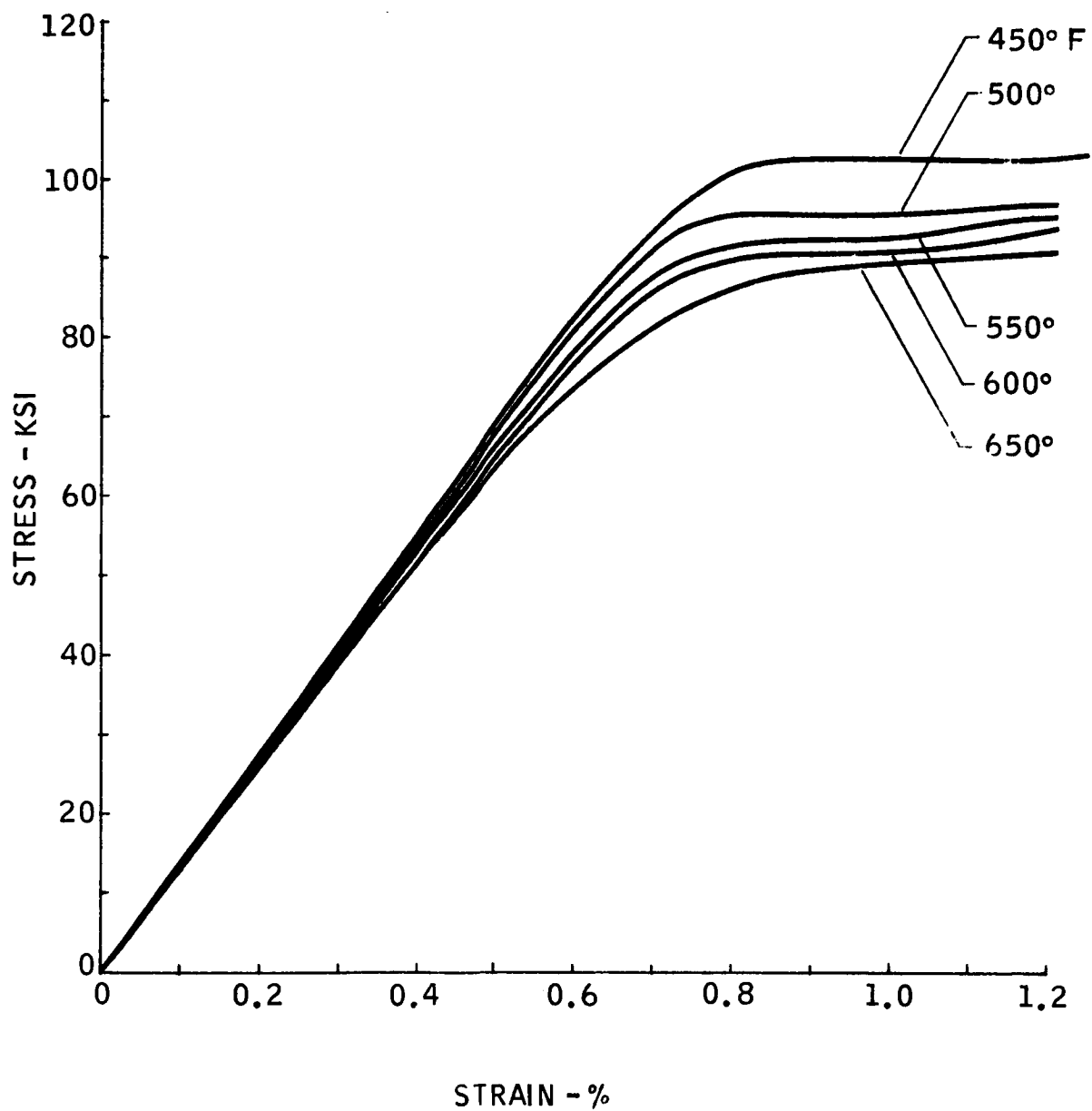


Figure 3. Elevated Temperature Stress Strain Diagrams for 0.050" Thick Ti-6Al-4V Annealed Sheet, Titanium Metals Corporation of American Heat D-4231

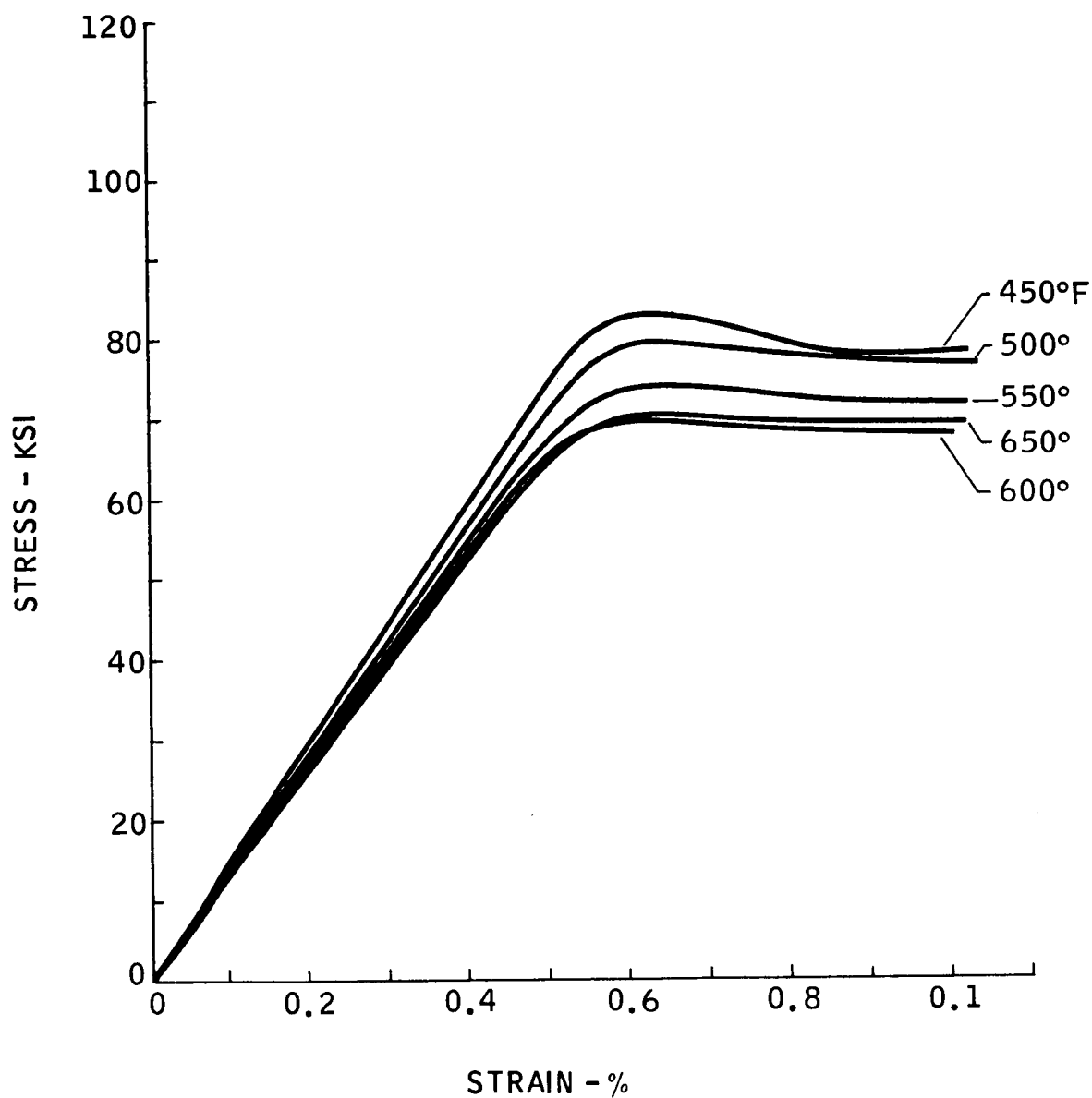


Figure 4. Elevated Temperature Stress Strain Diagrams for 0.050" Thick Ti-5Al-2 1/2 Sn Annealed Sheet, Titanium Metals Corporation of American Heat D-2242

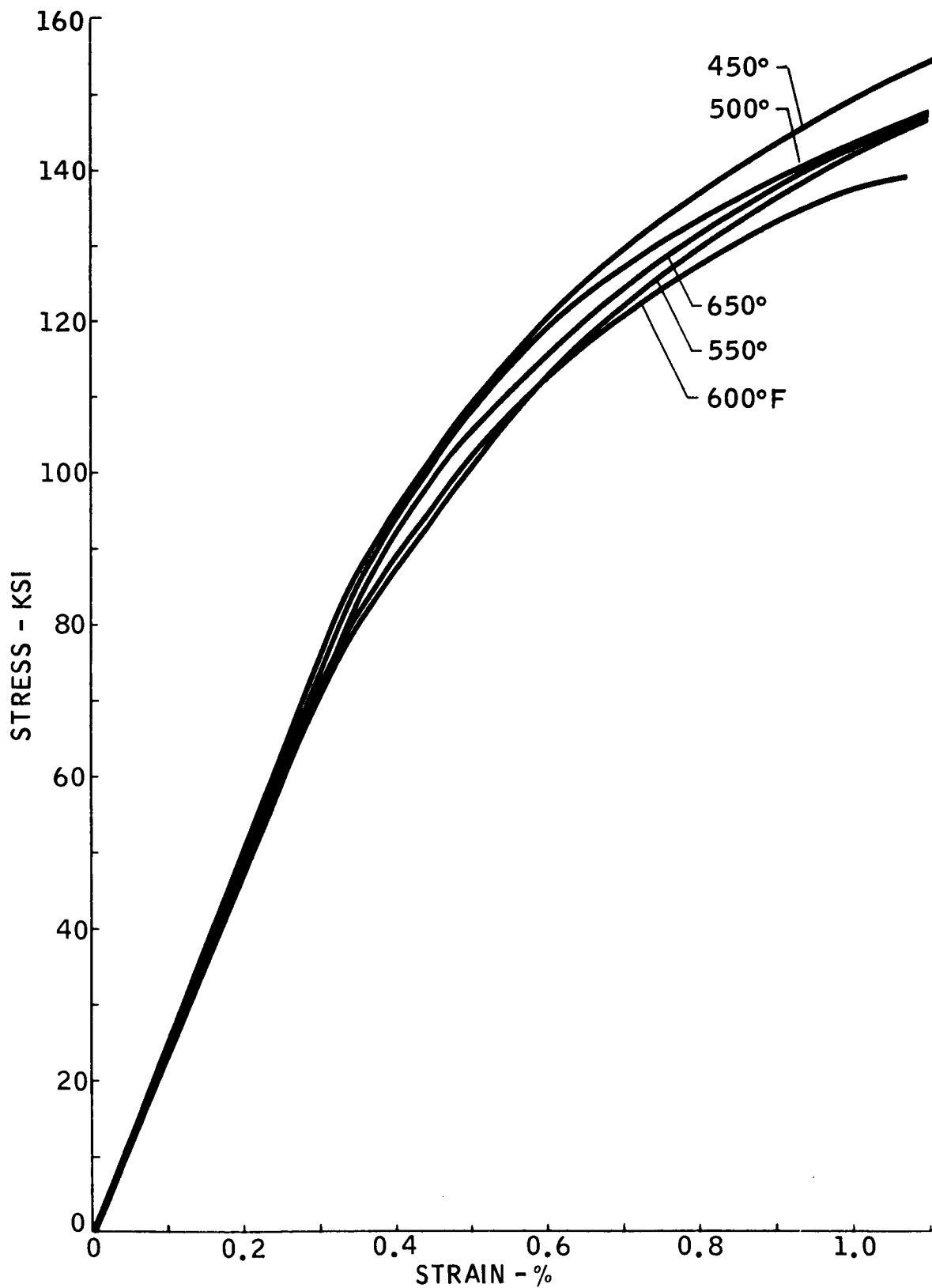


Figure 5. Elevated Temperature Stress Strain Diagrams for 0.050" Thick AM-350 SCT Sheet, Allegheny Ludlum Steel Corporation Heat 55431

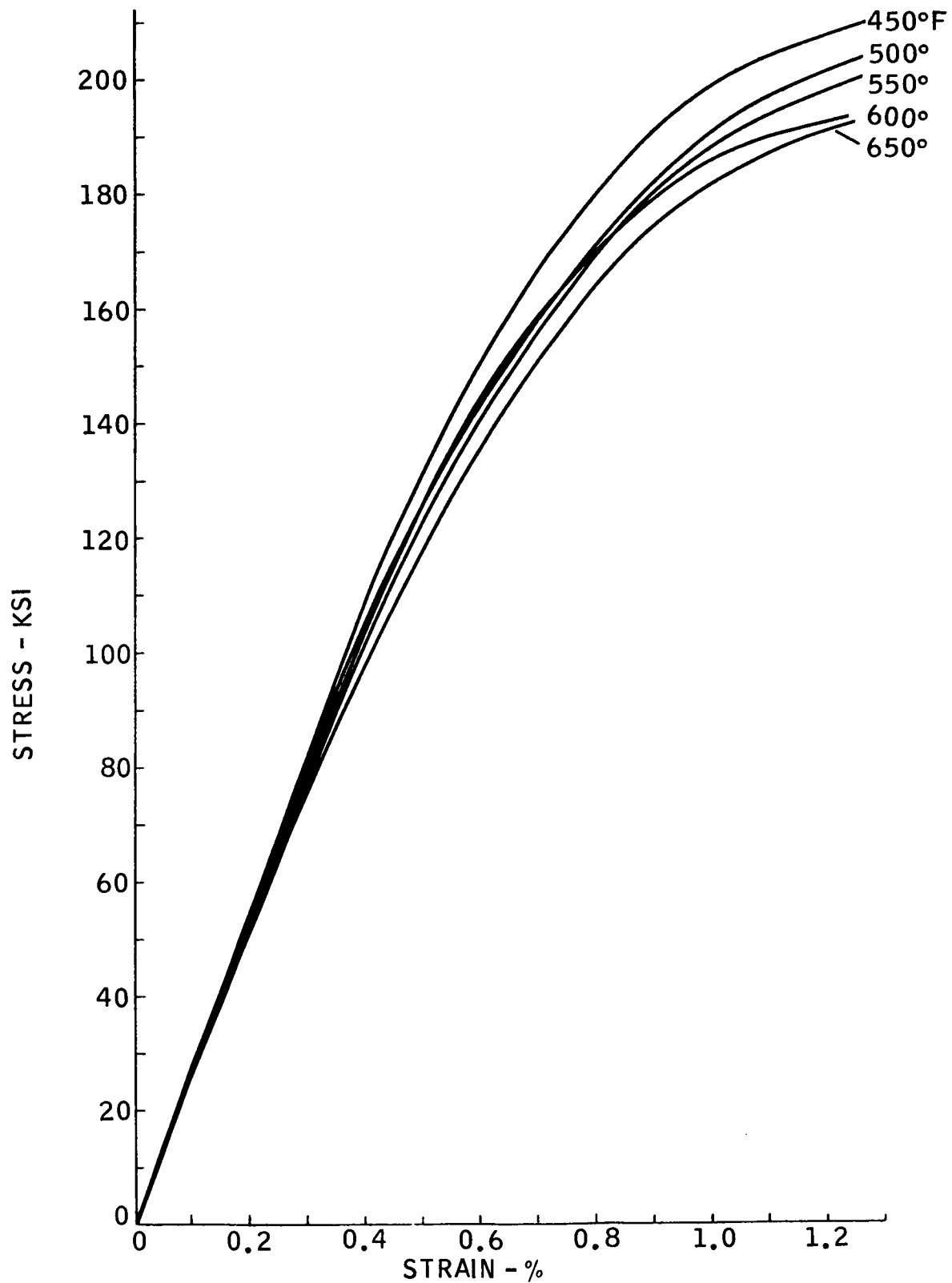


Figure 6. Elevated Temperature Stress Strain Diagrams for 0.050" Thick AM-355 CRT Sheet, Allegheny Ludlum Steel Corporation Heat 55467

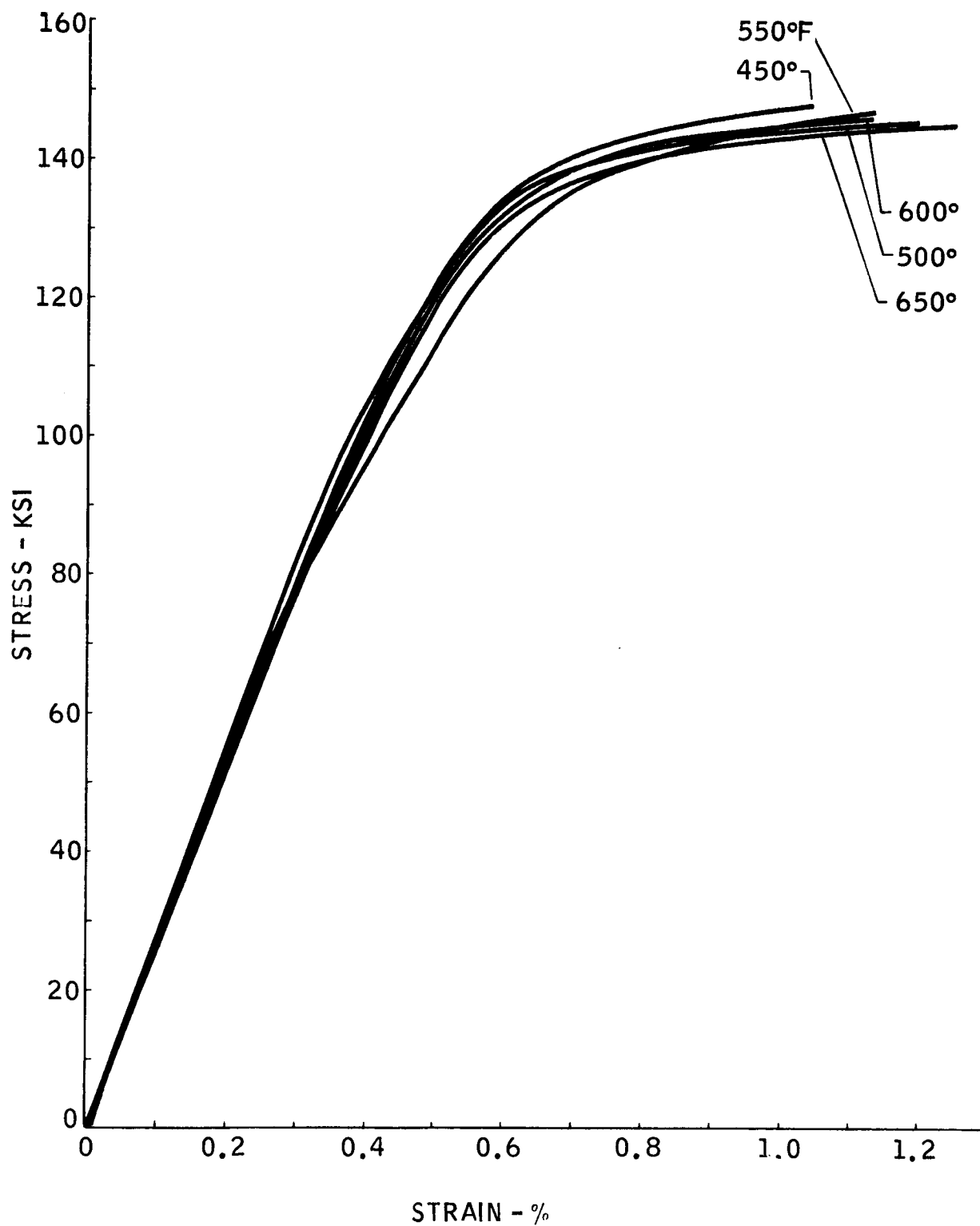


Figure 7. Elevated Temperature Stress Strain Diagrams for 0.050" Thick PH 15-7 Mo Condition RH-1100 Sheet, Armco Steel Corporation Heat 890681

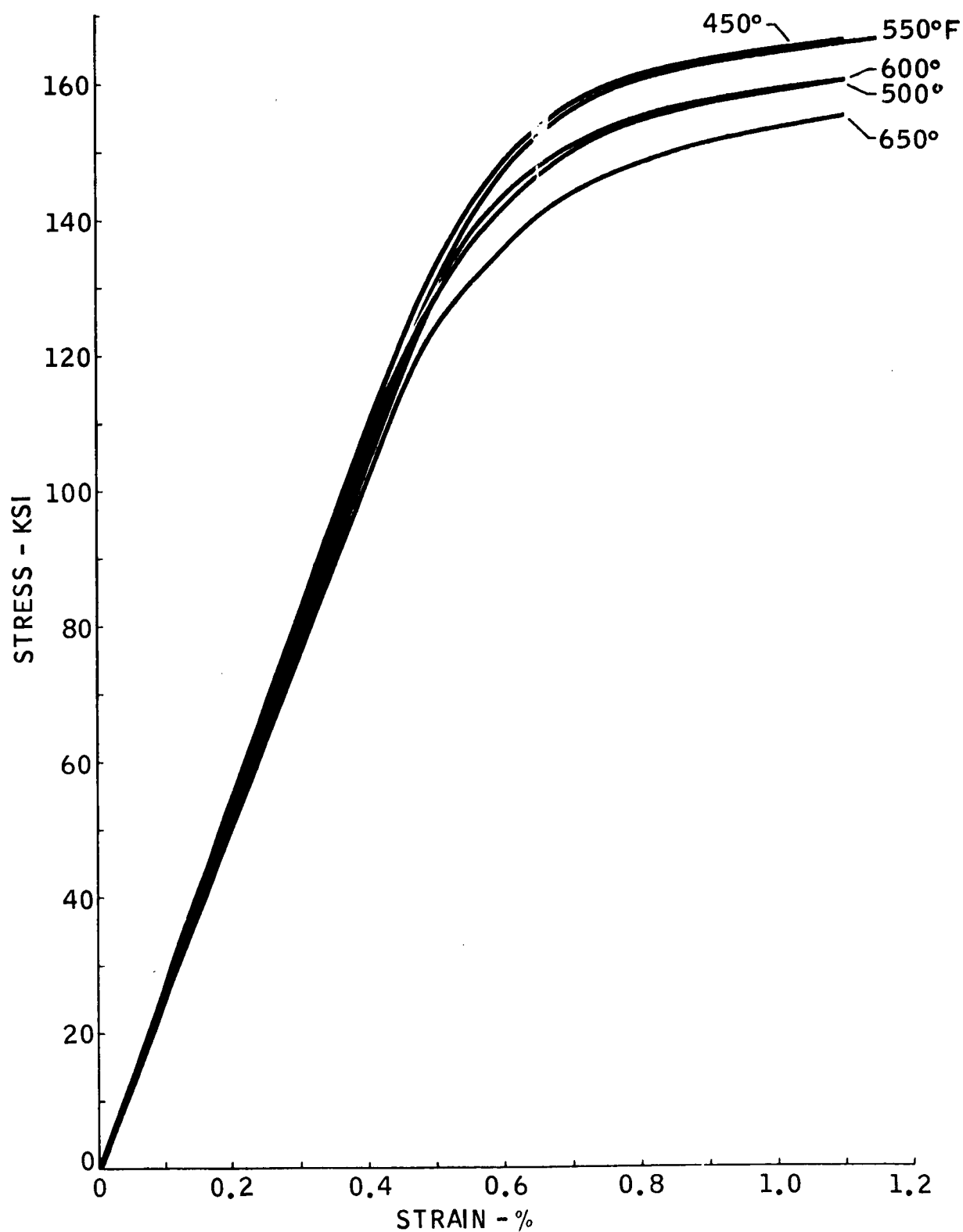


Figure 8. Elevated Temperature Stress Strain Diagrams for 0.050" Thick PH 14-8 Mo Condition RH-1050 Sheet, Armco Steel Corporation Heat 33750

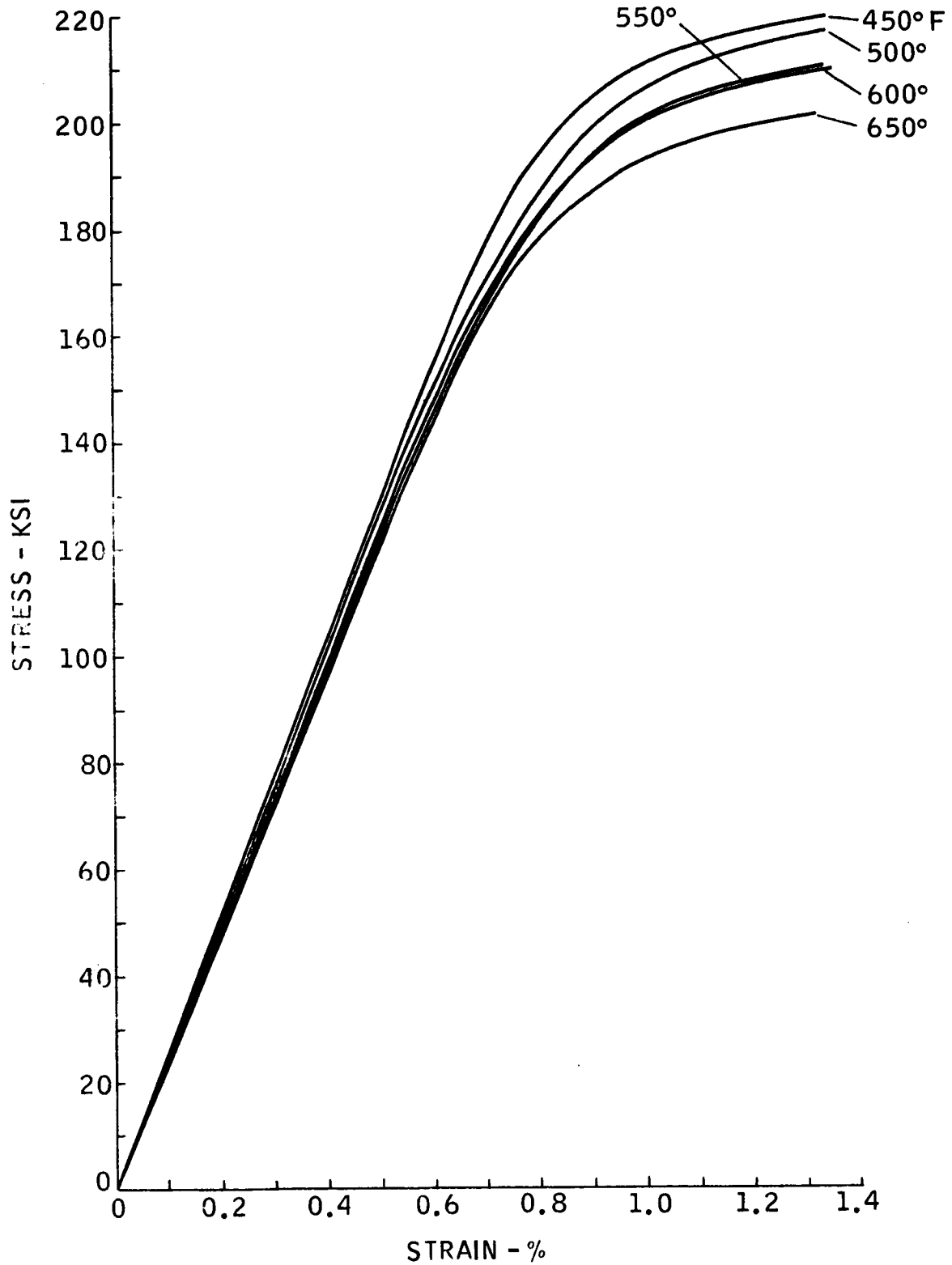


Figure 9. Elevated Temperature Stress Strain Diagrams for 0.050" Thick 18% Nickel Maraging Steel Sheet, United States Steel Corporation Heat 154000

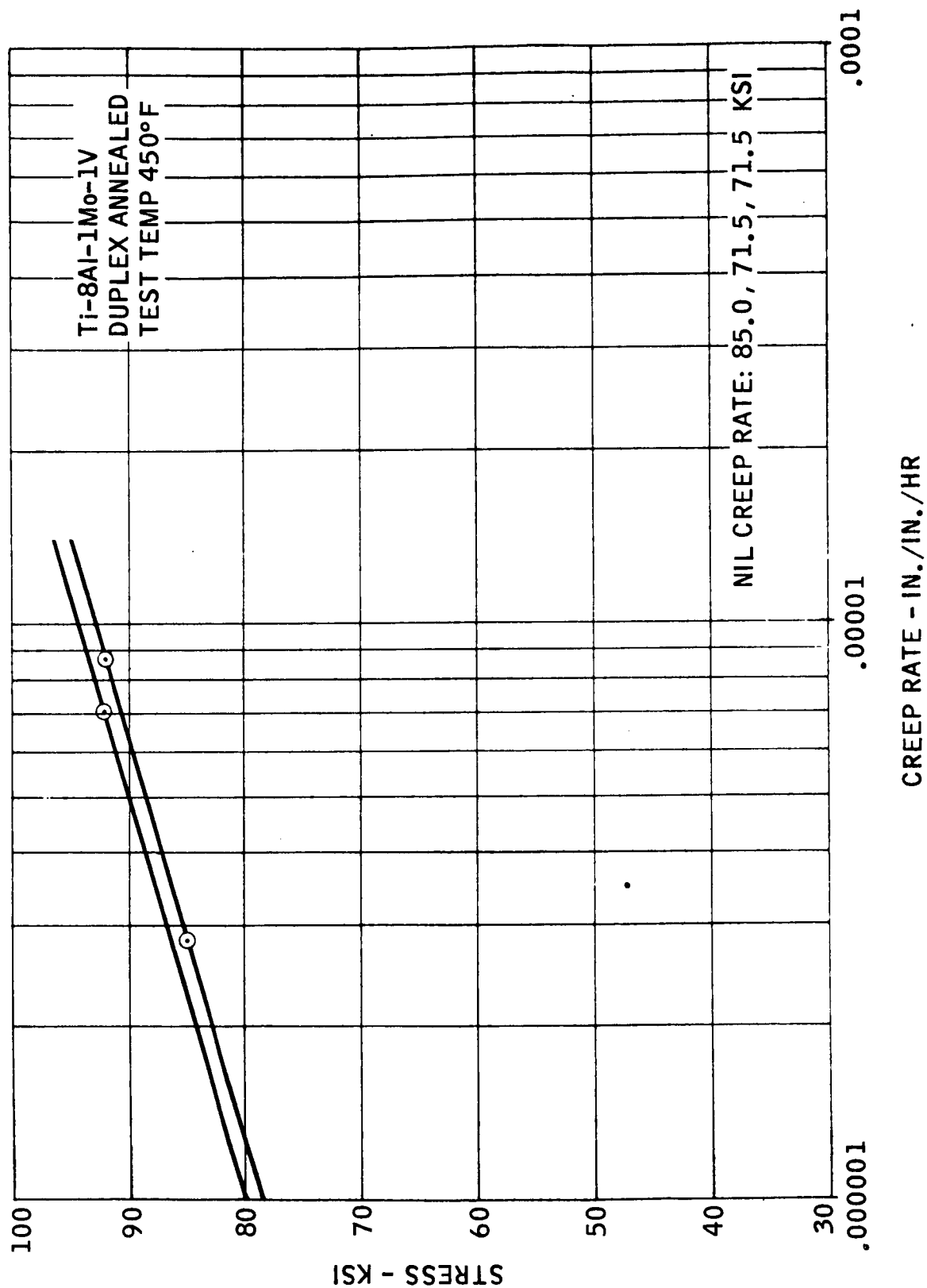


Figure 10. Stress Versus Creep Rate, Ti-8Al-1Mo-1V, 450° F

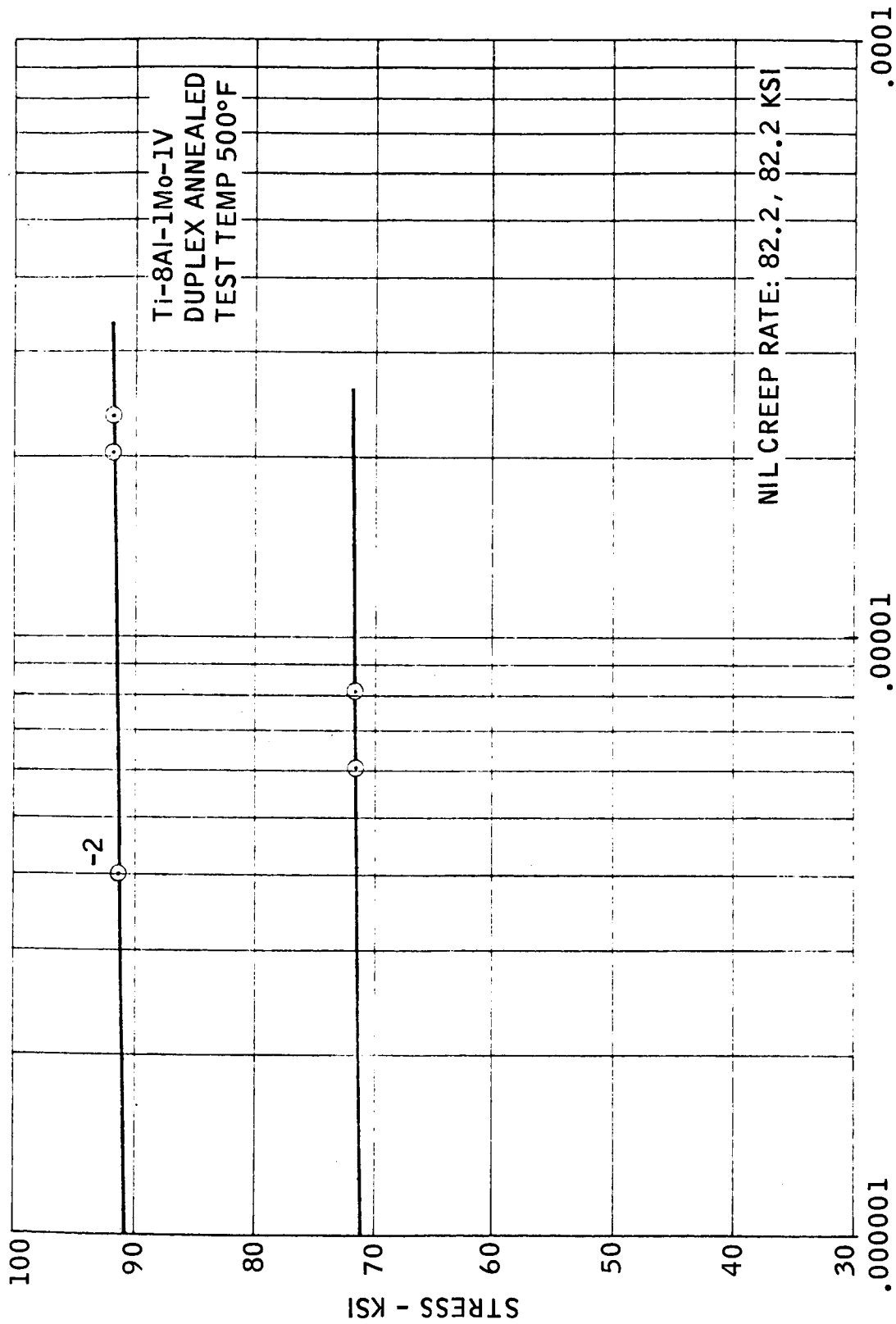


Figure 11. Stress Versus Creep Rate, Ti-8Al-1Mo-1V, 500° F

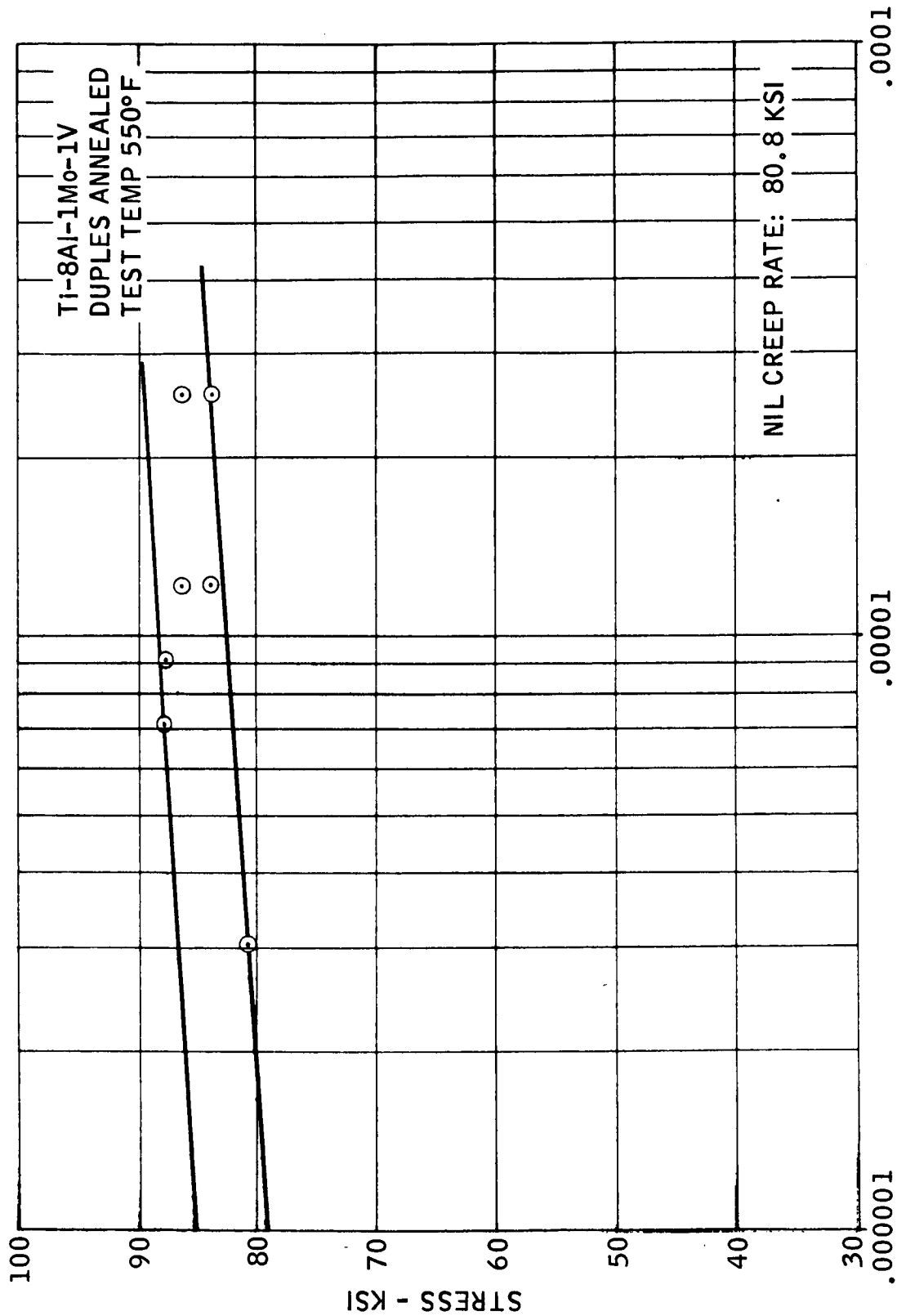
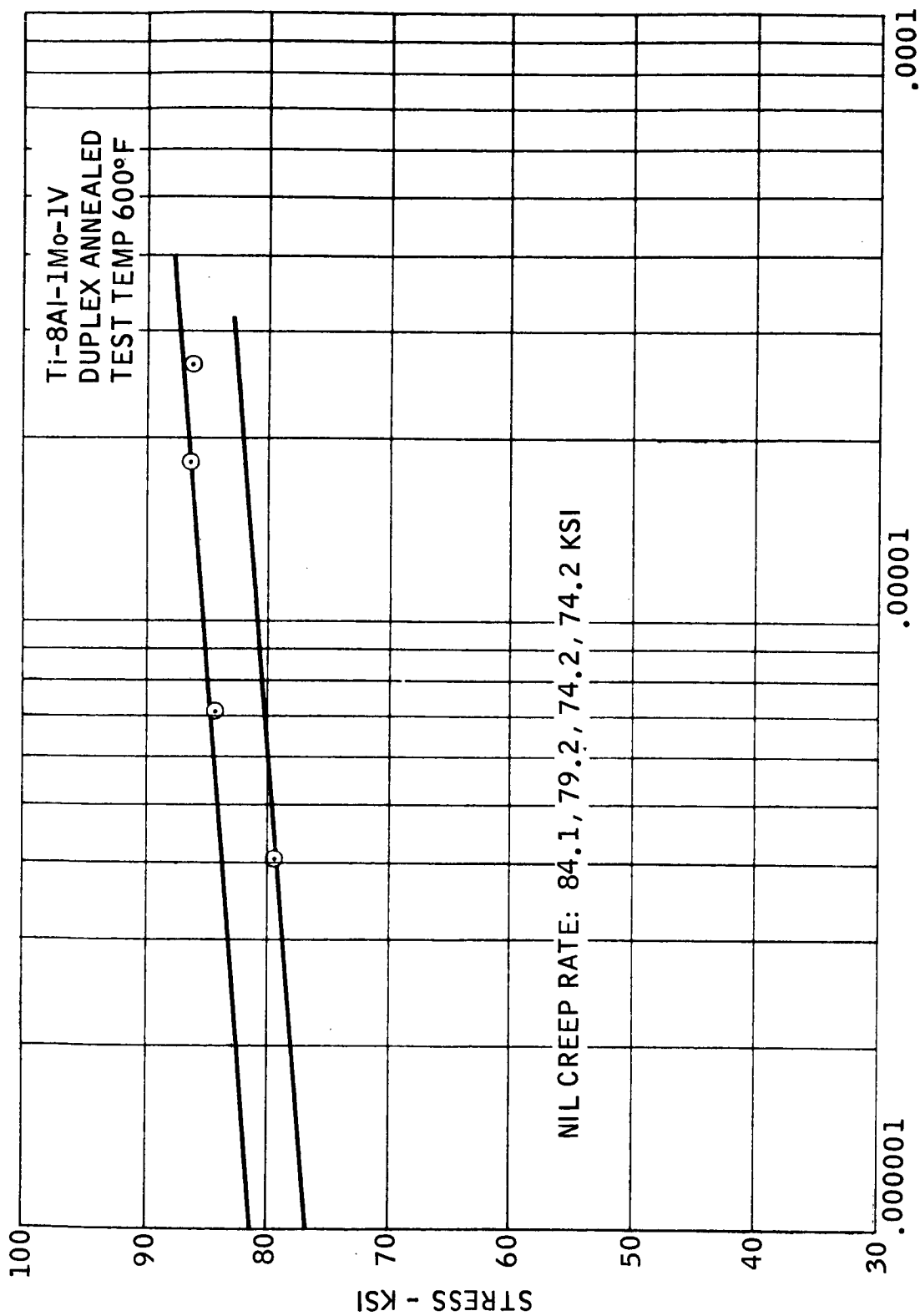


Figure 12. Stress Versus Creep Rate, Ti-8Al-1Mo-1V, 550° F



CREEP RATE - IN./IN./HR

Figure 13. Stress Versus Creep Rate, Ti-8Al-1Mo-1V, 600° F

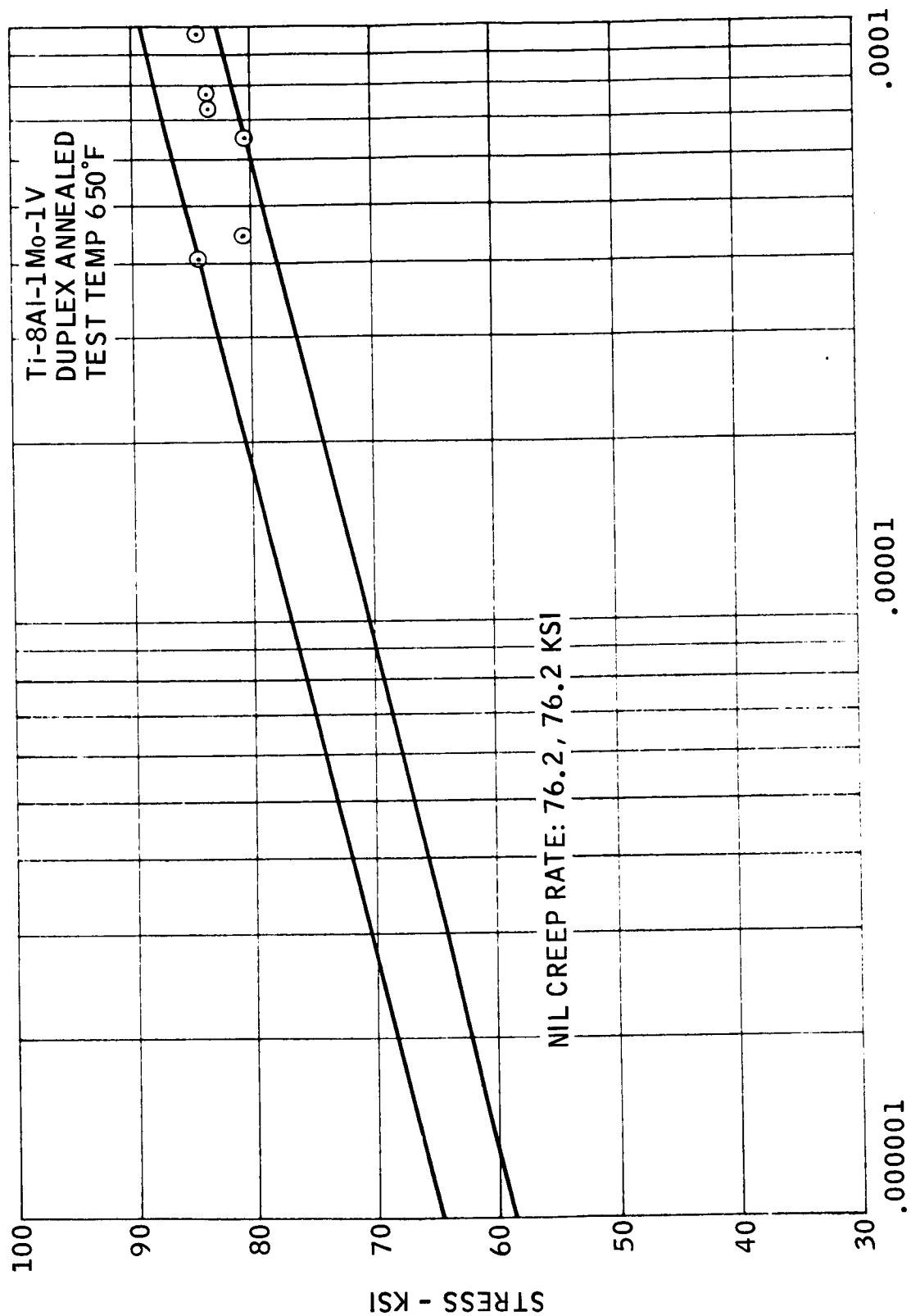


Figure 14. Stress Versus Creep Rate, Ti-8Al-1Mo-1V, 650°F

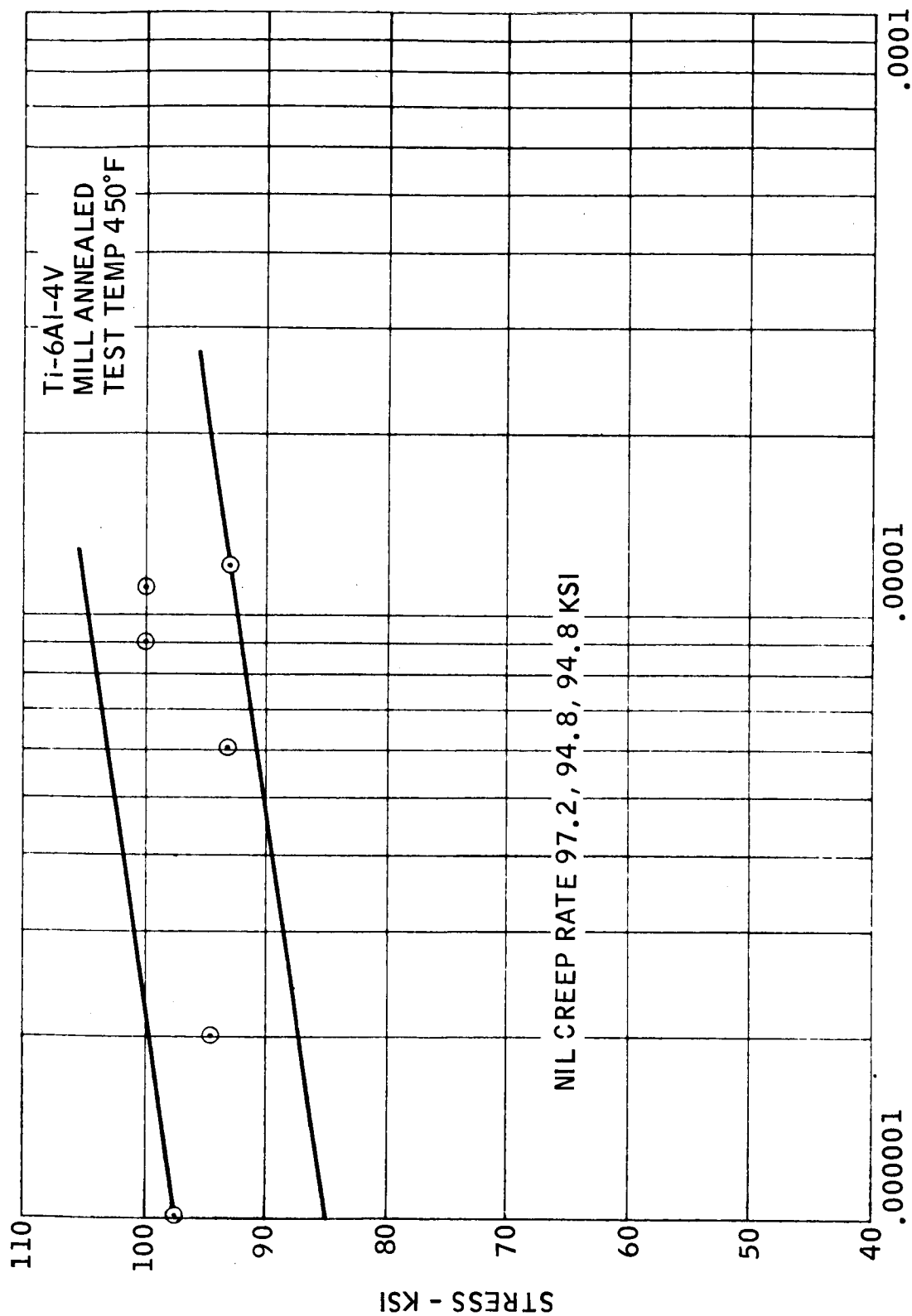


Figure 15. Stress Versus Creep Rate, Ti-6Al-4V, 450° F

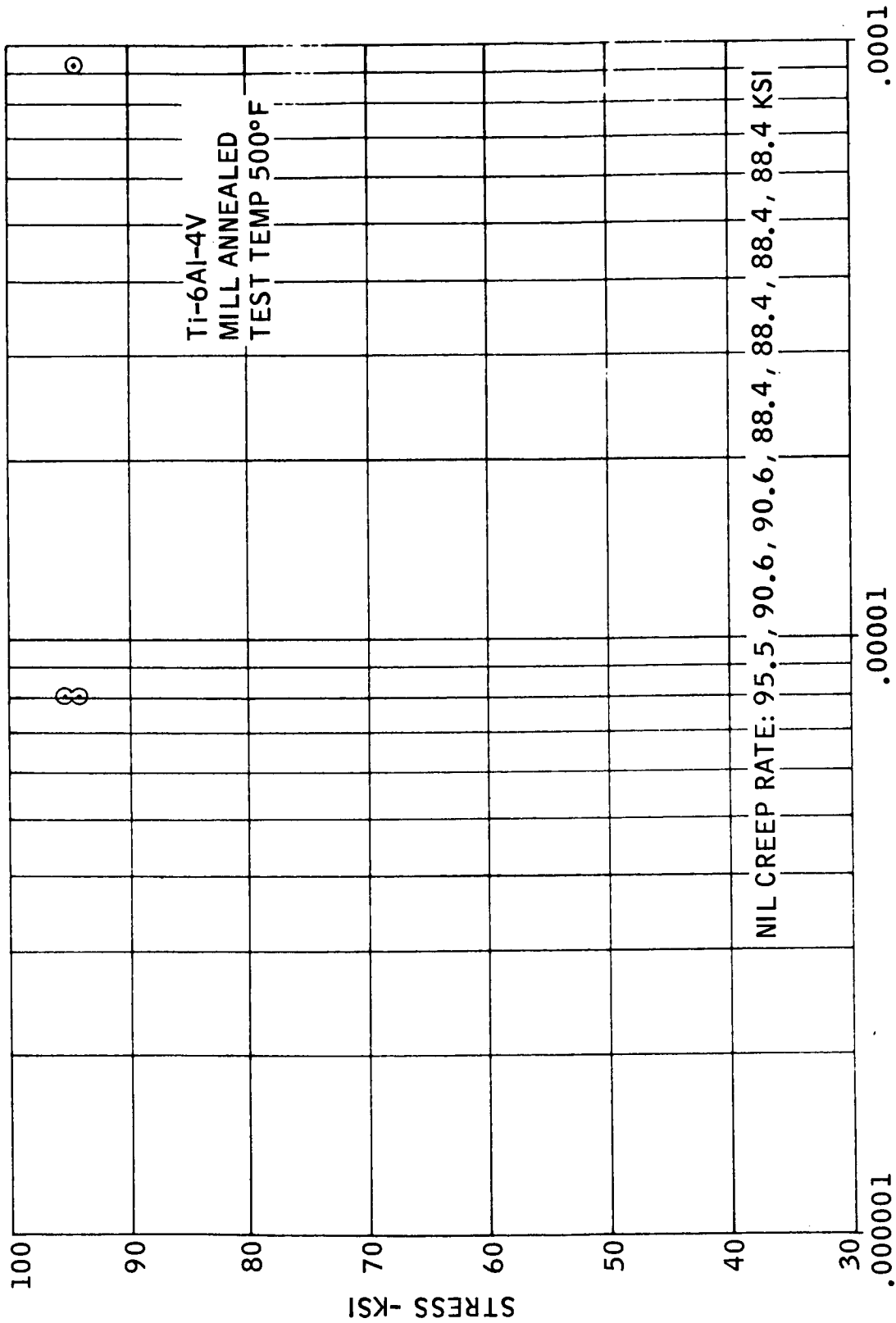


Figure 16. Stress Versus Creep Rate, Ti-6Al-4V, 500° F

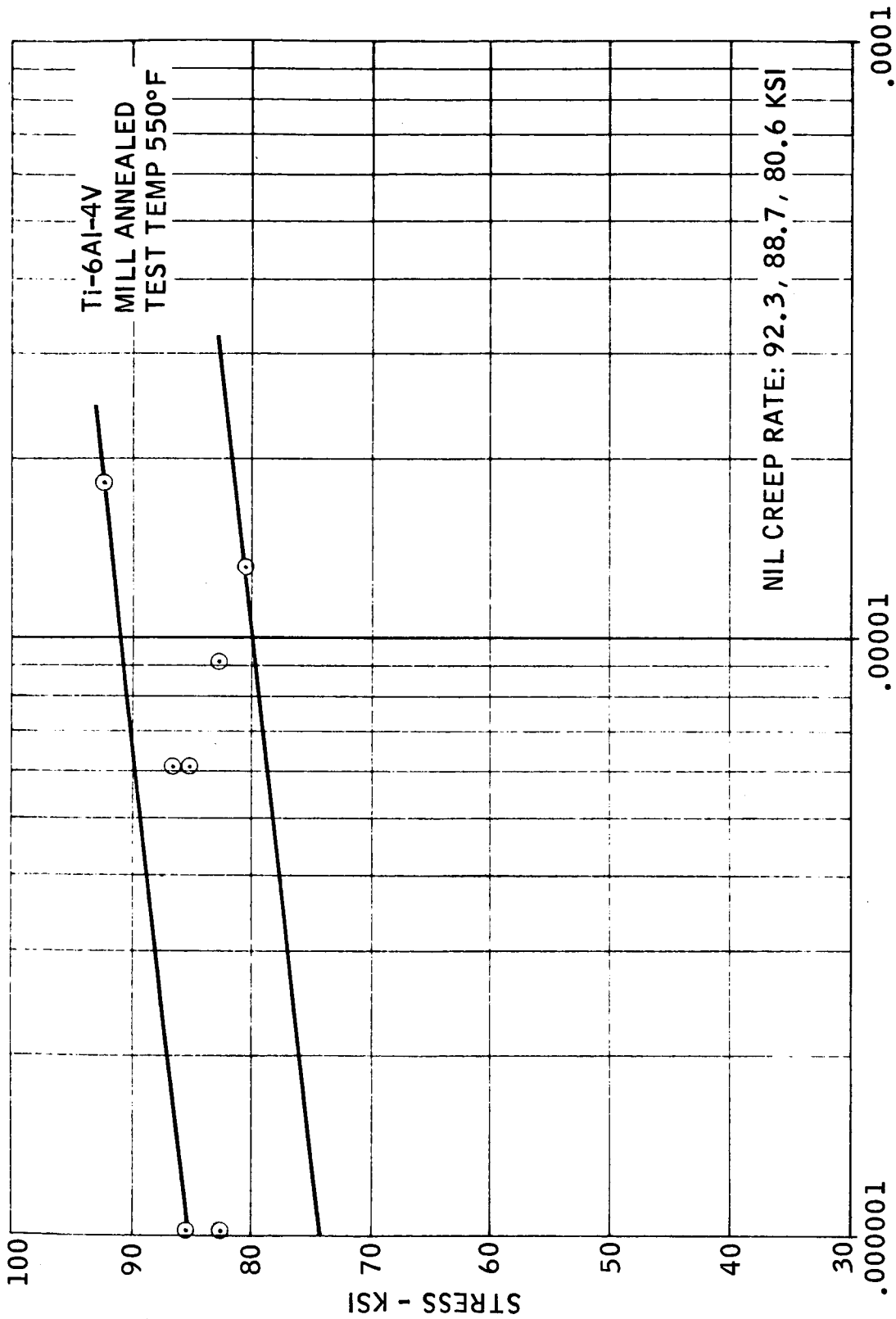


Figure 17. Stress Versus Creep Rate, Ti-6Al-4V, 550° F

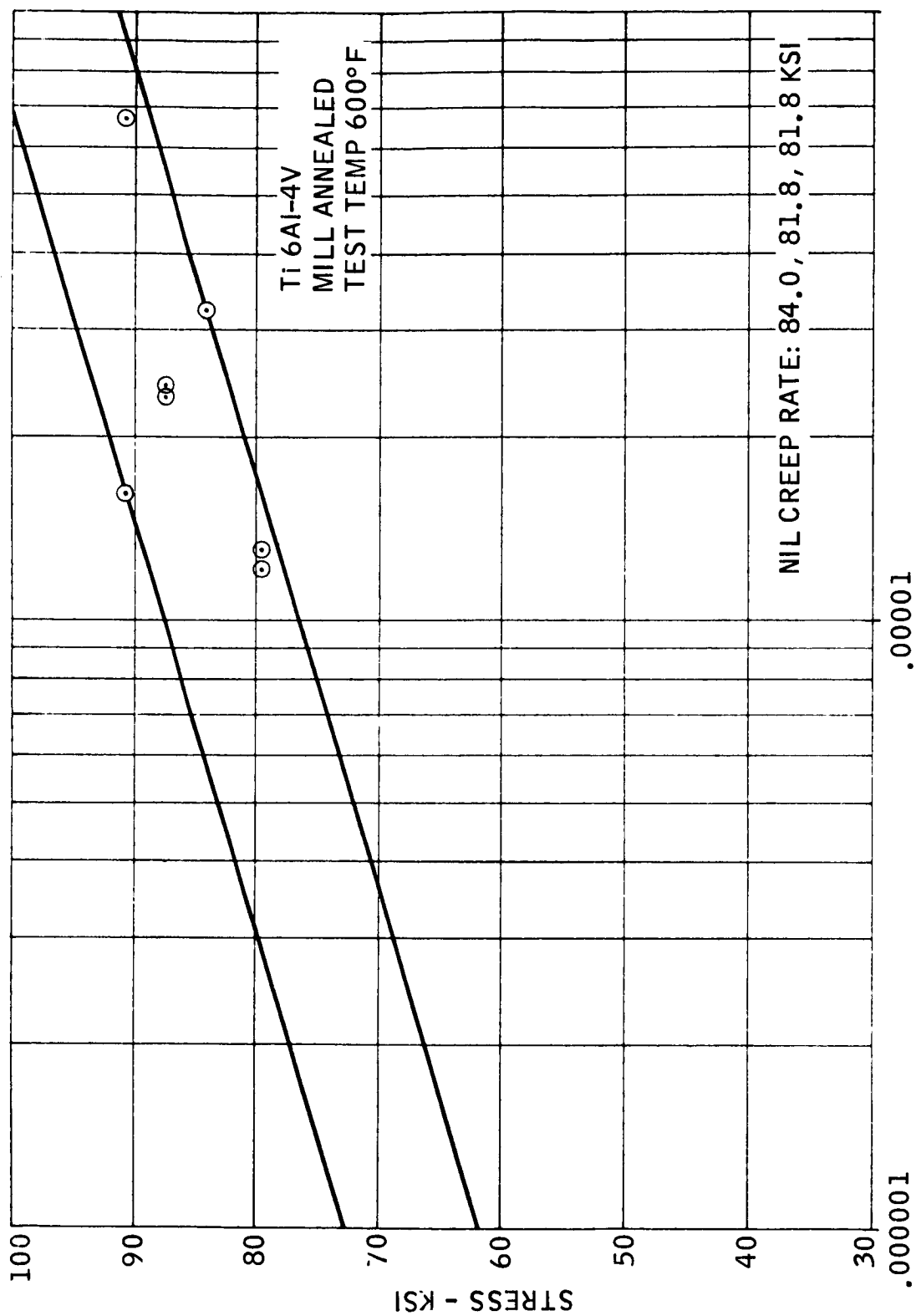


Figure 18. Stress Versus Creep Rate, Ti-6Al-4V, 600°F

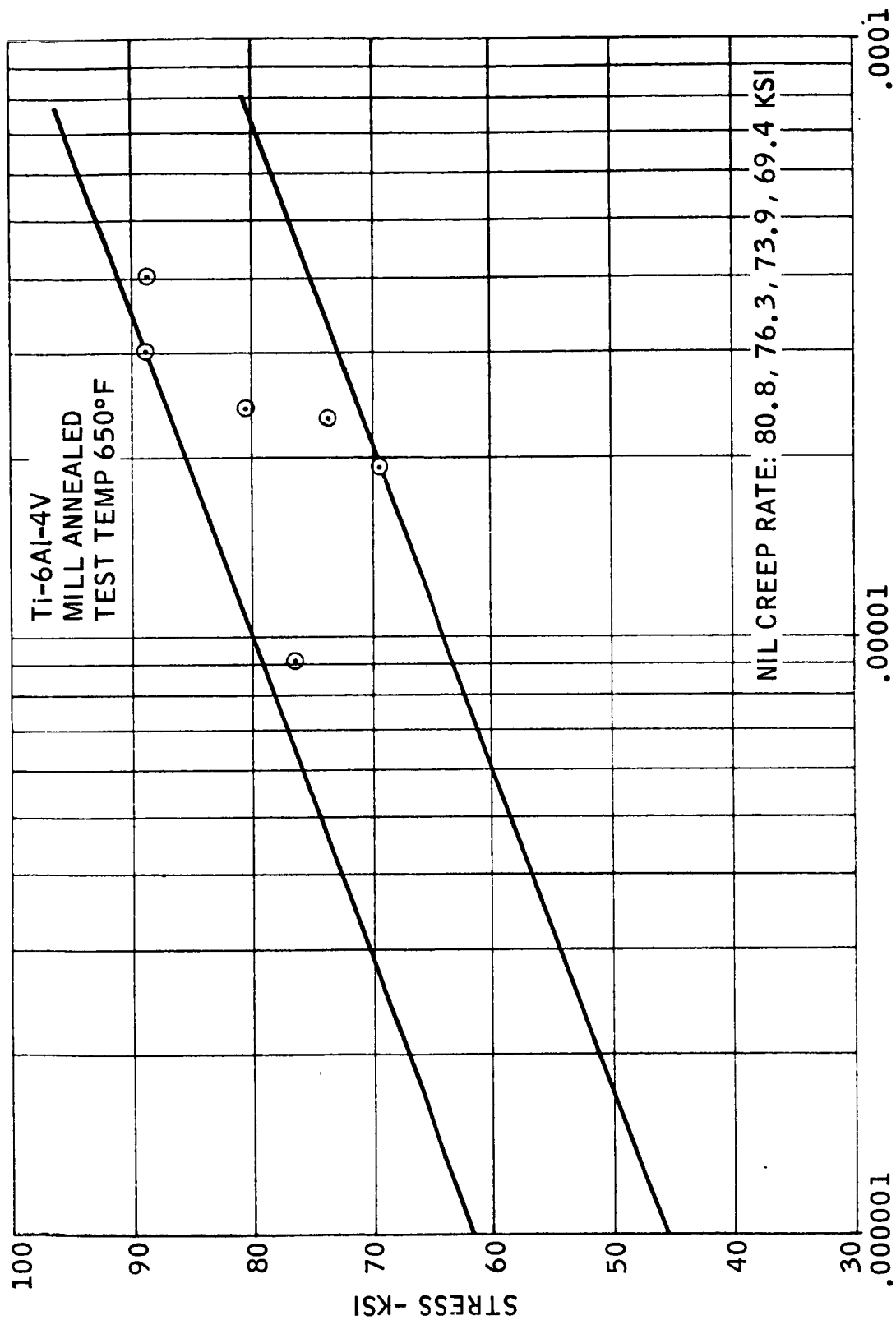


Figure 19. Stress Versus Creep Rate, Ti-6Al-4V, 650°F

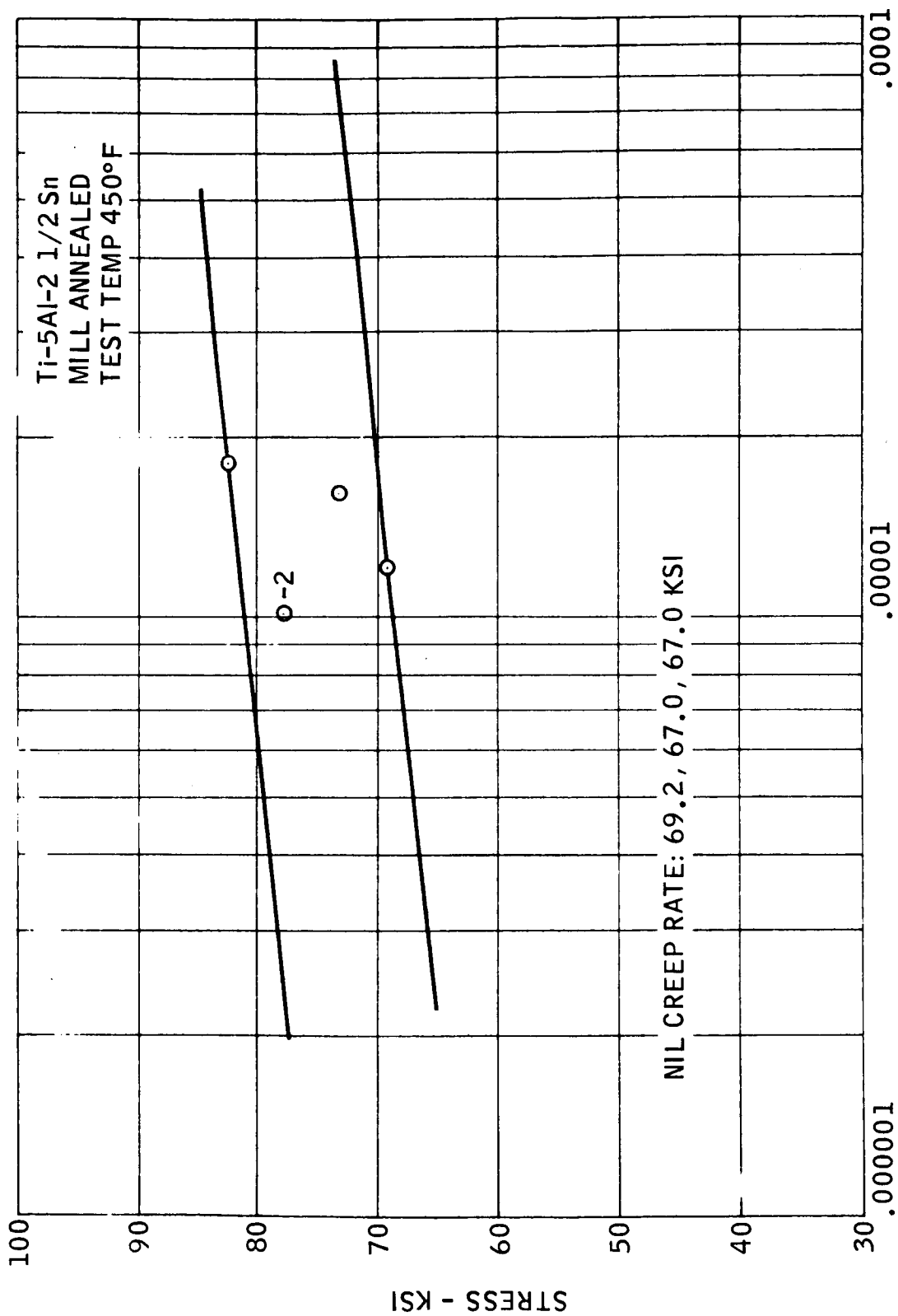
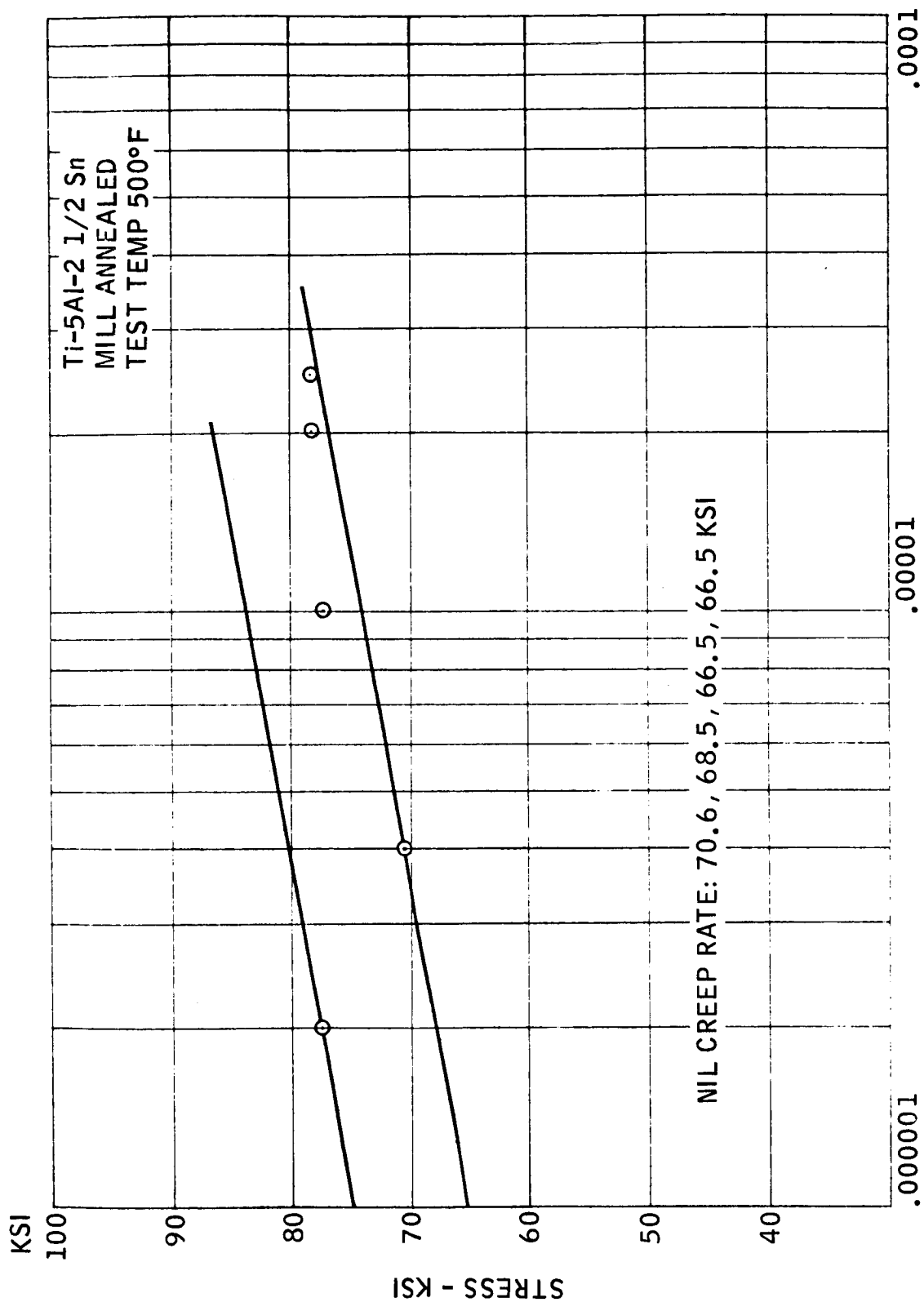
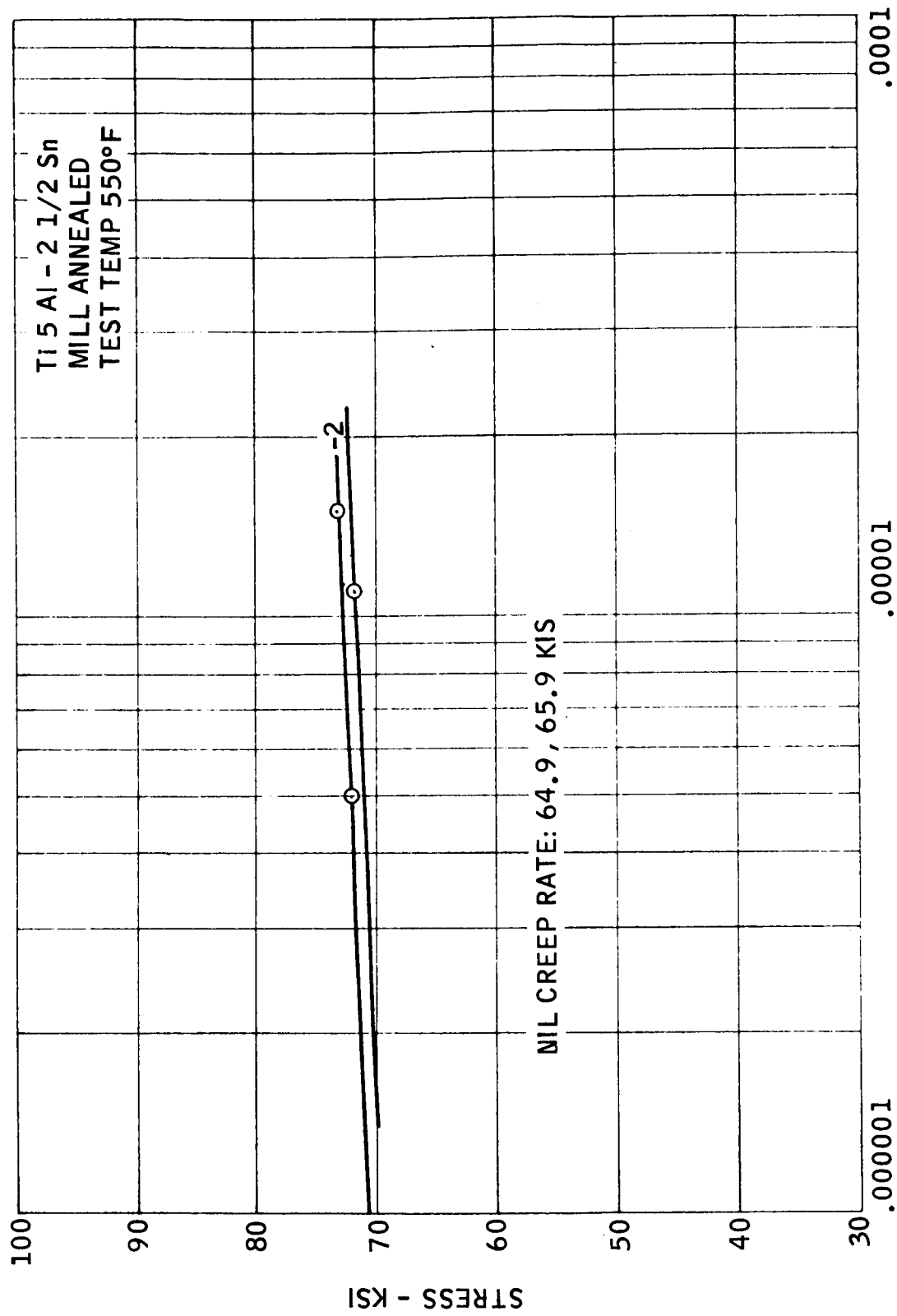


Figure 20. Stress Versus Creep Rate, Ti-5Al-2 1/2 Sn, 450°F

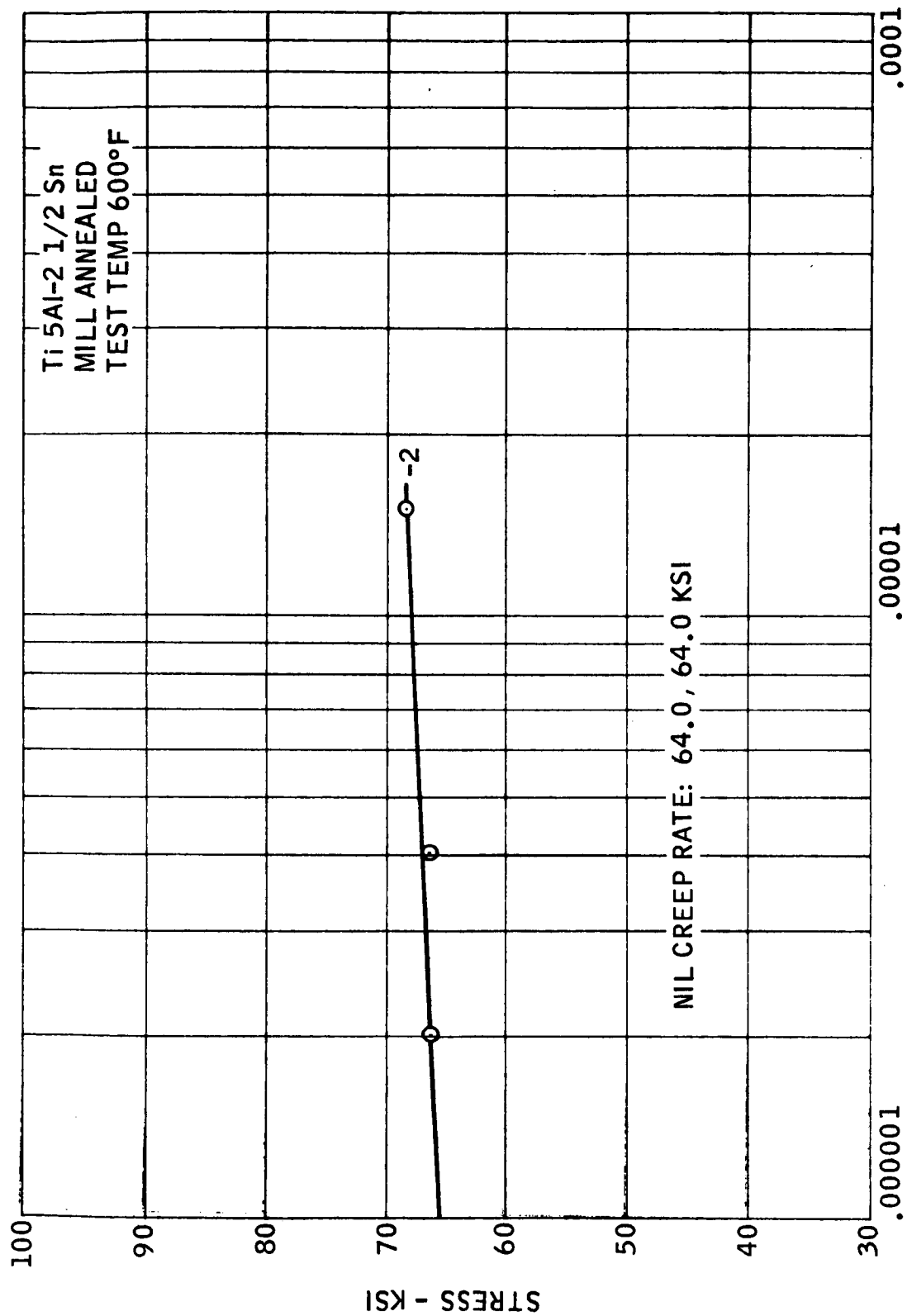


CREEP RATE - IN./IN./HR
 Figure 21. Stress Versus Creep Rate, Ti-5Al-2 1/2 Sn, 500°F



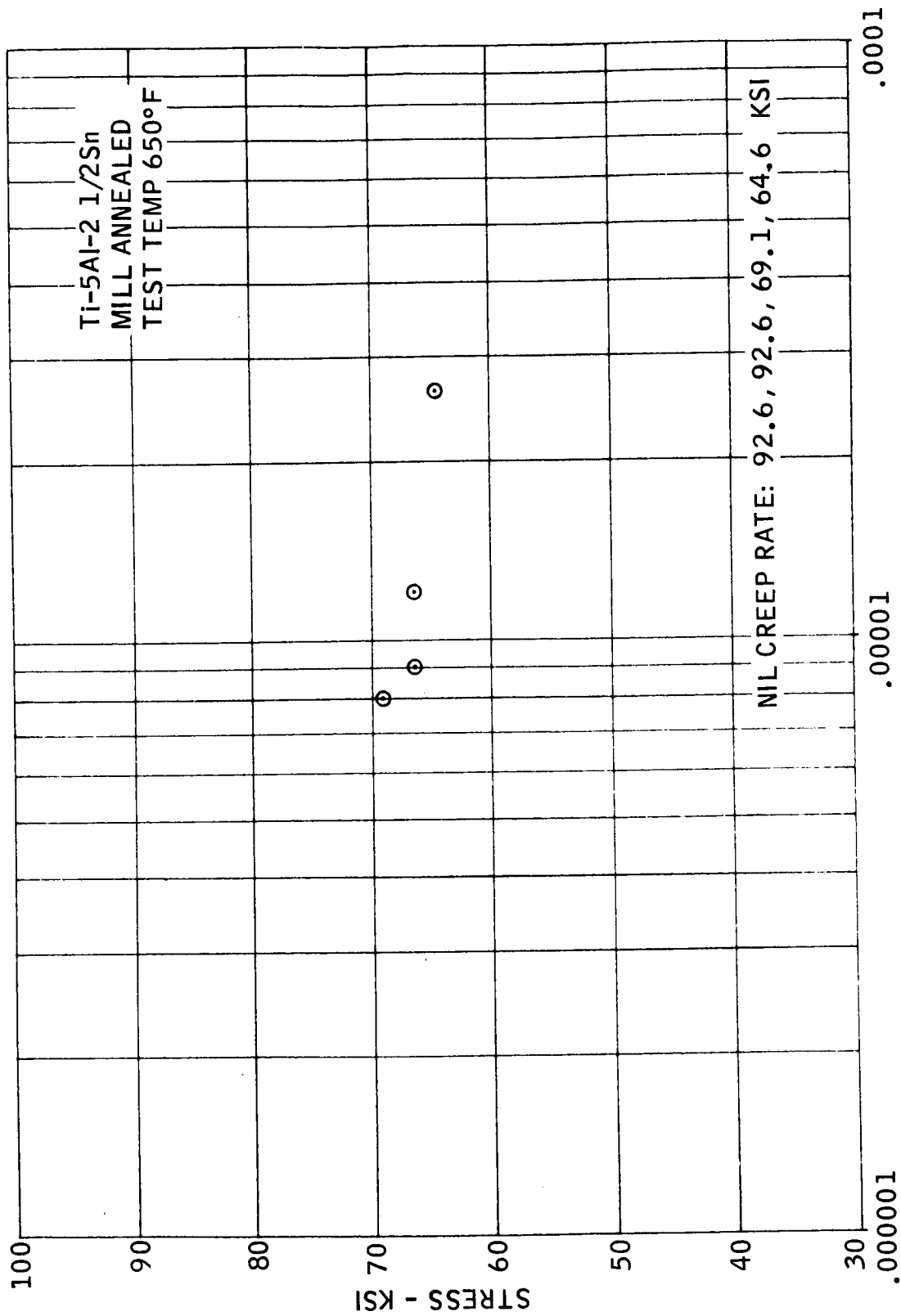
CREEP RATE - IN./IN./HR

Figure 22. Stress Versus Creep Rate, Ti-5Al-2 1/2 Sn, 550°F



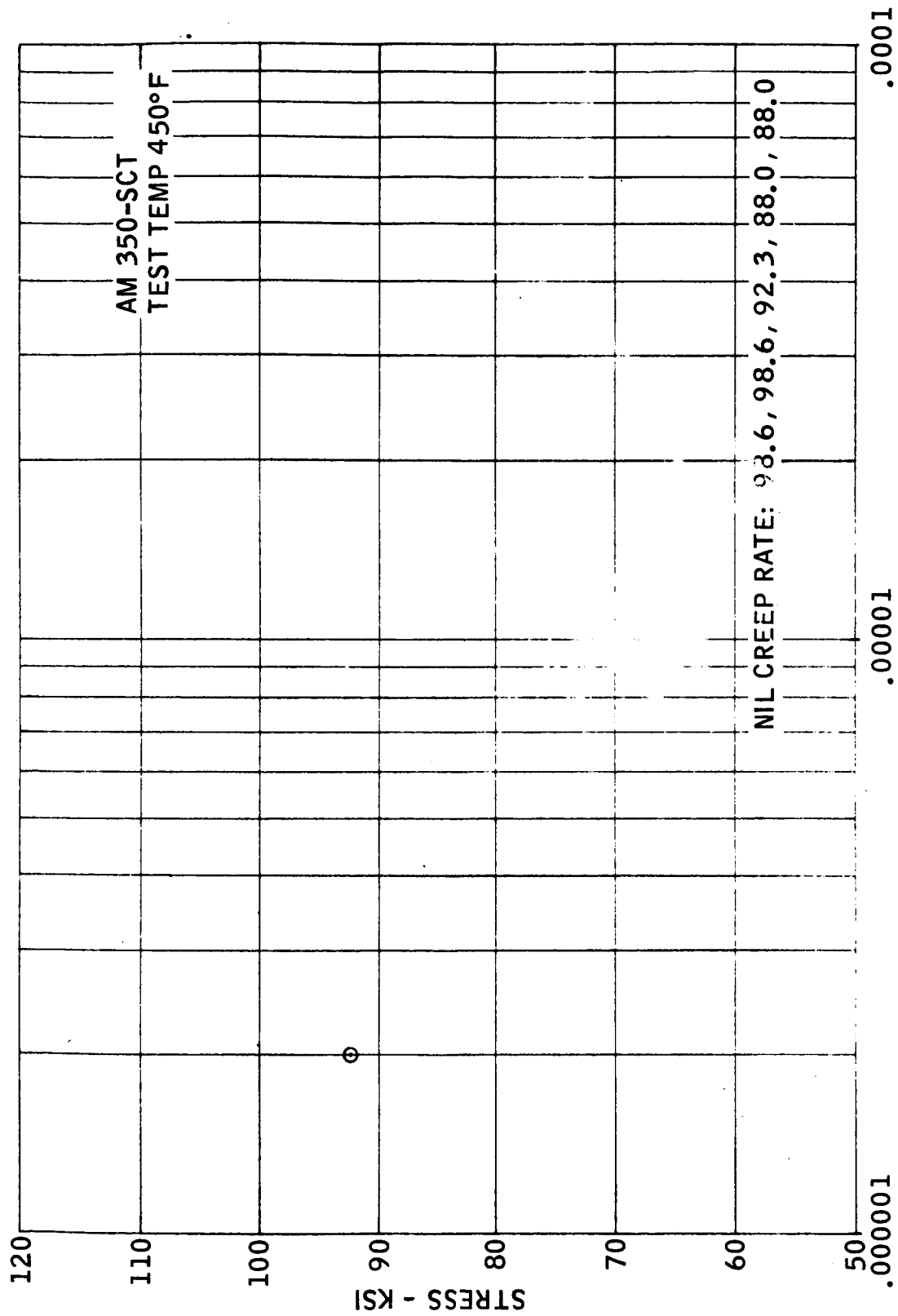
CREEP RATE IN./IN./HR

Figure 23. Stress Versus Creep Rate, Ti-5Al-2 1/2 Sn, 600°F



CREEP RATE - IN./IN./HR

Figure 24. Stress Versus Creep Rate, Ti-5Al-2 1/2 Sn, 650°F



CREEP RATE - IN./IN./HR

Figure 25. Stress Versus Creep Rate, AM-350 SCT, 450°F

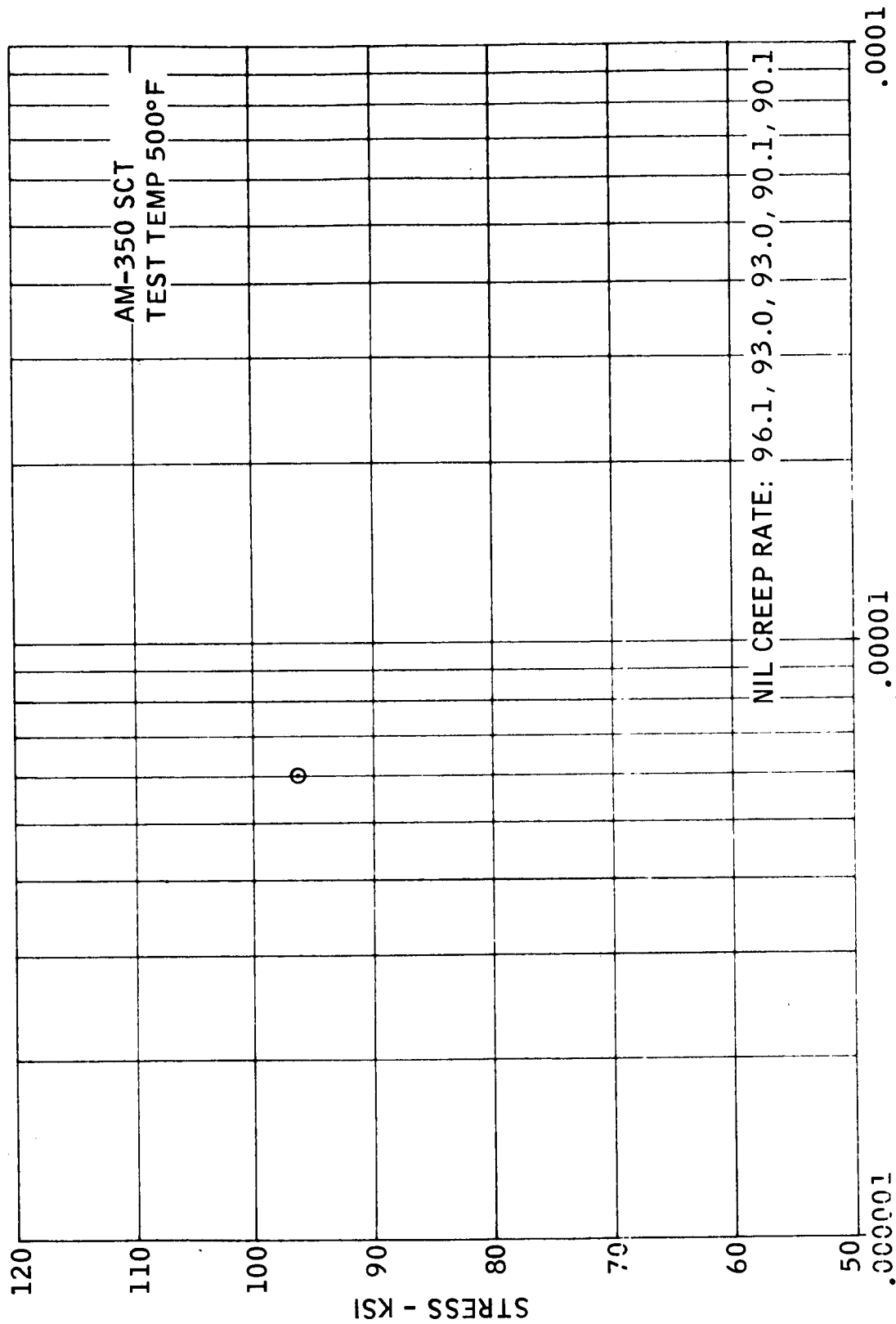


Figure 26. Stress Versus Creep Rate, AM-350 SCT, 500°F

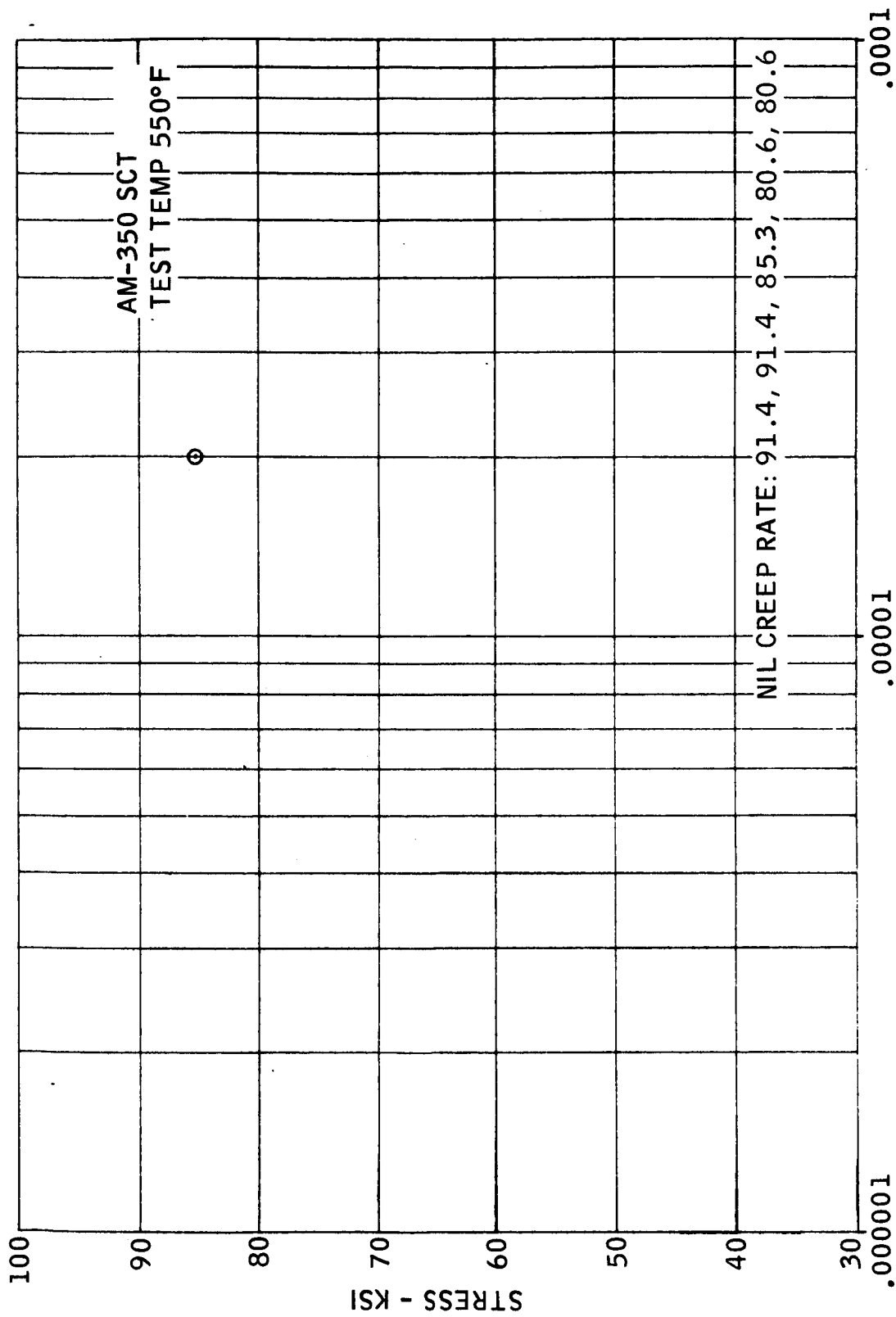
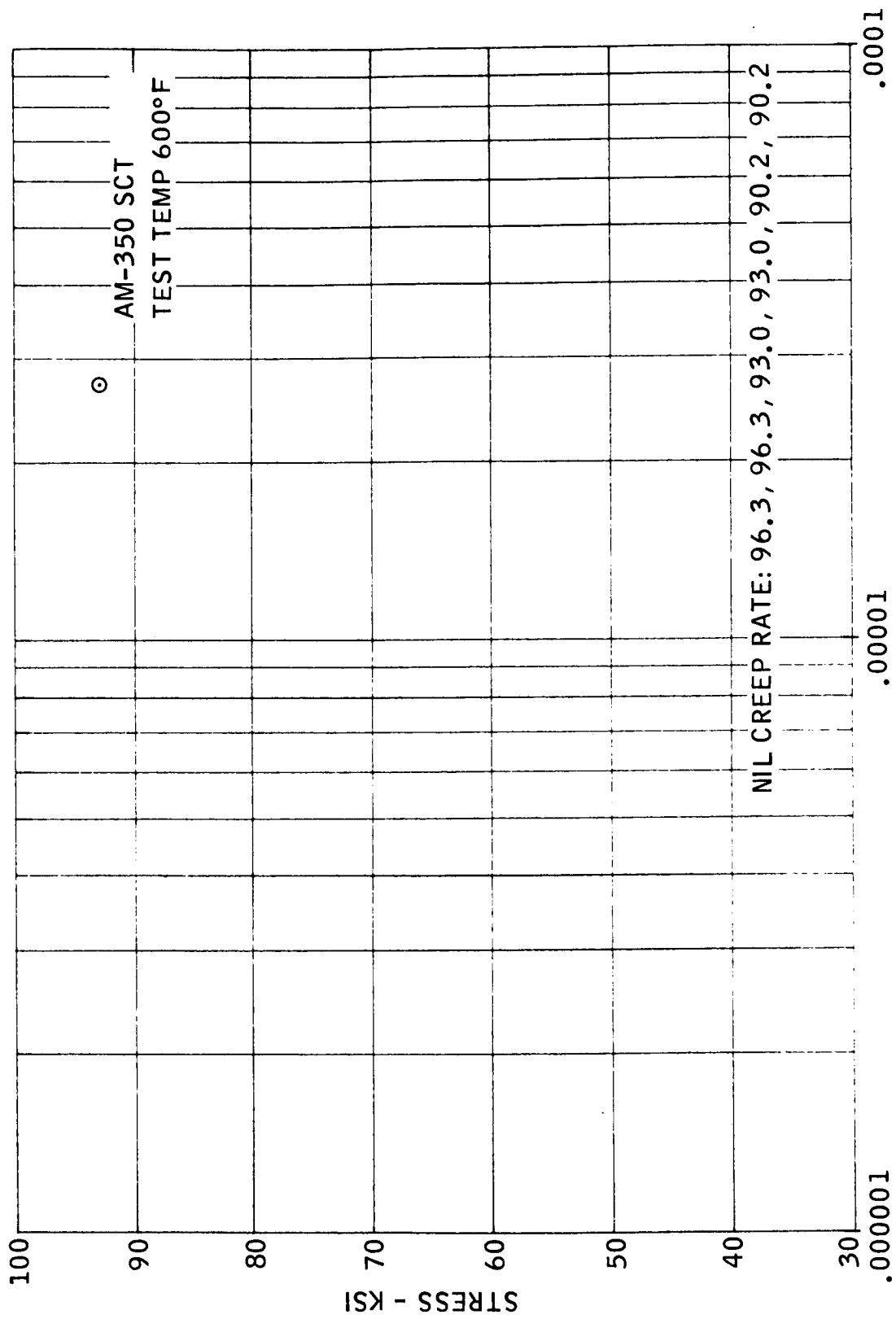


Figure 27. Stress Versus Creep Rate, AM-350 SCT, 550°F



CREEP RATE - IN./IN./HR

Figure 28. Stress Versus Creep Rate, AM-350 SCT, 600°F

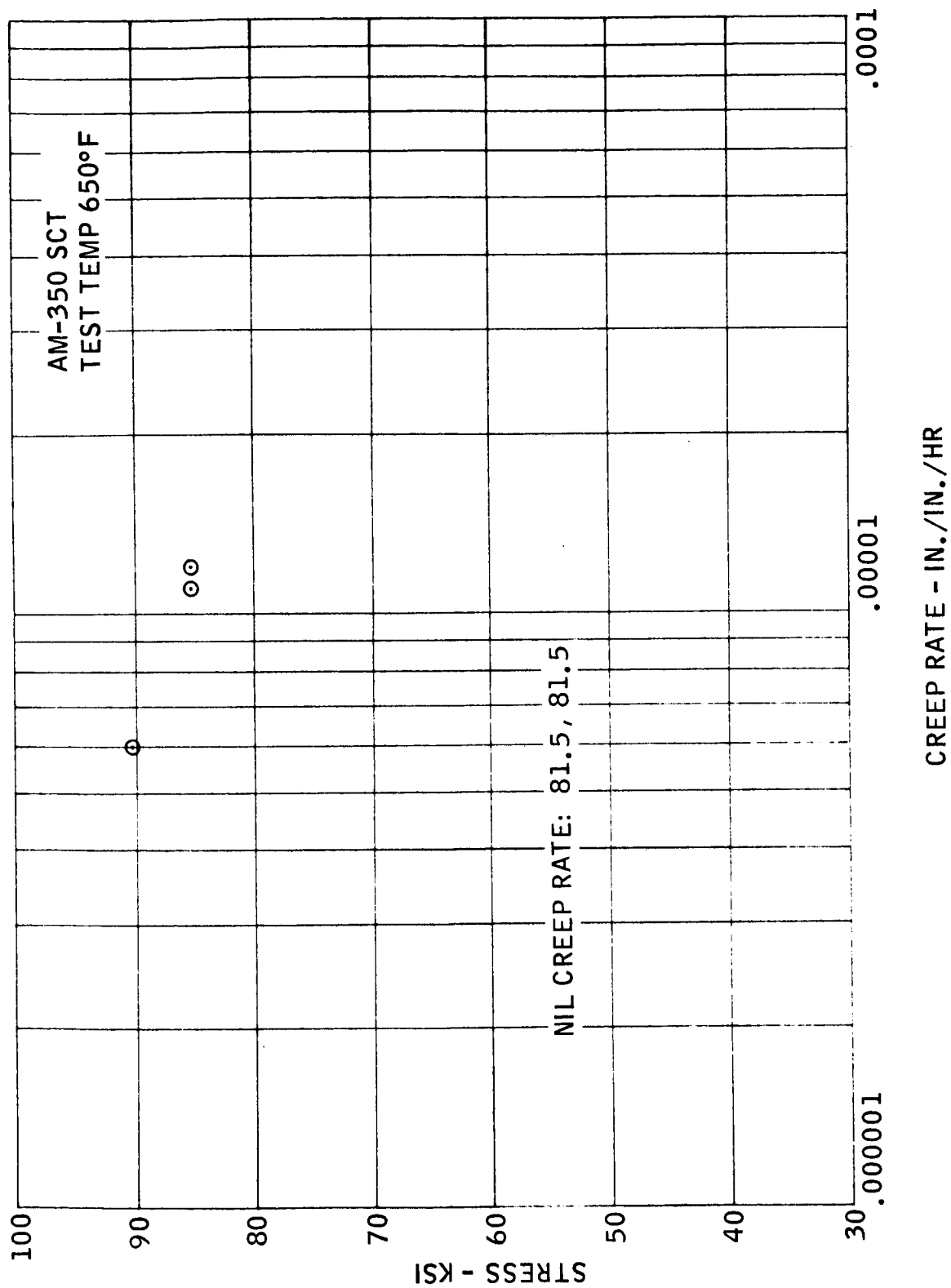
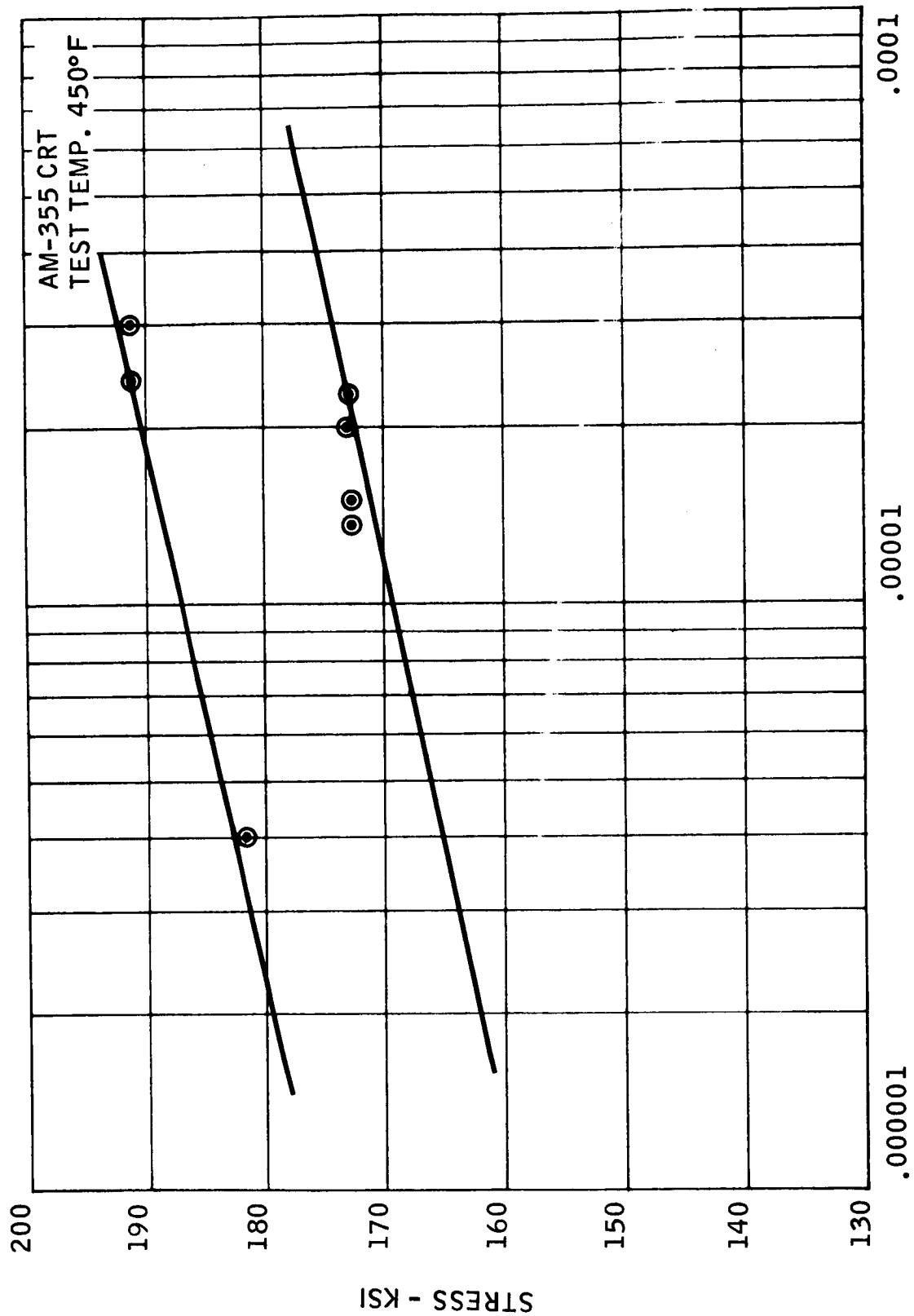


Figure 29. Stress Versus Creep Rate, AM-350 SCT, 650° F



CREEP RATE - IN./IN./HR.

Figure 30. Stress Versus Creep Rate, AM-355 CRT, 450°F

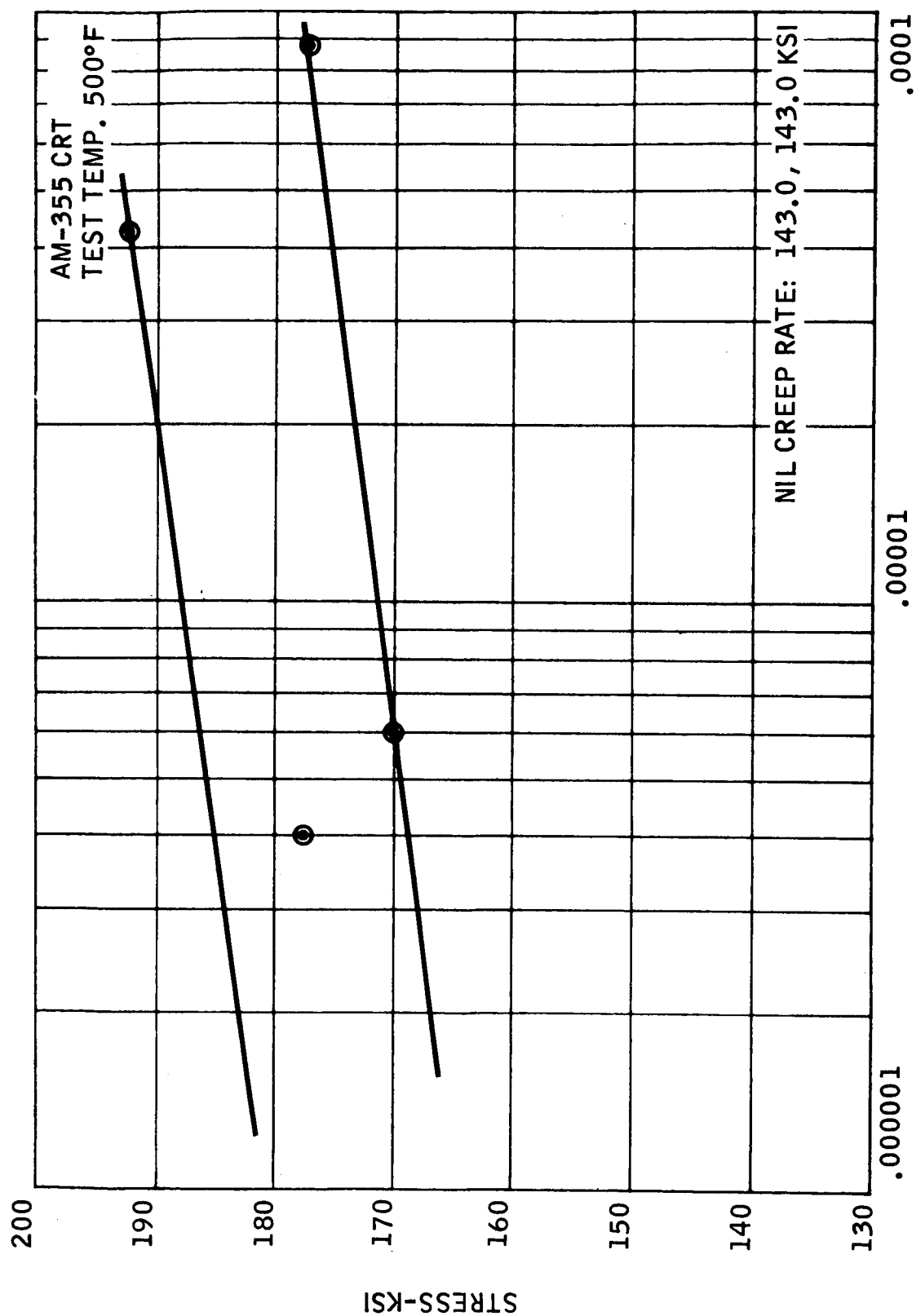
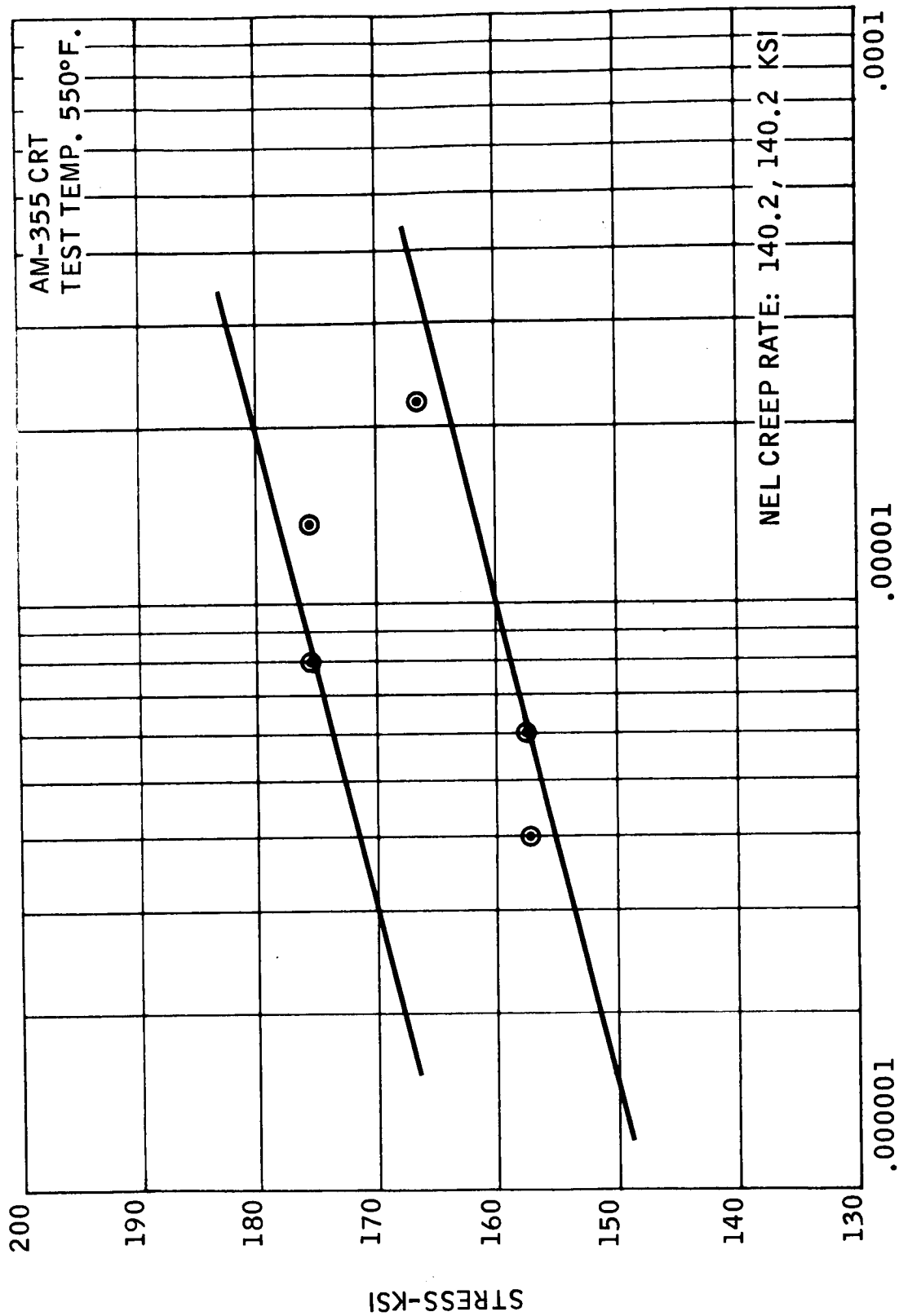


Figure 31. Stress Versus Creep Rate, AM-355 CRT, 500°F



CREEP RATE - IN./IN./HR.

Figure 32. Stress Versus Creep Rate, AM-355 CRT, 550°F

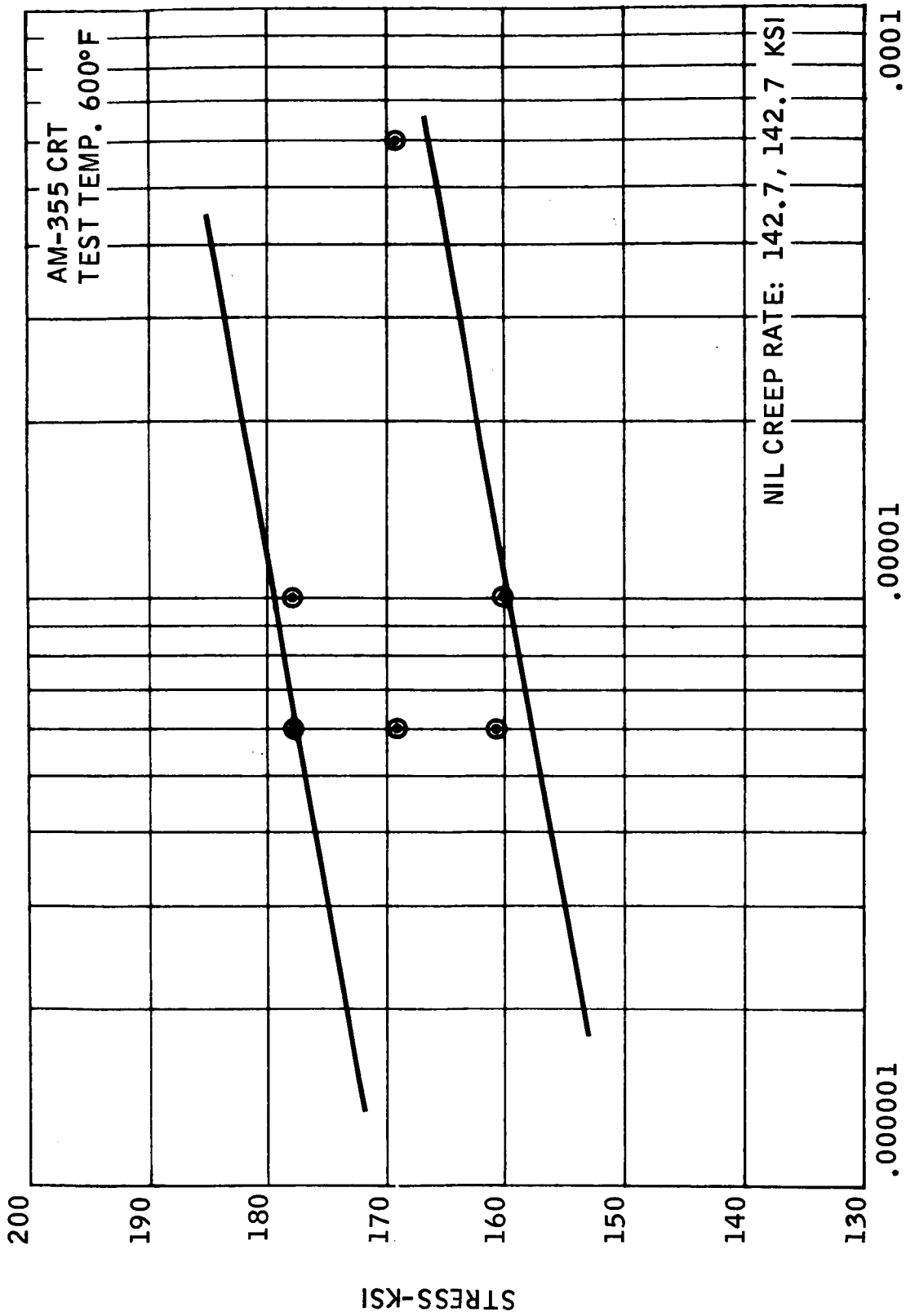
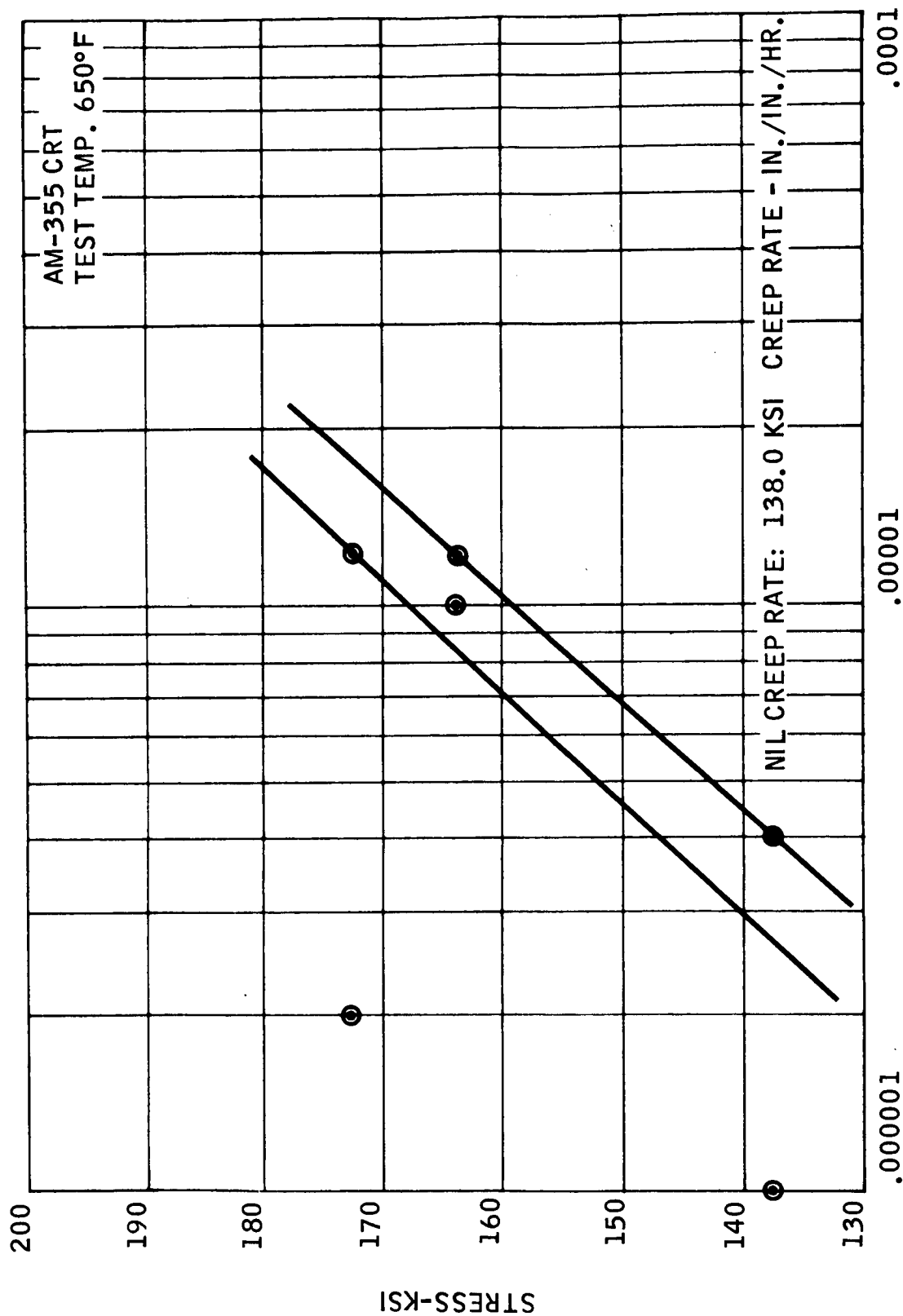


Figure 33. Stress Versus Creep Rate, AM-355CRT, 600°F



CREEP RATE - IN./IN./HR.

Figure 34. Stress Versus Creep Rate, AM-355 CRT, 650°F

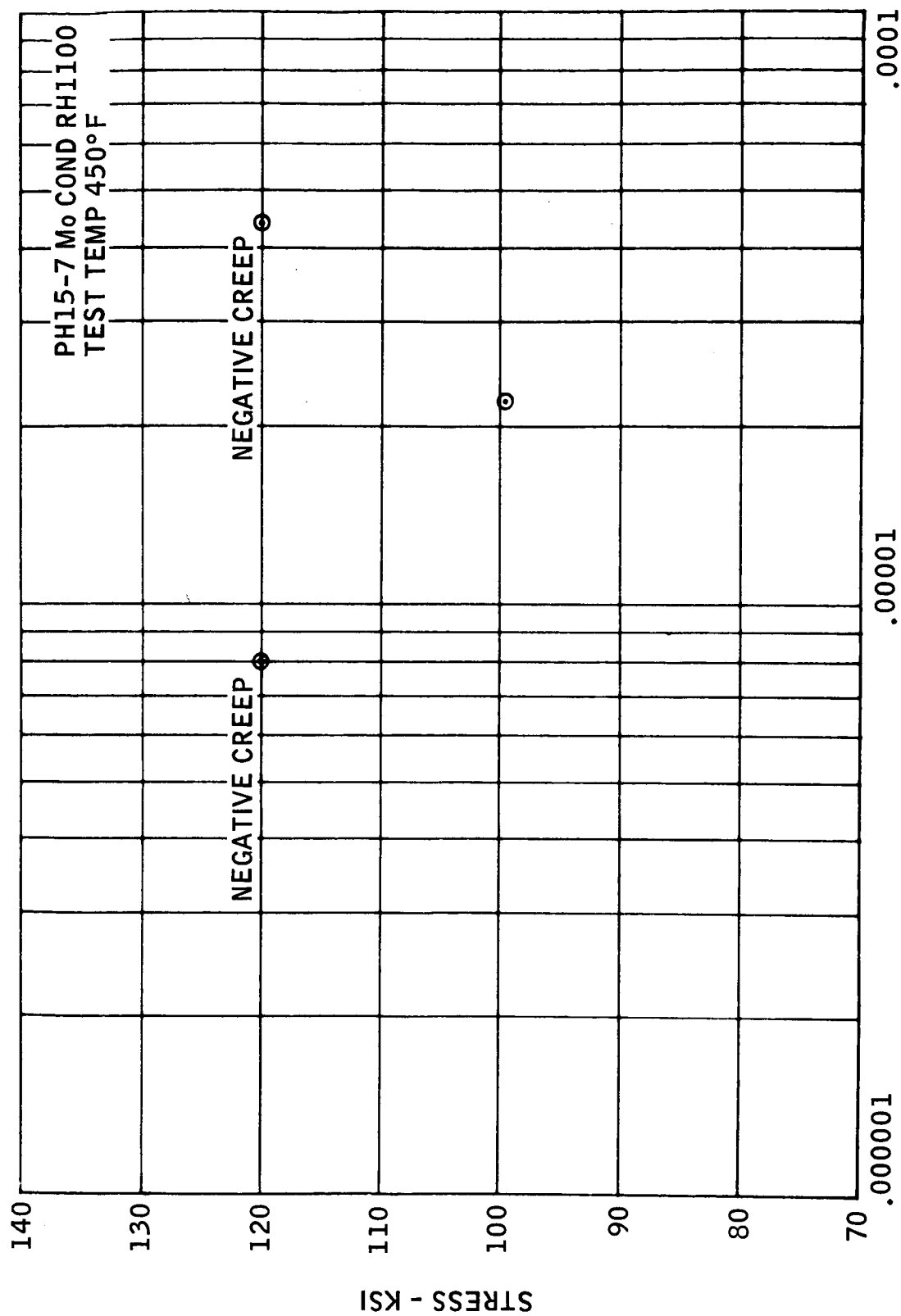
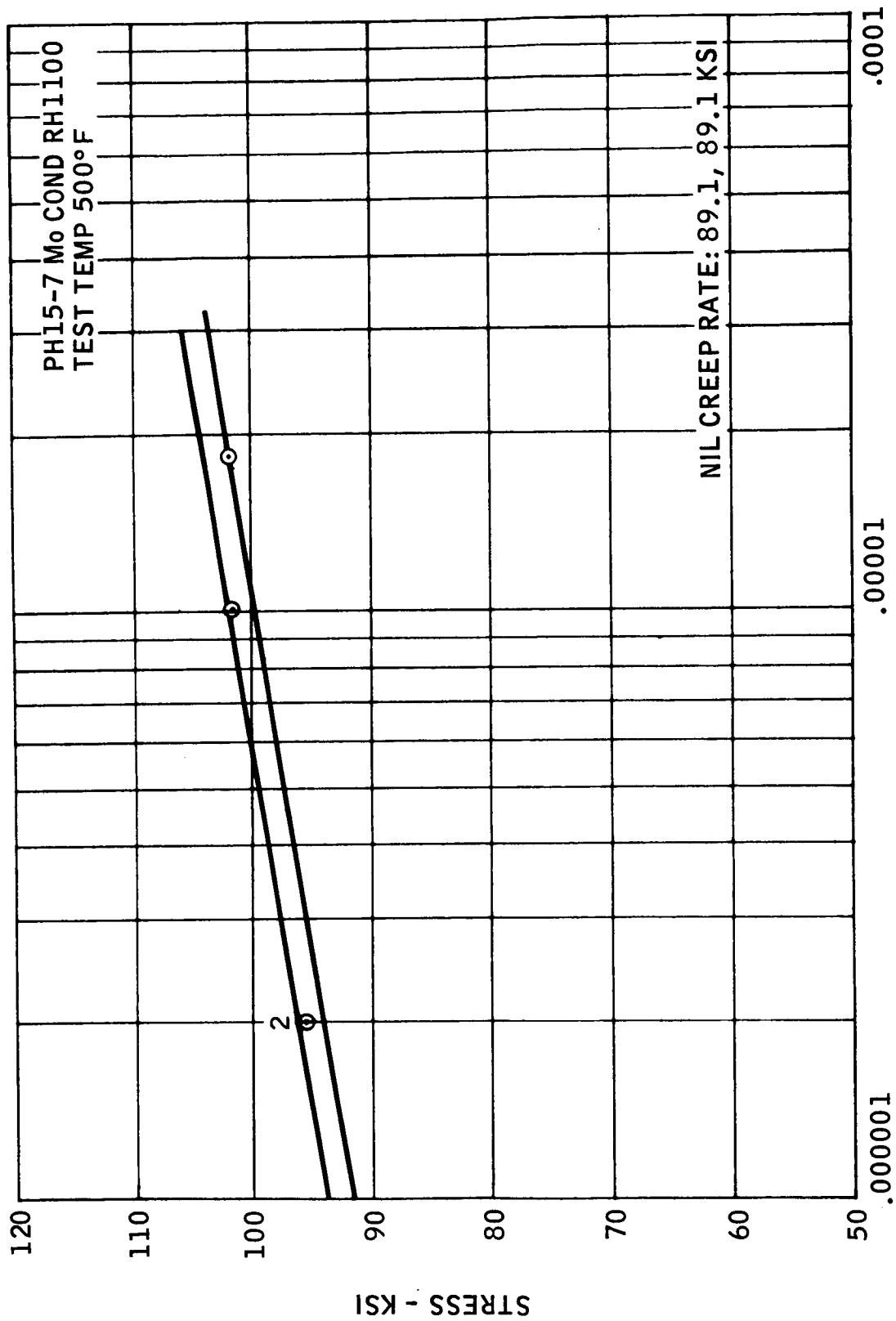


Figure 35. Stress Versus Creep Rate, PH 15-7 Mo, RH 1100, 450° F



CREEP RATE - IN./IN./HR

Figure 36. Stress Versus Creep Rate, PH 15-7 Mo, RH 1100, 500°F

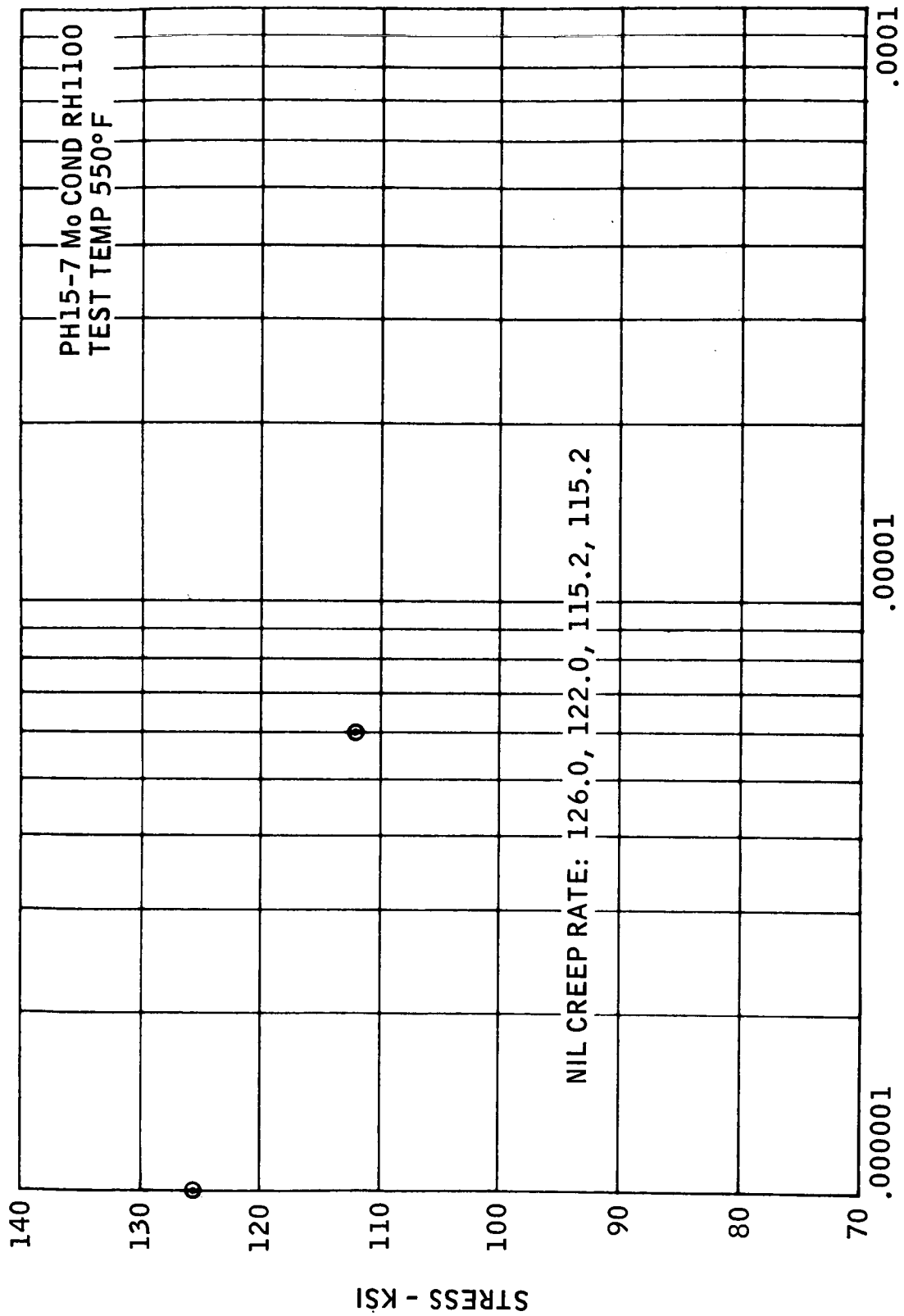


Figure 37. Stress Versus Creep Rate, PH 15-7 Mo, RH 1100, 550°F

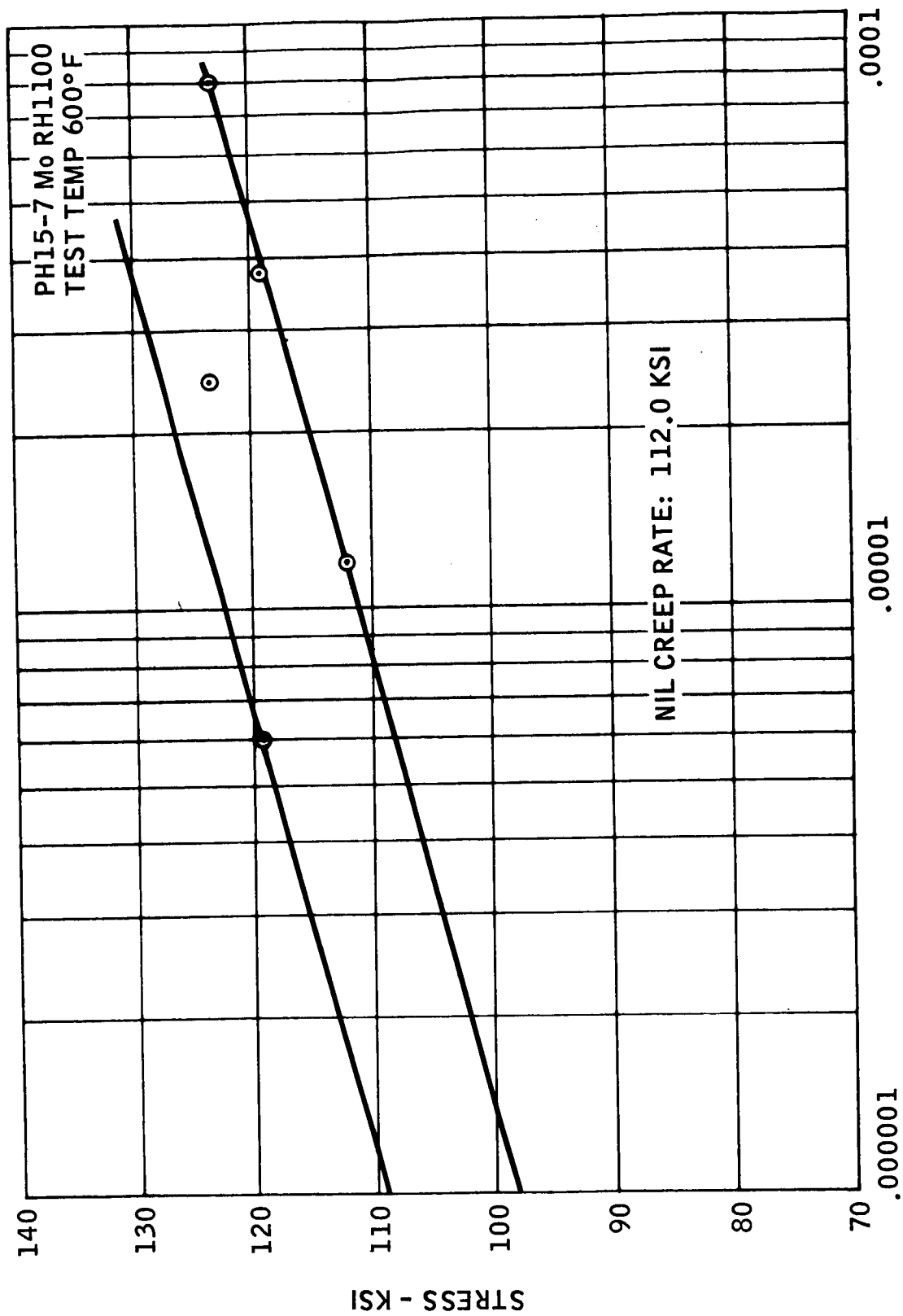
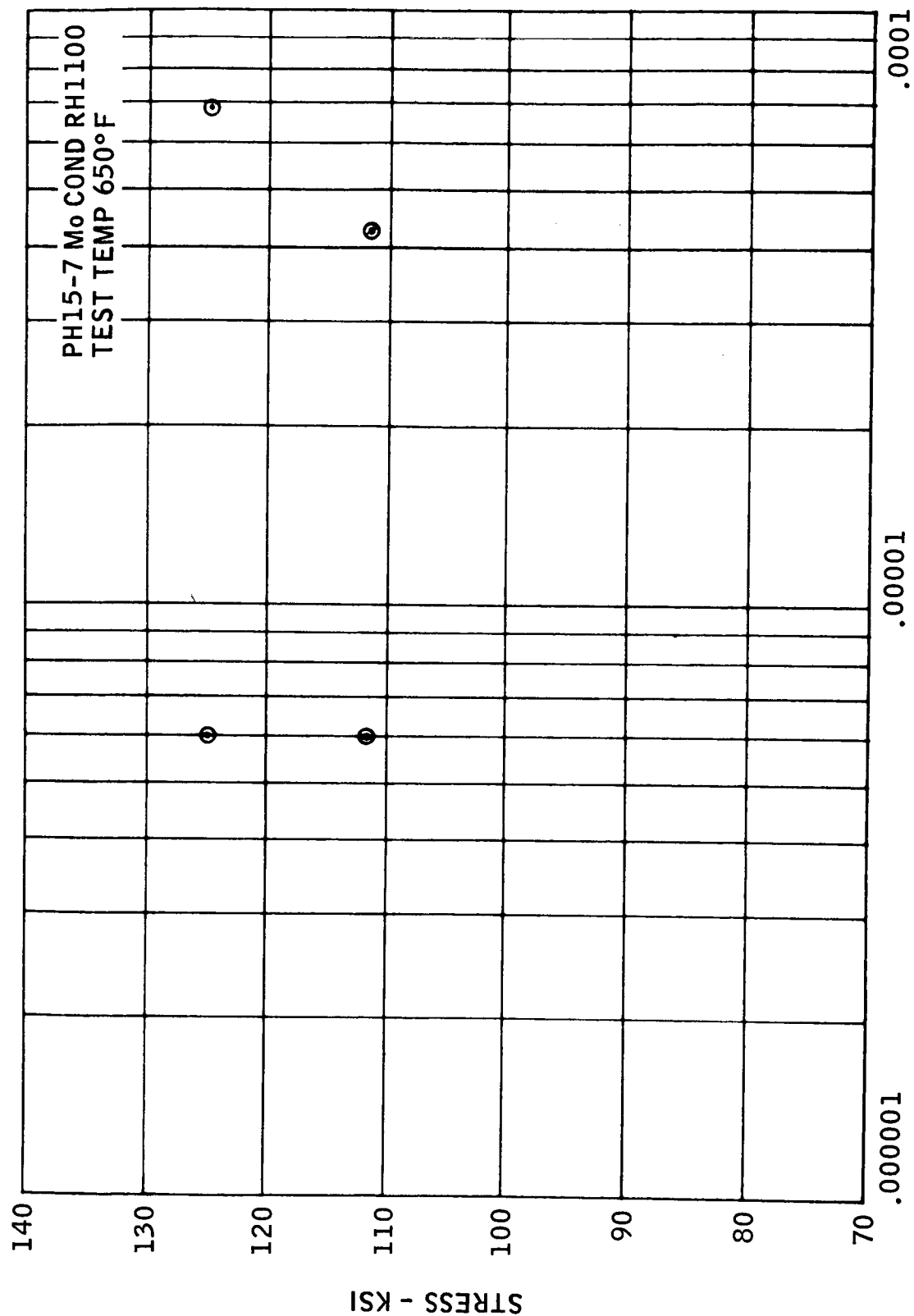
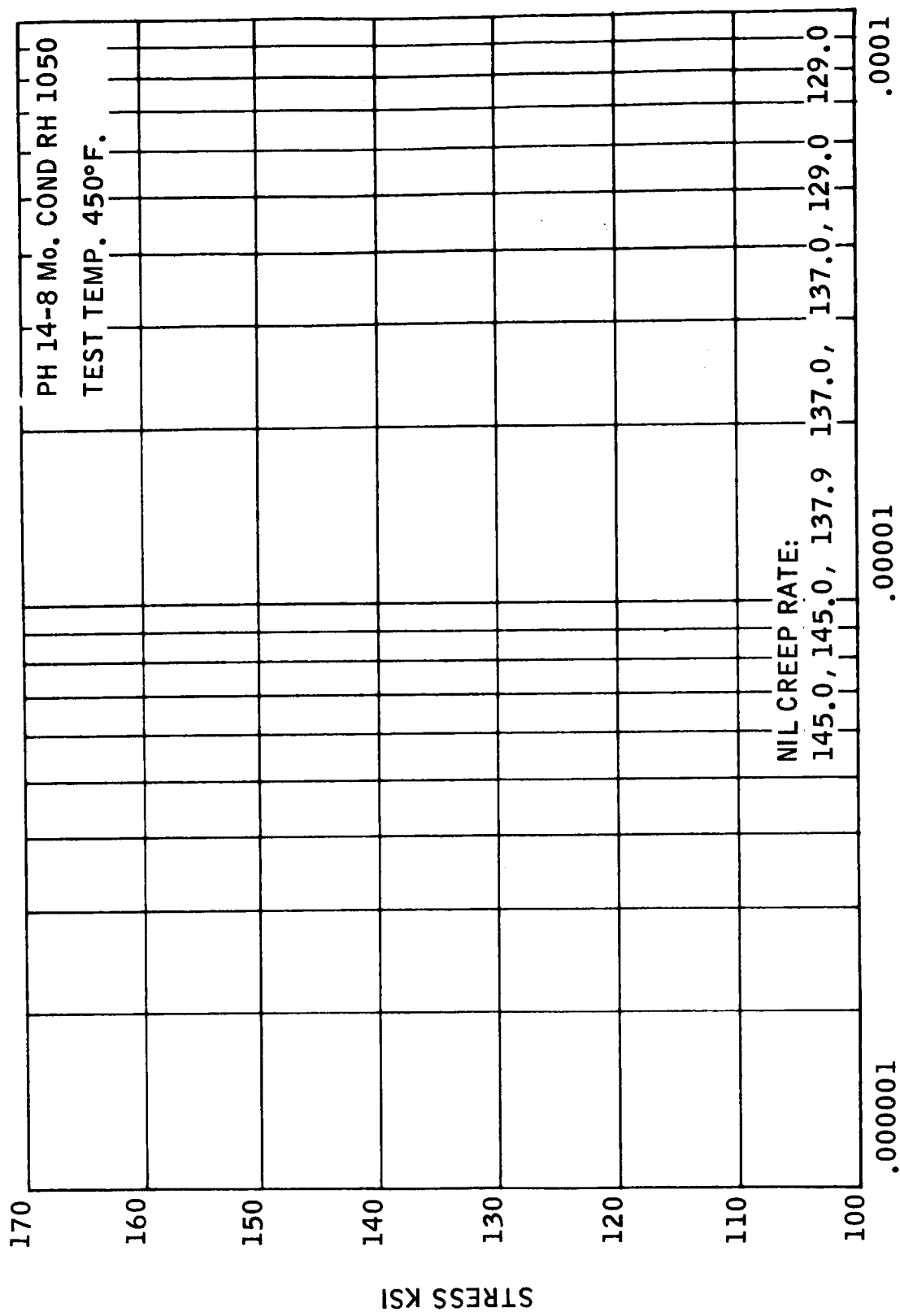


Figure 38. Stress Versus Creep Rate, PH 15-7 Mo, RH 1100, 600°F



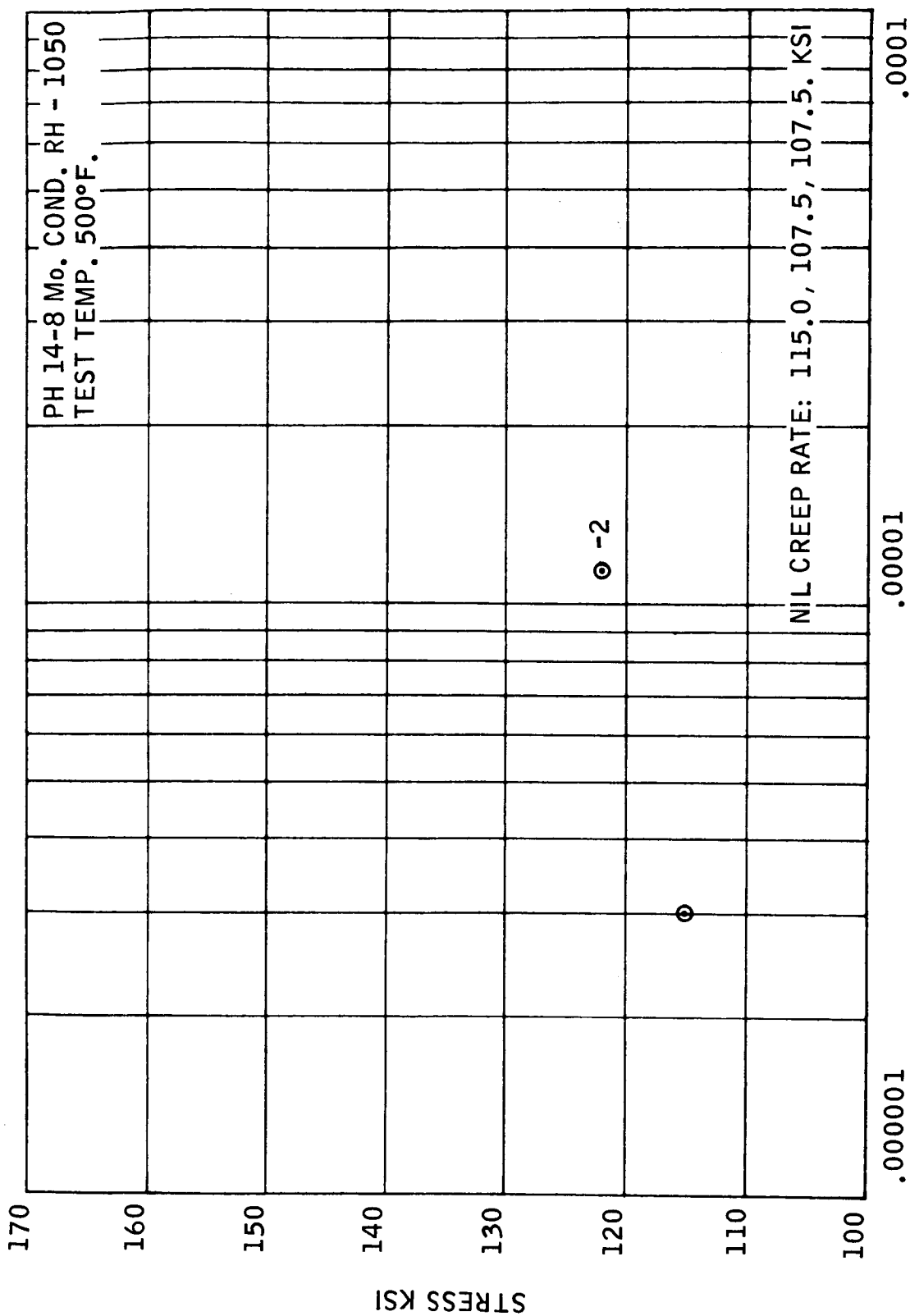
CREEP RATE - IN./IN./HR

Figure 39. Stress Versus Creep Rate, RH 15-7 Mo, RH 1100, 650°F



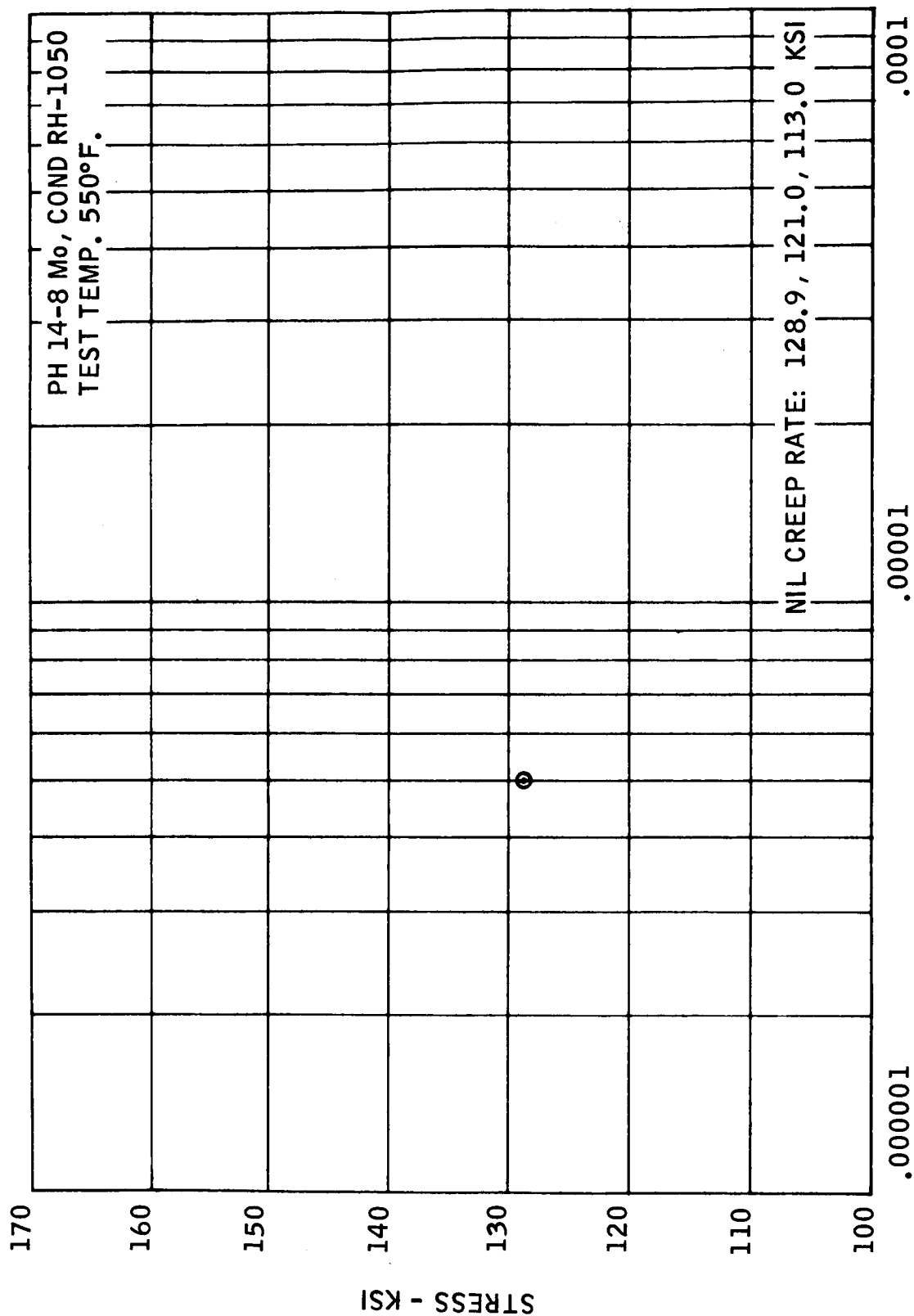
CREEP RATE -IN./IN./HR

Figure 40. Stress Versus Creep Rate, PH 14-8 Mo, RH 1050, 450°F



CREEP RATE - ln IN./IN./HR.

Figure 41. Stress Versus Creep Rate, PH 14-8 Mo, RH 1050, 500°F



CREEP RATE - IN./IN./HR.

Figure 42. Stress Versus Creep Rate, PH 14-8 Mo, RH 1050, 550°F

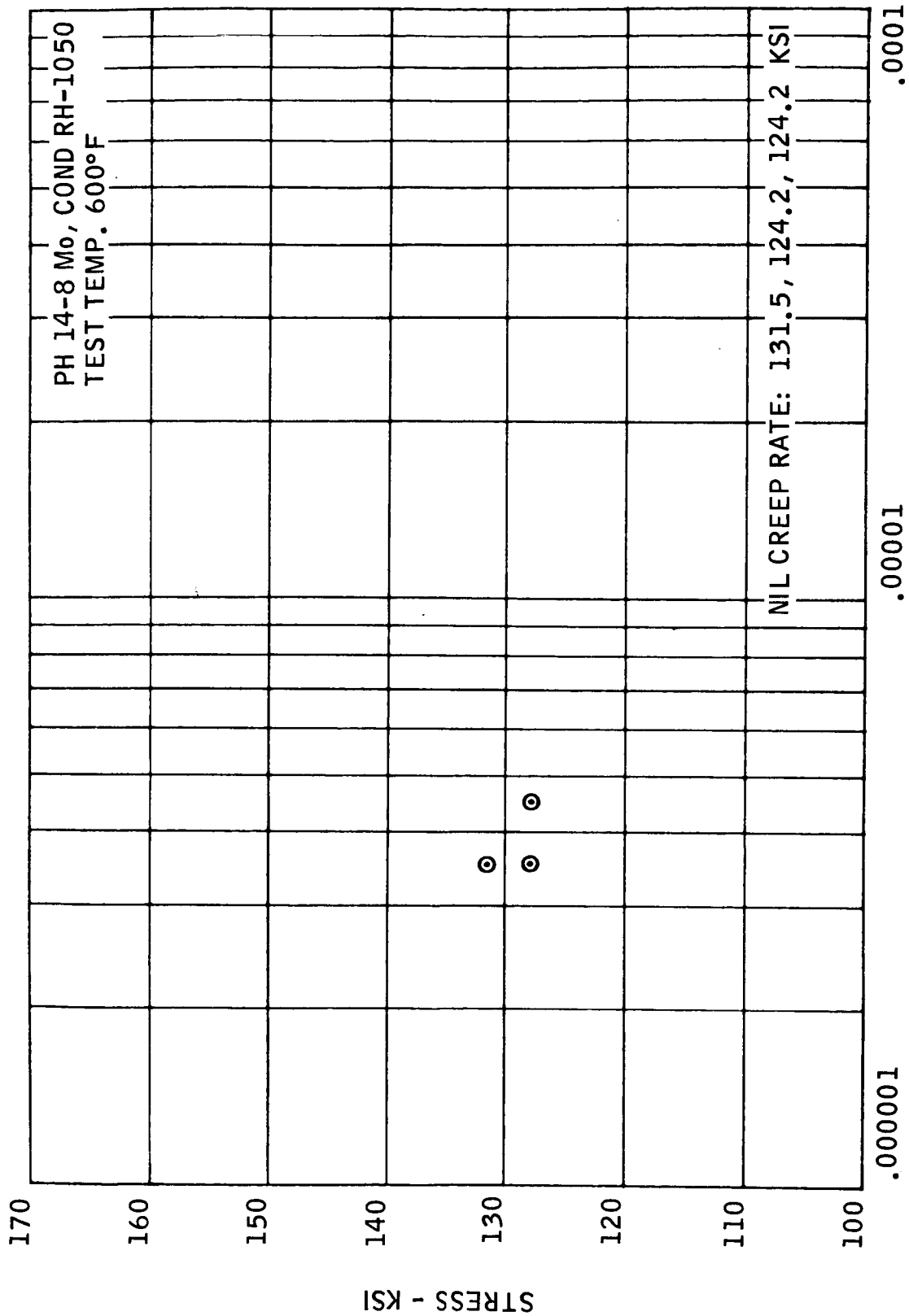
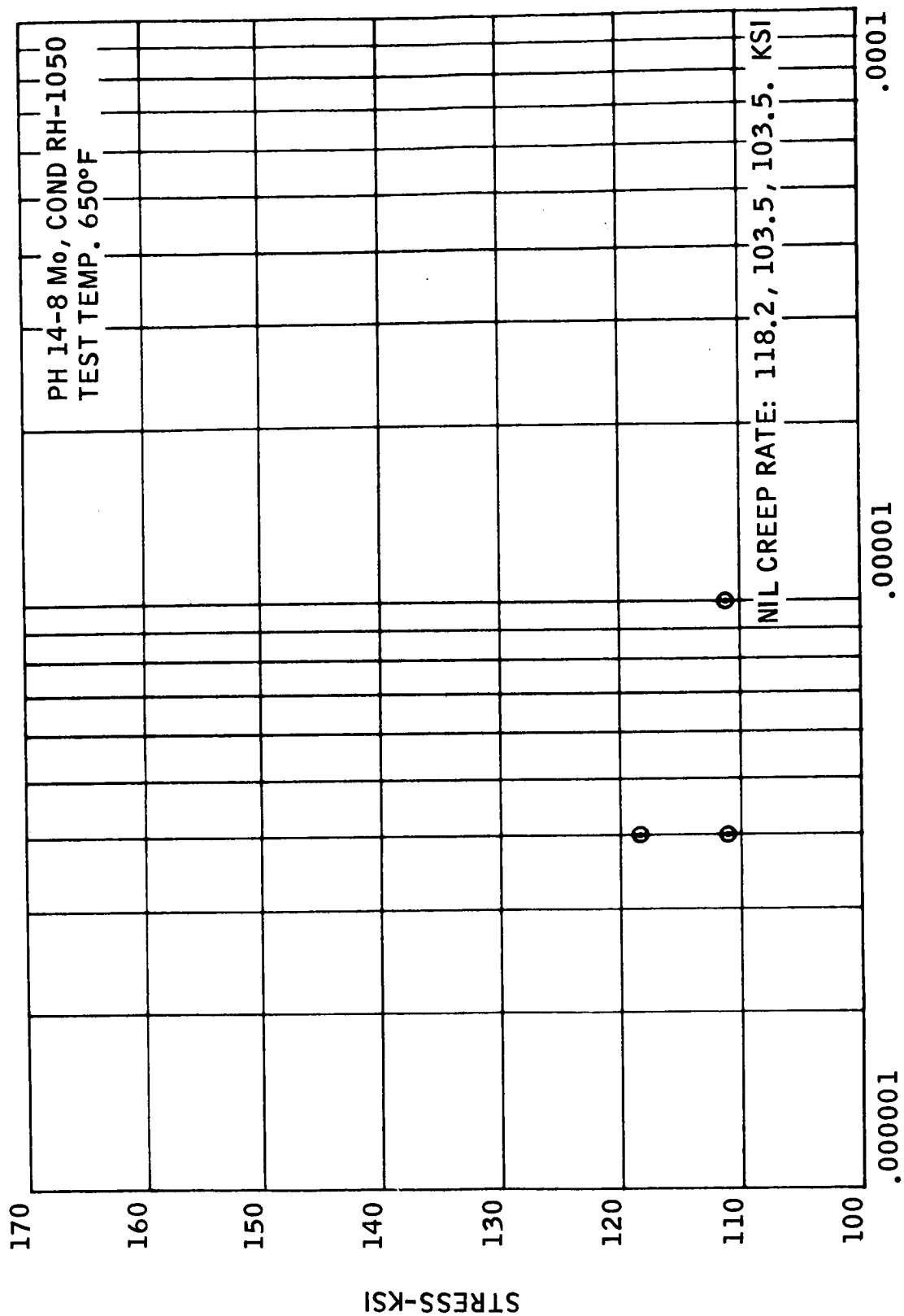
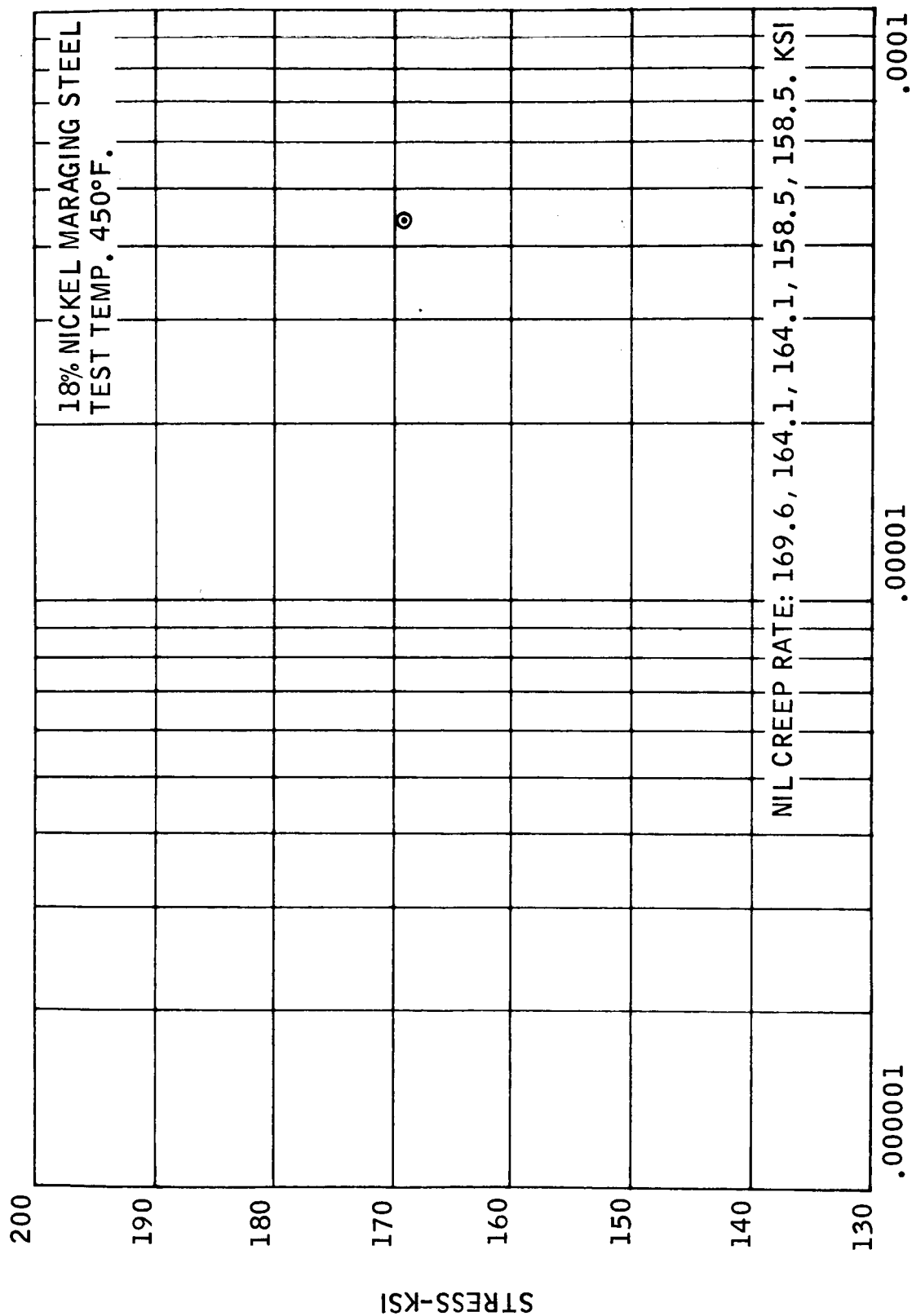


Figure 43. Stress Versus Creep Rate, PH 14-8 Mo, RH 1050, 600°F



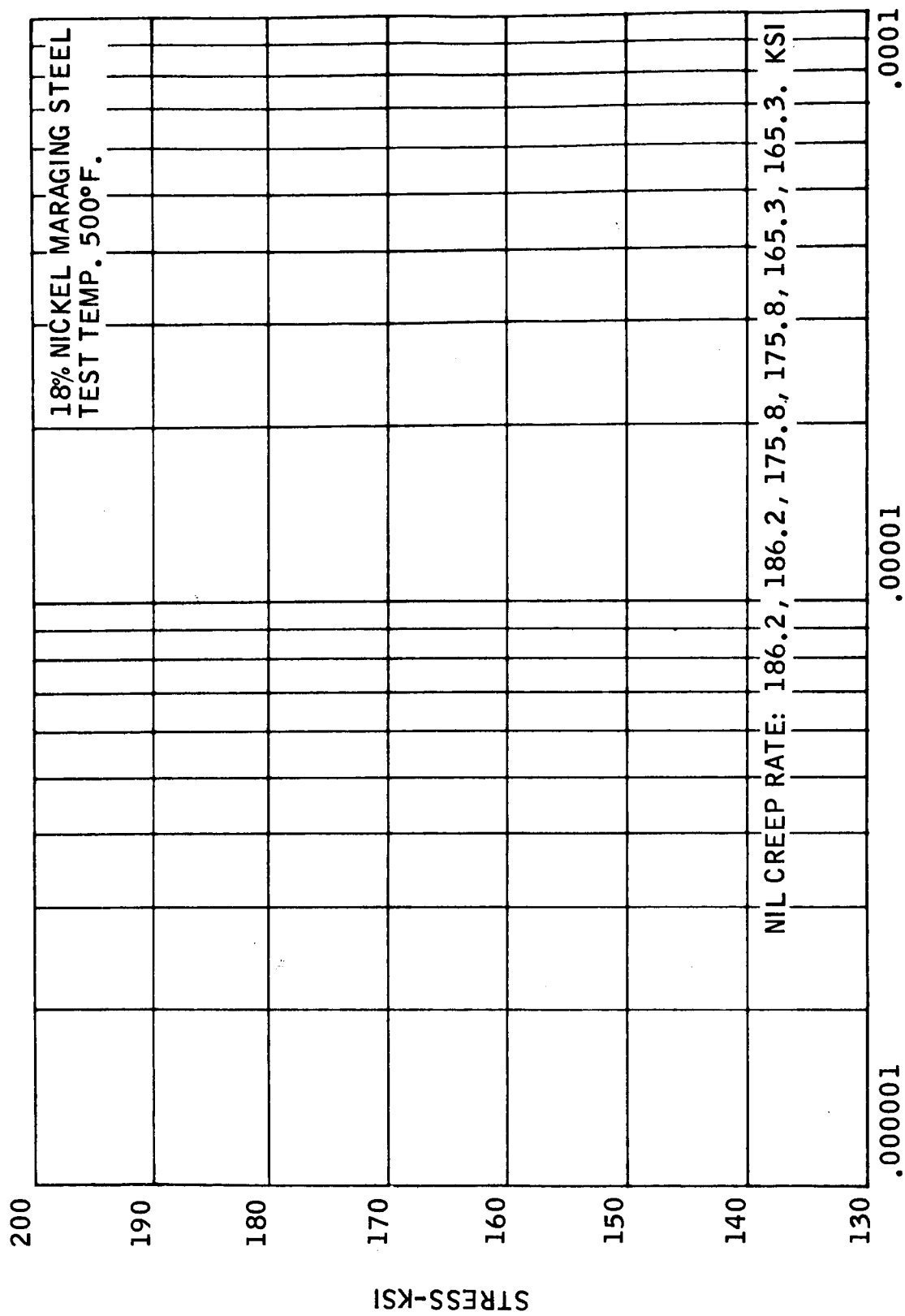
CREEP RATE - IN./IN./HR.

Figure 44. Stress Versus Creep Rate, PH 14-8 Mo, RH 1050, 650°F



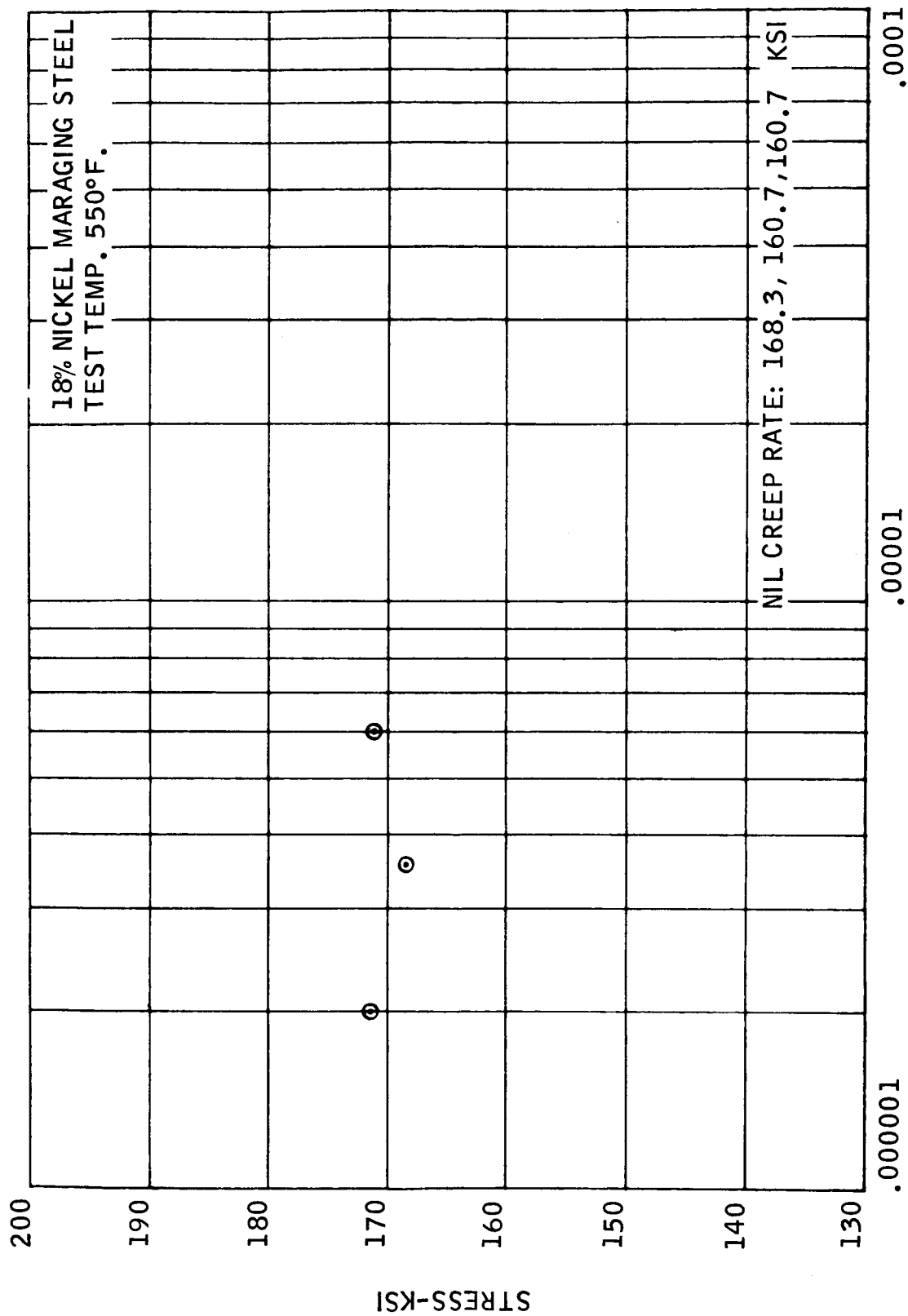
CREEP RATE - IN./IN./HR.

Figure 45. Stress Versus Creep Rate, 18% Nickel Maraging Steel, 450°F



CREEP RATE - IN./IN./HR.

Figure 46. Stress Versus Creep Rate, 18% Nickel Maraging Steel, 500°F



CREEP RATE -IN./IN./HR

Figure 47. Stress Versus Creep Rate, 18% Nickel Maraging Steel, 550°F

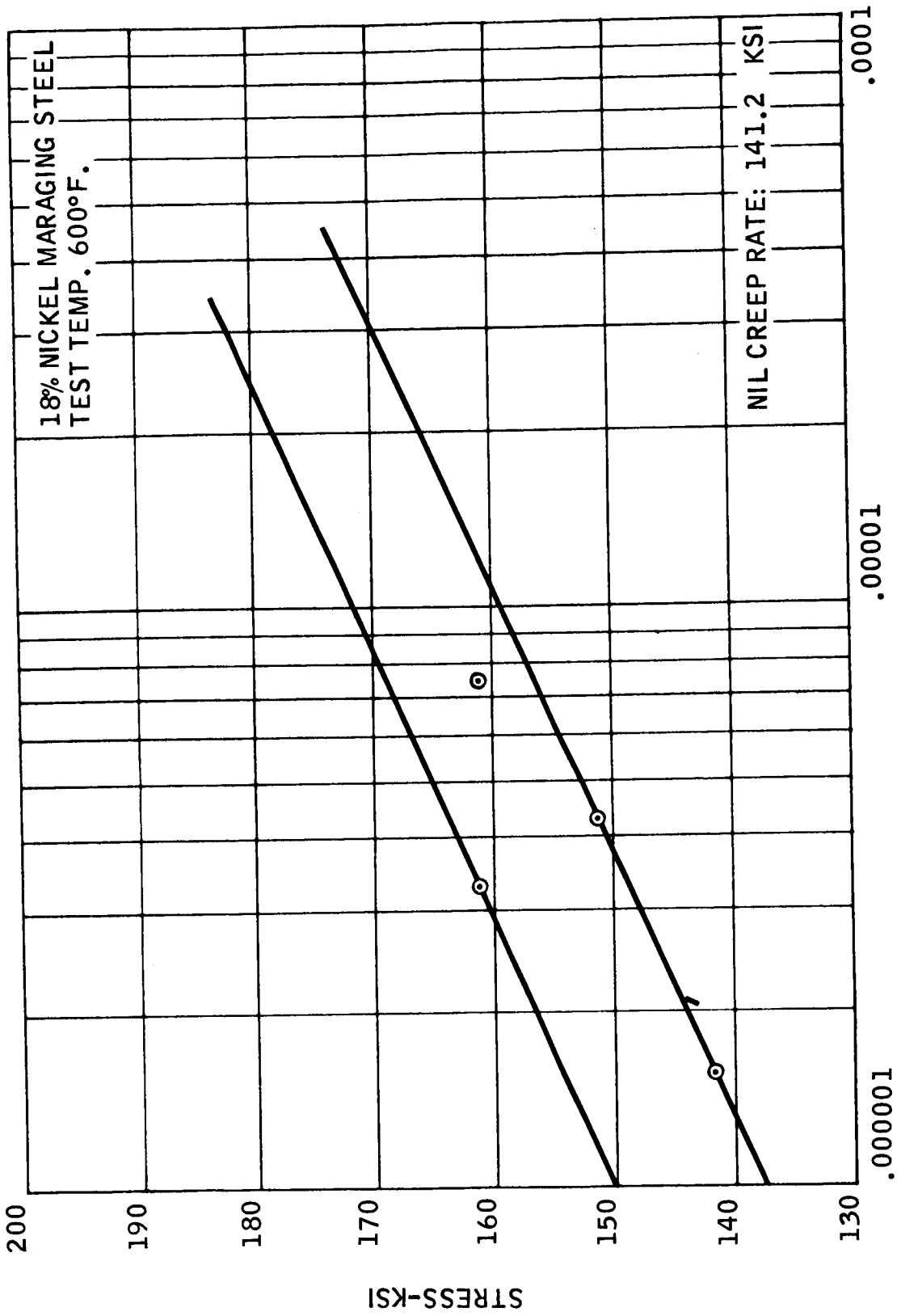
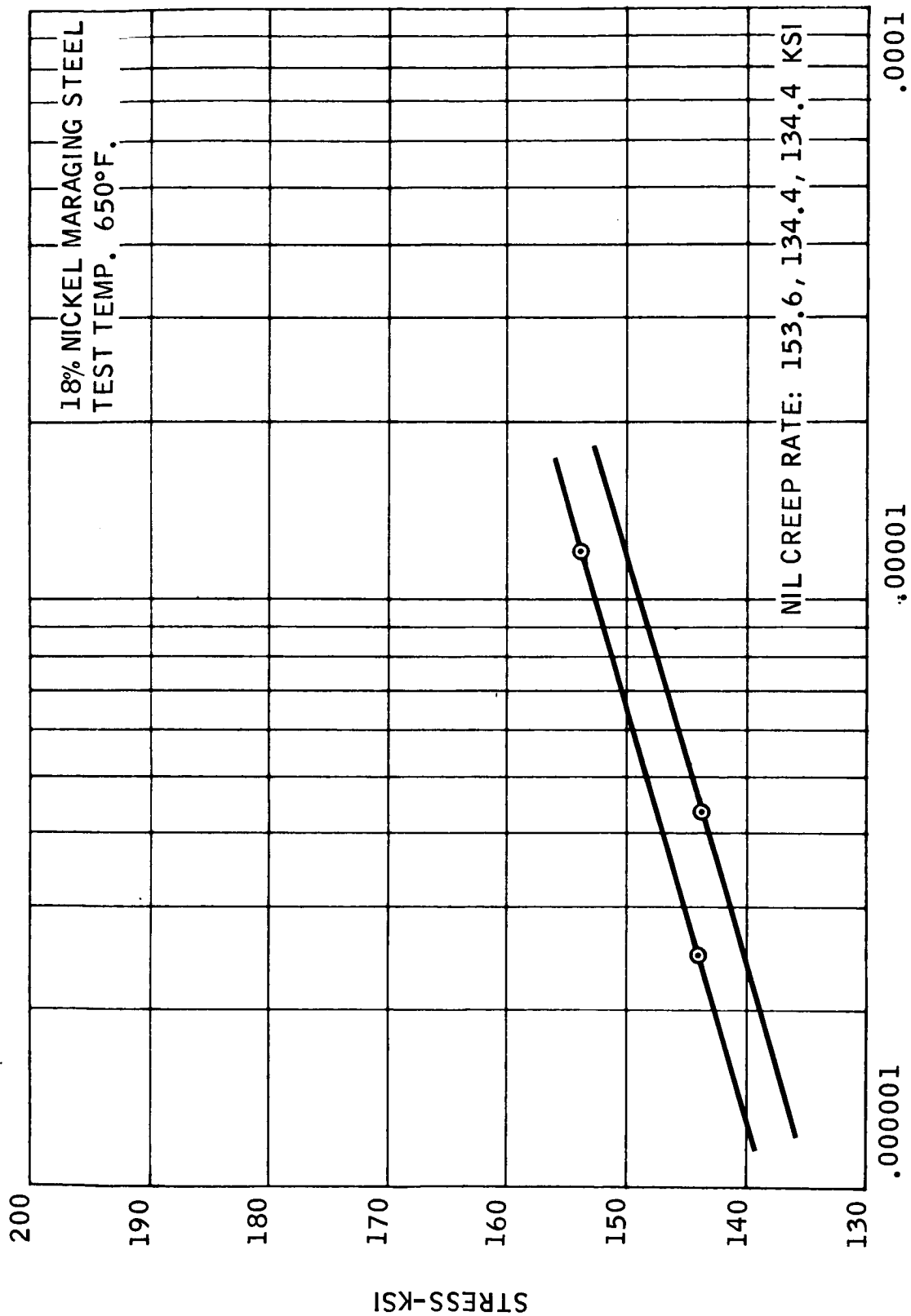


Figure 48. Stress Versus Creep Rate, 18% Nickel Maraging Steel, 600°F



CREEP RATE - IN./IN./HR.

Figure 49. Stress Versus Creep Rate, 18% Nickel Maraging Steel, 650°F

TABLES

Table 2. Mechanical Properties of Materials

Material	Heat No.	Condition	Mechanical Properties		
			Yield Strength KSI	Ultimate Strength KSI	Elongation %
Ti-8Al-1Mo-1V	V-1555 (a)	Single Annealed	148.5	153.4	11.5
		Duplex Annealed	138.5	149.2	10.0
	D-4539 (a)	Duplex Annealed	134.5	149.9	14.0
Ti-6Al-4V	D-4321 (a)	Mill Annealed	134.0	139.0	13.0
Ti-5Al-2 1/2 Sn	D-2242 (a)	Mill Annealed	127.5	132.1	16.3
AM-350	55431 (b)	Annealed	49.1	132.2	46.0
		SCT	172.6	204.7	16.0
		D. A.	151.6	178.3	13.0
AM-355	55467 (b)	CRT	231.0	236.0	15.0
PH 15-7 Mo	890681 (c)	Annealed	54.5	133.3	25.0
		TH	195.0	201.5	8.0
		RH	218.5	236.5	6.0
PH 14-8 Mo	33570 (c)	Annealed	54.5	133.3	25.0
		SRH-950	208.2	229.0	5.0
		SRH-1050	199.5	205.0	6.0
18% Ni M. A. S.	X15400 (d)	As Shipped	124.4	164.2	5.0
		950° F. - 3 hr. age	231.3	249.5	2.5

(a) Titanium Metals Corporation of America
(b) Allegheny Ludlum Steel Corporation
(c) Armco Steel Corporation
(d) United States Steel Corporation

Table 1. Chemical Analyses of Materials

Material	C	Mn	P	S	Si	Cr	Ni	Mo	V	Sn	Al	Fe	N ₂	H ₂	O ₂	Cu	Co
Ti-8Al-1Mo-IV	0.026							1.10	1.04		7.77	0.09	0.011	0.015	0.085		
Ti-8Al-1Mo-IV	0.022							1.1	1.0		7.6	0.08	0.012	0.014			
Ti-6Al-4V	0.023								4.1		5.9	0.12	0.016	0.006			
Ti-5Al-2 1/2 Sn	0.025									2.3	5.2	0.33	0.015	0.006			
AM-350	0.096	0.75	0.015	0.010	0.27	16.64	4.30	2.79					0.096				
AM-355	0.12	0.77	0.021	0.009	0.34	15.35	4.62	2.73					0.095				
PH 15-7 Mo	0.075	0.56	0.016	0.013	0.35	14.98	7.98	2.16			1.06						
PH 14-8 Mo	0.037	0.36	0.004	0.002	0.34	14.71	8.12	2.25			1.21						
18% Ni M. A. S. *	0.017	0.04	0.003	0.008	0.05		17.21	4.87			0.18					0.13	7.97

*18% Nickel Maraging Steel. Ti - 0.52%, Zr - 0.005%, Ca - 0.01%

Table 3. Mechanical Properties of Ti-8Al-1Mo-1V* at 450 to 650° F

Temp ° F	Offset-Percent										Ultimate Strength KSI	Elongation % in 2"
	Stress-KSI											
	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50		
450	85.6	89.5	92.2	93.6	94.3	94.9	95.3	95.5	95.7	95.9	113.0	12.0
	87.3	90.7	92.7	93.8	94.6	95.2	95.6	95.9	96.3	96.5	112.0	11.0
	82.0	88.4	91.8	92.6	93.3	93.8	94.1	94.5	95.0	95.2	111.1	11.5
	Ave. 84.9	89.6	92.2	93.3	94.1	94.6	95.0	95.3	95.7	96.2	112.0	11.5
	79.6	85.9	88.9	90.7	91.7	92.1	92.4	92.8	93.1	93.1	109.5	11.0
500	83.1	86.8	89.4	90.6	91.8	92.2	92.5	92.7	93.0	93.0	110.0	10.5
	83.9	87.8	90.3	91.6	92.2	92.4	92.6	93.2	93.4	93.4	109.5	11.5
	Ave. 82.2	86.8	89.5	91.0	91.9	92.2	92.5	92.9	93.2	93.2	109.7	11.0
	83.6	84.3	86.2	87.9	88.9	89.3	89.7	89.8	90.4	90.6	108.4	11.0
	76.9	81.4	84.6	86.3	87.6	88.2	88.4	89.0	89.3	89.5	106.7	12.0
550	82.0	86.0	87.3	88.1	88.6	89.0	89.4	89.8	90.2	90.5	106.7	11.0
	Ave. 80.8	83.9	86.0	87.4	88.3	88.8	89.1	89.2	90.0	90.2	107.3	11.3
	76.9	81.3	84.2	85.9	86.5	87.1	87.2	87.6	88.0	88.4	104.2	11.0
	69.8	76.4	79.3	82.1	84.0	85.4	86.1	86.8	87.0	87.3	104.7	12.0
	75.9	79.7	82.4	84.4	85.4	85.9	86.3	86.7	87.3	87.7	103.9	11.0
600	Ave. 74.2	79.2	82.0	84.1	85.3	86.1	86.6	87.7	87.5	87.8	104.3	11.3
	76.0	80.7	82.8	84.5	85.1	86.0	86.5	86.8	87.4	88.0	102.9	11.0
	76.0	79.8	81.9	83.6	84.4	85.5	85.9	86.3	86.9	87.6	102.4	11.0
	76.6	81.1	83.4	84.7	85.3	86.2	86.4	86.8	87.4	87.8	102.4	11.0
	Ave. 76.2	80.6	82.7	84.3	84.9	85.9	86.3	86.8	87.2	87.8	102.6	11.0

*Heat No. D4539 0.050" x 36" x 96" Sheet; Double Annealed.

Table 4. Mechanical Properties of Ti-6Al-4V at 450 to 650° F

Temp °F	Offset-Percent										Ultimate Strength KSI	Elongation % in 2"
	Stress-KSI											
	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50		
450	100.2	100.3	99.7	99.6	100.1	99.7	99.9	100.0	100.2	104.3	121.7	11.0
	95.2	99.5	100.7	101.5	101.3	101.2	101.6	101.7	101.7	101.7	117.9	11.0
	104.5	106.9	107.3	106.4	105.8	105.6	106.0	106.0	106.0	106.2	120.4	10.0
	Ave. 100.0	102.2	102.6	102.5	102.4	102.2	102.5	102.6	102.6	104.1	120.0	10.7
500	95.2	96.5	96.6	96.5	96.6	96.9	97.2	97.4	97.8	98.0	111.7	9.5
	93.5	95.0	95.0	95.0	95.2	95.5	95.8	96.0	96.2	96.2	109.3	10.0
	94.0	94.8	94.5	94.9	95.1	95.2	95.5	95.7	96.1	96.5	112.2	9.5
	Ave. 94.2	95.4	95.4	95.5	95.6	95.9	96.2	96.4	96.7	96.9	111.1	9.7
550	86.6	89.5	90.7	91.4	91.6	92.0	92.4	92.8	93.1	93.5	107.8	8.5
	91.6	92.6	92.7	92.8	93.5	93.8	94.3	94.6	94.9	95.3	110.3	9.5
	88.0	91.4	92.3	92.7	92.8	93.1	93.5	94.1	94.3	94.7	111.6	8.8
	Ave. 88.7	91.2	91.9	92.3	92.6	93.0	93.4	93.8	94.1	94.5	109.9	8.9
600	88.7	90.3	90.4	91.5	91.5	91.7	91.8	92.5	93.1	93.5	105.7	8.3
	89.8	90.4	90.7	91.0	91.5	92.1	92.7	93.1	93.6	93.9	105.9	8.8
	83.5	87.9	89.9	89.9	90.6	91.0	91.6	92.0	92.6	93.4	106.5	9.0
	Ave. 87.3	89.5	90.3	90.8	91.2	91.6	92.0	92.5	93.1	93.6	106.0	8.7
650	73.8	82.3	85.1	86.8	88.0	88.5	88.9	89.3	89.7	90.2	103.1	8.5
	80.5	86.6	89.4	90.6	90.8	91.7	92.3	92.8	93.2	93.4	105.0	9.0
	88.0	88.1	88.6	89.0	89.1	89.7	90.2	90.8	91.0	91.4	103.5	8.0
	Ave. 80.8	85.7	87.7	88.8	89.3	90.0	90.5	91.0	91.3	91.7	103.9	8.5

Table 5. Mechanical Properties of Ti-5Al-2 1/2 Sn at 450 to 650° F

Temp ° F	Offset-Percent										Ultimate Strength KSI	Elongation % in 2"
	.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50		
450	88.3	84.6	84.0	83.0	81.8	80.8	80.1	79.3	79.3	79.3	95.3	19.0
	81.5	80.6	79.6	78.5	77.2	75.6	75.0	75.5	75.5	75.6	94.8	21.0
	84.0	82.9	81.6	80.1	79.2	78.9	79.1	79.2	79.2	79.3	93.9	18.0
	Ave. 82.9	82.7	81.7	81.4	79.4	78.4	78.1	78.0	78.0	78.1	94.7	19.3
500	78.8	78.8	78.3	78.0	77.7	77.2	76.7	76.0	76.0	75.9	94.0	18.0
	80.8	80.4	79.5	78.9	77.9	77.5	77.1	76.9	76.8	76.8	93.2	18.0
	78.5	78.5	78.4	78.2	78.0	77.8	77.5	77.3	76.6	76.4	95.2	17.5
	Ave. 79.4	79.2	78.7	78.4	77.9	77.5	77.1	76.7	76.2	76.4	94.1	17.8
550	74.8	74.9	74.4	74.1	73.8	73.6	73.5	73.4	73.4	73.4	91.0	19.0
	74.7	75.7	75.8	75.8	75.4	75.0	74.7	74.4	74.3	74.1	94.2	19.5
	69.8	70.4	70.4	69.9	69.3	69.1	68.9	68.7	68.5	68.5	89.0	20.0
	Ave. 73.1	73.7	73.5	73.3	72.8	72.6	72.4	72.2	72.1	72.0	91.4	19.5
600	70.0	70.2	69.8	69.3	68.8	68.3	67.9	67.8	67.7	67.4	86.4	18.0
	70.1	70.1	69.7	69.5	69.3	69.1	69.1	69.1	69.1	69.0	87.7	17.5
	65.2	67.7	68.2	68.6	68.6	68.3	68.1	67.8	67.7	67.6	84.9	20.0
	Ave. 68.4	69.3	69.2	69.1	68.6	68.6	68.4	68.2	68.2	68.0	86.3	18.5
650	67.3	68.2	68.6	68.6	68.4	68.4	68.3	68.3	68.3	68.4	86.2	16.5
	68.4	69.7	69.7	69.5	69.0	68.9	68.9	68.9	69.1	69.2	86.9	16.5
	71.6	72.2	71.8	71.3	70.9	70.9	70.9	70.9	70.9	71.1	88.0	16.5
	Ave. 69.1	70.0	70.0	69.8	69.4	69.4	69.4	69.4	69.4	69.6	87.0	16.5

Table 6. Mechanical Properties of Am-350 SCT at 450 to 650° F

Temp ° F	Offset-Percent										Ultimate Strength KSI	Elongation % in 2"
	Stress-KSI											
	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50		
R. T.	133.1 118.4 146.7 Ave. 132.7	146.5 140.2 154.2 147.0	154.9 149.1 158.8 154.3	161.6 154.4 162.8 159.6	165.7 159.3 166.0 162.6	168.4 163.1 168.4 166.6	171.2 165.6 170.5 169.1	172.5 168.0 172.5 171.0	173.3 169.5 174.2 172.3	176.7 171.3 176.0 174.6	206.5 200.4 208.1 205.0	18.0 18.0 18.5 18.2
450	94.8 94.3 101.2 103.6 111.5 Ave. 101.1	108.0 111.4 118.9 115.5 120.2 114.8	117.3 124.0 131.3 122.7 128.1 124.7	124.5 131.6 138.5 128.9 133.7 131.4	128.3 137.7 145.1 134.1 138.0 136.6	132.1 143.0 149.9 138.1 142.0 141.1	135.3 147.3 153.6 142.1 145.4 144.7	137.9 150.9 156.1 144.9 148.2 147.5	140.2 154.0 159.2 147.4 150.5 150.2	149.6 156.8 161.7 149.8 152.7 154.1	169.7 184.7 186.1 177.6 178.5 179.3	9.5 8.0 7.0 8.0 7.0 7.9
500	97.0 107.5 98.2 102.3 119.3 Ave. 104.9	109.2 116.2 109.6 118.1 125.6 115.7	116.0 124.1 118.8 124.9 130.6 122.9	122.9 129.0 124.0 130.0 134.3 128.0	127.0 132.6 127.8 134.3 137.9 131.9	130.3 136.0 132.4 138.3 141.0 135.6	133.5 138.7 135.2 142.5 144.2 138.8	136.4 141.4 137.4 145.6 146.4 141.4	138.8 143.8 139.8 148.8 148.3 143.9	140.3 145.3 141.4 151.0 150.3 149.6	165.4 173.9 171.2 179.7 172.8 172.2	9.5 8.5 9.0 7.5 10.0 8.9
550	87.9 66.3 103.3 87.1 94.1 Ave. 87.7	99.8 97.8 115.1 101.0 110.3 104.8	106.0 111.6 122.6 111.3 119.0 114.1	113.5 123.4 129.9 117.7 124.8 121.9	118.5 129.4 135.8 123.2 130.7 127.5	122.7 137.1 139.9 127.2 135.6 132.3	126.4 142.8 144.0 131.3 139.0 136.7	129.7 147.2 147.3 134.5 142.6 140.3	132.4 151.1 150.1 137.5 142.6 142.7	134.9 157.0 152.8 140.0 148.3 146.6	166.3 196.5 182.3 171.4 173.6 178.1	9.0 6.5 7.0 10.0 7.5 8.0
600	94.5 78.0 92.8 90.6 106.3 Ave. 92.4	102.9 96.0 105.9 101.6 118.1 104.9	110.6 108.1 114.6 108.8 125.2 113.4	117.0 115.6 120.1 115.4 132.4 120.1	121.6 121.6 124.8 119.8 136.7 124.9	125.7 127.3 128.9 124.8 141.4 129.6	128.8 129.9 131.4 128.3 145.0 132.5	132.4 137.6 138.1 131.3 147.9 137.4	134.6 137.6 137.1 134.1 151.1 138.9	136.7 140.4 139.1 136.7 153.8 141.3	172.3 174.3 169.9 169.5 187.0 174.6	8.0 7.0 10.0 10.5 7.5 8.6

Table 6. Mechanical Properties of AM-350 SCT at 450 to 650° F (Cont.)

Temp ° F	Offset-Percent										Ultimate Strength KSI	Elongation % in 2"
	Stress-KSI											
	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50		
650	95.0	101.8	110.2	117.6	122.0	125.6	128.5	131.8	134.1	136.1	164.1	11.0
	89.2	110.8	118.9	125.4	130.6	135.9	139.3	142.4	145.4	147.3	177.9	7.0
	103.2	114.2	123.6	129.5	135.4	140.8	144.9	148.6	153.7	156.7	190.2	5.5
	103.4	113.6	122.1	129.0	134.3	138.7	142.4	145.2	147.7	150.1	181.3	7.0
	111.9	118.6	125.0	129.8	133.1	135.9	138.9	141.1	143.8	146.0	173.6	8.0
	Ave. 100.5	111.8	119.9	126.2	131.1	135.4	138.8	141.8	144.9	147.2	171.4	7.7

Table 7. Mechanical Properties of AM-355 CRT at 450 to 650° F

Temp ° F	Offset-Percent										Ultimate Strength KSI	Elongation % in 2"
	Stress-KSI											
	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50		
R. T.	169.0 221.9 148.6 Ave. 179.8	187.9 227.7 198.8 204.8	208.1 231.6 212.9 217.5	216.9 233.5 222.5 224.3	223.0 233.7 227.7 228.1	226.6 234.1 234.5 231.7	229.0 234.5 235.7 233.1	229.4 234.9 236.1 233.5	227.4 234.9 233.3 231.9	227.4 234.9 232.1 231.8	244.4 246.7 243.8 245.0	20.0 16.5 17.5 18.0
450	147.4 151.0 156.4 Ave. 148.3	167.3 167.3 177.0 170.5	181.3 179.6 189.3 183.4	191.2 189.8 195.5 192.2	198.2 195.9 200.0 198.0	202.4 210.0 203.7 205.4	206.2 203.3 205.8 205.1	208.8 205.3 207.8 207.3	210.4 207.8 209.1 209.1	212.0 209.4 210.7 210.7	222.7 218.8 218.5 220.0	3.5 3.5 3.5 3.5
500	121.5 146.2 140.7 Ave. 136.1	145.7 163.3 158.9 156.0	160.9 174.9 173.2 169.7	170.0 185.3 181.7 179.0	180.2 192.0 188.6 186.9	186.2 197.2 193.9 192.4	191.3 202.0 197.6 197.0	195.1 204.0 201.2 200.1	197.6 206.8 203.3 202.6	199.6 208.8 204.9 204.4	213.0 221.9 204.9 213.3	3.5 4.0 3.5 3.7
550	128.5 139.4 132.4 Ave. 133.4	150.2 161.4 149.0 153.5	164.0 173.3 160.8 166.0	171.9 183.3 170.6 175.3	181.8 191.2 178.4 183.8	187.7 196.4 184.3 189.5	191.7 200.4 189.4 193.8	194.5 202.4 192.9 196.6	196.8 204.8 195.3 199.0	198.8 206.8 197.3 201.0	218.2 228.3 212.9 219.8	4.5 3.5 4.0 4.0
600	118.6 156.0 152.2 Ave. 142.2	140.2 172.0 165.7 159.3	154.9 181.0 175.5 170.5	165.7 186.8 181.6 178.0	170.6 192.0 186.9 183.2	175.3 195.2 189.0 186.5	178.4 198.0 191.8 189.7	180.4 200.0 194.3 191.9	181.6 201.0 196.3 193.0	183.1 202.0 197.1 194.1	193.7 213.6 207.4 204.9	4.0 4.0 4.0 4.0
650	117.2 139.5 112.1 Ave. 122.9	142.6 157.0 138.9 146.2	158.2 169.6 155.8 161.2	169.5 181.2 165.9 172.2	175.8 186.8 172.6 178.4	181.6 189.9 178.6 183.4	185.5 192.2 182.5 186.7	189.5 194.8 185.5 189.9	192.2 196.7 187.5 192.1	194.1 197.7 189.5 193.8	210.6 209.7 202.8 207.7	4.5 5.0 5.0 4.8

Table 9. Mechanical Properties of PH 14-8 Mo* at 450 to 650° F

Temp ° F	Offset-Percent										Ultimate Strength KSI	Elongation % in 2"
	Stress-KSI											
	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50		
450	148.3	156.1	160.2	162.2	164.3	165.6	166.4	167.0	167.6	168.2	171.7	5.0
	131.1	143.0	150.6	154.0	156.5	157.9	159.0	160.6	161.0	161.6	167.6	5.5
	161.4	164.9	166.6	167.6	168.3	169.3	169.7	169.9	170.1	170.3	173.9	5.0
	Ave. 146.9	154.7	159.1	161.3	163.0	164.3	165.0	165.8	166.2	166.7	171.1	5.2
500	122.4	136.4	144.9	148.8	151.5	153.2	154.6	155.4	156.3	157.1	162.1	5.0
	135.3	145.6	149.3	152.8	154.9	156.8	157.8	159.0	159.6	160.3	165.2	5.0
	146.9	153.1	156.4	158.9	160.3	161.8	162.8	163.4	164.1	164.5	167.1	4.5
	Ave. 134.9	145.0	150.2	153.5	155.6	157.3	158.4	159.3	160.0	160.6	164.8	4.8
550	151.6	157.2	160.1	162.4	163.6	164.4	165.3	165.9	166.3	166.7	169.6	5.0
	150.3	155.9	158.2	159.8	160.7	161.9	162.3	162.7	163.4	164.0	166.5	5.0
	143.4	153.2	157.1	159.8	161.7	162.9	164.2	164.8	165.8	166.3	169.8	5.0
	148.5	155.8	160.0	162.5	164.6	165.6	166.7	167.3	168.3	169.0	173.3	4.5
600	Ave. 148.5	155.5	158.9	161.1	162.7	163.7	164.6	165.2	166.0	166.5	169.8	4.9
	144.3	150.4	153.7	155.8	157.4	158.7	159.7	160.5	161.1	161.5	164.8	4.5
	138.3	145.9	151.1	152.5	154.6	155.4	157.0	157.7	158.7	159.3	166.1	4.5
	142.9	149.6	153.2	155.4	157.1	159.0	159.6	160.8	161.3	161.7	166.3	4.5
650	Ave. 141.8	148.4	152.7	154.6	156.3	157.7	158.8	159.7	160.3	160.8	165.7	4.5
	136.1	143.6	147.5	150.4	152.2	153.7	155.1	155.9	157.0	157.4	163.8	5.0
	125.4	137.7	143.7	147.2	149.7	151.1	152.3	153.1	154.2	155.2	162.2	5.0
	131.1	139.0	143.5	146.0	147.9	149.8	151.4	152.0	153.3	153.9	160.3	5.0
	Ave. 130.8	140.1	144.9	147.9	149.9	151.5	152.9	153.7	154.8	155.5	158.8	5.0

*Heat No. 33750; 0.050" x 36" x 96" Sheet, 2D Finish, Condition RH-1050

Table 8. Mechanical Properties of PH 15-7 Mo* at 450 to 650° F

Temp °F	Offset-Percent										Ultimate Strength KSI	Elongation % in 2"
	Stress-KSI											
	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50		
R. T.	159.0 151.7 156.7 Ave. 155.8	161.4 156.0 159.2 158.9	163.2 159.0 158.8 160.3	164.4 160.6 161.8 162.3	165.4 162.2 163.1 163.6	166.0 163.4 163.7 164.4	166.6 164.2 164.1 165.0	167.0 164.8 164.7 165.5	167.0 164.8 164.7 165.5	167.6 165.5 165.3 166.1	178.8 177.4 175.7 177.3	11.5 10.0 9.0 10.2
450	109.9 130.4 119.6 Ave. 120.0	129.8 137.7 132.6 133.4	137.7 140.8 139.1 139.2	141.6 142.6 141.5 141.9	143.8 144.1 143.3 143.7	145.1 144.9 144.7 144.9	146.3 145.7 145.7 145.9	147.3 146.5 146.6 146.8	148.4 147.1 147.6 147.7	148.6 147.3 148.0 148.0	155.8 154.9 154.7 155.1	6.5 7.0 6.5 6.7
500	106.0 99.3 100.4 Ave. 101.9	124.5 124.1 120.9 123.2	134.6 132.5 128.8 132.0	140.5 137.1 133.3 137.0	142.4 140.2 136.4 139.7	144.4 141.8 138.0 141.4	145.6 143.4 139.7 142.9	146.5 144.3 144.1 144.0	147.5 145.3 142.1 145.0	148.1 146.1 143.2 145.8	155.1 153.2 151.4 153.2	5.5 5.5 6.0 5.7
550	127.1 120.8 130.2 Ave. 126.0	134.5 129.2 138.2 137.9	136.5 133.5 141.7 137.2	138.6 135.7 143.9 139.4	139.8 137.3 145.6 140.9	140.6 138.8 146.6 142.0	141.4 139.6 147.4 142.8	142.3 140.6 148.5 143.8	143.1 141.4 148.7 144.4	143.5 142.0 149.5 145.0	149.7 149.8 154.2 151.2	6.0 7.5 5.0 6.2
600	115.8 128.4 126.5 Ave. 123.6	131.3 135.0 134.6 133.6	136.5 138.9 138.2 137.9	138.7 140.8 140.4 140.0	140.7 142.2 142.2 141.7	141.5 143.3 143.0 142.6	142.5 144.1 144.0 143.5	143.3 144.9 144.8 144.3	143.9 145.3 145.4 144.9	144.7 145.7 146.1 145.5	150.5 152.3 150.7 151.2	5.0 5.5 5.0 5.2
650	128.3 120.0 129.2 122.6 Ave. 125.0	134.0 129.4 133.7 131.5 132.2	136.4 135.0 136.3 135.4 135.8	138.4 138.5 138.1 137.6 138.2	140.2 140.5 139.3 139.5 139.9	141.4 142.2 140.9 141.1 141.4	142.5 143.4 141.7 142.1 142.4	143.1 144.6 142.1 143.1 143.2	143.7 145.2 143.1 143.8 144.0	144.5 146.1 143.3 144.2 144.5	149.7 151.8 148.8 151.7 150.5	4.5 4.5 5.0 5.5 4.9

*Heat No. 890681; 0.050" x 36" x 96" Sheet, 2D Finish, Condition RH 1100.

Table 10. Mechanical Properties of 18 Percent Nickel Maraging Steel at 450 to 650° F

Temp ° F	Offset-Percent										Ultimate Strength KSI	Elongation % in 2"
	Stress-KSI											
	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50		
R. T.	182.6 207.6 215.5 Ave. 201.9	211.3 221.3 227.7 220.1	224.0 227.8 233.8 228.5	228.2 232.4 237.4 232.7	231.6 235.0 239.9 235.7	235.4 237.1 241.9 238.2	236.9 238.7 242.3 239.3	237.3 243.3 243.3 241.3	238.4 244.5 243.9 242.6	239.2 245.4 245.1 243.2	240.7 247.6 245.9 244.8	3.0 3.0 2.5 2.9
450	192.0 193.6 182.3 Ave. 189.3	204.3 204.2 197.7 202.1	210.3 209.8 204.7 208.3	214.4 212.8 209.0 212.0	216.0 215.2 210.0 213.7	218.0 217.8 212.9 216.0	218.6 219.0 212.6 216.8	220.3 220.8 214.6 218.6	220.9 221.2 215.8 219.3	221.9 221.6 218.5 220.7	226.0 226.4 224.1 225.5	2.5 3.0 3.0 2.8
500	185.3 177.1 166.4 Ave. 176.3	198.6 194.6 184.4 192.5	204.1 204.2 195.1 201.1	206.9 209.5 203.3 206.6	208.8 213.3 208.2 210.1	211.8 215.4 211.1 212.8	212.9 217.5 213.1 214.5	214.3 218.7 214.8 215.9	214.9 219.3 216.2 216.8	215.9 220.8 217.2 218.0	220.2 226.4 223.9 223.5	3.0 3.0 3.0 3.0
550	180.3 153.7 182.5 Ave. 172.1	191.8 180.3 193.4 188.5	198.4 190.2 199.8 196.1	202.5 196.3 203.9 200.9	204.9 200.4 205.9 203.8	207.8 202.9 207.8 206.2	208.6 204.9 209.4 207.7	210.3 206.6 211.1 209.3	210.9 207.8 211.7 210.1	211.5 209.4 212.5 211.2	219.3 218.6 219.7 219.2	3.0 2.5 2.5 2.7
600	186.3 168.3 174.0 Ave. 176.2	196.1 188.8 188.0 191.0	200.7 196.3 194.3 197.1	204.3 201.2 199.1 201.7	206.2 204.1 202.4 204.2	208.4 207.0 204.9 206.7	209.8 208.7 206.6 208.4	211.4 211.3 207.9 210.2	212.4 212.3 208.6 210.5	212.6 213.6 209.9 212.0	219.9 221.4 220.2 220.5	2.5 2.5 3.0 2.7
650	173.4 168.2 171.3 Ave. 170.9	183.5 177.9 185.2 182.2	189.3 183.7 190.8 187.9	193.4 188.4 194.3 192.0	195.5 190.8 198.4 194.9	198.7 192.8 201.7 197.8	200.0 194.2 203.4 199.2	201.2 196.1 204.0 200.4	202.5 196.8 204.6 201.3	203.1 198.1 205.6 202.3	215.1 210.0 214.9 213.3	2.5 2.0 2.5 2.3

Table 11. Average Stresses Required for 0.01 Percent Tensile Strain

Material	Temperature - °F				
	450	500	550	600	650
	Stress-KSI				
Ti-8Al-1Mo-1V D.A.	75.5	74.1	71.8	62.9	67.9
Ti 6Al-4V Ann	85.6	84.1	68.9	70.5	66.8
Ti 5Al-2 1/2 Sn Ann	80.8	74.0	64.9	66.0	64.2
AM-350-SCT	89.2	92.1	74.2	77.3	92.6
AM-355-CRT	122.5	102.3	96.3	115.2	83.1
PH 15-7 Mo-RH 1100	101.5	77.7	101.4	106.0	107.0
PH 14-8 Mo-RH 1050	131.7	117.9	134.6	129.9	118.7
18% Ni Marage Steel	155.8	138.5	128.6	134.0	137.4

Table 12. Primary Creep Strains and Times, Ti-8Al-1Mo-1V

Temp. °F	Stress KSI	Loading Strain In.	Primary Creep Strain In.	Primary Creep Time Min.
450	92.3	0.00753	0.00687	17
450	92.3	0.00753	0.00632	17
450	85.0	0.00583	0.00620	4
450	85.0	0.00583	-	2
450	71.5	0.00573	0.00573	20
450	71.5	0.00573	0.00553	20
500	91.9	0.00698	0.01562	20
500	91.9	0.00698	0.01502	20
500	91.1	0.00680	0.00700	20
500	91.1	0.00680	0.00320	20
500	82.2	0.00565	0.00595	20
500	82.2	0.00565	0.00255	20
500	71.6	0.00482	0.00558	20
500	71.6	0.00482	0.00498	20
550	87.5	0.00612	-	20
550	87.5	0.00612	-	20
550	86.0	0.00583	0.00197	20
550	86.0	0.00583	-	20
550	83.9	0.00570	0.00370	20
550	83.9	0.00570	0.00330	20
550	80.8	0.00545	0.00515	20
550	80.8	0.00545	0.00295	20
600	86.1	0.00620	0.01020	20
600	86.1	0.00620	0.00900	20
600	84.1	0.00582	0.00578	20
600	84.1	0.00582	0.00398	20
600	79.2	0.00526	0.00538	20
600	79.2	0.00526	0.00118	20
600	74.2	0.00482	0.00538	20
600	74.2	0.00482	0.00658	20

Table 12. Primary Creep Strains and Times, Ti-8Al-1Mo-1V (Cont.)

Temp. °F	Stress KSI	Loading Strain In.	Primary Creep Strain In.	Primary Creep Time Min.
650	84.2	0.00572	0.00808	20
650	84.2	0.00572	0.01008	20
650	83.3	0.00555	0.01425	20
650	83.3	0.00555	0.00705	20
650	80.5	0.00545	0.00635	20
650	80.5	0.00545	0.00515	20
650	76.2	0.00508	0.00522	20
650	76.2	0.00508	0.00292	20

Table 13. Primary Creep Strains and Times, Ti-6Al-4V

Temp. °F	Stress KSI	Loading Strain In.	Primary Creep Strain In.	Primary Creep Time Min.
450	100.0	0.00775	0.01325	27
450	100.0	0.00775	0.00940	42
450	97.2	0.00730	0.01365	17
450	97.2	0.00730	-	0
450	94.8	0.00728	0.00690	6
450	94.8	0.00728	-	4
450	94.5	0.00720	0.00730	4
450	94.5	0.00720	-	-
450	93.3	0.00693	0.00507	5
450	93.3		0.00497	27
500	95.5	0.00748	0.00437	27
500	95.5	0.00748	0.00267	5
500	94.2	0.00735	0.00955	58
500	94.2	0.00735	0.00670	14
500	90.6	0.00675	0.00970	4
500	90.6		0.00430	30
500	88.4	0.00670	0.00125	2
500	88.4	0.00670	0.00005	0
500	88.4	0.00670	0.00920	9
500	88.4	0.00670	0.00350	8
550	92.3	0.00830	0.00400	5
550	92.3	0.00830	0.00000	0
550	88.7	0.00875	0.00485	17
550	88.7	0.00875	-	2
550	85.4	0.00635	0.00335	2
550	85.4		0.00135	0
550	82.9	0.00640	0.00620	3
550	82.9	0.00640	0.00380	3
550	80.6	0.00620	0.00315	1
550	80.6		0.00095	2

Table 13. Primary Creep Strains and Times, Ti-6Al-4V (Cont.)

Temp. °F	Stress KSI	Loading Strain In.	Primary Creep Strain In.	Primary Creep Time Min.
600	90.8	0.00850	0.01110	24
600	90.8	0.00850	0.00240	8
600	87.3	0.00720	0.00460	50
600	87.3	0.00720	0.00085	9
600	84.0	0.00675	0.00835	5
600	84.0	0.00675	0.00605	5
600	81.8	0.00650	0.00700	4
600	81.8	0.00650	-	0
600	79.5	0.00625	0.00315	1
600	79.5	0.00625	0.00095	2
650	88.8	0.00900	0.00590	20
650	88.8		0.00485	55
650	80.8	0.00685	0.00435	30
650	80.8	0.00685	-	
650	76.3	0.00630	0.00030	5
650	76.3	0.00630	-	-
650	73.9	0.00595	0.01585	8
650	73.9	0.00595	-	
650	69.4	0.00540	0.00165	2
650	69.4	0.00540	0.00150	2

Table 14. Primary Creep Strains and Times, Ti-5Al-2 1/2 Sn

Temp. °F	Stress KSI	Loading Strain In.	Primary Creep Strain In.	Primary Creep Time Min.
450	82.9	0.00590	0.04800	708
450	82.9	0.00590	0.03940	4022
450	78.0	0.00529	0.01774	504
450	78.0	0.00529	0.01976	540
450	73.2	0.0495	0.02325	560
450	73.2		0.00825	600
450	69.2	0.00468	0.00907	5
450	69.2	0.00468	-	8
450	67.0	0.00450	0.00540	6
450	67.0	0.00450		
500	78.5	0.00570	0.04750	180
500	78.5	0.00570	0.03980	28
500	77.3	0.00562	0.03453	540
500	77.3	0.00562	0.02188	480
500	70.6	0.00500	0.01720	300
500	70.6	0.00500	-	20
500	68.5	0.00483	0.00417	8
500	68.5	0.00483	-	8
500	66.5	0.00467	0.00210	4
500	66.5	0.00467	0.00210	6
550	73.1	0.00575	0.02230	31
550	73.1	0.00575	0.01810	28
550	72.0	0.00558	0.01567	48
550	72.0	0.00558	0.01517	40
550	65.9	0.00488	0.00252	6
550	65.9	0.00488	-	4
600	68.4	0.00545	0.00720	38
600	68.4	0.00545	-	
600	66.3	0.00515	0.00385	20
600	66.3	0.00515	0.00085	4
600	64.0	0.00495	-	
600	64.0	0.00495	-	

Table 14. Primary Creep Strains and Times, Ti-5Al-2 1/2 Sn (Cont.)

Temp °F	Stress KSI	Loading Strain In.	Primary Creep Strain In.	Primary Creep Time Min.
650	69.1	0.00530	0.01050	18
650	69.1	0.00530	0.00755	42
650	65.6	0.00498	0.00502	20
650	65.6	0.00498	0.00202	10
650	64.6	0.00490	0.01770	30
650	64.6	0.00490	0.00250	8
650	62.9	0.00470	0.00710	4

Table 15. Primary Creep Strains and Times, AM-350 SCT

Temp. °F	Stress KSI	Loading Strain In.	Primary Creep Strain In.	Primary Creep Time Min.
450	111.5	0.00528	0.00012	5
450	111.5	0.00528	-	5
450	98.6	0.00432	-	8
450	98.6	0.00432	-	6
450	92.3	0.00380	0.00605	8
450	92.3	0.00380	0.00225	6
450	88.0	0.00355	0.00985	6
450	88.0	0.00355	0.00825	6
500	108.8	0.00532	0.00498	8
500	108.8		0.00318	10
500	96.1	0.00408	0.00492	12
500	96.1	0.00408	0.00092	8
550	91.4	0.00445	0.00325	10
550	91.4	0.00445	0.00225	8
550	85.3	0.00368	0.00362	6
550	85.3	0.00368	-	4
550	79.1	0.00345	0.00995	6
550	79.1	0.00345	-	6
600	96.3	0.00452	0.00413	10
600	96.3	0.00452	0.00148	6
600	93.8	0.00445	-	6
600	93.8	0.00445	-	12
600	93.0	0.00430	0.00055	6
600	93.0	0.00430	-	8
600	90.2	0.00412	0.00358	8
600	90.2	0.00412	0.00088	12
650	94.5	0.00403	0.00497	6
650	94.5	0.00403	0.00497	8
650	88.2	0.00375	0.00310	6
650	88.2	0.00375	0.00010	6
650	85.2	0.00348	0.00467	6
650	85.2	0.00348	0.00167	6
650	81.5	0.00340	0.00260	8
650	81.5	0.00340	0.00260	10

Table 16. Primary Creep Strains and Times, AM 355 CRT

Temp. °F	Stress KSI	Loading Strain In.	Primary Creep Strain In.	Primary Creep Time Min.
450	173.0	0.00743	0.01027	120
450	173.0	0.00743	0.00427	36
450	173.0	0.00743	0.00217	6
450	173.0	0.00743	0.00160	1
450	182.6	0.00815	0.00805	10
450	182.6	0.00815	0.00795	10
450	192.2	0.00903	0.00900	16
450	192.2	0.00903	0.00197	22
500	143.0	0.00600	0.00700	6
500	143.0	0.00600	0.00100	12
500	157.8	0.00697	0.01623	5
500	157.8	0.00697	0.01303	4
500	166.5	0.00760	0.00370	4
500	166.5	0.00760	0.00340	5
500	179.0	0.00865	0.00765	8
500	179.0	0.00865	0.00215	32
550	140.2	0.00597	Nil	12
550	140.2	0.00597	Nil	8
550	157.8	0.00697	0.00363	4
550	157.8	0.00697	0.00933	2
550	166.5	0.00767	0.00293	6
550	166.5	0.00767	0.00633	12
550	175.3	0.00852	0.01148	14
550	175.3	0.00852	0.01018	14
600	142.7	0.00594	0.00739	8
600	142.7	0.00594	0.00166	10
600	160.2	0.00724	0.01526	56
600	160.2	0.00724	0.00646	54
600	169.1	0.00792	0.01508	16
600	169.1	0.00792	0.01438	8
600	178.0	0.00894	0.01606	14
600	178.0	0.00894	0.00806	10

Table 16. Primary Creep Strains and Times, AM 355 CRT (Cont.)

Temp. °F	Strain KSI	Loading Strain In.	Primary Creep Strain In.	Primary Creep Time Min.
650	138.0	0.00615	0.00675	8
650	138.0	0.00615	0.00675	10
650	155.0	0.00725	0.001275	2
650	155.0	0.00725	0.00955	Nil
650	163.6	0.00797	0.00903	6
650	163.6	0.00797	0.00433	10
650	172.2	0.00860	0.00380	10
650	172.2	0.00860	0.00340	22

Table 17. Primary Creep Strains and Times, PH 15-7 Mo, Condition RH-1100

Temp °F	Stress KSI	Loading Strain In.	Primary Creep Strain In.	Primary Creep Time Min.
450	120.0	0.00492	0.01328	6
450	120.0	0.00492	0.00338	10
450	99.3	0.00377	0.00323	8
450	99.3	0.00377	0.00188	8
500	101.9	0.00395	0.00605	16
500	101.9	0.00395	0.00005	8
500	95.8	0.00367	0.00143	6
500	95.8	0.00367	0.00013	
500	89.1	0.00342	0.00518	6
500	89.1	0.00342	0.00308	6
550	126.0	0.00583	0.00317	12
550	126.0	0.00583	0.00247	10
550	122.0	0.00515	0.00795	10
550	122.0	0.00515	0.00045	8
550	115.2	0.00445	0.00555	10
550	115.2	0.00445	0.00170	10
600	123.6	0.00528	0.01432	14
600	123.6	0.00528	-	
600	119.2	0.00486	0.01114	10
600	119.2	0.00486	0.00879	12
600	112.0	0.00445	0.00130	8
600	112.0	0.00445	0.00470	10
650	125.0	0.00535	0.00205	16
650	125.0	0.00535	-	8
650	117.7	0.00490	0.00710	8
650	117.7	0.00490	0.00360	10

Table 18. Primary Creep Strains and Times, Ph 14-8 Mo, Condition RH-1050

Temp °F	Stress KSI	Loading Strain In.	Primary Creep Strain In.	Primary Creep Time Min.
450	145.0	0.00570	0.00740	8
450	145.0	0.00570	0.00610	8
450	137.0	0.00523	0.01342	8
450	137.0	0.00523	0.00747	12
450	129.0	0.00478	0.01347	14
450	129.0	0.00478	0.00827	180
500	122.0	0.00468	0.00732	8
500	122.0	0.00468	0.00732	12
500	115.0	0.00478	0.00187	8
500	115.0	0.00478	-	8
500	107.5	0.00395	0.00390	6
500	107.5	0.00395	0.00280	5
550	128.9	0.00488	0.00547	8
550	128.9	0.00488	0.00527	8
550	121.0	0.00458	0.00592	6
550	121.0	0.00458	0.00092	7
550	113.0	0.00425	0.00210	6
550	113.0	0.00425	0.00210	5
600	131.5	0.00518	0.00912	12
600	131.5	0.00518	0.00912	12
600	127.5	0.00495	0.00770	6
600	127.5	0.00495	0.00580	11
600	124.2	0.00468	0.00532	10
600	124.2	0.00468	0.00422	180
650	118.2	0.00468	0.00837	180
650	118.2	0.00468	0.00422	6
650	110.8	0.00428	0.00912	6
650	110.8	0.00428	0.00188	6
650	103.5			
650	103.5			

Table 19. Primary Creep Strains and Times, 18% Nickel Maraging Steel

Temp °F	Stress KSI	Loading Strain In.	Primary Creep Strain In.	Primary Creep Time Min.
450	169.6	0.00664	0.00776	10
450	169.6	0.00664	0.00469	4
450	164.1	0.00646	0.00154	8
450	164.1	0.00646	0.00239	10
450	158.5	0.00612	0.00728	10
450	158.5	0.00612	0.00678	8
500	186.2	0.00744	0.00841	10
500	186.2	0.00744	0.00041	10
500	175.8	0.00728	0.00852	10
500	175.8	0.00728	0.00852	8
500	165.3	0.00668	0.00962	10
500	165.3	0.00668	0.00695	10
500	171.0	0.00728	-	10
500	171.0	0.00728	-	10
500	168.3	0.00716	0.00719	10
500	168.3	0.00716	0.00149	8
500	160.7	0.00675	0.00090	6
500	160.7	0.00675	-	8
600	161.4	0.00658	0.00907	14
600	161.4	0.00658	0.00667	10
600	151.2	0.00612	0.00333	16
600	151.2	0.00612	0.00223	8
600	141.2	0.00555	0.00925	10
600	141.2	0.00555	0.00810	10
650	153.6	0.00640	0.01040	6
650	153.6		0.00960	10
650	144.0	0.00594	0.01266	8
650	144.0	0.00594	0.00056	10
650	134.4	0.00545	0.00390	8
650	134.4	0.00545	0.00355	6

Table 20. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V and Ti 5Al-2.5 Sn. Test Temperature - 450°F Nominal. Test Time - 150 Hours. (Sheet 1 of 2)

Elapsed Time Hours	Front Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
0	453.9	455.3	454.9	454.4	454.0	454.7	454.5	455.5	453.4
16	454.5	454.7	454.3	454.0	453.7	455.4	453.5	456.1	453.6
24	453.7	454.5	453.8	453.4	453.2	453.9	453.6	454.7	452.3
40	453.5	454.3	453.1	453.5	453.2	453.7	454.8	456.0	453.9
48	453.9	455.0	454.3	452.8	453.5	454.0	454.0	454.9	453.2
64	453.8	454.4	453.8	453.8	453.3	454.0	454.2	455.2	452.9
72	453.5	454.4	454.5	453.6	453.3	453.6	453.6	455.3	453.8
88	453.7	454.2	453.7	453.7	454.2	453.6	453.6	454.5	452.8
96	453.6	455.7	453.5	453.5	453.1	453.2	453.8	454.7	453.2
112	454.2	454.7	454.2	453.0	453.4	454.5	454.6	455.7	452.1
136	454.0	455.1	453.6	453.8	453.2	454.3	454.4	455.6	452.5
168	452.6	453.5	453.0	452.0	453.2	454.1	453.7	454.4	452.8
184	456.5	455.9	455.2	455.2	455.2	456.0	455.4	456.4	453.2

Table 20. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V, and Ti 5Al-2.5 Sn. Test Temperature - 450°F Nominal. Test Time - 150 Hours. (Sheet 2 of 2)

Elapsed Time Hours	Rear Test Channel Temperature - °F								
	1	2	3	4	5	6	7	8	9
0	453.5	455.2	453.9	455.7	454.0	454.0	455.3	455.8	455.5
16	451.1	454.2	453.2	456.1	452.9	453.3	454.4	455.0	454.6
24	450.4	453.0	451.9	454.4	451.6	452.0	453.9	454.0	453.6
40	450.6	453.9	454.6	455.3	450.4	450.5	452.7	454.8	453.1
48	452.6	454.3	452.3	454.2	452.4	451.9	454.0	454.9	454.2
64	451.6	453.6	451.6	454.0	452.1	451.7	453.7	454.4	454.3
72	453.6	455.5	453.2	455.7	453.1	453.1	456.4	455.7	453.6
88	452.2	453.6	451.5	453.8	452.5	452.0	453.7	454.4	453.8
96	452.4	454.1	451.6	452.8	452.3	453.3	451.8	454.7	454.2
112	454.0	454.9	452.8	455.5	454.1	452.7	453.7	456.2	455.3
136	453.7	454.3	452.2	455.1	453.7	452.5	453.5	456.2	454.5
168	453.0	454.9	452.4	456.6	452.8	452.5	453.2	456.5	454.7
184	455.4	454.9	456.8	458.9	455.5	456.3	455.4	457.6	456.8

Table 21. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V, and Ti 5Al-2.5 Sn. Test Temperature - 500°F Nominal. Test Time - 150 Hours (Sheet 1 of 2)

Elapsed Time Hours	Front Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
0	503.0	504.0	503.3	503.9	503.2	503.2	503.3	505.0	501.5
20	504.0	504.3	504.0	503.7	503.8	504.3	504.3	505.1	501.4
28	502.6	502.8	502.5	502.5	502.6	502.8	502.7	503.4	502.0
44	502.9	503.7	503.1	503.2	503.1	503.5	503.1	505.0	501.6
52	499.5	499.7	499.6	500.1	499.3	499.2	500.0	500.9	499.9
68	500.5	501.1	500.8	500.3	500.4	500.7	500.7	501.9	499.9
76	498.4	500.8	499.3	500.2	500.3	500.8	500.6	502.1	499.7
92	512.0	512.7	512.0	512.9	511.9	511.9	512.9	513.5	513.9
100	500.7	501.9	501.1	501.2	500.9	501.3	502.1	502.6	501.9
116	500.9	501.6	501.2	502.9	501.4	501.4	501.8	502.1	499.6
124	499.6	500.1	500.5	500.5	500.7	500.8	501.2	501.5	501.3
141	500.3	500.9	500.1	500.8	500.3	500.5	501.3	500.5	499.8
169	499.3	500.7	500.9	503.7	505.5	500.6	501.5	501.8	504.4
188	499.3	501.4	502.3	502.5	501.9	502.0	502.1	502.2	502.9
196	495.7	497.4	497.6	497.0	498.2	498.0	497.5	498.6	495.5
212	498.8	500.3	500.6	501.8	500.6	500.7	501.7	501.1	502.3

Table 21. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V and Ti 5Al-2.5 Sn. Test Temperature - 500°F Nominal. Test Time - 150 Hours (Sheet 2 of 2)

Elapsed Time Hours	Rear Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
0	505.9	509.2	506.2	509.5	506.4	506.1	506.4	507.8	507.3
20	507.0	507.5	506.8	506.5	506.9	507.8	508.2	506.5	508.0
28	502.2	503.1	503.8	503.8	503.1	503.9	503.6	504.1	505.2
44	501.3	501.2	501.4	501.7	502.0	501.0	501.2	503.1	502.8
52	498.0	498.5	498.4	499.5	499.2	500.0	499.0	500.9	500.8
68	499.4	499.3	500.3	499.9	499.9	499.5	499.3	502.2	501.0
76	500.6	500.4	500.7	499.6	500.9	500.7	500.9	501.8	504.7
92	497.5	496.6	499.3	499.3	498.1	497.3	497.6	498.5	499.6
100	494.0	493.8	494.0	494.1	499.6	495.4	493.7	495.4	496.5
116	493.6	494.5	493.9	494.7	494.8	494.9	495.3	496.3	496.1
124	495.1	493.1	494.6	499.6	495.0	494.3	493.1	495.5	495.9
141	494.9	494.8	495.5	498.0	495.0	496.2	497.5	497.1	496.9
169	492.9	492.8	497.6	496.0	495.9	494.2	493.8	495.3	494.8
188	491.8	492.4	495.8	493.8	494.0	493.1	492.5	495.1	494.3
196	492.7	491.4	491.4	494.3	493.3	495.7	497.4	495.0	493.1
212	491.4	496.7	496.6	494.5	492.7	495.6	496.9	494.6	493.5

Table 22. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V and Ti 5Al-2.5 Sn. Test Temperature - 550° F Nominal. Test Time - 150 Hours (Sheet 1 of 2)

Elapsed Time Hours	Front Test Channel Temperatures - ° F								
	1	2	3	4	5	6	7	8	9
0	543.7	546.0	546.5	545.9	546.4	546.5	545.9	545.8	546.1
20	543.1	545.5	546.9	547.3	546.5	546.2	546.7	544.4	546.2
40	543.4	545.4	547.1	547.2	546.5	546.7	546.6	546.0	546.2
48	543.0	544.6	545.4	546.1	544.7	545.3	546.4	544.0	545.8
64	544.6	546.0	546.0	546.6	545.8	546.8	546.7	546.5	546.0
72	543.8	545.1	545.5	546.4	545.8	545.1	546.2	546.2	544.8
88	546.2	546.8	548.5	548.9	548.8	548.8	547.9	547.0	547.7
96	544.6	546.2	547.2	546.9	548.6	548.7	548.2	546.7	548.7
112	548.0	548.8	548.8	548.6	547.4	548.5	548.2	549.0	550.3
120	544.1	546.9	548.5	546.8	549.2	548.1	548.2	548.0	550.6
136	544.2	546.3	547.0	548.5	549.1	549.1	548.2	546.8	551.4
144	543.6	545.9	543.9	547.9	548.8	547.7	547.0	546.4	548.5
160	546.8	546.9	548.9	550.5	547.1	547.5	547.3	546.4	550.8
184	547.2	549.6	550.4	551.7	549.4	550.7	550.1	550.4	552.3

Table 22. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V and Ti 5Al-2.5 Sn. Test Temperature - 550°F Nominal. Test Time - 150 Hours (Sheet 2 of 2)

Elapsed Time Hours	Rear Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
0	547.2	546.2	546.5	547.4	548.2	545.1	546.1	545.4	544.3
20	546.0	546.3	545.0	547.6	549.8	545.4	545.9	544.4	544.6
40	546.5	546.5	546.4	545.6	548.5	544.7	545.7	543.0	544.0
48	546.4	545.5	547.2	547.2	548.3	544.9	545.7	544.6	544.0
64	544.2	544.0	544.0	544.2	545.2	546.5	544.9	544.2	545.7
72	546.8	546.2	547.3	547.5	548.2	544.7	546.6	545.2	545.8
88	547.0	546.5	547.4	548.1	549.0	545.5	546.6	544.9	544.3
96	547.3	545.0	547.3	547.8	548.7	547.2	546.5	545.2	545.5
112	548.9	546.1	544.9	547.0	549.4	546.7	545.4	545.9	545.5
120	547.5	545.6	546.2	548.8	548.2	548.4	547.4	546.0	544.5
136	546.9	546.4	546.9	547.8	549.2	546.3	546.9	545.3	544.9
144	546.7	545.0	547.4	547.6	548.9	546.7	545.0	547.4	547.6
160	546.8	545.4	548.1	548.4	550.3	544.6	545.0	546.8	545.4
184	548.9	548.1	549.8	549.9	551.2	546.6	549.0	547.8	547.5

Table 23. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V and Ti 5Al-2.5 Sn. Test Temperature - 600°F Nominal. Test Time - 150 Hours (Sheet 1 of 2)

Elapsed Time Hours	Front Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
0	595.7	597.9	597.8	599.3	599.2	598.3	598.6	598.3	596.7
26	593.8	597.0	597.0	598.4	598.3	597.7	598.9	597.8	594.8
56	591.2	594.3	593.3	594.1	595.3	594.3	595.1	594.6	594.1
72	595.0	598.0	597.2	598.6	598.5	598.4	599.2	597.1	594.2
80	592.5	595.2	594.6	595.9	592.9	592.2	593.0	591.2	595.5
96	594.9	597.5	597.3	598.2	598.1	597.5	597.8	597.1	599.7
114	597.2	598.0	598.9	599.1	600.2	600.3	598.9	599.0	599.5
130	599.3	600.2	601.1	601.7	601.2	601.5	601.5	601.2	600.9
138	598.0	599.1	599.4	599.3	600.0	599.5	599.1	598.3	599.4
154	599.1	600.3	600.9	600.6	600.6	600.6	600.3	599.1	600.7
162	597.1	598.4	598.2	598.3	598.0	596.1	598.6	595.6	596.4

Table 23. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V and Ti 5Al-2.5 Sn. Test Temperature - 600°F Nominal. Test Time - 150 Hours (Sheet 2 of 2)

Elapsed Time Hours	Rear Test Channel Temperatures								
	1	2	3	4	5	6	7	8	9
0	593.7	592.4	593.5	595.9	595.1	591.4	593.4	591.8	591.5
26	593.5	592.5	592.8	594.4	595.2	592.4	593.8	592.3	591.2
56	592.2	590.9	591.5	594.0	594.8	591.2	592.3	591.1	589.8
72	593.7	592.5	593.6	594.1	594.6	591.5	593.2	592.3	591.5
80	587.6	587.9	587.3	588.5	589.0	585.7	587.6	585.5	585.8
96	592.8	592.4	593.1	593.9	594.6	591.8	592.9	592.1	591.5
114	598.6	597.7	598.9	599.4	600.3	599.6	599.2	597.9	597.9
130	601.5	601.5	601.3	601.3	601.1	599.9	600.6	598.4	596.8
138	601.4	601.5	601.9	599.8	601.0	600.6	600.3	598.7	598.5
154	602.0	601.7	602.0	599.9	601.1	600.0	599.5	598.9	597.9
162	600.2	600.7	597.4	599.1	600.4	598.9	601.0	601.7	601.9

Table 24. Onset of Creep Stress Measurement of T1 8Al-1Mo-1V, T1 6Al-4V and T1 5Al-2.5 Sn. Test Temperature - 650°F Nominal. Test Time - 150 Hours (Sheet 1 of 2)

Elapsed Time Hours	Front Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
0	647.1	646.7	647.4	648.5	646.7	646.0	646.2	645.7	646.7
16	649.5	650.7	650.0	650.1	649.6	649.2	649.0	648.7	648.9
24	644.3	644.0	644.6	645.3	646.5	643.7	644.5	644.1	642.1
40	646.9	645.0	645.5	643.9	644.3	642.6	644.0	643.4	642.8
48	646.0	646.1	646.0	645.7	646.7	644.1	644.0	644.5	643.5
64	651.6	651.5	650.2	653.6	653.7	651.6	651.8	650.8	650.3
128	648.2	648.6	650.0	650.2	650.2	646.4	647.7	647.3	645.5
136	648.3	649.1	649.3	650.1	650.6	647.4	649.0	648.0	646.4
152	647.6	648.3	649.1	649.4	650.2	648.6	646.2	646.9	646.2
160	647.8	647.8	648.6	648.6	650.6	646.9	647.4	646.9	645.4
176	646.6	647.3	648.1	648.8	649.8	646.6	647.3	646.9	644.6

Table 24. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V and Ti 5Al-2.5 Sn. Test Temperature - 650°F Nominal. Test Time - 150 Hours (Sheet 2 of 2)

Elapsed Time Hours	Rear Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
0	658.8	658.8	657.9	658.6	655.8	654.8	653.8	654.4	656.0
16	652.7	653.8	653.7	655.6	654.7	654.5	654.4	653.6	655.9
24	650.1	652.2	651.4	653.3	652.5	651.9	651.7	650.7	652.5
40	649.0	648.5	651.5	652.9	651.7	651.2	651.3	651.1	651.1
48	648.5	647.5	648.1	649.1	648.6	648.7	648.2	647.7	648.8
64	649.2	651.0	649.8	652.0	652.1	652.0	651.8	650.9	652.5
128	647.4	649.0	649.3	651.0	650.2	650.3	650.5	649.7	649.9
136	647.6	649.8	694.4	651.9	651.7	650.8	649.8	651.2	652.2
152	647.3	649.6	650.1	650.8	650.8	650.9	651.1	651.1	650.2
160	646.9	646.9	650.2	650.8	649.7	650.6	649.8	650.7	650.1
176	646.7	648.5	648.4	649.9	649.6	649.2	647.7	648.1	648.7

Table 25. Onset of Creep Stress Measurement of PH15-7 Mo, PH 14-8 Mo and AM 350. Test Temperature - 450°F Nominal. Test Time - 150 Hours.
(Sheet 1 of 2)

Elapsed Time Hrs	Front Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
0	451.1	449.6	450.2	449.1	451.0	448.4	448.9	448.3	448.2
8	454.1	450.9	450.6	451.3	452.2	450.8	450.2	449.3	449.2
24	450.9	450.6	450.2	449.0	450.7	448.7	448.8	448.2	447.4
32	451.9	450.7	450.4	449.7	451.2	448.5	449.1	448.7	448.4
48	452.4	451.9	451.7	451.6	454.4	449.3	450.1	444.4	450.4
64	452.5	453.8	451.8	451.7	452.7	450.1	450.3	449.8	450.7
80	452.3	451.4	452.3	452.2	452.1	450.2	450.6	450.1	449.9
88	452.3	451.2	451.6	451.7	452.5	450.0	450.3	449.8	449.6
104	453.3	451.8	452.5	452.4	452.4	450.5	450.6	450.2	451.2
112	453.2	451.3	452.4	450.2	452.1	451.1	454.1	452.1	452.0
128	453.1	451.6	452.3	452.2	453.4	451.1	450.7	450.1	451.5
136	451.8	450.8	450.5	449.9	451.4	448.5	449.1	448.5	449.5
152	451.4	451.3	452.0	451.9	453.0	450.2	450.5	450.1	449.8
160	451.7	452.6	452.7	452.8	453.7	451.2	451.3	450.7	450.6
176	452.0	454.6	451.8	452.7	453.7	450.7	451.4	450.7	450.7

Table 25. Onset of Creep Stress Measurement of PH15-7 Mo, PH 14-8 Mo and
AM 350. Test Temperature - 450°F Nominal. Test Time - 150 Hours.
(Sheet 2 of 2)

Elapsed Time Hrs	Front Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
0	450.1	450.9	450.7	451.7	450.6	451.0	450.7	450.4	449.5
8	453.3	454.1	454.3	454.4	453.9	453.1	453.0	452.7	453.1
24	449.2	450.3	451.0	451.5	449.6	450.6	450.5	450.3	448.4
32	449.4	450.2	449.5	451.0	449.2	450.4	450.0	449.9	449.0
48	452.5	453.4	452.6	454.3	453.0	453.0	452.6	452.8	451.6
64	451.2	452.1	452.5	453.2	451.5	452.1	451.9	451.8	451.1
80	452.9	453.8	452.9	454.8	452.8	453.7	452.6	453.2	452.6
88	450.9	451.8	452.3	453.1	451.4	452.0	451.7	451.5	450.6
104	452.4	453.6	452.7	454.2	452.8	454.0	452.4	452.8	451.8
112	451.9	453.0	452.6	454.1	452.1	453.0	452.0	452.4	451.3
128	452.7	452.5	453.4	453.6	453.4	453.9	453.2	453.1	451.6
136	450.2	451.3	450.9	451.4	451.2	451.5	450.1	450.7	447.9
152	450.4	451.5	450.0	452.9	450.9	451.5	451.3	451.3	450.1
160	451.2	451.2	452.9	453.6	451.7	452.6	452.2	452.5	450.9

Table 26. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and AM 350. Test Temperature - 500°F Test Time - 150 Hours.
(Sheet 1 of 2)

Elapsed Time Hrs	Front Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
0	502.3	501.3	500.8	500.1	501.7	500.4	502.3	498.9	499.2
16	502.3	501.1	500.4	500.5	501.3	501.3	502.1	498.9	499.1
24	503.3	499.7	500.6	499.8	500.9	500.1	502.3	498.6	498.9
40	502.0	501.5	500.4	500.7	500.5	500.0	500.8	498.1	498.4
56	501.8	500.8	500.0	500.3	500.2	499.5	501.8	498.6	498.9
72	502.5	501.6	500.6	501.2	501.6	500.5	502.7	499.4	499.5
80	501.5	500.5	499.5	500.0	501.0	499.4	501.5	498.6	499.6
96	501.5	500.7	500.1	498.1	500.4	499.4	501.5	498.4	498.5
104	502.6	500.8	500.5	500.6	501.5	502.7	501.6	498.8	499.2
120	501.9	501.2	500.5	500.5	501.3	500.3	501.6	498.9	498.8
136	501.2	500.5	499.8	499.4	500.9	499.9	499.8	498.5	499.4
152	502.4	501.5	500.6	500.6	501.8	500.8	502.4	499.3	500.1
160	501.8	500.6	500.6	500.5	501.0	500.0	501.4	499.5	500.1
176	501.8	500.2	500.4	500.5	501.3	500.3	501.4	498.7	499.6

Table 26. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and AM 350. Test Temperature - 500°F Test Time - 150 Hours.
(Sheet 2 of 2)

Elapsed Time Hrs	Front Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
0	502.9	503.5	502.8	504.6	503.0	503.4	503.1	503.4	502.6
16	500.0	500.7	500.0	500.7	500.0	500.8	499.8	500.7	499.7
24	503.0	503.8	504.7	503.1	503.8	503.1	503.6	503.4	503.0
40	503.3	503.2	502.6	503.9	503.1	503.6	503.4	502.5	502.2
56	503.3	503.7	503.0	504.5	502.7	503.0	503.7	502.9	502.7
72	503.1	503.8	504.6	504.3	502.8	503.3	502.8	503.5	502.9
80	499.3	500.8	500.3	501.3	499.4	500.0	499.9	500.7	499.5
96	500.9	501.4	501.1	501.6	500.7	501.3	500.5	501.1	500.7
104	500.4	501.4	501.4	502.4	500.7	501.3	500.8	501.0	500.4
120	502.1	502.5	502.8	503.4	501.7	502.1	502.0	502.1	502.1
136	499.2	500.2	500.0	501.0	499.5	499.8	499.3	500.1	499.3
152	502.2	503.0	503.1	503.5	502.2	502.4	502.5	502.6	502.2
160	500.1	500.8	500.6	501.4	500.0	500.7	499.9	500.4	499.0
176	500.2	500.3	500.1	501.6	500.1	500.9	500.4	500.7	499.8

Table 27. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 15-8 Mo and AM 350. Test Temperature -550°F, Nominal. Test Time - 150 Hours.
(Sheet 1 of 2)

Elapsed Time Hrs	Front Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
0	549.6	550.6	551.2	550.6	550.0	550.7	550.7	550.7	550.1
16	550.1	551.2	550.5	551.1	550.8	551.5	551.1	551.6	549.4
24	550.2	551.1	550.6	550.1	551.2	551.5	550.8	551.6	550.1
42	548.1	549.0	548.8	548.1	548.2	549.4	549.2	549.8	548.2
64	548.8	549.6	549.8	549.6	549.0	550.3	548.9	550.7	548.7
88	550.0	551.3	551.8	552.1	550.9	551.7	552.7	551.3	549.9
96	550.8	552.0	551.8	551.8	551.4	551.9	551.7	551.8	550.8
112	551.0	551.4	552.1	551.5	551.4	552.0	551.9	551.5	550.4
120	547.7	548.8	548.3	547.7	548.5	549.2	548.4	549.5	547.5
136	551.0	552.0	552.3	550.1	552.1	551.6	551.7	552.1	550.8
144	550.4	551.2	551.6	550.8	550.7	551.0	550.3	551.4	550.0
160	549.0	550.0	550.0	550.0	549.8	549.5	550.4	550.0	548.9

Table 27. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 15-8 Mo and
AM 350. Test Temperature - 550°F, Nominal. Test Time - 150 Hours.
(Sheet 2 of 2)

Elapsed Time Hrs	Front Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
0	551.3	553.7	551.7	551.0	551.8	551.3	550.2	548.9	548.6
16	551.1	554.0	550.4	550.8	551.3	550.3	549.6	548.6	548.3
24	550.6	552.8	550.6	549.5	551.1	549.9	549.0	548.2	547.8
42	551.2	553.3	551.0	550.6	551.2	550.3	550.9	548.7	548.7
64	551.4	551.8	550.3	550.2	551.9	550.9	550.2	548.7	549.9
88	551.0	554.3	551.0	551.0	552.2	550.8	550.0	548.9	548.4
96	551.0	553.7	550.9	551.0	551.9	550.6	551.0	549.0	548.6
112	550.0	552.8	551.4	550.9	551.0	550.6	549.8	549.0	548.4
120	550.5	552.9	550.2	547.8	551.3	550.1	549.6	548.3	548.0
136	551.5	553.8	551.2	551.4	551.3	551.0	550.2	549.5	548.9
144	551.3	553.8	550.7	551.2	551.0	550.8	549.8	549.1	547.9
160	550.9	551.9	551.0	549.8	551.5	550.0	549.5	548.6	548.6

Table 28. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and AM 350. Test Temperature 600° F Nominal. Test Time - 150 Hours.
(Sheet 1 of 2)

Elapsed Time Hrs	Front Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
0	606.7	609.1	607.8	607.3	608.5	606.0	605.0	604.4	603.5
24	617.5	617.2	622.2	622.0	622.3	625.8	622.6	620.7	618.9
40	609.6	611.6	610.0	609.9	610.6	609.0	608.9	608.2	606.0
64	607.8	609.5	604.8	605.0	608.8	607.1	606.4	606.7	604.1
72	606.8	608.4	606.0	606.9	607.4	606.3	605.5	604.0	609.9
88	606.6	608.0	606.4	606.8	607.0	605.3	604.8	603.9	602.5
92	611.6	610.0	606.5	605.9	606.3	604.8	605.4	606.0	607.6
108	607.0	608.9	606.9	606.9	607.3	605.8	605.8	604.8	603.1
116	603.4	605.6	604.1	604.0	604.5	603.0	602.4	601.9	600.0
132	602.6	606.1	603.4	603.9	603.8	602.8	601.3	600.5	599.6
140	603.9	606.6	603.4	603.0	603.9	602.3	603.0	601.9	600.8
156	604.4	605.5	603.6	603.5	604.5	602.9	602.6	601.7	601.0
164	603.8	604.8	602.4	601.9	602.4	601.3	602.0	600.5	599.9
188	605.6	606.9	604.6	604.4	605.1	604.0	604.3	603.4	602.1
239	600.9	601.0	599.5	599.8	600.4	598.9	598.0	598.0	597.6

Table 28. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and AM 350. Test Temperature 600° F Nominal. Test Time - 150 Hours.
(Sheet 2 of 2)

Elapsed Time Hrs	Front Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
0	616.0	616.3	616.8	618.0	618.9	617.3	617.5	617.6	614.8
24	612.1	612.6	612.6	609.3	605.6	608.0	608.1	609.4	609.6
40	595.0	597.4	597.8	596.8	598.5	599.1	597.9	599.1	597.0
64	598.9	601.3	600.7	602.4	602.5	602.4	601.8	602.4	600.0
72	599.0	601.1	601.0	601.9	602.5	602.3	601.6	602.3	600.0
88	599.5	601.9	601.9	601.6	602.9	602.5	601.8	602.3	599.9
92	602.9	602.9	602.1	602.1	602.6	602.4	602.5	604.6	605.0
108	598.4	600.7	600.5	601.1	601.9	601.8	600.9	601.4	599.8
116	598.9	600.3	599.9	600.9	601.8	601.5	600.8	601.4	599.2
132	598.0	600.1	600.1	600.8	601.4	601.8	600.5	600.9	599.5
140	597.3	598.9	599.3	599.7	600.5	600.1	600.0	601.0	599.5
156	598.8	600.1	599.9	600.5	601.1	601.1	600.6	602.1	600.1
164	597.3	598.8	595.0	599.0	599.9	600.3	600.1	601.3	599.4
188	599.5	600.8	601.3	601.1	601.9	601.9	601.8	602.9	601.9
239	595.0	599.4	599.8	600.4	599.5	600.6	599.8	602.3	602.0

Table 29. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and AM 350. Test Temperature - 650°F Nominal. Test Time - 150 Hours (Sheet 1 of 2)

Elapsed Time Hours	Front Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
0	656.8	656.8	654.9	654.9	655.3	654.5	653.9	653.9	652.3
8	658.5	660.6	656.4	656.1	657.9	656.3	656.1	655.8	653.9
24	650.1	651.6	648.0	648.5	649.4	647.1	647.3	646.5	645.1
32	645.0	634.9	632.1	632.5	645.5	643.4	639.4	640.6	642.5
48	652.9	659.5	650.5	647.8	650.4	649.6	648.9	648.9	648.0
72	653.8	653.4	650.5	650.3	650.8	649.4	648.6	649.2	648.3
88	653.3	654.9	651.3	650.6	651.1	649.8	649.8	649.7	649.7
96	653.0	655.3	650.8	650.4	650.9	649.6	649.6	649.7	648.6
112	652.4	651.9	650.1	649.8	650.3	649.1	648.9	649.0	648.4
120	653.1	652.4	651.0	649.6	651.4	649.9	649.5	649.9	649.8
136	649.5	649.5	647.0	647.8	647.6	646.0	646.0	646.6	645.4
142	649.8	650.5	647.5	647.3	648.0	646.4	646.8	646.5	645.6
158	651.1	646.5	648.0	648.8	649.2	647.1	647.6	647.7	647.5
166	651.0	651.6	648.7	648.3	649.0	647.4	647.4	648.5	646.8
182	650.4	649.3	648.2	649.3	648.6	646.9	646.5	647.2	646.8

Table 29. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and AM 350. Test Temperature - 650°F Nominal. Test Time - 150 Hours (Sheet 2 of 2)

Elapsed Time Hours	Rear Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
0	657.1	659.3	658.8	656.0	660.8	659.9	659.8	660.3	659.0
8	652.9	654.4	654.6	656.1	656.3	655.1	654.9	655.0	653.6
24	654.9	656.1	656.5	656.6	657.8	656.6	656.9	656.5	655.1
32	650.8	648.9	646.5	649.6	650.5	649.4	650.5	650.9	648.6
48	660.9	662.3	662.4	662.8	663.8	662.9	662.9	663.1	661.8
72	645.6	646.8	647.0	648.4	648.4	647.8	647.9	647.9	647.4
88	648.9	649.9	649.8	650.1	651.1	650.3	650.9	651.8	650.5
96	646.4	647.8	647.9	647.9	648.9	648.5	648.5	649.3	648.0
112	645.6	647.3	647.1	649.0	648.9	648.4	648.4	649.6	648.4
120	648.4	650.4	649.8	651.3	651.0	650.2	650.6	651.8	650.4
136	646.5	647.6	647.6	649.0	649.1	648.4	648.9	649.8	649.1
142	646.4	648.5	648.1	649.3	649.5	649.0	649.1	650.4	648.8
158	647.5	650.6	651.3	649.9	651.4	652.6	652.3	653.8	653.9
166	650.5	652.4	652.4	654.1	654.1	653.5	653.4	654.5	653.8
182	650.0	651.8	651.7	652.8	653.1	652.8	652.8	653.3	652.3

Table 30. Onset of Creep Stress Measurement of AM 355 and Maraging Steel. Test Temperature 450°F. Nominal Test Time - 150 Hours.
(Sheet 1 of 2)

Elapsed Time Hrs.	Front Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
0	457.5	457.4	456.9	457.0	457.3	457.1	456.6	454.8	454.6
16	458.8	457.2	457.4	457.6	459.3	455.9	457.4	454.8	453.9
24	457.6	457.4	457.2	458.2	457.3	455.9	456.6	455.6	455.0
40	457.2	457.3	456.3	457.3	458.3	457.1	457.8	455.5	455.3
48	455.7	456.2	455.4	455.6	455.0	455.0	455.0	453.9	453.2
64	456.0	456.0	455.4	455.8	455.6	455.5	454.2	454.2	454.4
72	457.4	456.3	455.1	456.1	456.5	456.3	452.8	454.4	454.6
90	454.9	455.9	456.8	455.5	455.5	454.6	455.3	454.2	455.6
123	455.9	455.2	456.5	454.7	455.0	453.4	455.2	452.1	453.4
131	455.6	455.9	456.9	456.4	456.2	455.8	455.8	454.9	454.5
147	455.9	455.2	456.6	454.8	454.9	454.8	454.2	454.1	453.4
155	457.4	457.3	457.1	457.6	457.7	457.4	456.9	455.2	454.8
171	456.9	456.6	456.9	456.7	456.9	456.5	456.1	454.7	454.4

Table 30. Onset of Creep Stress Measurement of AM 355 and Maraging Steel.
 Temperature 450° F. Nominal Test Time - 150 Hours.
 (Sheet 2 of 2)

Elapsed Time Hrs.	Rear Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
0	456.4	456.5	457.0	455.5	456.8	456.4	456.0	455.2	457.0
16	454.9	452.8	453.1	452.6	452.2	452.3	451.7	452.1	452.4
24	456.6	454.5	454.9	454.3	454.8	454.0	453.1	453.4	454.1
40	455.2	456.2	456.8	455.3	456.3	456.9	456.9	456.7	456.1
48	453.5	453.7	454.2	453.0	453.8	454.1	453.5	452.8	452.7
64	453.6	453.4	453.4	453.0	453.7	453.9	453.6	452.9	453.1
72	453.9	454.2	454.3	453.0	453.9	454.1	454.0	453.0	453.8
90	453.7	453.8	454.6	452.7	453.4	452.9	452.6	452.1	452.8
123	454.3	454.8	455.0	453.4	453.9	453.9	453.5	452.5	454.8
131	453.8	454.6	455.2	453.8	455.2	454.1	453.6	453.4	452.6
147	453.8	453.8	454.5	452.9	453.6	453.7	453.3	453.2	453.6
155	454.3	454.5	455.4	454.0	454.6	455.0	454.8	453.8	453.4
171	454.4	454.0	454.6	453.0	454.2	454.2	454.2	453.5	453.5

Table 31. Onset of Creep Stress Measurement of AM 355 and Maraging Steel.
 Test Temperature - 500°F Nominal Test Time - 150 Hours.
 (Sheet 1 of 2)

Elapsed Time Hrs.	Front Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
0	497.0	497.9	497.9	497.6	498.6	498.6	497.3	495.8	495.2
28	502.6	505.8	503.8	503.4	504.1	503.1	503.2	501.5	500.5
39	502.6	503.2	502.9	502.2	503.1	502.8	501.8	500.8	499.5
47	503.1	502.7	503.4	502.8	502.7	503.4	502.5	501.4	500.0
63	502.5	503.8	503.3	503.0	503.9	503.1	502.7	501.4	500.0
79	502.1	503.2	502.7	502.4	503.2	502.6	502.2	500.9	500.4
87	502.0	502.5	502.7	502.9	503.3	502.8	502.0	501.2	499.7
103	502.5	503.6	502.4	503.0	502.9	503.4	502.6	501.5	500.1
111	502.7	503.1	503.4	502.7	504.1	503.5	501.6	501.0	500.6
127	502.7	504.1	503.6	503.3	504.2	503.9	502.8	501.9	501.7
135	502.9	504.0	504.0	503.4	504.1	503.9	503.0	501.8	500.6
151	505.6	505.1	503.7	503.9	504.5	503.9	503.8	502.0	502.5

Table 31. Onset of Creep Stress Measurement of AM 355 and Maraging Steel.
 Test Temperature - 500°F Nominal Test Time - 150 Hours.
 (Sheet 2 of 2)

Elapsed Time Hrs.	Rear Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
0	499.2	501.0	501.5	501.2	501.4	500.6	499.7	499.6	499.5
28	503.0	504.6	505.0	504.9	505.3	505.3	504.6	504.2	503.2
39	499.9	501.7	501.9	502.0	502.2	503.2	501.4	501.9	501.2
47	501.4	503.3	502.4	503.1	502.6	503.3	502.7	502.6	502.1
63	501.4	503.2	502.2	503.3	503.6	503.8	505.5	503.4	502.1
79	498.9	500.8	501.1	500.8	501.1	501.4	500.3	500.4	500.3
87	499.4	501.9	501.3	501.7	501.1	502.1	501.6	501.7	500.6
103	500.9	502.6	502.3	503.3	501.9	503.2	503.1	502.3	501.4
111	500.4	501.9	501.7	502.2	502.8	502.6	502.3	501.8	500.9
127	501.3	502.8	503.4	501.9	503.4	503.6	502.0	501.5	501.8
135	500.3	503.0	502.2	503.4	503.0	503.4	503.0	502.7	501.9
151	500.4	500.1	499.9	499.4	501.1	500.4	500.4	500.5	500.6

Table 32. Onset of Creep Stress Measurement of AM 355 and Maraging Steel. Test Temperature - 550°F Nominal Test Time - 150 Hours.
(Sheet 1 of 2)

Elapsed Time Hours	Front Test Channel Temperatures °F								
	1	2	3	4	5	6	7	8	9
0	550.3	551.8	552.0	551.8	552.6	551.4	551.2	550.0	549.2
8	551.8	552.8	552.3	551.2	551.2	552.0	551.5	550.5	549.1
24	553.3	554.9	552.5	552.9	553.7	553.0	552.4	551.3	549.9
40	552.7	554.5	551.6	553.0	553.6	553.1	552.3	551.2	550.1
57	551.8	552.1	553.8	550.9	552.7	552.0	551.5	550.4	551.3
104	549.0	550.9	550.1	550.8	552.3	551.6	548.9	549.6	548.1
113	555.5	557.3	555.6	555.1	556.4	556.8	554.5	555.2	552.3
138	558.0	558.5	556.6	556.8	556.0	555.9	555.6	554.8	554.1
147	555.3	556.5	555.9	555.2	555.7	554.9	553.9	552.8	553.3
162	554.0	555.3	554.1	552.2	552.5	553.3	553.9	553.4	554.9
170	551.5	551.8	555.3	551.3	553.2	552.0	551.7	551.1	548.9
186	551.4	553.6	552.1	551.2	553.0	552.1	551.5	551.7	548.8
194	551.0	552.7	551.3	551.4	551.1	551.9	550.4	549.1	548.7
210	550.4	552.0	550.4	549.1	550.7	550.1	549.8	547.1	555.8
218	551.0	552.3	551.2	550.0	551.5	549.8	549.2	549.0	547.9
234	553.5	552.8	552.9	542.6	552.5	553.0	552.3	551.1	550.0
303	550.7	555.2	555.4	553.8	554.1	550.1	553.1	552.0	552.6
311	551.2	554.0	551.7	553.0	553.4	553.1	553.1	551.4	550.9

Table 32. Onset of Creep Stress Measurement of AM 355 and Maraging Steel. Test Temperature -550°F Nominal Test Time - 150 Hours.
(Sheet 2 of 2)

Elapsed Time Hrs.	Rear Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
0	551.0	552.0	552.3	552.3	552.5	552.5	552.2	552.1	551.0
8	551.4	552.7	553.3	553.1	553.2	553.1	552.5	552.4	551.6
24	548.8	550.4	550.6	550.8	551.0	551.0	549.1	550.2	549.4
40	548.3	549.7	550.0	548.4	550.0	550.2	550.2	549.9	549.0
57	548.5	548.5	550.0	549.9	550.4	551.1	550.4	550.0	549.0
104	550.9	551.0	551.8	549.9	549.0	550.1	551.6	550.6	550.2
113	551.3	552.7	552.8	552.8	553.9	552.6	553.0	552.2	551.9
138	553.2	553.8	554.9	552.7	553.5	554.4	554.7	554.5	554.5
147	552.0	553.0	553.1	551.2	552.0	552.4	552.2	552.1	552.5
162	553.1	552.1	553.2	549.8	551.1	550.0	551.4	553.3	553.9
170	551.5	550.8	550.6	549.6	551.2	551.1	551.4	551.3	551.1
186	548.4	549.5	549.4	549.8	550.6	549.3	548.2	549.3	548.3
194	548.8	549.8	550.1	550.1	549.6	550.5	551.5	550.0	549.2
210	545.8	548.0	547.8	547.9	548.6	548.7	549.3	548.0	547.6
218	546.7	548.1	547.7	548.2	548.3	548.6	549.5	548.4	547.6
234	548.2	549.0	549.1	549.2	549.3	549.3	549.4	548.9	548.8
303	548.5	547.9	547.6	548.0	547.8	548.1	549.2	548.0	547.2
311	546.5	547.5	547.7	547.4	548.2	547.5	548.3	547.5	546.7

Table 33. Onset of Creep Stress Measurement of AM 355 and Maraging Steel. Test Temperature - 600°F Nominal Test Time - 150 Hours.
(Sheet 1 of 2)

Elapsed Time Hrs.	Front Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
0	602.0	600.1	599.4	599.9	600.9	599.0	600.0	598.2	599.5
7	600.7	602.4	602.0	602.0	602.5	602.7	601.0	599.5	598.9
23	601.7	603.1	603.1	603.2	603.7	603.1	602.4	601.2	598.8
31	601.6	603.1	601.7	601.8	602.3	603.1	601.0	601.0	599.4
48	601.2	603.4	602.5	602.5	603.2	602.2	601.7	600.6	600.7
60	600.5	602.4	601.7	601.6	602.1	602.3	600.7	599.8	598.0
72	600.4	602.2	601.6	601.6	602.2	601.7	600.8	598.6	597.9
85	601.7	604.2	602.0	602.7	603.0	602.7	602.9	600.7	588.9
96	600.6	602.6	601.8	601.9	603.0	602.3	600.0	600.1	598.3
107	601.2	603.2	602.4	602.3	603.0	602.5	601.3	600.9	598.4
117	601.6	603.0	602.4	602.0	603.1	603.8	601.6	598.5	598.8
125	600.2	600.4	601.4	601.4	602.0	601.3	600.6	598.5	597.3
141	600.4	602.2	599.7	599.7	599.7	601.4	600.6	599.6	598.3
149	601.6	603.3	604.1	604.1	603.8	603.2	602.8	601.4	599.5
165	601.2	603.3	602.1	602.2	602.0	602.0	600.9	599.7	598.3
173	602.6	604.3	603.8	604.0	604.0	603.2	602.5	601.4	600.0
189	600.7	601.9	601.7	602.5	602.4	601.8	601.2	600.3	598.0

Table 33. Onset of Creep Stress Measurement of AM 355 and Maraging Steel. Test Temperature - 600°F Nominal Test Time - 150 Hours.
(Sheet 2 of 2)

Elapsed Time Hrs.	Rear Test Panel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
0	601.6	604.4	606.7	607.0	607.3	607.3	606.5	605.3	605.7
7	599.3	599.9	600.6	600.8	600.9	600.2	602.1	601.0	600.7
23	603.1	603.0	604.8	605.7	606.0	605.5	604.5	605.7	603.0
31	599.8	601.8	602.4	602.7	602.7	602.9	602.1	601.2	601.1
48	601.7	601.6	603.3	603.0	604.3	604.5	603.2	602.9	601.4
60	598.8	601.0	600.7	600.4	600.8	601.5	601.2	600.6	599.5
72	602.7	601.6	601.9	601.5	601.0	600.4	601.4	602.6	602.1
85	601.0	602.9	603.5	603.1	603.7	604.0	603.3	602.2	601.2
96	599.5	600.9	601.8	601.8	602.4	602.2	602.1	601.1	600.1
107	601.7	603.9	603.6	603.3	604.7	604.7	604.2	603.5	602.2
117	600.3	602.2	602.8	602.6	603.2	601.1	602.8	601.8	600.9
125	598.8	600.8	600.4	601.1	600.7	601.5	601.4	600.3	599.4
141	600.2	602.0	601.5	602.1	602.4	602.6	602.5	601.4	600.5
149	588.5	591.8	590.8	590.3	591.3	590.2	590.6	590.2	589.1
165	588.8	590.1	590.6	590.6	591.3	589.8	590.3	590.0	589.1
173	588.5	590.2	590.9	591.6	590.7	590.6	590.6	589.5	588.8
189	588.4	590.3	590.6	590.6	591.3	590.0	590.6	590.4	589.4

Table 34. Onset of Creep Stress Measurement of AM 355 and Maraging Steel. Test Temperature - 650°F Nominal Test Time - 150 Hours
(Sheet 1 of 2)

Elapsed Time Hrs.	Front Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
0	658.5	658.3	657.7	656.7	657.2	656.2	656.9	657.6	657.6
23	652.6	650.3	648.9	650.2	649.6	650.1	650.4	651.9	652.2
38	653.2	651.4	649.9	648.8	649.1	649.0	649.7	650.6	651.7
47	652.8	650.9	649.3	648.6	648.6	648.0	649.1	650.1	651.4
55	652.5	651.2	649.6	648.8	648.9	649.3	649.6	649.9	651.7
71	651.0	650.0	648.0	649.6	650.4	650.8	651.7	650.6	651.6
79	653.7	654.2	652.0	651.4	650.9	651.5	650.5	649.8	652.2
85	653.2	651.2	649.5	650.2	650.7	650.1	649.8	650.2	650.9
93	654.4	650.9	648.7	647.0	649.0	650.2	649.6	650.6	651.6
109	652.0	651.1	648.3	650.3	652.1	651.7	650.3	651.3	652.3
133	653.8	651.2	648.9	648.5	649.4	648.7	649.2	650.2	652.0
141	653.3	651.3	649.6	649.8	650.6	650.3	649.8	650.6	651.1
157	652.7	651.6	650.4	649.7	649.4	648.5	650.0	651.0	650.9
173	652.1	650.0	648.8	648.3	649.0	648.7	649.5	650.2	651.4
181	651.7	651.5	650.1	649.2	649.4	649.1	650.0	651.0	650.9
189	653.6	651.8	650.3	649.2	650.0	649.3	649.9	650.9	651.8
205	653.4	650.8	649.5	649.4	649.8	650.1	648.8	650.3	651.8
213	654.1	652.5	650.9	650.2	650.5	650.1	650.6	651.6	651.0

Table 34. Onset of Creep Stress Measurement of AM 355 and Maraging Steel. Test Temperature - 650°F Nominal Test Time - 150 Hours.
(Sheet 2 of 2)

Elapsed Time Hrs.	Rear Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
0	654.0	654.2	649.9	652.8	653.7	654.5	655.4	656.2	657.0
23	652.3	653.8	651.1	652.2	653.1	653.6	655.0	656.0	657.3
38	649.4	649.7	650.9	648.4	649.5	650.5	651.9	653.6	654.4
47	649.5	649.4	648.9	648.4	648.9	650.4	651.9	653.2	654.4
55	649.0	649.0	649.7	649.2	648.7	649.9	651.0	652.7	653.8
71	648.0	648.7	647.9	648.6	651.5	651.9	652.6	651.5	650.9
79	648.3	650.6	650.3	649.5	649.5	649.3	649.2	648.7	649.8
85	649.6	649.2	648.9	649.4	649.7	650.2	651.1	651.4	652.5
93	648.3	648.3	648.9	648.4	648.2	649.1	650.6	650.6	653.8
109	649.0	649.2	649.9	648.3	649.0	651.2	651.2	652.7	654.3
133	647.9	648.2	648.9	647.8	648.2	648.8	649.6	650.2	653.1
141	649.2	648.8	649.0	649.9	649.3	650.2	650.9	651.2	652.1
157	649.7	650.1	649.5	649.3	650.0	651.1	652.3	653.7	654.4

Table 35. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V and Ti 5Al-2 1/2 Sn.
Test Temperature - 450°F Nominal, Test Time - 1000 Hours
(Sheet 1 of 6)

Elapsed Time Hrs.	Front Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
0	458.6	456.4	455.4	455.1	454.7	455.5	452.4	455.6	457.3
14	458.5	455.7	453.9	454.9	454.5	454.6	453.7	455.6	456.8
22	458.2	455.6	454.6	454.5	454.3	454.3	452.8	455.1	456.5
38	458.6	456.2	455.3	457.5	455.8	456.7	455.6	456.9	457.4
48	458.7	456.2	455.1	456.8	455.0	454.0	453.6	455.9	457.1
62	456.7	457.0	454.6	455.6	454.7	456.2	456.2	456.9	457.8
72	461.3	459.1	457.8	457.7	457.5	457.4	456.0	458.5	459.5
134	459.9	458.3	456.5	457.4	457.1	456.6	455.5	457.0	457.8
142	459.6	457.5	456.5	456.4	456.1	459.5	453.8	457.0	458.3
158	459.6	457.7	454.0	457.5	457.2	453.2	454.5	457.1	458.1
166	460.0	458.0	455.8	458.1	456.5	457.1	454.5	451.3	458.4
182	459.5	457.4	459.5	456.4	455.8	456.8	454.5	457.0	457.8
190	460.0	458.1	457.1	460.0	456.7	456.3	454.9	457.5	458.5
206	456.8	455.6	456.1	458.2	459.7	461.2	453.8	456.7	454.4
214	459.9	458.1	456.0	456.3	456.2	456.4	454.6	457.5	458.4
230	459.3	457.4	455.4	456.2	455.9	454.1	454.3	457.0	457.8
238	459.9	458.2	457.0	456.9	456.7	454.8	454.9	457.0	458.4
302	459.3	457.4	456.4	456.2	456.0	455.4	454.8	456.8	457.8

Table 35. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V and Ti 5Al-2 1/2 Sn.
Test Temperature - 450°F Nominal, Test Time - 1000 Hours.
(Sheet 2 of 6)

Elapsed Time Hours	Front Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
310	458.8	457.5	455.1	455.7	455.7	453.6	454.5	456.6	457.5
326	459.9	457.9	456.7	456.2	456.4	454.9	454.8	457.2	458.3
334	459.3	457.8	456.4	456.5	456.2	455.8	454.4	457.0	458.0
350	458.2	458.7	457.0	456.1	456.2	454.6	454.9	457.2	458.5
358	459.2	458.0	457.4	457.7	457.4	458.0	460.9	459.0	459.6
374	459.3	458.0	455.4	456.4	456.0	453.5	454.5	457.1	458.3
382	458.6	457.3	454.8	456.7	455.4	455.1	453.6	456.3	457.6
398	458.3	457.1	454.5	455.4	453.0	456.0	453.2	456.0	456.9
406	458.3	457.0	456.6	455.5	455.3	456.2	452.2	455.9	456.9
494	458.2	456.4	455.6	455.6	455.2	453.9	452.0	455.7	457.0
502	457.6	456.3	455.2	456.5	454.6	455.5	451.5	455.3	456.3
517	457.5	456.3	453.9	454.7	455.6	454.2	451.9	455.2	456.1
525	458.1	456.9	454.6	455.3	454.9	454.9	452.8	455.9	457.1
541	459.9	456.7	455.3	450.1	454.9	454.4	452.7	455.7	456.9
549	459.1	456.8	455.5	455.5	455.4	455.3	452.8	456.2	457.3
565	458.5	456.3	455.6	455.2	454.1	456.1	453.3	455.8	457.2
573	458.6	456.2	455.3	455.3	455.1	453.4	453.1	456.0	457.1
637	458.8	456.6	455.7	455.4	455.3	456.3	453.3	456.1	457.3

Table 35. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V and Ti 5 Al-2 1/2 Sn.
Test Temperature - 450° F Nominal, Test Time - 1000 Hours.
(Sheet 3 of 6)

Elapsed Time Hrs	Front Test Channel Temperatures - ° F								
	1	2	3	4	5	6	7	8	9
645	458.6	457.1	455.4	455.4	456.3	455.0	453.3	456.1	457.3
661	459.2	457.5	455.0	455.3	455.2	454.3	455.1	456.5	457.7
669	459.5	458.0	458.0	456.3	457.3	456.0	453.5	456.9	458.0
685	460.9	458.5	457.0	456.8	456.6	457.4	457.8	457.6	458.7
693	459.1	458.0	455.5	456.1	456.0	455.9	454.5	456.1	458.1
709	459.7	457.9	455.3	457.1	457.3	456.0	454.1	456.1	458.2
717	459.3	457.1	455.1	455.7	455.8	455.6	456.1	456.8	457.7
733	459.3	457.8	455.6	456.2	456.0	455.9	454.2	457.1	458.2
741	459.1	457.0	455.1	455.7	455.5	455.5	453.5	455.3	457.4
805	459.8	457.4	456.5	456.4	455.7	456.2	454.4	457.2	458.2
813	458.9	457.5	455.1	455.0	456.3	455.5	453.8	456.3	457.7
829	459.1	457.8	455.8	455.2	455.7	454.0	454.6	456.6	457.8
837	459.1	457.8	455.8	455.2	455.7	454.0	454.6	456.6	457.8
853	455.7	457.8	455.3	456.1	457.5	459.2	456.9	457.9	458.8
861	460.2	458.6	456.9	456.2	456.1	458.9	457.5	458.6	459.2
877	459.9	458.9	456.6	456.0	457.5	456.3	454.9	457.0	458.3
901	459.1	457.4	456.3	456.1	456.0	456.0	454.8	456.9	458.0
909	459.7	458.3	456.7	456.4	456.9	457.4	454.5	457.2	458.4
973	459.4	457.6	456.2	455.4	455.7	456.9	454.0	456.6	457.9

Table 35. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V Ti 6Al-4V and Ti 5 Al-2 1/2 Sn.
 Test Temperature - 450°F Nominal Test Time - 1000 Hours
 (Sheet 4 of 6)

Elapsed Time Hrs.	Rear Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
0	452.4	453.1	452.2	453.5	453.1	454.6	454.5	456.5	457.8
14	453.0	453.1	451.9	453.9	452.4	453.5	454.4	455.9	457.5
22	452.6	452.9	452.5	453.1	452.2	453.3	454.8	456.4	457.6
38	452.9	453.1	452.8	453.0	451.9	454.0	454.6	456.8	457.6
48	453.1	453.5	453.0	453.2	452.5	453.7	455.0	456.8	457.1
62	453.2	453.0	452.0	453.2	452.3	453.6	454.6	456.3	457.6
72	454.6	454.9	454.7	455.8	454.3	455.8	456.4	458.4	459.0
134	454.9	454.8	453.7	455.2	454.4	455.5	456.1	457.8	459.2
142	454.4	454.6	454.0	455.0	453.7	455.2	456.0	457.6	458.9
158	453.9	454.4	454.0	454.6	453.5	454.9	456.0	457.7	458.5
166	454.1	454.5	453.8	455.0	453.6	455.2	456.8	457.7	458.7
182	454.4	454.4	453.2	454.7	453.7	455.0	455.7	457.3	458.6
190	454.5	455.2	454.1	455.1	453.9	455.8	455.9	457.7	458.9
206	456.5	457.5	458.0	457.7	455.4	453.7	453.8	453.6	452.4
214	452.7	454.3	453.8	454.6	453.4	454.5	455.6	457.3	458.5
230	452.9	454.9	454.1	455.3	454.3	455.5	456.0	457.8	458.9
238	452.8	454.2	454.1	454.2	453.5	455.0	454.4	457.3	458.6
302	454.1	454.9	454.4	455.2	454.2	455.5	456.1	457.5	458.6

Table 35. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V and Ti 5Al-2 1/2 Sn.
Test Temperature - 450°F Nominal, Test Time - 1000 Hours
(Sheet 5 of 6)

Elapsed Time Hrs.	Rear Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
310	452.8	454.6	454.0	454.9	453.7	455.1	456.0	457.5	458.7
326	452.7	454.9	454.3	455.1	454.3	455.2	456.0	457.6	458.8
334	453.6	454.9	454.1	454.9	454.0	454.9	455.9	457.4	458.7
350	453.9	454.7	454.2	455.1	454.1	455.1	456.1	457.6	458.8
358	454.2	454.5	454.1	454.8	453.7	454.9	455.8	457.4	458.7
374	453.8	454.1	453.7	454.2	454.3	454.6	455.2	456.9	458.0
382	453.8	454.1	453.7	454.1	454.3	454.6	455.2	456.9	458.0
398	453.6	453.8	453.3	453.8	453.0	454.0	455.1	456.5	457.7
406	453.0	453.5	452.7	453.7	452.9	454.0	454.1	456.5	457.4
494	453.3	453.6	452.7	453.7	452.7	453.9	454.8	456.5	457.5
502	453.1	453.5	453.2	454.2	452.9	453.8	455.9	456.6	457.4
517	452.3	452.7	452.5	452.8	452.3	453.2	452.2	455.7	456.7
525	453.5	454.1	454.0	453.8	453.3	454.7	455.2	457.2	458.3
541	453.4	453.7	453.4	453.5	452.9	454.6	455.1	456.9	457.9
549	454.1	454.3	453.8	454.7	453.6	454.7	455.5	457.2	457.9
565	454.0	454.2	453.8	454.9	453.5	454.6	455.7	457.0	457.7
573	453.7	454.0	453.6	454.8	453.3	454.8	455.4	457.1	458.1
637	454.0	454.3	453.8	454.5	453.7	454.2	455.0	456.7	457.0

Table 35. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6 Al-4V and Ti 5Al-2 1/2 Sn.
 Test Temperature - 450°F Nominal, Test Time - 1000 Hours.
 (Sheet 6 of 6)

Elapsed Time Hrs.	Rear Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
645	453.7	454.3	453.8	455.8	454.7	454.3	455.2	457.0	458.4
661	453.8	454.2	453.8	454.3	454.7	454.8	455.4	457.3	458.4
669	454.4	454.8	454.4	455.7	454.9	456.7	457.5	458.5	459.3
685	454.6	455.0	454.4	455.2	454.1	455.5	456.4	457.9	459.1
693	454.6	454.6	454.2	454.9	454.0	455.2	456.1	457.7	458.9
709	453.6	454.3	454.2	454.6	454.4	455.0	456.0	457.7	458.2
717	454.7	454.6	454.6	455.0	454.3	455.0	455.1	457.9	459.0
733	454.3	454.5	454.1	454.8	454.0	455.2	455.8	457.2	459.0
741	454.0	454.6	453.6	455.0	454.1	455.1	456.0	457.6	459.0
805	454.7	454.8	454.3	455.0	454.1	455.3	456.3	457.9	459.1
813	454.1	454.3	454.0	455.4	453.9	455.3	456.8	457.0	458.7
829	453.8	454.0	453.8	454.2	453.4	454.8	455.4	457.3	458.6
837	453.8	454.0	453.8	454.2	453.4	455.8	455.4	457.3	458.6
853	453.6	454.1	455.7	457.3	457.9	459.3	456.5	457.0	453.8
861	454.4	453.0	454.1	454.6	453.9	455.2	455.7	457.5	458.8
877	454.9	454.9	454.6	454.9	454.3	455.7	456.1	458.3	459.0
901	454.2	454.1	453.7	454.6	453.7	454.8	455.6	457.3	458.9
909	454.7	455.0	454.5	455.3	454.4	455.4	456.6	457.9	459.2

Table 36. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V
and Ti 5Al-2 1/2 Sn. Test Temperature - 500° F Nominal. Test
Time - 1000 Hours Nominal (Sheet 1 of 8)

Elapsed Time Hrs.	Front Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
0	502.2	501.5	501.1	501.0	501.5	500.7	499.3	500.4	499.7
16	503.8	503.4	503.2	503.6	504.1	503.6	501.9	501.9	502.4
24	503.7	503.5	504.9	502.6	504.8	503.8	503.9	503.4	502.4
40	500.3	500.6	501.2	500.1	500.5	500.5	499.0	498.9	497.9
48	501.0	501.7	501.1	501.4	501.9	501.0	499.5	500.0	499.2
112	501.3	500.8	499.7	499.4	500.2	500.0	499.3	499.3	498.1
120	502.2	502.8	501.5	501.5	502.0	501.4	500.1	501.6	500.8
136	503.1	502.6	500.3	501.3	500.4	500.4	500.0	498.3	500.3
144	504.9	503.5	501.5	501.7	501.1	501.9	501.0	498.5	501.9
160	503.3	502.6	500.2	500.5	500.1	500.8	499.4	497.6	500.4
168	503.6	503.1	501.1	501.9	500.2	501.9	500.5	498.2	501.1
184	502.2	501.3	500.1	499.8	500.3	499.6	498.7	500.7	500.2
192	502.6	501.3	501.1	500.0	501.3	501.0	499.7	501.9	500.9
208	500.0	499.9	499.3	498.8	499.8	498.4	498.0	500.0	499.2
216	503.4	502.8	502.8	501.8	502.3	502.8	500.5	501.8	502.4
280	501.9	501.1	500.7	501.8	500.7	501.7	499.6	500.9	500.4
288	502.2	501.4	500.5	500.2	500.7	500.4	498.8	501.3	501.2
304	501.9	500.9	500.4	500.3	500.5	500.2	498.6	501.0	499.8

Table 36. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V
and Ti 5Al-2 1/2 Sn. Test Temperature - 500°F Nominal. Test
Time - 1000 Hours Nominal (Sheet 2 of 8)

Elapsed Time Hrs.	Front Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
312	502.5	502.2	501.2	500.9	501.4	500.9	499.2	501.2	501.2
320	501.9	501.4	500.7	501.0	501.3	501.0	498.9	501.2	501.2
328	501.5	501.9	500.0	500.8	501.1	499.2	499.4	501.0	500.9
344	502.2	502.0	501.4	501.7	500.8	501.5	501.3	500.6	500.2
352	502.7	502.5	500.4	501.1	502.5	500.1	499.8	501.7	501.1
368	501.1	501.7	500.9	500.7	501.4	500.1	499.5	500.3	500.5
376	502.4	502.1	501.5	501.1	501.4	501.4	499.9	500.7	500.9
440	502.3	502.0	502.0	501.7	502.1	503.0	499.6	500.9	500.3
448	502.0	501.9	501.3	501.5	501.0	501.6	500.0	500.1	500.1
464	502.3	501.0	500.7	499.9	500.4	500.9	498.7	499.6	500.3
472	503.7	501.8	502.2	501.7	502.3	502.1	500.4	501.8	500.8
488	502.7	501.1	500.7	500.3	500.7	499.1	498.8	500.6	500.3
496	503.1	502.6	502.5	501.5	502.6	502.5	500.6	501.5	501.0
512	503.4	502.2	501.5	501.3	501.8	501.3	500.1	501.1	500.6
520	503.9	503.4	503.0	503.2	503.6	503.3	501.3	502.8	501.4
536	503.0	501.9	502.0	502.2	502.1	502.0	500.5	502.0	501.4
544	504.2	503.7	503.8	503.4	503.8	502.8	501.5	502.1	502.2
608	502.3	502.1	502.0	502.5	502.4	502.3	500.6	501.4	500.7

Table 36. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V
and Ti 5Al-2 1/2 Sn. Test Temperature - 500°F Nominal. Test
Time - 1000 Hours Nominal (Sheet 3 of 8)

Elapsed Time Hrs.	Front Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
616	504.3	504.0	504.2	504.1	504.3	504.1	502.3	503.4	502.0
634	502.9	502.3	502.6	502.8	503.4	502.7	500.9	501.6	501.7
640	503.9	503.0	503.3	503.4	503.6	503.3	502.0	502.2	501.5
656	502.0	501.2	501.3	501.3	501.1	500.8	499.8	498.6	498.7
664	503.7	502.7	503.0	502.9	503.3	503.0	501.1	502.0	500.9
680	503.4	501.5	501.7	501.6	501.8	501.3	500.1	501.0	499.3
688	503.3	502.2	502.2	502.2	502.6	502.3	500.6	501.6	499.9
704	501.7	501.0	500.4	500.3	500.8	501.7	499.1	499.0	499.0
712	502.4	502.0	500.0	501.8	502.3	502.0	500.9	500.7	499.8
776	500.4	500.2	501.3	499.2	499.8	499.7	497.5	498.8	498.6
784	501.0	501.2	500.6	500.5	500.8	500.6	499.1	500.7	500.0
800	500.9	500.3	499.4	498.2	499.7	499.6	498.0	499.0	499.0
808	501.5	501.2	501.2	499.8	501.3	501.3	499.4	500.3	499.3
824	500.9	500.5	500.1	499.9	499.5	499.6	499.0	499.5	498.9
832	500.7	500.0	498.7	498.4	499.0	499.0	497.7	499.2	499.3
848	500.9	501.4	499.9	500.4	501.0	498.7	498.0	499.5	499.3
856	503.5	501.5	500.6	500.3	500.7	500.5	498.6	500.8	500.3
872	501.4	500.3	499.7	499.3	499.9	499.6	498.2	499.3	499.0

Table 36. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V
and Ti 5Al-2 1/2 Sn. Test Temperature - 500°F Nominal. Test
Time - 1000 Hours Nominal (Sheet 4 of 8)

Elapsed Time Hrs.	Front Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
880	502.4	501.3	500.9	500.8	501.2	501.1	499.7	500.8	500.0
944	500.7	499.3	498.0	498.5	499.4	498.3	497.5	499.0	497.6
952	501.9	501.0	500.4	500.6	498.8	500.9	499.1	500.3	500.0
968	501.4	500.2	499.0	500.4	500.7	499.0	497.6	499.0	498.8
976	502.7	501.4	500.8	500.9	501.3	501.6	499.4	500.9	499.8
992	502.0	500.8	500.3	500.5	501.0	500.8	498.9	500.1	499.1
1000	502.1	500.6	500.1	500.5	500.5	500.8	499.0	501.0	500.0

Table 36. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V
and Ti 5Al-2 1/2 Sn. Test Temperature - 500°F Nominal. Test
Time - 1000 Hours Nominal (Sheet 5 of 8)

Elapsed Time Hrs.	Rear Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
0	499.1	498.7	499.6	500.0	499.6	499.8	499.9	500.4	500.6
16	499.8	500.6	500.1	501.4	500.2	501.0	501.0	501.2	500.8
24	498.7	500.8	500.7	501.4	500.5	501.0	501.0	501.3	501.1
40	498.5	499.1	498.3	499.8	499.2	499.2	499.7	500.2	500.0
48	498.5	499.3	499.9	500.4	499.2	500.4	500.0	500.9	499.8
112	498.3	499.0	498.8	498.9	499.0	499.9	498.9	500.4	499.7
120	498.1	498.7	499.3	499.4	498.8	499.3	498.3	500.3	501.2
136	500.7	497.9	499.2	498.2	499.2	499.0	499.4	499.1	500.5
144	500.8	498.0	499.1	497.4	498.2	498.9	499.1	498.9	500.7
160	500.1	498.5	499.6	500.6	499.6	499.5	499.6	499.9	500.8
168	501.2	498.6	499.6	499.1	498.5	498.9	500.0	499.0	500.8
184	499.7	499.3	499.6	499.8	499.1	499.5	500.2	501.1	500.9
192	498.8	499.2	499.1	499.7	499.2	500.0	500.1	500.4	501.0
208	499.0	499.1	498.7	499.4	499.0	499.8	499.7	501.0	501.3
216	499.2	501.1	500.1	501.2	501.6	502.4	501.9	501.5	501.7
280	498.8	499.6	499.1	499.3	499.5	500.4	500.5	500.8	501.1
288	498.3	498.8	497.9	498.5	498.5	498.7	499.3	501.1	500.4
304	499.7	499.7	499.6	500.0	499.6	500.2	501.8	501.8	502.1

Table 36. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6 Al-4V
and Ti 5Al-2 1/2 Sn. Test Temperature - 500° F Nominal. Test
Time - 1000 Hours Nominal (Sheet 6 of 8)

Elapsed Time Hrs.	Rear Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
312	499.5	499.6	499.5	500.0	499.5	499.9	500.1	501.0	501.2
320	499.4	499.7	499.7	501.0	499.9	500.7	500.7	501.6	500.8
328	499.2	499.4	499.2	499.8	499.1	499.8	500.4	500.7	501.4
344	499.3	499.7	499.2	500.3	499.4	500.6	500.8	501.4	501.4
352	499.0	499.4	499.3	499.8	499.2	500.0	500.2	501.4	500.8
368	499.4	499.5	498.8	500.2	499.5	500.4	500.6	501.3	501.2
376	499.9	499.7	498.3	498.4	498.9	499.7	499.1	500.9	501.0
440	499.6	498.2	498.1	499.3	498.2	498.5	499.4	500.4	499.8
448	497.3	498.4	498.1	498.8	498.7	498.1	498.4	500.5	500.4
464	498.3	498.5	499.2	499.1	498.4	498.2	498.4	500.5	499.9
472	497.9	498.4	497.9	498.2	498.0	498.4	497.8	499.8	500.5
488	498.6	498.7	498.6	499.9	498.4	497.3	499.6	500.7	500.6
496	498.2	498.3	498.9	499.1	498.6	498.1	498.2	500.2	498.7
512	497.9	498.7	498.3	498.9	498.8	498.9	498.9	500.5	499.7
520	499.0	499.5	499.0	499.4	498.7	499.3	500.1	500.7	500.5
536	498.4	499.5	498.9	499.9	499.1	499.8	500.6	500.5	499.7
544	499.7	499.5	499.1	499.6	498.7	498.5	500.1	500.2	500.5
608	497.2	498.6	497.3	497.8	499.0	499.0	498.2	499.7	497.7

Table 36. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V
and Ti 5Al-2 1/2 Sn. Test Temperature - 500°F Nominal. Test
Time - 1000 Hours Nominal (Sheet 7 of 8)

Elapsed Time Hrs.	Rear Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
616	498.2	497.8	498.6	499.8	499.2	499.4	499.4	500.0	499.1
634	497.6	498.4	499.4	498.1	499.3	498.8	498.3	500.1	498.1
640	497.8	498.4	498.4	499.5	499.0	498.9	499.1	500.3	498.6
656	496.8	497.8	498.7	497.0	498.2	497.9	496.8	499.0	497.6
664	498.1	498.5	498.1	499.4	498.2	499.0	498.6	499.7	498.2
680	496.8	498.2	497.1	498.5	498.6	498.7	498.8	499.3	497.5
688	497.9	498.3	498.1	498.4	498.4	498.6	498.3	500.4	498.9
704	497.6	498.0	497.7	498.3	498.5	497.8	498.5	499.5	498.6
712	497.9	498.4	497.8	498.4	498.7	499.9	500.0	499.6	499.4
776	498.5	498.1	499.2	498.5	498.1	498.5	499.0	499.8	499.9
784	498.0	498.1	498.0	499.2	498.3	498.5	499.5	500.2	500.3
800	498.3	498.3	498.9	500.4	499.9	500.1	501.1	500.1	500.3
808	497.7	498.0	498.4	500.8	499.4	499.8	500.8	499.9	500.0
824	497.8	497.6	497.9	500.2	498.5	500.0	500.5	499.7	499.6
832	497.8	497.8	498.6	499.9	499.4	499.6	498.0	499.8	500.1
848	498.0	498.2	497.6	499.9	499.6	500.0	499.1	499.8	499.9
856	498.3	498.3	498.6	498.7	498.0	498.7	499.5	500.9	500.6
872	497.8	497.9	498.4	498.6	498.4	498.9	499.2	500.0	500.1

Table 36. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V and Ti 5Al-2 1/2 Sn. Test Temperature - 500°F Nominal. Test Time - 1000 Hours Nominal (Sheet 8 of 8)

Elapsed Time Hrs.	Rear Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
880	498.2	498.4	498.5	499.2	498.6	499.2	499.7	500.3	500.2
944	496.8	498.5	498.2	498.6	498.7	499.3	499.0	500.0	500.0
952	498.6	498.3	498.5	499.0	498.5	498.3	498.6	500.0	500.6
968	498.9	498.8	498.4	499.3	498.8	499.3	499.8	500.6	500.8
976	498.8	499.0	498.8	499.3	498.8	499.7	500.3	500.8	500.8
992	498.2	498.4	498.2	498.9	498.3	499.2	499.2	499.9	499.7
1000	498.4	498.6	498.5	499.4	498.6	499.4	499.6	500.1	499.8

Table 37. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V
and Ti 5Al-2 1/2 Sn. Test Temperature - 550° F Nominal. Test
Time - 1000 Hours Nominal (Sheet 1 of 6)

Elapsed Time Hrs.	Front Test Channel Temperatures - ° F								
	1	2	3	4	5	6	7	8	9
0	553.2	551.8	549.9	551.3	551.7	550.2	549.6	551.7	551.4
8	552.7	552.9	552.0	551.0	553.8	552.6	552.3	553.1	551.2
24	551.7	551.0	551.6	550.3	551.8	551.4	549.5	551.3	550.1
32	553.2	553.1	552.6	552.6	553.3	552.9	550.8	552.3	552.2
96	553.7	552.4	550.3	551.3	551.5	551.3	550.4	551.7	550.7
104	553.5	552.4	551.9	551.5	552.2	552.2	550.5	551.4	552.2
120	553.5	551.3	550.4	550.5	550.9	550.8	549.5	551.2	551.3
128	554.6	552.5	551.7	551.3	551.9	551.8	550.3	551.9	552.0
144	552.8	551.8	550.9	549.9	549.9	551.3	550.3	551.4	551.8
152	553.5	552.4	550.8	551.9	552.5	552.4	550.2	551.9	552.0
264	551.2	553.0	550.9	551.9	552.9	552.6	553.3	551.2	549.9
272	554.5	544.2	554.3	554.4	554.9	554.8	553.0	553.5	553.7
288	554.3	554.9	554.3	554.6	554.6	554.7	553.1	553.4	552.7
296	554.6	553.9	554.1	554.3	554.6	553.4	553.8	554.0	553.6
312	553.2	551.7	552.1	552.7	552.7	553.2	551.0	552.9	551.3
320	550.9	551.3	549.8	550.2	551.3	551.3	547.7	548.8	549.0
336	552.9	553.6	552.4	553.1	553.3	553.6	550.2	552.4	551.9
344	551.4	551.5	551.1	549.8	551.3	552.4	548.5	550.3	549.5

Table 37. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V
and Ti 5Al-2 1/2 Sn. Test Temperature - 550°F Nominal. Test
Time - 1000 Hours Nominal (Sheet 2 of 6)

Elapsed Time Hrs.	Front Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
360	551.7	550.5	550.0	550.3	551.3	551.4	547.9	548.6	549.0
368	552.2	551.5	548.5	551.0	551.8	552.0	548.5	549.9	549.4
456	551.9	550.4	550.5	551.2	550.8	551.3	549.9	550.7	550.2
464	553.7	553.9	553.5	553.8	554.0	554.0	552.7	552.3	551.7
480	552.3	552.3	552.4	552.6	553.7	553.9	551.2	552.8	550.5
504	552.2	551.2	551.7	550.8	550.9	551.1	548.8	550.1	550.5
528	553.2	552.6	550.9	551.2	550.3	551.5	551.3	550.1	551.5
536	553.1	552.4	552.0	552.0	552.6	552.0	550.9	551.8	551.6
600	553.2	552.2	552.6	553.0	552.8	552.6	551.2	552.6	551.8
608	553.1	552.7	551.3	550.5	553.3	553.0	551.5	551.9	551.0
624	551.7	550.5	549.1	550.2	551.8	550.6	549.2	550.8	550.4
632	552.8	551.9	552.1	552.2	553.1	552.8	549.8	551.1	551.4
648	554.6	554.3	553.5	554.2	554.1	553.8	552.4	553.6	552.8
656	552.2	553.5	552.7	553.0	553.7	552.9	552.6	551.2	549.8
672	554.3	554.2	553.8	554.0	553.6	554.4	552.9	553.1	552.2
680	554.4	554.9	554.6	554.7	555.0	554.5	553.3	553.8	552.6
696	553.2	552.9	552.2	552.1	551.9	551.8	550.2	552.7	551.4
704	554.3	552.9	553.1	553.0	553.4	553.1	552.0	552.4	551.5

Table 37. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V
and Ti 5Al-2 1/2 Sn. Test Temperature - 550°F Nominal. Test
Time - 1000 Hours Nominal (Sheet 3 of 6)

Elapsed Time Hrs.	Front Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
768	553.8	553.9	552.0	553.3	553.9	555.2	552.2	553.0	552.6
776	554.9	554.5	555.0	554.9	554.6	555.0	553.6	554.4	553.3
792	552.9	550.3	551.3	551.8	550.7	550.9	551.1	551.8	550.9
800	552.9	554.3	553.1	553.8	554.2	553.1	553.2	552.8	551.9
816	553.7	552.2	551.7	552.6	553.1	550.5	551.7	552.6	551.4
936	555.4	554.4	553.7	554.2	554.2	553.8	553.3	553.4	551.8
952	553.6	552.8	551.7	552.9	553.3	552.1	552.0	552.8	551.2
960	554.5	554.9	554.6	554.9	555.1	555.2	553.6	553.7	553.4
976	554.1	554.5	553.9	554.5	555.0	555.2	553.1	553.3	553.0
1000	553.9	554.1	553.7	554.0	555.4	554.8	553.3	553.6	553.4

Table 37. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V and Ti 5Al-2 1/2 Sn. Test Temperature - 550°F Nominal. Test Time - 1000 Hours Nominal (Sheet 4 of 6)

Elapsed Time Hrs.	Rear Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
0	548.6	550.2	549.0	548.7	550.0	550.3	551.0	552.5	551.4
8	550.9	550.5	550.3	551.1	549.3	551.4	550.6	550.4	550.1
24	548.3	548.2	548.3	549.4	549.3	549.6	549.6	550.5	548.5
32	551.3	549.2	549.1	549.8	549.3	549.8	549.9	550.2	549.9
96	549.0	549.4	549.4	549.0	549.9	550.4	550.4	551.5	551.5
104	549.1	549.3	549.3	549.9	549.4	550.0	550.6	551.1	551.4
120	549.9	550.0	549.6	550.3	550.0	550.6	551.2	551.9	552.2
128	550.1	550.1	550.8	550.4	550.1	550.8	551.1	552.1	552.6
144	551.7	550.1	549.2	550.2	549.7	549.5	549.5	551.7	552.1
152	552.0	551.0	549.5	550.5	550.2	550.7	551.0	551.9	552.3
264	549.5	550.2	548.6	549.9	551.4	551.0	551.1	549.9	550.4
272	548.7	549.4	549.4	550.1	549.0	550.2	550.2	549.9	549.6
288	548.7	549.7	549.6	550.3	549.8	550.1	549.9	550.5	550.0
296	549.0	549.1	549.7	550.2	549.1	550.1	550.6	549.6	549.1
312	548.7	549.5	548.5	549.7	549.6	549.9	550.5	550.8	550.1
320	548.6	549.4	549.3	549.4	549.1	549.9	549.1	548.6	549.7
336	548.7	549.8	549.3	550.6	549.9	550.4	550.5	550.6	549.7
344	548.8	549.4	549.2	549.7	549.7	549.9	550.3	550.4	550.0

Table 37. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V
and Ti 5Al-2 1/2 Sn. Test Temperature - 550°F Nominal. Test
Time - 1000 Hours Nominal (Sheet 5 of 6)

Elapsed Time Hrs.	Rear Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
360	548.8	549.0	549.4	550.3	549.3	550.2	550.0	550.2	549.7
368	548.7	548.9	549.3	550.2	549.4	549.6	549.2	550.1	549.1
456	548.6	549.3	548.8	549.1	548.7	548.9	549.6	550.4	549.2
464	550.1	550.2	550.4	550.8	550.3	550.8	550.1	550.7	550.4
480	549.4	550.1	549.9	549.9	550.4	550.9	550.7	550.6	549.2
504	549.9	550.0	549.8	548.4	550.2	550.3	550.6	551.0	550.6
528	551.5	549.2	550.4	550.2	550.0	550.1	551.2	550.1	551.5
536	550.4	550.3	550.4	549.9	549.8	551.1	550.1	551.8	551.1
600	550.0	550.8	550.8	551.5	551.0	551.4	551.1	551.6	551.5
608	549.8	550.3	549.6	550.9	549.8	550.9	550.7	551.3	550.4
624	549.5	549.9	549.9	550.4	550.2	550.5	550.2	550.9	550.6
632	550.2	550.1	550.1	550.8	550.0	550.8	550.7	551.2	551.2
648	549.6	550.3	550.3	550.8	550.7	550.9	550.0	550.7	551.1
656	551.5	554.7	555.3	552.2	551.3	551.5	551.1	551.8	551.5
672	549.9	550.5	550.1	549.4	551.1	550.5	550.7	551.3	550.5
680	549.6	550.3	550.3	550.8	549.9	550.8	551.1	551.1	550.9
696	549.5	550.0	549.8	550.4	550.3	550.3	550.3	550.9	550.2
704	549.8	550.1	550.1	550.9	550.8	550.8	550.7	551.0	549.6

Table 37. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V
and Ti 5Al-2 1/2 Sn. Test Temperature - 550° F Nominal. Test
Time - 1000 Hours Nominal (Sheet 6 of 6)

Elapsed Time Hrs.	Rear Test Channel Temperatures - ° F								
	1	2	3	4	5	6	7	8	9
768	549.2	550.1	550.4	551.2	550.9	551.0	551.3	551.0	550.5
776	549.8	550.4	550.5	550.5	550.8	549.5	549.3	551.1	550.4
792	549.5	550.7	551.0	551.3	550.6	550.8	550.0	550.9	550.4
800	549.9	549.9	550.1	549.9	552.6	553.1	550.9	552.1	551.1
816	550.6	550.8	550.3	551.7	551.7	551.1	551.5	552.1	551.9
936	550.5	551.2	550.9	551.6	551.6	551.4	551.7	552.2	551.5
952	549.9	550.6	550.7	551.6	551.3	552.6	550.8	550.9	550.1
960	549.9	551.0	550.7	551.5	551.2	551.3	549.2	547.6	550.6
976	549.9	550.7	550.6	551.3	551.1	551.2	550.8	551.2	550.8
1000	550.2	551.0	550.8	551.3	551.0	551.0	550.3	551.0	550.6

Table 38. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V and Ti 5Al-2 1/2 Sn. Test Temperature - 600°F Nominal. Test Time - 1000 Hours (Sheet 1 of 6)

Elapsed Time Hrs.	Front Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
0	603.2	602.5	601.2	600.9	601.2	600.2	600.3	602.0	603.1
64	603.4	602.0	600.8	600.6	600.4	599.4	599.8	601.9	602.8
72	605.3	603.8	601.3	601.8	602.3	601.6	601.1	603.3	604.3
88	603.8	602.2	600.4	600.4	600.6	600.0	600.0	602.3	603.0
96	602.0	600.9	599.3	598.7	599.4	597.8	598.4	600.5	601.7
112	603.6	601.8	600.4	599.3	599.9	597.1	599.1	600.9	602.1
120	603.6	602.6	603.1	600.2	600.3	598.3	599.4	601.7	602.8
136	602.9	600.4	600.0	599.5	599.6	598.7	598.7	600.6	602.1
144	602.8	603.1	599.9	599.1	599.6	598.9	598.4	600.5	601.7
160	601.7	601.8	598.7	598.1	599.6	597.1	597.5	599.6	600.6
168	601.6	600.4	600.7	598.3	598.7	597.9	597.6	599.8	601.0
232	604.9	601.4	598.3	599.2	599.5	598.9	598.6	600.7	601.5
240	604.7	601.6	601.1	598.8	599.6	598.9	598.5	600.7	602.0
256	602.5	601.0	598.0	598.9	599.2	598.6	598.6	600.4	601.2
264	602.9	601.2	599.2	599.3	599.7	598.7	598.5	600.6	602.1
280	601.8	601.9	598.4	598.3	598.7	597.7	598.2	599.6	600.9
288	601.9	600.5	600.8	598.5	598.9	598.0	598.4	599.8	601.3
312	602.5	600.2	599.7	598.2	597.3	595.5	598.2	599.5	601.2

Table 38. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V and Ti 5Al-2 1/2 Sn. Test Temperature - 600°F Nominal. Test Time - 1000 Hours (Sheet 2 of 6)

Elapsed Time Hrs.	Front Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
328	601.5	600.5	598.5	598.3	598.6	597.8	598.1	599.7	601.2
336	601.6	599.9	597.3	598.4	597.5	596.1	597.8	599.8	601.4
400	601.0	600.7	598.8	600.3	598.7	598.0	598.1	599.6	600.8
424	602.4	601.3	601.7	599.9	599.3	598.6	598.9	600.0	601.1
432	601.5	600.0	598.7	597.3	598.4	597.3	597.9	599.6	600.6
448	601.4	601.6	598.1	598.1	598.5	597.2	597.8	599.8	601.1
456	601.8	600.1	597.9	597.8	598.4	599.4	598.0	597.7	600.5
472	603.5	602.7	599.8	599.3	599.9	599.3	599.2	601.1	602.2
480	602.6	600.0	600.0	598.8	599.5	599.1	597.9	600.5	601.5
496	603.3	601.1	598.8	599.1	599.6	597.4	599.5	600.5	602.2
504	602.5	600.7	601.3	599.7	599.4	598.8	598.6	600.4	601.4
568	602.1	601.0	598.9	598.9	599.4	598.5	598.6	600.5	601.7
576	601.8	600.2	597.8	598.3	598.0	598.5	597.5	600.0	600.3
592	602.6	600.9	597.5	598.8	599.4	598.8	598.6	600.6	601.5
600	601.4	599.5	598.4	597.8	597.6	596.6	596.5	599.4	600.6
616	602.0	600.2	598.2	598.1	598.5	596.5	596.7	599.7	600.9
624	602.5	600.6	599.6	597.9	599.2	598.7	598.6	600.4	601.5
640	603.1	600.9	599.4	598.9	599.4	598.9	598.7	600.5	601.7

Table 38. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V and Ti 5Al-2 1/2 Sn. Test Temperature - 600°F Nominal. Test Time - 1000 Hours (Sheet 3 of 6)

Elapsed Time Hrs.	Front Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
648	602.1	600.8	599.6	598.5	598.1	598.5	598.0	599.8	601.3
664	602.4	599.5	599.1	598.5	598.1	598.7	597.4	600.0	601.3
672	601.9	600.2	599.5	598.3	598.7	596.9	598.0	599.7	600.7
736	602.4	600.9	600.3	598.6	598.4	597.2	597.5	600.0	601.3
744	602.7	601.1	598.3	599.1	599.4	598.4	598.8	601.4	601.8
760	603.5	601.1	599.0	598.5	599.0	598.2	598.5	600.3	601.2
768	602.0	600.9	598.5	598.7	598.0	599.1	598.4	600.3	601.2
784	602.6	600.5	599.8	598.5	599.0	598.0	598.4	600.3	601.4
792	602.9	602.2	599.0	598.7	599.4	598.8	598.3	600.7	601.8
808	604.0	600.3	599.0	598.6	600.0	598.8	598.7	600.4	601.3
816	601.7	599.7	598.9	597.7	597.7	597.7	597.5	600.3	601.0
832	601.5	600.7	599.9	598.2	598.9	595.6	598.4	600.0	600.8
840	601.9	599.6	598.8	597.8	598.8	596.7	598.2	600.0	600.9
912	601.8	600.8	599.2	598.5	598.5	597.6	598.7	600.3	600.8
928	602.1	600.8	600.8	599.0	599.5	598.7	598.7	600.3	601.5
936	598.8	598.6	598.0	598.2	599.0	598.3	598.0	599.1	600.7
952	595.6	595.4	594.8	596.1	596.2	596.2	595.2	594.6	594.3
960	597.6	597.4	595.8	596.8	597.8	596.2	596.1	598.1	597.2

Table 38. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V and Ti 5Al-2 1/2 Sn. Test Temperature - 600°F Nominal. Test Time - 1000 Hours (Sheet 4 of 6)

Elapsed Time Hrs.	Rear Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
0	602.0	601.9	602.3	602.7	602.4	603.8	604.8	607.0	608.0
64	602.4	602.3	602.2	603.1	603.2	603.6	604.1	605.8	607.0
72	603.0	602.9	602.8	603.1	603.6	604.3	605.3	606.4	608.0
88	602.9	603.3	603.0	603.6	603.6	604.1	605.1	606.5	607.9
96	603.3	602.5	602.4	603.5	604.4	603.8	604.8	606.2	607.5
112	602.8	602.6	602.2	602.3	603.2	603.6	604.4	606.0	606.9
120	602.9	602.5	602.3	601.0	603.6	603.8	604.5	606.4	607.6
136	602.7	602.4	601.5	602.6	603.0	603.5	604.1	605.6	606.9
144	601.8	603.1	601.3	601.8	602.0	602.7	603.5	606.0	606.3
160	601.4	601.1	601.0	601.6	602.0	604.0	601.7	604.7	605.9
224	602.6	600.9	600.7	600.8	601.6	602.0	602.8	604.5	605.0
232	601.8	601.6	601.9	601.7	602.2	604.0	603.2	604.2	605.5
240	602.2	601.7	601.4	601.8	601.9	602.5	603.8	605.6	606.1
256	601.5	599.9	601.2	601.5	601.8	603.2	600.7	604.9	605.6
264	601.9	600.2	601.4	602.1	602.9	602.8	603.3	605.0	606.5
280	601.5	601.3	601.3	602.0	601.8	602.9	604.6	605.1	606.2
288	601.7	601.5	601.2	601.9	602.0	602.2	604.1	605.1	606.2
312	601.4	599.5	600.7	601.3	601.5	601.8	600.7	604.5	605.5

Table 38. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V and Ti 5Al-2 1/2 Sn. Test Temperature - 600°F Nominal. Test Time - 1000 Hours (Sheet 5 of 6)

Elapsed Time Hrs.	Rear Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
328	601.6	601.1	600.8	601.5	601.6	602.5	602.8	604.0	605.1
336	601.6	601.1	600.6	601.3	601.7	602.2	601.4	604.4	605.8
400	601.6	601.0	601.7	601.8	602.4	602.1	603.5	604.6	606.0
424	601.5	602.6	602.7	602.9	603.9	604.0	606.8	606.9	607.7
432	601.6	601.4	601.3	601.9	601.6	603.7	606.9	604.8	606.1
448	601.0	600.6	600.7	601.6	601.7	602.2	602.8	605.0	605.8
456	601.1	601.0	601.7	601.4	601.7	602.1	603.4	604.2	606.1
472	601.9	599.8	601.3	601.9	602.2	602.9	603.3	605.1	606.5
480	601.8	601.6	601.1	601.9	602.1	602.7	603.5	605.1	606.6
496	602.0	601.6	601.3	601.5	602.6	602.4	601.9	605.0	606.6
504	602.3	601.4	601.3	601.8	601.9	602.8	603.7	604.9	606.2
568	600.4	601.1	602.8	601.6	601.0	602.3	603.1	604.7	605.9
576	601.7	600.9	601.1	601.1	602.0	602.5	604.1	604.6	606.1
592	601.8	601.3	601.1	601.7	601.5	602.4	601.4	604.7	605.8
600	601.7	600.9	600.7	601.5	601.3	601.8	602.6	604.2	605.5
616	602.1	600.8	601.3	601.8	601.5	601.6	602.2	605.1	606.5
624	602.1	600.4	601.2	601.9	602.0	602.4	603.3	604.9	605.2
640	600.0	599.9	598.9	599.4	599.8	599.8	599.6	602.7	604.6

Table 38. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V
and Ti 5Al-2 1/2 Sn. Test Temperature - 600°F Nominal. Test
Time - 1000 Hours (Sheet 6 of 6)

Elapsed Time Hrs.	Rear Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
648	601.6	600.0	600.8	601.3	601.5	602.1	602.3	604.3	606.0
664	601.9	601.4	600.8	601.8	601.5	602.1	603.2	604.7	606.1
672	602.0	600.2	600.9	601.7	601.7	601.3	602.9	604.4	605.9
736	602.2	601.7	602.3	602.6	602.2	602.9	603.8	605.2	606.2
744	602.5	601.9	602.0	602.2	602.3	603.8	603.4	605.3	606.7
760	602.6	602.0	601.6	602.2	602.6	604.4	603.7	605.3	606.6
768	602.6	601.7	601.3	601.8	601.5	602.0	603.1	604.3	606.1
784	602.3	601.7	601.4	602.0	602.0	602.5	603.3	605.2	606.2
792	602.0	601.5	601.4	601.7	602.1	604.0	602.9	604.9	606.3
808	602.1	601.7	601.4	601.9	602.4	602.3	602.4	604.7	606.1
816	601.3	601.0	601.0	601.6	602.2	603.6	603.0	604.8	606.1
832	601.9	600.4	601.3	600.4	601.8	602.2	602.9	604.8	605.9
840	602.4	601.6	601.6	601.6	601.5	602.1	603.1	604.8	604.6
912	602.0	602.6	600.8	601.7	601.4	602.0	602.7	604.4	605.7
928	602.4	601.9	601.6	602.3	601.9	602.7	603.7	604.8	605.8
936	600.1	600.2	600.7	601.3	601.5	603.2	599.8	602.0	602.1
952	601.8	601.8	602.4	602.3	603.3	603.2	602.9	603.1	602.5
960	599.5	597.8	600.3	600.6	600.8	601.2	601.5	602.6	597.4

Table 39. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V
and Ti 5Al-2 1/2 Sn. Test Temperature - 650°F Nominal. Test
Time - 1000 Hours (Sheet 1 of 8)

Elapsed Time Hrs.	Front Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
0	652.0	651.1	650.8	650.2	651.0	650.3	650.1	651.1	651.0
16	-	-	-	-	-	-	-	-	-
24	653.8	652.6	552.2	652.2	652.5	651.7	651.4	652.4	652.2
40	656.0	654.9	655.0	655.6	654.6	654.6	654.6	655.5	655.5
48	657.4	654.0	654.0	654.2	653.9	653.8	653.7	654.8	655.0
64	656.5	654.3	654.0	653.9	654.2	653.4	653.8	653.8	654.8
72	657.4	657.7	656.6	656.0	656.3	655.8	654.3	657.0	658.0
88	656.3	654.9	654.4	654.6	654.9	655.0	653.1	653.3	654.0
96	656.4	653.3	653.6	653.0	653.1	652.1	653.0	654.5	654.4
160	653.4	652.4	649.8	651.0	650.1	651.3	649.0	649.9	651.6
168	653.1	650.8	651.0	650.4	650.6	650.0	650.3	651.8	652.4
184	653.6	651.3	650.3	649.6	648.7	649.4	649.7	651.2	651.0
192	653.1	650.4	650.4	650.3	650.1	651.6	650.3	651.4	651.9
208	653.6	650.8	650.4	649.9	650.2	651.6	650.3	651.5	652.3
216	651.6	650.0	649.2	649.0	648.6	648.9	649.4	649.8	651.1
232	651.0	648.5	648.5	648.2	648.6	647.7	647.5	649.8	650.7
240	652.5	650.2	650.3	650.3	651.2	651.1	649.5	651.3	652.1
256	652.4	651.7	650.7	650.4	649.7	650.3	649.9	651.6	651.9

Table 39. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V
and Ti 5Al-2 1/2 Sn. Test Temperature - 650°F Nominal. Test
Time - 1000 Hours (Sheet 2 of 8)

Elapsed Time Hrs.	Front Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
264	652.9	652.3	650.8	650.3	650.5	650.0	650.2	651.6	650.8
328	654.8	651.5	650.5	650.3	650.3	649.8	650.1	651.1	652.1
336	653.6	651.7	650.8	649.6	650.5	650.3	650.3	651.8	652.5
352	654.2	651.7	651.3	650.9	650.3	650.3	651.2	652.5	653.0
360	667.6	664.8	662.4	661.1	663.5	660.8	662.3	665.4	668.1
384	655.6	653.9	652.4	651.9	651.9	651.5	652.2	653.5	654.6
400	670.3	668.8	663.8	662.3	662.1	662.8	663.7	664.8	669.6
408	650.6	651.2	651.9	653.7	653.0	652.1	651.2	651.1	649.5
424	650.3	650.7	650.9	652.0	652.0	652.0	650.8	646.6	645.1
432	651.6	652.4	652.9	653.6	653.7	652.9	651.6	651.4	649.5
496	652.9	655.2	653.7	654.7	654.7	653.6	652.4	652.4	650.1
504	651.2	651.6	652.1	652.7	653.0	651.8	650.6	650.8	648.3
520	653.1	653.5	654.2	655.2	655.0	654.1	652.4	633.2	650.3
528	654.3	654.9	655.1	655.9	656.2	655.2	653.3	652.0	651.6
544	654.0	653.5	655.3	656.0	656.1	655.2	653.5	653.7	652.1
552	653.1	653.3	654.4	655.0	655.3	654.5	653.6	650.6	650.5
576	656.0	656.5	656.5	657.7	657.6	656.3	654.8	655.0	652.9
600	654.3	653.7	655.5	656.0	656.2	655.0	653.8	653.9	651.9

Table 39. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V
and Ti 5Al-2 1/2 Sn. Test Temperature - 650° F Nominal. Test
Time - 1000 Hours (Sheet 3 of 8)

Elapsed Time Hrs.	Front Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
608	653.6	654.3	654.6	655.9	656.0	654.6	653.8	653.9	651.5
624	653.7	654.5	655.7	656.5	656.6	655.0	653.9	654.3	651.7
632	654.6	653.6	655.6	656.5	656.5	655.4	654.3	654.6	652.5
648	653.9	654.1	655.2	655.7	656.0	654.7	653.8	653.6	651.6
656	654.6	655.2	656.8	656.8	656.9	655.9	654.5	654.6	652.3
672	653.6	653.7	654.4	655.6	655.7	654.7	653.2	653.3	651.6
680	651.2	655.4	654.4	654.4	655.0	654.9	653.9	654.5	654.0
696	655.0	655.3	656.1	656.9	654.9	654.9	654.9	655.1	653.3
704	655.0	655.3	656.5	657.1	657.2	655.7	654.8	654.8	654.0
728	653.5	653.4	654.3	655.4	655.5	654.3	653.1	653.3	651.9
792	653.5	653.4	654.3	655.4	655.5	654.3	653.1	653.3	651.8
800	654.4	654.4	654.5	656.4	656.5	655.2	652.4	654.1	653.1
816	653.4	652.0	654.5	655.6	655.8	654.6	653.5	653.8	652.2
824	654.2	654.2	655.5	656.5	656.4	653.7	654.1	654.3	652.7
840	653.7	654.8	655.1	656.0	656.3	655.0	653.8	653.8	652.8
848	653.5	655.3	655.1	656.2	656.1	656.0	653.8	654.0	652.6
864	652.2	652.3	653.5	654.2	654.6	653.3	652.3	652.3	650.6
872	653.9	653.4	655.5	656.2	656.6	655.1	653.6	654.2	652.0

Table 39. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V and Ti 5Al-2 1/2 Sn. Test Temperature - 650° F Nominal. Test Time - 1000 Hours (Sheet 4 of 8)

Elapsed Time Hrs.	Front Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
888	653.6	653.0	654.5	655.3	655.6	652.5	653.2	653.2	651.5
896	654.7	656.2	656.4	657.0	658.0	655.8	654.9	654.9	653.3
950	653.6	652.2	654.6	655.1	655.2	653.7	653.1	652.8	650.3
958	653.2	652.0	654.5	655.3	656.5	653.4	653.8	653.4	652.3
1022	652.9	652.8	654.3	654.7	655.4	655.0	652.7	652.4	651.5

Table 39. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V and Ti 5Al-2 1/2 Sn. Test Temperature - 650°F Nominal. Test Time - 1000 Hours (Sheet 5 of 8)

Elapsed Time Hrs.	Rear Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
0	649.4	649.9	649.8	648.8	650.3	650.6	650.3	651.1	650.2
16	662.3	663.0	665.4	666.6	666.6	665.9	662.4	660.8	660.8
24	651.7	651.6	652.2	652.2	652.4	652.6	653.0	653.1	653.4
40	649.5	649.7	650.3	650.7	651.1	651.3	651.4	651.4	652.1
48	650.3	649.8	650.3	650.5	650.8	651.2	651.7	651.9	652.9
64	648.6	648.2	648.2	648.7	649.0	648.7	649.8	650.1	651.5
72	652.9	651.8	653.0	650.9	651.4	651.1	653.0	653.9	655.2
88	654.7	651.7	651.4	652.0	652.1	652.8	653.9	655.3	655.3
96	651.5	650.5	651.6	650.8	651.3	651.8	652.7	653.6	653.7
160	651.6	651.7	652.1	651.7	651.9	652.9	653.1	653.2	654.7
168	652.0	650.1	651.3	651.0	652.2	652.5	651.6	654.4	652.9
184	649.5	649.6	649.4	649.9	650.2	650.8	651.9	653.0	654.7
192	650.5	648.8	649.0	650.6	651.0	651.3	652.0	653.2	654.7
208	650.2	649.8	649.6	650.0	650.4	650.9	651.5	653.1	654.6
216	649.9	649.2	649.5	649.5	650.2	650.7	651.6	652.7	654.2
232	650.4	648.7	648.6	648.4	649.8	650.1	650.9	652.0	653.5
240	649.2	648.9	648.8	649.5	649.9	649.9	651.2	652.0	653.4
256	650.0	649.9	650.1	650.6	651.0	651.6	652.3	653.1	654.1

Table 39. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V
and Ti 5Al-2 1/2 Sn. Test Temperature - 650° F Nominal. Test
Time - 1000 Hours (Sheet 6 of 8)

Elapsed Time Hrs.	Rear Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
264	648.6	648.7	648.7	649.3	649.8	650.2	651.2	651.6	653.2
328	648.7	648.7	648.9	649.4	649.8	650.4	651.1	651.5	652.9
336	650.0	647.5	648.6	648.1	649.5	649.9	651.9	651.1	653.4
352	649.1	649.7	648.4	649.1	649.6	650.1	651.1	652.2	653.9
360	659.7	657.8	657.2	657.5	658.3	659.4	661.3	664.1	668.7
384	649.6	648.7	648.4	649.0	649.5	650.3	650.9	652.1	654.2
400	662.3	658.1	658.7	658.5	659.1	659.8	662.2	666.4	670.0
408	639.3	642.0	642.0	644.7	643.3	642.7	641.7	647.2	640.0
424	641.0	642.6	643.1	644.1	644.2	643.3	643.2	642.7	641.0
432	641.0	643.0	644.7	644.4	644.9	644.1	643.0	643.0	641.7
496	642.6	644.1	644.4	645.7	645.7	644.3	643.8	644.3	642.1
504	644.6	646.4	647.4	648.2	648.9	647.5	644.9	646.4	645.1
520	649.2	648.2	648.6	650.0	649.7	648.6	648.4	647.9	646.9
528	645.8	647.4	648.0	649.5	649.5	648.9	648.3	645.5	647.9
544	647.0	648.8	649.5	650.6	650.5	649.6	649.6	648.8	647.5
552	647.3	648.8	649.5	650.6	650.6	649.8	649.5	648.8	646.6
576	649.7	649.5	650.1	651.1	651.0	650.6	650.0	649.3	648.2
600	647.7	648.4	650.7	651.1	650.5	650.0	649.6	649.0	648.0

Table 39. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V and Ti 5Al-2 1/2 Sn. Test Temperature - 650°F Nominal. Test Time - 1000 Hours (Sheet 7 of 8)

Elapsed Time Hrs.	Rear Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
608	648.1	649.5	649.9	651.1	651.1	650.7	650.3	649.4	649.0
624	649.4	649.1	649.2	650.3	650.8	650.3	649.8	648.7	647.9
632	647.5	648.8	649.4	650.3	650.6	649.9	650.3	649.2	648.0
648	647.9	649.4	649.8	650.2	651.0	650.4	650.5	648.9	648.2
656	649.9	649.9	650.1	651.4	651.4	650.2	650.2	649.2	649.5
672	647.4	648.8	649.0	650.7	650.6	650.2	649.7	648.3	647.9
680	647.9	649.6	650.0	650.9	652.0	650.9	650.8	648.9	648.3
696	647.3	648.7	648.8	650.8	651.1	649.9	652.0	649.9	649.2
704	648.6	648.8	648.9	650.4	650.8	649.0	648.9	650.2	647.6
728	648.0	649.6	650.6	651.2	652.0	650.7	648.8	648.9	648.4
792	647.7	649.6	650.0	651.0	651.0	650.6	650.8	649.0	648.2
800	646.9	648.5	649.6	650.5	650.6	650.1	649.8	648.4	647.5
816	647.7	649.2	649.6	650.8	650.2	650.3	650.1	648.8	647.9
824	647.7	649.1	649.7	650.8	650.4	650.6	650.6	648.8	647.9
840	648.6	647.3	649.5	648.6	648.6	650.6	650.0	649.8	648.1
848	647.3	649.5	649.2	650.2	649.7	649.5	649.6	648.3	647.6
864	647.5	648.9	649.3	650.4	650.1	650.4	649.9	648.7	648.0
872	647.4	648.9	649.3	650.7	650.6	650.1	651.9	649.3	648.7

Table 39. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V
and Ti 5Al-2 1/2 Sn. Test Temperature - 650°F Nominal. Test
Time - 1000 Hours (Sheet 8 of 8)

Elapsed Time Hrs.	Rear Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
888	647.7	649.2	649.9	650.7	650.5	650.4	650.4	648.5	648.0
896	647.4	649.0	649.9	650.8	650.9	651.5	649.8	648.7	647.9
950	647.8	649.4	649.7	651.0	652.1	650.2	650.2	648.9	648.2
958	647.2	648.6	649.0	650.2	649.7	649.5	649.2	647.8	648.7
1022	647.3	648.9	651.0	651.7	651.1	649.8	649.9	648.3	647.9

Table 40. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo
and AM 350. Test Temperature - 450°F Nominal, Test Time -
1000 Hours (Sheet 1 of 6)

Elapsed Time Hours	Front Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
0	449.8	451.5	451.2	452.5	452.1	453.0	450.9	450.3	448.3
16	450.8	452.3	452.2	453.7	453.1	452.0	451.4	451.4	448.5
24	451.8	454.4	453.9	455.0	455.4	454.9	454.3	453.1	450.7
88	451.5	453.4	452.9	454.6	454.4	453.8	452.4	451.9	450.0
96	452.0	453.6	453.6	454.8	454.5	453.0	453.0	452.0	450.3
112	451.5	453.3	453.4	454.7	454.4	453.6	453.2	452.4	449.8
120	452.3	454.2	453.4	455.3	454.9	454.1	453.8	452.8	451.5
136	451.1	451.6	452.3	454.0	453.7	453.2	452.5	451.8	449.6
144	452.3	453.9	453.4	455.1	455.4	454.7	453.8	452.6	450.2
160	451.6	453.1	452.9	454.5	454.0	453.0	453.0	450.4	449.6
168	452.8	454.7	454.6	455.8	455.5	454.9	454.3	453.6	451.0
184	451.6	453.3	452.9	454.5	452.9	453.4	453.1	452.1	450.1
192	452.5	451.9	454.2	454.5	455.3	454.3	453.7	452.4	451.1
256	450.5	451.4	450.6	452.6	452.3	451.5	451.1	450.3	448.3
264	451.5	452.5	452.5	453.9	452.7	452.8	451.9	451.5	449.4
280	450.3	451.8	451.5	452.9	452.8	452.0	451.5	450.6	448.7
288	451.5	453.0	452.8	454.3	454.1	453.3	452.9	452.3	450.8
304	451.6	451.6	451.7	453.8	453.2	452.8	452.5	451.5	449.4
312	451.9	453.0	452.2	454.4	454.2	453.4	452.9	451.9	449.9

Table 40. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo
and AM 350. Test Temperature - 450°F Nominal, Test Time -
1000 Hours (Sheet 2 of 6)

Elapsed Time Hours	Front Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
328	451.6	453.0	452.2	454.1	451.4	453.2	452.7	451.7	449.8
336	452.2	452.9	452.4	454.6	453.2	453.6	453.2	451.8	449.9
352	451.0	452.1	451.4	453.5	453.4	452.7	452.0	451.1	449.2
360	451.5	452.3	451.6	454.0	453.7	452.9	452.1	451.6	450.0
424	451.0	452.3	452.0	453.8	453.6	453.3	452.2	451.8	449.3
432	452.6	454.1	453.9	455.2	454.9	454.1	453.4	452.7	450.8
448	451.2	451.3	453.0	454.0	453.8	452.8	452.3	451.5	449.5
456	451.3	453.4	453.1	454.5	454.1	453.8	452.3	452.1	450.0
480	451.3	453.3	453.4	454.6	453.0	453.1	453.0	452.2	450.1
496	451.0	452.5	451.9	453.6	453.3	452.8	452.0	451.3	449.3
504	451.4	451.5	452.9	453.0	453.9	453.3	452.7	450.5	449.6
520	451.8	452.4	451.6	452.0	453.1	451.9	451.4	451.2	449.4
584	451.7	453.1	452.5	454.5	454.0	453.3	452.8	452.2	450.0
600	451.1	452.7	452.5	453.9	453.6	452.6	452.4	451.4	449.5
608	451.8	452.1	452.6	454.9	454.1	453.1	452.8	452.1	450.0
624	451.0	451.7	451.7	453.4	453.4	452.4	452.3	451.4	449.3
632	451.5	451.7	452.4	452.8	453.0	452.7	452.4	451.6	449.8
648	452.0	452.2	451.7	453.3	453.0	451.6	451.7	450.9	448.8
656	451.0	452.7	452.1	453.6	453.5	452.4	452.1	451.3	449.4

Table 40. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo
and AM 350. Test Temperature - 450°F Nominal, Test Time -
1000 Hours (Sheet 3 of 6)

Elapsed Time Hours	Front Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
672	451.0	452.6	452.3	453.7	453.3	452.5	452.0	451.2	449.4
680	451.7	453.1	452.7	454.2	453.1	453.1	452.7	452.1	450.0
696	452.8	453.0	452.0	454.1	453.9	452.5	452.3	451.4	449.6
760	451.0	452.7	452.8	454.2	453.8	452.7	452.5	451.9	450.3
776	452.4	452.7	452.1	453.8	454.1	452.6	452.1	451.3	449.3
784	451.9	453.3	452.8	454.5	454.2	453.3	452.7	451.9	450.1
800	451.6	452.8	452.4	454.3	453.9	453.1	452.4	451.6	449.7
808	452.1	452.6	452.8	454.7	454.1	453.4	452.9	450.2	450.0
824	451.6	453.1	452.6	454.1	453.9	453.1	452.5	450.4	449.4
832	453.0	454.5	453.0	454.4	454.0	453.3	452.8	452.2	449.5
848	451.2	452.1	450.8	453.3	453.5	452.3	451.4	451.0	448.7
856	452.3	453.7	453.8	454.8	454.4	453.9	453.0	452.3	449.8
872	451.6	453.4	452.8	454.2	452.4	452.9	452.7	451.8	448.7
880	451.8	454.0	453.0	454.9	454.4	454.2	453.4	452.5	450.0
896	452.1	453.5	453.1	454.5	454.2	453.3	452.9	452.0	449.5
904	453.1	453.8	452.6	454.1	453.8	452.7	454.9	452.7	452.0
1014	451.9	453.1	452.6	454.1	453.8	453.8	452.8	451.6	448.8
1030	451.9	453.3	453.2	454.5	454.0	452.8	452.8	452.1	449.7
1038	451.3	452.1	450.9	451.7	452.2	451.5	451.8	451.1	448.8
1060	451.2	452.2	452.4	452.4	453.4	452.3	452.2	451.4	448.9

Table 40. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo
and AM 350. Test Temperature - 450°F Nominal, Test Time -
1000 Hours (Sheet 4 of 6)

Elapsed Time Hours	Rear Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
0	450.5	450.0	451.3	451.1	450.7	451.8	450.3	449.6	449.3
16	448.7	449.0	451.0	451.0	451.0	451.0	451.0	450.5	449.0
24	448.3	449.7	450.7	450.1	450.5	450.5	450.1	450.6	449.7
88	449.9	450.3	451.5	451.4	451.0	451.1	449.6	450.0	449.9
96	448.8	449.3	451.3	451.2	450.8	450.8	450.1	449.8	449.4
112	449.1	450.3	452.4	451.2	450.9	451.0	450.7	450.4	450.1
120	449.0	449.5	450.5	451.4	450.6	450.0	450.5	449.6	449.3
136	449.2	450.2	451.6	451.5	451.1	451.3	451.2	450.5	450.1
144	450.5	450.6	451.6	451.4	451.0	451.1	450.1	450.3	450.0
160	449.4	449.8	450.7	451.8	451.8	450.2	450.6	450.5	450.3
168	450.1	450.0	451.4	451.8	451.0	450.8	451.0	450.3	450.8
184	450.8	450.4	449.5	452.0	451.6	451.0	450.7	451.5	451.5
192	450.3	450.1	451.0	451.8	451.3	450.9	450.8	449.5	450.5
256	450.6	450.6	451.0	449.4	450.2	450.2	451.6	451.1	450.1
264	449.9	449.8	451.0	451.0	450.5	450.7	450.6	450.0	449.3
280	449.4	449.7	450.2	450.8	449.2	450.0	449.3	448.8	449.8
288	450.2	450.0	449.8	451.4	450.8	451.7	449.9	450.1	450.7
304	450.2	450.6	452.3	451.9	451.3	451.2	451.1	450.5	450.6
312	450.5	451.1	451.6	451.7	451.0	450.9	450.0	450.9	451.0

Table 40. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo
and AM 350. Test Temperature - 450°F Nominal, Test Time -
1000 Hours (Sheet 5 of 6)

Elapsed Time Hours	Rear Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
328	450.4	450.6	451.5	452.0	451.5	451.5	451.3	450.8	450.4
336	450.7	450.4	451.3	451.9	451.2	451.2	451.2	450.4	450.5
352	449.9	450.0	450.3	451.7	450.3	450.7	450.9	450.3	450.7
360	450.1	450.0	450.6	451.7	450.8	451.0	451.2	450.6	450.1
424	450.6	450.4	451.3	451.6	451.0	451.3	451.1	450.5	450.6
432	450.4	450.7	451.7	452.1	451.4	451.3	450.7	450.9	450.7
448	450.8	450.6	451.5	451.9	451.4	452.2	451.2	450.8	450.1
456	450.7	450.7	451.3	451.7	451.3	451.3	451.1	450.6	450.4
480	450.8	450.7	451.5	452.0	451.5	451.4	451.7	451.0	450.3
496	450.0	450.4	451.6	451.8	451.1	451.4	451.2	450.7	451.2
504	450.4	450.3	451.2	451.5	451.4	451.3	451.1	450.6	450.5
520	450.2	450.5	451.7	451.7	451.1	450.9	451.3	450.7	450.0
584	450.3	450.2	451.6	451.4	450.7	451.9	450.9	450.4	450.5
600	450.6	450.8	452.1	450.8	451.5	451.6	450.8	450.9	450.2
608	450.1	450.5	451.2	451.8	450.9	451.3	451.5	450.8	450.1
624	450.6	451.0	452.1	452.3	451.5	452.7	451.4	451.0	450.7
632	450.0	450.5	451.1	451.7	451.0	450.9	450.7	450.2	450.0
648	450.1	450.5	451.4	451.7	451.2	451.4	451.1	450.4	450.6
656	449.8	450.2	451.6	451.5	451.1	451.2	450.9	450.5	450.3

Table 40. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo
and AM 350. Test Temperature - 450°F Nominal, Test Time -
1000 Hours (Sheet 6 of 6)

Elapsed Time Hours	Rear Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
672	450.3	450.0	451.0	451.4	450.9	450.9	451.1	450.6	449.8
680	450.2	450.4	451.2	451.8	450.9	451.3	451.4	450.5	450.2
696	450.2	450.4	451.6	451.8	451.4	451.3	451.3	449.8	450.9
760	450.4	450.2	451.0	451.6	451.0	451.1	450.7	450.4	450.1
776	450.3	450.5	452.1	451.3	451.8	452.4	451.4	450.7	451.5
784	450.7	450.5	451.4	451.9	451.4	451.4	450.7	450.7	450.3
800	450.3	450.6	451.5	451.9	451.7	451.7	451.5	450.9	450.6
808	450.2	450.5	451.3	451.8	451.8	451.2	451.3	450.6	450.5
824	450.4	450.8	451.4	452.0	451.4	451.6	451.5	450.9	450.6
832	450.3	449.9	451.2	451.6	451.2	451.3	451.1	449.5	450.5
848	450.1	450.6	451.3	451.8	451.2	451.6	451.3	450.7	451.2
856	450.2	450.6	451.4	451.8	451.5	451.5	450.9	450.6	449.9
872	450.3	450.8	452.6	452.1	451.5	451.8	451.5	451.0	450.9
880	450.2	450.2	451.4	451.9	451.4	451.4	451.2	450.9	450.5
896	450.6	450.8	451.8	451.9	451.7	451.9	451.6	451.2	451.7
904	451.2	452.6	454.0	452.6	452.6	453.4	452.8	452.2	452.5
1014	450.7	451.0	452.2	452.2	451.7	450.6	450.9	451.1	450.7
1030	450.6	450.9	451.7	452.2	451.7	451.6	452.0	451.1	450.7
1038	450.3	450.8	451.8	451.8	451.9	451.4	451.6	450.9	450.0
1060	450.2	450.6	452.0	451.8	451.4	451.3	451.5	450.5	449.8

Table 41. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and AM-350. Test Temperature - 500°F Nominal. Test Time - 1000 Hours (Sheet 1 of 6)

Elapsed Time Hours	Front Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
0	501.2	501.8	502.3	504.0	503.7	502.7	502.3	501.1	498.8
6	502.0	504.0	503.5	505.2	504.7	503.6	503.6	502.5	500.1
22	501.3	502.9	502.4	504.0	504.0	503.2	502.6	501.7	499.1
30	501.7	503.5	503.0	504.7	504.0	503.5	502.9	501.9	499.3
102	500.5	501.9	501.2	502.5	502.2	501.1	500.7	499.7	498.3
118	499.5	501.5	501.2	502.9	502.5	501.7	500.6	500.2	498.2
126	498.3	501.5	502.5	502.8	503.2	501.3	502.9	501.0	497.4
142	500.7	502.3	502.0	503.7	502.0	502.4	502.0	503.5	498.8
150	501.3	502.9	502.9	504.1	503.8	503.2	503.3	502.5	499.0
166	501.0	501.7	502.3	503.8	503.6	502.4	500.7	500.4	498.9
174	503.1	504.9	502.2	505.1	504.7	504.9	506.0	502.4	500.0
190	501.9	502.2	502.8	504.6	504.2	503.3	502.6	500.6	499.4
198	502.5	504.1	503.8	505.2	504.8	503.6	505.0	502.6	500.0
262	501.4	502.8	502.3	504.1	503.7	502.8	502.1	501.5	498.9
270	501.9	503.5	502.8	505.0	504.3	503.6	502.9	502.3	499.5
286	501.4	502.9	502.5	504.1	502.3	502.9	502.5	501.6	499.5
294	501.9	504.0	503.7	503.0	504.7	504.4	503.5	502.6	499.9
310	501.6	503.2	502.9	504.4	504.1	502.9	503.7	501.7	499.3
318	502.4	504.0	503.7	505.2	504.7	504.0	503.4	502.7	500.7

Table 41. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and AM-350. Test Temperature - 500°F Nominal. Test Time - 1000 Hours (Sheet 2 of 6)

Elapsed Time Hours	Front Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
334	501.5	503.4	503.5	504.5	504.1	503.3	503.0	501.9	499.7
342	501.3	501.4	503.2	501.4	503.2	501.3	499.0	499.6	497.3
358	501.4	501.4	502.9	504.4	504.0	503.3	501.1	501.7	499.7
366	502.1	504.1	503.6	505.2	505.0	504.5	503.4	502.5	500.0
430	500.6	502.4	502.1	503.7	503.4	502.3	501.9	501.2	499.0
438	501.1	502.5	502.5	503.9	503.4	502.7	501.8	501.0	498.8
454	501.2	502.8	502.6	504.1	503.6	502.4	502.4	501.3	498.8
468	501.8	503.0	503.0	504.6	504.1	503.5	502.9	501.1	498.9
480	501.1	502.4	501.7	503.8	502.6	501.9	502.2	501.2	499.1
488	501.7	503.1	502.6	504.2	503.7	502.9	502.5	501.6	499.0
512	501.2	501.3	501.7	503.7	503.3	502.6	501.8	501.0	498.6
536	502.1	503.7	501.5	503.7	503.4	502.5	501.8	501.1	498.9
624	502.0	503.6	503.1	504.7	504.3	502.9	501.7	502.7	499.7
640	501.9	503.3	502.9	504.5	504.7	503.6	503.1	502.1	499.4
648	502.2	503.5	502.8	504.6	504.4	503.6	503.0	502.0	499.9
664	501.7	503.3	502.7	504.3	504.0	503.2	502.8	501.8	499.1
672	501.9	503.3	502.8	504.6	504.2	503.3	502.9	501.9	499.5
688	501.3	502.7	502.3	504.2	503.9	503.0	502.5	500.6	499.2
696	501.3	502.8	502.6	504.2	503.0	502.8	502.8	501.7	499.4

Table 41. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and AM-350. Test Temperature - 500°F Nominal. Test Time - 1000 Hours (Sheet 3 of 6)

Elapsed Time Hours	Front Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
760	501.6	503.1	502.9	504.4	504.1	503.1	503.2	501.0	499.3
768	501.3	502.9	502.3	502.7	503.0	502.9	502.5	501.6	499.1
784	502.9	503.9	503.3	505.1	504.6	503.8	503.6	502.7	500.0
792	501.9	503.3	501.1	504.5	504.0	503.2	502.8	501.9	499.4
808	502.5	504.1	502.1	505.3	505.3	504.3	503.8	502.8	499.9
816	501.9	503.3	502.7	504.6	504.1	503.8	502.9	502.0	499.6
832	502.7	504.1	503.7	505.3	505.0	504.3	503.8	502.0	500.5
840	502.0	503.2	502.6	504.4	504.2	502.5	502.7	501.9	499.6
856	502.3	504.2	503.9	505.6	505.2	504.5	504.0	503.1	500.6
864	502.0	503.9	503.6	505.1	502.6	504.1	503.6	502.3	499.5
952	500.7	502.3	502.0	503.7	502.0	502.4	502.0	501.0	498.5
960	500.4	501.2	502.3	503.5	501.7	502.0	501.4	500.4	498.0
976	500.0	500.0	501.8	502.7	500.9	501.6	502.0	500.0	498.0
984	499.6	500.8	500.8	501.8	501.0	501.2	501.5	499.8	498.3
1000	499.9	501.2	501.2	501.8	501.7	501.5	501.8	500.3	498.6

Table 41. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and AM-350. Test Temperature - 500°F Nominal. Test Time - 1000 Hours (Sheet 4 of 6)

Elapsed Time Hours	Rear Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
0	499.8	500.4	501.1	501.6	500.7	501.1	501.1	500.5	500.7
6	500.2	500.6	501.5	502.1	501.4	501.6	501.6	500.8	500.5
22	500.0	500.6	501.9	501.9	501.0	501.5	500.0	500.6	501.2
30	499.8	500.5	501.2	501.8	501.7	501.4	501.3	500.6	500.3
102	498.9	499.6	500.3	501.0	500.1	500.6	500.4	499.8	499.2
118	499.4	500.1	501.1	501.6	500.4	501.0	500.9	500.4	499.7
126	499.7	500.3	501.2	500.5	500.7	501.1	500.8	500.4	499.7
142	500.4	501.7	502.6	501.6	501.7	502.2	501.7	500.7	500.4
150	499.7	500.2	502.1	501.6	500.8	500.9	501.3	500.7	500.4
166	499.8	500.3	501.5	501.8	501.1	501.7	501.6	498.6	497.8
174	499.8	499.4	501.4	501.3	501.3	501.3	501.5	499.0	502.2
190	500.0	500.6	501.8	501.9	501.0	501.4	501.1	500.4	500.0
198	500.0	500.5	503.0	501.8	502.0	501.6	501.0	500.4	500.4
262	499.9	500.4	501.5	501.7	500.9	501.3	500.8	500.0	500.5
270	499.8	500.3	500.9	501.5	501.2	501.1	501.6	500.1	499.7
286	500.1	500.2	501.4	500.4	501.1	500.2	500.8	500.1	500.0
294	500.2	500.3	501.1	501.5	500.8	501.2	500.0	500.0	499.8
310	500.2	499.3	501.7	501.7	500.7	501.3	501.6	500.1	500.7
318	499.8	500.4	501.7	501.8	500.7	501.2	500.8	500.2	499.8

Table 41. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and AM-350. Test Temperature - 500°F Nominal. Test Time - 1000 Hours (Sheet 5 of 6)

Elapsed Time Hours	Rear Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
334	500.4	500.6	502.0	501.9	501.0	499.9	501.0	500.4	500.3
342	500.0	501.8	502.4	501.2	502.0	501.2	500.7	500.1	500.2
358	500.5	500.7	502.2	501.8	501.0	501.5	500.9	500.4	500.8
366	499.9	500.2	501.3	501.6	501.0	501.0	500.0	500.3	499.8
430	500.0	500.0	501.0	501.6	500.3	500.8	500.7	501.0	499.6
438	499.5	499.0	501.3	501.3	500.5	500.8	500.5	500.7	499.7
454	500.0	500.2	501.2	501.7	501.1	501.1	500.8	500.0	500.0
462	499.8	499.9	500.7	501.1	500.3	500.7	500.4	499.6	499.4
480	501.4	500.2	501.2	501.3	500.9	501.2	500.5	499.7	500.2
488	500.0	500.4	501.0	501.5	501.9	501.2	500.6	499.9	500.1
512	500.3	500.4	501.1	501.6	500.7	501.2	500.7	500.0	500.1
536	499.9	500.1	501.1	501.4	501.0	500.9	500.5	499.9	499.8
624	499.9	500.1	500.7	501.5	500.7	501.2	500.3	499.9	500.0
640	501.0	499.6	500.4	501.0	500.4	500.4	500.8	499.4	499.3
648	500.0	499.9	502.6	501.5	501.0	501.9	500.7	499.8	499.2
664	499.2	498.8	500.6	499.9	500.6	500.8	499.7	498.3	499.4
672	499.3	499.7	500.7	500.3	501.0	500.6	500.3	499.8	499.5
688	499.7	500.4	500.8	501.3	500.9	501.9	500.7	499.8	499.7
696	499.2	499.8	500.9	499.3	500.9	500.8	499.9	499.4	499.8

Table 41. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and AM-350. Test Temperature - 500°F Nominal. Test Time - 1000 Hours (Sheet 6 of 6)

Elapsed Time Hours	Rear Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
760	499.1	499.5	500.1	500.6	500.3	501.7	500.4	499.1	498.3
768	500.1	500.2	501.6	501.7	501.2	501.2	501.0	499.9	500.0
784	500.1	499.1	500.9	501.2	501.1	502.1	500.8	500.4	499.9
792	500.3	500.3	501.0	501.8	501.4	500.3	501.1	500.5	500.1
808	500.4	499.5	501.3	501.6	501.4	502.6	500.2	500.6	500.1
816	500.5	500.7	501.5	502.1	501.6	501.8	501.3	500.3	500.3
832	499.0	501.3	501.4	500.0	501.3	501.7	502.4	500.7	500.9
840	500.1	500.0	501.2	503.0	500.9	500.5	500.3	499.2	499.8
856	499.9	499.4	501.1	501.7	501.4	502.0	501.0	500.4	500.2
864	499.9	499.5	500.7	501.4	501.0	500.9	500.2	501.1	499.2
952	500.4	501.7	502.6	501.6	501.7	502.2	501.7	500.7	500.5
960	500.2	501.4	501.7	501.7	501.7	502.0	500.9	500.4	500.2
976	500.0	500.5	501.2	501.8	501.8	501.8	500.6	500.2	500.0
984	499.8	500.0	501.0	501.6	501.5	501.5	500.8	500.0	500.0
1000	500.0	500.6	501.3	501.6	501.4	501.4	500.9	500.6	500.4

Table 42. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo
and AM 350. Test Temperature - 550° F Nominal. Test Time -
1000 Hours (Sheet 1 of 8)

Elapsed Time Hours	Front Test Channel Temperatures - ° F								
	1	2	3	4	5	6	7	8	9
0	550.9	553.0	552.5	554.0	552.6	552.0	551.7	551.9	548.9
16	549.9	550.8	551.4	553.2	553.1	551.8	551.8	551.2	548.6
24	550.7	552.7	553.9	554.2	554.5	551.9	554.5	552.9	549.9
88	551.0	552.6	551.7	553.8	552.2	552.6	551.9	551.5	548.9
96	550.3	551.4	553.4	552.7	552.5	551.6	552.2	551.9	549.5
112	549.6	550.6	552.6	550.7	551.6	552.4	550.1	550.6	547.3
120	549.7	550.5	551.7	553.2	552.9	551.4	552.1	551.1	548.0
136	549.2	551.9	550.6	553.2	552.9	550.6	551.8	550.2	548.6
144	549.7	551.9	550.8	552.9	552.8	551.5	550.7	550.6	548.1
264	548.7	549.4	548.2	554.3	553.1	551.6	554.0	551.7	548.9
272	553.9	556.9	555.2	557.8	556.5	554.6	554.8	552.7	552.1
288	552.0	552.1	554.0	552.5	553.1	553.8	552.0	549.8	551.1
296	552.9	550.3	552.4	553.5	550.2	549.5	550.1	548.7	548.0
315	552.4	551.5	553.4	554.3	551.8	550.8	552.4	550.4	548.1
320	554.8	553.6	553.0	555.2	552.7	552.5	553.2	551.9	550.0
336	551.5	552.1	552.5	554.8	551.9	552.0	552.5	550.5	549.7
360	554.3	552.9	554.0	555.3	552.2	551.8	552.9	550.4	548.3

Table 42. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and AM 350. Test Temperature - 550°F Nominal. Test Time - 1000 Hours (Sheet 2 of 8)

Elapsed Time Hours	Front Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
368	555.0	553.7	554.3	555.6	551.9	552.8	553.5	551.4	550.0
432	555.1	553.7	554.3	555.5	552.0	552.8	553.5	551.4	550.0
440	551.9	549.2	552.1	551.5	549.8	549.5	550.7	548.7	548.3
456	551.5	551.7	553.0	551.8	551.8	551.7	552.8	550.1	546.7
458	553.5	555.0	552.5	552.6	550.5	549.3	551.4	549.0	547.9
498	554.5	550.8	554.4	554.6	552.0	550.2	553.5	550.8	548.4
506	555.6	554.9	550.9	553.1	551.4	553.8	553.3	549.5	548.5
522	555.8	552.8	555.1	556.3	553.1	552.6	554.0	551.8	553.4
530	554.7	553.5	553.7	554.8	551.9	552.0	553.0	550.7	549.6
594	551.9	553.4	553.1	554.5	554.3	553.4	554.2	552.1	550.4
618	551.9	553.4	552.8	554.8	554.5	553.7	553.4	552.6	550.6
626	553.1	553.9	555.1	555.1	554.8	555.5	553.5	552.9	550.3
642	552.1	553.2	553.3	554.3	553.5	553.5	552.9	552.5	550.5
650	552.4	553.3	552.7	554.4	554.3	553.5	552.8	552.5	550.1
666	553.5	554.7	553.8	556.4	555.7	555.6	555.5	553.5	550.9
698	552.4	553.0	553.3	554.0	554.3	553.4	553.6	552.8	549.4
714	553.3	554.4	553.9	555.6	554.2	554.4	554.3	553.2	550.5

Table 42. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo
and AM 350. Test Temperature - 550°F Nominal. Test Time -
1000 Hours (Sheet 3 of 8)

Elapsed Time Hours	Front Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
722	552.2	554.2	552.7	554.5	554.3	554.3	553.2	552.4	549.8
738	553.0	553.9	554.3	556.3	556.3	554.3	553.3	554.6	549.2
746	550.4	551.8	549.3	554.7	554.6	552.2	552.7	553.0	552.0
786	552.8	554.3	554.3	555.6	555.4	554.4	554.4	553.3	550.3
794	552.2	553.5	552.9	554.7	554.2	554.5	553.5	552.6	549.9
810	553.3	554.4	554.2	555.5	555.5	555.2	554.3	553.3	550.1
818	552.2	553.4	552.9	554.6	554.2	553.4	553.3	552.4	549.0
834	553.4	554.8	553.9	555.1	555.3	554.3	554.6	553.4	550.1
842	552.6	554.1	553.4	552.1	554.4	551.4	553.1	552.2	548.9
858	552.4	554.8	553.8	554.8	554.4	554.4	553.8	552.9	550.1
866	553.6	554.8	554.7	555.1	555.0	554.5	554.1	553.3	550.4
930	553.0	554.0	553.7	555.1	554.9	553.8	554.5	552.1	549.3
938	552.1	553.3	552.6	554.4	554.1	553.2	553.1	552.1	548.9
954	552.2	553.3	553.0	554.6	554.5	553.5	553.4	552.4	549.9
962	552.0	552.9	553.4	554.0	553.8	552.8	552.9	552.1	548.8
978	551.8	553.7	553.3	554.6	554.4	553.6	553.5	552.3	549.6
986	552.5	553.5	553.3	554.4	555.4	553.0	553.4	552.3	548.9

Table 42. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and AM 350. Test Temperature - 550°F Nominal. Test Time - 1000 Hours (Sheet 4 of 8)

Elapsed Time Hours	Front Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
1002	551.9	553.4	553.5	552.7	552.6	553.2	553.3	552.3	549.9
1026	551.9	553.5	553.1	554.7	554.4	553.4	553.4	552.4	550.1
1034	551.9	553.2	553.1	554.4	554.0	554.6	553.2	552.2	549.0
1122	552.2	554.6	553.8	555.1	555.0	552.5	553.9	553.2	550.4
1130	552.0	553.4	553.4	554.3	555.2	554.0	553.3	552.2	548.3
1146	552.1	553.8	553.2	555.1	555.0	553.6	553.7	552.7	550.4
1154	551.3	553.0	552.8	552.2	554.0	551.3	552.9	552.9	550.1
1170	552.1	554.2	553.8	555.2	555.0	563.6	553.9	552.7	549.7
1178	551.4	553.2	552.9	554.0	552.7	553.1	553.1	551.6	549.2
1194	552.6	553.7	553.2	554.6	554.4	553.1	553.5	552.5	549.9
1202	551.4	553.0	552.5	554.1	553.8	551.1	552.8	552.2	548.6
1266	552.4	553.4	552.7	554.2	555.0	551.7	553.2	552.0	549.5
1290	556.5	556.8	555.8	555.4	554.0	553.0	554.8	554.2	555.1

Table 42. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and AM 350. Test Temperature - 550°F Nominal. Test Time - 1000 Hours (Sheet 5 of 8)

Elapsed Time Hours	Rear Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
0	550.9	551.5	554.2	552.6	551.0	552.4	551.7	551.2	549.7
16	550.2	550.1	551.2	552.4	551.7	551.5	550.2	549.5	548.9
24	549.4	549.8	551.2	550.8	551.4	550.7	552.1	552.0	550.5
88	550.6	550.8	552.0	552.8	551.9	552.2	551.1	550.6	549.5
96	550.2	550.8	551.8	552.8	552.2	552.2	551.6	551.3	549.6
112	550.4	550.5	551.4	552.5	551.9	551.1	549.9	549.6	549.0
120	550.3	550.1	551.9	550.5	551.4	551.3	550.6	550.4	548.9
136	550.6	550.8	551.8	552.7	552.2	553.4	550.4	550.5	549.1
144	549.9	550.5	551.8	552.6	552.2	551.9	550.9	550.9	549.5
264	561.6	562.2	564.3	564.8	563.5	563.5	559.9	559.4	560.3
272	556.6	554.5	562.8	554.9	555.3	552.6	553.8	554.0	552.9
288	552.9	554.0	555.0	553.8	555.3	553.6	553.3	551.2	552.8
296	551.8	550.0	550.9	549.1	549.5	551.2	550.3	549.0	553.5
315	553.1	552.0	552.5	551.4	551.0	553.7	553.6	552.0	554.5
320	555.0	552.7	552.5	551.4	551.0	553.7	553.6	552.0	554.5
336	555.5	554.5	557.3	552.7	551.8	554.2	554.0	553.2	555.0
360	554.5	554.0	557.0	554.0	552.7	551.5	553.8	553.3	555.0

Table 42. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and AM 350. Test Temperature - 550°F Nominal. Test Time - 1000 Hours (Sheet 6 of 8)

Elapsed Time Hours	Rear Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
368	554.2	554.7	553.0	550.3	549.9	552.6	552.5	551.2	553.4
432	555.2	554.7	554.2	550.9	551.1	553.8	553.4	551.7	554.4
440	551.8	550.0	551.2	548.4	548.3	549.2	550.8	547.9	550.7
456	551.6	547.7	552.9	551.5	550.0	549.0	546.8	547.3	547.2
458	552.3	547.6	553.4	551.0	549.2	548.5	548.4	547.4	547.5
474	555.6	554.6	554.1	551.9	551.7	553.3	553.7	548.5	553.3
498	553.5	550.0	553.6	550.6	550.3	553.5	553.7	551.1	552.9
506	552.2	548.8	552.5	552.6	551.1	549.4	547.7	547.6	547.6
522	555.8	554.7	555.1	550.0	552.7	554.0	554.4	551.7	554.7
530	552.9	552.4	554.0	553.7	550.5	552.7	552.1	550.2	552.3
594	552.3	552.5	554.3	554.5	554.2	554.2	553.3	552.9	551.7
618	552.0	552.6	554.1	554.6	554.1	554.2	553.5	552.8	552.1
626	551.8	552.4	554.0	554.3	553.7	553.8	553.3	551.8	551.4
642	552.3	552.7	554.4	554.3	554.0	554.0	553.1	552.0	551.2
650	551.4	552.9	554.4	554.4	554.2	552.2	553.3	552.4	551.1
666	552.9	553.5	555.1	555.8	554.7	554.8	553.8	553.2	551.8
698	551.9	553.2	554.0	554.6	554.3	554.4	555.1	552.7	551.5

Table 42. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and AM 350. Test Temperature - 550°F Nominal. Test Time - 1000 Hours (Sheet 7 of 8)

Elapsed Time Hours	Rear Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
714	552.8	553.0	554.0	555.2	554.2	554.3	555.4	552.5	551.4
722	552.5	552.6	553.9	554.8	553.9	554.2	553.0	551.8	551.1
738	553.1	554.5	553.5	557.5	557.0	556.8	554.9	553.8	551.4
746	551.7	553.5	554.3	556.5	555.5	556.9	554.5	553.3	552.8
786	552.7	553.1	554.1	554.7	554.2	554.3	553.9	553.0	551.5
794	551.7	552.2	553.3	554.0	553.8	554.0	552.9	552.4	550.9
810	552.3	553.6	554.8	554.8	553.9	554.5	553.6	552.2	551.8
818	552.2	552.4	554.1	554.4	553.8	553.9	553.0	552.0	551.2
834	552.8	552.9	555.2	555.2	554.8	554.2	553.8	552.7	551.7
842	551.9	552.4	553.6	554.5	553.9	554.0	553.0	552.0	551.1
858	551.8	552.7	554.3	554.3	554.4	554.3	553.5	552.5	551.6
866	552.2	552.1	553.6	554.3	554.6	554.1	553.4	552.9	551.8
930	552.2	552.1	553.6	554.3	554.6	554.1	553.4	552.9	551.8
938	552.5	552.6	554.3	554.6	553.4	554.1	553.3	551.8	550.0
954	552.0	552.4	553.6	554.3	553.9	554.1	553.5	554.1	551.2
962	552.2	551.5	554.0	554.5	554.2	554.1	553.1	551.9	550.7
978	553.6	552.3	554.0	554.4	553.8	553.5	553.5	552.9	551.8

Table 42. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo
and AM 350. Test Temperature - 550°F Nominal. Test Time -
1000 Hours (Sheet 8 of 8)

Elapsed Time Hours	Rear Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
986	551.8	552.4	554.4	554.5	554.4	554.2	551.9	552.7	551.2
1002	552.7	552.3	554.2	554.3	554.0	553.9	553.1	551.9	550.5
1026	551.4	552.0	554.3	555.4	554.1	554.1	553.0	551.8	551.2
1134	550.9	551.6	552.7	553.5	553.2	553.4	552.5	551.8	550.5
1122	552.0	552.0	554.6	554.4	553.8	554.0	553.4	552.4	551.0
1130	551.8	552.2	553.3	555.1	553.3	553.0	552.7	552.2	550.8
1146	552.3	552.5	554.5	554.5	554.9	553.8	553.3	552.6	551.3
1154	551.9	552.0	553.5	554.2	553.6	553.6	552.7	551.8	550.8
1170	552.2	552.5	553.8	554.4	554.0	554.2	553.2	552.2	551.3
1178	552.0	552.3	554.0	554.3	553.8	554.0	552.9	552.5	550.9
1194	552.2	552.5	554.1	554.5	554.7	553.9	552.1	552.5	550.1
1202	551.9	552.1	552.2	554.4	553.6	553.7	552.8	552.4	551.3
1266	552.3	552.7	554.4	554.5	554.1	551.2	551.2	551.7	550.9
1290	552.8	551.7	552.0	547.3	547.3	547.3	548.1	549.1	547.1

Table 43. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and AM 350. Test Temperature - 600°F Nominal. Test Time 1000 Hours (Sheet 1 of 8)

Elapsed Time Hours	Front Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
0	603.0	603.7	604.7	605.4	605.6	603.6	605.6	604.0	601.5
8	602.8	603.2	603.9	605.1	605.4	603.4	605.2	603.7	601.0
24	602.8	603.1	603.8	605.1	603.7	603.3	605.0	603.7	600.9
32	602.1	603.6	604.5	605.0	605.0	603.1	605.1	603.3	600.9
48	601.5	603.3	601.6	604.5	604.2	603.3	603.1	602.2	600.2
56	600.9	602.3	601.4	603.6	601.9	602.2	599.9	601.4	599.0
72	602.0	603.6	601.4	604.3	604.1	602.6	603.0	601.9	600.1
80	601.0	602.4	602.3	603.6	603.3	602.3	602.3	601.5	599.5
96	601.9	603.0	602.6	604.3	604.2	603.2	602.0	602.1	599.8
160	602.5	603.6	601.7	604.7	602.5	603.4	603.5	602.5	600.1
168	601.5	602.5	602.3	603.7	602.5	602.3	602.5	601.6	598.7
184	601.9	603.1	603.0	604.3	604.0	602.7	603.2	602.1	599.0
192	601.8	603.1	602.2	604.2	604.1	603.2	602.9	602.9	599.0
208	602.1	603.1	602.8	603.1	603.1	603.0	603.1	602.2	600.0
216	601.2	602.2	600.4	603.4	603.2	602.1	600.8	601.3	599.2
232	601.9	602.9	601.6	603.7	603.7	602.7	602.9	602.1	599.0
240	601.5	602.2	602.2	603.2	602.5	602.6	601.4	601.6	599.7

Table 43. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo
and AM 350. Test Temperature - 600°F Nominal. Test Time -
1000 Hours (Sheet 2 of 8)

Elapsed Time Hours	Front Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
256	601.9	603.2	603.1	604.3	604.1	603.0	603.0	602.0	599.9
264	600.5	602.1	601.1	603.4	602.1	602.2	602.1	601.2	598.6
328	601.3	602.9	602.6	602.9	603.9	602.9	603.1	601.8	600.3
336	600.8	602.1	601.7	602.3	603.2	602.2	601.2	600.1	599.0
352	601.1	602.6	602.4	603.8	603.6	602.7	602.5	601.6	600.2
360	600.9	602.6	602.4	603.6	603.3	601.8	602.4	600.3	599.4
376	602.7	602.8	602.3	604.0	602.9	602.6	601.8	601.8	599.5
384	600.9	601.9	601.0	603.4	603.1	601.1	601.8	601.0	599.4
400	601.5	603.0	602.6	602.9	604.0	603.1	602.0	601.8	600.1
408	601.4	602.6	602.4	602.7	603.5	602.6	601.5	601.7	599.3
424	602.2	602.8	601.2	604.0	603.8	602.6	602.9	601.8	600.0
432	600.6	601.5	602.3	603.4	603.2	602.1	601.3	601.4	599.4
498	602.5	605.0	603.3	604.7	604.5	604.0	603.9	600.5	598.8
506	600.4	602.0	601.2	603.3	601.9	602.0	602.1	601.3	599.2
522	601.8	602.6	602.4	603.8	602.6	602.7	602.6	601.5	599.7
530	600.5	602.4	602.6	603.5	601.7	601.8	602.0	600.0	598.6
554	600.6	601.3	601.6	603.3	602.9	602.4	602.0	601.0	599.0

Table 43. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo
and AM 350. Test Temperature - 600°F Nominal. Test Time -
1000 Hours (Sheet 3 of 8)

Elapsed Time Hours	Front Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
562	599.5	600.8	602.0	602.2	600.8	601.6	600.3	601.0	598.4
578	599.2	602.7	602.3	603.6	603.3	601.8	602.6	600.4	598.8
586	599.6	601.0	601.2	603.2	603.0	601.8	601.9	600.8	598.5
602	602.9	604.3	603.8	604.1	602.9	601.3	601.8	600.4	599.6
610	599.7	601.9	601.9	603.3	601.5	601.3	601.9	600.7	598.4
674	600.0	602.7	602.1	603.8	603.6	602.4	601.5	601.6	599.5
682	599.4	602.2	602.4	603.5	603.3	602.3	602.3	601.4	599.2
698	599.7	602.4	602.0	603.8	603.5	602.2	601.1	601.5	599.4
706	599.0	601.7	601.0	602.9	601.7	601.4	601.6	600.7	598.6
722	599.8	602.3	602.4	603.9	603.6	602.7	602.6	601.7	599.5
730	599.2	601.9	601.2	603.0	602.8	601.6	601.9	600.9	600.1
746	600.2	602.4	602.1	603.9	603.6	602.7	601.5	601.6	599.4
754	599.4	602.1	601.6	603.3	603.0	601.8	602.1	601.2	598.5
770	600.0	603.0	602.6	603.9	603.5	602.3	602.6	601.5	599.6
822	599.6	601.3	602.1	603.4	603.1	601.6	600.8	601.0	598.7
842	599.9	602.5	601.3	603.5	603.2	602.1	601.3	601.1	598.9
850	599.2	602.0	600.5	603.1	602.6	601.7	601.8	601.8	598.2

Table 43. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo,
and AM 350. Test Temperature - 600°F Nominal. Test Time -
1000 Hours (Sheet 4 of 8)

Elapsed Time Hours	Front Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
866	599.2	601.8	601.3	603.0	602.4	601.1	600.7	599.6	598.2
874	598.9	601.4	601.0	602.6	601.7	601.0	601.4	599.2	598.3
890	599.4	601.8	602.0	603.3	602.8	601.9	601.9	601.0	597.8
898	598.9	601.1	601.1	601.3	602.5	601.3	599.2	600.6	597.8
914	600.2	602.4	601.8	603.6	603.5	602.5	601.6	601.2	598.7
922	599.6	602.0	602.9	603.5	603.3	602.2	601.8	601.4	598.3
938	600.8	603.3	602.7	604.5	604.1	603.1	603.4	602.3	599.3
1002	600.2	601.9	602.3	602.8	603.8	602.8	602.8	601.8	599.2
1018	599.4	601.2	601.0	602.7	602.7	601.8	601.3	601.0	598.5

Table 43. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo
and AM 350. Test Temperature - 600°F Nominal. Test Time -
1000 Hours (Sheet 5 of 8)

Elapsed Time Hours	Rear Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
0	600.1	600.9	602.1	603.1	602.9	602.7	601.9	601.3	599.9
8	599.0	600.2	601.3	602.5	602.4	602.0	601.2	600.8	599.3
24	599.5	600.5	601.7	602.8	602.7	602.2	601.3	600.9	599.5
32	599.1	600.1	601.4	602.4	602.1	603.2	601.2	602.3	599.9
48	599.3	599.4	601.7	602.5	602.4	602.1	601.2	600.9	600.0
56	599.5	600.3	601.3	602.5	602.1	602.1	601.1	601.8	599.8
72	599.2	600.5	601.6	602.5	602.3	602.3	601.4	601.1	599.5
80	598.7	600.1	601.5	602.4	601.9	602.0	601.1	600.7	599.7
96	600.2	600.9	602.4	603.0	602.0	601.5	601.7	601.2	600.5
160	598.8	600.5	602.1	602.6	602.2	602.2	601.3	600.9	600.2
168	599.4	600.3	602.0	602.4	601.4	602.0	600.5	600.6	599.8
184	599.9	600.7	602.3	602.6	602.3	603.5	601.5	600.6	600.2
192	599.3	600.2	601.2	601.6	601.7	603.0	601.1	600.6	599.8
208	599.6	600.4	601.4	602.4	601.5	602.2	601.3	600.8	600.0
216	599.8	600.4	601.6	602.5	601.6	603.0	601.4	601.0	599.9
232	599.7	600.7	601.9	602.6	601.8	602.4	601.0	600.8	599.7
240	597.9	599.2	601.3	602.2	601.2	602.0	601.1	600.7	599.6

Table 43. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and AM 350. Test Temperature - 600° F Nominal. Test Time - 1000 Hours (Sheet 6 of 8)

Elapsed Time Hours	Rear Test Channel Temperatures - ° F								
	1	2	3	4	5	6	7	8	9
256	598.3	600.5	602.1	600.1	602.1	602.2	601.4	601.0	600.2
264	598.0	600.1	601.4	602.3	601.4	601.9	601.1	600.7	599.7
328	599.8	600.6	602.5	602.4	602.0	602.2	601.8	601.0	599.7
336	599.5	600.3	601.4	602.2	601.7	601.9	601.1	600.7	599.7
352	599.8	600.5	601.5	602.4	602.0	602.2	600.8	600.9	599.9
360	599.8	600.4	601.6	602.5	601.9	602.1	601.4	601.1	601.0
376	599.4	600.3	601.8	602.4	602.0	602.1	601.3	600.8	599.9
384	599.3	600.4	601.6	602.5	602.1	602.1	602.3	602.3	600.5
400	599.5	600.6	601.8	602.6	602.1	602.3	601.3	600.9	599.7
408	599.3	600.3	601.6	602.3	601.9	602.0	601.1	600.9	599.8
424	599.0	600.3	601.5	602.1	601.7	601.9	602.2	601.2	599.3
432	599.1	600.2	601.9	601.8	601.8	601.8	601.0	601.0	599.5
498	599.5	600.8	601.8	602.4	602.0	602.2	601.4	600.9	599.7
506	598.8	600.0	601.3	601.9	601.3	601.9	601.0	600.5	599.1
522	599.4	600.4	601.7	602.3	601.6	601.8	601.2	600.8	599.3
530	599.4	600.6	601.8	602.6	601.9	601.9	601.4	600.6	599.4
554	598.9	600.0	601.8	600.5	601.6	602.9	601.0	600.5	599.1

Table 43. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo
and AM 350. Test Temperature - 600° F Nominal. Test Time -
1000 Hours (Sheet 7 of 8)

Elapsed Time Hours	Rear Test Channel Temperatures - ° F								
	1	2	3	4	5	6	7	8	9
562	599.5	600.4	601.7	602.4	601.5	602.2	601.3	600.8	599.4
578	597.3	600.3	602.0	600.2	601.5	601.7	601.3	600.9	599.5
586	599.0	600.2	601.4	602.1	601.5	601.8	601.0	600.3	598.8
602	598.0	600.3	602.2	602.2	601.2	601.9	600.6	600.5	599.2
610	598.8	599.9	601.2	602.0	601.1	600.5	600.7	601.1	598.7
674	599.9	600.9	602.3	602.8	602.5	602.5	601.8	601.3	599.9
682	599.3	600.7	603.7	602.7	602.2	602.4	601.5	602.5	600.0
698	599.4	600.6	602.0	602.2	602.1	602.3	601.4	601.0	599.4
706	599.8	600.6	601.8	602.6	601.7	602.3	601.3	600.8	599.3
722	599.0	600.6	601.6	602.6	602.1	602.1	602.8	600.9	599.4
730	599.2	600.4	601.6	602.5	600.8	602.1	601.2	600.7	599.2
746	597.9	600.8	602.6	602.8	602.0	602.6	601.7	601.2	600.3
754	597.5	600.9	602.1	602.8	602.4	602.6	601.6	601.2	600.1
770	599.6	599.7	600.7	601.8	600.2	601.5	601.4	599.7	598.8
822	596.5	600.0	601.2	601.9	601.4	602.3	601.8	599.9	598.2
842	599.6	600.7	602.4	601.3	602.4	602.6	601.3	601.2	599.7
850	598.5	599.7	601.5	601.8	601.3	601.5	600.6	600.1	598.8

Table 43. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo
and AM 350. Test Temperature - 600°F Nominal. Test Time -
1000 Hours (Sheet 8 of 8)

Elapsed Time Hours	Rear Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
866	599.5	600.6	602.4	602.7	602.3	602.4	601.4	600.9	599.5
874	598.9	599.9	601.3	602.1	601.6	601.9	601.9	600.5	599.4
890	599.1	600.2	602.0	602.3	601.9	602.0	601.0	600.6	599.5
898	599.2	600.3	601.6	602.2	602.0	602.1	601.1	600.7	600.1
914	599.4	600.5	602.5	600.7	602.1	602.4	601.5	602.4	600.2
922	599.4	600.4	602.2	600.1	601.8	602.1	601.2	600.7	600.8
938	598.9	600.2	601.6	600.6	601.8	602.4	602.5	600.9	600.8
1002	598.8	599.9	601.2	602.0	601.5	601.7	600.6	600.2	599.2
1018	599.0	600.0	601.3	602.1	601.7	601.9	601.0	599.1	599.6

Table 44. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and AM-350. Test Temperature - 650°F Nominal. Test Time - 1000 Hours (Sheet 1 of 6)

Elapsed Time Hours	Front Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
0	651.1	651.7	652.9	653.7	652.9	653.3	652.2	651.8	650.6
8	651.2	651.4	652.8	653.5	652.7	653.0	651.9	651.8	650.7
24	648.8	651.4	652.9	653.6	653.3	653.3	652.0	651.5	650.7
32	650.7	650.9	652.1	653.3	652.9	652.7	651.8	651.3	651.2
48	652.2	652.8	654.4	653.5	654.3	654.4	653.3	653.2	651.8
160	651.7	652.2	653.6	654.6	654.0	653.8	653.1	652.5	651.4
168	651.6	651.6	653.2	654.2	653.7	653.6	652.6	652.3	651.1
184	651.7	652.0	653.4	654.2	654.0	654.6	652.7	652.4	651.7
190	651.3	652.1	653.1	654.0	653.3	654.5	653.2	652.5	651.3
208	651.9	653.7	654.9	652.6	654.5	654.5	654.1	652.9	652.8
216	650.9	651.5	652.8	653.8	653.1	654.2	653.8	651.9	651.4
232	650.8	649.9	653.5	654.0	653.5	653.6	652.5	652.3	651.0
240	651.8	651.8	652.9	654.0	653.3	653.7	652.4	653.9	651.0
256	651.7	652.6	654.0	654.3	653.9	653.7	654.0	652.9	651.6
320	653.3	655.0	656.7	658.1	656.2	656.3	655.0	655.2	652.7
328	649.0	650.2	651.7	652.2	651.2	651.6	650.6	650.3	648.8
344	650.8	651.3	652.9	651.7	653.0	652.7	651.7	651.4	650.0
352	650.4	651.1	652.8	653.4	653.0	653.0	651.7	651.5	649.9

Table 44. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and AM-350. Test Temperature - 650°F Nominal. Test Time - 1000 Hours (Sheet 2 of 6)

Elapsed Time Hours	Front Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
368	649.8	650.6	652.4	653.1	652.5	652.5	651.7	651.4	649.7
376	649.8	650.7	652.4	651.7	652.9	653.6	651.6	651.1	649.6
392	650.4	651.0	652.9	652.9	652.9	652.6	651.6	651.3	649.5
400	650.0	651.1	652.6	653.1	653.1	653.9	651.6	651.3	650.9
416	649.8	650.8	652.4	652.9	653.0	652.5	652.7	651.7	649.6
424	650.0	650.9	652.3	653.0	653.0	652.5	652.0	650.8	649.5
488	649.0	650.2	651.8	651.9	652.0	651.7	650.6	650.1	648.5
496	650.2	651.1	652.4	653.3	652.3	653.9	651.8	651.5	649.8
512	650.1	651.5	653.3	653.6	653.6	653.1	652.2	651.7	652.2
520	650.1	650.4	652.3	651.6	652.9	652.0	651.8	651.2	649.5
536	650.2	651.3	653.2	653.7	653.9	654.0	652.8	652.0	651.6
544	649.6	650.6	652.6	653.0	652.9	652.6	651.6	650.8	649.5
560	650.2	651.0	652.8	653.5	653.4	652.8	652.0	651.7	650.0
568	649.0	650.3	651.7	652.8	652.6	653.3	653.1	652.5	649.2
632	649.5	658.7	652.5	653.1	653.1	652.6	651.4	651.2	649.5
640	649.4	650.8	653.6	653.1	653.1	652.6	652.9	649.3	648.7
656	649.5	651.2	652.8	653.3	653.3	652.8	651.4	651.3	649.6
664	650.5	650.8	652.3	653.0	653.0	652.4	651.5	651.0	650.1

Table 44. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and AM-350. Test Temperature - 650°F Nominal. Test Time - 1000 Hours (Sheet 3 of 6)

Elapsed Time Hours	Front Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
680	649.3	650.9	652.4	652.9	652.9	652.5	650.9	651.1	649.9
688	649.1	650.6	652.1	652.9	652.7	653.3	651.5	651.0	649.7
704	650.1	651.4	653.1	653.5	653.2	653.4	652.2	651.7	650.5
712	649.3	651.2	652.7	651.8	652.0	651.5	651.8	651.5	649.4
848	648.9	650.1	652.2	652.8	652.6	652.5	651.4	650.9	649.8
856	650.1	651.2	653.9	653.9	654.1	653.1	542.5	652.1	650.2
872	650.6	652.4	653.0	653.8	653.6	653.3	652.7	652.0	650.2
880	650.5	651.6	653.8	653.7	653.3	653.0	652.4	651.9	649.5
896	650.5	652.0	654.0	653.8	653.4	652.3	652.2	651.9	650.2
904	650.6	652.2	653.4	653.7	653.4	653.2	652.4	650.1	647.9
1016	652.3	651.7	653.6	653.4	652.2	652.6	651.7	651.7	649.7

Table 44. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and AM 350. Test Temperature - 650° F Nominal. Test Time - 1000 Hours (Sheet 4 of 6)

Elapsed Time Hours	Rear Test Channel Temperatures - ° F								
	1	2	3	4	5	6	7	8	9
0	INSTRUMENTATION TAKEN OUT OF SERVICE AT START OF								
8	TEST FOR REPAIR AND RECALIBRATION. TEMPERATURE								
24	READINGS NOT RECORDED								
32									
48									
160	650.4	652.5	652.6	652.9	653.4	652.6	652.8	652.0	649.5
168	649.6	652.0	651.1	653.5	652.3	651.9	651.4	651.3	648.3
184	650.4	652.8	650.6	653.8	653.9	652.4	652.3	652.1	648.5
190	650.5	652.7	651.6	654.0	653.6	651.5	652.1	651.8	648.3
208	651.7	653.5	653.6	654.9	655.2	654.6	654.7	652.4	651.3
216	650.3	652.3	649.5	653.4	653.2	651.4	651.7	651.5	647.8
232	651.1	653.1	652.4	654.2	653.1	652.6	652.5	651.9	649.0
240	651.8	651.8	652.9	654.0	653.3	653.7	652.4	653.9	651.0
256	650.8	652.7	650.3	653.3	653.4	652.4	652.6	651.8	650.7
320	653.4	655.5	655.7	656.8	656.7	655.0	655.6	654.7	651.7
328	649.4	650.3	651.0	651.5	651.9	649.9	650.5	648.5	645.9
344	649.6	652.0	652.2	653.1	653.9	650.9	650.7	651.0	649.9
352	650.1	652.3	651.9	653.4	653.2	654.6	652.2	649.9	647.1

Table 44. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and AM 350. Test Temperature - 650°F Nominal. Test Time - 1000 Hours (Sheet 5 of 6)

Elapsed Time Hours	Rear Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
368	649.9	651.4	651.4	653.1	652.8	650.7	651.5	650.3	647.6
376	649.6	651.4	649.1	652.0	651.9	650.1	650.9	650.0	647.3
392	650.2	651.5	651.1	652.1	651.3	650.3	650.9	649.9	648.1
400	649.6	651.4	650.5	652.1	652.3	650.6	651.0	648.8	649.4
416	649.3	651.2	651.2	652.1	652.2	650.5	650.9	649.6	647.4
424	648.8	650.8	648.6	651.7	651.5	649.6	650.3	649.2	646.7
488	648.8	650.5	650.6	647.5	651.4	649.5	650.1	647.9	647.0
496	649.1	651.1	649.1	652.2	652.1	650.7	651.0	649.9	647.4
512	649.5	651.5	650.8	652.6	652.5	650.7	651.1	650.0	647.6
520	648.5	651.6	649.9	650.6	651.6	650.2	649.9	649.0	646.7
536	648.9	651.1	647.5	652.6	652.3	650.9	651.0	649.9	648.9
544	648.9	649.7	650.5	652.2	651.0	651.1	650.7	649.6	647.1
560	648.8	650.7	650.3	652.2	651.6	650.6	650.1	649.5	647.5
568	649.2	651.1	649.1	652.4	651.9	650.5	650.7	650.1	649.0
632	650.3	649.4	651.5	653.1	652.8	651.0	651.4	650.4	648.9
640	649.5	651.8	651.5	653.1	652.7	651.0	651.5	650.5	647.7
656	650.4	652.0	649.7	653.2	652.5	651.7	651.7	650.8	647.8
664	650.3	652.3	649.3	653.0	652.8	651.0	651.4	650.6	647.1

Table 44. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo
and AM 350. Test Temperature - 650°F Nominal. Test Time -
1000 Hours (Sheet 6 of 6)

Elapsed Time Hours	Rear Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
680	648.9	651.8	651.6	652.4	653.1	651.9	651.3	650.3	647.6
688	649.5	651.8	652.5	652.9	652.8	650.9	651.4	650.4	647.7
704	650.0	652.3	651.8	653.5	652.3	651.8	651.9	650.9	648.9
712	649.7	651.2	651.8	653.3	653.0	651.2	651.8	650.7	648.0
848	650.7	652.2	652.4	653.8	653.3	651.9	652.1	651.2	648.5
856	651.3	653.2	652.8	654.5	654.3	653.4	653.1	652.0	648.1
872	650.9	652.4	651.3	653.6	653.4	652.8	652.2	651.2	647.9
880	650.5	652.2	652.3	653.2	653.3	652.0	649.7	650.8	649.1
896	650.2	652.5	652.0	653.4	653.4	652.2	651.1	650.9	648.4
904	650.5	652.6	652.0	653.6	653.4	652.3	652.1	650.9	647.7
1016	650.3	652.3	651.2	653.5	653.4	652.0	649.8	649.8	

Table 45. Onset of Creep Stress Measurement of AM 355 and Maraging Steel.
 Test Temperature - 450° F Nominal. Test Time - 1000 Hours
 (Sheet 1 of 6)

Elapsed Time Hours	Front Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
0	451.3	453.5	542.6	453.6	453.8	453.4	451.8	451.1	450.2
8	451.8	453.2	452.1	452.6	453.1	450.8	450.6	451.1	449.2
24	450.1	450.2	448.8	449.5	450.0	449.7	447.8	447.3	447.0
32	451.5	451.5	451.2	451.9	451.6	451.4	450.0	449.6	447.7
48	456.1	457.8	457.4	457.8	458.1	457.0	455.8	455.8	453.5
56	454.3	455.2	455.3	456.3	456.0	455.4	453.8	453.8	451.9
72	453.9	455.8	455.1	454.6	456.1	455.7	452.7	453.1	452.1
80	454.5	456.1	455.6	456.2	456.3	456.1	454.1	454.0	452.9
144	451.6	452.6	453.5	453.9	454.1	453.5	451.2	451.2	450.1
152	455.8	457.3	456.8	457.7	458.0	458.2	456.7	455.0	453.5
168	454.6	453.3	456.3	456.4	454.6	456.1	454.1	453.0	452.5
176	454.1	454.9	455.5	455.9	455.7	455.4	453.6	453.5	451.9
216	451.1	456.8	456.4	455.0	456.8	456.7	454.7	455.3	452.9
224	454.2	456.0	455.4	455.6	456.2	454.4	453.8	453.6	451.8
240	453.3	455.1	455.1	454.9	454.4	454.1	452.6	451.9	451.9
248	453.9	453.4	455.4	455.6	455.6	454.6	454.2	452.9	451.7
312	453.5	455.2	455.2	455.1	455.1	454.8	453.0	453.0	452.9
320	454.4	456.1	454.3	455.9	455.8	456.2	454.7	453.8	452.1

Table 45. Onset of Creep Stress Measurement of AM 355 and Maraging Steel.
 Test Temperature - 450°F Nominal. Test Time - 1000 Hours
 (Sheet 2 of 6)

Elapsed Time Hours	Front Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
328	452.2	456.4	456.1	456.5	455.4	456.0	454.2	453.8	452.7
380	453.5	455.4	454.5	455.5	455.5	454.0	453.0	453.0	453.8
384	454.2	455.9	455.9	456.2	455.9	455.7	453.8	453.1	451.8
400	454.5	455.6	456.5	457.2	456.8	455.8	454.5	455.1	454.0
408	454.0	455.9	456.0	456.2	456.3	454.3	454.3	453.6	452.4
496	453.5	455.4	455.7	455.0	455.5	455.2	453.4	451.9	451.6
520	453.5	454.5	455.4	455.3	455.4	455.0	453.1	450.3	450.5
528	456.4	458.2	458.2	458.1	458.4	456.6	456.3	456.1	454.3
536	457.4	459.1	458.9	458.7	458.8	457.3	457.5	456.8	454.8
544	455.0	457.2	457.2	457.2	457.3	456.2	455.3	455.1	454.0
560	454.9	456.9	456.9	456.8	456.9	454.2	454.6	454.3	453.0
568	454.0	455.8	455.9	455.8	456.1	455.4	454.1	453.8	452.4
632	455.6	457.1	457.2	457.3	457.4	457.2	455.7	455.1	453.0
640	453.8	455.2	455.4	455.6	455.6	455.4	455.6	452.1	453.9
656	450.7	452.1	452.9	453.5	453.5	453.2	451.6	450.9	449.3
674	454.2	455.4	456.3	456.3	457.1	456.1	453.7	453.4	455.0
690	454.7	456.5	456.6	456.4	456.5	455.9	454.7	453.7	454.3
698	454.8	456.3	456.3	456.1	456.1	455.8	454.4	453.7	451.9

Table 45. Onset of Creep Stress Measurement of AM 355 and Maraging Steel.
 Test Temperature - 450° F Nominal. Test Time - 1000 Hours
 (Sheet 3 of 6)

Elapsed Time Hours	Front Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
714	541.2	453.3	453.2	453.2	453.1	452.5	451.3	450.6	451.0
722	452.5	454.2	454.1	454.3	454.3	452.7	451.7	451.3	450.2
738	452.8	454.5	454.7	454.8	454.7	454.2	452.3	451.0	452.8
746	453.2	455.2	455.6	455.2	455.6	454.6	452.6	452.3	451.9
810	451.2	455.1	455.3	455.4	454.2	452.8	452.9	452.8	452.0
818	453.5	455.2	455.3	455.2	454.7	455.5	452.8	452.6	452.1
834	451.6	453.3	452.4	453.3	453.2	453.7	451.5	452.0	449.5
842	451.7	453.2	453.6	453.7	453.8	452.7	451.4	450.9	450.0
858	453.4	454.6	455.1	455.6	455.4	454.0	453.0	451.8	451.5
874	453.0	453.4	455.0	455.1	454.9	454.6	452.7	452.5	451.2
882	454.1	455.8	456.1	455.7	455.7	455.9	453.6	453.3	451.6
898	452.2	454.3	452.6	453.9	453.8	453.6	452.0	452.3	450.8
906	452.7	454.1	454.4	453.6	453.1	453.1	452.1	451.8	450.5
970	450.1	451.8	451.9	452.0	451.6	451.4	449.7	449.7	448.3
978	454.7	456.4	456.3	456.4	456.3	456.0	454.1	453.8	449.9
1002	453.8	455.5	455.6	455.8	455.9	455.3	453.1	451.8	451.9
1010	453.7	455.3	455.2	455.1	455.1	455.1	453.4	453.5	451.5

Table 45. Onset of Creep Stress Measurement of AM 355 and Maraging Steel.
 Test Temperature - 450°F Nominal. Test Time - 1000 Hours
 (Sheet 4 of 6)

Elapsed Time Hours	Rear Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
0	448.9	447.8	450.4	448.9	448.7	449.3	448.6	448.3	448.4
8	445.9	444.3	447.3	445.5	445.9	446.0	445.8	445.1	445.4
24	448.0	446.7	449.4	447.1	447.1	446.9	447.1	447.5	446.8
32	447.1	447.3	449.7	446.9	447.1	447.3	447.1	445.6	446.3
48	449.0	447.3	449.0	448.9	448.6	448.9	448.8	448.3	448.4
56	448.5	446.6	449.7	447.0	447.8	448.6	448.6	448.1	448.0
72	449.9	448.3	451.1	449.6	449.3	449.9	449.7	449.2	449.2
80	449.0	448.0	451.2	449.8	449.4	450.1	449.9	450.5	449.6
144	449.8	449.2	451.6	449.8	449.1	450.4	448.8	449.1	449.2
152	450.0	448.1	451.2	449.6	449.5	450.9	449.9	449.5	449.4
168	451.1	449.1	452.0	450.3	450.3	450.8	449.9	449.9	449.8
176	450.8	448.9	451.8	450.5	450.2	450.6	450.6	450.2	450.2
216	451.0	449.8	455.2	450.7	450.6	451.9	451.0	450.5	450.6
224	499.6	448.8	451.7	450.5	449.9	450.7	449.8	449.9	450.7
240	451.0	449.4	450.3	450.7	450.3	450.8	451.0	450.2	450.2
248	450.9	449.0	452.0	450.6	449.9	450.9	450.8	450.4	450.2
312	450.5	448.8	451.7	450.2	449.3	449.3	450.2	449.8	449.7
320	450.4	448.7	451.7	450.1	449.3	449.8	450.0	449.7	450.9

Table 45. Onset of Creep Stress Measurement of AM 355 and Maraging Steel.
 Test Temperature - 450° F Nominal. Test Time - 1000 Hours
 (Sheet 5 of 6)

Elapsed Time Hours	Rear Test Channel Temperatures - ° F								
	1	2	3	4	5	6	7	8	9
328	450.7	448.4	452.4	450.3	450.7	450.6	451.2	450.1	450.2
380	450.2	447.9	451.1	449.5	449.0	449.7	450.2	450.6	449.3
384	450.5	448.9	450.2	448.5	450.1	449.7	450.4	449.8	449.9
400	450.0	447.9	451.3	449.5	449.2	449.5	459.7	449.1	450.2
408	448.8	448.2	450.1	449.8	449.5	450.2	448.9	449.5	449.5
496	449.9	448.3	450.8	449.8	449.7	450.0	450.1	448.0	449.4
520	450.2	447.8	451.4	450.0	449.4	450.0	450.0	449.5	449.5
528	446.7	444.9	444.8	446.2	446.1	445.9	446.0	444.6	446.6
536	446.7	445.0	447.6	446.3	446.0	446.3	446.5	445.9	445.8
544	446.7	444.7	447.5	444.7	446.2	446.6	446.7	445.9	446.0
560	447.3	445.6	448.5	447.1	446.7	447.1	447.2	446.4	446.7
568	447.3	445.4	442.8	446.7	446.5	446.9	447.1	446.6	446.5
632	449.4	447.8	444.7	448.6	448.7	449.2	449.2	448.8	448.8
640	449.8	448.2	449.6	449.3	449.7	449.0	449.7	449.2	449.2
656	449.3	447.6	449.5	448.5	448.3	448.1	449.0	457.5	447.2
674	449.4	447.0	450.0	448.7	448.6	448.9	449.3	447.1	447.6
690	449.4	448.8	450.4	448.6	448.9	449.2	449.5	448.9	448.6
698	449.2	448.2	450.6	448.6	448.9	449.5	448.6	448.9	448.9

Table 45. Onset of Creep Stress Measurement of AM 355 and Maraging Steel.
 Test Temperature - 450°F Nominal. Test Time - 1000 Hours
 (Sheet 6 of 6)

Elapsed Time Hours	Rear Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
714	450.3	448.9	450.9	450.1	450.4	450.5	450.6	449.4	449.8
722	450.6	448.9	450.8	450.0	450.2	450.2	450.2	449.3	449.8
738	450.4	449.2	450.6	449.7	450.2	450.7	450.8	450.2	450.3
746	450.6	449.2	451.6	450.4	450.2	450.7	450.9	450.2	450.1
810	450.5	449.1	451.0	450.1	450.6	450.6	449.9	450.3	450.1
818	450.5	448.9	450.8	451.0	450.6	450.3	449.9	450.4	450.1
834	449.9	448.3	450.2	449.1	449.3	449.8	447.5	447.4	447.8
842	450.1	448.6	450.2	449.8	450.4	450.1	450.3	449.8	449.8
858	450.0	449.3	449.7	450.2	450.4	450.9	450.5	450.3	450.3
874	450.0	448.7	450.5	448.7	449.7	450.2	450.2	451.0	450.0
882	450.0	448.7	449.7	449.7	450.4	450.1	450.3	450.0	450.8
898	449.9	448.4	450.1	449.5	449.3	450.2	449.9	450.7	449.6
906	450.1	449.0	449.6	449.5	449.5	450.1	450.1	449.7	449.7
970	449.8	448.3	450.2	449.2	449.4	450.0	450.0	449.6	449.7
978	450.3	449.4	450.5	449.9	450.1	450.2	450.3	449.9	449.8
1002	450.6	449.0	451.5	450.1	450.2	450.8	451.1	449.4	450.3
1010	449.7	447.7	449.6	449.3	449.3	449.9	450.0	449.6	449.4

Table 46. Onset of Creep Stress Measurement of AM355 and Maraging Steel. Test Temperature - 500°F Nominal. Test Time - 1000 Hours.
(Sheet 1 of 8)

Elapsed Time Hours	Front Test Channel Temperature - °F								
	1	2	3	4	5	6	7	8	9
0	501.2	501.6	503.3	502.8	502.8	501.7	500.2	500.1	497.6
24	500.6	501.2	503.0	502.5	502.4	501.4	499.9	499.9	497.5
88	503.3	503.9	504.9	504.6	503.9	503.5	502.5	501.9	499.8
96	502.8	503.9	504.2	504.1	504.0	503.1	502.0	500.3	501.3
112	503.5	504.2	505.1	504.8	504.2	504.1	502.4	503.4	501.2
120	503.5	503.9	505.0	504.8	504.7	504.7	503.2	501.4	500.3
136	501.9	502.7	504.3	503.6	503.4	502.7	501.5	501.1	498.9
144	501.4	502.3	503.5	503.0	502.9	501.8	501.2	500.6	499.1
160	501.9	503.0	504.1	503.7	503.4	502.4	501.5	501.2	499.1
168	501.3	502.6	503.4	502.9	502.7	501.6	500.9	499.2	498.2
184	502.6	503.1	504.8	504.3	504.0	503.0	501.9	499.9	499.5
192	501.2	502.3	503.0	502.5	502.5	501.4	500.6	498.9	497.9
256	500.1	500.8	502.2	502.0	501.6	500.5	499.7	499.4	496.9
264	499.8	500.6	501.7	501.6	501.3	500.1	499.4	499.0	496.8
280	500.3	501.5	502.4	502.0	501.8	500.5	499.9	499.6	497.4
288	500.9	501.7	503.0	502.6	501.1	501.4	500.2	498.2	499.0

Table 46. Onset of Creep Stress Measurement of AM355 and Maraging Steel. Test Temperature - 500°F Nominal. Test Time - 1000 Hours.
(Sheet 2 of 8)

Elapsed Time Hours	Front Test Channel Temperature - ° F								
	1	2	3	4	5	6	7	8	9
304	498.1	499.1	499.9	500.5	500.5	501.5	499.8	499.1	496.5
312	499.4	500.5	501.1	500.9	500.7	499.9	501.7	498.7	499.9
328	496.2	498.6	498.3	496.8	496.5	496.7	495.2	495.1	492.6
336	498.8	502.3	500.0	500.0	500.1	499.0	498.1	497.8	498.9
352	502.6	503.2	504.0	503.8	503.8	502.5	501.7	501.6	499.4
360	503.1	504.4	504.9	504.7	504.6	503.7	502.7	502.4	500.0
424	503.8	504.1	505.4	505.1	504.7	504.5	502.9	502.4	500.3
432	503.9	504.4	505.5	505.3	505.2	504.6	502.9	502.1	500.2
448	502.6	503.3	504.5	504.1	503.9	503.4	502.1	501.7	499.1
456	502.5	503.5	505.0	504.5	504.3	502.6	502.7	502.0	499.6
472	502.8	504.1	505.4	504.6	504.3	503.5	502.5	500.5	499.7
480	500.7	501.5	505.0	504.7	504.5	503.2	503.2	502.2	499.7
496	502.5	503.8	504.8	504.7	504.2	502.0	502.5	502.5	499.5
504	502.8	503.8	504.9	504.9	504.2	503.4	502.7	502.4	500.1
520	502.9	503.9	505.4	505.2	504.9	503.4	502.5	502.7	500.1
592	503.5	504.1	502.8	505.4	505.1	504.1	503.7	502.6	500.7

Table 46. Onset of Creep Stress Measurement of AM355 and Maraging Steel. Test Temperature - 500°F Nominal. Test Time - 1000 Hours.
(Sheet 3 of 8)

Elapsed Time Hours	Front Test Channel Temperature - °F								
	1	2	3	4	5	6	7	8	9
600	502.6	502.7	504.8	504.1	504.3	502.5	502.1	500.3	499.3
616	502.9	503.6	504.7	504.5	504.6	503.2	503.0	501.7	499.9
624	503.2	504.3	505.3	504.8	504.7	503.8	502.9	501.1	501.9
640	501.7	502.8	503.5	503.1	503.2	501.8	501.1	499.3	498.4
648	502.4	503.2	504.9	504.4	503.0	502.8	502.1	500.2	499.7
664	504.0	505.0	506.1	505.8	505.8	504.5	503.9	503.0	500.9
672	503.1	504.2	505.4	505.2	505.5	503.7	502.8	502.4	500.0
688	503.5	503.7	504.8	505.6	505.5	504.2	503.0	502.6	500.5
696	503.1	504.2	505.0	504.7	503.4	503.6	503.7	501.9	501.1
760	503.7	504.6	505.4	506.1	506.0	504.8	503.7	503.0	500.8
768	502.5	502.2	504.7	502.1	504.4	502.9	502.6	500.6	499.6
784	504.1	505.0	506.4	506.0	505.8	504.5	504.0	502.1	500.9
792	502.5	502.4	501.8	504.4	504.9	502.3	502.2	501.8	499.5
808	502.9	503.8	502.2	504.6	504.6	503.3	502.6	502.0	499.8
816	505.0	506.2	504.5	506.9	508.0	505.7	505.0	504.0	501.7
832	505.5	506.3	507.8	507.5	507.3	506.2	505.0	503.2	502.5

Table 46. Onset of Creep Measurement of AM355 and Maraging Steel. Test Temperature - 500°F Nominal. Test Time - 1000 Hours.
(Sheet 4 of 8)

Elapsed Time Hours	Front Test Channel Temperature - °F								
	1	2	3	4	5	6	7	8	9
856	503.5	502.9	504.1	503.8	502.3	502.3	501.4	499.6	500.1
864	505.1	506.7	508.0	507.4	507.4	505.9	505.6	504.5	502.6
928	502.5	503.7	505.0	504.7	504.8	503.2	502.2	502.0	499.7
936	504.6	505.9	507.2	506.9	506.9	505.6	504.6	502.6	501.8
952	503.9	504.1	505.9	505.6	504.0	503.6	503.9	503.0	501.0
960	504.0	505.4	506.9	506.5	505.0	504.8	504.1	503.5	501.4
976	504.7	505.6	506.8	504.2	506.8	504.4	504.0	502.1	501.6
984	504.9	505.1	506.1	505.8	505.8	504.2	504.0	503.0	501.0

Table 46. Onset of Creep Stress Measurement of AM355 and Maraging Steel. Test Temperature -500°F Nominal. Test Time - 1000 Hours (Sheet 5 of 8)

Elapsed Time Hours	Rear Test Channel Temperature - °F								
	1	2	3	4	5	6	7	8	9
0	498.3	498.5	502.1	499.7	498.4	499.3	499.2	499.8	499.0
24	498.2	498.3	501.8	499.5	498.4	497.3	499.0	499.7	499.0
88	498.0	498.2	501.4	499.2	498.0	499.1	498.8	499.3	498.4
96	497.3	497.4	500.7	498.6	497.3	498.4	498.0	498.7	497.9
112	497.5	497.5	500.8	498.5	497.6	498.8	498.5	498.9	498.1
120	496.5	496.7	499.9	497.8	496.5	499.6	497.4	498.0	497.2
136	497.4	497.6	501.0	498.8	497.6	498.9	497.4	499.1	499.3
144	496.7	497.0	500.2	498.0	496.7	498.1	497.1	498.3	497.3
160	498.0	497.8	501.3	499.2	497.7	498.8	498.6	499.2	498.4
168	496.6	496.9	500.2	497.8	496.6	497.7	497.5	498.1	497.3
184	498.3	498.5	502.1	499.4	498.2	499.7	499.0	499.7	498.7
192	496.1	495.5	499.0	497.4	496.3	497.8	496.8	497.5	497.0
256	496.5	496.8	500.1	497.6	496.7	497.6	497.5	498.2	497.4
264	496.8	496.9	500.2	497.9	496.9	497.8	497.2	498.4	497.6
280	496.9	497.1	500.4	498.4	497.0	498.2	497.9	498.4	497.6
288	496.9	497.1	500.7	498.6	497.0	498.5	497.9	498.5	497.5

Table 46. Onset of Creep Stress Measurement of AM355 and Maraging Steel. Test Temperature -500°F Nominal. Test Time - 1000 Hours
(Sheet 6 of 8)

Elapsed Time Hours	Rear Test Channel Temperature - °F								
	1	2	3	4	5	6	7	8	9
304	498.7	499.4	502.4	500.4	499.4	500.4	499.6	500.2	499.2
312	500.6	501.3	504.1	502.4	501.2	502.3	501.3	501.8	500.9
328	497.6	498.5	501.2	499.3	498.3	499.4	498.5	499.2	498.9
336	502.1	498.8	502.3	501.0	501.5	502.0	500.1	500.8	500.3
352	497.9	498.2	501.5	499.5	497.9	499.5	498.8	499.3	498.5
360	497.4	495.6	501.0	496.1	497.6	499.4	498.7	499.1	498.2
424	498.0	498.2	501.8	499.5	498.0	499.2	499.5	499.4	498.7
432	497.7	497.6	500.3	496.0	497.2	498.8	498.7	499.3	498.6
448	497.3	497.8	501.4	499.3	497.8	498.5	498.6	499.0	498.3
456	497.7	497.8	501.2	499.5	497.8	498.8	498.6	499.4	498.6
472	497.6	497.3	500.9	499.4	498.2	499.3	499.5	499.4	498.6
480	497.7	497.6	500.6	500.0	497.4	496.1	499.1	499.4	498.8
496	497.8	497.9	501.3	499.7	497.9	499.0	498.9	499.6	498.8
504	497.8	497.8	501.0	499.6	497.9	498.9	498.7	499.4	498.7
520	498.6	498.7	502.3	500.4	498.7	499.6	499.6	500.1	499.2
592	497.5	497.7	500.8	499.3	497.8	499.0	498.7	499.0	498.4

Table 46. Onset of Creep Stress Measurement of AM355 and Maraging Steel. Test Temperature -500°F Nominal. Test Time - 1000 Hours
(Sheet 7 of 8)

Elapsed Time Hours	Rear Test Channel Temperature - °F								
	1	2	3	4	5	6	7	8	9
600	497.4	497.3	500.5	499.2	497.5	498.6	498.6	499.2	498.4
616	497.1	497.2	500.4	496.0	497.1	498.5	497.2	495.5	498.5
624	497.7	497.3	501.3	499.3	497.8	499.2	498.6	499.2	498.4
640	497.1	497.1	500.2	498.8	497.3	498.5	498.2	499.2	498.1
648	498.0	498.0	501.2	499.4	497.8	499.1	498.6	499.0	498.4
664	497.8	497.9	501.4	499.6	497.9	499.0	498.8	499.6	498.7
672	498.0	498.2	501.7	499.7	498.1	499.2	499.3	499.6	498.9
688	498.0	498.1	500.3	499.8	498.4	499.4	497.9	499.7	499.1
696	497.9	498.0	501.6	499.5	497.8	499.5	498.8	499.7	498.6
760	498.8	498.7	502.2	500.6	499.0	498.0	499.3	500.3	499.6
768	497.5	497.5	499.6	499.2	497.5	499.0	499.2	499.2	498.4
784	497.8	497.7	499.8	499.4	497.9	499.1	498.7	499.4	498.4
792	498.9	499.0	502.2	500.6	499.3	500.2	499.7	500.4	499.3
808	498.2	498.6	501.8	499.9	498.3	499.4	499.9	499.7	497.8
816	498.8	498.9	502.3	500.5	498.9	499.9	499.1	500.8	498.5
832	499.5	498.2	502.9	501.2	499.7	500.8	499.9	500.8	499.0

Table 46. Onset of Creep Stress Measurement of AM355 and Maraging Steel. Test Temperature - 500°F Nominal. Test Time - 1000 Hours
(Sheet 8 of 8)

Elapsed Time Hours	Rear Test Channel Temperature - °F								
	1	2	3	4	5	6	7	8	9
856	497.9	498.1	500.1	499.5	498.1	499.2	498.5	499.7	497.5
864	498.5	498.5	502.0	500.2	498.6	497.4	499.4	500.2	498.3
928	498.6	498.7	502.1	502.2	498.8	499.2	499.5	500.3	501.5
936	498.6	497.3	501.8	500.3	498.8	500.2	499.3	500.2	498.3
952	498.4	498.5	501.4	499.8	498.5	499.7	499.1	500.4	497.9
960	498.5	498.6	501.0	500.1	498.7	500.0	499.3	500.1	498.0
976	499.1	497.6	502.3	500.8	499.4	500.4	499.8	500.6	498.7
984	497.9	497.9	501.4	499.5	499.1	499.4	498.1	499.4	497.4

Table 47. Onset of Creep Stress Measurement of AM355 and Maraging Steel. Test Temperature - 550°F Nominal. Test Time - 1000 Hours
(Sheet 1 of 8)

Elapsed Time Hours	Front Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
0	551.9	553.6	554.3	554.2	553.9	553.6	552.1	551.6	549.7
24	549.6	551.3	551.6	551.8	551.8	551.2	549.9	549.5	547.7
32	548.3	550.1	548.6	550.5	550.9	550.3	549.0	548.3	547.1
48	552.0	553.6	553.8	553.9	554.1	553.3	551.9	551.0	550.1
56	552.3	554.2	553.5	554.5	554.7	553.8	552.6	551.0	551.9
72	551.0	554.2	551.7	553.0	553.2	552.0	551.4	550.8	548.9
80	549.8	550.6	549.3	549.1	549.6	551.2	549.0	550.2	546.8
144	551.1	552.7	552.6	553.0	553.6	552.7	551.2	550.7	548.9
152	551.3	553.0	552.8	553.5	553.4	552.8	551.6	551.5	549.2
168	550.8	550.5	552.4	552.9	553.1	552.5	551.2	550.2	548.8
172	551.5	553.1	553.1	553.3	553.6	553.0	551.7	551.2	550.7
188	550.2	552.6	551.8	552.3	552.9	551.7	550.5	550.7	548.5
196	551.3	552.8	552.6	552.9	553.3	552.7	551.2	551.4	549.2
212	549.9	549.9	551.6	551.9	552.2	551.3	550.1	549.2	548.1
220	549.0	550.4	551.1	550.5	551.6	550.1	550.1	550.7	548.4
236	549.8	551.2	551.1	551.4	551.7	551.3	549.7	549.5	547.6

Table 47. Onset of Creep Stress Measurement of AM355 and Maraging Steel. Test Temperature - 550° F Nominal. Test Time - 1000 Hours
(Sheet 2 of 8)

Elapsed Time Hours	Front Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
244	549.5	552.5	551.8	551.2	551.2	552.3	551.6	551.3	548.8
308	550.0	551.3	552.5	550.8	551.1	551.3	550.1	550.1	547.8
316	550.2	550.8	551.7	551.7	552.4	551.4	550.1	550.1	548.0
356	549.6	549.9	550.8	551.6	551.9	551.0	549.8	549.5	547.8
364	549.6	549.3	551.6	551.8	552.1	550.5	549.6	549.5	547.9
380	550.5	551.1	551.8	552.1	552.2	551.8	550.3	550.3	548.1
388	551.3	552.1	552.9	553.1	553.4	550.8	551.6	551.1	548.7
404	551.5	551.9	553.1	553.5	553.8	552.9	552.0	552.0	549.4
412	551.4	552.5	552.8	553.0	553.4	552.9	551.4	551.5	554.3
478	551.3	553.2	552.9	553.2	553.7	552.7	551.6	551.0	549.5
486	551.3	552.2	552.8	553.1	553.7	552.7	551.6	550.9	549.4
502	550.4	552.6	552.4	552.6	553.0	551.1	550.7	550.0	549.0
510	549.9	551.0	551.4	551.5	552.1	550.9	549.9	550.0	547.7
526	550.0	551.0	551.0	551.9	552.3	551.6	550.4	550.0	548.2
534	550.0	551.8	552.4	552.5	553.0	552.4	551.0	549.9	548.8
550	550.0	552.1	551.1	551.6	552.2	550.1	550.1	549.6	548.1

Table 47. Onset of Creep Stress Measurement of AM355 and Maraging Steel. Test Temperature - 550°F Nominal. Test Time - 1000 Hours
(Sheet 3 of 8)

Elapsed Time Hours	Front Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
558	551.1	552.2	552.6	553.1	553.3	552.1	551.5	550.8	549.0
574	551.0	552.4	551.4	552.4	553.2	552.5	550.8	550.1	549.0
582	550.8	550.4	552.5	552.8	553.4	550.8	551.2	550.8	548.9
646	550.7	552.1	552.0	552.3	552.7	551.7	550.6	549.9	548.5
654	550.6	552.1	552.1	552.3	552.6	552.0	550.8	550.2	548.5
670	549.4	550.2	550.8	550.8	551.1	549.5	549.6	549.4	547.5
678	547.9	550.4	550.7	550.9	551.6	550.3	549.5	549.0	546.2
694	550.2	551.8	551.8	552.0	552.2	550.9	550.4	550.2	547.9
702	550.1	550.9	551.6	551.6	551.9	550.7	550.1	550.1	547.9
726	547.7	549.7	549.4	550.0	549.5	548.9	548.8	547.7	547.8
734	546.5	548.1	548.8	549.9	549.1	549.6	548.9	548.2	545.0
798	547.2	549.5	548.8	549.8	551.2	549.4	547.7	546.6	544.8
806	549.3	550.6	549.3	549.0	548.6	549.0	549.6	549.1	547.7
822	545.1	551.5	551.8	551.9	551.3	551.3	550.3	550.1	548.0
838	550.4	551.6	552.5	552.3	552.2	552.5	549.0	549.8	548.5
862	551.6	552.3	553.0	553.0	552.9	553.0	551.7	550.6	549.0

Table 47. Onset of Creep Stress Measurement of AM355 and Maraging Steel. Test Temperature - 550°F Nominal. Test Time - 1000 Hours
(Sheet 4 of 8)

Elapsed Time Hours	Front Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
870	546.1	544.2	542.8	543.2	545.7	547.4	544.5	545.0	544.5
894	546.9	548.2	547.5	548.3	548.5	547.9	547.1	548.5	544.5
902	549.4	549.2	551.7	551.6	551.6	550.6	549.7	548.7	547.3
966	548.0	549.4	549.4	550.0	550.2	549.4	548.1	547.4	546.2
974	552.2	553.6	554.4	544.3	554.3	553.2	552.4	551.8	551.7
990	552.6	554.3	554.5	554.7	554.7	552.7	553.3	553.4	550.7
998	552.9	554.5	554.9	554.9	555.0	554.2	553.4	551.9	550.7
1014	551.8	553.6	553.4	553.6	553.6	553.3	551.5	552.0	549.9

Table 47. Onset of Creep Stress Measurement of AM355 and Maraging Steel. Test Temperature - 550°F Nominal. Test Time - 1000 Hours
(Sheet 5 of 8)

Elapsed Time Hours	Rear Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
0	549.1	547.6	550.3	549.2	548.9	549.4	549.8	549.6	548.3
24	549.2	547.3	550.0	548.9	548.6	549.0	548.3	549.1	549.7
32	549.1	546.5	548.2	548.0	548.9	549.6	549.4	549.6	548.1
48	554.3	552.3	550.5	553.3	554.5	554.9	554.7	554.1	552.6
56	554.2	552.9	555.4	554.2	554.4	554.5	554.2	555.0	554.2
72	556.5	555.3	558.1	556.5	556.9	556.8	556.5	556.0	553.5
80	552.5	555.6	553.8	551.9	552.9	552.6	552.2	552.2	550.5
144	556.0	554.4	557.5	556.1	557.1	555.8	555.8	555.4	554.2
152	555.5	554.3	556.7	555.2	554.2	555.1	555.1	554.9	553.0
168	552.8	551.8	554.3	552.8	553.3	553.1	552.5	553.1	551.5
172	550.8	553.8	556.4	554.9	555.4	555.2	555.8	554.9	552.9
188	553.8	552.4	555.2	553.4	554.5	554.1	554.0	553.6	551.6
196	555.0	554.0	556.5	554.9	555.5	555.5	555.2	553.9	551.8
212	552.3	550.1	552.6	552.1	552.6	552.8	552.1	552.3	550.6
220	550.9	550.2	553.4	550.4	551.9	550.9	551.6	551.4	550.4
236	552.3	551.4	553.2	552.4	553.3	553.6	552.5	552.4	550.6

Table 47. Onset of Creep Stress Measurement of AM355 and Maraging Steel. Test Temperature - 550°F Nominal. Test Time - 1000 Hours
(Sheet 6 of 8)

Elapsed Time Hours	Rear Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
244	553.5	551.9	555.1	553.4	554.3	553.6	553.4	553.1	552.1
308	553.2	551.9	555.9	552.9	554.1	553.1	552.8	553.1	551.4
316	552.5	551.3	553.8	552.1	554.1	552.7	552.3	552.4	550.4
356	551.9	550.5	553.2	551.7	552.3	552.4	551.9	551.9	550.2
364	552.6	550.8	553.4	552.0	552.4	551.2	552.1	552.2	550.7
380	551.0	553.5	552.5	554.4	556.2	554.8	554.1	553.9	552.6
388	555.2	553.3	556.5	555.1	554.7	555.8	554.1	551.0	553.1
404	554.7	553.5	556.1	553.9	554.6	554.8	554.0	552.3	553.2
412	553.5	552.4	554.9	553.2	553.1	553.9	553.2	553.3	551.3
478	554.6	553.3	555.9	554.4	551.2	555.4	554.6	554.5	552.4
486	552.4	551.1	554.5	552.9	551.6	552.9	552.5	552.8	550.8
502	551.9	550.7	553.2	551.1	552.1	554.5	550.9	552.0	550.4
510	552.0	550.8	553.3	551.7	552.3	552.4	551.7	551.7	549.9
526	551.3	549.3	551.8	550.9	552.0	551.7	550.5	551.6	549.9
534	552.2	550.1	553.5	552.1	552.1	551.1	552.1	552.3	550.5
550	551.7	550.3	552.9	551.7	552.1	553.5	551.8	551.8	550.1

Table 47. Onset of Creep Stress Measurement of AM355 and Maraging Steel. Test Temperature - 550°F Nominal. Test Time - 1000 Hours
(Sheet 7 of 8)

Elapsed Time Hours	Rear Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
558	554.8	553.0	556.3	554.1	555.1	555.1	554.6	550.2	552.9
574	553.6	555.3	555.1	553.6	553.9	553.9	553.5	553.7	552.0
582	553.9	552.7	555.2	554.2	553.3	554.4	552.3	553.3	552.9
646	551.7	550.9	553.0	551.9	553.1	553.4	552.0	552.8	551.2
654	552.6	552.1	554.4	553.2	552.9	554.0	553.7	553.4	551.5
670	552.8	550.9	552.2	551.8	552.6	555.1	551.2	551.5	551.6
678	551.3	550.0	552.5	551.0	551.7	551.7	550.7	551.4	549.8
694	553.2	554.1	555.7	554.2	555.8	555.1	554.3	553.7	552.9
702	554.9	553.8	556.7	554.6	555.6	556.1	554.4	554.1	552.6
726	543.3	543.2	545.5	544.7	543.5	544.7	544.7	549.0	543.2
734	546.1	544.9	547.1	546.4	547.0	546.3	546.9	547.8	546.5
798	546.4	544.2	548.0	547.3	546.3	547.2	545.7	547.5	546.3
806	546.9	546.5	547.8	547.3	546.3	547.9	547.1	547.1	545.8
822	546.5	545.5	547.8	546.0	546.1	546.7	546.8	546.9	545.6
838	546.7	545.4	547.6	546.5	545.4	546.7	546.7	546.7	545.3
862	550.3	550.7	551.9	550.4	549.4	550.2	549.8	550.1	548.9

Table 47. Onset of Creep Stress Measurement of AM355 and Maraging Steel. Test Temperature - 550° F Nominal. Test Time - 1000 Hours
(Sheet 8 of 8)

Elapsed Time Hours	Rear Test Channel Temperatures - ° F								
	1	2	3	4	5	6	7	8	9
870	548.7	547.4	549.9	548.0	548.6	547.4	546.2	548.1	547.7
894	548.9	546.3	549.0	547.7	547.5	548.3	548.7	547.8	546.5
902	550.3	548.3	552.4	550.5	550.3	550.6	548.9	550.5	549.0
966	546.7	545.5	547.1	547.5	546.5	547.6	546.6	547.3	546.3
974	549.6	553.6	550.7	550.3	549.5	550.1	549.7	549.7	548.3
990	543.8	543.3	547.3	546.3	545.8	545.0	544.0	547.5	544.8
998	546.4	545.4	548.0	547.2	546.3	546.9	546.4	546.9	545.9
1014	546.2	544.9	547.9	546.3	545.7	546.5	546.2	546.4	544.9

Table 48. Onset of Creep Stress Measurement of AM355 and Maraging Steel. Test Temperature - 600°F Nominal. Test Time - 1000 Hours
(Sheet 1 of 8)

Elapsed Time Hours	Front Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
0	602.4	603.1	604.7	604.8	603.7	603.1	603.2	602.8	600.6
48	598.1	601.5	601.6	601.8	602.1	601.7	599.6	598.9	597.6
56	598.4	599.8	600.8	600.9	601.1	600.0	599.0	599.6	597.2
96	599.4	602.2	602.8	603.2	602.5	601.0	600.4	600.7	597.9
114	598.4	601.3	601.6	602.5	601.9	601.2	599.4	599.9	597.7
130	599.1	602.1	602.4	602.3	602.0	601.8	600.3	600.9	598.4
138	600.0	602.2	603.5	603.5	603.5	603.0	601.1	600.7	599.9
154	598.9	601.8	602.4	602.3	602.3	601.6	600.0	601.2	597.3
162	598.4	600.7	601.8	601.8	602.2	601.0	599.8	599.7	597.8
226	598.6	601.4	600.9	601.0	601.7	601.4	598.8	599.0	597.0
234	598.6	601.5	602.5	602.7	602.7	601.9	600.3	599.7	598.4
250	597.5	602.5	603.1	603.2	603.1	601.1	600.7	601.0	598.4
258	594.1	596.7	597.6	598.1	598.3	596.5	595.2	594.8	594.0
274	586.9	588.6	589.6	590.0	590.3	587.6	587.6	588.3	586.5
282	595.5	597.5	597.2	599.3	598.5	595.8	596.6	597.5	595.5
298	588.7	591.4	592.4	592.9	593.8	592.4	589.9	591.2	586.7

Table 48. Onset of Creep Stress Measurement of AM355 and Maraging Steel. Test Temperature - 600°F Nominal. Test Time - 1000 Hours
(Sheet 2 of 8)

Elapsed Time Hours	Front Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
306	595.9	598.3	599.1	600.3	600.3	600.0	599.5	597.9	595.8
322	596.5	599.0	599.1	599.3	599.9	600.5	597.8	597.8	595.7
340	596.4	598.5	598.7	599.3	599.2	599.1	596.4	596.6	595.1
404	595.9	597.8	598.8	599.6	599.4	599.7	597.5	596.5	595.6
412	595.4	598.0	598.2	599.2	599.0	599.0	597.1	596.9	594.8
428	595.9	597.3	597.7	598.9	597.7	598.6	596.3	596.3	594.5
436	596.6	598.5	598.7	599.6	599.4	599.5	596.5	597.3	595.4
452	596.3	599.0	598.9	600.1	599.9	599.5	598.1	597.4	595.7
460	596.1	598.0	598.2	600.4	599.2	599.2	598.3	598.5	594.9
476	594.6	595.9	596.6	598.6	598.4	598.2	596.5	595.1	594.3
484	596.6	598.6	598.3	599.8	601.0	599.0	596.8	596.8	595.3
500	596.1	597.9	598.0	599.2	599.1	599.0	596.1	595.8	594.8
508	596.1	597.8	597.8	599.1	598.9	598.8	596.3	596.5	596.2
572	595.9	598.9	597.1	598.8	598.5	597.1	595.9	595.9	594.7
596	595.7	597.1	598.1	599.1	599.0	599.9	596.2	596.6	595.0
604	596.6	597.7	599.3	599.9	599.5	599.2	597.0	597.1	597.2

Table 48. Onset of Creep Stress Measurement of AM355 and Maraging Steel. Test Temperature - 600° F Nominal. Test Time - 1000 Hours
(Sheet 3 of 8)

Elapsed Time Hours	Front Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
620	595.6	598.0	598.4	599.2	599.1	598.8	596.5	596.5	595.0
628	596.2	597.5	598.4	599.3	599.1	599.5	596.6	596.4	595.7
644	596.9	597.9	598.8	599.8	601.2	599.4	597.3	598.5	595.3
652	597.0	598.4	599.5	600.3	600.2	599.2	597.7	598.1	595.8
668	596.9	599.6	598.9	598.9	600.1	599.9	599.8	597.5	595.7
732	597.3	598.7	599.2	600.2	602.1	599.5	597.5	598.5	595.7
740	595.0	597.4	597.3	599.2	598.5	598.3	596.7	597.5	595.0
756	597.0	598.9	599.0	600.2	600.0	599.9	597.3	597.1	594.8
764	596.0	599.5	598.9	599.8	598.6	599.5	597.1	596.8	595.5
780	597.2	598.7	599.6	600.6	600.4	599.1	597.8	597.8	596.2
788	597.5	597.4	599.6	600.5	599.8	600.1	597.9	598.8	595.2
804	596.9	599.4	598.6	599.1	599.8	600.3	597.9	597.8	595.4
812	597.3	598.5	599.3	599.8	600.1	599.7	597.5	598.2	596.0
828	595.6	597.2	598.3	599.1	598.9	598.9	596.5	596.0	594.0
836	596.6	599.2	599.4	600.4	599.3	600.5	597.6	597.7	595.2
900	596.5	599.6	599.4	600.7	600.4	598.7	598.1	598.0	597.6

Table 48. Onset of Creep Stress Measurement of AM355 and Maraging Steel. Test Temperature - 600°F Nominal. Test Time - 1000 Hours
(Sheet 4 of 8)

Elapsed Time Hours	Front Test Channel Temperature - °F								
	1	2	3	4	5	6	7	8	9
908	597.4	598.7	599.8	601.4	600.4	600.7	597.9	598.5	597.9
924	597.7	597.5	598.4	599.7	600.1	599.6	597.0	597.1	595.4
932	596.5	597.5	598.6	599.5	598.4	599.6	596.8	596.8	595.3
948	597.5	598.9	599.7	600.6	600.5	600.7	598.1	597.9	596.9
956	598.3	599.7	599.7	600.6	601.0	598.6	598.2	598.4	596.0
972	596.6	598.9	599.1	600.2	600.1	601.2	598.1	597.4	595.6
980	597.1	596.6	599.1	600.3	600.1	599.7	598.4	597.3	596.0
996	596.9	598.2	599.0	599.9	598.5	599.6	598.2	597.4	594.7
1004	597.6	600.1	600.1	601.0	601.0	600.8	599.2	598.1	597.6

Table 48. Onset of Creep Stress Measurement of AM355 and Maraging Steel. Test Temperature - 600°F Nominal. Test Time - 1000 Hours
(Sheet 5 of 8)

Elapsed Time Hours	Rear Test Channel Temperature - °F								
	1	2	3	4	5	6	7	8	9
0	595.6	598.2	597.9	597.7	597.3	597.3	597.5	597.7	598.6
48	594.0	594.5	596.5	596.1	595.6	596.4	596.2	596.1	595.1
56	594.2	594.5	596.4	595.5	594.8	595.7	594.2	594.5	593.1
96	594.7	595.9	596.6	595.6	596.1	595.4	596.9	599.0	598.4
114	593.8	594.2	596.3	595.7	595.2	596.1	595.8	595.9	594.8
130	595.9	595.2	596.4	594.8	595.5	595.5	596.1	596.9	594.8
138	595.2	595.8	597.3	597.0	595.1	596.3	595.9	596.9	594.4
154	595.9	595.3	596.3	596.1	595.6	596.2	596.3	596.1	594.9
162	594.0	594.4	596.3	596.0	595.6	596.3	595.1	596.0	595.0
226	595.9	596.6	597.1	595.6	595.3	596.2	596.3	596.1	594.8
234	593.6	595.0	596.8	595.6	595.9	595.0	595.3	596.2	595.2
250	594.2	594.5	596.7	594.1	595.7	596.5	596.5	596.3	595.2
258	592.9	594.1	595.3	595.0	594.3	595.3	597.0	593.1	596.2
274	595.0	596.5	598.9	597.3	597.4	598.4	597.6	597.2	595.5
282	599.6	600.9	602.2	601.7	602.1	602.1	602.3	601.8	601.4
298	602.5	603.6	605.7	604.5	606.8	606.4	605.1	604.5	601.0

Table 48. Onset of Creep Stress Measurement of AM355 and Maraging Steel. Test Temperature - 600° F Nominal. Test Time - 1000 Hours (Sheet 6 of 8)

Elapsed Time Hours	Rear Test Channel Temperature - ° F								
	1	2	3	4	5	6	7	8	9
306	602.6	601.9	603.2	602.4	602.8	602.8	603.9	603.8	600.4
322	600.0	601.3	602.4	601.9	602.5	602.6	602.0	601.6	599.7
340	596.7	597.7	599.3	598.5	599.3	600.2	598.4	598.4	597.0
404	599.1	600.7	601.7	601.4	602.3	603.6	601.2	601.2	599.4
412	599.3	600.6	600.9	601.0	602.1	601.5	600.7	600.9	599.0
428	596.7	598.1	599.5	599.6	600.2	599.7	598.7	598.8	597.6
436	598.3	600.0	601.4	601.4	601.5	601.9	601.1	600.7	598.8
452	601.0	601.3	604.0	602.1	602.8	602.8	602.7	600.0	600.8
460	597.4	599.0	600.7	600.6	601.5	601.8	599.4	599.6	597.8
476	592.0	597.5	599.0	598.6	599.1	598.8	597.2	593.8	595.8
484	599.9	599.1	600.6	599.0	599.7	600.3	599.8	599.9	598.3
500	598.1	598.0	599.4	600.2	600.0	600.3	599.1	598.7	597.2
508	597.6	598.4	598.9	600.7	600.7	600.2	598.2	596.8	598.6
572	597.3	598.4	600.1	600.5	599.5	600.1	599.8	599.5	597.9
596	597.3	599.4	599.8	599.3	600.0	597.9	598.1	597.3	597.5
620	596.9	598.4	599.5	600.1	599.6	599.5	599.3	599.1	597.6

Table 48. Onset of Creep Stress Measurement of AM355 and Maraging Steel. Test Temperature - 600°F Nominal. Test Time - 1000 Hours
(Sheet 7 of 8)

Elapsed Time Hours	Rear Test Channel Temperature - °F								
	1	2	3	4	5	6	7	8	9
628	597.2	599.7	600.4	599.7	600.5	600.5	601.4	600.6	598.3
644	599.6	597.6	604.7	603.4	604.0	603.4	601.9	602.0	599.9
652	602.5	601.7	603.8	603.0	604.1	602.5	603.1	601.7	600.3
668	597.9	600.1	602.1	600.2	600.2	601.2	600.6	598.7	599.0
732	599.9	601.8	604.6	603.5	603.4	602.6	604.5	603.2	601.4
740	597.5	598.9	601.2	597.1	599.7	600.4	599.1	599.2	597.7
756	596.8	598.5	600.2	599.4	600.5	600.2	597.8	599.5	600.2
764	596.8	598.7	599.5	599.8	600.0	598.2	599.3	599.2	497.8
780	599.1	600.4	601.6	601.2	601.7	601.5	600.9	600.4	599.2
788	599.3	600.6	601.1	601.1	601.9	600.3	601.0	601.0	599.4
804	600.1	601.9	602.1	602.2	603.2	601.7	601.4	602.4	600.2
812	599.7	601.3	601.4	602.2	602.9	601.7	601.1	601.0	599.3
828	598.5	597.8	599.2	598.7	599.4	599.8	598.9	598.3	597.3
836	600.5	601.4	603.0	602.2	602.4	602.8	601.8	601.8	600.3
900	599.7	601.6	603.2	602.4	602.2	602.4	601.6	601.7	600.3
908	602.8	601.6	603.0	602.3	602.6	603.4	601.9	601.7	600.1

Table 48. Onset of Creep Stress Measurement of AM355 and Maraging Steel. Test Temperature - 600°F Nominal. Test Time - 1000 Hours
(Sheet 8 of 8)

Elapsed Time Hours	Rear Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
924	599.3	598.3	603.0	599.0	599.5	599.3	598.9	598.3	597.2
932	598.8	598.1	599.4	598.3	599.6	596.5	597.7	598.7	597.5
948	598.2	600.1	601.5	601.5	601.3	601.1	601.5	601.3	599.3
956	601.7	601.5	602.7	602.2	602.8	601.2	601.8	601.4	600.9
972	597.7	599.1	600.2	599.4	599.9	600.1	599.8	599.7	598.1
980	598.6	602.6	599.1	598.4	599.1	599.4	598.6	596.1	597.2
996	598.5	598.6	598.4	598.8	598.9	597.7	598.6	598.5	597.2
1004	598.0	599.9	600.9	599.9	600.9	599.6	600.7	599.8	600.0

Table 49. Onset of Creep Stress Measurement of AM 355 and Maraging Steel.
 Test Temperature - 650°F Nominal. Test Time - 1000 Hours
 (Sheet 1 of 8)

Elapsed Time Hours	Front Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
0	649.3	651.3	651.8	652.6	652.5	652.6	649.0	649.6	648.0
32	651.0	651.4	651.0	653.3	653.1	653.1	650.6	650.4	648.6
48	650.0	651.3	649.6	652.6	652.9	652.2	650.5	650.2	648.4
72	649.6	650.9	650.6	653.0	652.8	652.4	650.1	650.2	648.4
80	650.9	652.3	652.9	653.9	654.2	653.9	651.3	651.4	649.4
104	648.6	650.6	650.8	651.6	651.3	652.5	649.5	649.3	647.8
168	648.6	650.4	650.7	650.4	652.6	652.1	649.7	649.8	647.9
176	650.0	651.1	651.8	652.9	652.6	652.2	650.1	650.5	649.4
192	650.5	652.3	653.1	654.3	654.3	655.5	651.2	650.7	649.3
200	649.5	651.2	652.4	653.5	653.5	652.7	650.5	650.4	648.7
216	651.0	652.4	652.1	654.2	653.9	653.6	651.4	651.4	649.2
224	650.1	651.3	652.2	653.4	653.0	652.9	650.6	651.0	648.7
240	651.7	653.5	654.0	654.9	654.8	654.8	652.2	652.3	650.5
248	651.4	652.5	653.3	654.5	654.1	654.0	652.0	652.1	649.8
264	650.4	651.7	652.2	653.8	653.1	652.4	649.4	650.2	648.9
272	650.9	652.1	653.0	654.2	653.8	653.3	651.3	651.3	649.2
336	650.3	651.9	652.6	653.2	653.4	653.8	650.6	650.2	648.8
344	650.8	651.7	652.3	653.7	653.1	653.2	651.0	651.2	648.6

Table 49. Onset of Creep Stress Measurement of AM 355 and Maraging Steel.
 Test Temperature - 650°F Nominal. Test Time - 1000 Hours
 (Sheet 2 of 8)

Elapsed Time Hours	Front Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
360	651.2	652.5	652.9	653.9	653.6	653.8	651.3	651.1	649.3
368	650.3	651.3	652.0	653.2	651.8	652.7	650.1	650.3	648.5
384	649.6	651.3	651.6	652.8	652.9	653.4	650.2	650.4	648.2
392	649.7	651.1	651.6	652.0	652.2	652.4	649.3	650.5	649.7
408	649.7	651.4	651.7	652.4	652.8	652.2	649.6	649.2	648.1
416	650.3	651.0	650.5	652.7	652.4	651.0	648.6	648.8	647.4
480	650.1	651.3	652.3	653.1	653.4	653.1	650.2	650.0	648.5
488	650.7	650.7	650.3	651.1	652.2	652.3	649.5	650.0	648.0
504	650.3	652.3	652.0	653.0	653.1	652.4	650.1	649.9	648.7
512	650.5	651.3	651.7	651.5	652.8	653.3	649.8	650.0	648.9
528	650.4	651.4	652.2	653.4	653.1	653.4	650.6	649.5	648.9
536	649.7	651.1	651.8	652.7	652.2	652.8	649.7	649.6	648.8
550	652.7	652.9	652.2	653.2	653.3	653.0	650.4	650.3	649.1
558	650.3	651.7	652.4	653.3	652.9	653.2	650.4	650.3	649.1
574	650.1	652.2	652.2	651.9	652.8	652.9	650.3	650.7	648.5
582	649.3	650.2	652.5	652.4	652.3	652.2	649.6	649.2	648.1
646	649.4	650.1	651.1	653.0	652.1	652.2	649.4	649.0	648.6
654	649.2	651.3	649.5	652.0	651.6	652.6	648.1	649.8	649.8

Table 49. Onset of Creep Stress Measurement of AM 355 and Maraging Steel.
 Test Temperature - 650°F Nominal. Test Time - 1000 Hours
 (Sheet 3 of 8)

Elapsed Time Hours	Front Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
670	649.2	652.2	651.9	653.2	652.8	652.4	650.3	649.9	647.7
678	649.2	650.8	650.9	652.1	651.4	652.0	649.1	648.5	647.0
694	650.2	651.8	651.5	653.9	653.3	652.7	650.3	649.8	648.3
702	649.6	651.3	651.1	652.6	652.2	652.5	649.8	649.1	648.0
718	649.0	650.9	650.2	652.2	651.8	650.0	649.1	649.9	647.1
726	649.9	650.7	650.6	652.6	652.3	652.6	649.6	650.3	648.1
742	652.2	650.5	649.9	652.0	651.7	652.8	650.2	649.1	646.8
750	649.2	650.5	650.8	652.5	652.2	651.7	649.4	650.0	647.4
814	649.7	651.5	651.2	652.9	652.6	652.8	649.8	650.2	647.8
822	649.2	649.8	650.1	652.1	651.7	651.0	648.9	649.3	647.8
838	649.3	650.1	650.1	652.5	651.7	651.3	649.0	649.5	647.7
846	650.0	651.1	651.3	653.3	652.6	652.6	650.0	650.5	647.6
862	649.2	649.4	650.1	652.0	651.7	651.5	649.1	649.4	647.2
878	651.0	651.6	652.1	652.2	651.7	652.4	650.1	649.9	648.2
886	649.5	650.6	651.4	652.5	652.3	650.7	649.4	649.5	647.9
902	649.9	651.1	652.9	652.4	651.0	651.0	650.3	650.2	647.3
910	649.3	650.3	650.1	652.1	651.7	651.0	648.9	649.3	647.0
974	649.2	651.4	650.3	652.0	650.7	652.0	649.0	649.1	647.1

Table 49. Onset of Creep Stress Measurement of AM 355 and Maraging Steel.
 Test Temperature - 650°F Nominal. Test Time - 1000 Hours
 (Sheet 4 of 8)

Elapsed Time Hours	Front Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
982	649.7	651.8	651.2	652.2	651.6	652.5	650.2	649.7	647.3
998	649.4	650.0	649.2	651.2	651.2	650.8	649.7	648.9	646.8
1006	649.2	650.8	650.7	650.4	652.2	652.2	649.4	649.4	647.8
1022	649.1	650.6	650.8	651.7	650.9	651.6	649.3	650.0	647.2
1030	649.9	651.0	651.3	653.1	652.5	651.4	650.0	650.1	648.1

Table 49. Onset of Creep Stress Measurement of AM 355 and Maraging Steel.
 Test Temperature - 650°F Nominal. Test Time - 1000 Hours
 (Sheet 5 of 8)

Elapsed Time Hours	Rear Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
0	649.8	650.2	651.4	652.0	651.6	652.0	651.4	651.2	649.4
32	650.8	652.1	653.7	653.4	653.5	653.3	653.1	650.7	651.4
48	650.8	652.8	654.6	652.7	654.5	654.5	653.6	653.0	652.1
72	648.0	649.4	650.7	649.7	651.2	650.6	651.3	651.7	648.8
80	651.8	654.2	654.9	653.5	654.6	654.8	654.1	653.9	651.5
104	649.5	649.3	650.7	649.5	651.2	650.6	649.9	649.8	648.4
168	649.9	649.8	650.6	649.8	651.1	650.7	650.2	648.6	648.5
176	650.4	649.9	650.8	650.1	651.5	651.0	650.5	650.5	651.1
192	648.6	651.4	652.4	651.5	652.3	652.8	652.2	652.8	650.8
200	647.5	650.4	651.3	650.4	651.3	651.8	651.0	653.0	650.6
216	650.0	652.8	653.9	654.0	654.4	654.1	653.6	651.9	651.7
224	649.8	650.7	651.9	651.3	652.6	651.9	651.7	650.9	650.0
240	649.9	652.2	653.0	652.2	653.1	653.4	652.7	652.8	650.9
248	650.7	652.7	653.0	653.2	654.1	654.0	653.4	653.5	651.3
264	646.9	650.0	651.2	650.4	651.2	651.2	650.7	649.0	649.0
272	647.6	650.4	651.9	651.1	652.2	651.9	651.9	650.7	651.2
336	649.4	652.2	653.5	654.8	653.4	653.6	652.8	652.8	651.0
344	651.6	653.3	654.7	653.9	654.6	655.0	653.9	653.9	653.1

Table 49. Onset of Creep Stress Measurement of AM 355 and Maraging Steel.
 Test Temperature - 650°F Nominal. Test Time - 1000 Hours
 (Sheet 6 of 8)

Elapsed Time Hours	Rear Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
360	650.6	652.8	654.2	653.4	654.4	654.0	653.3	653.4	651.6
368	651.2	652.7	654.4	653.1	654.3	654.9	653.7	653.2	650.2
384	651.4	652.2	653.1	651.7	653.0	652.8	653.2	652.4	652.3
392	652.2	652.8	653.2	652.2	653.3	653.2	652.5	652.4	650.4
408	648.2	648.8	650.0	651.2	651.3	651.5	650.9	650.6	649.3
416	649.8	651.3	652.7	652.0	652.7	652.7	652.1	650.2	650.4
480	649.6	651.9	651.1	651.7	652.6	652.6	652.0	650.3	648.2
488	647.8	650.3	650.3	649.4	651.3	650.9	650.3	650.7	648.8
504	648.6	649.9	651.4	650.6	651.5	652.2	651.9	652.7	650.8
512	648.2	649.7	648.3	648.3	650.9	650.8	650.0	650.8	648.7
528	649.5	651.5	648.6	651.5	652.5	650.5	651.6	651.2	650.0
536	647.2	649.6	649.2	650.1	650.8	651.3	650.7	647.1	647.0
550	649.9	652.1	652.7	653.1	653.2	654.0	652.6	652.1	650.6
558	651.1	652.0	651.2	652.5	653.2	653.7	652.7	651.8	650.8
582	648.2	648.8	650.0	651.2	651.3	651.5	650.9	650.6	649.3
646	648.0	649.8	650.3	650.3	651.1	650.9	650.5	650.7	649.1
654	648.6	650.1	650.3	649.6	651.9	651.2	650.5	650.1	650.8
670	649.7	651.7	652.0	650.9	651.9	653.1	651.5	650.9	650.3

Table 49. Onset of Creep Stress Measurement of AM 355 and Maraging Steel.
 Test Temperature - 650°F Nominal. Test Time - 1000 Hours
 (Sheet 7 of 8)

Elapsed Time Hours	Rear Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
678	648.2	649.8	649.9	649.4	651.5	651.1	651.1	651.5	650.1
694	650.3	653.4	654.1	653.0	654.7	654.6	653.7	652.3	651.8
702	651.4	653.0	653.7	652.0	654.4	653.9	653.4	653.4	651.2
718	649.0	650.6	651.3	650.2	652.6	651.8	651.0	651.3	649.6
726	651.1	652.6	653.0	652.2	653.9	653.7	652.8	651.5	651.0
742	648.4	650.0	650.6	649.3	649.9	650.0	650.0	651.0	648.8
750	650.6	652.6	653.2	651.7	653.7	654.3	654.2	652.9	650.9
814	652.0	653.2	653.4	652.8	652.9	654.4	653.7	648.6	649.1
822	649.5	651.7	649.8	648.9	651.5	651.0	650.3	651.9	648.9
838	648.5	650.2	651.1	649.7	651.8	651.3	650.6	650.7	649.0
846	651.4	653.0	653.0	652.5	654.2	654.1	653.3	653.4	651.5
862	648.9	650.5	651.4	649.9	651.9	651.0	650.8	650.9	648.0
878	650.8	652.4	652.9	653.2	654.1	653.0	653.7	653.0	654.4
886	650.7	651.2	652.4	650.1	652.2	653.3	651.3	653.2	651.0
902	648.2	649.7	650.3	649.2	651.3	651.0	650.3	650.3	648.6
910	649.8	651.2	649.9	649.2	651.5	651.0	650.3	651.6	649.0
974	648.6	650.7	650.3	650.3	651.7	651.6	650.9	650.9	648.5
982	649.0	650.5	650.7	650.2	652.2	651.6	651.0	649.8	649.7

Table 49. Onset of Creep Stress Measurement of AM 355 and Maraging Steel.
 Test Temperature - 650°F Nominal. Test Time - 1000 Hours
 (Sheet 8 of 8)

Elapsed Time Hours	Rear Test Channel Temperatures - °F								
	1	2	3	4	5	6	7	8	9
998	649.0	650.8	652.0	651.6	650.9	650.0	649.6	652.5	650.1
1006	651.1	652.6	652.6	652.1	652.1	654.0	652.0	652.8	651.2
1022	651.2	652.6	652.1	652.1	653.9	653.3	652.7	653.1	651.1
1030	650.0	652.0	651.6	651.4	653.7	653.6	652.3	652.9	651.1

Table 50. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V
Summary of Applied Stresses (Sheet 1 of 3)

Material	Test Temperature Nominal - °F	Test Time Hours	Test Channel Position	Test Channel Number	Applied Stress K.S.I.
Ti 8Al-1Mo-1V	450	150	Front	1	73.8
"	"	"	"	2	78.0
"	"	"	"	3	87.5
"	"	"	Rear	1	75.0
"	"	"	"	2	80.0
"	"	"	"	3	87.5
Ti 8Al-1Mo-1V	500	150	Front	1	68.8
"	"	"	"	2	73.1
"	"	"	"	3	79.5
"	"	"	Rear	1	70.0
"	"	"	"	2	75.0
"	"	"	"	3	80.0
Ti 8Al-1Mo-1V	550	150	Front	1	74.9
"	"	"	"	2	76.4
"	"	"	"	3	76.8
"	"	"	Rear	1	76.3
"	"	"	"	2	76.4
"	"	"	"	3	77.5
Ti 8Al-1Mo-1V	600	150	Front	1	76.3
"	"	"	"	2	78.0
"	"	"	"	3	82.0
"	"	"	Rear	1	77.5
"	"	"	"	2	80.0
"	"	"	"	3	82.5

Table 50. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V
Summary of Applied Stresses (Sheet 2 of 3)

Material	Test Temperature Nominal - °F	Test Time Hours	Test Channel Position	Test Channel Number	Applied Stress K.S.I.
Ti 8Al-1Mo-1V	650	150	Front	1	57.1
"	"	"	"	2	58.5
"	"	"	"	3	64.6
"	"	"	Rear	1	58.0
"	"	"	"	2	60.0
"	"	"	"	3	65.0
Ti 8Al-1Mo-1V	450	1000	Front	1	86.2
"	"	"	"	2	83.0
"	"	"	"	3	71.5
"	"	"	Rear	1	87.5
"	"	"	"	2	85.0
"	"	"	"	3	71.0
Ti 8Al-1Mo-1V	500	1000	Front	1	73.9
"	"	"	"	2	75.7
"	"	"	"	3	72.5
"	"	"	Rear	1	75.0
"	"	"	"	2	77.5
"	"	"	"	3	72.0
Ti 8Al-1Mo-1V	550	1000	Front	1	66.5
"	"	"	"	2	68.3
"	"	"	"	3	65.0
"	"	"	Rear	1	67.5
"	"	"	"	2	70.0
"	"	"	"	3	64.5

Table 50. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V
Summary of Applied Stresses (Sheet 3 of 3)

Material	Test Temperature Nominal - °F	Test Time Hours	Test Channel Position	Test Channel Number	Applied Stress K.S.I.
Ti 8Al-1Mo-1V	600	1000	Front	1	73.9
"	"	"	"	2	75.7
"	"	"	"	3	80.0
"	"	"	Rear	1	75.0
"	"	"	"	2	77.5
"	"	"	"	3	79.4
Ti 8Al-1Mo-1V	650	1000	Front	1	51.7
"	"	"	"	2	58.6
"	"	"	"	3	62.5
"	"	"	"	1	57.5
"	"	"	"	2	60.0
"	"	"	"	3	62.1

Table 51. Onset of Creep Stress Measurement of Ti 6Al-4V
Summary of Applied Stresses (Sheet 1 of 3)

Material	Test Temperature Nominal - °F	Test Time Hours	Test Channel Position	Test Channel Number	Applied Stress K.S.I.
Ti 6Al-4V	450	150	Front	4	85.0
"	"	"	"	5	90.0
"	"	"	"	6	95.0
"	"	"	Rear	4	87.0
"	"	"	"	5	91.3
"	"	"	"	6	96.2
Ti 6Al-4V	500	150	Front	4	85.0
"	"	"	"	5	90.0
"	"	"	"	6	95.0
"	"	"	Rear	4	87.0
"	"	"	"	5	91.3
"	"	"	"	6	96.1
Ti 6Al-4V	550	150	Front	4	75.0
"	"	"	"	5	77.0
"	"	"	"	6	82.5
"	"	"	Rear	4	76.8
"	"	"	"	5	80.0
"	"	"	"	6	83.5
Ti 6Al-4V	600	150	Front	4	62.5
"	"	"	"	5	65.0
"	"	"	"	6	72.5
"	"	"	Rear	4	63.9
"	"	"	"	5	65.9
"	"	"	"	6	73.4

Table 51. Onset of Creep Stress Measurement of Ti 6Al-4V
Summary of Applied Stresses (Sheet 2 of 3)

Material	Test Temperature Nominal - °F	Test Time Hours	Test Channel Position	Test Channel Number	Applied Stress K.S.I.
Ti 6Al-4V	650	150	Front	4	50.0
"	"	"	"	5	55.0
"	"	"	"	6	60.0
"	"	"	Rear	4	51.2
"	"	"	"	5	55.8
"	"	"	"	6	60.7
"	450	1000	Front	4	85.0
"	"	"	"	5	78.5
"	"	"	"	6	68.3
"	"	"	Rear	4	84.5
"	"	"	"	5	78.4
"	"	"	"	6	68.5
Ti 6Al-4V	500	1000	Front	4	75.0
"	"	"	"	5	77.0
"	"	"	"	6	82.3
"	"	"	Rear	4	74.6
"	"	"	"	5	77.0
"	"	"	"	6	82.5
Ti 6Al-4V	550	1000	Front	4	90.0
"	"	"	"	5	85.0
"	"	"	"	6	82.3
"	"	"	Rear	4	89.3
"	"	"	"	5	85.0
"	"	"	"	6	82.5

Table 51. Onset of Creep Stress Measurement of Ti 6Al-4V
Summary of Applied Stresses (Sheet 3 of 3)

Material	Test Temperature Nominal - °F	Test Time Hours	Test Channel Position	Test Channel Number	Applied Stress K.S.I.
Ti 6Al-4V	600	1000	Front	4	62.5
"	"	"	"	5	65.0
"	"	"	"	6	67.3
"	"	"	Rear	4	62.2
"	"	"	"	5	65.0
"	"	"	"	6	67.5
Ti 6Al-4V	650	1000	Front	4	47.5
"	"	"	"	5	50.0
"	"	"	"	6	52.4
"	"	"	Rear	4	47.2
"	"	"	"	5	50.0
"	"	"	"	6	52.5

Table 52. Onset of Creep Stress Measurement of Ti 5Al-2.5 Sn
Summary of Applied Stresses (Sheet 1 of 3)

Material	Test Temperature Nominal - °F	Test Time Hours	Test Channel Position	Test Channel Number	Applied Stress K.S.I.
Ti 5Al-2.5 Sn	450	150	Front	7	62.0
"	"	"	"	8	65.0
"	"	"	"	9	69.5
"	"	"	Rear	7	62.3
"	"	"	"	8	67.3
"	"	"	"	9	70.0
Ti 5Al-2.5 Sn	500	150	Front	4	65.0
"	"	"	"	5	70.0
"	"	"	"	6	74.3
"	"	"	Rear	7	65.3
"	"	"	"	8	72.5
"	"	"	"	9	75.0
Ti 5Al-2.5 Sn	550	150	Front	7	67.5
"	"	"	"	8	70.0
"	"	"	"	9	72.5
"	"	"	Rear	7	67.7
"	"	"	"	8	72.5
"	"	"	"	9	73.2
Ti 5Al-2.5 Sn	600	150	Front	7	62.5
"	"	"	"	8	65.0
"	"	"	"	9	67.3
"	"	"	Rear	7	64.3
"	"	"	"	8	66.9
"	"	"	"	9	67.5

Table 52. Onset of Creep Stress Measurement of Ti 5Al-2.5 Sn
Summary of Applied Stresses (Sheet 2 of 3)

Material	Test Temperature Nominal - °F	Test Time Hours	Test Channel Position	Test Channel Number	Applied Stress K.S.I.
Ti 5Al-2.5 Sn	650	150	Front	7	57.5
"	"	"	"	8	60.0
"	"	"	"	9	62.1
"	"	"	Rear	7	57.7
"	"	"	"	8	61.0
"	"	"	"	9	62.5
Ti 5Al-2.5 Sn	450	1000	Front	7	69.5
"	"	"	"	8	68.0
"	"	"	"	9	66.2
"	"	"	Rear	7	70.6
"	"	"	"	8	68.5
"	"	"	"	9	66.5
Ti 5Al-2.5 Sn	500	1000	Front	7	66.9
"	"	"	"	8	69.4
"	"	"	"	9	72.1
"	"	"	Rear	7	67.5
"	"	"	"	8	70.0
"	"	"	"	9	72.5
Ti 5Al-2.5 Sn	550	1000	Front	7	71.4
"	"	"	"	8	69.4
"	"	"	"	9	67.1
"	"	"	Rear	7	72.5
"	"	"	"	8	70.0
"	"	"	"	9	67.5

Table 52. Onset of Creep Stress Measurement of Ti 5Al-2.5 Sn
Summary of Applied Stresses (Sheet 3 of 3)

Material	Test Temperature Nominal - °F	Test Time Hours	Test Channel Position	Test Channel Number	Applied Stress K.S.I.
Ti 5Al-2.5 Sn	600	1000	Front	7	59.1
"	"	"	"	8	62.0
"	"	"	"	9	64.7
"	"	"	Rear	7	60.0
"	"	"	"	8	62.5
"	"	"	"	9	65.0
Ti 5Al-2.5 Sn	650	1000	Front	7	56.6
"	"	"	"	8	59.5
"	"	"	"	9	62.2
"	"	"	Rear	7	57.5
"	"	"	"	8	60.0
"	"	"	"	9	62.5

Table 53. Onset of Creep Stress Measurement of PH 15-7 Mo
Summary of Applied Stresses (Sheet 1 of 3)

Material	Test Temperature Nominal - °F	Test Time Hours	Test Channel Position	Test Channel Number	Applied Stress K.S.I.
PH 15-7 Mo	450	150	Front	1	86.6
"	"	"	"	2	90.1
"	"	"	"	3	99.7
"	"	"	Rear	1	88.0
"	"	"	"	2	90.1
"	"	"	"	3	98.0
PH 15-7 Mo	500	150	Front	1	81.2
"	"	"	"	2	82.6
"	"	"	"	3	90.6
"	"	"	Rear	1	82.0
"	"	"	"	2	82.6
"	"	"	"	3	91.7
PH 15-7 Mo	550	150	Front	1	120.0
"	"	"	"	2	120.5
"	"	"	"	3	123.5
"	"	"	Rear	1	120.0
"	"	"	"	2	122.5
"	"	"	"	3	125.0
PH 15-7 Mo	600	150	Front	1	100.0
"	"	"	"	2	101.0
"	"	"	"	3	103.7
"	"	"	Rear	1	100.0
"	"	"	"	2	102.5
"	"	"	"	3	105.0

Table 53. Onset of Creep Stress Measurement of PH 15-7 Mo
Summary of Applied Stresses (Sheet 2 of 3)

Material	Test Temperature Nominal - °F	Test Time Hours	Test Channel Position	Test Channel Number	Applied Stress K.S.I.
PH 15-7 Mo	650	150	Front	1	107.5
"	"	"	"	2	110.0
"	"	"	"	3	112.5
"	"	"	Rear	4	107.5
"	"	"	"	5	108.3
"	"	"	"	6	111.1
PH 15-7 Mo	450	1000	Front	1	92.5
"	"	"	"	2	95.0
"	"	"	"	3	95.6
"	"	"	Rear	1	91.1
"	"	"	"	2	94.1
"	"	"	"	3	97.5
PH 15-7 Mo	500	1000	Front	1	92.5
"	"	"	"	2	95.0
"	"	"	"	3	95.0
"	"	"	Rear	1	92.5
"	"	"	"	2	97.5
"	"	"	"	3	97.5
PH 15-7 Mo	550	1000	Front	1	120.0
"	"	"	"	2	122.5
"	"	"	"	3	122.6
"	"	"	Rear	1	118.2
"	"	"	"	2	121.3
"	"	"	"	3	125.0

Table 53. Onset of Creep Stress Measurement of PH 15-7 Mo
Summary of Applied Stresses (Sheet 3 of 3)

Material	Test Temperature Nominal - °F	Test Time Hours	Test Channel Position	Test Channel Number	Applied Stress K.S.I.
PH 15-7 Mo	600	1000	Front	1	100.0
"	"	"	"	2	102.5
"	"	"	"	3	103.0
"	"	"	Rear	1	98.5
"	"	"	"	2	101.5
"	"	"	"	3	105.0
PH 15-7 Mo	650	1000	Front	1	107.5
"	"	"	"	2	110.0
"	"	"	"	3	112.5
"	"	"	Rear	1	105.9
"	"	"	"	2	108.9
"	"	"	"	3	114.7

Table 54. Onset of Creep Stress Measurement of PH 14-8 Mo
Summary of Applied Stresses (Sheet 1 of 3)

Material	Test Temperature Nominal - °F	Test Time Hours	Test Channel Position	Test Channel Number	Applied Stress K.S.I.
PH 14-8 Mo	450	150	Front	4	128.4
"	"	"	"	5	133.0
"	"	"	"	6	145.6
"	"	"	Rear	4	128.4
"	"	"	"	5	134.2
"	"	"	"	6	145.6
PH 14-8 Mo	500	150	Front	4	91.5
"	"	"	"	5	101.4
"	"	"	"	6	106.0
"	"	"	Rear	4	91.7
"	"	"	"	5	102.4
"	"	"	"	6	107.3
PH 14-8 Mo	550	150	Front	4	124.2
"	"	"	"	5	127.5
"	"	"	"	6	130.0
"	"	"	Rear	4	125.0
"	"	"	"	5	127.8
"	"	"	"	6	130.3
PH 14-8 Mo	600	150	Front	4	124.3
"	"	"	"	5	127.4
"	"	"	"	6	130.0
"	"	"	Rear	4	125.0
"	"	"	"	5	127.5
"	"	"	"	6	130.0

Table 54. Onset of Creep Stress Measurement of PH 14-8 Mo
Summary of Applied Stresses (Sheet 2 of 3)

Material	Test Temperature Nominal - °F	Test Time Hours	Test Channel Position	Test Channel Number	Applied Stress K.S.I.
PH 14-8 Mo	650	150	Front	4	125.0
"	"	"	"	5	127.5
"	"	"	"	6	130.0
"	"	"	Rear	4	124.4
"	"	"	"	5	127.9
"	"	"	"	6	129.5
PH 14-8 Mo	450	1000	Front	4	121.7
"	"	"	"	5	124.4
"	"	"	"	6	127.0
"	"	"	Rear	4	122.5
"	"	"	"	5	125.0
"	"	"	"	6	126.7
PH 14-8 Mo	500	1000	Front	4	97.5
"	"	"	"	5	100.0
"	"	"	"	6	102.5
"	"	"	Rear	4	97.5
"	"	"	"	5	100.0
"	"	"	"	6	102.5
PH 14-8 Mo	550	1000	Front	4	124.2
"	"	"	"	5	127.0
"	"	"	"	6	130.0
"	"	"	Rear	4	125.0
"	"	"	"	5	127.5
"	"	"	"	6	129.7

Table 54. Onset of Creep Stress Measurement of PH 14-8 Mo
Summary of Applied Stresses (Sheet 3 of 3)

Material	Test Temperature Nominal - °F	Test Time Hours	Test Channel Position	Test Channel Number	Applied Stress K.S.I.
PH 14-8 Mo	600	1000	Front	4	124.2
"	"	"	"	5	127.0
"	"	"	"	6	130.0
"	"	"	Rear	4	125.0
"	"	"	"	5	127.5
"	"	"	"	6	129.7
PH 14-8 Mo	650	1000	Front	4	125.0
"	"	"	"	5	127.5
"	"	"	"	6	130.0
"	"	"	Rear	4	125.8
"	"	"	"	5	128.0
"	"	"	"	6	129.7

Table 55. Onset of Creep Stress Measurement of AM 350
Summary of Applied Stresses (Sheet 1 of 3)

Material	Test Temperature Nominal - °F	Test Time Hours	Test Channel Position	Test Channel Number	Applied Stress K.S.I.
AM 350	450	150	Front	7	61.2
"	"	"	"	8	87.9
"	"	"	"	9	105.3
"	"	"	Rear	7	61.2
"	"	"	"	8	89.1
"	"	"	"	9	107.3
AM 350	500	150	Front	7	92.9
"	"	"	"	8	97.6
"	"	"	"	9	102.3
"	"	"	Rear	7	94.3
"	"	"	"	8	97.8
"	"	"	"	9	103.9
AM 350	550	150	Front	7	87.5
"	"	"	"	8	88.7
"	"	"	"	9	92.5
"	"	"	Rear	7	87.7
"	"	"	"	8	90.0
"	"	"	"	9	93.9
AM 350	600	150	Front	7	80.0
"	"	"	"	8	81.3
"	"	"	"	9	85.0
"	"	"	Rear	7	80.2
"	"	"	"	8	82.5
"	"	"	"	9	86.3

Table 55. Onset of Creep Stress Measurement of AM 350
Summary of Applied Stresses (Sheet 2 of 3)

Material	Test Temperature Nominal - °F	Test Time Hours	Test Channel Position	Test Channel Number	Applied Stress K.S.I.
AM 350	650	150	Front	7	80.0
"	"	"	"	8	82.5
"	"	"	"	9	85.0
"	"	"	Rear	7	79.3
"	"	"	"	8	81.3
"	"	"	"	9	86.3
AM 350	450	150	Front	7	84.8
"	"	"	"	8	87.5
"	"	"	"	9	89.5
"	"	"	Rear	7	85.0
"	"	"	"	8	85.7
"	"	"	"	9	90.0
AM 350	500	150	Front	7	82.5
"	"	"	"	8	85.0
"	"	"	"	9	87.5
"	"	"	Rear	7	82.5
"	"	"	"	8	85.0
"	"	"	"	9	87.5
AM 350	550	150	Front	7	87.3
"	"	"	"	8	90.0
"	"	"	"	9	91.9
"	"	"	Rear	7	87.5
"	"	"	"	8	88.2
"	"	"	"	9	92.5

Table 55. Onset of Creep Stress Measurement of AM 350
Summary of Applied Stresses (Sheet 3 of 3)

Material	Test Temperature Nominal - °F	Test Time Hours	Test Channel Position	Test Channel Number	Applied Stress K.S.I.
AM 350	600	150	Front	7	80.0
"	"	"	"	8	82.5
"	"	"	"	9	85.0
"	"	"	Rear	7	80.0
"	"	"	"	8	82.5
"	"	"	"	9	85.0
AM 350	650	150	Front	7	80.0
"	"	"	"	8	82.5
"	"	"	"	9	85.0
"	"	"	"	7	80.2
"	"	"	"	8	80.9
"	"	"	"	9	85.5

Table 56. Onset of Creep Stress Measurement of Maraging Steel.
Summary of Applied Stresses (Sheet 1 of 3)

Material	Test Temperature Nominal - °F	Test Time Hours	Test Channel Position	Test Channel Number	Applied Stress K.S.I.
AM 355	450	150	Front	1	167.5
"	"	"	"	2	165.0
"	"	"	"	3	162.5
"	"	"	Rear	1	167.9
"	"	"	"	2	163.6
"	"	"	"	3	162.8
AM 355	500	150	Front	1	157.5
"	"	"	"	2	160.0
"	"	"	"	3	162.5
"	"	"	Rear	1	157.8
"	"	"	"	2	158.6
"	"	"	"	3	162.8
AM 355	550	150	Front	1	160.3
"	"	"	"	2	163.0
"	"	"	"	3	167.5
"	"	"	Rear	1	162.5
"	"	"	"	2	167.5
"	"	"	"	3	168.1

Table 56. Onset of Creep Stress Measurement of Maraging Steel.
Summary of Applied Stresses (Sheet 2 of 3)

Material	Test Temperature Nominal - °F	Test Time Hours	Test Channel Position	Test Channel Number	Applied Stress K.S.I.
AM 355	600	150	Front	1	152.5
"	"	"	"	2	153.7
"	"	"	"	3	157.5
"	"	"	Rear	1	152.8
"	"	"	"	2	155.0
"	"	"	"	3	157.8
AM 355	650	150	Front	1	140.0
"	"	"	"	2	137.8
"	"	"	"	3	135.0
"	"	"	Rear	1	135.8
"	"	"	"	2	137.5
"	"	"	"	3	136.6
AM 355	450	1000	Front	1	157.5
"	"	"	"	2	159.6
"	"	"	"	3	162.1
"	"	"	Rear	1	156.2
"	"	"	"	2	160.0
"	"	"	"	3	162.5
AM 355	500	1000	Front	1	152.5
"	"	"	"	2	154.6
"	"	"	"	3	157.0
"	"	"	Rear	1	150.0
"	"	"	"	2	155.0
"	"	"	"	3	157.5

**Table 56. Onset of Creep Stress Measurement of Maraging Steel.
Summary of Applied Stresses (Sheet 3 of 3)**

Material	Test Temperature Nominal - °F	Test Time Hours	Test Channel Position	Test Channel Number	Applied Stress K.S.I.
AM 355	550	1000	Front	1	152.5
"	"	"	"	2	150.0
"	"	"	"	3	147.5
"	"	"	Rear	1	152.8
"	"	"	"	2	148.7
"	"	"	"	3	147.7
AM 355	600	1000	Front	1	152.5
"	"	"	"	2	154.6
"	"	"	"	3	157.1
"	"	"	Rear	1	150.0
"	"	"	"	2	155.0
"	"	"	"	3	157.5
AM 355	650	1000	Front	1	140.0
"	"	"	"	2	137.3
"	"	"	"	3	135.0
"	"	"	Rear	1	137.7
"	"	"	"	2	137.5
"	"	"	"	3	135.4

Table 57. Onset of Creep Stress Measurement of Maraging Steel.
Summary of Applied Stresses (Sheet 1 of 3)

Material	Test Temperature Nominal - °F	Test Time Hours	Test Channel Position	Test Channel Number	Applied Stress K.S.I.
Maraging Steel	450	150	Front	4	187.5
	"	"	"	5	190.0
	"	"	"	6	192.5
	"	"	Rear	4	190.0
	"	"	"	5	187.8
	"	"	"	6	193.2
Maraging Steel	500	150	Front	4	165.2
	"	"	"	5	170.0
	"	"	"	6	172.5
	"	"	Rear	4	167.5
	"	"	"	5	168.0
	"	"	"	6	173.1
Maraging Steel	550	150	Front	4	147.5
	"	"	"	5	148.7
	"	"	"	6	152.5
	"	"	Rear	4	147.7
	"	"	"	5	150.0
	"	"	"	6	152.8
Maraging Steel	600	150	Front	4	137.5
	"	"	"	5	139.4
	"	"	"	6	142.5
	"	"	Rear	4	138.4
	"	"	"	5	140.0
	"	"	"	6	143.0

Table 57. Onset of Creep Stress Measurement of Maraging Steel.
Summary of Applied Stresses (Sheet 2 of 3)

Material	Test Temperature Nominal - °F	Test Time Hours	Test Channel Position	Test Channel Number	Applied Stress K.S.I.
Maraging Steel	650	150	Front	4	135.0
	"	"	"	5	132.5
	"	"	"	6	130.0
	"	"	Rear	4	134.2
	"	"	"	5	133.0
	"	"	"	6	130.0
Maraging Steel	450	1000	Front	4	167.5
	"	"	"	5	170.0
	"	"	"	6	172.5
	"	"	Rear	4	165.5
	"	"	"	5	167.2
	"	"	"	6	172.2
Maraging Steel	500	1000	Front	4	187.5
	"	"	"	5	190.0
	"	"	"	6	192.5
	"	"	Rear	4	185.3
	"	"	"	5	186.8
	"	"	"	6	192.3
Maraging Steel	550	1000	Front	4	162.5
	"	"	"	5	165.0
	"	"	"	6	167.5
	"	"	Rear	4	160.2
	"	"	"	5	163.1
	"	"	"	6	168.1

Table 57. Onset of Creep Stress Measurement of Maraging Steel.
Summary of Applied Stresses (Sheet 3 of 3)

Material	Test Temperature Nominal - °F	Test Time Hours	Test Channel Position	Test Channel Number	Applied Stress K.S.I.
Maraging Steel	600	1000	Front	4	137.5
"	"	"	"	5	140.0
"	"	"	"	6	142.5
"	"	"	Rear	4	135.8
"	"	"	"	5	137.6
"	"	"	"	6	142.5
Maraging Steel	650	1000	Front	4	135.0
"	"	"	"	5	134.7
"	"	"	"	6	130.1
"	"	"	Rear	4	133.4
"	"	"	"	5	132.5
"	"	"	"	6	130.5

Table 58. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6 Al-4V and Ti 5Al-2.5 Sn. Test Temperature - 450° F Nominal. Test Time - 150 Hours (Sheet 1 of 2)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0
24	0	18	14	9	110	298	5	0	98
40	0	178	75	14	158	602	16	0	156
48	0	156	125	14	229	673	6	0	130
64	0	165	130	17	226	695	12	0	108
72	0	213	130	12	282	933	11	0	178
88	0	231	142	19	309	OR	15	0	193
96	11	260	150	27	326	39	21	0	210
112	0	261	140	27	303	66	21	5	278
136	0	205	152	40	346	177	20	13	364
168	0	230	109	26	462	345	23	19	361
184	0	271	110	33	453	373	23	30	351

Table 58. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V and Ti 5 Sn. Test Temperature - 450°F Nominal. Test Time - 150 Hours (Sheet 2 of 2)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
0	0	3	0	4	0	0	0	7	0
16	4	12	8	11	6	1	7	14	2
24	4	19	20	20	14	1	23	24	2
40	6	23	23	23	17	1	30	24	3
48	6	27	24	23	27	2	34	45	4
64	9	27	26	26	26	2	35	53	3
72	9	29	27	25	26	2	30	59	4
88	9	29	28	25	26	2	36	62	4
96	9	32	30	25	25	2	40	73	3
112	9	31	32	24	24	2	40	73	3
136	17	32	24	30	23	5	43	76	11
168	12	40	39	30	25	7	45	78	19
184	12	38	39	31	25	6	46	77	19

Table 59. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V and Ti 5Al-2.5 Sn. Test Temperature - 500° F Nominal. Test Time - 150 Hours (Sheet 1 of 2)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	48	0	0	0
28	3	8	1	0	4	82	0	8	10
44	5	11	2	1	6	103	0	11	17
52	9	11	1	13	9	118	0	16	19
68	9	12	1	13	10	127	0	16	20
76	10	10	1	13	10	128	1	16	20
92	8	0	1	0	11	138	1	17	16
100	11	1	1	0	10	166	3	19	22
116	14	10	0	5	16	186	0	34	42
124	12	7	0	1	18	193	2	35	36
141	17	16	0	13	23	227	3	43	53
169	18	17	0	15	28	233	3	44	52
188	20	18	0	15	31	249	2	43	50
196	19	19	0	18	32	256	4	63	55
212	20	20	0	18	32	253	2	60	55

Table 59. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti-6Al-4V and Ti 5Al-2.5 Sn. Test Temperature - 500°F Nominal. Test Time - 150 Hours (Sheet 2 of 2)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
0	0	0	0	0	0	0	0	0	0
20	5	10	4	13	21	54	5	12	2
28	5	9	3	13	21	79	5	13	1
44	4	34	21	33	43	114	6	38	7
52	21	48	30	39	64	141	8	59	16
68	35	48	41	43	65	153	12	53	24
76	37	52	43	45	70	160	13	52	25
92	36	49	41	44	68	160	12	52	25
100	37	66	42	49	72	175	17	53	32
116	45	69	42	48	80	182	19	65	42
124	65	91	58	60	95	203	31	89	64
141	63	87	59	58	93	198	30	82	67
169	65	93	60	60	93	205	31	78	69
188	64	96	60	60	94	205	31	80	69
196	68	88	60	54	97	217	30	86	69
212	69	90	60	56	97	219	30	87	70

Table 60. Onset of Creep Stress Measurement of Ti 8Al-1Mo, Ti 6Al-4V and Ti 5Al-2.5 Sn. Test Temperature - 550°F Nominal. Test Time - 150 Hours (Sheet 1 of 2)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
0	0	0	Transformer Malfunction	0	0	0	0	0	Transformer Malfunction
20	0	6		0	3	15	4	5	
40	0	31		19	5	30	1	4	
48	1	38		20	5	42	3	6	
64	0	53		28	7	42	1	4	
72	0	61		26	6	44	1	6	
88	0	68		28	7	42	0	4	
96	0	72		26	6	45	2	5	
112	0	89		44	7	79	1	3	
136	0	196		50	6	79	2	4	
144	1	104		55	7	78	2	4	
160	0	114		60	7	79	5	6	
184	0	123		70	9	47	5	5	

Table 60. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V and Ti 5Al-2.5 Sn. Test Temperature - 550° F Nominal. Test Time - 150 Hours (Sheet 2 of 2)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
0	0	0	0	0	0	0	0	0	0
20	3	13	7	7	9	1	2	1	1
40	18	30	22	36	29	2	2	1	3
48	18	32	22	42	34	2	2	1	0
64	19	39	36	51	36	0	57	2	5
72	20	40	37	51	34	1	57	2	7
88	20	42	36	51	33	0	59	2	8
96	20	42	37	51	28	1	59	1	11
112	24	53	54	59	30	0	59	2	11
120	24	56	54	59	27	0	60	2	11
136	26	63	55	61	32	0	61	2	12
144	24	62	54	59	30	0	60	2	11
160	26	72	56	66	36	0	62	2	13
184	27	72	57	66	29	0	62	2	13

Table 61. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V and Ti 5Al-2.5 Sn. Test Temperature - 600°F Nominal. Test Time - 150 Hours (Sheet 1 of 2)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
0	0	0	0	0	0	0	0	0	0
26	151	95	4	5	8	56	0	1	14
56	219	98	2	19	46	116	1	0	25
72	250	100	4	32	55	140	2	2	24
80	260	100	4	36	77	177	0	3	29
96	287	104	2	50	86	202	1	1	32
114	349	55	4	61	119	259	0	0	34
130	364	51	2	61	119	268	2	1	39
138	377	51	4	61	126	302	1	2	39
154	405	53	3	62	138	318	1	2	39
162	410	51	3	62	148	316	2	2	42

Table 61. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V and Ti 5Al-2.5 Sn. Test Temperature - 600° F Nominal. Test Time - 150 Hours (Sheet 2 of 2)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
0	0	0	0	0	0	0	0	0	0
26	28	0	0	26	41	1	13	0	0
56	29	3	3	32	71	1	39	2	1
72	91	3	3	30	75	1	41	2	1
80	91	2	2	30	85	5	57	2	0
96	94	4	4	38	99	1	66	4	1
114	123	4	4	49	85	1	75	0	4
130	125	5	5	48	98	2	77	0	5
138	123	4	4	46	108	2	79	0	4
154	125	6	4	47	127	1	88	0	4
162	125	12	4	47	143	1	93	0	4

Table 62. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V and Ti 5Al-2.5 Sn. Test Temperature - 650°F Nominal. Test Time - 150 Hours (Sheet 1 of 2)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
0	0	0	0	0	0	0	0	0	0
16	9	52	16	33	92	180	1	5	47
24	36	79	25	57	147	241	0	19	56
40	55	92	27	82	183	294	1	28	74
48	65	113	30	94	227	351	2	34	77
64	74	127	32	100	247	400	2	32	68
128	144	211	37	163	367	562	4	35	99
136	158	227	39	168	396	595	4	47	107
152	160	227	39	169	402	609	3	47	106
160	179	246	43	177	427	636	3	47	109
176	186	255	44	184	433	654	1	52	110

Table 62. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V and Ti 5Al-2.5 Sn. Test Temperature - 650° F Nominal. Test Time - 150 Hours (Sheet 2 of 2)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
0	0	0	0	0	0	0	0	0	0
16	4	6	1	0	18	0	27	40	5
24	4	11	2	0	25	0	38	41	5
40	6	16	2	1	39	0	46	60	5
48	4	17	1	0	53	0	58	61	5
64	4	22	0	0	61	0	61	34	4
128	6	59	0	12	159	0	102	51	5
136	6	69	0	14	183	0	119	58	5
152	8	71	0	18	194	0	123	59	5
160	6	80	0	22	210	0	138	59	5
176	8	85	1	24	212	0	141	59	5

Table 63. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and AM 350. Test Temperature - 450°F Nominal. Test Time - 150 Hours (Sheet 1 of 2)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
0	250	250	250	250	250	250	250	250	250
8	251	246	248	246	244	246	242	251	280
24	255	258	249	247	244	260	247	255	282
32	264	259	251	248	245	263	251	257	285
48	271	256	249	247	245	253	248	257	288
64	272	257	249	247	244	253	248	257	292
80	273	256	249	245	242	259	243	254	283
88	273	269	249	245	242	264	245	254	281
104	274	270	249	245	243	268	247	255	281
112	274	282	249	245	242	286	247	255	279
128	270	278	250	247	244	286	250	258	279
136	274	275	250	247	243	297	258	256	272
152	271	275	250	245	243	303	258	251	265
160	278	298	249	245	241	313	257	251	264
176	273	296	249	245	240	328	258	249	263

Table 63. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and
AM 350. Test Temperatures - 450°F Nominal. Test Time - 150 Hours
(Sheet 2 of 2)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
0	250	250	250	250	250	250	250	250	250
8	264	249	252	251	245	241	257	251	243
24	264	247	252	258	247	244	257	251	243
32	263	246	251	257	248	247	257	251	243
48	265	248	254	259	250	248	258	252	249
64	265	248	253	259	250	247	258	252	249
80	265	248	253	259	249	249	258	252	245
88	265	248	253	259	258	251	258	252	244
104	265	246	253	271	258	253	258	252	243
112	268	246	253	271	258	251	258	252	236
128	266	247	254	279	261	246	259	253	224
136	265	247	254	279	260	249	259	253	228
152	280	315	254	279	259	245	259	254	228
176	280	316	255	280	260	246	259	254	228

Table 64. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and
AM 350. Test Temperature - 500°F Nominal. Test Time - 150 Hours
(Sheet 1 of 2)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
0	250	250	250	250	250	250	250	250	250
16	250	254	251	251	251	260	260	251	254
24	251	261	250	251	251	267	270	251	255
40	250	263	251	253	252	272	273	252	255
56	247	264	250	252	251	276	280	251	255
72	248	265	251	253	252	275	281	252	255
80	252	265	250	253	251	278	285	251	255
96	246	266	251	253	251	279	286	252	254
104	249	265	251	252	250	283	286	251	254
120	254	266	251	252	250	288	288	253	256
136	251	266	250	253	250	288	287	251	254
152	243	264	249	251	249	297	284	248	247
160	246	265	250	252	250	297	284	249	246
176	243	268	252	254	252	297	287	252	250

Table 64. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and
AM 350. Test Temperature - 500°F Nominal. Test Time - 150 Hours
(Sheet 2 of 2)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
0	250	250	250	250	250	250	250	250	250
16	255	251	252	251	251	240	252	254	251
24	245	252	252	252	252	241	257	255	252
40	249	252	253	252	253	242	260	256	252
56	240	253	253	253	253	242	260	256	252
72	240	253	253	253	253	241	267	252	252
80	240	253	254	253	253	243	267	259	252
96	241	253	254	254	253	243	267	260	252
104	240	253	254	254	253	245	274	260	252
120	241	255	254	254	254	244	276	262	252
136	241	254	254	254	253	245	276	264	253
152	241	254	254	254	252	244	276	264	252
160	239	253	253	253	248	243	275	262	251
176	239	253	253	253	247	244	278	263	251

Table 65. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and AM 350.
Test Temperature - 550°F Nominal. Test Time - 150 Hours (Sheet 1 of 2)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
0	249	263	250	248	250	264	274	247	250
16	258	269	248	246	248	270	291	245	245
24	268	263	248	247	248	278	311	244	246
42	286	248	249	247	249	275	320	245	240
64	302	250	251	249	251	275	329	245	235
88	307	246	250	249	250	270	334	245	234
96	319	249	251	249	250	287	340	245	234
112	330	254	251	249	251	291	343	246	235
120	330	250	249	249	249	298	344	245	235
136	336	253	249	249	249	302	347	245	235
144	364	254	249	249	249	310	349	245	235
160	365	254	250	249	249	313	348	245	235

Table 65. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and AM 350.
Test Temperature - 550° F Nominal. Test Time - 150 Hours (Sheet 2 of 2)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
0	253	252	252	252	253	251	252	251	247
16	254	252	252	252	254	252	253	252	243
24	256	251	252	252	254	251	253	252	238
42	258	242	251	252	254	251	253	252	230
64	262	242	250	252	255	251	253	252	226
88	268	243	250	252	255	251	254	253	222
96	274	242	250	253	255	252	253	252	220
112	281	242	250	252	254	252	253	252	220
120	284	242	250	252	255	251	253	252	221
136	288	242	250	252	255	251	253	252	220
144	289	242	250	252	255	251	253	252	220
160	292	243	250	252	254	251	253	252	220

Table 66. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and AM 350.
Test Temperature - 600° F Nominal. Test Time - 150 Hours (Sheet 1 of 2)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
0	252	254	251	253	250	272	248	289	260
24	224	334	251	365	257	310	244	317	314
40	233	331	253	366	258	310	246	316	311
64	243	334	251	365	257	313	245	316	316
72	240	337	252	366	257	312	244	314	316
88	212	337	252	366	257	336	260	313	310
92	237	342	253	369	259	331	259	311	310
108	234	369	252	370	258	333	258	313	330
116	229	369	252	371	257	332	258	311	331
132	229	374	252	373	258	336	259	313	331
140	224	372	252	373	257	338	258	310	328
156	225	372	251	375	257	340	259	311	330
164	219	371	251	375	257	338	259	310	330
188	219	372	253	376	259	338	264	312	329
239	220	372	252	377	259	338	260	311	329

Table 66. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and AM 350.
Test Temperature - 600°F Nominal. Test Time - 150 Hours (Sheet 2 of 2)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
0	256	251	252	252	251	251	252	240	251
24	263	250	274	254	253	250	293	268	283
40	266	254	283	254	252	250	312	287	297
64	270	258	285	256	254	251	324	304	308
72	270	258	285	256	254	251	324	304	308
88	271	258	300	262	253	251	323	315	294
92	266	258	299	261	253	250	322	305	304
108	286	263	310	284	288	251	338	327	331
116	287	264	311	285	300	251	340	328	332
132	290	264	317	303	323	251	342	330	333
140	289	264	317	302	323	250	344	330	332
156	289	264	317	303	323	250	344	330	332
164	289	265	318	303	324	251	344	327	329
188	288	265	317	302	323	250	343	326	322
239	288	265	317	302	323	250	343	326	322

Table 67. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and AM 350.
Test Temperature - 650°F Nominal. Test Time - 150 Hours (Sheet 1 of 2)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
0	337	266	279	250	221	347	257	253	278
8	393	315	320	304	271	414	295	310	350
24	427	379	326	305	323	471	301	348	398
32	429	398	326	305	333	489	308	353	410
48	432	396	327	305	322	487	309	354	378
72	455	398	328	307	332	502	313	355	403
88	475	387	328	307	337	502	313	355	408
96	479	387	328	307	338	503	313	355	409
112	478	378	329	307	330	502	314	354	389
120	483	376	327	307	329	500	313	354	381
136	487	417	328	308	316	535	315	354	385
142	492	422	328	308	318	540	315	354	387
158	491	424	329	308	315	538	315	353	377
166	490	424	328	308	316	543	315	353	377
182	487	424	329	308	314	541	315	354	372

Table 67. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and AM 350.
Test Temperature - 650°F Nominal. Test Time - 150 Hours (Sheet 2 of 2)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
0	245	237	251	251	263	215	252	251	250
24	267	239	266	252	263	207	269	251	285
40	328	257	318	328	278	214	317	255	338
64	325	260	318	329	278	213	316	255	338
72	303	260	317	327	278	213	316	253	328
88	292	260	317	327	277	213	314	238	325
92	287	260	317	327	277	213	314	238	325
108	288	259	317	327	277	213	313	238	325
116	282	259	317	327	277	212	313	237	325
132	275	258	317	327	276	212	312	236	324
140	296	259	317	327	277	240	314	237	317
156	300	259	317	327	277	243	314	237	317
164	301	259	317	326	277	243	315	237	317
188	303	260	318	328	277	244	315	237	318
239	303	259	318	327	277	244	315	237	317

Table 68. Onset of Creep Stress Measurement of AM 355 and Maraging Steel.
 Test Temperature - 450° F Nominal. Test Time - 150 Hours
 (Sheet 1 of 2)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
0	321	221	250	273	242	258	251	252	252
16	337	222	249	283	245	264	257	252	252
24	343	220	248	289	245	263	258	252	253
40	351	228	251	295	248	272	259	253	253
48	351	227	250	299	247	270	259	252	252
64	351	224	247	297	245	272	258	250	253
72	353	218	248	297	242	269	257	247	253
90	442	204	249	305	243	266	257	244	253
123	444	199	250	305	242	266	254	244	253
131	448	199	249	304	241	264	254	237	253
147	455	199	250	312	242	267	255	237	254
155	455	197	249	309	239	266	251	232	253
171	459	196	248	317	241	267	254	233	253

Table 68. Onset of Creep Stress Measurement of AM 355 and Maraging Steel.
 Test Temperature 450°F Nominal. Test Time - 150 Hours
 (Sheet 2 of 2)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
0	279	250	244	251	251	251	248	251	253
16	290	252	245	252	252	252	250	252	254
24	290	252	245	252	252	252	251	252	255
40	304	254	244	253	251	257	261	254	259
48	307	255	245	255	252	258	267	266	262
64	310	256	245	258	253	258	268	271	263
72	306	255	243	255	251	257	266	278	263
90	299	255	246	259	253	259	270	315	265
123	299	254	241	259	253	259	270	315	265
131	299	254	241	259	253	259	270	315	265
147	302	253	242	259	253	259	269	315	265
155	302	254	241	259	253	259	270	315	265
171	306	254	241	260	253	259	270	315	265

Table 69. Onset of Creep Stress Measurement of AM 355 and Maraging Steel.
 Test Temperature - 500° F Nominal. Test Time - 150 Hours.
 (Sheet 1 of 2)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
0	238	231	249	224	223	220	232	240	247
28	226	190	249	192	195	203	209	232	247
39	226	207	248	194	200	208	222	231	247
47	226	200	249	195	201	208	225	232	247
63	226	193	249	194	198	202	222	232	247
79	224	201	248	194	197	203	223	231	246
87	225	200	248	194	197	203	226	256	246
103	225	193	249	194	198	203	225	256	247
111	224	189	249	192	197	201	222	255	247
127	224	193	249	194	198	203	227	255	246
135	223	189	249	193	197	201	225	254	246
161	260	217	249	194	197	194	229	253	246

Table 69. Onset of Creep Stress Measurement of AM 355 and Maraging Steel.
 Test Temperature - 500°F Nominal. Test Time - 150 Hours.
 (Sheet 2 of 2)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
0	224	244	220	225	247	233	220	251	212
28	196	226	203	209	239	219	209	251	166
39	196	223	201	210	239	219	209	252	163
47	194	222	200	209	238	219	208	251	157
63	192	220	195	209	234	218	209	251	154
79	192	219	196	209	234	219	209	251	151
87	193	218	195	209	234	218	209	266	150
103	191	217	194	208	233	218	208	265	149
111	194	217	194	209	234	212	209	265	149
127	194	217	193	208	233	212	208	265	149
135	195	217	193	208	233	212	209	265	146
161	210	216	193	209	233	212	208	265	143

Table 70. Onset of Creep Stress Measurement of AM 355 and Maraging Steel.
 Test Temperature - 550°F Nominal. Test Time - 150 Hours
 (Sheet 1 of 2)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
0	253	259	248	248	251	253	249	250	250
8	252	251	247	245	250	254	246	246	248
24	244	253	255	254	255	253	262	252	253
40	251	256	255	266	257	253	274	257	244
57	265	260	260	278	264	253	283	268	250
104	240	261	259	277	265	252	283	269	243
113	214	263	255	274	269	251	274	270	227
138	220	262	253	269	269	252	271	269	228
147	272	265	260	274	267	252	286	273	261
162	273	266	261	275	268	252	280	281	263
170	273	267	262	276	269	253	290	282	263
186	273	268	267	276	275	253	290	282	263
194	274	269	267	277	276	253	290	283	263
210	262	268	266	276	279	253	287	286	263
218	256	269	263	271	279	252	283	287	263
234	258	270	264	272	280	252	284	287	264
303	274	272	265	276	278	252	290	287	264
311	275	272	266	276	278	253	290	288	262

Table 70. Onset of Creep Stress Measurement of AM 355 and Maraging Steel.
 Test Temperature - 550°F Nominal. Test Time - 150 Hours
 (Sheet 2 of 2)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
0	244	252	254	253	254	252	259	251	252
8	242	253	255	253	254	252	259	252	253
24	244	253	255	254	255	252	262	252	253
40	251	256	255	266	257	253	273	257	244
57	265	260	260	279	265	255	283	269	250
104	240	261	259	277	265	252	283	269	243
113	214	263	255	274	269	251	274	270	227
138	220	262	253	269	269	252	271	269	228
147	272	265	260	274	267	252	286	273	261
162	273	266	261	275	268	252	280	281	263
170	273	267	262	276	269	253	290	282	263
186	273	268	267	276	275	253	290	282	263
194	274	269	267	277	276	253	290	283	263
210	262	269	266	276	279	253	287	286	263
218	256	269	263	271	279	252	283	287	263
234	258	269	264	272	280	252	284	287	264
303	258	270	265	272	280	253	285	288	263
311	259	270	265	274	281	253	286	288	263

Table 71. Onset of Creep Stress Measurement of AM 355 and Maraging Steel.
 Test Temperature - 600°F Nominal. Test Time - 150 Hours
 (Sheet 1 of 2)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
0	250	250	250	250	250	250	250	250	250
7	250	247	245	253	250	255	251	253	251
23	250	236	236	252	250	252	252	253	250
31	253	253	244	253	250	255	251	253	252
48	245	245	240	253	250	253	252	255	251
60	247	249	241	251	249	254	251	254	251
72	250	251	243	253	250	254	252	255	251
85	250	242	235	252	248	254	251	254	251
96	252	250	238	252	249	255	251	254	251
107	253	253	240	251	248	256	251	254	251
117	252	246	237	253	249	254	252	255	252
125	258	254	241	252	248	257	251	254	251
141	257	250	239	253	249	253	252	255	251
149	259	290	267	268	250	276	251	254	252
165	259	290	257	268	250	274	252	255	252
173	259	289	257	269	249	276	251	254	252
189	260	292	257	269	250	275	251	255	252

Table 71. Onset of Creep Stress Measurement of AM 355 and Maraging Steel.
 Test Temperature - 600° F Nominal. Test Time - 150 Hours
 (Sheet 2 of 2)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
0	250	250	250	250	250	250	250	250	250
7	248	252	250	250	250	250	248	249	250
23	247	252	250	251	252	251	250	249	251
31	250	252	249	249	249	250	248	248	249
48	251	251	249	250	250	251	250	247	250
60	253	251	251	250	250	250	251	248	250
72	253	251	248	249	250	250	250	247	250
85	253	251	249	250	250	250	249	248	250
96	255	251	249	250	250	251	250	248	250
107	257	252	249	250	250	251	250	248	250
117	255	252	247	248	249	250	249	247	249
125	262	250	249	250	250	251	249	247	250
141	262	253	248	249	249	250	249	246	249
149	248	250	248	250	249	250	251	247	249
165	276	251	247	250	249	250	253	246	249
173	273	250	248	250	249	250	252	246	249
189	278	250	248	250	249	251	253	246	248

Table 72. Onset of Creep Stress Measurement of AM 355 and Maraging Steels.
Test Temperature - 650° F Nominal. Test Time - 150 Hours
(Sheet 1 of 2)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
0	250	250	250	250	250	250	250	250	250
23	247	256	257	250	258	277	269	252	252
38	253	271	278	251	264	289	284	254	253
47	255	274	279	251	264	283	283	253	253
55	257	275	281	251	264	293	288	255	253
71	258	276	282	252	266	292	289	256	253
79	264	289	303	281	266	305	292	257	254
85	263	289	303	282	267	304	291	256	254
93	262	291	304	280	267	306	288	252	252
109	263	293	303	279	266	314	291	257	253
133	262	292	303	280	267	310	291	257	253
141	264	294	304	280	268	310	292	257	253
157	266	292	304	280	337	290	285	227	257

Table 72. Onset of Creep Stress Measurement of AM-355 and Maraging Steel.
Test Temperature - 650°F Nominal. Test Time - 150 Hours
(Sheet 2 of 2)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
0	250	250	250	250	250	250	250	250	250
23	226	262	239	241	242	244	244	263	254
38	218	259	240	241	240	253	260	260	237
47	213	257	235	238	240	251	257	257	229
55	209	252	232	233	233	240	251	251	229
71	211	246	228	230	229	234	248	248	226
79	204	248	225	228	229	234	249	249	180
85	211	248	230	230	236	246	246	246	182
93	198	245	222	227	233	245	245	245	*
109	201	239	220	217	228	241	241	241	*
133	190	244	228	230	236	244	244	244	*
141	192	244	231	233	230	242	245	245	*
157	190	246	230	229	234	245	243	245	*

* Transformer Malfunction

Table 73. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V, and Ti 5Al-2.5 Sn. Test Temperature - 450°F Nominal. Test Time - 1000 Hours (Sheet 1 of 8)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
0	492	493	675	511	539	526	510	567	570
14	493	493	675	513	546	528	509	573	590
22	491	498	679	522	545	501	509	575	598
38	502	488	675	560	546	538	505	568	618
48	490	496	662	540	536	494	504	568	602
62	487	487	648	535	534	509	497	594	605
72	535	499	644	555	533	446	502	543	640
134	592	479	661	562	543	647	509	545	695
142	615	494	682	566	518	589	536	572	809
158	615	471	673	584	541	743	535	551	866
166	628	490	681	594	535	734	541	570	872
182	652	493	682	607	543	712	560	563	892
190	644	495	675	597	527	691	558	573	878
206	655	485	674	601	535	767	560	557	909
214	649	512	689	605	524	749	611	585	500R
230	652	527	694	598	549	771	611	500R	495
238	712	552	704	618	538	500R	617	500	502
302	678	523	689	569	556	411	621	514	532

Table 73. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V, and Ti 5Al-2.5 Sn. Test Temperature - 450°F Nominal. Test Time - 1000 Hours (Sheet 2 of 8)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
310	692	548	688	580	544	408	622	525	525
326	700	545	700	640	556	442	626	523	530
334	693	546	702	559	554	483	632	527	531
350	700	546	705	610	554	476	644	521	532
358	701	557	710	554	539	480	656	532	532
374	690	543	701	561	552	491	650	514	530
382	717	571	721	581	552	510	687	540	533
398	739	575	719	595	526	544	696	522	505
406	738	560	710	599	525	556	708	532	526
494	737	560	659	605	522	520	675	509	508
502	756	562	701	615	530	604	716	539	537
517	753	573	706	584	530	571	699	517	512
525	781	580	705	594	543	605	736	546	563
541	747	574	673	629	527	566	694	510	516
549	763	589	692	673	543	595	728	533	554
565	751	599	658	644	489	522	673	425	506
573	750	578	684	591	541	587	718	528	566
637	718	563	655	615	526	536	693	516	523

Table 73. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V, and Ti 5Al-2.5 Sn. Test Temperature - 450°F Nominal. Test Time - 1000 Hours (Sheet 3 of 8)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
645	728	586	676	623	535	577	715	523	532
661	731	593	678	633	545	565	713	528	535
669	670	545	634	638	501	534	672	493	540
685	685	561	625	540	512	547	650	496	601
693	727	596	681	613	531	614	687	507	624
709	715	589	646	591	531	600	682	512	605
717	721	587	648	632	532	637	687	510	620
733	707	577	630	637	518	567	666	505	610
741	754	598	681	647	541	685	724	522	658
805	750	524	644	549	535	585	674	482	639
813	772	538	669	571	526	715	717	495	745
829	920	537	649	533	539	603	696	504	655
837	939	532	678	511	529	725	713	503	766
853	937	543	667	549	546	692	715	518	679
861	949	544	687	551	535	755	730	508	771
877	833	500	585	509	490	655	623	470	531
885	948	559	690	567	542	865	727	510	804
901	862	520	609	458	520	670	648	484	625

Table 73. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V, and Ti 5Al-2.5 Sn. Test Temperature - 450° F Nominal. Test Time - 1000 Hours (Sheet 4 of 8)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
909	946	555	686	559	539	760	725	508	814
973	894	522	642	501	521	674	648	470	648

Table 73. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V, and Ti 5Al-2.5 Sn. Test Temperature - 450°F Nominal. Test Time - 1000 Hours (Sheet 5 of 8)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
0	511	511	522	528	519	503	517	524	510
14	519	501	530	535	532	498	522	530	485
22	530	508	545	536	529	500	510	538	463
38	521	478	534	531	524	444	455	517	360
48	520	472	536	538	530	418	392	490	321
62	506	448	520	523	522	390	328	426	214
72	511	452	526	534	531	393	324	429	323
134	506	440	522	523	520	391	352	435	257
142	511	454	525	543	527	397	365	442	263
158	508	447	525	575	526	401	375	446	234
166	511	454	526	562	530	402	374	448	245
182	511	448	529	556	528	403	380	453	185
190	504	456	519	568	521	399	368	447	165
206	513	455	529	561	529	404	394	477	190
214	504	459	516	553	521	395	386	472	181
230	511	459	523	560	526	398	393	484	143
238	518	469	530	567	535	403	396	490	157
302	507	460	524	557	524	397	389	481	124

Table 73. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V, and Ti 5Al-2.5 Sn. Test Temperature - 450° F Nominal. Test Time - 1000 Hours (Sheet 6 of 8)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
310	492	462	508	544	518	394	381	474	135
326	511	470	525	558	526	400	400	495	141
334	499	470	513	558	517	395	386	499	142
350	511	471	523	560	525	401	402	512	143
358	508	481	520	561	525	400	404	514	142
374	519	479	532	566	533	410	453	548	187
382	522	488	527	570	541	410	465	570	200
398	512	480	516	556	524	401	466	564	179
406	530	496	528	569	533	423	486	575	217
494	512	475	513	544	517	412	486	563	145
502	537	493	537	568	537	431	494	479	173
517	539	489	540	569	522	525	507	583	088
525	539	498	539	574	552	430	495	582	103
541	540	492	538	566	528	423	501	578	046
549	534	498	533	573	535	421	491	574	054
565	525	496	525	564	533	412	489	568	991R
573	527	500	526	568	536	418	485	574	778
637	533	489	535	561	532	423	498	586	711

Table 73. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V, and Ti 5Al-2.5 Sn. Test Temperature - 450°F Nominal. Test Time - 1000 Hours (Sheet 7 of 8)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
645	536	499	537	572	538	423	488	577	724
661	540	497	536	568	536	422	498	582	697
669	517	494	515	557	527	411	458	573	644
685	526	490	527	556	528	413	471	550	621
693	533	502	520	564	530	406	459	540	619
709	528	493	527	559	531	412	474	564	582
717	526	496	525	561	529	411	471	546	581
733	532	490	531	559	529	413	474	578	556
741	537	501	536	571	539	415	473	557	561
805	570	487	540	560	529	321	472	604	536
813	570	501	540	571	535	328	464	567	534
829	584	492	543	564	533	330	477	589	481
837	602	504	535	570	533	333	462	617	481
853	611	497	542	566	532	334	476	583	455
861	611	504	546	574	538	336	471	600	473
877	609	494	540	564	531	332	480	608	334
885	615	503	548	575	539	334	478	560	349
901	611	493	545	565	533	334	482	550	315

Table 73. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V, and Ti 5AL-2.5 Sn. Test Temperature - 450° F Nominal. Test Time - 1000 Hours (Sheet 8 of 8)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
909	612	504	545	576	540	334	477	553	317
973	604	487	540	558	526	330	476	563	274

Table 74. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V and Ti 5Al-2.5 Sn. Test Temperature - 500°F Nominal. Test Time - 1000 Hours (Sheet 1 of 8)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
0	500	498	495	500	497	500	500	500	500
16	908	488	883	514	518	523	526	520	419
24	500R	470	500R	484	513	481	519	411	410
40	739	724	657	829	527	798	936	840	743
48	764	609	657	630	517	755	695	614	524
112	500R	588	500R	614	523	752	814	566	490
120	506	445	512	469	524	501	656	366	259
136	553	432	531	450	536	511	677	385	244
144	635	430	523	443	532	505	664	372	226
160	797	407	550	414	526	505	653	366	188
168	854	414	623	420	533	506	656	369	201
184	200R	397	704	466	521	499	650	355	156
192	210	398	757	407	530	501	644	355	164
208	267	393	877	410	527	501	655	350	167
216	284	395	941	415	535	437	664	320	172
280	768	372	200R	393	516	425	661	293	51
288	865	373	218	404	522	429	662	299	64

Table 74. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V and Ti 5Al-2.5 Sn. Test Temperature - 500°F Nominal. Test Time - 1000 Hours (Sheet 2 of 8)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
304	100R	373	242	393	521	433	686	305	40
312	96	370	243	389	521	430	682	300	23
320	127	362	300	384	521	432	689	305	13
328	138	369	335	391	527	434	692	309	19
344	265	358	421	381	519	430	686	302	500R
352	277	364	428	386	525	428	680	303	527
368	449	353	549	379	518	426	668	297	514
376	480	363	591	390	526	430	678	308	541
440	873	297	998	283	517	351	587	236	404
448	919	309	100R	292	535	352	580	256	418
464	100R	281	144	249	527	323	574	259	383
472	120	296	193	263	537	328	620	242	418
488	130	285	222	249	526	322	603	225	367
496	163	293	264	256	535	323	602	225	378
512	233	287	309	246	527	320	598	225	376
520	288	298	348	250	528	320	612	225	414
536	557	490	384	243	520	424	705	296	511

Table 74. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V and Ti 5Al-2.5 Sn. Test Temperature - 500° F Nominal. Test Time - 1000 Hours (Sheet 3 of 8)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
544	599	517	427	247	526	480	728	298	531
608	100R	688	955	412	531	716	948	561	717
616	102	645	963	381	537	677	881	488	635
634	121	615	100R	367	540	651	898	528	674
640	135	620	95	364	537	645	878	505	643
656	194	603	93	356	538	653	878	494	621
664	241	606	97	354	534	643	862	469	608
680	375	599	105	348	538	644	863	459	616
688	409	608	116	357	547	645	861	468	646
704	519	596	244	347	536	628	867	463	610
712	564	607	334	362	548	630	879	493	617
776	942	538	582	329	531	627	835	410	459
784	960	545	622	342	545	626	839	418	469
800	655R	534	618	328	532	627	845	414	438
808	746	538	719	333	532	627	832	411	458
824	797	522	763	316	520	618	832	393	416
832	823	532	807	327	524	619	837	399	437

Table 74. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V and Ti 5Al-2.5 Sn. Test Temperature - 500°F Nominal. Test Time - 1000 Hours (Sheet 4 of 8)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
848	941	530	926	326	527	626	850	411	395
856	965	530	933	326	527	624	840	405	393
872	700R	523	972	323	530	624	843	407	363
880	748	526	857	326	518	625	846	410	394
944	100R	514	100R	314	522	612	837	395	337
952	120	518	111	322	518	617	842	402	347
968	118	477	108	303	527	616	840	393	318
976	123	482	114	307	513	615	831	388	302
992	142	471	103	295	521	612	833	378	314
1000	146	477	111	294	524	589	832	375	311

Table 74. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V and Ti 5Al-2.5 Sn. Test Temperature - 500°F Nominal. Test Time - 1000 Hours (Sheet 5 of 8)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
0	489	429	515	520	526	479	489	489	448
16	504	381	579	417	578	469	655	507	611
24	609	384	572	411	553	499	647	478	481
40	966	442	581	575	572	673	881	554	665
48	500R	309	572	424	544	551	740	477	483
112	952	261	345	230	409	319	465	395	610
120	500R	301	589	386	558	477	787	321	625
136	789	235	608	387	583	519	838	340	705
144	828	226	580	360	557	518	810	325	649
160	959	189	537	370	558	436	734	292	545
168	200R	185	582	326	546	463	776	290	695
184	231	142	325	174	483	464	776	277	592
192	386	181	520	278	539	403	759	265	534
208	540	188	355	266	542	463	788	270	680
216	607	193	609	355	574	466	824	226	722
280	933	171	333	164	555	409	813	203	479
288	200R	179	616	286	573	498	871	203	714

Table 74. Onset of Creep Stress Measurement of Ti 8Al-1Mo, Ti 6Al-4V and Ti 5Al-2.5 Sn. Test Temperature - 500°F Nominal. Test Time - 1000 Hours (Sheet 6 of 8)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
304	178	171	542	281	558	441	812	186	688
312	199	180	614	370	577	457	864	187	684
320	248	185	561	293	558	408	766	188	535
328	333	174	618	313	582	486	893	173	668
344	411	180	569	263	552	391	799	175	615
352	451	174	623	331	580	490	904	184	716
368	580	183	593	270	575	429	870	189	669
376	647	180	627	317	591	497	913	209	669
440	100R	116	609	214	572	384	869	152	502
448	78	117	623	224	575	451	897	143	662
464	141	129	614	226	583	412	995	165	693
472	186	130	615	260	588	524	1000	222	708
488	220	137	586	232	564	445	884	199	434
496	274	127	620	235	593	477	1000	205	702
512	379	140	608	231	563	457	983	221	513
520	409	154	624	247	563	505	100R	253	607
536	657	305	595	290	555	597	190	459	611

Table 74. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V and Ti 5Al-2.5 Sn. Test Temperature - 500°F Nominal. Test Time - 1000 Hours (Sheet 7 of 8)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
544	730	300	633	339	567	636	206	457	830
608	897	308	567	365	505	582	299	505	949
616	873	286	566	344	520	554	274	474	928
634	100R	285	584	344	540	592	279	491	954
640	88	290	585	345	541	569	274	475	899
656	102	284	587	348	549	556	274	470	931
664	94	263	551	362	530	569	279	471	886
680	101	258	576	376	540	509	246	426	810
688	87	258	555	331	519	556	255	457	909
704	143	260	552	336	540	576	268	472	938
712	169	297	552	320	530	555	255	457	910
776	505	209	532	309	529	294	131	343	904
784	579	223	585	308	555	575	209	390	867
800	616	197	512	277	532	489	192	354	914
808	738	225	591	320	541	537	212	379	890
824	744	159	433	222	541	478	199	355	881
832	841	231	592	299	539	582	209	372	846

Table 74. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V and Ti 5Al-2.5 Sn. Test Temperature - 500°F Nominal. Test Time - 1000 Hours (Sheet 8 of 8)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
848	933	211	592	278	555	517	187	346	867
856	992	236	600	287	536	602	195	346	890
872	993	200	556	302	514	480	174	314	802
880	897	262	609	318	568	577	215	370	848
944	OR	223	578	246	521	493	175	295	588
952	23	234	605	268	552	511	176	314	699
968	75	216	602	285	570	510	186	308	747
976	140	230	630	315	579	545	206	326	891
992	181	199	596	277	560	548	206	334	633
1000	319	233	630	307	580	554	214	347	914

Table 75. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V and Ti 5Al-2.5 Sn. Test Temperature - 550° F Nominal. Test Time - 1000 Hours (Sheet 1 of 6)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
0	179	232	279	176	113	144	160	119	137
8	225	257	287	181	124	163	193	124	152
24	271	302	298	189	133	177	215	134	171
32	294	355	309	167	132	177	208	129	203
96	312	106	199	90	138	125	112	66	212
104	581	189	348	131	134	150	118	74	246
120	539	182	291	123	107	116	102	64	161
128	611	173	374	142	130	170	110	67	190
144	642	178	397	130	129	183	119	52	211
152	700	176	383	128	140	180	123	66	219
264	957	61	598	60	131	116	63	59	532
272	974	51	619	44	124	127	53	54	553
288	809	55	651	44	138	122	72	69	445
296	856	53	698	40	140	194	78	71	428
312	602	295	695	152	126	411	377	139	592
320	712	464	777	216	131	614	407	167	442
336	726	392	780	193	141	433	425	151	698

Table 75. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V and Ti 5Al-2.5 Sn. Test Temperature - 550°F Nominal. Test Time - 1000 Hours (Sheet 2 of 6)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
344	784	457	814	252	128	487	479	173	596
360	817	474	854	258	171	446	499	194	785
368	807	423	821	298	127	490	480	169	655
456	100R	100R	100R	100R	100R	100R	100R	100R	100R
464	102	130	162	140	87	38	85	23	110
480	85	153	160	142	91	71	112	50	111
504	88	144	173	188	82	182	208	233	118
528	98	271	162	237	78	236	267	230	96
536	125	286	230	235	68	284	317	402	132
600	132	319	284	302	88	348	401	453	139
608	171	369	285	320	76	286	397	531	152
624	190	391	256	284	83	341	412	548	165
632	177	378	293	364	67	314	395	490	149
648	207	412	317	381	88	341	405	512	140
656	207	380	306	322	65	339	403	505	153
672	207	347	284	335	83	337	416	521	174
680	228	517	355	341	63	366	437	579	159

Table 75. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6 Al-4V and Ti 5Al-2.5 Sn. Test Temperature - 550°F Nominal. Test Time - 1000 Hours (Sheet 3 of 6)

Elapsed Time Hours	Front Test Channel Strain Gage Reading - Units								
	1	2	3	4	5	6	7	8	9
696	183	303	298	359	73	269	343	548	173
704	246	426	349	270	58	347	428	568	168
768	231	249	263	475	80	366	475	616	190
776	281	485	380	364	63	351	425	528	172
792	285	503	360	450	77	340	430	584	190
800	284	420	374	430	63	386	449	431	174
816	300	369	310	265	54	388	325	442	181
936	403	610	463	555	51	435	529	630	200
952	420	488	431	609	63	457	534	777	249
960	475	629	512	609	46	569	643	810	308
976	475	629	326	535	52	713	653	782	299
1000	477	629	513	543	59	631	651	779	304

Table 75. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V and Ti 5Al-2.5 Sn. Test Temperature - 550° F Nominal. Test Time - 1000 Hours (Sheet 4 of 6)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
0	101	132	121	116	123	118	127	132	160
8	141	201	230	223	144	185	202	190	193
24	134	199	226	212	141	157	175	183	156
32	164	123	248	124	8	10	34	25	100R
96	208	132	239	138	19	16	45	49	114
104	259	113	221	124	10	11	39	92	8
120	277	119	231	132	15	12	35	81	11
128	294	122	235	140	25	19	50	68	7
144	333	116	230	135	21	17	44	65	100R
152	685	188	358	58	58	65	77	74	170
264	719	179	371	68	76	125	81	91	165
272	722	178	378	68	74	122	85	82	142
288	731	184	383	75	79	127	83	83	142
296	616	599	597	607	549	603	922	886	714
312	685	636	631	742	610	726	932	947	793
320	723	631	705	838	599	702	974	983	793
336	745	649	716	862	676	815	978	999	856

Table 75. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V and Ti 5Al-2.5 Sn. Test Temperature - 550°F Nominal. Test Time - 1000 Hours (Sheet 5 of 6)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
344	748	649	718	867	713	839	993	996	813
360	751	665	726	912	727	871	1000	663	861
368	754	669	731	923	731	875	1000	668	865
456	100R	100R	100R	100R	100R	100R	100R	100R	100R
464	107	110	112	245	188	109	950	0	66
480	60	95	71	202	221	95	944	2	50
504	231	185	103	294	229	106	100R	29	198
528	275	241	91	345	221	106	160	47	261
536	295	260	86	343	229	105	183	79	293
600	398	397	87	440	456	110	335	91	405
608	430	428	84	459	455	109	350	94	465
624	446	436	87	465	462	111	355	93	477
632	469	450	103	485	475	117	366	110	474
648	461	451	97	480	474	117	370	111	453
656	477	456	104	488	478	119	368	115	481
672	465	450	96	473	472	116	362	107	444
680	478	458	108	520	476	118	361	111	468

Table 75. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V and Ti 5Al-2.5 Sn. Test Temperature - 550°F Nominal. Test Time - 1000 Hours (Sheet 6 of 6)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
696	477	462	170	581	478	120	410	121	499
704	493	476	183	590	480	120	405	126	486
768	510	489	245	585	485	122	401	133	472
776	515	499	244	581	475	121	394	131	484
792	539	508	260	597	492	127	423	144	497
800	536	508	252	551	480	123	440	136	485
816	534	509	240	537	471	120	430	127	487
936	565	524	242	541	479	121	461	130	533
952	635	689	364	628	640	126	630	145	703
960	645	710	385	633	656	128	652	156	728
976	645	717	378	631	712	129	663	159	690
1000	647	721	383	633	683	131	665	164	716

Table 76. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V and Ti 5Al-2.5 Sn. Test Temperature - 600°F Nominal. Test Time - 1000 Hours (Sheet 1 of 8)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
0	271	92	100	28	112	118	58	101	104
64	731	76	268	33	125	137	58	28	117
72	738	71	281	31	115	120	47	100	115
88	1000	322	322	203	91	334	259	471	119
96	100R	203	382	265	100R	332	180	320	118
112	95	150	431	242	108	264	191	278	126
120	91	122	436	188	100	306	135	177	120
136	97	134	480	175	105	226	153	226	104
144	169	140	511	178	105	234	148	228	124
160	278	100R	562	192	120	244	193	300	129
168	299	110	579	190	108	250	197	307	115
232	491	110	788	190	138	246	198	271	118
240	609	101	844	198	132	277	204	266	115
256	630	102	903	201	135	270	209	278	99
264	642	103	924	197	139	304	198	275	126
280	770	104	990	207	149	299	218	293	127
288	787	100	100R	207	134	300	196	264	116

Table 76. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V and Ti 5Al-2.5 Sn. Test Temperature - 600°F Nominal. Test Time - 1000 Hours (Sheet 2 of 8)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
312	933	99	154	195	150	329	217	287	100
328	948	98	206	201	141	313	205	271	124
336	940	76	232	198	152	288	201	255	114
400	955	45	289	209	140	322	190	196	124
424	100R	52	433	200	161	316	198	219	135
432	107	43	484	178	150	321	203	225	139
448	104	50	575	174	159	303	208	226	114
456	141	33	618	151	144	326	198	217	120
472	165	39	644	134	148	334	211	230	122
480	198	19	661	132	143	330	191	208	120
544	210	35	696	127	155	292	195	211	122
552	246	20	728	120	143	322	197	214	113
568	430	21	867	108	148	324	202	212	104
576	474	36	930	126	149	308	202	212	130
592	528	46	942	135	160	287	212	220	134
600	575	40	977	129	150	315	216	231	137
664	615	43	1000	129	159	327	224	219	112

Table 76. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V and Ti 5Al-2.5 Sn. Test Temperature - 600°F Nominal. Test Time - 1000 Hours (Sheet 3 of 8)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
672	631	41	100R	122	157	328	215	206	126
688	624	48	127	117	155	292	227	220	103
712	654	50	159	124	160	356	235	229	110
720	673	54	174	120	159	317	231	230	123
736	768	53	191	120	159	318	226	216	118
744	867	43	327	86	157	318	215	113	126
760	885	47	356	83	160	296	202	110	121
768	912	45	441	61	162	324	203	111	126
832	100R	43	474	67	155	298	200	100	115
840	105	45	476	62	161	321	207	106	125
856	103	41	499	65	155	300	206	109	120
864	118	47	521	51	159	340	219	118	112
872	126	49	540	56	154	341	220	128	122
888	119	57	518	75	169	243	204	122	133
896	125	58	562	65	159	329	212	118	123
968	211	74	698	88	154	315	215	121	135
984	283	74	716	76	173	314	222	126	140

Table 76. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V and Ti 5Al-2.5 Sn. Test Temperature - 600°F Nominal. Test Time - 1000 Hours (Sheet 4 of 8)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
992	427	110	723	70	161	321	212	108	135
1008	716	330	754	79	120	434	405	499	140
1016	739	241	814	221	120	423	376	324	126

Table 76. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V and Ti 5Al-2.5 Sn. Test Temperature - 600°F Nominal. Test Time - 1000 Hours (Sheet 5 of 8)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
0	110	73	108	184	110	102	70	114	21
64	183	37	149	202	116	92	57	86	100R
72	202	30	154	198	114	82	32	78	100
88	896	111	800	868	415	110	539	227	339
96	1000	267	1000	962	672	115	343	358	1000
112	100R	265	100R	962	698	70	283	281	100R
120	99	162	100	837	683	50	122	202	96
136	121	146	124	844	699	53	172	202	221
144	115	141	115	840	697	42	156	185	223
160	125	139	126	847	782	44	192	188	243
168	129	146	131	852	706	43	212	187	247
232	145	130	166	847	711	35	209	178	128
240	148	132	180	850	707	29	196	178	1
256	161	128	214	862	770	30	208	183	100R
264	165	127	233	856	713	100R	198	168	39
280	173	119	272	863	707	101	198	163	15
288	185	120	309	851	708	100	196	163	100R

Table 76. Onset of Creep Stress Measurement of Ti 8Al-1Mo, Ti 6Al-4V and Ti 5Al-2.5 Sn. Test Temperature - 600°F Nominal. Test Time - 1000 Hours (Sheet 6 of 8)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
304	211	115	345	854	720	103	213	167	98
312	212	114	368	861	708	98	193	157	46
328	238	108	396	861	721	104	216	166	100R
336	241	107	424	861	727	100	182	153	700
400	297	92	578	859	716	103	188	159	677
408	296	92	608	863	714	99	175	152	568
424	319	90	698	860	772	102	194	161	553
432	324	90	698	860	772	102	194	157	553
448	332	94	724	860	874	107	183	157	480
456	328	89	775	867	835	102	186	149	446
472	347	91	837	855	714	98	178	158	372
480	345	90	854	853	710	95	163	151	266
544	364	84	885	855	713	95	177	154	253
552	358	84	921	849	714	92	165	150	212
568	405	82	95	857	705	95	187	157	157
576	403	80	91	847	708	93	158	145	30
592	418	75	102	853	752	94	174	152	12

Table 76. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V and Ti 5Al-2.5 Sn. Test Temperature - 600°F Nominal. Test Time - 1000 Hours (Sheet 7 of 8)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
600	416	77	89	844	702	91	158	145	6
664	437	74	102	869	713	95	173	154	900R
672	442	77	95	850	711	95	161	150	883
688	458	77	106	855	726	96	173	156	853
712	461	78	112	852	721	95	163	152	884
720	472	78	118	852	721	95	178	155	866
736	469	74	110	848	722	95	150	150	681
744	490	71	198	847	709	92	132	156	549
760	496	70	201	847	721	94	126	148	375
768	517	74	417	872	715	97	136	156	374
832	524	71	410	851	763	95	123	148	319
840	533	72	416	853	727	96	128	151	310
856	530	71	405	856	710	95	109	139	303
864	550	72	435	862	723	95	128	149	199
872	550	71	429	851	716	97	118	144	200
968	588	65	640	838	703	94	108	131	59

Table 76. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V and Ti 5Al-2.5 Sn. Test Temperature - 600° F Nominal. Test Time - 1000 Hours (Sheet 8 of 8)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
984	613	72	689	853	718	98	124	144	67
992	619	73	693	856	729	97	116	142	300
1008	647	128	300	985	720	100	370	247	589
1016	656	132	300	990	722	100	263	253	224

Table 77. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V and Ti 5Al-2.5 Sn. Test Temperature - 650° F Nominal. Test Time - 1000 Hours (Sheet 1 of 8)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
0	100	100	100	100	100	100	100	100	100
16	266	122	172	160	120	108	179	105	246
24	282	111	174	146	115	136	194	51	240
40	334	113	184	121	117	134	190	48	210
48	381	14	171	135	114	68	149	100R	210
64	376	26	183	128	116	87	156	109	284
72	492	60	259	117	109	176	175	108	244
88	599	136	273	107	103	254	230	241	252
96	622	134	278	117	114	251	265	252	243
160	863	125	527	96	109	210	259	250	217
168	931	95	569	96	114	206	262	261	229
184	100R	85	598	78	102	233	248	232	182
192	120	92	623	83	99	312	293	244	210
208	131	93	685	40	122	183	260	250	219
216	214	34	754	14	114	55	253	225	217
232		105R		1025R					
240	356	130	821	134	107	85	274	196	228
256	386	127	842	133	120	67	280	203	225

Table 77. Onset of Creep Stress Measurement of Ti 8 Al-1Mo-1V, Ti 6Al-4V and Ti 5Al-2.5 Sn. Test Temperature - 650°F Nominal. Test Time - 1000 Hours (Sheet 2 of 8)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
264	427	130	887	140	108	105	290	207	193
328	663	185	100R	147	107	144	377	213	189
336	852	100R	108	44	111	100R	179	100R	226
352	100R	576	257	180	100	645	613	905	239
360	133	282	260	82	1	288	213	274	232
400	100R	100R	100R	100R	100R	100R	100R	100R	100R
408	95	89	97	66	94	122	23	101	203
424	128	72	88	120	106	63	121	73	195
432	123	51	90	96	103	86	35	186	166
496	47	113	103	181	80	91	50	109	199
504	63	114	108	182	56	98	33	108	184
520	23	109	105	134	75	7	34	27	160
528	34	153	107	126	51	28	28	4	173
544	28	19	102	63	59	200R	17	200R	194
552	297	20	109	70	56	229	27	203	167
576	293	505R	114	59	59	199	27	198	192
600	302	548	117	12	54	160	33	160	195
608	299	581	119	8	53	163	40	166	202

Table 77. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V and Ti 5Al-2.5 Sn. Test Temperature - 650°F Nominal. Test Time - 1000 Hours (Sheet 3 of 8)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
624	352	563	174	1	60	147	42	169	217
632	357	561	200	5	51	165	58	171	188
648	358	549	200	1	60	148	57	167	194
656	359	582	224	9	50	153	47	144	184
672	367	538	235	2	47	199	48	154	186
680	400	555	272	1	47	183	73	155	201
696	405	560	288	2	40	190	71	153	175
704	419	515	301	17	41	183	66	148	199
720	458	571	326	0	46	233	92	161	195
728	500	546	338	100R	43	221	72	159	200
792	573	412	444	110	43	228	98	154	198
800	604	530	483	105	27	190	95	145	191
816	608	524	497	120	47	183	107	169	211
824	639	544	504	118	41	233	130	163	204
840	651	532	514	118	44	221	150	170	217
848	712	552	548	132	48	228	160	172	214
864	717	522	561	120	55	179	163	186	218
872	737	547	617	127	48	212	160	178	191

Table 77. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V and Ti 5Al-2.5 Sn. Test Temperature - 650°F Nominal. Test Time - 1000 Hours (Sheet 4 of 8)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
888	742	546	640	112	49	197	145	149	178
896	785	517	637	105	30	227	155	164	187
950	831	505	689	99	32	225	189	163	191
958	860	525	702	110	36	227	195	168	194
1022	880	538	710	114	40	229	199	172	197

Table 77. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V and Ti 5Al-2.5 Sn. Test Temperature - 650° F Nominal. Test Time - 1000 Hours (Sheet 5 of 8)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
0	100	100	100	100	100	100	100	100	100
16	49	18	61	92	1	37	44	9	19
24	68	26	78	116	31	52	64	6	500R
40	71	26	77	117	30	48	65	500R	542
48	71	19	77	117	36	48	97	504	314
64	70	24	77	126	43	51	94	506	372
72	54	27	77	128	30	57	157	511	480
88	387	76	113	244	267	226	335	536	741
96	398	88	114	245	260	215	356	537	749
160	497	99	290	261	282	219	402	558	614
168	516	102	292	257	274	214	362	553	617
184	549	102	293	255	276	221	363	577	587
192	563	105	355	258	281	226	358	557	571
208	625	111	471	261	284	217	367	567	604
216	627	108	475	259	266	121	295	558	292
232	665	104	476	262	269	117	266	569	186
240	665	107	475	315	300	101	252	572	175
256	700	104	484	266	272	107	260	569	202

Table 77. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V and Ti 5Al-2.5 Sn. Test Temperature - 650°F Nominal. Test Time - 1000 Hours (Sheet 6 of 8)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
264	688	109	483	261	261	100	247	574	112
328	773	105	815	317	268	103	300	564	112
336	770	107	800	263	86	15	100R	240	10
352	100R	95	100R	290	100R	100R	530	293	877
360	55	91	120	423	188	1	307	231	0
400	100R	100R	100R	100R	100R	100R	100R	100R	100R
408	96	96	93	61	1	49	30	75	54
424	107	93	102	64	31	86	55	56	149
432	98	92	96	57	30	65	76	57	47
496	108	26	108	15	36	76	105	44	65
504	85	11	93	93	43	86	71	0	43
520	103	10	106	97	30	152	126	14	97
528	92	13	95	95	267	174	87	9	74
544	103	11	104	98	260	170	97	15	200R
552	119	11	94	97	282	145	60	4	181
576	151	4	112	102	274	149	77	12	196
600	146	3	97	97	276	147	89	3	150
608	139	500R	91	94	281	145	71	509R	168

Table 77. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V and Ti 5Al-2.5 Sn. Test Temperature - 650°F Nominal. Test Time - 1000 Hours (Sheet 7 of 8)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
624	148	507	96	97	284	153	77	629	235
632	186	506	108	100	266	155	85	592	239
648	176	511	180	97	100	175	99	527	244
656	188	509	188	102	88	176	109	538	226
672	177	518	178	98	81	175	99	608	210
680	186	514	182	99	101	180	101	655	219
696	193	512	290	101	87	181	108	627	219
704	187	512	285	97	81	177	100	528	179
720	177	511	285	93	83	176	89	551	211
728	203	516	425	101	124	195	113	528	247
792	214	517	524	100	90	224	133	557	207
800	215	516	663	108	85	211	117	557	197
816	206	522	670	99	83	217	123	634	189
824	222	524	668	105	137	221	118	600	262
840	217	524	739	110	96	234	120	534	223
848	233	528	793	105	82	246	154	537	246
864	227	527	852	105	171	282	195	626	211
872	250	530	866	110	57	306	166	611	136

Table 77. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V, Ti 6Al-4V and Ti 5Al-2.5 Sn. Test Temperature - 650° F Nominal. Test Time - 1000 Hours (Sheet 8 of 8)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
888	241	528	858	108	99	183	184	668	140
896	258	530	880	108	87	201	155	554	147
950	238	529	964	103	85	228	137	693	135
958	265	531	893	108	89	235	128	676	142
1022	272	533	921	104	93	243	119	693	133

Table 78. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and AM 350.
Test Temperature - 450° F. Test Time-1000 Hours (Sheet 1 of 8)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
0	435	340	330	339	322	626	462	377	330
16	838	450	337	321	293	651	605	381	321
24	897	343	345	345	291	723	654	391	315
88	300R	281	339	322	295	700	800	368	244
96	318	334	354	338	293	854	840	374	252
112	328	302	356	340	294	734	852	385	273
120	335	270	353	339	297	884	300R	392	304
136	328	272	349	337	276	771	304	367	246
144	423	390	361	342	316	790	315	388	300
160	408	418	361	342	313	804	318	384	365
168	444	429	357	348	308	822	320	378	357
184	187	301	359	340	307	728	330	378	365
192	377	357	355	324	284	728	332	390	351
256	430	325	361	330	300	725	353	372	379
264	441	289	372	342	311	751	382	396	377
280	454	294	372	341	315	970	378	391	328
288	476	281	373	344	304	932	389	390	344
304	461	230	362	320	303	945	398	366	374

Table 78. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and AM 350.
Test Temperature -450°F Test Time-1000 Hours (Sheet 2 of 8)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
312	463	165	370	332	308	987	402	392	361
328	462	253	376	342	314	929	408	396	364
336	452	204	377	344	322	378	407	393	350
352	314	211	370	327	307	275	406	386	341
360	346	146	365	331	298	259	400	380	325
424	340	179	365	332	315	391	398	369	272
432	314	179	365	314	315	391	398	369	272
448	346	126	371	335	302	364	413	384	350
456	340	151	373	339	314	390	454	387	393
480	282	85	374	341	305	340	467	389	391
496	242	69	372	338	292	374	453	383	373
504	352	110	371	338	296	310	463	382	395
520	387	128	366	318	295	402	458	371	382
584	435	143	374	333	299	318	473	383	313
600	441	143	375	334	317	434	471	380	307
608	442	139	380	339	319	410	480	384	423
624	455	154	376	332	304	436	477	380	387
632	480	154	380	337	309	408	501	385	439

Table 78. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and AM 350.
Test Temperature - 450°F. Test Time-1000 Hours (Sheet 3 of 8)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
648	476	154	379	337	317	464	495	380	403
656	487	164	383	339	311	357	500	380	446
672	470	151	377	337	317	469	498	378	444
680	487	141	382	342	303	344	507	381	445
696	490	141	383	340	315	474	507	384	443
760	491	143	385	345	317	479	511	381	469
776	494	145	385	342	312	474	510	381	464
784	493	147	384	341	318	472	511	380	474
800	488	147	380	338	295	453	521	378	438
808	487	122	385	343	285	402	527	381	495
824	494	136	386	345	310	483	529	380	428
832	494	134	385	344	309	480	529	384	458
848	270	5	383	336	274	438	518	369	445
856	210	200	382	338	280	345	515	366	455
872	220	228	385	340	246	438	549	371	366
880	407	302	383	337	246	438	549	371	366
896	457	349	387	342	249	446	584	377	425
904	457	343	386	345	283	431	578	378	390

Table 78. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and AM 350.
Test Temperature - 450°F. Test Time - 1000 Hours (Sheet 4 of 8)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
1014	472	386	388	347	272	471	583	375	502
1030	468	342	385	341	241	347	580	377	492
1038	472	352	387	344	297	467	578	374	398
1060	480	345	386	341	284	354	583	377	490

Table 78. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and AM 350.
Test Temperature - 450°F Nominal. Test Time - 1000 Hours (Sheet 5 of 8)

Elapsed Time Hours	Rear Test Channel Strain Gage Reading - Units								
	1	2	3	4	5	6	7	8	9
0	298	249	605	494	575	325	372	724	388
16	285	265	594	381	390	317	253	662	291
24	256	266	560	398	549	287	65	424	290
88	304	264	560	334	338	266	49	300	351
96	294	264	526	526	279	300	61	308	361
112	309	271	653	344	286	294	103	318	361
120	301	260	615	431	246	294	48	298	424
136	300	254	520	381	399	303	201	390	296
144	291	272	547	340	279	289	91	666	420
160	297	269	520	349	325	320	75	304	282
168	297	274	526	346	303	303	57	138	289
184	337	272	530	351	425	313	49	257	373
192	329	274	529	355	313	292	79	15	319
256	330	269	528	366	473	294	88	55	319
264	330	266	527	367	310	306	55	98	411
280	329	272	527	356	319	306	79	75	302
288	330	271	535	353	379	291	70	37	314
304	333	270	527	354	312	321	68	27	317

Table 78. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and AM 350.
Test Temperature - 450°F. Test Time-1000 Hours (Sheet 6 of 8)

Elapsed Time Hours	Rear Test Channel Strain Gage Reading - Units								
	1	2	3	4	5	6	7	8	9
312	331	268	524	356	309	290	59	43	293
328	329	268	522	343	309	286	72	104	295
336	326	271	524	345	309	299	90	2	427
352	322	270	526	346	315	292	77	23	327
360	329	268	544	354	326	250	82	21	401
364	272	268	200R	361	284	246	56	202	353
432	223	273	212	357	244	255	165	181	356
448	229	271	214	358	242	243	64	163	295
456	329	257	218	360	160	246	136	147	306
480	328	241	216	371	170	266	50	109	300
496	270	243	223	360	235	246	55	155	395
504	261	240	219	344	214	245	51	123	346
520	266	238	226	350	221	274	58	190	310
584	240	241	224	347	233	242	75	143	294
600	236	239	227	361	240	247	65	143	456
608	225	237	221	380	213	250	54	149	367
624	230	238	227	331	239	241	68	153	331
632	228	240	224	337	242	239	53	151	289

Table 78. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and AM 350.
Test Temperature - 450°F. Test Time-1000 Hours (Sheet 7 of 8)

Elapsed Time Hours	Rear Test Channel Strain Gage Reading - Units								
	1	2	3	4	5	6	7	8	9
648	227	237	226	332	213	298	70	155	369
656	228	237	225	328	217	240	57	169	566
672	229	239	226	332	229	243	75	330	322
680	221	237	219	323	249	240	63	263	375
696	224	238	221	328	242	238	63	149	431
760	221	235	219	326	235	237	93	148	336
776	221	235	219	324	275	235	74	166	354
784	212	235	221	334	268	249	165	179	345
800	225	232	223	330	224	257	63	169	337
808	223	237	221	325	247	242	75	234	317
824	226	235	223	332	220	241	77	235	387
832	219	238	223	326	232	236	86	165	345
848	217	234	217	324	241	238	57	164	308
856	228	233	217	384	304	259	59	171	376
872	308	237	218	326	181	274	77	188	298
880	312	233	222	323	175	251	55	102	294
896	316	228	225	363	197	324	57	106	298
904	310	229	222	328	195	239	71	132	309

Table 78. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and AM 350.
Test Temperature - 450° F. Test Time - 1000 Hours (Sheet 8 of 8)

Elapsed Time Hours	Rear Test Channel Strain Gage Reading - Units								
	1	2	3	4	5	6	7	8	9
1014	239	227	248	347	206	284	72	204	291
1030	233	234	250	330	222	239	93	126	293
1038	225	236	247	325	266	251	87	153	297
1060	222	230	249	329	204	248	94	144	288

Table 79. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and AM 350. Test Temperature - 500°F Nominal. Test Time - 1000 Hours (Sheet 1 of 6)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
0	132	161	119	122	113	88	99	108	105
6	148	121	124	109	140	100	116	115	219
22	172	125	118	88	129	99	109	81	317
30	174	103	128	107	140	107	173	115	357
102	195	19	139	111	495	660	826	166	448
118	241	51	138	107	509	653	804	152	450
126	263	14	144	108	527	911	855	160	596
142	241	21	140	110	515	860	809	138	576
150	300	32	147	112	541	919	858	159	615
166	252	26	149	117	469	953	820	140	623
190	257	8	149	111	494	899	819	135	623
198	299	2	145	118	522	944	821	142	603
262	237	7	150	117	537	920	821	130	628
270	275	100R	147	116	514	891	849	130	553
286	290	107	148	111	534	901	874	144	617
294	285	72	153	120	522	910	854	130	674
310	273	70	149	117	513	869	826	125	667
318	285	83	153	119	518	919	852	128	640

Table 79. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and AM 350. Test Temperature - 500° F Nominal. Test Time - 1000 Hours (Sheet 2 of 6)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
334	270	74	153	121	489	934	830	122	699
342	290	73	152	113	507	854	865	130	630
358	276	67	152	123	524	940	849	122	712
366	278	70	156	120	529	956	858	124	623
430	266	70	151	110	465	648	848	125	685
438	245	70	158	117	494	640	825	105	699
454	252	85	156	114	512	648	813	106	694
462	272	99	164	118	531	675	859	108	704
480	258	83	166	119	536	674	841	104	676
488	277	87	164	114	541	744	863	106	730
512	283	82	163	111	533	847	874	110	725
536	315	94	163	119	543	895	839	99	545
624	293	118	158	107	487	633	818	88	777
640	341	72	167	110	511	653	875	91	825
648	307	79	165	103	515	626	841	85	781
664	370	68	166	106	558	653	882	93	715
672	375	58	173	103	563	601	892	85	903
688	384	52	183	112	568	669	892	76	754

Table 79. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo
and AM 350. Test Temperature - 500° F Nominal. Test Time -
1000 Hours (Sheet 3 of 6)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
696	405	49	161	108	504	581	937	72	841
760	483	46	183	112	609	609	991	79	842
768	487	23	179	102	619	641	987	76	885
784	488	17	181	98	653	200	200	69	880
792	496	44	184	104	651	200	218	94	200R
808	523	26	184	107	629	179	222	93	229
816	479	46	179	101	627	177	192	74	204
832	464	61	182	117	614	131	199	87	200
840	507	61	182	108	646	176	193	67	194
856	506	61	185	108	661	176	199	67	201
864	335	217	183	7	912	309	334	101	208
952	472	218	185	109	671	177	203	88	203
960	507	223	183	116	668	179	199	69	205
976	531	235	190	112	670	183	206	73	207
984	533	237	195	115	676	184	203	76	204
1000	538	239	201	116	678	188	201	78	203

Table 79. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and AM 350. Test Temperature - 500° F Nominal. Test Time - 1000 Hours (Sheet 4 of 6)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
0	89	93	93	91	89	99	100	103	98
6	125	117	109	122	129	94	120	103	106
22	135	116	105	119	128	82	154	117	101
30	154	122	109	129	130	74	123	12	121
102	219	555	395	585	90	257	683	103	513
118	279	556	392	513	168	259	888	143	516
126	267	515	391	503	164	259	703	98	506
142	276	486	394	619	182	299	906	97	513
150	271	480	389	500	215	317	950	120	633
166	273	485	394	493	214	314	100R	69	568
190	276	482	396	471	215	258	26	108	637
198	275	476	392	414	201	273	644	34	570
262	270	475	392	461	205	258	20	40	638
270	265	467	390	434	230	321	21	40	536
286	276	473	393	437	253	299	41	77	598
294	276	472	401	445	236	375	23	67	512
310	275	471	393	434	251	310	27	72	514
318	275	471	394	419	242	264	43	60	604

Table 79. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo
and AM 350. Test Temperature - 500° F Nominal. Test Time -
1000 Hours (Sheet 5 of 6)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
334	273	469	403	418	292	282	44	56	502
342	277	469	401	421	234	352	33	41	568
358	275	469	396	446	229	304	27	34	553
366	274	466	391	445	200	529	53	29	518
430	272	468	392	419	232	255	26	21	1000
438	275	470	394	442	222	285	31	27	590
454	279	470	389	505	243	459	29	47	528
462	279	470	445	507	225	288	55	5	508
480	276	464	391	405	234	250	23	13	556
488	273	462	390	396	228	303	20	23	583
512	275	463	388	433	255	415	107	29	628
536	275	492	391	406	206	244	25	20	504
624	309	462	393	395	256	261	28	26	523
640	312	497	383	345	182	245	32	100R	506
648	319	463	409	391	231	232	37	163	521
664	307	453	412	316	203	229	36	102	499
672	312	463	376	369	242	325	39	162	490
688	305	448	379	304	248	262	32	135	578

Table 79. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo
and AM 350. Test Temperature - 500°F Nominal. Test Time -
1000 Hours (Sheet 6 of 6)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
696	313	354	393	281	289	243	67	158	494
760	318	334	376	413	315	227	87	182	698
768	293	323	295	232	252	202	152	112	536
784	382	331	382	266	306	243	251	217	598
792	399	335	394	248	358	239	285	257	589
816	391	331	405	291	317	191	256	239	614
832	398	334	398	259	354	191	263	233	499
840	400	336	402	318	428	194	270	245	548
856	410	340	404	280	356	195	272	249	539
864	400	334	394	225	358	193	271	207	196
952	401	332	392	218	378	193	257	210	487
960	431	334	395	222	404	191	257	224	493
976	448	338	419	220	405	190	273	259	497
984	633	453	589	998	667	542	800	291	493
1000	453	343	427	226	408	193	276	263	498

Table 80. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and AM 350. Test Temperature - 550° F Nominal. Test Time - 1000 Hours (Sheet 1 of 8)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
0	257	239	199	243	202	214	188	206	313
16	401	269	199	252	185	206	192	213	321
24	1000	239	204	251	188	212	191	207	303
88	965	291	199	300	178	226	194	174	330
96	1000	263	193	250	194	176	196	187	345
112	1000	268	194	291	204	219	195	189	345
120	1000	224	195	290	196	190	197	190	407
136	1000	173	190	342	337	225	194	141	433
144	1000	192	202	289	201	239	203	149	453
264									
272									
288									
296									
315	500R	500R	500R	500R	500R	500R	500R	500R	500R
320	558	496	460	450	521	384	489	522	668
336	617	384	475	479	582	374	494	557	766
360	625	386	478	444	584	404	504	544	761
368	683	452	481	430	595	389	507	571	758

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Table 80. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and AM 350. Test Temperature - 550°F Nominal. Test Time - 1000 Hours
(Sheet 2 of 8)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
432	599	718	459	15	386	959	484	1000	625
440	488	726	466	24	376	1000	486	1000	632
456	453	516	468	37	379	1000	484	1000	671
458	583	688	479	27	336	1000	488	1000	652
498	500R	500R	500R	500R	500R	500R	500R	500R	500R
506	691	612	513	492	477	516	512	769	512
522	649	608	519	518	519	539	506	719	566
530	640	624	518	514	482	454	509	777	571
594	523	391	503	550	428	555	503	736	600
618	745	575	519	506	405	467	512	781	669
626	967	642	550	716	547	715	524	754	757
642	962	550	557	692	524	581	531	784	758
650	200R	754	555	708	471	598	538	798	750
666	232	521	530	769	520	743	514	756	648
698	300	709	551	830	532	768	523	770	719
714	365	767	553	798	523	730	537	796	733
722	360	735	546	793	527	766	522	755	704
738	270	485	492	686	480	706	486	494	664

Table 80. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and
AM 350. Test Temperature - 550°F Nominal. Test Time - 1000 Hours
(Sheet 3 of 8)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
746	335	773	551	722	511	572	541	787	732
786	256	670	527	748	522	741	517	713	680
794	114	608	550	762	500	567	542	789	662
810	53	476	528	727	558	525	522	753	655
818	184	600	548	522	525	544	542	796	659
834	201	566	541	714	551	549	537	785	669
842	264	577	558	689	545	725	540	794	707
858	240	534	549	658	548	679	535	788	732
866	253	500	556	672	567	671	544	791	640
930	221	398	467	572	439	659	502	675	711
938	293	488	557	678	484	691	545	779	711
954	253	466	550	674	517	514	540	773	738
962	283	491	554	585	465	527	548	790	738
978	289	488	552	670	552	533	545	784	680
986	311	489	555	704	496	717	551	794	712
1002	284	452	545	681	545	701	532	764	617
1010	309	491	550	696	500	720	546	792	666
1026	312	485	551	684	515	562	551	788	602

Table 80. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and AM 350. Test Temperatures - 550°F Nominal. Test Time 1000 Hours (Sheet 4 of 8)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
1034	316	472	549	613	533	534	548	785	570
1122	261	330	531	721	520	481	519	550	468
1130	268	456	551	627	482	501	543	770	715
1146	322	360	533	671	486	493	528	734	743
1154	349	453	544	580	515	503	543	772	686
1170	331	457	547	690	530	501	538	766	748
1178	356	455	552	632	534	510	551	780	644
1194	298	339	535	668	500	489	528	738	710
1202	259	456	553	549	509	511	552	779	742
1266	340	446	554	589	515	512	555	782	600
1290	303	394	531	682	536	544	533	730	797

Table 80. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and AM 350. Test Temperature - 550°F Nominal. Test Time - 1000 Hours
(Sheet 5 of 8)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
0	214	214	226	219	210	147	223	308	231
16	259	218	250	206	217	150	232	356	234
24	860	224	221	191	242	149	238	353	228
88	794	199	75	174	220	120	275	85	212
96	850	209	125	178	215	119	293	143	215
112	865	207	733	196	283	117	332	196	213
120	879	216	163	232	231	120	287	221	217
136	940	215	118	180	214	120	432	300	216
144	950	219	121	172	217	127	420	299	223
264									
272									
288									
296									
315	500R	500R	500R	500R	500R	500R	500R	500R	500R
320	524	518	618	518	513	518	527	448	526
336	526	516	613	531	578	523	538	459	519
360	486	516	589	527	525	518	442	390	519
368	483	500R	579	522	517	521	464	389	537

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Table 80. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and
AM 350. Test Temperature - 550°F Nominal. Test Time - 1000 Hours
(Sheet 6 of 8)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
432	483	1000	737	523	515	520	531	390	543
440	409	1000	756	736	574	1000	273	497	525
456	380	1000	748	735	446	1000	219	437	523
458	381	500R	701	697	478	1000	210	404	513
498	500R	500R	500R	500R	500R	500R	500R	500R	500R
506	545	512	570	522	527	505	523	587	516
522	526	500	537	511	499	497	517	531	514
530	585	508	540	521	530	495	567	550	515
594	699	518	578	526	511	499	571	597	521
618	665	502	562	516	493	488	678	666	512
626	658	503	439	534	487	489	551	511	508
642	655	510	451	7	489	545	718	567	531
650	638	502	441	7	549	637	574	619	563
666	633	502	435	13	510	547	625	576	526
674	636	506	445	17	507	548	650	658	537
690	631	508	455	19	503	541	611	640	522
698	644	507	451	26	518	547	650	693	526
762	645	510	471	44	491	540	678	680	503

Table 80. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and AM 350. Test Temperature - 550°F Nominal. Test Time - 1000 Hours
(Sheet 7 of 8)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
770	665	518	517	59	509	657	747	827	527
786	651	517	506	51	501	539	693	645	513
794	950	518	667	58	506	542	706	631	521
810	931	514	653	66	512	580	654	475	532
818	854	509	633	90	500	579	743	588	577
834	788	503	558	113	502	543	589	487	505
842	803	509	580	120	505	536	667	676	550
858	809	513	561	125	509	543	663	686	514
866	801	513	526	127	510	541	676	641	528
930	812	512	547	149	496	529	649	674	508
938	843	520	588	166	503	540	701	787	512
954	851	517	683	163	512	545	718	703	522
962	846	519	575	168	472	538	709	678	516
978	836	513	596	167	502	531	735	673	589
986	857	519	611	171	509	533	705	755	515
1002	860	515	609	166	506	530	704	757	508
1010	856	517	618	173	509	530	719	743	508
1026	874	520	636	169	506	531	710	729	510

Table 80. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and
AM 350. Test Temperature - 550° F Nominal. Test Time - 1000 Hours
(Sheet 8 of 8)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
1034	895	527	641	182	525	541	718	817	517
1122	860	513	556	201	515	541	650	575	513
1130	884	523	593	210	504	536	760	769	604
1146	878	514	623	202	514	531	666	742	588
1154	904	522	609	217	533	538	721	762	506
1170	896	520	607	211	519	532	715	749	505
1178	915	526	634	219	529	540	730	796	532
1194	904	518	602	209	517	534	712	773	537
1202	914	524	616	218	524	539	734	769	515
1266	929	528	640	230	527	545	716	783	553
1290	201	528	916	210	695	531	199	199	497

Table 81. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and AM 350. Test Temperature - 600°F Nominal. Test Time - 1000 Hours
(Sheet 1 of 8)

Elapsed Time Hours	Front Test Channel Strain Gage Reading - Units								
	1	2	3	4	5	6	7	8	9
0	150	328	374	432	681	120	121	203	256
8	180	417	369	358	706	114	131	230	283
24	283	452	413	363	717	136	174	238	300
32	288	427	391	300	720	129	174	204	295
48	226	421	401	376	723	127	185	217	352
56	314	448	411	385	709	155	205	219	356
72	224	445	405	390	740	134	198	197	360
80	297	407	406	396	722	134	209	214	361
96	234	323	437	408	736	100	206	155	393
160	270	301	420	391	728	102	205	147	387
168	306	305	435	358	725	114	213	181	422
184	392	402	455	362	718	137	236	190	441
192	391	393	463	300	821	132	240	179	505
208	416	439	471	406	710	171	246	183	508
216	389	362	465	418	806	155	240	173	458
232	386	407	449	351	607	164	242	170	448
240	372	404	453	394	613	161	245	173	506
256	421	393	497	423	776	195	254	173	492

Table 81. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and AM 350. Test Temperature - 600°F Nominal. Test Time - 1000 Hours (Sheet 2 of 8)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
264	396	361	484	415	796	186	250	164	390
328	388	404	476	375	613	189	254	164	511
336	216	355	508	361	597	196	251	155	490
352	318	385	512	338	617	213	252	163	408
360	323	339	485	290	620	200	259	166	558
376	440	385	531	377	646	224	269	169	517
384	309	349	487	367	743	185	248	155	438
400	458	399	525	371	632	220	271	166	476
408	457	406	512	306	799	206	260	157	506
424	488	391	536	318	777	226	268	161	553
432	453	461	531	402	754	217	269	161	524
498	448	451	505	391	615	217	267	160	535
506	690	374	611	386	697	223	249	110	471
522	805	380	587	352	578	192	266	136	569
530	737	361	632	351	784	172	270	110	401
554	962	300	629	352	596	178	274	128	566
562	101	332	653	386	730	193	278	123	577
578	103	329	624	367	597	168	276	115	470

Table 81. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and
AM 350. Test Temperature - 600°F Nominal. Test Time - 1000 Hours
(Sheet 3 of 8)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
586	87	323	651	379	738	150	277	101	436
602	72	244	535	269	610	153	282	90	427
610	67	294	654	312	772	145	278	89	570
674	56	295	651	371	566	141	260	65	446
682	21	256	665	329	586	100	266	28	371
698	27	303	693	327	589	99	262	14	364
706	21	254	720	350	763	101	278	16	392
722	32	260	701	348	673	118	265	19	365
730	31	263	715	379	706	96	267	11	531
746	36	322	761	402	752	120	282	14	411
754	33	251	690	328	747	165	269	10	517
770	29	288	682	340	723	107	264	100R	503
822	39	251	612	310	688	106	267	73	427
842	40	267	662	283	750	124	273	76	407
850	40	267	615	328	730	101	269	74	575
866	37	269	596	303	646	99	255	73	588
874	36	267	740	333	732	108	265	74	551
890	35	221	684	338	721	93	244	71	600

Table 81. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and AM 350. Test Temperature - 600° F Nominal. Test Time - 1000 Hours (Sheet 4 of 8)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
898	49	303	750	297	760	123	286	73	455
914	41	295	652	252	520	98	231	71	470
922	242	315	695	362	610	24	259	67	416
938	244	390	745	327	697	9	263	69	418
1002	356	366	762	353	570	30	271	70	630
1018	276	314	774	328	600	0	272	68	517

Table 81. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and AM 350. Test Temperature - 600°F Nominal. Test Time - 1000 Hours (Sheet 5 of 8)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
0	96	88	757	537	330	892	99	143	106
8	85	89	788	541	381	905	103	137	121
24	93	99	758	531	429	910	108	200	156
32	107	100	782	557	462	912	120	302	159
48	105	98	769	548	444	907	120	290	135
56	118	104	821	560	472	910	131	363	145
72	119	92	763	545	409	900	120	234	121
80	138	103	791	560	454	905	133	300	134
96	129	92	701	547	379	895	116	131	140
160	130	102	765	561	450	901	116	179	135
168	139	92	760	543	442	896	122	220	131
184	152	97	781	553	480	894	136	310	156
192	156	95	771	545	436	894	137	246	122
208	161	97	771	548	443	895	132	258	137
216	165	95	769	549	449	897	132	254	134
232	183	97	778	560	476	902	157	330	141
240	190	96	767	549	437	895	147	277	129
256	195	95	770	548	466	894	153	303	141

Table 81. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and
AM 350. Test Temperature - 600°F Nominal. Test Time - 1000 Hours
(Sheet 6 of 8)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
264	196	94	763	541	465	893	149	312	123
328	220	99	779	560	467	899	195	369	126
336	249	89	873	543	340	885	178	241	113
352	264	95	779	556	374	889	190	325	110
360	273	91	770	548	333	888	191	287	122
376	217	96	772	549	352	889	190	313	126
384	284	100	776	551	340	889	196	345	121
400	270	73	743	507	300	831	164	335	123
408	287	98	770	546	373	888	196	345	113
424	292	96	767	546	371	890	196	349	124
432	306	101	760	550	382	889	198	389	131
498	567	100	702	570	338	835	130	417	126
506	614	99	739	582	365	838	216	467	129
522	605	91	693	559	332	828	206	392	133
530	624	98	710	560	357	833	221	460	126
554	618	95	719	564	362	831	223	470	131
562	629	101	738	570	387	805	221	518	133
578	626	98	708	564	362	830	220	479	132

Table 81. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and
AM 350. Test Temperature - 600°F Nominal. Test Time - 1000 Hours
(Sheet 7 of 8)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
586	638	97	722	579	375	837	229	515	126
602	630	92	713	568	352	831	222	450	153
610	638	99	721	578	378	836	230	521	135
674	633	97	735	583	308	829	233	267	737
682	619	96	725	576	300	824	240	291	163
698	608	97	731	582	308	828	237	293	155
706	607	104	854	577	353	825	237	360	151
722	599	103	733	580	310	828	237	308	210
730	599	107	831	580	333	828	239	352	226
746	597	143	727	578	314	830	240	323	166
754	601	108	734	584	358	831	244	388	149
770	588	106	713	566	345	826	236	397	181
822	623	107	733	581	354	833	258	438	163
842	623	107	770	580	338	833	257	410	154
850	621	105	727	571	337	825	252	416	168
866	632	107	736	581	345	829	258	450	167
874	631	107	731	577	338	824	256	450	178
890	629	104	739	576	323	832	256	407	186

Table 81. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and AM 350. Test Temperature - 600° F Nominal. Test Time - 1000 Hours
(Sheet 8 of 8)

Elapsed Time Hours	Rear Test Channel Strain Gage Reading - Units								
	1	2	3	4	5	6	7	8	9
898	633	109	741	584	363	827	260	464	161
914	626	104	717	568	321	824	249	373	173
922	708	105	727	574	373	823	298	407	167
938	740	104	714	561	335	818	287	307	177
1002	786	110	726	568	368	818	290	383	159
1018	840	68	705	572	335	811	370	299	162

Table 82. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and
AM 350. Test Temperature - 650°F Nominal. Test Time - 1000 Hours
(Sheet 1 of 6)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
0	259	56	409	205	149	227	228	182	485
8	307	58	396	202	153	223	226	185	511
24	398	70	431	200	182	264	238	193	527
32	457	50	428	200	168	235	235	190	505
48	510	200R	415	187	174	239	225	182	470
160	856	153	398	202	176	214	187	148	499
168	942	155	261	203	174	218	202	166	445
184	907	173	257	194	168	231	239	188	546
190	912	170	236	199	163	221	220	174	524
208	931	229	303	180	121	197	213	166	526
216	749	229	340	167	107	306	230	181	517
232	805	210	295	193	140	279	238	185	553
240	879	197	342	195	120	234	235	182	569
256	200R	250	391	198	114	201	213	170	588
320	203	223	214	199	173	140	215	157	158
328	269	422	182	177	193	213	204	201	385
344	277	451	168	183	198	210	226	173	261
352	294	453	173	170	171	221	238	231	335

Table 82. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and AM 350. Test Temperature - 650°F Nominal. Test Time - 1000 Hours (Sheet 2 of 6)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
368	200	200	140	183	175	213	240	207	389
376	300	223	94	177	180	240	233	319	353
392	200	211	99	146	166	303	239	332	331
400	266	193	112	183	203	273	236	354	380
416	275	239	108	178	212	247	254	412	436
424	455	316	146	189	168	253	243	404	430
488	461	372	128	162	225	247	295	408	369
496	517	432	210	194	211	259	302	459	440
512	495	295	209	153	208	219	283	438	286
520	508	302	221	193	203	236	284	443	295
536	379	353	212	206	202	217	281	436	290
544	467	364	230	204	182	233	297	453	402
560	401	218	242	206	253	196	299	461	347
568	485	289	324	199	224	254	288	456	348
632	581	254	303	201	243	230	295	458	381
640	547	179	263	180	205	269	280	447	374
656	556	217	260	197	247	260	288	435	370
664	543	266	300	190	203	211	278	434	356

Table 82. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and
AM 350. Test Temperature - 650°F Nominal. Test Time - 1000 Hours
(Sheet 3 of 6)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
680	595	264	296	192	188	237	296	446	376
688	621	238	307	190	220	292	273	425	417
704	646	276	295	202	243	292	288	444	417
712	590	249	312	210	232	244	281	428	416
848	598	233	303	203	246	264	301	457	452
856	693	250	310	197	227	256	290	447	449
872	749	215	231	197	245	206	286	440	444
880	829	292	240	216	250	189	293	433	414
896	799	243	220	200	224	254	285	442	356
904	877	306	224	197	223	198	276	447	415
1016	846	278	196	201	192	276	296	456	435

Table 82. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and AM 350. Test Temperature -650°F Nominal. Test Time - 1000 Hours (Sheet 4 of 6)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
0									
8									
24									
32									
48									
160	200	200	200	200	200	200	200	200	200
168	208	207	218	208	229	208	212	178	208
184	213	199	200	221	234	215	226	185	242
190	203	202	192	211	236	213	234	181	262
208	202	203	160	207	211	216	88	0	197
216	225	207	242	215	220	217	108	54	244
232	227	210	276	217	216	217	87	48	228
240	242	210	300	212	211	215	89	54	274
256	278	202	273	227	223	223	101	32	312
320	287	210	265	218	213	217	88	30	218
328	351	202	237	233	224	223	92	201	212
344	347	204	222	223	213	230	33	197	213
352	356	200	181	228	219	224	46	249	204

INSTRUMENTATION TAKEN OUT OF SERVICE AT START OF TEST FOR REPAIR AND CALIBRATION. STRAIN GAGE UNIT NOT OPERATIVE.

Table 82. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and AM 350. Test Temperature - 650° F Nominal. Test Time - 1000 Hours (Sheet 5 of 6)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
368	299	202	213	201	161	201	195	204	169
376	572	227	403	216	170	201	354	537	205
392	567	229	405	218	148	201	357	533	226
400	571	236	409	218	172	199	349	562	205
416	262	253	509	219	177	203	443	194R	201
424	241	253	597	217	193	201	524	173	278
488	95	247	603	215	196	201	495	172	226
496	85	252	625	212	197	199	492	187	203
512	100	252	639	208	204	202	498	214	198
520	312	260	667	215	212	203	506	149	204
536	418	271	657	214	306	214	506	166	195
544	419	266	647	210	306	212	500	173	198
560	414	273	639	208	303	215	503	175	216
568	409	265	635	216	309	218	521	204	202
632	395	266	613	219	308	224	463	52	201
640	234	256	440	198	294	220	288	195	197
656	197	268	420	216	299	224	312	215	205

Table 82. Onset of Creep Stress Measurement of PH 15-7 Mo, PH 14-8 Mo and AM 350. Test Temperature - 650°F Nominal. Test Time - 1000 Hours (Sheet 6 of 6)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
664	207	259	404	210	296	223	299	127	197
680	191	268	396	223	300	229	304	88	204
688	203	286	366	209	291	224	295	71	211
704	188	268	365	230	306	231	306	115	208
712	213	269	368	210	295	225	291	106	203
848	192	274	365	219	298	229	304	144	204
856	207	267	391	204	291	223	289	95	200
872	197	269	383	227	270	231	309	96	204
880	215	266	359	208	288	224	285	37	201
896	198	270	347	216	291	227	299	123	202
904	244	236	396	205	281	221	284	173	187
1016	342	277	437	740	290	228	296	292	202

Table 83. Onset of Creep Stress Measurement of AM 355 and Maraging Steel.
 Test Temperature - 450°F Nominal. Test Time - 1000 Hours
 (Sheet 1 of 6)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
0	200	200	200	200	200	200	200	200	200
8	272	223	210	209	176	200	189	183	23
24	116	157	215	154	219	193	195	153	22
32	121	222	233	162	298	175	194	189	13
48	82	222	257	205	447	191	202	191	22
56	79	209	223	5	419	194	210	201	54
72	73	177	177	200R	352	170	188	166	68
80	73	272	216	279	418	187	213	186	42
144	58	226	191	255	331	172	176	179	75
152	46	184	183	279	337	151	183	173	66
168	58	211	205	308	274	188	180	183	103
176	38	263	208	299	315	156	184	177	92
192	66	232	194	323	308	172	193	181	95
200	55	263	219	343	267	171	208	190	67
216	50	253	202	244	239	151	221	190	82
224	58	280	214	322	303	183	217	188	94
240	65	255	215	307	298	162	225	187	73
248	26	221	223	327	326	143	247	198	90

Table 83. Onset of Creep Stress Measurement of AM 355 and Maraging Steel.
 Test Temperature - 450° F Nominal. Test Time - 1000 Hours
 (Sheet 2 of 6)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
312	25	205	206	339	326	124	223	186	118
320	4	262	210	361	301	118	218	189	129
328	200R	266	199	322	306	134	217	193	109
380	149	268	236	387	317	120	221	177	75
384	141	274	238	375	347	115	226	178	72
400	177	216	227	372	307	108	197	177	61
408	169	214	223	337	302	100	208	179	65
496	200R	200R	200R	200R	200R	200R	200R	200R	200R
520	255	529	218	188	113	176	170	205	185
528	278	398	212	119	194	181	174	220	215
536	290	491	222	193	112	158	133	216	175
544	338	508	235	186	114	212	188	223	224
560	395	486	237	195	109	200	276	252	309
568	461	426	254	251	142	190	310	246	399
632	390	482	241	193	157	185	297	246	398
640	264	516	205	216	310	168	300	276	424
656	341	528	214	218	263	172	299	291	545
674	326	438	230	221	288	171	295	288	440

Table 83. Onset of Creep Stress Measurement of AM 355 and Maraging Steel.
 Test Temperature - 450° F Nominal. Test Time - 1000 Hours
 (Sheet 3 of 6)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
690	357	442	220	218	282	172	308	298	396
698	373	567	238	224	307	180	313	306	572
714	367	433	233	243	282	184	312	328	403
722	355	605	243	247	277	179	304	322	482
738	276	474	220	212	265	119	313	291	394
746	345	385	225	234	320	176	319	298	412
810	322	380	204	198	282	175	298	305	414
818	362	408	224	210	314	170	283	295	399
834	384	398	231	229	313	176	299	311	413
842	358	501	215	217	294	174	288	308	407
858	331	454	204	223	276	156	270	286	405
874	278	417	197	211	250	157	177	303	480
882	356	444	232	217	313	168	296	318	561
898	231	500	219	219	309	169	291	309	562
906	292	549	231	238	394	164	306	329	561
970	161	345	175	235	402	106	205	323	643
978	131	464	160	247	492	159	296	349	754

Table 83. Onset of Creep Stress Measurement of AM 355 and Maraging Steel.
Test Temperature - 450° F Nominal. Test Time - 1000 Hours
(Sheet 4 of 6)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
0	200	200	200	200	200	200	200	200	200
8	242	127	173	170	193	204	185	152	218
24	169	123	136	125	254	194	164	90	201
32	192	222	138	134	337	195	162	167	210
48	193	182	129	241	567	193	169	208	215
56	185	173	137	161	558	190	160	192	212
72	133	98	124	181	511	178	90	123	201
80	166	145	136	205	520	193	107	157	212
144	131	95	99	86	385	197	199	75	225
152	125	126	68	113	345	188	188	105	212
168	114	69	55	37	323	186	163	38	225
176	113	99	59	85	326	185	172	77	210
192	115	102	61	65	334	189	166	83	218
200	110	121	58	27	329	187	162	104	213
216	102	130	65	90	344	193	166	96	223
224	99	171	63	49	334	191	161	126	218
240	93	159	62	71	344	191	161	131	219
248	82	186	62	144	350	191	166	140	218

Table 83. Onset of Creep Stress Measurement of AM 355 and Maraging Steel.
 Test Temperature - 450°F Nominal. Test Time - 1000 Hours
 (Sheet 5 of 6)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
312	63	74	54	107	335	188	132	66	216
320	65	105	19	59	323	191	126	112	218
328	45	90	9	98	330	189	134	121	217
380	19	132	7	57	294	194	136	33	212
384	17	129	2	70	325	186	139	72	207
400	200R	200R	200R	18	289	187	128	200R	208
408	193	190	195	29	273	182	129	167	202
496	200R	200R	200R	200R	200R	200R	200R	200R	200R
520	203	167	196	161	156	203	195	231	167
528	199	166	198	150	141	202	196	228	221
536	196	99	194	116	131	199	195	222	207
544	200	93	199	104	114	201	201	200	176
560	194	131	195	139	125	205	188	200	187
568	190	169	199	156	147	206	195	205	123
632	188	131	188	125	131	207	174	205	211
640	195	392	276	269	289	207	201	393	212
656	197	280	273	263	238	205	185	414	224
674	198	253	278	213	238	206	182	326	219

Table 83. Onset of Creep Stress Measurement of AM 355 and Maraging Steel.
 Test Temperature -450° F Nominal. Test Time - 1000 Hours
 (Sheet 6 of 6)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
690	196	291	277	288	271	205	187	348	215
698	195	296	283	271	256	200	196	346	217
714	191	267	275	262	232	200	180	347	218
722	190	264	272	236	209	201	173	322	198
738	195	316	270	264	254	199	167	288	200
746	190	308	274	265	262	202	180	293	214
810	193	217	275	200	197	203	179	288	216
818	194	285	280	253	221	201	182	298	214
834	192	310	275	270	243	202	186	312	217
842	193	255	274	196	202	205	169	286	220
858	188	290	275	246	238	200	178	290	216
874	193	264	271	186	217	196	162	283	197
882	189	309	272	239	220	200	165	286	215
898	190	309	269	246	237	198	162	291	220
906	184	425	269	368	352	200	172	402	209
970	190	399	333	429	491	194	172	542	209
978	188	263	341	315	433	198	179	543	210

Table 84. Onset of Creep Stress Measurement of AM 355 and Maraging Steel.
 Test Temperature - 500° F Nominal. Test Time - 1000 Hours
 (Sheet 1 of 6)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
0	200	200	200	200	200	200	200	200	200
24	194	151	151	199	181	206	230	230	224
88	191	209	325	921	169	210	228	203	248
112	183	197	413	200R	175	202	220	195	250
120	168	202	440	212	194	225	252	202	257
136	195	196	387	211	196	222	271	205	273
144	235	217	466	255	196	267	272	228	450
160	272	268	453	289	193	272	279	220	431
168	221	250	459	324	205	269	276	223	405
184	251	263	465	440	221	264	286	216	455
192	230	254	487	500	197	275	280	222	500
256	183	196	466	518	166	241	254	195	400
264	204	198	475	675	171	288	274	214	498
280	179	126	311	665	153	220	223	152	315
288	206	208	488	810	195	377	289	215	349
304	289	231	539	897	85	359	296	168	352
312	389	225	626	200R	27	363	267	90	450
328	421	209	686	351	200R	405	292	38	481

Table 84. Onset of Creep Stress Measurement of AM 355 and Maraging Steel.
 Test Temperature - 500° F Nominal. Test Time - 1000 Hours
 (Sheet 2 of 6)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
336	459	183	715	372	203	420	306	39	452
352	462	183	671	372	207	398	308	23	515
360	478	243	685	380	212	443	324	34	455
424	477	178	666	404	213	350	308	25	469
432	502	178	691	478	205	418	319	30	474
448	464	174	637	484	213	340	285	27	442
456	487	178	681	511	204	395	306	24	449
472	469	181	674	546	222	410	310	22	347
480	496	180	699	581	212	416	319	27	374
496	446	208	685	563	228	391	307	24	342
504	504	179	707	586	235	390	319	25	349
520	483	181	693	620	120	377	310	24	344
592	430	195	644	757	242	376	306	46	317
600	478	182	701	797	255	479	344	51	348
616	408	185	676	838	242	420	322	44	341
624	488	181	701	862	271	516	340	47	355
640	338	196	636	840	235	412	310	39	420
648	440	179	674	871	271	439	325	41	341

Table 84. Onset of Creep Stress Measurement of AM 355 and Maraging Steel.
 Test Temperature - 500°F Nominal. Test Time - 1000 Hours
 (Sheet 3 of 6)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
664	377	182	637	870	195	531	309	43	431
672	415	185	615	733	228	378	298	52	437
688	352	210	581	805	210	396	291	44	357
696	439	189	655	942	235	455	331	51	339
760	382	166	566	937	245	402	293	44	311
768	413	205	630	937	240	452	320	46	328
784	315	156	572	200R	234	401	305	43	383
792	365	179	608	195	204	431	245	25	372
808	424	215	690	186	260	483	335	26	349
816	390	171	634	199	247	430	306	20	315
832	421	173	651	194	255	464	327	23	327
856	402	168	624	190	240	437	304	24	424
864	435	204	694	193	260	483	333	23	378
928	467	245	663	185	198	441	317	43	501
936	415	230	615	246	207	590	307	50	354
952	372	176	639	238	237	637	308	36	338
960	514	178	664	230	256	666	334	42	372
976	341	166	632	252	247	508	331	36	374
984	395	183	668	218	300	610	318	36	331

Table 84. Onset of Creep Stress Measurement of AM 355 and Maraging Steel.
 Test Temperature - 500°F Nominal. Test Time - 1000 Hours
 (Sheet 4 of 6)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
0	200	200	200	200	200	200	200	200	200
24	90	201	201	205	200	201	201	200	150
88	133	406	237	763	101	208	235	277	98
112	108	475	229	918	121	199	205	309	200R
120	70	540	286	200R	185	196	226	389	192
136	91	479	296	249	153	202	245	365	190
144	81	536	298	263	175	202	286	430	206
160	99	486	301	300	160	206	297	390	192
168	87	486	293	294	157	204	286	379	189
184	83	456	294	287	142	201	294	366	188
192	82	490	293	446	145	198	286	391	187
256	82	523	309	586	130	195	290	389	178
264	88	582	312	636	156	198	318	406	181
280	91	583	324	642	141	200	329	389	191
288	101	531	310	690	166	207	332	414	197
304	111	739	368	708	155	211	343	434	206
312	104	582	338	814	93	204	309	430	194
328	102	661	382	998	114	201	307	537	191

Table 84. Onset of Creep Stress Measurement of AM 355 and Maraging Steel.
 Test Temperature - 500°F Nominal. Test Time - 1000 Hours
 (Sheet 5 of 6)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
336	105	612	387	200R	110	205	320	508	197
352	107	571	382	181	9	200	271	418	191
360	104	569	377	177	6	199	263	417	190
424	107	607	381	230	200R	200	275	470	207
432	110	581	377	292	179	200	273	434	207
448	108	614	377	329	177	201	287	473	194
456	113	597	377	318	166	198	267	445	189
472	111	605	378	360	182	197	283	474	186
480	93	664	385	326	148	177	251	424	160
496	117	609	429	362	168	195	273	460	188
504	116	614	388	359	164	192	268	458	185
520	117	595	503	426	160	197	273	454	182
592	146	723	539	638	256	195	361	568	188
600	153	672	537	614	212	198	325	484	190
616	152	711	538	708	269	195	322	538	185
624	156	695	527	688	238	195	317	479	188
640	153	718	528	724	262	194	333	534	185
648	161	699	528	711	219	199	320	484	187

Table 84. Onset of Creep Stress Measurement of AM 355 and Maraging Steel.
 Test Temperature - 500° F Nominal. Test Time - 1000 Hours
 (Sheet 6 of 6)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
664	161	717	544	745	274	198	326	511	191
672	166	726	534	746	260	200	320	492	193
688	165	702	530	757	269	197	332	518	189
696	170	719	528	759	259	200	322	467	194
760	177	716	535	825	245	201	370	500	196
768	182	765	527	838	255	200	356	529	196
784	181	764	531	904	307	201	364	558	192
792	188	761	536	848	174	205	309	418	193
808	184	714	528	947	268	200	337	526	186
816	193	785	534	957	239	205	339	466	191
832	195	771	531	932	189	200	340	445	190
856	196	718	535	962	200	200	347	462	190
864	198	788	554	996	270	200	350	521	181
928	205	776	559	200R	204	197	353	457	189
936	213	789	577	161	210	201	380	468	185
952	215	773	582	235	202	202	399	512	206
960	220	795	598	246	212	207	389	506	206
976	213	739	580	239	195	201	378	473	195
984	219	815	644	265	244	201	375	519	199

Table 85. Onset of Creep Stress Measurement of AM 355 and Maraging Steel.
 Test Temperature - 550° F Nominal. Test Time - 1000 Hours
 (Sheet 1 of 8)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
0	200	200	200	200	200	200	200	200	200
24	439	335	124	242	230	241	210	287	148
32	509	334	280	295	376	287	397	290	268
48	456	315	352	258	486	300	357	294	305
56	541	331	419	284	483	299	368	266	396
72	916	240	499	310	442	386	429	289	279
80	143R	158	537	393	484	361	339	310	297
144	296	160	410	519	481	586	687	408	499
152	273	258	665	508	470	675	700	462	442
168	382	273	748	600	477	766	739	509	468
172	303	281	767	644	644	815	791	516	502
188	289	281	735	582	477	791	790	464	690
196	300	357	743	666	615	825	785	563	498
212	371	338	752	653	581	613	792	556	489
220	305	351	748	676	623	797	829	568	507
236	302	284	763	662	477	649	721	505	692
244	402	387	751	724	470	589	826	552	494

Table 85. Onset of Creep Stress Measurement of AM 355 and Maraging Steel.
 Test Temperature - 550°F Nominal. Test Time - 1000 Hours
 (Sheet 2 of 8)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
308	306	363	773	716	656	831	780	478	622
316	319	273	747	693	609	587	780	437	742
356	422	262	764	805	523	613	822	477	620
364	429	358	813	716	464	653	824	467	474
380	467	316	820	818	541	670	887	490	488
388	583	371	811	801	608	504	831	456	743
404	505	359	886	927	579	312R	949	461	777
412	699	410	900	1000	638	347	994	506	563
478	527	397	865	243R	639	289	974	495	849
486	586	426	944	375	634	349	239R	581	817
502	495	368	808	333	623	320	222	485	616
510	718	424	936	440	677	437	261	434	785
526	708	434	944	459	646	343	263	640	710
534	728	418	936	407	586	304	268	642	943
550	738	420	933	517	513	371	268	644	257R
558	588	443	922	520	680	390	261	621	264
574	785	444	946	572	670	381	277	637	207

Table 85. Onset of Creep Stress Measurement of AM 355 and Maraging Steel.
 Test Temperature - 550°F Nominal. Test Time - 1000 Hours.
 (Sheet 3 of 8)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
582	788	459	993	585	673	379	302	713	258
646	770	457	970	561	600	398	306	690	232
654	687	452	951	487	653	416	299	668	275
670	610	466	942	537	660	432	288	606	203
678	858	472	975	641	652	476	312	747	224
694	835	470	967	592	640	462	308	681	218
702	873	486	979	649	673	495	328	713	232
726	200R	200R	200R	200R	200R	200R	200R	200R	200R
734	174	318	308	34	385	358	274	215	259
798	163	275	321	2	547	353	270	224	215
806	166	323	326	143	597	505	282	293	277
822	88	138	87	52	509	316	247	141	246
838	138	292	127	44	532	334	265	146	211
862	219	322	123	3	350	357	258	84	209
870	230	305	123	191	333	285	245	80	208
894	275	291	122	222	236	240	215	10	167
902	370	308	122	213	195	234	171	200R	161

Table 85. Onset of Creep Stress Measurement of AM 355 and Maraging Steel.
 Test Temperature - 550°F Nominal. Test Time - 1000 Hours
 (Sheet 4 of 8)

Elapsed Time Hour	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
966	310	298	125	232	209	224	190	253	152
974	441	315	123	240	235	237	210	287	160
990	448	320	121	223	216	239	211	293	160
998	420	327	123	223	210	238	211	284	178
1014	314	306	122	221	218	275	197	267	148

Table 85. Onset of Creep Stress Measurement of AM 355 and Maraging Steel.
 Test Temperature - 550°F Nominal. Test Time - 1000 Hours
 (Sheet 5 of 8)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
0	200	200	200	200	200	200	200	200	200
24									
32									
48	50	78	216	136	181	224	238	227	426
56	103	277	230	112	220	227	239	272	335
72	92	392	245	182	226	224	241	330	197
80	59	438	270	283	291	224	249	387	221
144	97	419	375	346	390	185	272	389	273
152	97	519	385	362	398	200	261	397	198
168	89	494	384	391	399	201	261	385	206
172	101	509	391	413	403	215	256	395	195
188	109	540	387	407	394	202	261	388	195
196	112	545	383	406	399	202	266	388	299
212	108	488	399	404	403	211	266	405	266
220	111	520	403	412	401	217	269	414	183
236	101	529	390	429	393	212	267	413	241
244	111	508	408	422	397	214	266	415	227

Table 85. Onset of Creep Stress Measurement of AM 355 and Maraging Steel.
Test Temperature - 550°F Nominal. Test Time - 1000 Hours
(Sheet 6 of 8)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
308	107	554	408	491	401	213	272	421	205
316	109	562	412	490	396	215	268	412	223
356	110	544	402	500	394	216	274	415	228
364	117	523	399	509	387	217	272	409	180
380	104	527	407	511	396	226	279	405	166
388	116	467	386	476	371	219	270	342	179
404	146	635	424	511	323	220	260	350	222
412	116	680	491	527	332	227	261	370	195
478	145	751	635	672	383	384	258	397	173
486	175	789	669	688	408	427	256	395	209
502	170	776	669	692	398	413	240	392	225
510	183	876	662	741	396	458	252	409	248
526	186	873	667	734	296	457	256	414	160
534	205	872	686	751	420	506	254	421	222
550	212	789	680	846	416	516	258	429	204
558	208	734	707	848	418	520	257	426	225
574	206	755	766	859	428	519	259	409	229

Table 85. Onset of Creep Stress Measurement of AM 355 and Maraging Steel.
 Test Temperature - 550°F Nominal. Test Time - 1000 Hours
 (Sheet 7 of 8)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
582	206	780	702	885	436	521	260	445	170
646	190	767	703	898	462	519	265	441	158
654	225	788	736	699	455	544	240	443	191
670	221	875	709	926	455	539	244	457	213
678	223	851	715	926	453	545	243	469	213
694	230	849	707	951	459	552	244	471	241
702	230	890	707	965	477	613	245	480	180
726	200R	200R	200R	200R	200R	200R	200R	200R	200R
734	211	215	242	202	195	233	255	125	170
798	220	134	246	258	312	253	257	284	186
806	225	143	249	258	350	266	265	327	194
822	215	2	182	208	22	233	249	250	175
838	205	231R	176	152	231R	231	252	206	181
862	211	109	108	93	205	234	253	191	202
870	213	259	110	228	327	235	253	375	191
894	209	225	191R	164	267	183	260	340	178
902	202	14	123	258	131	155	254	104	175

Table 85. Onset of Creep Stress Measurement of AM 355 and Maraging Steel.
 Test Temperature - 550° F Nominal. Test Time - 1000 Hours
 (Sheet 8 of 8)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
966	190	1	36	268	76	11	258	284	131
974	196	4	25	194	36	15	254	206	171
990	196	4	20	201	23	11	258	228	193
998	194	1	34	145	8	12	255	111	178
1014	194	198	19	188	199	9	250	198	180

Table 86. Onset of Creep Stress Measurement of AM 355 and Maraging Steel.
 Test Temperature - 600°F Nominal. Test Time - 1000 Hours
 (Sheet 1 of 8)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
0	200	200	200	200	200	200	200	200	200
48	224	260	360	252	447	240	268	293	292
56	226	368	386	274	490	281	285	304	374
96	172	293	390	293	486	244	279	274	347
114	219	355	401	359	452	254	295	307	387
130	213	331	412	339	499	236	270	254	311
138	220	374	443	410	505	272	300	313	331
154	233	348	456	468	459	313	315	307	274
162	235	378	468	485	607	329	328	327	274
226	200	351	471	505	563	285	323	273	326
234	223	389	497	562	596	379	363	318	269
250	223	379	504	613	653	429	370	331	240
258	202	331	413	531	607	263	330	190	211
274	201	465	589	603	718	351	467	312	232
282	201	462	609	756	610	403	389	293	294
298	220	365	566	734	592	406	391	269	244
306	230	285	556	740	560	396	370	186	284
322	239	274	551	675	511	386	355	182	296

Table 86. Onset of Creep Stress Measurement of AM 355 and Maraging Steel.
 Test Temperature - 600°F Nominal. Test Time - 1000 Hours
 (Sheet 2 of 8)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
340	253	273	586	733	602	405	382	187	343
404	245	300	597	676	447	371	364	163	246
412	216	331	598	759	575	455	399	183	284
428	219	330	600	812	415	447	406	185	395
436	276	300	542	734	492	392	386	176	319
452	277	328	463	656	311	384	330	149	334
460	346	305	671	743	480	487	442	204	386
476	257	356	669	785	408	665	446	193	383
484	317	410	653	709	393	602	410	183	359
500	351	336	692	896	410	565	429	186	396
508	322	424	703	811	417	490	433	191	393
572	461	427	653	781	369	670	412	173	460
596	336	413	671	900	430	668	434	170	325
604	364	368	776	181R	386	726	480	224	396
620	352	326	713	197	459	749	463	190	366
628	422	242	605	185	456	738	454	182	371
644	348	295	706	234	432	767	454	220	268
652	444	298	734	233	553	785	454	187	322

Table 86. Onset of Creep Stress Measurement of AM 355 and Maraging Steel.
 Test Temperature - 600°F Nominal. Test Time - 1000 Hours
 (Sheet 3 of 8)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
668	480	305	785	248	563	821	489	238	369
732	371	194	817	245	645	860	564	205	423
740	369	384	761	233	476	798	493	177	280
756	524	307	814	241	491	709	518	200	362
764	573	397	860	240	550	845	547	218	499
780	524	327	893	242	453	863	561	232	359
788	572	312	841	245	452	810	502	237	261
804	601	362	898	252	412	866	546	255	286
812	533	442	861	251	522	827	522	243	237
828	560	379	841	255	386	549	534	199	286
836	539	367	824	255	386	570	520	163	291
900	524	241	691	365	399	685	407	151	337
908	679	310	900	459	412	778	478	207	243
924	678	315	901	480	444	565	476	157	354
932	682	297	899	457	303	726	483	145	262
948	906	328	894	515	417	748	489	155	245
956	661	292	847	504	353	779	467	191	245
972	686	253	883	455	385	756	463	131	351

Table 86. Onset of Creep Stress Measurement of AM 355 and Maraging Steel.
 Test Temperature - 600° F Nominal. Test Time - 1000 Hours
 (Sheet 4 of 8)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
980	723	291	880	468	351	770	468	165	256
996	969	411	945	699	437	898	511	168	265
1004	194R	253	876	646	412	839	472	129	309

Table 86. Onset of Creep Stress Measurement of AM 355 and Maraging Steel.
 Test Temperature - 600° F Nominal. Test Time - 1000 Hours
 (Sheet 5 of 8)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
0	200	200	200	200	200	200	200	200	200
48	106	349	326	454	382	221	236	338	217
56	102	351	327	474	408	225	233	340	222
96	102	332	327	538	415	225	239	342	188
114	104	335	329	534	415	225	239	342	205
130	112	350	328	594	419	235	242	348	210
138	104	311	324	604	409	232	235	326	214
154	109	359	331	685	435	234	238	355	217
162	105	345	349	682	417	230	233	351	214
226	103	380	346	862	449	230	242	351	208
234	112	323	376	870	419	230	236	346	206
250	108	362	381	892	462	231	238	374	215
258	113	410	459	920	461	234	238	358	215
274	161	699	691	200R	951	233	233	712	216
282	168	243	719	290	539	234	224	299	213
298	168	258	691	310	535	231	231	320	209
306	167	158	687	205	428	229	232	281	206
322	172	157	724	242	371	240	226	282	275

Table 86. Onset of Creep Stress Measurement of AM 355 and Maraging Steel.
 Test Temperature - 600°F Nominal. Test Time - 1000 Hours
 (Sheet 6 of 8)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
340	165	174	714	271	371	228	222	289	202
404	167	160	716	340	392	227	240	331	201
412	160	169	707	372	412	216	231	316	191
428	162	186	707	407	378	226	227	326	199
436	173	154	709	460	374	241	331	365	217
452	171	129	701	464	351	236	239	348	208
460	175	156	706	490	349	240	225	345	210
476	182	175	716	550	349	242	243	370	215
484	180	139	706	562	345	236	229	307	210
500	189	159	720	573	355	244	236	322	218
508	182	189	712	589	373	240	227	332	209
572	188	162	611	623	382	233	247	334	193
596	196	193	730	651	366	237	241	351	218
604	199	159	724	679	393	242	241	370	215
620	198	137	711	692	362	240	240	336	213
628	195	129	718	485	387	235	241	326	213
644	189	131	709	687	344	227	241	345	229
652	189	77	714	684	334	232	237	322	211

Table 86. Onset of Creep Stress Measurement of AM 355 and Maraging Steels.
Test Temperature - 600°F Nominal. Test Time - 1000 Hours
(Sheet 7 of 8)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
668	182	81	709	701	339	230	241	335	205
732	197	121	652	767	324	226	238	347	234
740	192	105	706	769	310	221	246	343	281
756	201	71	720	773	277	227	249	300	175
764	191	66	704	767	283	220	249	296	204
780	198	68	659	779	302	220	227	248	187
788	187	59	718	786	296	220	258	293	163
804	193	64	716	790	284	221	256	276	240
812	193	64	676	788	281	218	253	301	197
828	211	51	590	797	289	237	269	360	215
836	200	59	603	791	283	224	256	362	204
900	219	195	577	805	163	252	230	401	311
908	213	227	733	818	155	249	236	404	236
924	231	236	742	842	145	254	214	377	225
932	233	236	740	844	134	256	225	379	233
948	229	200	727	840	109	254	239	382	231
956	225	203	735	844	90	249	232	393	207
972	234	192	677	853	65	264	246	325	269

Table 86. Onset of Creep Stress Measurement of AM 355 and Maraging Steel.
 Test Temperature - 600° F Nominal. Test Time - 1000 Hours
 (Sheet 8 of 8)

Elapsed Time Hours	Rear Test Channel Strain Gage Reading - Units								
	1	2	3	4	5	6	7	8	9
980	231	195	684	851	72	264	246	341	258
996	226	207	690	917	6	251	232	414	271
1004	223	205	753	906	151	254	208	400	265

Table 87. Onset of Creep Stress Measurement of AM 355 and Maraging Steel.
 Test Temperature - 650°F Nominal. Test Time - 1000 Hours
 (Sheet 1 of 8)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
0	200	200	200	200	200	200	200	200	200
32	335	428	389	294	360	468	240	351	176
48	458	218	253	386	300	441	295	362	127
72	591	555	518	626	499	488	364	447	328
80	656	635	525	667	410	478	396	429	234
104	638	639	500	744	212	556	362	431	467
168	793	359	323	862	179	544	487	339	470
176	969	674	597	333	178	563	488	442	485
192	978	739	636	364	216	791	569	503	502
200	150R	819	641	370	245	840	568	500	506
216	188	682	655	420	204	698	566	479	446
224	237	838	691	458	255	485R	643	519	491
240	207	694	652	504	232	463	590	452	514
248	241	845	712	617	235	503	676	519	515
264	206	675	652	636	250	370	654	482	558
272	260	828	725	717	248	437	702	523	648
336	427	850	759	950	203	410	691	464	517
344	492	992	825	315R	195	521	741	516	645

Table 87. Onset of Creep Stress Measurement of AM 355 and Maraging Steel.
 Test Temperature - 650°F Nominal. Test Time - 1000 Hours
 (Sheet 2 of 8)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
360	520	981	859	414	207	525	790	518	591
368	599	169R	890	490	246	555	822	483	535
384	567	193	890	579	256	562	833	503	700
392	632	199	902	684	223	595	852	525	653
408	637	205	908	689	227	599	859	533	659
416	653	247	919	757	251	629	868	528	700
480	627	269	200R	815	269	621	890	582	617
488	692	293	229	914	278	625	922	523	745
504	720	299	225	990	287	655	933	564	791
512	799	305	259	200R	294	662	952	616	735
528	832	347	290	279	302	695	959	618	704
536	837	359	290	284	308	699	968	683	732
550R	200R	200R	200R	200R	200R	200R	200R	200R	200R
558	156	203	308	357	543	517	346	509	411
574	163	226	295	476	545	601	346	512	418
582	190	249	300	616	669	702	391	517	470
646	161	271	290	659	624	660	371	490	529
654	111	237	309	795	616	757	414	548	465

Table 87. Onset of Creep Stress Measurement of AM 355 and Maraging Steel.
 Test Temperature - 650° F Nominal. Test Time - 1000 Hours
 (Sheet 3 of 8)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
670	118	289	312	859	642	744	414	535	482
678	104	265	280	873	535	673	358	495	494
694	122	339	316	350R	633	767	409	538	513
702	92	321	306	442	624	742	401	516	470
718	119	344	320	472	700	828	425	564	422
726	106	338	318	516	653	833	437	545	553
742	109	324	321	513	634	841	435	551	535
750	76	301	305	653	594	794	413	518	532
814	84	342	322	730	587	904	453	555	552
822	83	324	323	862	552	935	457	545	558
838	86	351	323	821	566	936	462	578	564
846	56	294	304	867	609	811	367	496	520
862	87	338	331	350R	620	950	458	561	557
878	81	345	335	357	600	995	458	555	583
886	65	337	331	375	649	570R	452	534	551
902	68	339	339	381	602	583	458	561	599
910	226	359	307	433	495	394	416	498	549
974	389	406	344	491	511	573	427	524	551

Table 87. Onset of Creep Stress Measurement of AM 355 and Maraging Steel.
 Test Temperature - 650° F Nominal. Test Time - 1000 Hours.
 (Sheet 4 of 8)

Elapsed Time Hours	Front Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
982	428	438	354	535	551	662	481	549	599
998	433	428	357	526	552	712	477	557	604
1006	364	411	327	540	501	528	431	511	552
1022	402	423	352	601	526	727	470	550	593
1030	407	433	357	633	551	712	481	563	599

Table 87. Onset of Creep Stress Measurement of AM 355 and Maraging Steel.
 Test Temperature - 650°F Nominal. Test Time - 1000 Hours
 (Sheet 5 of 8)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
0	200	200	200	200	200	200	200	200	200
32	202	144	190	284	250	206	236	211	216
48	215	181	243	470	220	209	262	194	190
72	221	189	282	532	213	198	271	211	251
80	254	229	211	699	160	212	290	168	225
104	258	223	106	793	56	209	400	237	231
168	340	254	269	185R	53	204	413	65	217
176	325	249	302	205	43	198	402	231	213
192	355	261	321	292	47	200	416	221	129
200	361	266	341	333	44	200	406	232	193
216	392	275	362	444	42	200	447	226	163
224	381	277	424	498	42	199	447	202	211
240	405	285	416	587	40	203	449	204	205
248	405	286	431	662	39	202	449	223	211
264	417	289	276	727	42	205	456	217	196
272	423	296	436	751	38	206	447	206	214
336	458	318	425	180R	42	207	466	102	216
344	453	312	471	288	36	202	440	121	219

Table 87. Onset of Creep Stress Measurement of AM 355 and Maraging Steel.
 Test Temperature - 650° F Nominal. Test Time - 1000 Hours
 (Sheet 6 of 8)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
360	456	320	467	368	33	204	458	223	208
368	459	330	348	484	43	207	451	224	225
384	468	335	491	567	48	211	465	243	219
392	463	334	462	651	46	206	455	234	220
408	463	336	373	696	43	212	459	217	214
416	471	339	361	693	34	214	464	192	204
480	480	314	455	874	36	218	467	222	207
488	484	350	602	905	39	230	454	227	220
504	484	353	569	175R	42	229	467	215	188
512	467	350	510	205	37	223	462	219	190
528	466	353	407	265	31	227	471	96	192
536	449	351	597	272	29	229	466	216	160
550	485	354	605	402	31	230	477	228	156
558	499	340	600	456	62	244	471	202	215
574	493	363	621	619	135	250	482	167	225
582	499	372	621	627	122	263	481	169	233
646	513	306	471	670	117	382	507	229	225
654	512	350	569	736	129	395	496	231	221

Table 87. Onset of Creep Stress Measurement of AM 355 and Maraging Steel.
 Test Temperature - 650°F Nominal. Test Time - 1000 Hours
 (Sheet 7 of 8)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
670	520	364	581	785	111	486	508	231	225
678	528	372	636	845	126	477	501	226	225
694	523	365	626	928	93	480	489	166	218
702	532	364	616	967	115	482	498	156	222
718	531	366	676	175R	124	481	503	231	231
726	529	368	585	148	131	484	490	211	227
742	547	369	651	156	138	557	485	223	230
750	542	367	568	152	130	552	497	219	185
814	555	372	665	284	127	568	508	229	229
822	553	371	686	292	151	564	504	180	224
838	561	377	703	351	113	539	499	145	230
846	563	372	682	347	139	561	497	145	231
862	573	374	696	550	130	568	505	93	228
878	557	372	674	551	128	562	416	215	127
886	569	375	699	564	129	567	503	221	224
902	550	375	690	566	130	568	505	218	136
910	566	377	601	706	140	571	505	198	219
974	575	366	749	741	93	569	494	148	225

Table 87. Onset of Creep Stress Measurement of AM 355 and Maraging Steel.
 Test Temperature - 650°F Nominal. Test Time - 1000 Hours
 (Sheet 8 of 8)

Elapsed Time Hours	Rear Test Channel Strain Gage Readings - Units								
	1	2	3	4	5	6	7	8	9
982	585	375	749	781	143	577	507	161	200
998	567	357	726	796	142	572	496	73	216
1006	578	377	760	845	111	573	507	136	204
1022	579	375	753	851	140	577	500	147	235
1030	582	377	761	847	143	573	506	149	239

Table 88. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V
Summary of 150-Hour Creep Test Results

Temperature °F	Stress KSI	Creep Rate In./In./Hr
450	73.8	.000000010
450	75.0	NIL
450	78.0	.000000010
450	80.0	.000000010
450	87.0	.000000022
450	87.5	.000000050
500	68.8	.000000060
500	70.0	.000000015
500	73.1	.000000040
500	75.0	.000000011
500	79.5	.000000100
500	80.0	NIL
550	74.9	.000000049
550	76.3	.000000005
550	76.4	.000000060
550	76.4	NIL
550	76.8	.000000011
550	77.5	NIL
600	76.3	.000000012
600	77.5	.000000024
600	78.0	NIL
600	80.0	NIL
600	82.0	NIL
600	82.5	NIL
650	57.1	NIL
650	58.0	.000000010
650	58.5	.000000625
650	60.0	.000000067
650	64.6	NIL
650	65.0	.000000110

Table 89. Onset of Creep Stress Measurement of Ti 6Al-4V
Summary of 150-Hour Creep Test Results

Temperature °F	Stress KSI	Creep Rate In./In./Hr
450	85.0	.000000030
450	87.0	NIL
450	90.0	.000000030
450	91.3	NIL
450	95.0	.000001800
450	96.2	NIL
500	85.0	.000000017
500	87.0	NIL
500	90.0	.000000026
500	91.3	NIL
500	95.0	.000001500
500	96.1	.000000090
550	75.0	.000000060
550	76.8	.000000008
550	77.0	.000000032
550	80.0	NIL
550	82.5	NIL
550	83.5	NIL
600	62.5	NIL
600	63.9	NIL
600	65.0	.000000040
600	65.9	.000000176
600	72.5	.000000037
600	73.4	NIL
650	50.0	.000000110
650	51.2	.000000024
650	55.0	.000000300
650	55.8	.000000016
650	60.0	.000000600
650	60.7	NIL

Table 90. Onset of Creep Stress Measurement of Ti 5Al-2.5 Sn
Summary of 150-Hour Creep Test Results

Temperature °F	Stress KSI	Creep Rate In./In./Hr
450	62.0	Nil
450	62.3	0.00000013
450	65.0	Nil
450	67.3	0.00000022
450	69.5	Nil
450	70.0	0.00000280
500	65.0	Nil
500	65.3	Nil
500	70.0	0.00000040
500	72.5	0.00000050
500	74.3	Nil
500	75.0	0.00000040
550	67.5	Nil
550	67.7	0.00000008
550	70.0	Nil
550	72.5	Nil
550	72.5	0.00000014
550	73.2	Mal-function
600	62.5	Nil
600	64.3	0.00000130
600	65.0	Nil
600	66.9	Nil
600	67.3	Nil
600	67.5	0.00000240
650	57.5	Nil
650	57.7	0.00000015
650	60.0	Nil
650	61.0	Nil
650	62.1	Nil
650	62.5	0.00000015

Table 91. Onset of Creep Stress Measurement of AM-350 SCT
Summary of 150-Hour Creep Test Results

Temperature °F	Stress KSI	Creep Rate In./In./Hr
450	61.2	0.00000003
450	61.2	0.00000011
450	87.9	Nil
450	89.1	Nil
450	105.3	Nil
450	107.8	Nil
500	92.9	0.00000008
500	94.3	Nil
500	97.6	Nil
500	97.8	0.00000047
500	102.3	Nil
500	103.9	Nil
550	87.5	Nil
550	87.7	Nil
550	88.7	Nil
550	90.0	Nil
550	92.5	Nil
550	93.9	Nil
600	80.0	Nil
600	80.2	Nil
600	81.3	Nil
600	82.5	Nil
600	85.0	Nil
600	86.3	Nil
650	79.3	Nil
650	80.0	Nil
650	81.3	Nil
650	82.5	Nil
650	85.0	Nil
650	86.3	Nil

Table 92. Onset of Creep Stress Measurement of AM-355 CRT
Summary of 150-Hour Creep Test Results

Temperature °F	Stress KSI	Creep Rate In./In./Hr
450	162.5	Nil
450	162.8	Nil
450	163.6	Nil
450	165.0	Nil
450	167.5	Nil
450	167.9	Nil
500	157.5	Nil
500	157.8	Nil
500	158.6	Nil
500	160.0	Nil
500	162.5	Nil
500	162.8	Nil
550	160.3	0.00000062
550	162.5	Nil
550	163.0	0.00000081
550	165.0	Nil
550	167.5	Nil
550	168.1	0.00000047
600	152.5	0.00000014
600	152.8	Nil
600	153.7	Nil
600	155.0	Nil
600	157.5	0.00000016
600	157.8	Nil
650	135.0	Nil
650	135.8	Nil
650	136.6	Nil
650	137.5	Nil
650	137.8	Nil
650	140.0	Nil

Table 93. Onset of Creep Stress Measurement of PH 15-7 Mo, Condition RH 1000
Summary of Creep Test Results

Temperature °F	Stress KSI	Creep Rate In./In./Hr
450	86.6	Nil
450	88.0	0.00000008
450	90.1	0.00000002
450	90.1	0.00000008
450	99.7	Nil
450	98.0	Nil
500	81.2	Nil
500	82.0	Nil
500	92.6	Nil
500	82.6	Nil
500	90.6	Nil
500	91.7	Nil
550	120.0	Nil
550	120.0	Nil
550	120.5	Nil
550	122.5	Nil
550	123.5	Nil
550	125.0	Nil
600	100.0	Nil
600	100.0	Nil
600	101.0	Nil
600	102.5	Nil
600	103.7	Nil
600	105.0	Nil
650	107.5	0.00000008
650	107.5	0.00000089
650	107.5	Nil
650	108.3	Nil
650	111.1	Nil
650	112.5	Nil

Table 94. Onset of Creep Stress Measurement of PH 14-8 Mo, Condition RH 1050
Summary of 150-Hour Creep Test Results

Temperature °F	Stress KSI	Creep Rate In./In./Hr
450	128.4	Nil
450	128.4	0.000000008
450	133.0	0.000000024
450	134.2	Nil
450	145.6	0.000000071
450	145.6	0.000000004
500	91.5	Nil
500	91.7	Nil
500	101.4	Nil
500	102.4	Nil
500	106.0	Nil
500	107.3	0.000000048
550	124.2	Nil
550	125.0	Nil
550	127.5	Nil
550	127.8	Nil
550	130.0	Nil
550	130.3	Nil
600	124.3	Nil
600	125.0	Nil
600	127.4	Nil
600	127.5	Nil
600	130.0	Nil
600	130.0	Nil
650	124.4	Nil
650	125.0	Nil
650	127.5	Nil
650	127.9	Nil
650	129.5	Nil
650	130.0	Nil

Table 95. Onset of Creep Stress Measurement of 18% Nickel Maraging Steel
Summary of 150-Hour Creep Test Results

Temperature °F	Stress KSI	Creep Rate In./In./Hr
450	187.5	Nil
450	187.8	Nil
450	190.0	Nil
450	190.0	Nil
450	192.5	0.00000017
450	193.2	Nil
500	165.2	Nil
500	167.5	Nil
500	168.0	Nil
500	170.0	Nil
500	172.5	Nil
500	173.1	Nil
550	147.5	0.00000058
550	147.7	Nil
550	148.7	0.00000120
550	150.0	Nil
550	152.5	Nil
550	152.8	0.00000095
600	137.5	0.00000007
600	138.4	Nil
600	139.4	0.00000024
600	140.0	0.00000033
600	142.5	0.00000010
600	143.0	Nil
650	130.0	Nil
650	130.0	0.00000010
650	132.5	Nil
650	133.0	Nil
650	134.2	Nil
650	135.0	0.00000009

Table 96. Onset of Creep Stress Measurement of Ti 8Al-1Mo-1V
Summary of 1000-Hour Creep Test Results

Temperature °F	Stress KSI	Creep Rate In./In./Hr
450	87.5	0.00000007
450	86.2	0.00000059
450	85.0	0.00000007
450	83.0	0.00000015
450	71.5	0.00000014
450	71.0	Nil
500	70.0	0.00000012
500	68.3	0.00000048
500	67.5	0.00000056
500	66.5	0.00000111
500	65.0	0.00000033
500	64.5	0.00000012
550	77.5	0.00000363
550	75.6	0.00000363
550	75.0	0.00000205
550	73.9	0.00000363
550	72.5	0.00000126
550	71.9	0.00000237
600	80.0	0.00000033
600	77.5	0.00000022
600	75.6	0.00000022
600	75.0	0.00000022
600	73.9	0.00000033
600	72.5	0.00000012
650	62.5	0.00000395
650	62.0	0.00000435
650	60.0	0.00000332
650	58.6	0.00000320
650	57.5	0.00000253
650	51.7	0.00000190

Table 97. Onset of Creep Stress Measurements of Ti 6Al-4V
Summary of 1000-Hour Creep Test Results

Temperature ° F	Stress KSI	Creep Rate In./In./Hr
450	87.5	0.00000007
450	86.2	0.00000059
450	85.0	0.00000007
450	83.0	0.00000015
450	71.5	0.00000014
450	71.0	Nil
500	90.0	0.00000853
500	89.5	0.00000964
500	85.0	0.00000790
500	85.0	0.00000711
500	82.5	0.00000632
500	82.3	0.00000632
550	82.5	0.00000175
550	82.3	0.00000135
550	77.0	0.00000124
550	77.0	0.00000174
550	75.0	0.00000395
550	74.6	0.00000079
600	65.0	0.00000095
600	65.0	Indeterminate
600	65.0	Nil
600	65.0	Nil
600	62.5	0.00001232
600	62.1	0.00000955
650	52.5	0.00000174
650	52.4	0.00000205
650	50.0	0.00000142
650	50.0	0.00000095
650	47.5	0.00000115
650	47.2	0.00000113

Table 98. Onset of Creep Stress Measurement of Ti 5Al-2.5 Sn
Summary of 1000-Hour Creep Test Results

Temperature ° F	Stress KSI	Creep Rate In./In./Hr
450	70.6	0.00000004
450	69.5	0.00000049
450	68.5	0.00000003
450	68.0	0.00000048
450	66.5	0.00000003
450	66.2	0.00000044
500	72.5	0.00000045
500	71.4	0.00000072
500	70.0	0.00000034
500	69.4	0.00000045
500	67.5	0.00000012
500	67.2	0.00000034
550	72.5	0.00000521
550	72.1	0.00000324
550	70.0	0.00000261
550	69.4	0.00000221
550	67.5	0.00000150
550	66.9	0.00000079
600	65.0	0.00000012
600	64.7	0.00000012
600	62.5	0.00000033
600	62.0	0.00000033
600	60.0	0.00000012
600	59.1	0.00000033
650	62.5	0.00000111
650	62.2	0.00000284
650	60.0	0.00000574
650	59.2	0.00000095
650	57.5	0.00000032
650	56.6	0.00000031

Table 99. Onset of Creep Stress Measurement of PH 15-7 Mo, Condition RH 1100
Summary of 1000 Hour Creep Test Results

Temperature °F	Stress KSI	Creep Rate In./In./Hr
450	91.1	0.00000008
450	92.5	0.00000055
450	94.1	0.00000032
450	95.0	0.00000095
450	95.6	0.00000111
450	97.5	0.00000040
500	92.5	0.00000095
500	92.5	0.00000142
500	95.0	Nil
500	95.0	0.00000190
500	97.5	0.00000221
500	97.5	0.00000205
550	118.2	0.00000040
550	120.0	0.00000040
550	121.3	0.00000063
550	122.5	0.00000063
550	122.6	0.00000071
550	125.0	0.00000063
600	98.5	Nil
600	100.0	Nil
600	101.5	Nil
600	102.5	Nil
600	103.0	0.00000002
600	105.0	0.00000041
650	105.9	0.00000003
650	107.5	0.00000007
650	108.9	0.00000023
650	110.0	0.00000012
650	112.5	0.00000109
650	114.7	0.00000019

Table 100. Onset of Creep Stress Measurement of PH 14-8 Mo, Condition RH 1050
Summary of 1000-Hour Creep Test Results

Temperature °F	Stress KSI	Creep Rate In./In./Hr
450	121.7	0.00000016
450	122.4	0.00000016
450	124.5	0.00000016
450	125.0	0.00000055
450	126.7	0.00000055
450	127.0	0.00000073
500	97.5	0.00000032
500	97.5	0.00000032
500	100.0	0.00000063
500	100.0	0.00000095
500	102.5	0.00000111
500	102.5	0.00000063
550	124.2	0.00000047
550	125.0	0.00000063
550	127.0	0.00000047
550	127.5	0.00000063
550	129.7	0.00000095
550	130.0	0.00000103
600	124.2	Nil
600	125.0	Nil
600	127.0	Nil
600	127.5	Nil
600	129.7	Nil
600	130.0	Nil
650	125.0	0.00000004
650	125.8	0.00000005
650	127.5	0.00000009
650	128.0	0.00000011
650	129.7	0.00000010
650	130.0	0.00000010

Table 101. Onset of Creep Stress Measurement of AM-350 SCT
Summary of 1000-Hour Creep Test Results

Temperature °F	Stress KSI	Creep Rate In./In./Hr
450	84.8	0.00000032
450	85.0	0.00000055
450	85.7	0.00000079
450	87.5	0.00000047
450	89.5	0.00000063
450	90.0	0.00000111
500	82.5	0.00000047
500	82.5	0.00000032
500	85.0	0.00000069
500	85.0	0.00000063
500	87.5	0.00000063
500	87.5	0.00000047
550	87.3	0.00000146
550	87.5	0.00000158
550	88.2	0.00000387
550	90.0	0.00000387
550	91.9	0.00000363
550	92.5	0.00000332
600	80.0	0.00000016
600	80.0	0.00000008
600	82.5	0.00000002
600	82.5	Indeterminate
600	85.0	0.00000007
600	85.0	Indeterminate
650	80.0	Nil
650	80.2	Nil
650	80.9	0.00000002
650	82.5	0.00000006
650	85.0	0.00000006
650	85.5	0.00000002

Table 102. Onset of Creep Stress Measurement of AM-355 CRT
Summary of 1000-Hour Creep Test Results

Temperature °F	Stress KSI	Creep Rate In./In./Hr
450	156.2	0.00000003
450	157.5	0.00000002
450	159.6	0.00000010
450	160.0	Nil
450	162.1	0.00000003
450	162.5	0.00000083
500	150.0	Nil
500	152.5	Indeterminate
500	154.6	0.00000010
500	155.0	Indeterminate
500	157.0	0.00000080
500	157.5	0.00000095
550	147.5	0.00000015
550	147.7	0.00000081
550	148.7	0.00000039
550	150.0	0.00000120
550	152.5	0.00000167
550	152.8	0.00000107
600	150.0	0.00000008
600	152.5	0.00000016
600	154.6	Indeterminate
600	155.0	0.00000017
600	157.1	Nil
600	157.5	0.00000112
650	135.0	0.00000076
650	135.4	0.00000032
650	137.3	0.00000125
650	137.5	0.00000095
650	137.7	Indeterminate
650	140.0	Indeterminate

Table 103. Onset of Creep Stress Measurements of 18% Nickel Maraging Steel
Summary of 1000-Hour Creep Test Results

Temperature °F	Stress KSI	Creep Rate In./In./Hr
450	165.5	Nil
450	167.2	0.00000002
450	167.5	0.00000036
450	170.0	0.00000031
450	172.2	0.00000012
450	172.5	0.00000015
500	185.3	0.00000009
500	187.5	0.00000016
500	186.8	0.00000007
500	190.0	0.00000003
500	192.3	0.00000007
500	192.5	Indeterminate
550	160.2	0.00000010
550	162.5	0.00000017
550	163.1	0.00000011
550	165.0	0.00000003
550	167.5	Nil
550	168.1	Indeterminate
600	135.8	Indeterminate
600	137.5	0.00000002
600	137.6	0.00000009
600	140.0	0.00000003
600	142.5	0.00000067
600	142.5	0.00000004
650	130.1	Indeterminate
650	130.5	Nil
650	132.5	0.00000005
650	133.4	0.00000003
650	134.7	0.00000008
650	135.0	Indeterminate