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WELSON & COMPANY, INCORPORATED

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FACILITY FORM 602

WELSON & CO., INC.
HARTFORD. CONN.

CR-115112

FINAL REPORT

For The

DEVELOPMENT OF LUNAR SAMPLE PROCESSING GLOVES

For The

LUNAR RECEIVING LABORATORY

CONTRACT NO. NAS 9-11626

24 JUNE 1971

1.0 INTRODUCTION

This effort was designed to establish the feasibility of developing a pair of all viton Sterile Nitrogen Atmospheric Processing (SNAP) cabinet gloves for use in the Lunar Receiving Laboratory (LRL) facility. All aspects from material formulation to finished product packaging were documented through this effort and two pair of feasibility gloves and two pair of design verification gloves were delivered to NASA for review and approval.

2.0 SUMMARY

The objectives of this effort were the formulations of a fabrication procedure for manufacturing Sterile Nitrogen Atmospheric Processing (SNAP) cabinet gloves and the delivery of two pair of all viton feasibility gloves and two pair of all viton design verification gloves. These goals were accomplished and their documented history is attached as appendices to this report. All previously documented knowledge in this regard was utilized in conjunction with in-house experimentation activities to establish an acceptable glove fabrication procedure for the Welson faciltiy.

Various areas of concern were uncovered during this program which lent themselves to further evaluation. The foremost of these adverse parameters was small air bubbles throughout the outer surface area of the cured gloves. This problem was traced to high humidity levels during the dipping cycle which resulted in air/water entrapment between each dipped layer. During the cure cycle, this entrapped gas tries to escape forming bubbles on the glove surface (mainly on the fingertips area). The preventive measures taken consisted of increasing the air drying times between dips and constantly bursting each new bubble as it appeared. This procedure yields a technically acceptable glove but does produce a slightly irregular outer surface. The ideal conditions would be to perform all aspects of the fabrication procedure in a low humidity enivronment. Another area considered in this regard was the state of the Viton A used. It was thought that the quality of the viton/magnesium oxide/carbon black mixture was not totally acceptable due to inadequate milling operations. Welson was assured by the compound manufacturer that this assumption was incorrect and that their certification of materials was proper. Therefore, this approach was not pursued any further however, it will be considered in subsequent operations.

2.0 SUMMARY (CONT'D)

The second problem area of note was that of glove self adhesion. This problem is not serious but must be accounted for after the glove has been removed from the mold. All sections of the glove tend to stick together if they come in contact with other portions of the glove or other gloves. Care must be taken to prevent contact until the gloves have had enough curing time to become totally inert. A soapy water solution followed by a hot air dry cycle seems to help eliminate this problem.

Both these areas have been investigated and are in control for future dippings.

3.0 DISCUSSION OF EVENTS

This study/fabrication effort was designed to establish the feasibility of developing an all viton cabinet glove for use in the Lunar Receiving Laboratory (LRL) facility. This facility is presently utilizing neoprene rubber gloves for its lunar sample handling, but these gloves lack the low contamination and high chemical resistance characteristics offered by the viton material. Recognizing this fact, various processes have been formulated for the manufacture of viton gloves, but these applications included a layer of beta marquisette within a viton covering to provide the strength needed for particular LRL applications. Therefore, the effort of this program went beyond that previously documented knowledge in the development of two pairs of all viton feasibility gloves and two pair of all viton development gloves.

The starting point of this program was the modification of the newly acquired facility equipment to accomodate the full arm gloves stipulated by the statement of work. The equipment had previsouly been used to dip and cure wrist length gloves and therefore extensive modifications were required. These modifications affected the motor/pulle assembly, filtering units, fan assembly, access openings, and the physical structure of the booth itself. Concurrently with these activities, the task of acquiring molds was initiated. This was one of the most time consuming aspects of the program. Several local manufacturers (east coast) were contacted as to the availability of porcelain molds of the desired configuration. It was learned that due to the limited quantity required and the close similarity of the molds requested to those being produced for large glove manufacturers, no company was willing to fulfill our needs. Welson Co. then contacted local ceramic concerns with varied results, however all responses were negative. Through NASA, Welson contacted

3.0 DISCUSSION OF EVENTS (CONT'D)

a west coast procelain manufacturer (Hueckel China and Procelain Company) who agreed to make the molds. However, their earliest possible delivery date left little time for the actual dipping of the 4 pairs of contract required gloves. Welson Co. therefore initiated an in-house effort to build a suitable mold while dipping experimentally with previously obtained wrist length porcelain molds. The results of the in-house fabricated mold (plaster covered with a hard epoxy coating) proved unsuccessful in that the solvents used in the viton solution attacked slightly the epoxy coating making it almost impossible to remove the glove without damaging it. However, the preliminary dipping attempts with the ceramic wrist length molds yielded such acceptable results that it was determined that there would be sufficient time to successfully complete this effort on schedule. These preliminary gloves were delivered to NASA for review purposes and received preliminary approval.

The time between the delivery of the wrist length gloves and the receipt of the molds was spent in perfecting the dipping techniques and ordering certified materials. The parameters of dipping speeds, immersion times, deposit vs. immersions, solvent compositions and viscosities, and curing cycles were established, utilized in combination with each other, modified if necessary, and finally documented for subsequent use with the full arm mold. Each attempt was recorded on prepared data gathering forms and are attached as Appendix A to this report. These forms indicate the physical conditions of the environment and materials during the test (temperature, humidity, viscosity, solids content, and immersion times) and provide all subjective, visual comments noted during the dipping procedure. The subsequent operations of curing were also varied in terms of air, temperature, and high temperature exposure times to establish the optimum combinations for Welson's

3.0 DISCUSSION OF EVENTS (CONT'D)

facility and its environment. These testing parameters were recorded in a daily log. Each parameter was evaluated in light of the desired end item's operational use to establish a firm curing cycle that provided the strength and off-gassing characteristics required. Finally, thickness measurements were made at strategic points on the front, rear and crotch sections of the glove to establish a thickness profile. Dipping procedures, including intermittent drying techniques, were then established to insure that the resulting glove would exhibit a relatively uniform thickness throughout the entire length.

The knowledge acquired during this interim time period established a total glove fabrication procedure for use on the full length molds. The first of these molds, a configuration sample, was dipped on 22 April 1971 in a certified batch of Viton A to test this newly formulated procedure. As expected, minor booth modifications were required to account for the specific peculiarities of this mold, but the actual dipping procedure checked out acceptably. Welson then initiated the effort required to fabricate the feasibility gloves. This is the first time during the program that any serious problems arose. These problems appeared in the form of air bubbles sporadically placed throughout the entire glove, but specifically located on the finger tips. Investigations into this area through communications with the viton manufacturers and distributers resulted in two possible solutions. The first being that viton, having a high affinity for water, is adversly affected by humidity. This may result in trapped air/water between each dipped layer which evantually tries to escape during the cure cycle. The second theory is that improper milling techniques were utilized in the viton sheet stock formulation allowing air or water entrainment which appeared only after being put into solution.

3.0 DISCUSSION OF EVENTS (CONT'D)

Having previously purchased the necessary quantity of uncured viton stock to complete this contract, Welson Co. launched an investigation into the reduction of humidity.

A desiccator was designed to house the dipped mold to allow a completely dry, air cure cycle after each dip. This approach provided improved results, but the humidity had previously contaminated the entire solution and thus the end results were not optimum. However, they did show a marked improvement over the previously dipped gloves and so a second full scale dipping procedure was performed. The results this time were much more favorable in that the only air bubbles to appear were located on the finger tips and were of minimal size and depth. They did not appear to affect the pressure integrity of the gloves but rather their aesthetic value. Subsequent high temperature curing of these 15 mil gloves exaggerated that condition but no leakage testing was performed. Another related problem was that of self adhesion of the uncured and cured gloves. This phenomena can be avoided by sumberging the gloves in a solution of Orvus Paste and cold water, but after a short time the condition re-appears. No permanent solution, other than time and a dry environment, has been found to date.

The 30 mil thick gloves presented the same problem areas as the 15 mil gloves with one addition, the extra thickness caused the material to sag on the arm section. This was controlled by constantly inverting the molds as the sagging started. In all other respects the dipping processes were the same for both thicknesses. The physical appearances of the gloves are similar with the exception that the thinner glove exhibits a more wrinkled surface finish due to its lack of stiffness. Both sizes have a slightly irregular outer surface due to the circulating air contamination within the dipping room.

3.0 DISCUSSION OF EVENTS (CONT'D)

Stricter quality control and cleanliness practices must be enforced to reduce the surface contamination level to an acceptable level.

Through the above activities, the deliverable items of two pair of Feasibility Gloves (15 and 30 mils thick) and two pair of Design Verification Gloves (15 and 30 mils thick) have been fabricated and their history documented. The other end item of this effort, the documentation of the fabrication procedure, is attached as Appendix B of this report. This document details the fabrication techniques and materials required to manufacture SNAP cabinet gloves. All aspects from facility preparation to glove delivery are systematically defined by this procedure.

WELSON & CO., INC.
HARTFORD, CONN.

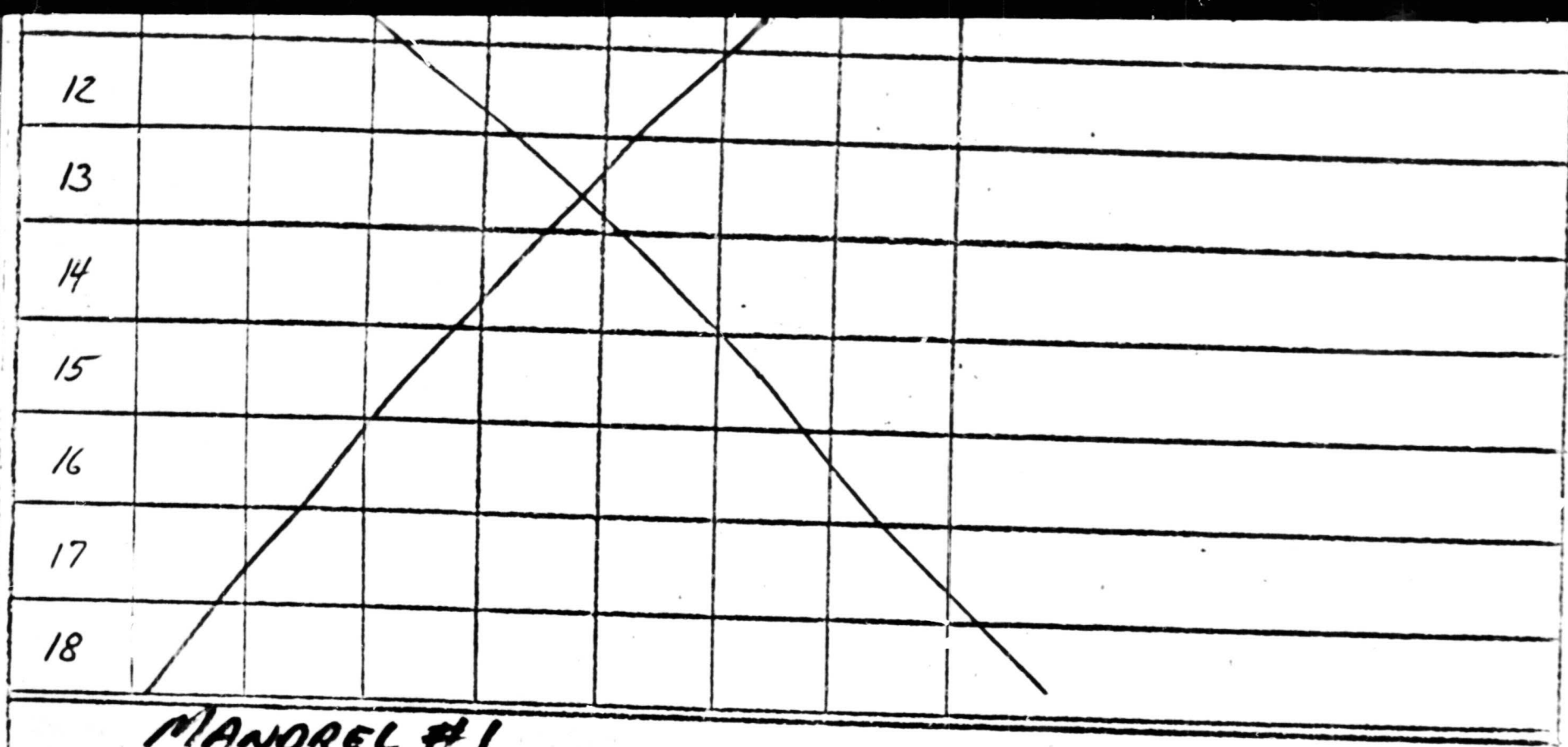
APPENDIX A

DATA SHEETS

Dip Number	Booth °F Temperature	Viton °F Temperature	Viscosity sec	Rheostat Setting	Immersion Time sec	Time Between Dips min		Comments
1	71	67	19	14	59	8:37 9:17		LINT, SAGS & DRIPS
2	74	65	—	14	—	9:18 9:34		ORANGE PEEL EFFECT
3	74	65.5	—	14	—	9:35 9:49		
4	75	65	—	14	60	9:50 10:05		
5	76	64	—	14	—	10:06 10:21		
6	74	63.5	—	14	66	10:22 10:35		
7	75	63.5	—	14	—	10:36 10:51		
8	74	62	—	14	—	10:52 11:24		
9	75	61.5	20	14	—	11:25 12:15		DELAYED DIPPING VISCOSITY CHECK
10	75	60	—	14	—	12.16 END		STILL EXHIBITS ORANGE PEEL EFFECT
11								
12								
13								
14								
15								

[redacted]

EDLPOUT. FRAME



MANOREL #1

- DATE - 5 MARCH '71
- START TIME - 8:37 AM
- FINISH TIME - 12:16 PM
- RELATIVE HUMIDITY - 35%
- SOLIDS CONTENT/TIME - 22/7:30AM
- CONTROL SETTINGS
  - EXHAUST FAN - LOW
  - BLOWER #1
    - FAN SPEED - LO
    - THERMOSTAT - 73°F
  - BLOWER #2
    - FAN SPEED - LO
    - THERMOSTAT - 73°F

2

FOLDOUT FRAME

Dip Number	Booth °F Temperature	Viton °F Temperature	Sec Viscosity	Rheostat Setting	Immersion Time Sec	Time Between Dips Min		Comments
1	71	66	19	14 in 12 out	78	8:51 9:21		Held manually - some sags
2	74	65	—	14 12	80	9:22 9:44		orange peel effect
3	75	65.5	—	14 12	—	9:45 10:00		
4	75	65	—	14 12	—	10:01 10:16		
5	76	64	—	14 12	—	10:17 10:31		
6	74	63.5	—	14 12	—	10:32 10:46		
7	75	63.5	—	14 12		10:47 11:00		
8	74	62	—	14 12	—	11:01 11:28		
9	75	61.5	20	14 12	—	11:29 11:54		Dilated dipping Viscosity check
10	75	60	—	14 12	—	11:55 12:20		Dilated dip
11	75	60	—	14 12	—	12:21 12:31		
12	76	60	—	14 12	—	12:32 END		
13								
14								
15								

FOLDOUT FRAME

9	75	61.5	20	12	-	11:54		Viscosity check
10	75	60	-	14 12	-	11:55 12:20		Orifice dip
11	75	60	-	14 12	-	12:21 12:31		
12 -	76	60	-	14 12	-	12:32 END		
13								
14								
15								
16								
17								
18								

MANOREL # 2

- DATE - 5 MARCH 71
- START TIME - 8:51 AM
- FINISH TIME - 12:32 PM
- RELATIVE HUMIDITY - 35%
- SOLIDS CONTENT / TIME - 22 / 7:30 AM
- CONTROL SETTINGS
  - EXHAUST FAN - LOW
  - BLOWER # 1
    - FAN SPEED - LO
    - THERMOSTAT - 73°F
  - BLOWER # 2
    - FAN SPEED - LO
    - THERMOSTAT - 73°F

FOLDOUT FRAME

Dip Number	Booth °F Temperature	Viton °F Temperature	Viscosity sec	Rheostat Setting	Immersion Time sec	Time Between Dips min		Comments
1	71	66	19	16 IN 14 OUT	56	8:56 9:30		LET MANDREL SPIN - SAG ON BACK OF PANEL
2	74	65	—	16 14	55	9:31 9:43		DRAWN PAST OFFSET
3	74	66.5	—	16 14	—	9:44 9:57		
4	75	65	—	16 14	—	9:58 10:14		
5	76	64	—	16 14	—	10:15 10:30		
6	74	63.5	—	16 14	—	10:31 10:44		
7	75	63.5	—	16 14	—	10:45 10:59		
8	74	62	—	16 14	—	11:00 11:26		
9	75	61.5	20	16 14	—	11:27 11:52		DELAYED DIPPING VISCOSITY CHECK
10	75	60	—	16 14	—	11:53 12:17		DELAYED DIP
11	75	60	—	16 14	—	12:18 12:29		
12	76	60	—	16 14	—	12:30 12:52		
13	77	59	—	16 14	—	12:53 1:06		
14	77	58.5	21	16 14	—	1:07 END		VISCOSITY CHECK
15								

FOLD OUT FRAME

12	76	60	-	15 14	-	12:30 12:52		
13	77	59	-	16 14	-	12:53 1:06		
14	77	58.5	21	16 14	-	1:07 END		VISCOSITY CHECK
15								
16								
17								
18								

MANOREL #3

- DATE - 5 MARCH 77
- START TIME - 8:56 AM
- FINISH TIME - 1:07 PM
- RELATIVE HUMIDITY - 35%
- SOLIDS CONTENT / TIME - 22 / 7:30 AM
- CONTROL SETTINGS
  - EXHAUST FAN - LOW
  - BLOWER #1
    - FAN SPEED - LO
    - THERMOSTAT - 73°F
  - BLOWER #2
    - FAN SPEED - LO
    - THERMOSTAT - 73°F

FOLDOUT FRAME

Dip Number	Booth °F Temperature	Viton °F Temperature	Viscosity Sec	Rheostat Setting	Immersion Time Sec	Time Between Dips Min		Comments
1	71.5	65	19	16 in 12 out	73	9:01 9:26		HELD MANDREL.
2	74	65	—	16 12	70	9:27 9:39		SLIGHT ORANGE PEEL
3	74	65.5	—	16 12	—	9:40 9:51		
4	75	65	—	16 12	74	9:52 10:07		
5	76	64	—	16 12	—	10:08 10:23		
6	74	63.5	—	16 12	—	10:24 10:40		
7	75	63.5	—	16 12	—	10:41 10:56		
8	74	62	—	16 12	—	10:57 11:08		
9	75	61.5	—	16 12	—	11809 11:21		
10	75	60	20	16 12	—	11:22 11:34		Viscosity check
11	75	61.5	—	16 12	—	11:35 11:49		
12	75	60	—	16 12	—	11:50 12:01		
13	75	60	—	16 12	—	12:02 12:12		
14	75	60	—	16 12	—	12:13 12:27		
15	76	60	—	16 12	—	12:28 12:37		

REDRAWN

12	75	60	-	10 12	-	11:50 12:01		
13	75	60	-	10 12	-	12:02 12:12		
14	75	60	-	10 12	-	12:13 12:27		
15	76	60	-	10 12	-	12:28 12:37		
16	76	60	-	10 12	-	12:38 END		
17								
18								

MANOREC # 4

- DATE - 5 MARCH '71
- START TIME - 9:01 AM
- FINISH TIME - 12:38 AM
- RELATIVE HUMIDITY - 35%
- SOLIDS CONTENT/TIME - 22/7:30AM
- CONTROL SETTINGS
  - EXHAUST FAN - LOW
  - BLOWER #1
    - FAN SPEED - LO
    - THERMOSTAT - 73°F
  - BLOWER #2
    - FAN SPEED - LO
    - THERMOSTAT - 73°F

FOLDOUT FRAME

Dip Number	Booth °F Temperature	Viton °F Temperature	Viscosity sec	Rheostat Setting	Immersion Time sec	Time Between Dips min		Comments
1	72	64	19	16 in 11 out	82	9:12 9:24		
2	74	65	—	16 11	86	9:25 9:42		
3	74	65.5	—	16 11	85	9:43 9:55		
4	75	65	—	16 11	—	9:56 10:10		
5	76	64	—	16 11	—	10:11 10:22		
6	74	63.5	—	16 11	—	10:23 10:37		
7	75	63.5	—	16 11	—	10:38 10:50		—
8	74	62	—	16 11	—	10:54 11:06		
9	75	61.5	—	16 11	—	11:07 11:18		
10	75	60	20	16 11	—	11:19 11:31		Viscosity check
11	75	61.5	—	16 11	—	11:32 11:45		
12	75	60	—	16 11	—	11:46 11:58		
13	75	60	—	16 11	—	11:59 12:10		
14	75	60	—	16 11	—	12:11 12:19		
15	76	60	—	16 11	—	12:20 12:25		

EDIDOU

12	75	60	–	16 11	–	11:46 11:58		
13	75	60	–	16 11	–	11:59 12:10		
14	75	60	–	16 11	–	12:11 12:19		
15	76	60	–	16 11	–	12:20 12:35		
16	76	60	–	16 11	–	12:36 12:48		
17	77	59	–	16 11	–	12:49 1:01		
18	77	58.5	21	16 11	92	1:02 END		VISCOSITY CHECK

MANUAL # 5

- DATE - 5 MARCH '71
- START TIME - 9:12 AM
- FINISH TIME - 1:02 PM
- RELATIVE HUMIDITY - 35%
- SOLIDS CONTENT / TIME - 22 / 7:30 AM
- CONTROL SETTINGS
  - EXHAUST FAN - LOW
  - BLOWER #1
    - FAN SPEED - LO
    - THERMOSTAT - 73°F
  - BLOWER #2
    - FAN SPEED - LO
    - THERMOSTAT - 73°F

FOLDOUT FRAME

Dip Number	Booth °F Temperature	Viton °F Temperature	Sec. Viscosity	Rheostat Setting	Immersion Time sec	Time Between Dips min		Comments
1	71	67	19	~~8~~ 10	46	8:32 9:16		
2	74	65	—	10	—	9:17 9:31		ORANGE PEEL EFFECT
3	74	65.5	—	10	43	9:32 9:47		
4	75	65	—	10	—	9:48 10:03		
5	76	64	—	10	—	10:04 10:18		
6	74	63.5	—	10	—	10:19 10:34		
7	75	63.5	—	10	—	10:35 10:49		
8	74	62	—	10	—	10:50 11:03		
9	75	61.5	—	10	—	11:04 11:16		
10	75	60	20	10	—	11:17 11:30		VISCOSITY CHECK
11	75	61.5	—	10	—	11:31 11:43		
12	74.5	60	—	10	—	11:44 11:56		
13	75	60	—	10	—	11:57 12:09		
14	75	60	—	10	—	12:10 12:23		
15	75	60	—	10	—	12:24		

FOR OUT FRAME

	75	60	20	10		11:30		Viscosity check
11	75	61.5	-	10	-	11:31 11:43		
12	74.5	60	-	10	-	11:44 11:56		
13	75	60	-	10	-	11:57 12:09		
14	75	60	-	10	-	12:10 12:23		
15	75	60	-	10	-	12:24 12:33		
16	76	60	-	10	-	12:34 12:46		
17	77	59	-	10	-	12:47 END		Orifice in booth
18								

SAMPLE

- DATE - 5 MARCH 71
- START TIME - 8:30 AM
- FINISH TIME - 12:47 PM
- RELATIVE HUMIDITY - 35%
- SOLIDS CONTENT/TIME - 22 / 7:30 AM
- CONTROL SETTINGS
  - EXHAUST FAN - LOW
  - BLOWER #1
    - FAN SPEED - LO
    - THERMOSTAT - 73°F
  - BLOWER #2
    - FAN SPEED - LO
    - THERMOSTAT - 73°F

FOLDOUT FRAME

Dip Number	Booth (°F) Temperature	Viton (°F) Temperature	Viscosity (sec)	Rheostat Setting	Immersion Time (sec)	Time Between Dips OUT / IN	Min:Sec	Comments
1	75	70	18	16 12	58	8:51 8:50	12	SLIGHT ORANGE PEEL
2	76	70	-	-	75	9:04 9:03	12	
3	77	70	-	-	64	9:17 9:16	10	
4	77	70	-	-	75	9:28 9:27	8	
5	77	70	-	-	62	9:37 9:36	9	
6	77	70	-	-	68	9:47 9:46	10	
7	76	70	-	-	63	9:58 9:57	11	
8	76	70	-	-	70	10:10 10:09	35	[illegible]
9	75	69	19	-	-	10:46 10:45	11	[illegible]
10	76	68	-	-	-	10:58 10:57	9	
11	76	68	-	-	-	11:08 11:07	10	
12	[illegible]	66	19	-	-	11:19 11:18		[illegible]
13								
14								

FOLDOUT FRAME

	76	68	—	—	—	10:50		
						10:57	9	
11	76	68	—	—	—	10:08		
						11:07	10	
12	76	66	19	—	—	11:19		
						11:18		END dipping - viscosity check
13								
14								
15								
16								
17								
18								

- ARTICLE - MANOREL #6
- DATE - 9 MARCH 1971
- START TIME - 8:50 AM
- FINISH TIME - 11:19 AM
- RELATIVE HUMIDITY - 34%
- SOLIDS CONTENT / TIME - 19 / 5:00PM - 8 MAR 71
- CONTROL SETTINGS
  - EXHAUST FAN - LOW
  - BLOWER #1
    - FAN SPEED - LO
    - THERMOSTAT - 80°F
  - BLOWER #2
    - FAN SPEED - LO
    - THERMOSTAT - 80°F

FOLDOUT FRAME

Dip Number	Booth (°F) Temperature	Viton (°F) Temperature	Viscosity (sec)	Aerostat Setting	Immersion Time (sec)	Time Between Dips OUT / IN	Mins	Comments
1	75	70	18	16 11	78	8:56 8:55	10	SLIGHT ORANGE PEEL
2	76	69.5	–	–	72	9:07 9:06	12	
3	77	70	–	–	85	9:20 9:19	10	
4	77	70	–	–	72	9:31 9:30	7	
5	77	70	–	–	84	9:39 9:38	9	
6	77	70	–	–	85	9:49 9:48	11	
7	76	70	–	–	83	10:01 10:00	10	
8	76	68.5	–	–	82	10:12 10:11	35	STOP DIPPING - PUT ON O-RING
9	75	69	19	–	–	10:48 10:47	11	1ST DIP OVER O-RING
10	76	68	–	–	–	11:00 10:59	10	
11	76	68	–	–	–	11:11 11:10	9	
12	76	66	19	–	–	11:21 11:20		END DIPPING - VISCOSITY CHECK
13								
14								

EDLDQUE ERAME

	76	68				10:59	10	
11	76	68	—	—	—	11:11 11:10	9	
12	76	66	19	—	—	11:21 11:20		END OF MORNING ACTIVITY START
13								
14								
15								
16								
17								
18								

- ARTICLE - MANDREL #7
- DATE - 7 MARCH 1971
- START TIME - 8:56 AM
- FINISH TIME - 11:21 AM
- RELATIVE HUMIDITY - 34%
- SOLIDS CONTENT/TIME - 19 / 5:00 AM - 8 MARCH '71
- CONTROL SETTINGS
  - EXHAUST FAN - LOW
  - BLOWER #1
    - FAN SPEED - LO
    - THERMOSTAT - 80°F
  - BLOWER #2
    - FAN SPEED - LO
    - THERMOSTAT - 80°F

FOLDOUT FRAME

Dip Number	Booth (°F) Temperature	Viton (°F) Temperature	Viscosity (sec)	Rheostat Setting	Immersion Time (sec)	Time Between Dips OUT / IN	Min	Comments
1	75	70	18	15 14	50	8:59 8:58	9	BAGS AT WAIST
2	76	69.5	—	—	57	9:07 9:08	14	EXCESSIVE DRIPPING
3	77	70	—	—	54	9:24 9:23	7	
4	77	70	—	—	50	9:32 9:31	9	
5	77	70	—	—	51	9:42 9:41	9	
6	77	70	—	—	49	9:52 9:51	10	
7	76	70	—	—	50	10:03 10:02	11	STOP DIPPING - PUT ON O-RING
8	76	68.5 70	—	—	51	10:15 10:14	36	PAINTED VITON AROUND O-RING 1ST DIP OVER O-RING
9	75	69	19	—	—	10:52 10:51	10	
10	76	68	—	—	—	11:03 11:02	10	
11	76	68	—	—	—	11:14 11:13	9	
12	76	66	19	—	—	11:24 11:23		END DIPPING - VISCOSITY CHECK
13								
14								
15								

FOLDOUT FRAME

						11:02		
11	76	68	—	—	—	11:14 11:13	9	
12	76	66	9	—	—	11:24 11:23		End dipping - viscosity check
13								
14								
15								
16								
17								
18								

- Article - Manorec # 8
- Date - 9 March 1971
- Start Time - 8:50 AM
- Finish Time - 11:24 AM
- Relative Humidity - 34%
- Solids Content / Time - 19 / 8:00 AM - 8 March 71
- Control Settings
  - Exhaust Fan - Low
  - Blower #1
    - Fan Speed - Lo
    - Thermostat - 80°F
  - Blower #2
    - Fan Speed - Lo
    - Thermostat - 80°F

FOLDOUT FRAME

Dip Number	Booth (°F) Temperature	Viton (°F) Temperature	Viscosity (sec)	Pressure Setting	Immersion Time (sec)	Time Between Dips OUT / IN	Min Sec	Comments
1	75	70	18	18 / 11	82	9:01 / [illegible]	10	
2	76	69.5	-	—	75	[illegible] / 9:11	13	
3	77	70	—	—	70	9:26 / 9:25	8	
4	77	70	-	-	73	9:35 / 9:34	8	
5	77	70	-	—	80	9:44 / 9:43	10	
6	77	70	—	-	82	9:55 / 9:54	10	—
7	76	70	—	-	75	10:06 / 10:05	11	
8	76	68.5	—	—	70	10:18 / 10:17	35	STOP O-RING - PUT ON O-RING
9	75	69	19	—	—	10:54 / 10:53	11	PAINTED VITON AROUND O-RING 1ST RUN OVER O-RING
10	76	68	—	-	-	11:06 / 11:05	9	
11	76	68	—	-	-	11:16 / 11:15	9	
12	76	66	19	-	-	11:26 / 11:25		END O-RING - VISCOSITY CHECK
13								
14								
15								

FOLDOUT FRAME

	76	68	—	-	-	11:05	9	
11	76	68	—	-	-	11:16 11:15	9	
12	76	66	19	-	-	11:26 11:25		END OF APPROX. WORKING CURVE
13								
14								
15								
16								
17								
18								

- ARTICLE - MANUAL #10
- DATE - 9 MARCH 1971
- START TIME - 9:00 AM
- FINISH TIME - 11:26 AM
- RELATIVE HUMIDITY - 34%
- SOLIDS CONTENT/TIME - 19/ 5:00PM - 8 MARCH '71
- CONTROL SETTINGS
  - EXHAUST FAN - LOW
  - BLOWER #1
    - FAN SPEED - LO
    - THERMOSTAT - 80°F
  - BLOWER #2
    - FAN SPEED - LO
    - THERMOSTAT - 80°F

FOLDOUT FRAME

Dip Number	Booth (°F) Temperature	Vition (°F) Temperature	Viscosity (sec)	Rheostat Setting	Immersion Time (sec)	Time Between Dips OUT / IN	Time Between Dips Min:Sec	Comments
1	76°	70	19	16 / 11	58	1:45 / 1:44		MCR ATTACHED AGAIN
2								
3								
4								
5								
6								
7								
8								
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10								
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13								
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FOLDOUT FRAME

FOLDOUT FRAME

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- ARTICLE - ULTRACAL CLOTH
- DATE - 9 MARCH 1971
- START TIME - 1:44 PM
- FINISH TIME - 1:45 PM
- RELATIVE HUMIDITY - 34%
- SOLIDS CONTENT/TIME - 19/5:00PM - 8MARCH'71
- CONTROL SETTINGS
  - EXHAUST FAN - LOW
  - BLOWER #1
    - FAN SPEED - LO
    - THERMOSTAT - 80°F
  - BLOWER #2
    - FAN SPEED - LO
    - THERMOSTAT - 80°F

FOLDOUT FRAME

FOLDOUT FRAME

FOLDOUT FRAME

Dip Number	Booth (°F) Temperature	Viton (°F) Temperature	Viscosity (sec)	Rheostat Setting	Immersion Time (sec)	Time Between Dips OUT / IN	Min:Sec	Comments
1	76°	71°	19	16 14	54	1:42 1:41		~~MEK APPLIED AIR~~
2	76	69	—	—	58	1:52 1:51	9	INVERTED
3	76	69	—	—	56	2:01 2:00	8	NOT "
4	76	70	—	—	56	2:11 2:10	9	NOT "
5	76	71	—	—	60	2:20 2:19	8	INVERTED
6	76	71	—	—	60	2:30 2:29	9	INVERTED
7	76	71.5	—	—	58	2:39 2:38	8	INVERTED
8	76	71.5	—	—	60	2:49 2:48	9	INVERTED
9	76.5	72	—	—	58	2:58 2:57	8	INVERTED
10	76.5	72	—	—	57	3:08 3:07	9	INERTED
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12								
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FOLDOUT FRAME

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- ARTICLE - CHROME SAMPLES
- DATE - 7 MARCH 1971
- START TIME - 1:41 PM
- FINISH TIME - 3.08 PM
- RELATIVE HUMIDITY - 34%
- SOLIDS CONTENT/TIME - 19/5:00 AM - 8 MARCH '71
- CONTROL SETTINGS
  - EXHAUST FAN - LOW
  - BLOWER #1
    - FAN SPEED - LO
    - THERMOSTAT - 80°F
  - BLOWER #2
    - FAN SPEED - LO
    - THERMOSTAT - 80°F

FOLDOUT FRAME

Dip Number	Booth (°F) Temperature	Viton (°F) Temperature	Viscosity (sec)	Rheostat Setting	Immersion Time (sec)	Time Between Dips OUT / IN	Min Sec	Comments
1	77	70	22		62	10:02 / 10:01		SOLUTION ATTACKED THE PAINT
2								STOPPED TEST
3								
4								
5								
6								
7								
8								
9								
10								
11								
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FOLD OUT FRAME

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FOLDOUT FRAME

- ARTICLE - PORCELAIN PAINT SAMPLE
- DATE - 17 MARCH 1971
- START TIME -
- FINISH TIME -
- RELATIVE HUMIDITY - 46%
- SOLIDS CONTENT/TIME - 19 @ 4:30PM - 16 MARCH 1971
- CONTROL SETTINGS
  - EXHAUST FAN - LOW
  - BLOWER #1
    - FAN SPEED - LO
    - THERMOSTAT - 80°F
  - BLOWER #2
    - FAN SPEED - LO
    - THERMOSTAT - 80°F

FOLDOUT FRAME

DIP NUMBER	BOOTH (°F) TEMPERATURE	VITON (°F) TEMPERATURE	VISCOSITY (SEC)	RHEOSTAT SETTING	IMMERSION TIME (SEC)	TIME BETWEEN DIPS OUT / IN	MIN:	COMMENTS
1	77	70	22		60	10:04		SOLUTION ATTACHED TAN EPOXY
2								STOPPED TEST
3								
4								
5								
6								
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FOLDOUT FRAME

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- ARTICLE - Epoxy Paint Samples
- DATE - 17 MARCH 1971
- START TIME -
- FINISH TIME -
- RELATIVE HUMIDITY - 46%
- SOLIDS CONTENT/TIME - 19 @ 4:30PM - 16 MARCH 1971
- CONTROL SETTINGS
  - EXHAUST FAN - LOW
  - BLOWER #1
    - FAN SPEED - LO
    - THERMOSTAT - 80°F
  - BLOWER #2
    - FAN SPEED - LO
    - THERMOSTAT - 80°F

FOLDOUT FRAME

DIP NUMBER	BOOTH (°F) TEMPERATURE	VITON (°F) TEMPERATURE	VISCOSITY (SEC)	PREDIAL SETTING	IMMERSION TIME (SEC)	TIME BETWEEN DIPS OUT / IN	MINS	COMMENTS
1	78	68	22	16 14		10:15 10:14		
2	-	-	-	-	56	10:24 10:23	8	
3	-	-	-	-	58	10:33 10:32	8	
4	-	-	-	-		10:42 10:41	8	
5	-	-	-	-	60	10:51 10:50	8	
6	79	-	-	-		11:00 10:59	8	
7						11:08		GLOBS OF VITON FELL ON SURFACE - STOPPED TEST
8								
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11								
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FOLLOUT FRAME

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- ARTICLE - FULL LENGTH ULTRAFAN GLOVE
- DATE - 17 MARCH 1971
- START TIME - 10:14 AM
- FINISH TIME - 11:00 AM
- RELATIVE HUMIDITY - 46%
- SOLIDS CONTENT/TIME - 19 @ 4:30 PM - 16 MARCH 1971
- CONTROL SETTINGS
  - EXHAUST FAN - LOW
  - BLOWER #1
    - FAN SPEED - LO
    - THERMOSTAT - 80°F
  - BLOWER #2
    - FAN SPEED - LO
    - THERMOSTAT - 80°F

FOLDOUT FRAME

Dip Number	Booth (°F) Temperature	Vision (°F) Temperature	Viscosity (sec)	Preset/Set Setting	Immersion Time (sec)	Time Between Dips OUT / IN	Min	Comments
1	78	68	22	16 14	45	10:12 10:11		
2	-	-	-	-	47	10:21 10:20	8	10:21
3	—	-	-	—		10 30 10:29	8	
4	-	—	-	—	52	10:39 10:38	8	
5				16 12	47	10:49 10:47	8	CHG. SPEED 16-12 UP TO CONVOLUTE DIP
6	79	-	-	—	47	10:58 10:57	8	UP TO CONVOLUTE DIP
7	-	-	-	16 14	45	11:07 11:06	8	COMPLETE DIP
8	-	-	-	14 12	47	11:16 11:15	8	UP TO 1ST CONVOLUTE DIP
9	—	-	-	—	48	11:25 11:24	8	FASTER OUT FOR CONVOLUTE-SECTION - COMPLETE DIP
10	—	—	—	14 12	—	11:34 11:33	8	1ST CONVOLUTE DIP
11	-	-	-	-	-	11:43 11:42	8	
12								
13								
14								
15								

FOLDOUT FRAME

11	-	-	-	-	-	11:43 11:42	8	
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13								
14								
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17								
18								

FOLD OUT FRAME

- ARTICLE - EVAPORATIVE COOLER
- DATE - 17 MARCH 1971
- START TIME - 10:11 AM
- FINISH TIME -
- RELATIVE HUMIDITY - 46%
- SOLIDS CONTENT/TIME - 19 @ 4:30 PM - 16 MARCH 1971
- CONTROL SETTINGS
  - EXHAUST FAN - LOW
  - BLOWER #1
    - FAN SPEED - LO
    - THERMOSTAT - 80°F
  - BLOWER #2
    - FAN SPEED - LO
    - THERMOSTAT - 80°F

Dip Number	Booth (°F) Temperature	Vition (°F) Temperature	Viscosity (sec)	Rheostat Setting	Immersion Time (sec)	Time Between Dips OUT / IN	Min:Sec	Comments
1	76	66	21	16 14	51	9:40 9:39	01	NO TEFLON COATING
2	77	66	—	—	46	9:50 9:49	10	
3	—	-	-	-	54	9:59 9:58	8	
4	78	66	—	—	50	10:08 10:07	8	
5	77	66	-	16 14	56	10:17 10:16	8	
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FOLDOUT FRAME

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- ARTICLE - ULTRACAL FINDINGS - EPON 815
- DATE - 25 MARCH 1971
- START TIME - 9:37 AM
- FINISH TIME - 10:17 AM
- RELATIVE HUMIDITY - 31%
- SOLIDS CONTENT/TIME - ——
- CONTROL SETTINGS
  - EXHAUST FAN - LOW
  - BLOWER #1
    - FAN SPEED - LO
    - THERMOSTAT - 80°F
  - BLOWER #2
    - FAN SPEED - LO
    - THERMOSTAT - 80°F

FOLDOUT, FRAME

Dip Number	Booth (°F) Temperature	Viton (°F) Temperature	Viscosity (sec)	Rheostat Setting	Immersion Time (sec)	Time Between Dips OUT / IN	Time Between Dips Min:Sec	Comments
1	76	66	21	18 18	30	9:42 9:41		w Teflon coating
2	77	66	"	—	29	9:33 9:32	10	
3	"	—	—	—	27	10:01 10:01	8	
4	78	66	—	—	29	10:10 10:09	8	
5	77	66	—	18 18	26	10:17 10:18	8	
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FOLDOUT FRAME

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- ARTICLE - ULTRASOL NANO - SPIN 015
- DATE - 25 MARCH 1971
- START TIME - 9:41 AM
- FINISH TIME - 10:13 AM
- RELATIVE HUMIDITY - 31%
- SOLIDS CONTENT / TIME - —
- CONTROL SETTINGS
  - EXHAUST FAN - LOW
  - BLOWER #1
    - FAN SPEED - LO
    - THERMOSTAT - 80°F
  - BLOWER #2
    - FAN SPEED - LO
    - THERMOSTAT - 80°F

FOLDOUT FRAME 2

Dip Number	Booth (°F) Temperature	Viton (°F) Temperature	Viscosity (sec)	Rheostat Setting	Immersion Time (sec)	Time Between Dips OUT / IN	Min:Sec	Comments
1	64	62	33	15 13	96	9:57 9:58		USED DAVICO ANTI REVERSE - FINISHED UP DRY FOR 30 MIN.
2	"	"	"	18 16	45	10:10 10:09		
3	"	"	"	"	40	10:21 10:20		
4	70	"	"	"	43	10:32 10:31		"O" RING ADDED - NO VITON IN RING
5	"	"	"	"	43	10:43 10:42		
6	"	"	"	"		10:54 10:53		
7	"	"	"	"	42	11:05 11:04		
8	"	"	"	"	43	11:16 11:15		
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FOLDOUT FRAME

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- ARTICLE - MANOREL #6
- DATE - 31 MARCH 1991
- START TIME - 9:58 AM
- FINISH TIME - 11:16 AM
- RELATIVE HUMIDITY - 38%
- SOLIDS CONTENT/TIME - 14.6 @ 11:30 AM - 31 MARCH '91
- CONTROL SETTINGS
  - EXHAUST FAN - LOW
  - BLOWER #1
    - FAN SPEED - LO
    - THERMOSTAT - OFF
  - BLOWER #2
    - FAN SPEED - OFF
    - THERMOSTAT - OFF

CUT OUT FRAME

DIP NUMBER	BOOTH (°F) TEMPERATURE	VITON (°F) TEMPERATURE	VISCOSITY (SEC)	RHEOSTAT SETTING	IMMERSION TIME (SEC)	TIME BETWEEN DIPS OUT / IN	MIN:SEC	COMMENTS
1	64	62	33	12 / 12	47	10:01 / 10:00		USED OLDER ROSIN - REDUCED - FINISH RUN ONLY FOR 30 min.
2				"	47	10:12 / 10:11		
3				"	45	10:23 / 10:22		
4	70	"	"	"	43	10:34 / 10:33		
5	"	"	"	"	40	10:45 / 10:44		"O" RING ADDED (VITON COATED) NOT
6	"	"	"	"	43	10:56 / 10:55		
7	"	"	"	"	43	11:07 / 11:06		
8	71	"	"	"	43	11:18 / 11:17		
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FOLDOUT FRAME

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- ARTICLE - MANOREL #7
- DATE - 31 MARCH 1991
- START TIME - 10:00 AM
- FINISH TIME - 11:18 AM
- RELATIVE HUMIDITY - 38%
- SOLIDS CONTENT/TIME - M.C @ 11:30AM - 31 MARCH 1991
- CONTROL SETTINGS
  - EXHAUST FAN - LOW
  - BLOWER #1
    - FAN SPEED - 2
    - THERMOSTAT - OFF
  - BLOWER #2
    - FAN SPEED - OFF
    - THERMOSTAT - OFF

FOLDOUT FRAME 2

Dip Number	Booth (°F) Temperature	Viton (°F) Temperature	Viscosity (sec)	Rheostat Setting	Immersion Time (sec)	Time Between Dips OUT / IN	Min:Sec	Comments
1	64	62	33	18 16	46	10:02 10:01		Used Reverse Coated Nitrile 35 min dry
2				"	47	10:13 10:12		
3					47	10:25 10:24		
4	70	"	"	"	44	10:36 10:35		
5	"	"	"	"	45	10:47 10:46		
6	"	"	"	"	45	10:58 10:57		"O" Ring added (Viton coated)
7	"	"	"	"	45	11:09 11:08		
8	71	"	"	"	45	11:20 11:19		
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FOLLOW PRINT

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- ARTICLE - MANOREL #8
- DATE - 31 MARCH 1971
- START TIME - 10:01 AM
- FINISH TIME - 11:20 AM
- RELATIVE HUMIDITY - 38%
- SOLIDS CONTENT/TIME - 14.6 @ 11:30AM - 31 MARCH 71
- CONTROL SETTINGS
  - EXHAUST FAN - LOW
  - BLOWER #1
    - FAN SPEED - LO
    - THERMOSTAT - OFF
  - BLOWER #2
    - FAN SPEED - OFF
    - THERMOSTAT - OFF

FOLDOUT FRAME 2

Dip Number	Booth (°F) Temperature	Viton (°F) Temperature	Viscosity (sec)	Rheostat Setting	Immersion Time (sec)	Time Between Dips OUT / IN	Min:Sec	Comments
1	64	62	33	18 16		10:05 10:04		Used Formulation 1 another 15 min day
2						10:15 10:14		
3						10:26 10:25		
4	70	"	"	"	40	10:38 10:37		
5	"	"	"	"	43	10:50 10:49		
6	"	"	"	"	43	11:01 11:00		
7	"	"	"	"	43	11:11 11:10		
8	71	"	"	"	43	11:23 11:22		
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FOLD OUT FRAME

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- ARTICLE - MANOREL #90
- DATE - 31 MARCH 1981
- START TIME - 10:04 AM
- FINISH TIME - 11:43 AM
- RELATIVE HUMIDITY - 38%
- SOLIDS CONTENT/TIME - 14.6 @ 11:30 AM - 31 MARCH 81
- CONTROL SETTINGS
  - EXHAUST FAN - LOW
  - BLOWER #1
    - FAN SPEED - LO
    - THERMOSTAT - OFF
  - BLOWER #2
    - FAN SPEED - OFF
    - THERMOSTAT - OFF

FOLDOUT FRAME 2

Dip Number	Booth (°F) Temperature	Vition (°F) Temperature	Viscosity (sec)	Rheostat Setting	Immersion Time (sec)	Time Between Dips OUT / IN	Min:Sec	Comments
1	64	62	33	18 16	40	10:07 10:06		No access to mount wire
2						10:18 10:17		went in at 80 (AM-0) - drains & no drops
3					43	10:29 10:28		
4	70	"	"	"	43	10:40 10:39		
5	"	"	"	"		10:52 10:51		
6	"	"	"	"	42	10:03 11:02		
7	"	"	"	"		11:14 11:13		
8	71	"	"	"		11:25 11:24		
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- ARTICLE - MANGROVE #18
- DATE - 31 MARCH 1971
- START TIME - 10:06 AM
- FINISH TIME - 11:25 AM
- RELATIVE HUMIDITY - 38%
- SOLIDS CONTENT / TIME - 14.6 @ 11:30 AM - 31 MARCH 71
- CONTROL SETTINGS
  - EXHAUST FAN - LOW
  - BLOWER #1
    - FAN SPEED - LO
    - THERMOSTAT - OFF
  - BLOWER #2
    - FAN SPEED - OFF
    - THERMOSTAT - OFF

FOR PHOTOGRAPHIC PURPOSES ONLY

Dip Number	Bostik (°F) Temperature	Viton (°F) Temperature	Viscosity (sec)	Rheostat Setting	Immersion Time (sec)	Time Between Dips OUT / IN	Min ~~Sec~~	Comments
1	74°	62°	19	20 / 10	51	10:58 / 10:50		VITON ONLY PARTIALLY TOOK ON MOLD
2	"	"	"	"	54	10:57 / 10:56	5	COMPLETELY COATED MOLD THIS TIME BUT PHYSICAL APPEARANCE IS CARRY, "RUNNY", AND ORANGE PEELY
3	"	63	"	"	54	11:04 / 11:03	6	APPEARANCE REMAINS UNCHANGED
4	"	"	"	"	53	11:12 / 11:10	7	"
5	"	"	"	"	53	11:21 / 11:20	8	APPEARANCE SHOWS SMOOTHER CONTOUR
6	"	"	"	"	54	11:31 / 11:30	9	
7	"	"	"	"	53	11:42 / 11:41	10	
8		"	"	"	53	11:54 / 11:53	11	
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FOLD OUT FILE NAME

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- ARTICLE - LARGE VERTICAL GLOVE MOLD
- DATE - 12 April 1971
- START TIME - 10:50 AM
- FINISH TIME - 11:54 AM
- RELATIVE HUMIDITY - 47%
- SOLIDS CONTENT / TIME - 15.5 % @ 12:00 NOON 12 April 71
- CONTROL SETTINGS

EXHAUST FAN - [illegible]

OVEN #1

FAN SPEED - 40

TEMPERATURE - 72°F

CONTROL

[illegible] - OFF

FOLD OUT PAGE