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COPY 2

STUDY AND DEVELOPMENT
OF
LIGHT ARMOR MATERIALS

WAL REPORT NO. 710/891-11
CONTRACT NO. W 19-020-ORD-6511
RAD NO. ORDTS 9-10632
O.O. PROJECT NO. T85-5008
WAL PROJECT NO. 6.22 H

85 8 8 102

INTERIM REPORT NO. 1, SEPTEMBER 1949
BY
RESEARCH LABORATORIES
OF
VICTORY PLASTICS CO.
HUDSON, MASSACHUSETTS

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BOSTON ORDNANCE DISTRICT
Army Base
Boston 10, Massachusetts

STUDY AND DEVELOPMENT
OF
LIGHT ARMOR MATERIALS

COPY NO. 2

WAL REPORT NO. 710/891-11
CONTRACT NO. W 19-020-ORD-6511
RAD NO. ORDTS 9-10632
C.O. PROJECT NO. TS5-5008
WAL PROJECT NO. 6.22 H

INTERIM REPORT NO. I
SEPTEMBER 1949

BY THE

RESEARCH LABORATORIES

OF

VICTORY PLASTICS COMPANY
HUDSON, MASSACHUSETTS

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INDEX TO REPORT

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- II. INTRODUCTION
- III. SUMMARY
- IV. LAMINATING AND PROCESSING TECHNIQUES
- V. TESTS

APPENDIX

- A. DETAILED TABULATION OF RESULTS

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I. ABSTRACT:

This evaluation report summarizes research and development work on fragment-resistant plastic laminates for use as components of personnel armor assemblies carried on during the period 1 November 1948 - 31 August 1949. Preliminary evaluations have been made of promising resins based upon formulations of phenol-formaldehyde and polyvinyl butyral. These promise to provide better armor characteristics at lower cost than has been true of resins previously evaluated. Preliminary evaluations have also been made of several new types of fabrics, i.e., Fortisan, Orlon, and Fiber V. Studies have been made of the effects of forming into helmets, exposure to accelerated and natural aging, and salt sprays. Reductions in ballistic values under these exposure conditions were small. In the transparent armor program, newly available transparent back-up films have resulted in improved clarity with no appreciable change in ballistic value.

II. INTRODUCTION:

This is an interim report for the United States of America (Boston Ordnance District) Contract Number W 19-020-ORD-6511 (Victory Plastics Project Number 1091) on "Design and Development of Laminating Techniques and Laminates." The work summarized in this report covers the period from 1 November 1948 to 31 August 1949 and may be considered as an extension of Contract Number W 19-020-ORD-6477, which describes a continuation of a program of research into and development of laminating techniques and laminates that might eventually be used for light-weight armor. During the interim, major effort was centered around the following items:-

1. Opaque Laminates.

- a) Continuation of the resin evaluation program to determine the more promising types.
- b) Detailed tests of the more promising resins, especially the series based upon the phenol-formaldehyde-polyvinyl butyral type of resins.
- c) The ballistic testing of samples that have been exposed (1) to outside weathering, (2) in an approved weather-ometer, (3) in a standard salt spray apparatus, and (4) to high and low temperatures.

2. Transparent Armor.

- a) Studies of laminating techniques to increase the optical clarity and reduce distortion.

b) The development of new adhesives and methods of bonding to increase the ballistic limits without decreasing the delamination upon impact.

c) The development of combinations to increase the properties for the retention of "back spalls" without extreme impairment of optical clarity.

III. SUMMARY:

As a result of this investigation, non-metallic materials have been developed that have Merit Factors of 96,100 to 108,300 when subjected to ballistic tests using the Fragment-Simulating Projectile, G-2, 17 Grains, Cal. .22 (TS7) Ser-147, Long Rifle.

Table I is a bar graph which summarizes and compares the ballistic characteristics of the more promising materials developed under this contract with 0.044" thick Hadfield steel and rigid fiber-glass laminate developed by others and tested at this facility.

During the interim the following has been accomplished and or delivered as set forth under "Article I Scope of Work:"

A. "Study and development of laminating as applied to various new combinations of fragment-resistant transparent and opaque materials."

1. Thorough evaluation of the best resins found and or developed was carried out by application over a wide range of percentages to Nylon, Fortisan and Orlon fabrics

2. A new thermo-setting resin was found that when applied to Nylon on a low percentage basis resulted

in a cost reduction of approximately one-half for material and a reduction in the neighborhood of seventy-five percent in direct labor for application.

3. This new resin being of the thermo-setting type requires approximately a ten minute cycle for a complete cure in steam heated molds. However, early indications show that by the use of high frequency heating a complete cure can be effected in approximately forty seconds.

4. An improvement was made in the transparent fragment-resistant laminates with the development of a Nylon back-up film that improved the optical clarity of the laminate without reducing the ballistic characteristics or decreasing the ability to retain and trap all back spalls.

B. "Development of new transparent and opaque fragment-resistant plastic laminates for use as components of armor assemblies, as requested by the Contracting Officer, giving particular consideration to the following characteristics:

1. "The molding or forming of laminates into required shapes that might eventually be used in the fabrication of items of armor."

(a) The materials that proved the best ballistically were molded in three dimensional shapes in positive molds as follows:

Helmet Liner T21E1 5 ply
Crash Helmet EX-49-1 7 ply
Helmet T21E2 14 ply

The above items retained their ballistic qualities for the most part as well as dimensional stability at temperature extremes.

2. "Maintenance of ballistic qualities, molded shapes and optical clarity (of transparent materials) under the following conditions and for the lengths of time as directed by the Contracting Officer:

(a) "After exposure in an approved Weather-ometer to accelerated cycles."

(1) Samples that were exposed for the equivalent of one and one half years in an approved Weather-ometer showed only a slight reduction in ballistic limits.

(b) "After exposure in standard salt spray apparatus."

(1) Panels exposed for seven (7) days in a standard salt spray apparatus show only a slight reduction in ballistic properties.

(c) "After exposure to outside weathering in a standard outside exposure rack."

(1) Panels exposed for twelve (12) months showed a reduction in ballistic qualities of approximately eight (8) percent.

(d) "After exposure to temperatures up to +125°F and over an approved range of humidities."

(1) Very little or no change in ballistic qualities was found after exposure to 125°F ± 20°F for forty-two (42) hours and subsequently tested at this temperature in a specially constructed box. Detailed comparisons may be made by consulting the firing data appended to this report (Appendix A).

3. "Resistance to penetration by fragments, particularly as evaluated by a ballistic limit test employing cal. .22 fragment-simulating projectile G-2."

(a) During the interim 2427 rounds of Fragment-Simulating Projectile, G-2, 17 Grain Cal. .22 (T37) Sec-147 Long Rifle Bullets, Ammunition were loaded, fired, recorded, and the V50 Ballistic Limits calculated and plotted.

C. "Reduction to practice of such theoretical knowledge gained in other pertinent research and development programs of the Ordnance Department as may become available to the Contractor."

1. During the interim valuable aid was received from personnel connected with the Boston Ordnance District and Watertown Arsenal.

D. "Manufacture and delivery of not more than 250 fragmentation test samples 12" x 15" in size, and not more than 100 inspection samples 6" x 6" in size, of specimens selected by the Technical Director and authorized by the Contracting Officer to be delivered at such point or points as the Contracting Officer may designate."

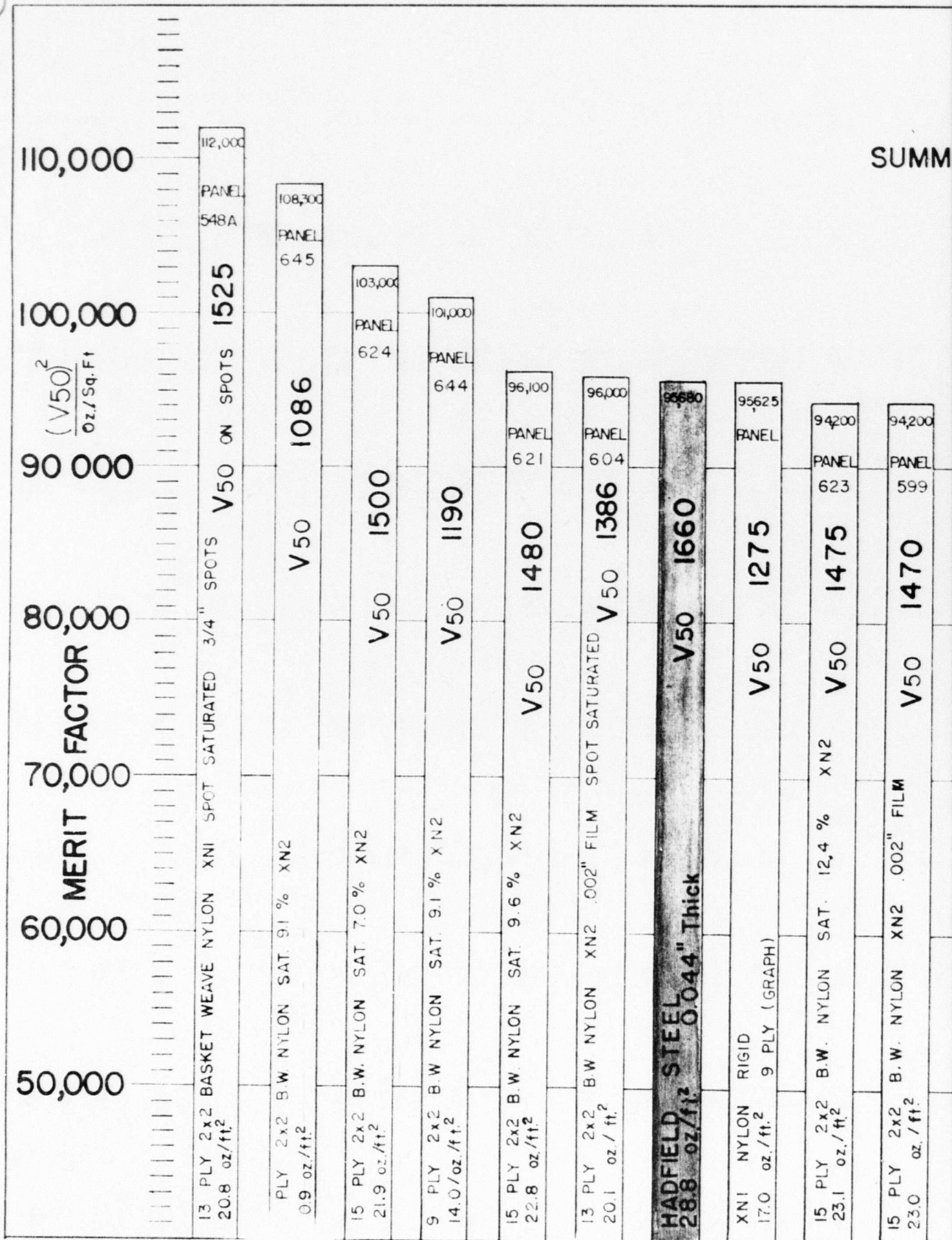
1. At the request of the Contracting Officer, fifty (50) 12" x 15" and six (6) 6" x 6" transparent panels weighing approximately 50.4 ounces per square foot were delivered to the points designated by the Contracting Officer.

E. "Monthly progress reports shall be submitted and such interim technical reports as may be required by the Contracting Officer. Contractor shall furnish a complete final report covering the study and results accomplished hereunder."

1. Ten (10) monthly progress reports and this interim report have been furnished in accordance with the above.

(1)

SUMM



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TABLE I

SUMMARY OF MERIT FACTORS OF VARIOUS LIGHT ARM COMBINATIONS DEVELOPED UNDER CONTRACT NO. W-19-020-ORD-6511

RAD NO. ORDTS 9-10632
O.O. PROJECT NO. TS5-500
WAL PROJECT NO. WAL 622

NYLON RIGID 17.0 oz./ft ² 9 PLY (GRAPH)	V50	1275	94200
15 PLY 2x2 B.W. NYLON SAT 12.4 % XN2 23.1 oz./ft ²	V50	1475	94200
15 PLY 2x2 B.W. NYLON XN2 002" FILM 23.0 oz./ft ²	V50	1470	93962
NYLON RIGID 002" SCOTCH WELD 15 PLY 23.0 oz./ft ² 340" THICK	V50	1470	93800
9 PLY UNSAT. 4x4 BW FORTISAN 27.3 oz./ft ² 9 PLY 2x2 B.W. NYLON 002" FILM SCOTCH WELD	V50 (APPROX.)	1138	92,700
9 PLY 2x2 B.W. NYLON XN2 002" FILM 14.1 oz./ft ²	V50	1617	92,791
4x4 B.W. FORTISAN QUILTED 28.3 oz./ft ²	V50	1460	90,800
15 PLY 2x2 B.W. NYLON XN3 002" FILM 23.5 oz./ft ²	V50 (APPROX.)	1365	89,500
13 PLY 2x2 B.W. NYLON XN1 SPOT SAT 3/4" SPOTS 20.8 oz./ft ²	V50	1593	88,728
16 PLY 2x2 B.W. NYLON SAT 20-22% FIN 30.0 oz./ft ²	V50	1476	87,600
NYLON RIGID - 004" SCOTCH WELD 24.8 oz./ft ²	V50	1551	87,315
2x1 W. FORTISAN QUILTED 27.8 oz./ft ²	V50	1328	87,306
4x4 B.W. NYLON QUILTED 30.0 oz./ft ²	V50	1406	86,000
15 PLY 4x4 B.W. FORTISAN SAT 79.9% XN1 30.0 oz./ft ²	V50	1406	85,000

3
 IS LIGHT ARMOR
 UNDER
 D-6511
 TS 9-10632
 NO. TS5-5008
 NO. WAL 6.22 H

2x1 B.W. FORTISAN QUILTED 27 P oz / ft ²	V50 1551	PANEL 531	87,315
2x2 B.W. NYLON QUILTED 30.4 oz / ft ²	V50 1328	PANEL 538	87,306
15 PLY 4x4 B.W. FORTISAN SAT. 798% XN1 23.5 oz / ft ²	V50 1425	PANEL 553	86,500
2x2 B.W. NYLON QUILTED 30.4 oz / ft ²	V50 1617	PANEL 537	86,009
15 PLY 2x2 B.W. NYLON SAT. 117% XN2 24.2 oz / ft ²	V50 1438	PANEL 609	85,600
2x2 B.W. NYLON LOOSE 21.7 oz / ft ²	V50 1357	PANEL 325	84,859
2x2 B.W. NYLON QUILTED 40.4 oz / ft ²	V50 1805	PANEL 539	80,644
15 PLY 2x2 B.W. NYLON 25.4 oz / ft ² SAT. 21.0% XN2	V50 1430	PANEL 620	80,500
FIBRE - GLASS LAMINATE 20.0 oz / ft ²	V50 1247	PANEL 77,750	77,750
22 PLY 2x2 B.W. ORLON UNSAT. 28.2 oz / ft ² QUILTED 1" SQUARES	V50 1475 (APPROX.)	PANEL 618	77,200
15 PLY 2x2 B.W. ORLON 19.8 oz / ft ² XN2 .002" FILM	V50 1176 (APPROX.)	PANEL 616	69,700
2x2 B.W. GLASS 28.0 oz / ft ² V5d	260	PANEL	56,700

4

40 4	02								
15 PLY 2x2 B.W. NYLON 25.4 oz/ft ² SAT 21.0% XN2	V 50	1430		PANEL 620	80,500				
FIBRE - GLASS LAMINATE 20.0 oz/ft ²	V 50	1247		PANEL	77,750				
22 PLY 2x2 B.W. ORLON UNSAT. 28.2 oz/ft ² QUILTED 1" SQUARES	V 50	1475 (APPROX.)		PANEL 618	77,200				
15 PLY 2x2 B.W. ORLON 19.8 oz/ft ² XN2 .002" FILM	V 50	1176 (APPROX.)		PANEL 616	69,700				
22 B.W. GLASS 28.0 oz/ft ² Vsd		1260		PANEL 31	56,700				

VICTORY PLASTICS CO.
HUDSON, MASS.
SEPTEMBER 1949

IV LAMINATING AND PROCESSING TECHNIQUES:

A. Because work on a previous contract consisted primarily of evaluating various resins, work on this contract was confined more or less to the complete evaluation of the more promising resins and the evaluation of other fabrics than Nylon. Consequently, comparative tests were conducted on quilted Nylon, Glass, Fortisan, and Orlon as a start. A fairly complete evaluation of the 2x2 basket weave Fortisan fabric using various resins was conducted. These included methyl methacrylates, Nylon solutions, polyesters, polyvinyl butyral, cellulose acetate butyrate, and the newly developed "Scotch-Weld" film and its liquid counterpart which are a copolymer of phenol-formaldehyde and polyvinyl butyral.

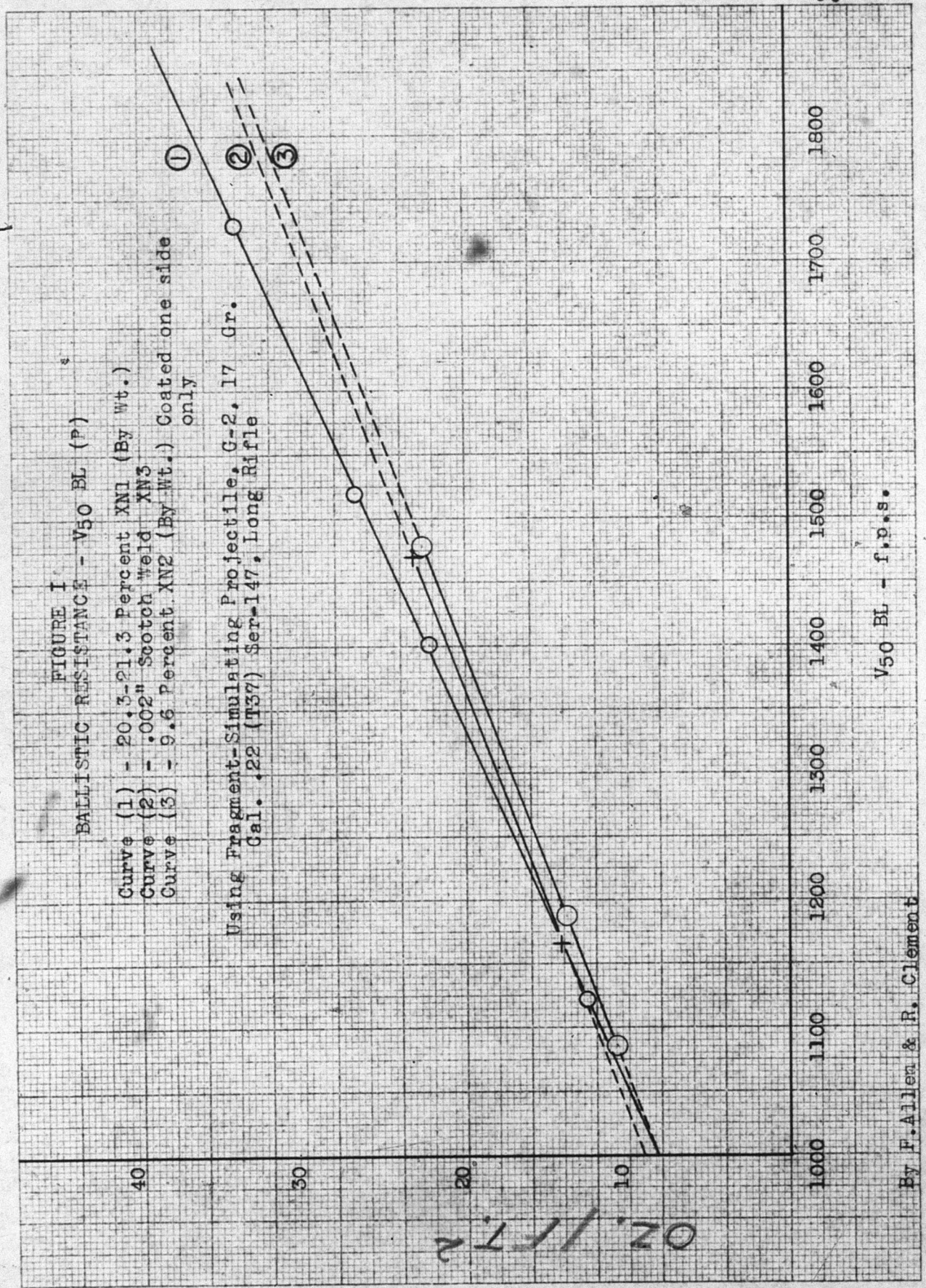
B. Under the previous contract the best resin found and/or developed was a 50 percent monomeric-50 percent polymeric methyl methacrylate solution. This is designated as XN1 resin in this and all previous progress reports. It was found that approximately 20 percent of the XN1 by weight on 15 ounces per square yard Nylon gave the best results, and the resin cost is \$0.3241 per square yard (see Figure 1 Page 9 for ballistic data). During a pilot run on a commercial saturator it was found that it required 16 man hours to saturate (three passes) one hundred (100) yards of 2x2 basket weave Nylon with approximately 20 percent XN1 resin.

C. During the interim we were asked by Watertown Arsenal Laboratory, who have technical supervision over this contract, to investigate a material manufactured by Minnesota Mining and Mfg. Co.,

called Scotch-Weld bonding film No. 580. This is a thermo-setting material consisting of a copolymer of phenol-formaldehyde and polyvinyl butyral, and is manufactured in 0.004" and 0.002" thickness. These materials are designated as 0.002" XN3 and 0.004" XN3. For comparative ballistic data see Figure I Page 9. We have not considered this material any further in this program as its costs are prohibitive for use in end use items, namely, a square yard of 0.002" film costs \$0.90. However, we do have a quantity of the 0.002" Scotch-Weld film on hand that we use as a standard in the preliminary evaluation of fabrics.

D. Because the Scotch-Weld material was ruled out due to cost and is only kept on hand for comparative evaluations, search was started for a liquid material of similar composition that could be easily applied and still be reasonable in cost.

It was found that Bakelite Corporation had such a resin (BJ 16320 Victory Plastics XN2) which was a copolymer of 50 percent phenol-formaldehyde and 50 percent polyvinyl butyral. It is a solution of 35 percent solids in alcohol and toluene, and is an ideal material for knife coating. The best materials to date have resulted when 8 percent to 10 percent by weight XN2 were knife coated on one side only and laminated under 200 lbs per square inch pressure for 12 to 15 minutes (see Table I in Summary and Figure I Page 9). The resin cost is approximately \$0.165 per square yard and only three and one half (3½) man hours of labor are required to knife coat 100 yards.



V50 BL - f.p.s.

By F. Allen & R. Clement

02.172

Considerable work was done on "spot-laminating" XN2 resin in order to obtain a flexible material that still retained the ballistic properties of the rigid laminates.

V TESTS:

A. Ballistic Tests.

1. The more promising resins and fabric combinations were subjected to the V₅₀ ballistic limit tests using standard G-2 fragment-simulating cal. .22 steel projectiles and the resultant merit factors calculated, recorded and graphically represented in Table I of the Summary.

2. The results when plotted on weight in ounces per square foot versus V₅₀ ballistic limit are linear for the same resin contents, as shown in Figure I Page 9.

3. A panel consisting of 2x2 basket weave Nylon weighing 10.9 ounces per square foot and having an XN2 resin content of 9.1 percent has the highest fragment resistance of any practicable light weight armor combination developed by this facility.

B. Ballistic Testing at Temperature Extremes.

At temperatures ranging from -50° to 125°F there has been very little or no change in the ballistic resistance.

C. Weathering Tests.

It has been found that the laminated panels show no serious warpage and delamination after one year's exposure to atmospheric weathering.

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D. Salt Spray.

After one hundred and sixty-eight (168) hours exposure to a salt spray the ballistic limit of panels laminated with 9.1 percent XN2 material showed a reduction in ballistic limits of approximately seven (7) percent with a water pick-up based on the dry weight of twenty one (21) percent.

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APPENDIX A

DETAILED TABULATION OF RESULTS

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PANEL DATA

PANEL NO. 541

TEST DATE 11/24/48

SATURATING DATA

TYPE OF CLOTH 4x4 BW Nylon WEIGHT OF CLOTH 12.78 OZ/SQ YD

REMARKS 2 Blocks of 7 ply stitched in 1" squares separately
Then 2 blocks of 7 ply stitched together on button stitcher in 2"
squares.

LAMINATING DATA

PLIES 14 PANEL SIZE 8x8 INCHES

AVERAGE THICKNESS _____ AVERAGE WEIGHT 19.8 OZ/SQ FT

BONDING PRESSURE 51.4 p.s.i.

REMARKS Heated for 10 Minutes at 300°F.

FIRING DATA

FD NO. STRIKING VELOCITY RESULT

4414	1297	PP
4415	Dud	PP Hit Aluminum
4416	1345	PP
4417	1348	PP

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PANEL DATA

PANEL NO. 543

TEST DATE 12/20/48

SATURATING DATA

TYPE OF CLOTH 2x2 BW Nylon WEIGHT OF CLOTH 13.0 OZ/SQ YD
TYPE OF SATURANT XN-1 RESIN CONTENT 6 % BY WT
SATURANT FORMULA 66 Percent MEK
17 Percent Monomer - 17 Percent
Polymer

REMARKS Spot Saturated - one side only

LAMINATING DATA

FLIES 13 PANEL SIZE 12x15 INCHES
MOLDING PRESSURE 120 p.s.i.
CYCLE 15 Minutes Steam
10 Minutes Water

REMARKS Flexible panel - edge of panel bound with OD cloth
tape. (Large Gov. press used 3-6)

FIRING DATA

<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
4419	1347	PP
4420	1335	PP
4421	1432	CP
4422	1390	CP
4423	1409	CP
4424	1316	PP
4425	1385	CP
4426	1320	PP
4427	1480	CP
4428	1272	PP
4429	1413	CP
4430	1413	CP
4431	1373	CP
4432	1364	CP
4433	1341	PP
4434	1049	PP
4435	1341	CP
4436	1352	CP
4437	1349	CP
4438	1360	PP

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PANEL DATA

PANEL NO. 544

TEST DATE: 1/3/49

SATURATING DATA

TYPE OF CLOTH 2x2 BW Nylon WEIGHT OF CLOTH 13 OZ/SQ YD
TYPE OF SATURANT XN-1 RESIN CONTENT 15 % BY WT
SATURANT FORMULA 66 Percent MEK
17 Percent Monomer - 17 Percent
Polymer

LAMINATING DATA

PLIES 15 PANEL SIZE 6x6 INCHES
AVERAGE THICKNESS 0.395" AVERAGE WEIGHT 25.0 OZ/SQ FT
MOLDING PRESSURE 110 p.s.i. STEAM PRESSURE 80 LBS
CYCLE 10 Minutes
Steam - 5 Minutes Water

FIRING DATA

<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
4439	1850	CP
4440	1428	PP
4441	1648	CP
4442	1658	CP

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PANEL DATA

PANEL NO. 545

TEST DATE 1/5/49

TYPE OF CLOTH: U.S. Army Body Armor Hatfield Steel M-5 Flyer's Apron

LAMINATING DATA

AVERAGE WEIGHT: 70.02/SQ. FT

FIRING DATA

RD. NO. STRIKING VELOCITY RESULT

4443	1662	PP
4444	1662	PP
4445	1840	PP
4446	1954	PP
4447	2130	PP
4448	Dud	PP
4449	2230	CP
4450	Dud	PP
4451	"	PP
4452	"	PP
4453	"	PP
4454	2215	PP

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PANEL DATA

PANEL NO. 546

TEST DATE 1/5/49

SATURATING DATA

TYPE OF SATURANT XN1 RESIN CONTENT 32 % BY WT

REMARKS 7 Ply Crash Helmet

LAMINATING DATA

PLIES 7

FIRING DATA

FD NO. STRIKING VELOCITY RESULT

4455	929	PP (Surface Flaking Resin)
4456	1188	CP
4457	1074	PP (Helmet Pushed In)
4458	1038	PP
4459	1036	PP
4460	1150	PP
4461	1172	CP

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PANEL DATA

PANEL NO. 547

TEST DATE 1/6/49

SATURATING DATA

TYPE OF CLOTH 2x2 BW Nylon WEIGHT OF CLOTH 13 OZ/SQ YD
TYPE OF SATURANT KN-1 RESIN CONTENT 20.0 % BY WT
SATURANT FORMULA 66 Percent MEK
17 Percent Monomer - 17 Percent
Polymer

LAMINATING DATA

PLIES 37 PANEL SIZE 6x6 INCHES
AVERAGE THICKNESS 0.858" AVERAGE WEIGHT 68.9 OZ/SQ FT

FIRING DATA

<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
4462	2085	PP
4463	2253	PP
4464	Dud	PP
4465	Dud	PP

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PANEL DATA

PANEL NO. 548

TEST DATE 1/10/49

SATURATING DATA

TYPE OF CLOTH 2x2 R^w Nylon WEIGHT OF CLOTH 13 OZ/SQ YD

TYPE OF SATURANT XN-1

SATURANT FORMULA 66 Percent WFK
17 Percent Monomer - 17 Percent
Polymer

REMARKS Soot saturated with 3/4" spots

LAMINATING DATA

PLIES 13 PANEL SIZE 12x17 INCHES

MOULDING PRESSURE 110 p.s.i. AVERAGE WEIGHT 20.8 OZ/SQ FT

STEAM PRESSURE 80 LBS

SPRING DATA

PANEL A

PANEL B

Shoot on the Spots

M.F. 112,000

V₅₀ 1525

RD NO.	STRIKING VELOCITY	RESULT	RD NO.	STRIKING VELOCITY	RESULT
4466	Dud	PP	4483	1325	PP
4467	Dud	PP	4484	1530	CP
4468	1397	PP	4485	1530	CP
4469	1454	CP	4486	1493	PP
4470	1450	PP	4487	1544	PP
4471	1389	PP	4488	1554	CP
4472	1468	PP	4489	1573	CP
4473	1556	CP	4490	1522	CP
4474	Dud	CP	4491	Dud	PP
4475	1498	PP	4492	1489	PP
4476	1493	PP	4493	Dud	CP
4477	1563	PP	4494	1573	CP
4479	HL Peters 1356	PP	4495	1517	CP
4479	" 1283	PP	4496	1530	CP
4480	1434	PP	4497	1522	CP
4481	1552	CP			
4482	1451				

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PANEL DATA

PANEL NO. 548 Continued

TEST DATE 1/11/49

FIRING DATA

<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
4498	1563	CP
4499	1549	PP
4500	1558	CP
4501	1554	CP
4502	1349	PP
4503	1513	PP
4504	1522	PP
4505	1522	PP
4506	1484	CP
4507	1525	PP
4508	1484	PP
4509	1495	PP
4510	1453	CP
4511	1471	CP
4512	1473	CP

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RESTRICTED

PANEL DATA

PANEL NO. 548
Continued

TEST DATE 1/11/49

FIRING DATA

Shooting between the Spots

PANEL C

M.F. 89,500

PANEL D

V₂₀ 1365

<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>	<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
4513	1575	CP	4521	Dud	CP
4514	1434	CP	4522	Dud	CP
4515	1327	PP	4523	1276	PP
4516	1318	PP	4524	1360	PP
4517	Dud	PP	4525	1392	PP
4518	1304	CP	4526	1378	PP
4519	1356	CP	4527	1373	PP
4520	1992	CP	4528	1405	CP
			4529	1405	CP
			4530	1428	CP
			4531	1482	CP
			4532	1392	CP
			4533	1421	CP
			4534	1397	CP
			4535	1405	CP
			4536	1380	PP
			4537	1356	PP
			4538	1349	PP
			4539	1378	CP
			4540	1356	CP
			4541	1425	CP

Between Spots

PANEL E

RD NO. STRIKING VELOCITY RESULT

4542	1370	CP
4543	1428	CP
4544	1416	CP
4545	1342	PP
4546	1345	PP
4547	1370	CP
4548	1315	PP
4549	1334	PP
4550	1405	CP
4551	1351	CP
4552	1356	CP
4553	1405	CP
4554	1345	PP
4555	1349	PP
4556	1315	PP

RESTRICTED

RESTRICTED

PANEL DATA

PANEL NO. 549

TEST DATE 1/11/49

SATURATING DATA

TYPE OF CLOTH 2x2 BW Nylon WEIGHT OF CLOTH 13 OZ/SQ YD
TYPE OF SATURANT XN-1 RESIN CONTENT 20-22 % BY WT
SATURANT FORMULA 36 Percent MEK
17 Percent Monomer - 17 Percent
Polymer

LAMINATING DATA

PLIES 16 PANEL SIZE 12x15 INCHES
AVERAGE WEIGHT 28.6 OZ/SQ FT
CYCLE 20 Minutes Steam
10 Minutes Water

REMARKS Laminated on 715 ton press (8-6) Low pressure
used 250# line pressure.

FIRING DATA

PANEL A M.F. 88,700 PANEL B V60 1593

<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>	<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
4557	1713	CP	4577	1844	CP
4558	1635	PP	4578	1639	CP
4559	1370	PP	4579	1597	CP
4560	1588	PP	4580	1650	CP
4561	1500	PP	4581	1618	CP
4562	1678	CP	4582	1592	CP
4563	1662	PP	4583	1592	CP
4564	1713	CP	4584	1426	PP
4565	1695	CP	4585	1563	PP
4566	1662	CP	4586	1503	PP
4567	1602	PP	4587	1497	PP
4568	1630	PP	4588	1587	PP
4569	1544	PP	4589	1493	PP
4570	1650	PP	4590	1683	CP
4571	1634	PP	4591	1650	CP
4572	1623	PP	4592	1567	CP
4573	1593	PP	4593	1592	CP
4574	1685	CP	4594	1613	CP
4575	1515	PP	4595	1623	CP
4576	1719	CP	4596	1650	CP

RESTRICTED

RESTRICTED

PANEL DATA

PANEL NO. 549 Continued

TEST DATE 1/11/49

LAMINATING DATA

AVERAGE WEIGHT 29.8 OZ/SQ FT

FIRING DATA

SAME AS 549A

PANEL D

PANEL C

<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>	<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
4617	1818	CP	4597	1640	CP
4618	1662	CP	4598	1779	CP
4619	1713	CP	4599	1582	CP
4620	1608	PP	4600	1655	CP
4621	1644	CP	4601	1572	CP
4622	1592	PP	4602	1544	PP
4623	1634	PP	4603	1520	PP
4624	1678	CP	4604	1352	PP
4625	1529	CP	4605	1552	CP
4626	1644	PP	4606	1572	PP
4627	1650	CP	4607	1544	CP
4628	1684	CP	4608	1442	PP
4629	1638	PP	4609	1572	PP
4630	1684	CP	4610	1598	CP
4631	1645	CP	4611	1500	PP
4632	1639	CP	4612	1563	PP
4633	1623	PP	4613	1578	CP
4634	1650	CP	4614	1519	PP
4635	1630	PP	4615	1617	CP
4636	1639	CP	4616	1563	CP

RESTRICTED

UNCLASSIFIED

PANEL DATA

PANEL NO. 550

TEST DATE 1/11/49

SATURATING DATA

TYPE OF CLOTH 2x2 BW Nylon WEIGHT OF CLOTH 13 OZ/SQ YD

TYPE OF SATURANT XN-1 RESIN CONTENT 21.8 % BY WT

SATURANT FORMULA 66 Percent MEK
17 Percent Monomer - 17 Percent
Polymer

LAMINATING DATA

PLIES 6 PANEL SIZE 6x6 INCHES

REMARKS 3 Two ply sections - two ply sections made by
interweaving 8" x 3/4" strips into a basket weave.

FIRING DATA

<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
4637	930	PP
4638	1072	CP
4639	1072	CP
4640	1079	CP

RESTRICTED

PANEL NO. 551

TEST DATE 1/18/49

SATURATING DATA

TYPE OF CLOTH 4x4 BW Fortisan WEIGHT OF CLOTH 12.78 OZ/SQ YD
 TYPE OF SATURANT XN-1 RESIN CONTENT 19.6 % BY WT
 SATURANT FORMULA 66 Percent MEK
17 Percent Monomer - 17 Percent
Polymer

LAMINATING DATA

PLIES 7 PANEL SIZE 6x6 INCHES
 AVERAGE THICKNESS 0.136" AVERAGE WEIGHT 12.1 OZ/SQ FT
 HOLDING PRESSURE 120#/in² STEAM PRESSURE 100 LBS
 CYCLE 5 Minutes
Soak - 3 Minutes Water

PIRING DATA

<u>ID NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
4641	1086	CP
4642	1007	CP
4643	996	CP
4644	923	CP
4645	748	FP
4646	668	PP
4647	786	PP

RESTRICTED

PANEL DATA

PANEL NO. 552

TEST DATE: 1/19/49

SATURATING DATA

TYPE OF CLOTH 4x4 BW Fortisan WEIGHT OF CLOTH 12.78 OZ/SQ YD
TYPE OF SATURANT KN-1 RESIN CONTENT 11.26 % BY WT
SATURANT FORMULA 66 Percent MEK ROLL SETTING 0.038 INCHES
17 Percent Monomer - 17 Percent
Polymer AIR DRIED

LAMINATING DATA

PLIES 7 PANEL SIZE 6x6 INCHES
AVERAGE THICKNESS: 0.136" AVERAGE WEIGHT 11.0 OZ/SQ FT
MOLDING PRESSURE 78.6#/in² STEAM PRESSURE 60 LBS
CYCLE 5 Minutes
Steam - 5 Minutes Water

FIRING DATA

RD NO. STRIKING VELOCITY RESULT

4648	921	PP
4649	1000	PP
4650	937	PP
4651	952	PP

RESTRICTED

PANEL DATA

PANEL NO. 553

TEST DATE 1/24/49

SATURATING DATA

TYPE OF CLOTH 4x4 BW Fortisan WEIGHT OF CLOTH 13 oz/sq yd
TYPE OF SATURANT XN-1 RESIN CONTENT 7.98 % BY WT
SATURANT FORMULA 66 Percent MEK ROLL SETTING 0.054 INCHES
17 Percent Monomer - 17 Percent
Polymer

LAMINATING DATA

PIEPS 15 PANEL SIZE 12x15 INCHES
AVERAGE THICKNESS 0.293" AVERAGE WEIGHT 23.5 oz/sq ft
MOLDING PRESSURE 75 p.s.i. STEAM PRESSURE 70 LBS
CYCLE 8 Minutes
Steam - 8 Minutes Water

FIRING DATA

<u>ID NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
4652	1417	CP
4653	1467	CP
4654	1417	CP
4655	1247	PP Delaminated
4656	1079	PP
4657	1327	PP Delaminated
4658	1464	CP
4659	1410	PP Delaminated
4660	1433	CP
4661	1443	CP
4662	1203	PP
4663	1303	PP
4664	1433	CP Barely

RESTRICTED

RESTRICTED

PANEL DATA

PANEL NO. 555

TEST DATE 1/26/49

SATURATING DATA

TYPE OF CLOTH 4x4 B Fortisan WEIGHT OF CLOTH 13 OZ/SQ YD
TYPE OF SATURANT PPG Nylon RESIN CONTENT 21.0 % BY WT

LAMINATING DATA

PLIES 15 PANEL SIZE 12x15 INCHES
AVERAGE THICKNESS 0.270" AVERAGE WEIGHT 27.1 OZ/SQ FT

FIRING DATA

RD NO. STRIKING VELOCITY RESULT

4666	1425	CP
4667	1323	CP
4668	1295	CP
4669	1253	CP
4670	1235	CP
4671	1123	CP
4672	1373	CP
4673	964	PP
4674	980	PP

RESTRICTED

GENERAL

PANEL DATA

PANEL NO. 556

TESTDATE 1/25/49

SATURATING DATA

TYPE OF CLOTH 2x2 BW Nylon WEIGHT OF CLOTH 13.0 OZ/SQ YD

TYPE OF SATURANT IP8 Nylon

REMARKS: Spot saturated 1/2" spots - spots 1" apart

LAMINATING DATA

PLIES 13 PANEL SIZE 12x15 INCHES

FIRING DATA

Sample pulled out of
frame. Test not
valid

RD NO. STRIKING VELOCITY RESULT

4675	1578	CP	Between Spots
4676	1587	CP	Ditto
4677	1475	PP	Hit Spots
4678	1408	PP	Ditto

RESTRICTED

PANEL DATA

PANEL NO. 557

TEST DATE 2/1/49

SATURATING DATA

TYPE OF CLOTH 4x4 BW Fortisan WEIGHT OF CLOTH 13.0 OZ/SQ YD
TYPE OF SATURANT XN1 RESIN CONTENT 15.9 % BY T
SATURANT FORMULA 66 Percent MEK
17 Percent Monomer - 17 Percent
Polymer

LAMINATING DATA

PLIES 15 PANEL SIZE 6x6 INCHES
AVERAGE THICKNESS 0.273" AVERAGE WEIGHT 25.2 OZ/SQ FT
MOLDING PRESSURE 110 p.s.i. STAMP PRESSURE 80 LBS
CYCLE 10 Minutes
Steam - 5 Minutes Water

FIRING DATA

FD NO. STRIKING VELOCITY RESULT

4679	1470	GP
4680	1417	CP
4681	1406	GP
4682	1195	PP

} Delamination

RESTRICTED

PANEL DATA

PANEL NO. 558

TEST DATE 2/1/45

SATURATING DATA

TYPE OF CLOTH 4x4 BW Fortisan WEIGHT OF CLOTH 13.0 OZ/100 YD
TYPE OF SATURANT KMI RESIN CONTENT 24.1 % BY W
SATURANT FORMULA 68 Percent MEK
17 Percent Monomer - 17 Percent
Polymer

LAMINATING DATA

PLIES 15 PANEL SIZE 6x6 INCHES
AVERAGE THICKNESS 0.306" AVERAGE WEIGHT 28.6 OZ/100 SQ FT
MOLDING PRESSURE 110 p.s.i. STEAM PRESSURE 30 LBS
CYCLE 10 Minutes
Steam - 5 Minutes later

FIRING DATA

RD NO. STRIKING VELOCITY RESULT RD NO. STRIKING VELOCITY RESULT

4683 1183 PP
4684 1321 CP
4685 1221 PP
4686 1332 CP
4687 1200 PP
4688 959 PP

NO DELAMINATION

PANEL DATA

PANEL NO. 559

TEST DATE 2/1/49

SATURATING DATA

TYPE OF CLOTH 2x2 BK Nylon WEIGHT OF CLOTH 18 OZ/SQ YD
TYPE OF SATURANT XN-1 RESIN CONTENT 21.8 % BY WT
SATURANT FORMULA 66 Percent MEK
17 Percent Monomer - 17 Percent
Polymer

LAMINATING DATA

PLIES 7 PANEL SIZE 6x6 INCHES
AVERAGE THICKNESS 0.160" AVERAGE WEIGHT 8 OZ/SQ FT
HOLDING PRESSURE 110 p.s.i. STEAM PRESSURE 80 LBS
CYCLE 10 Minutes
Steam - 5 Minutes Water

FIRING DATA

RD NO. STRIKING VELOCITY RESULT

4689	1520	CP
4690	895	PP
4691	1200	CP
4692	1046	PP
4693	1200	CP
4694	1165	CP
4695	1146	CP
4696	1110	PP
4697	1133	PP
4698	1160	CP
4699	1152	PP

RESTRICTED

PANEL DATA

PANEL NO. 560

TEST DATE 2/3/49

SATURATING DATA

TYPE OF CLOTH	<u>4x4 54 Fortisan</u>	WEIGHT OF CLOTH	<u>13.0 OZ/SQ YD</u>
TYPE OF SATURANT	<u>FM 1000 Nylon</u>	RESIN CONTENT	<u>11.6 % BY WT</u>
SATURANT FORMULA	<u>10 Percent FM 1000 Nylon - 74 Percent Ethyl Alcohol 16 Percent Water</u>	ROLL SETTING	<u>0.023 INCHES</u>

EXAMINATING DATA

PLIES	<u>15</u>	PANEL SIZE	<u>6x6</u> INCHES
AVERAGE THICKNESS	<u>0.030"</u>	AVERAGE WEIGHT	<u>24.6</u> OZ/SQ FT
MOLDING PRESSURE	<u>110 p.s.i.</u>	STEAM PRESSURE	<u>70</u> LBS
CYCLE	<u>10 Minutes</u>		
	<u>Steam and 5 Minutes Water</u>		
REMARKS	<u>Forms a very poor bond</u>		

FIRING DATA

<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
4700	1181	PP
4701	1485	CP

PANEL DATA

PANEL NO. 561

TEST DATE 12/27/49

SATURATING DATA

TYPE OF CLOTH 4x4 BL Fortisan WEIGHT OF CLOTH 23.0 OZ/SQ YD
TYPE OF SATURANT Fuzon-0 RESIN CONTENT 31.5 % BY WT
SATURANT FORMULA 91 Percent Fuzon-0 ROLL GROUNDING 0.024 INCHES
9 Percent Xylol

REMARKS Dried in oven at 280°F for five minutes.

LAMINATING DATA

PLIES 16 PANEL SIZE 6x8 INCHES
AVERAGE THICKNESS 0.839" AVERAGE WEIGHT 33.5 OZ/SQ FT
MOLDING PRESSURE 110 p.s.i. STEAM PRESSURE 150 LBS
CYCLE 10 Minutes
Steam - 5 Minutes "ster"

FIRING DATA

<u>RD NO.</u>	<u>SPRINKLING VELOCITY</u>	<u>RESULT</u>
4702	1310	FP
4703	1275	FP
4704	1315	FP
4705	1465	CP
4706	625	FP
4707	1340	CP

RESTRICTED

EXHIBIT

RAWH NO. 583

TEST DATE 1/14/49

SATURATING DATA

TYPE OF CLOTH 2x2 BW Nylon WEIGHT OF CLOTH 13.15/31 YD

REMARKS: Scotch weld bonding film 0.004"

FINISHING DATA

PIECE 15 Nylon - 14 PANEL SIZE 6x6 INCHES
Scotch weld

AVERAGE WEIGHT 24.9 OZ/33 FT

CYCLE 15 Minutes Steam DRYING TEMPERATURE 150 FTS

REMARKS: Panel placed in hot press

SPINNING DATA

V50 - 1476

RD NO. SPINNING VELOCITY YARDIT

4713	1551	CP
4714	1348	PP
4715	1431	PP
4716	1465	CP
4717	1400	—
4718	1445	CP

TABLE NO. ASH Conditions

DATE 2/21/42

EXTRINSIC DATA

TYPE OF CLOTH 2x2 B Nylon WEIGHT OF CLOTH 18.0 oz/sq yd
 TYPE OF STRIPPER 2,000 Scotch POINT POINT 10.2 BY WT
fold

REMARKS 14 Piles of Scotch fold used to bond 15 Piles of
2x2 B Nylon

LAMINATING DATA

PLIES 15 SIZE 12x15 INCHES
 AVERAGE THICKNESS 0.331 AVERAGE WEIGHT 24.8 oz/sq ft
 DYEING PRESSURE 110 p.s.i. STEAM PRESSURE 150 LBS
 CYCLE 15 minutes
Steam

PIERCING DATA

V50 = 1476

<u>ID NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>	<u>MEAN</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
4833	1525	OP	4854	1437	PP
4834	1520	OP	4854	1445	PP
4835	1350	PP	4855	1539	OP
4836	1336	PP	4856	1497	OP
4837	1427	PP	4857	1515	OP
4838	1408	PP	4858	1482	PP
4839	1577	PP	4859	1482	OP
4840	1569	PP	4860	1520	OP
4841	1515	OP	4861	1500	OP
4842	1470	PP	4862	1470	PP
4843	1500	OP	4863	1451	PP
4844	1500	OP	4864	1427	PP
4845	1450	PP	4865	1500	OP
4846	1375	PP	4866	1491	PP
4847	1420	PP	4867	1450	PP
4848	1500	OP	4868	1480	OP
4849	1428	PP	4869	1530	OP
4850	1454	PP	4870	1465	PP
4851	1437	PP	4871	1470	PP
4852	1445	OP	4872	1437	PP

FIRING DATA

V50 = 1476

RD NO. STRIKING VELOCITY RESULT

4873	1229	PP
4874	1352	PP
4875	1455	PP
4876	1412	PP
4877	1510	CP
4878	1642	CP
4879	1491	CP
4880	1482	CP
4881	1480	PP
4882	1427	PP
4883	1491	CP
4884	1461	PP
4885	1520	CP
4886	1461	PP
4887	1482	CP
4888	1491	CP
4889	1361	PP
4890	1402	PP
4891	1470	CP
4892	1497	CP

PANEL NO. 565

TRIAL NO. 2719

PANEL DATA

SATURATING DATA

TYPE OF CLOTH	<u>4x4 BW Fortisan</u>	WEIGHT OF CLOTH	<u>13.0</u> OZ/SQ. YD.
TYPE OF SATURANT	<u>H235 Latex</u>	RESIN CONTENT	<u>11.9</u> % BY WT
SATURANT FORMULA	<u>75 Percent H₂O</u> <u>25 Percent H235</u> <u>Latex</u>	ROLL SETTING	<u>0.028</u> INCHES

LAMINATING DATA

PLIES	<u>15</u>	PANEL SIZE	<u>6x6</u> INCHES
AVERAGE THICKNESS	<u>0.305"</u>	AVERAGE WEIGHT	<u>26.4</u> OZ/SQ. FT.
MOLDING PRESSURE	<u>110 p.s.i.</u>	STEAM PRESSURE	<u>80</u> LBS.
CYCLE	<u>10 Minutes Steam</u> <u>5 Minutes Water</u>		

PIRING DATA

<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>	
4720	1480	CP	} DETERMINATION
4721	1376	CP	
4722	1196	PP	
4723	1358	CP	

RESTRICTED

PANEL DATA

PANEL NO. 563

TEST DATE 2/11/49

SATURATING DATA

TYPE OF CLOTH	<u>4x4 35 Fortisan</u>	WEIGHT OF CLOTH	<u>15.0</u> OZ/SQ YD
TYPE OF SATURANT	<u>Geon 3428</u>	RESIN CONTENT	<u>26.2</u> % BY WT
SATURANT FORMULA	<u>13 Percent Geon 61 Percent MEK - 26 Percent Cyclohex</u>	FOLI THICKNESS	<u>0.026</u> INCHES

LAMINATING DATA

PLIES	<u>15</u>	PANEL SIZE	<u>6x6</u> INCHES
AVERAGE THICKNESS	<u>0.290"</u>	AVERAGE WEIGHT	<u>29.8</u> OZ/SQ FT
MOLDING PRESSURE	<u>110 p.s.i.</u>	STEAM PRESSURE	<u>80</u> LBS
CYCLE	<u>20 Minutes Steam 5 Minutes Water</u>		

FIRING DATA

<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
4724	1402	CP
4725	1342	CP
4726	1200	CP
4727	1148	PP
4728	1218	CP
4729	1187	PP

RESTRICTED

PANEL DATA

PANEL NO. 567

TEST DATE 2/7/49

SATURATING DATA

TYPE OF CLOTH 4x4 SW Fortisan WEIGHT OF CLOTH 13 OZ/SQ YD
TYPE OF SATURANT XRS 75 RESIN CONTENT 23.6 % BY WT
SATURANT FORMULA 99.2 Percent XRS ROLL SETTING 0.026 INCHES
75 - 0.8 Percent Alperox C

LAMINATING DATA

PLIES 15 PANEL SIZE 6x6 INCHES
AVERAGE THICKNESS 0.278" AVERAGE WEIGHT 28.4 OZ/SQ FT
MOLDING PRESSURE 110 p.s.i. STEAM PRESSURE 80 LBS
CYCLE 10 Minutes
Steam - 6 minutes Water

FIRING DATA

<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
4730	1350	CP
4731	1218	PP
4732	1261	CP DELAMINATION
4733	1234	PP
4734	1279	PP

RESTRICTED

PANEL DATA

PANEL NO. 562

TEST DATE 2/7/49

SATURATING DATA

TYPE OF CLOTH 4x4 88 Fortisan WEIGHT OF CLOTH 13 OZ/SQ YD
TYPE OF SATURANT PVB RESIN CONTENT 14.9 % BY WT
SATURANT FORMULA 85 Percent Quakersol ROGL SETTING 0.024 INCHES
15 Percent PVB
REMARKS Dried in oven for 5 minutes

LAMINATING DATA

PLIES 15 PANEL SIZE 6x6 INCHES
AVERAGE THICKNESS 0.251" AVERAGE WEIGHT 24.8 OZ/SQ FT
MOLDING PRESSURE 110 p.s.i. STEAM PRESSURE 30 LBS
CYCLE 10 Minutes steam
5 Minutes water

PIRING DATA

<u>ID NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
4735	1230	CP
4736	1219	CP
4737	1162	CP
4738	1000	PP
4739	1140	CP

RESTRICTED

PANEL DATA

PANEL NO. 569

TEST DATE 2/7/40

SATURATING DATA

TYPE OF CLOTH 4x4 BW Fortisan WEIGHT OF CLOTH 12.78 OZ/SQ YD
TYPE OF SATURANT Penite II RESIN CONTENT 21.7 % BY WT
SATURANT FORMULA Obtained ready mixed ROLL THICKNESS 0.023 INCHES
REMARKS Dried in oven at 180°F for 5 minutes

LAMINATING DATA

PLIES 15 PANEL SIZE 6x6 INCHES
AVERAGE THICKNESS 0.275" AVERAGE WEIGHT 25.8 OZ/SQ FT
MOLDING PRESSURE 110 p.s.i. STEAM PRESSURE 80 LBS
CYCLE 10 Minutes steam
5 Minutes water

FIRING DATA

<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
4740	1241	CP
4741	1178	CP
4742	1252	CP

RESTRICTED

PANEL DATA

PANEL NO. 570

TEST DATE 2/1/49

SATURATING DATA

TYPE OF CLOTH 4x4 BF Fortisan WEIGHT OF CLOTH 12.78 OZ/SQ YD
REMARKS 3/16" Scotch Weld in 2" squares

LAMENATING DATA

PLIES 13 PANEL SIZE 6x6 INCHES
AVERAGE THICKNESS 0.240" AVERAGE WEIGHT 18.63 OZ/SQ FT
MOLDING PRESSURE 110 p.s.i. STAMP PRESSURE 140 LBS
CYCLE 8 Minutes Steam

FIRING DATA

RD NO. STRIKING VELOCITY RESULT

4743	1209	PP
4744	1326	CP
4745	1230	CP
4746	1188	PP
4747	1308	CP
4748	1315	PP

RESTRICTED

RESTRICTED

PANEL DATA

PANEL NO. 571

TEST DATE 2/7/49

SATURATING DATA

TYPE OF CLOTH 4x4 BW Fortisan WEIGHT OF CLOTH 12.78 OZ/SQ YD

TYPE OF SATURANT XN1

SATURANT FORMULA 66 Percent MEK
17 Percent Monomer - 17 Percent
Polymer

REMARKS Spot Saturated - applied to both sides of cloth
through 6x6 zinc plate with 25 3/4" holes.

LAMINATING DATA

PLIES 15 PANEL SIZE 6x6 INCHES

AVERAGE THICKNESS 0.321" AVERAGE WEIGHT 24.4 OZ/SQ FT

MOLDING PRESSURE 110 p.s.i. STEAM PRESSURE 80 LBS

CYCLE 10 Minutes
Steam - 5 Minutes water cooled

FIRING DATA

SE NO. STRIKING VELOCITY RESULT

4749	1309	PP	} DELAMINATION
4750	1382	PP	
4751	1400	PP	
4752	1418	PP	
4753	Dud	CP	

RESTRICTED

RESTRICTED

PANEL DATA

PANEL NO. 572

TEST DATE: 2/8/49

SATURATING DATA

TYPE OF CLOTH 4x4 BF Fortisan WEIGHT OF CLOTH 12.73 OZ/SG YD
TYPE OF SATURANT Fuzon-0 RESIN CONTENT 18.7 % By WT
SATURANT FORMULA 90.5 Percent Fuzon - 9.5 Percent Tylo1

REMARKS Spotted on one side only .. dried in oven at 280°F for five minutes.

LAMINATING DATA

PLIES 15 PANEL SIZE 6x6 INCHES
AVERAGE THICKNESS 0.310 AVERAGE WEIGHT 26.2 OUNCES/SG
CYCLE 10 Minutes STEAM PRESSURE 150 LBS
Steam - 5 Minutes Water

FIRING DATA

FD NO. STRIKING VELOCITY RESULT

<u>4754</u>	<u>1457</u>	<u>CP</u>
<u>4755</u>	<u>1332</u>	<u>CP</u>
<u>4756</u>	<u>1222</u>	<u>PP</u>
<u>4757</u>	<u>1261</u>	<u>PP</u>
<u>4758</u>	<u>1288</u>	<u>PP</u>

RESTRICTED

SAFETY DATA

PANEL NO. 573

DATE 1/10/58

SATURATING DATA

TYPE OF CLOTH 4x4 BK Nonwoven WEIGHT OF CLOTH 12.75 OZ/SQ YD

TYPE OF SATURANT Relaxing Solution

SATURANT FORMULA 65% Glycerol
15% PVB

REMARKS Spot saturated on one side only. Dried in vac.
at 100°F. for 5 minutes.

LAMINATING DATA

PAPER 18 PANEL SIZE 6x6 INCHES

AVERAGE THICKNESS .286" AVERAGE WEIGHT 22.5 OZ/SQ FT

MOLDING PRESSURE 110 p.s.i. STEAM PRESSURE 80 LBS

CYCLE 10 Minutes Steam
and 5 Minutes Water Cooled

FIRING DATA

RD NO. STRIKING VELOCITY RESULT

4750 1580 CP
4760 1280 CP
4781 1381 CP

PANEL DATA

PANEL NO. 574

TIME DATE 2/3/49

SATURATING DATA

TYPE OF CLOTH 4x4 E. Fortisan WEIGHT OF CLOTH 18.72 OZ./SQ YD

REMARKS 3/16" Strips of "VB" in 2 inch squares

LAMINATING DATA

PLIES 15 PANEL SIZE 6x6 INCHES

AVERAGE THICKNESS .235" AVERAGE WEIGHT 24.8 OZ./SQ FT

MOLDING PRESSURE 110 p.s.i. STEAM PRESSURE 80 LBS

CYCLE 10 MINUTES

Steam - 5 MINUTES after Cooled

WIRING DATA

RL NO. STRIKING VELOCITY RESULT

4762	1400	CP
4763	1343	CP
4764	1206	CP
4765	1273	CP

RESPECT D

PANEL DATA

PANEL NO. 575

DATE 10/2/49

SATURATING DATA

TYPE OF CLOTH 2x2 2 1/2 Nylon WEIGHT OF CLOTH 13.0
4x4 8" Fortisan 12.72 OZ./SQ. YD.
TYPE OF SATURANT XXI RESIN CONTENT 25.0 % BY WT
Nylon Saturated
with XXX

REMARKS 2/16" Strips of PVB on edges

LAMINATING DATA

PLIES 10 Ply Nylon PANEL SIZE 6x4 INCHES
10 Ply Fortisan
AVERAGE THICKNESS .035" AVERAGE WEIGHT 24.3 OZ./SQ. FT.
HOLDING PRESSURE 130 p.s.i. STEAM PRESSURE 60 LBS
CYCLE 10 Minutes Steam
5 Minutes Water

REMARKS Nylon front with 10 Plies of Fortisan in back
banded with PVB strips

FIFING DATA

<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
<u>4766</u>	<u>1391</u>	<u>PF</u>
<u>4767</u>	<u>1459</u>	<u>PF</u>
<u>4768</u>	<u>1465</u>	<u>CF</u>
<u>4769</u>	<u>1400</u>	<u>PF</u>
<u>4770</u>	<u>1463</u>	<u>CF</u>
<u>4771</u>	<u>1490</u>	<u>PF</u>

RESPECTED

PANEL DATA

PANEL NO. 576

TEST DATE 2/8/49

SATURATING DATA

TYPE OF CLOTH Same as 275 but Fortisan Front

FIFING DATA

<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
4772	1465	PP
4773	1465	PF
4774	1474	PP
4775	1567	CP
4776	1567	CP
4777	1550	CP

RESTRICTED

PANEL DATA

PANEL NO. 577

TEST DATE 2/8/49

SATURATING DATA

TYPE OF CLOTH 2x2 BW Nylon WEIGHT OF CLOTH _____ OZ/SQ YD
4x4 BW Fortisan

TYPE OF SATURANT AN1 RESIN CONTENT 21.8 % BY WT

REMARKS Fortisan Front 3/16" PVB On Edges 1/2" PVB Into
Face

LAMINATING DATA

PLIES 10 Plies Fortisan PANEL SIZE 6x6 INCHES
5 Plies Nylon

AVERAGE THICKNESS 0.318" AVERAGE WEIGHT 25 OZ/SQ FT

FIRING DATA

RD NO. STRIKING VELOCITY RESULT

4778	1406	CP
4779	1550	CP
4780	1325	PP
4781	1396	PP
4782	1560	CP
4783	1431	PP

RESTRICTED

PANEL DATA
SATURATING DATA

PANEL NO. 578

TEST DATE 2/9/49

TYPE OF CLOTH 4x4 EW Fortisan WEIGHT OF CLOTH 12.78 OZ/SQ YD

TYPE OF SATURANT .004" Scotch Weld

LAMINATING DATA

PLIES 15 Fortisan PANEL SIZE 6x6 INCHES
14 Scotch Weld

AVERAGE WEIGHT 24.2 OZ/SQ FT

AVERAGE THICKNESS .297"

STEAM PRESSURE 150 LBS

MOLDING PRESSURE 110 psi

CYCLE 15 Minutes Steam

FIRING DATA

RD NO. STRIKING VELOCITY RESULT

<u>4784</u>	<u>1308</u>	<u>CP</u>
<u>4785</u>	<u>1205</u>	<u>PP</u>
<u>4785</u>	<u>1299</u>	<u>CP</u>

RESTRICTED

RESTRICTED

PANEL NO. 579

PANEL DATA

TEST DATE 2/2/49

SATURATING DATA

TYPE OF CLOTH 2x2 BW Nylon WEIGHT OF CLOTH 13.0 OZ/SQ YD
4x4 BW Fortisan 12.78
TYPE OF SATURANT Nylon Saturated RESIN CONTENT 21.8 % BY WT
with KNL
SATURANT FORMULA 66% MEK - 17%
Monomer - 17% Polymer

LAMINATING DATA

PLIES 15 PANEL SIZE 6x6 INCHES
AVERAGE THICKNESS .285" AVERAGE WEIGHT 23.0 OZ/SQ FT
MOLDING PRESSURE 110 p.s.i. STEAM PRESSURE 120 LBS
CYCLE 14 Minutes
Steam - 5 Minutes Water

REMARKS 10 Plies Fortisan bonded with 1/2" strips Scotch
Weld on edges - Fortisan front.

FIRING DATA

<u>RD. NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
4787	1432	CP
4788	1416	FP
4789	1396	FP
4790	1420	FP
4791	1460	PP
4792	1440	PP

RESTRICTED

RESTRICTED

PANEL DATA

PANEL NO. 580

TEST DATE 2/9/49

SATURATING DATA

TYPE OF CLOTH 2x2 BW Nylon WEIGHT OF CLOTH 13.0 OZ/SQ YD
2x2 BW Glass Cloth
TYPE OF SATURANT Nylon Saturated RESIN CONTENT 21.8 % BY WT
With XN1
SATURANT FORMULA 66% NEK
17% Monomer - 17% Polymer

LAMINATING DATA

PLIES 15 PANEL SIZE 6x6 INCHES
AVERAGE THICKNESS .234" AVERAGE WEIGHT 23.1 OZ/SQ FT
MOLDING PRESSURE 110 p.s.i. STEAM PRESSURE 150 LBS
CYCLE 15 Minutes
Water
REMARKS Glass cloth bonded with $\frac{1}{4}$ " strips Scotch Weld

FIRING DATA

<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
4793	1350	CP
4794	1258	PP
4795	1274	CP

RESTRICTED

RESTRICTED

PANEL DATA

PANEL NO. 581

TEST DATE: 2/9/49

SATURATING DATA

TYPE OF CLOTH 4x4 BW Fortisan
2x2 BW Glass Cloth

WEIGHT OF CLOTH 12.78 OZ/SQ YD

REMARKS: Fortisan and Glass Cloth Bonded Alternately with 1/4"
Strips of Scotch Weld.

LAMINATING DATA

PLIES 15

PANEL SIZE 3x6 INCHES

AVERAGE THICKNESS 0.225"

AVERAGE WEIGHT 21.9 OZ/SQ FT

MOLDING PRESSURE 110 p.s.i.

STEAM PRESSURE 150 LBS

CYCLE 15 Minutes

Steam

FIRING DATA

RD NO. STRIKING VELOCITY RESULT

4796	1359	CP
4797	1210	CP
4798	1127	PP
4799	1198	PP
4800	1208	PP

RESTRICTED

RESTRICTED

PANEL DATA

PANEL NO. 582
SAVE AS PANEL NO.
580 BUT WITH NYLON
FRONT

TEST DATE 2/2/49

FIRING DATA

<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
4801	1237	CP
4802	1179	PP
4803	1247	CP
4804	1177	PP
4805	1240	PP

RESTRICTED

RESTRICTED

PANEL DATA

PANEL NO. 583

TEST DATE 2/10/49

SATURATING DATA

TYPE OF CLOTH 2x2 Glass Cloth WEIGHT OF CLOTH 13.0 OZ/SQ YD
2x2 Nylon - 4x4 Fortisan 12.78

TYPE OF SATURANT Nylon Sat. with
21.8 Percent XN1

SATURANT FORMULA 66 Percent MEK
17 Percent Monomer - 17 Percent
Polymer

LAMINATING DATA

PLIES 5 Ply Nylon PANEL SIZE 6x6 INCHES
5 Ply Glass Cloth 5 Ply Fortisan
AVERAGE WEIGHT 23.3 OZ/SQ FT
AVERAGE THICKNESS 0.283" STEAM PRESSURE 150 LBS
MOLDING PRESSURE 110 p.s.i.
CYCLE 15 Minutes Steam
10 Minutes Water Cooled

REMARKS Unsaturated cloth bonded on edges with $\frac{1}{4}$ " strips
of Scotch Weld.

FIRING DATA

<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
4806	1342	PP
4807	1500	CP
4808	1320	CP
4809	1354	PP
4810	1295	PP
4811	1377	PP

RESTRICTED

RESTRICTED

PANEL DATA

PANEL NO. 584

TEST DATE 2/10/49

SATURATING DATA

TYPE OF CLOTH 2x2 BW Glass Cloth

TYPE OF SATURANT Scotch Weld

LAMINATING DATA

PLIES	<u>14 Scotch Weld</u>	PANEL SIZE	<u>6x6</u> INCHES
	<u>15 Glass Cloth</u>		OZ
AVERAGE THICKNESS	<u>0.198"</u>	AVERAGE WEIGHT	<u>24.8</u> OZ/SQ FT.
MOLDING PRESSURE	<u>110 p.s.i.</u>	STEAM PRESSURE	<u>150</u> LBS
CYCLE	<u>15 Minutes Steam</u>		

FIRING DATA

<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
4812	1331	CP
4813	1859	CP
4814	1180	CP
4815	1004	PP
4816	1165	CP

RESTRICTED

RESTRICTED

PANEL DATA

PANEL NO. 585

TEST DATE 2/10/49

SATURATING DATA

TYPE OF CLOTH 2x2 BW Fortisan WEIGHT OF CLOTH 12.78 OZ/SQ YD
TYPE OF SATURANT XN1 RESIN CONTENT 17.5 % BY WT
SATURANT FORMULA 66 Percent MEK
17 Percent Monomer 17 Percent
Polymer

LAMINATING DATA

PLIES 15 PANEL SIZE 6x6 INCHES
AVERAGE THICKNESS 0.208" AVERAGE WEIGHT 25.4 OZ/SQ FT
MOLDING PRESSURE 110 p.s.i. STEAM PRESSURE 80 LBS
CYCLE 10 Minutes
Steam - 5 Minutes Water

FIRING DATA

<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
4817	1424	CP
4818	1291	CP
4819	1157	PP
4820	1222	PP
4821	1289	PP
4822	1354	CP

RESTRICTED

RESTRICTED

PANEL DATA

PANEL NO. 586

TEST DATE 2/10/49

SATURATING DATA

TYPE OF CLOTH 4x4 and 2x2 WEIGHT OF CLOTH 12.78 OZ/SQ YD
BW Fortisan

RESIN CONTENT 17.5 % BY WT

TYPE OF SATURANT 2x2 Fortisan
Sat. 17.5 KN1

SATURANT FORMULA 66 Percent MEK
17 Percent Monomer 17 Percent
Polymer

LAMINATING DATA

PLIES 15 PANEL SIZE 6x6 INCHES

AVERAGE THICKNESS 0.286" AVERAGE WEIGHT 23.6 OZ/SQ FT

MOULDING PRESSURE 110 p.s.i. STEAM PRESSURE 150 LBS

CYCLE 15 Minutes
Steam - 5 Minutes Water

REMARKS 4x4 Fortisan Bonded with 1/4" Strips Scotch Weld
on Edges 1" Strips PVE at Interface

FIRING DATA

RD NO. STRIKING VELOCITY RESULT

4823	1392	CP
4824	1367	CP
4825	1217	PP
4826	1348	CP

RESTRICTED

RESTRICTED

PANEL DATA

PANEL NO. 587

TEST DATE 2/10/49

SATURATING DATA

TYPE OF CLOTH 2x2 BW Fortisan WEIGHT OF CLOTH 12.78 OZ/SQ YD
4x4 BW Nylon 13.0

TYPE OF SATURANT Nylon Sat. 21.8 RESIN CONTENT 21.8 % BY WT
Percent XN1

SATURANT FORMULA 66 Percent MEK
17 Percent Monomer 17 Percent
Polymer

LAMINATING DATA

PLIES 15

AVERAGE THICKNESS 0.325"

CYCLE 15 Minutes Steam
10 Minutes Water

REMARKS 10 Plies Fortisan Bonded at Edges with 1/4"
Strips Scotch Weld - Interface bonded with 1/4" Strips of P.V.B.

FIRING DATA

<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
4827	1232	PP
4828	1360	PP
4829	1408	CP
4830	1428	CP
4831	1355	CP
4832	1396	CP

RESTRICTED

RESTRICTED

PANEL NO. 588

PANEL DATA

TEST DATE 2/11/49

SATURATING DATA

TYPE OF CLOTH 2x2 BW Nylon WEIGHT OF CLOTH 13.0 OZ/SQ YD
4x4 BW Fortisan 12.78

TYPE OF SATURANT Scotch Weld

REMARKS Fortisan front - 5 Plies of Nylon Bonded Together
with 4 Plies of Scotch Weld - 10 Plies of Fortisan Bonded at Edges
with 3/16" Strips of Scotch Weld.

LAMINATING DATA

PLIES 15 PANEL SIZE 6x6 INCHES
AVERAGE THICKNESS 305" AVERAGE WEIGHT 22.6 OZ/SQ FT
MOLDING PRESSURE 110 p.s.i. STEAM PRESSURE 150 LBS
CYCLE 15 Minutes
Steam

FIRING DATA

<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
4893	1412	PP
4894	1462	PP
4895	1440	PP
4896	1492	CP
4897	1438	PP
4898	1462	CP

RESTRICTED

RESTRICTED

PANEL DATA

PANEL NO. 589

TEST DATE 2/17/49

SATURATING DATA

TYPE OF CLOTH 2x2 BW Nylon Crash Helmet

TYPE OF S

LAMINATING DATA

PLIES 7 Ply Nylon - 6 Ply 0.004" Scotch Weld

FIRING DATA

RD NO. STRIKING VELOCITY RESULT

4899	1252	CP
4900	1070	PP
4901	1143	CP
4902	1122	CP
4903	1083	CP
4904	1074	CP
4905	1048	PP
4906	1016	CP
4907	1032	CP
4908	997	PP
4909	1088	CP
4910	997	PP
4911	1027	CP
4912	993	CP

RESTRICTED

RESTRICTED

PANEL DATA

PANEL NO. 590

TEST DATE 2/24/49

SATURATING DATA

TYPE OF CLOTH 2x2 BW Nylon WEIGHT OF CLOTH 13.0 OZ/SQ YD
TYPE OF SATURANT Scotch Weld RESIN CONTENT 5.2 % BY WT
SATURANT FORMULA 66 Percent Scotch ROLL SETTING 0.028 INCHES
Weld 34 Percent Isopropyl Alcohol

REMARKS 14 Plies Nylon Knife-coated 1 Ply Unsaturated
Dried in Oven at 150 F for 1 hour, 20 Minutes

LAMINATING DATA

PLIES 15 PANEL SIZE 6x6 INCHES
AVERAGE THICKNESS 0.275" AVERAGE WEIGHT 22.9 OZ/SQ FT
MOLDING PRESSURE 500# Gauge STEAM PRESSURE 180 LBS
20x20 Press
CYCLE 30 Minutes
Steam

FIRING DATA

DELAMINATION

<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
4913	1234	PP
4914	1362	PP
4915	1515	CP
4916	1380	PP
4917	1458	CP
4918	1424	CP

RESTRICTED

RESTRICTED

PANEL DATA

PANEL NO. 591

TEST DATE 2/25/49

SATURATING DATA

TYPE OF CLOTH 2x2 BW Nylon WEIGHT OF CLOTH 13.0 OZ/SQ YD
TYPE OF SATURANT XN1 RESIN CONTENT 26.7 PERCENT BY WT
SATURANT FORMULA 66 Percent MEK
17 Percent Monomer 17 Percent
Polymer

REMARKS O.D. Surface on Crash Helmet

LAMINATING DATA

PLIES 7

FIRING DATA

<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
4919	1230	CP
4920	1102	CP
4921	1074	CP
4922	984	CP
4923	986	CP
4924	888	PP
4925	864	PP
4926	906	PP
4927	1040	CP

RESTRICTED

RESTRICTED

PANEL DATA

PANEL NO. 592

TEST DATE 3/3/49

SATURATING DATA

TYPE OF CLOTH 2x2 BW Nylon WEIGHT OF CLOTH 13.0 OZ/SQ YD
Crash Helmet
RESIN CONTENT 26.7 PERCENT BY WT
TYPE OF SATURANT XN1
SATURANT FORMULA 66 Percent MEK
17 Percent Monomer 17 Percent
Polymer

LAMINATING DATA

PLIES 7 AVERAGE WEIGHT 17.0 OZ/SQ FT

FIRING DATA

RD NO. STRIKING VELOCITY RESULT

4928	1035	PP
4929	1120	PP
4930	1185	CP
4931	1028	PP
4932	1109	PP
4933	1168	CP
4934	1052	PP <u>Slant</u>
4935	2160	<u>Up 1" Glancing</u>
4936	1389	CP
4937	1102	PP
4938	1248	CP
4939	1153	CP
4940	1158	CP
4941	1130	PP

REMARKS 7 Ply OD and Point

RESTRICTED

RESTRICTED

PANEL DATA

PANEL NO. 593

TEST DATE 3/3/49

SATURATING DATA

TYPE OF CLOTH 2x2 BW Nylon WEIGHT OF CLOTH 13.0 OZ/SQ YD
Crash Helmet
RESIN CONTENT 26.7 PERCENT BY WT
TYPE OF SATURANT XN1
SATURANT FORMULA 36 Percent MEK
17 Percent Monomer 17 Percent
Polymer

REMARKS 7 Ply OD and Paint

LAMINATING DATA

PLIES 7

FIRING DATA

<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
4942	1082	PF
4943	1210	CP Chips
4944	1090	PF

RESTRICTED

RESTRICTED

PANEL DATA

PANEL NO. 594
Same as #592

TEST DATE 3/4/49

SATURATING DATA

Crash Helmet

FIRING DATA

<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
4945	1108	PP
4946	1088	PP
4947	1190	CP
4948	1068	PP
4949	1142	CP
4950	1052	PP
4951	1176	CP
4952	1058	PP
4953	1128	CP
4954	1168	PP <u>Glancing</u>

RESTRICTED

RESTRICTED

PANEL DATA

PANEL NO. 595

TEST DATE 3/8/49

LAMINATING DATA

AVERAGE THICKNESS 0.202" AVERAGE WEIGHT 16.5 OZ/SQ FT

REMARKS Dr. Ehlers Sample

FIRING DATA

<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>	<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
4955	1269	CP	4971	1022	CP
4956	1182	CP	4972	946	PP
4957	1143	CP	4973	1010	CP
4958	1018	CP	4974	998	CP
4959	946	PP	4975	1035	CP
4960	1018	CP	4976	984	CP
4961	990	CP	4977	966	PP
4962	916	PP	4978	1000	CP
4963	965	PP	4979	958	PP
4964	1033	CP	4980	1024	CP
4965	990	CP	4981	1002	CP
4966	1028	CP	4982	990	PP
4967	993	PP	4983	965	PP
4968	973	PP	4984	958	PP
4969	1010	CP	4985	966	PP
4970	960	PP	4986	1022	CP

RESTRICTED

RESTRICTED

PANEL DATA

PANEL NO. 596

TEST DATE 3/10/49

SATURATING DATA

TYPE OF CLOTH 2x2 BW Nylon WEIGHT OF CLOTH 13.0 OZ/SQ YD

TYPE OF SATURANT 0.002" Scotch Weld

REMARKS 14 Pl. 0.002" Scotch Weld used to Bond 15 Plies of 2x2 BW Nylon

LAMINATING DATA

PLIES 15 PANEL SIZE 6x6 INCHES

AVERAGE THICKNESS 0.328" AVERAGE WEIGHT 23.1 OZ/SQ FT

MOULDING PRESSURE 110 p.s.i. STEAM PRESSURE 150 LBS

CYCLE 15 Minutes
Steam and 5 Minutes Water

FIRING DATA

RD NO.	STRIKING VELOCITY	RESULT
4987	1365	PP
4988	1510	CP
4989	1423	PP
4990	1497	PP
4991	1443	PP
4992	1504	PP

TEST DATE 3/18/49

PANEL SIZE 6x6

RD NO.	STRIKING VELOCITY	RESULT
5005	1500	CP
5006	Dud	PP
5007	1353	PP
5008	1452	PP
5009	1514	CP
5010	1532	CP

RESTRICTED

RESTRICTED

PANEL DATA

PANEL NO. 597

TEST DATE 3/11/49

SATURATING DATA

TYPE OF CLOTH 2x2 B" Nylon WEIGHT OF CLOTH 13.0 OZ/SQ YD

TYPE OF SATURANT 0.002" Scotch
Weld

REMARKS: 14 Plies of Scotch Weld used to Bond 15 Plies of
2x2 B" Nylon

LAMINATING DATA

PLIES 15 Ply PANEL SIZE 6x6 INCHES
AVERAGE THICKNESS 0.282" AVERAGE WEIGHT 22.8 OZ/SQ FT
MOLDING PRESSURE 900 p.s.i. STEAM PRESSURE 150 LBS

FIRING DATA

RD NO.	STRIKING VELOCITY	RESULT
4993	1568	CP
4994	1443	CP
4995	1372	PP
4996	1443	CP
4997	1358	PP
4998	1443	CP

RESTRICTED

RESTRICTED

PANEL NO. 598

PANEL DATA

TEST DATE 3/14/49

SATURATING DATA

TYPE OF CLOTH 2x2 BW Nylon WEIGHT OF CLOTH 13.0 OZ/SQ YD

TYPE OF SATURANT 0.002" Scotch Weld

REMARKS: 14 Plies of Scotch Weld used to bond 15 Plies of 2x2 Basket Weave Nylon

LAMINATING DATA

PLIES 15 PANEL SIZE 6x6 INCHES

AVERAGE THICKNESS 0.295" AVERAGE WEIGHT 22.6 OZ/SQ FT

MOLDING PRESSURE 500 p.s.i. STEAM PRESSURE 150 LBS

CYCLE 15 Minutes Steam

FIRING DATA

<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
4999	1400.	CP
5000	1068	PP
5001	1378	PP
5002	1321	PP
5003	1372	PP
5004	1390.	PP

RESTRICTED

RESTRICTED

PANEL DATA

PANEL NO. 599

TEST DATE 3/21/49

SATURATING DATA

TYPE OF CLOTH 2x2 BW Nylon WEIGHT OF CLOTH 13.0 OZ/SQ YD

TYPE OF SATURANT 0.002" Scotch Weld

LAMINATING DATA

PLIES 14 ply Scotch Weld PANEL SIZE 12x15 INCHES
15 ply Nylon

AVERAGE THICKNESS 0.340" AVERAGE WEIGHT 23.0 % BY WT

MOULDING PRESSURE 200 p.s.i. STEAM PRESSURE 150 LBS

CYCLE 20 Minutes Steam

M.F. 94,000

FIRING DATA

V50 - 1470

RD NO. STRIKING VELOCITY RESULT RD NO. STRIKING VELOCITY RESULT

5011	1520	CP	5031	1482	CP
5012	1464	CP	5032	1464	PP
5013	1432	PP	5033	1402	PP
5014	1388	PP	5034	1458	CP
5015	1410	PP	5035	1422	PP
5016	Dud	CP	5036	1460	PP
5017	1540	CP	5037	1408	PP
5018	1460	PP	5038	1408	PP
5019	1450	PP	5039	1470	PP
5020	1474	CP	5040	1465	CP
5021	1458	PP	5041	1482	CP
5022	1400	PP	5042	Dud	PP
5023	1442	PP	5043	1640	CP
5024	1416	PP	5044	1668	CP
5025	1408	PP	5045	1470	PP
5026	1470	PP	5046	1442	PP
5027	1514	CP	5047	1490	CP
5028	1548	CP	5048	1478	CP
5029	1422	PP	5049	Dud	CP
5030	1514	CP	5050	1474	PP

RESTRICTED

RESTRICTED

PANEL DATA

PANEL 599 Continued

TEST DATE 3/21/49

MF. 94,000

FIRING DATA

V50 - 1470

<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
5051	Dud	PP
5052	1422	PP
5053	1500	CP
5054	1505	CP
5055	1490	CP
5056	Dud	CP
5057	1483	CP
5058	1482	PP
5059	1402	PP
5060	1458	CP
5061	1402	PP
5062	1378	PP
5063	1370	PP
5064	1408	PP
5065	1500	CP
5066	1428	PP
5067	1478	CP
5068	1500	CP
5069	1480	PP
5070	Dud	CP

RESTRICTED

RESTRICTED

PANEL DATA

PANEL NO. 801

TEST DATE 5/11/49

SATURATING DATA

TYPE OF CLOTH 2x2 BW Nylon WEIGHT OF CLOTH 13.0 OZ/SQ YD
TYPE OF SATURANT BJ-16320 RESIN CONTENT 8.7 % BY WT
ROLL SETTING 0.030 INCHES

REMARKS 14 Plies Knife Coated One Side - 1 Ply Unsaturated
Air Dried 15 Minutes

LAMINATING DATA

PLIES 15 PANEL SIZE 12x15 INCHES
AVERAGE THICKNESS _____ AVERAGE WEIGHT 23.6 OZ/SQ FT
MOLDING PRESSURE 125 p.s.i. STEAM PRESSURE 100 LBS
CYCLE 20 Minutes
Steam - 5 Minutes Water Cooled

FIRING DATA

RD NO.	STRIKING VELOCITY	RESULT	RD. NO.	STRIKING VELOCITY	RESULT
5080	Dud	CP	5104	1408	PP
5081	1667	CP	5105	1468	PP
5082	1437	PP	5106	1468	PP
5083	Dud	CP	5107	1442	PP
5084	Dud	CP	5108	1433	CP
5085	1563	CP	5109	1433	CP
5086	1538	CP	5110	1488	PP
5087	1488	PP	5111	1480	PP
5088	1549	CP	5112	1554	CP
5089	Dud	PP			
5090	1497	CP			
5091	1488	PP			
5092	Dud	PP			
5093	1395	PP			
5094	1375	PP			
5095	1323	PP			
5096	1362	PP			
5097	Dud	CP			
5098	Dud	PP			
5099	1355	PP			
5100	1303	PP			
5101	Dud	PP			
5102	Dud	PP			
5103	1367	PP			

RESTRICTED

PANEL DATA

PANEL NO. 402

TEST DATE: 5/21/49

SATURATING DATA

TYPE OF CLOTH 2x2 BW Nylon WEIGHT OF CLOTH 13.0 Oz/SQ YD

TYPE OF SATURANT BJ-16320 RESIN CONTENT 14.0 % BY WT

SATURANT FORMULA One Part Solvent
Four Parts Resin

REMARKS: Mixture Composition 40 Percent Quakersol - 50 Percent
M.E.K. - 10 Percent Butanol.

LAMINATING DATA

PLIES 15 PANEL SIZE 6x6 INCHES

AVERAGE THICKNESS 0.315" AVERAGE WEIGHT 25.5 OZ/SQ FT

MOLDING PRESSURE 200 p.s.i. STEAM PRESSURE 125 LBS

CYCLE 20 Minutes
Steam - (FELT GAULS)

FIRING DATA

RD NO. STRIKING VELOCITY RESULT

5114	1267	PP
5115	1450	CP
5116	Dud	CP
5117	1360	CP
5118	1348	CP
5119	1320	PP

Hit Aluminum

RESTRICTED

RESTRICTED

PANEL DATA

PANEL NO. 603

TEST DATE: 5/11/49

SATURATING DATA

TYPE OF CLOTH 2x2 B" Nylon WEIGHT OF CLOTH 13.0 OZ/SQ YD

TYPE OF SATURANT 0.002" Scotch
Weld Interlayers

LAMINATING DATA

PLIES 7 PANEL SIZE 12x15 INCHES

CYCLE 20 Minutes AVERAGE WEIGHT 15.0 OZ/SQ FT
Steam

STEAM PRESSURE 80 LBS

FIRING DATA

<u>ID NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
5120	684	PP
5121	841	PP
5122	1168	CP
5123	1614	CP
5124	1782	CP
5125	903	PP
5126	1270	CP
5127	1053	PP
5128	1168	CP
5129	1124	PP
5130	1336	CP
5131	1171	CP
5132	1152	PP
5133	1109	CP

RESTRICTED

RESTRICTED

PANEL DATA

PANEL NO. 6C4

TEST DATE: 5/17/49

SATURATING DATA

TYPE OF CLOTH 2x2 BW Nylon WEIGHT OF CLOTH 13.0 OZ/SQ YD

LAMINATING DATA

PLIES 13 PANEL SIZE 17x13 INCHES

MOLDING PRESSURE 150 v.s.i. AVERAGE WEIGHT 20.1 OZ/SQ FT

CYCLE 30 MINUTES STEAM PRESSURE 100 LBS

Steam and 5 MINUTES Water

Cooled

REMARKS: Laminated with 5/8" Diameter Circles (0.002") Scotch Weld - Circles 1 31/32" Apart.

FIRING DATA

<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>	<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
5134	1253	PP	5158	1318	PP
5135	Dud	PP	5159	1374	PP
5136	1337	CP	5160	1391	PP
5137	1338	CP	5161	1315	PP
5138	1295	CP	5162	1347	PP
5139	1409	CP	5163	1369	PP
5140	1308	PP	5164	1347	PP
5141	1335	PP	5165	1457	CP
5142	1326	FP	5166	1408	CP
5143	1343	PP	5167	1386	PP
5144	Dud	CP	5168	1462	CP
5145	1422	CP	5169	Dud	PP
5146	1471	CP	5170	1356	PP
5147	Dud	CP	5171	1388	CP
5148	1418	CP			
5149	1355	CP			
5150	1340	CP			
5151	1362	PP			
5152	1393	CP			
5153	1326	PP			
5154	1312	PP			
5155	1306	PP			
5156	1372	CP			
5157	1333	PP			

RESTRICTED

RESTRICTED

PANEL DATA

PANEL NO. 605

DATE: 5/18/49

SATURATING DATA

TYPE OF CLOTH 4x4 BW Fortisen WEIGHT OF CLOTH: 13.0 OZ/SQ YD

TYPE OF SATURANT Scotch Weld

LAMINATING DATA

PIES 15 PANEL SIZE 12x15 INCHES

AVERAGE THICKNESS 0.282" AVERAGE WEIGHT 22.6 OZ/SQ FT

MOLDING PRESSURE 120 p.s.i. STEAM PRESSURE 100 LBS

CYCLE 20 Minutes

Steam - 5 Minutes Water Cooled

REMARKS Laminated w'th Scotch Weld (0.002).

FIRING DATA

<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
5172	1385	CP
5173	1330	CP
5174	1191	PP
5175	1203	PP
5176	1157	PP
5177	1179	PP
5178	1374	CP
5179	1164	PP
5180	1245	PP
5181	1241	PP
5182	1486	CP
5183	1340	CP

RESTRICTED

PANEL DATA

PANEL NO. 606

TEST DATE 6/1/49

SATURATING DATA

TYPE OF CLOTH 2x2 BW Nylon WEIGHT OF CLOTH 13 OZ/SQ YD
TYPE OF SATURANT BJ 16320 RESIN CONTENT 10.4 % BY WT
ROLL SETTING 0.034 INCHES

REMARKS Air Dried - 14 Plies Knife Coated Using Laboratory
Coater - 1 Ply Uncoated -

LAMINATING DATA

PLIES 15 PANEL SIZE 6x6 INCHES
AVERAGE THICKNESS 0.320" AVERAGE WEIGHT 23.0 OZ/SQ FT
MOULDING PRESSURE 125 p.s.i. STEAM PRESSURE 100 LBS
CYCLE 35 Minutes
Steam - 5 Minutes Water Cooled

FIRING DATA

<u>ID NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
5184	1558	CP
5185	1506	CP
5186	1433	PP
5187	1474	PP
5188	1468	CP
5189	1468	CP

RESTRICTED

RESTRICTED

PANEL DATA

PANEL NO. 607

TEST DATE 6/1/49

SATURATING DATA

TYPE OF CLOTH 2x2 BW Nylon WEIGHT OF CLOTH 13.0 OZ/SQ YD

TYPE OF SATURANT XN1 RESIN CONTENT 21 % BY WT

REMARKS Cloth Has Been Saturated For Four Months And Kept In A Box.

LAMINATING DATA

PLIES 16 PANEL SIZE 12x15 INCHES

AVERAGE THICKNESS 0.395" AVERAGE WEIGHT 27.7 OZ/SQ FT

MOLDING PRESSURE 140 p.s.i. STEAM PRESSURE 125 LBS

CYCLE 15 Minutes
Steam - 5 Minutes Water Cooled

FIRING DATA

<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
5190	1811	CP
5191	1488	PP
5192	1567	PP
5193	Dud	PP

RESTRICTED

PANEL DATA

PANEL NO. 608

TEST DATE 5/27/49

SATURATING DATA

TYPE OF CLOTH 2x2 BW Nylon WEIGHT OF CLOTH 13.0 OZ/SQ YD

TYPE OF SATURANT BJ-16320 RESIN CONTENT 11.7 % BY WT

ROLL SETTING 0.036 INCHES

REMARKS Knife Coated - 14 Plies Knife XCoated - 1 Ply Uncoated

LAMINATING DATA

PLIES 15 PANEL SIZE 12x15 INCHES

AVERAGE THICKNESS 0.317" AVERAGE WEIGHT 23.4 OZ/SQ FT

MOLDING PRESSURE 150 p.s.i. STEAM PRESSURE 100 LBS

CYCLE 20 Minutes
Steam - 5 Minutes Water Cooled

FIRING DATA

<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>	<u>RD NO.</u>	<u>STRIKING</u>
5194	1684	CP		
5195	1433	CP		
5196	1393	PP		
5197	1476	CP		
5198	1396	PP		
5199	1434	PP		
5200	1375	PP		
5201	1389	PP		
5202	1333	PP		
5203	1450	PP		
5204	1405	PP		
5205	1441	PP		
5206	1520	CP		
5207	1458	CP		
5208	Dud	CP		
5209	1478	CP		
5210	1475	CP		
5211	1450	PP		
5212	1450	PP		
5213	1437	PP		

RESTRICTED

PANEL DATA

PANEL NO. 609

TEST DATE 5/31/49

SATURATING DATA

TYPE OF CLOTH 2x2 BW Nylon WEIGHT OF CLOTH 13.0 OZ/SQ YD
TYPE OF SATURANT BJ-16320 RESIN CONTENT 11.7 O/O 76 WT
REMARKS Knife Coated - 14 Plies Knife Coated - 1 Ply Un-
saturated

LAMINATING DATA

PLIES 15 PANEL SIZE
AVERAGE THICKNESS 0.317" AVERAGE WEIGHT 24.2 OZ/SQ FT
MOLDING PRESSURE 150 p.s.i. STEAM PRESSURE 1.45 LBS
REMARKS Taken Out Of Press Hot And Put In Oven At 325°F For
75 Minutes

FIRING DATA

RD NO. STRIKING VELOCITY RESULT

5214	1623	CP
5215	1628	CP
5216	1623	PP
5217	1582	PP
5218	1447	CP
5219	1593	PP
5220	1450	CP
5221	1393	PP
5222	Dud	PP
5223	1677	CP
5224	1409	PP
5225	1334	PP
5226	1306	PP
5227	Dud	PP
5228	1532	CP
5229	1425	PP
5230	1436	PP
5231	1348	PP
5231	1441	CP
5232	1425	PP
5233	1337	PP
5234	1329	PP
5235	1396	PP
5236	Dud	PP

RESTRICTED

RESTRICTED

PANEL DATA

PANEL NO. 610

TEST DATE 8/13/49

SATURATING DATA

TYPE OF CLOTH 2x2 BW Nylon RESIN CONTENT 16.9 % BY WT AVERAGE

TYPE OF SATURANT RY-16320

REMARKS Resin Coated On One Side

LAMINATING DATA

PLIES 9 PANEL SIZE 12x15 INCHES

AVERAGE THICKNESS 0.200" AVERAGE WEIGHT 13.6 OZ/SQ FT

FIRING DATA

<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
5237	1909	CP
5238	1195	CP
5239	1195	CP
5240	1150	CP
5241	1225	CP
5242	1050	PP
5243	1062	PP
5245	1112	CP
5246	1118	CP
5247	1265	CP
5248	1007	PP
5249	894	PP
5250	972	PP
5251	1084	PP
5252	1097	CP
5253	1033	PP
5254	1056	PP
5255	944	PP
5256	1033	PP
5257	1010	PP
5258	1077	PP
5259	1080	PP
5260	1071	PP

RESTRICTED

RESTRICTED

PANEL NO. 811

TEST DATE 6/15/49

SATURATING DATA

TYPE OF CLOTH 2x2 BW Nylon WEIGHT OF CLOTH 13.0 OZ/SQ YD
TYPE OF SATURANT BJ-16320 RESIN CONTENT 5 Ply 12.9 % BY WT
4 Ply 20.4 % BY WT
ROLL SETTING 0.042 INCHES
0.040

REMARKS 5 Ply O.D. BW Nylon Knife Coated With 12.9 Percent
BJ 16320 - 4 Ply 2x2 BW Nylon Knife Coated With 11.7 Percent BJ 16320

LAMINATING DATA

PLIES 9 PANEL SIZE 12x15 INCHES
AVERAGE THICKNESS 0.210" AVERAGE WEIGHT 14.8 OZ/SQ FT
MOLDING PRESSURE 140 p.s.i. STEAM PRESSURE 125 LBS
CYCLE 20 Minutes Steam
5 Minutes Water Cooled

FIRING DATA

<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
5261	1063	PP
5262	1035	PP
5263	1112	CP
5264	1080	PP
5265	1112	CP
5266	1135	CP
5267	1012	PP
5268	1022	PP
5269	1045	PP
5270	980	PP
5271	1026	PP

RESTRICTED

RESTRICTED

T21E2 Helmet (2nd)

PANEL DATA

PANEL NO. 618

TEST DATE: 6/15/49

SATURATING DATA

TYPE OF CLOTH 2x2 BW Nylon WEIGHT OF CLOTH 13 OZ/SQ YD

TYPE OF SATURANT XN-1 RESIN CONTENT 30.5 % BY WT

LAMINATING DATA

PLIES 14 PANEL SIZE Helmet

FIRING DATA

<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
5272	1640	CP
5273	1393	PP
5274	1467	PP
5275	1533	CP Side of Helmet
5276	1497	PP
5277	1433	PP
5278	1533	PP
5279	1541	PP
5280	Dud	CP
5281	1582	CP
5282	1622	CP
5283	Dud	CP
5284	1533	CP

RESTRICTED

RESTRICTED

PANEL DATA

PANEL NO. 613

TEST DATE 6/16/49

SATURATING DATA

TYPE OF CLOTH 2x2 BW Nylon WEIGHT OF CLOTH 13 OZ/SQ YD

SATURANT 0.002" Scotch Film

REMARKS OD Faces

LAMINATING DATA

PLIES 9 PANEL SIZE 12x15 INCHES

AVERAGE THICKNESS 0.198" AVERAGE WEIGHT 14.1 OZ/SQ FT

CYCLE 20 Minutes Steam STEAM PRESSURE 80 LBS

FIRING DATA

<u>RG NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
5285	1136	CP
5286	1144	CP
5287	1163	CP
5288	1194	CP
5289	1118	PP
5290	1141	PP Hit Aluminum

RESTRICTED

RESTRICTED

PANEL NO. 614

TEST DATE 6/16/49

PANEL DATA

TYPE OF CLOTH 2x2 BW Nylon WEIGHT OF CLOTH 13.0 OZ/SQ YD

TYPE OF SATURANT BJ 16320 RESIN CONTENT 16.9 % BY WT

REMARKS Resin Coated On One Side

LAMINATING DATA

PLIES 9 PANEL SIZE Crash Helmet

AVERAGE THICKNESS 0.200" AVERAGE WEIGHT 15.6 OZ/SQ FT

FIRING DATA

<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
5291	1195	CP
5292	1121	CP
5293	975	PP
5294	956	PP
5295	1003	CP
5296	1070	CP
5297	1191	CP
5298	956	CP

RESTRICTED

RESTRICTED

PANEL DATA

PANEL NO. 615

TEST DATE: 6/20/49

SATURATING DATA

TYPE OF CLOTH 4x4 BW Fortisan WEIGHT OF CLOTH 13.0 OZ/SQ YD

REMARKS: 8 Ply Unsat. 4x4 BW Fortisan (front) 9 Ply BW Nylon
8 Ply .002" Scotch Weld.

LAMINATING DATA

PLIES 18 PANEL SIZE 12x15 INCHES

AVERAGE WEIGHT 27.3 OZ/SQ FT

FIRING DATA

<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
5299	1767	CP
5300	1634	CP
5301	1355	PP
5302	1542	PP Hit Aluminum
5303	1462	PP
5304	1432	PP
5305	Dud	CP
5306	1539	PP
5307	1462	PP
5308	1492	PP
5309	1587	PP
5310	Dud	PP
5311	Dud	CP
5312	1592	PP
5313	1613	CP
5314	1608	CP

RESTRICTED

RESTRICTED

PANEL DATA

PANEL NO. 616

TEST DATE: 8/22/49

SATURATING DATA

TYPE OF CLOTH 2x2 BW Orlon WEIGHT OF CLOTH 12.83 OZ/SQ YD

TYPE OF SATURANT: Scotch Weld

SATURANT FORMULA 14 Ply Scotch
Weld

LAMINATING DATA

PLIES 15 PANEL SIZE 12x15 INCHES

AVERAGE THICKNESS 0.260" AVERAGE WEIGHT 19.8 OZ/SQ FT

MOLDING PRESSURE 130 p.s.i. STEAM PRESSURE 125 LBS

CYCLE 20 Minutes
Steam - 5 Minutes Water Cooled

FIRING DATA

<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
5315	1404	CP
5316	1200 ^{LC}	CP
5317	627	PP
5318	542	PP
5319	1700	CP
5320	1071	PP
5321	1134	PP
5322	1165 ^{HC}	PP
5323	1228	CP
5324	1282	CP

RESTRICTED

RESTRICTED

PANEL NO. S17

PANEL DATA

TEST DATE: 6/22/49

SATURATING DATA

TYPE OF CLOTH 2x2 BW Nylon WEIGHT OF CLOTH 13 OZ/SQ YD
TYPE OF SATURANT Industrial Tape
Co. ST 1029 0.002" Film

LAMINATING DATA

PLIES 15 PANEL SIZE 12x15 INCHES
MOLDING PRESSURE 130 p.s.i. AVERAGE WEIGHT 23.5 OZ/SQ FT
CYCLE 25 Minutes STEAM PRESSURE 125 LBS
Steam

FIRING DATA

RD NO. SPEAKING VELOCITY RESULT

5326	1432	PP
5327	1562	CP
5328	1295	PP
5329	1432	PP
5330	Dud	PP
5331	1397	PP
5332	1563	CP
5333	1505	CP
5334	1510	CP
5335	1442	PP
5336	1416	PP
5337	1395	PP
5338	1505	CP
5339	1487	CP
5340	1474	CP
5341	1458	PP
5342	1461	CP Barely
5343	1458	PP

RESTRICTED

RESTRICTED

PANEL DATA

PANEL NO. 618

TEST DATE 6/27/49

SATURATING DATA

TYPE OF CLOTH 2x2 BW Orlon WEIGHT OF CLOTH 12.83 OZ/SQ YD

TYPE OF SATURANT Stitched

REMARKS Quilted 1" Squares

LAMINATING DATA

RD NO. STRIKING VELOCITY RESULT RD NO. STRIKING VELOCITY RESULT

5344	1096	PP	5364	1373	PP
5345	1007	PP	5365	1535	CP
5346	1173	PP	5366	1430	PP
5347	1176	PP	5367	1512	CP
5348	1109	PP			
5349	1438	PP			
5350	1394	PP			
5351	Dud	CP			
5352	1370	PP			
5353	1558	CP			
5354	1539	CP			
5355	Dud	CP			
5356	1422	PP			
5357	1512	CP			
5358	1500	Disregard			
5359	1451	PP			
5360	1468	PP			
5361	1478	PP			
5362	1430	CP			
5363	Dud	PP			

RESTRICTED

PANEL DATA

PANEL NO. 619

TEST DATE: 6/28/49

SATURATING DATA

TYPE OF CLOTH 2x2 BK Nylon WEIGHT OF CLOTH 13 OZ/SQ YD
 TYPE OF SATURANT Methyl Methacrylate RESIN CONTENT 22.0 % BY WT
 SATURANT FORMULA 66 Percent MEK
17 Percent Monomer - 17 Percent
Polymer

LAMINATING DATA

PLIES 15 PANEL SIZE 12x15 INCHES
 AVERAGE THICKNESS 0.332" AVERAGE WEIGHT 25.4 OZ/SQ FT
 MOULDING PRESSURE 160 p.s.i. STEAM PRESSURE 100 LBS
 CYCLE 12 Minutes Steam
and 5 Minutes Cold Water

FIRING DATA

V₅₀ - 1495

<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>	<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
5368	1812	CP	5388	1544	CP
5369	1708	CP	5389	1539	CP
5370	1678	CP	5390	1511	PP
5371	1343	PP	5391	1533	CP
5372	1500	PP	5392	1511	PP
5373	1528	CP	5393	1463	PP
5374	1519	CP	5394	1493	PP
5375	1479	PP	5395	1562	CP
5376	1526	PP	5396	1450	PP
5377	1562	CP	5397	1484	CP
5378	1558	CP	5398	1539	CP
5379	1475	PP	5399	1462	PP
5380	Dud	CP	5400	1433	PP
5381	1567	CP	5401	1485	CP
5382	1519	PP	5402	1493	CP
5383	1511	PP	5403	1547	CP
5384	1511	CP	5404	1433	PP
5385	1554	CP	5405	1417	PP
5386	1544	CP	5406	1454	PP
5387	1618	CP	5407	Dud	CP

RESTRICTED

PANEL DATA

PANEL NO. 620

TEST DATE 6/29/49

SATURATING DATA

TYPE OF CLOTH 2x2 BW Nylon WEIGHT OF CLOTH 12.6 OZ/SQ YD
TYPE OF SATURANT BJ-16320 RESIN CONTENT 21 % BY WT
SATURANT FORMULA _____ ROLL SETTING 0.0360 INCHES
REMARKS: Knife Coated - Piece Placed In Press When Platens
Reached 300 F.

LAMINATING DATA

PLIES 15 PANEL SIZE 12x15 INCHES
AVERAGE THICKNESS 0.338 AVERAGE WEIGHT 25.4 OZ/SQ FT
MOLDING PRESSURE 150 STEAM PRESSURE 80 LBS
CYCLE 20 Minutes Steam
5 Minutes Cooled

FIRING DATA

V50 - 1430

<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>	<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
5408	1489	CP	5428	1467	CP
5409	1500	CP	5429	1495	CP
5410	1421	PP	5430	1404	PP
5411	1436	PP	5431	1357	PP
5412	1381	PP	5432	Dud	CP
5413	Dud	PP	5433	1493	CP
5414	Dud	CP	5434	1454	CP
5415	1385	PP	5435	1534	CP
5416	Dud	CP	5436	1445	CP
5417	1425	PP	5437	1433	CP
5418	Dud	PP	5438	1483	CP
5419	1493	CP	5439	1454	CP
5420	1435	CP	5440	1374	PP
5421	1435	PP	5441	1462	CP
5422	1400	PP	5442	1470	CP
5423	1538	CP	5443	1493	CP
5424	1404	PP	5444	1418	PP
5425	Dud	PP	5445	1415	CP
5426	1396	PP	5446	Dud	PP
5427	1417	PP	5447	1378	PP

RESTRICTED

RESTRICTED

PANEL NO. 820 Continued

TEST DATE 8/29/49

FIRING DATA

V50 - 1430

RD NO. STRIKING VELOCITY RESULT

5448	1433	CP
5449	1404	PP
5450	1422	PP
5451	Dud	PP
5452	1462	CP
5453	1408	PP
5454	1546	CP
5455	1479	CP
5456	1466	CP
5457	1479	CP
5458	1362	PP
5459	1396	PP
5460	1389	PP
5461	1374	PP
5462	1396	PP
5463	1416	PP
5464	1467	CP
5465	1326	PP
5466	1443	CP
5467	1352	PP

RESTRICTED

PANEL NO. 621

TEST DATE 8/29/49

SATURATING DATA

TYPE OF CLOTH 2x2 BW Nylon WEIGHT OF CLOTH 12.6 OZ/SQ YD
 TYPE OF SATURANT BJ-16320 RESIN CONTENT 9.6 % BY WT
 ROII SETTING .0335 INCHES
 REMARKS Knife Coated - Air Dried At Room Temperature

LAMINATING DATA

PLIES 15 PANEL SIZE 12x15 INCHES
 AVERAGE THICKNESS .320" AVERAGE WEIGHT 22.8 OZ/SQ FT
 MOLDING PRESSURE 150 p.s.i. STEAM PRESSURE 80 LBS
 CYCLE 20 Minutes

FIRING DATA

V₅₀ - 1480

RD NO.	STRIKING VELOCITY	RESULT	RD NO.	STRIKING VELOCITY	RESULT
55					
5468	1511	CP	5489	1416	PP
5469	1493	CP	5489	1430	CP
5470	1422	PP	5490	1493	CP
5471	1337	PP	5491	1582	CP
5472	1425	PP	5492	1475	PP
5473	1441	PP	5493	1462	PP
5474	Dud	PP	5494	1462	PP
5475	1393	PP	5495	1433	PP
5476	1416	PP	5496	1511	CP
5477	1441	PP	5497	1667	CP
5478	1445	PP	5498	Dud	CP
5479	1497	CP	5499	1493	CP
5480	1389	PP	5500	1548	CP
5481	1438	PP	5501	1484	PP
5482	1425	PP	5502	1479	CP
5483	1441	PP	5503	1471	CP
5484	1409	PP	5504	1500	CP
5485	1511	CP	5505	Dud	PP
5486	1433	PP	5506	1511	CP
5487	1453	PP	5507	1468	CP

RESTRICTED

RESTRICTED

FIRING DATA

PANEL NO. 621 Continued

TEST DATE 6/29/49

V50 1480

RD NO. STRIKING VELOCITY RESULT

5508	--	CP
5509	1453	PP
5510	1406	PP
5511	1493	CP
5512	1397	PP
5513	1397	PP
5514	---	CP
5515	1543	CP
5516	1493	PP
5517	1542	CP
5518	1462	PP
5519	Dud	CP
5520	1534	CP
5521	1474	PP
5522	1458	PP
5523	1500	PP
5524	1458	PP
5525	1458	PP
5526	1515	CP
5527	1568	CP
5528	1458	PP
5529	Dud	PP

RESTRICTED

PANEL DATA

PANEL NO. 622

TEST DATE 7/1/49

SATURATING DATA

TYPE OF CLOTH 2x2 BW Nylon WEIGHT OF CLOTH 13 OZ/SQ YD

TYPE OF SATURANT BJ-16320 RESIN CONTENT 20 % BY WT

REMARKS Knife Coated - Panel Cured By High Frequency Induction Heating

LAMINATING DATA

PLIES 9 PANEL SIZE 6x6 INCHES

AVERAGE WEIGHT 16.2 OZ/SQ FT

PIRING DATA

RD NO. STRIKING VELOCITY RESULT

5530	938	CP
5531	1237	CP
5532	1186	CP
5533	1118	PP
5534	1218	CP
5535	1141	CP
5536	1197	CP
5537	1134	CP

RESTRICTED

PANEL DATA

PANEL NO. 623

TEST DATE 7/11/49

SATURATING DATA

TYPE OF CLOTH 2x2 BW Nylon WEIGHT OF CLOTH 12.6 OZ/SQ YD

TYPE OF SATURANT BJ-16320 RESIN CONTENT 12.4 % BY WT

REMARKS Knifecoated

LAMINATING DATA

PLIES 15 PANEL SIZE 12x15 INCHES

AVERAGE THICKNESS 0.325" AVERAGE WEIGHT 23.0 OZ/SQ FT

MOLDING PRESSURE 150 p.s.i. STEAM PRESSURE 80 LBS

REMARKS Laminated After Plates Heated To Temperature.

FIRING DATA

V50 - 1475

<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>	<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
5538	1685	CP	5558	1540	CP
5539	1558	CP	5559	1458	CP
5540	1493	CP	5560	1488	CP
5541	1472	CP	5561	Dud	PP
5542	1548	CP	5562	Dud	PP
5543	1548	CP	5563	1484	PP
5544	1448	PP	5564	1386	PP
5545	1548	CP	5565	1521	CP
5546	1428	PP	5566	1548	CP
5547	1437	PP	5567	1432	PP
5548	1493	PP	5568	Dud	PP
5549	1476	CP	5569	1389	PP
5550	1458	PP	5570	Dud	PP
5551	Dud	CP	5571	1432	PP
5552	1506	CP	5572	1603	CP
5553	1480	CP	5573	1506	CP
5554	1447	PP	5574	Dud	PP
5555	1453	PP	5575	Dud	CP
5556	1512	CP	5576	1519	PP
5557	Dud		5577	1471	CP

RESTRICTED

RESTRICTED

PANEL DATA

PANEL NO. 623 Cont'd

TEST DATE 7/13/49

FIRING DATA

V_{AO} - 1475

<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
5578	1476	PP
5579	1363	PP
5580	Dud	PP
5581	1333	PP
5582	1445	PP
5583	Dud	PP
5584	1396	PP
5585	1568	CP
5586	1490	PP
5587	1428	PP
5588	1448	PP
5589	1432	PP
5590	1432	PP
5591	Dud	PP
5592	1432	PP
5593	1484	CP
5594	1515	CP
5595	1338	PP
5596	1408	PP
5597	1493	PP

RESTRICTED

PANEL DATA

PANEL NO. 624

TEST DATE 7/15/49

SATURATING DATA

TYPE OF CLOTH 2x2 BW Nylon WEIGHT OF CLOTH 13.0 OZ/SQ YD
TYPE OF SATURANT BJ-16320 RESIN CONTENT 7.0 % BY WT
REMARKS Knife Coated

LAMINATING DATA

PLIES 15 PANEL SIZE 12x15 INCHES
AVERAGE THICKNESS .330" AVERAGE WEIGHT 21.9 OZ /SQ FT

FIRING DATA

V50 - 1500

<u>RD NO</u>	<u>SPRINKLING VELOCITY</u>	<u>RESULT</u>	<u>RD NO.</u>	<u>SPRINKLING VELOCITY</u>	<u>RESULT</u>
5598	Dud	CP	5618	1553	CP
5599	1432	PP	5619	1548	CP
5600	1515	CP	5620	1467	PP
5601	Dud	PP	5621	1497	CP
5602	Dud	PP	5674	1744	CP
5603	1458	PP	5675	1564	CP
5604	1500	CP	5676	1558	CP
5605	1465	PP	5677	1463	PP
5606	1488	PP	5678	1500	CP
5607	1340	CP	5679	1597	CP
5608	1476	PP	5680	1646	CP
5609	1445	PP	5681	1618	CP
5610	1533	CP	5682	1497	PP
5611	1516	PP	5683	1449	PP
5612	1458	PP	5684	Dud	PP
5613	1449	PP	5685	1493	PP
5614	1557	CP	5686	1444	PP
5615	Dud	PP	5687	1505	PP
5616	Dud	CP	5688	1641	CP
5617	1462	PP	5689	1687	CP

RESTRICTED

PANEL NO1 624 Cont'd

TEST DATE 7/15/89

FIRING DATA

V50 - 1500

<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
5690	1433	PP
5691	1488	PP
5692	Dud	CP
5693	1520	CP
5694	1525	CP
5695	1433	PP
5696	1479	CP

RESTRICTED

RESTRICTED

PANEL DATA

PANEL NO. 328

TEST DATE 7/25/48

SATURATING DATA

TYPE OF CLOTH Fiber V

TYPE OF SATURANT Scotch Weld 9,002"

LAGNATING DATA

PLIES 15 PANEL SIZE 6x6 INCHES
AVERAGE WEIGHT 30.5 OZ/SQ FT

PIRING DATA

<u>ID NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
5622	1266	PP
5623	1376	PP
5624	1386	PP
5625	1428	PP
5626	1644	CP

RESTRICTED

RESTRICTED

PANEL DATA

PANEL NO. 626

TEST DATE 7/18/48

SATURATING DATA

TYPE OF CLOTH 2x2 BW Nylon WEIGHT OF CLOTH 13.0 OZ/SQ YD

TYPE OF SATURANT XN-1 RESIN CONTENT 21.0 % BY WT

SATURANT FORMULA 98% MEK
17 1/2 Monomer - 17% Polymer

REMARKS Salt Spray Exposure Test (168 Hours Exposure)

LAMINATING DATA

PLIES 16 PANEL SIZE 12x15 INCHES

AVERAGE WEIGHT 29.4 OZ/SQ FT

PIRING DATA V₅₀ = 1482

<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>	<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
5626	1724	CP	5650	1644	CP
5627	1618	CP	5651	1493	CP
5628	1445	CP	5652	1366	PP
5629	1424	PP	5653	1488	PP
5630	1408	PP	5654	1483	PP
5631	1587	CP	5655	1500	CP
5632	1514	CP	5656	Dud	PP
5633	1412	PP	5657	1578	CP
5634	1469	PP	5658	Dud	CP
5635	1409	PP	5659	1488	CP
5636	1482	CP	5660	1493	PP
5637	1467	CP	5661	1445	PP
5638	1532	CP	5662	1493	PP
5639	1482	CP	5663	1476	CP
5640	1506	PP	5664	1296	PP
5641	1476	PP	5665	1476	PP
5642	1425	PP	5666	1538	CP
5643	1573	CP	5667	1597	CP
5644	1322	CP	5668	1524	CP
5645	1448	PP	5669	1388	PP
5646	1467	PP	5670	1467	PP
5647	1413	PP	5671	1497	CP
5648	1548	CP	5672	1421	PP
5649	1511	CP	5673	1493	CP

RESTRICTED

PARTIAL W. 021

MARK DATA

TEST DAY

1952

CHARACTERISTIC DATA

TYPE OF CLOTH 342 Rayon WEIGHT OF CLOTH 13 OZ/Sq YD
 TYPE OF SAMPLE BY 10320 TESTS CONDUCTED 10 BY VP
 REMARKS 342 Rayon

LAMINATING DATA

PUTER 3

REMARKS Panel Laminated with Inserts Embedded Between
 4th and 5th Paper Counted From Reverse Side of Panel - Shots Fired
 Directly At Back of Inserts.

PERFORMANCE DATA

BY NO. STARTING WEIGHT FINISH

5697	1000	90
5698	1120	90
5699	1158	90
5700	1000	90

RESTRICTED

RESTRICTED

PANEL DATA

PANEL NO. 628

TEST DATE 7/28/49

SATURATING DATA

TYPE OF CLOTH 2x2 BW Nylon WEIGHT OF CLOTH 13.0 OZ/SQ YD
TYPE OF SATURANT XN-1 RESIN CONTENT 21 % BY WT

LAMINATING DATA

PLIES 16 PANEL SIZE 11 $\frac{1}{2}$ "x12" INCHES
AVERAGE WEIGHT 29.4 OZ/SQ FT

REMARKS Panel Fired In Insulated Firing Chamber After 42 Hours
Exposure To 125 $^{\circ}$ + 20F

FIRING DATA

<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
5701	1634	CP
5702	Dud	PP
5703	1492	
5804	1462	PP
5805	1540	PP
5706	1475	PP
5708	1540	PP
5709	Dud	PP
5710	1532	PP
5711	1564	PP
5712	1645	CP
5713	1818	Dud - Hit Cork
5714	1564	PP
5715	1650	CP
5716	1638	CP
5717	1660	CP

RESTRICTED

RESTRICTED

PANEL DATA

PANEL NO. 629

TEST DATE & 7/28/49

Nine Ply Crash Helmet With Molded In Inserts and Tapped In Inserts

FIRING DATA

<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
5718	1174	CP
5719	953	PP
5720	1024	PP
5721	938	PP
5722	1296	CP
5723	1267	PP
5724	1073	PP
5725	1161	CP
5726	1039	PP
5727	1034	CP
5728	986	CP
5729	892	PP
5730	1112	CP
5731	1109	PP

RESTRICTED

RESTRICTED

PANEL DATA

PANEL NO. 630

TEST DATE 8/10/49

SATURATING DATA

TYPE OF CLOTH 2x2 BW Nylon

RESIN CONTENT 5.5 % By Wt

REMARKS Saturated by Industrial Tape

LAMINATING DATA

PLIES 15 PANEL SIZE 6x6
12x15 INCHES

AVERAGE THICKNESS 0.315" AVERAGE WEIGHT 22.8 OZ/SQ FT

MOLDING PRESSURE 150 p.s.i. STEAM PRESSURE 80 LBS

CYCLE 20" Steam FIRING DATA
10" Water V₅₀ - 1460

RD NO. STRIKING VELOCITY RESULT RD NO. STRIKING VELOCITY RESULT
12x15 Panel 6x6 Panel

5825	1384	PP	5732	1467	CP
5826	1520	CP	5733	1360	PP
5827	1404	PP	5734	1363	PP
5828	1400	PP	5735	1497	CP
5829	1458	PP	5736	1558	CP
5830	1440	PP	5737	1512	CP
5831	1411	PP	5738	1304	PP
5832	1466	CP	5739	1398	PP
5833	1440	PP	5740	1389	PP
5834	1458	PP	5741	1380	PP
5835	1561	CP	5742	1457	PP
5836	1532	CP	5743	1450	PP
5837	1530	CP			
5838	1490	CP			
5839	Dud	PP			
5840	1482	CP			
5841	1426	PP			
5842	1380	PP			
5843	1530	CP			
5844	1598	CP			

RESTRICTED

PANEL NO. 631

TEST DATE 8/3/49

PANEL DATA

SAME AS PANEL #628

FIRING DATA

<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
5744	1603	CP
5745	1362	PP
5746	1457	PP
5747	1488	PP
5748	1533	PP
5749	1512	Hit Cork
5750	1540	PP
5751	1619	CP
5752	1512	PP
5753	1500	PP
5754	1597	PP
5755	1577	PP
5756	1678	Hit Frame
5757	Dud	CP
5758	1665	CP
5759	Dud	PP

RESTRICTED

RESTRICTED

PANEL DATA

PANEL NO. 632

TEST DATE 9/5/49

SATURATING DATA

REMARKS: SAME AS PANEL #610 - In Weatherometer for 56.3 5 Hours.

FIRING DATA

<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>	<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
5760	964	PP			
5761	917	PP			
5762	1105	CP			
5763	990	PP			
5764	1132	CP			
5765	990	PP			
5766	1132	CP			
5767	1192	CP			
5768	1095	PP			
5769	1071	CP			
5770	966	PP			
5771	1050	CP			
5772	925	PP			
5773	1044	PP			
5774	1090	CP			
5775	1033	CP			
5776	1052	PP			
5777	1081	CP			
5778	1088	CP			
5779	1062	CP			

RESTRICTED

RESTRICTED

PANEL NO. 633

TEST DATE 9/5/49

PANEL DATA

SATURATING DATA

TYPE OF CLOTH 2x2 EW Nylon WEIGHT OF CLOTH 13 OZ/SQ YD
TYPE OF SATURANT XN1 RESIN CONTENT 20 % BY WT
SATURANT FORMULA 66% MKK -
17% Monomer - 17% Polymer

REMARKS In Weatherometer For 556.2 Hours. (Sample #52, #51, 8,
#7, #3, #4.

LAMINATING DATA

PLIES 16

FIRING DATA

RD NO.	SAMPLE NO	STRIKING VELOCITY	RESULT	RD NO.	SAMPLE NO.	STRIKING VELOCITY	RESULT
5780	52	Dud	PP	5800	7	1450	PP
5781		1562	CP	5801		1440	PP
5782		1549	PP	5802		1541	CP
5783		1572	CP	5803		1496	CP
5784		Dud	PP	5804	3	Dud	CP
5785		1538	PP	5805		1548	CP
5786	51	1533	CP	5806		1558	CP
5787		1541	CP	5807		1588	PP
5788		1558	CP	5808		1440	PP
5789		Dud	PP	5809		Dud	CP
5790		1475	PP	5810	4	1513	PP
5791		1496	PP	5811		1542	PP
5792	8	1423	PP	5812		Dud	CP
5793		1562	CP	5813		2561	CP
5794		Dud	PP	5814		1538	CP
5795		1560	CP	5815		Dud	CP
5796		1570	CP				
5797		1510	CP				
5798	7	Dud	CP				
5799		1459	PP				

RESTRICTED

RESTRICTED

PANEL DATA

PANEL NO. 634

TEST DATE 8/9/49

SATURATING DATA

TYPE OF CLOTH 2x2 BW Nylon WEIGHT OF CLOTH 13 OZ/SQ YD
RESIN
TYPE OF SATURANT XN2 RESIN CONTENT 10 % BY WT
REMARKS Same as Helmet, Screw and "A" Frame Fired to
Outside Helmet

LAMINATING DATA

PLIPS 7 Plies Nylon PANEL SIZE 6x6 INCHES
2 Plies OD

FIRING DATA

<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
5816	1070	CP Removed "A"
5817	1122	CP " "
5818	762	CP " "
5819	975	PP " "

RESTRICTED

RESTRICTED

PANEL DATA

PANEL NO. 635

TEST DATE 3/2/49

SATURATING DATA

TYPE OF CLOTH 2x2 BW Nylon WEIGHT 13.0 OZ/SQ YD

TYPE OF SATURANT YN2 RESIN CONTENT 10 % BY WT

REMARKS Nylon Inserts 3 & 4 Layers - "A" Frame and Screw

LAMINATING DATA

PLIES 7 Ply Nylon
2 Ply OD "

FIRING DATA

<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
5820	1042	PP Removed "A"
5821	Dud?	PP
5822	738	PP Removed "A"
5823	857	CP "
5824	1154	CP

RESTRICTED

RESTRICTED

PANEL DATA

PANEL NO. 636

TEST DATE 8/12/49

SATURATING DATA

TYPE OF CLOTH 2x2 BW Nylon WEIGHT OF CLOTH 13.0 OZ/SQ YD

TYPE OF SATURANT XN1

REMARKS Weathered on Roof for One Year.

FIRING DATA

<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
5904	1530	CP
5905	1538	CP
5906	1418	PP
5907	1392	PP
5908	1530	CP
5909	1524	CP
5910	1358	PP
5911	1358	PP
5912	1515	CP
5913	1418	PP
5914	1295	PP
5915	Dud	CP
5916	Dud	CP
5917	Dud	PP
5918	1458	PP
5919	1440	PP
5920	1330	PP
5921	1466	PP
5922	1392	PP
5923	1444	PP

RESTRICTED

RESTRICTED

TRANSPARENT PANEL DATA
SANDWICH

PANEL #637A

PANEL DATE 8/18/49

TYPE OF RIGID MATERIAL - Two Pieces of THICKNESS 3/16 INCHES
Polymethyl Methacrylate

TYPE OF PLIANT MATERIAL Twelve Pieces of THICKNESS 0.015 INCHES
Polyvinyl Butyral

TYPE OF "BACK UP" MATERIAL One Piece of THICKNESS 0.008 INCHES
Nylon Film

PRE HEAT-CYCLE ONE Hour at
130°F (Oven)

REMARKS Acrylic Monomer Used As An Adhesive To Bond
The Pliant Material To The rigid Material

LAMINATING DATA

PLIES 6 PANEL SIZE 12"x15" INCHES

AVERAGE THICKNESS 0.528" AVERAGE WEIGHT 50.4 OZ/SQ FT

MOLDING PRESSURE 200 p.s.i. STEAM PRESSURE 50 LBS

CYCLE 60 Minutes Steam
60 Minutes Water Cooled

REMARKS Edges of Laminate Covered with 1" Transparent
"Scotch" Tape.

FIRING DATA

M.F. 51,300

V₅₀ 1593

RD NO.	STRIKING VELOCITY	RESULT	RD NO.	STRIKING VELOCITY	RESULT
PANEL A			PANEL B		
5924	1804	CP	5940	1612	CP
5925	1833	CP	5941	1588	CP
5926	1552	CP	5942	1530	PP
5927	1600	CP	5943	1612	CP
5928	1395	PP	5944	1539	PP
5929	1336	PP	5945	1520	PP
5930	1572	PP	5946	1650	CP
5931	1500	PP	5947	1668	CP
5932	1470	PP	5948	1572	PP
5933	1600	PP	5949	1539	PP
5934	1608	PP	5950	1492	PP
5935	1673	CP	5951	1598	CP
5936	Dud	CP	5952	1558	PP
5937	1590	PP	5953	1552	PP
5938	Dud	PP	5954	1580	PP
5939	Dud	CP	5955	1694	CP

RESTRICTED

RESTRICTED

TRANSPARENT PANEL DATA

PANEL #637 Cont'd

DATE 8/18/49

FIRING DATA

RD NO. STRIKING VELOCITY RESULT

PANEL C

5972	Dud	CP
5973	1542	PP
5974	1542	PP
5975	1587	CP
5976	1510	PP
5977	1582	PP
5978	1670	CP
5979	Dud	CP
5980	1558	CP
5981	1515	PP
5982	1505	PP
5983	1450	PP
5984	1461	PP
5985	1621	CP
5986	1538	PP
5987	1118	PP

RESTRICTED

RESTRICTED

PANEL DATA

PANEL NO. 638

TEST DATE 8/11/49

SATURATING DATA

TYPE OF CLOTH 2x2 BW Nylon WEIGHT OF CLOTH 13 OZ/SQ YD

TYPE OF SATURANT XN2 RESIN CONTENT 10 % BY WT

REMARKS Crash Helmet Mounted On Clay Head Before Firing

LAMINATING DATA

PLIES 9

FIRING DATA

<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
5845	1180	CP
5846	1058	PP
5847	1062	CP
5848	1008	PP
5849	1046	CP Removed A
5850	978	PP
5851	1115	CP Removed A
5852	860	PP
5853	1040	PP
5854	1048	PP
5855	1248	CP
5856	1100	CP
5857	1038	PP
5858	1094	PP Removed A
5859	1030	PP

RESTRICTED

RESTRICTED

PANEL DATA

PANEL NO. 639

TEST DATE 8/11/49

SATURATING DATA

TYPE OF CLOTH 2x2 BW Nylon WEIGHT OF CLOTH 13.0 OZ/SQ YD

TYPE OF SATURANT XN2

REMARKS Crash Helmet - No Suspension - 500 Grams

LAMINATING DATA

PIES 9

FIRING DATA

RD NO. STRIKING VELOCITY RESULTS

5860	1282	CP
5861	1090	CP
5862	1084	CP
5863	1148	CP
5864	976	PP
5865	982	PP
5866	1142	CP
5867	1092	PP
5868	1068	PP
5869	1132	CP
5870	1220	CP
5871	1006	PP
5872	1088	Furrow
5873	890	" PP
5874	1088	PP
5875	1210	Furrow CP Barely
5876	1220	CP
5877	934	PP

RESTRICTED

PANEL NO. 640

TEST DATE 8/11/49

SATURATING DATA

TYPE OF SATURANT IN1

REMARKS Helmet T21E1

FIRING DATA

<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
5878	900	CP
5879	725	PP
5880	982	CP
5881	828	PP
5882	832	CP
5883	805	PP
5884	750	PP
5885	810	CP

RESTRICTED

RESTRICTED

PANEL NO. 641

TEST DATE 8/11/41

SATURATING DATA

TYPE OF SATURANT XN2

REMARKS: Helmet T21E1

FIRING DATA

RD NO. STRIKING VELOCITY RESULT

5886	874	CP
5887	815	PP
5888	826	PP
5889	650	PP
5890	695	PP
5891	844	PP
5892	980	CP
5893	945	PP
5894	894	PP

RESTRICTED

RESTRICTED

PANEL NO. 642

TEST DATE 8/11/49

SATURATING DATA

TYPE OF SATURANT IN3

RESIN CONTENT 5.6 % BY WT

REMARKS

Helmet T21E1 - Industrial Tape Resin - 290 Grams.

FIRING DATA

<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
5895	815	PP
5896	939	PP
5897	935	CP
5898	618	PP
5899	965	PP
5900	890	PP
5901	882	PP
5902	1255	CP
5903	973	CP

RESTRICTED

PANEL NO. 644

TEST DATE 8/30/49

PANEL DATA

SATURATING DATA

TYPE OF CLOTH 2x2 BW Nylon WEIGHT OF CLOTH 13 OZ/SQ YD
 TYPE OF SATURANT XN2 RESIN CONTENT 9.1 % BY WT
 ROLL SETTING .032 INCHES

REMARKS Resin Used As Received

LAMINATING DATA

PLIES 9 PANEL SIZE 12x15 INCHES
 AVERAGE THICKNESS 0.210" AVERAGE WEIGHT 14.0 OZ/SQ FT
 MOLDING PRESSURE 150 STEAM PRESSURE 100 LBS
 CYCLE 20 Minutes Steam
8 Minutes Water

FIRING DATA

M.F. 101,000

V₅₀ 1190

RD NO.	STRIKING VELOCITY	RESULT	RD NO.	STRIKING VELOCITY	RESULT
5989	1039	PP	6009	1188	PP
5990	1188	CP	6010	Dud	CP
5991	1082	PP	6011	1168	PP
5992	1023	PP	6012	1330	CP
5993	1184	PP	6013	1198	CP
5994	1118	PP	6014	1147	PP
5995	1141	PP	6015	1271	CP
5996	1230	CP	6016	1220	PP
5997	1200	CP	6017	1327	CP
5998	1141	PP	6018	1256	CP
5999	1157	PP	6019	1299	CP
6000	1242	CP	6020	1208	CP
6001	1170	PP	6021	1256	CP
6002	1118	PP	6022	1158	PP
6003	1157	PP	6023	1170	PP
6004	1172	PP	6024	1154	PP
6005	1228	CP	6025	1108	PP
6006	Dud	CP	6026	1289	CP
6007	1265	CP	6027	1240	CP
6008	1196	CP	6028	1238	CP

PANEL NO. 644
Continued

RESTRICTED

FIRING DATA

<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
6029	1223	CP
6030	1285	CP
6031	1192	CP
6032	1154	PP
6033	1128	PP
6034	1139	PP
6035	1203	CP
6036	1159	PP
6037	1217	CP
6038	1188	PP
6039	1132	PP
6040	1210	PP
6041	1142	PP
6042	1094	PP
6043	1217	CP
6044	1247	CP
6045	1281	CP
6046	1156	PP
6047	1212	CP
6048	1138	PP

RESTRICTED

RESTRICTED

PANEL DATA

PANEL NO. 645

TEST DATE 8/30/49

SATURATING DATA

TYPE OF CLOTH 2x2 BW Nylon WEIGHT OF CLOTH 13 OZ/SQ YD
TYPE OF SATURANT XN2 RESIN CONTENT 9.1 % BY WT
ROLL SETTING .032 INCHES

REMARKS Resin Used As Received

LAMINATING DATA

PLIES 7 PANEL SIZE 12x15 INCHES
AVERAGE THICKNESS .165" AVERAGE WEIGHT 10.9 OZ/SQ FT
MOLDING PRESSURE 150 STEAM PRESSURE 100 LBS
CYCLE 20 Minutes Steam
8 Minutes Water

REMARKS Panels Inserted When Plates At 300°F.

FIRING DATA

M.F. 108,300

V50 - 1086

RD NO.	STRIKING VELOCITY	RESULT	RD NO.	STRIKING VELOCITY	RESULT
6049	892	PP	6069	914	PP
6050	1180	CP	6070	1108	PP
6051	927	PP	6071	1122	CP
6052	1002	PP	6072	862	PP
6053	1066	PP	6073	930	PP
6054	1082	PP	6074	1079	PP
6055	1175	CP	6075	1090	PP
6056	1050	PP	6076	771	PP
6057	1022	PP	6077	1142	CP
6058	1008	PP	6078	1252	CP
6059	1222	CP	6079	1120	CP
6060	1154	CP	6080	1288	CP
6061	1092	PP	6081	1129	CP
6062	927	PP	6082	902	PP
6063	1140	CP	6083	1108	PP
6064	1129	CP	6084	847	PP
6065	1015	PP	6085	1081	CP
6066	1100	CP	6086	1143	CP
6067	946	PP	6087	1090	CP
6068	920	PP	6088	1200	CP

RESTRICTED

RESTRICTED

PANEL DATA

PANEL NO. 645 Cont'd

FIRING DATA

V50 - 1086

<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
6089	945	PD
6090	1048	PP
6091	1015	PP
6092	1018	PP
6093	1168	CP
6094	1220	CP
6095	1071	PP
6096	1160	CP
6097	1220	CP
6098	1070	PP
6099	1101	PP
6100	1035	PP
6101	1215	CP
6102	1140	CP
6103	1118	CP
6104	1080	CP
6105	1167	CP
6106	978	PP
6107	1048	PP
6108	1004	PP

RESTRICTED

RESTRICTED

PANEL DATA

PANEL NO. 646

TEST DATE 9/1/49

SATURATING DATA

TYPE OF CLOTH 2x2 BW Nylon WEIGHT OF CLOTH 11.8 OZ/SQ YD
TYPE OF SATURANT XN2 RESIN CONTENT 10.4 % BY WT
ROLL SETTING 0.027 INCHES
REMARKS Coated On Both Sides - Oven Dried -

LAMINATING DATA

PLIES 7 PANEL SIZE 12x15 INCHES
AVERAGE THICKNESS 0.150" AVERAGE WEIGHT 10.2 OZ/SQ FT
MOLDING PRESSURE 150 p.s.i. STEAM PRESSURE 100 LBS
CYCLE 20 Minutes
Steam - 3 Minutes Water

REMARKS Panel Placed In Press When Plates Reached Temperature of 300°F.

M.F. 95,300

FIRING DATA

V50 = 987

RD NO.	STRIKING VELOCITY	RESULT	RD NO.	STRIKING VELOCITY	RESULT
6109	1092	CP	6129	1103	CP
6110	975	PP	6130	1020	CP
6111	966	PP	6131	1047	CP
6112	834	PP	6132	1092	CP
6113	957	PP	6133	1021	CP
6114	1090	CP	6134	1070	CP
6115	1115	CP	6135	1011	PP
6116	940	PP	6136	1050	CP
6117	986	CP	6137	1066	CP
6118	913	PP	6138	1196	CP
6119	1113	CP	6139	1130	CP
6120	1091	CP	6140	964	PP
6121	724	PP	6141	940	PP
6122	956	PP	6142	973	PP
6123	1055	CP	6143	885	PP
6124	1000	CP	6144	918	PP
6125	990	CP	6145	830	PP
6126	944	PP	6146	1009	CP
6127	1150	CP	6147	789	PP
6128	1051	CP	6148	959	PP

RESTRICTED

RESTRICTED

PANEL NO. 646 Continued

PANEL DATA

TEST DATE 9/1/49

FIRING DATA

<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
6149	1082	CP
6150	996	PP
6151	857	PP
6152	897	PP
6153	980	PP
6154	712	PP
6155	1040	CP
6156	1059	CP
6157	897	PP
6158	828	PP
6159	777	PP
6160	1047	CP
6161	877	PP
6162	914	PP
6163	886	PP
6164	945	PP
6165	1145	CP
6166	876	PP
6167	1032	CP
6168	931	PP

RESTRICTED

RESTRICTED

PANEL DATA

PANEL NO. 647

TEST DATE 9/2/49

SATURATING DATA

TYPE OF CLOTH 2x2 BW Nylon WEIGHT OF CLOTH 11.8 OZ/SQ YD
TYPE OF SATURANT XN2 RESIN CONTENT 10.4 % BY WT
ROLL SETTING .027 INCHES

REMARKS Coated on Both Sides

LAMINATING DATA

PLIES 9 PANEL SIZE 12x15 INCHES
AVERAGE THICKNESS 0.190" AVERAGE WEIGHT 13.3 OZ/SQ FT
MOLDING PRESSURE 150 p.s.i. STEAM PRESSURE 100 LBS
CYCLE 20 Minutes Steam
8 Minutes Water

FIRING DATA

M.F. 88,700

V50 - 1050

<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>	<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
6169	1268	CP	6189	1103	CP
6170	1181	CP	6190	1238	CP
6171	1002	PP	6191	921	PP
6172	1253	CP	6192	971	PP
6173	1320	CP	6193	1170	CP
6174	1125	CP	6194	1014	PP
6175	998	PP	6195	1108	CP
6176	1177	CP	6196	949	PP
6177	1165	CP	6197	1102	CP
6178	1066	PP	6198	1118	CP
6179	993	PP	6199	1002	PP
6180	1069	CP	6200	1118	CP
6181	1208	CP	6201	1100	CP
6182	1243	CP	6202	1017	PP
6183	1190	CP	6203	1080	PP
6184	984	PP	6204	1240	CP
6185	919	PP	6205	1080	CP
6186	1016	PP	6206	1136	CP
6187	1014	PP	6207	1167	CP
6188	1004	PP	6208	914	PP

RESTRICTED

RESTRICTED

PANEL DATA

PANEL NO. 647 Cont'd

TEST DATE 9/1/49

FIRING DATA

<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
6209	1088	CP
6210	1085	CP
6211	1057	CP
6212	755	PP
6213	1063	CP
6214	1025	PP
6215	1002	PP
6216	1047	PP
6217	950	PP
6218	1025	PP
6219	1052	CP
6220	1088	CP
6221	1110	CP
6222	1047	PP
6223	652	PP
6224	1285	CP
6226	1160	CP
6227	1126	CP
6228	1152	CP

RESTRICTED

RESTRICTED

PANEL NO. 648

TEST DATE: 9/2/49

Steel Helmet (M-1) with Helmet Liner

V50 BL - 1111

FIRING DATA

RD NO. STRIKING VELOCITY RESULT RD NO. STRIKING VELOCITY RESULT

Not Zero Degrees Obliquity

6229	1103	CP	6259	1228	CP
6230	1007	PP	6260	1312	PP
6231	960	PP	6261	1350	PP
6232	1006	PP	6262	1275	CP
6233	1113	CP	6263	1203	CP
6234	1127	CP	6264	1103	PP
6235	1081	PP	6265	1217	CP
6236	1155	CP	6266	1217	PP
6237	1170	CP	6267	1275	CP
6238	895	PP	6268	1203	CP
6239	990	PP	6269	1117	CP
6240	1093	PP	6270	1221	CP
6241	973	PP	6271	1072	CP
6242	1203	CP	6272	1155	CP
6243	971	PP	6273	941	PP
6244	1280	CP	6274	849	PP
6245	1015	PP	6275	945	PP
6246	1080	CP	6278	1127	PP
6247	1063	PP	6277	1165	CP
6248	1093	CP	6273	1243	CP
6249	1150	PP	6279	1014	PP
6250	1097	PP	6280	1011	PP
6251	1074	PP	6281	1235	CP
6252	1136	PP	6282	1192	CP
6253	1155	PP	6283	1043	CP
6254	1248	PP	6284	1070	CP
		Rit "A" Frame	6285	914	PP
6255	1212	PP	6286	984	PP
6256	1305	PP	6287	1029	PP
6257	1305	CP	6288	870	PP
6258	1288	PP	6289	1132	CP

RESTRICTED

RESTRICTED

PANEL DATA

PANEL NO. 549

TEST DATE 9/7/49

SATURATING DATA

TYPE OF CLOTH 2x2 BW Nylon WEIGHT OF CLOTH 13 OZ/SQ YD
TYPE OF SATURANT KN2 RESIN CONTENT 10.5 % BY WT
ROLL SETTING 1st .031" INCHES
5.6 Percent - 2nd .032" INCHES
4.9 Percent

REMARKS Coated On Both Sides

LAMINATING DATA

PIES 9 PANEL SIZE 12x15 INCHES
MOLDING PRESSURE 150 p.s.i. AVERAGE WEIGHT 11.35 OZ/SQ FT
CYCLE 20 Minutes STEAM PRESSURE 100 LBS
Steam - 8 Minutes Water

REMARKS Panel Inserted When Plates At 300°F.

FIRING DATA

M.F. 91600

V50 - 1150

<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>	<u>RD NO.</u>	<u>STRIKING VELOCITY</u>	<u>RESULT</u>
6290	1069	PP	6310	1220	CP
6291	1118	PP	6311	1072	PP
6292	Dud	CP	6312	1177	PP
6293	1143	PP	6313	1136	PP
6294	1103	PP	6314	1093	PP
6295	1198	CP	6315	1075	PP
6296	1080	PP	6316	1226	CP
6297	1251	CP	6317	1136	PP
6298	1070	PP	6318	1210	CP
6299	1138	PP	6319	1197	PP
6300	1180	CP	6320	1258	CP
6301	1147	CP	6321	1210	CP
6302	1179	CP	6322	1279	CP
6303	1090	PP	6323	Dud	CP
6304	1043	PP	6324	1229	CP
6305	1085	PP	6325	1155	CP
6306	1091	PP	6326	1333	CP
6307	1130	PP	6327	1209	CP
6308	1052	PP	6328	1197	CP
6309	1242	CP	6329	1130	PP

RESTRICTED

RESTRICTED

PANEL NO. 649 Cont'd

TEST DATE 9/7/49

FIRING DATA

V₅₀ - 1150

RD NO. STRIKING VELOCITY RESULT

6330	Dud	PP
6331	1043	PP
6332	1291	CP
6333	1047	PP
6334	1120	PP
6335	1177	CP
6336	1022	PP
6337	1262	CP
6338	1104	PP
6339	1173	CP
6340	1126	PP
6341	1177	CP
6342	1177	PP
6344	1160	CP
6343	1120	PP
6345	1248	CP
6346	1220	CP
6347	1190	CP
6348	1177	CP
6349	1279	CP

RESTRICTED

PANEL DATA

PANEL NO. 650

TEST DATE 9/8/49

SATURATING DATA

TYPE OF CLOTH 2x2BW Nylon WEIGHT OF CLOTH 13 OZ/SQ Y
TYPE OF SATURANT XN2 RESIN CONTENT 10.5 % BYWT
ROLL SETTING 1st .031 INCHES
5.6 Percent
4.9 Percent
2nd .032

REMARKS Coated On Both Sides - Oven Dried 150°F.

LAMINATING DATA

PLIES 7 PANEL SIZE 12x15 INCHES
MOLDING PRESSURE 150 p.s.i. AVERAGE WEIGHT 10.18 OZ/SQ F
CYCLE 90 Minutes STEAM PRESSURE 100 LBS
Steam - 8 Minutes Water

REMARKS Panel Inserted When Plates at 300°F

MF - 109,000

FIRING DATA

V50 - 1050

RD NO.	STRIKING VELOCITY	RESULT	RD NO.	STRIKING VELOCITY	RESULT
6350	928	PP	6370	1047	PP
6351	930	PP	6371	960	PP
6352	1066	CP	6372	964	PP
6353	952	PP	6373	995	PP
6354	1027	PP	6374	1087	CP
6355	1210	CP	6375	1103	CP
6356	1029	PP	6376	1029	PP
6357	1099	CP	6377	1037	PP
6358	956	PP	6378	1032	PP
6359	1078	CP	6379	1068	PP
6360	990	PP	6380	1173	CP
6361	978	PP	6381	1165	CP
6362	1139	CP	6382	1048	PP
6363	1047	PP	6383	1091	CP
6364	1008	PP	6384	947	PP
6365	1160	CP	6385	Dud	CP
6366	1110	CP	6386	1078	CP
6367	1081	CP	6387	989	PP
6368	1165	CP	6388	1057	CP
6369	1087	CP	6389	934	PP

RESTRICTED

RESTRICTED

PANEL NO. 650 Cont'd

TEST DATE 9/8/49

FIRING DATA

M.F. 109,000

V₅₀ - 1050

RD NO. STRIKING VELOCITY RESULT

6390	1061	PP
6391	960	PP
6392	1054	PP
6393	925	PP
6394	1077	CP
6395	1059	CP
6396	1020	PP
6397 -	1094	CP
6398	1072	PP
6399	1109	CP
6400	1032	PP
6401	1044	PP
6402	1021	PP
6403	934	PP
6404	915	PP
6405	1173	CP
6406	1129	CP
6407	1077	CP
6408	79b	PP
6409	929	PP

RESTRICTED