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REINFORCED PLASTIC SONAR DOME MATERIAL INVESTIGATION. VOLUME II--ETC(U)
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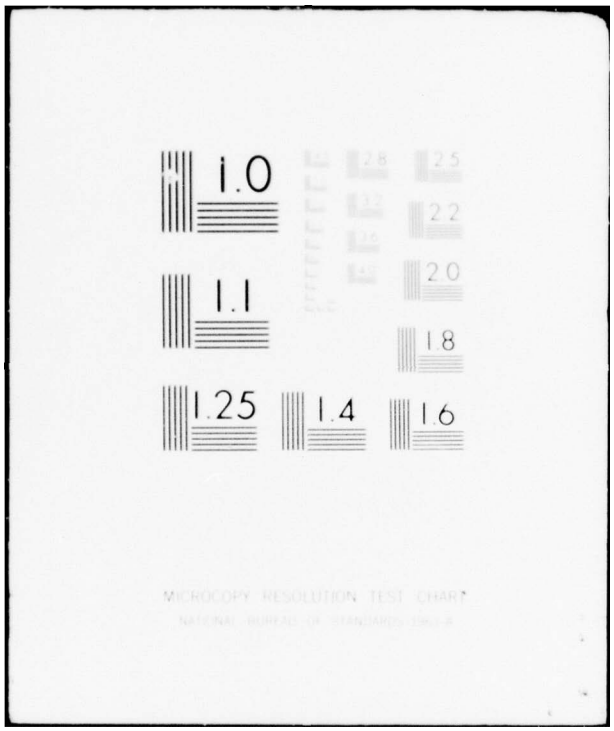
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Molders & Fabricators of Reinforced Plastics

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MATERIALS AND PRODUCTION OF PANEL #308-M

MATERIALS

Reinforcement:	Turner Halsey S-1313 Polypropylene.
Resin:	90% Allied rigid PE-941 and 10% Allied flexible PE-9600 Polyester resin.
Catalyst:	0.5% Methyl Ethyl Ketone Peroxide.
Promoter:	0.2% Cobalt Napthenate.

PRODUCTION OF PANEL

Panel was fabricated in two stages, each with 22 plies of reinforcement. Each ply had its warp direction rotated 45° from the preceding ply. Since Turner Halsey does not manufacture S-1313 in widths larger than 60", many plies were constructed of more than one piece of reinforcement. When a ply of reinforcement contained more than one single piece of reinforcement, butt joints were used and staggered throughout the panel.

Wrinkles formed in the panel from the exotherm caused by polymerization of the resin. When subjected to 200°F for 40 hours, panel warped. Because the panel warped during post curing, a second panel was made and allowed to cure at room temperature for 30 days.

MATERIALS AND PRODUCTION OF PANEL #408-M

MATERIALS

Reinforcement:	Turner Halsey S-1313 Polypropylene.
Resin:	90% Allied rigid PE-941 and 10% Allied flexible PE-9600 Polyester resin.
Catalyst:	0.6% Methyl Ethyl Ketone Peroxide.
Promoter:	0.2% Cobalt Napthenate.

PRODUCTION OF PANEL

Panel was fabricated in four stages, each containing 44 plies of reinforcement. Each ply had its warp direction rotated 45° from the preceding ply. Since Turner Halsey does not manufacture S-1313 in widths larger than 60", many plies were constructed of more than one single piece of reinforcement. When a ply of reinforcement contained more than one single piece of reinforcement, butt joints were used and staggered throughout the panel.

Wrinkles formed in the panel from the exotherm caused by polymerization of the resin. When subjected to 200°F for 40 hours, the panel warped. Because the panel warped during post curing, a second panel was made and allowed to cure at room temperature for 30 days.

MATERIALS AND PRODUCTION OF PANEL #322

MATERIALS

Reinforcement: 181 Fabric.

Resin: 50% Ciba rigid 509 and 50% Ciba flexible 508 Epoxy resin.

Hardener: 24% Ciba DP-138.

PRODUCTION OF PANEL

Panel was fabricated in two stages, each with 39 plies of reinforcement.

The viscosity of the resin hindered removal of air from the panel. When fabrication of panel #422 began, the number of plies of reinforcement was decreased per stage to overcome this difficulty. From the results of Panel #422 fabrication, this panel should be made in at least three stages to obtain a void-free panel.

The gel time schedule for the epoxy mixture used is approximately 25 to 35 hours at 72°F.

From experience in fabrication of vacuum molded panels with this epoxy, if such a gel schedule is used, the panel should be left under vacuum for an additional 24 hours after gel. As an alternative procedure, which was used for this panel, subjecting the panel to a temperature of 100°F for 24 hours is sufficient to gel the panel and allow removal from vacuum.

After fabrication was completed the panel was post cured for 24 hours at 225°F.

MATERIALS AND PRODUCTION OF PANEL #422

MATERIALS

Reinforcement: 181 Fabric.

Resin: 50% Ciba rigid 509 and 50% Ciba flexible 508 Epoxy resin.

Hardener: 24% Ciba DP-138.

PRODUCTION OF PANEL

The viscosity of the epoxy mix was slightly higher than the polyesters used and therefore increased the difficulty of removing excess resin and air from the panel. Because of the anticipated difficulty in removing the air, the first stage contains only 10 plies of 181 fabric. No difficulty was encountered in removing air from the first stage so the amount of fabric was increased to 15 plies in the second stage. Again no difficulty in removing air was encountered. The third and fourth stages contain 20 plies each and the difficulty in removing the air began to increase. The fifth and last stage contains 30 plies and a great amount of time and energy was needed to remove the air.

The gel time for the epoxy mixture used is approximately 25 to 35 hours at 72°F. From experience in fabrication of vacuum molded panels with this epoxy, if such a gel schedule is used, the panel should be left under vacuum for an additional 24 hours after gel. As an alternative procedure, which was used for this panel, subjecting the panel to a temperature of 100°F for 24 hours is sufficient to gel the panel and allow removal from vacuum.

After fabrication was completed the panel was post cured for 48 hours at 220°F.

MATERIALS AND PRODUCTION OF PANEL #311-M

MATERIALS

Reinforcement:	Wellington Sears SN-308 Nylon.
Resin:	90% Allied rigid PE-941 and 10% Allied flexible PE-9600 Polyester resins.
Catalyst:	0.6% Methl Ethyl Ketone Peroxide.
Promoter:	0.2% Cobalt Napthenate.

PRODUCTION OF PANEL

The warp direction of the reinforcement in this panel has been rotated 45° from the warp direction of the preceding ply. Due to warpage when post cured at 225°F for 24 hours, the first panel was discarded and a second one fabricated. The second panel was fabricated in one stage and contains 30 plies.

After room temperature gel, the panel was allowed to cure at room temperature for 30 days.

MATERIALS AND PRODUCTION OF PANEL #411-M

MATERIALS

Reinforcement:	Wellington Sears SN-308 Nylon.
Resin:	90% Allied rigid PE-941 and 10% Allied flexible PE-9600 Polyester resins.
Catalyst:	0.6% Methyl Ethyl Ketone Peroxide.
Promoter:	0.2% Cobalt Napthenate.

PRODUCTION OF PANEL

The warp direction of the reinforcement in this panel was rotated 45°from the warp direction of the preceding ply. Due to warpage when post cured at 200°F for 48 hours, the first panel was discarded and a second one fabricated.

The second panel was fabricated in one stage and contains 60 plies. After room temperature gel, the panel was allowed to cure at room temperature for 30 days.

MATERIALS AND PRODUCTION OF PANEL #349-M

MATERIALS

Reinforcement: Owens-Corning OCF-ECF 12% elastomer coated glass and 181 fabric.

Resin: 90% Allied rigid PE-941 and 10% Allied flexible PE-9600 Polyester resins.

Catalyst: 0.6% Methyl Ethyl Ketone Peroxide.

Promoter: 0.1% Cobalt Napthenate.

PRODUCTION OF PANEL

Panel was fabricated in two stages, each containing 36 plies of reinforcement. The reinforcements in the panel were alternated from ply to ply with both surfaces of the finished panel containing the 181 reinforcement. Besides alternating the reinforcements, the warp direction of every group of two plies (each group contains one ply 181 and one ply Owens-Corning OCF-ECF with parallel warp directions) of fabric has been rotated 45^{o} from the preceding group's warp direction.

Owens-Corning OCF-ECF reinforcement presents a handling problem because of the unidirectional weave and loose binder of the material. Once cut to desired pattern dimensions, the fabric unravels and loses its integrity. When attempting to remove excess resin and air from the panel, the plies of OCF-ECF shift and move from pre-arranged positions resulting in a different warp direction than desired. If the fabric is held in position by tape, the warp direction still shifts because there is no binder to hold each individual strand into position. Due to the distance between strands, approximately 1/16", air is trapped in these voids and cannot be easily removed.

After room temperature gel, panel was allowed to cure at room temperature for 30 days. Panel was not post cured at elevated temperatures because of the elastomer on the Owens-Corning fabric.

MATERIALS AND PRODUCTION OF PANEL #449-M

MATERIALS

Reinforcement: Owens-Corning OCF-ECF 12% elastomer coated glass and 181 fabric.

Resin: 90% Allied rigid PE-941 and 10% Allied flexible PE-9600 Polyester resin.

Catalyst: 0.6% Methyl Ethyl Ketone Peroxide.

Promoter: 0.1% Cobalt Napthenate.

PRODUCTION OF PANEL

Panel was fabricated in three stages. The first and second stages contain 36 plies each and the third contains 32 plies of reinforcement. The reinforcements in the panel were alternated from ply to ply with both surfaces of the finished panel containing the 181 reinforcement. Besides alternating the reinforcements, the warp direction of every group of two plies (each group contains one ply 181 and one ply of Owens-Corning OCF-ECF with parallel warp directions) of fabric has been rotated 45^{0} from the preceding group's warp direction.

Owens-Corning OCF-ECF reinforcement presents a handling problem because of the unidirectional weave and loose binder of the material. Once cut to desired pattern dimensions, the fabric unravels and loses its integrity. When attempting to remove excess resin and air from the panel, the plies of OCF-ECF shift and move from pre-arranged positions, resulting in a different warp direction than desired. If the fabric is held in position by tape, the warp direction still shifts because there is no binder to hold each individual strand into position. Due to the distance between strands, approximately 1/16", air is trapped in these voids and cannot be easily removed.

After room temperature gel, panel was allowed to cure at room temperature for 30 days. Panel was not post cured at elevated temperatures because of the elastomer on the Owens-Corning fabric.

MATERIALS AND PRODUCTION OF PANEL #360

MATERIALS

Reinforcement: Owens-Corning S-901/81 S-Glass.

Resin: 20% Allied rigid PE-941 and 80% Allied flexible PE-9600 Polyester resin.

Catalyst: 0.5% Methyl Ethyl Ketone Peroxide.

Promoter: 0.15% Cobalt Napthenate.

PRODUCTION OF PANEL

Panel was fabricated in two stages. First stage contains 38 plies and the second stage contains 28 plies.

Because of the special finish on the glass, removal of excess resin and air was difficult.

After room temperature gel, panel was post cured at 200°F for 44 hours.

MATERIALS AND PRODUCTION OF PANEL #460

MATERIALS

Reinforcement: Owens-Corning S-901/81 S-Glass.

Resin: 20% Allied rigid PE-941 and 80% Allied flexible PE-9600 Polyester resin.

Catalyst: Resin was catalized with 0.5% Methyl Ethyl Ketone Peroxide.

Promoter: 0.1% Cobalt Napthenate.

PRODUCTION OF PANEL

Panel was fabricated in four stages. Each stage contains 38 plies of reinforcement.

Because of the special finish on the glass, removal of excess resin and air was difficult.

After room temperature gel, panel was post cured at 200°F for 72 hours.

MATERIALS AND PRODUCTION OF PANEL #503

MATERIALS

Reinforcement: 181 Fabric.

Resin: 90% Allied rigid PE-941 and 10% Allied flexible PE-9600 Polyester resins.

Catalyst: 0.5% Methyl Ethyl Ketone Peroxide.

Promoter: 0.15% Cobalt Napthenate.

PRODUCTION OF PANEL

Panel was fabricated in two stages, each containing 39 plies of reinforcement. No special production requirements or caution was needed during fabrication.

Panel gelled at room temperature and was post cured at 200°F for 72 hours.

MATERIALS AND PRODUCTION OF PANEL #603

MATERIALS

Reinforcement: 181 Fabric.

Resins: 90% Allied rigid PE-941 and 10% Allied flexible PE-9600 Polyester resins.

Catalyst: 0.5% Methyl Ethyl Ketone Peroxide.

Promoter: 0.15% Cobalt Napthenate.

PRODUCTION OF PANEL

Panel was fabricated in four stages. First stage contains 32 plies of reinforcement, the second and third stages contain 36 plies each and the fourth stage contains 25 plies of reinforcement. No special production requirements or caution was needed during fabrication.

Panel gelled at room temperature and was post cured at 200°F for 72 hours.

MATERIALS AND PRODUCTION OF PANEL #526

MATERIALS

Reinforcement: 181 Fabric.

Resin: Ciba 6005 Epoxy Resin.

Hardener: 8% Ciba 951.

PRODUCTION OF PANEL

Panel was fabricated in three stages, each containing 24 plies of reinforcement.

The viscosity of Ciba 6005 epoxy is 7,000 to 10,000 cps at 25°C and because of this high viscosity, removal of excess resin and air is difficult. To ease removal of air and excess resin each stage was reduced to 24 plies instead of the normal 32 - 36 plies.

Panel was allowed to gel at room temperature and was post cured at 200°F for 50 hours.

MATERIALS AND PRODUCTION OF PANEL #626

MATERIALS

Reinforcement: 181 Fabric.

Resin: Ciba 6005 Epoxy Resin.

Hardener: 8% Ciba 951.

PRODUCTION OF PANEL

Panel was fabricated in five stages, each containing 24 plies of reinforcement.

The viscosity of Ciba 6005 Epoxy is 7,000 to 10,000 cps at 77°F and because of this high viscosity, removal of excess resin and air is difficult. To facilitate removal of air and excess resin, each stage was reduced to 24 plies instead of the normal 32 to 36 plies.

Panel was allowed to gel at room temperature and then post cured at 200°F for 50 hours.

MATERIALS AND PRODUCTION OF PANEL #626

MATERIALS

Reinforcement: 181 Fabric.

Resin: Ciba 6005 Epoxy Resin.

Hardener: 8% Ciba 951.

PRODUCTION OF PANEL

Panel was fabricated in five stages, each containing 24 plies of reinforcement.

The viscosity of Ciba 6005 Epoxy is 7,000 to 10,000 cps at 77°F and because of this high viscosity, removal of excess resin and air is difficult. To facilitate removal of air and excess resin, each stage was reduced to 24 plies instead of the normal 32 to 36 plies.

Panel was allowed to gel at room temperature and then post cured at 200°F for 50 hours.

MATERIALS AND PRODUCTION OF PANEL #532

MATERIALS

Reinforcement: 181 fabric.

Resin: 10% Allied rigid PE-941 and 90% Allied flexible PE-9600 Polyester resin. An additional 4% Styrene Monomer was added to decrease viscosity.

Catalyst: 0.5% Methyl Ethyl Ketone Peroxide.

Promoter: 0.1% Cobalt Napthenate.

PRODUCTION OF PANEL

Panel was fabricated in two stages. First stage contains 36 plies of reinforcement and the second stage contains 34 plies. There were no special production techniques required in fabrication of this panel.

After room temperature gel, panel was post cured for 72 hours at 180°F.

MATERIALS AND PRODUCTION OF PANEL #632

MATERIALS

Reinforcement: 181 fabric.

Resin: 10% Allied rigid PE-941 and 90% Allied flexible PE-9600 Polyester resin. An additional 4% Styrene Monomer was added to decrease viscosity.

Catalyst: 0.5% Methyl Ethyl Ketone Peroxide.

Promoter: 0.1% Cobalt Napthenate.

PRODUCTION OF PANEL

Panel was fabricated in four stages. Stages one, three and four contain 36 plies of reinforcement and stage two contains 34 plies. There were no special production techniques required in fabrication of this panel.

After room temperature gel, panel was post cured at 180°F for 72 hours.

MATERIALS AND PRODUCTION OF PANEL #535

MATERIALS

Reinforcement: 181 fabric and Turner Halsey S-1313 Polypropylene fabric.

Resin: 50% Allied rigid PE-941 and 50% Allied flexible PE-9600 Polyester resins.

Catalyst: 0.6% Methyl Ethyl Ketone Peroxide.

Promoter: 0.1% Cobalt Napthenate.

PRODUCTION OF PANEL

Panel was fabricated in two stages. Both stages contain 36 plies of reinforcement with 181 fabric as the surface material of the finished panel. The two reinforcements were arranged so that three consecutive plies were 181 and the next ply was polypropylene. This arrangement was used throughout fabrication of panel.

The specific gravity of polypropylene is approximately the same as the resin and, as a result, the polypropylene "floats" in the resin and it is difficult to keep each ply's warp direction parallel to each other.

Since polypropylene is a synthetic material and has a tendency to warp when subjected to elevated temperatures, the panel was allowed to gel at room temperature and cure at the same temperature for 30 days.

MATERIALS AND PRODUCTION OF PANEL #635

MATERIALS

Reinforcement:	181 fabric and Turner Halsey S-1313 Polypropylene fabric.
Resin:	50% Allied rigid PE-941 and 50% Allied flexible PE-9600 Polyester resin.
Catalyst:	0.6% Methyl Ethyl Ketone Peroxide.
Promoter:	0.1% Cobalt Napthenate.

PRODUCTION OF PANEL

Panel was fabricated in four stages, each containing 36 plies of reinforcement. The two reinforcements used were arranged so that three consecutive plies were 181 and the next ply was polypropylene. This arrangement was used repeatedly throughout the fabrication of the panel.

The specific gravity of polypropylene is approximately the same as the resin and, as a result, the polypropylene "floats" in the resin and it is difficult to keep each ply's warp direction parallel to each other.

Since polypropylene is a synthetic material and has a tendency to warp when subjected to elevated temperatures, the panel was allowed to gel at room temperature and cure at the same temperature for 30 days.

MATERIALS AND PRODUCTION OF PANEL #537-M

MATERIALS

Reinforcement:	181 Fabric.
Resin:	90% Allied rigid PE-941 and 10% Allied flexible PE-9600 Polyester resins.
Catalyst:	0.6% Methyl Ethyl Ketone Peroxide.
Promoter:	0.1% Cobalt Napthenate.

PRODUCTION OF PANEL

Panel was fabricated in two stages. First stage contains 37 plies and second stage contains 34 plies of reinforcement. The panel was constructed with the warp direction of each ply rotated 45° from the preceding ply.

During fabrication some of the plies shifted. The plies which shifted and reoriented their warp direction were those plies whose prearranged warp direction was at 45° and 135° to the panel's edge.

Panel gelled at room temperature and was post cured at 200°F for 72 hours.

MATERIALS AND PRODUCTION OF PANEL #637-M

MATERIALS

Reinforcement: 181 Fabric.

Resin: 90% Allied rigid PE-941 and 10% Allied flexible PE-9600 Polyester resins.

Catalyst: 0.65% Methyl Ethyl Ketone Peroxide.

Promoter: 0.1% Cobalt Napthenate.

PRODUCTION OF PANEL

Panel was fabricated in four stages. First stage contains 37 plies, second stage contains 34 plies and, both third and fourth stages contain 36 plies of reinforcement each. The panel was constructed with the warp direction of each ply rotated 45° from the preceding ply.

During fabrication some of the plies shifted. The plies which shifted and reoriented their warp direction were those plies whose prearranged warp direction was at 45° and 135° to the panel's edge.

Panel gelled at room temperature and was post cured at 200°F for 72 hours.

MATERIALS AND PRODUCTION OF PANEL #551

MATERIALS

Reinforcement: Wellington Sears S-81 Fortisan.

Resin: Ciba 6005 Epoxy resin with 10% Ciba reactive diluent RD-1.

Hardner: 9.5% Ciba 951.

PRODUCTION OF PANEL

The viscosity of Ciba 6005 Epoxy at 25°C is 7,000 - 10,000 cps and, because of this, 10% RD-1 diluent was added to reduce viscosity. The lower viscosity was needed because the epoxy resin does not penetrate through the Fortisan fabric readily at 10,000 cps.

To allow adequate time for penetration of the resin through the reinforcement and completion of fabrication, the size of each stage was reduced. The panel was fabricated in three stages with the first stage containing 25 plies, the second 24 plies and, the third 30 plies of reinforcement.

The panel was allowed to gel at room temperature. During the gelling stage wrinkles began to form as the polymerization exotherm increased. To reduce chances of further wrinkling or warping of the panel, the panel was cured at room temperature for 30 days.

MATERIAL AND PRODUCTION OF PANEL #651

MATERIALS

Reinforcement: Wellington Sears S-81 Fortisan.

Resin: Ciba 6005 Epoxy resin with 10% Ciba reactive diluent RD-1.

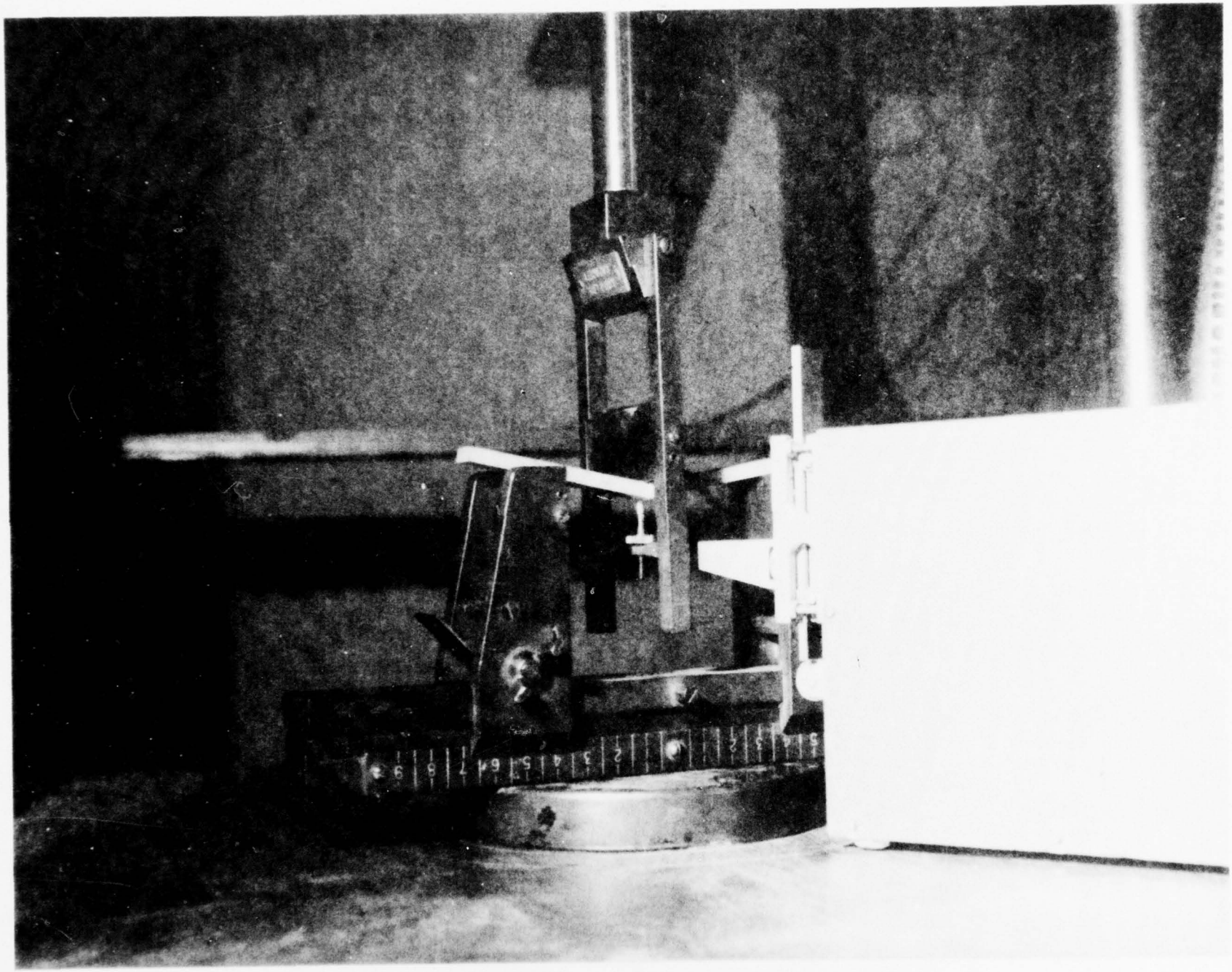
Hardner: 9.5% Ciba 951.

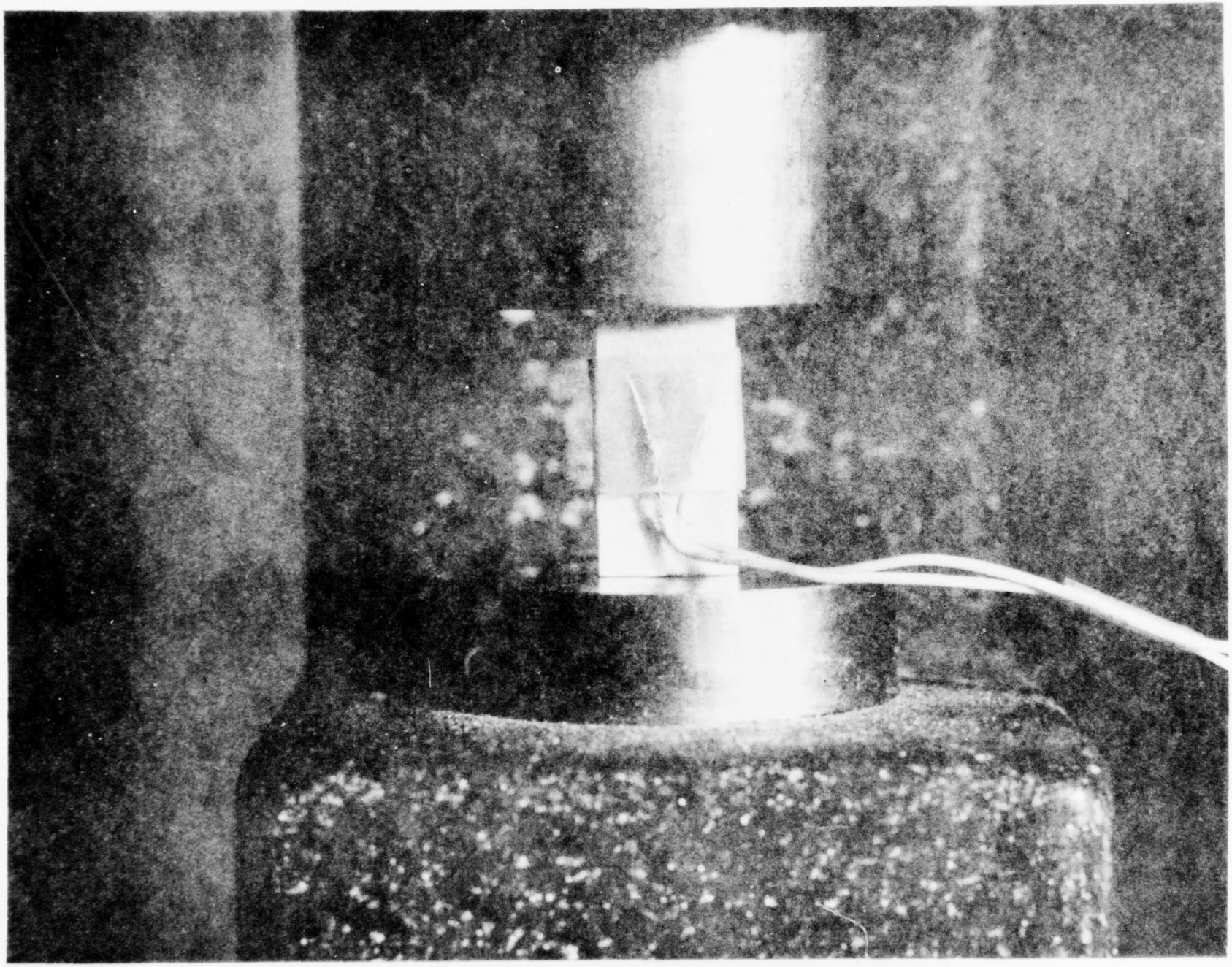
PRODUCTION OF PANEL

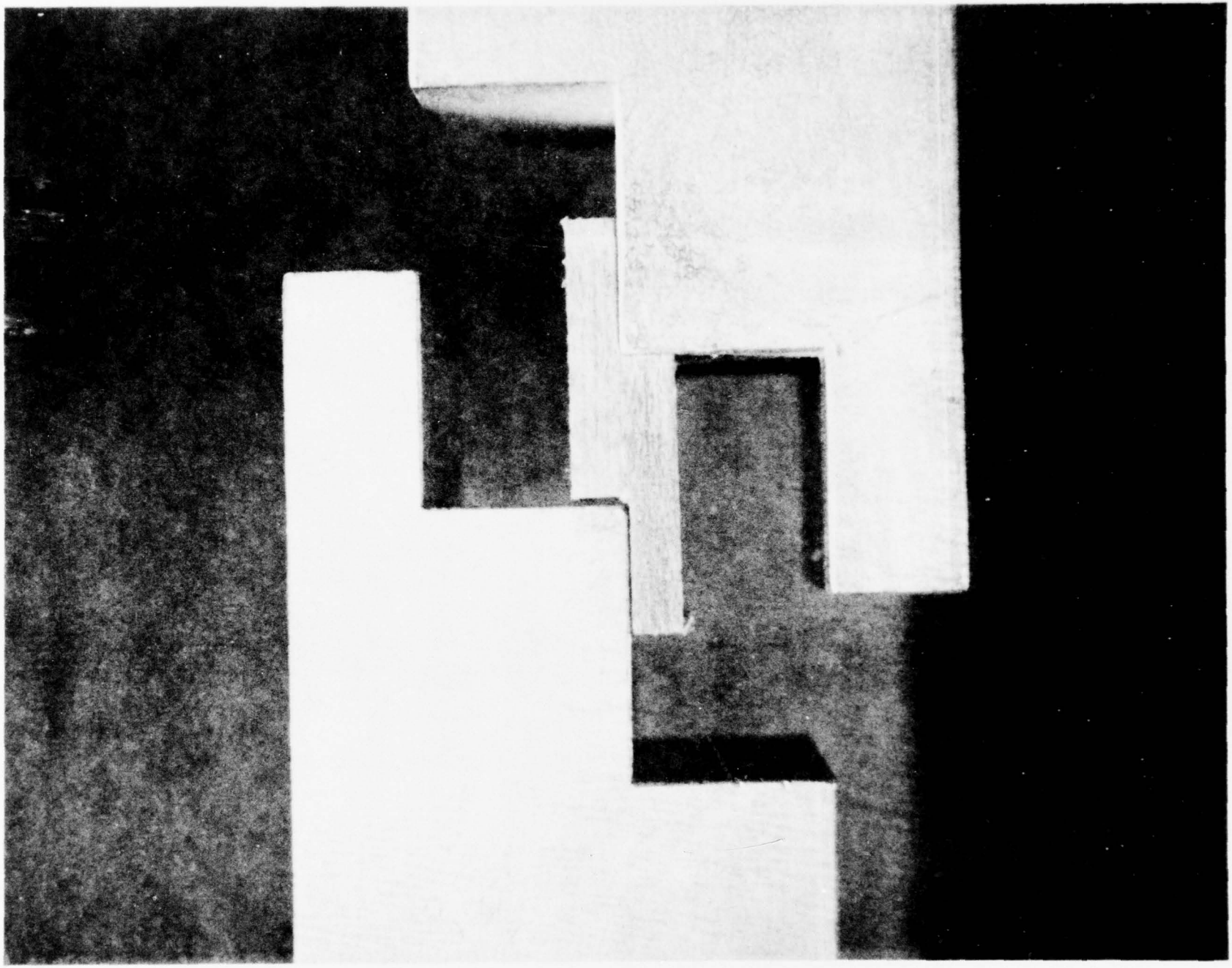
The viscosity of Ciba 6005 Epoxy at 25°C is 7,000 - 10,000 cps and, because of this, 10% RD-1 diluent was added to reduce viscosity. The lower viscosity was needed because the epoxy resin does not penetrate through the Fortisan fabric readily at 10,000 cps.

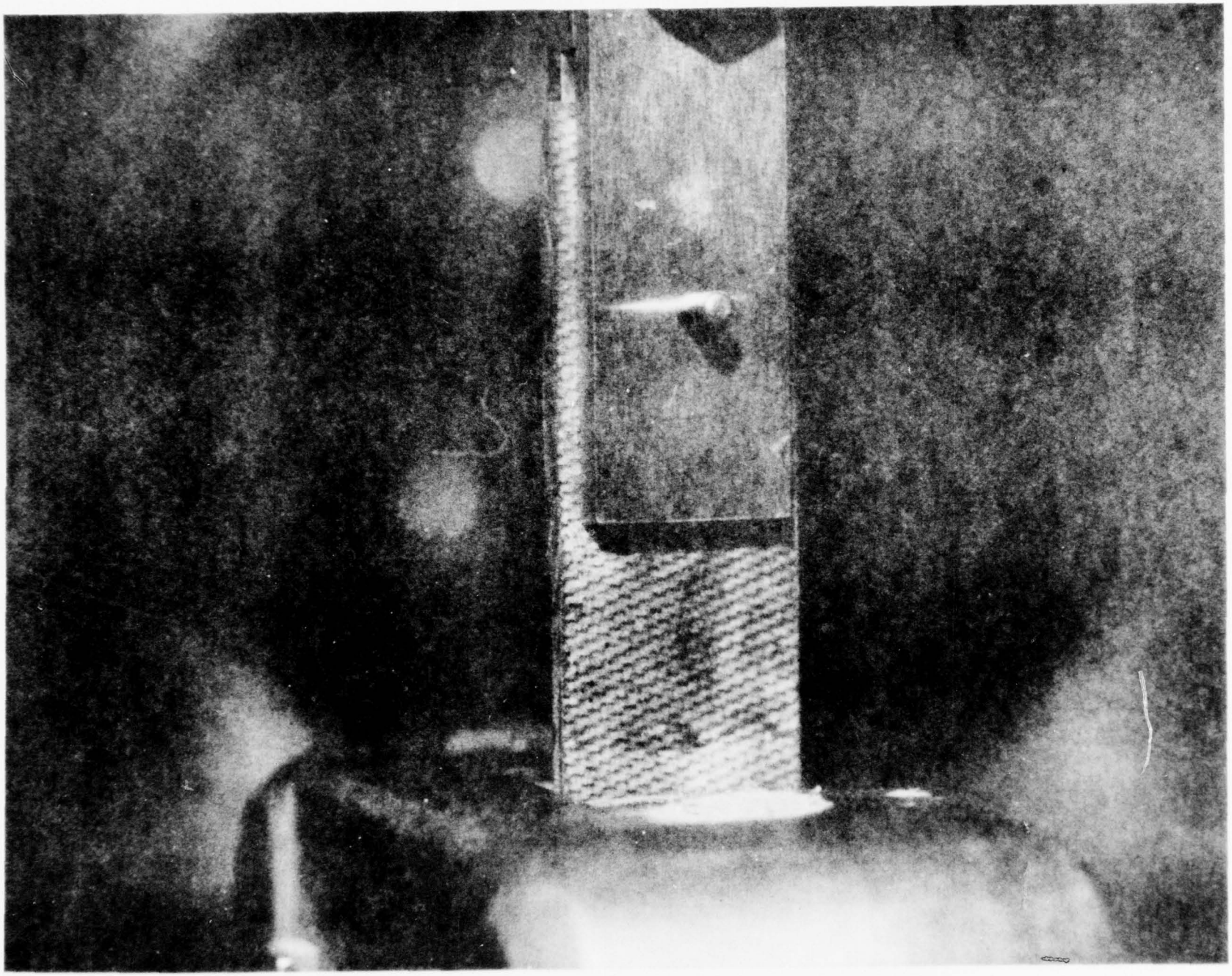
To allow adequate time for penetration of the resin through the reinforcement and completion of fabrication, the size of each stage was reduced. The panel was fabricated in five stages with 25 plies in the first stage, 24 plies in the second and, 30 plies in each of the remaining three stages.

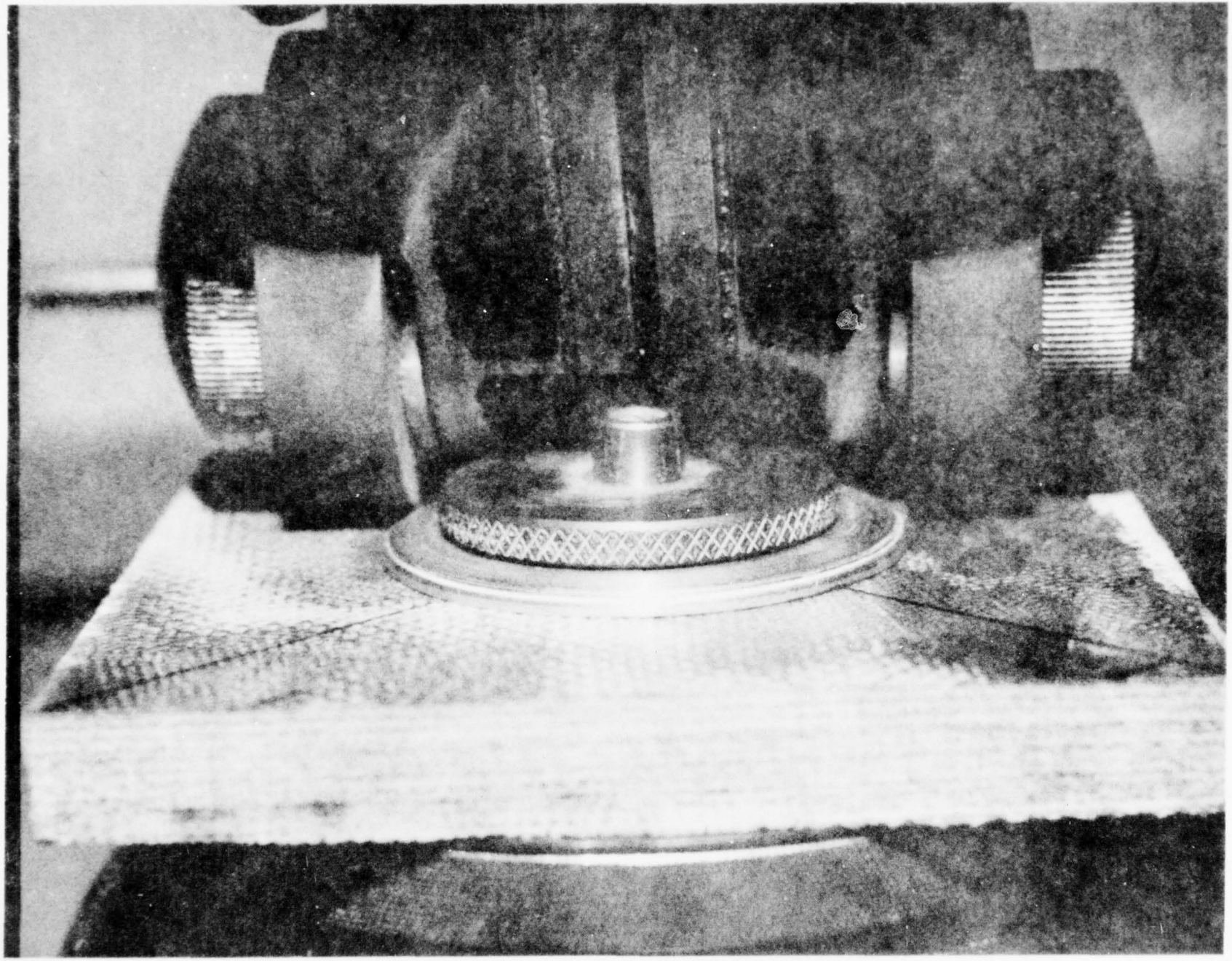
The panel was allowed to gel at room temperature. During the gelling stage, wrinkles began to form as the polymerization exotherm increased. To reduce chances of further wrinkling or warping of the panel, the panel was cured at room temperature for 30 days.

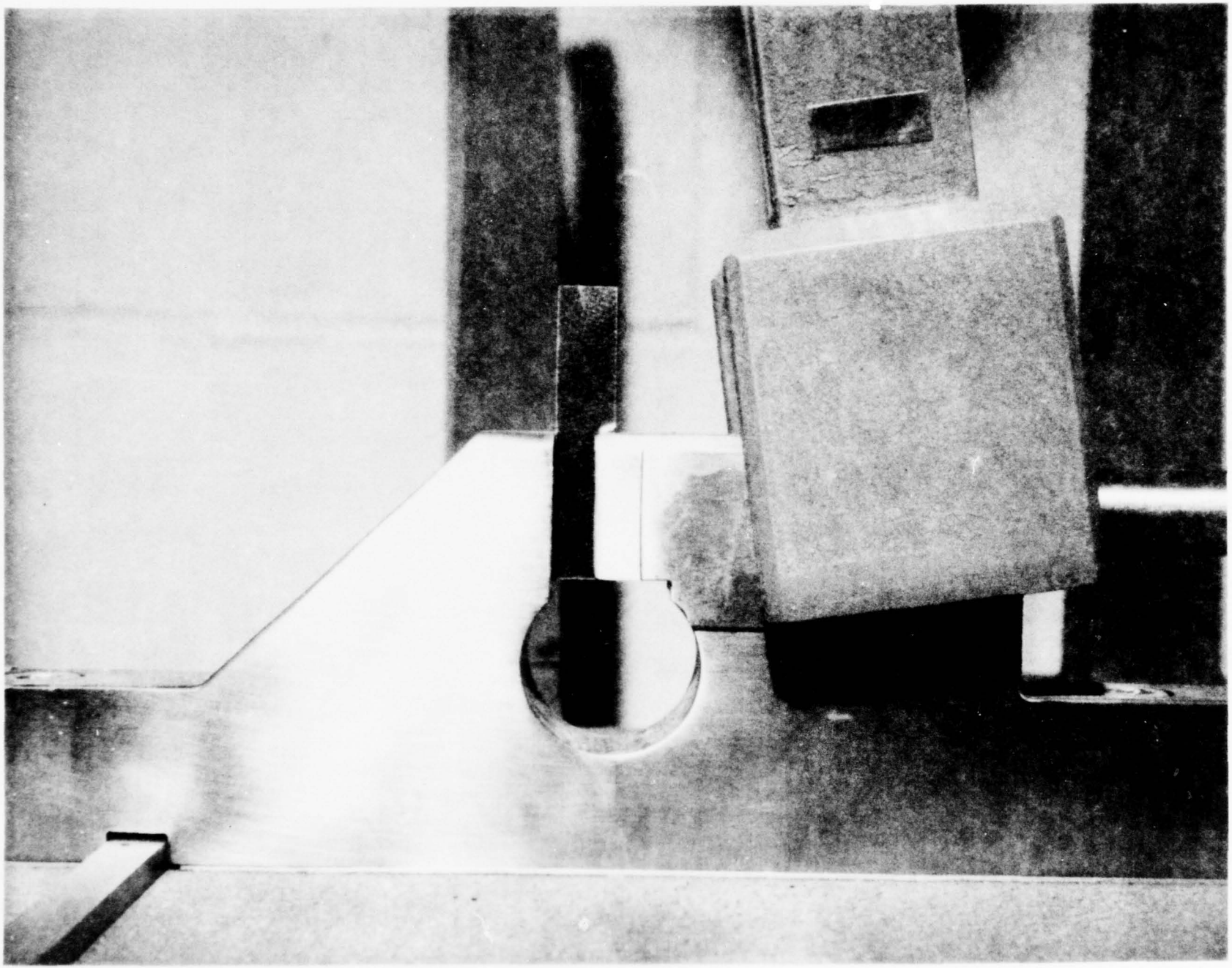












METHODS OF MECHANICAL MEASUREMENT AND CALCULATION

Flexural Strength and Modulus of Elasticity

A. Mechanical measurements were performed as outlined in Federal Test Method Standard Number 406, method 1031.

B. Flexural strength was calculated using the following equation:

$$S = \frac{3PL}{2bd^2}$$

where:

S = Ultimate flexural strength - PSI.

P = Ultimate load - pounds

L = Span length - inches

b = Specimen width - inches

d = Specimen thickness - inches

C. Flexural modulus of elasticity was calculated using the following equation:

$$E_m = \frac{l^3 m}{4bd^3}$$

where:

E_m = Flexural modulus of elasticity - PSI

l = Span length - inches

m = Slope of the tangent to the initial straight-line portion of the load deflection curve - pounds per inch.

b = Specimen width - inches

d = Specimen thickness - inches

TENSILE STRENGTH AND MODULUS

A. Mechanical measurements were performed as outlined in Federal Test Method Standard Number 406, method 1011.

B. Tensile strength was calculated using the following equation:

$$S = \frac{P}{bd}$$

where:

S = Ultimate tensile strength-PSI

P = Ultimate load - pounds

b = Specimen width - inches

d = Specimen thickness - inches

C. Tensile modulus of elasticity was calculated using the following equation:

$$E_m = \frac{\text{Stress}}{\text{Strain}}$$

where:

$\frac{\text{Stress}}{\text{Strain}}$ = Calculated by drawing a line tangent to the initial linear portion of the Stress-Strain curve and selecting a value for the Stress and dividing by the corresponding value for Strain.

COMPRESSIVE STRENGTH AND MODULUS

A. Mechanical measurements were performed as outlined in Federal Test Method Standard Number 406, method 1021.

B. Compressive strength was calculated using the following equation:

$$S = \frac{P}{bd}$$

where:

S=Ultimate compressive strength-PSI
b=Specimen width-inches
d=Specimen thickness - inches
P=Ultimate load - pounds

C. Compressive modulus was calculated using the following equation:

$$E_m = \frac{\text{Stress}}{\text{Strain}}$$

where: $\frac{\text{Stress}}{\text{Strain}}$=Calculated by drawing a line tangent to the initial linear portion of the Stress-Strain curve and selecting a value for the stress and dividing by the corresponding value for strain.

INTERLAMINAR SHEAR STRENGTH

A. Mechanical measurements were performed as outlined in ASTM D 1037 adopted from ASTM D 805.

B. Interlaminar shear strength was calculated using the following equation:

$$S = \frac{P}{A}$$

where:

S=Interlaminar Shear Strength-PSI
A=Length of overlap area (inches) times width of overlap area (inches) - IN^2
P=Ultimate load - Pounds

BEARING STRENGTH

A. Mechanical measurements were performed as outlined in Federal Test Method Standard Number 406, method 1051.

B. Bearing strength was calculated using the following equation:

$$S_b = \frac{1}{25} \times \frac{P/A}{e/d}$$

where: S_b=Bearing strength - PSI

P =Bearing load at point B, which is the intersection of the 4% deformation offset and the tangent line to the stress-strain curve of the specimen - pounds.

A =Bearing area - Square inches

e =4% of Bearing hole diameter-inches

d =Bearing hole diameter-inches

SPECIFIC GRAVITY

A. Mechanical measurements were performed as outlined in Federal Test Method Standard 406, method 5011.

B. Specific gravity was calculated using the following equation:

$$\text{Sp.GR.} = \frac{W_1}{W_1 - W_2}$$

where: W_1 = weight of specimen in air.

W_2 = weight of specimen in water.

BONDING STRENGTH

A. Mechanical measurements were performed as outlined in Federal Test Method Standard 406, method 1111.

B. Bonding strength was calculated using the following equation:

$$S = \frac{P}{bd}$$

where: P = rupture load - pounds

b = specimen width - inches

d = specimen thickness - inches

IZOD IMPACT STRENGTH

A. Mechanical measurements were performed as outlined in Federal Test Method Standard Number 406, method 1071.

B. Izod Impact strength was calculated using the following equation:

$$S = \frac{W}{\text{inch of notch}}$$

where:

S=Izod Impact Strength - Foot-Pounds/inch of notch

W=Energy in foot-pounds expended in the individual test.

ABRASION WEAR

A. Mechanical measurements were performed as outlined in Federal Test Method Standard Number 406, method 1091.

B. Abrasion wear was calculated using the following equation:

$$A = \frac{W_1 - W_2}{5}$$

where:

A=Abrasion wear-AVG.MGS. removed per 1000 revolutions.

W_1=Original weight of specimen-grams.

W_2=Final weight of specimen after 5,000 revolutions - grams.

RESIN CONTENT

A. Mechanical measurements were performed as outlined in Federal Test Method Standard 406, method 7061, for all glass reinforced laminates. For laminates containing thermo-plastics or other synthetics, procedure #2 described below was used to determine resin content.

B. Resin content was calculated using either procedure #1 (all glass reinforced laminates) or procedure #2 (all thermo-plastic or synthetic laminates).

Procedure #1:

$$\% \text{ Resin by weight} = \frac{100 \text{ (loss in weight)}}{\text{(original weight of laminate)}}$$

Procedure #2:

$$\% \text{ Resin by weight} = \frac{100 \text{ (weight of laminate-weight of reinforcement)}}{\text{(weight of reinforcement)}}$$

WATER ABSORPTION

A. Mechanical measurements were performed as outlined in Federal Test Method Standard 406, method 7031. Procedure A was used for all laminates containing reinforcements other than glass, and Procedure E was used for all laminates containing glass as a reinforcement.

B. Water absorption was calculated using the following equation:

$$\% \text{ Water Absorbed by weight} = \frac{(W_2 - W_1) \times 100}{W_1}$$

where: W_2=weight of wet specimen.

W_1=original weight of specimen.

VOID CONTENT

A. Mechanical measurements were performed as outlined in MIL-P-17549C.

B. Void content was calculated using the following equation:

$$\% \text{ Voids} = 100 - \frac{a(d)}{c} - \frac{a(e)}{b}$$

where:

a=specific gravity of laminate times 100.

d=resin content of laminate expressed as a decimal.

c=manufacturer's recorded specific gravity of the cured unfilled resin used in the laminate.

e=reinforcement content of laminate expressed as a decimal.

b=specific gravity of reinforcement (glass = 2.57).

AVERAGE PHYSICAL PROPERTIES

PANEL	FLEXURAL STRENGTH PSI x 10^{-3}	FLEXURAL MODULUS PSI x 10^{-6}	TENSILE STRENGTH PSI x 10^{-3}	TENSILE MODULUS PSI x 10^{-6}	COMPRESSIVE STRENGTH PSI x 10^{-3}	COMPRESSIVE MODULUS PSI x 10^{-6}	INTERLAMINAR SHEAR STRENGTH PSI x 10^{-3}	BEARING STRENGTH PSI x 10^{-3}	BONDING STRENGTH PSI x 10^{-3}	SPECIFIC GRAVITY	ABRASION WEAR MGS/1000 REV	PERCENT RESIN CONTENT	PERCENT WATER ABSORPTION	IMPACT-IZOD Ft. Lb./In.	PERCENT VOID CONTENT
PANEL # 408M															
WARP-DRY	8.40	.295	10.0	.360	7.70	.265	1.20	9.00	.731						
WARP-WET	9.50	.355	10.0	.375	8.60	.229	1.20	6.03	.768		DRY 37.6		DRY 24.7		
FILL-DRY	-	-	-	-	-	-	-	-	-	1.06		36.0		--	
FILL-WET	-	-	-	-	-	-	-	-	-		WET 81.8		0.10	WET 30.9	
45° TO WARP-DRY	-	-	-	-	-	-	-	-	-						
45° TO WARP-WET	-	-	-	-	-	-	-	-	-						
PANEL # 308M															
WARP-DRY	7.30	.276	10.4	.373	9.40	.289	1.30	8.90	.734						
WARP-WET	8.10	.321	10.5	.363	8.30	.273	1.20	5.84	.760		DRY 26.2		DRY 24.9		
FILL-DRY	-	-	-	-	-	-	-	-	-	1.06		37.3		--	
FILL-WET	-	-	-	-	-	-	-	-	-		WET 113		0.11	WET 28.5	
45° TO WARP-DRY	-	-	-	-	-	-	-	-	-						
45° TO WARP-WET	-	-	-	-	-	-	-	-	-						

COMMENTS

* Void content cannot be determined because of the nature of the reinforcement.

The above panels have an isotropic construction. Tests, conducted in the three warp directions indicated, yielded the same average results; therefore, each test was conducted without regard to warp direction.

AVERAGE PHYSICAL PROPERTIES

PANEL	FLEXURAL STRENGTH PSI x 10^{-3}	FLEXURAL MODULUS PSI x 10^{-6}	TENSILE STRENGTH PSI x 10^{-3}	TENSILE MODULUS PSI x 10^{-6}	COMPRESSIVE STRENGTH PSI x 10^{-3}	COMPRESSIVE MODULUS PSI x 10^{-6}	INTERLAMINAR SHEAR STRENGTH PSI x 10^{-3}	BEARING STRENGTH PSI x 10^{-3}	BONDING STRENGTH PSI x 10^{-3}	SPECIFIC GRAVITY	ABRASION WEAR MGS/1000 REV	PERCENT RESIN CONTENT	PERCENT WATER ABSORPTION	IMPACT-IZOD Ft. Lb./In.	PERCENT VOID CONTENT
PANEL # 422															
WARP-DRY	25.3	1.60	35.9	2.50	19.8	.539	2.10	19.4	1.78						
WARP-WET	13.5	.888	25.1	1.80	9.50	.179	1.50	3.75	.935		DRY		DRY		
FILL-DRY	22.9	1.39	30.2	1.96	16.0	.737	2.00	13.0	1.66		28.1		14.4		
FILL-WET	11.9	.773	20.8	1.39	7.20	.635	1.50	4.72	.925	1.74	WET	39.7	0.26	WET	--
45° TO WARP-DRY	7.10	.183	12.7	.324	9.10	.214	3.50	--	--		45.0			14.8	
45° TO WARP-WET	3.80	.077	7.20	.153	5.20	.222	1.80	--	--						
PANEL # 322															
WARP-DRY	23.3	1.54	19.6	1.54	21.6	.838	2.20	8.70	1.78						
WARP-WET	12.9	.859	16.7	1.20	7.60	.713	1.70	2.82	.919		DRY		DRY		
FILL-DRY	21.7	1.20	12.5	.089	14.9	1.08	3.30	10.1	1.68		16.8		14.6		
FILL-WET	11.4	.692	8.40	.071	6.80	1.04	2.00	3.01	.934	1.79		44.9	0.27		--
45° TO WARP-DRY	6.40	.156	22.0	1.94	10.4	.396	3.80	--	--		WET			WET	
45° TO WARP-WET	3.50	.063	19.4	1.63	3.80	.127	2.20	--	--		48.2			14.5	

COMMENTS

* Unable to determine void content because specific gravity of cured resin is not known.

AVERAGE PHYSICAL PROPERTIES

PANEL	FLEXURAL STRENGTH PSI x 10^{-3}	FLEXURAL MODULUS PSI x 10^{-6}	TENSILE STRENGTH PSI x 10^{-3}	TENSILE MODULUS PSI x 10^{-6}	COMPRESSIVE STRENGTH PSI x 10^{-3}	COMPRESSIVE MODULUS PSI x 10^{-6}	INTERLAMINAR SHEAR STRENGTH PSI x 10^{-3}	BEARING STRENGTH PSI x 10^{-3}	BONDING STRENGTH PSI x 10^{-3}	SPECIFIC GRAVITY	ABRASION WEAR MGS/1000 REV	PERCENT RESIN CONTENT	PERCENT WATER ABSORPTION	IMPACT-IZOD Ft. Lb./In.	PERCENT VOID CONTENT
PANEL # 411M															
WARP-DRY	7.50	.310	13.2	.325	6.60	.331	1.40	4.73	.494						
WARP-WET	6.00	.214	12.8	.219	6.90	.333	1.10	3.22	.565		DRY 44.5			DRY 45.1	
FILL-DRY	-	-	-	-	-	-	-	-	-						
FILL-WET	-	-	-	-	-	-	-	-	-	1.17	WET 90.7	34.8	0.60	WET 43.3	--
45° TO WARP-DRY	-	-	-	-	-	-	-	-	-						
45° TO WARP-WET	-	-	-	-	-	-	-	-	-						
PANEL # 311M															
WARP-DRY	7.10	.250	14.5	.336	7.80	.257	1.20	4.50	.502						
WARP-WET	5.30	.149	12.7	.177	7.70	.279	1.30	2.98	.575		DRY 25.8			DRY 44.8	
FILL-DRY	-	-	-	-	-	-	-	-	-	1.16		34.8	0.57		--
FILL-WET	-	-	-	-	-	-	-	-	-						
45° TO WARP-DRY	-	-	-	-	-	-	-	-	-		WET 139			WET 45.9	
45° TO WARP-WET	-	-	-	-	-	-	-	-	-						

COMMENTS

**Void content cannot be determined because of the nature of the reinforcement.

The above panels have an isotropic construction. Tests, conducted in the three warp directions indicated, yielded the same average results; therefore, each test was conducted without regard to warp direction.

AVERAGE PHYSICAL PROPERTIES

PANEL	FLEXURAL STRENGTH PSI x 10^{-3}	FLEXURAL MODULUS PSI x 10^{-6}	TENSILE STRENGTH PSI x 10^{-3}	TENSILE MODULUS PSI x 10^{-6}	COMPRESSIVE STRENGTH PSI x 10^{-3}	COMPRESSIVE MODULUS PSI x 10^{-6}	INTERLAMINAR SHEAR STRENGTH PSI x 10^{-3}	BEARING STRENGTH PSI x 10^{-3}	BONDING STRENGTH PSI x 10^{-3}	SPECIFIC GRAVITY	ABRASION WEAR MGS/1000 REV	PERCENT RESIN CONTENT	PERCENT WATER ABSORPTION	IMPACT-IZOD Ft. Lb./In.	PERCENT VOID CONTENT
PANEL # 449M															
WARP-DRY	30.6	1.54	30.1	1.92	16.2	.934	3.10	31.9	1.29						
WARP-WET	30.5	1.59	27.6	1.80	16.7	.670	3.20	23.5	1.34		DRY 68.7			DRY 35.9	
FILL-DRY	-	-	-	-	-	-	-	-	-						
FILL-WET	-	-	-	-	-	-	-	-	-	1.62	WET 91.1	37.0	0.77	WET 30.3	--
45° TO WARP-DRY	-	-	-	-	-	-	-	-	-						
45° TO WARP-WET	-	-	-	-	-	-	-	-	-						
PANEL # 349M															
WARP-DRY	23.4	1.31	30.7	1.93	19.2	.984	3.60	28.6	1.15						
WARP-WET	21.5	1.20	30.3	1.85	19.1	1.02	1.70	22.7	1.23		DRY 63.0			DRY 37.5	
FILL-DRY															
FILL-WET															
45° TO WARP-DRY										1.62	WET 71.6	39.0	0.76	WET 30.7	--
45° TO WARP-WET															

COMMENTS

* Void content cannot be determined because of the nature of the reinforcement.

The above panels have an isotropic construction. Tests, conducted in the three warp directions indicated, yielded the same average results; therefore, each test was conducted without regard to warp direction.

AVERAGE PHYSICAL PROPERTIES

PANEL	FLEXURAL STRENGTH PSI x 10^{-3}	FLEXURAL MODULUS PSI x 10^{-6}	TENSILE STRENGTH PSI x 10^{-3}	TENSILE MODULUS PSI x 10^{-6}	COMPRESSIVE STRENGTH PSI x 10^{-3}	COMPRESSIVE MODULUS PSI x 10^{-6}	INTERLAMINAR SHEAR STRENGTH PSI x 10^{-3}	BEARING STRENGTH PSI x 10^{-3}	BONDING STRENGTH PSI x 10^{-3}	SPECIFIC GRAVITY	ABRASION WEAR MGS/1000 REV	PERCENT RESIN CONTENT	PERCENT WATER ABSORPTION	IMPACT-IZOD Ft. Lb./In.	PERCENT VOID CONTENT
PANEL # 460															
WARP-DRY	36.0	2.07	56.6	2.43	21.9	.978	2.60	16.50	2.07						
WARP-WET	37.5	2.16	52.3	2.23	19.2	.808	2.10	10.8	1.93		DRY 55.6			DRY 49.2	
FILL-DRY	24.5	1.78	56.9	2.45	22.4	1.28	2.40	16.6	1.98	1.65		49.7	0.75		1.30
FILL-WET	25.4	1.86	51.5	2.13	16.5	.808	2.30	12.8	1.89		WET 74.0			WET 46.5	
45° TO WARP-DRY	11.9	.635	12.5	.614	11.0	.345	3.10	--	--						
45° TO WARP-WET	10.6	.518	10.3	.579	9.90	.281	2.90	--	--						
PANEL # 360															
WARP-DRY	36.8	.668	60.8	2.32	19.8	.926	2.60	17.5	1.90						
WARP-WET	39.2	2.08	58.2	2.09	16.9	.763	2.50	14.0	1.89		DRY 65.1			DRY 47.0	
FILL-DRY	25.1	.660	55.9	2.15	18.8	.885	2.40	18.8	1.78	1.63		49.7	0.24		1.71
FILL-WET	28.8	1.74	55.2	1.98	17.1	.804	2.40	15.2	1.97		WET 107			WET 46.3	
45° TO WARP-DRY	12.2	.606	14.1	.555	10.5	.288	3.10	--	--						
45° TO WARP-WET	14.5	.710	12.6	.369	9.70	.325	2.60	--	--						
COMMENTS															

AVERAGE PHYSICAL PROPERTIES

PANEL	FLEXURAL STRENGTH PSI x 10^{-3}	FLEXURAL MODULUS PSI x 10^{-6}	TENSILE STRENGTH PSI x 10^{-3}	TENSILE MODULUS PSI x 10^{-6}	COMPRESSIVE STRENGTH PSI x 10^{-3}	COMPRESSIVE MODULUS PSI x 10^{-6}	INTERLAMINAR SHEAR STRENGTH PSI x 10^{-3}	BEARING STRENGTH PSI x 10^{-3}	BONDING STRENGTH PSI x 10^{-3}	SPECIFIC GRAVITY	ABRASION WEAR MGS/1000 REV	PERCENT RESIN CONTENT	PERCENT WATER ABSORPTION	IMPACT-IZOD Ft. Lb./In.	PERCENT VOID CONTENT
PANEL # 603															
WARP-DRY	51.4	2.79	43.9	3.26	40.1	1.51	1.60	33.1	1.56						
WARP-WET	39.4	2.71	41.7	2.89	30.5	1.23	2.00	31.2	1.71		DRY 60.7			DRY 15.9	
FILL-DRY	56.8	2.97	42.0	3.25	27.9	.959	1.90	35.3	1.44	1.77		41.1	.012		1.00
FILL-WET	40.7	2.68	37.5	2.63	27.6	.768	2.30	28.8	1.89		WET 90.0			WET 16.1	
45° TO WARP-DRY	40.8	2.25	21.3	1.92	24.3	.903	3.40	--	--						
45° TO WARP-WET	31.8	1.83	18.9	1.69	21.6	.880	3.10	--	--						
PANEL # 503															
WARP-DRY	55.9	2.80	44.3	3.18	31.7	1.39	2.20	34.3	1.47						
WARP-WET	44.0	2.48	38.3	2.86	29.2	1.01	3.10	30.7	1.52		DRY 48.0			DRY 13.8	
FILL-DRY	44.7	2.47	34.0	2.88	29.8	1.09	1.90	35.2	1.44	1.72		44.3	.013		1.16
FILL-WET	41.2	2.03	31.9	2.49	23.2	.820	2.50	31.4	1.52		WET 82.6			WET 14.3	
45° TO WARP-DRY	34.1	1.88	19.9	1.87	24.2	.728	2.50	--	--						
45° TO WARP-WET	22.9	1.47	18.2	1.59	24.1	.711	2.60	--	--						
COMMENTS															

AVERAGE PHYSICAL PROPERTIES

PANEL	PLEXURAL STRENGTH PSI x 10^{-3}	PLEXURAL MODULUS PSI x 10^{-6}	TENSILE STRENGTH PSI x 10^{-3}	TENSILE MODULUS PSI x 10^{-6}	COMPRESSIVE STRENGTH PSI x 10^{-3}	COMPRESSIVE MODULUS PSI x 10^{-6}	INTERLAMINAR SHEAR STRENGTH PSI x 10^{-3}	BEARING STRENGTH PSI x 10^{-3}	BONDING STRENGTH PSI x 10^{-3}	SPECIFIC GRAVITY	ABRASION WEAR MGS/1000 REV	PERCENT RESIN CONTENT	PERCENT WATER ABSORPTION	IMPACT-IZOD Ft. Lb./In.	PERCENT VOID CONTENT
PANEL # 626															
WARP-DRY	52.2	2.75	40.8	2.74	41.7	1.00	2.80	33.2	1.64						
WARP-WET	41.3	2.43	30.6	2.58	33.3	1.02	3.80	29.9	1.68		DRY			DRY	
FILL-DRY	40.8	2.12	39.9	2.78	39.2	1.18	4.40	34.0	1.68		18.8			12.1	
FILL-WET	29.2	1.88	29.3	2.60	40.1	1.09	4.30	25.1	1.61	1.66		46.2	0.13		0.46
45° TO WARP-DRY	34.1	1.74	21.6	1.47	22.0	.527	4.90	--	--		WET			WET	
45° TO WARP-WET	15.4	1.51	20.9	1.38	22.5	.581	5.40	--	--		45.0			10.9	
PANEL #526															
WARP-DRY	56.1	2.67	40.8	2.78	47.1	1.24	3.10	33.2	1.81						
WARP-WET	45.7	2.45	29.4	2.63	37.7	1.61	2.80	29.4	1.77		DRY			DRY	
FILL-DRY	48.6	2.37	39.5	2.87	32.9	1.02	3.50	34.4	1.69		41.2			13.1	
FILL-WET	41.5	2.10	28.5	2.54	30.9	.911	3.00	28.5	1.77	1.68		45.4	0.14		0.53
45° TO WARP-DRY	39.6	1.84	19.8	1.52	23.7	.642	4.10	--	--		WET			WET	
45° TO WARP-WET	34.9	1.58	19.8	1.33	22.7	.574	4.30	--	--		33.6			11.0	
COMMENTS															

AVERAGE PHYSICAL PROPERTIES

PANEL	FLEXURAL STRENGTH PSI x 10^{-3}	FLEXURAL MODULUS PSI x 10^{-6}	TENSILE STRENGTH PSI x 10^{-3}	TENSILE MODULUS PSI x 10^{-6}	COMPRESSIVE STRENGTH PSI x 10^{-3}	COMPRESSIVE MODULUS PSI x 10^{-6}	INTERLAMINAR SHEAR STRENGTH PSI x 10^{-3}	BEARING STRENGTH PSI x 10^{-3}	BONDING STRENGTH PSI x 10^{-3}	SPECIFIC GRAVITY	ABRASION WEAR MGS/1000 REV	PERCENT RESIN CONTENT	PERCENT WATER ABSORPTION	IMPACT-IZOD Ft. Lb./In.	PERCENT VOID CONTENT
PANEL # 632															
WARP-DRY	68.5	2.94	37.8	2.53	14.6	1.04	2.10	25.2	1.50						
WARP-WET	54.1	3.01	34.4	2.28	11.8	.801	1.20	18.5	1.36		DRY 70.8			DRY 20.1	
FILL-DRY	27.5	1.78	33.6	2.22	15.8	.825	2.20	21.1	1.46	1.82		35.7	0.32		1.50
FILL-WET	21.7	1.72	33.1	2.02	10.6	.699	2.00	17.0	1.32		WET 105			WET 19.8	
45° TO WARP-DRY	13.6	.658	11.4	.586	10.3	1.33	2.70	--	--						
45° TO WARP-WET	11.2	.553	9.70	.374	8.00	.271	1.80	--	--						
PANEL # 532															
WARP-DRY	55.5	2.79	35.7	2.37	15.3	1.08	2.20	34.5	1.41						
WARP-WET	44.0	2.73	32.5	2.20	12.1	.630	2.20	29.8	1.33		DRY 59.9			DRY 15.7	
FILL-DRY	54.8	2.65	31.1	2.12	16.9	.626	2.10	29.1	1.29						
FILL-WET	45.2	2.69	29.9	1.91	12.5	.625	1.90	26.0	1.31	1.79		35.9	0.22		2.50
45° TO WARP-DRY	12.4	.449	11.9	.534	6.70	.377	2.60	--	--		WET 86.5			WET 16.4	
45° TO WARP-WET	13.1	.482	8.80	.448	8.20	.386	2.10	--	--						
COMMENTS															

AVERAGE PHYSICAL PROPERTIES

PANEL	FLEXURAL STRENGTH PSI x 10^{-3}	FLEXURAL MODULUS PSI x 10^{-6}	TENSILE STRENGTH PSI x 10^{-3}	TENSILE MODULUS PSI x 10^{-6}	COMPRESSIVE STRENGTH PSI x 10^{-3}	COMPRESSIVE MODULUS PSI x 10^{-6}	INTERLAMINAR SHEAR STRENGTH PSI x 10^{-3}	BEARING STRENGTH PSI x 10^{-3}	BONDING STRENGTH PSI x 10^{-3}	SPECIFIC GRAVITY	ABRASION WEAR MGS/1000 REV	PERCENT RESIN CONTENT	PERCENT WATER ABSORPTION	IMPACT-IZOD Ft. Lb./In.	PERCENT VOID CONTENT *
PANEL # 635															
WARP-DRY	38.0	1.87	31.2	2.17	22.4	1.05	1.20	23.1	1.28						
WARP-WET	30.0	1.83	30.1	1.87	19.5	.692	1.20	14.5	.918		DRY 17.0			DRY 15.3	
FILL-DRY	33.7	1.88	31.3	2.22	21.9	1.04	2.10	24.3	1.22	1.57		33.2	0.09		--
FILL-WET	29.1	1.83	29.1	2.09	16.2	.761	2.00	17.2	1.03		WET 34.1			WET 18.8	
45° TO WARP-DRY	18.7	.940	13.3	1.11	13.9	.812	1.80	--	--						
45° TO WARP-WET	17.0	.785	12.2	.880	14.0	.429	1.50	--	--						
PANEL #535															
WARP-DRY	33.8	1.63	32.0	2.20	22.4	1.10	2.00	23.4	1.21						
WARP-WET	25.4	1.57	30.2	2.05	20.4	.786	1.60	17.2	.951		DRY 60.6			DRY 16.0	
FILL-DRY	29.3	1.51	31.3	2.21	18.6	.697	2.30	24.5	1.29	1.58		34.0	0.15		--
FILL-WET	21.5	1.47	29.2	2.00	17.6	.711	1.90	17.3	1.13		WET 78.4			WET 19.2	
45° TO WARP-DRY	19.9	.774	14.6	1.30	14.1	.517	1.40	--	--						
45° TO WARP-WET	12.5	.563	13.2	1.08	14.7	.428	1.60	--	--						
COMMENTS	* Void content cannot be determined because of the nature of the reinforcement.														

AVERAGE PHYSICAL PROPERTIES

PANEL	FLEXURAL STRENGTH PSI x 10^{-3}	FLEXURAL MODULUS PSI x 10^{-6}	TENSILE STRENGTH PSI x 10^{-3}	TENSILE MODULUS PSI x 10^{-6}	COMPRESSIVE STRENGTH PSI x 10^{-3}	COMPRESSIVE MODULUS PSI x 10^{-6}	INTERLAMINAR SHEAR STRENGTH PSI x 10^{-3}	BEARING STRENGTH PSI x 10^{-3}	BONDING STRENGTH PSI x 10^{-3}	SPECIFIC GRAVITY	ABRASION WEAR MGS/1000 REV	PERCENT RESIN CONTENT	PERCENT WATER ABSORPTION	IMPACT-IZOD Ft. Lb./In.	PERCENT VOID CONTENT
PANEL # 637M															
WARP-DRY	44.6	2.44	35.1	2.51	28.9	.932	2.80	43.2	1.49						
WARP-WET	40.1	2.27	35.5	2.35	26.7	1.11	3.50	38.7	1.58		DRY 64.9			DRY 14.0	
FILL-DRY	--	--	--	--	--	--	--	--	--	1.78		39.8	.218		1.2
FILL-WET	-	-	-	-	-	-	-	-	-		WET 91.3			WET 14.7	
45° TO WARP-DRY	-	-	-	-	-	-	-	-	-						
45° TO WARP-WET	-	-	-	-	-	-	-	-	-						
PANEL # 537M															
WARP-DRY	47.4	2.14	37.4	2.73	32.0	1.37	2.70	44.8	1.45						
WARP-WET	35.7	2.11	35.4	2.43	26.8	.879	2.70	33.3	1.65		DRY 70.5			DRY 13.9	
FILL-DRY	-	-	-	-	-	-	-	-	-	1.74		41.4	0.21		0.75
FILL-WET	-	-	-	-	-	-	-	-	-						
45° TO WARP-DRY	-	-	-	-	-	-	-	-	-		WET			WET	
45° TO WARP-WET	-	-	-	-	-	-	-	-	-		84.3			14.2	
COMMENTS	The above panels have an isotropic construction. Tests conducted in the three warp directions indicated, yielded the same average results; therefore, each test was conducted without regard to warp direction.														

AVERAGE PHYSICAL PROPERTIES

PANEL	FLEXURAL STRENGTH PSI x 10^{-3}	FLEXURAL MODULUS PSI x 10^{-6}	TENSILE STRENGTH PSI x 10^{-3}	TENSILE MODULUS PSI x 10^{-6}	COMPRESSIVE STRENGTH PSI x 10^{-3}	COMPRESSIVE MODULUS PSI x 10^{-6}	INTERLAMINAR SHEAR STRENGTH PSI x 10^{-3}	BEARING STRENGTH PSI x 10^{-3}	BONDING STRENGTH PSI x 10^{-3}	SPECIFIC GRAVITY	ABRASION WEAR MGS/1000 REV	PERCENT RESIN CONTENT	PERCENT WATER ABSORPTION	IMPACT-IZOD Ft. Lb./In.	PERCENT VOID CONTENT *
PANEL #651															
WARP-DRY	28.9	1.51	24.0	1.66	15.0	.909	1.50	15.9	.573						
WARP-WET	24.5	.957	22.1	.898	10.0	.827	1.90	7.41	.910		DRY 39.4			DRY 5.8	
FILL-DRY	19.9	1.01	15.6	1.18	13.3	.893	2.10	14.0	.519						
FILL-WET	14.0	.585	12.4	.634	8.50	.369	2.10	6.24	.816	1.28	WET 191	44.3	1.85	WET 7.2	--
45° TO WARP-DRY	15.3	.593	12.1	.682	11.7	.400	2.20	--	--						
45° TO WARP-WET	10.3	.398	9.50	.352	8.50	.354	1.90	--	--						
PANEL #551															
WARP-DRY	24.1	1.09	20.9	1.42	13.0	.522	2.00	13.0	.849						
WARP-WET	19.1	.835	15.3	.743	8.90	.310	2.10	5.25	.570		DRY 39.5			DRY 3.20	
FILL-DRY	21.8	1.02	15.6	1.20	14.7	.637	2.00	13.7	.758	1.28		44.5	1.87		--
FILL-WET	15.9	.626	13.7	.617	9.70	.648	1.60	6.84	.462						
45° TO WARP-DRY	21.2	.960	12.4	.687	11.6	.399	2.60	--	--		WET 65.6			WET 2.00	
45° TO WARP-WET	16.3	.633	10.3	.387	7.50	.279	2.50	--	--						
COMMENTS	* Void content cannot be determined because of the nature of the reinforcement.														

REINFORCED PLASTICS TESTING LABORATORY
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FLEXURAL PROPERTIES OF PANEL #3004

Condition of Test	Flexural Strength, psi	Flexural Modulus, psi x 10^6
As Received	6,800	0.247
	7,400	0.276
	7,600	0.311
Average	7,300	0.276
30 Day Distilled Water Soak	8,000	0.321
	8,400	0.326
	8,100	0.317
Average	8,100	0.321

TENSILE PROPERTIES OF PANEL #308

Condition of Test	Tensile Strength, psi	Tensile Modulus, psi X 10^6
As Received	10,500	0.353
	10,200	0.375
	10,500	0.385
Average	10,400	0.373
30 Day Distilled Water Soak	10,900	0.337
	10,300	0.384
	10,400	0.367
Average	10,500	0.363

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COMPRESSIVE PROPERTIES OF PANEL #3008

Condition of Test	Compressive Strength, psi	Compressive Modulus, psi X 10^6
As Received	8,400	0.380
	9,800	0.280
	10,100	0.207
Average	9,400	0.289
30 Day Distilled Water Soak	8,100	0.218
	8,600	0.258
	8,100	0.342
Average	8,300	0.273

INTERLAMINAR SHEAR PROPERTIES OF PANEL #308M

Condition of Test	Interlaminar Shear Strength, psi
As Received	1,300
	1,500
	1,200
Average	1,300
30 Day Distilled Water Saok	1,100
	1,600
	970
Average	1,200

REINFORCED PLASTICS TESTING LABORATORY
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BEARING PROPERTIES OF PANEL #308M

Condition of Test	Bearing Strength, psi
As Received	8,970
	8,420
	9,200
Average	8,900
30 Day Distilled Water Soak	5,810
	5,760
	5,840
Average	5,840

BONDING STRENGTH TEST DATA

Panel # 308M

Federal Standards-#406
Test #1111

Identification Number	Warp Dir.	Length	Width	Thickness	Rupture Force	Bonding Strength
308M-1-Dry	none	0.990"	0.990"	0.480"	750 lbs	758 psi
308M-3-Dry	none	1.001"	1.000"	0.479"	720 lbs	719 psi
308M-5-Dry	none	1.002"	1.000"	0.482"	725 lbs	724 psi
308M-2-Wet	none	0.996"	0.998"	0.495"	840 lbs	845 psi
308M-4-Wet	none	0.993"	1.001"	0.496"	700 lbs	704 psi
308M-6-Wet	none	0.990"	1.002"	0.497"	725 lbs	731 psi

Bonding Strength = Rupture Force/Area

Average Results:

Dry: 734 psi

Wet: 760 psi

REINFORCED PLASTICS TESTING LABORATORY
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ABRASION WEAR OF PANEL #308M

Condition of Test	Wgt. Loss, 5,000 Rev. in grams	Average Wgt. Loss, 1,000 Rev. in grams
As Received	0.1106	.0221
	0.1508	.0302
Average	0.1307	.0262
30 Day Distilled Water Soak	0.2287	.0458
	0.9055	.1811
Average	0.5671	.1134

REINFORCED PLASTICS TESTING LABORATORY
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IZOD IMPACT STRENGTH OF PANEL #3001

Condition of Test	Impact Strength, ft.-lbs./inch notch
As Received	25.3
	24.6
	24.4
Average	24.9
30 Day Distilled Water Soak	28.4
	29.0
	28.2
Average	28.5

PHYSICAL TEST DATA SHEET

PANEL # 308 M

Resin Content*

Wt. of Fabric	Wt. of Laminate	Percent Resin
12-3/4 lbs.	8 lbs.	37.25%
	Average	37.25%

Water Absorption (24 Hours Soak)

Wt. of Sample	Wt. After Soak	% Water Absorbed
28.96 gm.	28.99 gm.	0.10%
30.06 gm.	30.08 gm.	0.07%
29.89 gm.	29.94 gm.	0.17%
	Average	0.11%

Specific Gravity Federal Standard 406 - #5011

Wt. in Air	Wt. in water	Specific Gravity
16.34 gm.	0.94 gm.	1.06
17.91 gm.	1.00 gm.	1.06
16.92 gm.	0.99 gm.	1.06
	Average	1.06

Void Content

Void content cannot be determined because of the nature of the reinforcement.

* Resin content cannot be determined according to Federal Standard 406 - #7061 because of the low melting point of the reinforcement.

FLEXURAL PROPERTIES OF PANEL #408M

Condition of Test	Flexural Strength, psi	Flexural Modulus, psi X 10^6
As Received	8,500	0.290
	8,400	0.294
	8,300	0.295
Average	8,400	0.293
30 Day Distilled Water Soak	9,700	0.352
	9,700	0.364
	9,200	0.349
Average	9,500	0.355

REINFORCED PLASTICS TESTING LABORATORY
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TENSILE PROPERTIES OF PANEL #408M

Condition of Test	Tensile Strength, psi	Tensile Modulus, psi X 10^6
As Received	10,100	0.387
	9,800	0.344
	10,200	0.348
Average	10,000	0.360
30 Day Distilled Water Soak	10,000	0.364
	9,900	0.387
	10,000	0.375
Average	10,000	0.375

REINFORCED PLASTICS TESTING LABORATORY
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COMPRESSIVE PROPERTIES OF PANEL #408

Condition of Test	Compressive Strength, psi	Compressive Modulus, psi X 10^6
As Received	7,500	0.225
	7,700	0.295
	7,900	0.275
Average	7,700	0.265
30 Day Distilled Water Soak	8,900	0.271
	8,400	0.248
	8,600	0.167
Average	8,600	0.229

INTERLAMINAR SHEAR PROPERTIES OF PANEL #408M

Condition of Test	Interlaminar Shear Strength, psi
As Received	1,400
	1,100
	1,100
Average	1,200
30 Day Distilled Water Soak	1,500
	760
	1,300
Average	1,200

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

BEARING PROPERTIES OF PANEL #408X

Condition of Test	Bearing Strength, psi
As Received	9,090
	9,530
	7,520
Average	9,000
30 Day Distilled Water Soak	6,110
	6,110
	5,880
Average	6,030

BONDING STRENGTH TEST DATA

Panel # 408M

Federal Standards-#406
Test #1111

Identification Number	Warp Dir.	Length	Width	Thickness	Rupture Force	Bonding Strength
408M-1-Dry	none	0.998"	1.002"	0.481"	830 lbs	830 psi
408M-3-Dry	none	1.000"	1.001"	0.479"	640 lbs	639 psi
408M-5-Dry	none	0.998"	1.003"	0.480"	725 lbs	724 psi
408M-2-Wet	none	1.002"	0.999"	0.498"	780 lbs	779 psi
408M-4-Wet	none	0.997"	0.999"	0.495"	850 lbs	853 psi
408M-6-Wet	none	1.000"	1.000"	0.494"	673 lbs	673 psi

Bonding Strength = Rupture Force/Area

Average Results:

Dry: 731 psi

Wet: 768 psi

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

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ABRASION WEAR OF PANEL #4002

Condition of Test	Wgt. Loss, 5,000 Rev. in grams	Average Wgt. Loss, 1,000 Rev. in grams
As Received	0.1762	.0352
	0.1999	.0400
Average	0.1881	.0376
30 Day Distilled Water Soak	0.3198	.0640
	0.4980	.0996
Average	0.4089	.0818

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

IZOD IMPACT STRENGTH OF PANEL #4081

Condition of Test	Impact Strength, ft.-lbs./inch notch
As Received	25.2
	24.4
	24.4
Average	24.7
30 Day Distilled Water Soak	31.0
	31.2
	30.6
Average	30.9

PHYSICAL TEST DATA SHEET

Panel # 408M

Resin Content*

Wt. of Fabric	Wt. of Laminate	Percent Resin
12-1/2 lbs.	8 lbs.	36.00%

Average 36.00%

Water Absorption (24 Hours Soak)

Wt. of Sample	Wt. after Soak	% Water Absorbed
36.41 gm	36.44 gm	0.08%
34.00 gm	34.04 gm	0.12%
35.55 gm	35.59 gm	0.11%

Average 0.10%

Specific Gravity Federal Standard 406 - #5011

Wt. in Air	Wt. in Water	Specific Gravity
13.45 gm.	0.81 gm.	1.06
16.49 gm.	0.95 gm.	1.06
17.23 gm.	0.95 gm.	1.06

Average 1.06

Void Content

Void content cannot be determined because of the nature of the reinforcement.

* Resin content cannot be determined according to Federal Standard 406 - #7061 because of the low melting point of the reinforcement.

REINFORCED PLASTICS TESTING LABORATORY

106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

FLEXURAL PROPERTIES OF PANEL #22

Condition of Test	Flexural Strength, psi			Flexural Modulus, psi x 10^6		
	Warp	Fill	45° Warp	Warp	Fill	45° Warp
As Received	23,700	21,700	6,400	1.59	1.22	0.1[illegible]
	22,900	21,500	5,900	1.52	1.25	0.1[illegible]
	23,200	21,900	6,400	1.51	1.31	0.197
Average	23,300	21,700	6,400	1.54	1.27	0.194
2 Hr. Boil	13,400	11,000	3,900	0.[illegible]00	0.691	0.0[illegible]2
	12,700	11,000	3,400	0.[illegible]64	0.701	0.0[illegible]2
	12,700	10,900	3,100	0.[illegible]52	0.[illegible]85	0.0[illegible]3
Average	12,900	11,400	3,500	0.[illegible]59	0.[illegible]92	0.[illegible]03

REINFORCED PLASTICS TESTING LABORATORY
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TENSILE PROPERTIES OF PANEL #322

Condition of Test	Tensile Strength, psi			Tensile Modulus, psi x 10^6		
	Warp	Fill	45° Warp	Warp	Fill	45° Warp
As Received	21,000	11,300	21,300	1.36	0.085	2.02
	18,700	13,300	22,300	1.48	0.091	2.11
	19,200	12,400	22,300	1.50	0.092	1.70
Average	19,000	12,500	22,000	1.54	0.089	1.94
2 Hr. Boil	16,300	8,700	18,700	1.10	0.069	1.68
	15,300	8,300	19,200	1.18	0.075	1.84
	17,400	9,100	20,400	1.25	0.069	1.86
Average	16,700	8,400	19,400	1.20	0.071	1.83

REINFORCED PLASTICS TESTING LABORATORY
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COMPRESSIVE PROPERTIES OF PANEL #322

Condition of Test	Compressive Strength, psi			Compressive Modulus, psi X 10^6		
	Warp	Fill	45° Warp	Warp	Fill	45° Warp
As Received	22,600	13,200	10,500	1.15	0.946	0.477
	23,800	16,500	10,500	0.354	1.03	0.333
	18,500	15,100	10,200	1.01	1.21	0.373
Average	21,600	14,900	10,400	0.838	1.08	0.396
2 Hr. Boil	9,300	6,900	3,800	0.702	1.60	0.139
	7,300	7,100	3,900	0.743	0.579	0.129
	6,300	6,400	3,700	0.695	0.943	0.113
Average	7,600	6,800	3,800	0.713	1.04	0.127

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

INTERLAMINAR SHEAR PROPERTIES OF PANEL #322

Condition of Test	Interlaminar Shear Strength, psi		
	Warp	Fill	45° Warp
As Received	2,200	3,300	3,700
	2,200	3,200	3,500
	2,200	3,300	4,100
Average	2,200	3,300	3,800
2 Hr. Boil	1,300	2,100	2,100
	1,800	2,100	2,200
	1,900	1,900	2,200
Average	1,700	2,000	2,200

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

BEARING PROPERTIES OF PANEL #322

Condition of Test	Bearing Strength, psi		
	Warp	Fill	
As Received	8,940	10,000	
	8,140	9,690	
	8,380	10,100	
Average	8,700	10,100	
2 Hr. Boil	2,670	3,390	
	2,980	3,050	
	2,820	2,600	
Average	2,820	3,010	

BONDING STRENGTH TEST DATA

PANEL # 322

Federal Standards - #406
Test #1111

Identification Number	Warp Dir.	Length	Width	Thickness	Rupture Force	Bonding Strength
322-1-dry	parallel	1.000"	0.998"	0.476"	1750 lbs	1754 psi
322-3-dry	parallel	1.000"	0.999"	0.478"	1775 lbs	1777 psi
322-5-dry	parallel	1.002"	0.998"	0.476"	1800 lbs	1800 psi
322-7-dry	perpend.	0.996"	1.000"	0.475"	1675 lbs	1682 psi
322-9-dry	perpend.	1.001"	1.003"	0.476"	1700 lbs	1693 psi
322-11-dry	perpend.	1.000"	1.000"	0.478"	1650 lbs	1650 psi
322-2-wet	p rallel	1.001"	1.000"	0.477"	925 lbs	924 psi
322-4-wet	parallel	0.998"	0.996"	0.475"	925 lbs	931 psi
322-6-wet	parallel	0.999"	0.999"	0.475"	900 lbs	902 psi
322-8-wet	perpend.	1.000"	1.001"	0.476"	975 lbs	974 psi
322-10-wet	perpend.	1.001"	0.996"	0.475"	925 lbs	928 psi
322-12-wet	perpend.	1.004"	0.996"	0.478"	900 lbs	900 psi

Bonding Strength = Rupture Force/Area

Average Results:

Parallel to Warp

Dry: 1777 psi

Wet: 919 psi

Perpendicular to Warp

Dry: 1675 psi

Wet: 934 psi

REINFORCED PLASTICS TESTING LABORATORY
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ABRASION WEAR OF PANEL #322

Condition of Test	Wgt. Loss, 5,000 Rev. in grams	Average Wgt. Loss, 1,000 Rev. in grams
As Received	0.1009	.0202
	0.0671	.0134
Average	0.0840	.0168
2 Hr. Boil	0.1322	.0264
	0.3500	.0700
Average	0.2411	.0482

REINFORCED PLASTICS TESTING LABORATORY
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MATERIALS EVALUATION Page 12 DATE 12/17/6[illegible] REPORT NUMBER 4132

[illegible]

Condition of Test	Impact Strength, ft.-lbs./inch notch
	Warp
As Received	14.0
	15.[illegible]
	14.0
Average	14.[illegible]
2 Hr. Boil	14.2
	14.[illegible]
	14.4
Average	14.5

PHYSICAL TEST DATA SHEETS

PANEL # 322

Resin Content Fed. Standard 406 #7061

Wt. of Sample	Wt. of Residue	Percent Resin
26.63 gm.	14.72 gm.	44.72%
26.60 gm.	14.68 gm.	44.81%
25.52 gm.	14.02 gm.	45.06%
	Average	44.86%

Water Absorption Fed. Standard 406 #7031 Pro. E

Wt. of Sample	Wt. After Boil	% Water Absorbed
75.62 gm	75.80 gm	0.24%
70.08 gm	70.25 gm	0.24%
74.68 gm	74.94 gm	0.33%
	Average	0.27%

Specific Gravity Fed. Standard 406 #5011

Wt. in Air	Wt. in Water	Specific Gravity
42.73 gm	18.86 gm	1.79
47.86 gm	21.27 gm	1.80
45.93 gm	20.27 gm	1.79
	Average	1.79

Void Content Mil-P-17549C

Unable to determine void content because specific gravity of cured resin is not known.

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

FLEXURAL PROPERTIES OF PANEL #422

Condition of Test	Flexural Strength, psi			Flexural Modulus, psi X 10^6		
	Warp	Fill	45° Warp	Warp	Fill	45° Warp
As Received	25,300	24,500	7,100	1.62	1.30	0.217
	25,300	21,600	6,900	1.57	1.40	0.160
	25,300	22,700	7,300	1.60	1.47	0.173
Average	25,300	22,900	7,100	1.60	1.39	0.183
2 Hr. Boil	12,900	11,600	3,700	0.943	0.727	0.078
	14,000	11,800	3,600	0.839	0.819	0.079
	13,600	12,200	3,800	0.883	0.773	0.075
Average	13,500	11,900	3,700	0.888	0.773	0.077

TENSILE PROPERTIES OF PANEL #422

Condition of Test	Tensile Strength, psi			Tensile Modulus, psi X 10^6		
	Warp	Fill	45° Warp	Warp	Fill	45° Warp
As Received	38,000	29,200	12,600	2.69	1.97	0.327
	36,000	32,400	13,000	2.41	1.96	0.324
	33,700	29,100	12,600	2.40	1.94	0.322
Average	35,900	30,200	12,700	2.50	1.96	0.324
2 Hr. Boil	24,900	19,400	7,400	1.81	1.37	0.150
	24,800	21,500	7,400	1.66	1.32	0.173
	25,500	21,400	6,800	1.92	1.47	0.135
n Average	25,100	20,800	7,200	1.80	1.39	0.153

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

COMPRESSIVE PROPERTIES OF PANEL #422

Condition of Test	Compressive Strength, psi			Compressive Modulus, psi X 10^6		
	Warp	Fill	45° Warp	Warp	Fill	45° Warp
As Received	19,500	14,300	9,200	0.564	0.506	0.311
	20,200	17,500	9,500	0.456	0.863	0.206
	19,800	16,200	8,700	0.597	0.840	0.123
Average	19,800	16,000	9,100	0.539	0.737	0.214
2 Hr. Boil	9,700	7,300	4,600	0.245	0.827	0.167
	9,600	6,900	5,900	0.163	0.335	0.161
	9,300	7,500	5,100	0.130	0.744	0.339
Average	9,500	7,200	5,200	0.179	0.635	0.222

INTERLAMINAR SHEAR PROPERTIES OF PANEL #422

Condition of Test	Interlaminar Shear Strength, psi		
	Warp	Fill	45° Warp
As Received	2,100	2,000	3,500
	2,100	2,000	3,500
	2,000	2,000	3,400
Average	2,100	2,000	3,500
2 Hr. Boil	1,400	1,500	1,800
	1,500	1,500	1,900
	1,500	1,400	1,800
Average	1,500	1,500	1,800

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

BEARING PROPERTIES OF PANEL #422

Condition of Test	Bearing Strength, psi		
	Warp	Fill	
As Received	16,100	11,100	
	21,800	14,100	
	20,300	13,800	
Average	19,400	13,000	
2 Hr. Boil	3,640	4,630	
	3,790	4,660	
	3,810	4,660	
Average	3,750	4,720	

BONDING STRENGTH TEST DATA

PANEL # 422

Federal Standards - #406
Test #1111

Identification Number	Warp Dir.	Length	Width	Thickness	Rupture Force	Bonding Strength
BS90-422-1-dry	parallel	1.000"	0.998"	0.473"	1750 lbs	1754 psi
BS90-422-3-dry	parallel	1.000"	1.000"	0.475"	1850 lbs	1850 psi
BS90-422-5-dry	parallel	1.001"	1.002"	0.476"	1750 lbs	1745 psi
BS90-422-7-dry	perpend.	1.001"	1.001"	0.475"	1600 lbs	1598 psi
BS90-422-9-dry	perpend.	1.000"	1.000"	0.474"	1725 lbs	1725 psi
BS90-422-11-dry	perpend.	1.000"	1.002"	0.474"	1650 lbs	1647 psi
BS90-422-2-wet	parallel	0.997"	0.999"	0.486"	950 lbs	954 psi
BS90-422-4-wet	parallel	1.000"	0.999"	0.487"	800 lbs	801 psi
BS90-422-6-wet	parallel	1.000"	1.000"	0.486"	1050 lbs	1050 psi
BS90-422-8-wet	perpend.	0.999"	1.000"	0.486"	875 lbs	876 psi
BS90-422-10-wet	perpend.	1.002"	0.999"	0.486"	950 lbs	949 psi
BS90-422-12-wet	perpend.	1.000"	1.000"	0.486"	950 lbs	950 psi

Bonding Strength = Rupture Force/Area

Average Results:

Parallel to Warp

Dry: 1783 psi

Wet: 935 psi

Perpendicular to Warp

Dry: 1657 psi

Wet: 925 psi

REINFORCED PLASTICS TESTING LABORATORY

106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

MATERIALS EVALUATION Page 141 DATE 12/17/63 REPORT NUMBER 4132

ABRASION WEAR OF PANEL #422

Condition of Test	Wgt. Loss, 5,000 Rev. in grams	Average Wgt. Loss, 1,000 Rev. in grams
As Received	0.1335	.0267
	0.1473	.0295
Average	0.1404	.0281
2 Hr. Boil	0.2062	.0412
	0.2436	.0487
Average	0.2249	.0450

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

MATERIALS EVALUATION DATE 12/17/68 REPORT NUMBER 4132

IZOD IMPACT STRENGTH OF PANEL #422

Condition of Test	Impact Strength, ft.-lbs./inch notch
	Warp
As Received	13.2
	13.6
	14.4
Average	14.4
2 Hr. Boil	13.6
	14.6
	14.2
Average	14.3

PHYSICAL TEST DATA SHEET

PANEL #422

Resin Content Federal Standard 406 - #7061

Wt. of Sample	Wt. of Residue	Percent Resin
32.04 gm.	19.28 gm.	39.83%
28.98 gm.	17.58 gm.	39.34%
29.64 gm.	17.80 gm.	39.95%
	Average	39.71%

Water Absorption Federal Standard 406 - #7031 Pro E.

Wt. of Sample	Wt. After Boil	% Water Absorbed
89.09 gm.	89.47 gm.	0.42 %
90.93 gm.	91.04 gm.	0.12 %
91.29 gm.	91.52 gm.	0.25 %
	Average	0.26%

Specific Gravity Federal Standard 406 - #5011

Wt. in Air	Wt. in Water	Specific Gravity
62.79 gm.	26.68 gm.	1.74
67.24 gm.	28.35 gm.	1.75
67.97 gm.	28.79 gm.	1.73
	Average	1.74

Void Content Mil-P-17549C

Unable to determine void content because specific gravity of cured resin is not known.

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

FLEXURAL PROPERTIES OF PANEL #311M

Condition of Test	Flexural Strength, psi	Flexural Modulus, psi X 10^6
As Received	6,700	0.230
	7,100	0.248
	7,400	0.271
Average	7,100	0.250
30 Day Distilled Water Soak	5,300	0.154
	5,000	0.129
	5,500	0.165
Average	5,300	0.149

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

TENSILE PROPERTIES OF PANEL #311M

Condition of Test	Tensile Strength, psi	Tensile Modulus, psi X 10^6
As Received	12,500	0.357
	12,500	0.344
	19,400	0.306
Average	14,500	0.336
30 Day Distilled Water Soak	9,000	0.167
	11,000	0.161
	18,000	0.203
Average	12,700	0.177

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

COMPRESSIVE PROPERTIES OF PANEL #311M

Condition of Test	Compressive Strength, psi	Compressive Modulus, psi X 10^6
As Received	8,100	0.239
	7,900	0.293
	7,400	0.239
Average	7,800	0.257
30 Day Distilled Water Soak	7,500	0.250
	7,600	0.268
	7,900	0.318
Average	7,700	0.279

INTERLAMINAR SHEAR PROPERTIES OF PANEL #311M

Condition of Test	Interlaminar Shear Strength, psi
As Received	970
	970
	1,800
Average	1,200
30 Day Distilled Water Soak	1,500
	1,200
	1,300
Average	1,300

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

BEARING PROPERTIES OF PANEL #311M

Condition of Test	Bearing Strength, psi
As Received	4,310
	4,290
	4,350
Average	4,500
30 Day Distilled Water Soak	3,040
	2,870
	3,040
Average	2,980

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REINFORCED PLASTIC SONAR DOME MATERIAL INVESTIGATION. VOLUME II--ETC(U)
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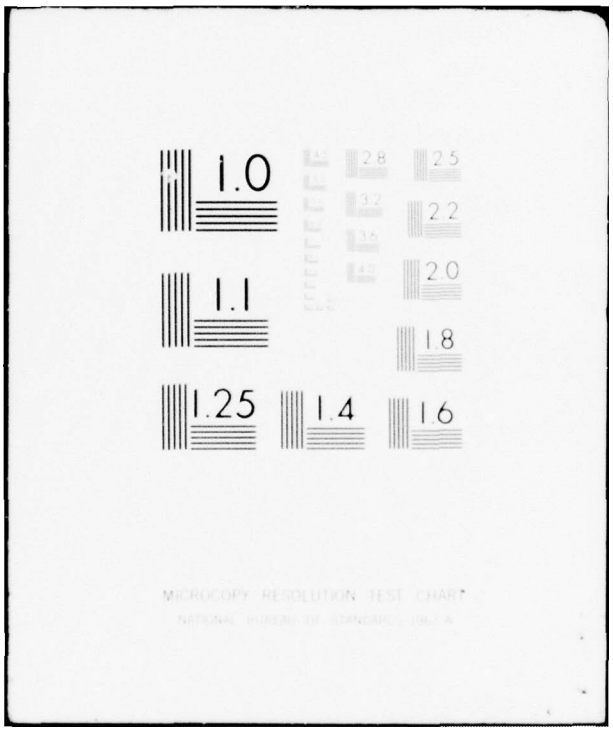
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MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

BONDING STRENGTH TEST DATA

Panel # 311 M

Federal Standards-#406
Test #1111

Identification Number	Warp Dir.	Length	Width	Thickness	Rupture Force	Bonding Strength
311M-1-Dry	none	1.003"	1.000"	0.479"	475 lbs	474 psi
311M-3-Dry	none	0.996"	1.001"	0.478"	530 lbs	532 psi
311M-5-Dry	none	1.000"	0.998"	0.481"	500 lbs	501 psi
311M-2-Wet	none	1.005"	1.006"	0.506"	625 lbs	618 psi
311M-4-Wet	none	1.000"	1.000"	0.500"	550 lbs	550 psi
311M-6-Wet	none	0.992"	0.997"	0.504"	550 lbs	556 psi

Bonding Strength = Rupture Force/Area

Average Results:

Dry: 502 psi

Wet: 575 psi

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

ABRASION WEAR OF PANEL #311K

Condition of Test	Wgt. Loss, 5,000 Rev. in grams	Average Wgt. Loss, 1,000 Rev. in grams
As Received	0.0501	.0100
	0.2074	.0415
Average	0.1288	.0258
30 Day Distilled Water Soak	0.8767	.1753
	0.5113	.1023
Average	0.6940	.1388

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

IZOD IMPACT STRENGTH OF PANEL #311X

Condition of Test	Impact Strength, ft.-lbs./inch notch
As Received	43.6
	44.8
	46.0
Average	44.8
30 Day Distilled Water Soak	46.0
	49.2
	42.6
Average	45.9

PHYSICAL TEST DATA SHEET

PANEL # 311 M

Resin Content*

Wt. of Fabric	Wt. of Laminate	Percent Resin
11-1/2 lbs.	7-1/2 lbs.	34.78%
	Average	34.8%

Water Absorption (24 Hours Soak)

Wt. of Sample	Wt. After Soak	% Water Absorbed
39.25 gm.	39.46 gm.	0.54%
35.37 gm.	35.58 gm.	0.59%
36.41 gm.	36.62 gm.	0.58%
	Average	0.57%

Specific Gravity Federal Standard 406 - #5011

Wt. in Air	Wt. in Water	Specific Gravity
19.15 gm.	2.77 gm.	1.17
18.65 gm.	2.64 gm.	1.16
19.77 gm.	2.80 gm.	1.16
	Average	1.16

Void Content

Void content cannot be determined because of the nature of the reinforcement.

* Resin content cannot be determined according to Federal Standard 406 - #7061 because of the low melting point of the reinforcement.

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

FLEXURAL PROPERTIES OF PANEL #411M

Condition of Test	Flexural Strength, psi	Flexural Modulus, psi X 10^6
As Received	8,000	0.319
	7,600	0.310
	6,800	0.300
Average	7,500	0.310
30 Day Distilled Water Soak	6,500	0.243
	5,200	0.176
	6,200	0.218
Average	6,000	0.214

TENSILE PROPERTIES OF PANEL #411M

Condition of Test	Tensile Strength, psi	Tensile Modulus, psi X 10^6
As Received	12,100	0.325
	13,800	0.302
	13,600	0.348
Average	13,200	0.325
30 Day Distilled Water Soak	12,800	0.206
	13,000	0.238
	12,700	0.213
Average	12,800	0.219

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

COMPRESSIVE PROPERTIES OF PANEL #411

Condition of Test	Compressive Strength, psi	Compressive Modulus, psi X 10^6
As Received	6,600	0.206
	6,400	0.400
	6,700	0.387
Average	6,600	0.331
30 Day Distilled Water Soak	6,800	0.523
	7,800	0.259
	6,000	0.216
Average	6,900	0.333

INTERLAMINAR SHEAR PROPERTIES OF PANEL #411M

Condition of Test	Interlaminar Shear Strength, psi
As Received	1,600
	1,700
	1,000
Average	1,400
30 Day Distilled Water Soak	1,300
	1,100
	950
Average	1,100

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

BEARING PROPERTIES OF PANEL #411M

Condition of Test	Bearing Strength, psi
As Received	4,440
	4,140
	5,620
Average	4,730
30 Day Distilled Water Soak	3,220
	3,210
	3,220
Average	3,220

BONDING STRENGTH TEST DATA

Panel # 411M

Federal Standards-#406
Test #1111

Identification Number	Warp Dir.	Length	Width	Thickness	Rupture Force	Bonding Strength
411M-1-Dry	none	1.000"	1.004"	0.474'	530 lbs	528 psi
411M-3-Dry	none	0.994"	1.002"	0.481"	490 lbs	492 psi
411M-5-Dry	none	1.000"	1.001"	0.477"	462 lbs	462 psi
411M-2-Wet	none	0.996"	1.002"	0.501"	550 lbs	551 psi
411M-4-Wet	none	1.001"	1.005"	0.499"	580 lbs	579 psi
411M-6-Wet	none	1.005"	1.002"	0.503"	570 lbs	566 psi

Bonding Strength = Rupture Force/Area

Average Results:

Dry: 494 psi

Wet: 565 psi

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

ABRASION WEAR OF PANEL #411

Condition of Test	Wgt. Loss, 5,000 Rev. in grams	Average Wgt. Loss, 1,000 Rev. in grams
As Received	0.2411	.0482
	0.2040	.0408
Average	0.2226	.0445
30 Day Distilled Water Soak	0.4594	.0919
	0.4479	.0896
Average	0.4537	.0907

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

MATERIALS EVALUATION Page 90 DATE 12/17/68 REPORT NUMBER 4132

IZOD IMPACT STRENGTH OF PANEL #411

Condition of Test	Impact Strength, Ft.-Lbs./inch notch
As Received	46.0
	43.5
	42.4
Average	45.1
30 Day Distilled Water Soak	42.6
	44.2
	43.0
Average	43.3

PHYSICAL TEST DATA SHEET

PANEL # 411 M

Resin Content*

Wt. of Fabric	Wt. of Laminate	Percent Resin
11-1/2 lbs	7-1/2 lbs.	34.78%
	Average	34.78%

Water Absorption (24 Hours Soak)

Wt. of Sample	Wt. After Soak	% Water Absorbed
52.60 gm.	52.85 gm.	0.46%
53.35 gm.	53.65 gm.	0.56%
52.24 gm.	52.64 gm.	0.77%
	Average	0.60%

Specific Gravity Federal Standard 406 - #5011

Wt. in Air	Wt. in Water	Specific Gravity
19.13 gm.	2.82 gm.	1.17
19.45 gm.	2.79 gm.	1.17
19.38 gm.	2.77 gm.	1.17
	Average	1.17

Void Content

Void content cannot be determined because of the nature of the reinforcement.

* Resin content cannot be determined according to Federal Standard 406 - #7061 because of the low melting point of the reinforcement.

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

FLEXURAL PROPERTIES OF PANEL #3491

Condition of Test	Flexural Strength, psi	Flexural Modulus, psi X 10^6
As Received	22,400	1.24
	24,600	1.38
	23,100	1.30
Average	23,400	1.31
30 Day Distilled Water Soak	22,600	1.24
	19,400	1.02
	22,600	1.34
Average	21,500	1.20

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

TENSILE PROPERTIES OF PANEL #349M

Condition of Test	Tensile Strength, psi	Tensile Modulus, psi X 10^6
As Received	30,900	1.89
	31,300	2.00
	29,900	1.91
Average	30,700	1.93
30 Day Distilled Water Soak	30,300	1.85
	30,500	1.85
	30,000	1.84
Average	30,300	1.85

COMPRESSIVE PROPERTIES OF PANEL #349N

Condition of Test	Compressive Strength, psi	Compressive Modulus, psi X 10^6
As Received	16,700	0.879
	21,500	1.10
	19,500	0.983
Average	19,200	0.984
30 Day Distilled Water Soak	19,700	1.18
	17,500	0.861
	20,100	1.03
Average	19,100	1.02

INTERLAMINAR SHEAR PROPERTIES OF PANEL #349M

Condition of Test	Interlaminar Shear Strength, psi
As Received	3,000
	3,800
	3,900
Average	3,600
30 Day Distilled Water Soak	1,300
	2,600
	1,300
Average	1,700

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

BEARING PROPERTIES OF PANEL #349M

Condition of Test	Bearing Strength, psi
As Received	24,000
	32,000
	32,000
Average	29,000
30 Day Distilled Water Soak	22,700
	22,700
	22,700
Average	22,700

BONDING STRENGTH TEST DATA

Panel # 349M

Federal Standards-#406
Test #1111

Identification Number	Warp Dir.	Length	Width	Thickness	Rupture Force	Bonding Strength
349M-1-Dry	none	1.002"	0.998"	0.478"	1125 lbs	1125 psi
349M-3-Dry	none	0.990"	1.000"	0.478"	1160 lbs	1172 psi
349M-5-Dry	none	0.996"	1.00"	0.477"	1150 lbs	1155 psi
349M-2-Wet	none	1.008"	1.003"	0.483"	1350 lbs	1335 psi
349M-4-Wet	none	1.004"	1.004"	0.489"	1030 lbs	1022 psi
349M-6-Wet	none	1.006"	1.005"	0.491"	1340 lbs	1325 psi

Bonding Strength = Rupture Force/Area

Average Results:

Dry: 1151 psi

Wet: 1227 psi

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

MATERIALS EVALUATION DATE 12/17/68 REPORT NUMBER 4132

ABRASION WEAR OF PANEL #3491

Condition of Test	Wgt. Loss, 5,000 Rev. in grams	Average Wgt. Loss, 1,000 Rev. in grams
As Received	0.3340	.0668
	0.2960	.0592
Average	0.3150	.0630
30 Day Distilled Water Soak	0.3751	.0750
	0.3405	.0681
Average	0.3578	.0716

REINFORCED PLASTICS TESTING LABORATORY

106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

MATERIALS EVALUATION Page 53 DATE 12/17/60 REPORT NUMBER 4132

IZOD IMPACT STRENGTH OF PANEL 4349H

Condition of Test	Impact Strength, ft.-lbs./inch notch
As Received	36.3
	39.4
	36.4
Average	37.5
30 Day Distilled Water Soak	30.4
	29.6
	32.0
Average	30.7

PHYSICAL TEST DATA SHEET

Panel # 349M

Resin Content*

Wt. of Fabric	Wt. of Laminate	Percent Resin
13.56 lbs.	18.85 lbs.	39%
		Average 39%

Water Absorption (24 Hours Soak)

Wt. of Sample	Wt. After Soak	% Water Absorbed
37.8 gm.	38.1 gm	0.79 %
35.2 gm.	35.5 gm	0.85 %
30.6 gm.	30.8 gm	0.65 %
		Average 0.76%

Specific Gravity Federal Standard 406 - #5011

Wt. in Air	Wt. in Water	Specific Gravity
26.1 gm	10.1 gm	1.63
24.3 gm	9.3 gm	1.62
27.8 gm	10.6 gm	1.62
		Average 1.62

Void Content

Void content cannot be determined because of the nature of the reinforcement.

- Resin content cannot be determined according to Federal Standard 406 - #7061 because of the low melting point of the reinforcement.

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

FLEXURAL PROPERTIES OF PANEL #449M

Condition of Test	Flexural Strength, psi	Flexural Modulus, psi X 10^6
As Received	29,600	1.58
	30,800	1.57
	31,500	1.48
Average	30,600	1.54
30 Day Distilled Water Soak	31,300	1.74
	31,300	1.50
	29,000	1.53
Average	30,500	1.59

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

TENSILE PROPERTIES OF PANEL #449M

Condition of Test	Tensile Strength, psi	Tensile Modulus, psi X 10^6
As Received	32,400	2.05
	29,600	1.87
	28,400	1.84
Average	30,100	1.92
30 Day Distilled Water Soak	30,100	1.86
	27,200	1.92
	25,400	1.61
Average	27,600	1.80

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

COMPRESSIVE PROPERTIES OF PANEL #449M

Condition of Test	Compressive Strength, psi	Compressive Modulus, psi X 10^6
As Received	15,500	0.867
	16,000	1.09
	17,100	0.855
Average	16,200	0.934
30 Day Distilled Water Soak	17,300	0.613
	18,600	0.733
	14,100	0.660
Average	16,700	0.670

INTERLAMINAR SHEAR PROPERTIES OF PANEL #449M

Condition of Test	Interlaminar Shear Strength, psi
As Received	3,000
	3,800
	2,600
Average	3,100
30 Day Distilled Water Soak	2,700
	3,700
	3,100
Average	3,200

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

BEARING PROPERTIES OF PANEL #4491

Condition of Test	Bearing Strength, psi
As Received	32,000
	32,000
	30,000
Average	31,000
30 Day Distilled Water Soak	22,000
	22,000
	25,000
Average	23,000

BONDING STRENGTH TEST DATA

Panel # 449M

Federal Standards-#406
Test #1111

Identification Number	Warp Dir.	Length	Width	Thickness	Rupture Force	Bonding Strength
449M-1-Dry	none	1.002"	1.000"	0.480"	1300 lbs	1297psi
449M-3-Dry	none	1.000"	0.999"	0.478"	1280 lbs	1287psi
449M-5-Dry	none	1.001"	1.000"	0.477"	1280 lbs	1279psi
449M-2-Wet	none	1.001"	1.000"	0.485"	1330 lbs	1329psi
449M-4-Wet	none	1.000"	1.004"	0.484"	1475 lbs	1475psi
449M-6-Wet	none	1.003"	1.005"	0.486"	1225 lbs	1215psi

Bonding Strength = Rupture Force/Area

Average Results:

Dry: 1288 psi

Wet: 1340 psi

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

ABRASION WEAR OF PANEL #4491

Condition of Test	Wgt. Loss, 5,000 Rev. in grams	Average Wgt. Loss, 1,000 Rev. in grams
As Received	0.3788	.0758
	0.3082	.0616
Average	0.3435	.0687
30 Day Distilled Water Soak	0.3735	.0745
	0.5381	.1076
Average	0.4557	.0911

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

MATERIALS EVALUATION Page 9 DATE 12/17/68 REPORT NUMBER 4132

IZOD IMPACT STRENGTH OF PANEL #4491

Condition of Test	Impact Strength, Ft.-lbs./inch notch
As Received	34.6
	37.2
	36.0
Average	35.9
30 Day Distilled Water Soak	27.0
	31.6
	32.4
Average	30.3

PHYSICAL TEST DATA SHEET

PANEL # 449M

Resin Content*

Wt. of Fabric	Wt. of Laminate	Percent Resin
13.56 lbs.	18.58 lbs.	37%

Average 37%

Water Absorption (24 Hours Soak)

Wt. of Sample	Wt. After Soak	% Water Absorbed
44.8 gm	45.1 gm	0.67%
31.3 gm	31.6 gm	0.96%
29.1 gm	29.3 gm	0.69%

Average 0.77 %

Specific Gravity Federal Standard 406 - #5011

Wt. in Air	Wt. in Water	Specific Gravity
25.1 gm	9.6 gm	1.62
22.6 gm	8.7 gm	1.63
27.0 gm	10.1 gm	1.60

Average 1.62

Void Content

Void content cannot be determined because of the nature of the reinforcement.

* Resin content cannot be determined according to Federal Standard 406 - #7061 because of the low melting point of the reinforcement.

REINFORCED PLASTICS TESTING LABORATORY

106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

MATERIALS EVALUATION Page 6 DATE 12/17/64 REPORT NUMBER 4132

FLEXURAL PROPERTIES OF RAMIA M500

Condition of Test	Flexural Stress @, psi			Flexural Modulus, psi x 10⁶		
	Warp	Fill	45° Warp	Warp	Fill	45° Warp
As Received	34,800	24,000	11,000	0.662	0.650	0.605
	40,300	25,500	12,000	0.655	0.671	0.595
	35,200	25,100	13,000	0.683	0.650	0.616
Average	36,800	25,100	12,200	0.663	0.660	0.605
2 Hr. Boil	41,200	29,400	14,000	2.01	1.79	0.740
	38,200	30,200	15,500	2.16	1.63	0.733
	38,100	26,700	13,300	2.08	1.81	0.650
Average	39,200	28,800	14,500	2.08	1.74	0.710

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

TENSILE PROPERTIES OF PANEL #360

Condition of Test	Tensile Strength, psi			Tensile Modulus, psi X10^6		
	Warp	Fill	45° Warp	Warp	Fill	45° Warp
As Received	63,900	52,500	14,000	2.29	1.96	0.634
	58,200	55,200	14,100	2.37	2.07	0.534
	60,400	59,900	14,200	2.30	2.41	0.398
Average	60,800	55,900	14,100	2.32	2.15	0.555
2 Hr. Boil	60,200	55,000	13,100	2.16	1.94	0.440
	58,000	55,100	12,100	2.03	1.91	0.280
	56,500	55,400	12,600	2.09	2.08	0.387
Average	58,200	55,200	12,600	2.09	1.98	0.369

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

MATERIALS EVALUATION DATE 12/17/66 REPORT NUMBER 4132

COMPRESSIVE PROPERTIES OF PANEL #360

Condition of Test	Compressive Strength, psi			Compressive Modulus, psi x 10^6		
	Warp	Fill	45° Warp	Warp	Fill	45° Warp
As Received	18,800	19,300	10,300	0.959	1.13	0.307
	19,600	17,200	10,100	0.905	0.760	0.283
	21,100	20,000	11,000	0.913	0.764	0.273
Average	19,800	18,800	10,500	0.926	0.885	0.288
2 Hr. Boil	16,500	16,500	10,300	0.817	0.732	0.304
	17,600	17,500	9,100	0.683	0.820	0.313
	16,700	17,300	9,200	0.788	0.861	0.297
Average	16,900	17,100	9,700	0.763	0.804	0.325

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

INTERLAMINAR SHEAR PROPERTIES OF PANEL #500

Condition of Test	Interlaminar shear strength, psi		
	Warp	Fill	45° Warp
As Received	2,300	2,500	3,100
	2,400	2,200	3,200
	2,900	2,400	3,000
Average	2,500	2,400	3,100
2 Hr. Boil	2,300	2,300	2,700
	2,300	2,400	2,500
	2,900	2,100	2,700
Average	2,500	2,400	2,600

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

BEARING PROPERTIES OF PANEL #360

Condition of Test	Bearing Strength, psi		
	Warp	Fill	
As Received	17,400	18,600	
	17,600	19,500	
	17,400	18,400	
Average	17,500	18,800	
2 Hr. Boil	14,000	16,700	
	14,000	16,500	
	14,000	12,400	
Average	14,000	15,200	

BONDING STRENGTH TEST DATA

Panel # 360

Federal Standards-#406
Test #1111

Identification Number	Warp Dir.	Length	Width	Thickness	Rupture Force	Bonding Strength
BS90-360-1-Dry	Paraallel	1.000"	0.999"	0.475"	1925 lbs	1927 psi
BS90-360-3-Dry	Parallel	1.002"	1.001"	0.477"	1850 lbs	1844 psi
BS90-360-5-Dry	Parallel	1.004"	1.001"	0.477"	1925 lbs	1915 psi
BS90-360-7-Dry	Perpend.	1.002"	0.998"	0.476"	1900 lbs	1900 psi
BS90-360-9-Dry	Perpend.	1.002"	1.002"	0.476"	1750 lbs	1743 psi
BS90-360-11-Dry	Perpend.	1.001"	1.000"	0.478"	1700 lbs	1700 psi
BS90-360-2-Wet	Parallel	1.000"	1.004"	0.477"	1800 lbs	1793 psi
BS90-360-4-wet	Parallel	1.007"	1.005"	0.477"	1850 lbs	1828 psi
BS90-360-6-Wet	Parallel	1.004"	1.003"	0.479"	2075 lbs	2061 psi
BS90-360-8-Wet	Perpend.	1.001"	1.001"	0.479"	1825 lbs	1823 psi
BS90-360-10-Wet	Perpend.	1.000"	1.002"	0.480"	2050 lbs	2046 psi
BS90-360-12-Wet	Perpend.	1.001"	1.000"	0.481"	2050 lbs	2048 psi

Bonding Strength = Rupture Force/Area

Average Results:

Dry: 1895 psi

Wet: 1894 psi

Perpendicular To Warp

Dry: 1781 psi

Wet: 1972 psi

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

ABRASION WEAR OF PANEL #360

Condition of Test	Wgt. Loss, 5,000 Rev. in grams	Average Wgt. Loss, 1,000 Rev. in grams
As Received	0.3022	.0604
	0.3488	.0698
Average	0.3255	.0651
2 Hr. Boil	0.6057	.1211
	0.4651	.0930
Average	0.5354	.1071

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

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IZOD IMPACT STRENGTH OF PANEL #360

Condition of Test	Impact Strength, ft.-lbs./inch notch
	Warp
As Received	46.4
	48.4
	46.2
Average	47.0
2 Hr. Boil	44.2
	49.4
	45.4
Average	46.3

PHYSICAL TEST DATA SHEET

PANEL # 360

Resin Content Federal Standard 406 - #7061

Wt. of Sample	Wt. of Residue	Percent Resin
14.65gm.	7.39 gm.	49.56%
14.57gm.	7.32 gm.	49.76%
16.09gm.	8.09 gm.	49.72%
	Average	49.68%

Water Absorption Federal Standard 406 - # 7031 Pro. D

Wt. of Sample	Wt. After Boil	% Water Absorbed
42.52 gm.	42.62 gm.	0.24%
38.85 gm.	38.96 gm.	0.28%
37.38 gm.	37.46 gm.	0.21%
	Average	0.24%

Specific Gravity Federal Standard 406 - #5011

Wt. in Air	Wt. in Water	Specific Gravity
28.11 gm.	10.88 gm.	1.63
29.11 gm.	11.35 gm.	1.64
28.96 gm.	11.22 gm.	1.63
	Average	1.63

Void Content Mil-P-17549C

Sp. Gr. Laminate	Sp. Gr. Cured Resin	Resin Content (Decimal	Glass Content (Decimal)	Percent Voids
1.63	1.22	0.496	0.504	1.77
1.63	1.22	0.497	0.503	1.60
1.63	1.22	0.496	0.504	1.77
			Average	1.71%

FLEXURAL PROPERTIES OF PANEL #60

Condition of Test	Flexural Strength, psi			Flexural Modulus, psi X 10^6		
	Warp	Fill	45° Warp	Warp	Fill	45° Warp
As Received	35,000	25,100	11,300	2.05	1.86	0.603
	37,100	25,600	11,800	2.11	1.70	0.604
	35,800	22,700	12,700	2.05	1.78	0.694
Average	36,000	24,500	11,900	2.07	1.78	0.635
2 Hr. Boil	37,300	24,000	8,900	2.17	1.79	0.469
	36,900	26,300	10,900	2.20	1.90	0.521
	38,200	25,800	11,900	2.12	1.88	0.505
Average	37,500	25,400	10,600	2.16	1.86	0.518

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

TENSILE PROPERTIES OF PANEL #460

Condition of Test	Tensile Strength, psi			Tensile Modulus, psi X 10^6		
	Warp	Fill	45° Warp	Warp	Fill	45° Warp
As Received	55,800	55,300	12,800	2.39	2.60	0.436
	57,600	57,800	12,500	2.46	2.16	0.671
	56,500	57,500	12,200	2.44	2.59	0.736
Average	56,600	56,900	12,500	2.43	2.45	0.614
2 Hr. Boil	53,400	53,400	10,500	2.13	2.08	0.616
	51,600	46,300	10,400	2.22	1.93	0.573
	51,900	55,700	10,100	2.34	2.37	0.548
Average	52,300	51,500	10,300	2.23	2.13	0.579

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

COMPRESSIVE PROPERTIES OF PANEL #460

Condition of Test	Compressive Strength, psi			Compressive Modulus, psi X 10^6		
	Warp	Fill	45° Warp	Warp	Fill	45° Warp
As Received	22,200	23,800	10,900	0.909	1.46	0.322
	21,400	24,000	11,700	0.906	1.36	0.370
	22,000	19,400	10,500	1.12	1.02	0.344
Average	21,900	22,400	11,000	0.978	1.28	0.345
2 Hr. Boil	17,900	17,100	10,000	0.842	0.712	0.237
	19,700	17,000	10,000	0.799	0.731	0.306
	19,900	15,500	9,800	0.783	0.930	0.298
Average	19,200	16,500	9,900	0.808	0.808	0.281

INTERLAMINAR SHEAR PROPERTIES OF PANEL #460

Condition of Test	Interlaminar Shear Strength, psi		
	Warp	Fill	45° Warp
As Received	3,000	2,500	2,900
	2,700	2,300	3,000
	2,200	2,500	3,400
Average	2,600	2,400	3,100
2 Hr. Boil	1,400	2,000	2,800
	2,300	2,600	3,100
	2,600	2,300	2,800
Average	2,100	2,300	2,900

BEARING PROPERTIES OF PANEL #460

Condition of Test	Bearing Strength, psi		
	Warp	Fill	
As Received	17,500	15,800	
	16,900	15,200	
	15,000	14,800	
Average	16,500	16,600	
2 Hr. Boil	10,300	16,500	
	11,500	11,000	
	10,700	11,000	
Average	10,800	12,800	

BONDING STRENGTH TEST DATA

PANEL # 460

Federal Standards - #406
Test #1111

Identification Number	Warp Dir.	Length	Width	Thickness	Rupture Force	Bonding Strength
BS90-460-1-dry	parallel	1.000"	1.000"	0.478"	2000 lbs	2000psi
BS90-460-3-dry	parallel	1.000"	1.000"	0.479"	2150 lbs	2150psi
BS90-460-5-dry	parallel	1.000"	1.000"	0.480"	2050 lbs	2050psi
BS90-460-7-dry	perpend.	0.999"	1.000"	0.480"	1900 lbs	1902psi
BS90-460-9-dry	perpend.	1.003"	1.001"	0.480"	2100 lbs	2092psi
BS90-460-11-dry	perpend.	1.001"	1.001"	0.478"	1950 lbs	1946psi
BS90-460-2-wet	parallel	1.002"	1.003"	0.477"	1850 lbs	1841psi
BS90-460-4-wet	parallel	1.002"	1.000"	0.483"	1950 lbs	1946psi
BS90-460-6-wet	parallel	0.999"	0.997"	0.484"	2000 lbs	2008psi
BS90-460-8-wet	perpend.	1.000"	1.002"	0.481"	2000 lbs	1996psi
BS90-460-10-wet	perpend.	1.000"	1.000"	0.477"	1700 lbs	1700psi
BS90-460-12-wet	perpend.	1.000"	1.000"	0.478"	1975 lbs	1975psi

Bonding Strength = Rupture Force/Area

Average Results:

Parallel to Warp

Dry: 2067 psi

Wet: 1932 psi

Perpendicular to Warp

Dry: 1980 psi

Wet: 1890 psi

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

ABRASION WEAR OF PANEL #460

Condition of Test	Wgt. Loss, 5,000 Rev. in grams	Average Wgt. Loss, 1,000 Rev. in grams
As Received	0.3179	.0636
	0.2373	.0475
Average	0.2776	.0556
2 Hr. Boil	0.2822	.0564
	0.4574	.0915
Average	0.3698	.0740

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

IZOD IMPACT STRENGTH OF PANEL #460

Condition of Test	Impact Strength, ft.-lbs./inch notch
	Warp
As Received	43.4
	47.4
	51.3
Average	49.2
2 Hr. Boil	46.3
	46.0
	46.3
Average	46.5

PHYSICAL TEST DATA SHEET

PANEL # 460

Resin Content Federal Standard 406 - #7061

Wt. of Sample	Wt. of Residue	Percent Resin
16.82 gm	8.51 gm	50.59 %
17.13 gm	8.73 gm	49.03 %
17.30 gm	8.76 gm	49.36 %

Average 49.66%

Water Absorption Federal Standard 406 - # 7031 Pro. E

Wt. of Sample	Wt. After Boil	% Water Absorbed
28.24 gm	28.4 gm	0.71 %
34.45 gm	34.8 gm	0.87 %
45.75 gm	46.1 gm	0.66 %

Average 0.75%

Specific Gravity Federal Standard 406 - #5011

Wt. in Air	Wt. in Water	Specific Gravity
28.24 gm	11.00 gm	1.64
34.45 gm	13.60 gm	1.65
45.75 gm	18.05 gm	1.65

Average 1.65

Void Content Mil-P-17549C

Sp. Gr. Laminate	Sp. Gr. Cured Resin	Resin Content (Decimal	Glass Content (Decimal)	Percent Voids
1.64	1.22	0.490	0.510	1.8
1.64	1.22	0.494	0.506	1.3
1.65	1.22	0.506	0.494	0.9

Average 1.3%

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

FLEXURAL PROPERTIES OF PANEL #503

Condition of Test	Flexural Strength, psi			Flexural Modulus, psi X 10^6		
	Warp	Fill	45° Warp	Warp	Fill	45° Warp
As Received	59,900	44,300	34,900	2.03	2.49	1.91
	54,200	43,400	32,300	2.05	2.39	1.90
	54,600	46,400	35,100	2.71	2.52	1.92
Average	55,900	44,700	34,100	2.60	2.47	1.91
2 Hr. Boil	44,300	42,500	20,900	2.50	2.00	1.40
	42,000	39,900	24,700	2.41	2.21	1.53
	45,700	41,300	23,200	2.45	1.96	1.47
Average	44,000	41,200	22,900	2.40	2.03	1.47

TENSILE PROPERTIES OF PANEL #503

Condition of Test	Tensile Strength, psi			Tensile Modulus, psi X 10^6		
	Warp	Fill	45° Warp	Warp	Fill	45° Warp
As Recieved	43,700	35,000	19,400	3.30	2.77	1.85
	48,200	26,800	19,900	3.21	2.83	1.88
	40,900	40,100	20,300	3.04	3.04	1.87
Average	44,300	34,000	19,900	3.18	2.88	1.87
2 Hr. Boil	32,600	24,000	18,000	3.07	2.53	1.51
	41,000	34,100	18,500	2.84	2.44	1.54
	41,400	37,500	18,100	2.67	2.51	1.71
Average	38,300	31,900	18,200	2.86	2.49	1.59

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

COMPRESSIVE PROPERTIES OF PANEL #503

Condition of Test	Compressive Strength, psi			Compressive Modulus, psi X 10^6		
	Warp	Fill	45° Warp	Warp	Fill	45° Warp
As Received	35,100	31,700	22,900	1.45	1.21	0.453
	30,100	30,800	24,100	1.30	0.988	0.976
	29,800	26,900	25,600	1.41	1.07	0.755
Average	31,700	29,800	24,200	1.39	1.09	0.728
2 Hr. Boil	26,000	25,000	24,600	0.834	0.740	0.679
	29,300	22,300	23,400	0.872	0.844	0.702
	32,300	22,300	24,200	1.31	0.877	0.691
Average	29,200	23,200	24,100	1.01	0.820	0.711

INTERLAMINAR SHEAR PROPERTIES OF PANEL #503

Condition of Test	Interlaminar Shear Strength, psi		
	Warp	Fill	45° Warp
As Received	1,900	2,200	2,100
	1,800	1,600	2,300
	2,900	2,000	3,100
Average	2,200	1,900	2,500
2 Hr. Boil	3,200	2,500	3,400
	3,000	2,700	3,000
	3,000	2,300	1,300
Average	3,100	2,500	2,600

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

BEARING PROPERTIES OF PANEL #503

Condition of Test	Bearing Strength, psi		
	Warp	Fill	
As Received	32,600	32,000	
	34,400	36,900	
	36,000	36,600	
Average	34,300	35,200	
2 Hr. Boil	33,100	29,900	
	29,800	34,800	
	29,300	29,400	
Average	30,700	31,400	

BONDING STRENGTH TEST DATA

PANEL # 503

Federal Standards - #406
Test #1111

Identification Number	Warp Dir.	Length	Width	Thickness	Rupture Force	Bonding Strength
BS90-503-1-DRY	Parallel	0.997"	0.999"	0.477"	1300 Lb.	1395 psi
BS90-503-3-DRY	Parallel	1.000"	0.998"	0.476"	1500 Lb	1503 psi
BS90-503-5-DRY	Parallel	1.000"	1.001"	0.476"	1500 Lb.	1499 psi
BS90-503-7-DRY	Perpend.	0.999"	0.998"	0.478"	1425 Lb.	1429 psi
BS90-503-9-DRY	Perpend	1.000"	0.998"	0.478"	1325 Lb.	1328 psi
BS90-503-11-DRY	Perpend.	1.000"	0.999"	0.478"	1550 Lb.	1552 psi
BS90-503-2-Wet	Parallel	0.999"	1.000"	0.482"	1550 lb.	1552 psi
BS90-503-4-Wet	Parallel	1.000"	0.998"	0.483"	1650 lb.	1653 psi
BS90-503-6-Wet	Parallel	0.998"	0.998"	0.481"	1350 lb.	1355 psi
BS90-503-8-Wet	Perpend	0.996"	1.000"	0.485"	1500 lb.	1506 psi
BS90-503-10-Wet	Perpend	0.997"	0.997"	0.481"	1500 lb.	1599 psi
BS90-503-12-Wet	Perpend	0.999"	0.999"	0.481"	1450 lb.	1453 psi

Bonding Strength = Rupture Force/Area

Average Results:

Parallel to Warp

Dry: 1466 PSI

Wet: 1520 PSI

Perpendicular to Warp

Dry: 1436 PSI

Wet: 1519 PSI

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

ABRASION WEAR OF PANEL #503

Condition of Test	Wgt. Loss, 5,000 Rev. in grams	Average Wgt. Loss, 1,000 Rev. in grams
As Received	0.2497	.0499
	0.2305	.0461
Average	0.2401	.0480
2 Hr. Boil	0.5026	.1001
	0.3251	.0650
Average	0.4139	.0826

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

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IZOD IMPACT STRENGTH OF PANEL #03

Condition of Test	Impact Strength, ft.-lbs./inch notch
	Warp
As Received	13.6
	13.6
	14.2
Average	13.8
2 Hr. Boil	14.2
	13.6
	14.6
Average	14.3

PHYSICAL TEST DATA SHEET

PANEL # 503

Resin Content Federal Standard 406 - #7061

Wt. of Sample	Wt. of Residue	Percent Resin
20.77 gm.	11.53 gm.	44.49 %
20.57 gm.	11.51 gm.	44.04 %
19.30 gm.	10.73 gm.	44.40 %

Average 44.31%

Water Absorption Federal Standard 406 - # 7031 Pro. E

Wt. of Sample	Wt. After Boil	% Water Absorbed
86.39 gm	86.39 gm	0.00%
85.41 gm	85.42 gm	0.012%
80.02 gm	80.03 gm	0.013%

Average 0.0125%

Specific Gravity Federal Standard 406 - #5011

Wt. in Air	Wt. in Water	Specific Gravity
38.53 gm.	16.12 gm.	1.72
38.77 gm.	16.35 gm.	1.73
36.60 gm.	15.33 gm.	1.72

Average 1.72

Void Content Mil-P-17549C

Sp. Gr. Laminate	Sp. Gr. Cured Resin	Resin Content (Decimal	Glass Content (Decimal)	Percent Voids
1.72	1.23	0.44	0.56	1.00
1.72	1.23	0.44	0.56	1.00
1.71	1.23	0.44	0.56	1.50

Average 1.16%

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

FLEXURAL PROPERTIES OF PANEL #603

Condition of Test	Flexural Strength, psi			Flexural Modulus, pai X 10^6		
	Warp	Fill	45° Warp	Warp	Fill	45° Warp
As Received	49,100	55,600	41,300	2.85	2.95	2.32
	52,300	56,100	40,000	2.82	3.00	2.20
	52,700	58,600	41,200	2.71	2.97	2.24
Average	51,400	56,800	40,800	2.79	2.97	2.25
2 Hr. Boil	39,100	40,000	29,900	3.12	2.69	1.89
	38,700	40,700	32,600	2.52	2.74	1.79
	40,400	41,300	32,800	2.48	2.60	1.81
Average	39,400	40,700	31,800	2.71	2.68	1.83

TENSILE PROPERTIES OF PANEL #603

Condition of Test	Tensile Strength, psi			Tensile Modulus, psi X 10^6		
	Warp	Fill	45° Warp	Warp	Fill	45° Warp
As Received	44,800	41,400	21,700	3.30	3.37	1.95
	42,500	42,500	21,400	3.33	3.32	2.00
	44,500	42,200	20,900	3.15	3.05	1.80
Average	43,900	42,000	21,300	3.26	3.25	1.92
2 Hr. Boil	42,000	37,300	19,100	2.97	2.62	1.68
	41,500	36,700	18,700	2.87	2.50	1.66
	41,500	38,400	18,900	2.83	2.76	1.74
Average	41,700	37,500	18,900	2.89	2.63	1.69

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

COMPRESSIVE PROPERTIES OF PANEL #603

Condition of Test	Compressive Strength, psi			Compressive Modulus, psi $\times 10^6$		
	Warp	Fill	45° Warp	Warp	Fill	45° Warp
As Received	46,100	28,600	24,900	1.60	0.963	0.982
	36,700	28,400	24,200	1.47	0.907	0.944
	37,600	26,600	23,800	1.46	0.947	0.943
Average	40,100	27,900	24,300	1.51	0.939	0.963
2 Hr. Boil	31,400	27,400	21,600	1.13	0.577	0.929
	29,000	29,300	21,900	1.29	0.877	0.848
	31,200	26,100	21,300	1.22	0.851	0.804
Average	30,500	27,600	21,600	1.23	0.760	0.860

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

MATERIALS EVALUATION DATE 12/17/66 REPORT NUMBER 4132

INTERLAMINAR SHEAR PROPERTIES OF PANEL #603

Condition of Test	Interlaminar Shear Strength, psi		
	Warp	Fill	45° Warp
As Received	1,700	2,600	3,900
	930	1,700	3,700
	2,100	1,400	2,600
Average	1,600	1,900	3,400
2 Hr. Boil	1,400	2,200	3,700
	1,700	2,200	1,200
	3,000	2,600	4,300
Average	2,000	2,300	3,100

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

BEARING PROPERTIES OF PANEL #603

Condition of Test	Bearing Strength, psi		
	Warp	Fill	
As Received	34,200	32,000	
	31,900	35,400	
	33,100	30,600	
Average	33,100	35,300	
2 Hr. Boil	30,600	30,000	
	32,100	28,400	
	30,900	29,900	
Average	31,200	28,000	

BONDING STRENGTH TEST DATA

PANEL # 603

Federal Standards - #406
Test #1111

Identification Number	Warp Dir.	Length	Width	Thickness	Rupture Force	Bonding Strength
BS90-603-1-DRY	Parallel	0.999"	0.999"	0.476"	1525 Lb.	1528 psi
BS90-603-3-DRY	Parallel	0.999"	0.998"	0.475"	1500 Lb.	1505 psi
BS90-603-5-DRY	Parallel	0.997"	1.008"	0.476"	1650 Lb.	1648 psi
BS90-603-7-DRY	Perpend	0.997"	1.001"	0.476"	1350 Lb.	1353 psi
BS90-603-9-DRY	Perpend	1.000"	1.000"	0.476"	1375 Lb	1375 psi
BS90-603-11-DRY	Perpend	1.002"	1.001"	0.476"	1600 Lb.	1595 psi
BS90-603-2-Wet	Parallel	0.998"	0.99?"	0.479"	1725 Lb.	1730 psi
BS90-603-4-Wet	Parallel	0.998 "	0.998"	0.478"	1575 Lb.	1581 psi
BS90-603-6-Wet	Parallel	0.998 "	0.998"	0.478"	1800 Lb.	1807 psi
BS90-603-8-Wet	Perpend	0.998 "	0.998"	0.479"	1800 Lb.	1807 psi
BS90-603-10-Wet	Perpend	0.999 "	0.999"	0.478"	1950 Lb.	1954 psi
BS90-603-12-Wet	Perpend	0.998 "	0.999"	0.478"	1900 Lb.	1906 psi

Bonding Strength = Rupture Force/Area

Average Results:

Parallel to Warp

Dry: 1560 PSI

Wet: 1706 PSI

Perpendicular to Warp

Dry: 1441 PSI

Wet: 1889 PSI

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

MATERIALS EVALUATION DATE 12/17/68 REPORT NUMBER 4132

ABRASION WEAR OF PANEL #603

Condition of Test	Wgt. Loss, 5,000 Rev. in Grams	Average Wgt. Loss, 1,000 Rev. in Grams
As Received	0.3068	.0614
	0.3002	.0600
Average	0.3035	.0607
2 Hr. Boil	0.4543	.0909
	0.4449	.0890
Average	0.4496	.0900

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

MATERIALS EVALUATION Page 106 DATE 12/17/6[illegible] REPORT NUMBER 4132

IZOD IMPACT STRENGTH OF PAN-L-[illegible]

Condition of Test	Impact Strength, Ft.-Lbs./inch notch
As Received	15.4
	15.[illegible]
	15.5
Average	15.9
2 Hr. Boil	16.4
	16.0
	15.[illegible]
Average	16.1

PHYSICAL TEST DATA SHEET

PANEL # 603

Resin Content Federal Standard 406 - #7061

Wt. of Sample	Wt. of Residue	Percent Resin
35.33 gm.	20.85 gm.	40.98%
38.66 gm.	22.80 gm.	41.02%
39.03 gm.	22.91 gm.	41.30%
		Average 41.10%

Water Absorption Federal Standard 406 - # 7031 Pro. E

Wt. of Sample	Wt. After Boil	% Water Absorbed
106.51 gm.	106.52 gm.	0.009%
109.83 gm.	109.85 gm.	0.018%
106.41 gm.	106.42 gm.	0.009%
		Average 0.012%

Specific Gravity Federal Standard 406 - #5011

Wt. in Air	Wt. in Water	Specific Gravity
80.46 gm.	34.93 gm.	1.77
78.70 gm.	34.20 gm.	1.77
74.71 gm.	32.26 gm.	1.76
		Average 1.77

Void Content Mil-P-17549C

Sp. Gr. Laminate	Sp. Gr. Cured Resin	Resin Content (Decimal	Glass Content (Decimal)	Percent Voids
1.76	1.23	0.41	0.59	0.9
1.76	1.23	0.40	0.60	1.7
1.77	1.23	0.41	0.59	0.40
				Average 1.00%

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

FLEXURAL PROPERTIES OF PANEL #526

Condition of Test	Flexural Strength, psi			Flexural Modulus, psi X 10^6		
	Warp	Fill	45° Warp	Warp	Fill	45° Warp
As Received	59,900	48,500	40,600	2.65	2.34	1.53
	59,200	49,300	39,500	2.73	2.41	1.51
	49,300	46,100	38,700	2.44	2.36	1.50
Average	56,100	48,000	39,600	2.67	2.37	1.54
2 Hr. Boil	46,400	42,900	37,300	2.39	2.12	1.64
	44,000	40,000	37,300	2.49	2.03	1.75
	46,600	41,600	30,200	2.48	2.10	1.35
Average	45,700	41,500	34,900	2.45	2.10	1.58

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

TENSILE PROPERTIES OF PANEL #526

Condition of Test	Tensile Strength, psi			Tensile Modulus, psi X 10^6		
	Warp	Fill	45° Warp	Warp	Fill	45° Warp
As Received	44,200	37,900	19,600	2.86	2.87	1.52
	39,000	40,300	20,400	2.79	2.94	1.61
	39,200	40,200	19,500	2.70	2.81	1.43
Average	40,800	39,500	19,800	2.78	2.87	1.52
2 Hr. Boil	31,500	28,600	21,100	2.60	2.69	1.38
	29,000	28,900	19,600	2.68	2.51	1.35
	27,700	27,900	18,800	2.61	2.52	1.27
Average	29,400	28,500	19,800	2.63	2.54	1.33

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

COMPRESSIVE PROPERTIES OF PANEL #526

Condition of Test	Compressive Strength, psi			Compressive Modulus, psi X 10^6		
	Warp	Fill	45° Warp	Warp	Fill	45° Warp
As Received	47,800	33,300	23,200	1.03	1.02	0.525
	46,800	33,500	24,400	1.45	1.00	0.650
	46,600	31,900	23,600	1.23	1.05	0.674
Average	47,100	32,900	23,700	1.24	1.02	0.642
2 Hr. Boil	36,000	31,500	22,100	1.98	0.880	0.642
	39,400	30,500	23,100	1.82	0.833	0.554
	37,600	30,800	22,800	1.02	1.02	0.525
Average	37,700	30,900	22,700	1.61	0.911	0.574

INTERLAMINAR SHEAR PROPERTIES OF PANEL #526

Condition of Test	Interlaminar Shear Strength, psi		
	Warp	Fill	45° Warp
As Received	3,200	3,900	3,900
	3,000	2,000	4,500
	3,200	4,500	3,900
Average	3,100	3,500	4,100
2 Hr. Boil	2,800	2,900	3,600
	3,600	2,400	4,600
	1,900	3,700	4,800
Average	2,800	3,000	4,300

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

BEARING PROPERTIES OF PANEL #526

Condition of Test	Bearing Strength, psi		
	Warp	Fill	
As Received	33,800	30,700	
	31,400	36,900	
	34,300	35,700	
Average	33,200	34,400	
2 Hr. Boil	30,900	28,400	
	32,000	28,000	
	24,600	29,200	
Average	29,400	28,500	

BONDING STRENGTH TEST DATA

PANEL # 526

Federal Standards - #406
Test #1111

Identification Number	Warp Dir.	Length	Width	Thickness	Rupture Force	Bonding Strength
BS90-526-1-dry	parallel	1.000"	0.999"	0.476"	2150 lbs	2152 psi
BS90-526-3-dry	parallel	1.001"	1.000"	0.477"	1675 lbs	1673 psi
BS90-526-5-dry	parallel	1.001"	1.001"	0.477"	1600 lbs	1598 psi
BS90-526-7-dry	perpend.	1.000"	1.000"	0.479"	1600 lbs	1600 psi
BS90-526-9-dry	perpend.	1.001"	0.999"	0.478"	1675 lbs	1675 psi
BS90-526-11-dry	perpend.	1.001"	1.000"	0.477"	1800 lbs	1798 psi
BS90-526-2-wet	parallel	1.000"	0.999"	0.477"	1800 lbs	1802 psi
BS90-526-4-wet	parallel	1.001"	1.000"	0.476"	1750 lbs	1748 psi
BS90-526-6-wet	parallel	0.999"	1.002"	0.477"	1775 lbs	1768 psi
BS90-526-8-wet	perpend.	1.000"	0.998"	0.477"	1780 lbs	1784 psi
BS90-526-10-wet	perpend.	1.002"	0.998"	0.476"	1750 lbs	1750 psi
BS90-526-12-wet	perpend.	1.001"	0.999"	0.478"	1775 lbs	1775 psi

Bonding Strength = Rupture Force/Area

Average Results:

Parallel to Warp		Perpendicular to Warp	
Dry:	1807 psi	Dry:	1691 psi
Wet:	1773 psi	Wet:	1770 psi

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

MATERIALS EVALUATION Page 145 DATE 12/17/68 REPORT NUMBER 4132

ABRASION WEAR OF PANEL #526

Condition of Test	Wgt. Loss, 5,000 Rev. in grams	Average Wgt. Loss, 1,000 Rev. in grams
As Received	0.2281	.0456
	0.1837	.0367
Average	0.2059	.0412
2 Hr. Boil	0.1839	.0368
	0.1518	.0304
Average	0.1679	.0336

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

MATERIALS EVALUATION Page 101 DATE 12/17/63 REPORT NUMBER 4132

IZOD IMPACT STRENGTH OF PAHL #526

Condition of Test	Impact Strength, ft.-lbs./inch notch
	Warp
As Received	13.6
	13.6
	12.0
Average	13.1
2 Hr. Boil	10.4
	11.4
	11.2
Average	11.0

PHYSICAL TEST DATA SHEET

PANEL # 526

Resin Content Federal Standard 406 - #7061

Wt. of Sample	Wt. of Residue	Percent Resin
23.45 gm.	12.58 gm.	46.35 %
23.10 gm.	12.58 gm.	45.54 %
22.60 gm.	12.39 gm.	45.18 %

Average 45.36%

Water Absorption Federal Standard 406 - # 7031 Pro. D

Wt. of Sample	Wt. After Boil	% Water Absorbed
67.05 gm.	67.14 gm.	0.13%
74.32 gm.	74.45 gm.	0.17%
70.19 gm.	70.28 gm.	0.13%

Average 0.14%

Specific Gravity Federal Standard 406 - #5011

Wt. in Air	Wt. in Water	Specific Gravity
47.00 gm.	18.99 gm.	1.68
46.30 gm.	18.69 gm.	1.68
51.88 gm.	20.75 gm.	1.67

Average 1.68

Void Content Mil-P-17549C

Sp. Gr. Laminate	Sp. Gr. Cured Resin	Resin Content (Decimal	Glass Content (Decimal)	Percent Voids
1.67	1.19	0.458	0.542	0.51
1.67	1.19	0.459	0.541	0.43
1.67	1.19	0.456	0.544	0.66

Average 0.53%

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

MATERIALS EVALUATION Page 19 DATE 12/17/68 REPORT NUMBER 4132

FLEXURAL PROPERTIES OF PANEL 4626

Condition of Test	Flexural Strength, psi			Flexural Modulus, psi X 10^6		
	Warp	Fill	45° Warp	Warp	Fill	45° Warp
As Received	51,900	42,100	37,300	2.37	2.25	1.[illegible]
	50,200	40,300	31,800	2.66	2.09	1.[illegible]
	54,600	39,900	33,300	2.91	2.01	1.[illegible]
Average	52,200	40,800	34,100	2.75	2.12	1.74
2 Hr. Boil	44,700	31,500	20,400	2.51	1.97	1.59
	40,100	27,300	18,500	2.43	1.82	1.46
	39,500	26,900	17,300	2.34	1.84	1.47
Average	41,300	29,200	15,400	2.43	1.88	1.51

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

TENSILE PROPERTIES OF PANEL #626

Condition of Test	Tensile Strength, psi			Tensile Modulus, psi X 10^6		
	Warp	Fill	45° Warp	Warp	Fill	45° Warp
As Received	40,400	38,300	21,100	2.69	2.83	1.55
	39,700	41,600	21,600	2.72	2.77	1.45
	42,200	39,800	22,000	2.81	2.73	1.42
Average	40,800	39,900	21,600	2.74	2.78	1.47
2 Hr. Boil	30,300	29,100	20,900	2.59	2.55	1.36
	31,700	29,700	20,900	2.55	2.59	1.40
	29,700	29,100	21,000	2.59	2.65	1.38
Average	30,600	29,300	20,900	2.58	2.60	1.38

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

COMPRESSIVE PROPERTIES OF PANEL #626

Condition of Test	Compressive Strength, psi			Compressive Modulus, psi X10^6		
	Warp	Fill	45° Warp	Warp	Fill	45° Warp
As Received	48,000	42,100	21,100	1.11	1.30	0.522
	41,100	36,900	22,000	0.903	1.19	0.573
	35,900	38,700	22,900	0.996	1.04	0.486
Average	41,700	39,200	22,000	1.00	1.18	0.527
2 Hr. Boil	32,400	40,600	23,300	0.914	1.08	0.571
	35,600	38,400	21,700	1.30	1.25	0.614
	32,000	41,300	22,400	0.865	0.940	0.558
Average	33,300	40,100	22,500	1.02	1.09	0.581

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

INTERLAMINAR SHEAR PROPERTIES OF PANEL 3026

Condition of Test	Interlaminar Shear Strength, psi		
	Warp	Fill	45° Warp
As Received	4,100	4,300	4,700
	1,500	4,[illegible]	5,100
	2,900	4,300	5,000
Average	2,800	4,400	4,900
2 Hr. Boil	3,400	4,100	5,700
	4,300	4,600	5,200
	3,600	4,100	5,200
Average	3,800	4,300	5,400

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

BEARING PROPERTIES OF PANEL #626

Condition of Test	Bearing Strength, psi		
	Warp	Fill	
As Received	31,600	33,700	
	33,500	33,400	
	34,600	35,000	
Average	33,200	34,000	
2 Hr. Boil	28,200	18,900	
	32,300	27,700	
	29,100	28,600	
Average	29,900	25,100	

BONDING STRENGTH TEST DATA

PANEL # 626

Federal Standards - #406
Test #1111

Identification Number	Warp Dir.	Length	Width	Thickness	Rupture Force	Bonding Strength
621-1-dry	parallel	1.000"	0.999"	0.476"	1750 lbs	1752psi
626-3-dry	parallel	1.006"	0.999"	0.474"	1425 lbs	1418psi
626-5-dry	p rallel	1.001"	1.000"	0.475"	1750 lbs	1748psi
626-7-dry	perpend.	1.000"	1.004"	0.475"	1600 lbs	1594psi
626-9-dry	perpend.	0.999"	0.999"	0.476"	1750 lbs	1753psi
626-11-dry	perpend.	0.999"	1.000"	0.475"	1700 lbs	1702psi
626-2-wet	parallel	1.000"	1.000"	0.475"	1775 lbs	1775psi
626-4-wet	parallel	1.001"	0.999"	0.476"	1600 lbs	1600psi
626-6-wet	parallel	1.001"	0.998"	0.476"	1650 lbs	1652psi
626-8-wet	perpend.	1.000"	1.002"	0.476"	1500 lbs	1497psi
626-10-wet	perpend.	0.998"	1.002"	0.475"	1675 lbs	1675psi
626-12-wet	perpend.	0.999"	o.001"	0.476"	1650 lbs	1650psi

Bonding Strength = Rupture Force/Area

Average Results:

Parallel to Warp

Dry: 1639 psi

Wet: 1676 psi

Perpendicular to Warp

Dry: 1683 psi

Wet: 1607 psi

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

MATERIALS EVALUATION Page 151 DATE 12/17/63 REPORT NUMBER 4132

ABRASION WEAR OF PANEL #626

Condition of Test	Wgt. Loss, 5,000 Rev. in grams	Average Wgt. Loss, 1,000 Rev. in grams
As Received	0.1062	.0212
	0.0821	.0164
Average	0.0942	.0188
2 Hr. Boil	0.0753	.0150
	0.3744	.0749
Average	0.2249	.0450

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

MATERIALS EVALUATION Page 107 DATE 12/17/68 REPORT NUMBER 4132

IZOD IMPACT STRENGTH OF PANEL #626

Condition of Test	Impact Strength, ft.-lbs./inch notch
	Vero
As Received	12.2
	12.0
	12.0
Average	12.1
2 Hr. Boil	10.6
	11.4
	10.4
Average	10.9

PHYSICAL TEST DATA SHEET

PANEL # 626

Resin Content Federal Standard 406 - #7061

Wt. of Sample	Wt. of Residue	Percent Resin
24.02gm.	12.84 gm.	46.54 %
23.01gm.	12.53 gm.	45.55 %
22.96gm.	12.31 gm.	46.39 %
		Average 46.16%

Water Absorption Federal Standard 406 - # 7031 Pro. E

Wt. of Sample	Wt. After Boil	% Water Absorbed
81.49 gm.	81.61 gm.	0.15%
90.98 gm.	91.10 gm.	0.13%
91.31 gm.	91.42 gm.	0.12%
		Average 0.13%

Specific Gravity Federal Standard 406 - #5011

Wt. in Air	Wt. in Water	Specific Gravity
56.80 gm.	22.65 gm.	1.66
50.88 gm.	20.20 gm.	1.66
51.41 gm.	20.48 gm.	1.66
		Average 1.66

Void Content Mil-P-17549C

Sp. Gr. Laminate	Sp. Gr. Cured Resin	Resin Content (Decimal	Glass Content (Decimal)	Percent Voids
1.66	1.19	0.464	0.536	0.62%
1.67	1.19	0.463	0.537	0.13%
1.66	1.19	0.464	0.536	0.62%
			Average	0.46%

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

FLEXURAL PROPERTIES OF PANEL #532

Condition of Test	Flexural Strength, psi			Flexural Modulus, psi X 10^6		
	Warp	Fill	45° Warp	Warp	Fill	45° Warp
As Received	51,800	51,800	12,700	2.77	2.66	0.503
	58,200	56,900	12,200	2.81	2.63	0.422
	56,600	55,700	12,200	2.78	2.65	0.422
Average	55,500	54,800	12,400	2.79	2.65	0.449
2 Hr. Boil	42,000	43,100	13,700	2.71	2.70	0.493
	43,700	47,200	13,300	2.66	2.71	0.492
	46,400	45,300	12,200	2.81	2.66	0.461
Average	44,000	45,200	13,100	2.73	2.69	0.482

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

TENSILE PROPERTIES OF PANEL #532

Condition of Test	Tensile Strength, psi			Tensile Modulus, psi X 10^6		
	Warp	Fill	45° Warp	Warp	Fill	45° Warp
As Received	35,000	31,900	11,500	2.41	2.07	0.530
	35,300	30,300	12,200	2.40	2.10	0.555
	36,300	30,800	11,900	2.31	2.13	0.518
Average	35,700	31,100	11,900	2.37	2.12	0.534
2 Hr. Boil	34,000	28,900	9,100	2.14	1.72	0.430
	30,900	30,100	8,900	2.31	1.99	0.452
	32,500	30,800	8,300	2.16	2.01	0.426
Average	32,500	29,900	8,900	2.20	1.91	0.443

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

COMPRESSIVE PROPERTIES OF PANEL #532

Condition of Test	Compressive Strength, psi			Compressive Modulus, psi X 10^6		
	Warp	Fill	45° Warp	Warp	Fill	45° Warp
As Received	13,700	16,200	7,000	1.24	0.544	0.313
	16,600	17,100	6,400	1.09	0.633	0.394
	15,700	17,500	6,800	0.917	0.701	0.423
Average	15,300	16,900	6,700	1.08	0.626	0.377
2 Hr. Boil	12,400	11,100	8,700	0.545	0.534	0.309
	12,500	12,500	8,100	0.629	0.614	0.500
	11,500	13,900	7,800	0.717	0.678	0.350
Average	12,100	12,500	8,200	0.630	0.625	0.386

INTERLAMINAR SHEAR PROPERTIES OF PANEL #532

Condition of Test	Interlaminar Shear Strength, psi		
	Warp	Fill	45° Warp
As Received	2,400	1,600	3,700
	2,000	2,200	2,000
	2,300	2,400	2,100
Average	2,200	2,100	2,600
2 Hr. Boil	2,200	1,900	1,400
	2,400	1,900	2,900
	2,000	1,900	2,200
Average	2,200	1,900	2,100

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

BEARING PROPERTIES OF PANEL #532

Condition of Test	Bearing Strength, psi		
	Warp	Fill	
As Received	34,900	36,300	
	34,700	34,700	
	33,900	16,200	
Average	34,500	29,100	
2 Hr. Boil	28,600	14,200	
	31,400	29,800	
	29,500	34,000	
Average	29,800	26,000	

BONDING STRENGTH TEST DATA

PANEL # 532

Federal Standards - #406
Test #1111

Identification Number	Warp Dir.	Length	Width	Thickness	Rupture Force	Bonding Strength
BS90-532-1-dry	parallel	0.999"	0.997"	0.478"	1400 lbs	1406 psi
BS90-532-3-dry	parallel	1.000"	0.999"	0.477"	1425 lbs	1426 psi
BS90-532-5-dry	parallel	1.000"	0.997"	0.479"	1400 lbs	1404 psi
BS90-532-7-dry	perpend.	1.001"	0.998"	0.473"	1300 lbs	1301 psi
BS90-532-9-dry	perpend.	1.002"	0.999"	0.478"	1250 lbs	1249 psi
BS90-532-11-dry	perpend.	1.002"	0.999"	0.479"	1325 lbs	1324 psi
BS90-532-2-wet	parallel	0.999"	0.999"	0.481"	1375 lbs	1378 psi
BS90-532-4-wet	parallel	1.000"	1.001"	0.481"	1275 lbs	1274 psi
BS90-532-6-wet	parallel	0.999"	0.998"	0.481"	1325 lbs	1329 psi
BS90-532-8-wet	perpend.	0.998"	0.999"	0.481"	1325 lbs	1329 psi
BS90-532-10-wet	perpend.	0.995"	1.000"	0.476"	1350 lbs	1357 psi
BS90-532-12-wet	perpend.	0.997"	0.997"	0.480"	1250 lbs	1257 psi

Bonding Strength = Rupture Force/Area

Average Results:

Parallel to Warp		Perpendicular to Warp	
Dry:	1412 psi	Dry:	1291 psi
Wet:	1327 psi	Wet:	1314 psi

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

ABRASION WEAR OF PANEL #532

Condition of Test	Wgt. Loss, 5,000 Rev. in grams	Average Wgt. Loss, 1,000 Rev. in grams
As Received	0.2806	.0561
	0.3186	.0637
Average	0.2996	.0599
2 Hr. Boil	0.3678	.0736
	0.4963	.0993
Average	0.4321	.0865

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

MATERIALS EVALUATION Page 102 DATE 12/17/68 REPORT NUMBER 4132

IZOD IMPACT STRENGTH OF PANEL #532

Condition of Test	Impact Strength, ft.-lbs./inch notch
	Warp
As Received	15.2
	15.3
	16.0
Average	15.7
2 Hr. Boil	15.3
	16.0
	15.4
Average	16.4

PHYSICAL TEST DATA SHEET

PANEL # 532

Resin Content Federal Standard 406 - #7061

Wt. of Sample	Wt. of Residue	Percent Resin
35.5 gm	22.87 gm	35.5%
36.8 gm	23.79 gm	35.3%
37.8 gm	23.91 gm	36.8%
		Average 35.9%

Water Absorption Federal Standard 406 - # 7031 Pro. B

Wt. of Sample	Wt. After Boil	% Water Absorbed
43.6 gm	43.7 gm	0.23%
46.6 gm	46.7 gm	0.21%
44.3 gm	44.4 gm	0.23%
		Average 0.22%

Specific Gravity Federal Standard 406 - #5011

Wt. in Air	Wt. in Water	Specific Gravity
43.6 gm	19.2 gm	1.79
46.6 gm	20.5 gm	1.79
45.8 gm	20.2 gm	1.79
		Average 1.79

Void Content Mil-P-17549C

Sp. Gr. Laminate	Sp. Gr. Cured Resin	Resin Content (Decimal	Glass Content (Decimal)	Percent Voids
1.79	1.22	.354	.646	2.9
1.79	1.22	.359	.641	2.7
1.80	1.22	.360	.640	2.1
			Average	2.5%

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

FLEXURAL PROPERTIES OF PANEL #632

Condition of Test	Flexural Strength, psi			Flexural Modulus, psi X 10^6		
	Warp	Fill	45° Warp	Warp	Fill	45° Warp
As Received	71,400	29,100	14,300	3.25	1.85	0.621
	68,000	26,400	13,300	2.54	1.71	0.647
	66,000	27,100	13,300	3.02	1.77	0.707
Average	68,500	27,500	13,600	2.94	1.78	0.658
2 Hr. Boil	54,100	21,800	10,900	3.11	1.78	0.553
	54,700	21,800	11,400	2.98	1.69	0.522
	53,400	21,400	11,200	2.94	1.69	0.583
Average	54,100	21,700	11,200	3.01	1.72	0.553

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

MATERIALS EVALUATION Page 42 DATE 12/17/58 REPORT NUMBER 4132

TENSILE PROPERTIES OF PANEL #632

Condition of Test	Tensile Strength, psi			Tensile Modulus, psi X 10^6		
	Warp	Fill	45° Warp	Warp	Fill	45° Warp
As Received	38,600	30,300	11,800	2.50	2.19	0.585
	36,500	35,900	11,600	2.52	2.19	0.625
	38,200	35,700	10,800	2.57	2.29	0.549
Average	37,800	33,600	11,400	2.53	2.22	0.586
2 Hr. Boil	34,800	33,700	9,800	2.35	2.04	0.385
	35,400	33,200	9,600	2.21	1.92	0.371
	32,900	32,500	9,700	2.27	2.09	0.365
Average	34,400	33,100	9,700	2.28	2.02	0.374

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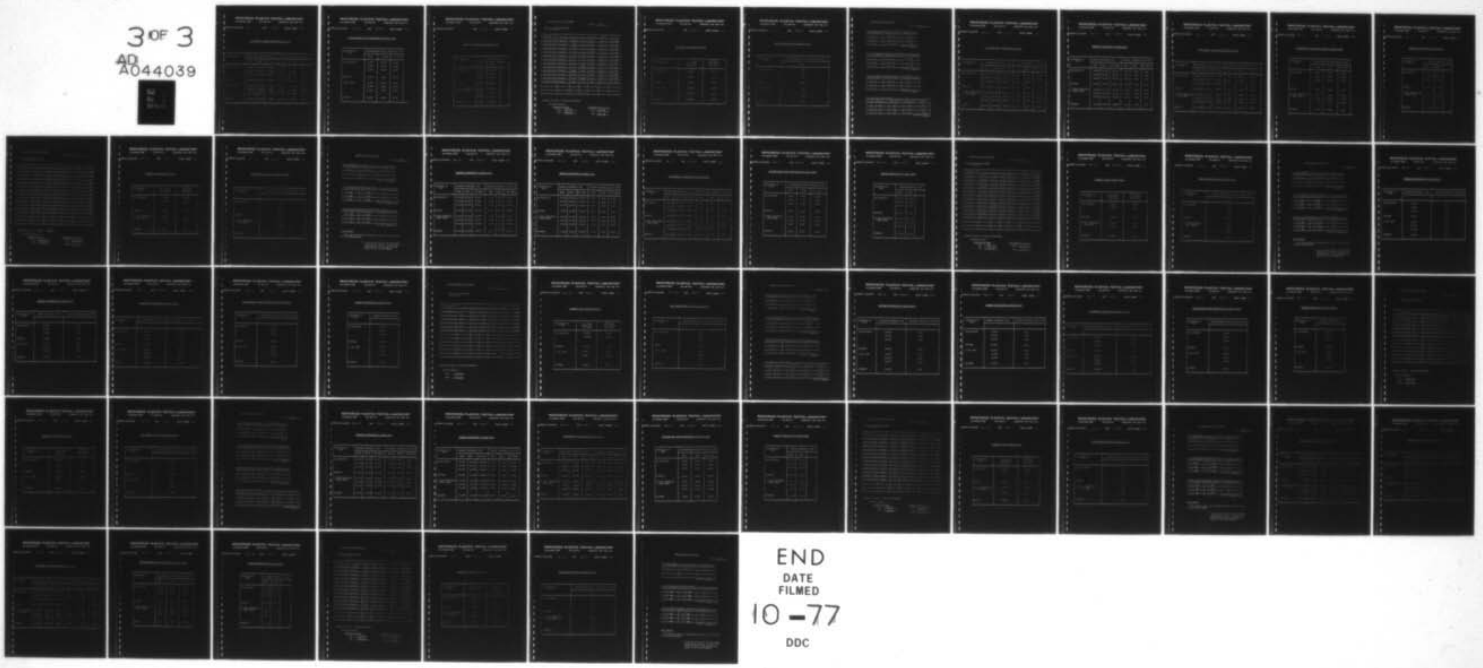

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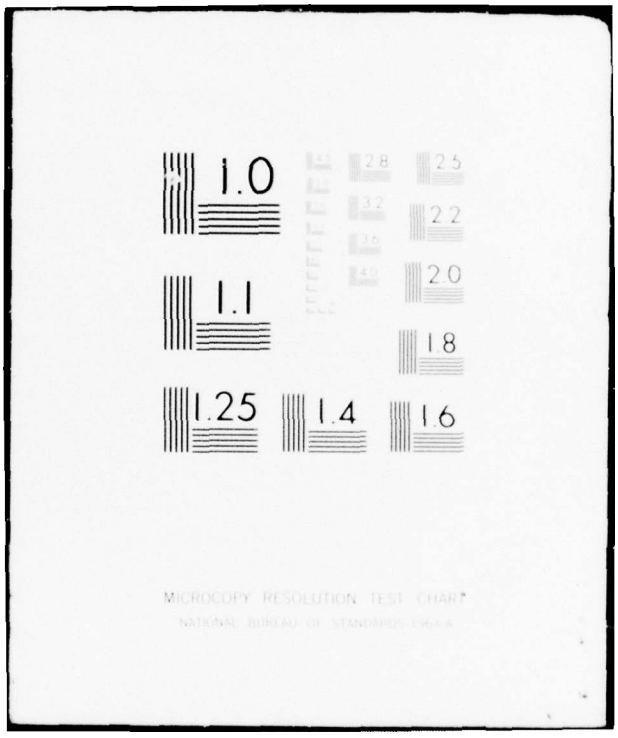
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NATIONAL BUREAU OF STANDARDS 1963-A

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

COMPRESSIVE PROPERTIES OF PANEL #632

Condition of Test	Compressive Strength, psi			Compressive Modulus, psi X 10^6		
	Warp	Fill	45° Warp	Warp	Fill	45° Warp
As Received	14,700	12,400	10,100	1.11	0.645	1.10
	15,600	16,100	10,300	0.952	1.00	1.34
	13,500	13,300	10,400	1.17	0.829	1.30
Average	14,600	15,800	10,300	1.04	0.825	1.33
2 Hr. Boil	12,300	9,900	7,600	0.801	0.656	0.420
	11,200	11,700	7,600	0.971	0.700	0.177
	12,000	10,300	8,700	0.632	0.712	0.210
Average	11,800	10,600	8,000	0.801	0.699	0.271

INTERLAMINAR SHEAR PROPERTIES OF PANEL #632

Condition of Test	Interlaminar Shear Strength, psi		
	Warp	Fill	45° Warp
As Received	1,200	2,200	2,800
	2,500	2,300	2,900
	2,500	2,100	2,400
Average	2,100	2,200	2,700
2 Hr. Boil	1,000	2,100	2,000
	1,000	2,100	1,900
	1,500	1,900	1,400
Average	1,200	2,000	1,800

REINFORCED PLASTICS TESTING LABORATORY

106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

MATERIALS EVALUATION DATE 12/17/68 REPORT NUMBER 4132

MARINE PROPERTIES OF PANEL #432

Condition of Test	Bearing Strength, psi		
	Warp	Fill	
As Received	25,400	22,700	
	27,300	21,100	
	23,000	19,400	
Average	25,200	21,100	
30 Day Distilled Water Soak	20,100	18,300	
	18,100	16,800	
	17,400	16,000	
Average	18,500	17,000	

BONDING STRENGTH TEST DATA

PANEL # 632

Federal Standards - #406
Test #1111

Identification Number	Warp Dir.	Length	Width	Thickness	Rupture Force	Bonding Strength
BS90-632-1-DRY	Parallel	0.999"	1.000"	0.476"	1450 Lb.	1451 psi
BS90-632-3-DRY	Parallel	0.997"	1.000"	0.477"	1550 Lb.	1555 psi
BS90-632-5-DRY	Parallel	1.002"	1.000"	0.477"	1500 Lb.	1497 psi
BS90-632-7-DRY	Perpend.	1.001"	1.000"	0.478"	1450 Lb.	1450 psi
BS90-632-9-DRY	Perpend.	1.002"	1.000"	0.478"	1500 Lb.	1497 psi
BS90-632-11-DRY	Perpend.	1.001"	1.003"	0.481"	1450 Lb.	1444 psi
BS90-632-2-Wet	Parallel	0.999"	1.000"	0.483"	1250 Lb.	1251 psi
BS90-632-4-Wet	Parallel	1.000"	0.998"	0.476"	1400 Lb.	1402 psi
BS90-632-6-Wet	Parallel	0.999"	1.002"	0.483"	1440 Lb.	1439 psi
BS90-632-8-Wet	Perpend.	1.001"	1.003"	0.475"	1300 Lb.	1295 psi
BS90-632-10-Wet	Perpend.	1.009"	0.997"	0.478"	1250 Lb.	1243 psi
BS90-632-12-Wet	Perpend.	0.999"	1.002"	0.480"	1425 Lb.	1424 psi

Bonding Strength = Rupture Force/Area

Average Results:

Parallel to Warp

Dry: 1501 PSI

Wet: 1364 PSI

Perpendicular to Warp

Dry: 1464 PSI

Wet: 1321 PSI

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

ABRASION WEAR OF PANEL #632

Condition of Test	Wgt. Loss, 5,000 Rev. in grams	Average Wgt. Loss, 1,000 Rev. in grams
As Received	0.3931	.0786
	0.3152	.0630
Average	0.3542	.0708
2 Hr. Boil	0.5180	.1036
	0.5328	.1066
Average	0.5254	.1051

REINFORCED PLASTICS TESTING LABORATORY

106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

MATERIALS EVALUATION Page 103 DATE 12/17/68 REPORT NUMBER 4132

IZOD IMPACT STRENGTH OF PANEL #632

Condition of Test	Impact Strength, ft.-lbs/inch notch
	Warp
As Received	21.0
	19.6
	19.6
Average	20.1
2 Hr. Boil	19.2
	19.8
	20.4
Average	19.8

PHYSICAL TEST DATA SHEET

PANEL # 632

Resin Content Federal Standard 406 - #7061

Wt. of Sample	Wt. of Residue	Percent Resin
34.8 gm	22.42 gm	35.6 %
34.6 gm	21.78 gm	37.0 %
36.6 gm	23.98 gm	34.4 %
		Average 35.7%

Water Absorption Federal Standard 406 - # 7031 Pro. E

Wt. of Sample	Wt. After Boil	% Water Absorbed
51.1 gm	51.2 gm	0.20 %
53.6 gm	53.8 gm	0.37 %
53.1 gm	53.3 gm	0.38 %
		Average 0.32%

Specific Gravity Federal Standard 406 - #5011

Wt. in Air	Wt. in Water	Specific Gravity
51.1 gm	23.0 gm	1.82
53.6 gm	24.1 gm	1.82
52.7 gm	23.7 gm	1.82
		Average 1.82

Void Content Mil-P-17549C

Sp. Gr. Laminate	Sp. Gr. Cured Resin	Resin Content (Decimal	Glass Content (Decimal)	Percent Voids
1.82	1.22	.352	.648	1.7%
1.82	1.22	.361	.639	1.0%
1.82	1.22	.350	.650	1.8%
				Average 1.5%

REINFORCED PLASTICS TESTING LABORATORY

106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

FLEXURAL PROPERTIES OF PANEL #535

Condition of Test	Flexural Strength, psi			Flexural Modulus, psi X 10^6		
	Warp	Fill	45° Warp	Warp	Fill	45° Warp
As Received	33,500	31,700	24,700	1.68	1.56	0.829
	33,300	28,200	19,100	1,59	1,51	0,726
	32,500	28,000	16,000	1,62	1.47	0.769
Average	33,800	29,300	19,900	1.63	1.51	0.774
30 Day Distilled Water Soak	25,500	21,100	19,900	1.56	1.49	0.560
	24,000	22,600	12,800	1.54	1.44	0.565
	26,800	20,900	12,500	1.60	1.47	0.564
Averge	25,400	21,500	12,500	1,57	1,47	0,563

TENSILE PROPERTIES OF PANEL #535

Condition of Test	Tensile Strength, psi			Tensile Modulus, psi X 10^6		
	Warp	Fill	45° Warp	Warp	Fill	45° Warp
As Received	32,200	31,600	13,800	2.15	2.48	1.40
	32,200	31,500	14,900	2.21	2.06	1.29
	31,500	30,800	15,200	2.25	2.08	1.22
Average	32,000	31,300	14,600	2.20	2.21	1.30
30 Day Distilled Water Soak	30,100	28,400	12,600	1.98	1.96	0.968
	30,000	30,100	13,100	2.03	2.03	1.20
	30,500	29,100	13,900	2.13	2.01	1.07
Average	30,200	29,200	13,200	2.05	2.00	1.08

REINFORCED PLASTICS TESTING LABORATORY

106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

COMPRESSIVE PROPERTIES OF PANEL #535

Condition of Test	Compressive Strength, psi			Compressive Modulus, psi X 10^6		
	Warp	Fill	45° Warp	Warp	Fill	45° Warp
As Received	21,000	18,700	13,900	1.50	0.705	0.502
	27,100	17,200	15,000	0.839	0.605	0.520
	19,100	19,800	13,500	0.971	0.781	0.519
Average	22,400	18,600	14,100	1.10	0.697	0.517
30 Day Distilled Water Soak	21,200	18,300	14,500	0.700	0.747	0.423
	20,700	16,800	13,600	0.757	0.730	0.512
	19,200	17,600	16,100	0.901	0.655	0.510
Average	20,400	17,600	14,700	0.786	0.711	0.482

INTERLAMINAR SHEAR PROPERTIES OF PANEL #535

Condition of Test	Interlaminar Shear Strength, psi		
	Warp	Fill	45° Warp
As Received	2,000	3,800	1,200
	1,500	1,000	1,900
	2,400	2,100	1,200
Average	2,000	2,300	1,400
30 Day Distilled Water Soak	1,500	1,600	1,800
	2,300	2,200	1,800
	940	1,800	1,200
Average	1,600	1,900	1,600

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

MATERIALS EVALUATION Page 125 DATE 12/17/68 REPORT NUMBER 4132

BEARING PROPERTIES OF PANEL #535

Condition of Test	Bearing Strength, psi		
	Warp	Fill	
As Received	22,900	25,300	
	22,900	26,100	
	24,300	22,200	
Average	23,400	24,500	
30 Day Distilled Water Soak	16,800	16,200	
	17,400	16,100	
	17,300	19,700	
Average	17,200	17,300	

BONDING STRENGTH TEST DATA

PANEL # 535

Federal Standards - #406
Test #1111

Identification Number	Warp Dir.	Length	Width	Thickness	Rupture Force	Bonding Strength
535-1-Dry	parallel	1.004"	0.999"	0.478"	1340 lbs	1336 psi
535-3-Dry	parallel	1.000"	1.002"	0.478"	1225 lbs	1223 psi
535-5-Dry	parallel	1.007"	1.003"	0.478"	1090 lbs	1079 psi
535-7-Dry	perpend.	1.000"	0.999"	0.479"	1250 lbs	1251 psi
535-9-Dry	perpend.	0.999"	1.001"	0.480"	1325 lbs	1325 psi
535-11-Dry	perpend.	1.000"	1.001"	0.482"	1290 lbs	1289 psi
535-2-wet	parallel	1.000"	1.002"	0.490"	975 lbs	973 psi
535-4-wet	parallel	0.999"	1.001"	0.490"	980 lbs	980 psi
535-6-wet	parallel	1.001"	1.000"	0.492"	900 lbs	899 psi
535-8-wet	perpend.	1.004"	0.999"	0.496"	1150 lbs	1147 psi
535-10-wet	perpend.	1.000"	1.004"	0.485"	1150 lbs	1145 psi
535-12-wet	perpend.	1.001"	0.999"	0.484"	1100 lbs	1100 psi

Bonding Strength = Rupture Force/Area

Average Results:

Parallel to Warp

Dry: 1213 psi

Wet: 951 psi

Perpendicular to Warp

Dry: 1288 psi

Wet: 1131 psi

ABRASION WEAR OF PANEL #535

Condition of Test	Wgt. Loss, 5,000 Rev. in grams	Average Wgt. Loss, 1,000 Rev. in grams
As Received	0.3772	.0754
	0.2290	.0458
Average	0.3031	.0606
30 Day Distilled Water Soak	0.2757	.0551
	0.5087	.1017
Average	0.3922	.0784

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

MATERIALS EVALUATION Page 103 DATE 12/17/68 REPORT NUMBER 4132

IZOD IMPACT STRENGTH OF PANEL #535

Condition of Test	Impact Strength, ft.-lbs./inch notch
As Received	16.0
	15.8
	16.2
Average	16.0
30 Day Distilled Water Soak	18.8
	20.4
	18.4
Average	19.2

PHYSICAL TEST DATA SHEET

PANEL # 535

Resin Content*

Wt. of Fabric	Wt. of Laminate	Percent Resin
22.87 oz.	34.65 oz.	33.99 %

Average 33.99%

Water Absorption (24 Hours Soak)

Wt. of Sample	Wt. After Soak	% Water Absorbed
64.62 gm.	64.74 gm.	0.19 %
64.17 gm.	64.23 gm.	0.09 %
64.38 gm.	64.48 gm.	0.16%

Average 0.15%

Specific Gravity Federal Standard 406 - #5011

Wt. in Air	Wt. in Water	Specific Gravity
36.33 gm.	13.31 gm.	1.58
40.01 gm.	14.79 gm.	1.59
36.94 gm.	13.46 gm.	1.57

Average 1.58

Void Content

Void content cannot be determined because of the nature of the reinforcement.

* Resin content cannot be determined according to Federal Standard 406 - #7061 because of the low melting point of the reinforcement.

FLEXURAL PROPERTIES OF PANEL #635

Condition of Test	Flexural Strength, psi			Flexural Modulus, psi X 10^6		
	Warp	Fill	45° Warp	Warp	Fill	45° Warp
As Received	36,700	32,900	18,300	1.86	1.78	0.979
	38,500	35,400	18,800	1.87	2.00	0.940
	38,700	32,800	18,900	1.88	1.85	0.901
Average	38,000	33,700	18,700	1.87	1.88	0.940
30 Day Distilled Water Soak	27,800	30,100	16,400	1.88	1.82	0.813
	30,100	28,800	17,400	1.77	1.86	0.786
	32,100	28,300	17,300	1.83	1.80	0.756
Average	30,000	29,100	17,000	1.83	1.83	0.785

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

TENSILE PROPERTIES OF PANEL #635

Condition of Test	Tensile Strength, psi			Tensile Modulus, psi X 10^6		
	Warp	Fill	45° Warp	Warp	Fill	45° Warp
As Received	32,000	31,500	13,700	2.10	2.22	1.11
	30,800	30,900	13,300	2.26	2.21	1.08
	30,800	31,400	12,900	2.15	2.22	1.13
Average	31,200	31,300	13,300	2.17	2.22	1.11
30 Day Distilled Water Soak	29,100	28,600	12,100	1.83	2.09	0.885
	30,500	29,700	12,700	1.87	2.10	0.891
	30,700	29,100	11,700	1.91	2.08	0.863
Average	30,100	29,100	12,200	1.87	2.09	0.880

COMPRESSIVE PROPERTIES OF PANEL #635

Condition of Test	Compressive Strength, psi			Compressive Modulus, psi x 10^6		
	Warp	Fill	45° Warp	Warp	Fill	45° Warp
As Received	17,200	19,800	14,000	1.12	1.20	0.365
	28,900	23,100	13,300	0.959	1.15	0.349
	21,100	22,800	14,300	1.07	0.756	0.721
Average	22,400	21,900	13,900	1.05	1.04	0.312
30 Day Distilled Water Soak	17,900	16,000	14,200	0.606	0.950	0.469
	22,100	16,500	14,000	0.733	0.681	0.419
	18,400	16,300	13,700	0.737	0.653	0.399
Average	19,500	16,200	14,000	0.692	0.761	0.429

INTERLAMINAR SHEAR PROPERTIES OF PANEL #635

Condition of Test	Interlaminar Shear Strength, psi		
	Warp	Fill	45° Warp
As Received	1,100	1,700	1,300
	1,100	880	1,700
	1,300	3,600	2,300
Average	1,200	2,100	1,800
30 Day Distilled Water Soak	1,300	1,500	1,900
	1,300	1,200	1,300
	1,100	3,400	1,400
Average	1,200	2,000	1,500

BEARING PROPERTIES OF PANEL #635

Condition of Test	Bearing Strength, psi		
	Warp	Fill	
As Received	22,800	26,000	
	23,300	26,000	
	23,200	21,000	
Average	23,100	24,300	
30 Day Distilled Water Soak	14,000	16,900	
	15,000	16,400	
	14,500	18,300	
Average	14,500	17,200	

BONDING STRENGTH TEST DATA

PANEL # 635

Federal Standards - #406
Test #1111

Identification Number	Warp Dir.	Length	Width	Thickness	Rupture Force	Bonding Strength
635-1-dry	parallel	1.001"	1.000"	0.475"	1225 lbs	1224 psi
635-3-dry	parallel	1.002"	0.997"	0.475"	1275 lbs	1276 psi
635-5-dry	parallel	1.000"	0.998"	0.476"	1350 lbs	1353 psi
635-7-dry	perpend.	0.996"	1.000"	0.477"	1300 lbs	1305 psi
635-9-dry	perpend.	0.999"	1.000"	0.475"	1200 lbs	1201 psi
635-11-dry	perpend.	1.006"	1.003"	0.478"	1175 lbs	1164 psi
635-2-wet	parallel	1.000"	1.001"	0.486"	800 lbs	799 psi
635-4-wet	parallel	1.001"	0.996"	0.489"	975 lbs	978 psi
635-6-wet	parallel	1.001"	0.998"	0.491"	975 lbs	976 psi
635-8-wet	perpend.	0.998"	0.998"	0.490"	1000 lbs	1004 psi
635-10-wet	perpend.	0.999"	1.000"	0.485"	1050 lbs	1051 psi
635-12-wet	perpend.	1.000"	1.000"	0.493"	1025 lbs	1025 psi

Bonding Strength = Rupture Force/Area

Average Results:

Parallel to Warp

Dry: 1284 psi

Wet: 918 psi

Perpendicular to Warp

Dry: 1223 psi

Wet: 1027 psi

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

ABRASION WEAR OF PANEL #635

Condition of Test	Wgt. Loss, 5,000 Rev. in grams	Average Wgt. Loss, 1,000 Rev. in grams
As Received	0.1201	.0240
	0.0500	.0100
Average	0.0851	.0170
30 Day Distilled Water Soak	0.1693	.0335
	0.1725	.0345
Average	0.1709	.0341

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

IZOD IMPACT STRENGTH OF PANEL #635

Condition of Test	Impact Strength, ft.-lbs./inch notch
	Warp
As Received	15.2
	14.8
	16.0
Average	15.3
30 Day Distilled Water Soak	17.6
	18.4
	20.4
Average	18.8

PHYSICAL TEST DATA SHEET

PANEL # 635

Resin Content*

Wt. of Fabric	Wt. of Laminate	Percent Resin
22.87 oz.	34.25 oz.	33.2 %

Average 33.2%

Water Absorption (24 Hours Soak)

Wt. of Sample	Wt. After Soak	% Water Absorbed
49.13 gm.	49.16 gm.	0.06%
50.00 gm.	50.03 gm.	0.06%
50.07 gm.	50.14 gm.	0.14%

Average 0.09%

Specific Gravity Federal Standard 406 - #5011

Wt. in Air	Wt. in Water	Specific Gravity
32.17 gm.	11.90 gm.	1.59
34.40 gm.	12.32 gm.	1.56
34.71 gm.	12.32 gm.	1.55

Average 1.57

Void Content

Void content cannot be determined because of the nature of the reinforcement.

* Resin content cannot be determined according to Federal Standard 406 - #7061 because of the low melting point of the reinforcement.

FLEXURAL PROPERTIES OF PANEL #537M

Condition of Test	Flexural Strength, psi	Flexural Modulus, psi X 10^6
As Received	48,100	2.35
	45,100	1.87
	49,100	2.19
Average	47,400	2.14
2 Hr. Boil	36,500	2.19
	34,600	2.04
	36,100	2.11
Average	35,700	2.11

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

TENSILE PROPERTIES OF PANEL #537M

Condition of Test	Tensile Strength, psi	Tensile Modulus, psi X 10^6
As Received	35,700	2.71
	37,300	2.70
	39,200	2.78
Average	37,400	2.73
2 Hr. Boil	34,900	2.46
	35,000	2.45
	36,400	2.39
Average	35,400	2.43

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

COMPRESSIVE PROPERTIES OF PANEL #537M

Condition of Test	Compressive Strength, psi	Compressive Modulus, psi X 10⁶
As Received	29,400	1.06
	33,200	1.57
	33,300	1.47
Average	32,000	1.37
2 Hr. Boil	30,000	0.908
	25,100	0.810
	25,400	0.838
Average	26,800	0.879

INTERLAMINAR SHEAR PROPERTIES OF PANEL #537H

Condition of Test	Interlaminar Shear Strength, psi
As Received	3,400
	2,900
	1,900
Average	2,700
2 Hr. Boil	2,600
	3,600
	2,000
Average	2,700

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

BEARING PROPERTIES OF PANEL #537M

Condition of Test	Bearing Strength, psi
As Received	46,500
	41,600
	46,200
Average	44,800
2 Hr. Boil	30,000
	36,000
	34,000
Average	33,300

BONDING STRENGTH TEST DATA

Panel # 537M

Federal Standards-#406
Test #1111

Identification Number	Warp Dir.	Length	Width	Thickness	Rupture Force	Bonding Strength
BS45-537M-1-Dry	none	1.002"	0.999"	0.476"	1525 lbs	1523 psi
BS45-537M-3-Dry	none	0.998"	0.998"	0.477"	1400 lbs	1405 psi
BS45-537M-5-Dry	none	0.999"	0.997"	0.476"	1425 lbs	1431 psi
BS45-537M-2-Wet	none	0.999"	0.999"	0.478"	1675 lbs	1678 psi
BS45-537M-4-Wet	none	1.000"	0.998"	0.478"	1700 lbs	1703 psi
BS45-537M-6-Wet	none	0.998"	0.998"	0.478"	1550 lbs	1556 psi

Bonding Strength = Rupture Force/Area

Average Results:

Dry: 1453 psi

Wet: 1646 psi

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

ABRASION WEAR OF PANEL #537H

Condition of Test	Wgt. Loss, 5,000 Rev. in grams	Average Wgt. Loss, 1,000 Rev. in grams
As Received	0.3744	.0725
	0.3422	.0684
Average	0.3583	.0705
2 Hr. Boil	0.4279	.0856
	0.4148	.0830
Average	0.4213	.0843

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

IZOD IMPACT STRENGTH OF PANEL #537

Condition of Test	Impact Strength, ft.-lbs./inch notch
As Received	14.0
	14.2
	13.6
Average	13.9
2 Hr. Boil	14.0
	14.0
	14.6
Average	14.2

PHYSICAL TEST DATA SHEET

PANEL # 537M

Resin Content Federal Standard 406 - #7061

Wt. of Sample	Wt. of Residue	Percent Resin
28.1 gm	16.5 gm	41.3%
27.6 gm	16.0 gm	42.0%
27.3 gm	16.1 gm	41.0%
		Average 41.4%

Water Absorption Federal Standard 406 - # 7031 Pro. E

Wt. of Sample	Wt. After Boil	% Water Absorbed
42.7 gm	42.8 gm	0.23%
45.4 gm	45.5 gm	0.22%
54.2 gm	54.3 gm	0.18%
		Average 0.21%

Specific Gravity Federal Standard 406 - #5011

Wt. in Air	Wt. in water	Specific Gravity
42.7 gm	18.1 gm	1.74
45.4 gm	19.1 gm	1.73
54.2 gm	23.2 gm	1.75
		Average 1.74

Void Content Mil-P-17549C

Sp. Gr. Laminate	Sp. Gr. Cured Resin	Resin Content (Decimal	Glass Content (Decimal)	Percent Voids
1.75	1.22	.420	.580	0.26%
1.75	1.22	.412	.588	0.86%
1.74	1.22	.416	.584	1.13%
			Average	0.75%

FLEXURAL PROPERTIES OF PANEL #637M

Condition of Test	Flexural Strength, psi	Flexural Modulus, psi X 10^6
As Received	45,300	2.43
	44,700	2.49
	43,700	2.41
Average	44,600	2.44
2 Hr. Boil	42,600	2.33
	39,100	2.30
	38,700	2.18
Average	40,100	2.27

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

TENSILE PROPERTIES OF PANEL #637M

Condition of Test	Tensile Strength, psi	Tensile Modulus, psi X 10^6
As Received	33,600	2.43
	33,700	2.56
	28,100	2.53
Average	35,100	2.51
2 Hr. Boil	34,900	2.33
	35,100	2.42
	36,400	2.31
Average	35,500	2.35

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

COMPRESSIVE PROPERTIES OF PANEL #6371

Condition of Test	Compressive Strength, psi	Compressive Modulus, psi X 10^6
As Received	26,800	0.950
	30,500	1.05
	29,300	0.796
Average	28,900	0.932
2 Hr. Boil	29,500	1.32
	26,100	0.996
	24,600	1.02
Average	26,700	1.11

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

INTERLAMINAR SHEAR PROPERTIES OF PANEL #637M

Condition of Test	Interlaminar Shear Strength, psi
As Received	2,700
	2,600
	3,100
Average	2,800
2 Hr. Boil	3,300
	3,800
	3,400
Average	3,500

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

BEARING PROPERTIES OF PANEL #637M

Condition of Test	Bearing Strength, psi
As Received	41,400
	46,700
	41,400
Average	43,200
2 Hr. Boil	37,300
	37,300
	41,400
Average	38,700

BONDING STRENGTH TEST DATA

Panel # 637M

Federal Standards-#406
Test #1111

Identification Number	Warp Dir.	Length	Width	Thickness	Rupture Force	Bonding Strength
BS45-637M-1-Dry	none	1.000"	0.998"	0.479"	1450 lbs	1453 psi
BS45-637M-3-Dry	none	0.992"	0.999"	0.477"	1550 lbs	1564 psi
BS45-637M-5-Dry	none	1.000"	0.999"	0.478"	1450 lbs	1452 psi
BS45-637M-2-Wet	none	0.998"	0.999"	0.478"	1475 lbs	1479 psi
BS45-637M-4-Wet	none	0.997"	0.998"	0.481"	1450 lbs	1457 psi
BS45-637M-6-Wet	none	1.000"	0.998"	0.469"	1800 lbs	1804 psi

Bonding Strength = Rupture Force/Area

Average Results:

Dry: 1489 psi

Wet: 1580 psi

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

ABRASION WEAR OF PANEL #637K

Condition of Test	Wgt. Loss, 5,000 Rev. in grams	Average Wgt. Loss, 1,000 Rev. in grams
As Received	0.3174	.0635
	0.3244	.0649
Average	0.3209	.0642
2 Hr. Boil	0.4648	.0930
	0.4478	.0896
Average	0.4563	.0913

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

IZOD IMPACT STRENGTH OF PANEL #637M

Condition of Test	Impact Strength, ft.-lbs./inch notch
As Received	13.6
	13.6
	14.8
Average	14.0
2 Hr. Boil	15.0
	14.4
	14.8
Average	14.7

PHYSICAL TEST DATA SHEET

PANEL # 637M

Resin Content Federal Standard 406 - #7061

Wt. of Sample	Wt. of Residue	Percent Resin
26.5 gm	16.0 gm	39.6 %
29.2 gm	17.2 gm	41.1 %
28.8 gm	17.5 gm	39.2 %
	Average	39.8%

Water Absorption Federal Standard 406 - # 7031 Pro. E

Wt. of Sample	Wt. After Boil	% Water Absorbed
65.3 gm	65.4 gm	0.153 %
56.2 gm	56.4 gm	0.355 %
68.3 gm	68.4 gm	0.147 %
	Average	0.218%

Specific Gravity Federal Standard 406 - #5011

Wt. in Air	Wt. in Water	Specific Gravity
65.3 gm	28.7 gm	1.78
56.2 gm	24.8 gm	1.79
68.3 gm	29.9 gm	1.78
	Average	1.78

Void Content Mil-P-17549C

Sp. Gr. Laminate	Sp. Gr. Cured Resin	Resin Content (Decimal	Glass Content (Decimal)	Percent Voids
1.77	1.22	0.391	0.609	1.3
1.77	1.22	0.390	0.610	1.4
1.78	1.22	0.389	0.611	1.0
			Average	1.2%

FLEXURAL PROPERTIES OF PANEL #551

Condition of Test	Flexural Strength, psi			Flexural Modulus, psi X 10^6		
	Warp	Fill	45° Warp	Warp	Fill	45° Warp
As Received	19,400	21,800	24,800	0.719	1.07	1.37
	26,800	20,900	19,800	1.20	0.906	0.756
	26,000	22,600	19,100	1.36	1.10	0.753
Average	24,100	21,800	21,200	1.09	1.02	0.960
30 Day Distilled Water Soak	21,600	15,100	14,000	0.772	0.582	0.518
	21,900	16,200	21,200	0.956	0.655	0.882
	13,800	16,500	13,600	0.777	0.640	0.498
Average	19,100	15,900	16,300	0.835	0.626	0.633

TENSILE PROPERTIES OF PANEL #551

Condition of Test	Tensile Strength, psi			Tensile Modulus, psi X 10^6		
	Warp	Fill	45° Warp	Warp	Fill	45° Warp
As Received	23,300	15,800	12,100	1.53	1.17	0.661
	15,300	15,500	12,900	1.18	1.20	0.722
	24,200	15,500	12,300	1.55	1.22	0.677
Average	20,900	15,600	12,400	1.42	1.20	0.687
30 Day Distilled Water Soak	22,100	13,600	10,100	0.787	0.633	0.374
	12,000	14,100	10,300	0.602	0.594	0.399
	18,000	13,400	10,600	0.840	0.624	0.389
Average	15,300	13,700	10,300	0.743	0.617	0.387

COMPRESSIVE PROPERTIES OF PANEL #551

Condition of Test	Compressive Strength, psi			Compressive Modulus, psi X 10^6		
	Warp	Fill	45° Warp	Warp	Fill	45° Warp
As Received	13,700	15,300	11,800	0.520	0.544	0.425
	13,100	14,200	12,000	0.593	0.734	0.301
	12,100	14,600	10,900	0.452	0.641	0.470
Average	13,000	14,700	11,600	0.522	0.637	0.399
30 Day Distilled Water Soak	9,000	9,300	8,300	0.291	0.626	0.216
	8,800	9,900	7,900	0.329	0.720	0.297
	9,000	10,000	6,400	0.314	0.598	0.211
Average	8,900	9,700	7,500	0.310	0.648	0.275

INTERLAMINAR SHEAR PROPERTIES OF PANEL #551

Condition of Test	Interlaminar Shear Strength, psi		
	Warp	Fill	45° Warp
As Received	1,700	2,400	2,700
	2,000	1,600	2,500
	2,400	2,000	2,500
Average	2,000	2,000	2,600
30 Day Distilled Water Soak	2,200	2,000	2,500
	2,000	1,000	2,500
	2,000	1,800	2,500
Average	2,100	1,600	2,500

BEARING PROPERTIES OF PANEL #551

Condition of Test	Bearing Strength, psi		
	Warp	Fill	
As Received	13,700	14,500	
	12,900	13,300	
	10,300	13,200	
Average	13,000	13,700	
30 Day Distilled Water Soak	6,050	5,340	
	4,400	7,540	
	4,300	7,590	
Average	5,250	6,840	

BONDING STRENGTH TEST DATA

PANEL # 551

Federal Standards - #406
Test #1111

Identification Number	Warp Dir.	Length	Width	Thickness	Rupture Force	Bonding Strength
BS90-551-1-DRY	Parallel	1.001"	1.003"	0.485"	875 Lb.	849 psi
BS90-551-3-DRY	Parallel	1.004"	0.998"	0.484"	850 Lb.	848 psi
BS90-551-5-DRY	Parallel	1.003"	0.998"	0.484"	850 Lb.	849 psi
BS90-551-7-DRY	Perpend.	1.003"	0.998"	0.481"	775 Lb.	774 psi
BS90-551-9-DRY	Perpend.	1.001"	0.999"	0.486"	825 Lb.	825 psi
BS90-551-11-DRY	Perpend.	1.004"	0.998"	0.482"	675 Lb	674 psi
BS90-551-2-Wet	Parallel	1.008"	1.009"	0.516"	425 Lb	418 psi
BS90-551-4-Wet	Parallel	1.010"	0.995"	0.514"	500 Lb	497 psi
BS90-551-6-Wet	Parallel	1.005"	1.001"	0.509"	800 Lb	795 psi
BS90-551-8-Wet	Perpend	1.007"	1.001"	0.519"	550 Lb	546 psi
BS90-551-10-Wet	Perpend	1.005"	1.010"	0.518"	425 Lb	419 psi
BS90-551-12-Wet	Perpend	1.006"	1.004"	0.516"	425 Lb	421 psi

Bonding Strength = Rupture Force/Area

Average Results:

Parallel to Warp		Perpendicular to Warp	
Dry:	849 PSI	Dry:	758 PSI
Wet:	570 PSI	Wet:	462 PSI

REINFORCED PLASTICS TESTING LABORATORY

106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

ABRASION WEAR OF PANEL #551

Condition of Test	Wgt. Loss, 5,000 Rev. in grams	Average Wgt. Loss, 1,000 Rev. in grams
As Received	0.2080	.0416
	0.1870	.0374
Average	0.1975	.0395
30 Day Distilled Water Soak	0.1725	.0345
	0.4831	.0966
Average	0.3278	.0656

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

IZOD IMPACT STRENGTH OF PANEL #551

Condition of Test	Impact Strength, ft.-lbs./inch notch
	Warp
As Received	3.2
	3.2
	3.2
Average	3.2
30 Day Distilled Water Soak	2.0
	2.0
	2.0
Average	2.0

PHYSICAL TEST DATA SHEET

PANEL # 551

Resin Content*

Wt. of Fabric	Wt. of Laminate	Percent Resin
2.57 lbs.	4.63 lbs.	44.5%
		Average 44.5%

Water Absorption (24 Hours Soak)

Wt. of Sample	Wt. After Soak	% Water Absorbed
42.59 gm.	43.41 gm.	1.93%
40.74 gm.	41.55 gm.	1.99%
46.42 gm.	47.21 gm.	1.70%
		Average 1.87%

Specific Gravity Federal Standard 406 - #5011

Wt. in Air	Wt. in Water	Specific Gravity
19.01 gm.	4.23 gm.	1.29
18.09 gm.	3.99 gm.	1.28
18.86 gm.	4.00 gm.	1.27
		Average 1.28

Void Content

Void content cannot be determined because of the nature of the reinforcement.

* Resin content cannot be determined according to Federal Standard 406 - #7061 because of the low melting point of the reinforcement.

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

FLEXURAL PROPERTIES OF PANEL #651

Condition of Test	Flexural Strength, psi			Flexural Modulus, psi X 10^6		
	Warp	Fill	45° Warp	Warp	Fill	45° Warp
As Received	28,600	19,800	15,400	1.54	1.03	0.590
	29,000	20,400	15,200	1.46	0.983	0.585
	29,100	19,600	15,300	1.53	1.01	0.603
Average	28,900	19,900	15,300	1.51	1.01	0.593
30 Day Distilled Water Soak	23,900	12,800	10,600	0.921	0.600	0.396
	23,900	15,100	10,500	0.910	0.611	0.399
	25,700	14,000	9,800	1.04	0.553	0.399
Average	24,500	14,000	10,300	0.957	0.585	0.398

TENSILE PROPERTIES OF PANEL #651

Condition of Test	Tensile Strength, psi			Tensile Modulus, psi X 10^6		
	Warp	Fill	45° Warp	Warp	Fill	45° Warp
As Received	24,400	16,700	12,900	1.66	1.19	0.694
	23,900	15,100	11,700	1.74	1.19	0.672
	23,600	15,000	11,600	1.57	1.15	0.679
Average	24,000	15,600	12,100	1.66	1.18	0.682
30 Day Distilled Water Soak	21,300	14,100	10,800	0.882	0.592	0.322
	23,400	11,100	9,500	0.920	0.724	0.371
	21,500	13,000	8,300	0.893	0.587	0.364
Average	22,100	12,400	9,500	0.898	0.634	0.352

COMPRESSIVE PROPERTIES OF PANEL #651

Condition of Test	Compressive Strength, psi			Compressive Modulus, psi X 10^6		
	Warp	Fill	45° Warp	Warp	Fill	45° Warp
As Received	15,700	13,000	11,100	0.930	0.704	0.240
	14,800	13,400	12,200	0.657	0.616	0.303
	14,500	13,400	11,800	1.14	1.36	0.657
Average	15,000	13,300	11,700	0.909	0.893	0.400
30 Day Distilled Water Soak	9,500	8,300	7,900	0.821	0.466	0.393
	10,400	8,700	8,400	0.812	0.319	0.374
	10,200	9,300	9,100	0.849	0.322	0.296
Average	10,000	8,500	8,500	0.827	0.369	0.354

INTERLAMINAR SHEAR PROPERTIES OF PANEL #651

Condition of Test	Interlaminar Shear Strength, psi		
	Warp	Fill	45° Warp
As Received	1,300	2,300	2,500
	1,100	1,700	2,600
	2,200	2,400	1,500
Average	1,500	2,100	2,200
30 Day Distilled Water Soak	1,300	2,200	1,800
	2,200	2,300	2,000
	2,200	1,900	2,000
Average	1,900	2,100	1,900

REINFORCED PLASTICS TESTING LABORATORY
106 BANGOR STREET (516) 884-7774 LINDENHURST, NEW YORK 11757

BEARING PROPERTIES OF PANEL #651

Condition of Test	Bearing Strength, psi		
	Warp	Fill	
As Received	16,400	13,400	
	15,500	15,400	
	15,900	13,200	
Average	15,900	14,000	
30 Day Distilled Water Soak	7,290	6,040	
	7,680	5,070	
	7,260	5,600	
Average	7,410	6,240	

BONDING STRENGTH TEST DATA

PANEL # 651

Federal Standards - #406
Test #1111

Identification Number	Warp Dir.	Length	Width	Thickness	Rupture Force	Bonding Strength
BS90-651-1-DRY	Parallel	1.005"	1.012"	0.483"	675 Lb.	664 psi
BS90-651-3-DRY	Parallel	1.009"	1.010"	0.486"	600 Lb.	589 psi
BS90-651-5-DRY	Parallel	1.001"	1.016"	0.484"	475 Lb	467 psi
BS90-651-7-DRY	Perpend.	1.004"	1.008"	0.488"	475 Lb	469 psi
BS90-651-9-DRY	Perpend.	1.007"	1.003"	0.487"	650 Lb.	643 psi
BS90-651-11-DRY	Perpend.	1.004"	1.009"	0.483"	450 Lb.	444 psi
BS90-651-2-Wet	Parallel	1.010"	1.000"	0.514"	900 Lb.	891 psi
BS90-651-4-Wet	Parallel	1.004"	1.004"	0.510"	850 Lb.	843 psi
BS90-651-6-Wet	Parallel	1.000"	1.005"	0.515"	1000 LB.	995 psi
BS90-651-8-Wet	Perpend.	1.001"	0.994"	0.510"	950 Lb.	955 psi
BS90-651-10-Wet	Perpend.	1.004"	1.005"	0.510"	450 Lb.	446 psi
BS90-651-12-Wet	Perpend.	0.998"	1.004"	0.514"	1050 Lb.	1048 psi

Bonding Strength = Rupture Force/Area

Average Results:

Parallel to Warp

Dry: 573 PSI

Wet: 910 PSI

Perpendicular to Warp

Dry: 519 PSI

Wet: 816 PSI

ABRASION WEAR OF PANEL #671

Condition of Test	Wt. Loss, 5,000 Rev. in grams	Average Wt. Loss, 1,000 Rev. in grams
As Received	0.2346	.0469
	0.1597	.0319
Average	0.1972	.0394
30 Day Distilled Water Soak	0.9746	.1949
	0.9306	.1861
Average	0.9526	.1905

IZOD IMPACT STRENGTH OF PANEL #651

Condition of Test	Impact Strength, ft.-lbs./inch notch
	Warp
As Received	5.6
	5.8
	6.0
Average	5.8
30 Day Distilled Water Soak	10.0
	6.0
	5.6
Average	7.2

PHYSICAL TEST DATA SHEET

PANEL # 651

Resin Content*

Wt. of Fabric	Wt. of Laminate	Percent Resin
2.57 lbs.	4.61 lbs	44.3 %

Average 44.3%

Water Absorption (24 Hours Soak)

Wt. of Sample	Wt. After Soak	% Water Absorbed
46.55 gm.	47.55 gm.	2.15 %
44.68 gm.	45.68 gm.	2.24 %
45.60 gm.	46.53 gm.	1.16 %

Average 1.85%

Specific Gravity Federal Standard 406 - #5011

Wt. in Air	Wt. in Water	Specific Gravity
30.15 gm.	6.62 gm.	1.28
30.27 gm.	6.45 gm.	1.27
30.13 gm.	6.56 gm.	1.28

Average 1.28

Void Content

Void content cannot be determined because of the nature of the reinforcement.

* Resin content cannot be determined according to Federal Standard 406 - #7061 because of the low melting point of the reinforcement.