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STRENGTH TESTING OF PRODUCTION GRADE H-451 GRAPHITE; LOTS 472, 478, AND 482

by
G. B. ENGLE and R. J. PRICE

Prepared under
Contract EY-76-C-03-0167
Project Agreement No. 17
for the San Francisco Operations Office
U.S. Energy Research and Development Administration

MASTER

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ABSTRACT

Ninety-eight production logs of H-451 graphite, from three separate extrusion lots, were sampled for tensile testing. Eight replicate axial specimens from the midlength center and four replicate radial specimens from the end center of each log were tested. The axial strengths (average value 12.7 MPa) showed wide lot-to-lot and log-to-log variations, while the radial strengths (average value 15.8 MPa) were more uniform. Statistically based acceptance criteria which could be used for assigning a log to a minimum strength category were derived for two alternative definitions of "minimum" strength. The first definition would require 90% of the material at the midlength center of the log to exceed the specified minimum strength, with 90% confidence (90/90); the second, more stringent, definition would require 99% of the material to exceed the specified minimum, with 95% confidence (99/95). If three minimum strength categories are assumed, with category A requiring a minimum strength of 10.3 MPa, category B requiring 8.3 MPa, and category C requiring 5.5 MPa, use of the 90/90 definition of minimum strength would cause the rejection of two logs. Use of the 99/95 definition of minimum strength would increase the number of rejected logs to 18; however, this would include only 2 out of the 56 logs in the best extrusion lot. Decreasing the number of tests per log from eight to four would cause only small differences in the yields of logs accepted in each category.

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1. SUMMARY AND CONCLUSIONS

Ninety-eight production logs of H-451 graphite, from three separate extrusion lots, were sampled for tensile testing. Eight replicate axial specimens from the midlength center and four replicate radial specimens from the end center of each log were tested. The following observations were made:

1. The axial strengths (average value 12.7 MPa) showed wide lot-to-lot and log-to-log variations, while the radial strengths (average value 15.8 MPa) were more uniform (see Section 5, Tables 1 and 2).
2. There was no statistically significant correlation between axial strength and radial strength in the same log, or between strength and the position of the log in the graphitizing furnace.
3. Acceptance criteria for assigning logs to a minimum strength category could be based on axial tensile tests, and each log should be sampled. A statistical model incorporating a separate lot-to-lot variance, log-to-log variance, and within-log variance was adopted for this purpose.
4. Acceptance criteria which could be used for assigning a log to strength category A [minimum strength 10.3 MPa (1500 psi)], B [minimum strength 8.3 MPa (1200 psi)], or C [minimum strength 5.5 MPa (800 psi)] were derived (see Section 6, Table 4). Calculations were made for either four or eight replicate specimens per log and two alternative definitions of "minimum strength" were considered. The first definition would require 90% of the material at the midlength center of the log to

exceed the specified minimum strength, with 90% confidence (90/90); the second, more stringent, definition would require 99% of the material to exceed the specified minimum, with 95% confidence (99/95).

5. The criteria were applied to the axial test data from the 98 logs. Using the 90/90 definition of minimum strength and testing eight specimens per log, two logs would fail to qualify for category C while almost half of the logs would qualify for category A.
6. Use of the 99/95 definition of minimum strength would increase the number of logs rejected to 18; the yield of logs accepted in each strength category would fall slightly short of the requirements of a typical core segment.
7. Decreasing the number of tests per log from eight to four would cause a small reduction in the yields.
8. The differences in quality between the three extrusion lots represented in the 98-log order have a clear effect on the yields of logs in each strength category. Using the 99/95 definition of minimum strength, only two of the 56 logs in the best lot (478) would be rejected and about 25% would qualify for category A. This compares with a rejection rate of about 40% for logs from the other two lots.

2. INTRODUCTION

Grade H-451 is under development by the Great Lakes Carbon Corporation (GLCC) as a candidate graphite for Large High-Temperature Gas-Cooled Reactor (LHTGR) replaceable fuel and reflector blocks. Characterization and irradiation data on preproduction grade H-451 were reported in Refs. 1 through 5. This report contains tensile strength data on 98 production logs, which were produced as a portion of 354-log order for Fort St. Vrain (FSV) reload fuel elements. The strength specimens were taken from locations which would not interfere with subsequent machining operations and were used to assess strategies for acceptance testing of logs from large production orders.

3. MATERIALS

The material consisted of 98 full-size [431.8 mm (17 in.) diameter by 812.8 mm (32 in.) long] production logs. These logs were produced with the same formulation and procedures used to produce preproduction lot 426 (see Ref. 1).

The 98 logs were a portion of a 354-log order for FSV reload fuel elements. The 354-log order was manufactured through the bake step and then stored due to a delay in the final processing of the order. The 98 logs described in this report were taken through the graphitization step and portions were distributed to General Atomic Company (GA), Oak Ridge National Laboratory (ORNL), and Brookhaven National Laboratory (BNL) for experimental purposes. The 98 logs were taken from three different production extrusion lots (472, 478, and 482), but all logs were graphitized in the same furnace run. The logs were sampled for tensile testing by GLCC at their Morganton Plant in accordance with a sampling plan devised by GA. The GA axial strength specimens were taken as near to the mid-length center of each log as possible [within 51 mm (2 in.) of the centerline, see Fig. 1] while preserving the logs for subsequent machining into a fuel element. A 16 mm (0.625 in.) diameter by 356 mm (14 in.) long rod was cored from the center and a 25 mm (1 in.) slab was taken from one end of each log. A 102 mm (4 in.) core was taken for axial specimens as shown in Fig. 1. Axial test specimens 6.35 mm in diameter by 23 mm long were machined from the axial core as shown in Fig. 2, and radial specimens of the same size were machined from the end slab as shown in Fig. 3. A single tensile test specimen (12.8 mm diameter by 76.2 mm long) was taken from each central core as shown in Fig. 1 for measurement by GLCC.

Eight axial specimens and four radial specimens from each log were measured for ultimate tensile strength at GA, and one axial specimen from

Fig. 1. Slabbing and coring H-451 fuel element logs

Fig. 2. Axial tensile strength specimens

Fig. 3. Radial tensile strength specimens

each log was measured at GLCC. The manufacturer's identification numbers, positions in the graphitizing furnace, and the bulk density of each log are listed for each extrusion lot in Appendix A (Tables A-1 through A-3). The logs are listed in order of furnace position. In this report the identification numbers assigned at GA (first column of Tables A-1 through A-3) are used.

4. EXPERIMENTAL METHODS

The tensile test method is described in Ref. 1. General Atomic and GLCC used the same tensile strength method, although the specimen size differed (Section 3). Round-robin tests performed on controlled specimen sets of H-451 showed the two laboratories to agree within 1% using the method described in Ref. 1.

5. EXPERIMENTAL RESULTS

5.1. AXIAL SPECIMENS

Individual strength measurements, grouped by extrusion lot, are listed in Appendix B (Tables B-1 through B-3). Nine specimens were lost or damaged during machining, and one strength value from a flawed specimen [2.7 MPa (392 psi)] was rejected. The first part of the specimen number identifies the parent log, and the final letter identifies the axial distance of the specimen from the center of the log. The specimens were located along the axis between 25 and 127 mm (1 and 5 in.) from the center, with the A-specimens closest to the center and the D-specimens most distant.

Tables B-4 through B-6 in Appendix B list the average strength value for each log, grouped by extrusion lot. The tables include the following information for each log:

1. A single strength measurement supplied by GLCC, from a cylindrical specimen 12.8 mm (0.505 in.) in diameter, taken on the log axis 343 mm (13.5 in.) from the midlength center.
2. The average of the four GA specimens closest to the center (subscripts A and B).
3. The average of all eight GA specimens (subscripts A, B, C, and D).

Correlation between the values for GLCC's single specimen and the GA average values was poor. This difference probably reflects both the spatial separation of the sampling zones and the inherent randomness of a single specimen. Statistical tests showed no significant difference in mean values between the A and B specimens (located closest to the log center) and the C and D specimens; therefore, they can be treated as coming from the same population.

There was no apparent correlation between strength and the position of the log within the graphitization furnace.

The average strengths and standard deviations for material from each extrusion lot are listed in Table 1. The grand mean of 12.7 MPa (1843 psi) compares with a value of 13.3 MPa (1936 psi) obtained from GLCC's single specimens.

The differences in average strength between the three extrusion lots, shown in Table 1, were statistically highly significant. The small differences in standard deviation between the different extrusion lots were not statistically significant.

The difference between the average strengths of lots 472-478 and 482 can be accounted for by GLCC differences in processing.

5.2. RADIAL SPECIMENS

The individual radial strength measurements are listed in Appendix C (Tables C-1 through C-3). Only specimens with an A or B subscript were tested. The specimens were located within 25 mm (1 in.) of the end of the parent log and within 51 mm (2 in.) of the centerline (see Fig. 3). The average strength values for each log are listed in Appendix C (Tables C-4 through C-6).

There was no statistically significant correlation between the radial strength and the axial strength of the same logs (correlation coefficient 0.11).

The average radial strengths and standard deviations for each extrusion lot are listed in Table 2. The grand mean was 15.8 MPa (2291 psi). The difference in strength between lots 472 and 478 was not statistically significant, but lot 482 was significantly weaker than the other two lots. In contrast to the axial strengths the differences in standard deviation

TABLE 1
STATISTICAL ANALYSIS OF AXIAL STRENGTH DATA

Extrusion Lot	Number of Specimens Tested	Average Strength		Standard Deviation	
		MPa	psi	MPa	psi
472	111	12.3	1779	2.9	420
478	439	13.6	1976	2.8	400
482	224	11.1	1616	2.7	389
All	774	12.7	1843	3.0	430

TABLE 2
STATISTICAL ANALYSIS OF RADIAL STRENGTH DATA

Extrusion Lot	Number of Specimens Tested	Average Strength		Standard Deviation	
		MPa	psi	MPa	psi
472	56	16.4	2380	1.4	209
478	224	16.3	2364	1.8	256
482	112	14.5	2100	2.7	389
All	392	15.8	2291	2.2	318

were statistically significant, with lot 482 showing more variability than the other two lots. This was attributable to an increase in both the log-to-log variability and the within-log (specimen-to-specimen) variability.

The higher strength and reduced standard deviation of the radial specimens at the end-center position compared with the axial specimens at the midlength-center position are not unusual and have been observed in preproduction logs. The differences between the three lots show that material extruded in different lots can vary considerably in strength properties after impregnation and graphitization.

6. APPLICATION OF RESULTS TO ACCEPTANCE TESTING

6.1. STRATEGY FOR ACCEPTANCE TESTING

The results described in the previous section show that the strength of axial midlength-center specimens is both lower and more scattered than the strength of radial end-center specimens. Variations between extrusion lots and variations between logs within the same lot both contribute to the scatter. The log-to-log scatter is too great to allow qualification of entire lots. It is evident that acceptance tests intended to ensure minimum strength needs should be based on axial midlength-center specimens and that each log should be sampled. Additional tests on radial end-center specimens would be of little value in qualifying logs because of the relatively high uniform strength of such material.

6.2. STATISTICAL MODEL

To develop logical acceptance criteria, the following statistical model was assumed:

$$x_{ij} = \mu + \alpha_i + \beta_j + \epsilon_{ij} \quad , \quad (1)$$

where x_{ij} is an axial strength measurement from the j^{th} log in the i^{th} lot, μ is the grand mean strength, α_i is the variation systematic to the i^{th} lot, β_j is the variation systematic to the j^{th} log from this lot, and ϵ_{ij} is the random variation (in the midlength-center sampling zone) within this log. It was further assumed that α , β , and ϵ are normally and independently distributed with means of zero and variances of σ_{lot}^2 , σ_{log}^2 , and σ_{WL}^2 , respectively. The latter three quantities are, in order, the variances attributable to lot-to-lot variations, log-to-log variations,

and within-log variations. It is implicit in the model that the log-to-log variance is the same for all extrusion lots and the within-log variance is the same for all logs.

Values for the three components of variance were calculated from the test data by the analysis of variance method. The calculations confirmed that both lot-to-lot and log-to-log variations were statistically highly significant. The values for σ_{lot}^2 , σ_{log}^2 and σ_{WL}^2 are shown in Table 3; the corresponding standard deviations are also included.

Table 3 shows that the largest contributor to the spread in the axial strength measurements is the log-to-log variation among logs from the same extrusion lot. On the other hand, the within-log variance $[2.67 \text{ (MPa)}^2]$ is low enough for log-by-log acceptance tests based on a few specimens per log to be practicable.

6.3. ACCEPTANCE CRITERIA

The purpose of acceptance testing is to ensure that material from the midlength center (the weakest location) of the logs meets the minimum strength requirement, S_{min} , for a particular reactor core component. Because of the variability in graphite strengths, a statistical definition of "minimum strength" is required. For the present analysis the following two alternative definitions were considered:

90/90: At least 90% of the material at the midlength center of the log equals or exceeds the specified minimum strength, with 90% confidence.

99/95: At least 99% of the material at the midlength center of the log equals or exceeds the specified minimum strength, with 95% confidence.

TABLE 3
COMPONENTS OF VARIANCE: AXIAL STRENGTH DATA

Source of Variation	Symbol	Variance		Standard Deviation	
		MPa ²	psi ²	MPa	psi
Lot-to-lot	σ_{lot}^2	1.22	25,533	1.10	160
Log-to-log	σ_{log}^2	5.22	109,905	2.29	332
Within log (residual)	σ_{WL}^2	2.67	56,200	1.63	237

An acceptance testing strategy which meets the needs can be derived from the statistical model of Eq. 1, if it is assumed that the present estimate of the within-log variance $[2.67 \text{ (MPa)}^2]$ is exact and will remain unchanged in future production runs. Suppose that n replicate specimens from the midlength center of a log are tested and their average, $\bar{x}$, is used to estimate the mean log strength, $\mu + \alpha_i + \beta_j$. The minimum strength requirement, $S_{\min}$, will be met if $\bar{x}$ meets the following criterion:

$$\bar{x} \geq S_{\min} + 1.282 \sigma_{WL} + \frac{1.282}{\sqrt{n}} \sigma_{WL} \quad 2(a)$$

if the 90/90 definition of minimum strength is used, or

$$\bar{x} \geq S_{\min} + 2.326 \sigma_{WL} + \frac{1.645}{\sqrt{n}} \sigma_{WL} \quad 2(b)$$

if the more stringent 99/95 definition of minimum strength is used. The numerical factors in Eq. 2 come from tabulated values for the standard normal distribution.

Different components in the HTGR core experience different stress levels. Therefore, the following three strength categories were considered:

Category A: minimum strength 10.3 MPa (1500 psi)

Category B: minimum strength 8.3 MPa (1200 psi)

Category C: minimum strength 5.5 MPa (800 psi)

The value which $\bar{x}$ must exceed for a log to be assigned to category A, B, or C can be calculated from Eq. 2. Values are shown in Table 4 for both four and eight replicate tests per log, and for both the 90/90 and the 99/95 definitions of minimum strength.

The criteria listed in Table 4 were applied to each of the 98 tested logs. For the case requiring four replicate tests, the four specimens closest to the log center (subscripts A and B) were used. The assigned

TABLE 4
CRITERIA FOR ASSIGNING LOGS TO STRENGTH
CATEGORIES A, B, OR C (AXIAL DATA)

Number of Tests per Log	Definition of Minimum Strength, $S_{\min}$	Strength Category ^(a)	Value Which Average Measured Strength, $\bar{x}$, Must Exceed	
			MPa	psi
4	90/90 ^(b)	A	13.5	1956
		B	11.4	1656
		C	8.7	1256
	99/95 ^(c)	A	15.5	2246
		B	13.4	1946
		C	10.7	1546
8	90/90 ^(b)	A	13.2	1911
		B	11.1	1611
		C	8.3	1211
	99/95 ^(c)	A	15.1	2189
		B	13.0	1889
		C	10.3	1489

(a) Categories correspond to the following minimum strengths:

A: 10.3 MPa (1500 psi)
B: 8.3 MPa (1200 psi)
C: 5.5 MPa (800 psi)

(b) At least 90% of material at midlength center exceeds specified minimum strength, with 90% confidence.

(c) At least 99% of material at midlength center exceeds specified minimum strength, with 95% confidence.

category for each log is given in Appendix B (Tables B-4 through B-6) for both a four-specimen and an eight-specimen sampling plan, and for both the loose and the more stringent definitions of minimum strength.

6.4. YIELDS OF LOGS BY CATEGORY

A summary of the numbers of logs assigned to each category under four-specimen and eight-specimen sampling plans, applying either of the two definitions of minimum strength, is given in Table 5. The results are broken down by extrusion lot.

Using the less stringent 90/90 definition of minimum strength and an eight-specimen sampling plan, only two logs would be rejected as failing to qualify for strength category C, and almost half the logs would qualify for category A. If the more stringent 99/95 definition is used, 18 logs would be rejected and about 20% of the remainder would qualify for category A. A typical order of logs for a replacement segment of an HTGR core would require about 25% of the accepted logs to qualify for category A and 70% to qualify for A or B. If the 99/95 minimum strength definition were adopted in place of the 90/90 definition, the yields in the higher categories would fall just short of these requirements, based on the quality of the production for all 98 logs considered in this order.

The effect on the yields of reducing the number of tests per log from eight to four is fairly small. The number of rejects would increase from two to five under the 90/90 strength definition, and rejects would be increased from 18 to 22 under the 99/95 strength definition. There would be some overall downgrading because more borderline logs would be moved down in category than would be moved up.

The better quality of extrusion lot 478, indicated by its higher average strength in Table 1, is clearly reflected in the yields listed in Table 5. Even using the 99/95 definition of minimum strength, only two of the 56 logs in lot 478 would be rejected and 25% would meet category A requirements.

TABLE 5
YIELDS OF LOGS IN EACH STRENGTH
CATEGORY (BASED ON AXIAL STRENGTHS)

Number of Tests per Log	Definition of Minimum Strength, S_{min}	Extrusion Lot	Number of Logs Assigned to Strength Category				
			A	B	C	Reject	Total
4	90/90 ^(a)	472	6	3	4	1	14
		478	27	22	6	1	56
		482	6	6	13	3	28
		All	39	31	23	5	98
	99/95 ^(b)	472	1	5	3	5	14
		478	12	16	26	2	56
		482	1	5	7	15	28
		All	14	26	36	22	98
8	90/90 ^(a)	472	6	3	4	1	14
		478	29	22	5	0	56
		482	7	6	14	1	28
		All	42	31	23	2	98
	99/95 ^(b)	472	2	4	4	4	14
		478	14	20	20	2	56
		482	1	6	9	12	28
		All	17	30	33	18	98

(a) At least 90% of material at midlength center exceeds specified minimum strength, with 90% confidence.

(b) At least 99% of material at midlength center exceeds specified minimum strength, with 95% confidence.

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APPENDIX A

IDENTIFICATION NUMBERS AND DENSITIES OF LOGS IN EXTRUSION LOTS 472, 478,
AND 482

TABLE A-1
IDENTIFICATION NUMBERS AND DENSITIES OF LOGS IN EXTRUSION LOT 472

GA Log Number (7194-)	GLCC Log Number (1272-)	GLCC Serial Number	Position in Graphitizing Furnace #51	Log Density (Mg/m ³)
16	22	10026	2-6	1.74
20	18	10034	3-4	1.75
26	48	10044	4-4	1.73
29	29	10051	5-1	1.77
40	30	10066	6-6	1.73
42	14	10072	7-2	1.73
46	26	10076	7-6	1.75
55	13	10093	9-3	1.74
75	12	10125	12-5	1.74
78	28	10132	13-2	1.73
84	23	10142	14-2	1.74
94	24	10156	15-6	1.74
96	45	10162	16-2	1.74
105	34	10176	17-6	1.73

TABLE A-2
IDENTIFICATION NUMBERS AND DENSITIES OF LOGS IN EXTRUSION LOT 478

GA Log Number (7194-)	GLCC Log Number (1272-)	GLCC Serial Number	Position in Graphitizing Furnace #51	Log Density (Mg/m ³)
12	66	10022	2-2	1.73
13	17	10023	2-3	1.73
14	21	10024	2-4	1.72
17	37	10031	3-1	1.71
18	30	10032	3-2	1.75
19	48	10033	3-3	1.73
24	28	10042	4-2	1.73
28	41	10046	4-6	1.74
30	8	10052	5-2	1.75
31	67	10053	5-3	1.73
33	68	10055	5-5	1.73
37	36	10063	6-3	1.73
38	44	10064	6-4	1.75
39	6	10065	6-5	1.74
43	9	10073	7-3	1.74
47	38	10081	8-1	1.73
48	77	10082	8-2	1.75
49	15	10083	8-3	1.75
51	18	10085	8-5	1.75
52	72	10086	8-6	1.73
53	49	10091	9-1	1.74
54	29	10092	9-2	1.73
56	62	10094	9-4	1.71
57	12	10095	9-5	1.75
58	2	10096	9-6	1.75
59	1	10101	10-1	1.74
61	10	10103	10-3	1.74
63	55	10105	10-5	1.72
64	93	10106	10-6	1.74
65	25	10111	11-1	1.74
66	26	10112	11-2	1.74
67	27	10113	11-3	1.74
68	95	10114	11-4	1.73
69	16	10115	11-5	1.75
70	75	10116	11-6	1.74
72	39	10122	12-2	1.72
73	87	10123	12-3	1.72
74	45	10124	12-4	1.74
76	19	10126	12-6	1.74
79	32	10133	13-3	1.75
80	11	10134	13-4	1.74
82	76	10136	13-6	1.74
83	23	10141	14-1	1.73
85	7	10143	14-3	1.74
86	40	10144	14-4	1.74
87	35	10145	14-5	1.74
88	5	10146	14-6	1.76
89	46	10151	15-1	1.74
90	63	10152	15-2	1.73
91	43	10153	15-3	1.74
92	60	10154	15-4	1.73
98	13	10164	16-4	1.74
100	54	10166	16-6	1.73
104	4	10175	17-5	1.75
107	58	10183	18-3	1.73
108	61	10184	18-4	1.73

TABLE A-3
IDENTIFICATION NUMBERS AND DENSITIES OF LOGS IN EXTRUSION LOT 482

GA Log Number (7194-)	GLCC Log Number (1272-)	GLCC Serial Number	Position in Graphitizing Furnace #51	Log Density (Mg/m ³)
11	118	10021	2-1	1.72
15	136	10025	2-5	1.74
21	147	10035	3-5	1.73
22	126	10036	3-6	1.74
23	113	10041	4-1	1.75
25	153	10043	4-3	1.74
27	102	10045	4-5	1.73
32	121	10054	5-4	1.72
34	54	10056	5-6	1.72
35	50	10061	6-1	1.74
36	129	10062	6-2	1.75
41	144	10071	7-1	1.77
44	114	10074	7-4	1.73
45	122	10075	7-5	1.75
50	111	10084	8-4	1.74
60	110	10102	10-2	1.73
62	44	10104	10-4	1.71
71	108	10121	12-1	1.73
77	53	10131	13-1	1.72
81	104	10135	13-5	1.72
93	132	10155	15-5	1.73
95	155	10161	16-1	1.72
97	115	10163	16-3	1.73
99	151	10165	16-5	1.74
101	134	10171	17-1	1.72
102	150	10173	17-3	1.73
103	123	10174	17-4	1.73
106	117	10181	18-1	1.74

APPENDIX B

AXIAL TENSILE STRENGTH MEASUREMENTS FOR EXTRUSION LOTS 472, 478, AND 482

TABLE B-1
AXIAL TENSILE STRENGTH MEASUREMENTS: EXTRUSION LOT 472

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (MG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
<hr/>							
7194-16-2A	AX	MLC					14.1
7194-16-2B	AX	MLC					13.7
7194-16-4A	AX	MLC					12.4
7194-16-4B	AX	MLC					14.3
16-2C	AX	MLC					16.0
16-2D	AX	MLC					13.4
16-4C	AX	MLC					14.5
16-4D	AX	MLC					14.9
<hr/>							
MEAN							14.2 (2052.PSI)
STD. DEV.							1.1 (157.PSI)
<hr/>							
7194-20-2A	AX	MLC					14.3
7194-20-2B	AX	MLC					16.0
7194-20-4A	AX	MLC					16.1
7194-20-4B	AX	MLC					14.6
20-2C	AX	MLC					15.7
20-2D	AX	MLC					16.4
20-4C	AX	MLC					14.3
20-4D	AX	MLC					13.9
<hr/>							
MEAN							15.2 (2201.PSI)
STD. DEV.							1.0 (140.PSI)
<hr/>							
7194-26-2A	AX	MLC					13.0
7194-26-2B	AX	MLC					12.5
7194-26-4A	AX	MLC					12.2
7194-26-4B	AX	MLC					11.8
26-2C	AX	MLC					11.8
26-2D	AX	MLC					12.7
26-4C	AX	MLC					13.6
26-4D	AX	MLC					11.9
<hr/>							
MEAN							12.4 (1806.PSI)
STD. DEV.							.6 (92.PSI)
<hr/>							

TABLE B-1 (Continued)

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (MG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
7194-29-2A	AX	MLC					8.1
7194-29-2B	AX	MLC					8.7
7194-29-4A	AX	MLC					10.8
7194-29-4B	AX	MLC					10.8
29-2C	AX	MLC					10.5
29-2D	AX	MLC					11.1
29-4C	AX	MLC					10.6
29-4D	AX	MLC					11.4
MEAN							10.3 (1488.PSI)
STD. DEV.							1.2 (171.PSI)
7194-40-2A	AX	MLC					7.2
7194-40-2B	AX	MLC					8.1
7194-40-4A	AX	MLC					6.0
7194-40-4B	AX	MLC					7.0
40-2C	AX	MLC					7.4
40-2D	AX	MLC					7.2
40-4C	AX	MLC					6.3
40-4D	AX	MLC					6.5
MEAN							7.0 (1012.PSI)
STD. DEV.							.7 (96.PSI)
7194-42-2A	AX	MLC					11.1
7194-42-2B	AX	MLC					5.3
7194-42-4A	AX	MLC					12.9
7194-42-4B	AX	MLC					11.4
42-2C	AX	MLC					9.6
42-2D	AX	MLC					11.1
42-4C	AX	MLC					8.3
42-4D	AX	MLC					11.2
MEAN							10.1 (1468.PSI)
STD. DEV.							2.4 (343.PSI)

TABLE B-1 (Continued)

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (MG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
7194-46-2A	AX	MLC					13.7
7194-46-2B	AX	MLC					14.5
7194-46-4A	AX	MLC					16.4
7194-46-4B	AX	MLC					14.6
46-2C	AX	MLC					12.8
46-2D	AX	MLC					13.1
46-4C	AX	MLC					15.0
46-4D	AX	MLC					12.8
MEAN							14.1 (2046.PSI)
STD. DEV.							1.3 (185.PSI)
7194-55-2A	AX	MLC					15.6
7194-55-2B	AX	MLC					14.5
7194-55-4A	AX	MLC					14.6
7194-55-4B	AX	MLC					16.2
55-2C	AX	MLC					16.0
55-2D	AX	MLC					14.5
55-4C	AX	MLC					15.0
55-4D	AX	MLC					15.5
MEAN							15.2 (2210.PSI)
STD. DEV.							.7 (98.PSI)
7194-75-2A	AX	MLC					12.5
7194-75-2B	AX	MLC					16.2
7194-75-4A	AX	MLC					17.4
7194-75-4B	AX	MLC					17.0
75-2C	AX	MLC					11.8
75-2D	AX	MLC					16.6
75-4C	AX	MLC					11.8
75-4D	AX	MLC					14.6
MEAN							14.8 (2140.PSI)
STD. DEV.							2.4 (347.PSI)

TABLE B-1 (Continued)

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (MG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
7194-78-2A	AX	MLC					11.0
7194-78-2B	AX	MLC					9.7
7194-78-4A	AX	MLC					10.3
7194-78-4B	AX	MLC					10.0
78-2C	AX	MLC					10.1
78-2D	AX	MLC					10.1
78-4C	AX	MLC					8.9
78-4D	AX	MLC					10.5
MEAN							10.1 (1461.PSI)
STD. DEV.							.6 (90.PSI)
7194-84-2A	AX	MLC					13.9
7194-84-2B	AX	MLC					15.6
7194-84-4A	AX	MLC					14.3
7194-84-4B	AX	MLC					15.7
84-2C	AX	MLC					15.6
84-2D	AX	MLC					14.3
84-4C	AX	MLC					12.9
84-4D	AX	MLC					15.8
MEAN							14.8 (2143.PSI)
STD. DEV.							1.1 (155.PSI)
7194-94-2A	AX	MLC					11.2
7194-94-4A	AX	MLC					13.1
7194-94-4B	AX	MLC					13.4
94-2C	AX	MLC					12.4
94-2D	AX	MLC					11.5
94-4C	AX	MLC					10.1
94-4D	AX	MLC					14.2
MEAN							12.3 (1780.PSI)
STD. DEV.							1.4 (204.PSI)

TABLE B-1 (Continued)

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (MG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
7194-96-2A	AX	MLC					8.4
7194-96-2B	AX	MLC					9.1
7194-96-4A	AX	MLC					8.7
7194-96-4B	AX	MLC					9.3
96-2C	AX	MLC					4.5
96-2D	AX	MLC					9.4
96-4C	AX	MLC					11.3
96-4D	AX	MLC					9.5
MEAN							8.8 (1275.PSI)
STD. DEV.							1.9 (282.PSI)
7194-105-2A	AX	MLC					13.9
7194-105-2B	AX	MLC					12.0
7194-105-4A	AX	MLC					13.1
7194-105-4B	AX	MLC					12.9
105-2C	AX	MLC					9.4
105-2D	AX	MLC					11.0
105-4C	AX	MLC					12.9
105-4D	AX	MLC					15.6
MEAN							12.6 (1827.PSI)
STD. DEV.							1.9 (270.PSI)

TABLE B-2
AXIAL TENSILE STRENGTH MEASUREMENTS: EXTRUSION LOT 478

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (MG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
7194-12-2A	AX	MLC					13.8
7194-12-2B	AX	MLC					9.9
7194-12-4A	AX	MLC					11.3
7194-12-4B	AX	MLC					11.5
12-2C	AX	MLC					13.4
12-2D	AX	MLC					13.6
12-4C	AX	MLC					11.1
12-4D	AX	MLC					11.9
MEAN							12.1 (1749.PSI)
STD. DEV.							1.4 (205.PSI)
7194-13-2A	AX	MLC					13.7
7194-13-2B	AX	MLC					12.5
7194-13-4A	AX	MLC					12.7
7194-13-4B	AX	MLC					14.5
13-2C	AX	MLC					12.5
13-2D	AX	MLC					12.8
13-4C	AX	MLC					12.5
13-4D	AX	MLC					13.3
MEAN							13.1 (1894.PSI)
STD. DEV.							.7 (104.PSI)
7194-14-2A	AX	MLC					14.9
7194-14-2B	AX	MLC					15.1
7194-14-4A	AX	MLC					15.1
7194-14-4B	AX	MLC					16.6
14-2C	AX	MLC					16.5
14-4C	AX	MLC					17.6
14-4D	AX	MLC					15.0
MEAN							15.8 (2294.PSI)
STD. DEV.							1.0 (152.PSI)

TABLE B-2 (Continued)

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (MG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
7194-17-2A	AX	MLC					10.1
7194-17-2B	AX	MLC					11.1
7194-17-4A	AX	MLC					12.9
7194-17-4B	AX	MLC					10.3
17-2C	AX	MLC					11.1
17-2D	AX	MLC					12.1
17-4C	AX	MLC					10.5
17-4D	AX	MLC					11.7
MEAN							11.2 (1627.PSI)
STD. DEV.							1.0 (140.PSI)
7194-18-2A	AX	MLC					14.3
7194-18-2B	AX	MLC					10.3
7194-18-4A	AX	MLC					12.5
7194-18-4B	AX	MLC					13.4
18-2C	AX	MLC					14.4
18-2D	AX	MLC					13.2
18-4C	AX	MLC					15.3
18-4D	AX	MLC					12.9
MEAN							13.3 (1929.PSI)
STD. DEV.							1.5 (222.PSI)
7194-19-2A	AX	MLC					13.3
7194-19-2B	AX	MLC					12.2
7194-19-4A	AX	MLC					11.5
7194-19-4B	AX	MLC					12.0
19-2C	AX	MLC					13.7
19-2D	AX	MLC					11.5
19-4C	AX	MLC					13.4
19-4D	AX	MLC					12.9
MEAN							12.6 (1824.PSI)
STD. DEV.							.9 (128.PSI)

TABLE B-2 (Continued)

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (MG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
7194-24-2A	AX	MLC					16.2
7194-24-2B	AX	MLC					17.5
7194-24-4A	AX	MLC					14.6
7194-24-4B	AX	MLC					16.5
24-2C	AX	MLC					13.9
24-2D	AX	MLC					13.6
24-4C	AX	MLC					15.2
24-4D	AX	MLC					15.7
MEAN							15.4 (2234.PSI)
STD. DEV.							1.3 (190.PSI)
7194-28-2A	AX	MLC					9.6
7194-28-2B	AX	MLC					14.8
7194-28-4A	AX	MLC					14.1
7194-28-4B	AX	MLC					14.6
28-2C	AX	MLC					10.5
28-2D	AX	MLC					12.5
28-4C	AX	MLC					12.8
28-4D	AX	MLC					11.1
MEAN							12.5 (1813.PSI)
STD. DEV.							2.0 (283.PSI)
7194-30-2A	AX	MLC					15.4
7194-30-2B	AX	MLC					16.4
7194-30-4A	AX	MLC					15.6
7194-30-4B	AX	MLC					14.8
30-2C	AX	MLC					16.5
30-2D	AX	MLC					15.2
30-4C	AX	MLC					14.5
30-4D	AX	MLC					12.7
MEAN							15.1 (2196.PSI)
STD. DEV.							1.2 (179.PSI)

TABLE B-2 (Continued)

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (MG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
7194-31-2A	AX	MLC					17.0
7194-31-2B	AX	MLC					14.9
7194-31-4A	AX	MLC					12.7
7194-31-4B	AX	MLC					12.0
31-2C	AX	MLC					14.4
31-2D	AX	MLC					10.0
31-4C	AX	MLC					15.6
31-4D	AX	MLC					13.6
MEAN							13.8 (1997.PSI)
STD. DEV.							2.2 (322.PSI)
7194-33-2A	AX	MLC					15.5
7194-33-2B	AX	MLC					15.4
7194-33-4A	AX	MLC					13.7
7194-33-4B	AX	MLC					13.2
33-2C	AX	MLC					14.3
33-2D	AX	MLC					11.4
33-4C	AX	MLC					12.2
33-4D	AX	MLC					13.1
MEAN							13.6 (1972.PSI)
STD. DEV.							1.4 (210.PSI)
7194-37-2A	AX	MLC					11.7
7194-37-2B	AX	MLC					11.0
7194-37-4A	AX	MLC					11.4
7194-37-4B	AX	MLC					13.5
37-2C	AX	MLC					12.3
37-2D	AX	MLC					9.4
37-4C	AX	MLC					8.7
37-4D	AX	MLC					11.3
MEAN							11.2 (1618.PSI)
STD. DEV.							1.5 (221.PSI)

TABLE B-2 (Continued)

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (MG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
7194-38-2A	AX	MLC					13.6
7194-38-2B	AX	MLC					12.1
7194-38-4A	AX	MLC					11.1
7194-38-4B	AX	MLC					12.5
38-2C	AX	MLC					10.9
38-2D	AX	MLC					11.1
38-4C	AX	MLC					12.8
38-4D	AX	MLC					13.2
MEAN							12.2 (1765.PSI)
STD. DEV.							1.0 (151.PSI)
7194-39-2A	AX	MLC					14.1
7194-39-2B	AX	MLC					14.2
7194-39-4A	AX	MLC					11.9
7194-39-4B	AX	MLC					14.9
39-2C	AX	MLC					6.6
39-2D	AX	MLC					10.9
39-4C	AX	MLC					10.4
39-4D	AX	MLC					14.9
MEAN							12.2 (1776.PSI)
STD. DEV.							2.9 (419.PSI)
7194-43-2A	AX	MLC					14.1
7194-43-2B	AX	MLC					16.2
7194-43-4A	AX	MLC					16.4
7194-43-4B	AX	MLC					13.5
43-2C	AX	MLC					16.5
43-2D	AX	MLC					15.1
43-4C	AX	MLC					13.9
43-4D	AX	MLC					15.3
MEAN							15.1 (2192.PSI)
STD. DEV.							1.2 (173.PSI)

TABLE B-2 (Continued)

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (MG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
7194-47-2A	AX	MLC					14.6
7194-47-2B	AX	MLC					12.1
7194-47-4A	AX	MLC					11.0
7194-47-4B	AX	MLC					10.1
47-2C	AX	MLC					12.2
47-2D	AX	MLC					8.4
47-4C	AX	MLC					13.8
47-4D	AX	MLC					13.4
MEAN							12.0 (1734.PSI)
STD. DEV.							2.0 (297.PSI)
7194-48-2A	AX	MLC					9.9
7194-48-2B	AX	MLC					6.9
7194-48-4A	AX	MLC					12.1
7194-48-4B	AX	MLC					10.1
48-2C	AX	MLC					9.0
48-2D	AX	MLC					9.3
48-4C	AX	MLC					11.9
48-4D	AX	MLC					10.7
MEAN							10.0 (1448.PSI)
STD. DEV.							1.7 (244.PSI)
7194-49-2A	AX	MLC					14.9
7194-49-2B	AX	MLC					14.6
7194-49-4A	AX	MLC					13.1
7194-49-4B	AX	MLC					14.3
49-2C	AX	MLC					13.5
49-2D	AX	MLC					12.9
49-4C	AX	MLC					14.6
49-4D	AX	MLC					15.3
MEAN							14.2 (2055.PSI)
STD. DEV.							.9 (128.PSI)

TABLE B-2 (Continued)

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (MG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
7194-51-2A	AX	MLC					10.1
7194-51-2B	AX	MLC					14.8
7194-51-4A	AX	MLC					10.3
7194-51-4B	AX	MLC					10.7
51-2C	AX	MLC					10.4
51-2D	AX	MLC					10.7
51-4C	AX	MLC					9.1
51-4D	AX	MLC					9.4
MEAN							10.7 (1550.PSI)
STD. DEV.							1.7 (253.PSI)
7194-52-2A	AX	MLC					15.6
7194-52-2B	AX	MLC					15.6
7194-52-4A	AX	MLC					17.2
7194-52-4B	AX	MLC					16.2
52-2C	AX	MLC					18.0
52-2D	AX	MLC					16.2
52-4C	AX	MLC					16.9
52-4D	AX	MLC					17.1
MEAN							16.6 (2406.PSI)
STD. DEV.							.8 (121.PSI)
7194-53-2A	AX	MLC					12.8
7194-53-2B	AX	MLC					13.1
7194-53-4A	AX	MLC					13.1
7194-53-4B	AX	MLC					14.2
53-2C	AX	MLC					15.6
53-2D	AX	MLC					13.6
53-4C	AX	MLC					13.4
53-4D	AX	MLC					15.3
MEAN							13.9 (2014.PSI)
STD. DEV.							1.1 (154.PSI)

TABLE B-2 (Continued)

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (MG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
7194-54-2A	AX	MLC					11.7
7194-54-2B	AX	MLC					15.6
7194-54-4A	AX	MLC					15.2
7194-54-4B	AX	MLC					10.5
54-2C	AX	MLC					13.5
54-2D	AX	MLC					14.6
54-4C	AX	MLC					15.5
54-4D	AX	MLC					15.2
MEAN							14.0 (2027.PSI)
STD. DEV.							1.9 (277.PSI)
7194-56-2A	AX	MLC					12.7
7194-56-2B	AX	MLC					14.9
7194-56-4A	AX	MLC					12.9
7194-56-4B	AX	MLC					11.1
56-2C	AX	MLC					11.0
56-2D	AX	MLC					13.5
56-4C	AX	MLC					12.9
56-4D	AX	MLC					15.2
MEAN							13.0 (1889.PSI)
STD. DEV.							1.5 (222.PSI)
7194-57-2A	AX	MLC					13.1
7194-57-2B	AX	MLC					13.5
7194-57-4A	AX	MLC					13.5
7194-57-4B	AX	MLC					7.9
57-2C	AX	MLC					13.4
57-2D	AX	MLC					7.3
57-4C	AX	MLC					11.5
57-4D	AX	MLC					13.5
MEAN							11.7 (1698.PSI)
STD. DEV.							2.6 (381.PSI)

TABLE B-2 (Continued)

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (MG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
7194-58-2A	AX	MLC					15.1
7194-58-2B	AX	MLC					13.6
7194-58-4A	AX	MLC					14.2
7194-58-4B	AX	MLC					15.2
58-2C	AX	MLC					12.5
58-2D	AX	MLC					11.5
MEAN							13.7 (1985.PSI)
STD. DEV.							1.4 (210.PSI)
7194-59-2A	AX	MLC					12.8
7194-59-2B	AX	MLC					12.4
7194-59-4A	AX	MLC					6.6
7194-59-4B	AX	MLC					11.8
59-2C	AX	MLC					6.5
59-2C	AX	MLC					11.7
59-4D	AX	MLC					11.4
59-4D	AX	MLC					12.7
MEAN							10.7 (1556.PSI)
STD. DEV.							2.6 (381.PSI)
7194-61-2A	AX	MLC					11.4
7194-61-2B	AX	MLC					15.1
7194-61-4A	AX	MLC					8.6
7194-61-4B	AX	MLC					8.2
61-2C	AX	MLC					12.8
61-2D	AX	MLC					9.6
61-4C	AX	MLC					12.8
61-4D	AX	MLC					11.5
MEAN							11.2 (1629.PSI)
STD. DEV.							2.4 (342.PSI)

TABLE B-2 (Continued)

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (MG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
7194-63-2A	AX	MLC					15.1
7194-63-2B	AX	MLC					16.9
7194-63-4A	AX	MLC					13.5
7194-63-4B	AX	MLC					17.6
63-2C	AX	MLC					13.8
63-2D	AX	MLC					14.8
63-4C	AX	MLC					18.6
63-4D	AX	MLC					17.0
MEAN							15.9 (2305.PSI)
STD. DEV.							1.9 (271.PSI)
7194-64-2A	AX	MLC					20.5
7194-64-2B	AX	MLC					18.7
7194-64-4A	AX	MLC					18.0
7194-64-4B	AX	MLC					18.0
64-2C	AX	MLC					15.9
64-2D	AX	MLC					18.5
64-4C	AX	MLC					18.1
64-4D	AX	MLC					16.4
MEAN							18.0 (2616.PSI)
STD. DEV.							1.4 (206.PSI)
7194-65-2A	AX	MLC					20.5
7194-65-2B	AX	MLC					19.4
7194-65-4A	AX	MLC					19.7
7194-65-4B	AX	MLC					18.2
65-2C	AX	MLC					17.2
65-2D	AX	MLC					14.1
65-4C	AX	MLC					16.6
65-4D	AX	MLC					17.2
MEAN							17.9 (2590.PSI)
STD. DEV.							2.0 (295.PSI)

TABLE B-2 (Continued)

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (MG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
7194-66-2A	AX	MLC					18.6
7194-66-2E	AX	MLC					14.9
7194-66-4A	AX	MLC					17.9
7194-66-4B	AX	MLC					18.6
66-2C	AX	MLC					16.9
66-2D	AX	MLC					17.0
66-4C	AX	MLC					18.8
66-4D	AX	MLC					17.3
MEAN							17.5 (2538.PSI)
STD. DEV.							1.3 (187.PSI)
7194-67-2A	AX	MLC					18.7
7194-67-2B	AX	MLC					17.4
7194-67-4A	AX	MLC					18.4
7194-67-4B	AX	MLC					16.3
67-2C	AX	MLC					14.6
67-2D	AX	MLC					14.3
67-4C	AX	MLC					15.7
67-4D	AX	MLC					15.5
MEAN							16.4 (2377.PSI)
STD. DEV.							1.7 (241.PSI)
7194-68-2A	AX	MLC					14.4
7194-68-2B	AX	MLC					12.7
7194-68-4A	AX	MLC					12.7
7194-68-4B	AX	MLC					13.1
68-2C	AX	MLC					11.5
68-2D	AX	MLC					13.5
68-4C	AX	MLC					11.5
68-4D	AX	MLC					12.9
MEAN							12.8 (1854.PSI)
STD. DEV.							.9 (137.PSI)

TABLE B-2 (Continued)

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (MG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
7194-69-2A	AX	MLC					13.8
7194-69-2B	AX	MLC					12.0
7194-69-4A	AX	MLC					13.5
7194-69-4B	AX	MLC					10.8
69-2C	AX	MLC					12.2
69-2D	AX	MLC					10.5
69-4C	AX	MLC					12.2
69-4D	AX	MLC					12.1
MEAN							12.2 (1763.PSI)
STD. DEV.							1.1 (164.PSI)
7194-70-2A	AX	MLC					11.5
7194-70-2B	AX	MLC					12.2
7194-70-4A	AX	MLC					8.3
7194-70-4B	AX	MLC					12.8
70-2C	AX	MLC					12.4
70-2D	AX	MLC					9.1
70-4C	AX	MLC					11.0
70-4D	AX	MLC					12.0
MEAN							11.2 (1619.PSI)
STD. DEV.							1.6 (235.PSI)
7194-72-2A	AX	MLC					15.1
7194-72-2B	AX	MLC					14.8
7194-72-4A	AX	MLC					11.4
7194-72-4B	AX	MLC					12.0
72-2C	AX	MLC					13.6
72-2D	AX	MLC					12.7
72-4C	AX	MLC					9.8
72-4D	AX	MLC					15.3
MEAN							13.1 (1898.PSI)
STD. DEV.							2.0 (284.PSI)

TABLE B-2 (Continued)

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (MG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
7194-73-2A	AX	MLC					12.1
7194-73-2B	AX	MLC					10.8
7194-73-4A	AX	MLC					11.1
7194-73-4B	AX	MLC					12.7
73-2C	AX	MLC					11.1
73-2D	AX	MLC					10.7
73-4C	AX	MLC					9.7
73-4D	AX	MLC					9.8
MEAN							11.0 (1597.PSI)
STD. DEV.							1.0 (147.PST)
7194-74-2A	AX	MLC					12.1
7194-74-2B	AX	MLC					15.0
7194-74-4A	AX	MLC					15.8
7194-74-4B	AX	MLC					15.2
74-2C	AX	MLC					16.9
74-2D	AX	MLC					14.8
74-4C	AX	MLC					15.3
74-4D	AX	MLC					12.4
MEAN							14.7 (2129.PSI)
STD. DEV.							1.6 (237.PSI)
7194-76-2A	AX	MLC					15.5
7194-76-2B	AX	MLC					16.6
7194-76-4A	AX	MLC					17.7
7194-76-4B	AX	MLC					17.4
76-2C	AX	MLC					17.1
76-2D	AX	MLC					15.9
76-4C	AX	MLC					15.8
76-4D	AX	MLC					14.3
MEAN							16.3 (2364.PSI)
STD. DEV.							1.1 (166.PSI)

TABLE B-2 (Continued)

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (MG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
7194-79-2A	AX	MLC					8.4
7194-79-2B	AX	MLC					15.1
7194-79-4A	AX	MLC					15.3
7194-79-4B	AX	MLC					15.0
79-2C	AX	MLC					8.2
79-2D	AX	MLC					15.9
79-4C	AX	MLC					14.1
79-4D	AX	MLC					13.3
MEAN							13.2 (1909.PSI)
STD. DEV.							3.1 (450.PSI)
7194-80-2A	AX	MLC					14.8
7194-80-2B	AX	MLC					14.2
7194-80-4A	AX	MLC					15.6
7194-80-4B	AX	MLC					12.5
80-2C	AX	MLC					11.7
80-2D	AX	MLC					13.5
80-4C	AX	MLC					12.6
80-4D	AX	MLC					13.5
MEAN							13.5 (1965.PSI)
STD. DEV.							1.3 (186.PSI)
7194-82-2A	AX	MLC					9.0
7194-82-2B	AX	MLC					9.0
7194-82-4A	AX	MLC					7.4
7194-82-4B	AX	MLC					8.3
82-2C	AX	MLC					9.3
82-2D	AX	MLC					8.3
82-4C	AX	MLC					8.4
82-4D	AX	MLC					8.2
MEAN							8.5 (1231.PSI)
STD. DEV.							.6 (86.PSI)

TABLE B-2 (Continued)

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (MG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
7194-83-2A	AX	MLC					19.8
7194-83-2B	AX	MLC					19.0
7194-83-4A	AX	MLC					20.5
7194-83-4B	AX	MLC					19.8
83-2C	AX	MLC					17.2
83-2D	AX	MLC					20.0
83-4C	AX	MLC					19.1
83-4D	AX	MLC					20.9
MEAN							19.5 (2830.PSI)
STD. DEV.							1.1 (166.PSI)
7194-85-2A	AX	MLC					14.1
7194-85-2B	AX	MLC					15.3
7194-85-4A	AX	MLC					12.2
7194-85-4B	AX	MLC					10.7
85-2C	AX	MLC					10.1
85-4C	AX	MLC					12.6
85-4D	AX	MLC					12.5
MEAN							12.5 (1812.PSI)
STD. DEV.							1.8 (262.PSI)
7194-86-2A	AX	MLC					13.2
7194-86-2B	AX	MLC					10.7
7194-86-4A	AX	MLC					17.1
7194-86-4B	AX	MLC					17.0
86-2C	AX	MLC					16.9
86-2D	AX	MLC					16.7
86-4C	AX	MLC					14.2
86-4D	AX	MLC					11.6
MEAN							14.7 (2127.PSI)
STD. DEV.							2.6 (379.PSI)

TABLE B-2 (Continued)

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (MG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
7194-87-2A	AX	MLC					17.9
7194-87-2B	AX	MLC					17.5
7194-87-4A	AX	MLC					11.9
7194-87-4B	AX	MLC					19.8
87-2C	AX	MLC					17.9
87-2D	AX	MLC					17.9
87-4C	AX	MLC					19.4
87-4D	AX	MLC					16.3
MEAN							17.3 (2510.PSI)
STD. DEV.							2.4 (352.PSI)
7194-88-2B	AX	MLC					15.8
7194-88-4A	AX	MLC					19.2
7194-88-4B	AX	MLC					19.0
88-2C	AX	MLC					14.8
88-2D	AX	MLC					18.0
88-4C	AX	MLC					17.4
88-4D	AX	MLC					14.1
MEAN							16.9 (2451.PSI)
STD. DEV.							2.0 (297.PSI)
7194-89-2A	AX	MLC					14.4
7194-89-2B	AX	MLC					11.7
7194-89-4A	AX	MLC					12.0
7194-89-4B	AX	MLC					10.8
89-2C	AX	MLC					10.8
89-2D	AX	MLC					11.4
89-4C	AX	MLC					12.0
89-4D	AX	MLC					12.9
MEAN							12.0 (1739.PSI)
STD. DEV.							1.2 (170.PSI)

TABLE B-2 (Continued)

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (MG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
7194-90-2A	AX	MLC					14.9
7194-90-2B	AX	MLC					14.9
7194-90-4A	AX	MLC					16.5
7194-90-4B	AX	MLC					12.7
90-2C	AX	MLC					13.4
90-2D	AX	MLC					12.9
90-4C	AX	MLC					16.0
90-4D	AX	MLC					10.4
MEAN							14.0 (2025.PSI)
STD. DEV.							2.0 (290.PSI)
7194-91-2A	AX	MLC					13.2
7194-91-2B	AX	MLC					10.6
7194-91-4A	AX	MLC					12.9
7194-91-4B	AX	MLC					12.7
91-2C	AX	MLC					13.8
91-2D	AX	MLC					14.8
91-4C	AX	MLC					11.8
91-4D	AX	MLC					15.5
MEAN							13.2 (1907.PSI)
STD. DEV.							1.6 (227.PSI)
7194-92-2A	AX	MLC					11.0
7194-92-2B	AX	MLC					8.7
7194-92-4A	AX	MLC					12.0
7194-92-4B	AX	MLC					13.1
92-2C	AX	MLC					12.9
92-2D	AX	MLC					10.0
92-4C	AX	MLC					13.9
92-4D	AX	MLC					10.5
MEAN							11.5 (1670.PSI)
STD. DEV.							1.8 (256.PSI)

TABLE B-2 (Continued)

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (MG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
7194-98-4A	AX	MLC					15.6
7194-98-4B	AX	MLC					14.9
98-4C	AX	MLC					14.7
98-4D	AX	MLC					15.1
MEAN							15.1 (2185.PSI)
STD. DEV.							.4 (54.PSI)
7194-100-2A	AX	MLC					15.9
7194-100-2B	AX	MLC					10.7
7194-100-4A	AX	MLC					16.7
7194-100-4B	AX	MLC					17.2
100-2C	AX	MLC					15.5
100-2D	AX	MLC					15.7
100-4C	AX	MLC					14.4
100-4D	AX	MLC					13.9
MEAN							15.0 (2176.PSI)
STD. DEV.							2.1 (298.PSI)
7194-104-2A	AX	MLC					15.2
7194-104-2B	AX	MLC					13.4
7194-104-4A	AX	MLC					8.6
7194-104-4B	AX	MLC					14.3
104-2C	AX	MLC					11.8
104-2D	AX	MLC					14.9
104-4C	AX	MLC					15.0
104-4D	AX	MLC					15.0
MEAN							13.5 (1962.PSI)
STD. DEV.							2.3 (335.PSI)

TABLE B-2 (Continued)

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (MG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
7194-107-2A	AX	MLC					12.9
7194-107-2B	AX	MLC					15.4
7194-107-4A	AX	MLC					14.9
7194-107-4B	AX	MLC					14.3
107-2C	AX	MLC					14.4
107-2D	AX	MLC					15.3
107-4C	AX	MLC					15.7
107-4D	AX	MLC					14.3
MEAN							14.7 (2129.PSI)
STD. DEV.							.9 (129.PSI)
7194-108-2A	AX	MLC					14.2
7194-108-2B	AX	MLC					13.7
7194-108-4A	AX	MLC					13.6
7194-108-4B	AX	MLC					12.5
108-2C	AX	MLC					10.4
108-2D	AX	MLC					10.1
108-4C	AX	MLC					11.4
108-4D	AX	MLC					7.2
MEAN							11.6 (1688.PSI)
STD. DEV.							2.4 (345.PSI)

TABLE B-3
AXIAL TENSILE STRENGTH MEASUREMENTS: EXTRUSION LOT 482

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (MG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
7194-11-2A	AX	MLC					14.5
7194-11-2B	AX	MLC					14.4
7194-11-4A	AX	MLC					14.4
7194-11-4B	AX	MLC					16.0
11-2C	AX	MLC					15.8
11-2D	AX	MLC					17.4
11-4C	AX	MLC					17.3
11-4D	AX	MLC					15.9
MEAN							15.7 (2277.PSI)
STD. DEV.							1.2 (179.PSI)
7194-15-2A	AX	MLC					7.9
7194-15-2B	AX	MLC					7.9
7194-15-4A	AX	MLC					9.9
7194-15-4B	AX	MLC					10.3
15-2C	AX	MLC					10.4
15-2D	AX	MLC					11.7
15-4C	AX	MLC					10.2
15-4D	AX	MLC					11.4
MEAN							9.9 (1443.PSI)
STD. DEV.							1.4 (204.PSI)
7194-21-2A	AX	MLC					14.7
7194-21-2B	AX	MLC					15.4
7194-21-4A	AX	MLC					15.1
7194-21-4B	AX	MLC					17.0
21-2C	AX	MLC					13.4
21-2D	AX	MLC					13.0
21-4C	AX	MLC					16.6
21-4D	AX	MLC					12.2
MEAN							14.7 (2131.PSI)
STD. DEV.							1.7 (246.PSI)

TABLE B-3 (Continued)

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (MG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
7194-22-2A	AX	MLC					10.9
7194-22-2B	AX	MLC					8.1
7194-22-4A	AX	MLC					8.7
7194-22-4B	AX	MLC					9.3
22-2C	AX	MLC					9.0
22-2D	AX	MLC					9.9
22-4C	AX	MLC					11.0
22-4D	AX	MLC					9.8
MEAN							9.6 (1393.PSI)
STD. DEV.							1.0 (148.PSI)
7194-23-2A	AX	MLC					12.5
7194-23-2B	AX	MLC					13.8
7194-23-4A	AX	MLC					11.0
7194-23-4B	AX	MLC					12.5
23-2C	AX	MLC					12.9
23-2D	AX	MLC					13.4
23-4C	AX	MLC					12.5
23-4D	AX	MLC					12.5
MEAN							12.6 (1833.PSI)
STD. DEV.							.8 (120.PSI)
7194-25-2A	AX	MLC					13.2
7194-25-2B	AX	MLC					14.5
7194-25-4A	AX	MLC					15.6
7194-25-4B	AX	MLC					14.4
25-2C	AX	MLC					12.7
25-2D	AX	MLC					12.2
25-4C	AX	MLC					14.3
25-4D	AX	MLC					15.3
MEAN							14.0 (2035.PSI)
STD. DEV.							1.2 (177.PSI)

TABLE B-3 (Continued)

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (MG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
7194-27-2A	AX	MLC					12.0
7194-27-2B	AX	MLC					7.3
7194-27-4A	AX	MLC					11.3
7194-27-4B	AX	MLC					13.1
27-2C	AX	MLC					12.7
27-2D	AX	MLC					12.7
27-4C	AX	MLC					7.6
27-4D	AX	MLC					10.3
MEAN							10.8 (1574.PSI)
STD. DEV.							2.3 (331.PSI)
7194-32-2A	AX	MLC					12.2
7194-32-2B	AX	MLC					13.6
7194-32-4A	AX	MLC					14.2
7194-32-4B	AX	MLC					13.9
32-2C	AX	MLC					14.7
32-2D	AX	MLC					11.8
32-4C	AX	MLC					16.2
32-4D	AX	MLC					14.8
MEAN							13.9 (2020.PSI)
STD. DEV.							1.4 (206.PSI)
7194-34-2A	AX	MLC					9.4
7194-34-2B	AX	MLC					11.9
7194-34-4A	AX	MLC					8.2
7194-34-4B	AX	MLC					12.1
34-2C	AX	MLC					9.5
34-2D	AX	MLC					11.1
34-4C	AX	MLC					11.5
34-4D	AX	MLC					12.2
MEAN							10.7 (1558.PSI)
STD. DEV.							1.5 (220.PSI)

TABLE B-3 (Continued)

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (MG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
7194-35-2A	AX	MLC					8.7
7194-35-2B	AX	MLC					7.4
7194-35-4A	AX	MLC					9.3
7194-35-4B	AX	MLC					9.3
35-2C	AX	MLC					9.1
35-2D	AX	MLC					8.7
35-4C	AX	MLC					8.3
35-4D	AX	MLC					8.9
MEAN							8.7 (1264.PSI)
STD. DEV.							.6 (89.PSI)
7194-36-2A	AX	MLC					10.1
7194-36-2B	AX	MLC					5.8
7194-36-4A	AX	MLC					9.6
7194-36-4B	AX	MLC					11.0
36-2C	AX	MLC					11.2
36-2D	AX	MLC					13.6
36- C	AX	MLC					9.4
36-4D	AX	MLC					10.3
MEAN							10.1 (1467.PSI)
STD. DEV.							2.2 (319.PSI)
7194-41-2A	AX	MLC					13.5
7194-41-2B	AX	MLC					13.5
7194-41-4A	AX	MLC					13.4
7194-41-4B	AX	MLC					11.8
41-2C	AX	MLC					12.2
41-2D	AX	MLC					14.8
41-4C	AX	MLC					15.3
41-4D	AX	MLC					16.3
MEAN							13.9 (2009.PSI)
STD. DEV.							1.5 (220.PSI)

TABLE B-3 (Continued)

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (MG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
7194-44-2A	AX	MLC					9.3
7194-44-2B	AX	MLC					6.2
7194-44-4A	AX	MLC					9.8
7194-44-4B	AX	MLC					6.9
44-2C	AX	MLC					8.3
44-2D	AX	MLC					8.3
44-4C	AX	MLC					8.8
44-4D	AX	MLC					10.8
MEAN							8.6 (1241.PSI)
STD. DEV.							1.5 (218.PSI)
7194-45-2A	AX	MLC					9.7
7194-45-2B	AX	MLC					11.5
7194-45-4A	AX	MLC					8.2
7194-45-4B	AX	MLC					8.3
45-2C	AX	MLC					5.3
45-2D	AX	MLC					11.4
45-4C	AX	MLC					11.1
45-4D	AX	MLC					9.7
MEAN							9.4 (1364.PSI)
STD. DEV.							2.1 (304.PSI)
7194-50-2A	AX	MLC					8.9
7194-50-2B	AX	MLC					5.6
7194-50-4A	AX	MLC					9.0
7194-50-4B	AX	MLC					11.5
50-2C	AX	MLC					8.0
50-2D	AX	MLC					8.9
50-4C	AX	MLC					7.2
50-4D	AX	MLC					9.3
MEAN							8.5 (1239.PSI)
STD. DEV.							1.7 (248.PSI)

TABLE B-3 (Continued)

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (MG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
7194-60-2A	AX	MLC					10.4
7194-60-2B	AX	MLC					9.0
7194-60-4A	AX	MLC					10.4
7194-60-4B	AX	MLC					6.9
60-2C	AX	MLC					7.9
60-2D	AX	MLC					5.6
60-4C	AX	MLC					10.3
60-4D	AX	MLC					9.4
MEAN							8.7 (1267.PSI)
STD. DEV.							1.8 (259.PSI)
7194-62-2A	AX	MLC					8.2
7194-62-2B	AX	MLC					6.6
7194-62-4A	AX	MLC					9.8
7194-62-4B	AX	MLC					9.7
62-2C	AX	MLC					9.7
62-2D	AX	MLC					10.1
62-4C	AX	MLC					10.0
62-4D	AX	MLC					8.7
MEAN							9.1 (1321.PSI)
STD. DEV.							1.2 (176.PSI)
7194-71-2A	AX	MLC					12.9
7194-71-2B	AX	MLC					12.7
7194-71-4A	AX	MLC					12.0
7194-71-4B	AX	MLC					9.6
71-2C	AX	MLC					10.3
71-2D	AX	MLC					13.6
71-4C	AX	MLC					8.3
71-4D	AX	MLC					12.8
MEAN							11.5 (1670.PSI)
STD. DEV.							1.9 (276.PSI)

TABLE B-3 (Continued)

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (MG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
7194-77-2A	AX	MLC					13.8
7194-77-2B	AX	MLC					11.3
7194-77-4A	AX	MLC					14.6
7194-77-4B	AX	MLC					14.5
77-2C	AX	MLC					13.4
77-2D	AX	MLC					16.7
77-4C	AX	MLC					17.3
77-4D	AX	MLC					10.3
MEAN							14.0 (2027.PSI)
STD. DEV.							2.4 (350.PSI)
7194-81-2A	AX	MLC					9.1
7194-81-2B	AX	MLC					8.6
7194-81-4A	AX	MLC					8.4
7194-81-4B	AX	MLC					8.9
81-2C	AX	MLC					6.6
81-2D	AX	MLC					6.6
81-4C	AX	MLC					9.4
81-4D	AX	MLC					9.8
MEAN							8.4 (1224.PSI)
STD. DEV.							1.2 (176.PSI)
7194-93-2A	AX	MLC					8.6
7194-93-2B	AX	MLC					6.5
7194-93-4A	AX	MLC					8.0
7194-93-4B	AX	MLC					5.5
93-2C	AX	MLC					7.0
93-2D	AX	MLC					6.1
93-4C	AX	MLC					7.6
93-4D	AX	MLC					8.4
MEAN							7.2 (1046.PSI)
STD. DEV.							1.1 (165.PSI)

TABLE B-3 (Continued)

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (MG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
7194-95-2A	AX	MLC					8.2
7194-95-2B	AX	MLC					10.1
7194-95-4A	AX	MLC					10.9
7194-95-4B	AX	MLC					8.7
95-2C	AX	MLC					8.9
95-2D	AX	MLC					11.7
95-4C	AX	MLC					10.7
95-4D	AX	MLC					10.1
MEAN							9.9 (1436.PSI)
STD. DEV.							1.2 (177.PSI)
7194-97-2A	AX	MLC					15.6
7194-97-2B	AX	MLC					13.1
7194-97-4A	AX	MLC					12.8
7194-97-4B	AX	MLC					14.7
97-2C	AX	MLC					14.1
97-2D	AX	MLC					14.5
97-4C	AX	MLC					13.5
97-4D	AX	MLC					15.6
MEAN							14.2 (2063.PSI)
STD. DEV.							1.1 (156.PSI)
7194-99-2A	AX	MLC					13.2
7194-99-2B	AX	MLC					11.7
7194-99-4A	AX	MLC					11.2
7194-99-4B	AX	MLC					12.2
99-2C	AX	MLC					11.4
99-2D	AX	MLC					13.3
99-4C	AX	MLC					11.8
99-4D	AX	MLC					12.9
MEAN							12.2 (1771.PSI)
STD. DEV.							.8 (122.PSI)

TABLE B-3 (Continued)

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (MG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
7194-101-2A	AX	MLC					8.9
7194-101-2B	AX	MLC					8.9
7194-101-4A	AX	MLC					9.8
7194-101-4B	AX	MLC					12.8
101-2C	AX	MLC					10.0
101-2D	AX	MLC					13.5
101-4C	AX	MLC					8.6
101-4D	AX	MLC					14.5
MEAN							10.9 (1576.PSI)
STD. DEV.							2.4 (341.PSI)
7194-102-2A	AX	MLC					10.7
7194-102-2B	AX	MLC					10.8
7194-102-4A	AX	MLC					7.5
7194-102-4B	AX	MLC					11.9
102-2C	AX	MLC					11.8
102-2D	AX	MLC					13.1
102-4C	AX	MLC					12.8
102-4D	AX	MLC					13.6
MEAN							11.5 (1672.PSI)
STD. DEV.							1.9 (282.PSI)
7194-103-2A	AX	MLC					12.1
7194-103-2B	AX	MLC					12.8
7194-103-4A	AX	MLC					12.2
7194-103-4B	AX	MLC					11.0
103-2C	AX	MLC					12.7
103-2D	AX	MLC					11.8
103-4C	AX	MLC					9.3
103-4D	AX	MLC					9.6
MEAN							11.4 (1657.PSI)
STD. DEV.							1.4 (198.PSI)

TABLE B-3 (Continued)

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (MG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
7194-106-2A	AX	MLC					12.5
7194-106-2F	AX	MLC					11.6
7194-106-4A	AX	MLC					10.8
7194-106-4B	AX	MLC					11.0
106-2C	AX	MLC					12.8
106-2D	AX	MLC					11.6
106-4C	AX	MLC					12.2
106-4D	AX	MLC					9.0
MEAN							11.4 (1660.PSI)
STD. DEV.							1.2 (174.PSI)

TABLE B-4
SUMMARY OF AXIAL STRENGTH DATA FOR EXTRUSION LOT 472

GA Log Number (7194-)	Strength (MPa)			Assigned Strength Category			
	GLCC	GA		Based on 4 GA Tests		Based on 8 GA Tests	
	1 Specimen	Mean of 4 (A&B Specs.)	Mean of 8 Specimens	90/90 Conf. (a)	99/95 Conf. (b)	90/90 Conf. (a)	99/95 Conf. (b)
16	12.8	13.6	14.2	A	B	A	B
20	15.4	15.3	15.2	A	B	A	A
26	14.8	12.4	12.4	B	C	B	C
29	10.0	9.6	10.3	C	Reject	C	C
40	12.6	7.1	7.0	Reject	Reject	Reject	Reject
42	11.4	10.2	10.1	C	Reject	C	Reject
46	17.0	14.8	14.1	A	B	A	B
55	8.8	15.2	15.2	A	B	A	A
75	14.3	15.8	14.8	A	A	A	B
78	13.1	10.2	10.1	C	Reject	C	Reject
84	12.2	14.9	14.8	A	B	A	B
94	12.1	12.6	12.3	B	C	B	C
96	13.4	8.9	8.8	C	Reject	C	Reject
105	14.7	13.0	12.6	B	C	B	C

- (a) At least 90% of material at midlength-center exceeds specified minimum strength, with 90% confidence.
- (b) At least 99% of material at midlength-center exceeds specified minimum strength, with 95% confidence.

TABLE B-5
SUMMARY OF AXIAL STRENGTH DATA FOR EXTRUSION LOT 478

GA Log Number (7194-)	Strength (MPa)			Assigned Strength Category			
	GLCC	GA		Based on 4 GA Tests		Based on 8 GA Tests	
	1 Specimen	Mean of 4 (A&B Specs.)	Mean of 8 Specimens	90/90 Conf. (a)	99/95 Conf. (b)	90/90 Conf. (a)	99/95 Conf. (b)
12	8.3	11.6	12.1	B	C	B	C
13	9.1	13.3	13.1	B	C	B	B
14	16.5	15.4	15.8	A	B	A	A
17	14.8	11.1	11.2	C	C	B	C
18	12.6	12.6	13.3	B	C	A	B
19	13.8	12.3	12.6	B	C	B	C
24	12.1	16.2	15.4	A	A	A	A
28	17.1	13.3	12.5	B	C	B	C
30	15.8	15.6	15.1	A	A	A	A
31	7.2	14.1	13.8	A	B	A	B
33	11.7	14.4	13.6	A	B	A	B
37	10.3	11.9	11.2	B	C	B	C
38	14.4	12.3	12.2	B	C	B	C
39	11.0	13.8	12.2	A	B	B	C
43	13.8	15.0	15.1	A	B	A	A
47	15.2	12.0	12.0	B	C	B	C
48	15.3	9.7	10.0	C	Reject	C	Reject
49	17.0	14.2	14.2	A	B	A	B
51	14.5	11.5	10.7	B	C	C	C
52	13.4	16.1	16.6	A	A	A	A
53	12.8	13.3	13.9	B	C	A	B
54	16.2	13.3	14.0	B	C	A	B
56	11.7	12.9	13.0	B	C	B	B
57	15.2	12.0	11.7	B	C	B	C
58	13.0	14.5	13.7	A	B	A	B
59	15.2	10.9	10.7	C	C	C	C
61	10.8	10.8	11.2	C	C	B	C
63	17.1	15.8	15.9	A	A	A	A
64	17.9	18.8	18.0	A	A	A	A
65	15.7	19.4	17.9	A	A	A	A
66	16.7	17.5	17.5	A	A	A	A
67	16.3	17.7	16.4	A	A	A	A
68	14.6	13.2	12.8	B	C	B	C
69	15.7	12.5	12.2	B	C	B	C
70	13.8	11.2	11.2	C	C	B	C
72	13.2	13.3	13.1	B	C	B	B
73	14.5	11.7	11.0	B	C	C	C
74	10.1	14.5	14.7	A	B	A	B
76	18.3	16.8	16.3	A	A	A	A
79	11.2	13.5	13.2	B	B	B	B
80	16.8	14.3	13.5	A	B	A	B
82	10.7	8.4	8.5	Reject	Reject	C	Reject
83	16.3	19.8	19.5	A	A	A	A
85	10.5	13.1	12.5	B	C	B	C
86	12.1	14.5	14.7	A	B	A	B
87	16.2	16.8	17.3	A	A	A	A
88	12.5	18.0	16.9	A	A	A	A
89	11.4	12.2	12.0	B	C	B	C
90	13.2	14.7	14.0	A	B	A	B
91	18.1	12.3	13.2	B	C	B	B
92	15.0	11.2	11.5	C	C	B	C
98	16.1	15.2	15.1	A	B	A	B
100	14.1	15.1	15.0	A	B	A	B
104	8.3	12.9	13.5	B	C	A	B
107	16.8	14.4	14.7	A	B	A	B
108	11.0	13.5	11.6	A	B	B	C

(a) At least 90% of material at midlength center exceeds specified minimum strength, with 90% confidence.

(b) At least 99% of material at midlength center exceeds specified minimum strength, with 95% confidence.

TABLE B-6
SUMMARY OF AXIAL STRENGTH DATA FOR EXTRUSION LOT 482

GA Log Number (7194-)	Strength (MPa)			Assigned Strength Category			
	GLCC	GA		Based on 4 GA Tests		Based on 8 GA Tests	
	1 Specimen	Mean of 4 (A/B Specs.)	Mean of 8 Specimens	90/90 Conf. (a)	99/95 Conf. (b)	90/90 Conf. (a)	99/95 Conf. (b)
11	19.0	14.8	15.7	A	B	A	A
15	8.8	9.0	9.9	C	Reject	C	Reject
21	13.6	15.6	14.7	A	A	A	B
22	9.7	9.3	9.6	C	Reject	C	Reject
23	14.2	12.5	12.6	B	C	B	C
25	18.9	14.4	14.0	A	B	A	B
27	8.7	10.9	10.8	C	C	C	C
32	17.9	13.5	13.9	A	B	A	B
34	11.1	10.4	10.7	C	Reject	C	C
35	9.8	8.7	8.7	C	Reject	C	Reject
36	16.2	9.1	10.1	C	Reject	C	Reject
41	16.2	13.1	13.9	B	C	A	B
44	7.9	8.1	8.6	Reject	Reject	C	Reject
45	11.9	9.4	9.4	C	Reject	C	Reject
50	9.7	8.8	8.5	C	Reject	C	Reject
60	7.0	9.2	8.7	C	Reject	C	Reject
62	7.2	8.6	9.1	Reject	Reject	C	Reject
71	16.6	11.8	11.5	B	C	B	C
77	15.4	13.5	14.0	A	B	A	B
81	7.9	8.8	8.4	C	Reject	C	Reject
93	6.3	7.1	7.2	Reject	Reject	Reject	Reject
95	16.0	9.5	9.9	C	Reject	C	Reject
97	16.2	14.0	14.2	A	B	A	B
99	16.7	12.1	12.2	B	C	B	C
101	14.9	10.1	10.9	C	Reject	C	C
102	16.2	10.2	11.5	C	Reject	B	C
103	7.7	12.0	11.4	B	C	B	C
106	10.7	11.5	11.4	B	C	B	C

- (a) At least 90% of material at midlength-center exceeds specified minimum strength, with 90% confidence.
- (b) At least 99% of material at midlength-center exceeds specified minimum strength, with 95% confidence.

APPENDIX C

RADIAL TENSILE STRENGTH MEASUREMENTS FOR EXTRUSION LOTS, 472, 478, AND 482

TABLE C-1
RADIAL TENSILE STRENGTH MEASUREMENTS: EXTRUSION LOT 472

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSA- TION (MG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
7194- 16-1A	RAD	EC					16.7
7194- 16-3A	RAD	EC					15.0
7194- 16-1B	RAD	EC					17.9
7194- 16-3B	RAD	EC					16.5
MEAN							16.5 (2398,PSI)
STD. DEV.							1.2 (169,PSI)
7194- 20-1A	RAD	EC					16.2
7194- 20-3A	RAD	EC					17.3
7194- 20-1B	RAD	EC					17.4
7194- 20-3B	RAD	EC					17.5
MEAN							17.1 (2477,PSI)
STD. DEV.							.6 (89,PSI)
7194- 26-1A	RAD	EC					17.0
7194- 26-3A	RAD	EC					18.1
7194- 26-1B	RAD	EC					18.2
7194- 26-3B	RAD	EC					14.9
MEAN							17.1 (2476,PSI)
STD. DEV.							1.5 (221,PSI)
7194- 29-1A	RAD	EC					16.0
7194- 29-3A	RAD	EC					14.3
7194- 29-1B	RAD	EC					16.1
7194- 29-3B	RAD	EC					14.9
MEAN							15.3 (2225,PSI)
STD. DEV.							.9 (124,PSI)

TABLE C-1 (Continued)

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (MG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
7194-	40-1A	RAD	EC				17.0
7194-	40-3A	RAD	EC				17.0
7194-	40-1B	RAD	EC				14.0
7194-	40-3B	RAD	EC				14.5
MEAN							15.6 (2268,PSI)
STD. DEV.							1.6 (232,PSI)
7194-	42-1A	RAD	EC				19.0
7194-	42-3A	RAD	EC				17.2
7194-	42-1B	RAD	EC				17.4
7194-	42-3B	RAD	EC				14.2
MEAN							16.9 (2457,PSI)
STD. DEV.							2.0 (291,PSI)
7194-	46-1A	RAD	EC				19.7
7194-	46-3A	RAD	EC				15.9
7194-	46-1B	RAD	EC				15.7
7194-	46-3B	RAD	EC				16.4
MEAN							16.9 (2458,PSI)
STD. DEV.							1.9 (271,PSI)
7194-	55-1A	RAD	EC				17.0
7194-	55-3A	RAD	EC				14.6
7194-	55-1B	RAD	EC				17.3
7194-	55-3B	RAD	EC				16.3
MEAN							16.3 (2365,PSI)
STD. DEV.							1.2 (173,PSI)

TABLE C-1 (Continued)

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (MG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
7194- 75-1A	RAD	EC					17.3
7194- 75-3A	RAD	EC					15.6
7194- 75-1B	RAD	EC					14.6
7194- 75-3B	RAD	EC					18.4
MEAN							16.5 (2389,PSI)
STD. DEV.							1.7 (246,PSI)
7194- 78-1A	RAD	EC					15.7
7194- 78-3A	RAD	EC					15.0
7194- 78-1B	RAD	EC					15.7
7194- 78-3B	RAD	EC					17.7
MEAN							16.1 (2328,PSI)
STD. DEV.							1.1 (166,PSI)
7194- 84-1A	RAD	EC					15.9
7194- 84-3A	RAD	EC					15.9
7194- 84-1B	RAD	EC					13.9
7194- 84-3B	RAD	EC					18.3
MEAN							16.0 (2318,PSI)
STD. DEV.							1.8 (259,PSI)
7194- 94-1A	RAD	EC					18.0
7194- 94-3A	RAD	EC					17.3
7194- 94-1B	RAD	EC					18.4
7194- 94-3B	RAD	EC					16.0
MEAN							17.4 (2527,PSI)
STD. DEV.							1.0 (152,PSI)

TABLE C-1 (Continued)

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (MG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
7194- 96-1A	RAD	EC					16.9
7194- 96-3A	RAD	EC					16.6
7194- 96-1B	RAD	EC					18.1
7194- 96-3B	RAD	EC					16.6
MEAN							17.0 (2471,PSI)
STD. DEV.							.7 (106,PSI)
7194-105-1A	RAD	EC					12.4
7194-105-3A	RAD	EC					15.7
7194-105-1B	RAD	EC					16.4
7194-105-3B	RAD	EC					15.0
MEAN							14.9 (2160,PSI)
STD. DEV.							1.8 (258,PSI)

TABLE C-2
RADIAL TENSILE STRENGTH MEASUREMENTS: EXTRUSION LOT 478

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (MG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
7194-	12-1A	RAD	EC				16.5
7194-	12-3A	RAD	EC				16.2
7194-	12-1B	RAD	EC				16.5
7194-	12-3B	RAD	EC				17.5
MEAN							17.1 (2486,PSI)
STD. DEV.							1.0 (152,PSI)
7194-	13-1A	RAD	EC				17.3
7194-	13-3A	RAD	EC				18.1
7194-	13-1B	RAD	EC				17.1
7194-	13-3B	RAD	EC				16.5
MEAN							17.3 (2502,PSI)
STD. DEV.							.7 (98,PSI)
7194-	14-1A	RAD	EC				16.7
7194-	14-3A	RAD	EC				17.4
7194-	14-1B	RAD	EC				16.8
7194-	14-3B	RAD	EC				17.6
MEAN							17.1 (2487,PSI)
STD. DEV.							.4 (64,PSI)
7194-	17-1A	RAD	EC				15.9
7194-	17-3A	RAD	EC				16.1
7194-	17-1B	RAD	EC				15.1
7194-	17-3B	RAD	EC				15.2
MEAN							15.6 (2259,PSI)
STD. DEV.							.5 (76,PSI)

TABLE C-2 (Continued)

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (MG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
7194-	18-1A	RAD	EC				16.4
7194-	18-3A	RAD	EC				13.4
7194-	18-1B	RAD	EC				17.5
7194-	18-3B	RAD	EC				10.7
MEAN							14.5 (2102,PSI)
STD. DEV.							3.1 (450,PSI)
7194-	19-1A	RAD	EC				16.5
7194-	19-3A	RAD	EC				14.9
7194-	19-1B	RAD	EC				16.4
7194-	19-3B	RAD	EC				14.4
MEAN							15.5 (2251,PSI)
STD. DEV.							1.1 (153,PSI)
7194-	24-1A	RAD	EC				13.1
7194-	24-3A	RAD	EC				11.5
7194-	24-1B	RAD	EC				16.4
7194-	24-3B	RAD	EC				15.3
MEAN							14.1 (2040,PSI)
STD. DEV.							2.2 (315,PSI)
7194-	28-1A	RAD	EC				17.0
7194-	28-3A	RAD	EC				14.6
7194-	28-1B	RAD	EC				14.2
7194-	28-3B	RAD	EC				19.5
MEAN							16.3 (2366,PSI)
STD. DEV.							2.4 (354,PSI)

TABLE C-2 (Continued)

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (MG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
7194-	30-1A	RAD	EC				16.2
7194-	30-3A	RAD	EC				16.4
7194-	30-1B	RAD	EC				17.4
7194-	30-3B	RAD	EC				18.6
MEAN							17.2 (2488,PSI)
STD. DEV.							1.1 (162,PSI)
7194-	31-1A	RAD	EC				18.4
7194-	31-3A	RAD	EC				16.9
7194-	31-1B	RAD	EC				17.1
7194-	31-3B	RAD	EC				15.0
MEAN							16.9 (2446,PSI)
STD. DEV.							1.4 (202,PSI)
7194-	33-1A	RAD	EC				17.3
7194-	33-3A	RAD	EC				16.9
7194-	33-1B	RAD	EC				8.0
7194-	33-3B	RAD	EC				14.0
MEAN							14.1 (2039,PSI)
STD. DEV.							4.3 (621,PSI)
7194-	37-1A	RAD	EC				18.4
7194-	37-3A	RAD	EC				13.1
7194-	37-1B	RAD	EC				14.6
7194-	37-3B	RAD	EC				16.3
MEAN							15.6 (2263,PSI)
STD. DEV.							2.3 (332,PSI)

TABLE C-2 (Continued)

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (MG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
7194-	38-1A	RAD	EC				15.1
7194-	38-3A	RAD	EC				17.4
7194-	38-1B	RAD	EC				15.7
7194-	38-3B	RAD	EC				18.0
MEAN							16.5 (2400,PSI)
STD. DEV.							1.4 (200,PSI)
7194-	39-1A	RAD	EC				17.7
7194-	39-3A	RAD	EC				18.0
7194-	39-1B	RAD	EC				16.7
7194-	39-3B	RAD	EC				18.3
MEAN							17.7 (2564,PSI)
STD. DEV.							.7 (98,PSI)
7194-	43-1A	RAD	EC				16.6
7194-	43-3A	RAD	EC				16.6
7194-	43-1B	RAD	EC				16.6
7194-	43-3B	RAD	EC				17.4
MEAN							16.8 (2436,PSI)
STD. DEV.							.4 (60,PSI)
7194-	47-1A	RAD	EC				15.9
7194-	47-3A	RAD	EC				15.1
7194-	47-1B	RAD	EC				17.4
7194-	47-3B	RAD	EC				15.9
MEAN							16.1 (2330,PSI)
STD. DEV.							1.0 (142,PSI)

TABLE C-2 (Continued)

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (MG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
7194- 48-1A	RAD	EC					17.5
7194- 48-3A	RAD	EC					16.3
7194- 48-1B	RAD	EC					18.7
7194- 48-3B	RAD	EC					15.7
MEAN							17.0 (2472.PSI)
STD. DEV.							1.3 (189.PSI)
7194- 49-1A	RAD	EC					18.6
7194- 49-3A	RAD	EC					14.9
7194- 49-1B	RAD	EC					16.9
7194- 49-3B	RAD	EC					15.7
MEAN							16.5 (2396.PSI)
STD. DEV.							1.6 (230.PSI)
7194- 51-1A	RAD	EC					16.0
7194- 51-3A	RAD	EC					17.7
7194- 51-1B	RAD	EC					17.1
7194- 51-3B	RAD	EC					18.5
MEAN							17.4 (2518.PSI)
STD. DEV.							1.1 (153.PSI)
7194- 52-1A	RAD	EC					17.3
7194- 52-3A	RAD	EC					15.1
7194- 52-1B	RAD	EC					17.3
7194- 52-3B	RAD	EC					15.2
MEAN							16.2 (2350.PSI)
STD. DEV.							1.3 (182.PSI)

TABLE C-2 (Continued)

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (MG/M**3)	YOUNG'S MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
7194- 53-1A	RAD	EC					15.2
7194- 53-3A	RAD	EC					13.2
7194- 53-1B	RAD	EC					16.4
7194- 53-3B	RAD	EC					13.6
MEAN							14.6 (2121,PSI)
STD. DEV.							1.5 (214,PSI)
7194- 54-1A	RAD	EC					17.4
7194- 54-3A	RAD	EC					17.2
7194- 54-1B	RAD	EC					16.6
7194- 54-3B	RAD	EC					16.6
MEAN							16.9 (2457,PSI)
STD. DEV.							.4 (63,PSI)
7194- 56-1A	RAD	EC					15.9
7194- 56-3A	RAD	EC					15.8
7194- 56-1B	RAD	EC					15.5
7194- 56-3B	RAD	EC					16.3
MEAN							15.8 (2298,PSI)
STD. DEV.							.3 (51,PSI)
7194- 57-1A	RAD	EC					15.9
7194- 57-3A	RAD	EC					18.1
7194- 57-1B	RAD	EC					19.2
7194- 57-3B	RAD	EC					13.6
MEAN							16.7 (2425,PSI)
STD. DEV.							2.5 (362,PSI)

TABLE C-2 (Continued)

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (MG/CM ³)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
7194- 58-1A	RAD	EC					17.3
7194- 58-3A	RAD	EC					16.6
7194- 58-1B	RAD	EC					17.0
7194- 58-3B	RAD	EC					15.9
MEAN							16.7 (2420,PSI)
STD. DEV.							3.0 (89,PSI)
7194- 59-1A	RAD	EC					18.1
7194- 59-3A	RAD	EC					14.6
7194- 59-1B	RAD	EC					14.2
7194- 59-3B	RAD	EC					9.8
MEAN							14.2 (2058,PSI)
STD. DEV.							3.4 (493,PSI)
7194- 61-1A	RAD	EC					18.1
7194- 61-3A	RAD	EC					17.1
7194- 61-1B	RAD	EC					15.7
7194- 61-3B	RAD	EC					16.6
MEAN							16.9 (2451,PSI)
STD. DEV.							1.0 (147,PSI)
7194- 63-1A	RAD	EC					16.0
7194- 63-3A	RAD	EC					15.2
7194- 63-1B	RAD	EC					16.4
7194- 63-3B	RAD	EC					17.6
MEAN							16.3 (2363,PSI)
STD. DEV.							1.0 (144,PSI)

TABLE C-2 (Continued)

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (MG/M**3)	YOUNGS MODULUS (GPA)	PEKM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
7194-	64-1A	RAD	EC				18.1
7194-	64-3A	RAD	EC				18.7
7194-	64-1B	RAD	EC				18.7
7194-	64-3B	RAD	EC				18.1
MEAN							18.4 (2670,PSI)
STD. DEV.							.3 (47,PSI)
7194-	65-1A	RAD	EC				17.3
7194-	65-3A	RAD	EC				18.4
7194-	65-1B	RAD	EC				15.7
7194-	65-3B	RAD	EC				18.8
MEAN							17.6 (2548,PSI)
STD. DEV.							1.4 (201,PSI)
7194-	66-1A	RAD	EC				15.9
7194-	66-3A	RAD	EC				17.9
7194-	66-1B	RAD	EC				16.6
7194-	66-3B	RAD	EC				16.3
MEAN							16.7 (2415,PSI)
STD. DEV.							.8 (123,PSI)
7194-	67-1A	RAD	EC				18.3
7194-	67-3A	RAD	EC				18.6
7194-	67-1B	RAD	EC				19.0
7194-	67-3B	RAD	EC				17.3
MEAN							18.3 (2649,PSI)
STD. DEV.							.7 (104,PSI)

TABLE C-2 (Continued)

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (MG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
7194- 68-1A	RAD	EC					18.0
7194- 68-3A	RAD	EC					17.3
7194- 68-1B	RAD	EC					17.6
7194- 68-3B	RAD	EC					18.3
MEAN							17.8 (2578,PSI)
STD. DEV.							^{0.4} (63,PSI)
7194- 69-1A	RAD	EC					17.0
7194- 69-3A	RAD	EC					18.0
7194- 69-1B	RAD	EC					16.4
7194- 69-3B	RAD	EC					17.0
MEAN							17.1 (2481,PSI)
STD. DEV.							^{0.6} (94,PSI)
7194- 70-1A	RAD	EC					18.8
7194- 70-3A	RAD	EC					16.4
7194- 70-1B	RAD	EC					16.2
7194- 70-3B	RAD	EC					15.2
MEAN							16.7 (2415,PSI)
STD. DEV.							^{1.6} (225,PSI)
7194- 72-1A	RAD	EC					15.6
7194- 72-3A	RAD	EC					15.6
7194- 72-1B	RAD	EC					17.7
7194- 72-3B	RAD	EC					16.9
MEAN							16.4 (2385,PSI)
STD. DEV.							^{1.0} (148,PSI)

TABLE C-2 (Continued)

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (MG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
7194- 73-1A	RAD	EC					17.2
7194- 73-3A	RAD	EC					14.3
7194- 73-1B	RAD	EC					16.3
7194- 73-3B	RAD	EC					15.9
MEAN							15.9 (2308,PSI)
STD. DEV.							1.2 (171,PSI)
7194- 74-1A	RAD	EC					11.5
7194- 74-3A	RAD	EC					15.3
7194- 74-1B	RAD	EC					13.8
7194- 74-3B	RAD	EC					13.2
MEAN							13.5 (1951,PSI)
STD. DEV.							1.6 (227,PSI)
7194- 76-1A	RAD	EC					17.4
7194- 76-3A	RAD	EC					17.4
7194- 76-1B	RAD	EC					15.3
7194- 76-3B	RAD	EC					18.5
MEAN							17.2 (2491,PSI)
STD. DEV.							1.4 (196,PSI)
7194- 79-1A	RAD	EC					15.6
7194- 79-3A	RAD	EC					15.6
7194- 79-1B	RAD	EC					15.7
7194- 79-3B	RAD	EC					13.8
MEAN							15.2 (2201,PSI)
STD. DEV.							0.9 (137,PSI)

TABLE C-2 (Continued)

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (MG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
7194- 80-1A	RAD	EC					16.0
7194- 80-3A	RAD	EC					13.6
7194- 80-1B	RAD	EC					15.3
7194- 80-3B	RAD	EC					15.9
MEAN							15.2 (2205,PSI)
STD. DEV.							1.1 (158,PSI)
7194- 82-1A	RAD	EC					17.1
7194- 82-3A	RAD	EC					16.7
7194- 82-1B	RAD	EC					15.7
7194- 82-3B	RAD	EC					15.4
MEAN							16.3 (2358,PSI)
STD. DEV.							.8 (117,PSI)
7194- 83-1A	RAD	EC					18.4
7194- 83-3A	RAD	EC					17.4
7194- 83-1B	RAD	EC					16.1
7194- 83-3B	RAD	EC					15.4
MEAN							16.9 (2445,PSI)
STD. DEV.							1.3 (191,PSI)
7194- 85-1A	RAD	EC					16.6
7194- 85-3A	RAD	EC					16.3
7194- 85-1B	RAD	EC					15.2
7194- 85-3B	RAD	EC					15.6
MEAN							15.9 (2308,PSI)
STD. DEV.							.6 (94,PSI)

TABLE C-2 (Continued)

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (MG/CM ³)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
7194- 86-1A	RAD	EC					17.4
7194- 86-3A	RAD	EC					19.1
7194- 86-1B	RAD	EC					18.3
7194- 86-3B	RAD	EC					14.7
MEAN							17.4 (2522,PSI)
STD. DEV.							1.9 (274,PSI)
7194- 87-1A	RAD	EC					12.5
7194- 87-3A	RAD	EC					13.2
7194- 87-1B	RAD	EC					17.1
7194- 87-3B	RAD	EC					13.1
MEAN							14.0 (2027,PSI)
STD. DEV.							2.1 (308,PSI)
7194- 88-1A	RAD	EC					16.4
7194- 88-3A	RAD	EC					18.7
7194- 88-1B	RAD	EC					16.6
7194- 88-3B	RAD	EC					17.7
MEAN							17.4 (2517,PSI)
STD. DEV.							1.1 (154,PSI)
7194- 89-1A	RAD	EC					14.9
7194- 89-3A	RAD	EC					13.9
7194- 89-1B	RAD	EC					17.3
7194- 89-3B	RAD	EC					17.6
MEAN							15.9 (2308,PSI)
STD. DEV.							1.8 (259,PSI)

TABLE C-2 (Continued)

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (MG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
7194-	90-1A	RAD	EC				17.8
7194-	90-3A	RAD	EC				14.6
7194-	90-1B	RAD	EC				15.7
7194-	90-3B	RAD	EC				14.6
MEAN							15.7 (2277.PSI)
STD. DEV.							1.5 (221.PSI)
7194-	91-1A	RAD	EC				17.0
7194-	91-3A	RAD	EC				12.4
7194-	91-1B	RAD	EC				14.3
7194-	91-3B	RAD	EC				13.5
MEAN							14.3 (2074.PSI)
STD. DEV.							2.0 (287.PSI)
7194-	92-1A	RAD	EC				18.1
7194-	92-3A	RAD	EC				17.2
7194-	92-1B	RAD	EC				13.2
7194-	92-3B	RAD	EC				14.5
MEAN							15.7 (2283.PSI)
STD. DEV.							2.3 (333.PSI)
7194-	98-1A	RAD	EC				15.2
7194-	98-3A	RAD	EC				16.0
7194-	98-1B	RAD	EC				15.0
7194-	98-3B	RAD	EC				18.5
MEAN							16.2 (2349.PSI)
STD. DEV.							1.6 (236.PSI)

TABLE C-2 (Continued)

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (MG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
7194-100-1A	RAD	EC					18.7
7194-100-3A	RAD	EC					17.9
7194-100-1B	RAD	EC					17.6
7194-100-3B	RAD	EC					18.1
MEAN							18.1 (2619,PSI)
STD. DEV.							.5 (70,PSI)
7194-104-1A	RAD	EC					17.1
7194-104-3A	RAD	EC					16.5
7194-104-1B	RAD	EC					17.4
7194-104-3B	RAD	EC					17.1
MEAN							17.0 (2471,PSI)
STD. DEV.							.4 (60,PSI)
7194-107-1A	RAD	EC					16.7
7194-107-3A	RAD	EC					12.2
7194-107-1B	RAD	EC					18.3
7194-107-3B	RAD	EC					16.7
MEAN							16.0 (2318,PSI)
STD. DEV.							2.6 (378,PSI)
7194-108-1A	RAD	EC					15.3
7194-108-3A	RAD	EC					16.9
7194-108-1B	RAD	EC					17.6
7194-108-3B	RAD	EC					17.6
MEAN							16.8 (2440,PSI)
STD. DEV.							1.1 (153,PSI)

TABLE C-3

RADIAL TENSILE STRENGTH MEASUREMENTS: EXTRUSION LOT 482

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (MG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
7194-	11-1A	RAD	EC				9.5
7194-	11-3A	RAD	EC				11.9
7194-	11-1B	RAD	EC				12.3
7194-	11-3B	RAD	EC				12.6
MEAN							11.6 (1685,PSI)
STD. DEV.							1.4 (204,PSI)
7194-	15-1A	RAD	EC				8.7
7194-	15-3A	RAD	EC				15.9
7194-	15-1B	RAD	EC				16.9
7194-	15-3B	RAD	EC				13.9
MEAN							13.9 (2011,PSI)
STD. DEV.							3.7 (529,PSI)
7194-	21-1A	RAD	EC				16.9
7194-	21-3A	RAD	EC				15.3
7194-	21-1B	RAD	EC				16.8
7194-	21-3B	RAD	EC				13.5
MEAN							15.6 (2265,PSI)
STD. DEV.							1.6 (229,PSI)
7194-	22-1A	RAD	EC				17.6
7194-	22-3A	RAD	EC				17.3
7194-	22-1B	RAD	EC				17.5
7194-	22-3B	RAD	EC				15.6
MEAN							17.0 (2465,PSI)
STD. DEV.							.9 (133,PSI)

TABLE C-3 (Continued)

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (MG/M**3)	YOUNG'S MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
7194- 23-1A	RAD	EC					10.0
7194- 23-3A	RAD	EC					17.3
7194- 23-1B	RAD	EC					12.8
7194- 23-3B	RAD	EC					12.8
MEAN							13.2 (1916,PSI)
STD. DEV.							3.0 (439,PSI)
7194- 25-1A	RAD	EC					13.8
7194- 25-3A	RAD	EC					12.8
7194- 25-1B	RAD	EC					15.6
7194- 25-3B	RAD	EC					12.0
MEAN							13.5 (1962,PSI)
STD. DEV.							1.6 (226,PSI)
7194- 27-1A	RAD	EC					9.7
7194- 27-3A	RAD	EC					17.1
7194- 27-1B	RAD	EC					13.8
7194- 27-3B	RAD	EC					17.1
MEAN							14.4 (2093,PSI)
STD. DEV.							3.5 (510,PSI)
7194- 32-1A	RAD	EC					13.1
7194- 32-3A	RAD	EC					8.3
7194- 32-1B	RAD	EC					15.3
7194- 32-3B	RAD	EC					10.7
MEAN							11.8 (1717,PSI)
STD. DEV.							3.0 (439,PSI)

TABLE C-3 (Continued)

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (MG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
7194-	34-1A	RAD	EC				18.4
7194-	34-3A	RAD	EC				18.1
7194-	34-1B	RAD	EC				15.2
7194-	34-3B	RAD	EC				17.6
MEAN							17.3 (2512,PSI)
STD. DEV.							1.5 (214,PSI)
7194-	35-1A	RAD	EC				16.9
7194-	35-3A	RAD	EC				18.7
7194-	35-1B	RAD	EC				16.9
7194-	35-3B	RAD	EC				18.0
MEAN							17.6 (2553,PSI)
STD. DEV.							.9 (131,PSI)
7194-	36-1A	RAD	EC				12.6
7194-	36-3A	RAD	EC				12.5
7194-	36-1B	RAD	EC				10.3
7194-	36-3B	RAD	EC				12.4
MEAN							11.9 (1733,PSI)
STD. DEV.							1.1 (164,PSI)
7194-	41-1A	RAD	EC				14.8
7194-	41-3A	RAD	EC				13.4
7194-	41-1B	RAD	EC				12.9
7194-	41-3B	RAD	EC				14.7
MEAN							13.9 (2023,PSI)
STD. DEV.							.9 (138,PSI)

TABLE C-3 (Continued)

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (MG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
7194-	44-1A	RAD	EC				18.4
7194-	44-3A	RAD	EC				16.2
7194-	44-1B	RAD	EC				12.6
7194-	44-3B	RAD	EC				16.9
MEAN							16.0 (2324,PSI)
STD. DEV.							2.4 (354,PSI)
7194-	45-1A	RAD	EC				14.2
7194-	45-3A	RAD	EC				17.5
7194-	45-1B	RAD	EC				17.1
7194-	45-3B	RAD	EC				18.0
MEAN							16.7 (2422,PSI)
STD. DEV.							1.7 (245,PSI)
7194-	50-1A	RAD	EC				15.1
7194-	50-3A	RAD	EC				15.3
7194-	50-1B	RAD	EC				16.3
7194-	50-3B	RAD	EC				15.5
MEAN							15.5 (2253,PSI)
STD. DEV.							.5 (77,PSI)
7194-	60-1A	RAD	EC				18.0
7194-	60-3A	RAD	EC				13.1
7194-	60-1B	RAD	EC				11.7
7194-	60-3B	RAD	EC				15.4
MEAN							14.5 (2109,PSI)
STD. DEV.							2.8 (404,PSI)

TABLE C-3 (Continued)

SPECIMEN NUMBER	ORIENT- ATION	LUCA- TION	DENSITY (MG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
7194-	62-1A	RAD	EC				17.8
7194-	62-3A	RAD	EC				12.4
7194-	62-1B	RAD	EC				16.7
7194-	62-3B	RAD	EC				15.0
MEAN							15.6 (2267,PSI)
STD. DEV.							2.1 (311,PSI)
7194-	71-1A	RAD	EC				9.3
7194-	71-3A	RAD	EC				6.9
7194-	71-1B	RAD	EC				17.3
7194-	71-3B	RAD	EC				17.1
MEAN							12.6 (1834,PSI)
STD. DEV.							5.4 (777,PSI)
7194-	77-1A	RAD	EC				13.6
7194-	77-3A	RAD	EC				14.8
7194-	77-1B	RAD	EC				14.2
7194-	77-3B	RAD	EC				13.3
MEAN							14.0 (2028,PSI)
STD. DEV.							1.6 (91,PSI)
7194-	81-1A	RAD	EC				15.9
7194-	81-3A	RAD	EC				14.8
7194-	81-1B	RAD	EC				13.3
7194-	81-3B	RAD	EC				16.6
MEAN							15.1 (2196,PSI)
STD. DEV.							1.4 (205,PSI)

TABLE C-3 (Continued)

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (MG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
7194- 93-1A	RAD	EC					16.9
7194- 93-3A	RAD	EC					17.4
7194- 93-1B	RAD	EC					15.6
7194- 93-3B	RAD	EC					18.3
MEAN							17.0 (2471,PSI)
STD. DEV.							1.1 (163,PSI)
7194- 95-1A	RAD	EC					13.9
7194- 95-3A	RAD	EC					13.2
7194- 95-1B	RAD	EC					16.7
7194- 95-3B	RAD	EC					12.6
MEAN							14.1 (2048,PSI)
STD. DEV.							1.8 (262,PSI)
7194- 97-1A	RAD	EC					11.8
7194- 97-3A	RAD	EC					14.2
7194- 97-1B	RAD	EC					12.2
7194- 97-3B	RAD	EC					11.9
MEAN							12.5 (1819,PSI)
STD. DEV.							1.1 (162,PSI)
7194- 99-1A	RAD	EC					12.4
7194- 99-3A	RAD	EC					14.6
7194- 99-1B	RAD	EC					13.5
7194- 99-3B	RAD	EC					15.5
MEAN							14.0 (2028,PSI)
STD. DEV.							1.3 (195,PSI)

TABLE C-3 (Continued)

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (MG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
7194-101-1A	RAD	EC					15.9
7194-101-3A	RAD	EC					8.4
7194-101-1B	RAD	EC					12.5
7194-101-3B	RAD	EC					9.3
MEAN							11.5 (1671,PSI)
STD. DEV.							3.4 (492,PSI)
7194-102-1A	RAD	EC					12.5
7194-102-3A	RAD	EC					14.6
7194-102-1B	RAD	EC					14.3
7194-102-3B	RAD	EC					12.5
MEAN							13.5 (1957,PSI)
STD. DEV.							1.1 (166,PSI)
7194-103-1A	RAD	EC					17.3
7194-103-3A	RAD	EC					8.1
7194-103-1B	RAD	EC					16.6
7194-103-3B	RAD	EC					14.2
MEAN							14.0 (2038,PSI)
STD. DEV.							4.2 (602,PSI)
7194-106-1A	RAD	EC					17.3
7194-106-3A	RAD	EC					16.2
7194-106-1B	RAD	EC					16.7
7194-106-3B	RAD	EC					15.9
MEAN							16.5 (2395,PSI)
STD. DEV.							.6 (91,PSI)

TABLE C-4
SUMMARY OF RADIAL STRENGTH DATA FOR EXTRUSION LOT 472

GA Log Number (7194-)	Strength (Mean of 4 Specimens) (MPa)	GA Log Number (7194-)	Strength (Mean of 4 Specimens) (MPa)
16	16.5	55	16.3
20	17.1	75	16.5
26	17.1	78	16.1
29	15.3	84	16.0
40	15.6	94	17.4
42	16.9	96	17.0
46	16.9	105	14.9

TABLE C-5
SUMMARY OF RADIAL STRENGTH DATA FOR EXTRUSION LOT 478

GA Log Number (7194-	Strength (Mean of 4 Specimens) (MPa)	GA Log Number (7194-	Strength (Mean of 4 Specimens) (MPa)
12	17.1	64	18.4
13	17.3	65	17.6
14	17.1	66	16.7
17	15.6	67	18.3
18	14.5	68	17.8
19	15.5	69	17.1
24	14.1	70	16.7
28	16.3	72	16.4
30	17.2	73	15.9
31	16.9	74	13.5
33	14.1	76	17.2
37	15.6	79	15.2
38	16.5	80	15.2
39	17.7	82	16.3
43	16.8	83	16.9
47	16.1	85	15.9
48	17.0	86	17.4
49	16.5	87	14.0
51	17.4	88	17.4
52	16.2	89	15.9
53	14.6	90	15.7
54	16.9	91	14.3
56	15.8	92	15.7
57	16.7	98	16.2
58	16.7	100	18.1
59	14.2	104	17.0
61	16.9	107	16.0
63	16.3	108	16.8

TABLE C-6
SUMMARY OF RADIAL STRENGTH DATA FOR EXTRUSION LOT 482

GA Log Number (7194-	Strength (Mean of 4 Specimens) (MPa)	GA Log Number (7194-	Strength (Mean of 4 Specimens) (MPa)
11	11.6	50	15.5
15	13.9	60	14.5
21	15.6	62	15.6
22	17.0	71	12.6
23	13.2	77	14.0
25	13.5	81	15.1
27	14.4	93	17.0
32	11.8	95	14.1
34	17.3	97	12.5
35	17.6	99	14.0
36	11.9	101	11.5
41	13.9	102	13.5
44	16.0	103	14.0
45	16.7	106	16.5