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STATISTICAL STUDY OF THE STRENGTH OF NEAR-ISOTROPIC GRAPHITE

by
R. J. PRICE

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Larry E. Williams
Authorizing Official

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ABSTRACT

More than 2000 tensile and four-point bend tests were made at ambient temperature on specimens from one log of extruded near-isotropic petroleum-coke-based nuclear graphite (Great Lakes Carbon Corporation grade H-451). The mean strengths showed the expected systematic dependence on orientation and location, with axial specimens stronger than radial specimens and material near the edge of the log stronger than material near the center-line. There were additional local fluctuations in strength which, in some cases, corresponded to local variations in density. The coefficient of variation was lower for axial specimens than for radial specimens, and lower for bend specimens than for tensile specimens. The cumulative strength distribution could be fitted equally well by a normal (Gaussian) distribution or by a Weibull distribution. The value of the Weibull modulus, m , was lower for tensile tests than for bend tests, which conflicts with predictions of the Weibull model for the strength of brittle solids. The mean tensile strength of small tensile specimens (volume 724 mm^3) was higher than that of large tensile specimens (volume 9847 mm^3) by 3% (axial orientation) or 8% (radial orientation). These numbers disagree with differences of 28% and 38%, respectively, predicted by the Weibull model. The mean flexural strength correlated well with the mean tensile strength of companion specimens. Flexural strengths (corrected for the nonlinear stress-strain relationship of graphite) averaged 52% higher than the corresponding tensile strengths for the axial orientation, and 55% higher for the radial orientation. These values agree well with Weibull theory predictions of 51% and 64%, respectively. However, the other inconsistencies mentioned above prevent the material from qualifying as a Weibull solid.

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1. INTRODUCTION

Mechanical design of the graphite moderator and reflector blocks of a high-temperature gas-cooled nuclear reactor (HTGR) requires a detailed knowledge of the statistical distribution of tensile and bend strength within a graphite log. Factors which must be defined include:

1. The systematic variation of strength with orientation and location throughout the log.
2. For a given orientation and location, the statistical distribution of strengths and the mean, standard deviation, coefficient of variation, and Weibull modulus which characterize the population.
3. The dependence of strength on specimen size.
4. The relationship between flexural strength and tensile strength.

An additional factor to be determined is the validity of the Weibull statistical theory (Ref. 1) for the type of graphite to be used. The Weibull theory, in which the strength of a brittle solid is assumed to be controlled by flaws, has potential uses in the engineering design of load-bearing structures made from brittle materials because it relates the probability of failure to the volume of material under load, the stress gradient, and multiaxial stress states. It can be combined with finite element stress analysis to predict the probability of failure as a function of position in components under complex stress states. These features of the Weibull model have led to its use in the design of ceramic aerospace (Ref. 2) and gas turbine (Ref. 3) components. However, previous studies of the strength of a coarse-grained needle-coke-based nuclear graphite (Great Lakes Carbon Corporation grade H-327) (Ref. 4) and near-isotropic

Gilsocarbon-based graphites (Ref. 5) showed that while the ratios relating the strength of flexural specimens and internally pressurized tubes to the tensile strength were correctly predicted by the Weibull model, the dependence of strength on specimen volume was overestimated.

In the present study a single log of extruded near-isotropic petroleum-coke-based nuclear graphite (Great Lakes Carbon Corporation grade H-451) was cut into sections. Tensile specimens of two sizes and flexural specimens were taken in both axial and radial orientations from locations covering most of the log. More than 2000 specimens were tested to failure at ambient temperature. The dependence of strength on orientation, log location, specimen size, and type of test was determined and the results were compared with predictions of the Weibull model.

2. EXPERIMENTAL METHODS

All specimens were taken from the same log of Great Lakes Carbon Corporation H-451 graphite (GLCC lot No. 408, piece No. 48, GA log No. 5651-90). Four 127-mm (5-in.) deep slabs were cut transverse to the axis. Two slabs (1 and 4) were located within 25 mm (1 in.) of the two ends of the log, and two slabs (2 and 3) were located adjacent to the midlength plane of the log. The locations of the slabs are shown shaded in Fig. 1. Each slab was cut into a center section (C) and an edge section (E) on a radius of 108 mm (4.25 in.).

Cylindrical cores for test specimens were core drilled in axial and radial orientations from the central zone and the edge zone of each slab according to the plan shown in Figs. 2 and 3. Large tensile specimens [right cylinders 12.8 mm (0.505 in.) diameter by 76 mm (3 in.) long], small tensile specimens [6.4 mm (0.25 in.) diameter by 23 mm (0.9 in.) long], and flexural specimens [6.4 mm (0.25 in.) diameter by 51 mm (2 in.) long] were machined from the cores. Identification was retained throughout by use of the slab number (Fig. 1), followed by the core number (Figs. 2 and 3). This sampling plan gave approximately equal numbers of the three types of specimens, with each type spread uniformly over the sampling zone.

The tensile specimens were cemented between aluminum end pieces with epoxy cement, using V-block jigs to ensure axial alignment. The specimens were tested to failure in an Instron tensile testing machine, using roller-link chains to apply the load to the specimen end pieces. Stress-strain curves were measured on four representative 12.8-mm-diameter specimens out of each batch using a 51-mm (2-in.) gauge-length extensometer; on the remainder of the specimens only the failure load was measured.

The flexural specimens were tested in four-point bending with the loading points equally spaced 12.7 mm (0.5 in.) apart. The modulus of rupture was calculated from the failure load using simple beam theory. Because of nonlinear elastic behavior, the modulus of rupture overestimates the outer fiber stress at failure and a correction needs to be applied. The graphite stress-strain curve is fairly well represented by the expression (Ref. 6):

$$\sigma = E \epsilon_o \left[1 - \exp\left(-\frac{\epsilon}{\epsilon_o}\right) \right] , \quad (1)$$

where σ is the stress, E is the slope of the stress-strain curve at zero strain, ϵ is the strain, and ϵ_o is a constant for a given type of graphite which characterizes the curvature of the stress-strain curve. If Eq. 1 is used in place of Hooke's Law to calculate the relationship between bending moment and outer fiber strain in a beam, the following relationships are obtained between the modulus of rupture, MOR (bend strength calculated assuming elastic behavior) and the true outer fiber strain at fracture, ϵ_f :

Rectangular cross-section beam:

$$\text{MOR} = E \epsilon_o \left\{ 1.5 - \frac{3\epsilon_o^2}{\epsilon_f^2} \left[1 - \left(1 + \frac{\epsilon_f}{\epsilon_o} \right) \exp\left(-\frac{\epsilon_f}{\epsilon_o}\right) \right] \right\} \quad (2)$$

Cylindrical beam:

$$\begin{aligned} \text{MOR} = E \epsilon_f \left[1 - 0.340 \left(\frac{\epsilon_f}{\epsilon_o} \right) + 8.33 \times 10^{-2} \left(\frac{\epsilon_f}{\epsilon_o} \right)^2 \right. \\ \left. - 1.62 \times 10^{-2} \left(\frac{\epsilon_f}{\epsilon_o} \right)^3 + 2.60 \times 10^{-3} \left(\frac{\epsilon_f}{\epsilon_o} \right)^4 \right] \quad (3) \end{aligned}$$

Correction factors to be applied to convert the conventionally calculated modulus of rupture to the true outer fiber stress at fracture are plotted in Fig. 4 for a graphite with $\epsilon_o = 0.004$. This value of ϵ_o is an average obtained from stress-strain curves on both axial and radial specimens.

3. RESULTS

3.1. DATA TABULATION

The results of the tests are listed in Tables 1 through 48. Tables 1 through 12 contain data from slab 1; Tables 13 through 24 data from slab 2; Tables 25 through 36 data from slab 3; and Tables 37 through 48 data from slab 4. The density of most specimens was calculated from the weight and dimensions and is included in the tables. Young's modulus was obtained on some specimens by loading to 7 MPa (1000 psi), unloading to 0.7 MPa (100 psi), and reloading to failure. The modulus was calculated from the 0.7 MPa to 7 MPa reloading curve. The tables of flexural test data include both the modulus of rupture and the flexural strength corrected for non-linearity of the stress-strain curve. A gap in a table indicates a specimen lost or broken during handling.

The test data from slabs 1, 2, 3, and 4 are summarized in Tables 49 through 52. The data summaries include the number of specimens in a group, the mean strength and standard deviation, the coefficient of variation (standard deviation divided by the mean), and the Weibull modulus. Derivation of the Weibull modulus is described in Section 3.3.

3.2. DEPENDENCE OF STRENGTH ON ORIENTATION AND LOCATION

The mean strengths listed in Tables 49 through 52 show the expected dependence on orientation. In all specimen groups but one, the axial specimens were stronger than the radial specimens (confidence levels greater than 99%). The exception was the central zone of slab 4, where the difference between axial strength and radial strength was not significant (Table 52). The ratio between axial and radial tensile strengths averaged 1.19; the ratio between axial and radial flexural strengths

averaged 1.13. In all tensile specimen groups except the axial specimens from slab 1, material from the edge zone was stronger than that from the central zone (confidence levels greater than 99%). The strength difference between edge and center axial tensile specimens from slab 1 was not statistically significant. The average ratio between the edge tensile strength and center tensile strength was 1.16; for flexural strength the average ratio was 1.07.

These systematic differences between axial and radial strength, and between edge and center strength, are common in extruded graphite logs and result from the alignment of coke particles during extrusion and the distribution of impregnant carbon following the impregnation process.

Strength variations along the length of the log were less systematic. With the exception of axial specimens from the central zone there was a progressive increase in strength in passing from slab 1 to slab 4. Among axial specimens from the center zone the trend was reversed, with the strength decreasing in passing from slab 1 to slab 4 (all confidence levels greater than 99%). Thus, the degree of orientation (axial strength divided by radial strength) was lowest in the center of slab 4.

When the strengths of individual specimens were correlated with their locations in the log, further local variations became evident in some regions. These local variations in strength, together with local variations in density, are illustrated in Figs. 5 through 20. Maps showing the locations of individual specimens are shown in Figs. 5 through 8 for slab 1, Figs. 9 through 12 for slab 2, Figs. 13 through 16 for slab 3, and Figs. 17 through 20 for slab 4. The large circles in the figures represent the cores which were machined into 12.8-mm-diameter tensile specimens. The small circles mark the cores for the 6.4-mm-diameter tensile specimens and bend specimens and are divided horizontally into halves; the halves closest to the center of the figure represent the bend specimens and the outer halves represent the small tensile specimens. Open circles or semicircles indicate specimens whose strength or density is lower than half a standard

deviation below the mean for their slab, zone, orientation, and specimen type; half-filled circles or semicircles indicate about average strength or density (within half a standard deviation); and completely filled circles show specimens with high strength or density.

The presence of local variations is evident from the figures. For example, in the edge zone of slab 1 (Fig. 6) the radial specimens from the upper left hand quadrant tended to be weaker than average, while the axial specimens from the lowest quadrant tended to be strong. Analysis of variance confirmed that the quadrant-to-quadrant variations were statistically significant. The corresponding map of densities (Fig. 5) showed a similar trend in density for the same two specimen groups. The tendency for axial specimens from the lowest quadrant of the edge zones to be stronger than average was evident in all four slabs (Figs. 6, 10, 14, and 18), indicating that a band of higher strength material ran through the length of the log. This suggests that one cause of local variations is inhomogeneity in the mix charged to the extrusion press during fabrication.

In some, but not all cases, the local variations in strength were correlated with variations in density. Such variations can be caused either by inhomogeneity in the mix or by nonuniform impregnation.

3.3. STATISTICAL DISTRIBUTION OF STRENGTHS

The standard deviation and coefficient of variation for each group of specimens are included in Tables 49 through 52. In most cases the differences between the standard deviations of different specimen groups are not statistically significant. However, when the coefficients of variation are compared, some trends are apparent. For most groups of radial specimens the coefficients of variation were higher than those of comparable axial specimens, and in most cases the differences are significant at the 95% confidence level. The mean values for the coefficients of variation are summarized in Table 53. Coefficients of variation for the flexural strengths were consistently lower than for the tensile strengths; these differences are significant at the 95% or 99% confidence level in the majority of cases.

Weibull's model for the strength of brittle materials (Ref. 1) gives the following expression for the probability of survival, S , under a tensile stress:

$$S = \exp \left[- \int_V \left(\frac{\sigma - \sigma_u}{\sigma_o} \right)^m dV \right] , \quad (4)$$

where σ is the tensile stress in an element of volume dV , σ_u is a stress below which the failure probability is zero (σ_u is normally taken as zero for graphite), σ_o is the scale factor for the distribution function, and m is the shape factor for the distribution and is known as the Weibull modulus. When σ_u is zero and the specimen is under uniform tension, Eq. 4 can be linearized:

$$\ln \ln \left(\frac{1}{S} \right) = \ln V - m \ln \sigma_o + m \ln \sigma . \quad (5)$$

Equation 5 was used to estimate m values for each set of strength data by means of a least-squares linear regression analysis of $\ln \ln (1/S)$ versus $\ln \sigma$. The results are included in Tables 49 through 53. According to the Weibull model, a series of bend tests should yield the same value of m as a series of tensile tests on the same material. However, the observed m values were consistently higher for the bend tests than for the tensile tests (Tables 49 through 53), which does not agree with the Weibull model.

Cumulative distribution curves showing the probability of survival versus the normalized fracture stress for each group of data are shown in Figs. 21 through 68. The strength data were normalized by dividing by the median strength and were plotted on probability paper. When plotted in this way, data conforming to a normal (Gaussian) distribution function would fall on a straight line. Data following a Weibull distribution function would fall on a convex-downward curve whose curvature depends on the value of m . Figures 21 through 68 include best-fit lines for both a Gaussian and a Weibull distribution. Because of the form of Eq. 5, the

low strength data points are more heavily weighted than the high strength data in the fitting of the Weibull function. Taken as a whole, the data showed no preferential tendency to conform more closely to one distribution than to the other. Within the experimental scatter, the results could be represented equally well by a Gaussian or a Weibull distribution.

3.4. DEPENDENCE OF STRENGTH ON SPECIMEN SIZE

The ratios between the mean tensile strength of small-sized specimens and large-sized specimens from the same location and orientation are included in Tables 49 through 52. The mean ratio was 1.03 for the axial orientation and 1.08 for the radial orientation.

The Weibull model predicts that the strength, S_1 , of tensile specimens with volume V_1 is related to the strength, S_2 , of specimens with volume V_2 by the relationship (Ref. 4):

$$\frac{S_1}{S_2} = \left(\frac{V_2}{V_1} \right)^{\frac{1}{m}}, \quad (6)$$

assuming that σ_u is zero. In the present case V_1 and V_2 are 724 mm^3 and 9847 mm^3 , respectively. Using the mean m values from Table 53, Eq. 6 predicts a strength ratio of 1.28 for the axial orientation and 1.38 for the radial orientation. It is evident that the Weibull model grossly overestimates the volume dependence of the strength of H-451 graphite.

3.5. RELATIONSHIP BETWEEN FLEXURAL STRENGTH AND TENSILE STRENGTH

The ratios between the four-point flexural strength (corrected for the nonlinear stress-strain relationship) and the tensile strength of companion 6.4-mm-diameter specimens are listed in Tables 49 through 52. The mean values are 1.52 for axial specimens and 1.55 for radial specimens. Weibull theory predicts (Ref. 4) the following relationships between the four-point bend strength, S_B , of cylindrical specimens where the volume between each

of the support points is V_B and the tensile strength, S_T , of companion specimens of volume V_T :

$$\frac{S_B}{S_T} = \left[\frac{2 \times 4 \times 6 \text{ --- } (m+2)}{1 \times 3 \times 5 \text{ --- } (m-1)} \right]^{\frac{1}{m}} \left[\frac{V_T^{(m+1)}}{V_B^{(m+3)}} \right]^{\frac{1}{m}} \quad (7a)$$

(m an even integer)

and

$$\frac{S_B}{S_T} = \left[\frac{1 \times 3 \times 5 \text{ --- } (m+2)}{2 \times 4 \times 6 \text{ --- } (m-1)} \times \frac{\pi}{2} \right]^{\frac{1}{m}} \left[\frac{V_T^{(m+1)}}{V_B^{(m+3)}} \right]^{\frac{1}{m}} \quad (7b)$$

(m an odd integer)

Values for the first term in Eq. 7a and Eq. 7b are given in Ref. 4. Using the values 724 mm^3 and 402 mm^3 for V_T and V_B , respectively, and taking m values from Table 53, Eq. 6 predicts bend strength to tensile strength ratios of 1.51 for axial specimens and 1.64 for radial specimens. These values are in good agreement with the observed ratios of 1.52 and 1.55 for the axial and radial orientations.

The mean four-point bend strength (corrected for the nonlinear stress-strain relationship) is plotted against the mean tensile strength of companion 6.4-mm-diameter tensile specimens in Fig. 69. Each datum point represents the mean strength for one orientation, slab, and zone (center or edge). The bend and tensile strengths correlate well. A least-squares linear regression analysis gives the following relation between the bend strength, S_B , and the tensile strength, S_T (MPa):

$$S_B = 9.47 + 0.886S_T \text{ (6.4-mm-diameter tensile specimens)} \quad (8)$$

The correlation coefficient was 0.88. A similar plot of bend strength versus the tensile strength of 12.8-mm-diameter tensile specimens is

shown in Fig. 70. The least-squares linear relationship between bend strength and tensile strength in this case is:

$$S_B = 11.18 + 0.808S_T \text{ (12.8-mm-diameter tensile specimens) , (9)}$$

with a correlation coefficient of 0.92.

4. SUMMARY AND CONCLUSIONS

More than 2000 tensile and four-point bend tests were made at ambient temperature on specimens from one log of extruded near-isotropic petroleum-coke-based nuclear graphite (Great Lakes Carbon Corporation grade H-451). The following conclusions were drawn:

1. Axial specimens averaged 19% stronger than radial specimens when tested in tension. In bending axial specimens averaged 13% stronger than radial specimens.
2. Specimens taken near the edge of the log averaged 16% stronger than those from near the centerline when tested in tension, and 7% stronger when tested in bending.
3. In addition to these expected and systematic strength variations, additional local fluctuations in strength were found. In some cases they corresponded to local variations in density. These local variations were probably caused during fabrication by inhomogeneity in the mix charged to the extrusion press or by nonuniform impregnation.
4. The coefficient of variation for axial tensile strengths from the same zone in the parent log averaged 11.2%, compared with 14.7% for radial tensile strengths. For bend strengths the coefficient of variation was lower than for tensile strengths, averaging 7.9% for the axial orientation and 9.0% for the radial orientation.
5. Cumulative strength distribution curves were plotted for each specimen group. Within experimental scatter the data were equally well represented by a normal (Gaussian) distribution

or by the distribution predicted by the Weibull theory for the strength of brittle solids.

6. When fitted to the Weibull distribution, the value of the Weibull modulus, m , was lower for tensile tests (mean values of 10.7 for axial specimens and 8.1 for radial specimens) than for bend tests (mean values of 15.8 for axial specimens and 13.6 for radial specimens). Such a difference is contrary to predictions based on the Weibull model.
7. Tensile specimens of two sizes (volumes 9847 mm^3 and 724 mm^3) were tested. The small specimens averaged 3% stronger than the large specimens for the axial orientation, and 8% stronger for the radial orientation. The observed "size effect" was much lower than expected from the Weibull model, which would predict differences of 28% and 38% for the axial and radial directions, respectively.
8. The mean flexural strength showed good correlation with the mean tensile strength of companion specimens (correlation coefficient 0.9). Flexural strengths (corrected for the nonlinear stress-strain relationship of graphite) averaged 52% higher than the corresponding tensile strengths for the axial orientation, and 55% higher for the radial orientation. These values are in good agreement with the Weibull model (predicted values of 51% axial and 64% radial).
9. In spite of the agreement between the observed bend-to-tensile strength ratio and that predicted by the Weibull model, both the observed "size effect" and the difference in Weibull modulus between tensile tests and bend tests are inconsistent with the Weibull model. Thus, the graphite does not meet the criteria which would allow it to be treated as a Weibull solid.

10. The variability in graphite strength must be considered in the mechanical design of graphite components. The present work shows that a large part of the variability is attributable to local fluctuations over distances on the order of 100 mm, which suggests that reductions in the scatter of strength data could result from improvements in the uniformity of the mixing and impregnation processes.

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TABLE 1
STRENGTHS OF SMALL-SIZED TENSILE SPECIMENS, SLAB 1, AXIAL ORIENTATION,
END-EDGE LOCATION

LOT NO. 408		SPEC. DIA.		6.4 MM			
LOG NO. 5651-90		SPEC. LENGTH		23. MM			
LOG DENSITY 1.75		KG/M**3					
SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (KG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
1AE- 1-A1	AX	EE	1.738				14.2
1AE- 2-A1	AX	EE	1.725				16.6
1AE- 3-A1	AX	EE	1.719				14.6
1AE- 4-A1	AX	EE	1.734				16.9
1AE- 5-A1	AX	EE	1.736				14.7
1AE- 6-A1	AX	EE	1.728				15.6
1AE- 7-A1	AX	EE	1.741				15.9
1AE- 8-A1	AX	EE	1.714				12.9
1AE- 9-A1	AX	EE	1.741				16.0
1AE-10-A1	AX	EE	1.742				13.8
1AE-11-A1	AX	EE	1.730				17.7
1AE-12-A1	AX	EE	1.738				18.5
1AE-13-A1	AX	EE	1.712				12.4
1AE-14-A1	AX	EE	1.732				18.1
1AE-15-A1	AX	EE	1.731				17.1
1AE-16-A1	AX	EE	1.732				17.1
1AE-17-A1	AX	EE	1.734				17.0
1AE-18-A1	AX	EE	1.745				15.0
1AE-19-A1	AX	EE	1.736				17.3
1AE-20-A1	AX	EE	1.733				15.9
1AE-21-A1	AX	EE	1.739				16.0
1AE-22-A1	AX	EE	1.723				12.6
1AE-23-A1	AX	EE	1.728				17.6
1AE-24-A1	AX	EE	1.730				17.6
1BE-1-A1	AX	EE	1.715				16.6
2-A1	AX	EE	1.713				16.4
3-A1	AX	EE	1.725				17.4
4-A1	AX	EE	1.744				19.6
5-A1	AX	EE	1.732				17.9
6-A1	AX	EE	1.729				16.0
7-A1	AX	EE	1.722				17.1
8-A1	AX	EE	1.724				18.4
9-A1	AX	EE	1.728				17.8
10-A1	AX	EE	1.735				16.4
11-A1	AX	EE	1.740				17.9
12-A1	AX	EE	1.731				15.7
13-A1	AX	EE	1.726				18.6
14-A1	AX	EE	1.727				17.8
15-A-1	AX	EE	1.732				16.6
16-A1	AX	EE	1.724				14.7
17-A1	AX	EE	1.724				13.7
18-A1	AX	EE	1.719				14.5
19-A1	AX	EE	1.731				20.5
20-A1	AX	EE	1.726				16.4
21-A1	AX	EE	1.700				11.1
22-A1	AX	EE	1.723				19.8
23-A1	AX	EE	1.733				18.2
24-A1	AX	EE	1.719				19.2
MEAN			1.729				16.4 (2386.PSI)
STD. DEV.			.009				2.0 (291.PSI)

TABLE 2
STRENGTHS OF LARGE-SIZED TENSILE SPECIMENS, SLAB 1, AXIAL ORIENTATION,
END-EDGE LOCATION

LOT NO. 408 SPEC. DIA. 12.8 MM
LOG NO. 5651-93 SPEC. LENGTH 76. MM
LOG DENSITY 1.75 KG/M**3

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (KG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
1A-E-200	AX	EE	1.729				16.7
1A-E-201	AX	EE	1.731	9.6	.012	.242	14.8
1A-E-202	AX	EE	1.734				15.7
1A-E-203	AX	EE	1.729				16.0
1A-E-204	AX	EE	1.731				15.7
1A-E-205	AX	EE	1.734				17.1
1A-E-206	AX	EE	1.733				17.1
1A-E-207	AX	EE	1.735				16.9
1A-E-208	AX	EE	1.727				15.4
1A-E-209	AX	EE	1.728				14.3
1A-E-210	AX	EE	1.734				18.0
1A-E-211	AX	EE	1.736				16.4
1A-E-212	AX	EE	1.723				16.2
1A-E-213	AX	EE	1.722				16.6
1A-E-214	AX	EE	1.718				17.0
1A-E-215	AX	EE	1.718				16.9
1A-E-216	AX	EE	1.717				15.9
1A-E-217	AX	EE	1.725	9.6	.015	.295	17.7
1A-E-218	AX	EE	1.727				14.9
1A-E-219	AX	EE	1.729				15.4
1A-E-220	AX	EE	1.721				9.3
1A-E-221	AX	EE	1.730				13.5
1A-E-222	AX	EE	1.727				13.7
1A-E-223	AX	EE	1.726				13.3
1B-E-200	AX	EE	1.734				18.6
1B-E-201	AX	EE	1.735	10.1	.011	.307	19.2
1B-E-202	AX	EE	1.732				19.8
1B-E-203	AX	EE	1.734				16.5
1B-E-204	AX	EE	1.730				17.9
1B-E-205	AX	EE	1.734				18.1
1B-E-206	AX	EE	1.726				18.1
1B-E-207	AX	EE	1.731				18.0
1B-E-208	AX	EE	1.728				17.8
1B-E-209	AX	EE	1.729				17.4
1B-E-210	AX	EE	1.722				17.1
1B-E-211	AX	EE	1.725				
1B-E-212	AX	EE	1.729				17.0
1B-E-213	AX	EE	1.725				11.7
1B-E-214	AX	EE	1.726				16.3
1B-E-215	AX	EE	1.722				14.6
1B-E-216	AX	EE	1.720				12.3
1B-E-217	AX	EE	1.720	9.4	.013	.192	11.8
1B-E-218	AX	EE	1.708				11.5
1B-E-219	AX	EE	1.720				15.8
1B-E-220	AX	EE	1.723				15.7
1B-E-221	AX	EE	1.717				16.0
1B-E-222	AX	EE	1.714				14.3
1B-E-223	AX	EE	1.722				16.5
MEAN			1.726	9.7 (1.40 MPsi)	.013	.259	15.9 (2304.PSI)
STD. DEV.			.006	.3 (.04 MPsi)	.002	.053	2.2 (312.PSI)

TABLE 3
STRENGTHS OF FOUR-POINT BEND SPECIMENS, SLAB 1, AXIAL ORIENTATION,
END-EDGE LOCATION

LOT NO. 408			SPEC. DIA. 6.4 MM		
LOG NO. 5651-90			SPEC. LENGTH 51. MM		
LOG DENSITY 1.75			KG/M**3		
SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (KG/M**3)	MODULUS OF RUPTURE (MPA) (UNCORRECTED)	FLEXURAL STRENGTH (MPA) (CORRECTED)
1AE-1-B1	AX	EE	1.721	27.5	23.9
1AE-2-B1	AX	EE	1.720	28.1	24.3
1AE-3-B1	AX	EE	1.737	26.9	23.5
1AE-4-B1	AX	EE	1.716	27.5	23.9
1AE-5-B1	AX	EE	1.736	27.8	24.1
1AE-6-B1	AX	EE	1.713	26.7	23.3
1AE-7-B1	AX	EE	1.715	25.3	22.3
1AE-8-B1	AX	EE	1.741	32.0	27.0
1AE-9-B1	AX	EE	1.741	27.6	24.1
1AE-10-R1	AX	EE	1.738	31.4	26.6
1AE-11-B1	AX	EE	1.712	24.7	21.8
1AE-12-R1	AX	EE	1.721	23.1	24.3
1AE-13-R1	AX	EE	1.733	28.3	24.5
1AE-14-R1	AX	EE	1.701	26.1	22.9
1AE-15-R1	AX	EE	1.717	27.6	24.1
1AE-16-B1	AX	EE	1.691	29.2	25.1
1AE-17-R1	AX	EE	1.720	25.5	22.5
1AE-18-R1	AX	EE	1.722	27.2	23.7
1AE-19-R1	AX	EE	1.727	28.6	24.7
1AE-20-R1	AX	EE	1.740	32.8	27.5
1AE-21-R1	AX	EE	1.731	25.8	22.7
1AE-22-R1	AX	EE	1.718	32.6	27.3
1AE-23-R1	AX	EE	1.723	27.5	23.9
1AE-24-B1	AX	EE	1.723	25.5	22.5
1B-E-1-R1	AX	EE	1.742	28.5	24.7
2-B1	AX	EE	1.733	34.0	28.2
3-B1	AX	EE	1.743	31.4	26.6
4-B1	AX	EE	1.728	30.8	26.2
5-B1	AX	EE	1.736	28.6	24.7
6-B1	AX	EE	1.726	27.8	24.2
7-B1	AX	EE	1.740	28.9	24.9
8-B1	AX	EE	1.733	30.9	26.2
9-B1	AX	EE	1.726	30.9	26.3
10-B1	AX	EE	1.729	26.3	23.0
11-B1	AX	EE	1.733	26.9	23.5
12-B1	AX	EE	1.733	29.5	25.3
13-B1	AX	EE	1.724	28.8	24.9
14-B1	AX	EE	1.727	29.5	25.4
15-B1	AX	EE	1.724	27.8	24.1
16-R1	AX	EE	1.725	30.9	26.3
17-B1	AX	EE	1.725	30.3	25.9
18-B1	AX	EE	1.721	26.7	23.4
19-R1	AX	EE	1.719	27.5	23.9
20-B1	AX	EE	1.704	27.4	23.9
21-B1	AX	EE	1.715	33.4	27.9
22-B1	AX	EE	1.715	26.4	23.2
23-B1	AX	EE	1.711	30.0	25.6
24-B1	AX	EE	1.706	28.3	24.5
MEAN			1.724	28.6 MPA (4146. PSI)	24.7 MPA (3576. PSI)
STD. DEV.			.011	2.2 MPA (324. PSI)	1.5 MPA (224. PSI)

TABLE 4
STRENGTHS OF SMALL-SIZED TENSILE SPECIMENS, SLAB 1, AXIAL ORIENTATION,
END-CENTER LOCATION

LOT NO. 408		SPEC. DIA.		6.4 MM			
LOG NO. 5651-97		SPEC. LENGTH		23. MM			
LOG DENSITY 1.75		KG/M**3					
SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (KG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
1A-C-1A1	AX	EC					13.3
A2	AX	EC					17.8
1A-C-2A1	AX	EC					13.1
A2	AX	EC					19.4
1A-C-3-A1	AX	EC					16.6
A2	AX	EC					13.8
1A-C-4-A1	AX	EC					18.4
A2	AX	EC					17.8
1A-C-5-A1	AX	EC					16.4
A2	AX	EC					15.5
1A-C6-A1	AX	EC					18.1
A2	AX	EC					15.2
1A-C7-A1	AX	EC					16.6
A2	AX	EC					19.1
1A-C8-A1	AX	EC					16.7
A2	AX	EC					19.5
1A-C9-A1	AX	EC					11.4
A2	AX	EC					16.4
1A-C10-A1	AX	EC					16.9
A2	AX	EC					10.8
1B-C-1-A1	AX	EC	1.754				14.3
1-A2	AX	EC	1.760				14.7
2-A1	AX	EC	1.753				16.9
2-A2	AX	EC	1.751				17.1
3-A1	AX	EC	1.742				17.6
3-A2	AX	EC	1.759				17.8
4-A1	AX	EC	1.760				13.8
4-A2	AX	EC	1.754				15.7
5-A1	AX	EC	1.756				12.9
5-A2	AX	EC	1.748				12.2
6-A1	AX	EC	1.752				18.4
6-A2	AX	EC	1.751				14.3
7-A1	AX	EC	1.762				11.8
7-A2	AX	EC	1.749				14.7
8-A1	AX	EC	1.750				16.9
8-A2	AX	EC	1.755				20.8
9-A1	AX	EC	1.755				14.5
9-A2	AX	EC	1.751				12.6
10-A1	AX	EC	1.752				16.6
10-A2	AX	EC	1.756				17.6
MEAN			1.754				15.9 (2299.PSI)
STD. DEV.			.005				2.4 (353.PSI)

TABLE 5
STRENGTHS OF LARGE-SIZED TENSILE SPECIMENS, SLAB 1, AXIAL ORIENTATION,
END-CENTER LOCATION

LOT NO. 408		SPEC. DIA. 12.8 MM					
LOG NO. 5651-90		SPEC. LENGTH 76. MM					
LOG DENSITY 1.75		KG/M**3					
SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (KG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
1A-C-200	AX	EC	1.729				17.9
1A-C-201	AX	EC	1.729				17.1
1A-C-202	AX	EC	1.731				15.1
1A-C-203	AX	EC	1.732	10.1	.013	.239	15.7
1A-C-204	AX	EC	1.723				15.5
1A-C-205	AX	EC	1.727				14.0
1A-C-206	AX	EC	1.725				16.6
1A-C-208	AX	EC	1.719				12.8
1A-C-209	AX	EC	1.725				14.0
1A-C-210	AX	EC	1.725	10.0	.010	.203	14.2
1A-C-211	AX	EC	1.728				13.5
1A-C-212	AX	EC	1.733				14.2
1A-C-213	AX	EC	1.733				15.7
1A-C-214	AX	EC	1.733				14.5
1A-C-215	AX	EC	1.730				14.6
1B-C-200	AX	EC	1.723				13.7
1B-C-201	AX	EC	1.731				15.7
1B-C-202	AX	EC	1.737				16.9
1B-C-203	AX	EC	1.729	8.3	.013	.283	16.8
1B-C-204	AX	EC	1.720				13.1
1B-C-205	AX	EC	1.730				16.0
1B-C-206	AX	EC	1.731				16.7
1B-C-207	AX	EC	1.735				17.3
1B-C-208	AX	EC	1.737				16.3
1B-C-209	AX	EC	1.729				14.9
1B-C-210	AX	EC	1.732	8.5	.012	.250	14.7
1B-C-211	AX	EC	1.729				16.8
1B-C-212	AX	EC	1.730				9.2
1B-C-213	AX	EC	1.728				17.5
1B-C-214	AX	EC	1.726				16.1
1B-C-215	AX	EC	1.730				16.3
MEAN			1.729	9.2 (1.34 MPsi)	.012	.244	15.3 (2214. PSI)
STD. DEV.			.004	1.0 (.14 MPsi)	.001	.033	1.8 (258. PSI)

TABLE 6
STRENGTHS OF FOUR-POINT BEND SPECIMENS, SLAB 1, AXIAL ORIENTATION,
END-CENTER LOCATION

LOT NO. 408			SPEC. DIA.		6.4 MM
LOG NO. 5651-90			SPEC. LENGTH		51. MM
LOG DENSITY 1.75			KG/M**3		
SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (KG/M**3)	MODULUS OF RUPTURE (MPA) (UNCORRECTED)	FLEXURAL STRENGTH (MPA) (CORRECTED)
1A-C2-B1	AX	EC	1.730	30.9	26.0
1A-C3-B1	AX	EC	1.745	32.8	27.2
1A-C6-B1	AX	EC	1.724	24.7	21.7
1A-C7-B1	AX	EC	1.731	28.1	24.1
1A-C8-B1	AX	EC	1.741	21.0	18.9
1A-C9-B1	AX	EC	1.736	32.6	27.1
1A-C10-B1	AX	EC	1.739	28.1	24.1
1AC-11B1	AX	EC	1.716	23.9	21.1
-12B1	AX	EC	1.732	27.2	23.5
-13B1	AX	EC	1.723	30.5	25.8
1B-C-1-B1	AX	EC	1.753	18.5	16.9
2-B1	AX	EC	1.739	24.7	21.7
3-B1	AX	EC	1.745	28.6	24.5
4-B1	AX	EC	1.747	29.2	24.9
5-B1	AX	EC	1.738	27.8	23.9
6-B1	AX	EC	1.746	28.6	24.5
7-B1	AX	EC	1.748	28.1	24.1
8-B1	AX	EC	1.752	25.3	22.1
9-B1	AX	EC	1.748	30.0	25.4
10-B1	AX	EC	1.754	29.8	25.3
11-B1	AX	EC	1.726	24.6	21.6
12-B1	AX	EC	1.722	28.5	24.4
1BC-13-B1	AX	EC	1.708	26.3	22.9
1BC-14-B1	AX	EC	1.724	29.8	25.3
1BC-15-B1	AX	EC	1.714	24.9	21.8
MEAN			1.735	27.4 MPA (3971. PSI)	23.6 MPA (3417. PSI)
STD. DEV.			.013	3.4 MPA (488. PSI)	2.4 MPA (350. PSI)

TABLE 7
STRENGTHS OF SMALL-SIZED TENSILE SPECIMENS, SLAB 1, RADIAL ORIENTATION,
END-EDGE LOCATION

LOT NO. 408		SPEC. DIA.		6.4 MM	
LOG NO. 5651-90		SPEC. LENGTH		23. MM	
LOG DENSITY 1.75		KG/M**3			

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (KG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
1A-E-300A1	RAD	EE	1.738				11.7
1A-E-301A1	RAD	EE	1.731				9.0
1A-E-302A1	RAD	EE	1.717				7.6
1A-E-303A1	RAD	EE	1.724				8.1
1A-E-304A1	RAD	EE	1.718				9.8
1A-E-305A1	RAD	EE	1.718				12.5
1A-E-306A1	RAD	EE	1.733				12.4
1A-E-307A1	RAD	EE	1.743				13.5
1A-E-308A1	RAD	EE	1.739				11.5
1A-E-309A1	RAD	EE	1.743				14.2
1A-E-310A1	RAD	EE	1.745				10.8
1A-E-311A1	RAD	EE	1.748				11.5
1A-E-312A1	RAD	EE	1.733				13.5
1A-E-313A1	RAD	EE	1.732				13.2
1A-E-314A1	RAD	EE	1.724				12.4
1A-E-315A1	RAD	EE	1.732				13.1
1A-E-316A1	RAD	EE	1.733				12.5
1A-E-317A1	RAD	EE	1.724				9.8
1A-E-318A1	RAD	EE	1.737				14.0
1A-E-319A1	RAD	EE	1.738				15.3
1A-E-320A1	RAD	EE	1.730				13.6
1A-E-321A1	RAD	EE	1.737				13.9
1A-E-322A1	RAD	EE	1.723				14.0
1A-E-323A1	RAD	EE	1.720				13.6
1BE-300-A1	RAD	EE	1.735				12.3
301-A1	RAD	EE	1.745				11.9
302-A1	RAD	EE	1.742				12.6
303-A1	RAD	EE	1.744				11.9
304-A1	RAD	EE	1.725				14.1
305-A1	RAD	EE	1.741				13.8
306-A1	RAD	EE	1.752				13.1
307-A1	RAD	EE	1.747				11.6
308-A1	RAD	EE	1.745				15.4
309-A1	RAD	EE	1.743				14.7
310-A1	RAD	EE	1.747				14.0
311-A1	RAD	EE	1.733				13.4
312-A1	RAD	EE	1.733				14.6
313-A1	RAD	EE	1.726				13.9
314-A1	RAD	EE	1.726				14.9
315-A1	RAD	EE	1.723				16.3
316-A1	RAD	EE	1.724				14.0
317-A1	RAD	EE	1.723				14.6
318-A1	RAD	EE	1.732				14.4
319-A1	RAD	EE	1.723				15.5
321-A1	RAD	EE	1.726				15.1
322-A1	RAD	EE	1.726				15.7
323-A1	RAD	EE	1.722				13.5
MEAN			1.733				13.0 (1892.PSI)
STD. DEV.			.009				1.9 (279.PSI)

TABLE 8
STRENGTHS OF LARGE-SIZED TENSILE SPECIMENS, SLAB 1, RADIAL ORIENTATION,
END-EDGE LOCATION

LOT NO. 408		SPEC. DIA.		12.8 MM	
LOG NO. 5651-90		SPEC. LENGTH		76. MM	
LOG DENSITY 1.75		KG/M**3			

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (KG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
1A-E-500	RAD	EE	1.727	6.9	.025	.145	7.2
1A-E-501	RAD	EE	1.725				8.2
1A-E-502	RAD	EE	1.721				7.5
1A-E-503	RAD	EE	1.720				9.1
1A-E-504	RAD	EE	1.716				9.4
1A-E-505	RAD	EE	1.711				9.9
1A-E-506	RAD	EE	1.702				10.6
1A-E-507	RAD	EE	1.713				9.8
1A-E-508	RAD	EE	1.725				9.2
1A-E-509	RAD	EE	1.721				6.4
1A-E-510	RAD	EE	1.727				8.2
1A-E-511	RAD	EE	1.730				9.0
1A-E-512	RAD	EE	1.732				14.5
1A-E-513	RAD	EE	1.733				15.2
1A-E-514	RAD	EE	1.731				12.3
1A-E-515	RAD	EE	1.723				13.2
1A-E-516	RAD	EE	1.719				13.7
1A-E-517	RAD	EE	1.712	8.0	.021	.209	11.4
1A-E-518	RAD	EE	1.736				16.3
1A-E-519	RAD	EE	1.733				11.6
1A-E-520	RAD	EE	1.732				15.4
1A-E-521	RAD	EE	1.727				11.6
1A-E-522	RAD	EE	1.727				15.4
1A-E-523	RAD	EE	1.718				8.6
1B-E-500	RAD	EE	1.736	6.9	.014	.262	13.0
1B-E-501	RAD	EE	1.734				13.6
1B-E-502	RAD	EE	1.734				13.1
1B-E-503	RAD	EE	1.732				13.3
1B-E-504	RAD	EE	1.729				12.7
1B-E-505	RAD	EE	1.728				11.9
1B-E-506	RAD	EE	1.740				13.1
1B-E-507	RAD	EE	1.739				13.3
1B-E-508	RAD	EE	1.736				14.4
1B-E-509	RAD	EE	1.732				14.1
1B-E-510	RAD	EE	1.733				14.1
1B-E-511	RAD	EE	1.733				13.2
1B-E-512	RAD	EE	1.728				13.9
1B-E-513	RAD	EE	1.728				13.9
1B-E-514	RAD	EE	1.728				13.5
1B-E-515	RAD	EE	1.724				14.3
1B-E-516	RAD	EE	1.723				13.2
1B-E-517	RAD	EE	1.730	7.9	.021	.222	11.4
1B-E-518	RAD	EE	1.729				14.1
1B-E-519	RAD	EE	1.727				14.5
1B-E-520	RAD	EE	1.727				13.6
1B-E-521	RAD	EE	1.722				13.9
1B-E-522	RAD	EE	1.719				13.3
1B-E-523	RAD	EE	1.717				9.5
MEAN			1.726	7.4	.020	.209	12.1
			(1.08 MPsi)		(1760.Psi)		
STD. DEV.			.008	.6	.005	.049	2.5
			(.09 MPsi)		(358.Psi)		

TABLE 9
STRENGTHS OF FOUR-POINT BEND SPECIMENS, SLAB 1, RADIAL ORIENTATION,
END-EDGE LOCATION

LOT NO. 408		SPEC. DIA. 6.4 MM	
LOG NO. 5651-90		SPEC. LENGTH 51. MM	
LOG DENSITY 1.75		KG/M**3	

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (KG/M**3)	MODULUS OF RUPTURE (MPA) (UNCORRECTED)	FLEXURAL STRENGTH (MPA) (CORRECTED)
1A-E-300B1	RAD	EE	1.741	17.4	15.6
1A-E-301B1	RAD	EE	1.747	18.2	16.2
1A-E-302B1	RAD	EE	1.738	22.7	19.5
1A-E-303B1	RAD	EE	1.723	20.5	17.9
1A-E-304B1	RAD	EE	1.723	21.6	18.7
1A-E-305B1	RAD	EE	1.710	20.8	18.1
1A-E-306B1	RAD	EE	1.727	14.9	13.6
1A-E-307B1	RAD	EE	1.722	20.5	17.9
1A-E-309B1	RAD	EE	1.721	12.6	11.7
1A-E-310-B1	RAD	EE	1.727	21.9	18.9
1A-E-311-B1	RAD	EE	1.725	16.6	14.9
1A-E-312-B1	RAD	EE	1.720	27.8	22.7
1A-E-313-B1	RAD	EE	1.741	23.3	19.9
1A-E-314-B1	RAD	EE	1.724	24.7	20.8
1A-E-315-B1	RAD	EE	1.728	24.7	20.8
1A-E-316-B1	RAD	EE	1.729	24.7	20.8
1A-E-317-B1	RAD	EE	1.716	21.3	18.5
1A-E-318-B1	RAD	EE	1.743	28.9	23.4
1A-E-319-B1	RAD	EE	1.742	27.2	22.4
1A-E-320-B1	RAD	EE	1.718	26.1	21.7
1A-E-321-B1	RAD	EE	1.708	27.2	22.4
1A-E-322-B1	RAD	EE	1.723	25.8	21.0
1A-E-323-B1	RAD	EE	1.712	19.9	17.5
1B-E-300-B1	RAD	EE	1.747	20.9	18.3
301-B1	RAD	EE	1.732	25.9	21.6
302-B1	RAD	EE	1.739	25.5	21.3
303-B1	RAD	EE	1.731	27.5	22.6
304-B1	RAD	EE	1.727	28.6	23.2
305-B1	RAD	EE	1.736	29.4	23.7
306-B1	RAD	EE	1.742	24.3	20.6
307-B1	RAD	EE	1.739	27.5	22.6
308-B1	RAD	EE	1.731	24.9	21.0
309-B1	RAD	EE	1.734	26.5	22.0
310-B1	RAD	EE	1.739	26.5	22.0
311-B1	RAD	EE	1.726	27.0	22.3
312-B1	RAD	EE	1.731	26.5	22.0
313-B1	RAD	EE	1.728	27.6	22.6
314-B1	RAD	EE	1.727	23.7	20.1
315-B1	RAD	EE	1.725	26.9	22.2
316-B1	RAD	EE	1.722	28.3	23.0
317-B1	RAD	EE	1.715	26.0	21.6
318-B1	RAD	EE	1.725	25.3	21.2
319-B1	RAD	EE	1.717	24.8	20.9
321-B1	RAD	EE	1.717	25.1	21.1
322-B1	RAD	EE	1.724	27.2	22.4
323-B1	RAD	EE	1.715	25.6	21.4
MEAN			1.728	24.1 MPA (3499. PSI)	20.3 MPA (2948. PSI)
STD. DEV.			.010	3.8 MPA (555. PSI)	2.7 MPA (388. PSI)

TABLE 10
STRENGTHS OF SMALL-SIZED TENSILE SPECIMENS, SLAB 1, RADIAL ORIENTATION,
END-CENTER LOCATION

LOT NO. 408		SPEC. DIA. 6.4 MM	
LOG NO. 5651-90		SPEC. LENGTH 23. MM	
LOG DENSITY 1.75		KG/M**3	

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (KG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
1A-C-300A1	RAD	EC	1.715				11.1
1A-C-301A1	RAD	EC	1.737				16.6
1AC-302-A1	RAD	EC	1.729				10.7
1AC-303-A1	RAD	EC	1.726				10.1
1AC-304-A1	RAD	EC	1.730				9.7
1AC-305-A1	RAD	EC	1.725				
1AC-306-A1	RAD	EC	1.711				10.0
1AC-307-A1	RAD	EC	1.736				9.4
1AC-308-A1	RAD	EC	1.720				10.4
1AC-309-A1	RAD	EC	1.728				11.0
1AC-310-A1	RAD	EC	1.735				11.2
1AC-311-A1	RAD	EC	1.737				14.3
1A-C-312-A1	RAD	EC	1.742				11.7
1A-C-313-A1	RAD	EC	1.742				10.0
1A-C-314-A1	RAD	EC	1.746				11.5
1A-C-315-A1	RAD	EC	1.749				11.9
1A-C-317-A1	RAD	EC	1.742				11.7
1A-C-318-A1	RAD	EC	1.743				8.7
1A-C-319-A1	RAD	EC	1.743				8.0
1B-C-300-A1	RAD	EC	1.753				11.8
301-A1	RAD	EC	1.748				14.7
302-A1	RAD	EC	1.752				11.7
303-A1	RAD	EC	1.760				12.2
304-A1	RAD	EC	1.756				12.6
305-A1	RAD	EC	1.754				15.7
306-A1	RAD	EC	1.743				9.0
307-A1	RAD	EC	1.737				14.9
308-A1	RAD	EC	1.727				15.8
309-A1	RAD	EC	1.733				14.5
310-A1	RAD	EC	1.757				15.6
311-A1	RAD	EC	1.733				13.1
312-A1	RAD	EC	1.749				13.8
313-A1	RAD	EC	1.745				14.0
314-A1	RAD	EC	1.750				9.4
315-A1	RAD	EC	1.746				11.0
316-A1	RAD	EC	1.744				12.5
317-A1	RAD	EC	1.745				12.2
318-A1	RAD	EC	1.746				15.3
319-A1	RAD	EC	1.741				15.3
MEAN			1.740				12.2 (1767.PSI)
STD. DEV.			.011				2.3 (332.PSI)

TABLE 11
STRENGTHS OF LARGE-SIZED TENSILE SPECIMENS, SLAB 1, RADIAL ORIENTATION,
END-CENTER LOCATION

LOT NO. 408		SPEC. DIA. 12.8 MM	
LOG NO. 5651-90		SPEC. LENGTH 76. MM	
LOG DENSITY 1.75		KG/M***3	

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (KG/M***3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
1A-C-500	RAD	EC	1.731	7.9	.007	.177	10.6
1A-C-501	RAD	EC	1.729				7.8
1A-C-502	RAD	EC	1.724				9.4
1A-C-503	RAD	EC	1.730				7.1
1A-C-504	RAD	EC	1.733				10.2
1A-C-505	RAD	EC	1.727				8.7
1A-C-506	RAD	EC	1.729				8.3
1A-C-507	RAD	EC	1.732				11.2
1A-C-508	RAD	EC	1.722				11.2
1A-C-509	RAD	EC	1.736				9.9
1A-C-510	RAD	EC	1.731				8.3
1A-C-511	RAD	EC	1.719				12.5
1A-C-512	RAD	EC	1.737				8.6
1A-C-513	RAD	EC	1.730				9.3
1A-C-514	RAD	EC	1.731				11.5
1A-C-515	RAD	EC	1.732				9.8
1A-C-516	RAD	EC	1.730				12.7
1A-C-517	RAD	EC	1.722	8.4	.020	.240	13.0
1B-C-500	RAD	EC	1.735	7.4	.013	.244	12.9
1B-C-501	RAD	EC	1.733				13.8
1B-C-502	RAD	EC	1.726				11.8
1B-C-503	RAD	EC	1.735				9.9
1B-C-504	RAD	EC	1.734				9.7
1B-C-505	RAD	EC	1.731				11.1
1B-C-506	RAD	EC	1.731				10.4
1B-C-507	RAD	EC	1.728				12.4
1B-C-508	RAD	EC	1.726				8.8
1B-C-509	RAD	EC	1.731				11.1
1B-C-510	RAD	EC	1.731				13.3
1B-C-511	RAD	EC	1.718				11.4
1B-C-512	RAD	EC	1.735				9.4
1B-C-513	RAD	EC	1.732				11.9
1B-C-514	RAD	EC	1.728				12.0
1B-C-515	RAD	EC	1.728				11.8
1B-C-516	RAD	EC	1.730				12.5
1B-C-517	RAD	EC	1.726	7.3	.003	.200	11.7
MEAN			1.730	7.8	.011	.215	10.7
			(1.13 MPsi)		(1555. PSI)		
STD. DEV.			.004	.5	.007	.032	1.7
			(.07 MPsi)		(248. PSI)		

TABLE 12
STRENGTHS OF FOUR-POINT BEND SPECIMENS, SLAB 1, RADIAL ORIENTATION,
END-CENTER LOCATION

LOT NO. 408		SPEC. DIA.		6.4 MM	
LOG NO. 5651-90		SPEC. LENGTH		51. MM	
LOG DENSITY 1.75		KG/M**3			

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (KG/M**3)	MODULUS OF RUPTURE (MPA) (UNCORRECTED)	FLEXURAL STRENGTH (MPA) (CORRECTED)
1A-C-300B1	RAD	EC	1.728	19.0	16.9
1A-C-301B1	RAD	EC	1.722	22.7	19.7
1A-C-302B1	RAD	EC	1.726	18.2	16.3
1A-C-303B1	RAD	EC	1.743	22.5	19.5
1A-C-304B1	RAD	EC	1.723	20.8	18.3
1A-C-305B1	RAD	EC	1.719	19.9	17.6
1A-C-306B1	RAD	EC	1.733	20.2	17.8
1A-C-307B1	RAD	EC	1.730	22.2	19.3
1AC-308-B1	RAD	EC	1.727	21.9	19.1
1AC-310-B1	RAD	EC	1.719	24.7	21.0
1AC-311-B1	RAD	EC	1.730	24.1	20.7
1AC-312-B1	RAD	EC	1.736	25.3	21.4
1AC-313-B1	RAD	EC	1.738	25.3	21.4
1AC-314-B1	RAD	EC	1.756	23.0	19.9
1AC-315-B1	RAD	EC	1.729	24.4	20.9
1AC-317-B1	RAD	EC	1.741	22.7	19.7
1AC-318-B1	RAD	EC	1.747	22.5	19.5
1AC-319-B1	RAD	EC	1.746	20.8	18.3
1B-C-300-B1	RAD	EC	1.736	24.7	21.0
301-B1	RAD	EC	1.734	18.5	16.6
302-B1	RAD	EC	1.747	24.1	20.7
303-B1	RAD	EC	1.744	20.5	18.1
304-B1	RAD	EC	1.746	25.3	21.4
305-B1	RAD	EC	1.733	26.4	22.1
306-B1	RAD	EC	1.733	24.4	20.9
307-B1	RAD	EC	1.730	24.4	20.9
308-B1	RAD	EC	1.736	25.3	21.4
309-B1	RAD	EC	1.734	26.4	22.1
310-B1	RAD	EC	1.732	27.2	22.7
311-B1	RAD	EC	1.741	28.1	23.2
312-B1	RAD	EC	1.749	21.9	19.1
313-B1	RAD	EC	1.741	24.1	20.7
314-B1	RAD	EC	1.744	26.7	22.3
315-B1	RAD	EC	1.739	28.1	23.2
316-B1	RAD	EC	1.733	23.0	19.9
317-B1	RAD	EC	1.731	28.6	23.5
318-B1	RAD	EC	1.736	23.9	20.5
319-B1	RAD	EC	1.731	27.8	23.0
MEAN			1.735	23.7 MPA (3433. PSI)	20.3 MPA (2941. PSI)
STD. DEV.			.009	2.7 MPA (396. PSI)	1.9 MPA (275. PSI)

TABLE 13
STRENGTHS OF SMALL-SIZED TENSILE SPECIMENS, SLAB 2, AXIAL ORIENTATION,
MIDLENGTH-EDGE LOCATION

LOT NO. 408			SPEC. DIA.		6.4 MM	
LOG NO. 5651-90			SPEC. LENGTH		23. MM	
LOG DENSITY 1.75			KG/M**3			

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (KG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT TURE SET (PCT)	FRAC- TURE STRAIN (PCT)

2A-E-1-A1	AX	MLE	1.732			17.2
1-A2	AX	MLE	1.739			19.2
2-A1	AX	MLE	1.734			16.8
2-A2	AX	MLE	1.733			16.6
3-A1	AX	MLE	1.739			16.8
3-A2	AX	MLE	1.750			19.3
4-A1	AX	MLE	1.738			19.6
4-A2	AX	MLE	1.734			17.8
5-A1	AX	MLE	1.739			16.5
5-A2	AX	MLE	1.735			13.6
6-A1	AX	MLE	1.736			15.3
6-A2	AX	MLE	1.734			16.6
7-A1	AX	MLE	1.737			17.4
7-A2	AX	MLE	1.730			17.7
8-A1	AX	MLE	1.731			16.1
8-A2	AX	MLE	1.736			15.7
9-A1	AX	MLE	1.742			18.0
9-A2	AX	MLE	1.737			16.3
10-A1	AX	MLE	1.744			18.0
10-A2	AX	MLE	1.742			18.5
11-A1	AX	MLE	1.732			16.4
12-A1	AX	MLE	1.739			18.8
2BE-1A1	AX	MLE	1.748			21.3
2A1	AX	MLE	1.745			21.1
3A1	AX	MLE	1.743			17.8
4A1	AX	MLE	1.749			19.6
5A1	AX	MLE	1.749			21.3
6A1	AX	MLE	1.753			20.3
7A1	AX	MLE	1.738			18.3
8A1	AX	MLE	1.752			19.3
9A1	AX	MLE	1.740			19.5
10A1	AX	MLE	1.746			19.2
11A1	AX	MLE	1.746			20.2
12A1	AX	MLE	1.745			19.9
2BE-13A1	AX	MLE	1.745			18.2
14A1	AX	MLE	1.738			17.8
15A1	AX	MLE	1.752			18.5
16A1	AX	MLE	1.737			18.0
17A1	AX	MLE	1.736			19.6
18A1	AX	MLE	1.740			17.7
19A1	AX	MLE	1.731			18.6
20A1	AX	MLE	1.744			20.7
21A1	AX	MLE	1.732			16.8
22A1	AX	MLE	1.733			17.7
23A1	AX	MLE	1.735			16.3
24A1	AX	MLE	1.731			20.8

MEAN			1.740			18.2
						(2638,PSI)
STD. DEV.			.006			1.7
						(248,PSI)

TABLE 14
STRENGTHS OF LARGE-SIZED TENSILE SPECIMENS, SLAB 2, AXIAL ORIENTATION,
MIDLENGTH-EDGE LOCATION

LOT NO. 40A		SPEC. DIA. 12.8 MM					
LOG NO. 5651-90		SPEC. LENGTH 76. MM					
LOG DENSITY 1.75		KG/M**3					
SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (KG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
2AE-200	AX	MLE	1.736				18.1
-201	AX	MLE	1.738	9.4	.004	.249	16.3
-202	AX	MLE	1.740				17.4
-203	AX	MLE	1.741				17.9
-204	AX	MLE	1.742				17.2
-205	AX	MLE	1.743				16.7
-206	AX	MLE	1.742				16.3
-207	AX	MLE	1.736				17.5
-208	AX	MLE	1.739				18.1
-209	AX	MLE	1.741				16.2
-210	AX	MLE	1.740				15.6
-211	AX	MLE	1.740				18.0
2AE-212	AX	MLE	1.738				14.3
-213	AX	MLE	1.738				15.4
-214	AX	MLE	1.741				17.7
-215	AX	MLE	1.733				15.8
-216	AX	MLE	1.734				18.2
-217	AX	MLE	1.734	9.7	.013	.294	17.1
-218	AX	MLE	1.740				17.6
-219	AX	MLE	1.739				18.0
-220	AX	MLE	1.738				17.4
-221	AX	MLE	1.737				15.3
-222	AX	MLE	1.732				16.4
-223	AX	MLE	1.739				16.3
2BF-200	AX	MLE	1.748				21.7
-201	AX	MLE	1.748	9.7	.015	.352	21.0
-202	AX	MLE	1.743				19.4
-203	AX	MLE	1.741				20.9
-204	AX	MLE	1.748				20.0
-205	AX	MLE	1.742				19.6
-206	AX	MLE	1.742				18.5
-207	AX	MLE	1.744				19.0
-208	AX	MLE	1.740				18.4
-209	AX	MLE	1.750				18.9
-210	AX	MLE	1.745				18.4
-211	AX	MLE	1.746				17.2
2BF-212	AX	MLE	1.745				19.2
-213	AX	MLE	1.742				17.8
-214	AX	MLE	1.745				18.0
-215	AX	MLE	1.735				17.9
-216	AX	MLE	1.751				20.0
-217	AX	MLE	1.734	9.4	.002	.287	18.4
-218	AX	MLE	1.736				17.1
-219	AX	MLE	1.733				18.0
-220	AX	MLE	1.729				16.9
-221	AX	MLE	1.738				12.2
-222	AX	MLE	1.730				16.1
-223	AX	MLE	1.737				15.3
MEAN			1.740	9.5	.008	.295	17.6
				(1.38 MPaSI)			(2552,PSI)
STD. DEV.			.005	.2	.006	.043	1.7
				(.02 MPaSI)			(253,PSI)

TABLE 15
STRENGTHS OF FOUR-POINT BEND SPECIMENS, SLAB 2, AXIAL ORIENTATION,
MIDLENGTH-EDGE LOCATION

LOT NO. 408 SPEC. DIA. 6.4 MM
LOG NO. 5651-90 SPEC. LENGTH 51. MM
LOG DENSITY 1.75 KG/M**3

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (KG/M**3)	MODULUS OF RUPTURE (MPA) (UNCORRECTED)	FLEXURAL STRENGTH (MPA) (CORRECTED)
2A-E-1-B1	AX	MLE	1.740	34.3	27.4
2-B1	AX	MLE	1.739	29.0	24.3
3-B1	AX	MLE	1.733	28.4	23.9
4-B1	AX	MLE	1.735	30.6	25.3
5-B1	AX	MLE	1.742	31.1	25.6
6-B1	AX	MLE	1.732	30.5	25.2
7-B1	AX	MLE	1.741	31.3	25.7
8-B1	AX	MLE	1.740	29.3	24.5
9-B1	AX	MLE	1.747	29.8	24.8
10-B1	AX	MLE	1.736	30.9	25.5
11-B1	AX	MLE	1.735	27.8	23.5
12-B1	AX	MLE	1.735	26.8	22.9
13-B1	AX	MLE	1.743	27.5	23.3
14-B1	AX	MLE	1.728	28.0	23.6
15-B1	AX	MLE	1.733	25.0	21.6
16-B1	AX	MLE	1.734	26.9	22.9
17-B1	AX	MLE	1.736	28.7	24.1
18-B1	AX	MLE	1.741	27.8	23.5
19-B1	AX	MLE	1.733	25.3	21.8
20-B1	AX	MLE	1.731	33.8	27.1
21-B1	AX	MLE	1.734	26.0	22.3
22-B1	AX	MLE	1.739	23.4	20.5
23-B1	AX	MLE	1.729	24.3	21.1
24-B1	AX	MLE	1.732	28.4	23.9
2BE-1B1	AX	MLE	1.751	32.9	26.6
2B1	AX	MLE	1.742	33.1	26.8
3B1	AX	MLE	1.744	35.7	28.1
4B1	AX	MLE	1.752	37.1	28.8
5B1	AX	MLE	1.741	34.0	27.3
6B1	AX	MLE	1.744	34.0	27.2
7B1	AX	MLE	1.746	30.6	25.3
8B1	AX	MLE	1.739	31.3	25.7
9B1	AX	MLE	1.740	30.6	25.3
10B1	AX	MLE	1.739	30.8	25.4
11B1	AX	MLE	1.746	32.9	26.6
2BE-12B1	AX	MLE	1.731	25.0	21.6
-13B1	AX	MLE	1.750	32.5	26.4
-14B1	AX	MLE	1.751	33.2	26.8
-15B1	AX	MLE	1.749	33.8	27.1
-16B1	AX	MLE	1.748	33.0	26.7
-17B1	AX	MLE	1.743	32.9	26.6
-18B1	AX	MLE	1.746	25.1	21.7
-19B1	AX	MLE	1.738	27.6	23.3
-20B1	AX	MLE	1.741	31.1	25.6
-21B1	AX	MLE	1.739	32.0	26.1
-22B1	AX	MLE	1.733	29.5	24.6
-23B1	AX	MLE	1.734	24.0	20.9
-24B1	AX	MLE	1.735	30.3	25.1
MEAN			1.739	30.0 MPA (4345. PSI)	24.8 MPA (3596. PSI)
STD. DEV.			.006	3.3 MPA (480. PSI)	2.1 MPA (298. PSI)

TABLE 16
STRENGTHS OF SMALL-SIZED TENSILE SPECIMENS, SLAB 2, AXIAL ORIENTATION,
MIDLENGTH-CENTER LOCATION

LOT NO. 408		SPEC. DIA. 6.4 MM				
LOG NO. 5651-90		SPEC. LENGTH 23. MM				
LOG DENSITY 1.75		KG/M**3				

SPECIMEN NUMBER	ORIENT- ATION	LOG DENSITY TJON (KG/M**3)	YOUNG'S MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)

2A-C-1-A1	AX	MLC	1.733			
1-A2	AX	MLC	1.742			14.7
2-A1	AX	MLC	1.735			14.3
2-A2	AX	MLC	1.728			14.8
3-A1	AX	MLC	1.738			16.7
3-A2	AX	MLC	1.729			15.8
4-A1	AX	MLC	1.733			16.1
4-A2	AX	MLC	1.730			13.2
5-A1	AX	MLC	1.726			14.3
5-A2	AX	MLC	1.725			15.1
6-A1	AX	MLC	1.717			15.1
6-A2	AX	MLC	1.728			12.0
7-A1	AX	MLC	1.731			13.4
7-A2	AX	MLC	1.741			15.2
8-A1	AX	MLC	1.729			14.8
8-A2	AX	MLC	1.723			15.4
9-A1	AX	MLC	1.728			15.2
10-A1	AX	MLC	1.720			15.1
10-A2	AX	MLC	1.725			12.4
2B-C-1A1	AX	MLC	1.740			17.2
1A2	AX	MLC	1.728			15.5
2A1	AX	MLC	1.737			16.9
2A2	AX	MLC	1.732			15.2
3A1	AX	MLC	1.739			15.5
3A2	AX	MLC	1.734			15.1
4A1	AX	MLC	1.732			14.5
4A2	AX	MLC	1.738			15.6
5A1	AX	MLC	1.717			12.6
5A2	AX	MLC	1.723			15.0
6A1	AX	MLC	1.738			14.3
6A2	AX	MLC	1.732			14.9
7A1	AX	MLC	1.728			12.7
7A2	AX	MLC	1.731			14.6
8A1	AX	MLC	1.736			16.4
8A2	AX	MLC	1.736			16.1
2B-C-9A1	AX	MLC	1.737			14.8
9A2	AX	MLC	1.739			15.7
10A1	AX	MLC	1.743			17.9
10A2	AX	MLC	1.744			16.3

MEAN		1.732				15.0 (2177.PSI)
STD. DEV.		.007				1.3 (188.PSI)

TABLE 17
STRENGTHS OF LARGE-SIZED TENSILE SPECIMENS, SLAB 2, AXIAL ORIENTATION,
MIDLENGTH-CENTER LOCATION

LOT NO. 408		SPEC. DIA. 12.8 MM	
LOG NO. 5651-90		SPEC. LENGTH 76. MM	
LOG DENSITY 1.75		KG/M**3	

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (KG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
2AC-200	AX	MLC	1.735				14.5
-201	AX	MLC	1.731				15.0
-202	AX	MLC	1.734				14.3
-203	AX	MLC	1.735	9.7	.010	.227	14.3
-204	AX	MLC	1.733				13.7
-205	AX	MLC	1.734				13.5
-206	AX	MLC	1.732				13.7
-207	AX	MLC	1.730				16.2
-208	AX	MLC	1.731				14.4
-209	AX	MLC	1.731				14.6
-210	AX	MLC	1.731	9.4	.010	.247	15.3
-211	AX	MLC	1.734				15.1
-212	AX	MLC	1.735				13.2
-213	AX	MLC	1.734				15.4
-214	AX	MLC	1.736				16.2
-215	AX	MLC	1.730				15.8
2BC-200	AX	MLC	1.733				15.2
-201	AX	MLC	1.741				15.0
-202	AX	MLC	1.731				15.2
-203	AX	MLC	1.730	9.0	.003	.235	14.4
-204	AX	MLC	1.735				14.9
-205	AX	MLC	1.739				15.0
-206	AX	MLC	1.729				11.2
-207	AX	MLC	1.730				13.2
-208	AX	MLC	1.735				16.0
-209	AX	MLC	1.739				15.3
-210	AX	MLC	1.737	9.3	.005	.240	16.0
-211	AX	MLC	1.741				15.1
-212	AX	MLC	1.730				15.3
-213	AX	MLC	1.729				15.1
-214	AX	MLC	1.731				14.6
-215	AX	MLC	1.725				12.9
MEAN			1.733	9.3 (1.35 MPsi)	.007	.237	14.7 (2127 PSI)
STD. DEV.			.004	.3 (.04 MPsi)	.004	.008	1.1 (156 PSI)

TABLE 18
STRENGTHS OF FOUR-POINT BEND SPECIMENS, SLAB 2, AXIAL ORIENTATION,
MIDLENGTH-CENTER LOCATION

LOT NO. 408		SPEC. DIA.		5.4 MM	
LOG NO. 5651-90		SPEC. LENGTH		51. MM	
LOG DENSITY 1.75		KG/M**3			
SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (KG/M**3)	MODULUS OF RUPTURE (MPA) (UNCORRECTED)	FLEXURAL STRENGTH (MPA) (CORRECTED)
2AC-1-B1	AX	MLC	1.729	23.2	20.2
2-B1	AX	MLC	1.733	27.1	22.9
3-B1	AX	MLC	1.736	31.0	25.3
4-B1	AX	MLC	1.723	28.5	23.8
5-B1	AX	MLC	1.728	27.5	23.2
6-B1	AX	MLC	1.732	27.5	23.1
7-B1	AX	MLC	1.726	25.8	22.1
8-B1	AX	MLC	1.731	22.8	19.9
9-B1	AX	MLC	1.714	25.4	21.8
10-B1	AX	MLC	1.728	26.7	22.7
2AC-11-B1	AX	MLC	1.733	26.1	22.2
-11-B2	AX	MLC	1.730	27.6	23.3
-12-B1	AX	MLC	1.727	28.3	23.7
-12-B2	AX	MLC	1.722	25.6	21.9
-13-B1	AX	MLC	1.738	26.4	22.4
-13-B2	AX	MLC	1.729	27.8	23.4
-14-B1	AX	MLC	1.733	26.3	22.4
-14-B2	AX	MLC	1.733	24.2	21.0
-15-B1	AX	MLC	1.732	26.5	22.5
-15-B2	AX	MLC	1.727	25.9	22.2
2BC-18B1	AX	MLC	1.743	26.9	22.8
-2B1	AX	MLC	1.739	30.0	24.8
-3B1	AX	MLC	1.727	24.6	21.2
-4B1	AX	MLC	1.746	26.2	22.3
-5B1	AX	MLC	1.730	27.7	23.3
-6B1	AX	MLC	1.732	28.6	23.9
-7B1	AX	MLC	1.731	27.2	23.0
-8B1	AX	MLC	1.736	26.4	22.5
-9B1	AX	MLC	1.733	27.6	23.3
-10B1	AX	MLC	1.734	23.4	20.4
2BC-11B1	AX	MLC	1.738	27.4	23.1
-11B2	AX	MLC	1.744	27.4	23.1
-12B1	AX	MLC	1.723	27.1	22.9
-12B2	AX	MLC	1.733	25.4	21.8
-13B1	AX	MLC	1.732	25.1	21.6
-13B2	AX	MLC	1.724	27.8	23.4
-14B1	AX	MLC	1.730	28.8	24.0
-14B2	AX	MLC	1.733	23.9	20.8
-15B1	AX	MLC	1.725	26.4	22.4
-15B2	AX	MLC	1.738	26.7	22.6
MEAN			1.731	26.6 MPA (3861. PSI)	22.6 MPA (3275. PSI)
STD. DEV.			.006	1.7 MPA (252. PSI)	1.2 MPA (167. PSI)

TABLE 19
STRENGTHS OF SMALL-SIZED TENSILE SPECIMENS, SLAB 2, RADIAL ORIENTATION,
MIDLENGTH-EDGE LOCATION

LOT NO. 408		SPEC. DIA. 6.4 MM					
LOG NO. 5651-90		SPEC. LENGTH 23. MM					
LOG DENSITY 1.75		KG/M**3					
SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (KG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
2AF-300A1	RAD	MLE	1.740				17.7
-301A1	RAD	MLE	1.730				14.9
-302A1	RAD	MLE	1.745				18.0
-303A1	RAD	MLE	1.733				12.2
-304A1	RAD	MLE	1.739				15.2
-305A1	RAD	MLE	1.738				14.7
-306A1	RAD	MLE	1.738				16.6
-307A1	RAD	MLE	1.741				17.5
-308A1	RAD	MLE	1.740				16.4
-309A1	RAD	MLE	1.735				17.6
-310A1	RAD	MLE	1.733				19.3
-311A1	RAD	MLE	1.736				17.7
-312A1	RAD	MLE	1.736				14.0
2AE-313A1	RAD	MLE	1.735				14.7
-314A1	RAD	MLE	1.735				15.3
-315A1	RAD	MLE	1.739				17.5
-316A1	RAD	MLE	1.729				13.2
-317A1	RAD	MLE	1.738				15.0
-318A1	RAD	MLE	1.740				12.8
-319A1	RAD	MLE	1.732				15.1
-320A1	RAD	MLE	1.739				16.2
-321A1	RAD	MLE	1.739				11.1
-322A1	RAD	MLE	1.727				12.2
-323A1	RAD	MLE	1.736				11.1
2HF-300A1	RAD	MLE	1.740				14.2
-301A1	RAD	MLE	1.741				12.9
-302A1	RAD	MLE	1.752				16.3
-303A1	RAD	MLE	1.736				17.4
-304A1	RAD	MLE	1.743				15.4
-305A1	RAD	MLE	1.745				15.4
-306A1	RAD	MLE	1.749				16.8
-307A1	RAD	MLE	1.746				14.2
-308A1	RAD	MLE	1.749				16.7
-309A1	RAD	MLE	1.745				15.1
-310A1	RAD	MLE	1.749				15.9
-311A1	RAD	MLE	1.743				14.5
24F-312A1	RAD	MLE	1.737				15.6
-313A1	RAD	MLE	1.732				14.6
-314A1	RAD	MLE	1.739				15.5
-315A1	RAD	MLE	1.734				15.1
-316A1	RAD	MLE	1.738				15.0
-317A1	RAD	MLE	1.733				15.5
-318A1	RAD	MLE	1.742				15.4
-319A1	RAD	MLE	1.734				14.4
-320A1	RAD	MLE	1.742				12.1
-321A1	RAD	MLE	1.737				16.1
-322A1	RAD	MLE	1.740				15.7
-323A1	RAD	MLE	1.730				15.9
MEAN							15.2
							(2210,PSI)
STD. DEV.							1.8
							(263,PSI)

TABLE 20
STRENGTHS OF LARGE-SIZED TENSILE SPECIMENS, SLAB 2, RADIAL ORIENTATION,
MIDLENGTH-EDGE LOCATION

LOT NO. 408 SPEC. DIA. 12.8 MM
LOG NO. 5051-00 SPEC. LENGTH 76. MM
LOG DENSITY 1.75 KG/M**3

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (KG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
24F-500	RAD	MLE	1.741	9.0	.015	.322	17.2
-501	RAD	MLE	1.737				15.1
-502	RAD	MLE	1.738				16.6
-503	RAD	MLE	1.740				14.3
-504	RAD	MLE	1.740				16.0
-505	RAD	MLE	1.739				16.3
-506	RAD	MLE	1.738				16.9
-507	RAD	MLE	1.739				16.0
-508	RAD	MLE	1.739				13.6
-509	RAD	MLE	1.738				14.6
-510	RAD	MLE	1.740				16.3
-511	RAD	MLE	1.736				15.4
24F-512	RAD	MLE	1.739				15.8
-513	RAD	MLE	1.735				10.9
-514	RAD	MLE	1.737				12.4
-515	RAD	MLE	1.738				11.5
-516	RAD	MLE	1.735				11.5
-517	RAD	MLE	1.733	9.0	.015	.322	12.4
-518	RAD	MLE	1.730				12.7
-519	RAD	MLE	1.733				12.2
-520	RAD	MLE	1.737				13.0
-521	RAD	MLE	1.736				11.1
-522	RAD	MLE	1.737				10.2
-523	RAD	MLE	1.736				11.6
28E-500	RAD	MLE	1.747	8.6	.020	.271	13.9
-501	RAD	MLE	1.746				9.8
-502	RAD	MLE	1.745				12.6
-503	RAD	MLE	1.739				12.7
-504	RAD	MLE	1.749				12.9
-505	RAD	MLE	1.744				14.0
-506	RAD	MLE	1.749				11.2
-507	RAD	MLE	1.746				12.7
-508	RAD	MLE	1.744				10.6
-509	RAD	MLE	1.748				13.7
-510	RAD	MLE	1.749				12.5
-511	RAD	MLE	1.744				12.7
28E-512	RAD	MLE	1.734				16.0
-513	RAD	MLE	1.737				15.4
-514	RAD	MLE	1.737				15.1
-515	RAD	MLE	1.737				14.4
-516	RAD	MLE	1.737				14.1
-517	RAD	MLE	1.737	8.7	.014	.257	13.8
-518	RAD	MLE	1.732				15.8
-519	RAD	MLE	1.735				14.8
-520	RAD	MLE	1.737				16.1
-521	RAD	MLE	1.739				16.7
-522	RAD	MLE	1.730				15.5
-523	RAD	MLE	1.738				16.1

MEAN			1.739	8.8	.016	.293	13.9
				(1.28 MPST)			(2014, PST)

STD. DEV.			.005	.2	.003	.034	2.0
				(.03 MPST)			(292, PST)

TABLE 21
STRENGTHS OF FOUR-POINT BEND SPECIMENS, SLAB 2, RADIAL ORIENTATION,
MIDLENGTH-EDGE LOCATION

LOT NO. 408		SPEC. DIA.		6.4 MM	
LOG NO. 5651-90		SPEC. LENGTH		51. MM	
LOG DENSITY 1.75		KG/M**3			
SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (KG/M**3)	MODULUS OF RUPTURE (MPA) (UNCORRECTED)	FLEXURAL STRENGTH (MPA) (CORRECTED)
2AE-300B1	RAD	MLE	1.730	25.2	21.3
-301B1	RAD	MLE	1.738	29.8	24.1
-302B1	RAD	MLE	1.731	27.5	22.7
-303B1	RAD	MLE	1.733	31.6	25.1
-304B1	RAD	MLE	1.738	27.8	22.9
-305B1	RAD	MLE	1.734	29.4	23.9
-306B1	RAD	MLE	1.734	25.5	21.5
-307B1	RAD	MLE	1.733	30.4	24.4
-308B1	RAD	MLE	1.734	25.1	21.2
-309B1	RAD	MLE	1.731	26.2	21.9
-310B1	RAD	MLE	1.735	25.9	21.7
-311B1	RAD	MLE	1.734	27.0	22.4
2AE-312B1	RAD	MLE	1.726	22.8	19.7
-313B1	RAD	MLE	1.732	25.0	21.1
-314B1	RAD	MLE	1.716	23.3	20.0
-315B1	RAD	MLE	1.726	23.3	20.0
-316B1	RAD	MLE	1.728	19.2	17.0
-317B1	RAD	MLE	1.713	18.6	16.6
-318B1	RAD	MLE	1.719	20.8	18.2
-319B1	RAD	MLE	1.736	22.1	19.1
-320B1	RAD	MLE	1.728	22.8	19.7
-321B1	RAD	MLE	1.727	24.6	20.9
-322B1	RAD	MLE	1.732	24.5	20.8
-323B1	RAD	MLE	1.731	26.2	21.9
2BE-300B1	RAD	MLE	1.746	22.3	19.3
-301B1	RAD	MLE	1.744	23.6	20.2
-302B1	RAD	MLE	1.746	24.2	20.6
-303B1	RAD	MLE	1.744	26.1	21.9
-304B1	RAD	MLE	1.745	23.9	20.4
-305B1	RAD	MLE	1.744	26.1	21.9
-306B1	RAD	MLE	1.744	22.5	19.5
-307B1	RAD	MLE	1.746	28.4	23.3
-308B1	RAD	MLE	1.749	25.3	21.3
-309B1	RAD	MLE	1.750	23.6	20.2
-310B1	RAD	MLE	1.753	27.3	22.6
-311B1	RAD	MLE	1.751	27.0	22.4
2BE-312B1	RAD	MLE	1.735	23.4	20.1
-313B1	RAD	MLE	1.739	29.0	23.6
-314B1	RAD	MLE	1.733	27.9	23.0
-315B1	RAD	MLE	1.740	24.9	21.1
-316B1	RAD	MLE	1.740	22.6	19.5
-317B1	RAD	MLE	1.739	27.3	22.6
-318B1	RAD	MLE	1.736	24.0	20.5
-319B1	RAD	MLE	1.736	25.9	21.7
-320B1	RAD	MLE	1.732	26.2	21.9
-321B1	RAD	MLE	1.742	24.5	20.8
-322B1	RAD	MLE	1.737	27.0	22.4
-323B1	RAD	MLE	1.739	27.6	22.8
MEAN			1.736	25.3 MPA (3671. PSI)	21.3 MPA (3089. PSI)
STD. DEV.			.009	2.7 MPA (393. PSI)	1.8 MPA (257. PSI)

TABLE 22
STRENGTHS OF SMALL-SIZED TENSILE SPECIMENS, SLAB 2, RADIAL ORIENTATION,
MIDLENGTH-CENTER LOCATION

LOT NO. 408			SPEC. DIA.		6.4 MM	
LOG NO. 5651-90			SPEC. LENGTH		23. MM	
LOG DENSITY 1.75			KG/M**3			

SPECIMEN NUMBER	ORIENT- ATION	LOG DENSITY TION (KG/M**3)	YOUNG'S MODULUS (GPA)	PERM. ANENT SET (PCT)	FRAC. TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)

2AC-300A1	RAD	MLC	1.742			15.2
-301A1	RAD	MLC	1.734			9.8
-302A1	RAD	MLC	1.735			12.8
-303A1	RAD	MLC	1.741			15.5
-304A1	RAD	MLC	1.732			11.1
-305A1	RAD	MLC	1.736			14.2
-306A1	RAD	MLC	1.730			14.1
-307A1	RAD	MLC	1.737			8.4
-308A1	RAD	MLC	1.731			7.4
-309A1	RAD	MLC	1.727			7.0
2AC-310A1	RAD	MLC	1.736			12.4
-311A1	RAD	MLC	1.737			9.8
-312A1	RAD	MLC	1.731			10.9
-313A1	RAD	MLC	1.735			9.4
-314A1	RAD	MLC	1.742			12.5
-315A1	RAD	MLC	1.740			12.9
-316A1	RAD	MLC	1.745			15.7
-317A1	RAD	MLC	1.739			5.6
2B-C300A1	RAD	MLC	1.734			9.5
301A1	RAD	MLC	1.735			13.4
302A1	RAD	MLC	1.733			14.7
303A1	RAD	MLC	1.728			7.5
304A1	RAD	MLC	1.732			14.0
305A1	RAD	MLC	1.725			11.9
306A1	RAD	MLC	1.730			10.9
307A1	RAD	MLC	1.726			12.9
308A1	RAD	MLC	1.726			12.3
309A1	RAD	MLC	1.734			12.4
2B-C310A1	RAD	MLC	1.730			15.1
311A1	RAD	MLC	1.736			16.9
312A1	RAD	MLC	1.741			15.4
313A1	RAD	MLC	1.730			15.5
314A1	RAD	MLC	1.731			15.9
315A1	RAD	MLC	1.732			14.1
316A1	RAD	MLC	1.735			12.6
317A1	RAD	MLC	1.735			14.0
318A1	RAD	MLC	1.730			11.2
319A1	RAD	MLC	1.737			13.8

MEAN			1.734			12.3
						(1789,PSI
STD. DEV.			.005			2.8
						(405,PSI

TABLE 23
STRENGTHS OF LARGE-SIZED TENSILE SPECIMENS, SLAB 2, RADIAL ORIENTATION,
MIDLENGTH-CENTER LOCATION

LOT NO. 408 SPEC. DIA. 12.8 MM
LOG NO. 5651-90 SPEC. LENGTH 76. MM
LOG DENSITY 1.75 KG/M**3

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (KG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
2AC-500	RAD	MLC	1.730	8.4	.016	.220	11.9
-501	RAD	MLC	1.733				11.2
-502	RAD	MLC	1.731				13.2
-503	RAD	MLC	1.729				12.7
-504	RAD	MLC	1.733				12.7
-505	RAD	MLC	1.733				12.3
-506	RAD	MLC	1.734				11.2
-507	RAD	MLC	1.736				
-508	RAD	MLC	1.732				11.1
-509	RAD	MLC	1.732				10.2
2AC-510	RAD	MLC	1.733				10.2
-511	RAD	MLC	1.737				12.2
-512	RAD	MLC	1.734				11.9
-513	RAD	MLC	1.734				12.0
-514	RAD	MLC	1.735				12.3
-515	RAD	MLC	1.734				10.7
-516	RAD	MLC	1.733				11.1
-517	RAD	MLC	1.734	8.2	.018	.242	12.5
2BC-500	RAD	MLC	1.744	8.5	.002	.055	14.5
-501	RAD	MLC	1.739				12.4
-502	RAD	MLC	1.724				11.4
-503	RAD	MLC	1.737				12.3
-504	RAD	MLC	1.735				11.7
-505	RAD	MLC	1.738				11.0
-506	RAD	MLC	1.737				13.4
-507	RAD	MLC	1.738				11.6
-508	RAD	MLC	1.736				11.4
2BC-509	RAD	MLC	1.730				14.1
-510	RAD	MLC	1.716				13.4
-511	RAD	MLC	1.720				11.5
-512	RAD	MLC	1.727				12.1
-513	RAD	MLC	1.724				11.6
-514	RAD	MLC	1.726				9.8
-515	RAD	MLC	1.729				11.1
-516	RAD	MLC	1.729				9.3
-517	RAD	MLC	1.727	8.5	.016	.190	11.0
MEAN			1.732	8.4	.013	.177	11.8
				(1.22 MPsi)			(1712.PSi)
STD. DEV.			.006	.1	.007	.084	1.1
				(.02 MPsi)			(164.PSi)

TABLE 24
STRENGTHS OF FOUR-POINT BEND SPECIMENS, SLAB 2, RADIAL ORIENTATION,
MIDLENGTH-CENTER LOCATION

		LOT NO. 438		SPEC. DIA. 6.4 MM	
		LOG NO. 5651-93		SPEC. LENGTH 51. MM	
		LOG DENSITY 1.75		KG/M**3	
SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (KG/M**3)	MODULUS OF RUPTURE (MPA) (UNCORRECTED)	FLEXUPAL STRENGTH (MPA) (CORRECTED)
2AC-300B1	RAD	MLC	1.736	28.9	23.4
-301B1	RAD	MLC	1.724	25.2	21.1
-302B1	RAD	MLC	1.729	26.2	21.7
-303B1	RAD	MLC	1.729	25.4	21.3
-304B1	RAD	MLC	1.720	27.3	22.4
-305B1	RAD	MLC	1.725	23.6	20.1
-306B1	RAD	MLC	1.727	25.5	21.4
-307B1	RAD	MLC	1.731	27.6	22.6
-308B1	RAD	MLC	1.727	22.3	19.2
-309B1	RAD	MLC	1.726	16.7	15.0
-310B1	RAD	MLC	1.728	17.9	15.9
2AC-311B1	RAD	MLC	1.736	13.9	16.4
-312B1	RAD	MLC	1.738	20.1	17.7
-313B1	RAD	MLC	1.736	25.7	21.5
-314B1	RAD	MLC	1.730	21.3	18.5
-315B1	RAD	MLC	1.740	21.3	18.5
-316B1	RAD	MLC	1.738	21.3	18.9
-317B1	RAD	MLC	1.741	24.3	20.6
2EC-300B1	RAD	MLC	1.734	22.8	19.6
-301B1	RAD	MLC	1.730	27.2	22.4
-302B1	RAD	MLC	1.729	26.2	21.8
-303B1	RAD	MLC	1.726	22.8	19.5
-304B1	RAD	MLC	1.726	26.2	21.8
-305B1	RAD	MLC	1.727	22.5	19.4
-306B1	RAD	MLC	1.724	20.8	18.2
-307B1	RAD	MLC	1.730	23.4	19.9
-308B1	RAD	MLC	1.721	22.7	19.5
-309B1	RAD	MLC	1.736	23.2	19.8
-310B1	RAD	MLC	1.729	24.2	20.5
2EC-311B1	RAD	MLC	1.731	26.2	21.8
-312B1	RAD	MLC	1.732	21.7	18.8
-313B1	RAD	MLC	1.729	23.3	19.9
-314B1	RAD	MLC	1.731	25.2	21.2
-315B1	RAD	MLC	1.732	20.6	18.0
-316B1	RAD	MLC	1.732	21.6	18.8
-317B1	RAD	MLC	1.733	21.6	18.8
-318B1	RAD	MLC	1.731	25.8	21.5
-319B1	RAD	MLC	1.726	21.7	18.8
MEAN			1.730	23.4 MPA (3394. PSI)	19.9 MPA (2886. PSI)
STD. DEV.			.005	2.8 MPA (405. PSI)	1.9 MPA (276. PSI)

TABLE 25
STRENGTHS OF SMALL-SIZED TENSILE SPECIMENS, SLAB 3, AXIAL ORIENTATION,
MIDLENGTH-EDGE LOCATION

LOT NO. 408			SPEC. DIA.			6.4 MM		
LOG NO. 5651-90			SPEC. LENGTH			23. MM		
LOG DENSITY 1.75			KG/M**3					
SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (KG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)	
-3AE---	1-A1	AX	MLE	1.742			15.7	
---	2-A1	AX	MLE	1.744	10.4	.029	.300	17.8
---	3-A1	AX	MLE	1.740				18.6
---	4-A1	AX	MLE	1.739	8.9	.028	.261	15.9
---	5-A1	AX	MLE	1.738				17.3
---	6-A1	AX	MLE	1.737				15.1
---	7-A1	AX	MLE	1.735				17.3
---	8-A1	AX	MLE	1.741	11.5	.020	.262	17.8
---	9-A1	AX	MLE	1.747				17.8
---	10-A1	AX	MLE	1.738	10.2	.020	.270	16.4
---	11-A1	AX	MLE	1.741				13.9
-3AE---	12-A1	AX	MLE	1.741	9.6	.026	.320	18.7
---	13-A1	AX	MLE	1.734				17.4
---	14-A1	AX	MLE	1.733	8.9	.032	.306	16.4
---	15-A1	AX	MLE	1.732				17.4
---	16-A1	AX	MLE	1.730	8.3	.037	.328	17.3
---	17-A1	AX	MLE	1.737				18.3
---	18-A1	AX	MLE	1.730	10.3	.030	.260	15.7
---	19-A1	AX	MLE	1.730				17.0
---	20-A1	AX	MLE	1.744				19.6
---	21-A1	AX	MLE	1.730				14.9
---	22-A1	AX	MLE	1.745				17.2
---	23-A1	AX	MLE	1.738				16.5
---	24-A1	AX	MLE	1.738				16.1
-3BE---	1-A1	AX	MLE	1.738				18.1
---	2-A1	AX	MLE	1.745	11.2	.028	.341	20.6
---	3-A1	AX	MLE	1.737				18.5
---	4-A1	AX	MLE	1.742				19.9
---	5-A1	AX	MLE	1.737				11.0
---	6-A1	AX	MLE	1.742				16.8
---	7-A1	AX	MLE	1.740				15.8
---	8-A1	AX	MLE	1.739	9.8	.033	.319	18.3
---	9-A1	AX	MLE	1.743				16.2
---	10-A1	AX	MLE	1.745				17.1
---	11-A1	AX	MLE	1.753				15.0
---	12-A1	AX	MLE	1.742	8.4	.050	.350	18.2
---	13-A1	AX	MLE	1.754				21.5
---	14-A1	AX	MLE	1.735	9.0	.038	.371	19.4
---	15-A1	AX	MLE	1.742				16.8
---	16-A1	AX	MLE	1.750	10.5	.022	.258	17.1
---	17-A1	AX	MLE	1.743				19.2
---	18-A1	AX	MLE	1.737	9.6	.039	.287	16.8
---	19-A1	AX	MLE	1.725				15.4
-3BE---	20-A1	AX	MLE	1.725	8.3	.034	.250	15.2
---	21-A1	AX	MLE	1.725				12.5
---	22-A1	AX	MLE	1.722				17.1
---	23-A1	AX	MLE	1.741				15.1
---	24-A1	AX	MLE	1.732				19.2
MEAN			1.738	9.7	.031	.300	17.0	
				(1.40 MPsi)			(2469.PSi)	
STD. DEV.			.007	1.0	.008	.038	1.9	
				(.15 MPsi)			(281.PSi)	

TABLE 26
STRENGTHS OF LARGE-SIZED TENSILE SPECIMENS, SLAB 3, AXIAL ORIENTATION,
MIDLENGTH-EDGE LOCATION

LOT NO. 408			SPEC. DIA. 12.8 MM				
LOG NO. 5651-90			SPEC. LENGTH 76. MM				
LOG DENSITY 1.75			KG/M**3				
SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (KG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
3AE-L200	AX	MLE	1.745				16.6
-L201	AX	MLE	1.747		.012	.230	18.0
-L202	AX	MLE	1.742				17.8
-L203	AX	MLE	1.735				17.8
-L204	AX	MLE	1.734				14.6
-L205	AX	MLE	1.735				16.5
-L206	AX	MLE	1.740				14.2
-L207	AX	MLE	1.744				16.8
-L208	AX	MLE	1.744				18.4
-L209	AX	MLE	1.741				15.2
-L210	AX	MLE	1.742				16.4
-L211	AX	MLE	1.742				16.6
-L212	AX	MLE	1.737				14.7
-L213	AX	MLE	1.735				14.7
-L214	AX	MLE	1.736				13.7
-L215	AX	MLE	1.737				15.6
-L216	AX	MLE	1.731				17.2
-L217	AX	MLE	1.732		.010	.198	15.7
-L218	AX	MLE	1.735				17.1
3AE-L219	AX	MLE	1.732				16.7
-L220	AX	MLE	1.733				16.0
-L221	AX	MLE	1.741				16.8
-L222	AX	MLE	1.736				16.3
-L223	AX	MLE	1.741				17.0
3BE-L200	AX	MLE	1.748				15.0
-L201	AX	MLE	1.748		.005	.232	19.7
-L202	AX	MLE	1.746				20.9
-L203	AX	MLE	1.741				19.9
-L204	AX	MLE	1.745				17.3
-L205	AX	MLE	1.744				18.2
-L206	AX	MLE	1.743				19.9
3BE-L207	AX	MLE	1.749				19.3
-L208	AX	MLE	1.753				19.6
-L209	AX	MLE	1.743				17.7
-L210	AX	MLE	1.746				19.1
-L211	AX	MLE	1.751				19.2
-L212	AX	MLE	1.749				18.4
-L213	AX	MLE	1.748				17.2
-L214	AX	MLE	1.748				18.0
-L215	AX	MLE	1.746				17.6
-L216	AX	MLE	1.737				14.9
-L217	AX	MLE	1.741		.013	.197	16.2
-L218	AX	MLE	1.736				15.7
-L219	AX	MLE	1.737				17.8
-L220	AX	MLE	1.732				15.0
-L221	AX	MLE	1.736				18.1
-L222	AX	MLE	1.732				15.1
-L223	AX	MLE	1.736				17.0
MEAN			1.741		.010	.214	17.0 (2470.PSI)
STD. DEV.			.006		.004	.019	1.7 (245.PSI)

TABLE 27
STRENGTHS OF FOUR-POINT BEND SPECIMENS, SLAB 3, AXIAL ORIENTATION,
MIDLENGTH-EDGE LOCATION

LOT NO. 408		SPEC. DIA. 6.4 MM			
LOG NO. 5651-90		SPEC. LENGTH 51. MM			
LOG DENSITY 1.75		KG/M**3			
SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (KG/M**3)	MODULUS OF RUPTURE (MPA) (UNCORRECTED)	FLEXURAL STRENGTH (MPA) (CORRECTED)
-3AE---1-B1	AX	MLE		27.2	23.7
---2-B1	AX	MLE		32.3	27.2
---3-B1	AX	MLE		24.7	21.9
---4-B1	AX	MLE		32.3	27.2
---5-B1	AX	MLE		33.3	27.8
---6-B1	AX	MLE		28.2	24.5
---7-B1	AX	MLE		25.5	22.4
---8-B1	AX	MLE		29.6	25.4
---9-B1	AX	MLE		29.8	25.5
--10-B1	AX	MLE		30.5	26.0
--11-B1	AX	MLE		29.2	25.1
-3AF--12-B1	AX	MLE		26.8	23.4
--13-B1	AX	MLE		23.3	20.8
--14-B1	AX	MLE		28.4	24.6
--15-B1	AX	MLE		25.0	22.1
--16-B1	AX	MLE		30.6	26.0
--17-B1	AX	MLE		24.7	21.9
--18-B1	AX	MLE		26.7	23.3
--19-B1	AX	MLE		29.7	25.5
--20-B1	AX	MLE		27.8	24.1
--21-B1	AX	MLE		31.6	26.7
--22-B1	AX	MLE		29.2	25.1
--23-B1	AX	MLE		29.0	25.0
--24-B1	AX	MLE		32.6	27.3
-3BE---1-B1	AX	MLE		35.1	29.0
---2-B1	AX	MLE		34.7	28.7
---3-B1	AX	MLE		34.6	28.7
---4-B1	AX	MLE		32.8	27.5
---5-B1	AX	MLE		38.0	30.6
-3BE---6-B1	AX	MLE		29.2	25.1
---7-B1	AX	MLE		34.5	28.6
---8-B1	AX	MLE		33.3	27.8
---9-B1	AX	MLE		31.0	26.3
--10-B1	AX	MLE		36.5	29.8
--11-B1	AX	MLE		31.5	26.6
--12-B1	AX	MLE		31.0	26.3
--13-B1	AX	MLE		29.5	25.3
--14-B1	AX	MLE		30.8	26.2
--15-B1	AX	MLE		31.0	26.3
--16-B1	AX	MLE		31.0	26.3
--17-B1	AX	MLE		33.0	27.7
--18-B1	AX	MLE		31.0	26.4
--19-B1	AX	MLE		31.0	26.4
--20-B1	AX	MLE		35.0	28.9
--21-B1	AX	MLE		29.5	25.4
--22-B1	AX	MLE		27.2	23.7
--23-B1	AX	MLE		27.2	23.7
--24-B1	AX	MLE		30.4	26.0
MEAN				30.4 MPA (4402. PSI)	25.8 MPA (3746. PSI)
STD. DEV.				3.2 MPA (467. PSI)	2.2 MPA (315. PSI)

TABLE 28
STRENGTHS OF SMALL-SIZED TENSILE SPECIMENS, SLAB 3, AXIAL ORIENTATION,
MIDLENGTH-CENTER LOCATION

LOT NO. 408			SPEC. DIA.		6.4 MM	
LOG NO. 5651-90			SPEC. LENGTH		23. MM	
LOG DENSITY 1.75			KG/M**3			

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (KG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TUPE STRAIN (PCT)	TENSILE STRENGTH (MPA)
-3AC---1-A1	AX	MLC	1.744				14.7
---1-A2	AX	MLC	1.748	9.1	.010	.271	16.8
---2-A1	AX	MLC	1.740				14.0
---2-A2	AX	MLC	1.735	10.1	.020	.209	14.1
---3-A1	AX	MLC	1.736				10.2
---3-A2	AX	MLC	1.727	10.0	.020	.227	15.0
---4-A1	AX	MLC	1.730				13.9
---4-A2	AX	MLC	1.727	8.3	.021	.315	15.9
---5-A1	AX	MLC	1.730				11.9
---5-A2	AX	MLC	1.725	8.8	.019	.212	12.5
---6-A1	AX	MLC	1.731				15.7
---6-A2	AX	MLC	1.730	9.4	.015		
---7-A1	AX	MLC	1.732				12.9
---7-A2	AX	MLC	1.731	10.3	.016	.212	13.9
---8-A1	AX	MLC	1.736				14.0
---8-A2	AX	MLC	1.735	11.1	.020	.196	13.7
---9-A1	AX	MLC	1.727				6.6
---9-A2	AX	MLC	1.733	10.4	.033	.217	13.9
--10-A1	AX	MLC	1.730				12.5
-3AC--10-A2	AX	MLC	1.736	9.2	.020	.210	13.5
-3BC---1-A1	AX	MLC	1.740				11.8
---1-A2	AX	MLC	1.750	12.0	.032	.212	14.4
---2-A1	AX	MLC	1.741				14.0
---2-A2	AY	MLC	1.754	10.7	.033	.240	15.5
---3-A1	AX	MLC	1.744				15.1
---3-A2	AX	MLC	1.756	10.4	.040	.273	15.0
---4-A1	AX	MLC	1.733				14.9
---4-A2	AX	MLC	1.741	10.0	.041	.249	15.3
---5-A1	AX	MLC	1.733				12.9
---5-A2	AX	MLC	1.732	8.9	.030	.263	15.6
---6-A1	AX	MLC	1.740				
---6-A2	AX	MLC	1.736	8.2	.040	.288	14.4
---7-A1	AX	MLC	1.732				12.1
---7-A2	AX	MLC	1.737	7.4	.042	.183	10.7
---8-A1	AX	MLC	1.737				10.1
---8-A2	AY	MLC	1.745	10.9	.041	.261	16.2
---9-A1	AX	MLC	1.747				13.5
-3BC---9-A2	AX	MLC	1.739	10.1	.012	.201	14.1
--10-A1	AX	MLC	1.717				14.8
--10-A2	AY	MLC	1.725	9.4	.039	.220	12.8

MEAN		1.736	9.7	.028	.236	13.7
			(1.41 MPsi)			(1980.PSi)
STD. DEV.		.008	1.1	.011	.035	2.0
			(.16 MPsi)			(286.PSi)

TABLE 29
STRENGTHS OF LARGE-SIZED TENSILE SPECIMENS, SLAB 3, AXIAL ORIENTATION,
MIDLENGTH-CENTER LOCATION

LOG NO. 408	SPEC. DIA. 12.8 MM
LOG NO. 5651-90	SPEC. LENGTH 76. MM
LOG DENSITY 1.75	KG/M**3

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (KG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
3AC-L200	AX	MLC	1.736				14.0
-L201	AX	MLC	1.734				13.2
-L202	AX	MLC	1.732				13.4
-L203	AX	MLC	1.728		.019	.160	12.2
-L204	AX	MLC	1.727				12.3
-L205	AX	MLC	1.734				13.0
-L206	AX	MLC	1.736				12.8
-L207	AX	MLC	1.736				12.1
-L208	AX	MLC	1.733				13.2
-L209	AX	MLC	1.726				13.1
-L210	AX	MLC	1.726		.010	.174	13.1
-L211	AX	MLC	1.728				13.6
-L212	AX	MLC	1.736				12.8
-L213	AX	MLC	1.741				13.8
-L214	AX	MLC	1.740				12.6
-L215	AX	MLC	1.739				12.9
3BC-L200	AX	MLC	1.746				15.9
-L201	AX	MLC	1.739				15.1
-L202	AX	MLC	1.734				13.8
-L203	AX	MLC	1.735		.012	.172	13.1
-L204	AX	MLC	1.733				11.6
-L205	AX	MLC	1.741				15.1
-L206	AX	MLC	1.736				13.4
-L207	AX	MLC	1.740				15.2
-L208	AX	MLC					
-L209	AX	MLC	1.740				13.2
-L210	AX	MLC	1.743		.013	.174	13.7
-L211	AX	MLC	1.742				14.0
-L212	AX	MLC	1.741				11.4
-L213	AX	MLC	1.725				11.6
-L214	AX	MLC	1.725				12.6
-L215	AX	MLC	1.731				12.6
MEAN			1.735		.013	.170	13.3 (1922.PSI)
STD. DEV.			.006		.004	.007	1.1 (154.PSI)

TABLE 30
STRENGTHS OF FOUR-POINT BEND SPECIMENS, SLAB 3, AXIAL ORIENTATION,
MIDLENGTH-CENTER LOCATION

LOT NO. 408		SPEC. DIA. 6.4 MM			
LOG NO. 5651-90		SPEC. LENGTH 51. MM			
LOG DENSITY 1.75		KG/M**3			
SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (KG/M**3)	MODULUS OF RUPTURE (MPA) (UNCORRECTED)	FLEXURAL STRENGTH (MPA) (CORRECTED)
-3AC---1-B1	AX	MLC		25.9	22.7
---2-B1	AX	MLC		25.5	22.5
---3-B1	AX	MLC		24.4	21.6
---4-B1	AX	MLC		27.8	24.2
---5-B1	AX	MLC		23.3	20.8
---6-B1	AX	MLC		25.6	22.6
---7-B1	AX	MLC		24.8	21.9
---8-B1	AX	MLC		27.3	23.8
---9-B1	AX	MLC		23.7	21.1
--10-B1	AX	MLC		26.0	22.8
--11-B1	AX	MLC		25.4	22.4
--11-B2	AX	MLC		22.0	19.8
--12-B1	AX	MLC		23.8	21.2
--12-B2	AX	MLC		26.4	23.1
--13-B1	AX	MLC		30.0	25.7
--13-B2	AX	MLC		25.2	22.3
--14-B1	AX	MLC		24.7	21.9
--14-B2	AX	MLC		24.1	21.4
--15-B1	AX	MLC		25.0	22.1
-3AC--15-B2	AX	MLC		24.9	22.0
-3BC---1-B1	AX	MLC		26.7	23.3
---2-B1	AX	MLC		25.5	22.5
---3-B1	AX	MLC		31.4	26.7
---4-B1	AX	MLC		31.6	26.7
---5-B1	AX	MLC		25.1	22.2
---6-B1	AX	MLC		21.4	19.3
---7-B1	AX	MLC		27.8	24.2
---8-B1	AX	MLC		27.4	23.9
---9-B1	AX	MLC		26.9	23.5
--10-B1	AX	MLC		28.2	24.4
--11-B1	AX	MLC		27.5	23.9
--11-B2	AX	MLC		25.1	22.2
--12-B1	AX	MLC		24.7	21.8
--12-B2	AX	MLC		25.7	22.6
--13-B1	AX	MLC		24.7	21.9
--13-B2	AX	MLC		26.0	22.9
--14-B1	AX	MLC		26.9	23.5
-3BC--14-B2	AX	MLC		25.8	22.7
--15-B1	AX	MLC		24.5	21.7
--15-B2	AX	MLC		28.1	24.4
MEAN				25.9 MPA (3758. PSI)	22.8 MPA (3300. PSI)
STD. DEV.				2.1 MPA (308. PSI)	1.6 MPA (225. PSI)

TABLE 31
STRENGTHS OF SMALL-SIZED TENSILE SPECIMENS, SLAB 3, RADIAL ORIENTATION,
MIDLENGTH-EDGE LOCATION

LOT NO. 408		SPEC. DIA.		6.4 MM			
LOG NO. 5651-90		SPEC. LENGTH		23. MM			
LOG DENSITY 1.75		KG/M***3					
SPECIMEN NUMBER	ORIENT- TION	LOCA- TION	DENSITY (KG/M***3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
-3AE-300-A1	RAD	MLE	1.740				14.4
-301-A1	RAD	MLE	1.740	9.4	.030	.261	14.7
-302-A1	RAD	MLE	1.742				13.0
-303-A1	RAD	MLE	1.739	8.2	.030	.169	9.1
-304-A1	RAD	MLE	1.744				14.7
-305-A1	RAD	MLE	1.736	8.6	.037	.240	12.6
-3AE-306-A1	RAD	MLE	1.736				13.2
-307-A1	RAD	MLE	1.740	8.2	.038	.254	12.5
-308-A1	RAD	MLE	1.741				13.1
-309-A1	RAD	MLE	1.738	8.5	.040	.208	11.2
-310-A1	RAD	MLE	1.736				9.1
-311-A1	RAD	MLE	1.737	6.4	.020	.262	12.2
-312-A1	RAD	MLE	1.742				8.6
-313-A1	RAD	MLE	1.738	8.6	.038	.269	15.0
-314-A1	RAD	MLE	1.739				14.0
-315-A1	RAD	MLE	1.744	9.0	.012	.261	15.5
-316-A1	RAD	MLE	1.746				
-317-A1	RAD	MLE	1.744	9.3	.022	.314	17.4
-318-A1	RAD	MLE	1.736				15.0
-319-A1	RAD	MLE	1.737	8.2	.030	.339	15.8
-320-A1	RAD	MLE	1.739				14.7
-321-A1	RAD	MLE	1.738				15.3
-322-A1	RAD	MLE	1.740				13.2
-323-A1	RAD	MLE	1.741				14.7
-3EE-300-A1	RAD	MLE	1.751				13.2
-301-A1	RAD	MLE	1.743	10.2	.030	.268	15.0
-302-A1	RAD	MLE	1.750				14.0
-303-A1	RAD	MLE	1.747	8.6	.035	.309	15.6
-304-A1	RAD	MLE	1.750				8.2
-305-A1	RAD	MLE	1.747	8.0	.031	.268	14.2
-306-A1	RAD	MLE	1.749				16.0
-307-A1	RAD	MLE	1.751	9.0	.017	.280	15.5
-308-A1	RAD	MLE	1.748				16.7
-309-A1	RAD	MLE	1.748	9.4	.030	.282	15.3
-310-A1	RAD	MLE	1.750				14.3
-311-A1	RAD	MLE	1.741	7.5	.035	.232	11.9
-312-A1	RAD	MLE	1.746				16.0
-313-A1	RAD	MLE	1.740	8.1	.024	.290	15.0
-3BE-314-A1	RAD	MLE	1.736				16.9
-315-A1	RAD	MLE	1.734	8.0	.035	.278	12.6
-316-A1	RAD	MLE	1.737				15.6
-317-A1	RAD	MLE	1.735	7.9	.029	.262	13.9
-318-A1	RAD	MLE	1.745				16.6
-319-A1	RAD	MLE	1.742	10.1	.039	.292	16.5
-320-A1	RAD	MLE	1.744				15.3
-321-A1	RAD	MLE	1.730				15.3
-322-A1	RAD	MLE	1.732				15.2
-323-A1	RAD	MLE	1.736				14.1
MEAN			1.741	8.6	.030	.270	14.1
			(1.24 MPsi)		(2043.Psi)		
STD. DEV.			.005	.9	.008	.037	2.1
			(.13 MPsi)		(311.Psi)		

TABLE 32
STRENGTHS OF LARGE-SIZED TENSILE SPECIMENS, SLAB 3, RADIAL ORIENTATION,
MIDLENGTH-EDGE LOCATION

LOT NO. 408	SPEC. DIA. 12.8 MM
LOG NO. 5651-90	SPEC. LENGTH 76. MM
LOG DENSITY 1.75	KG/M**3

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (KG/M**3)	YOUNG'S MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
3BE-L500	RAD	MLE	1.748		.012	.193	13.8
3BE-L501	RAD	MLE	1.750				11.3
-L502	RAD	MLE	1.749				13.2
-L503	RAD	MLE	1.749				12.7
-L504	RAD	MLE	1.748				12.3
-L505	RAD	MLE	1.748				14.5
-L506	RAD	MLE	1.748				13.5
-L507	RAD	MLE	1.746				12.5
-L508	RAD	MLE	1.746				12.8
-L509	RAD	MLE	1.746				11.8
-L510	RAD	MLE	1.747				14.1
-L511	RAD	MLE	1.747				14.0
-L512	RAD	MLE	1.740				14.9
-L513	RAD	MLE	1.740				13.4
-L514	RAD	MLE	1.739				15.1
-L515	RAD	MLE	1.739				14.8
-L516	RAD	MLE	1.740				13.8
-L517	RAD	MLE	1.741		.013	.227	15.6
-L518	RAD	MLE	1.739				15.2
-L519	RAD	MLE	1.740				15.2
3BE-L520	RAD	MLE	1.740				14.9
-L521	RAD	MLE	1.740				15.8
-L522	RAD	MLE	1.740				15.8
-L523	RAD	MLE	1.739				15.8
MEAN			1.744		.012	.210	14.0 (2036.PSI)
STD. DEV.			.004		.001	.024	1.3 (193.PSI)

TABLE 33
STRENGTHS OF FOUR-POINT BEND SPECIMENS, SLAB 3, RADIAL ORIENTATION,
MIDLENGTH-EDGE LOCATION

LOT NO. 408			SPEC. DIA. 6.4 MM		
LOG NO. 5651-9C			SPEC. LENGTH 51. MM		
LOG DENSITY 1.75			KG/M**3		
SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (KG/M**3)	MODULUS OF RUPTURE (MPA) (UNCORRECTED)	FLEXURAL STRENGTH (MPA) (CORRECTED)
-3AE-300-B1	RAD	MLE		27.5	23.3
-301-B1	RAD	MLE		23.4	20.5
-302-B1	RAD	MLE		25.2	21.8
-303-B1	RAD	MLE		24.1	21.0
-304-B1	RAD	MLE		23.6	20.7
-305-B1	RAD	MLE		21.5	19.1
-306-B1	RAD	MLE		27.7	23.5
-307-B1	RAD	MLE		27.5	23.4
-308-B1	RAD	MLE		23.9	20.9
-309-B1	RAD	MLE		24.7	21.4
-310-B1	RAD	MLE		25.1	21.7
-311-B1	RAD	MLE		25.4	21.9
-312-B1	RAD	MLE		31.3	25.7
-313-B1	RAD	MLE		27.8	23.6
-314-B1	RAD	MLE		28.4	23.9
-315-B1	RAD	MLE		28.8	24.2
-316-B1	RAD	MLE		28.4	23.9
-317-B1	RAD	MLE		29.7	24.8
-318-B1	RAD	MLE		28.9	24.2
-3AE-319-B1	RAD	MLE		30.2	25.1
-320-B1	RAD	MLE		27.3	23.2
-321-B1	RAD	MLE		28.5	24.0
-322-B1	RAD	MLE		26.8	22.9
-323-B1	RAD	MLE		30.1	25.0
-3BE-300-B1	RAD	MLE		25.6	22.1
-301-B1	RAD	MLE		28.2	23.8
-302-B1	RAD	MLE		25.1	21.7
-303-B1	RAD	MLE		25.2	21.8
-304-B1	RAD	MLE		25.6	22.0
-305-B1	RAD	MLE		23.4	20.5
-306-B1	RAD	MLE		26.2	22.5
-307-B1	RAD	MLE		23.2	20.4
-308-B1	RAD	MLE		24.7	21.4
-309-B1	RAD	MLE		26.4	22.6
-310-B1	RAD	MLE		25.3	21.8
-311-B1	RAD	MLE		29.8	24.8
-312-B1	RAD	MLE		25.1	21.7
-3BE-313-B1	RAD	MLE		26.9	23.0
-314-B1	RAD	MLE		28.1	23.7
-315-B1	RAD	MLE		25.4	21.9
-316-B1	RAD	MLE		24.4	21.2
-317-B1	RAD	MLE		32.7	26.6
-318-B1	RAD	MLE		30.3	25.1
-319-B1	RAD	MLE		25.0	21.6
-320-B1	RAD	MLE		27.6	23.4
-321-B1	RAD	MLE		27.0	23.1
-322-B1	RAD	MLE		27.2	23.1
-323-B1	RAD	MLE		28.1	23.8
MEAN				26.7 MPA (3875. PSI)	22.8 MPA (3304. PSI)
STD. DEV.				2.4 MPA (342. PSI)	1.6 MPA (230. PSI)

TABLE 34
STRENGTHS OF SMALL-SIZED TENSILE SPECIMENS, SLAB 3, RADIAL ORIENTATION,
MIDLENGTH-CENTER LOCATION

LOT NO. 408 SPEC. DIA. 6.4 MM
LOG NO. 5651-90 SPEC. LENGTH 23. MM
LOG DENSITY 1.75 KG/M**3

SPECIMEN NUMBER	ORIENT- ATION	LOCAT- ION	DENSITY (KG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
-3AC-300-A1	RAD	MLC	1.737				12.6
-301-A1	RAD	MLC	1.733	9.0	.021	.170	10.9
-302-A1	RAD	MLC	1.730				13.3
-303-A1	RAD	MLC	1.731	7.9	.020	.189	10.9
-304-A1	RAD	MLC	1.736				13.0
-305-A1	RAD	MLC	1.729	9.4	.033	.229	13.4
-306-A1	RAD	MLC	1.737				14.3
-307-A1	RAD	MLC	1.739	6.6	.040	.239	12.6
-308-A1	RAD	MLC	1.747				11.5
-309-A1	RAD	MLC	1.736				11.7
-310-A1	RAD	MLC	1.733				14.5
-311-A1	RAD	MLC	1.737	7.2	.026	.270	14.0
-312-A1	RAD	MLC	1.744				14.1
-313-A1	RAD	MLC	1.736	7.1	.039	.270	12.3
-314-A1	RAD	MLC	1.737				
-3AC-315-A1	RAD	MLC	1.736	9.0	.043	.180	9.5
-316-A1	RAD	MLC	1.740				13.9
-317-A1	RAD	MLC	1.733	7.4	.033	.281	14.6
-318-A1	RAD	MLC	1.738				
-319-A1	RAD	MLC	1.736	7.7	.030	.210	12.2
-3BC-300-A1	RAD	MLC	1.738				10.9
-301-A1	RAD	MLC	1.744	6.3	.043	.220	12.5
-302-A1	RAD	MLC	1.741				
-303-A1	RAD	MLC	1.741	8.6	.028	.211	11.5
-304-A1	RAD	MLC	1.739				12.9
-305-A1	RAD	MLC	1.747	9.7	.030	.170	11.2
-306-A1	RAD	MLC	1.750				15.4
-307-A1	RAD	MLC	1.744	9.8	.030	.250	14.1
-308-A1	RAD	MLC	1.742				14.1
-309-A1	RAD	MLC	1.747	8.4	.037	.282	14.6
-310-A1	RAD	MLC	1.735				12.0
-311-A1	RAD	MLC	1.735	9.1	.022	.270	16.2
-312-A1	RAD	MLC	1.734				14.3
-3BC-313-A1	RAD	MLC	1.739	8.6	.031	.250	13.0
-314-A1	RAD	MLC	1.732				12.2
-315-A1	RAD	MLC	1.728	8.0	.026	.333	16.4
-316-A1	RAD	MLC	1.733				8.0
-317-A1	RAD	MLC	1.736	7.0	.033	.323	14.9
-318-A1	RAD	MLC	1.738				13.4
-319-A1	RAD	MLC	1.726	8.7	.030	.260	12.9
MEAN			1.737	8.2 (1.19 MPsi)	.031	.244	13.0 (1881 PSI)
STD. DEV.			.005	1.1 (.15 MPsi)	.007	.047	1.8 (255 PSI)

TABLE 35
STRENGTHS OF LARGE-SIZED TENSILE SPECIMENS, SLAB 3, RADIAL ORIENTATION,
MIDLENGTH-CENTER LOCATION

LOT NO. 408		SPEC. DIA. 12.8 MM	
LOG NO. 5651-90		SPEC. LENGTH 76. MM	
LOG DENSITY 1.75		KG/M**3	

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (KG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
BAC-L500	RAD	MLC	1.734		.014	.179	12.5
-L501	RAD	MLC	1.735				12.7
-L502	RAD	MLC	1.737				11.4
-L503	RAD	MLC	1.734				7.8
-L504	RAD	MLC	1.749				12.8
-L505	RAD	MLC	1.737				11.1
-L506	RAD	MLC	1.733				12.1
-L507	RAD	MLC	1.734				12.0
-L508	RAD	MLC	1.735				10.6
-L509	RAD	MLC	1.729				11.4
-L510	RAD	MLC	1.737				10.5
-L511	RAD	MLC	1.735				10.2
-L512	RAD	MLC	1.735				12.4
-L513	RAD	MLC	1.736				10.1
-L514	RAD	MLC	1.734				10.3
-L515	RAD	MLC	1.732				11.8
-L516	RAD	MLC	1.739				10.0
-L517	RAD	MLC	1.740		.016	.122	8.6
3FC-L500	RAD	MLC	1.739		.015	.150	11.0
-L501	RAD	MLC	1.739				11.2
-L502	RAD	MLC	1.737				12.4
-L503	RAD	MLC	1.739				10.7
-L504	RAD	MLC	1.742				11.9
-L505	RAD	MLC	1.742				11.5
-L506	RAD	MLC	1.742				12.8
-L507	RAD	MLC	1.741				8.2
-L508	RAD	MLC	1.739				11.6
-L509	RAD	MLC	1.741				14.1
-L510	RAD	MLC	1.732				12.3
-L511	RAD	MLC	1.736				12.8
-L512	RAD	MLC	1.737				12.8
-L513	RAD	MLC	1.737				11.2
-L514	RAD	MLC	1.737				13.2
-L515	RAD	MLC	1.736				11.8
-L516	RAD	MLC	1.736				12.0
-L517	RAD	MLC	1.737		.010	.183	12.9
MEAN			1.737		.014	.158	11.5 (1663.PSI)
STD. DEV.			.004		.003	.028	1.4 (202.PSI)

TABLE 36
STRENGTHS OF FOUR-POINT BEND SPECIMENS, SLAB 3, RADIAL ORIENTATION,
MIDLENGTH-CENTER LOCATION

LOT NO. 408		SPEC. DIA. 6.4 MM			
LOG NO. 5651-90		SPEC. LENGTH 51. MM			
LOG DENSITY 1.75		KG/M**3			
SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION (KG/M**3)	DENSITY	MODULUS OF RUPTURE (MPA) (UNCORRECTED)	FLEXURAL STRENGTH (MPA) (CORRECTED)
-3AC-300-B1	RAD	MLC		20.4	18.1
-301-B1	RAD	MLC		22.9	20.0
-302-B1	RAD	MLC		26.0	22.2
-303-B1	RAD	MLC		22.9	20.0
-304-B1	RAD	MLC		22.3	19.5
-305-B1	RAD	MLC		24.4	21.1
-306-B1	RAD	MLC		26.7	22.6
-307-B1	RAD	MLC		27.4	23.1
-308-B1	RAD	MLC		25.5	21.8
-309-B1	RAD	MLC		19.5	17.4
-310-B1	RAD	MLC		25.4	21.7
-311-B1	RAD	MLC		21.0	18.6
-312-B1	RAD	MLC		23.1	20.1
-313-B1	RAD	MLC		23.1	20.2
-314-B1	RAD	MLC		23.4	20.3
-3AC-315-B1	RAD	MLC		24.8	21.4
-316-B1	RAD	MLC		24.5	21.1
-317-B1	RAD	MLC		25.2	21.6
-318-B1	RAD	MLC		22.0	19.3
-319-B1	RAD	MLC		23.6	20.5
-3RC-300-B1	RAD	MLC		28.4	23.7
-301-B1	RAD	MLC		26.1	22.2
-302-B1	RAD	MLC		26.2	22.3
-303-B1	RAD	MLC		21.6	19.0
-304-B1	RAD	MLC		21.7	19.1
-305-B1	RAD	MLC		26.5	22.4
-306-B1	RAD	MLC		27.5	23.1
-307-B1	RAD	MLC		25.1	21.5
-308-B1	RAD	MLC		26.0	22.2
-309-B1	RAD	MLC		26.9	22.7
-310-B1	RAD	MLC		28.6	23.8
-311-B1	RAD	MLC		23.4	20.4
-312-B1	RAD	MLC		25.6	21.9
-3RC-313-B1	RAD	MLC		23.1	20.1
-314-B1	RAD	MLC		22.0	19.3
-315-B1	RAD	MLC		23.5	20.4
-316-B1	RAD	MLC		24.0	20.8
-317-B1	RAD	MLC		27.3	23.0
-318-B1	RAD	MLC		26.3	22.4
-319-B1	RAD	MLC		27.5	23.1
MEAN				24.5 MPA (3558. PSI)	21.1 MPA (3061. PSI)
STD. DEV.				2.3 MPA (330. PSI)	1.6 MPA (231. PSI)

TABLE 37
STRENGTHS OF SMALL-SIZED TENSILE SPECIMENS, SLAB 4, AXIAL ORIENTATION,
END-EDGE LOCATION

LOT NO. 408		SPEC. DIA.		6.4 MM			
LOG NO. 5651-90		SPEC. LENGTH		23. MM			
LOG DENSITY 1.75		KG/M**3					
SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (KG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
-4AE---1-A1	AX	EE	1.746				16.9
---2-A1	AX	EE	1.749				20.1
---3-A1	AX	EE	1.721				18.2
---4-A1	AX	EE	1.740				15.7
---5-A1	AX	EE	1.746				16.3
---6-A1	AX	EE	1.738				13.8
---7-A1	AX	EE	1.751				14.2
---8-A1	AX	EE	1.746				13.4
---9-A1	AX	EE	1.738				17.3
--10-A1	AY	EE	1.747				18.4
--11-A1	AY	EE	1.747				15.0
-4AE--12-A1	AY	EE	1.741				19.0
--13-A1	AX	EE	1.734				17.7
--14-A1	AX	EE	1.732				16.3
--15-A1	AX	EE	1.738				15.2
--16-A1	AX	EE	1.744				15.8
--17-A1	AX	EE	1.745				15.2
--18-A1	AX	EE	1.734				15.6
--19-A1	AX	EE	1.734				20.0
--20-A1	AX	EE	1.741				13.2
--21-A1	AX	EE	1.738				16.0
--22-A1	AX	EE	1.747				19.8
--23-A1	AX	EE	1.731				14.9
--24-A1	AY	EE	1.742				18.1
-4EE---1-A1	AX	EE	1.754				16.0
---2-A1	AX	EE	1.746				18.2
---3-A1	AX	EE	1.747				18.1
---4-A1	AX	EE	1.749				19.7
---5-A1	AX	EE	1.736				16.7
-4EE---6-A1	AX	EE	1.752				19.7
---7-A1	AX	EE	1.740				19.4
---8-A1	AX	EE	1.749				15.2
---9-A1	AX	EE	1.735				19.6
--10-A1	AY	EE	1.740				18.1
--11-A1	AX	EE	1.753				18.9
--12-A1	AX	EE	1.742				16.3
--13-A1	AY	EE	1.743				17.2
--14-A1	AX	EE	1.749				19.2
--15-A1	AX	EE	1.745				14.3
--16-A1	AX	EE	1.743				17.5
--17-A1	AX	EE	1.749				19.1
--18-A1	AX	EE	1.735				14.1
--19-A1	AX	EE	1.742				15.8
--20-A1	AX	EE	1.735				15.0
--21-A1	AX	EE	1.734				16.5
--22-A1	AX	EE	1.728				14.5
--23-A1	AX	EE	1.737				14.7
--24-A1	AX	EE	1.713				18.0
MEAN			1.741				16.8 (2442.PSI)
STD. DEV.			.008				2.0 (287.PSI)

TABLE 38
STRENGTHS OF LARGE-SIZED TENSILE SPECIMENS, SLAB 4, AXIAL ORIENTATION,
END-EDGE LOCATION

LOT NO. 408			SPEC. DIA.		12.8 MM		
LOG NO. 5651-90			SPEC. LENGTH		76. MM		
LOG DENSITY 1.75			KG/M**3				
SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (KG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
4AE-L200	AX	EE	1.745				16.8
-L201	AX	EE	1.747		.009	.238	19.1
-L202	AX	EE	1.747				17.5
-L203	AX	EE	1.748				14.4
-L204	AX	EE	1.738				16.2
-L205	AX	EE	1.750				17.8
-L206	AX	EE	1.744				16.5
-L207	AX	EE	1.743				16.4
-L208	AX	EE	1.747				16.7
-L209	AX	EE	1.746				15.6
-L210	AX	EE	1.750				17.3
-L211	AX	EE	1.748				16.3
-L212	AX	EE	1.739				14.5
-L213	AX	EE	1.741				16.6
-L214	AX	EE	1.738				15.4
-L215	AX	EE	1.738				16.9
-L216	AX	EE	1.738				14.5
-L217	AX	EE	1.744		.013	.186	14.4
-L218	AX	EE	1.749				15.8
4AE-L219	AX	EE	1.743				16.9
-L220	AX	EE	1.745				15.4
-L221	AX	EE	1.747				16.8
-L222	AX	EE	1.749				14.7
-L223	AX	EE	1.744				17.4
4BE-L200	AX	EE	1.752				18.3
-L201	AX	EE	1.751		.011	.231	19.3
-L202	AX	EE	1.750				17.9
-L203	AX	EE	1.758				20.2
-L204	AX	EE	1.746				19.6
-L205	AX	EE	1.743				18.5
-L206	AX	EE	1.748				18.7
4BE-L207	AX	EE	1.744				17.3
-L208	AX	EE	1.747				17.6
-L209	AX	EE	1.753				19.6
-L210	AX	EE	1.746				16.6
-L211	AX	EE	1.740				15.8
-L212	AX	EE	1.750				17.3
-L213	AX	EE	1.749				16.5
-L214	AX	EE	1.747				16.2
-L215	AX	EE	1.751				17.2
-L216	AX	EE	1.741				14.7
-L217	AX	EE	1.753		.008	.226	18.2
-L218	AX	EE	1.739				15.9
-L219	AX	EE	1.742				14.7
-L220	AX	EE	1.734				13.8
-L221	AX	EE	1.737				16.9
-L222	AX	EE	1.738				15.2
-L223	AX	EE	1.738				16.8
MEAN			1.745		.010	.220	16.7
							(2425.PSI)
STD. DEV.			.005		.002	.023	1.5
							(223.PSI)

TABLE 39
STRENGTHS OF FOUR-POINT BEND SPECIMENS, SLAB 4, AXIAL ORIENTATION,
END-EDGE LOCATION

TEST NO. 428			SPEC. DIA. 2.4 MM		
LOG NO. 5551-90			SPEC. LENGTH 51. MM		
LOG DENSITY 1.75			KG/M**3		

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (KG/M**3)	MODULUS OF RUPTURE (MPA) (UNCORRECTED)	FLEXURAL STRENGTH (MPA) (CORRECTED)

-4AF---1-B1	AX	EF		33.8	28.1
---2-B1	AX	EE		31.8	26.5
---3-B1	AX	EF		33.9	28.2
---4-B1	AX	EE		29.7	25.2
---5-B1	AX	EE		31.4	26.6
---6-B1	AX	EE		26.9	23.2
---7-B1	AX	EE		28.7	23.5
---8-B1	AX	EE		30.5	26.1
---9-B1	AX	EF		28.4	24.5
---10-B1	AX	EE		25.2	22.2
---11-B1	AX	EE		29.3	25.5
---12-B1	AX	EE		28.2	24.4
---13-B1	AX	EF		28.7	24.8
---14-B1	AX	EE		26.6	23.8
---15-B1	AX	EE		27.8	24.0
---16-B1	AX	EE		27.9	24.2
---17-B1	AX	EE		28.8	25.4
---18-B1	AX	EE		25.7	22.7
---19-B1	AX	EE		21.7	19.5
-4AF---20-B1	AX	EE		28.3	24.5
---21-B1	AX	EE		30.7	26.1
---22-B1	AX	EE		27.8	24.0
---23-B1	AX	EE		27.8	23.5
---24-B1	AX	EE		27.4	23.9
-4BF---1-B1	AX	EE		30.4	25.9
---2-B1	AX	EE		32.1	27.9
---3-B1	AX	EE		32.8	27.5
---4-B1	AX	EE		34.1	29.3
---5-B1	AX	EE		30.9	26.3
---6-B1	AX	EE		33.3	27.8
---7-B1	AX	EE		33.5	28.0
---8-B1	AX	EE		26.5	23.2
---9-B1	AX	EE		29.9	25.6
---10-B1	AX	EE		30.1	25.7
---11-B1	AX	EE		26.4	23.1
---12-B1	AX	EE		25.9	22.7
---13-B1	AX	EE		28.4	24.6
-4BF---14-B1	AX	EE		26.2	23.0
---15-B1	AX	EE		31.2	26.5
---16-B1	AX	EE		28.7	24.8
---17-B1	AX	EE		27.5	23.9
---18-B1	AX	EE		27.8	24.1
---19-B1	AX	EE		23.6	21.1
---20-B1	AX	EE		27.2	23.6
---21-B1	AX	EE		27.4	23.9
---22-B1	AX	EE		25.3	22.3
---23-B1	AX	EE		27.7	24.1
---24-B1	AX	EE		32.8	27.5

MEAN				28.3 MPA (4187. PSI)	24.8 MPA (3596. PSI)

STD. DEV.				2.5 MPA (400. PSI)	2.0 MPA (285. PSI)

TABLE 40
STRENGTHS OF SMALL-SIZED TENSILE SPECIMENS, SLAB 4, AXIAL ORIENTATION,
END-CENTER LOCATION

LOT NO. 408		SPEC. DIA.		6.4 MM	
LOG NO. 5651-90		SPEC. LENGTH		23. MM	
LOG DENSITY 1.75		KG/M**3			

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (KG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
-4AC---1-A1	AX	EC	1.744				12.7
---1-A2	AX	EC	1.743				14.1
---2-A1	AX	EC	1.739				13.6
---2-A2	AX	EC	1.739				14.2
---3-A1	AX	EC	1.736				13.4
---3-A2	AX	EC	1.746				14.2
---4-A1	AX	EC	1.747				14.6
---4-A2	AX	EC	1.749				15.5
---5-A1	AX	EC	1.749				15.9
---5-A2	AX	EC	1.747				14.5
---6-A1	AX	EC	1.744				12.8
---6-A2	AX	EC	1.747				12.0
---7-A1	AX	EC	1.753				12.1
---7-A2	AX	EC	1.736				11.5
---8-A1	AX	EC	1.751				10.3
---8-A2	AX	EC	1.737				13.5
---9-A1	AX	EC	1.745				12.2
---9-A2	AX	EC	1.739				10.7
--10-A1	AX	EC	1.740				10.5
-4AC--10-A2	AX	EC	1.739				11.3
-4PC---1-A1	AX	EC	1.737				13.4
---1-A2	AX	EC	1.743				16.3
---2-A1	AX	EC	1.743				16.0
---2-A2	AX	EC	1.742				16.9
---3-A1	AX	EC	1.740				15.7
---3-A2	AX	EC	1.751				16.0
---4-A1	AX	EC	1.750				17.0
---4-A2	AX	EC	1.738				14.5
---5-A1	AX	EC	1.727				11.6
---5-A2	AX	EC	1.721				12.2
---6-A1	AX	EC	1.744				14.6
---6-A2	AX	EC	1.750				12.8
---7-A1	AX	EC	1.741				14.8
---7-A2	AX	EC	1.749				15.2
---8-A1	AX	EC	1.754				16.4
---8-A2	AX	EC	1.751				17.7
---9-A1	AX	EC	1.741				17.0
-4EC---9-A2	AX	EC	1.746				15.5
--10-A1	AX	EC	1.741				14.2
--10-A2	AX	EC	1.751				15.7
MEAN			1.743				14.1
							(2042.PSI)
STD. DEV.			.007				2.0
							(288.PSI)

TABLE 41
STRENGTHS OF LARGE-SIZED TENSILE SPECIMENS, SLAB 4, AXIAL ORIENTATION,
END-CENTER LOCATION

LOT NO. 408	SPEC. DIA. 12.8 MM
LOG NO. 5651-90	SPEC. LENGTH 76. MM
LOG DENSITY 1.75	KG/M**3

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (KG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
4AC-L200	AX	EC	1.746				12.0
-L201	AX	EC	1.740				13.1
-L202	AX	EC	1.744				12.7
-L203	AX	EC	1.743		.011	.137	11.0
-L204	AX	EC	1.742				13.4
-L205	AX	EC	1.742				11.7
-L206	AX	EC	1.740				13.0
-L207	AX	EC	1.741				11.9
-L208	AX	EC	1.736				10.9
-L209	AX	EC	1.740				12.5
-L210	AX	EC	1.741		.010	.134	11.1
-L211	AX	EC	1.738				10.5
-L212	AX	EC	1.746				13.7
-L213	AX	EC	1.748				13.1
4AC-L214	AX	EC	1.742				13.4
-L215	AX	EC	1.742				14.9
4BC-L200	AX	EC	1.753				16.0
-L201	AX	EC	1.749				15.6
-L202	AX	EC	1.746				16.0
-L203	AX	EC	1.747		.008	.190	15.5
-L204	AX	EC	1.744				13.8
-L205	AX	EC	1.746				14.3
-L206	AX	EC	1.742				13.1
-L207	AX	EC	1.740				11.7
-L208	AX	EC	1.751				14.5
-L209	AX	EC	1.748				14.5
-L210	AX	EC	1.749		.009	.180	14.1
-L211	AX	EC	1.751				13.0
-L212	AX	EC	1.745				11.4
-L213	AX	EC	1.745				13.0
-L214	AX	EC	1.742				12.0
-L215	AX	EC	1.739				12.0
MEAN			1.744		.009	.160	13.1 (1901.PSI)
STD. DEV.			.004		.001	.029	1.5 (221.PSI)

TABLE 42
STRENGTHS OF FOUR-POINT BEND SPECIMENS, SLAB 4, AXIAL ORIENTATION,
END-CENTER LOCATION

LOT NO. 408		SPEC. DIA. 6.4 MM	
LOG NO. 5651-99		SPEC. LENGTH 51. MM	
LOG DENSITY 1.75		KG/M**3	

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (KG/M**3)	MODULUS OF RUPTURE (MPA) (UNCORRECTED)	FLEXURAL STRENGTH (MPA) (CORRECTED)
-4AC---1-B1	AX	EC		30.1	25.5
---2-B1	AX	EC		25.4	22.2
---3-B1	AX	EC		24.7	21.7
---4-B1	AX	EC		25.2	22.1
---5-B1	AX	EC		23.0	20.5
---6-B1	AX	EC		24.9	21.8
---7-B1	AX	EC		25.2	22.1
-4AC---8-B1	AX	EC		21.0	18.9
---9-B1	AX	EC		26.0	22.7
---10-B1	AX	EC		24.0	21.2
---11-B1	AX	EC		22.5	20.0
---11-B2	AX	EC		22.8	20.3
---12-B1	AX	EC		25.6	22.5
---12-B2	AX	EC		29.6	25.3
---13-B1	AX	EC		29.5	25.1
---13-B2	AX	EC		27.5	23.7
---14-B1	AX	EC		25.8	22.5
---14-B2	AX	EC		26.2	22.8
---15-B1	AX	EC		29.9	25.3
---15-B2	AX	EC		25.4	22.2
-4EC---1-B1	AX	EC		31.1	26.1
---2-B1	AX	EC		32.6	27.1
---3-B1	AX	EC		31.0	26.1
---4-B1	AX	EC		24.0	21.2
---5-B1	AX	EC			
-4EC---6-B1	AX	EC		29.8	25.3
---7-B1	AX	EC		23.7	20.9
---8-B1	AX	EC		29.8	25.3
---9-B1	AX	EC		29.6	25.1
---10-B1	AX	EC		29.2	24.9
---11-B1	AX	EC		26.4	22.9
---11-B2	AX	EC		27.3	23.6
---12-B1	AX	EC		25.3	22.2
---12-B2	AX	EC		24.4	21.5
---13-B1	AX	EC		18.8	17.1
---13-B2	AX	EC		29.3	25.0
---14-B1	AX	EC		23.5	20.8
---14-B2	AX	EC		22.1	19.7
---15-B1	AX	EC		23.2	20.6
---15-B2	AX	EC		26.2	22.8

MEAN	26.2 MPA (3801. PSI)	22.7 MPA (3297. PSI)
STD. DEV.	3.2 MPA (450. PSI)	2.3 MPA (328. PSI)

TABLE 43
STRENGTHS OF SMALL-SIZED TENSILE SPECIMENS, SLAB 4, RADIAL ORIENTATION,
END-EDGE LOCATION

LCT NO. 408		SPEC. DIA. 6.4 MM				
LOG NO. 5651-90		SPEC. LENGTH 23. MM				
LOG DENSITY 1.75		KG/M**3				
SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION (KG/M**3)	DENSITY YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
-4AE-300-A1	RAD	EE	1.739			14.7
-301-	RAD	EE	1.735			16.1
-302-	RAD	EE	1.741			12.0
-303-	RAD	EE	1.742			14.3
-304-	RAD	EE	1.732			13.1
-305-	RAD	EE	1.736			12.8
-306-	RAD	EE	1.743			17.2
-307-	RAD	EE	1.740			17.1
-308-	RAD	EE	1.736			15.6
-309-	RAD	EE	1.739			14.1
-310-	RAD	EE	1.739			14.6
-311-	RAD	EE	1.736			12.8
-312-	RAD	EE	1.735			15.1
-313-	RAD	EE	1.738			15.3
-314-	RAD	EE	1.734			13.2
-315-	RAD	EE	1.746			11.5
-316-	RAD	EE	1.744			17.9
-317-	RAD	EE	1.747			14.5
-318-	RAD	EE	1.745			13.9
-4AE-319-A1	RAD	EE	1.743			13.9
-320-A1	RAD	EE	1.744			14.9
-321-A1	RAD	EE	1.745			14.6
-322-A1	RAD	EE	1.742			12.1
-323-A1	RAD	EE	1.741			16.6
-4BE-300-A1	RAD	EE	1.749			17.1
-301-A1	RAD	EE	1.747			17.4
-302-A1	RAD	EE	1.750			17.2
-303-A1	RAD	EE	1.749			15.2
-304-A1	RAD	EE	1.754			16.9
-305-A1	RAD	EE	1.747			16.2
-306-A1	RAD	EE	1.747			17.3
-307-A1	RAD	EE	1.749			18.7
-308-A1	RAD	EE	1.751			17.6
-309-A1	RAD	EE	1.750			17.2
-310-A1	RAD	EE	1.746			17.3
-311-A1	RAD	EE	1.749			16.6
-312-A1	RAD	EE	1.740			18.7
-4BE-313-A1	RAD	EE	1.742			16.5
-314-A1	RAD	EE	1.736			17.5
-315-A1	RAD	EE	1.734			15.8
-316-A1	RAD	EE	1.734			18.6
-317-A1	RAD	EE	1.730			15.8
-318-A1	RAD	EE	1.730			17.2
-319-A1	RAD	EE	1.736			15.2
-320-A1	RAD	EE	1.732			17.3
-321-A1	RAD	EE	1.742			16.2
-322-A1	RAD	EE	1.740			15.8
-323-A1	RAD	EE	1.739			17.1
MEAN			1.741			15.7 (2287. PSI)
STD. DEV.			.006			1.8 (267. PSI)

TABLE 44
STRENGTHS OF LARGE-SIZED TENSILE SPECIMENS, SLAB 4, RADIAL ORIENTATION,
END-EDGE LOCATION

LOT NO. 408		SPEC. DIA.		17.8 MM			
LOG NO. 5651-90		SPEC. LENGTH		76. MM			
LOG DENSITY 1.75		KG/M**3					
SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (KG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
4AE-L500	RAD	EE	1.742		.014	.170	12.9
-L501	RAD	EE	1.749				16.8
-L502	RAD	EE	1.740				13.8
-L503	RAD	EE	1.740				11.5
-L504	RAD	EE	1.741				11.7
-L505	RAD	EE	1.738				11.0
-L506	RAD	EE	1.749				13.6
-L507	RAD	EE	1.743				13.6
-L508	RAD	EE	1.744				12.1
-L509	RAD	EE	1.742				12.4
-L510	RAD	EE	1.743				11.5
-L511	RAD	EE	1.740				10.0
-L512	RAD	EE	1.753				14.6
4AE-L513	RAD	EE	1.751				13.2
-L514	RAD	EE	1.744				15.8
-L515	RAD	EE	1.743				14.9
-L516	RAD	EE	1.741				16.2
-L517	RAD	EE	1.746		.012	.220	15.6
-L518	RAD	EE	1.753				15.2
-L519	RAD	EE	1.748				15.5
-L520	RAD	EE	1.744				15.8
-L521	RAD	EE	1.746				14.5
-L522	RAD	EE	1.742				14.2
-L523	RAD	EE	1.741				13.3
4BE-L500	RAD	EE	1.756		.008	.193	14.3
4BE-L501	RAD	EE	1.755				14.1
-L502	RAD	EE	1.755				13.5
-L503	RAD	EE	1.751				12.5
-L504	RAD	EE	1.752				15.2
-L505	RAD	EE	1.752				16.0
-L506	RAD	EE	1.757				15.2
-L507	RAD	EE	1.754				15.0
-L508	RAD	EE	1.755				14.6
-L509	RAD	EE	1.751				14.1
-L510	RAD	EE	1.752				15.5
-L511	RAD	EE	1.750				15.2
-L512	RAD	EE	1.738				16.3
-L513	RAD	EE	1.736				16.5
-L514	RAD	EE	1.741				15.1
-L515	RAD	EE	1.739				15.8
-L516	RAD	EE	1.740				16.6
-L517	RAD	EE	1.741		.010	.183	14.1
-L518	RAD	EE	1.745				18.0
-L519	RAD	EE	1.739				18.0
4PE-L520	RAD	EE	1.744				16.6
-L521	RAD	EE	1.743				15.5
-L522	RAD	EE	1.742				17.7
-L523	RAD	EE	1.740				16.6
MEAN			1.746		.011	.194	14.6 (2121.PSI)
STD. DEV.			.006		.003	.018	1.9 (269.PSI)

TABLE 45
STRENGTHS OF FOUR-POINT BEND SPECIMENS, SLAB 4, RADIAL ORIENTATION,
END-EDGE LOCATION

LOT NO. 408		SPEC. DIA.		6.4 MM	
LOG NO. 5651-90		SPEC. LENGTH		51. MM	
LOG DENSITY 1.75		KG/M**3			
SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (KG/M**3)	MODULUS OF RUPTURE (MPA) (UNCORRECTED)	FLEXURAL STRENGTH (MPA) (CORRECTED)
-4AE-300-B1	RAD	EE		27.6	22.7
-301-B1	RAD	EE		26.7	22.1
-302-B1	RAD	EE		25.9	21.6
-303-B1	RAD	EE		23.6	20.1
-304-B1	RAD	EE		24.4	20.7
-305-B1	RAD	EE		24.7	20.8
-306-B1	RAD	EE		32.5	25.2
-4AE-307-B1	RAD	EE		25.1	21.1
-308-B1	RAD	EE		21.8	18.9
-309-B1	RAD	EE		23.7	20.2
-310-B1	RAD	EE		19.6	17.3
-311-B1	RAD	EE		21.8	18.9
-312-B1	RAD	EE		23.5	20.0
-313-B1	RAD	EE		27.6	22.6
-314-B1	RAD	EE		26.3	21.9
-315-B1	RAD	EE		28.2	23.0
-316-B1	RAD	EE		28.4	23.1
-317-B1	RAD	EE		30.2	24.1
-318-B1	RAD	EE		26.6	22.1
-319-B1	RAD	EE		27.8	22.8
-320-B1	RAD	EE		27.1	22.3
-321-B1	RAD	EE		24.2	20.5
-322-B1	RAD	EE		27.7	22.7
-323-B1	RAD	EE		26.7	22.1
-4BE-300-B1	RAD	EE		25.6	21.4
-4BE-301-B1	RAD	EE		26.8	22.2
-302-B1	RAD	EE		23.2	19.9
-303-B1	RAD	EE		27.7	22.7
-304-B1	RAD	EE		23.5	20.0
-305-B1	RAD	EE		24.7	20.8
-306-B1	RAD	EE		27.2	22.4
-307-B1	RAD	EE		27.9	22.8
-308-B1	RAD	EE		17.1	15.4
-309-B1	RAD	EE		23.3	19.9
-310-B1	RAD	EE		25.7	21.5
-311-B1	RAD	EE		24.6	20.8
-312-B1	RAD	EE		30.1	24.0
-313-B1	RAD	EE		27.7	22.7
-314-B1	RAD	EE		29.4	23.6
-315-B1	RAD	EE		30.6	24.3
-316-B1	RAD	EE		27.8	22.8
-317-B1	RAD	EE		30.5	24.2
-318-B1	RAD	EE		28.2	23.0
-319-B1	RAD	EE		30.3	24.2
-4BE-320-B1	RAD	EE		28.9	23.4
-321-B1	RAD	EE		28.6	23.2
-322-B1	RAD	EE		31.4	24.7
-323-B1	RAD	EE		29.2	23.5
MEAN				26.5 MPA (3842. PSI)	21.9 MPA (3172. PSI)
STD. DEV.				3.1 MPA (443. PSI)	1.9 MPA (280. PSI)

TABLE 46
STRENGTHS OF SMALL-SIZED TENSILE SPECIMENS, SLAB 4, RADIAL ORIENTATION,
END-CENTER LOCATION

LOT NO. 408			SPEC. DIA.		6.4 MM		
LOG NO. 5651-9C			SPEC. LENGTH		23. MM		
LOG DENSITY 1.75			KG/M**3				
SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (KG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
-4AC-300-A1	RAD	EC	1.725				14.1
-301-A1	RAD	EC	1.730				13.9
-302-A1	RAD	EC	1.738				16.5
-303-A1	RAD	EC	1.741				15.3
-304-A1	RAD	EC	1.734				15.6
-305-A1	RAD	EC	1.732				14.8
-306-A1	RAD	EC	1.711				12.7
-307-A1	RAD	EC	1.722				12.0
-308-A1	RAD	EC	1.726				12.0
-309-A1	RAD	EC	1.726				11.2
-310-A1	RAD	EC	1.731				13.8
-311-A1	RAD	EC	1.730				13.0
-312-A1	RAD	EC	1.741				19.6
-313-A1	RAD	EC	1.735				15.4
-314-A1	RAD	EC	1.733				15.1
-4AC-315-A1	RAD	EC	1.732				12.3
-316-A1	RAD	EC	1.727				12.2
-317-A1	RAD	EC	1.724				12.9
-318-A1	RAD	EC	1.718				14.4
-319-A1	RAD	EC	1.723				11.9
-4BC-300-A1	RAD	EC	1.747				15.1
-301-A1	RAD	EC	1.727				14.3
-302-A1	RAD	EC	1.759				17.3
-303-A1	RAD	EC	1.756				13.9
-304-A1	RAD	EC	1.738				13.5
-305-A1	RAD	EC	1.740				15.5
-306-A1	RAD	EC	1.740				14.8
-307-A1	RAD	EC	1.734				12.3
-308-A1	RAD	EC	1.736				14.3
-309-A1	RAD	EC	1.741				15.0
-310-A1	RAD	EC	1.742				14.6
-311-A1	RAD	EC	1.739				13.9
-312-A1	RAD	EC	1.738				19.6
-4BC-313-A1	RAD	EC	1.726				15.4
-314-A1	RAD	EC	1.727				15.2
-315-A1	RAD	EC	1.742				12.3
-316-A1	RAD	EC	1.733				12.7
-317-A1	RAD	EC	1.731				7.9
-318-A1	RAD	EC	1.720				10.4
-319-A1	RAD	EC	1.733				13.0
MEAN			1.733				14.0
							(2029.PSI)
STD. DEV.			.009				2.2
							(317.PSI)

TABLE 47
STRENGTHS OF LARGE-SIZED TENSILE SPECIMENS, SLAB 4, RADIAL ORIENTATION,
END-CENTER LOCATION

LOT NO. 408			SPEC. DIA. 12.8 MM	
LOG NO. 5651-90			SPEC. LENGTH 76. MM	
LOG DENSITY 1.75			KG/M**3	

SPECIMEN NUMBER	ORIENT- ATION	LOCA- TION	DENSITY (KG/M**3)	YOUNGS MODULUS (GPA)	PERM- ANENT SET (PCT)	FRAC- TURE STRAIN (PCT)	TENSILE STRENGTH (MPA)
4AC-L500	RAD	EC	1.749		.014	.209	15.1
-L501	RAD	EC	1.745				12.7
-L502	RAD	EC	1.739				12.0
-L503	RAD	EC	1.751				15.3
-L504	RAD	EC	1.752				13.9
-L505	RAD	EC	1.748				13.8
-L506	RAD	EC	1.742				13.2
-L507	RAD	EC	1.740				12.6
-L508	RAD	EC	1.738				8.1
-L509	RAD	EC	1.747				16.6
-L510	RAD	EC	1.747				13.3
-L511	RAD	EC	1.743				12.0
-L512	RAD	EC	1.750				14.6
-L513	RAD	EC	1.748				12.8
-L514	RAD	EC	1.741				6.8
-L515	RAD	EC	1.741				11.0
4AC-L516	RAD	EC	1.741				10.7
-L517	RAD	EC	1.740		.015	.160	11.9
4BC-L500	RAD	EC	1.755		.006	.182	14.5
-L501	RAD	EC	1.754				13.4
-L502	RAD	EC	1.739				9.7
-L503	RAD	EC	1.755				15.3
-L504	RAD	EC	1.750				17.5
-L505	RAD	EC	1.752				13.4
-L506	RAD	EC	1.750				16.9
-L507	RAD	EC	1.724				14.3
-L508	RAD	EC	1.768				13.7
-L509	RAD	EC	1.751				15.5
-L510	RAD	EC	1.749				14.6
-L511	RAD	EC	1.741				13.1
-L512	RAD	EC	1.747				16.8
-L513	RAD	EC	1.743				14.1
-L514	RAD	EC	1.745				12.2
-L515	RAD	EC	1.737				13.1
-L516	RAD	EC	1.739				13.7
-L517	RAD	EC	1.738				13.0
MEAN			1.746		.012	.167	13.4 (1939.PSI)
STD. DEV.			.008		.005	.020	2.3 (328.PSI)

TABLE 48
STRENGTHS OF FOUR-POINT BEND SPECIMENS, SLAB 4, RADIAL ORIENTATION,
END-CENTER LOCATION

LOT NO. 408			SPEC. DIA.	6.4 MM	
LOG NO. 5651-90			SPEC. LENGTH	51. MM	
LOG DENSITY 1.75			KG/M**3		
SPECIMEN NUMBER	ORIFNT- ATION	LOCA- TION	DENSITY (KG/M**3)	MODULUS OF RUPTURE (MPA) (UNCORRECTED)	FLEXURAL STRENGTH (MPA) (CORRECTED)
-4AC-300-B1	RAD	EC		27.2	22.7
-301-B1	RAD	EC		23.5	20.2
-302-B1	RAD	EC		26.6	22.3
-4AC-303-B1	RAD	EC		24.7	21.0
-304-B1	RAD	EC		26.3	22.1
-305-B1	RAD	EC		25.3	21.5
-306-B1	RAD	EC		22.5	19.5
-307-B1	RAD	EC		24.3	20.8
-308-B1	RAD	EC		22.0	19.2
-309-B1	RAD	EC		23.1	20.0
-310-B1	RAD	EC		25.6	21.6
-311-B1	RAD	EC		20.5	18.0
-312-B1	RAD	EC		31.8	25.3
-313-B1	RAD	EC		24.8	21.1
-314-B1	RAD	EC		23.3	20.1
-315-B1	RAD	EC		21.0	18.5
-316-B1	RAD	EC		22.7	19.6
-317-B1	RAD	EC		22.7	19.7
-318-B1	RAD	EC		25.8	21.8
-319-B1	RAD	EC		23.1	20.0
-4BC-300-B1	RAD	EC		22.5	19.5
-4BC-301-B1	RAD	EC		25.8	21.8
-302-B1	RAD	EC		26.6	22.3
-303-B1	RAD	EC		29.1	23.8
-304-B1	RAD	EC		25.4	21.5
-305-B1	RAD	EC		27.0	22.5
-306-B1	RAD	EC		26.3	22.1
-307-B1	RAD	EC		27.1	22.6
-308-B1	RAD	EC		27.2	22.7
-309-B1	RAD	EC		27.5	22.9
-310-B1	RAD	EC		26.3	22.1
-311-B1	RAD	EC		25.4	21.5
-312-B1	RAD	EC		28.2	23.3
-313-B1	RAD	EC		30.4	24.5
-314-B1	RAD	EC		26.9	22.5
-315-B1	RAD	EC		29.4	24.0
-316-B1	RAD	EC		26.9	22.5
-317-B1	RAD	EC		26.9	22.5
-318-B1	RAD	EC		26.9	22.5
-319-B1	RAD	EC		30.7	24.7
MEAN				25.7 MPA (3732. PSI)	21.7 MPA (3142. PSI)
STD. DEV.				2.6 MPA (379. PSI)	1.7 MPA (246. PSI)

TABLE 49
SUMMARY OF STATISTICAL STUDY OF THE STRENGTH OF H-451 GRAPHITE
Log 5651-90 (GLCC Log 48), Slab 1 (End of Parent Log)

Orientation	Location in Parent Log	Type of Specimen	No. of Replicate Specimens	Strength				Strength Ratio	
				Mean (MPa)	Standard Deviation (MPa)	Coefficient of Variation (%)	Weibull Modulus, m	Small Tensile	Flexural
								Large Tensile	Small Tensile
Axial	End edge	Small tensile	48	16.4	2.0	12.2	9.4	1.03	1.51
		Large tensile	47	15.9	2.2	13.5	8.1		
		Flexural(a)	48	24.7	1.5	6.3	19.7		
	End center	Small tensile	40	15.9	2.4	15.4	7.5	1.04	1.48
		Large tensile	31	15.3	1.8	11.7	8.9		
		Flexural(a)	25	23.6	2.4	10.2	11.1		
Radial	End edge	Small tensile	47	13.0	1.9	14.7	7.2	1.07	1.56
		Large tensile	48	12.1	2.5	20.3	5.3		
		Flexural(a)	46	20.3	2.7	13.2	8.0		
	End center	Small tensile	38	12.2	2.3	18.8	6.2	1.14	1.66
		Large tensile	36	10.7	1.7	15.9	7.2		
		Flexural(a)	38	20.3	1.9	9.4	13.1		

(a) Corrected for nonlinear stress-strain relationship.

TABLE 50
SUMMARY OF STATISTICAL STUDY OF THE STRENGTH OF H-451 GRAPHITE
Log 5651-90 (GLCC Log 48), Slab 2 (Midlength of Parent Log)

Orientation	Location in Parent Log	Type of Specimen	No. of Replicate Specimens	Strength				Strength Ratio	
				Mean (MPa)	Standard Deviation (MPa)	Coefficient of Variation (%)	Weibull Modulus, m	<u>Small Tensile</u> Large Tensile	<u>Flexural</u> Small Tensile
Axial	Midlength edge	Small tensile	46	18.2	1.7	9.4	12.6	1.03	1.36
		Large tensile	48	17.6	1.7	9.9	11.8		
		Flexural(a)	48	24.8	2.1	8.3	14.5		
	Midlength center	Small tensile	38	15.0	1.3	8.6	13.4	1.02	1.51
		Large tensile	32	14.7	1.1	7.3	15.2		
		Flexural(a)	40	22.6	1.2	5.1	22.9		
Radial	Midlength edge	Small tensile	48	15.2	1.8	11.9	9.7	1.09	1.40
		Large tensile	48	13.9	2.0	14.5	8.0		
		Flexural(a)	48	21.3	1.8	8.3	14.9		
	Midlength center	Small tensile	38	12.3	2.8	22.6	4.6	1.04	1.62
		Large tensile	35	11.8	1.1	9.6	12.4		
		Flexural(a)	38	19.9	1.9	9.6	12.3		

(a) Corrected for nonlinear stress-strain relationship.

TABLE 51
SUMMARY OF STATISTICAL STUDY OF THE STRENGTH OF H-451 GRAPHITE
Log 5651-90 (GLCC Log 48), Slab 3 (Midlength of Parent Log)

Orientation	Location in Parent Log	Type of Specimen	No. of Replicate Specimens	Strength				Strength Ratio	
				Mean (MPa)	Standard Deviation (MPa)	Coefficient of Variation (%)	Weibull Modulus, m	$\frac{\text{Small Tensile}}{\text{Large Tensile}}$	$\frac{\text{Flexural}}{\text{Small Tensile}}$
Axial	Midlength edge	Small tensile	48	17.0	1.9	11.4	10.0	1.00	1.52
		Large tensile	48	17.0	1.7	9.9	11.9		
		Flexural(a)	48	25.8	2.2	8.4	14.1		
	Midlength center	Small tensile	40	13.7	2.0	14.4	6.8	1.05	1.66
		Large tensile	31	13.3	1.1	8.0	14.4		
		Flexural(a)	40	22.8	1.6	6.8	17.1		
Radial	Midlength edge	Small tensile	47	14.1	2.1	15.2	6.8	1.01	1.62
		Large tensile	24	14.0	1.3	9.5	12.1		
		Flexural(a)	48	22.8	1.6	7.0	17.0		
	Midlength center	Small tensile	37	13.0	1.8	13.6	8.3	1.13	1.62
		Large tensile	36	11.5	1.4	12.1	9.1		
		Flexural(a)	40	21.1	1.6	7.5	15.7		

(a) Corrected for nonlinear stress-strain relationship.

TABLE 52
SUMMARY OF STATISTICAL STUDY OF THE STRENGTH OF H-451 GRAPHITE
Log 5651-90 (GLCC Log 48), Slab 4 (End of Parent Log)

Orientation	Location in Parent Log	Type of Specimen	No. of Replicate Specimens	Strength				Strength Ratio	
				Mean (MPa)	Standard Deviation (MPa)	Coefficient of Variation (%)	Weibull Modulus, m	Small Tensile Large Tensile	Flexural Small Tensile
Axial	End edge	Small tensile	48	16.8	2.0	11.8	10.0	1.01	1.48
		Large tensile	48	16.7	1.5	9.2	12.9		
		Flexural (a)	48	24.8	2.0	7.9	14.9		
	End center	Small tensile	40	14.1	2.0	14.1	8.2	1.08	1.61
		Large tensile	32	13.1	1.5	11.6	10.0		
		Flexural (a)	39	22.7	2.3	9.9	11.7		
Radial	End edge	Small tensile	48	15.7	1.8	11.7	9.9	1.08	1.39
		Large tensile	48	14.6	1.9	12.7	9.2		
		Flexural (a)	48	21.9	1.9	8.8	12.9		
	End center	Small tensile	40	14.0	2.2	15.6	7.2	1.04	1.55
		Large tensile	36	13.4	2.3	16.9	6.2		
		Flexural (a)	40	21.7	1.7	7.8	15.0		

(a) Corrected for nonlinear stress-strain relationship.

TABLE 53
MEAN VALUES OF COEFFICIENT OF VARIATION AND WEIBULL MODULUS FOR
STRENGTH OF H-451 GRAPHITE, LOG 5651-90

Orientation	Type of Test	Coefficient of Variation (%)	Weibull Modulus, m
Axial	Tensile	11.2	10.7
Axial	Bend	7.9	15.8
Radial	Tensile	14.7	8.1
Radial	Bend	9.0	13.6

Fig. 1. Locations of slabs (shaded) for statistical strength testing in log 565I-90 of H-451 graphite

Fig. 2. Coring plan for edge zone of slab

Fig. 3. Coring plan for center zone of slab

Fig. 4. Correction factors for bend-test data to allow for nonlinear stress-strain relationship (H-451 graphite)

Fig. 5. Map of the distribution of density in slab 1, edge zone

Fig. 6. Map of the distribution of strength in slab 1, edge zone

Fig. 7. Map of the distribution of density in slab 1, center zone

Fig. 8. Map of the distribution of strength in slab 1, center zone

Fig. 9. Map of the distribution of density in slab 2, edge zone

Fig. 10. Map of the distribution of strength in slab 2, edge zone

Fig. 11. Map of the distribution of density in slab 2, center zone

Fig. 12. Map of the distribution of strength in slab 2, center zone

Fig. 13. Map of the distribution of density in slab 3, edge zone

Fig. 14. Map of the distribution of strength in slab 3, edge zone

Fig. 15. Map of the distribution of density in slab 3, center zone

Fig. 16. Map of the distribution of strength in slab 3, center zone

Fig. 17. Map of the distribution of density in slab 4, edge zone

Fig. 18. Map of the distribution of strength in slab 4, edge zone

Fig. 19. Map of the distribution of density in slab 4, center zone

Fig. 20. Map of the distribution of strength in slab 4, center zone

Fig. 21. Cumulative distribution curve for strength of small-sized tensile specimens, slab 1, axial orientation, end-edge location

Fig. 22. Cumulative distribution curve for strength of large-sized tensile specimens, slab 1, axial orientation, end-edge location

Fig. 23. Cumulative distribution curve for strength of four-point bend specimens, slab 1, axial orientation, end-edge location

Fig. 24. Cumulative distribution curve for strength of small-sized tensile specimens, slab 1, axial orientation, end-center location

Fig. 25. Cumulative distribution curve for strength of large-sized tensile specimens, slab 1, axial orientation, end-center location

Fig. 26. Cumulative distribution curve for strength of four-point bend specimens, slab 1, axial orientation, end-center location

Fig. 27. Cumulative distribution curve for strength of small-sized tensile specimens, slab 1, radial orientation, end-edge location

Fig. 28. Cumulative distribution curve for strength of large-sized tensile specimens, slab 1, radial orientation, end-edge location

Fig. 29. Cumulative distribution curve for strength of four-point bend specimens, slab 1, radial orientation, end-edge location

Fig. 30. Cumulative distribution curve for strength of small-sized tensile specimens, slab 1, radial orientation, end-center location

Fig. 31. Cumulative distribution curve for strength of large-sized tensile specimens, slab 1, radial orientation, end-center location

Fig. 32. Cumulative distribution curve for strength of four-point bend specimens, slab 1, radial orientation, end-center location

Fig. 33. Cumulative distribution curve for strength of small-sized tensile specimens, slab 2, axial orientation, midlength-edge location

Fig. 34. Cumulative distribution curve for strength of large-sized tensile specimens, slab 2, axial orientation, midlength-edge location

Fig. 35. Cumulative distribution curve for strength of four-point bend specimens, slab 2, axial orientation, midlength-edge location

Fig. 36. Cumulative distribution curve for strength of small-sized tensile specimens, slab 2, axial orientation, midlength-center location

Fig. 37. Cumulative distribution curve for strength of large-sized tensile specimens, slab 2, axial orientation, midlength-center location

Fig. 38. Cumulative distribution curve for strength of four-point bend specimens, slab 2, axial orientation, midlength-center location

Fig. 39. Cumulative distribution curve for strength of small-sized tensile specimens, slab 2, radial orientation, midlength-edge location

Fig. 40. Cumulative distribution curve for strength of large-sized tensile specimens, slab 2, radial orientation, midlength-edge location

Fig. 41. Cumulative distribution curve for strength of four-point bend specimens, slab 2, radial orientation, midlength-edge location

Fig. 42. Cumulative distribution curve for strength of small-sized tensile specimens, slab 2, radial orientation, midlength-center location

Fig. 43. Cumulative distribution curve for strength of large-sized tensile specimens, slab 2, radial orientation, midlength-center location

Fig. 44. Cumulative distribution curve for strength of four-point bend specimens, slab 2, radial orientation, midlength-center location

Fig. 45. Cumulative distribution curve for strength of small-sized tensile specimens, slab 3, axial orientation, midlength-edge location

Fig. 46. Cumulative distribution curve for strength of large-sized tensile specimens, slab 3, axial orientation, midlength-edge location

Fig. 47. Cumulative distribution curve for strength of four-point bend specimens, slab 3, axial orientation, midlength-edge location

Fig. 48. Cumulative distribution curve for strength of small-sized tensile specimens, slab 3, axial orientation, midlength-center location

Fig. 49. Cumulative distribution curve for strength of large-sized tensile specimens, slab 3, axial orientation, midlength center location

Fig. 50. Cumulative distribution curve for strength of four-point bend specimens, slab 3, axial orientation, midlength-center location

Fig. 51. Cumulative distribution curve for strength of small-sized tensile specimens, slab 3, radial orientation, midlength-edge location

Fig. 52. Cumulative distribution curve for strength of large-sized tensile specimens, slab 3, radial orientation, midlength-edge location

Fig. 53. Cumulative distribution curve for strength of four-point bend specimens, slab 3, radial orientation, midlength-edge location

Fig. 54. Cumulative distribution curve for strength of small-sized tensile specimens, slab 3, radial orientation, midlength-center location

Fig. 55. Cumulative distribution curve for strength of large-sized tensile specimens, slab 3, radial orientation, midlength-center location

Fig. 56. Cumulative distribution curve for strength of four-point bend specimens, slab 3, radial orientation, midlength-center location

Fig. 57. Cumulative distribution curve for strength of small-sized tensile specimens, slab 4, axial orientation, end-edge location

Fig. 58. Cumulative distribution curve for strength of large-sized tensile specimens, slab 4, axial orientation, end-edge location

Fig. 59. Cumulative distribution curve for strength of four-point bend specimens, slab 4, axial orientation, end-edge location

Fig. 60. Cumulative distribution curve for strength of small-sized tensile specimens, slab 4, axial orientation, end-center location

Fig. 61. Cumulative distribution curve for strength of large-sized tensile specimens, slab 4, axial orientation, end-center location

Fig. 62. Cumulative distribution curve for strength of four-point bend specimens, slab 4, axial orientation, end-center location

Fig. 63. Cumulative distribution curve for strength of small-sized tensile specimens, slab 4, radial orientation, end-edge location

Fig. 64. Cumulative distribution curve for strength of large-sized tensile specimens, slab 4, radial orientation, end-edge location

Fig. 65. Cumulative distribution curve for strength of four-point bend specimens, slab 4, radial orientation, end-edge location

Fig. 66. Cumulative distribution curve for strength of small-sized tensile specimens, slab 4, radial orientation, end-center location

Fig. 67. Cumulative distribution curve for strength of large-sized tensile specimens, slab 4, radial orientation, end-center location

Fig. 68. Cumulative distribution curve for strength of four-point bend specimens, slab 4, radial orientation, end-center location

Fig. 69. Correlation between strength of flexural specimens and small (6.4 mm diameter) tensile specimens. Each datum point represents the mean for one orientation, slab, and zone (edge or center).

Fig. 70. Correlation between strength of flexural specimens and large (12.8 mm diameter) tensile specimens. Each datum point represents the mean for one orientation, slab, and zone (edge or center).