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90503 Mock STUDY

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DEVELOPMENT DIVISION

OCTOBER - DECEMBER 1975
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ABSTRACT

Two billets were pressed from each of three lots of 90503 mock. One billet from each of these lots was pressed using dried powder. Samples were taken from each pressing charge just prior to pressing and volatile content measured. Each of these six billets were then machined into compression and tensile specimens.

Additional compression specimens were machined from an existing hemispherical part made from one of these lots of material.

Dimensional stability tests were conducted on parts from each billet and the hemisphere.

Compression and tensile testing was conducted at 21 C and 49 C on specimens from each of the six billets. The small scale compression specimens from the hemisphere were also tested at these temperatures.

The mechanical properties testing shows that the compression strain at rupture and the tensile rupture stress were significantly affected by the higher temperature. No apparent differences were seen between parts made from dried or normal powder.

EXPERIMENTAL TESTS AND RESULTS

VOLATILES TESTING

Samples were taken from each of three batches of 90503 mock for volatile content analysis. Two each pressing charges were then weighed from each of the batches. One charge from each batch was oven-dried at 65 C under plant vacuum for twenty four hours. Each charge was then pre-heated to 49 C in preparation for pressing. Additional samples for volatile content analysis were taken just prior to pressing. Results are shown in Table I. The volatiles content was determined by the weight loss of the samples after being dried for twenty-four hours at 65 C in a forced air circulating oven. Comparable results were obtained by drying under the same conditions but using a vacuum oven connected to plant vacuum.

PHYSICAL PROPERTIES TESTING

The six previously described pressing charges were isostatically pressed at 140 MPa for ten minutes. Lot numbers, part numbers, and pressing condition of parts are summarized in Table II. All six billets were machined into parts for physical properties testing.

One hemispherical part, Piece No. 42057Y4604, had been previously fabricated from Lot No. 005-11. This part was machined into small scale compression specimens. The standard size compression parts from billet No. 42267Y3106 were used as a control group for the parts from the hemisphere.

Small scale compression parts were also machined from billet No. 42267Y3105 for correlation with properties from the hemispherical parts.

One part was selected from each group of compression specimens. These were used to check the dimensional stability of the parts. Weights and dimensions were recorded and the parts were then thermally conditioned at 49 C for twenty-four hours. All parts except the one from the hemisphere showed a slight size and weight loss. Typical weight losses were 0.02 to 0.04 percent. The part from the hemisphere showed no dimensional change; however, this is probably due to gaging error because this piece showed more weight loss than the others.

The tensile and compression specimens used as control parts for each of the three lots of material were those pressed from normal powder and tested at 21 C. The tensile specimens were tested at a constant cross-head velocity of 0.002 mm/sec and the compression specimens at 0.001 mm/sec (see Tables III through XVI).

The results of the tensile tests for this material were significant in that the specimens behaved similar to compression specimens; the parts failed before rupturing (see Figs. 1 through 6 and Tables III through VIII). The average tensile stress-strain data for each of the three lots of material showed no apparent effect due to drying the powder. However, the specimens tested at 49 C showed a decrease in tensile stress of approximately 70%. Compression test data also showed no significant effect due to drying. The ultimate stress of the three lots was reduced by approximately 65% for the parts tested at 49 C. The composite compression test curves are shown in Figs. 7 through 14. The student "t" test applied to the failure stress showed that there were no significant differences at the 99% confidence level between parts made from normal powder and those made from dried powder.

CONCLUSIONS

On conducting experiments to determine the volatile content of 90503 mock it is best to use a forced air circulating oven, or an oven connected to plant vacuum. It was found that CEF was pulled from the samples when a very low vacuum was used during the drying process. This was confirmed by mass spectrometry and thermogravimetric analysis(1).

Compression test results show that testing at elevated temperatures significantly decreases the ultimate stress without appreciably altering the rupture strain. The elevated temperatures also showed a significant effect on the tensile stress.

The small scale compression specimens taken from the hemispherical part showed a tensile stress 35% greater than the control specimens used for this group (see Tables IX and XI). However, the small scale compression specimens from pressing No. 42267Y3105 agreed well with the standard compression parts from this pressing (see Tables X and XII).

(1) Conversation with L. C. Myers, December 1975.

Drying did not seem to have an appreciable effect on the strength of these materials.

Table I. Volatile Content (%) of Three Lots of 90503 Mock

<u>005-11</u>	<u>Batch No.</u>		<u>Remarks</u>
	<u>015-73</u>	<u>016-73</u>	
0.04	0.03	0.05	Samples pulled prior to any material preparation
0.04	0.04	0.04	Samples pulled from normal powder just prior to pressing (after pre-heat cycle)
0.03	0.09	0.03	Samples pulled from dried powder just prior to pressing (after pre-heat cycle)

Table II. Dimensional Stability of 90503 Mock Specimens

Batch No.	Piece No.	Dried Powder			Normal Powder			Remarks
		Diameter (cm)	Length (cm)	Weight (g)	Diameter (cm)	Length (cm)	Weight (g)	
016-73	42267Y3101-17	2.0267	6.3477	33.1533				Original Measurement
		2.0254	6.3462	33.1450				Final Measurement
		0.0013	0.0015	0.0083				Actual Loss
		0.064	0.024	0.025				Percentage Loss
016-73	42267Y3102-17				2.0272	6.3480	33.1144	Original Measurement
					NA	6.3462	33.1075	Final Measurement
					NA	0.0018	0.0069	Actual Loss
					NA	0.028	0.021	Percentage Loss
015-73	42267Y3103-17	2.0264	6.3475	33.1177				Original Measurement
		2.0254	6.3457	33.1111				Final Measurement
		0.0010	0.0018	0.0066				Actual Loss
		0.049	0.028	0.020				Percentage Loss
015-73	42267Y3104-17				2.0251	6.3500	33.1501	Original Measurement
					2.0244	6.3487	33.1420	Final Measurement
					0.0007	0.0013	0.0081	Actual Loss
					0.035	0.020	0.024	Percentage Loss
005-11	42267Y3105-17	2.0267	6.3487	33.0744				Original Measurement
		2.0257	6.3470	33.0700				Final Measurement
		0.0010	0.0017	0.0044				Actual Loss
		0.049	0.027	0.013				Percentage Loss
	42267Y3105-25	1.2705	3.8095	7.8000				Original Measurement
		1.2700	3.8085	7.7967				Final Measurement
		0.0005	0.0010	0.0033				Actual Loss
		0.039	0.026	0.042				Percentage Loss
	42267Y3106-17				2.0236	6.3513	33.0556	Original Measurement
					2.0226	6.3487	33.0541	Final Measurement
					0.0010	0.0026	0.0015	Actual Loss
					0.049	0.041	0.005	Percentage Loss
	42057Y4604-11 ^a				1.2695	3.8087	7.8100	Original Measurement
					1.2695	3.8087	7.8044	Final Measurement
					-0-	-0-	0.0056	Actual Loss
					-0-	-0-	0.072	Percentage Loss

^aThis piece machined from existing hemispherical part.

NA - Not Available

Table III. Tensile Test at a Constant Crosshead Speed of 0.002 mm/sec for Mock 90503

(Lot. No. 005-11 Normal, Pressing No. 42267Y3106, Density 1.615 Mg/m³)

Piece No.	Rupture ^a Mode	Initial Modulus ^b (GPa)	Failure			Rupture		Work to Rupture (KJ/m ³)
			Time (sec)	Stress (MPa)	Strain (%)	Time (sec)	Strain (%)	
Tested at 21 C (Control Group)								
1	2	3.00	214	1.50	0.38	249	0.48	5.75
2	4	7.75	228	1.55	0.20	255	0.48	5.43
3	2	15.70	230	1.57	0.20	255	0.25	3.37
4	3	7.38	192	1.48	0.25	224	0.31	3.78
Mean		8.45	216	1.53	0.26	246	0.38	4.58
Std. Dev.		5.27	18	0.04	0.09	15	0.12	1.18
Tested at 49 C								
5	4	3.72	145	0.37	0.23	192	0.28	0.89
7	5	4.76	154	0.41	0.38	196	0.47	1.84
8	3	3.10	145	0.39	0.36	194	0.45	1.44
Mean		3.86	148	0.41	0.32	194	0.40	1.39
Std. Dev.		0.84	5	0.06	0.08	3	0.11	0.48

^a 1 and 7 are in curved section, 2 and 6 are in the straight section outside the extensometer, 3 and 5 are at the knife edges and 4 is between the knife edges.

^b Initial Modulus: (20% rupture stress)/strain.

Table IV. Tensile Test at a Constant Crosshead Speed of 0.002 mm/sec for Mock 90503

(Lot. No. 005-11 Dried, Pressing No. 42267Y3105, Density 1.613 Mg/m³)

Piece ^a No.	Rupture ^b Mode	Initial Modulus (GPa)	Failure			Rupture		Work to Rupture (KJ/m ³)
			Time (sec)	Stress (MPa)	Strain (%)	Time (sec)	Strain (%)	
Tested at 21 C								
3	7	5.23	221	1.44	0.35	247	0.42	4.94
4	2	18.40	219	1.38	0.37	242	0.40	4.34
8	6	4.53	213	1.36	0.40	242	0.47	5.08
Mean		9.38	218	1.39	0.37	244	0.43	4.79
Std. Dev.		7.81	4	0.04	0.03	3	0.04	0.39
Tested at 49 C								
1	5	0.80	155	0.40	0.44	209	0.61	4.00
2	4	7.75	137	0.39	0.48	183	0.93	4.73
5	5	1.00	146	0.40	0.59	218	0.78	2.69
7	6	2.27	133	0.40	0.34	172	0.42	1.44
Mean		2.95	143	0.40	0.46	195	0.69	3.22
Std. Dev.		3.26	10	0.01	0.11	22	0.22	1.46

^a1 and 7 are in curved section, 2 and 6 are in the straight section outside the extensometer, 3 and 5 are at the knife edges and 4 is between the knife edges.

^bInitial Modulus: (20% rupture stress)/strain.

Table V. Tensile Test at a Constant Crosshead Speed of 0.002 mm/sec for Mock 90503

(Lot. No. 015-73 Normal, Pressing No. 42267Y3104, Density 1.616 Mg/m³)

Piece No.	Rupture ^a Mode	Initial Modulus ^b (GPa)	Failure			Rupture		Work to Rupture (KJ/m ³)
			Time (sec)	Stress (MPa)	Strain (%)	Time (sec)	Strain (%)	
Tested at 21 C (Control Group)								
5	2	41.40	188	1.04	0.36	222	0.44	3.85
6	3	4.25	186	1.06	0.38	229	0.50	4.38
7	3	1.48	234	1.00	0.43	293	0.76	5.72
8	6	7.33	210	1.10	0.35	231	0.38	3.42
Mean		13.60	204	1.05	0.38	244	0.52	4.34
Std. Dev.		18.30	23	0.04	0.04	33	0.17	1.00
Tested at 49 C								
1	5	0.49	89	0.21	0.24	139	0.35	0.61
2	3	0.65	149	0.25	0.26	171	0.29	0.58
3	3	1.19	119	0.24	0.25	139	0.26	0.52
4	5	0.92	155	0.28	0.32	187	0.35	0.82
Mean		0.81	128	0.24	0.27	159	0.31	0.64
Std. Dev.		0.31	30	0.03	0.04	24	0.05	0.13

^a1 and 7 are in curved section, 2 and 6 are in the straight section outside the extensometer, 3 and 5 are at the knife edges and 4 is between the knife edges.

^bInitial Modulus: (20% rupture stress)/strain.

Table VI. Tensile Test at a Constant Crosshead Speed of 0.002 mm/sec for Mock 90503

(Lot. No. 015-73 Dried, Pressing No. 42267Y3103, Density 1.616 Mg/m³)

Piece No.	Rupture ^a Mode	Initial Modulus ^b (GPa)	Failure			Rupture		Work to Rupture (KJ/m ³)
			Time (sec)	Stress (MPa)	Strain (%)	Time (sec)	Strain (%)	
Tested at 21 C								
2	6	3.94	187	0.99	0.36	236	0.64	4.92
3	6	9.18	172	0.92	0.34	216	0.44	3.39
4	3	4.33	187	0.97	0.36	227	0.53	4.37
Mean		5.82	182	0.96	0.36	226	0.54	4.23
Std. Dev.		2.92	9	0.04	0.01	10	0.10	0.78
Tested at 49 C								
5	NA	0.86	111	0.30	0.27	156	0.33	3.39
6	NA	1.90	107	0.29	0.28	154	0.35	4.05
7	NA	12.00	105	0.30	0.19	134	0.25	3.05
8	NA	10.60	85	0.27	0.21	129	0.39	5.42
Mean		6.35	102	0.29	0.24	143	0.33	3.98
Std. Dev.		5.78	12	0.02	0.05	14	0.06	1.05

^a1 and 7 are in curved section, 2 and 6 are in the straight section outside the extensometer, 3 and 5 are at the knife edges and 4 is between the knife edges.

^bInitial Modulus: (20% rupture stress)/strain.

NA - Not Available

Table VII. Tensile Test at a Constant Crosshead Speed of 0.002 mm/sec for Mock 90503

(Lot. No. 016-73 Normal, Pressing No. 42267Y3102, Density 1.620 Mg/m³)

Piece No.	Rupture ^a Mode	Initial Modulus ^b (GPa)	Failure			Rupture		Work to Rupture (KJ/m ³)
			Time (sec)	Stress (MPa)	Strain (%)	Time (sec)	Strain (%)	
Tested at 21 C (Control Group)								
1	5	1.54	944	0.92	0.39	820	0.46	3.32
2	5	2.44	707	0.98	0.39	864	0.51	4.17
6	4	3.22	770	0.97	0.38	972	0.60	4.89
8	6	2.13	750	0.96	0.40	880	0.47	3.72
Mean		2.33	793	0.96	0.39	884	0.51	4.03
Std. Dev.		0.70	104	0.02	0.01	64	0.06	0.68
Tested at 49 C								
3	NA	12.00	105	0.30	0.24	142	0.33	0.88
4	2	8.39	86	0.21	0.15	127	0.32	0.59
5	3	12.00	118	0.30	0.27	145	0.34	0.94
7	4	10.20	89	0.25	0.18	134	0.30	0.69
Mean		10.70	99	0.27	0.21	137	0.32	0.78
Std. Dev.		1.75	15	0.04	0.06	8	0.02	0.16

^a1 and 7 are in curved section, 2 and 6 are in the straight section outside the extensometer, 3 and 5 are at the knife edges and 4 is between the knife edges.

^bInitial Modulus: (20% rupture stress)/strain.

NA - Not Available

Table VIII. Tensile Test at a Constant Crosshead Speed of 0.002 mm/sec for Mock 90503

(Lot. No. 016-73 Dried, Pressing No. 42267Y3101, Density 1.617 Mg/m³)

Piece No.	Rupture ^a Mode	Initial Modulus ^b (GPa)	Failure			Rupture		Work to Rupture (KJ/m ³)
			Time (sec)	Stress (MPa)	Strain (%)	Time (sec)	Strain (%)	
Tested at 21 C								
5	3	4.14	158	0.83	0.16	219	0.23	1.64
6	6	4.21	162	0.84	0.16	209	0.20	1.73
7	6	3.81	197	0.84	0.15	238	0.19	6.38
Mean		4.05	172	0.84	0.16	222	0.21	3.15
Std. Dev.		0.21	22	0.01	0.00	15	0.03	2.80
Tested at 49 C								
1	3	--	83	0.25	0.18	113	0.19	0.41
2	3	--	93	0.29	0.24	136	0.31	0.78
3	3	--	92	0.25	0.19	110	0.25	0.57
4	2	--	83	0.21	0.20	113	0.20	0.46
Mean		--	88	0.25	0.20	118	0.24	0.55
Std. Dev.		--	6	0.03	0.03	12	0.06	0.17

^a1 and 7 are in curved section, 2 and 6 are in the straight section outside the extensometer, 3 and 5 are at the knife edges and 4 is between the knife edges.

^bInitial Modulus: (20% rupture stress)/strain.

Table IX. Compression Test at a Constant Crosshead Speed of 0.001 mm/sec for Mock 90503
(Lot. No. 005-11 Normal, Pressing No. 42267Y3106, Density 1.614 Mg/m³)

Piece No.	Initial Modulus ^a (GPa)	Failure			Rupture		Work to Rupture (kJ/m ³)
		Time (sec)	Stress (MPa)	Strain (%)	Time (sec)	Strain (%)	
Tested at 21 C (Control Group)							
9	0.89	1560	7.81	1.19	2160	3.89	146
10	0.77	1551	7.68	1.36	2145	3.68	147
11	1.47	1560	7.72	1.10	2415	2.39	112
12	0.78	1500	5.81	1.30	2430	4.29	115
Mean	0.98	1543	7.25	1.24	2288	3.56	130
Std. Dev.	0.34	29	0.97	0.12	156	0.82	19
Tested at 49 C							
13	0.26	1035	2.27	1.14	1674	3.29	36.8
14	0.48	1248	2.75	1.12	2022	3.12	45.1
15	0.41	1152	2.90	1.14	1779	3.19	48.3
16	0.55	1161	2.77	1.09	1977	3.30	45.2
Mean	0.43	1149	2.67	1.12	1863	3.22	43.8
Std. Dev.	0.13	88	0.28	0.03	164	0.09	4.9

^aInitial Modulus: (20% rupture stress)/strain.

Table X. Compression Test at a Constant Crosshead Speed of 0.001 mm/sec for Mock 90503
(Lot. No. 005-11 Dried, Pressing No. 42267Y3105, Density 1.613 Mg/m³)

Piece No.	Initial Modulus ^a (GPa)	Failure			Rupture		Work to Rupture (KJ/m ³)
		Time (sec)	Stress (MPa)	Strain (%)	Time (sec)	Strain (%)	
Tested at 21 C							
9	0.75	1605	7.45	1.39	2097	3.30	154
10	0.89	1536	7.53	1.27	2079	3.32	135
15	1.04	1656	9.63	1.44	1986	2.79	170
16	0.98	1560	9.52	1.44	1911	2.85	177
Mean	0.91	1589	8.53	1.38	2018	3.07	159
Std. Dev.	0.13	53	1.20	0.08	87	0.29	19
Tested at 49 C							
11	0.51	1197	2.68	1.15	1800	2.77	42.9
12	0.35	1335	2.77	1.30	1833	2.88	47.4
13	0.32	1320	2.81	1.37	1908	3.40	51.5
14	0.45	1320	2.81	1.15	1719	2.51	44.5
Mean	0.41	1293	2.77	1.24	1815	2.89	46.6
Std. Dev.	0.09	64	0.06	0.11	78	0.37	3.8

^aInitial Modulus: (20% rupture stress)/strain.

Table XI. Compression Test at a Constant Crosshead Speed of 0.001 mm/sec for Mock 90503

(Lot. No. 005-11 Normal, Pressing No. 42057Y4604, Density 1.620 Mg/m³)

Small Scale Specimens Taken From Hemisphere

Piece No.	Initial Modulus ^a (GPa)	Failure			Rupture		Work to Rupture (KJ/m ³)
		Time (sec)	Stress (MPa)	Strain (%)	Time (sec)	Strain (%)	
Tested at 21 C							
6	0.87	759	9.96	1.35	1002	2.12	111
7	0.86	684	9.80	1.25	1068	2.08	110
8	0.83	711	9.45	1.30	1110	2.28	121
9	1.72	762	9.83	1.39	1176	2.18	141
10	0.83	780	10.01	1.46	1419	2.53	127
Mean	1.02	739	9.81	1.35	1155	2.24	116
Std. Dev.	0.39	40	0.22	0.08	161	0.18	8
Tested at 49 C							
1	0.32	561	3.26	1.10	957	2.55	41.4
2	0.31	591	3.34	1.19	1170	3.11	42.6
3	0.22	585	3.32	1.25	1320	3.59	47.1
4	0.31	618	3.34	1.18	1182	2.88	43.0
5	0.38	630	3.39	1.18	945	2.24	40.5
Mean	0.31	597	3.33	1.18	1115	2.87	42.9
Std. Dev.	0.06	27	0.05	0.06	161	0.52	2.5

^aInitial Modulus: (20% rupture stress)/strain.

Table XII. Compression Test at a Constant Crosshead Speed of 0.001 mm/sec for Mock 90503
(Lot. No. 005-11 Dried, Pressing No. 42267Y3105, Density 1.613 Mg/m³)

Small Scale Specimens

Piece No.	Initial Modulus ^a (GPa)	Failure			Rupture		Work to Rupture (KJ/m ³)
		Time (sec)	Stress (MPa)	Strain (%)	Time (sec)	Strain (%)	
Tested at 21 C							
18	0.43	807	8.69	1.37	1056	2.11	96.8
19	0.37	780	8.84	1.59	1074	2.59	116.4
20	0.28	822	8.79	1.61	1083	2.64	116.7
Mean	0.36	803	8.76	1.52	1071	2.44	110.0
Std. Dev.	0.08	21	0.08	0.14	14	0.30	11.5
Tested at 49 C							
21	0.24	615	2.85	1.36	1095	2.93	35.2
22	0.21	594	2.65	1.28	906	2.34	31.8
23	0.38	450	2.45	0.95	981	2.52	32.3
24	0.11	624	2.67	1.50	969	2.15	29.5
Mean	0.23	571	2.65	1.27	988	2.48	30.1
Std. Dev.	0.11	82	0.18	0.24	79	0.33	2.3

^aInitial Modulus: (20% rupture stress)/strain.

Table XIII. Compression Test at a Constant Crosshead Speed of 0.001 mm/sec for Mock 90503

(Lot. No. 015-73 Normal, Pressing No. 42267Y3104, Density 1.616 Mg/m³)

Piece No.	Initial Modulus ^a (GPa)	Failure			Rupture		Work to Rupture (kJ/m ³)
		Time (sec)	Stress (MPa)	Strain (%)	Time (sec)	Strain (%)	
Tested at 21 C (Control Group)							
12	0.71	1356	5.89	1.43	1914	3.09	116
13	0.53	1368	5.92	1.30	1848	2.69	127
16	0.53	1368	5.92	1.30	1848	2.69	102
Mean	0.64	1429	5.91	1.37	1982	3.25	115
Std. Dev.	0.10	116	0.02	0.07	178	0.66	13
Tested at 49 C							
9	0.41	1098	2.12	1.25	1818	3.58	39.8
10	0.42	1116	2.10	1.13	1740	2.97	32.8
11	0.40	1110	2.11	1.08	1671	2.80	34.5
14	0.31	1380	2.07	1.11	1704	2.79	31.0
Mean	0.38	1176	2.10	1.14	1733	3.03	34.5
Std. Dev.	0.05	136	0.02	0.08	63	0.37	3.8

^aInitial Modulus: (20% rupture stress)/strain.

Table XIV. Compression Test at a Constant Crosshead Speed of 0.001 mm/sec for Mock 90503

(Lot. No. 015-73 Dried, Pressing No. 42267Y3103, Density 1.616 Mg/m³)

Piece No.	Initial Modulus ^a (GPa)	Failure			Rupture		Work to Rupture (KJ/m ³)
		Time (sec)	Stress (MPa)	Strain (%)	Time (sec)	Strain (%)	
Tested at 21 C							
9	0.73	1692	6.04	1.40	2406	3.96	132
10	0.73	1482	6.01	1.41	2046	2.53	107
11	0.74	1365	5.90	1.26	1836	2.99	109
12	0.68	1461	5.90	1.28	2049	3.50	113
Mean	0.72	1500	5.96	1.34	2084	3.25	115
Std. Dev.	0.03	138	0.07	0.08	237	0.62	11
Tested at 49 C							
13	0.30	1125	2.03	1.11	1752	3.03	34.6
14	0.34	1209	2.55	1.28	1866	3.59	49.0
16	0.34	1140	2.12	2.02	1890	2.85	30.9
Mean	0.33	1158	2.23	1.47	1836	3.15	38.2
Std. Dev.	0.02	45	0.28	0.48	74	0.39	9.6

^aInitial Modulus: (20% rupture stress)/strain.

Table XV. Compression Test at a Constant Crosshead Speed of 0.001 mm/sec for Mock 90503

(Lot. No. 016-73 Normal, Pressing No. 42267Y3102, Density 1.620 Mg/m³)

Piece No.	Initial Modulus ^a (GPa)	Failure			Rupture		Work to Rupture (KJ/m ³)
		Time (sec)	Stress (MPa)	Strain (%)	Time (sec)	Strain (%)	
Tested at 21 C (Control Group)							
9	0.82	1338	6.95	1.81	1989	3.67	128
10	0.79	1431	6.90	1.39	2046	2.75	115
11	0.87	1317	6.92	1.34	1854	2.97	126
12	0.92	1368	6.87	1.38	2172	4.20	139
Mean	0.85	1364	6.91	1.48	2015	3.40	127
Std. Dev.	0.06	50	0.04	0.22	132	0.67	10
Tested at 49 C							
13	0.39	1086	2.14	1.04	1632	1.84	27.1
14	0.41	1041	2.05	1.06	1761	3.34	33.4
15	1.15	849	2.01	0.81	1509	2.56	26.5
16	0.39	1035	2.02	1.01	1656	2.90	30.2
Mean	0.58	1003	2.05	0.98	1640	2.66	29.3
Std. Dev.	0.38	105	0.06	0.12	104	0.63	3.2

^aInitial Modulus: (20% rupture stress)/strain.

Table XVI. Compression Test at a Constant Crosshead Speed of 0.001 mm/sec for Mock 90503

(Lot. No. 016-73 Dried, Pressing No. 42267Y3101, Density 1.617 Mg/m³)

Piece No.	Initial Modulus ^a (GPa)	Failure			Rupture		Work to Rupture (KJ/m ³)
		Time (sec)	Stress (MPa)	Strain (%)	Time (sec)	Strain (%)	
Tested at 21 C							
9	0.54	1389	6.40	1.93	2085	3.88	156
10	0.59	1476	6.61	1.89	2100	3.50	151
12	0.67	1413	5.54	1.26	2040	3.36	101
Mean	0.60	1426	6.18	1.69	2075	3.58	136
Std. Dev.	0.07	45	0.56	0.38	31	0.27	30
Tested at 49 C							
13	0.39	1182	2.06	1.10	2016	2.87	17.8
14	0.41	1092	2.02	1.08	1710	2.84	18.3
15	0.46	1041	2.08	1.01	1554	2.53	30.4
16	0.51	1143	2.16	1.08	1848	3.26	34.7
Mean	0.44	1115	2.08	1.07	1782	2.87	25.3
Std. Dev.	0.05	61	0.06	0.04	197	0.30	8.6

^aInitial Modulus: (20% rupture stress)/strain.

Lot No. 005-11 Normal
Pressing No. 42267Y3106

Fig. 1. Mock 90503 Tensile Tests at a Constant Crosshead Speed of 0.002 mm/sec

Fig. 2. Mock 90503 Tensile Tests at a Constant Crosshead Speed of 0.002 mm/sec

Fig. 3. Mock 90503 Tensile Tests at a Constant Crosshead Speed of 0.002 mm/sec

Lot No. 015-73 Dried
Pressing No. 42267Y3103

Fig. 4. Mock 90503 Tensile Tests at a Constant Crosshead Speed of 0.002 mm/sec

Lot No. 016-73 Normal
Pressing No. 42267Y3102

Fig. 5. Mock 90503 Tensile Tests at a Constant Crosshead Speed of 0.002 mm/sec

Lot No. 016-73 Dried
Pressing No. 42267Y3101

Fig. 6. Mock 90503 Tensile Tests at a Constant Crosshead Speed of 0.002 mm/sec

Fig. 7. Mock 90503 Compression Tests at a Constant Crosshead Speed of 0.001 mm/sec

Fig. 8. Mock 90503 Compression Tests at a Constant Crosshead Speed of 0.001 mm/sec

Fig. 9. Mock 90503 Compression Tests at a Constant Crosshead Speed of 0.001 mm/sec

Fig. 10. Mock 90503 Compression Tests at a Constant Crosshead Speed of 0.001 mm/sec

Fig. 11. Mock 90503 Compression Tests at a Constant Crosshead Speed of 0.001 mm/sec

Fig. 12. Mock 90503 Compression Tests at a Constant Crosshead Speed of 0.001 mm/sec

Fig. 13. Mock 90503 Compression Tests at a Constant Crosshead Speed of 0.001 mm/sec

Fig. 14. Mock 90E03 Compression Tests at a Constant Crosshead Speed of 0.001 mm/sec