

DEA-130 COLLAPSE DATA

Shell Donated COLLAPSE DATA - VALUES SHOWN IN RED

BLUE D,

6-Jun-02

Sample Number	Manufacturer	Heat	Nominal OD Inch	Nominal Weight Lb/ft	Specified Yield Ksi	Grade Letter
1	Shell Donated		2.875	7.8	125	A
2	Shell Donated		3.5	9.2	110	A
3	Shell Donated		3.5	10.2	125	A
4			4.5	12.6	80	L
5			4.5	12.6	80	L
6			4.5	12.6	80	L
7	Shell Donated		4.5	13.5	85	A
8	Shell Donated		4.5	13.5	95	A
9	Shell Donated		4.5	13.5	110	A
10	Shell Donated		4.5	13.5	125	A
11	Shell Donated		4.5	15.1	95	A
12	Shell Donated		4.5	15.1	110	A
13	Shell Donated		4.5	15.1	110	A
14	Shell Donated		4.5	15.1	110	A
15			5	15	95	A
16			5	15	95	A
17			5	15	95	A
18			5.5	14	55	J
19			5.5	14	55	J
20			5.5	14	55	J
21			5.5	14	55	J
22			5.5	17	80	N
23			5.5	17	80	N
24			5.5	17	80	N
25			5.5	17	80	N
26			5.5	17	80	L
27			5.5	17	80	L
28			5.5	17	80	L
29			5.5	17	80	L
30	Shell Donated		5.5	17	110	A
31			5.5	20	80	N
32			5.5	20	80	N
33			5.5	20	80	N
34			5.5	20	80	L
35			5.5	20	80	L
36			5.5	20	80	L
37			5.5	20	110	P
38			5.5	20	110	P
39			5.5	20	110	P
40	Shell Donated		5.5	20	110	A
41	Shell Donated		5.5	20	110	A
42	Shell Donated		5.5	23	110	A
43	Shell Donated		5.5	23	110	A
44	Shell Donated		5.5	23	110	A
45			7	26	55	K
46			7	26	55	K
47			7	26	55	K

48	7	29	80	N
49	7	29	80	N
50	7	29	80	N
51	7	29	80	N
52	7	29	80	L
53	7	29	80	L
54	7	29	80	L
55	7	29	80	L
56	7	29	80	L
57	7	29	95	A
58	7	29	95	A
59	7	29	95	A
60	7	29	110	A
61	7	29	110	A
62	7	29	110	A
63	7	29	110	A
64	7	32	80	N
65	7	32	80	N
66	7	32	80	N
67	7	32	110	A
68	7	32	110	A
69	7	32	110	A
70	7	35	125	Q
71	7	35	125	Q
72	7	35	125	Q
73	7.75	46.1	110	P
74	7.75	46.1	110	P
75	7.75	46.1	110	P
76	7.75	46.1	125	Q
77	7.75	46.1	125	Q
78	8.625	24	55	K
79	8.625	24	55	K
80	8.625	24	55	K
81	8.625	32	55	J
82	8.625	32	55	J
83	8.625	32	55	J
84	8.625	32	55	J
85	9.625	36	55	K
86	9.625	36	55	K
87	9.625	36	55	K
88	9.625	36	55	K
89	9.625	36	55	K
90	9.625	36	55	K
91	9.625	36	55	K
92	9.625	40	80	N
93	9.625	40	80	N
94	9.625	40	80	N
95	9.625	47	80	L
96	9.625	47	80	L
97	9.625	47	80	L
98	9.625	47	80	N
99	9.625	47	80	N

100	9.625	47	80	N
101	9.625	53.5	110	A
102	9.625	53.5	110	A
103	9.625	53.5	110	A
104	9.625	53.5	110	P
105	9.625	53.5	110	P
106	9.625	53.5	110	P
107	9.625	53.5	125	Q
108	9.625	53.5	125	Q
109	9.625	53.5	125	Q
110	10.75	40.5	55	J
111	10.75	40.5	55	J
112	10.75	40.5	55	J
113	10.75	45.5	80	N
114	10.75	45.5	80	N
115	10.75	45.5	80	N
116	11.75	71	125	Q
117	11.75	71	125	Q
118	11.75	71	125	Q
119	13.375	48	40	H
120	13.375	48	40	H
121	13.375	48	40	H
122	13.375	54.5	55	K
123	13.375	54.5	55	K
124	13.375	54.5	55	K
125	13.375	54.5	55	K
126	13.375	54.5	55	K
127	13.375	54.5	55	K
128	13.375	54.5	55	K
129	13.375	68	80	N
130	13.375	68	80	N
131	13.375	68	80	N
132	13.375	68	110	P
133	13.375	68	110	P
134	13.375	68	110	P
135	13.375	68	110	P
136	13.375	68	110	P
137	13.375	68	110	P
138	13.375	72	95	A
139	13.375	72	95	A
140	13.375	72	110	P
141	13.375	72	110	P
142	13.375	72	110	P
143	13.625	88.2	125	Q
144	13.625	88.2	125	Q
145	13.625	88.2	125	Q
146	16	84	80	N
147	16	84	80	N
148	16	84	80	N
149	16	97	110	P
150	16	97	110	P
151	16	97	110	P

ATA IS SHELL DONATED PIPE

Grade	HighCollapse	Process	Finish	Average	Average	Average	Average	Actual
	Pipe ?		Code	OD	t	Ovality	Eccentricity	Weight, Lb/ft
2550	FALSE	Smls	36	2.89	0.282	0.042%	1.113%	8.19
SM13CrM110	FALSE	Smls		3.51	0.269	0.322%	1.900%	9.26
825	FALSE	Smls	36	3.51	0.285	0.060%	1.630%	10.11
	FALSE	Smls	30	4.53	0.274	0.189%	1.521%	12.63
	FALSE	Smls	30	4.52	0.270	0.196%	2.337%	12.30
	FALSE	Smls	30	4.53	0.266	0.177%	1.882%	12.27
13 Cr-85	FALSE	Smls	25	4.51	0.284	0.244%	1.901%	12.93
13 Cr-95	FALSE	Smls		4.53	0.295	0.471%	3.145%	13.47
Hyper 13Cr-110	FALSE	Smls	25	4.51	0.295	0.416%	2.356%	13.17
825	FALSE	Smls	36	4.51	0.297	0.074%	4.400%	13.83
NK15Cr95	FALSE	Smls		4.53	0.343	0.356%	3.933%	15.37
NK15CR110	FALSE	Smls		4.52	0.329	0.342%	2.969%	14.67
KOHP1-13Cr110	FALSE	Smls	25	4.51	0.333	0.261%	1.604%	14.80
SM13CrM110	FALSE	Smls		4.52	0.335	0.201%	2.708%	14.83
	FALSE	Smls	25	5.02	0.302	0.168%	1.910%	15.00
	FALSE	Smls	25	5.02	0.314	0.168%	2.203%	15.45
	FALSE	Smls	25	5.02	0.304	0.139%	3.711%	14.85
	FALSE	EW	8	5.53	0.238	0.370%	0.643%	13.64
	FALSE	EW	8	5.53	0.238	0.428%	0.700%	13.58
	FALSE	EW	8	5.53	0.236	0.405%	0.376%	13.50
	FALSE	EW	8	5.54	0.243	0.385%	0.560%	13.94
	FALSE	EW	28	5.54	0.299	0.395%	0.697%	16.80
	FALSE	EW	28	5.54	0.299	0.431%	1.051%	16.80
	FALSE	EW	28	5.55	0.298	0.369%	0.997%	16.75
	FALSE	EW	28	5.55	0.298	0.507%	0.942%	16.80
	FALSE	EW	28	5.53	0.312	0.534%	0.937%	0.00
	FALSE	EW	28	5.53	0.307	0.508%	0.815%	16.91
	FALSE	EW	28	5.53	0.311	0.499%	1.109%	13.53
	FALSE	EW	28	5.53	0.308	0.701%	0.813%	16.83
Hyper 13Cr-110	FALSE	Smls	24	5.51	0.301	0.354%	2.615%	16.64
	FALSE	Smls	30	5.51	0.363	0.145%	6.573%	19.91
	FALSE	Smls	30	5.52	0.372	0.149%	4.303%	20.43
	FALSE	Smls	30	5.51	0.373	0.137%	3.666%	20.56
	FALSE	Smls	25	5.52	0.365	0.284%	2.022%	19.77
	FALSE	Smls	25	5.53	0.371	0.183%	1.909%	19.98
	FALSE	Smls	25	5.53	0.369	0.151%	4.216%	19.98
	FALSE	Smls	28	5.54	0.365	0.243%	2.290%	20.07
	FALSE	Smls	28	5.53	0.366	0.351%	4.241%	20.05
	FALSE	Smls	28	5.54	0.364	0.275%	3.217%	20.05
KOHP-1-13Cr110	FALSE	Smls	25	5.53	0.364	0.169%	3.227%	19.85
NK15Cr110	FALSE	Smls		5.53	0.373	0.350%	2.335%	20.40
NK15Cr110	FALSE	Smls		5.53	0.401	0.293%	2.103%	21.98
KOHP-1-13Cr110	FALSE	Smls	25	5.52	0.427	0.201%	1.482%	22.91
13Cr110	FALSE	Smls		5.52	0.423	0.312%	2.281%	22.66
	FALSE	Smls	3	7.04	0.365	0.194%	2.872%	25.99
	FALSE	Smls	3	7.05	0.369	0.192%	2.304%	26.25
	FALSE	Smls	3	7.05	0.360	0.165%	6.662%	25.67

FALSE	EW	28	7.06	0.402	0.675%	0.801%	28.44
FALSE	EW	28	7.09	0.397	0.679%	1.126%	28.26
FALSE	EW	28	7.07	0.404	0.603%	1.218%	28.69
FALSE	EW	28	7.06	0.402	0.498%	0.897%	28.61
FALSE	Smls	30	7.04	0.406	0.145%	2.189%	28.82
FALSE	Smls	30	7.05	0.402	0.169%	2.611%	28.76
FALSE	Smls	25	7.03	0.425	0.126%	0.843%	29.14
FALSE	Smls	25	7.03	0.418	0.107%	1.961%	29.14
FALSE	Smls	25	7.03	0.421	0.125%	2.398%	29.25
FALSE	EW	28	7.06	0.406	0.203%	0.554%	28.95
FALSE	EW	28	7.07	0.406	0.225%	0.575%	28.95
FALSE	EW	28	7.06	0.405	0.192%	0.891%	28.99
TRUE	EW	28	7.07	0.405	0.146%	0.816%	28.76
TRUE	EW	28	7.07	0.404	0.302%	0.612%	28.76
TRUE	EW	28	7.08	0.403	0.325%	0.882%	28.67
TRUE	EW	28	7.06	0.403	0.464%	0.819%	28.56
FALSE	Smls	3	7.06	0.456	0.200%	2.958%	31.95
FALSE	Smls	3	7.06	0.459	0.143%	1.436%	32.04
FALSE	Smls	3	7.07	0.451	0.165%	1.157%	31.74
FALSE	Smls	30	7.06	0.468	0.275%	3.694%	32.55
FALSE	Smls	30	7.05	0.453	0.381%	2.818%	31.67
FALSE	Smls	30	7.05	0.456	0.195%	1.807%	31.78
FALSE	Smls	30	7.04	0.506	0.295%	1.274%	35.25
FALSE	Smls	30	7.04	0.495	0.212%	2.315%	34.67
FALSE	Smls	30	7.03	0.499	0.234%	2.438%	34.82
FALSE	Smls	28	7.81	0.588	0.232%	2.451%	45.33
FALSE	Smls	28	7.80	0.608	0.285%	4.101%	46.80
FALSE	Smls	28	7.81	0.588	0.247%	2.719%	45.31
TRUE	Smls	29	7.82	0.598	0.227%	1.905%	45.66
TRUE	Smls	29	7.82	0.600	0.226%	2.572%	45.89
FALSE	Smls	3	8.68	0.274	0.330%	4.391%	24.52
FALSE	Smls	3	8.68	0.274	0.215%	4.398%	24.43
FALSE	Smls	3	8.68	0.273	0.287%	6.278%	24.33
FALSE	EW	8	8.69	0.343	0.265%	0.510%	31.13
FALSE	EW	8	8.69	0.342	0.142%	0.682%	30.56
FALSE	EW	8	8.69	0.349	0.132%	0.470%	31.20
FALSE	EW	8	8.69	0.343	0.277%	0.493%	30.75
FALSE	EW	13	9.70	0.352	0.139%	1.278%	35.30
FALSE	EW	13	9.70	0.353	0.215%	1.212%	35.53
FALSE	EW	13	9.70	0.356	0.199%	0.725%	35.83
FALSE	EW	13	9.71	0.353	0.151%	0.732%	35.59
FALSE	Smls	3	9.69	0.358	0.211%	1.645%	35.44
FALSE	Smls	3	9.69	0.355	0.287%	2.178%	35.50
FALSE	Smls	3	9.70	0.359	0.307%	3.678%	35.74
FALSE	Smls	3	9.71	0.402	0.143%	1.985%	39.72
FALSE	Smls	3	9.71	0.401	0.232%	2.781%	39.71
FALSE	Smls	3	9.70	0.406	0.219%	3.820%	40.07
FALSE	Smls	30	9.69	0.470	0.213%	3.640%	46.15
FALSE	Smls	30	9.69	0.463	0.147%	2.202%	45.49
FALSE	Smls	30	9.68	0.471	0.283%	2.798%	45.19
FALSE	Smls	30	9.70	0.478	0.223%	3.001%	47.00
FALSE	Smls	30	9.69	0.491	0.265%	4.487%	48.22

FALSE	Smls	30	9.69	0.490	0.285%	4.179%	48.36
FALSE	Smls	30	9.71	0.543	0.097%	1.985%	53.01
FALSE	Smls	30	9.71	0.544	0.113%	2.715%	53.33
FALSE	Smls	30	9.72	0.548	0.128%	3.406%	53.63
FALSE	Smls	30	9.69	0.534	0.632%	1.260%	52.18
FALSE	Smls	30	9.69	0.546	0.531%	2.652%	53.14
FALSE	Smls	30	9.72	0.551	0.347%	4.034%	52.83
FALSE	Smls	29	9.69	0.547	0.281%	1.617%	52.99
FALSE	Smls	29	9.69	0.543	0.154%	2.845%	52.85
FALSE	Smls	29	9.69	0.547	0.159%	2.017%	52.97
FALSE	EW	8	10.82	0.343	0.280%	0.624%	38.40
FALSE	EW	8	10.81	0.342	0.275%	1.536%	38.19
FALSE	EW	8	10.82	0.344	0.292%	0.751%	38.25
TRUE	Smls	30	10.84	0.398	0.180%	2.071%	44.43
TRUE	Smls	30	10.83	0.401	0.249%	1.614%	44.61
TRUE	Smls	30	10.83	0.400	0.220%	1.562%	44.44
FALSE	Smls	30	11.84	0.589	0.268%	3.850%	69.70
FALSE	Smls	30	11.84	0.602	0.214%	2.333%	72.00
FALSE	Smls	30	11.84	0.588	0.289%	2.488%	70.25
FALSE	EW	8	13.44	0.322	0.229%	0.638%	45.43
FALSE	EW	8	13.44	0.323	0.208%	0.825%	45.40
FALSE	EW	8	13.44	0.323	0.220%	0.387%	45.31
FALSE	Smls	3	13.44	0.386	0.212%	3.573%	53.47
FALSE	Smls	3	13.47	0.386	0.364%	1.628%	53.57
FALSE	Smls	3	13.46	0.391	0.170%	1.884%	54.24
FALSE	EW	13	13.46	0.383	0.191%	0.522%	53.43
FALSE	EW	13	13.48	0.383	0.210%	0.334%	53.56
FALSE	EW	13	13.45	0.386	0.276%	0.533%	53.63
FALSE	EW	13	13.47	0.383	0.169%	0.494%	53.62
TRUE	Smls	28	13.45	0.482	0.170%	4.300%	66.76
TRUE	Smls	28	13.44	0.485	0.166%	6.290%	66.82
TRUE	Smls	28	13.45	0.486	0.302%	8.119%	66.93
FALSE	Smls	30	13.47	0.479	0.225%	3.037%	65.83
FALSE	Smls	30	13.47	0.482	0.368%	1.987%	66.13
FALSE	Smls	30	13.47	0.479	0.184%	1.643%	65.92
TRUE	Smls	28	13.44	0.480	0.212%	1.603%	65.94
TRUE	Smls	28	13.44	0.473	0.271%	1.537%	65.21
TRUE	Smls	28	13.43	0.481	0.196%	3.223%	66.28
TRUE	Smls	30	13.47	0.523	0.647%	2.365%	70.04
TRUE	Smls	30	13.46	0.528	0.618%	2.458%	73.01
TRUE	Smls	28	13.46	0.502	0.396%	3.065%	69.14
TRUE	Smls	28	13.45	0.505	0.269%	4.037%	69.53
TRUE	Smls	28	13.45	0.514	0.303%	4.757%	70.65
TRUE	Smls	29	13.73	0.642	0.218%	1.775%	89.94
TRUE	Smls	29	13.72	0.647	0.289%	1.537%	90.66
TRUE	Smls	29	13.73	0.647	0.200%	1.987%	90.28
TRUE	Smls	28	16.09	0.531	0.231%	2.329%	87.85
TRUE	Smls	28	16.08	0.520	0.291%	4.723%	86.23
TRUE	Smls	28	16.08	0.512	0.234%	4.682%	85.08
TRUE	EW	26	16.07	0.574	0.274%	1.071%	94.08
TRUE	EW	26	16.09	0.572	0.334%	0.626%	90.35
TRUE	EW	26	16.08	0.574	0.310%	0.532%	92.11

Sample	Sample	Collapse	Failure	Yield Stress, Ksi			Tensile Stress	
Weight, Lb	Length, Inch	Pressure, Psi	Location	End	Middle	Average	End	Middle
15.7	23	30,000	N/A			140.60		
21.6	28	17,227	135/315 deg			115.80		
23.6	28	19,903	135/270 deg			113.70		
37.9	36	10,315	0/315-135/180deg	87.31	87.74	87.53	102.97	107.47
36.9	36	10,058	0/45-180/225deg	82.52	83.10	82.81	99.20	100.22
36.8	36	9,939	0/315-135/180deg	87.60	86.73	87.16	103.41	103.41
38.8	36	11,039	90/135-270/315			88.00		
40.4	36	12,469	0/315-135/180			101.60		
39.5	36	13,550	0/180 deg			118.50		
41.5	36	13,416	90/290 deg			96.00		
46.1	36	15,899	0/315-135/180			95.30		
44	36	16,912	135/315 deg			116.60		
44.4	36	16,368	135/315 deg			114.50		
44.5	36	15,883	0/45-180/225			114.00		
50	40	9,506	45/90-225/270	96.30	96.70	96.50	125.00	126.60
51.5	40	10,364	45/225 deg	96.30	98.20	97.25	125.70	127.00
49.5	40	9,229	0/315-135/180deg	94.60	95.40	95.00	121.70	123.10
50	44	4,263	135/315	64.80	69.80	67.30	78.50	83.30
49.8	44	4,160	135/315	67.20	65.70	66.45	79.50	78.00
49.5	44	4,048	0/180	67.40	68.60	68.00	81.30	82.40
51.1	44	4,355	0/180	69.20	67.20	68.20	82.70	81.70
61.6	44	7,846	90/270	96.30	97.00	96.65	107.50	110.50
61.6	44	8,084	90/270	98.20	101.20	99.70	109.70	113.20
61.4	44	7,879	90/270	99.60	101.00	100.30	110.90	112.40
61.6	44	8,226	90/270	103.20	101.90	102.55	114.70	113.30
0	44	6,933	90-270	84.20	85.90	85.05	99.00	101.00
62	44	7,439	90-270	85.00	85.10	85.05	98.90	101.40
62	55	6,997	90-270	82.00	85.40	83.70	98.90	101.00
61.7	44	6,793	90-270	91.90	87.50	89.70	104.60	101.30
61	44	9,153	0/45-225deg			116.30		
73	44	11,968	0/315-135/180deg	92.53	95.72	94.12	108.05	110.37
74.9	44	12,258	0/180 deg	93.54	94.70	94.12	108.19	109.93
75.4	44	12,255	0/315-135/180deg	96.88	94.99	95.94	110.95	110.08
72.5	44	10,783	0/315-135/180deg	83.10	85.30	84.20	111.10	113.70
73.25	44	10,591	0/45-180/225deg	85.10	84.00	84.55	112.80	112.30
73.25	44	10,473	90/135-270/315deg	84.70	85.30	85.00	111.10	113.60
73.6	44	14,094	45/90-225/270	128.50	123.10	125.80	136.70	132.70
73.5	44	15,369	0-180	124.80	127.00	125.90	133.30	134.90
73.5	44	14,776	45/90-225/270	127.40	125.60	126.50	135.00	134.40
72.8	44	13,878	0/180 Deg			115.40		
74.8	44	14,641	0/315-135/180			114.50		
80.6	44	16,781	45/225 deg			121.80		
84	44	18,162	90/270 deg			114.20		
83.1	44	16,695	90/135-270/315			114.00		
121.3	56	5,757	0/180 DEG	72.10	72.60	72.35	113.20	112.40
122.5	56	5,961	0/180 DEG	69.50	70.00	69.75	110.00	110.20
119.8	56	5,400	135/315 DEG	69.50	72.90	71.20	110.70	111.40

132.7	56	7,799 0/180	100.70	96.30	98.50	115.10	111.10
131.9	56	7,602 0/180	100.80	107.80	104.30	114.80	121.70
133.9	56	8,484 135/315	93.00	94.00	93.50	107.60	107.70
133.5	56	7,254 45/90-225/270	88.60	88.70	88.65	101.80	103.20
134.5	56	8,965 45/225 deg	86.58	86.58	86.58	106.89	107.32
134.2	56	8,912 45/225 deg	88.03	87.45	87.74	107.61	107.32
136	56	8,956 0/45-180/225deg	89.80	87.00	88.40	116.90	113.90
136	56	9,136 90/270 deg	86.60	87.30	86.95	113.60	114.00
136.5	56	8,770 90/135-270/315deg	86.90	88.20	87.55	113.60	113.70
135.1	56	10,872 90/270	120.80	131.40	126.10	131.00	141.00
135.1	56	10,370 90/270	120.40	121.70	121.05	130.60	132.00
135.3	56	10,709 90/270	122.90	121.40	122.15	133.10	131.80
134.2	56	10,323 0/45-180/225	114.90	113.60	114.25	129.60	127.00
134.2	56	10,042 135/315	113.40	115.40	114.40	127.60	128.70
133.8	56	10,211 135/315	114.30	113.30	113.80	127.90	127.20
133.3	56	10,018 135/315	111.10	113.00	112.05	125.00	127.70
149.1	56	10,906 45/90-225/270	84.70	86.90	85.80	102.00	102.70
149.5	56	10,901 45/90-225/270	84.80	84.90	84.85	100.90	101.60
148.1	56	10,790 45/90-225/270	86.20	84.70	85.45	101.00	100.30
151.9	56	13,278 90/225 DEG	121.00	123.00	122.00	133.10	132.90
147.6	56	12,503 135/315 DEG	119.00	118.00	118.50	128.10	127.80
148.3	56	13,509 90/270 DEG	118.80	120.70	119.75	128.20	130.40
164.5	56	17,601 135/180-0/315	136.60	139.60	138.10	148.30	154.30
161.8	56	17,165 90/270 DEG	136.80	143.10	139.95	147.30	154.50
162.5	56	17,674 90/135-270/315	135.00	139.00	137.00	148.90	154.80
234.2	62	20,468 22/202 Ddeg	129.30	139.90	134.60	153.90	153.80
241.8	62	19,474 90/270 DEG	133.70	125.20	129.45	146.70	151.00
234.1	62	19,413 135/315 DEG	134.20	130.80	132.50	145.40	152.30
235.9	62	21,220 45/225 DEG	148.20	149.00	148.60	159.90	160.30
237.1	62	23,956 45/225 DEG	145.10	142.20	143.65	157.70	155.50
141	69	2,022 0/315-135/180	65.20	66.10	65.65	105.30	107.00
140.5	69	1,959 45-225	67.60	68.90	68.25	108.70	109.90
139.9	69	1,989 0/45-180/225	66.80	66.40	66.60	107.10	107.00
179	69	3,490 0/180	65.40	62.30	63.85	80.40	78.30
175.7	69	3,329 0/180	62.20	63.30	62.75	78.80	78.30
179.4	69	3,324 90/270	62.10	63.60	62.85	77.70	77.80
176.8	69	3,091 90/135-270/315	64.90	65.10	65.00	79.90	80.40
226.5	77	3,085 45/225	68.40	66.10	67.25	101.30	102.10
228	77	3,144 0/180	70.30	70.10	70.20	100.00	99.20
229.9	77	3,137 90/270	69.40	72.90	71.15	101.90	100.30
228.4	77	2,988 0/180	70.30	67.10	68.70	102.60	101.30
227.4	77	2,814 90/135 - 270 DEG	68.20	70.00	69.10	106.80	107.00
227.8	77	2,777 45/225 DEG	67.50	67.50	67.50	106.50	106.70
229.3	77	2,689 90/270 DEG	66.20	65.10	65.65	102.60	103.10
254.9	77	5,032 45/90-225/270	94.00	93.20	93.60	108.20	107.80
254.8	77	4,975 135-315	94.80	93.60	94.20	109.40	107.80
257.1	77	5,231 135-315	91.20	94.00	92.60	106.40	108.60
296.1	77	7,405 45-225	84.70	81.80	83.25	102.10	101.23
291.9	77	7,163 90-270	80.49	85.28	82.88	97.75	101.38
290	77	6,622 45-225	86.15	85.13	85.64	103.12	101.67
301.6	77	7,779 90-270	99.93	95.43	97.68	116.31	113.41
309.4	77	8,226 45/90-225/270	99.35	97.75	98.55	112.54	115.15

310.3	77	8,021 135-315	99.20	99.06	99.13	113.41	114.43
339.8	77	11,287 135/315 DEG	119.20	123.10	121.15	132.30	134.30
341.9	77	11,684 135/315 DEG	122.80	122.90	122.85	133.50	134.10
343.8	77	11,640 45/225 DEG	122.20	123.90	123.05	133.20	135.20
334.8	77	9,879 0/180 DEG	134.70	131.50	133.10	145.30	143.90
341	77	10,728 0/180 DEG	123.80	127.20	125.50	137.70	139.30
339	77	9,629 90/135-270/315	123.60	119.30	121.45	137.90	137.30
340	77	10,832 45/90-225/270	134.00	132.80	133.40	147.90	147.90
339.1	77	10,836 135-315	125.80	126.70	126.25	143.00	143.00
339.9	77	10,695 90/270	131.50	131.70	131.60	146.10	146.70
275.2	86	1,783 0/45-180/225DEG	62.54	61.07	61.80	80.33	79.15
273.7	86	2,062 45/225DEG	77.70	64.20	70.95	90.10	81.48
274.1	86	1,738 45/225DEG	63.14	63.59	63.36	83.34	82.23
318.4	86	3,363 0/180 DEG	94.10	92.80	93.45	106.00	106.00
319.7	86	3,698 135/315	92.30	94.40	93.35	104.30	107.50
318.5	86	3,542 90/270 DEG	89.50	94.20	91.85	103.60	106.70
546	94	8,865 0/180 DEG	141.30	141.80	141.55	147.60	147.60
564	94	9,814 0/315-135/180	144.20	140.30	142.25	152.90	147.50
550.3	94	8,860 45/90-225/270	142.60	143.90	143.25	147.80	148.80
405.1	107	937 45/225 DEG	64.68	64.01	64.34	82.47	84.09
404.8	107	936 45/225 DEG	61.85	62.35	62.10	82.48	83.26
404	107	950 135/315 DEG	64.70	61.56	63.13	84.19	83.92
476.8	107	1,543 135/315 DEG	72.00	69.10	70.55	110.80	109.10
477.7	107	1,552 0/45-180/225 DEG	65.50	65.80	65.65	105.10	105.10
483.6	107	1,462 135/315 DEG	66.70	66.70	66.70	105.70	107.10
476.4	107	1,535 90/270	71.80	66.30	69.05	105.20	102.60
477.6	107	1,455 45/225	69.90	68.90	69.40	102.80	100.10
478.2	107	1,561 45/225	68.80	73.50	71.15	100.80	101.90
478.1	107	1,468 0/180	71.50	69.80	70.65	103.90	103.00
595.3	107	3,402 0/180 DEG	102.20	103.00	102.60	114.20	114.10
595.8	107	3,521 45/225 DEG	99.50	98.20	98.85	110.70	110.00
596.8	107	3,437 135/315 DEG	100.70	102.40	101.55	112.30	114.10
587	107	3,278 90-270 DEG	131.11	131.25	131.18	145.76	149.67
589.7	107	3,342 135/315 DEG	129.51	131.54	130.53	139.52	143.58
587.8	107	3,316 90-270 DEG	128.35	129.95	129.15	142.71	146.34
588	107	3,208 45/225 Deg	127.00	130.10	128.55	135.80	137.80
581.5	107	3,080 135/315 Deg	124.70	127.10	125.90	135.40	136.90
591	107	3,352 90/270 Deg	121.70	125.50	123.60	132.20	135.60
624.5	107	3,813 45/225 deg	120.96	118.49	119.72	138.50	137.05
651	107	4,010 45/225 deg	119.50	122.41	120.96	140.39	139.95
616.5	107	3,637 90/270 Deg	125.50	127.00	126.25	135.60	137.30
620	107	3,809 45/225 Deg.	124.10	124.00	124.05	134.50	135.00
630	107	4,056 135/315 DEG	126.30	126.30	126.30	136.60	136.50
817	109	8,317 90/135-270/315deg	149.60	151.70	150.65	160.50	162.90
823.5	109	7,620 0/180 Deg	148.30	153.60	150.95	162.30	165.20
820	109	7,849 90/270 Deg.	143.20	142.20	142.70	155.20	154.30
937.1	128	2,669 135/315 DEG	106.10	103.20	104.65	117.30	115.00
919.8	128	2,550 0/180 DEG	105.80	102.60	104.20	117.50	115.00
907.5	128	2,413 135/180-0/315	103.20	103.50	103.35	115.10	115.20
1003.5	128	3,100 0/180 DEG	118.70	120.80	119.75	155.40	134.00
963.7	128	2,903 0/45-180/225	112.40	123.70	118.05	136.30	136.10
982.5	128	3,150 0/45-180/225	133.80	128.00	130.90	149.30	139.40

Stress, Ksi	Residual Stress, Psi	
	Thin Shell	Crampton
148.10	5,578	5,076
126.10	8,545	7,776
138.90	36,060	32,814
105.22	4,241	3,860
99.71	3,206	2,918
103.41	4,488	4,084
116.90	6,227	5,667
123.50	2,140	1,947
126.20	16,953	15,427
130.00	32,763	29,814
119.70	4,670	4,250
140.40	746	678
124.90	19,081	17,364
121.80	6,609	6,014
125.80	13,128	11,947
126.35	10,967	9,980
122.40	15,239	13,868
80.90	22,750	20,702
78.75	21,069	19,173
81.85	22,317	20,309
82.20	18,192	16,555
109.00	19,922	18,129
111.45	19,334	17,594
111.65	18,666	16,986
114.00	13,199	12,011
100.00	21,736	19,780
100.15	23,564	21,443
99.95	22,727	20,682
102.95	22,109	20,119
129.60	16,551	15,061
109.21	9,462	8,611
109.06	7,944	7,229
110.51	8,274	7,529
112.40	3,603	3,279
112.55	2,788	2,537
112.35	2,346	2,135
134.70	26,861	24,444
134.10	23,707	21,573
134.70	26,268	23,904
127.90	19,802	18,020
137.30	1,249	1,137
137.90	1,503	1,367
126.30	8,617	7,842
123.30	763	694
112.80	9,116	8,295
110.10	18,885	17,186
111.05	15,704	14,290

113.10	33,687	30,655
118.25	34,050	30,985
107.65	-1,174	-1,068
102.50	26,608	24,213
107.10	6,064	5,518
107.47	4,414	4,017
115.40	3,634	3,307
113.80	2,960	2,694
113.65	3,173	2,887
136.00	24,150	21,976
131.30	24,400	22,204
132.45	20,555	18,705
128.30	6,853	6,236
128.15	13,080	11,903
127.55	13,815	12,572
126.35	10,659	9,700
102.35	801	729
101.25	1,788	1,627
100.65	1,084	987
133.00	16,853	15,336
127.95	11,353	10,331
129.30	12,905	11,744
151.30	24,034	21,871
150.90	25,846	23,520
151.85	26,993	24,564
153.85	32,388	29,473
148.85	24,744	22,517
148.85	32,567	29,636
160.10	18,630	16,953
156.60	19,234	17,503
106.15	19,002	17,292
109.30	13,844	12,598
107.05	16,157	14,703
79.35	18,390	16,734
78.55	17,660	16,071
77.75	16,865	15,347
80.15	17,737	16,141
101.70	11,342	10,322
99.60	11,635	10,588
101.10	12,237	11,135
101.95	12,193	11,096
106.90	13,138	11,956
106.60	15,128	13,767
102.85	15,294	13,918
108.00	5,120	4,659
108.60	5,050	4,595
107.50	3,163	2,878
101.67	-2,936	-2,672
99.56	2,572	2,340
102.39	2,023	1,841
114.86	3,961	3,604
113.85	1,150	1,047

113.92	2,933	2,669
133.30	20,262	18,438
133.80	19,102	17,383
134.20	19,663	17,894
144.60	19,051	17,337
138.50	191	174
137.60	19,543	17,784
147.90	28,568	25,997
143.00	32,321	29,412
146.40	32,226	29,325
79.74	20,407	18,571
85.79	19,080	17,363
82.79	20,011	18,210
106.00	4,706	4,282
105.90	5,338	4,857
105.15	4,802	4,370
147.60	13,723	12,488
150.20	22,186	20,189
148.30	12,468	11,346
83.28	18,963	17,256
82.87	18,896	17,196
84.05	19,634	17,866
109.95	15,112	13,752
105.10	1,970	1,793
106.40	16,927	15,403
103.90	31,257	28,444
101.45	9,992	9,092
101.35	25,255	22,982
103.45	10,836	9,861
114.15	4,751	4,323
110.35	5,477	4,984
113.20	6,638	6,041
147.71	39,310	35,772
141.55	30,937	28,152
144.52	36,961	33,635
136.80	25,011	22,760
136.15	22,688	20,646
133.90	23,847	21,701
137.78	24,710	22,486
140.17	27,825	25,321
136.45	12,227	11,127
134.75	13,025	11,853
136.55	10,858	9,880
161.70	25,745	23,428
163.75	14,097	12,829
154.75	30,859	28,082
116.15	4,547	4,138
116.25	5,481	4,987
115.15	4,313	3,925
144.70	24,705	22,481
136.20	26,747	24,340
144.35	23,596	21,473