



July 2009

1 - SCOPE OF APPLICATION

This document contains the torque values applicable for VAM TOP HT mill and field ends.

It contains two tables:

- **Except for CRA** : for carbon and material $\leq 13\%CR$
- **For CRA material** :
for material $> 13\%CR$
And SM13CRM (80-95-110 ksi), SM13CRS (80-90-95-110 ksi), VM95 13CRSS, VM110 13CRSS and CRA material.

Make- up performed at production and repair shops.

Standard make-up will be performed to a torque between the **Mill & Licensee** minimum and maximum values specified in the corresponding columns .

Make-up in the field.

For Liner applications make-up can be performed to any torque comprised between the values specified in "Tubing + Liner min" and "Liner max" columns.

For Tubing applications make-up torque range is defined by the "Tubing + Liner min" and "Tubing max" columns.

2 - DOPE APPLICATION

For VAM TOP HT 100% of dope quantity on box is acceptable only for the mill end.

3 - DOPE QUANTITY

MINIMUM DOPE QUANTITY FOR MAKE - UP

Nominal O.D.	Dope volume	
	(in.)	(in. ³)
4 ½	10	0.6
5	14	0.9
5 ½	16	1.0
6 5/8	19	1.2
7	25	1.5
7 5/8	28	1.7

The weight of dope to apply on a connection depends of the specific gravity of the used dope. For example, the make – up dope quantity in 7" VAM TOP HT will be :

$25 \times 1.67 = 42\text{g}$ with a dope having a gravity of 1.67 g/cm^3 and $1.5 \times 1.00 = 1.5 \text{ oz}$ with a dope having a gravity of 1.00 oz/in^3

SIZE (OD)	NOMI- NAL WEIGHT	WALL THICK- -NESS	65 ksi					
			Field				Mill & licensee	
			Tubing + Liner min.	opti	Tubing max.	Liner Max.	min.	max.
in. mm	lb/ft	in. mm	ft.lb. N.m.					
4 1/2" 114.30	10.50	0.224	2220	2460	2700	2890	2890	3170
		5.69	3000	3330	3660	3920	3920	4310
	11.60	0.250	2800	3110	3420	3760	3760	4130
		6.35	3800	4220	4640	5100	5100	5600
	12.60	0.271	3260	3620	3980	4410	4410	4850
		6.88	4400	4900	5400	6000	6000	6600
	13.50	0.290	3710	4120	4530	5060	5060	5560
		7.37	5000	5600	6200	6900	6900	7600
	15.10	0.337	4630	5140	5650	6370	6370	7000
		8.56	6300	7000	7700	8600	8600	9500
	17.00	0.380	5600	6220	6840	7810	7810	8590
		9.65	7600	8400	9200	10600	10600	11700
17.70	0.402	6120	6800	7480	8550	8550	9400	
	10.21	8300	9200	10100	11600	11600	12800	
18.90	0.430	6840	7590	8340	9500	9500	10450	
	10.92	9300	10300	11300	12800	12800	14100	
21.50	0.500	8150	9050	9950	11200	11200	12300	
	12.70	11100	12300	13500	15200	15200	16700	
23.70	0.560	9150	10150	11150	12650	12650	13850	
	14.22	12300	13700	15100	17200	17200	18900	
5" 127.00	15.00	0.296	4370	4850	5330	5930	5930	6510
		7.52	5900	6600	7300	8040	8040	8830
	18.00	0.362	6190	6870	7550	8700	8700	9500
		9.19	8400	9300	10200	11800	11800	12900
	20.30	0.408	7470	8300	9130	10500	10500	11500
		10.36	10200	11300	12400	14250	14250	15600
	20.80	0.422	7830	8700	9570	10850	10850	11950
		10.72	10600	11800	13000	14700	14700	16200
	21.40	0.437	8460	9400	10340	11550	11550	12700
		11.10	11400	12700	14000	15650	15650	17200
23.20	0.478	9500	10500	11500	13000	13000	14300	
	12.14	12800	14200	15600	17650	17650	19400	
5 1/2" 139.70	17.00	0.304	5220	5790	6360	7230	7230	7960
		7.72	7000	7800	8600	9800	9800	10800
	20.00	0.361	6840	7590	8340	9750	9750	10800
		9.17	9300	10300	11300	13200	13200	14750
	23.00	0.415	8780	9750	10720	12300	12300	13500
	10.54	11900	13200	14500	16700	16700	18300	
26.00	0.476	10850	11950	13050	15550	15550	17100	
	12.09	14600	16200	17800	21100	21100	23200	
6 5/8" 168.28	23.20	0.330	7830	8700	9570	11950	11950	13100
		8.38	10600	11800	13000	16200	16200	17750
	24.00	0.352	8780	9750	10720	13400	13400	14800
		8.94	11900	13200	14500	18150	18150	20050
	28.00	0.417	10100	11200	12300	17700	17700	19500
		10.59	13700	15200	16700	24000	24000	26450
32.00	0.475	14050	15550	17050	22050	22050	24250	
	12.07	19000	21100	23200	29900	29900	32900	
36.70	0.562	15650	17350	19050	27100	27100	30050	
	14.27	21100	23500	25900	36700	36700	40700	
7" 177.80	26.00	0.362	9500	10500	11500	14100	14100	15500
		9.19	12800	14200	15600	19100	19100	21100
	29.00	0.408	11700	13000	14300	18100	18100	19900
		10.36	15900	17700	19500	24550	24550	27000
	32.00	0.453	13050	14450	15850	20600	20600	22700
		11.51	17600	19600	21600	27950	27950	30800
	35.00	0.498	14400	15900	17400	25100	25100	27700
		12.65	19400	21600	23800	34050	34050	37550
	38.00	0.540	16300	18100	19900	27900	27900	31000
		13.72	22000	24500	27000	37850	37850	42050
41.00	0.590	18250	20250	22250	31250	31250	34400	
	14.99	24700	27500	30300	42350	42350	46650	
7 5/8" 193.68	29.70	0.375	11100	12300	13500	17950	17950	19900
		9.53	15000	16700	18400	24300	24300	27000
	33.70	0.430	13700	15200	16700	23130	23130	25650
	10.92	18500	20600	22700	31400	31400	34800	

SIZE (OD)	NOMI- NAL WEIGHT	WALL THICK- -NESS	75-80-85 ksi					
			Field				Mill & licensee	
			Tubing + Liner min.	Tubing opti	Tubing max.	Liner Max.	min.	max.
in. mm	lb/ft	in. mm	ft.lb. N.m.					
4 1/2" 114.30	10.50	0.224	2540	2820	3100	3470	3470	3810
		5.69	3440	3820	4200	4710	4710	5180
	11.60	0.250	3260	3620	3980	4560	4560	5010
		6.35	4400	4900	5400	6200	6200	6800
	12.60	0.271	3710	4120	4530	5420	5420	5960
		6.88	5000	5600	6200	7400	7400	8100
	13.50	0.290	4170	4630	5090	6150	6150	6760
		7.37	5700	6300	6900	8300	8300	9100
	15.10	0.337	5220	5790	6360	7670	7670	8430
		8.56	7000	7800	8600	10400	10400	11400
	17.00	0.380	6390	7090	7790	9400	9400	10340
		9.65	8600	9600	10600	12700	12700	14000
17.70	0.402	6840	7590	8340	10350	10350	11350	
	10.21	9300	10300	11300	14000	14000	15400	
18.90	0.430	7830	8700	9570	11450	11450	12550	
	10.92	10600	11800	13000	15500	15500	17100	
21.50	0.500	9500	10500	11500	13900	13900	15200	
	12.70	12800	14200	15600	18800	18800	20700	
23.70	0.560	10850	11950	13050	15600	15600	17100	
	14.22	14600	16200	17800	21200	21200	23300	
5" 127.00	15.00	0.296	4950	5500	6050	7090	7090	7800
		7.52	6700	7500	8300	9610	9610	10600
	18.00	0.362	7170	7960	8750	10150	10150	11100
		9.19	9700	10800	11900	13750	13750	15050
	20.30	0.408	8460	9400	10340	12650	12650	14000
		10.36	11400	12700	14000	17150	17150	19000
	20.80	0.422	9150	10150	11150	13400	13400	14800
10.72		12300	13700	15100	18150	18150	20050	
21.40	0.437	9500	10500	11500	14100	14100	15550	
	11.10	12800	14200	15600	19100	19100	21100	
23.20	0.478	10850	11950	13050	16250	16250	17900	
	12.14	14600	16200	17800	22050	22050	24250	
5 1/2" 139.70	17.00	0.304	5930	6580	7230	8700	8700	9500
		7.72	8000	8900	9800	11800	11800	12900
	20.00	0.361	7830	8700	9570	11950	11950	13100
		9.17	10600	11800	13000	16200	16200	17750
	23.00	0.415	9850	10850	11850	15200	15200	16700
10.54		13200	14700	16200	20600	20600	22650	
6 5/8" 168.28	23.20	0.330	9150	10150	11150	14800	14800	16300
		8.38	12300	13700	15100	20050	20050	22100
	24.00	0.352	10100	11200	12300	16650	16650	18300
		8.94	13700	15200	16700	22550	22550	24800
	28.00	0.417	13050	14450	15850	21700	21700	23850
10.59		17600	19600	21600	29400	29400	32350	
32.00	0.475	14400	15900	17400	27000	27000	29650	
	12.07	19400	21600	23800	36600	36600	40200	
36.70	0.562	18000	19900	21800	33500	33500	37150	
	14.27	24300	27000	29700	45400	45400	50400	
7" 177.80	26.00	0.362	10850	11950	13050	17350	17350	19100
		9.19	14600	16200	17800	23500	23500	25900
	29.00	0.408	13450	14850	16250	22050	22050	24250
		10.36	18100	20100	22100	29900	29900	32900
	32.00	0.453	14050	15550	17050	25450	25450	28000
		11.51	19000	21100	23200	34500	34500	37950
	35.00	0.498	16300	18100	19900	30600	30600	33750
		12.65	22000	24500	27000	41500	41500	45750
	38.00	0.540	18600	20600	22600	35150	35150	38250
		13.72	25100	27900	30700	47650	47650	51850
41.00	0.590	20850	23150	25450	38450	38450	42600	
	14.99	28300	31400	34500	52150	52150	57750	
7 5/8" 193.68	29.70	0.375	13050	14450	15850	21980	21980	24380
		9.53	17600	19600	21600	29800	29800	33100
	33.70	0.430	14400	15900	17400	28300	28300	31390
		10.92	19400	21600	23800	38400	38400	42600

SIZE (OD)	NOMI- NAL WEIGHT	WALL THICK- -NESS	90-95-100 ksi					
			Field				Mill & licensee	
			Tubing + Liner min.	Liner opti	Tubing max.	Liner Max.	min.	max.
in. mm	lb/ft	in. mm	ft.lb. N.m.					
4 1/2" 114.30	10.50	0.224	2800	3110	3420	4120	4120	4530
		5.69	3800	4220	4640	5600	5600	6200
	11.60	0.250	3650	4050	4450	5350	5350	5880
		6.35	4900	5500	6100	7300	7300	8000
	12.60	0.271	4110	4560	5010	6370	6370	7000
		6.88	5600	6200	6800	8600	8600	9500
	13.50	0.290	4690	5210	5730	7230	7230	7950
		7.37	6400	7100	7800	9800	9800	10800
	15.10	0.337	5860	6510	7160	9050	9050	9950
		8.56	7900	8800	9700	12300	12300	13500
	17.00	0.380	7170	7960	8750	11050	11050	12150
		9.65	9700	10800	11900	15000	15000	16500
17.70	0.402	7830	8700	9570	12100	12100	13300	
	10.21	10600	11800	13000	16400	16400	18000	
18.90	0.430	8460	9400	10340	13400	13400	14700	
	10.92	11400	12700	14000	18100	18100	19900	
21.50	0.500	10850	11950	13050	16500	16500	18100	
	12.70	14600	16200	17800	22400	22400	24600	
23.70	0.560	12100	13400	14700	18600	18600	20400	
	14.22	16300	18100	19900	25200	25200	27700	
5" 127.00	15.00	0.296	5480	6080	6680	8300	8300	9200
		7.52	7400	8200	9000	11250	11250	12450
	18.00	0.362	7830	8700	9570	11950	11950	13100
		9.19	10600	11800	13000	16200	16200	17750
	20.30	0.408	9500	10500	11500	14800	14800	16300
		10.36	12800	14200	15600	20050	20050	22100
	20.80	0.422	10100	11200	12300	15550	15550	17100
		10.72	13700	15200	16700	21100	21100	23200
21.40	0.437	10850	11950	13050	16650	16650	18300	
	11.10	14600	16200	17800	22550	22550	24800	
23.20	0.478	12100	13400	14700	19150	19150	21000	
	12.14	16300	18100	19900	25950	25950	28450	
5 1/2" 139.70	17.00	0.304	6510	7230	7950	10500	10500	11500
		7.72	8800	9800	10800	14250	14250	15600
	20.00	0.361	8780	9750	10720	13750	13750	15100
		9.17	11900	13200	14500	18650	18650	20450
	23.00	0.415	11100	12300	13500	17700	17700	19500
10.54		15000	16700	18400	24000	24000	26450	
6 5/8" 168.28	23.20	0.330	10100	11200	12300	17350	17350	19100
		8.38	13700	15200	16700	23500	23500	25900
	24.00	0.352	11450	12650	13850	19500	19500	21500
		8.94	15500	17200	18900	26450	26450	29150
	28.00	0.417	13700	15200	16700	25600	25600	28200
		10.59	18500	20600	22700	34700	34700	38250
	32.00	0.475	16300	18100	19900	32100	32100	35350
12.07		22000	24500	27000	43500	43500	47950	
36.70	0.562	20600	22800	25000	39900	39900	44300	
	14.27	27800	30900	34000	54200	54200	60100	
7" 177.80	26.00	0.362	12450	13750	15050	20600	20600	22700
		9.19	16700	18600	20500	27950	27950	30800
	29.00	0.408	15300	17000	18700	26050	26050	28650
		10.36	20700	23000	25300	35300	35300	38850
	32.00	0.453	16000	17700	19400	31400	31400	33050
		11.51	21600	24000	26400	42550	42550	44800
	35.00	0.498	18600	20600	22600	36150	36150	39800
		12.65	25100	27900	30700	49050	49050	53950
	38.00	0.540	20850	23150	25450	41000	41000	45150
		13.72	28300	31400	34500	55600	55600	61200
41.00	0.590	20850	23150	25450	46150	46150	50750	
	14.99	28300	31400	34500	62600	62600	68800	
7 5/8" 193.68	29.70	0.375	14400	15900	17400	26050	26050	28900
		9.53	19400	21600	23800	35300	35300	39200
	33.70	0.430	16300	18100	19900	33550	33550	37200
		10.92	22000	24500	27000	45500	45500	50400

SIZE (OD)	NOMI- NAL WEIGHT	WALL THICK- -NESS	105-110-115 ksi					
			Field				Mill & licensee	
			Tubing + Liner min.	Liner opti	Tubing max.	Liner Max.	min.	max.
in. mm	lb/ft	in. mm	ft.lb. N.m.					
4 1/2" 114.30	10.50	0.224	3130	3470	3810	4770	4770	5240
		5.69	4240	4710	5180	6500	6500	7200
	11.60	0.250	4040	4480	4920	6150	6150	6760
		6.35	5500	6100	6700	8300	8300	9100
	12.60	0.271	4560	5060	5560	7310	7310	8040
		6.88	6200	6900	7600	9900	9900	10900
	13.50	0.290	5220	5790	6360	8300	8300	9130
		7.37	7000	7800	8600	11300	11300	12400
	15.10	0.337	6450	7160	7870	10400	10400	11400
		8.56	8700	9700	10700	14100	14100	15500
	17.00	0.380	7830	8700	9570	12750	12750	13950
9.65		10600	11800	13000	17300	17300	19000	
17.70	0.402	8460	9400	10340	13950	13950	15250	
	10.21	11400	12700	14000	18900	18900	20800	
18.90	0.430	9500	10500	11500	15400	15400	16900	
	10.92	12800	14200	15600	20900	20900	23000	
21.50	0.500	11700	13000	14300	19100	19100	21000	
	12.70	15900	17700	19500	25900	25900	28500	
23.70	0.560	13700	15200	16700	21650	21650	23750	
	14.22	18500	20600	22700	29300	29300	32200	
5" 127.00	15.00	0.296	6060	6730	7400	9400	9400	10300
		7.52	8200	9100	10000	12750	12750	13950
	18.00	0.362	8780	9750	10720	13750	13750	15100
		9.19	11900	13200	14500	18650	18650	20450
	20.30	0.408	10850	11950	13050	17000	17000	18700
		10.36	14600	16200	17800	20350	20350	25350
	20.80	0.422	11100	12300	13500	18100	18100	19900
10.72		15000	16700	18400	24550	24550	27000	
21.40	0.437	11700	13000	14300	19150	19150	21000	
	11.10	15900	17700	19500	25950	25950	28450	
23.20	0.478	13450	14850	16250	21700	21700	23850	
	12.14	18100	20100	22100	29400	29400	32350	
5 1/2" 139.70	17.00	0.304	7470	8300	9130	11950	11950	13100
		7.72	10200	11300	12400	16200	16200	17750
	20.00	0.361	9850	10850	11850	15900	15900	17500
		9.17	13200	14700	16200	21550	21550	23750
	23.00	0.415	12450	13750	15050	20600	20600	22700
10.54		16700	18600	20500	27950	27950	30800	
26.00	0.476	15050	16650	18250	25450	25450	28000	
	12.09	20300	22600	24900	34500	34500	37950	
6 5/8" 168.28	23.20	0.330	11450	12650	13850	20250	20250	22300
		8.38	15500	17200	18900	27450	27450	30250
	24.00	0.352	13050	14450	15850	22800	22800	25100
		8.94	17600	19600	21600	30900	30900	34050
	28.00	0.417	14650	16250	17850	29600	29600	32650
		10.59	19900	22100	24300	40150	40150	44250
	32.00	0.475	18000	19900	21800	37150	37150	40850
12.07		24300	27000	29700	50350	50350	55400	
36.70	0.562	20850	23150	25450	46100	46100	51200	
	14.27	28300	31400	34500	62500	62500	69400	
7" 177.80	26.00	0.362	13700	15200	16700	24000	24000	26450
		9.19	18500	20600	22700	32550	32550	35850
	29.00	0.408	16000	17700	19400	30100	30100	33150
		10.36	21600	24000	26400	40800	40800	44950
	32.00	0.453	17650	19550	21450	34700	34700	38200
		11.51	23800	26500	29200	47050	47050	51800
	35.00	0.498	20600	22800	25000	41800	41800	46050
		12.65	27800	30900	34000	56650	56650	62450
	38.00	0.540	20850	23150	25450	47300	47300	52150
		13.72	28300	31400	34500	64150	64150	70700
41.00	0.590	20850	23150	25450	53750	53750	59150	
	14.99	28300	31400	34500	72900	72900	80200	
7 5/8" 193.68	29.70	0.375	15050	16650	18250	30200	30200	33500
		9.53	20300	22600	24900	40900	40900	45400
	33.70	0.430	18250	20250	22250	38900	38900	43100
		10.92	24700	27500	30200	52700	52700	58400

SIZE (OD)	NOMI- NAL WEIGHT	WALL THICK- -NESS	120-125-130 ksi					
			Field				Mill & licensee	
			Tubing + Liner min.	Liner opti	Tubing max.	Liner Max.	min.	max.
in. mm	lb/ft	in. mm	ft.lb. N.m.					
4 1/2" 114.30	10.50	0.224	3450	3830	4210	5420	5420	5960
		5.69	4700	5200	5700	7400	7400	8100
	11.60	0.250	4500	4990	5480	7020	7020	7720
		6.35	6100	6800	7500	9500	9500	10500
	12.60	0.271	5020	5570	6120	8300	8300	9130
		6.88	6800	7600	8400	11300	11300	12400
	13.50	0.290	5740	6370	7000	9500	9500	10450
		7.37	7700	8600	9500	12800	12800	14100
	15.10	0.337	7170	7960	8750	11800	11800	12900
		8.56	9700	10800	11900	16000	16000	17600
17.00	0.380	8780	9750	10720	14450	14450	15850	
	9.65	11900	13200	14500	19600	19600	21600	
17.70	0.402	9500	10500	11500	15750	15750	17250	
	10.21	12800	14200	15600	21400	21400	23500	
18.90	0.430	10450	11550	12650	17500	17500	19200	
	10.92	14100	15700	17300	23700	23700	26100	
21.50	0.500	13050	14450	15850	21650	21650	23750	
	12.70	17600	19600	21600	29300	29300	32200	
23.70	0.560	15050	16650	18250	24650	24650	27050	
	14.22	20300	22600	24900	33400	33400	36700	
5" 127.00	15.00	0.296	6510	7230	7950	10850	10850	11850
		7.52	8800	9800	10800	14700	14700	16200
	18.00	0.362	9500	10500	11500	15550	15550	17100
		9.19	12800	14200	15600	21100	21100	23200
	20.30	0.408	11700	13000	14300	19150	19150	21050
		10.36	15900	17700	19500	25950	25950	28450
	20.80	0.422	12450	13750	15050	20250	20250	22300
		10.72	16700	18600	20500	27450	27450	30250
21.40	0.437	13050	14450	15850	21350	21350	23500	
	11.10	17600	19600	21600	28950	28950	31850	
23.20	0.478	14400	15900	17400	24650	24650	27150	
	12.14	19400	21600	23800	33450	33450	36750	
5 1/2" 139.70	17.00	0.304	8150	9050	9950	13750	13750	15050
		7.72	11100	12300	13500	18650	18650	20450
	20.00	0.361	10850	11950	13050	18100	18100	19900
		9.17	14600	16200	17800	24450	24450	27000
	23.00	0.415	13700	15200	16700	23150	23150	25650
10.54		18500	20600	22700	31400	31400	34700	
6 5/8" 168.28	23.20	0.330	12700	14100	15500	22800	22800	25100
		8.38	17200	19100	21000	30900	30900	34050
	24.00	0.352	14400	15900	17400	25950	25950	28600
		8.94	19400	21600	23800	35200	35200	38700
	28.00	0.417	16000	17700	19400	33700	33700	37150
		10.59	21600	24000	26400	45700	45700	50300
	32.00	0.475	19850	22050	24250	42250	42250	46450
12.07		26900	29900	32900	57250	57250	62950	
36.70	0.562	20850	23150	25450	52400	52400	58100	
	14.27	28300	31400	34500	71000	71000	78800	
7" 177.80	26.00	0.362	15050	16650	18250	27350	27350	30100
		9.19	20300	22600	24900	37050	37050	40800
	29.00	0.408	16300	18100	19900	34300	34300	37750
		10.36	22000	24500	27000	46500	46500	51100
	32.00	0.453	19600	21700	23800	39400	39400	43400
		11.51	26500	29400	32300	53450	53450	58850
	35.00	0.498	20850	23150	25450	47500	47500	52350
		12.65	28300	31400	34500	64450	64450	70900
	38.00	0.540	20850	23150	25450	53800	53800	59150
		13.72	28300	31400	34500	72950	72950	80200
41.00	0.590	20850	23150	25450	61250	61250	67420	
	14.99	28300	31400	34500	83050	83050	91400	
7 5/8" 193.68	29.70	0.375	15650	17350	19050	34400	34400	38150
		9.53	21100	23500	25900	46600	46600	51700
	33.70	0.430	20150	22400	24650	44300	44300	49100
		10.92	27300	30400	33400	60100	60100	66600

SIZE (OD)	NOMI- NAL WEIGHT	WALL THICK- -NESS	135-140 ksi					
			Field				Mill & licensee	
			Tubing + Liner min.	Liner opti	Tubing max.	Liner Max.	min.	max.
in. mm	lb/ft	in. mm	ft.lb. N.m.					
4 1/2" 114.30	10.50	0.224	3710	4120	4530	5930	5930	6520
		5.69	5000	5600	6200	8000	8000	8800
	11.60	0.250	4820	5350	5880	7740	7740	8510
		6.35	6600	7300	8000	10500	10500	11600
	12.60	0.271	5400	6000	6600	9100	9100	10010
		6.88	7300	8100	8900	12400	12400	13600
	13.50	0.290	6120	6800	7480	10400	10400	11400
		7.37	8300	9200	10100	14100	14100	15500
	15.10	0.337	7830	8700	9570	13000	13000	14300
		8.56	10600	11800	13000	17700	17700	19500
17.00	0.380	9500	10500	11500	15900	15900	17400	
	9.65	12800	14200	15600	21600	21600	23800	
17.70	0.402	10100	11200	12300	17350	17350	19050	
	10.21	13700	15200	16700	23500	23500	25900	
18.90	0.430	11450	12650	13850	19150	19150	21050	
	10.92	15500	17200	18900	26000	26000	28600	
21.50	0.500	14050	15550	17050	23700	23700	26000	
	12.70	19000	21100	23200	32200	32200	35400	
23.70	0.560	15300	17000	18700	27250	27250	29950	
	14.22	20700	23000	25300	37000	37000	40700	
5" 127.00	15.00	0.296	7170	7960	8750	11950	11950	13100
		7.52	9700	10800	11900	16200	16200	17750
	18.00	0.362	10450	11550	12650	17350	17350	19100
		9.19	14100	15700	17300	23500	23500	25900
	20.30	0.408	12450	13750	15050	20950	20950	23100
		10.36	16700	18600	20500	28400	28400	31300
	20.80	0.422	13050	14450	15850	22400	22400	24650
10.72		17600	19600	21600	30350	30350	33400	
21.40	0.437	14050	15550	17050	23500	23500	25900	
	11.10	19000	21100	23200	31850	31850	35100	
23.20	0.478	15050	16650	18250	27050	27050	29750	
	12.14	20300	22600	24900	36650	36650	40350	
5 1/2" 139.70	17.00	0.304	8780	9750	10720	15200	15200	16700
		7.72	11900	13200	14500	20600	20600	22650
	20.00	0.361	11700	13000	14300	19900	19900	21900
		9.17	15900	17700	19500	27000	27000	29700
23.00	0.415	14400	15900	17400	25600	25600	28150	
	10.54	19400	21600	23800	34700	34700	38150	
6 5/8" 168.28	23.20	0.330	13700	15200	16700	25250	25250	27750
		8.38	18500	20600	22700	34250	34250	37600
	24.00	0.352	15050	16650	18250	28550	28550	31450
		8.94	20300	22600	24900	38700	38700	42650
28.00	0.417	17250	19150	21050	37200	37200	40850	
	10.59	23400	26000	28600	50450	50450	55400	
32.00	0.475	20850	23150	25450	46500	46500	51150	
	12.07	28300	31400	34500	63050	63050	69350	
36.70	0.562	20850	23150	25450	57600	57600	63900	
	14.27	28300	31400	34500	78200	78200	86700	
7" 177.80	26.00	0.362	16000	17700	19400	30100	30100	33150
		9.19	21600	24000	26400	40800	40800	44950
	29.00	0.408	17650	19550	21450	37750	37750	41500
		10.36	23800	26500	29200	51200	51200	56250
	32.00	0.453	20850	23150	25450	43400	43400	47750
		11.51	28300	31400	34500	58850	58850	64750
	35.00	0.498	20850	23150	25450	52350	52350	57550
		12.65	28300	31400	34500	71000	71000	78050
38.00	0.540	20850	23150	25450	59250	59250	65200	
	13.72	28300	31400	34500	80350	80350	88400	
41.00	0.590	20850	23150	25450	67400	67400	74150	
	14.99	28300	31400	34500	91400	91400	100550	
7 5/8" 193.68	29.70	0.375	16900	18800	20700	37900	37900	42050
		9.53	22900	25500	28100	51400	51400	57000
	33.70	0.430	20850	23150	25450	48800	48800	54150
		10.92	28300	31400	34500	66200	66200	73400

SIZE (OD)	NOMI- NAL WEIGHT	WALL THICK- -NESS	145-150-155 ksi					
			Field				Mill & licensee	
			Tubing + Liner min.	opti	Tubing max.	Liner Max.	min.	max.
in. mm	lb/ft	in. mm	ft.lb. N.m.					
4 1/2" 114.30	10.50	0.224	3970	4410	4850	6440	6440	7080
		5.69	5400	6000	6600	8700	8700	9600
	11.60	0.250	5220	5790	6360	8400	8400	9240
		6.35	7000	7800	8600	11400	11400	12500
	12.60	0.271	5800	6440	7080	10000	10000	11000
		6.88	7800	8700	9600	13500	13500	14900
	13.50	0.290	6510	7230	7950	11350	11350	12450
		7.37	8800	9800	10800	15400	15400	16900
	15.10	0.337	8150	9050	9950	14200	14200	15600
		8.56	11100	12300	13500	19200	19200	21100
	17.00	0.380	10100	11200	12300	17300	17300	19000
		9.65	13700	15200	16700	23400	23400	25700
17.70	0.402	10850	11950	13050	18900	18900	20700	
	10.21	14600	16200	17800	25600	25600	28200	
18.90	0.430	12100	13400	14700	20900	20900	22900	
	10.92	16300	18100	19900	28300	28300	31100	
21.50	0.500	15050	16650	18250	25800	25800	28300	
	12.70	20300	22600	24900	35000	35000	38500	
23.70	0.560	15650	17350	19050	29850	29850	32750	
	14.22	21100	23500	25900	40500	40500	44600	
5" 127.00	15.00	0.296	7470	8300	9130	13000	13000	14300
		7.52	10200	11300	12400	17650	17650	19400
	18.00	0.362	11100	12300	13500	18800	18800	20700
		9.19	15000	16700	18400	25500	25500	28050
	20.30	0.408	13450	14850	16250	23150	23150	25400
		10.36	18100	20100	22100	31400	31400	34450
	20.80	0.422	14050	15550	17050	24400	24400	26850
		10.72	19000	21100	23200	33100	33100	36400
21.40	0.437	15050	16650	18250	25800	25800	28350	
	11.10	20300	22600	24900	35000	35000	38450	
23.20	0.478	16000	17700	19400	29400	29400	32350	
	12.14	21600	24000	26400	39850	39850	43850	
5 1/2" 139.70	17.00	0.304	9500	10500	11500	16650	16650	18300
		7.72	12800	14200	15600	22550	22550	24800
	20.00	0.361	12450	13750	15050	21700	21700	23850
		9.17	16700	18600	20500	29400	29400	32350
	23.00	0.415	15050	16650	18250	27900	27900	30650
10.54		20300	22600	24900	37850	37850	41550	
6 5/8" 168.28	23.20	0.330	15050	16650	18250	27600	27600	30400
		8.38	20300	22600	24900	37400	37400	41200
	24.00	0.352	15650	17350	19050	31250	31250	34350
		8.94	21100	23500	25900	42350	42350	46500
	28.00	0.417	18600	20600	22600	40550	40550	44650
10.59		25100	27900	30700	55000	55000	60550	
32.00	0.475	20850	23150	25450	50750	50750	55850	
	12.07	28300	31400	34500	68800	68800	75700	
7" 177.80	26.00	0.362	16300	18100	19900	32850	32850	36150
		9.19	22000	24500	27000	44550	44550	49000
	29.00	0.408	18900	21000	23100	41250	41250	45350
		10.36	25600	28400	31200	55950	55950	61500
	32.00	0.453	20850	23150	25450	47500	47500	52200
11.51		28300	31400	34500	64400	64400	70750	
35.00	0.498	20850	23150	25450	57200	57200	62950	
	12.65	28300	31400	34500	77550	77550	85350	
38.00	0.540	20850	23150	25450	64700	64700	71150	
	13.72	28300	31400	34500	87700	87700	96450	
41.00	0.590	20850	23150	25450	73500	73500	80850	
	14.99	28300	31400	34500	99650	99650	109600	
7 5/8" 193.68	29.70	0.375	20850	23150	25450	41500	41500	46000
		9.53	28300	31400	34500	56300	56300	62400
	33.70	0.430	20850	23150	25450	53350	53350	59180
		10.92	28300	31400	34500	72300	72300	80200

SIZE (OD)	NOMI- NAL WEIGHT	WALL THICK- NESS	65 ksi					
			Field				Mill& licensee	
			Tubing + Liner		Liner			
in. mm	lb/ft	in. mm	min.	opti	max.	Max.	min.	max.
			ft.lb. N.m.					
4 1/2" 114.30	10.50	0.224	2220	2460	2700	2890	2890	3170
		5.69	3010	3330	3660	3920	3920	4300
	11.60	0.250	2800	3110	3420	3760	3760	4130
		6.35	3800	4220	4640	5100	5100	5600
	12.60	0.271	3260	3620	3980	4410	4410	4850
		6.88	4420	4910	5400	5980	5980	6580
	13.50	0.290	3710	4120	4530	5060	5060	5560
		7.37	5030	5590	6140	6860	6860	7540
	15.10	0.337	4630	5140	5650	6370	6370	7000
		8.56	6280	6970	7660	8640	8640	9490
	17.00	0.380	5600	6220	6840	7810	7810	8590
		9.65	7590	8430	9270	10590	10590	11650
	17.70	0.402	6120	6800	7480	8550	8550	9400
		10.21	8300	9220	10140	11590	11590	12740
18.90	0.430	6840	7590	8340	9500	9500	10450	
	10.92	9270	10290	11310	12880	12880	14170	
21.50	0.500	8150	9050	9950	11200	11200	12300	
	12.70	11050	12270	13490	15190	15190	16680	
23.70	0.560	9150	10150	11150	12650	12650	13850	
	14.22	12410	13760	15120	17150	17150	18780	
5" 127.00	15.00	0.296	4370	4850	5330	5930	5930	6510
		7.52	5920	6580	7230	8040	8040	8830
	18.00	0.362	6190	6870	7550	8700	8700	9500
		9.19	8390	9310	10240	11800	11800	12880
	20.30	0.408	7470	8300	9130	10500	10500	11500
		10.36	10130	11250	12380	14240	14240	15590
	20.80	0.422	7830	8700	9570	10850	10850	11950
		10.72	10620	11800	12980	14710	14710	16200
	21.40	0.437	8460	9400	10340	11550	11550	12700
		11.10	11470	12740	14020	15660	15660	17220
23.20	0.478	9500	10500	11500	13000	13000	14300	
	12.14	12880	14240	15590	17630	17630	19390	
5 1/2" 139.70	17.00	0.304	5220	5790	6360	7230	7230	7960
		7.72	7080	7850	8620	9800	9800	10790
	20.00	0.361	6840	7590	8340	9750	9750	10800
		9.17	9270	10290	11310	13220	13220	14640
	23.00	0.415	8780	9750	10720	12300	12300	13500
10.54		11900	13220	14530	16680	16680	18300	
26.00	0.476	10850	11950	13050	15550	15550	17100	
	12.09	14710	16200	17690	21080	21080	23180	
6 5/8" 168.28	23.20	0.330	7830	8700	9570	11950	11950	13100
		8.38	10620	11800	12980	16200	16200	17760
	24.00	0.352	8780	9750	10720	13400	13400	14800
		8.94	11900	13220	14530	18170	18170	20070
	28.00	0.417	10100	11200	12300	17700	17700	19500
		10.59	13690	15190	16680	24000	24000	26440
32.00	0.475	14050	15550	17050	22050	22050	24250	
	12.07	19050	21080	23120	29900	29900	32880	
36.70	0.562	15650	17350	19050	27100	27100	30050	
	14.27	21220	23520	25830	36740	36740	40740	
7" 177.80	26.00	0.362	9500	10500	11500	14100	14100	15500
		9.19	12880	14240	15590	19120	19120	21020
	29.00	0.408	11700	13000	14300	1800	18100	19900
		10.36	15860	17630	19390	2440	24540	26980
	32.00	0.453	13050	14450	15850	20600	20600	22700
		11.51	17690	19590	21490	27930	27930	30780
	35.00	0.498	14400	15900	17400	25100	25100	27700
		12.65	19520	21560	23590	34030	34030	37560
	38.00	0.540	16300	18100	19900	27900	27900	31000
		13.72	22100	24540	26980	37830	37830	42030
41.00	0.590	18250	20250	22250	31250	31250	34400	
	14.99	24740	27460	30170	42370	42370	46640	
7 5/8" 193.68	29.70	0.375	11100	12300	13500	17950	17950	19900
		9.53	15050	16680	18300	24340	24340	26980
	33.70	0.430	13700	15200	16700	23130	23130	25650
		10.92	18570	20610	22640	31360	31360	34780



for CRA material

SIZE (OD)	NOMI- NAL WEIGHT	WALL THICK- NESS	75-80-85 ksi					
			Field				Mill & licensee	
			Tubing + Liner min.	Liner opti	Tubing max.	Liner Max.	min.	max.
in. mm	lb/ft	in. mm	ft.lb. N.m.					
4 1/2" 114.30	10.50	0.224	2540	2820	3100	3470	3470	3810
		5.69	3440	3820	4200	4700	4700	5170
	11.60	0.250	3260	3620	3980	4560	4560	5010
		6.35	4400	4900	5400	6180	6180	6790
	12.60	0.271	3710	4120	4530	5420	5420	5960
		6.88	5030	5590	6140	7350	7350	8080
	13.50	0.290	4170	4630	5090	6150	6150	6760
		7.37	5650	6280	6900	8340	8340	9170
	15.10	0.337	5220	5790	6360	7670	7670	8430
		8.56	7080	7850	8620	10400	10400	11430
	17.00	0.380	6390	7090	7790	9400	9400	10340
		9.65	8660	9610	10560	12740	12740	14020
	17.70	0.402	6840	7590	8340	10350	10350	11350
		10.21	9270	10290	11310	14030	14030	15390
18.90	0.430	7830	8700	9570	11450	11450	12550	
	10.92	10620	11800	12980	15520	15520	17020	
21.50	0.500	9500	10500	11500	13900	13900	15200	
	12.70	12880	14240	15590	18850	18850	20610	
23.70	0.560	10850	11950	13050	15600	15600	17100	
	14.22	14710	16200	17690	21150	21150	23180	
5" 127.00	15.00	0.296	4950	5500	6050	7090	7090	7800
		7.52	6710	7460	8200	9610	9610	10580
	18.00	0.362	7170	7960	8750	10150	10150	11100
		9.19	9720	10790	11860	13760	13760	15050
	20.30	0.408	8460	9400	10340	12650	12650	14000
		10.36	11470	12740	14020	17150	17150	18980
	20.80	0.422	9150	10150	11150	13400	13400	14800
		10.72	12410	13760	15120	18170	18170	20070
21.40	0.437	9500	10500	11500	14100	14100	15550	
	11.10	12880	14240	15590	19120	19120	21080	
23.20	0.478	10850	11950	13050	16250	16250	17900	
	12.14	14710	16200	17690	22030	22030	24270	
5 1/2" 139.70	17.00	0.304	5930	6580	7230	8700	8700	9500
		7.72	8040	8920	9800	11800	11800	12880
	20.00	0.361	7830	8700	9570	11950	11950	13100
		9.17	10620	11800	12980	16200	16200	17760
	23.00	0.415	9850	10850	11850	15200	15200	16700
	10.54	13350	14710	16070	20610	20610	22640	
26.00	0.476	12100	13400	14700	18800	18800	20700	
	12.09	16410	18170	19930	25490	25490	28070	
6 5/8" 168.28	23.20	0.330	9150	10150	11150	14800	14800	16300
		8.38	12410	13760	15120	20070	20070	22100
	24.00	0.352	10100	11200	12300	16650	16650	18300
		8.94	13690	15190	16680	22570	22570	24810
	28.00	0.417	13050	14450	15850	21700	21700	23850
		10.59	17690	19590	21490	29420	29420	32340
	32.00	0.475	14400	15900	17400	27000	27000	29650
	12.07	19400	21600	23800	36610	36610	40200	
36.70	0.562	18000	19900	21800	33500	33500	37150	
	14.27	24400	26980	29560	45420	45420	50370	
7" 177.80	26.00	0.362	10850	11950	13050	17350	17350	19100
		9.19	14710	16200	17690	23520	23520	25900
	29.00	0.408	13450	14850	16250	22050	22050	24250
		10.36	18240	20130	22030	29900	29900	32880
	32.00	0.453	14050	15550	17050	25450	25450	28000
		11.51	19000	21100	23200	34510	34510	37960
	35.00	0.498	16300	18100	19900	30600	30600	33750
		12.65	22100	24540	26980	41490	41490	45760
	38.00	0.540	18600	20600	22600	35150	35150	38250
		13.72	25220	27930	30640	47660	47660	51860
41.00	0.590	20850	23150	25450	38450	38450	42600	
	14.99	28270	31390	34510	52130	52130	57760	
7 5/8" 193.68	29.70	0.375	13050	14450	15850	21980	21980	24380
		9.53	17690	19590	21490	29800	29800	33050
	33.70	0.430	14400	15900	17400	28300	28300	31390
	10.92	19520	21560	23590	38370	38370	42560	

SIZE (OD)	NOMI- NAL WEIGHT	WALL THICK- -NESS	90-95-100 ksi					
			Field				Mill& licensee	
			Tubing + Liner min.	opti	Tunbing max.	Liner Max.	min.	max.
in. mm	lb/ft	in. mm	ft.lb. N.m.					
4 1/2" 114.30	10.50	0.224	2800	3110	3420	3620	3620	3980
		5.69	3800	4220	4640	4900	4900	5400
	11.60	0.250	3650	4050	4450	4560	4560	5010
		6.35	4900	5500	6100	6200	6200	6800
	12.60	0.271	4110	4560	5010	5420	5420	5960
		6.88	5570	6180	6790	7400	7400	8100
	13.50	0.290	4690	5210	5730	6220	6220	6840
		7.37	6400	7100	7800	8400	8400	9200
	15.10	0.337	5860	6510	7160	7740	7740	8510
		8.56	7900	8800	9700	10500	10500	11600
	17.00	0.380	7170	7960	8750	9350	9350	10280
		9.65	9720	10790	11860	12700	12700	14000
	17.70	0.402	7830	8700	9570	10050	10050	11050
10.21		10620	11800	12980	13600	13600	15000	
18.90	0.430	8460	9400	10340	11050	11050	12150	
	10.92	11470	12740	14020	15000	15000	16500	
21.50	0.500	10850	11950	13050	13250	13250	14550	
	12.70	14710	16200	17690	17900	17900	19700	
23.70	0.560	12100	13400	14700	14700	14700	16000	
	14.22	16410	18170	19930	19930	19930	21800	
5" 127.00	15.00	0.296	5480	6080	6680	7020	7020	7720
		7.52	7430	8240	9060	9520	9520	10470
	18.00	0.362	7830	8700	9570	9900	9900	10800
		9.19	10620	11800	12980	13400	13400	14700
	20.30	0.408	9500	10500	11500	11850	11850	12950
		10.36	12880	14240	15590	16050	16050	17550
	20.80	0.422	10100	11200	12300	12300	12300	13500
10.72		13690	15190	16680	16700	16700	18300	
21.40	0.437	10850	11950	13050	13050	13050	14100	
	11.10	14710	16200	17690	17690	17690	19200	
23.20	0.478	12100	13400	14700	14700	14700	16000	
	12.14	16410	18170	19930	19930	19930	21700	
5 1/2" 139.70	17.00	0.304	6510	7230	7950	8700	8700	9570
		7.72	8830	9800	10780	11800	11800	12900
	20.00	0.361	8780	9750	10720	11200	11200	12300
		9.17	11900	13220	14530	15200	15200	16700
	23.00	0.415	11100	12300	13500	13750	13750	15050
10.54		15050	16680	18300	18650	18650	20450	
26.00	0.476	13700	15200	16700	16700	16700	17900	
	12.09	18570	20610	22640	22640	22640	24300	
6 5/8" 168.28	23.20	0.330	10100	11200	12300	13500	13500	14800
		8.38	13690	15190	16680	18300	18300	20100
	24.00	0.352	11450	12650	13850	14900	14900	16300
		8.94	15520	17150	18780	20200	20200	22200
	28.00	0.417	13700	15200	16700	18450	18450	20250
		10.59	18570	20610	22640	25000	25000	27500
32.00	0.475	16300	18100	19900	21700	21700	23800	
	12.07	22000	24500	27000	29400	29400	32300	
36.70	0.562	20600	22800	25000	25350	25350	27900	
	14.27	27930	30910	33900	34400	34400	37800	
7" 177.80	26.00	0.362	12450	13750	15050	15700	15700	17200
		9.19	16880	18640	20410	21300	21300	23300
	29.00	0.408	15300	17000	18700	18800	18800	20600
		10.36	20740	23050	25350	25500	25500	28000
	32.00	0.453	16000	17700	19400	20900	20900	22900
		11.51	21600	24000	26400	28350	28350	31150
	35.00	0.498	18600	20600	22600	24000	24000	26400
		12.65	25220	27930	30640	32550	32550	35800
38.00	0.540	20850	23150	25450	26050	26050	28650	
	13.72	28270	31390	34510	35300	35300	38800	
41.00	0.590	20850	23150	25450	28000	28000	30800	
	14.99	28300	31400	34500	37950	37950	41750	
7 5/8" 193.68	29.70	0.375	14400	15900	17400	18800	18800	20700
		9.53	19520	21560	23590	25500	25500	28100
	33.70	0.430	16300	18100	19900	22800	22800	25100
10.92		22000	24500	27000	30900	30900	34000	

SIZE (OD)	NOMI- NAL WEIGHT	WALL THICK- -NESS	105-110-115 ksi					
			Field				Mill & licensee	
			Tubing + Liner		Tubing	Liner		
			min.	opti	max.	Max.	min.	max.
in. mm	lb/ft	in. mm	ft. lb. N.m.					
4 1/2" 114.30	10.50	0.224	3130	3470	3810	4120	4120	4530
		5.69	4240	4710	5180	5600	5600	6200
	11.60	0.250	4040	4480	4920	5280	5280	5800
		6.35	5500	6100	6700	7200	7200	7900
	12.60	0.271	4560	5060	5560	6220	6220	6840
		6.88	6200	6900	7600	8400	8400	9200
	13.50	0.290	5220	5790	6360	7090	7090	7790
		7.37	7000	7800	8600	9600	9600	10600
	15.10	0.337	6450	7160	7870	8900	8900	9790
		8.56	8700	9700	10700	12100	12100	13300
	17.00	0.380	7830	8700	9570	10650	10650	11650
		9.65	10600	11800	13000	14400	14400	15800
	17.70	0.402	8460	9400	10340	11550	11550	12650
		10.21	11400	12700	14000	15700	15700	17300
18.90	0.430	9500	10500	11500	12650	12650	13850	
	10.92	12800	14200	15600	17200	17200	18900	
21.50	0.500	11700	13000	14300	15200	15200	16700	
	12.70	15860	17630	19390	20600	20600	22700	
23.70	0.560	13700	15200	16700	16800	16800	18400	
	14.22	18570	20610	22640	22800	22800	25100	
5" 127.00	15.00	0.296	6060	6730	7400	7960	7960	8750
		7.52	8200	9100	10000	10800	10800	11800
	18.00	0.362	8780	9750	10720	11300	11300	12400
		9.19	11900	13220	14530	15300	15300	16800
	20.30	0.408	10850	11950	13050	13500	13500	14800
		10.36	14710	16200	17690	18300	18300	20100
	20.80	0.422	11100	12300	13500	14100	14100	15500
		10.72	15050	16680	18300	19100	19100	21000
	21.40	0.437	11700	13000	14300	14800	14800	16200
		11.10	15860	17630	19390	20050	20050	22050
23.20	0.478	13450	14850	16250	16500	16500	18100	
	12.14	18240	20130	22030	22350	22350	24550	
5 1/2" 139.70	17.00	0.304	7470	8300	9130	10000	10000	11000
		7.72	10200	11300	12400	13550	13550	14850
	20.00	0.361	9850	10850	11850	12800	12800	14000
		9.17	13350	14710	16070	17350	17350	19050
	23.00	0.415	12450	13750	15050	15700	15700	17200
	10.54	16880	18640	20410	21300	21300	23300	
26.00	0.476	15050	16650	18250	18700	18700	20500	
	12.09	20410	22570	24740	25350	25350	27850	
6 5/8" 168.28	23.20	0.330	11450	12650	13850	15500	15500	17000
		8.38	15500	17200	18900	21000	21000	23100
	24.00	0.352	13050	14450	15850	17100	17100	18800
		8.94	17600	19600	21600	23200	23200	25500
	28.00	0.417	14650	16250	17850	21200	21200	23300
		10.59	19900	22100	24300	28750	28750	31550
	32.00	0.475	18000	19900	21800	24900	24900	23300
		12.07	24300	27000	29700	33750	33750	37000
36.70	0.562	20850	23150	25450	28950	28950	31850	
	14.27	28270	31390	34510	39300	39300	43200	
7" 177.80	26.00	0.362	13700	15200	16700	18000	18000	19800
		9.19	18570	20610	22640	24400	24400	26800
	29.00	0.408	16000	17700	19400	21600	21600	23700
		10.36	21690	24000	26300	29300	29300	32200
	32.00	0.453	17650	19550	21450	23950	23950	26250
		11.51	23800	26500	29200	32450	32450	35600
	35.00	0.498	20600	22800	25000	27500	27500	30200
		12.65	27800	30900	34000	37300	37300	41000
	38.00	0.540	20850	23150	25450	29800	29800	32700
		13.72	28300	31400	34500	40400	40400	44350
	41.00	0.590	20850	23150	25450	32100	32100	35300
	14.99	28300	31400	34500	43500	43500	47850	
7 5/8" 193.68	29.70	0.375	15050	16650	18250	21650	21650	23800
		9.53	20410	22570	24740	29400	29400	32300
	33.70	0.430	18250	20250	22250	26200	26200	28800
	10.92	24700	27500	30300	35500	35500	39000	

SIZE (OD)	NOMI- NAL WEIGHT	WALL THICK- NESS	120-125-130 ksi					
			Field				Mill & licensee	
			Tubing + Liner min.	opti	Tunbing max.	Liner Max.	min.	max.
in. mm	lb/ft	in. mm	ft.lb. N.m.					
4 1/2" 114.30	10.50	0.224	3450	3830	4210	4630	4630	5090
		5.69	4700	5200	5700	6300	6300	6900
	11.60	0.250	4500	4990	5480	5930	5930	6520
		6.35	6100	6800	7500	8000	8000	8800
	12.60	0.271	5020	5570	6120	7020	7020	7720
		6.88	6800	7600	8400	9500	9500	10500
	13.50	0.290	5740	6370	7000	8030	8030	8830
		7.37	7700	8600	9500	10900	10900	12000
	15.10	0.337	7170	7960	8750	10050	10050	11050
		8.56	9700	10800	11900	13600	13600	15000
	17.00	0.380	8780	9750	10720	12000	12000	13200
		9.65	11900	13200	14500	16300	16300	17900
	17.70	0.402	9500	10500	11500	13000	13000	14300
		10.21	12800	14200	15600	17700	17700	19500
18.90	0.430	10450	11550	12650	14250	14250	15650	
	10.92	14100	15700	17300	19300	19300	21200	
21.50	0.500	13050	14450	15850	17050	17050	18750	
	12.70	17690	19590	21490	23100	23100	25400	
23.70	0.560	15050	16650	18250	19000	19000	20900	
	14.22	20410	22570	24740	25800	25800	28400	
5" 127.00	15.00	0.296	6510	7230	7950	9050	9050	9950
		7.52	8800	9800	10800	11250	11250	12350
	18.00	0.362	9500	10500	11500	13000	13000	14300
		9.19	12800	14200	15600	17650	17650	19350
	20.30	0.408	11700	13000	14300	15100	15100	16600
		10.36	15860	17630	19390	20450	20450	22450
	20.80	0.422	12450	13750	15050	15800	15800	17300
		10.72	16880	18640	20410	21400	21400	23500
21.40	0.437	13050	14450	15850	16600	16600	18200	
	11.10	17690	19590	21490	22500	22500	24700	
23.20	0.478	14400	15900	17400	18500	18500	20300	
	12.14	19520	21560	23590	25100	25100	27600	
5 1/2" 139.70	17.00	0.304	8150	9050	9950	11300	11300	12400
		7.72	11100	12300	13500	15300	15300	16800
	20.00	0.361	10850	11950	13050	14400	14400	15800
		9.17	14600	16200	17800	19500	19500	21400
	23.00	0.415	13700	15200	16700	17600	17600	19300
10.54		18570	20610	22640	23850	23850	26150	
26.00	0.476	15650	17350	19050	21000	21000	23100	
	12.09	21220	23520	25830	28450	28450	31250	
6 5/8" 168.28	23.20	0.330	12700	14100	15500	17500	17500	19200
		8.38	17200	19100	21000	23750	23750	26050
	24.00	0.352	14400	15900	17400	19400	19400	21300
		8.94	19400	21600	23800	26300	26300	28900
	28.00	0.417	16000	17700	19400	23900	23900	26300
		10.59	21600	24000	26400	32400	32400	35650
	32.00	0.475	19850	22050	24250	28100	28100	30900
		12.07	26900	29900	32900	38100	38100	41900
36.70	0.562	20850	23150	25450	32600	32600	35900	
	14.27	28300	31400	34500	44200	44200	48600	
7" 177.80	26.00	0.362	15050	16650	18250	20400	20400	22400
		9.19	20410	22570	24740	27650	27650	30350
	29.00	0.408	16300	18100	19900	24400	24400	26800
		10.36	22000	24500	27000	33100	33100	36350
	32.00	0.453	19600	21700	23800	27100	27100	29800
		11.51	26500	29400	32300	36750	36750	40400
	35.00	0.498	20850	23150	25450	31000	31000	34100
		12.65	28300	31400	34500	42050	42050	46250
38.00	0.540	20850	23150	25450	33600	33600	36900	
	13.72	28300	31400	34500	45550	45550	50050	
41.00	0.590	20850	23150	25450	36200	36200	39800	
	14.99	28300	31400	34500	49100	49100	53950	
7 5/8" 193.68	29.70	0.375	15650	17350	19050	24500	24500	27000
		9.53	21220	23520	25830	33200	33200	36600
	33.70	0.430	20150	22400	24650	29650	29650	32600
10.92		27300	30400	33400	40200	40200	44200	

SIZE (OD)	NOMI- NAL WEIGHT	WALL THICK- -NESS	135-140 ksi						
			Field			Mill & licensee			
			Tubing + Liner min.	opti	Tunbing max.	Liner Max.	min.	max.	
in. mm	lb/ft	in. mm	ft.lb. N.m.						
4 1/2" 114.30	10.50	0.224	3710	4120	4530	5140	5140	5650	
		5.69	5000	5600	6200	7000	7000	7700	
	11.60	0.250	4820	5350	5880	6510	6510	7160	
		6.35	6600	7300	8000	8800	8800	9700	
	12.60	0.271	5400	6000	6600	7740	7740	8510	
		6.88	7300	8100	8900	10500	10500	11600	
	13.50	0.290	6120	6800	7480	8800	8800	9680	
		7.37	8300	9200	10100	12000	12000	13200	
	15.10	0.337	7830	8700	9570	11000	11000	12100	
		8.56	10600	11800	13000	14900	14900	16400	
	17.00	0.380	9500	10500	11500	13150	13150	14450	
		9.65	12800	14200	15600	17800	17800	19600	
	17.70	0.402	10100	11200	12300	14250	14250	15650	
		10.21	13700	15200	16700	19300	19300	21200	
18.90	0.430	11450	12650	13850	15600	15600	17100		
	10.92	15500	17200	18900	21200	21200	23300		
21.50	0.500	14050	15550	17050	18650	18650	20450		
	12.70	19000	21100	23200	25300	25300	27800		
23.70	0.560	15300	17000	18700	20900	20900	22900		
	14.22	20740	23050	25350	28300	28300	31100		
5" 127.00	15.00	0.296	7170	7960	8750	9800	9800	10700	
		7.52	9700	10800	11900	13300	13300	14600	
	18.00	0.362	10450	11550	12650	13900	13900	15200	
		9.19	14100	15700	17300	18850	18850	20650	
	20.30	0.408	12450	13750	15050	16600	16600	18200	
		10.36	16880	18640	20410	22500	22500	24700	
	20.80	0.422	13050	14450	15850	17300	17300	19000	
		10.72	17690	19590	21490	23450	23450	25750	
	21.40	0.437	14050	15550	17050	18100	18100	19900	
		11.10	19050	21080	23120	24550	24550	26950	
	23.20	0.478	15050	16650	18250	20200	20200	22200	
		12.14	20410	22570	24740	27400	27400	30100	
	5 1/2" 139.70	17.00	0.304	8780	9750	10720	12300	12300	13500
			7.72	11900	13200	14500	16700	16700	18300
20.00		0.361	11700	13000	14300	15800	15800	17300	
		9.17	15860	17630	19390	21400	21400	23500	
23.00		0.415	14400	15900	17400	19400	19400	21300	
		10.54	19520	21560	23590	26300	26300	28900	
26.00	0.476	16300	18100	19900	23000	23000	25300		
	12.09	22100	24540	26980	31200	31200	34300		
6 5/8" 168.28	23.20	0.330	13700	15200	16700	19200	19200	21100	
		8.38	18500	20600	22700	26050	26050	28650	
	24.00	0.352	15050	16650	18250	21350	21350	23450	
		8.94	20300	22600	24900	28950	28950	31750	
	28.00	0.417	17250	19150	21050	26250	26250	28850	
		10.59	23400	26000	28600	35600	35600	39100	
	32.00	0.475	20850	23150	25450	30800	30800	33800	
		12.07	28300	31400	34500	41750	41750	45850	
	36.70	0.562	20850	23150	25450	35700	35700	39200	
		14.27	28300	31400	34500	48400	48400	53200	
7" 177.80	26.00	0.362	16000	17700	19400	22300	22300	24500	
		9.19	21690	24000	26300	30250	30250	33250	
	29.00	0.408	17650	19550	21450	26750	26750	29350	
		10.36	23800	26500	29200	36250	36250	39850	
	32.00	0.453	20850	23150	25450	29650	29650	32550	
		11.51	28300	31400	34500	40200	40200	44200	
	35.00	0.498	20850	23150	25450	34000	34000	37400	
		12.65	28300	31400	34500	46100	46100	50700	
	38.00	0.540	20850	23150	25450	36750	36750	40350	
		13.72	28300	31400	34500	49850	49850	54700	
	41.00	0.590	20850	23150	25450	39550	39550	43450	
		14.99	28300	31400	34500	53600	53600	58900	
	7 5/8" 193.68	29.70	0.375	16900	18800	20700	27000	27000	29700
			9.53	22900	25500	28100	36600	36600	40300
33.70		0.430	20850	23150	25450	32600	32600	35800	
		10.92	28300	31400	34500	44200	44200	48500	

SIZE (OD)	NOMI-NAL WEIGHT	WALL THICK-NESS	145-150-155 ksi					
			Field				Mill & licensee	
			Tubing + Liner		Tubing	Liner		
in. mm	lb/ft	in. mm	min.	opti	max.	Max.	min.	max.
			ft.lb. N.m.					
4 1/2" 114.30	10.50	0.224	3970	4410	4850	5570	5570	6120
		5.69	5400	6000	6600	7600	7600	8400
	11.60	0.250	5220	5790	6360	7090	7090	7790
		6.35	7000	7800	8600	9600	9600	10600
	12.60	0.271	5800	6440	7080	8400	8400	9240
		6.88	7800	8700	9600	11400	11400	12500
	13.50	0.290	6510	7230	7950	9600	9600	10560
		7.37	8800	9800	10800	13000	13000	14300
	15.10	0.337	8150	9050	9950	12000	12000	13200
		8.56	11100	12300	13500	16300	16300	17900
	17.00	0.380	10100	11200	12300	14300	14300	15700
		9.65	13700	15200	16700	19400	19400	21300
	17.70	0.402	10850	11950	13050	15500	15500	17000
		10.21	14600	16200	17800	21000	21000	23100
18.90	0.430	12100	13400	14700	16950	16950	18550	
	10.92	16300	18100	19900	22900	22900	25200	
21.50	0.500	15050	16650	18250	20300	20300	22300	
	12.70	20300	22600	24900	27600	27600	30400	
23.70	0.560	15650	17350	19050	22800	22800	25000	
	14.22	21100	23500	25900	30900	30900	34000	
5" 127.00	15.00	0.296	7470	8300	9130	10700	10700	11700
		7.52	10200	11300	12400	14500	14500	15900
	18.00	0.362	11100	12300	13500	15100	15100	16600
		9.19	15000	16700	18400	20450	20450	22450
	20.30	0.408	13450	14850	16250	17900	17900	19600
		10.36	18100	20100	22100	24250	24250	26650
	20.80	0.422	14050	15550	17050	18800	18800	20600
		10.72	19000	21100	23200	25500	25500	28000
	21.40	0.437	15050	16650	18250	19700	19700	21600
		11.10	20410	22570	24740	26700	26700	29300
23.20	0.478	16000	17700	19400	21900	21900	24000	
	12.14	21690	24000	26300	29700	29700	32600	
5 1/2" 139.70	17.00	0.304	9500	10500	11500	13400	13400	14700
		7.72	12800	14200	15600	18150	18150	19950
	20.00	0.361	12450	13750	15050	17100	17100	18800
		9.17	16700	18600	20500	23200	23200	25500
	23.00	0.415	15050	16650	18250	21000	21000	23100
10.54		20410	22570	24740	28450	28450	31250	
26.00	0.476	17000	18800	20600	24950	24950	27350	
	12.09	23050	25490	27930	33850	33850	37150	
6 5/8" 168.28	23.20	0.330	15050	16650	18250	20950	20950	22950
		8.38	20300	22600	24900	28400	28400	31200
	24.00	0.352	15650	17350	19050	23200	23200	25500
		8.94	21100	23500	25900	31450	31450	34550
	28.00	0.417	18600	20600	22600	28650	28650	31450
		10.59	25100	27900	30700	38850	38850	42650
32.00	0.475	20850	23150	25450	33500	33500	36800	
	12.07	28300	31400	34500	45400	45400	49900	
36.70	0.562	20850	23150	25450	38800	38800	42600	
	14.27	28300	31400	34500	52600	52600	57800	
7" 177.80	26.00	0.362	16300	18100	19900	24400	24400	26800
		9.19	22100	24540	26980	33100	33100	36350
	29.00	0.408	18900	21000	23100	29150	29150	32050
		10.36	25600	28400	31200	39500	39500	43450
	32.00	0.453	20850	23150	25450	33250	33250	36550
		11.51	28300	31400	34500	45100	45100	49550
	35.00	0.498	20850	23150	25450	36900	36900	40500
		12.65	28300	31400	34500	50050	50050	54900
38.00	0.540	20850	23150	25450	39900	39900	43800	
	13.72	28300	31400	34500	54100	54100	59400	
41.00	0.590	20850	23150	25450	42950	42950	47150	
	14.99	28300	31400	34500	58250	58250	63900	
7 5/8" 193.68	29.70	0.375	20850	23150	25450	29400	29400	32300
		9.53	28270	31390	34510	39900	39900	43800
	33.70	0.430	20850	23150	25450	35500	35500	39000
		10.92	28300	31400	34500	48100	48100	52900