

TUBULAR GUIDE

**BOS**

BLESS OILFIELD SERVICES, INC.

*Committed To Excellence & Innovation*





Thank you for choosing Bless Oilfield Services, Inc. as your oilfield service provider. We have constructed this easily accessible Tubular Goods Guide to be a quick reference for you and your workforce.

For Service and Additional Information, Please Call

**(O) 281-227-3300 • (F) 281-227-3305**  
**6301 E. Mount Houston • Houston, TX 77050**  
[www.blessoilfieldservices.com](http://www.blessoilfieldservices.com)



*Committed To Excellence & Innovation*

## Table of Contents

Tubing Data	1-4
New Drill Pipe Data	5-6
Casing Data	7-13
Alternative Drift Size	14
8 Round Dimension Terms	14
Buttress Casing Dimension Terms	14
8 Round /Buttress Charts	15
Fractions	16
Range Lengths	16
Symbols & Abbreviated Terms	17
Permissible Depth of Coupling	17
External Imperfections	
Process of Manufacture & Heat Treatment	18
Chemical Composition Glossary	19
Standard Mill Terminology	20-21
Estimated Hardness Values	22-23
Thread Type Markings	23
API Specification - Grade Color Codes	24

**TUBING DATA**

<b>SIZE O.D.</b>	<b>WEIGHT PER FT.</b>	<b>WALL THICKNESS</b>	<b>DRIFT DIAMETER</b>	<b>5% NOMINAL WALL</b>	<b>12 1/2% NOMINAL WALL</b>	<b>87 1/2% NOMINAL WALL</b>
<b>1.050"</b>	1.14	.113	.730	.006	.014	.099
	1.20	.113	.730	.006	.014	.099
	1.48	.154	.648	.008	.019	.135
	1.54	.154	.648	.008	.019	.135
<b>1.315"</b>	1.70	.133	.955	.007	.017	.116
	1.80	.133	.955	.007	.017	.116
	2.19	.179	.863	.009	.022	.157
	2.24	.179	.863	.009	.022	.157
<b>1.660"</b>	2.30	.140	1.286	.007	.018	.122
	2.40	.140	1.286	.007	.018	.122
	3.03	.191	1.184	.010	.024	.167
	3.07	.191	1.184	.010	.024	.167
	3.24	.198	1.170	.010	.025	.173
<b>1.900"</b>	2.75	.145	1.516	.007	.018	.127
	2.90	.145	1.516	.007	.018	.127
	3.65	.200	1.406	.010	.025	.175
	3.73	.200	1.406	.010	.025	.175
	4.19	.219	1.368	.011	.027	.192
	4.42	.250	1.306	.013	.031	.219
	5.15	.300	1.206	.015	.038	.262

**TUBING DATA**

<b>SIZE O.D.</b>	<b>WEIGHT PER FT.</b>	<b>WALL THICKNESS</b>	<b>DRIFT DIAMETER</b>	<b>5% NOMINAL WALL</b>	<b>12 1/2% NOMINAL WALL</b>	<b>87 1/2% NOMINAL WALL</b>
<b>2.063"</b>	3.25	.156	1.657	.008	.020	.136
	3.40	.156	1.657	.008	.020	.136
	4.50	.225	1.519	.011	.028	.197
<b>2-3/8"</b>	4.00	.167	1.947	.008	.021	.146
	4.60	.190	1.901	.010	.024	.166
	4.70	.190	1.901	.010	.024	.166
	5.30	.218	1.845	.011	.027	.191
	5.80	.254	1.773	.013	.032	.222
	5.95	.254	1.773	.013	.032	.222
	6.20	.261	1.759	.013	.033	.228
	6.60	.295	1.691	.015	.037	.258
	7.35	.336	1.609	.017	.042	.294
	7.45	.336	1.609	.017	.042	.294
<b>2-7/8"</b>	6.40	.217	2.347	.011	.027	.190
	6.50	.217	2.347	.011	.027	.190
	7.80	.276	2.229	.014	.035	.241
	7.90	.276	2.229	.014	.035	.241
	8.60	.308	2.165	.015	.039	.269
	8.70	.308	2.165	.015	.039	.269
	8.90	.316	2.149	.016	.040	.276
	9.35	.340	2.101	.017	.043	.297
	9.45	.340	2.101	.017	.043	.297

**TUBING DATA**

SIZE O.D.	WEIGHT PER FT.	WALL THICKNESS	DRIFT DIAMETER	5% NOMINAL WALL	12 1/2% NOMINAL WALL	87 1/2% NOMINAL WALL
2-7/8"	10.40	.362	2.057	.018	.045	.317
	10.50	.392	1.997	.020	.049	.343
	11.00	.404	1.971	.020	.051	.354
	11.50	.440	1.901	.022	.055	.385
3-1/2"	7.70	.216	2.943	.011	.027	.189
	9.20	.254	2.867	.013	.032	.222
	9.30	.254	2.867	.013	.032	.222
	10.20	.289	2.797	.014	.036	.253
	12.70	.375	2.625	.019	.047	.328
	12.95	.375	2.625	.019	.047	.328
	14.30	.430	2.515	.022	.054	.376
	14.90	.449	2.477	.022	.056	.393
	15.50	.476	2.423	.024	.060	.416
	16.70	.510	2.355	.026	.064	.446
	17.00	.530	2.315	.027	.066	.464
4"	9.50	.226	3.423	.011	.028	.198
	11.00	.262	3.351	.013	.033	.229
	11.60	.286	3.303	.014	.036	.250
	13.20	.330	3.215	.017	.041	.289
	14.80	.380	3.115	.019	.048	.332
	16.10	.415	3.045	.021	.052	.363
	16.50	.430	3.015	.022	.054	.376

# TUBING DATA

SIZE O.D.	WEIGHT PER FT.	WALL THICKNESS	DRIFT DIAMETER	5% NOMINAL WALL	12 1/2% NOMINAL WALL	87 1/2% NOMINAL WALL
4"	18.90	.500	2.875	.025	.063	.437
	22.20	.610	2.655	.031	.076	.534
4-1/2"	9.50	.205	3.965	.010	.026	.179
	10.50	.224	3.927	.011	.028	.196
	12.60	.271	3.833	.014	.034	.237
	12.75	.271	3.833	.014	.034	.237
	13.50	.290	4.795	.015	.036	.254
	15.20	.337	3.701	.017	.042	.295
	17.00	.380	3.615	.019	.048	.332
	17.70	.402	3.571	.020	.050	.352
	18.90	.430	3.515	.022	.054	.376
	21.50	.500	3.375	.025	.063	.437
	23.70	.560	3.255	.028	.070	.490
	26.10	.630	3.115	.032	.079	.551



End of Tubing Data

For service call  
**Bless Oilfield Services, Inc.**  
 (O) 281-227-3300 • (F) 281-227-3305  
[www.blessoilfieldservices.com](http://www.blessoilfieldservices.com)

**NEW DRILL PIPE DATA**

<b>SIZE O.D.</b>	<b>WEIGHT PER FT.</b>	<b>WALL THICKNESS</b>	<b>5% NOMINAL WALL</b>	<b>12 1/2% NOMINAL WALL</b>	<b>87 1/2% NOMINAL WALL</b>
<b>2-3/8"</b>	4.85	.190	.010	.024	.166
	6.65	.280	.014	.035	.245
<b>2-7/8"</b>	6.85	.217	.011	.027	.190
	10.40	.362	.018	.045	.317
<b>3-1/2"</b>	9.50	.254	.013	.032	.222
	13.30	.368	.018	.046	.322
	15.50	.449	.022	.056	.393
<b>4"</b>	11.85	.262	.013	.033	.229
	14.00	.330	.017	.041	.289
	15.70	.380	.019	.048	.332
<b>4-1/2"</b>	13.75	.271	.014	.034	.237
	16.60	.337	.017	.042	.295
	20.00	.430	.022	.054	.376
	22.82	.500	.025	.063	.437
	24.66	.550	.028	.069	.481
	25.50	.575	.029	.072	.503
<b>5"</b>	16.25	.296	.015	.037	.259
	19.50	.362	.018	.045	.317
	25.60	.500	.025	.063	.437

## NEW DRILL PIPE DATA

SIZE O.D.	WEIGHT PER FT.	WALL THICKNESS	5% NOMINAL WALL	12 1/2% NOMINAL WALL	87 1/2% NOMINAL WALL
5-1/2"	19.20	.304	.015	.038	.266
	21.90	.361	.018	.045	.316
	24.70	.415	.021	.052	.363
6-5/8"	25.20	.330	.017	.041	.289
	27.70	.363	.018	.045	.317



End of New Drill Pipe Data

For service call

**Bless Oilfield Services, Inc.**

(O) 281-227-3300 • (F) 281-227-3305

[www.blessoilfieldservices.com](http://www.blessoilfieldservices.com)



# CASING DATA

SIZE O.D.	WEIGHT PER FT.	WALL THICKNESS	DRIFT DIAMETER	ALT. DRIFT	5% NOMINAL WALL	12 1/2% NOMINAL WALL	87 1/2% NOMINAL WALL
4-1/2"	9.50	.205	3.965		.010	.026	.179
	10.50	.224	3.927		.011	.028	.196
	11.00	.237	3.901		.012	.030	.207
	11.60	.250	3.875		.013	.031	.219
	12.60	.271	3.833		.014	.034	.237
	13.50	.290	3.795		.015	.036	.254
	15.10	.337	3.701	3.750	.017	.042	.295
	16.60	.373	3.629		.019	.047	.326
	18.80	.430	3.515		.022	.054	.376
5"	11.50	.220	4.435		.011	.028	.192
	13.00	.253	4.369		.013	.032	.221
	15.00	.296	4.283		.015	.037	.259
	18.00	.362	4.151		.018	.045	.317
	20.30	.408	4.059		.020	.051	.357
	20.80	.422	4.031		.021	.053	.369
	21.40	.437	4.001		.022	.055	.382
	23.20	.478	3.919		.024	.060	.418
	24.10	.500	3.875		.025	.063	.437
5-1/2"	14.00	.244	4.887		.012	.031	.213
	15.50	.275	4.825		.014	.034	.241
	17.00	.304	4.767		.015	.038	.266
	20.00	.361	4.653		.018	.045	.316

# CASING DATA

SIZE O.D.	WEIGHT PER FT.	WALL THICKNESS	DRIFT DIAMETER	ALT. DRIFT	5% NOMINAL WALL	12 1/2% NOMINAL WALL	87 1/2% NOMINAL WALL
5-1/2"	23.00	.415	4.545		.021	.052	.363
	26.00	.476	4.423		.024	.060	.416
	26.80	.500	4.375		.025	.063	.437
	28.40	.530	4.315		.027	.066	.464
	29.70	.562	4.251		.028	.070	.492
	32.30	.612	4.151		.031	.077	.535
	32.60	.625	4.125		.031	.078	.547
	35.30	.687	4.001		.034	.086	.601
	36.40	.705	3.965		.035	.088	.617
	38.00	.750	3.875		.038	.094	.656
	40.50	.812	3.751		.041	.101	.711
43.10	.875	3.625		.044	.109	.766	
6-5/8"	20.00	.288	5.924		.014	.036	.252
	23.20	.330	5.840		.017	.041	.289
	24.00	.352	5.796		.018	.044	.308
	28.00	.417	5.666		.021	.052	.365
	32.00	.475	5.550		.024	.059	.416
7"	17.00	.231	6.413		.012	.029	.202
	20.00	.272	6.331		.014	.034	.238
	23.00	.317	6.241	6.250	.016	.040	.277
	26.00	.362	6.151		.018	.045	.317
	29.00	.408	6.059	6.125	.020	.051	.357

# CASING DATA

SIZE O.D.	WEIGHT PER FT.	WALL THICKNESS	DRIFT DIAMETER	ALT. DRIFT	5% NOMINAL WALL	12 1/2% NOMINAL WALL	87 1/2% NOMINAL WALL
7"	32.00	.453	5.969	6.000	.023	.057	.396
	35.00	.498	5.879		.025	.062	.436
	38.00	.540	5.795		.027	.068	.472
	41.00	.590	5.695		.030	.074	.516
	42.70	.626	5.625		.031	.078	.548
	44.00	.640	5.595		.032	.080	.560
	46.40	.687	5.500		.034	.086	.601
	49.50	.730	5.415		.037	.091	.639
	50.10	.750	5.375		.038	.094	.656
	53.60	.812	5.251		.041	.101	.711
57.10	.875	5.125	.044	.109	.766		
7-5/8"	24.00	.300	6.900	6.500	.015	.038	.262
	26.40	.328	6.844		.016	.041	.287
	29.70	.375	6.750		.019	.047	.328
	33.70	.430	6.640		.022	.054	.376
	39.00	.500	6.500		.025	.063	.437
	42.80	.562	6.376		.028	.070	.492
	45.30	.595	6.310		.030	.074	.521
	47.10	.625	6.250		.031	.078	.547
	51.20	.687	6.126		.034	.086	.601
	55.30	.750	6.000		.038	.094	.656
7-3/4"	46.10	.595	6.435	6.500	.030	.074	.521

# CASING DATA

SIZE O.D.	WEIGHT PER FT.	WALL THICKNESS	DRIFT DIAMETER	ALT. DRIFT	5% NOMINAL WALL	12 1/2% NOMINAL WALL	87 1/2% NOMINAL WALL
8-5/8"	24.00	.264	7.972		.013	.033	.231
	28.00	.304	7.892		.015	.038	.266
	29.35	.322	7.856		.016	.040	.282
	32.00	.352	7.796	7.875	.018	.044	.308
	36.00	.400	7.700		.020	.050	.350
	40.00	.450	7.600	7.625	.023	.056	.394
	44.00	.500	7.500		.025	.063	.437
	49.00	.557	7.386		.028	.070	.487
	52.00	.595	7.310		.030	.074	.521
8-3/4"	49.70	.557	7.500		.028	.070	.487
9-5/8"	32.30	.312	8.845		.016	.039	.273
	36.00	.352	8.765		.018	.044	.308
	40.00	.395	8.679	8.750	.020	.049	.346
	43.50	.435	8.599	8.625	.022	.054	.381
	47.00	.472	8.525	8.625	.024	.059	.413
	53.50	.545	8.379	8.500	.027	.068	.477
	58.40	.595	8.279	8.375	.030	.074	.521
	59.40	.609	8.251		.030	.076	.533
	61.10	.625	8.219		.031	.078	.547
	64.90	.672	8.125		.034	.084	.588
	70.30	.734	8.001		.037	.092	.642
	75.60	.797	7.875		.040	.100	.697

# CASING DATA

SIZE O.D.	WEIGHT PER FT.	WALL THICKNESS	DRIFT DIAMETER	ALT. DRIFT	5% NOMINAL WALL	12 1/2% NOMINAL WALL	87 1/2% NOMINAL WALL
<b>9-3/4"</b>	59.20	.595	8.404	8.500	.030	.074	.521
<b>9-7/8"</b>	62.80	.625	8.469	8.500	.031	.078	.547
<b>10-3/4"</b>	32.75	.279	10.036		.014	.035	.244
	40.50	.350	9.894		.018	.044	.306
	45.50	.400	9.794	9.875	.020	.050	.350
	51.00	.450	9.694		.023	.056	.394
	55.50	.495	9.604	9.625	.025	.062	.433
	60.70	.545	9.504		.027	.068	.477
	65.70	.595	9.404	9.500	.030	.074	.521
	71.10	.650	9.294		.033	.081	.569
	73.20	.672	9.250		.034	.084	.588
	79.20	.734	9.126		.037	.092	.642
85.30	.797	9.000		.040	.100	.697	
<b>11-3/4"</b>	42.00	.333	10.928	11.000	.017	.042	.291
	47.00	.375	10.844		.019	.047	.328
	54.00	.435	10.724		.022	.054	.381
	60.00	.489	10.616	10.625	.024	.061	.428
	65.00	.534	10.526	10.625	.027	.067	.467
	71.00	.582	10.430		.029	.073	.509
<b>11-7/8"</b>	71.80	.582	10.555	10.625	.029	.073	.509

# CASING DATA

SIZE O.D.	WEIGHT PER FT.	WALL THICKNESS	DRIFT DIAMETER	ALT. DRIFT	5% NOMINAL WALL	12 1/2% NOMINAL WALL	87 1/2% NOMINAL WALL
13-3/8"	48.00	.330	12.559		.017	.041	.289
	54.50	.380	12.459		.019	.048	.332
	61.00	.430	12.359		.022	.054	.376
	68.00	.480	12.259		.024	.060	.420
	72.00	.514	12.191	12.250	.026	.064	.450
	77.00	.550	12.119		.028	.069	.481
	80.70	.580	12.059		.029	.073	.507
	85.00	.608	12.003		.030	.076	.532
	86.00	.625	11.969	12.000	.031	.078	.547
	92.00	.672	11.875		.034	.084	.588
98.00	.719	11.781		.036	.090	.629	
13-1/2"	81.40	.580	12.153	12.250	.029	.073	.507
13-5/8"	88.20	.625	12.188	12.250	.031	.078	.547
14"	92.68	.650	12.512		.033	.081	.569
	99.43	.700	12.412		.035	.087	.613
	106.13	.750	12.312		.038	.094	.656
	112.78	.800	12.212		.040	.100	.700
	119.38	.850	12.112		.043	.106	.744
16"	65.00	.375	15.062		.019	.047	.328
	75.00	.438	14.936		.022	.055	.383

## CASING DATA

SIZE O.D.	WEIGHT PER FT.	WALL THICKNESS	DRIFT DIAMETER	ALT. DRIFT	5% NOMINAL WALL	12 1/2% NOMINAL WALL	87 1/2% NOMINAL WALL
16"	84.00	.495	14.822		.024	.062	.433
	97.00	.525	14.662	14.250	.029	.072	.503
	109.00	.656	14.500		.033	.082	.574
18-5/8"	87.50	.435	17.567		.022	.054	.381
	99.50	.500	17.437	17.500	.025	.053	.438
	101.00	.510	17.417	17.500	.026	.054	.446
20"	94.00	.438	18.936		.022	.055	.383
	106.50	.500	18.812		.025	.083	.438
	133.00	.635	18.542		.032	.079	.556
	169.00	.612	18.188		.041	.102	.711



End of Casing Data

For service call

**Bless Oilfield Services, Inc.**

(O) 281-227-3300 • (F) 281-227-3305

[www.blessoilfieldservices.com](http://www.blessoilfieldservices.com)

**ALTERNATIVE DRIFT SIZE****ALTERNATIVE DRIFT SIZE (cont.)**

SIZE	WEIGHT PER FT.	O.D. (INCHES)	LENGTH	DIAMETER	SIZE	WEIGHT PER FT.	O.D. (INCHES)	LENGTH	DIAMETER
7"	23.00	7.000	6	6.250	11-3/4"	42.00	11.750	12	11.000
7"	32.00	7.000	6	6.000	11-3/4"	60.00	11.750	12	10.625
7-3/4"	46.10	7.750	6	6.500	11-3/4"	65.00	11.750	12	10.625
8-5/8"	32.00	8.625	6	7.875	13-3/8"	72.00	13.375	12	12.250
8-5/8"	40.00	8.625	6	7.625	13-3/8"	86.00	13.375	12	12.000
9-5/8"	40.00	9.625	12	8.750	13-1/2"	81.40	13.500	12	12.250
9-5/8"	53.50	9.625	12	8.500	13-5/8"	88.20	13.625	12	12.250
9 5/8"	58.40	9.625	12	8.375	16"	97.00	16.000	12	14.750
10-3/4"	45.50	10.750	12	9.875	18-5/8"	99.50	18.625	12	17.50
10-3/4"	55.50	10.750	12	9.625	18-5/8"	101.00	18.625	12	17.50

**8 ROUND DIMENSION TERMS**

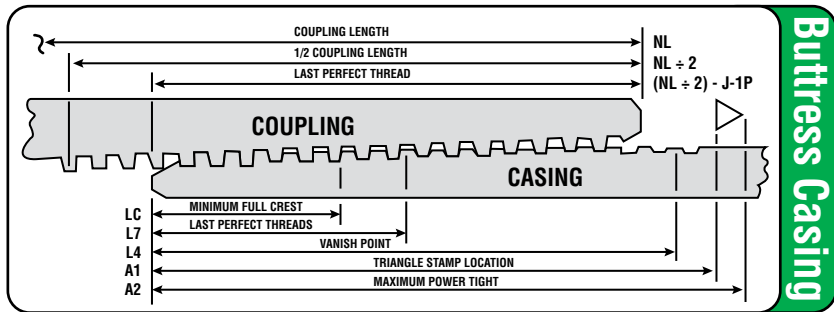
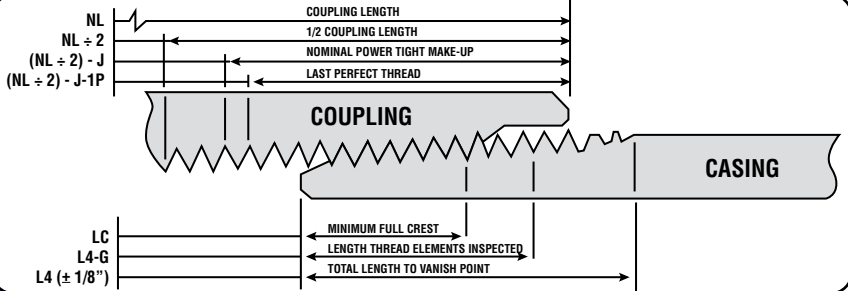
NL	Coupling Length
NL÷2	1/2 Coupling Length
(NL ÷ 2) + J	Nominal Power Tight Make-Up
(NL ÷ 2) - J - 1P	Last Perfect Threads
LC	Minimum Full Crest
L4 - G	Length Thread Elements Inspected
L4 (± 1/8")	Total Length to Vanish Point

**BUTTRESS CASING DIMENSION TERMS**

NL	Coupling Length
NL÷2	1/2 Coupling Length
(NL ÷ 2) - J - 1P	Last Perfect Thread
LC	Minimum Full Crest
L7	Last Perfect Threads
A1	△ Triangle Stamp Location
A2	Maximum Power Tight



## 8 Round



## Butress Casing

# FRACTIONS

FRACTION	DECIMAL	FRACTION	DECIMAL	FRACTION	DECIMAL	FRACTION	DECIMAL	FRACTION	DECIMAL
<b>1/64</b>	.015625	<b>7/32</b>	.21875	<b>27/64</b>	.421875	<b>5/8</b>	.625	<b>53/64</b>	.828125
<b>1/32</b>	.03125	<b>15/64</b>	.234375	<b>7/16</b>	.4375	<b>41/64</b>	.640625	<b>27/32</b>	.84375
<b>3/64</b>	.046875	<b>1/4</b>	.25	<b>29/64</b>	.453125	<b>21/32</b>	.65625	<b>55/64</b>	.859375
<b>1/16</b>	.625	<b>17/64</b>	.265625	<b>15/32</b>	.46875	<b>43/64</b>	.671875	<b>7/8</b>	.875
<b>5/64</b>	.078125	<b>9/32</b>	.28125	<b>31/64</b>	.484375	<b>11/16</b>	.6875	<b>57/64</b>	.890625
<b>3/32</b>	.09375	<b>19/64</b>	.296875	<b>1/2</b>	.50	<b>45/64</b>	.703125	<b>29/32</b>	.90625
<b>7/64</b>	.109375	<b>5/16</b>	.3125	<b>33/64</b>	.515625	<b>23/32</b>	.71875	<b>59/64</b>	.921875
<b>1/8</b>	.125	<b>21/64</b>	.328125	<b>17/32</b>	.53125	<b>47/64</b>	.734375	<b>15/16</b>	.9375
<b>9/64</b>	.140625	<b>11/32</b>	.34375	<b>35/64</b>	.546875	<b>3/4</b>	.75	<b>61/64</b>	.953125
<b>5/32</b>	.15625	<b>23/64</b>	.359375	<b>9/16</b>	.5625	<b>49/64</b>	.765625	<b>31/32</b>	.96875
<b>11/64</b>	.171875	<b>3/8</b>	.375	<b>37/64</b>	.578125	<b>25/32</b>	.78125	<b>63/64</b>	.984375
<b>3/16</b>	.1875	<b>25/64</b>	.390625	<b>19/32</b>	.59375	<b>51/64</b>	.796875	<b>1</b>	1.00
<b>13/64</b>	.203125	<b>13/32</b>	.40625	<b>39/64</b>	.609375	<b>13/16</b>	.8125		

# RANGE LENGTHS

TYPE	RANGE 1	RANGE 2	RANGE 3	NOTES
<b>Casing &amp; Liner</b>	16.0' to 25.0'	25.0' to 33.0'	34.0' to 48.0'	
<b>Tubing &amp; Casing</b>	20.0' to 24.0'	28.0' to 32.0'	38.0' to 42.0' ©	
<b>Pup-Joints</b>	2;3;4;6;8;10 & 12d	NA	NA	

# SYMBOLS AND ABBREVIATED TERMS

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
<b>BC</b>	Buttress thread connection	<b>OD</b>	Outside diameter	<b>IJ</b>	Integral joint tubing connection
<b>CV</b>	Charpy V-notch impact test	<b>Q</b>	Quenched and tempered	<b>k</b>	A constant / calculation of elongation
<b>D</b>	Specified outside diameter	<b>S</b>	Seamless process	<b>LC</b>	Long round thread connection
<b>d</b>	Calculated inside diameter	<b>Sc</b>	Min. acceptable results ANSI-NACE B test	<b>USC</b>	United States customary (units)
<b>EMI</b>	Electromagnetic inspection	<b>SCC</b>	Special clearance coupling	<b>UT</b>	Ultrasonic testing
<b>EU</b>	External upset tubing connection	<b>SSCC</b>	Sulfide stress corrosion cracking	<b>W</b>	Spec. OD for ISO/API thread couplings
<b>EW</b>	Electric-weld process	<b>STC</b>	Short round thread connection	<b>Wc</b>	Specified outside diameter of SCC
<b>HBW</b>	Brinell hardness with tungsten ball	<b>T</b>	Specified wall thickness	<b>N</b>	<heat treat process> full length normalized
<b>HBS</b>	Brinell hardness with steel ball	<b>T&amp;C</b>	Threaded and coupled	<b>N&amp;T</b>	Normalized and tempered
<b>HRC</b>	Rockwell hardness C-scale	<b>XC</b>	Extreme line casing connection	<b>YSmin</b>	Specified minimum yield strength
<b>NDE</b>	Non-destructive examination	<b>ID</b>	Inside diameter		
<b>NU</b>	Non-upset tubing connection				

## PERMISSIBLE DEPTH OF COUPLING EXTERNAL IMPERFECTIONS

TYPE	SIZE	GROUP	PITS & ROUND BOTTOM GOUGES	GRIP MARKS & SHARP BOTTOM GOUGES	GROUP 2(C90 & T95) GROUP 4 (round & sharp)
<b>Tubing</b>	< 3 1/2"	1; 2 (except C90 & T95); 3	.030"	.025"	.030"
	≥ 3 1/2" to ≤ 4 1/2"	1; 2 (except C90 & T95); 3	.045"	.030"	.035"
	< 6 5/8"	1; 2 (except C90 & T95); 3	.035"	.030"	.030"
<b>Casing (a)</b>	≥ 6 5/8" to ≥ 7 5/8"	1; 2 (except C90 & T95); 3	.045"	.040"	.035"
	> 7 5/8"	1; 2 (except C90 & T95); 3	.060"	.040"	.035"

(a) includes casing used as tubing

# PROCESS OF MANUFACTURE AND HEAT TREATMENT

GROUP	GRADE	TYPE	MFG PROCESS (a)	HEAT TREATMENT	TEMPERING TEMP. MIN. C°	KEY
1	H40	-	S or EW	None	-	a) S= Seamless
1	J55	-	S or EW	None (b)	-	ERW= electric welded
1	K55	-	S or EW	None (b)	-	b) Full length normalized (N),
1	N80	1	S or EW	c	-	normalized and tempered (N&T),
1	N80	Q	S or EW	Q&T	-	or quenched and tempered (Q&T),
2	M65	-	S or EW	d	-	at the manufacturer's option or as
2	L80	1	S or EW	Q&T	566	specified on the purchase order.
2	L80	9Cr	S	Q&T (e)	593	c) Full length normalized or normalized
2	L80	13Cr	S	Q&T (e)	593	and tempered at the manufacturer's
2	C90	1	S	Q&T	621	option.
2	C90	2	S	Q&T	621	d) All pipe shall be full body heat-
2	C90	-	S or EW	Q&T	538	treated. Full length normalized (N),
2	T95	1	S	Q&T	649	normalized and tempered (N&T),
2	T95	2	S	Q&T	649	or quenched and tempered (Q&T),
3	P110	-	S or EW (f,g)	Q&T	-	at the manufacturer's option or as
4	Q125	1	S or EW (g)	Q&T	-	specified on the purchase order.
4	Q125	2	S or EW (g)	Q&T	-	e) Type 9Cr and 13Cr may be
4	Q125	3	S or EW (g)	Q&T	-	air-quenched.
4	Q125	4	S or EW (g)	Q&T	-	f) Special chemical requirements for
						electric-welded P110 casing are
						specified in API 5CT; Table C.5.
						g) Special requirements unique to
						electric-welded P110 and Q125 are
						specified in API 5CT; A.5 (SR11).

## **Molybdenum - Mo**

Increases hardenability of steels and helps maintain a specified hardenability. It increases high temperature tensile and creep strengths. Molybdenum hardened steels require higher tempering temperatures for softening purposes

## **Nickel - Ni**

Is used in low alloy steels to reduce the sensitivity of the steel to variations in heat treatment and distortion and cracking on quenching. It also improves low temperature toughness and hardenability.

## **Niobium - Nb (Columbium - Cb)**

Lowers transition temperature and raises the strength of low carbon steel. Niobium increases strength at elevated temperatures, results in finer grain size and forms stable carbides, lowering the hardenability of the steel.

## **Nitrogen - N**

Increases the strength, hardness and machinability of steel, but it decreases the ductility and toughness. In aluminum killed steels, nitrogen combines with the aluminum to provide grain size control, thereby improving both toughness and strength. Nitrogen can reduce the effect of boron on the hardenability of steels.

## **Phosphorus - P**

Is generally restricted to below 0.04 weight percent to minimize its detrimental effect on ductility and toughness. Certain steels may contain higher levels to enhance machinability, strength and/or atmospheric corrosion resistance.

## **Silicon - Si**

Is one of the principal deoxidizers with the amount used dependent on the deoxidization practice. It slightly increases the strength of ferrite without a serious loss of ductility. In larger quantities, it aids the resistance to scaling up to 500° F in air and decreases magnetic hysteresis loss.

## **Sulfur - S**

Is detrimental to transverse strength and impact resistance. It affects longitudinal properties to a lesser degree. Existing primarily in the form of manganese sulfide stringers, sulfur is typically added to improve machinability.

## **Titanium - Ti**

Is added to boron steels because it combines with oxygen and nitrogen, thus increasing the effectiveness of boron. Titanium, as titanium nitride, also provides grain size control at elevated temperatures in microalloy steels. In excess, titanium is detrimental to machinability and internal cleanliness.

## **Tellurium - Te**

Is added to steel to modify sulfide type inclusion size, morphology and distribution. The resulting sulfide type inclusions are finer and remain ellipsoidal in shape following hot working, thereby improving transverse properties.

## **Vanadium - V**

Inhibits grain growth during heat treating while improving strength and toughness of hardened and tempered steels. Additional up to .05% increase hardenability whereas larger amounts tend to reduce hardenability because of carbide formation. Vanadium is also utilized in ferrite/pearlite microalloy steels to increase hardness through carbonitride precipitation strengthening of the matrix.



## Annealing

A treatment consisting of heating uniformly to a temperature, within or above the critical range, and cooling at a controlled rate to a temperature under the critical range. This treatment is used to produce a definite microstructure, usually one designed for best machinability, and/or to remove stresses, induce softness, and alter ductility, toughness or other mechanical properties.

## Billet

A solid semifinished round or square that has been hot worked usually smaller than a bloom. Also a general term for wrought starting stock for forgings or extrusions.

## Bloom

A semifinished hot rolled rectangular product. The width of the bloom is no more than twice the thickness and the cross-sectional area is usually not less than 36 square inches.

## Capped Steel

A type of steel similar to rimmed steel, usually cast in a bottle top ingot, in which the application of a mechanical or chemical cap renders the rimming action incomplete by causing the top metal to solidify.

## DI (Ideal Diameter)

The diameter of a round steel bar that will harden at the center to a given percent of martensite when subjected

to an ideal quench (i.e; Grossman quench severity  $H=\infty$ )

## Elongation

In tensile testing, the increase in gage length, measured after the fracture of a specimen within the gage length, usually expressed as a percentage of the original gage length.

## End – Quench Hardenability Test (Jominy Test)

A laboratory procedure for determining the hardenability of a steel or other ferrous alloy. Hardenability is determined by heating a standard specimen above the upper critical temperature, placing the hot specimen in a fixture so that a stream of cold water impinges on one end, and, after cooling to room temperature is completed, measuring the hardness near the surface of the specimen at regularly spaced intervals along its length. The data are normally plotted as hardness versus distance from the quenched end.

## Hardness

Resistance of a metal to plastic deformation, usually by indentation. However, this may also refer to stiffness or temper, or to resistance to scratching, abrasion, or cutting.

## Impact Test

A test to determine the behavior of materials when subjected to high rates of loading, usually in bending, tension or torsion. The quantity measured is the energy

absorbed in breaking the specimen by a single blow, as in the Charpy or Izod tests.

## Ingot

A casting of a simple shape which can be used for hot working or remelting.

## Killed Steel

Steel treated with a strong deoxidizer to reduce oxygen to a level where no reaction occurs between carbon and oxygen during solidification.

## Lap

A surface imperfection which appears as a seam. It is caused by the folding over of hot metal, fins, or sharp corners and then rolling or forging them into the surface but not welding them. Laps on tubes can form from seams on piercing mill billets.

## Machinability

This is a generic term for describing the ability of a material to be machined. To be meaningful, machinability must be qualified in terms of tool wear, tool life, chip control, and/or surface finish and integrity. Overall machining performance is affected by a myriad of variables relating to the machining operation and the work piece. An overall review is provided in the ASM Metals Handbook: Machinability, Ninth Edition, Volume 16, 1989.

### Normalizing

A treatment consisting of heating uniformly to temperature at least 100 ° F above the critical range and cooling in still air at room temperature. The treatment produces a recrystallization and refinement of the grain structure and gives uniformity in hardness and structure to the product.

### Pickling

An operation by which surface oxide (scale) is removed by chemical action. Sulfuric acid is typically used for carbon and low-alloy steels. After the acid bath, the steel is rinsed in water.

### Quenching

A treatment consisting of heating uniformly to a predetermined temperature and cooling rapidly in air or liquid medium to produce a desired crystalline structure.

### Reduction of Area

The difference, expressed as a percentage of original area, between the original cross-sectional area of a tensile test specimen and the minimum cross-sectional area measured after complete separation.

### Rimmed Steel

A low carbon steel having enough iron oxide to give a continuous evolution of carbon monoxide during solidification giving a rim of material virtually free of voids.

### Scab

An imperfection which is a flat piece of metal rolled into the steel surface,

### Seam

A defect on the surface of a metal which appears as a crack. Experience indicates that most seams are created during the cooling or reheating of cast structures.

### Semi – Killed Steel

Incompletely deoxidized steel which contains enough dissolved oxygen to react with the carbon to form carbon monoxide to offset solidification shrinkage.

### Spheroidize Anneal

A special type of annealing that requires an extremely long cycle. This treatment is used to produce globular carbides and maximum softness for best machinability in some analyses, or to improve cold formability.

### Strand Casting (Continuous Casting)

Operation in which a cast shape is continuously drawn through the bottom of the mold as it solidifies. The length is not determined by mold dimensions.

### Stress Relieve Temper

A thermal treatment to restore elastic properties and to minimize distortion on subsequent machining or hardening operations. This treatment is usually applied to material that has been heat treated (quenched and tempered). Normal practice would be to heat

to a temperature 100 ° F lower than the tempering temperatures used to establish mechanical properties and hardness. Ordinarily, no straightening is performed after the stress relieve temper.

### Tempering

A treatment consisting of heating uniformly to some predetermined temperature under the critical range, holding at that temperature a designated period of time and cooling in air or liquid. This treatment is used to produce one or more of the following end results: A) to soften material for subsequent machining or cold working, B) to improve ductility and relieve stresses resulting from prior treatment or cold working, and C) to produce the desired mechanical properties or structure in the second step of a double treatment.

### Tensile Strength

In tensile testing, the ratio of maximum load to original cross-sectional area.

### Yield Point

The first stress in a material, usually less than the maximum attainable stress, at which an increase in strain occurs without an increase in stress. If there is a decrease in stress after yielding, a distinction may be made between upper and lower yield points.

### Yield Strength

The stress at which a material exhibits a specified deviation from proportionality of stress and strain. An offset of .2% is commonly used.

# ESTIMATED HARDNESS VALUES FOR OIL FIELD TUBULAR GOODS

GRADE	YIELD STRENGTH	TENSILE	HARDNESS	
			BRINELL	ROCKWELL
<b>DRILL PIPE</b>				
D	55,000	95,000	196-220	89-104B
E	75,000	100,000	220-260	19-27C
"X" BR-94	95,000	115,000	240-290	22-30C
Grade "G"- X 105	105,000	120,000	250-310	24-32C
SBR-110	110,000	125,000	280-330	29-35C
Spec BR-135	135,000	150,000	301-371	34-40C

## TUBING

H40	40,000	60,000		70-87B
J55	55 to 80,000	75,000		84-100B
K55	55 to 80,000	95,000		15-24C
C75	75 to 90,000	100,000		15-26C
N80	80 to 110,000	120,000		20-31C
P105	105 to 135,000	125,000		23-33C
P110	110 to 140,000	150,000		24-34C
T-35	135 to 165,000			34-40C



# ESTIMATED HARDNESS VALUES FOR OIL FIELD TUBULAR GOODS (cont.)

GRADE	YIELD STRENGTH	TENSILE	HARDNESS	
			BRINELL	ROCKWELL
<b>CASING</b>				
H40	40 to 60,000	60,000		70-87B
J55	55 to 80,000	75,000		84-100B
K55	55 to 80,000	95,000		15-24C
C75	75 to 90,000	95,000		15-26C
N80	80 to 110,000	95,000		18-31C
XS Soo 95	*92-95 to 110,000	110,000		22-30C
Spec S95	75 to 95,000	95,000		14-22C
P110	110 to 40,000	125,000		24-34C
Soo125	125 to 150,000	135,000		30-38C
V150	150 to 180,000	160,000		36-43C

## Notes

### THREAD TYPE MARKINGS

PRODUCT	THREAD TYPE	MARKED SYMBOL
Casing	Short round	STC
	Long round	LC
	Buttress	BC
	Extreme-line	XC

### THREAD TYPE MARKINGS (cont.)

PRODUCT	THREAD TYPE	MARKED SYMBOL
Tubing	Non-upset	NU
	External upset	EU
	Integral joint	IJ

# API SPECIFICATION 5CT / ISO 11960 - GRADE COLOR CODES

GRADE	GRADE TYPE	NUMBER AND COLOR OF BANDS FOR PIPE, COUPLING STOCK AND PUP JOINTS $\geq 1,8m$	COLOR(S) FOR COUPLINGS	
			ENTIRE COUPLING	BAND(S) <sup>a</sup>
1	2	3	4	5
H40		None or Black band at the manufacturer's option	None	Same as for pipe
J55 tubing		• One bright green	Bright green	None
J55 casing		• One bright green	Bright green	One white
K55		•• Two bright green	Bright green	None
M65		•• One bright green, one blue	M65 pipe uses L80 Type 1 couplings	
N80	1	• One red	Red	None
N80	Q	•• One red, one bright green	Red	• Green
L80	1	•• One red, one brown	Red	• One brown
L80	9Cr	••• One red, one brown, two yellow	Red	•• Two yellow
L80	13Cr	••• One red, one brown, one yellow	Red	• One yellow
C90	1	• One purple	Purple	None
C90	2	•• One purple, one yellow	Purple	• One yellow
T95	1	• One silver	Silver	None
T95	2	•• One silver, one yellow	Silver	• One yellow
C95		• One brown	Brown	None
P110		• One white	White	None
Q125	1	• One orange	Orange	None
Q125	2	•• One orange, one yellow	Orange	• One yellow
Q125	3	•• One orange, one green	Orange	• One green
Q125	4	•• One orange, one brown	Orange	• One brown

<sup>a</sup> Special-clearance couplings shall also have a black band

We at Bless Oilfield Services, Inc. hope that you enjoy having this wealth of information at your fingertips. The information in this booklet is up-to-date and accurate, however we are not liable for any production errors at the time of printing.



# **BLESS OILFIELD SERVICES, INC.**

6301 E. Mount Houston • Houston, Tx 77050

(O) 281-227-3300 • (F) 281-227-3305

[www.blessoilfieldservices.com](http://www.blessoilfieldservices.com)