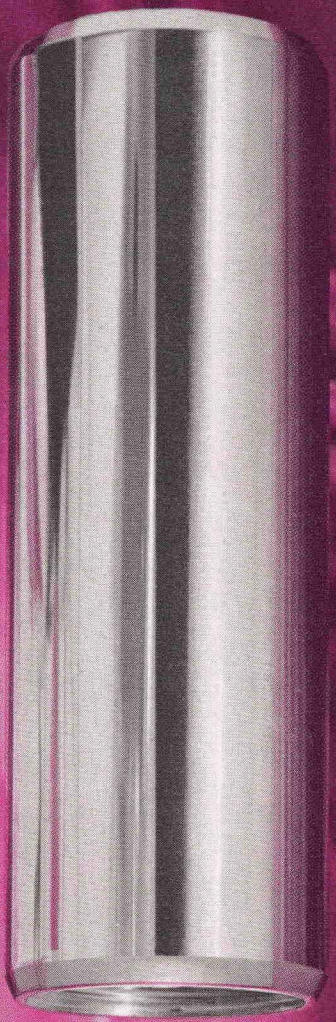
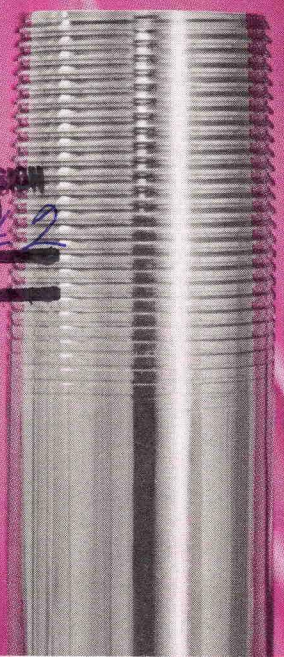
National

Buttress-Thread Tubing



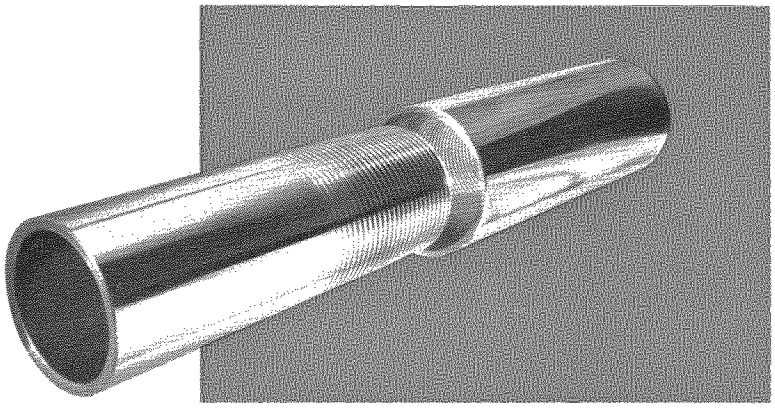


National Tube
Division of
United States Steel

National B Buttress-Thread Tubing

National Tube
Division of
United States Steel

PITTSBURGH, PA.



This mark tells you
a product is made of modern steel

An Important Development in Oil Country Tubular Products

The growing number of multiple completion wells in recent years has emphasized the oil well tubing problem of hole clearance between the casing and the tubing. The non-upset API tubing joint, offering the best clearance, has a tensile strength of less than 75 per cent of the tubing body. Increasing joint strength, comparable to the tubing body by the use of an external upset, requires a larger O.D. coupling and results in the loss of clearance. Clearly there has been a need for a non-upset tubing joint offering maximum clearance without sacrificing strength.

National Tube Division, developer of the Buttress Thread for casing joints, accepted this challenge with an extensive program of research on the application of the Buttress Thread to tubing, including thread forms, flank angles, and the effects of physical properties on joint efficiency. The result of this long study and practical application is a non-upset tubing with joint strength comparable to the plain end tubing body—USS National Buttress-Thread Tubing. This new joint is designed for: maximum clearance; high-tensile and compression strength; gas-leak tightness at 15,000 psi and with 100 temperature cycles between about 60 F and 200 F; ability to withstand at least 12 repeated make-ups and breaks without thread damage or impairment to joint performance; accurate threads and better finish due to carbide threading practice.

OUTSTANDING FEATURES OF USS NATIONAL BUTTRESS-THREAD TUBING

1. Provides a joint with tensile strength comparable to that of the body of the tubing, with maximum clearance for multiple completion well practice.

2. Has no external or internal upset; no cold working, swaging, expanding, etc. on the pipe ends. (Therefore has extended life in service because it can be easily repaired in the field.)

3. Contour of the coupling ends, square or beveled, provides minimum interference when running.

4. The electro tin plating (.0020″ Avg.) on coupling threads assures gas-leak tightness and reduces make-up torque and tonging.

5. The rugged flat-crested buttress thread is highly resistant to joint damage.

6. The joint permits repeated make-ups and breaks without galling.

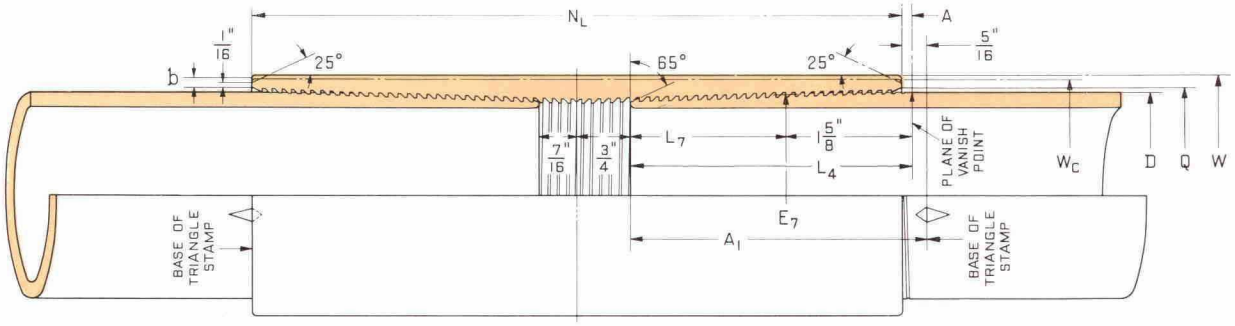
7. Flat crests and roots, parallel to the pipe axis, give good stabbing characteristics. They also provide fast make-up and reduce cross-threading, giving maximum running speed.

THREADING DATA FOR USS NATIONAL SEAMLESS DIAMOND Ⓑ BUTTRESS-THREAD TUBING

NON-UPSET

Basic Power-Tight Position

Basic Hand-Tight Position



BASIC POWER MAKE-UP: FACE OF COUPLING TO BASE OF TRIANGLES OF STEEL STAMP MARK

HANDTIGHT STANDOFF A = 1 - THREAD

Pipe	Threads†				End of pipe to base of triangle stamp	Coupling						
						Outside diameter		Calculated weight		Length: regular or special clearance	Chamfer diameter	Bearing face width
Size: outside diameter	Number per inch	Total length: end of pipe to vanish point	Perfect length	Pitch diameter at plane of perfect thread length		Regular	Special clearance[8]	Regular	Special clearance			
D		L_4	L_7	E_7	A_1	W	W_c			N_L	Q	b
	Ins.							Lbs.		Ins.		
2	8	3.250	1.625	1.962	3 7/16	2.500	2.250	4.25	2.20	7 3/4	2.125	5/32
2 3/8	8	3.625	2.000	2.337	3 13/16	2.875	2.700	5.55	3.78	8 1/2	2.500	5/32
2 7/8	8	3.625	2.000	2.837	3 13/16	3.500	3.220	8.24	4.84	8 1/2	3.000	3/16
3 1/2	8	3.625	2.000	3.462	3 13/16	4.250	3.865	11.86	6.21	8 1/2	3.625	3/16
4	8	3.625	2.000	3.962	3 13/16	4.750	4.400	13.41	7.62	8 1/2	4.125	3/16
4 1/2	8	3.625	2.000	4.462	3 13/16	5.200	4.920	13.96	8.84	8 1/2	4.625	3/16

†Taper 3/4-inch per foot measured on the diameter.

For weights, additional dimensions and performance properties see page 5.
For additional notes, see page 9.

GROSS LINEAL FOOTAGE FROM NET FOOTAGE—MULTIPLICATION FACTORS

Size: outside diameter	Nominal: weight per foot threads and coupling	Number of threads per inch	Make-up loss per joint	*Multiplication factor	
				Average length of joint	
Ins.	Lbs.		Ins.	20 Ft.	30 Ft.
2	3.40	8	3.438	1.0145	1.0096
2 3/8, 2 7/8, 3 1/2, 4, 4 1/2	ALL	8	3.812	1.0161	1.0107

*To obtain the gross or shipping length, multiply the net length in feet by the multiplication factor.

USS NATIONAL SEAMLESS
DIAMOND ⟨B⟩ BUTTRESS-THREAD TUBING

NON-UPSET

DIMENSIONS

Size: outside diameter	Weight per foot		Dimensions						Calculated weight of coupling		Areas		
			Tubing			Coupling							
						Outside dia.		Length: regular or special clearance					
	Nominal: threads and coupling	Plain end	Wall thickness	Inside diameter	Drift diameter	Regular	[3, 8] Spec. clearance		Regular	[8] Spec. clearance	Plain end	[7] Regular coupling	[7, 8] Spec. clearance coupling
Ins.	Lbs.		Ins.						Lbs.		Sq. Ins.		
2	3.40	3.23	.165	1.670	1.576	2.500	2.250	7¾	4.25	2.20	.951	2.068	1.135
2⅜	4.60	4.43	.190	1.995	1.901	2.875	2.700	8½	5.55	3.78	1.304	2.505	1.739
2⅞	6.40	6.16	.217	2.441	2.347	3.500	3.220	8½	8.24	4.84	1.812	3.669	2.191
3½	9.20	8.81	.254	2.992	2.867	4.250	3.865	8½	11.86	6.21	2.590	5.224	2.770
4	10.90	10.46	.262	3.476	3.351	4.750	4.400	8½	13.41	7.62	3.077	5.909	3.394
4½	12.60	12.24	.271	3.958	3.833	5.200	4.920	8½	13.96	8.84	3.600	6.184	3.958

INTERNAL PRESSURES, COLLAPSE, AND TENSION PROPERTIES

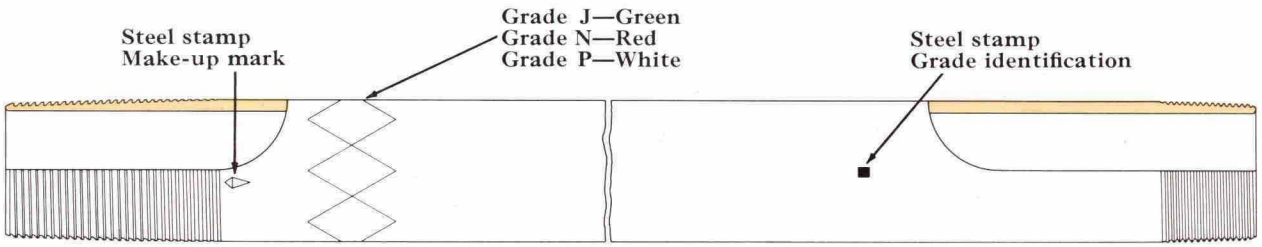
Size: outside diameter	Nominal: weight per foot threads and coupling	Steel grade	Internal pressures					Minimum properties					
			Test[3]			[6] Yield (min.)	Ultimate (min.)	Tension		Collapse		Tension	
								Regular coup.				Spec. clear. coup.	
			[4] Mill	At fiber stress equal to 80% of min. yield strength	Special clearance coupling			[5] Equiv. length S. F. 2	Yield load	[2] Setting depth S. F. 1⅛	Pressure	[5, 8] Equiv. length S. F. 2	[5, 8] Yield load
Ins.	Lbs.		psi					Ft.	Lbs.	Ft.	psi	Ft.	Lbs.
2	3.40	J	3000	7300	6200	7940	14440	7690	52310	13120	7380	7690	52310
		N	10600	10600	9000	11550	15880	11190	76090	17160	9650	11190	76090
		P	13900	13900	.....	15160	17900	14690	99870	23220	13060	.....	.....
2⅜	4.60	J	3000	7000	6000	7700	14000	7800	71730	12760	7180	7800	71730
		N	10200	10200	8700	11200	15400	11340	104340	16680	9380	11340	104340
		P	13400	13400	.....	14700	17360	14880	136940	22580	12700	.....	.....
2⅞	6.40	J	3000	6600	5600	7260	13210	7790	99660	12090	6800	7790	99660
		N	9700	9700	8200	10570	14530	11320	144960	15820	8900	11320	144960
		P	12700	12700	.....	13870	16380	14860	190260	21400	12040	.....	.....
3½	9.20	J	3000	6400	5400	6980	12700	7740	142460	11660	6560	7740	142460
		N	9300	9300	7900	10160	13970	11260	207220	15250	8580	11260	207220
		P	12200	12200	.....	13340	15750	14780	271970	20640	11610	.....	.....
4	10.90	J	3000	5800	4900	6300	11460	7760	169220	10220	5750	7760	169220
		N	8400	8400	7100	9170	12610	11290	246140	13370	7520	11290	246140
		P	11000	11000	.....	12040	14210	14820	323050	18080	10170	.....	.....
4½	12.60	J	3000	5300	4500	5790	10540	7860	198030	9080	5110	7860	198030
		N	7700	7700	6500	8440	11590	11430	288040	11880	6680	11430	288040
		P	10100	10100	.....	10070	13070	15000	378050	16050	9030	.....	.....

NOTE: USS National Seamless Diamond B Buttress-Thread Tubing has 8 Diamond B Buttress Threads per inch. Taper ¾-inch per foot measured on the diameter.

For additional notes, see page 9.

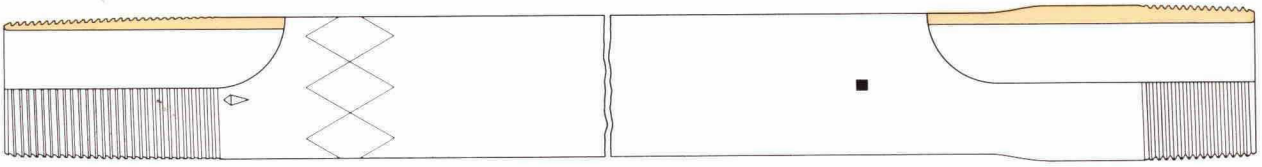
USS NATIONAL SEAMLESS DIAMOND ◈ BUTTRESS-THREAD TUBING

CROSS-OVER NIPPLE DETAIL (External threads)



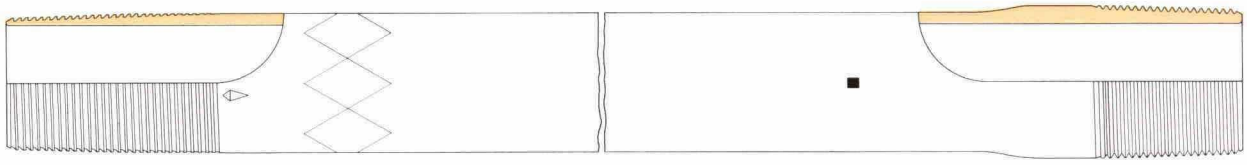
BUTTRESS TUBING THREAD

API Non-Upset
Tubing Thread



BUTTRESS TUBING THREAD

API External Upset
(Short) Tubing Thread



BUTTRESS TUBING THREAD

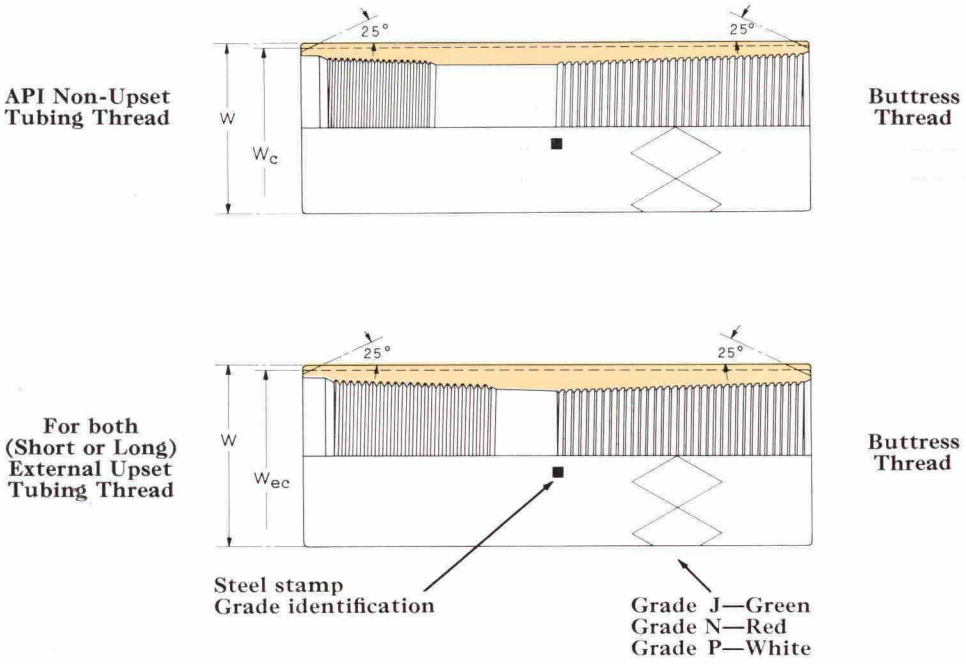
(*Hi-Pres-Sure*)
External Upset—Long T & C
Tubing Thread

Furnished in Minimum Lengths of
3, 4, 6, 8, 10 Ft. and Range - 2

Cross-over joints can be furnished with proper couplings made up on nipples handling-tight or power-tight.

USS NATIONAL DIAMOND (B) BUTTRESS-THREAD TUBING

CROSS-OVER COUPLING DETAIL (Internal threads) AND COUPLING O.D. DIMENSIONS



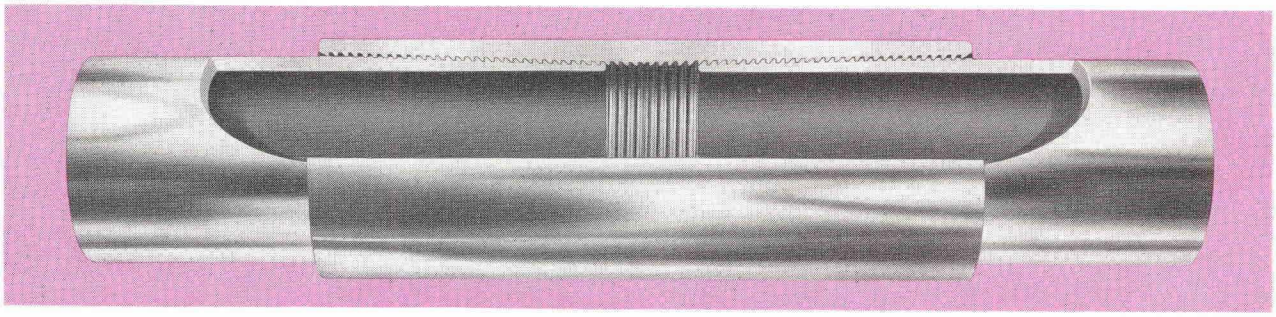
Couplings regularly furnished with rounded corners both ends, or beveled both ends as ordered.

Size inches	Buttress to Non-Upset API		Buttress to Ext-Upset API and Ext-Upset Long T&C	
	Coupling O.D., inches		Coupling O.D., inches	
	W	W_c	W	W_{ec}
2.000	.....	.....	.....	.....
2.375	2.875	2.700	3.063	2.910
2.875	3.500	3.220	3.668	3.460
3.500	4.250	3.865	4.500	4.180
4.000	4.750	4.400	5.000	.....
4.500	5.200	4.920	5.563	.....

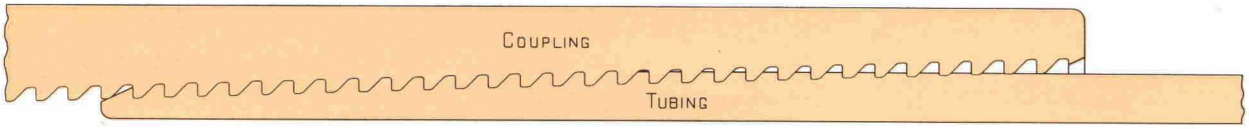
NOTE: For detail thread dimensions of buttress-thread tubing, see page 4. For detail thread dimensions of API non-upset T&C joints, see page 10. For detail thread dimensions of API external upset T&C and long T&C (Hi-Pres-Sure) joints, see pages 11 and 12.

JOINT AND THREADING DETAIL USS NATIONAL SEAMLESS DIAMOND ⟨B⟩ BUTTRESS THREAD TUBING

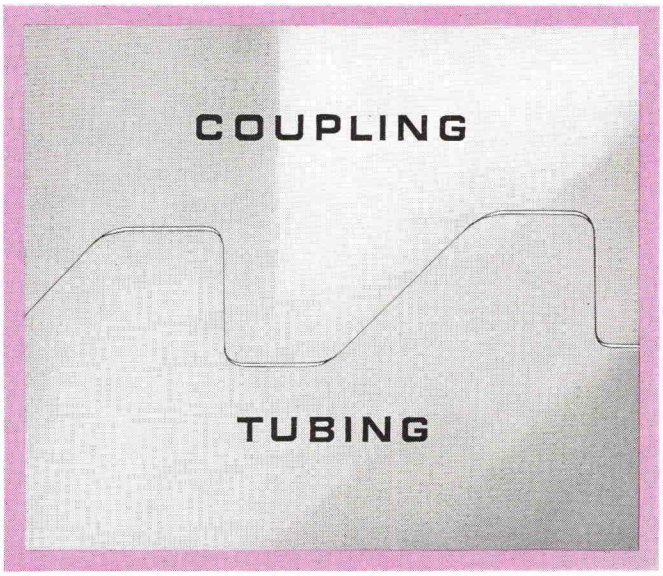
(Coupling threads electro tin-plated .0020 inch average thickness)



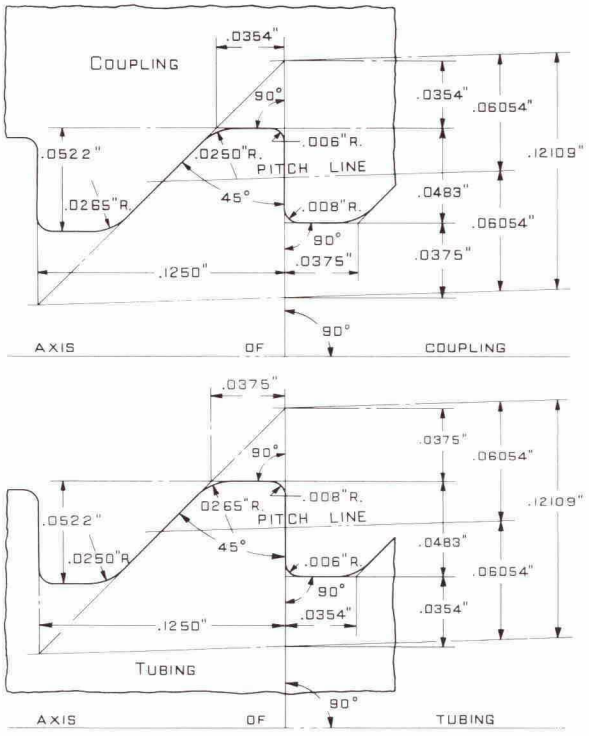
Basic Power-Tight Position — Cut Away Section of Joint — Basic Hand-Tight Position



Enlarged Section of Joint (Basic Power-Tight Position)



Enlarged Mated Thread Profile



TENSILE REQUIREMENTS

Grade	Yield strength min., psi	Tensile strength min., psi	Elongation, min. per cent in 2 in.	
			Strip specimens	Full-section specimens
TUBING				
J-55	55,000	75,000	20	25
N-80	80,000	100,000	16	18
P-105 (Deep-Well)	105,000	120,000	15	17

RANGE LENGTHS

ALL LENGTHS IN FEET

	Range	
	1	2
TUBING		
Total range length, incl.	20–24	28–32
Range length for 100 per cent of carload:		
Permissible variation, max.	2	2
Permissible length, min.	20	28

NOTES

The permissible variation in weight for any length of tubing is 6½ per cent above and 3½ per cent below; but the carload weight shall not be more than 1¾ per cent under the calculated weight.

Furnished with threads and coupling unless otherwise ordered.

For tables of tensile requirements and range lengths, see above.

The weight per foot of tubing with threads and coupling is based on a length of 20 feet, including the coupling.

Field conditions vary so widely that definite safety factors for collapse or tension cannot be recommended.

[2]Since salt water is practically always encountered in drilling, the length of string is based upon 2 feet of water column to each pound of collapsing pressure.

[3]Test pressures for tubing furnished with special clearance couplings of the same grade are approximately 85 per cent of regular high-test pressures. Tubing furnished with special clearance couplings of one steel grade higher than the tubing grade shall be tested to the regular high-test pressure. Unless otherwise specified, Grade J-55 tubing with regular or special clearance couplings will be tested to a maximum pressure of 3000 psi.

[4]Present mill equipment limits test pressure to 15,000 psi. API test pressures 10,000 psi maximum.

[5]Tension setting depths for Buttress-Thread tubing are not related to those for casing which are based on joint pull-out strength. Tension setting depths shown are determined as the product of the minimum yield strength for the grade and the plain end area of the tubing or the effective metal area of the regular or special clearance coupling, whichever is smaller.

[6]Based on 87½ per cent for internal pressure at minimum yield strength.

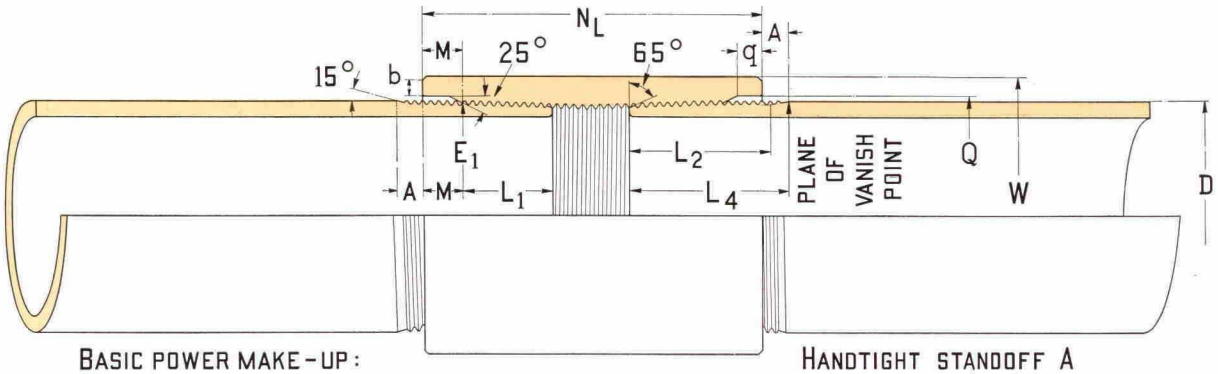
[7]Root of the regular or special clearance coupling thread at the first perfect thread on the pipe when made up to the power-tight position.

[8]On tubing furnished with special clearance couplings it is standard practice to furnish couplings in one steel grade higher than the tubing grade but P-105 is our present highest grade.

THREADING DATA FOR
USS NATIONAL SEAMLESS DIAMOND ◈ TUBING (API)

NON-UPSET

Section of Joint—Shown Handtight



BASIC POWER MAKE-UP: FACE OF COUPLING TO PLANE OF VANISH POINT.

HANDTIGHT STANDOFF A 2 THREADS

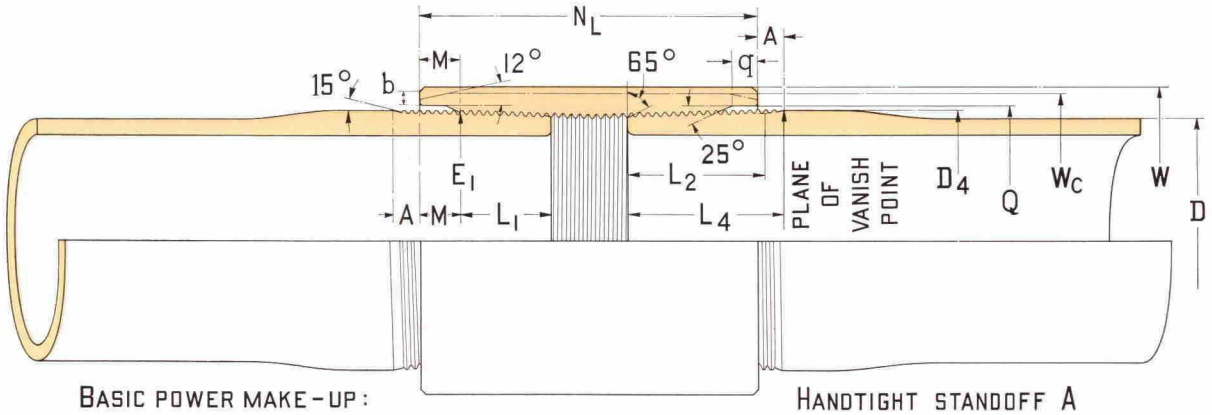
Pipe		Threads†					Coupling					
Size: outside diameter	Nominal: weight per foot threads and coupling	Number per inch	Length: end of pipe to hand-tight plane	Effective length	Total length: end of pipe to vanish point	Pitch diameter at hand-tight plane	Outside diameter	Length	Recess		Bearing face width	Length: face of coupling to hand-tight plane
									Diameter	Depth		
D			L_1	L_2	L_4	E_1	W	N_L	Q	q	b	M
Ins.	Lbs.		Ins.									
1.900	2.75	10	.729	1.206	1.375	1.83826	2.200	3¾	1.963	5/16	1/16	.446
2⅜	4.00 4.60 5.80	10	.979	1.456	1.625	2.31326	2.875	4¼	2.438	5/16	3/16	.446
2⅞	6.40 8.60	10	1.417	1.894	2.063	2.81326	3.500	5⅛	2.938	5/16	3/16	.446
3½	7.70 9.20 *10.20 12.70	10	1.667	2.144	2.313	3.43826	4.250	5⅝	3.563	5/16	3/16	.446
4	9.50	8	1.591	2.140	2.375	3.91395	4.750	5¾	4.063	⅜	3/16	.534
4½	12.60	8	1.779	2.328	2.563	4.41395	5.200	6⅛	4.563	⅜	3/16	.534

†Taper ¾-inch per foot measured on the diameter.
*On direct mill shipments only.

THREADING DATA FOR USS NATIONAL SEAMLESS DIAMOND Ⓑ TUBING (API)

EXTERNAL-UPSET

Section of Joint—Shown Handtight



BASIC POWER MAKE-UP: FACE OF COUPLING TO PLANE OF VANISH POINT.

HANDTIGHT STANDOFF A 2 THREADS

Pipe		Threads†						Coupling						
Size: outside diameter	Nominal: weight per foot threads and coupling	Number per inch	Length: end of pipe to hand-tight plane	Effective length	Total length: end of pipe to vanish point	Pitch diameter at hand-tight plane	Outside diameter external upset	Outside diameter		Length	Recess		Bearing face width	Length: face of coupling to hand-tight plane
								Regular	Special clearance		Diameter	Depth		
D			L_1	L_2	L_4	E_1	D_4	W	W_c	N_L	Q	q	b	M
Ins.	Lbs.		Ins.											
1.050	1.20	10	.479	.956	1.125	1.25328	1.315	1.660	.....	3¼	1.378	5/16	3/32	.446
1.315	1.80	10	.604	1.081	1.250	1.40706	1.469	1.900	.....	3½	1.531	5/16	3/32	.446
1.660	2.40	10	.729	1.206	1.375	1.75079	1.812	2.200	.....	3¾	1.875	5/16	1/8	.446
1.900	2.90	10	.792	1.269	1.438	2.03206	2.094	2.500	.....	3⅞	2.156	5/16	1/8	.446
2⅜	4.70 5.95	8	1.154	1.703	1.938	2.50775	2.594	3.063	2.910	4⅞	2.656	⅜	5/32	.534
2⅞	6.50 8.70	8	1.341	1.890	2.125	3.00775	3.094	3.668	3.460	5¼	3.156	⅜	7/32	.534
3½	9.30 12.95	8	1.591	2.140	2.375	3.66395	3.750	4.500	4.180	5¾	3.813	⅜	¼	.534
4	11.00	8	1.716	2.265	2.500	4.16395	4.250	5.000	.....	6	4.313	⅜	¼	.534
4½	12.75	8	1.841	2.390	2.625	4.66395	4.750	5.563	.....	6¼	4.813	⅜	¼	.534

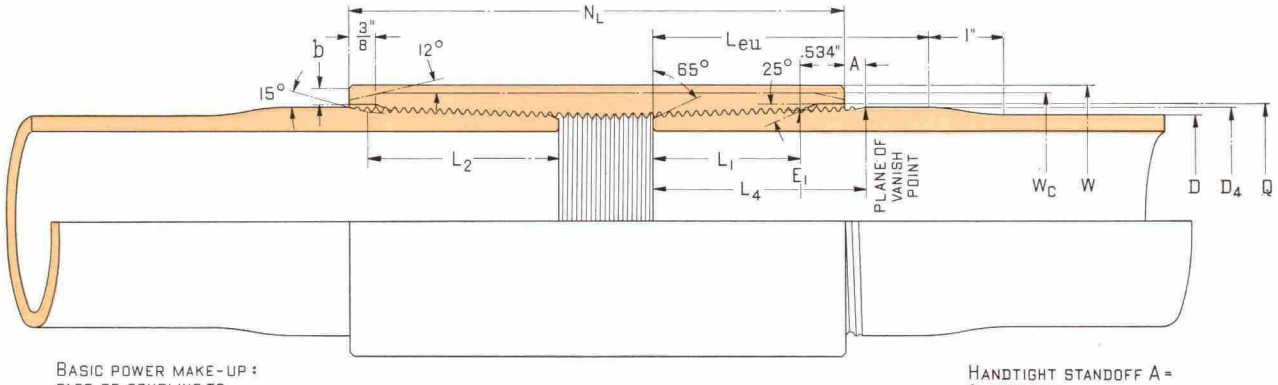
†Taper ¾-inch per foot measured on the diameter.

THREADING DATA FOR
USS NATIONAL SEAMLESS DIAMOND ⟨B⟩ *Hi-Pres-Sure* TUBING

EXTERNAL-UPSET LONG T & C[1]

Basic Power-Tight Position

Basic Hand-Tight Position



BASIC POWER MAKE-UP: FACE OF COUPLING TO PLANE OF VANISH POINT

HANDTIGHT STANDOFF A = 2 THREADS

Pipe	Threads†				External upset		Coupling, long T & C				
							Outside diameter		Length: regular O.D. or special clearance	Diameter of recess	Bearing face width
Size: outside diameter	Length: end of pipe to hand-tight plane	Effective length	Total length: end of pipe to vanish point	Pitch diameter at hand-tight plane	Outside diameter	Total length	Regular	Special clearance			
D	L_1	L_2	L_4	E_1	D_4	L_{eu}	W	W_c	N_L	Q	b
Ins.											
2⅜	1.779	2.328	2.563	2.50775	2.594	3½	3.063	2.910	6⅛	2.656	5/32
2⅞	2.091	2.640	2.875	3.00775	3.094	3¾	3.668	3.460	6¾	3.156	7/32
3½	2.341	2.890	3.125	3.66395	3.750	4	4.500	4.180	7¼	3.813	¼

[1]Tentative API Std. 5AX.

†8 round threads per inch: taper ¾-inch per foot measured on the diameter.

Tolerance on total length of external upset, $L_{eu} = \pm$ ½-inch.

GROSS LINEAL FOOTAGE FROM NET FOOTAGE—MULTIPLICATION FACTORS

Size: outside diameter	Nominal: weight per foot threads and coupling	Number of threads per inch	Make-up loss per joint	*Multiplication factor	
				Average length of joint	
Ins.	Lbs.		Ins.	20 Ft.	30 Ft.
2⅜	All	8	2.563	1.0108	1.0072
2⅞	All	8	2.875	1.0121	1.0081
3½	All	8	3.125	1.0132	1.0088

*To obtain the gross or shipping length, multiply the net length in feet by the multiplication factor.

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National Tube Division of United States Steel

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