PERFORATOR® GmbH







Oil and Gasfield Drill Pipes

PERFORATOR® Oil and Gasfield Drill Pipes

- ✓ API approved
- ✓ Mother pipe in grade E, X, G + S
- ✓ Tool joint material SAE 4145
- ✓ Dimensions up to 5" pipe and API 5 1/2 IF tool joint
- ✓ Hard facing acc. to ARNCO 100 XT, 200 XT, 300 XT

- ✓ Non-destructive testing
- Irradiation test acc.
 DIN EN 1435/A
- Ultrasonic test acc.
 DIN EN 1712/1713 and
- Magnetic powder test acc. DIN EN 1290
- ✓ Destructive testing
- Tensile test acc. DIN 50125
- Bending test acc.
 API SPEC 7, latest edition
- Notched bar impact test acc. DIN 50115



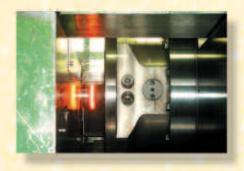
1. Engineering



2. Pipes



3. Hardfacing



4. Friction Welding



5. Heat Treatment



6. Inspection

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PERFORATOR® Drill Pipe and Tool Joint Grades

Drill Pipe Friction welded Tool Joints

Internal Upset IU Numbered Connections NC

External Upset EU Internal Flush IF

Internal-External Upset IEU Full Hole FH

acc. to API Spec. 5D

Additional requirements can be designed and supplied on request.

DRILL PIPE AND TOOL JOINT GRADES

	10.00 PER TOTAL	A A CONTRACT	V Part I I I I I	MARKET AND		
	Mechanical	nroperti	es of AF	l drill nine	grades	
	Moonanoa	ргороги	oo oi Ai	r arm pipe	grados	
Grade	Yield strength psi N/mm² min.	psi N/mm² max.		e strength psi N/mm² min.	Elongation ¹ in 2 inches % min.	API
E - 75	75 000	105 000	100	000	see	Spec. 5 D
	515	725		690	footnote	
X - 95	95 000	125 000	105	000		Spec. 5 D
	655	860		725		
G-105	105 000	135 000	115	000		Spec. 5 D
	725	930		795		
S-135	135 000	165 000	145	000		Spec. 5 D
	930	1 140	1	000		
	Mechanical	propertie	s of API	tool joint	grades	
Yield strength			gation	Box	API	
psi N/mm²	psi N/mm²	in 2 inc	ches %	Hardness Brinell		
min.	min.	mi		min.	-	
120 000	140 000		3	285	Spec. 7	
827	965					

¹ The minimum elongation in 2 inches (50.80 mm) shall be that determined by the following formula:

$$e = 625.000 \frac{A^{02}}{U^{09}}$$

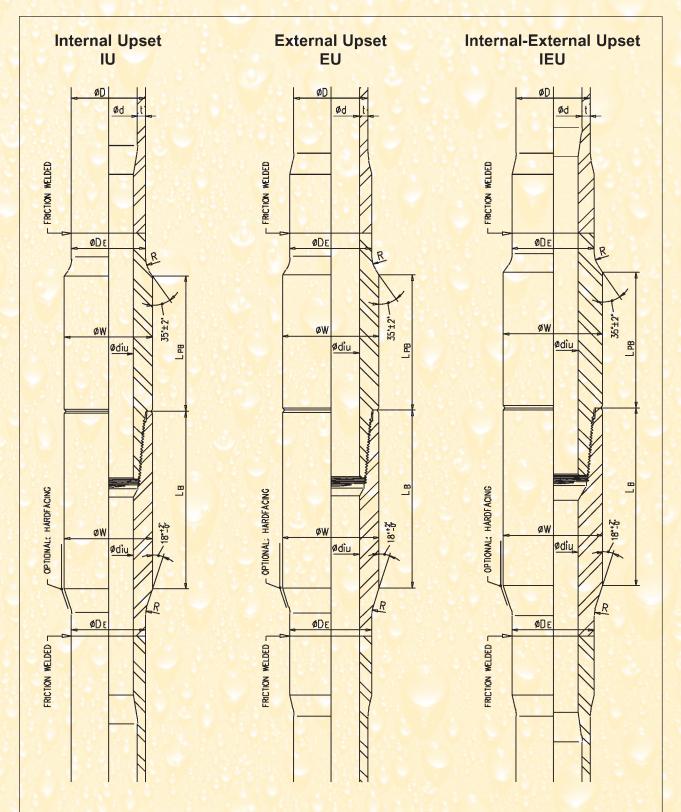
where:

e =minimum elongation in 2 inches (50.80 mm) in percent rounded to nearest 1/2 percent.

A =cross sectional area of the tensile test specimen in square inches, based on specified outside diameter or nominal specimen width, and specified wall thickness, rounded to the nearest 0.01 sq.in., or 0.75 sq.in., whichever is smaller.

U =specified tensile strength, psi.

Dimensions of Drill Pipe with Weld-On Tool Joints



Treatment of Thread Surfaces

The tool joint threads are phosphated and in connection with the thread dope, according to API BUL 7A1, this provides an excellent surface treatment to avoid galling during make-up and break-out.

As an alternative, copper plated threads can be supplied on request.

<u> </u>									<u> </u>		1)		
1	2	3	4	5	6	7	8	9	10	11	12	13	
0.	NI.	344-31	la cha		Pipe D	_			D. C.	D			
Size:	Nominal	Wall	Inside	Section		Grade		D:		ce Properties	Tabl	Ladina	
Outside	Weight	Thickness	Diameter	Area	Upset		Callanas		ipe Tensile	Tarajanal		Joint	
Diameter				Pipe			Collapse Resistance	Internal Yield	Yield	Torsional Yield	Tensile Yield	Torsional Yield	
				Body			Resistance	Pressure	Yieiu	Yleiu	Yield	Yieiu	
D		t	d	Α			P _c	Pi					
in.	lb/ft		n.	sq.in.			p:		lb	ft-lb	lb	ft-lb	
mm	kg/m		m	cm ²				ar	kN	Nm	kN	Nm	
2 3/8	6.65	0.280	1.815	1.8429	EU	E	15 600	15 470	138 220	6 250	313 680	6 800	
60,3	9,90	7,11	46,10	11,89			1 076	1 067	615	8 470	1 396	9 220	CONT
00,5	9,90	7,11	40,10	11,03	EU	Х	19 760	19 600	175 080	7 920	313 680	6 800	
	;					^	1 362	1 351	779	10 740	1 396	9 220	
					EU	G	21 840	21 660	193 500	8 750	313 680	6 800	
						d	1 506	1 493	861	11 860	1 396	9 220	
2 7/8	6.85	0.217	2.441	1.8120	EU	E	10 467	9 907	135 902	8 083	447 131	11 871	
73,0	10,19	5,51	62,00	11,69			722	683	605	10 960	1 990	16 090	
70,0	10,15	3,31	02,00	11,00	EU	X	12 940	12 548	172 143	10 238	447 131	11 871	5 V
						^	892	865	766	13 880	1 990	16 090	
					EU	G	14 020	13 869	190 263	11 316	447 131	11 871	
							967	956	847	15 340	1 990	16 090	
2 7/8	8.60	0.308	2.260	2.4831	EU	Е	14 348	14 061	186 290	10 413	313 682	6 875	
73,0	12,80	7,82	57,40	16,02			989	970	829	14 120	1 396	9 320	
7.0,0	12,00	,,02	07,10	10,02			000	0.10	020	11.120	447 131	11 871	
			1 4 /							3 (1 990	16 090	
					EU	X	18 174	17 810	235 967	13 190	313 682	6 875	
							1 253	1 228	1 050	17 880	1 396	9 320	
							1 200	1220	1 000	17 000	447 131	11 871	
											1 990	16 090	
					EU	G	20 087	19 685	260 805	14 578	313 682	6 875	
							1 385	1 357	1 161	19 760	1 396	9 320	
							1 000	1 001		10 700	447 131	11 871	
											1 990	16 090	
					EU	S	25 826	25 310	335 321	18 743	495 727	13 196	4
							1 781	1 745	1 492	25 410	2 206	17 890	
2 7/8	10.40	0.362	2.151	2.8579	EU	E	16 509	16 526	214 345	11 550	447 131	11 871	
73,0	15,48	9,19	54,64	18,44			1 138	1 139	954	15 660	1 990	16 090	
. 0,0	.0,.0	0,10	0.,0.	,	EU	Х	20 911	20 933	271 504	14 635	495 727	13 196	
							1 442	1 443	1 208	19 840	2 206	17 890	
											447 131	11 871	
											1 990	16 090	
					ΕŲ	G	23 112	23 137	300 083	16 176	495 727	13 196	
							1 594	1 595	1 335	21 930	2 206	17 890	
					EU	S	29 716	29 747	385 821	20 800	623 846	16 946	
771							2 049	2 051	1 717	28 200	2 776	22 980	
							•						

	14	15	16	17	18	19	20	21	22	23	24	25	26
	Тоо	l Joint D	ata	9.5			11 Y			Dri	II Pipe Da	ta	
	Connection	Diamet	er of Pin a	nd Box	Tong :	Space Space	Cross S	ectional	Adjusted	Make-Up	Torsional	Capacity	Total
	Type				Leng	th of	Are	a of	Weight*	Torque	Ratio,		Dis-
		Outside	Inside	Elevator	Pin	Box	Pin	Box			Pin to Pipe	•	place-
				Upset							47		ment
													**
		W	d _{iu}	DE	LPB	LB	AP	AB	11. 701	6. 11		110	. 10.
				in.			The second	.in.	lb/ft	ft-lb			al./ft
	110.00 (0.00 15)	0.0/0	1.04	mm				m²	kg/m	Nm	4.00	1/1	
	NC 26 (2 3/8 IF)	3 3/8	1 3/4	2 9/16	7	8	2.531	2.457	7.05	3 500	1.09	0.134	0.241
	NC 26 (2.2/9 IE)	85,7	44,5	65,1 2 9/16	177,8 7	203,2	16,33	15,85	10,5 7.05	4 750	0.06	1,664	2,993 0.241
	NC 26 (2 3/8 IF)	3 3/8 85,7	1 3/4 44,5	65,1	177,8	8 203,2	2.531 16,33	2.457 15,85	10,5	3 500 4 750	0.86	0.134 1,664	2,993
	NC 26 (2 3/8 IF)	3 3/8	1 3/4	2 9/16	7	8	2.531	2.457	7.05	3 500	0.78	0.134	0.241
	110 20 (2 3/0 11)	85,7	44,5	65,1	177,8	203,2	16,33	15,85	10,5	4 750	0.70	1,664	2,993
	NC 31 (2 7/8 IF)	4 1/8	2 1/8	3 3/16	7	9	3.627	4.337	7.73	5 935	1.47	0.238	0.356
		104,8	54,0	81,0	177,8	228,6	23,40	27,98	11,5	8 050		2,96	4,42
	NC 31 (2 7/8 IF)	4 1/8	2 1/8	3 3/16	7	9	3.627	4.337	7.73	5 935	1.16	0.238	0.356
		104,8	54,0	81,0	177,8	228,6	23,40	27,98	11,5	8 050		2,96	4,42
	NC 31 (2 7/8 IF)	4 1/8	2 1/8	3 3/16	7	9	3.627	4.337	7.73	5 935	1.05	0.238	0.356
		104,8	54,0	81,0	177,8	228,6	23,40	27,98	11,5	8 050		2,96	4,42
	NC 26 (2 3/8 IF)	3 3/8	1 3/4	3	7	8	2.531	2.457	9.33	3 438	0.52	0.201	0.343
		85,7	44,5	76,2	177,8	203,2	16,33	15,85	13,9	4 660		2,497	4,260
	NC 31 (2 7/8 IF)	4 1/8	2 1/8	3 3/16	7	9	3.627	4.337	9.81	5 935	1.14	0.206	0.356
		104,8	54,0	81,0	177,8	228,6	23,40	27,98	14,6	8 050		2,56	4,42
	NC 26 (2 3/8 IF)	3 3/8	1 3/4	3	7	8	2.531	2.457	9.33	3 438	0.52	0.201	0.343
		85,7	44,5	76,2	177,8	203,2	16,33	15,85	13,9	4 660		2,50	4,26
	NC 31 (2 7/8 IF)	4 1/8	2 1/8	3 3/16	7	9	3.627	4.337	9.81	5 935	0.90	0.206	0.356
	NO 00 (0 0/0 IE)	104,8	54,0	81,0	177,8	228,6	23,40	27,98	14,6	8 050	0.47	2,56	4,42
	NC 26 (2 3/8 IF)	3 3/8	1 3/4	3	7	8	2.531	2.457	9.33	3 438	0.47	0.201	0.343
	NC 31 (2 7/8 IF)	85,7 4 1/8	44,5	76,2 3 3/16	177,8 7	203,2	16,33	15,85	13,9	4 660 5 935	0.91	2,50	4,26 0.356
	NO 31 (2 //0 IP)	104,8	2 1/8 54,0	81,0	177,8	228,6	3.627 23,40	4.337 27,98	9.81 14,6	8 050	0.81	0.206 2,56	4,42
	NC 31 (2 7/8 IF)	4 1/8	2	3 3/16	7	9	4.032	4.337	9.93	6 598	0.70	0.204	0.356
	.10 01 (2 1/0 11)	104,8	50,8	81,0	177,8	228,6	26,01	27,98	14,8	8 950	0.70	2,53	4,42
	NC 31 (2 7/8 IF)	4 1/8	2 1/8	3 3/16	7	9	3.627	4.337	10.96	5 935	1.03	0.189	0.356
		104,8	54,0	81,0	177,8	228,6	23,40	27,98	16,3	8 050		2,348	4,422
1000	NC 31 (2 7/8 IF)	4 1/8	2	3 3/16	7	9	4.032	4.337	11.08	6 598	0.90	0.187	0.356
		104,8	50,8	81,0	177,8	228,6	26,01	27,98	16,5	8 950		2,32	4,42
	NC 31 (2 7/8 IF)	4 1/8	2 1/8	3 3/16	7	9	3.627	4.337	10.96	5 935	0.81	0.189	0.356
		104,8	54,0	81,0	177,8	228,6	23,40	27,98	16,3	8 050		2,35	4,42
8 72 100	NC 31 (2 7/8 IF)	4 1/8	2	3 3/16	7	9	4.032	4.337	11.08	6 598	0.82	0.187	0.356
		104,8	50,8	81,0	177,8	228,6	26,01	27,98	16,5	8 950		2,32	4,42
	NC 31 (2 7/8 IF)	4 3/8	1 5/8	3 3/16	7	9	5.099	6.006	11.72	8 473	0.81	0.184	0.363
		111,1	41,3	81,0	177,8	228,6	32,90	38,75	17,4	11 490		2,29	4,51

^{*} Weight of the pipe / tool joint assembly is based on the average pipe length of 29.4 ft plus tool joint length.

^{**} Including drill pipe volume.

						Y 1			OM		(1)		
1	2	3	4	5 _	6	7	8	9	10	11	12	13	
Size:	Nominal	Wall	Inside	Section	Pipe D	ata Grade			Darforman	Dropartico			
Outside	Weight	Thickness	Diameter	Area	Upset			Pi	pe	ce Properties	Tool	Joint	
Diameter	Worgin	THIOKHOOD	Diamotor	Pipe	Оросс		Collapse	Internal	Tensile	Torsional	Tensile	Torsional	
				Body			Resistance	Yield	Yield	Yield	Yield	Yield	
								Pressure				V	
D		t	d	Α			P _c	Pi					
in.	lb/ft	ii	1.	sq.in.			р	si	lb	ft-lb	lb	ft-lb	
mm	kg/m		m	cm ²				ar	kN	Nm	kN	Nm	
3 1/2	9.50	0.254	2.992	2.5902	EU	E	10 001	9 530	194 265	14 146	419 798	12 813	
88,9	14,14	6,45	76,00	16,71			690	657	864	19 180	1 868	17 370	
	, .										587 309	18 107	
											2 614	24 550	
					EU	Х	12 080	12 070	246 069	17 918	587 309	18 107	
							833	832	1 095	24 290	2 614	24 550	
					EU	G	13 060	13 340	271 971	19 805	587 309	18 107	
							900	920	1 210	26 850	2 614	24 550	
					EU	S	15 750	17 150	349 677	25 463	587 309	18 107	
							1 086	1 182	1 556	34 520	2 614	24 550	
3 1/2	13.30	0.368	2.764	3.6209	EU	E	14 110	13 800	271 570	18 551	587 309	18 107	
88,9	19,79	9,35	70,21	23,36	3		973	952	1 208	25 150	2 614	24 550	
					EU	Х	17 880	17 480	343 989	23 498	649 160	20 326	Y S
							1 233	1 205	1 531	31 860	2 889	27 560	
											587 309	18 107	
											2 614	24 550	
					EU	G	19 760	19 320	380 198	25 972	708 065	22 213	
			0				1 362	1 332	1 692	35 210	3 151	30 120	
											649 160	20 326	
											2 889	27 560	
											587 309	18 107	
											2 614	24 550	
					EU	S	25 400	24 840	488 826	33 393	842 442	26 515	
						*	1 751	1 713	2 175	45 270	3 749	35 950	
											708 065	22 213	
											3 151	30 120	
											776 408	25 673	
											3 455	34 810	
											838 258	27 760	
			17/10								3 730	37 640	

14	15	16	17	18	19	20	21	22	23	24	25	26
Too	l Joint D	ata							Dri	II Pipe D	ata	
Connection	Diamet	er of Pin a	nd Box	Tong :			ectional	Adjusted	Make-Up	Torsional	Capacity	Total
Type	Outoido	Inside	Elevator	Leng Pin		Are.	a of Box	Weight*	Torque	Ratio,		Dis-
	Outside	inside	Elevator Upset	PIII	Box	PIN	BOX			Pin to Pipe		place- ment
			Оробі									**
	W	d _{iu}	DE	LPB	LB	AP	AB					
			in.			sq	.in.	lb/ft	ft-lb		US g	gal./ft
			mm				m²	kg/m	Nm			m
NC 38****	4 3/4	3	3 7/8	8	10.5	3.378	5.052	10.46	6 407	0.91	0.366	0.525
	120,7	76,2	98,4	203,2	266,7	21,79	32,59	15,6	8 690		4,546	6,521
NC 38 (3 1/2 IF)	4 3/4	2 11/16	3 7/8	8	10.5	4.774	5.052	10.91	9 054	1.28	0.359	0.525
	120,7	68,3	98,4	203,2	266,7	30,80	32,59	16,2	12 280		4,46	6,52
NC 38 (3 1/2 IF)	4 3/4	2 11/16	3 7/8	8	10.5	4.774	5.052	10.91	9 054	1.01	0.359	0.525
	120,7	68,3	98,4	203,2	266,7	30,80	32,59	16,2	12 280		4,46	6,52
NC 38 (3 1/2 IF)	4 3/4	2 11/16	3 7/8	8	10.5	4.774	5.052	10.91	9 054	0.91	0.359	0.525
	120,7	68,3	98,4	203,2	266,7	30,80	32,59	16,2	12 280		4,46	6,52
NC 38 (3 1/2 IF)	4 3/4	2 11/16	3 7/8	8	10.5	4.774	5.052	10.91	9 054	0.71	0.359	0.525
	120,7	68,3	98,4	203,2	266,7	30,80	32,59	16,2	12 280		4,46	6,52
NC 38 (3 1/2 IF)	4 3/4	2 11/16	3 7/8	8	10.5	4.774	5.052	14.08	9 054	0.98	0.310	0.525
	120,7	68,3	98,4	203,2	266,7	30,80	32,59	21,0	12 280		3,851	6,521
NC 38 (3 1/2 IF)	5	2 9/16	3 7/8	8	10.5	5.290	6.966	14.60	10 163	0.87	0.308	0.531
	127,0	65,1	98,4	203,2	266,7	34,13	44,94	21,7	13 780		3,83	6,60
NC 38 (3 1/2 IF)	4 3/4	2 11/16	3 7/8	8	10.5	4.774	5.052	14.08	9 054	0.77	0.310	0.525
	120,7	68,3	98,4	203,2	266,7	30,80	32,59	21,0	12 280		3,85	6,52
NC 38 (3 1/2 IF)	5	2 7/16	3 7/8	8	10.5	5.781	6.966	14.75	11 106	0.86	0.305	0.531
	127,0	61,9	98,4	203,2	266,7	37,30	44,94	22,0	15 060		3,79	6,60
NC 38 (3 1/2 IF)	5	2 9/16	3 7/8	8	10.5	5.290	6.966	14.60	10 163	0.78	0.308	0.531
	127,0	65,1	98,4	203,2	266,7	34,13	44,94	21,7	13 780		3,83	6,60
NC 38 (3 1/2 IF)	4 3/4	2 11/16	3 7/8	8	10.5	4.774	5.052	14.08	9 054		0.310	0.525
110 00 (0 112 11)	120,7	68,3	98,4	203,2	266,7	30,80	32,59	21,0	12 280		3,85	6,52
NC 38 (3 1/2 IF)	5	2 1/8	3 7/8	8	10.5	6.900	6.966	15.10	13 258	0.79		0.531
110 00 (0 1/2 11)	127,0	54,0	98,4	203,2	266,7	44,52	44,94	22,5	17 980			6,60
NC 39 (3 1/2 IE)	5		3 7/8	8								0.531
NC 38 (3 1/2 IF)		2 7/16			10.5	5.781	6.966	14.75	11 106			
NO 40 /4 510	127,0	61,9	98,4	203,2	266,7	37,30	44,94	22,0	15 060		3,79	6,60
NC 40 (4 FH)	5 1/4	2 11/16	3 7/8	7	10	6.342	7.260	14.83	12 837	0.77		0.537
	133,4	68,3	98,4	177,8	254,0	40,92	46,84	22,1	17 400		3,85	6,67
NC 40 (4 FH)	5 1/4	2 9/16	3 7/8	7	10	6.857	7.260	14.99	13 880		0.308	0.537
	133,4	65,1	98,4	177,8	254,0	44,24	46,84	22,3	18 820		3,83	6,67

^{*} Weight of the pipe / tool joint assembly is based on the average pipe length of 29.4 ft plus tool joint length.

^{**} Including drill pipe volume.

1	2	3	4	5	6	7	8	9	10	11	12	13	
		7117			Pipe D		Ya V	W.					
Size:	Nominal	Wall	Inside	Section		Grade			Performano	e Properties			
Outside	Weight	Thickness	Diameter	Area	Upset			Pi	pe		Tool	Joint	
)iameter	Worging	THIONHOOD	Diamotor	Pipe	Оросс		Collapse	Internal	Tensile	Torsional	Tensile	Torsional	
παιτιστοι				Body			Resistance	Yield	Yield	Yield	Yield	Yield	
				Bouy	4		nesisiance		Helu	Helu	rieiu	Helu	
								Pressure					
D		t	d	Α			P _c	Pi					
in.	lb/ft	ir	1.	sq.in.			p:		lb	ft-lb	lb	ft-lb	
mm	kg/m	m	m	cm ²			ba	ar	kN	Nm	kN	Nm	
3 1/2	15.50	0.449	2.602	4.3037	EU	E	16 770	16 840	322 776	21 086	649 160	20 326	
88,9	23,07	11,40	66,09	27,77	V-10		1 156	1 161	1 436	28 590	2 889	27 560	
											708 065	22 213	
	\$ C										3 151	30 120	
											649 160	19 174	
									13		2 889	26 000	
					Y						708 065	19 174	
						74	04.050	04.000	400.040	00 700	3 151	26 000	
					EU	Х	21 250	21 330	408 849	26 708	649 160	20 326	
						31.4	1 465	1 471	1 819	36 210	2 889	27 560	
											708 065	22 213	
											3 151	30 120	
					EU	G	23 480	23 570	451 886	29 520	842 442	26 515	
							1 619	1 625	2 011	40 020	3 749	35 950	1
											708 065	22 213	
											3 151	30 120	
									31/01		838 258	27 760	
											3 730	37 640	
					EU	S	30 190	30 310	580 996	37 954	979 999	32 943	
							2 082	2 090	2 585	51 460	4 361	44 660	
			4 3				2 002	2 000	2 300	51 400	4 001	44 000	
			0 11 2										
			.0		3/1								
						3							
				.0									
					1				W. Y.				
					1								
		11										4 . 4 . 1	
					134								

14	15	16	17	18	19	20	21	22	23	24	25	26
	Joint D		V 4.			3 9 1 7				II Pipe Da		
Connection Type	Diamet	er of Pin a	nd Box	Tong S Leng			ectional a of	Adjusted Weight*	Make-Up Torque	Torsional Ratio,	Capacity	Total Dis-
	Outside	Inside	Elevator Upset	Pin	Box	Pin	Вох			Pin to Pipe		place- ment
	w	d _{iu}	DE	LPB	LB	AP	AB					* *
	VV	u _{iu}	in.	LFD	LD		.in.	lb/ft	ft-lb		US	gal./ft
			mm				m²	kg/m	Nm			m
NC 38 (3 1/2 IF)	5	2 9/16	3 7/8	8	10.5	5.290	6.966	16.68	10 163	0.96	0.276	0.531
	127,0	65,1	98,4	203,2	266,7	34,13	44,94	24,8	13 780		3,428	6,596
NC 38 (3 1/2 IF)	5	2 7/16	3 7/8	8	10.5	5.781	6.966	16.84	11 106	1.05	0.273	0.531
	127,0	61,9	98,4	203,2	266,7	37,30	44,94	25,1	15 060			6,60
NC 38 (3 1/2 IF)	4 3/4	2 9/16	3 7/8	8	10.5	5.290	5.052	16.33	9 587		0.276	0.525
	120,7	65,1	98,4	203,2	266,7	34,13	32,59	24,3	13 000			6,52
NC 38 (3 1/2 IF)	4 3/4	2 7/16	3 7/8	8	10.5	5.781	5.052	16.49	9 587		0.273	0.525
NO 30 (0.4/0 IE)	120,7	61,9	98,4	203,2	266,7	37,30	32,59	24,5	13 000			6,52
NC 38 (3 1/2 IF)	5	2 9/16	3 7/8	8	10.5	5.290	6.966	16.68	10 163			0.531
NC 38 (3 1/2 IF)	127,0 5	65,1 2 7/16	98,4 3 7/8	203,2	266,7 10.5	34,13 5.781	44,94 6.966	24,8 16.84	13 780 11 106			6,60 0.531
140 30 (3 1/2 11)	127,0	61,9	98,4	203,2	266,7	37,30	44,94	25,1	15 060			6,60
NC 38 (3 1/2 IF)	5	2 1/8	3 7/8	8	10.5	6.900	6.966	17.19	13 258			0.531
	127,0	54,0	98,4	203,2	266,7	44,52	44,94	25,6	17 980			6,60
NC 38 (3 1/2 IF)	5	2 7/16	3 7/8	8	10.5	5.781	6.966	16.84	11 106	0.75	0.273	0.531
	127,0	61,9	98,4	203,2	266,7	37,30	44,94	25,1	15 060		3,39	6,60
NC 40 (4 FH)	5 1/4	2 9/16	3 7/8	7	10	6.857	7.260	17.08	13 880	0.94	0.276	0.537
	133,4	65,1	98,4	177,8	254,0	44,24	46,84	25,4	18 820		3,43	6,67
NC 40 (4 FH)	5 1/2	2 1/4	3 7/8	7	10	8.038	9.371	17.81	16 472		0.271	0.543
	139,7	57,2	98,4	177,8	254,0	51,86	60,46	26,5	22 330		3,37	6,74
												N. T.
							71.3					And I
	11.5											
The state of the state of												
				V 1/1								

	e e								C/M		1) 0		
1	2	3	4	5 -	6	7	8	9	10	11	12	13	
0'	Ni	VAZ-11	1		Pipe D	_			D: (D P			
Size:	Nominal	Wall	Inside	Section		Grade		Di	ipe	ce Properties	Tool J	loint	
Outside Diameter	Weight	Thickness	Diameter	Area Pipe	Upset		Collapse	Internal	Tensile	Torsional	Tensile	Torsional	
Diameter				Body			Resistance	Yield	Yield	Yield	Yield	Yield	
		No.		Бойу			nesisiance	Pressure	fielu	rieiu	riela	fielu	
D		t	d	Α			P _c	Pi					
in.	lb/ft		n.	sq.in.				si '	lb	ft-lb	lb	ft-lb	
mm	kg/m		m	cm ²			WITH THE T	ar	kN	Nm	kN	Nm	
4	14.00	0.330	3.340	3.8048	IU	Е	11 350	10 830	285 359	23 288	711 613	23 487	
101,6	20,83	8,38	84,84	24,55			783	747	1 270	31 570	3 167	31 840	
					EU	E	11 350	10 830	285 359	23 288	901 167	33 625	
							783	747	1 270	31 570	4 010	45 590	
											901 167	33 257	
											4 010	45 090	
					IU	Х	14 380	13 720	361 455	29 498	776 408	25 673	
							992	946	1 608	39 990	3 455	34 810	
											711 613	23 487	<u> </u>
											3 167	31 840	
					EU	Х	14 380	13 720	361 455	29 498	901 167	33 625	
							992	946	1 608	39 990	4 010	45 590	
											901 167	33 257	To the state of
											4 010	45 090	
			10/		IU	G	15 900	15 160	399 503	32 603	897 163	30 114	
							1 096	1 045	1 778	44 200	3 992	40 830	
											776 408	25 673	
											3 455	34 810	
			1		EU	G	15 900	15 160	399 503	32 603	901 167	33 625	
			\$ 10 C				1 096	1 045	1 778	44 200	4 010	45 590	
											901 167	33 257	
											4 010	45 090	
		21516			IU	S	20 140	19 490	513 647	41 918	1 080 137	36 363	
	5 7						1 389	1 344	2 286	56 830	4 807	49 300	
											838 258	27 760	
											3 730	37 640	
					EU	S	20 140	19 490	513 647	41 918	1 048 429	39 230	
							1 389	1 344	2 286	56 830	4 666	53 190	
											1 048 429	34 057	
											4 666	46 170	
4 1/2	13.75	0.271	3.958	3.6004	IU	E	7 170	7 900	270 034	25 908	823 118	30 655	
114,3	20,46	6,88	100,53	23,23			494	545	1 202	35 130	3 663	41 560	
					EU	Е	7 170	7 900	270 034	25 908	849 268	33 824	
3-73							494	545	1 202	35 130	3 779	45 860	

	14	15	16	17	18	19	20	21	22	23	24	25	26
	Тоо	l Joint D	ata	4 3	770					Dri	II Pipe Da	ata	
	Connection	Diame	ter of Pin a	nd Box	Tong 9	Space	Cross S	ectional ectional	Adjusted	Make-Up	Torsional	Capacity	Total
	Type				Leng	th of	Area	a of	Weight*	Torque	Ratio,		Dis-
		Outside	Inside	Elevator	Pin	Box	Pin	Box			Pin to Pipe		place-
				Upset									ment
		144		5.5	1.00	- 6	4.5	4.5					**
		W	d _{iu}	DE in.	LPB	LB	AP	AB	lb/ft	ft-lb		IIC a	1 /ft
				mm				. in. m²	kg/m	Nm			gal./ft m
	NC 40 (4 FH)	5 1/4	2 13/16	4 3/16	7	10	5.802	7.260	15.37	11 744	1.01	0.443	0.678
	110 40 (4111)	133,4	71,4	106,4	177,8	254,0	37,43	46,84	22,9	15 920			8,422
	NC 46 (4 IF)	6	3 1/4	4 1/2	7	10	7.363	9.853	16.05	16 813		0.453	0.699
		152,4	82,6	114,3	177,8	254,0	47,50	63,57	23,9	22 800			8,68
	NC 46 (4 IF)	5 3/4	3 1/4	4 1/2	7	10	7.363	7.546	15.65	16 629		0.453	0.693
		146,1	82,6	114,3	177,8	254,0	47,50	48,68	23,3	22 550			8,61
	NC 40 (4 FH)	5 1/4	2 11/16	4 3/16	7	10	6.342	7.260	15.53	12 837		0.441	0.678
		133,4	68,3	106,4	177,8	254,0	40,92	46,84	23,1	17 400			8,42
	NC 40 (4 FH)	5 1/4	2 13/16	4 3/16	7	10	5.802	7.260	15.37	11 744		0.443	0.678
		133,4	71,4	106,4	177,8	254,0	37,43	46,84	22,9	15 920		5,50	8,42
	NC 46 (4 IF)	6	3 1/4	4 1/2	7	10	7.363	9.853	16.05	16 813	1.14	0.453	0.699
		152,4	82,6	114,3	177,8	254,0	47,50	63,57	23,9	22 800		5,63	8,68
	NC 46 (4 IF)	5 3/4	3 1/4	4 1/2	7	10	7.363	7.546	15.65	16 629	1.13	0.453	0.693
		146,1	82,6	114,3	177,8	254,0	47,50	48,68	23,3	22 550		5,63	8,61
	NC 40 (4 FH)	5 1/2	2 7/16	4 3/16	7	10	7.348	9.371	16.20	15 057	0.92	0.436	0.683
		139,7	61,9	106,4	177,8	254,0	47,41	60,46	24,1	20 410		5,42	8,48
	NC 40 (4 FH)	5 1/4	2 11/16	4 3/16	7	10	6.342	7.260	15.53	12 837	0.79	0.441	0.678
		133,4	68,3	106,4	177,8	254,0	40,92	46,84	23,1	17 400		5,48	8,42
	NC 46 (4 IF)	6	3 1/4	4 1/2	7	10	7.363	9.853	16.05	16 813	1.03	0.453	0.699
		152,4	82,6	114,3	177,8	254,0	47,50	63,57	23,9	22 800		5,63	8,68
	NC 46 (4 IF)	5 3/4	3 1/4	4 1/2	7	10	7.363	7.546	15.65	16 629	1.02	0.453	0.693
		146,1	82,6	114,3	177,8	254,0	47,50	48,68	23,3	22 550		5,63	8,61
	NC 40 (4 FH)	5 1/2	2	4 3/16	7	10	8.873	9.371	16.65	18 182	0.87	0.429	0.683
		139,7	50,8	106,4	177,8	254,0	57,25	60,46	24,8	24 650		5,33	8,48
	NC 40 (4 FH)	5 1/4	2 9/16	4 3/16	7	10	6.857	7.260	15.68	13 880	0.66	0.438	0.678
		133,4	65,1	106,4	177,8	254,0	44,24	46,84	23,3	18 820		5,44	8,42
	NC 46 (4 IF)	6	3	4 1/2	7	10	8.590	9.853	16.43	19 615	0.94	0.448	0.699
		152,4	76,2	114,3	177,8	254,0	55,42	63,57	24,5	26 590		5,56	8,68
	NC 46 (4 IF)	5 3/4	3	4 1/2	7	10	8.590	7.546	16.02	17 028		0.448	0.693
		146,1	76,2	114,3	177,8	254,0	55,42	48,68	23,8	23 090			8,61
	NC 46 (4 IF)	6	3 3/8	4 11/16	7	10	6.712	9.853	15.50	15 328		0.623	0.860
		152,4	85,7	119,1	177,8	254,0	43,30	63,57	23,1	20 780		7,738	10,682
1	NC 50 (4 1/2 IF)	6 1/4	3 7/8	5	7	10	6.917	9.044	15.25	16 912		0.637	0.870
		158,8	98,4	127,0	177,8	254,0	44,63	58,35	22,7	22 930		7,91	10,81

^{*} Weight of the pipe / tool joint assembly is based on the average pipe length of 29.4 ft plus tool joint length.

1	0	2	1	5	6	7	8	0	10	11	10	12	
	2	3	4	5	6 Pipe D		0	9	10	11	12	13	
Cizo	Nominal	Wall	Ingido		_				Darformana	o Dropartica			
Size:			Inside	Section		Grade		D.		e Properties			
Outside	Weight	Thickness	Diameter	Area	Upset			1	ipe		Tool J		
Diameter				Pipe			Collapse	Internal	Tensile	Torsional	Tensile	Torsional	
				Body			Resistance	Yield	Yield	Yield	Yield	Yield	
								Pressure					
D		t	d	Α		U.	P _c	Pi					
	IIa /fd								Ile	£4 Ha	II.	£L IIa	
in.	lb/ft	ii		sq.in.			A TOTAL OF	si	lb	ft-lb	lb	ft-lb	
mm	kg/m	m	m	cm ²			b	ar	kN	Nm	kN	Nm	
4 1/2	16.60	0.337	3.826	4.4074	IEU	Е	10 390	9 830	330 559	30 807	901 167	33 994	
114,3	24,70	8,56	97,18	28,43			716	678	1 471	41 770	4 010	46 090	
											713 424	26 620	
					EU	E	10 390	9 830	330 559	30 807	3 175 939 098	36 090 37 676	
							716	678	1 471	41 770	4 179	51 080	
											939 098	37 485	
											4 179	50 820	
					IEU	E	10 390	9 830	330 559	30 807	976 158	34 780	
							716	678	1 471	41 770	4 344 976 158	47 150 34 384	
											4 344	46 620	
			3,2 %		IEU	Х	12 760	12 450	418 708	39 022	1 048 429	39 659	Yes Same
						31 4	880	858	1 863	52 910	4 666	53 770	
											901 167	33 994	
						7 :					4 010	46 090	
						40.0					901 167 4 010	33 625 45 590	
					EU	Х	12 760	12 450	418 708	39 022	939 098	37 676	
							880	858	1 863	52 910	4 179	51 080	
											939 098	37 485	
							10 -00	40.470	440 =00		4 179	50 820	
		7/2			IEU	X	12 760 880	12 450 858	418 708 1 863	39 022 52 910	976 158 4 344	34 780 47 150	
							000	000	1 003	52 910	976 158	34 384	
							NO.				4 344	46 620	
					IEU	G	13 820	13 760	462 782	43 130	1 048 429	39 659	
							953	949	2 059	58 480	4 666	53 770	
											1 048 429	39 230	
					EU	G	13 820	13 760	462 782	43 130	4 666 939 098	53 190 37 676	
						ŭ	953	949	2 059	58 480	4 179	51 080	
											939 098	37 485	
						100		M. M. L.			4 179	50 820	
					IEU	G	13 820	13 760	462 782	43 130	976 158	34 780	
							953	949	2 059	58 480	4 344 976 158	47 150 34 384	
											4 344	46 620	
					IEU	S	16 770	17 690	595 005	55 453	1 183 911	44 871	1
							1 156	1 220	2 648	75 180	5 268	60 840	
											1 048 429	39 659	
					EU	S	16 770	17 690	595 005	55 A50	4 666	53 770	
					20	3	16 770 1 156	1 220	2 648	55 453 75 180	1 109 923 4 939	44 673 60 570	
					1		. 100	1 220	2070	, 5 100	1 109 923	44 166	
											4 939	59 880	
					IEU	S	16 770	17 690	595 005	55 453	1 235 340	44 769	
							1 156	1 220	2 648	75 180	5 497	60 700	
											976 158 4 344	34 780 47 150	
											976 158	47 150 34 384	
											4 344	46 620	
												.5 520	

	14	15	16	17	18	19	20	21	22	23	24	25	26
	Too	l Joint D	ata	MYST						Dri	II Pipe Da	ata	
	Connection	Diamet	er of Pin a	nd Box	Tong :	Space	Cross S	ectional	Adjusted	Make-Up	Torsional	Capacity	Total
	Type				Leng	th of	Are	a of	Weight*	Torque	Ratio,		Dis-
	Туро	Outside	Inside	Elevator	Pin	Box	Pin	Вох	- Worgine	Torquo	Pin to Pipe		
		Outside	mside		FIII	DUX	FIII	DUX			Pili to Pipe		place-
				Upset									ment
													**
		W	d _{iu}	DE	LPB	LB	AP	AB					
	一角 对新安全的			in.			sq	.in.	lb/ft	ft-lb		US	gal./ft
				mm			The second second	m²	kg/m	Nm			m
4	NO 4C (4 IF)	C 4/A	0.4/4		7	10					1.10	1	
	NC 46 (4 IF)	6 1/4 158,8	3 1/4 82,6	4 11/16 119,1	7 177,8	10 254,0	7.363 47,50	12.258 79,08	18.62 27,7	16 997 23 040	1.10	0.582 7,229	0.867 10,769
	NC 46 (4 IF)	6	3 1/4	4 11/16	7	10	7.363	9.853	18.19	13 310	0.86	0.582	0.860
		152,4	82,6	119,1	177,8	254,0	47,50	63,57	27,1	18 050		7,23	10,68
	NC 50 (4 1/2 IF)	6 3/8	3 3/4	5	7	10	7.665	10.284	18.18	18 838	1.22	0.596	0.873
	NO 50 (4.4/0 IE)	161,9	95,3	127,0	177,8	254,0	49,45	66,35	27,1	25 540	1.00	7,40	10,84
	NC 50 (4 1/2 IF)	6 1/4 158,8	3 3/4 95,3	5 127,0	7 177,8	10 254,0	7.665 49,45	9.044 58,35	17.97 26,7	18 742 25 410	1.22	0.596 7,40	0.870 10,81
	4 1/2 FH	6	3	4 11/16	7	10	7.919	10.320	18.58	17 390	1.13		0.860
		152,4	76,2	119,1	177,8	254,0	51,09	66,58	27,7	23 580		7,15	10,68
	4 1/2 FH	5 3/4	3	4 11/16	7	10	7.919	8.013	18.18	17 192	1.12	0.576	0.854
	NO 40 (4 IE)	146,1	76,2	119,1	177,8	254,0	51,09	51,70	27,1	23 310	1.00	7,15	10,61
	NC 46 (4 IF)	6 1/4 158,8	3 76,2	4 11/16 119,1	7 177,8	10 254,0	8.590 55,42	12.258 79,08	18.99 28,3	19 830 26 890	1.02	0.577 7,17	0.867 10,77
	NC 46 (4 IF)	6 1/4	3 1/4	4 11/16	7	10	7.363	12.258	18.62	16 997	0.87	0.582	0.867
		158,8	82,6	119,1	177,8	254,0	47,50	79,08	27,7	23 040		7,23	10,77
	NC 46 (4 IF)	6	3 1/4	4 11/16	7	10	7.363	9.853	18.19	16 813	0.86	0.582	0.860
	110 -0 (4 4/0 15)	152,4	82,6	119,1	177,8	254,0	47,50	63,57	27,1	22 800		7,23	10,68
	NC 50 (4 1/2 IF)	6 3/8 161,9	3 3/4 95,3	5 127,0	7 177,8	10 254,0	7.665	10.284	18.18 27,1	18 838	0.97	0.596	0.873
	NC 50 (4 1/2 IF)	6 1/4	3 3/4	5	7	10	49,45 7.665	66,35 9.044	17.97	25 540 18 742	0.96	7,40 0.596	10,84 0.870
	110 00 (11,211)	158,8	95,3	127,0	177,8	254,0	49,45	58,35	26,7	25 410	0.00	7,40	10,81
	4 1/2 FH	6	3	4 11/16	7	10	7.919	10.320	18.58	17 390	0.89	0.576	0.860
		152,4	76,2	119,1	177,8	254,0	51,09	66,58	27,7	23 580		7,15	10,68
	4 1/2 FH	5 3/4 146,1	3 76,2	4 11/16	7	10 254,0	7.919 51,09	8.013 51,70	18.18	17 192 23 310	0.88	0.576 7,15	0.854 10,61
	NC 46 (4 IF)	6 1/4	3	119,1 4 11/16	177,8 7	10	8.590	12.258	27,1 18.99	19 830	0.92		0.867
		158,8	76,2	119,1	177,8	254,0	55,42	79,08	28,3	26 890		7,17	10,77
	NC 46 (4 IF)	6	3	4 11/16	7	10	8.590	9.853	18.55	19 615		0.577	0.860
		152,4	76,2	119,1	177,8	254,0	55,42	63,57	27,6	26 590		7,17	10,68
	NC 50 (4 1/2 IF)	6 3/8	3 3/4	5	7	10	7.665	10.284	18.18	18 838	0.87	0.596	0.873
	NC 50 (4 1/2 IF)	161,9 6 1/4	95,3 3 3/4	127,0 5	177,8 7	254,0 10	49,45 7.665	66,35 9.004	27,1 17.97	25 540 18 742	0.87	7,40 0.596	10,84 0.870
	.10 00 (4 1/2 11)	158,8	95,3	127,0	177,8	254,0	49,45	58,09	26,7	25 410	5.07	7,40	10,81
100	4 1/2 FH	6	3	4 11/16	7	10	7.919	10.320	18.58	17 390	0.81	0.576	0.860
MIL /		152,4	76,2	119,1	177,8	254,0	51,09	66,58	27,7	23 580		7,15	10,68
	4 1/2 FH	5 3/4	3	4 11/16	7	10	7.919	8.013	18.18	17 192	0.80	0.576	0.854
	NC 46 (4 IF)	146,1 6 1/4	76,2 2 3/4	119,1 4 11/16	177,8 7	254,0 10	51,09 9.719	51,70 12.258	27,1 19.32	23 310 22 436	0.81	7,15 0.572	10,61 0.867
	110 10 (111)	158,8	69,9	119,1	177,8	254,0	62,70	79,08	28,8	30 420	3.01	7,10	10,77
	NC 46 (4 IF)	6 1/4	3	4 11/16	7	10	8.590	12.258	18.99	19 830	0.72	0.577	0.867
		158,8	76,2	119,1	177,8	254,0	55,42	79,08	28,3	26 890		7,17	10,77
	NC 50 (4 1/2 IF)	6 3/8	3 1/2	5	7	10	9.089	10.284	18.62	22 336	0.81	0.589	0.873
	NC 50 (4 1/2 IF)	161,9 6 1/4	88,9 3 1/2	127,0 5	177,8 7	254,0 10	58,64 9.089	66,35 9.044	27,7 18.40	30 280 22 083	0.80	7,32 0.589	10,84 0.870
	110 00 (7 1/2 11)	158,8	88,9	127,0	177,8	254,0	58,64	58,35	27,4	29 940	3.00	7,32	10,81
	4 1/2 FH	6 1/4	2 1/2	4 11/16	7	10	10.079	12.725	19.66	22 385	0.81	0.566	0.867
		158,8	63,5	119,1	177,8	254,0	65,03	82,10	29,3	30 350	1111	7,03	10,77
	4 1/2 FH	6	3	4 11/16	7	10	7.919	10.320	18.58	17 390	0.63	0.576	0.860
	4 1/2 FH	152,4 5 3/4	76,2 3	119,1 4 11/16	177,8 7	254,0 10	51,09 7.919	66,58 8.013	27,7 18.18	23 580 17 192	0.62	7,15 0.576	10,68 0.854
			J	7 11/10		10	1.010	0.010	10.10	11 134	U.UL	0.070	U.UJ4

^{*} Weight of the pipe / tool joint assembly is based on the average pipe length of 29.4 ft plus tool joint length. ** Including drill pipe volume.

717									C) May		(1)		
1	2	3	4	5	6	7	8	9	10	11	12	13	
				1	Pipe D								
Size:	Nominal	Wall	Inside	Section		Grade			Performano	e Properties	N Y Y		
Outside	Weight	Thickness	Diameter	Area	Upset			Pi	pe		Tool J	oint	
Diameter				Pipe			Collapse	Internal	Tensile	Torsional	Tensile	Torsional	
				Body			Resistance	Yield	Yield	Yield	Yield	Yield	
								Pressure					
D		t	d	Α		V	P _c	Pi					
in.	lb/ft	iı	n.	sq.in.				si	lb	ft-lb	lb	ft-lb	7
mm	kg/m	m	m	cm ²			A TOTAL DE	ar	kN	Nm	kN	Nm	
4 1/2	20.00	0.430	3.640	5.4981	IEU	Е	12 960	12 540	412 359	36 901	1 048 429	39 659	
			92,46		IEU	_	894	865	1 835	50 030	4 666	53 770	
114,3	29,76	10,92	92,40	35,47			094	000	1 033	50 030	1 048 429	39 230	
											4 666	A1570 (-171)	
	Mark				EU	F	12 960	12 540	412 359	36 901	1 025 983	53 190 41 235	
					EU	E							
		7/3/3					894	865	1 835	50 030	4 566 1 025 983	55 910 41 025	
											THE RESERVE OF THE PARTY OF THE	DUTCH AT SEC.	
					IEU		10.000	10.540	412 359	00 004	4 566 976 158	55 620	
					IEU	E	12 960	12 540		36 901		34 780	
					IEII	V	894	865	1 835	50 030	4 344	47 150	
					IEU	X	16 420	15 890	522 321	46 741	1 183 911	44 871	
							1 132	1 096	2 324	63 370	5 268	60 840	
						40.5					1 048 429	39 659	
					EII	V	10.100	45.000	500.004	40.744	4 666	53 770	
					EU	X	16 420	15 890	522 321	46 741	1 025 983	41 235	
							1 132	1 096	2 324	63 370	4 566	55 910	
				NO W							1 109 923	44 673	
					TETT.		40.400	45.000	F00 004	10.711	4 939	60 570	
					IEU	X	16 420	15 890	522 321	46 741	1 235 340	44 265	
					1511	0	1 132	1 096	2 324	63 370	5 497	60 010	
					IEU	G	18 150	17 560	577 302	51 661	1 307 611	49 630	
					T,		1 251	1 211	2 569	70 040	5 819	67 290	
			Y 313 -								1 235 340	44 265	
											5 497	60 010	
											1 048 429	39 659	
					EII	_	10 150	17.500	E77 200	E1 CC1	4 666	53 770	
12-16					EU	G	18 150	17 560	577 302	51 661	1 109 923	44 673	
							1 251	1 211	2 569	70 040	4 939	60 570	
	4 5 7				100						1 268 966	50 484	
			7		JEU	0	22 222	20.570	740.040	66 400	5 647	68 450	
					IEU	S	23 330	22 570	742 246	66 422	1 419 531	53 936	
							1 609	1 556	3 303	90 050	6 317	73 130	
											1 183 911	44 871	
					EII	C	22 220	20.570	740.046	66 400	5 268	60 840	
					EU	S	23 330	22 570	742 246	66 422	1 416 229	50 484	
		34 33					1 609	1 556	3 303	90 050	6 302	68 450	
											1 416 229	57 801	
											6 302	78 370	
1											1 268 966	50 484	
											5 647	68 450	

	14	15	16	17	18	19	20	21	22	23	24	25	26
		I Joint D		77.5							II Pipe D		
	Connection	Diamet	er of Pin a	nd Box	Tong	Space	Cross S	ectional	Adjusted	Make-Up	Torsional		Total
	Type				Leng		Are		Weight*	Torque	Ratio,		Dis-
	.,,,,,	Outside	Inside	Elevator	Pin	Box	Pin	Вох	- Tangina		Pin to Pipe		place-
		Cutolad	morao	Upset		Box		Box			Tim to Tipo		ment
T.				Орзог									**
		w	4	DE	LPB	LD	AP	AB					
		VV	d _{iu}	DE	LPD	LB			11- /61	£ II.		110 -	- 1 /ft
				in.			The second live	.in.	lb/ft	ft-lb			gal./ft
				mm				m² I	kg/m	Nm			m
	NC 46 (4 IF)	6 1/4	3	4 11/16	7	10	8.590	12.258	22.35	19 830	1.07	0.525	0.867
		158,8	76,2	119,1	177,8	254,0	55,42	79,08	33,3	26 890		6,521	10,769
	NC 46 (4 IF)	6	3	4 11/16	7	10	8.590	9.853	21.92	19 615		0.525	0.860
		152,4	76,2	119,1	177,8	254,0	55,42	63,57	32,6	26 590		6,52	10,68
	NC 50 (4 1/2 IF)	6 3/8	3 5/8	5	7	10	8.389	10.284	21.76	20 617	1.12	0.541	0.873
		161,9	92,1	127,0	177,8	254,0	54,12	66,35	32,4	27 950		6,72	10,84
	NC 50 (4 1/2 IF)	6 1/4	3 5/8	5	7	10	8.389	9.044	21.54	20 513	1.11	0.541	0.870
		158,8	92,1	127,0	177,8	254,0	54,12	58,35	32,1	27 810		6,72	10,81
	4 1/2 FH	6	3	4 11/16	7	10	7.919	10.320	21.94	17 390		0.525	0.860
	NO 40 (4 IE)	152,4	76,2	119,1	177,8	254,0	51,09	66,58	32,7	23 580		6,52	10,68
	NC 46 (4 IF)	6 1/4	2 3/4	4 11/16	7	10	9.719	12.258	22.68	22 436	0.96	0.520	0.867
	NO 40 (4 IE)	158,8	69,9	119,1	177,8	254,0	62,70	79,08	33,8	30 420	0.05	6,46	10,77
	NC 46 (4 IF)	6 1/4	3	4 11/16	7	10	8.590	12.258	22.35	19 830	0.85	0.525	0.867
	NO 50 (4.4/0 IF)	158,8	76,2	119,1	177,8	254,0	55,42	79,08	33,3	26 890	0.00	6,52	10,77
	NC 50 (4 1/2 IF)	6 3/8	3 5/8	5	7	10	8.389	10.284	21.76	20 617			0.873
The second	NC 50 /4 1/0 IF)	161,9 6 3/8	92,1 3 1/2	127,0 5	177,8 7	254,0 10	54,12 9.089	66,35 10.284	32,4 21.98	27 950 22 336		6,72	10,84 0.873
	NC 50 (4 1/2 IF)										0.96	0.538 6,68	
	4 1/2 FH	161,9 6	88,9 2 1/2	127,0 4 11/16	177,8 7	254,0 10	58,64 10.079	66,35 10.320	32,7 22.59	30 280 22 133	0.95	0.515	10,84 0.860
	4 1/2 FN	152,4	63,5	119,1	177,8	254,0	65,03	66,58	33,6	30 010	0.95	6,40	10,68
	NC 46 (4 IF)	6 1/4	2 1/2	4 11/16	7	10	10.750	12.258	22.98	24 815	0.96	0.516	0.867
	140 40 (4 11-)	158,8	63,5	119,1	177,8	254,0	69,35	79,08	34,2	33 640	0.90	6,41	10,77
	4 1/2 FH	6	2 1/2	4 11/16	7	10	10.079	10.320	22.59	22 133	0.86	0.515	0.860
	7 1/2 111	152,4	63,5	119,1	177,8	254,0	65,03	66,58	33,6	30 010		6,40	10,68
	NC 46 (4 IF)	6 1/4	3	4 11/16	7	10	8.590	12.258	22.35	19 830	0.77	0.525	0.867
196	110 40 (411)	158,8	76,2	119,1	177,8	254,0	55,42	79,08	33,3	26 890	0.77	6,52	10,77
District Annual Property of the Parket	NC 50 (4 1/2 IF)	6 3/8	3 1/4	5	7	10	10.414	10.284	21.98	25 242	0.98		0.873
	.10 03 (4 1/2 11)	161,9	82,6	127,0	177,8	254,0	67,19	66,35	32,7	34 220		6,61	10,84
March 1	NC 50 (4 1/2 IF)	6 3/8	3 1/4	5	7	10	10.414	10.284	22.37	25 242		0.532	0.873
	()	161,9	82,6	127,0	177,8	254,0	67,19	66,35	33,3	34 220		6,61	10,84
	NC 46 (4 IF)	6 1/4	2 1/4	4 11/16	7	10	11.683	12.258	23.25	26 968		0.511	0.867
		158,8	57,2	119,1	177,8	254,0	75,37	79,08	34,6	36 560		6,35	10,77
	NC 46 (4 IF)	6 1/4	2 3/4	4 11/16	7	10	9.719	12.258	22.68	22 436	0.68	0.52	0.867
		158,8	69,9	119,1	177,8	254,0	62,70	79,08	33,8	30 420		6,46	10,77
1	NC 50 (4 1/2 IF)	6 3/8	3	5	7	10	11.642	10.284	22.73	25 242	0.76	0.526	0.873
		161,9	76,2	127,0	177,8	254,0	75,11	66,35	33,8	34 220		6,53	10,84
5,5,00	NC 50 (4 1/2 IF)	6 5/8	3	5	7	10	11.642	12.836	23.20	28 900			0.880
		168,3	76,2	127,0	177,8	254,0	75,11	82,81	34,5	39 180		6,53	10,93
- 4	NC 50 (4 1/2 IF)	6 3/8	3 1/4	5	7	10	10.414	10.284	22.37	25 242		0.532	0.873
		161,9	82,6	127,0	177,8	254,0	67,19	66,35	33,3	34 220		6,61	10,84
		ŕ								15/11/2			

^{*} Weight of the pipe / tool joint assembly is based on the average pipe length of 29.4 ft plus tool joint length.

							4		C) M. V.		1)		
1	2	3	4	5	6	7	8	9	10	11	12	13	
Size:	Nominal	Wall	Inside	Section	Pipe D	ata Grade			Darforman	ce Properties			
Outside	Weight	Thickness	Diameter		Upset			Pi	ipe	se Froperties	Tool J	loint	
Diameter	Weight	THIOKIIGGG	Diameter	Pipe	Орзос		Collapse	Internal	Tensile	Torsional	Tensile	Torsional	
				Body			Resistance	Yield	Yield	Yield	Yield	Yield	
								Pressure				(Vertical)	
D		t	d	Α			P _c	Pi					
in.	lb/ft	ii	ո.	sq.in.			р	si	lb	ft-lb	lb	ft-lb	
mm	kg/m	m	m	cm ²			b	ar	kN	Nm	kN	Nm	
5	16.25	0.296	4.408	4.3743	IEU	Е	6 940	7 770	328 074	35 044	939 098	37 676	
127,0	24,18	7,52	111,96	28,22		1	479	536	1 460	47 510	4 179	51 080	
					IEU	X	8 110	9 840	415 560	44 389	939 098	37 676	
							559	678	1 849	60 180	4 179	51 080	
					IEU	G	8 620	10 880	459 303	49 062	939 098	37 676	
							594	750	2 044	66 520	4 179	51 080	
					IEU	S	9 830	13 990	590 532	63 080	1 109 923	44 673	
					0		678	965	2 628	85 520	4 939	60 570	
5	19.50	0.362	4.276	5.2746	IEU	Ε	9 960	9 500	395 596	41 167	939 098	37 676	
127,0	29,02	9,19	108,61	34,03			687	655	1 760	55 810	4 179	51 080	
											939 098	37 868	
											4 179	51 340	
								3			939 098	37 485	
											4 179	50 820	
					IEU	Х	12 030	12 040	501 088	52 144	939 098	37 676	
							829	830	2 230	70 700	4 179	51 080	
					2						1 109 923	44 673	
											4 939	60 570	
					IEU	G	13 000	13 300	553 834	57 633	1 109 923	44 900	
							896	917	2 465	78 140	4 939	60 880	
							333		100	70 110	1 109 923	44 673	
											4 939	60 570	
											1 268 966	51 447	
											5 647	69 750	
					IEU	S	15 670	17 100	710.070	74 100			
					IEU	3	15 670	17 100	712 072		1 268 966	51 447	
							1 080	1 179	3 169	100 460	5 647	69 750	
						-					1 416 229	56 985	
					8						6 302	77 260	
			* 1								1 551 710	63 406	
											6 905	85 970	
											1 619 235	72 483	
771			100						1		7 206	98 270	

	14	15	16	17	18	19	20	21	22	23	24	25	26
	Тоо	l Joint D	ata							Dri	II Pipe D	ata	
	Connection	Diamet	ter of Pin a	nd Box	Tong S		Cross S		Adjusted	Make-Up	Torsional	Capacity	Total
	Type	Outoida	Incida	Elevator	Leng		Area		Weight*	Torque	Ratio,		Dis-
		Outside	Inside	Elevator Upset	Pin	Box	Pin	Box			Pin to Pipe		place- ment
				Орзот									**
		W	d _{iu}	DE	LPB	LB	AP	AB					
		7.00		in.			sq	.in.	lb/ft	ft-lb		US g	gal./ft
				mm			CI	m²	kg/m	Nm		1/	m
	NC 50 (4 1/2 IF)	6 3/8	3 3/4	5 1/8	7	10	7.665	10.284	18.34	18 838	1.08	0.773	1.053
		161,9	95,3	130,2	177,8	254,0	49,45	66,35	27,3	25 540		9,602	13,079
	NC 50 (4 1/2 IF)	6 3/8	3 3/4	5 1/8	7	10	7.665	10.284	18.34	18 838	0.85	0.773	1.053
		161,9	95,3	130,2	177,8	254,0	49,45	66,35	27,3	25 540		9,60	13,08
	NC 50 (4 1/2 IF)	6 3/8	3 3/4	5 1/8	7	10	7.665	10.284	18.34	18 838	0.77	0.773	1.053
		161,9	95,3	130,2	177,8	254,0	49,45	66,35	27,3	25 540		9,60	13,08
	NC 50 (4 1/2 IF)	6 3/8	3 1/2	5 1/8	7	10	9.089	10.284	18.77	22 336	0.71	0.766	1.053
		161,9	88,9	130,2	177,8	254,0	58,64	66,35	27,9	30 280		9,51	13,08
	NC 50 (4 1/2 IF)	6 3/8	3 3/4	5 1/8	7	10	7.665	10.284	21.10	18 838	0.92	0.731	1.053
		161,9	95,3	130,2	177,8	254,0	49,45	66,35	31,4	25 540		9,080	13,079
	NC 50 (4 1/2 IF)	6 1/2	3 3/4	5 1/8	7	10	10.414	10.284	21.33	18 934	0.92	0.731	1.056
		165,1	95,3	130,2	177,8	254,0	67,19	66,35	31,7	25 670		9,08	13,12
	NC 50 (4 1/2 IF)	6 1/4	3 3/4	5 1/8	7	10	7.665	9.044	20.89	18 742	0.91	0.731	1.050
		158,8	95,3	130,2	177,8	254,0	49,45	58,35	31,1	25 410		9,08	13,04
	NC 50 (4 1/2 IF)	6 3/8	3 3/4	5 1/8	7	10	7.665	10.284	21.10	18 838	0.72	0.731	1.053
		161,9	95,3	130,2	177,8	254,0	49,45	66,35	31,4	25 540		9,08	13,08
	NC 50 (4 1/2 IF)	6 3/8	3 1/2	5 1/8	7	10	9.089	10.284	21.53	22 336	0.86	0.724	1.053
		161,9	88,9	130,2	177,8	254,0	58,64	66,35	32,0	30 280		8,99	13,08
	NC 50 (4 1/2 IF)	6 1/2	3 1/2	5 1/8	7	10	9.089	11.548	21.76	22 450	0.78	0.724	1.056
	The state of the s	165,1	88,9	130,2	177,8	254,0	58,64	74,50	32,4	30 440		8,99	13,12
	NC 50 (4 1/2 IF)	6 3/8	3 1/2	5 1/8	7	10	9.089	10.284	21.53	22 336	0.78	0.724	1.053
		161,9	88,9	130,2	177,8	254,0	58,64	66,35	32,0	30 280		8,99	13,08
	NC 50 (4 1/2 IF)	6 1/2	3 1/4	5 1/8	7	10	10.414	11.548	22.15	25 724		0.718	1.056
		165,1	82,6	130,2	177,8	254,0	67,19	74,50	33,0	34 880		8,92	13,12
	NC 50 (4 1/2 IF)	6 1/2	3 1/4	5 1/8	7	10	10.414	11.548	22.15	25 724		0.718	1.056
		165,1	82,6	130,2	177,8	254,0	67,19	74,50	33,0	34 880	11.00	8,92	13,12
	NC 50 (4 1/2 IF)	6 1/2	3	5 1/8	7	10	11.642	11.548	22.51	28 492		0.712	1.056
		165,1	76,2	130,2	177,8	254,0	75,11	74,50	33,5	38 630	1000	8,84	13,12
	NC 50 (4 1/2 IF)	6 5/8	2 3/4	5 1/8	7	10	12.771	12.836	23.07	31 703	0.86	0.708	1.060
5 6 1 5 5		168,3	69,9	130,2	177,8	254,0	82,39	82,81	34,3	42 980	100	8,79	13,17
	5 1/2 FH	7 1/4	3 1/2	5 1/8	8	10	13.316	14.468	23.42	36 241	0.98	0.724	1.082
		184,2	88,9	130,2	203,2	254,0	85,91	93,34	34,9	49 140		8,99	13,44
		,	20,0	.50,2		_5 1,0	33,31	, -, -,	2 .,0	.5 , 10		2,00	,

^{*} Weight of the pipe / tool joint assembly is based on the average pipe length of 29.4 ft plus tool joint length.

	e e					<u> </u>			C/M		1) 0		
1	2	3	4	5	6	7	8	9	10	11	12	13	
					Pipe D	_							
Size:	Nominal	Wall	Inside	Section	Type	Grade			Performano	ce Properties	TO VIV		
Outside	Weight	Thickness	Diameter	Area	Upset			Pi	ipe		Tool J	oint	
Diameter				Pipe			Collapse	Internal	Tensile	Torsional	Tensile	Torsional	
				Body			Resistance	Yield	Yield	Yield	Yield	Yield	
								Pressure					
D		t	d	Α		V	P _c	Pi					
in.	lb/ft	ii	n.	sq.in.				si	lb	ft-lb	lb	ft-lb	
mm	kg/m		m	cm ²			AME I	ar	kN	Nm	kN	Nm	
					UE LI	-					2 2 2 2 2 2 2 2 2		
5	25.60	0.500	4.000	7.0686	IEU	E	13 500	13 120	530 145	52 257	1 109 923	44 673	
127,0	38,10	12,70	101,60	45,60			931	905	2 359	70 850	4 939	60 570	
											939 098	37 676	
					1511	V	47.400	40.000	674 547	00.400	4 179	51 080	
					IEU	Х	17 100	16 620	671 517	66 192	1 109 923	44 900	
		WENT TO THE REAL PROPERTY.					1 179	1 146	2 988	89 740	4 939	60 880	
											1 268 966	51 447	
											5 647	69 750	
											1 416 229 6 302	56 985	
												77 260	
					30.						1 619 235	62 903	
											7 206	85 280	
											1 778 278	62 903	
											7 913	85 280	
											1 619 235	72 483	
											7 206 1 778 278	98 270 78 716	
										3 1			
					IEU	G	18 900	10 000	740,000	73 160	7 913	106 720	
					IEU	G		18 380	742 203	F100 100 100 100 100 100 100 100 100 100	1 268 966	51 447	
							1 303	1 267	3 303	99 190	5 647	69 750	1 2 To 3 To 3
											1 416 229		
											6 302 1 551 710	77 260 63 406	
			Y 411				13.3					70 Y 10 Y	
											6 905 1 619 235	85 970	
											7 206	62 903 85 280	
											1 778 278	62 903	
											7 913	85 280	
						WW					1 619 235	72 483	
											7 206	98 270	
											1 778 278	78 716	
											7 913	106 720	
					IEU	S	24 300	23 620	954 261	94 062	1 619 235	62 903	
					120		1 675	1 629	4 246	127 530	7 206	85 280	
					1		1075	1 029	+ 240	127 330	1 778 278	62 903	
					8						7 913	85 280	
											1 619 235	72 483	
					1 1					1 7 7 7 7 7 7	7 206	98 270	
			11.5								1 778 278	78 716	
		The state of						1 2 1 1 1			7 913	106 720	
											1 913	100 720	1-Y

	14	15	16	17	18	19	20	21	22	23	24	25	26
		I Joint D		MAY							ill Pipe D		
	Connection	Diamet	ter of Pin a	ind Box	Tong			ectional	Adjusted	Make-Up		Capacity	Total
	Type				Leng	th of	Are	a of	Weight*	Torque	Ratio,		Dis-
		Outside	Inside	Elevator	Pin	Box	Pin	Box			Pin to Pipe		place
				Upset									mer
													* *
		w	d _{iu}	DE	LPB	LB	AP	AB					
				in.			so	in.	lb/ft	ft-lb		US	gal./ft
				mm				m²	kg/m	Nm			/m
	NC 50 (4 1/2 IF)	6 3/8	3 1/2	5 1/8	7	10	9.089	10.284	27.08	22 336	0.85	0.639	1.053
		161,9	88,9	130,2	177,8	254,0	58,64	66,35	40,3	30 280	0.00	7,937	13,079
	NC 50 (4 1/2 IF)	6 3/8	3 3/4	5 1/8	7	10	7.665	10.284	26.65	18 838	0.72	0.646	1.053
		161,9	95,3	130,2	177,8	254,0	49,45	66,35	39,7	25 540		8,02	13,08
Y	NC 50 (4 1/2 IF)	6 1/2	3 1/2	5 1/8	7	10	9.089	11.548	27.30	22 450	0.68	0.639	1.056
	7	165,1	88,9	130,2	177,8	254,0	58,64	74,50	40,6	30 440		7,94	13,12
	NC 50 (4 1/2 IF)	6 1/2	3 1/4	5 1/8	7	10	10.414	11.548	27.69	25 724	0.78	0.633	1.056
	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	165,1	82,6	130,2	177,8	254,0	67,19	74,50	41,2	34 880		7,86	13,12
	NC 50 (4 1/2 IF)	6 1/2	3	5 1/8	7	10	11.642	11.548	28.05	28 492	0.86	0.628	1.056
		165,1	76,2	130,2	177,8	254,0	75,11	74,50	41,7	38 630		7,80	13,12
	5 1/2 FH	7	3 1/2	5 1/8	8	10	13.316	11.670	28.39	31 452	0.95	0.640	1.074
		177,8	88,9	130,2	203,2	254,0	85,91	75,29	42,2	42 640		7,95	13,34
	5 1/2 FH	7	3 1/4	5 1/8	8	10	14.642	11.670	28.78	31 452	0.95	0.634	1.074
		177,8	82,6	130,2	203,2	254,0	94,46	75,29	42,8	42 640	0.00	7,87	13,34
	5 1/2 FH	7 1/4	3 1/2	5 1/8	8	10	13.316	14.468	28.94	36 241	1.10	0.640	1.082
		184,2	88,9	130,2	203,2	254,0	85,91	93,34	43,1	49 140		7,95	13,44
	5 1/2 FH	7 1/4	3 1/4	5 1/8	8	10	14.642	14.468	29.33	39 358	1.19	0.634	1.082
		184,2	82,6	130,2	203,2	254,0	94,46	93,34	43,6	53 360		7,87	13,44
	NC 50 (4 1/2 IF)	6 1/2	3 1/4	5 1/8	7	10	10.414	11.548	27.69	25 724	0.70	0.633	1.056
		165,1	82,6	130,2	177,8	254,0	67,19	74,50	41,2	34 880	0.70	7,86	13,12
	NC 50 (4 1/2 IF)	6 1/2	3	5 1/8	7	10	11.642	11.548	28.05	28 492	0.78	0.628	1.056
	110 00 (1 112 11)	165,1	76,2	130,2	177,8	254,0	75,11	74,50	41,7	38 630	0110	7,80	13,12
	NC 50 (4 1/2 IF)	6 5/8	2 3/4	5 1/8	7	10	12.771	12.836	28.61	31 703	0.87	0.623	1.060
		168,3	69,9	130,2	177,8	254,0	82,39	82,81	42,6	42 980		7,74	13,17
	5 1/2 FH	7	3 1/2	5 1/8	8	10	13.316	11.670	28.39	31 452	0.86	0.640	1.074
		177,8	88,9	130,2	203,2	254,0	85,91	75,29	42,2	42 640		7,95	13,34
	5 1/2 FH	7	3 1/4	5 1/8	8	10	14.642	11.670	28.78	31 452	0.86	0.634	1.074
		177,8	82,6	130,2	203,2	254,0	94,46	75,29	42,8	42 640		7,87	13,34
	5 1/2 FH	7 1/4	3 1/2	5 1/8	8	10	13.316	14.468	28.94	36 241	0.99	0.640	1.082
		184,2	88,9	130,2	203,2	254,0	85,91	93,34	43,1	49 140		7,95	13,44
Y 3 1	5 1/2 FH	7 1/4	3 1/4	5 1/8	8	10	14.642	14.468	29.33	39 358	1.08	0.634	1.082
		184,2	82,6	130,2	203,2	254,0	94,46	93,34	43,6	53 360		7,87	13,44
	5 1/2 FH	7	3 1/2	5 1/8	8	10	13.316	11.670	28.39	31 452	0.67	0.640	1.074
		177,8	88,9	130,2	203,2	254,0	85,91	75,29	42,2	42 640	1000	7,95	13,34
	5 1/2 FH	7	3 1/4	5 1/8	8	10	14.642	11.670	28.78	31 452	0.67	0.634	1.074
		177,8	82,6	130,2	203,2	254,0	94,46	75,29	42,8	42 640		7,87	13,34
	5 1/2 FH	7 1/4	3 1/2	5 1/8	8	10	13.316	14.468	28.94	36 241	0.77	0.640	1.082
		184,2	88,9	130,2	203,2	254,0	85,91	93,34	43,1	49 140		7,95	13,44
	5 1/2 FH	7 1/4	3 1/4	5 1/8	8	10	14.642	14.468	29.33	39 358	0.84	0.634	1.082
		184,2	82,6	130,2	203,2	254,0	94,46	93,34	43,6	53 360		7,87	13,44

^{*} Weight of the pipe / tool joint assembly is based on the average pipe length of 29.4 ft plus tool joint length.

7/1/	e e					Y			C) M. Y.				
1	2	3	4	5 _	6	7	8	9	10	11	12	13	
0.	l n	147.11			Pipe D	_			D (D 11			
Size:	Nominal	Wall	Inside	Section		Grade		D		ce Properties			
Outside	Weight	Thickness	Diameter	Area	Upset		0-11		pe To a cita	T	Tool J		
Diameter				Pipe			Collapse	Internal	Tensile	Torsional	Tensile	Torsional	
				Body			Resistance	Yield	Yield	Yield	Yield	Yield	
								Pressure				V	
D	Ile /f4	t	d	A			P _c	P _i	II.	fa lla	II.	£4 IIa	
in.	lb/ft		n. 	sq.in.			WITH THE T	si	lb kN	ft-Ib Nm	lb kN	ft-Ib Nm	
mm	kg/m		m	cm ²	1511	_		ar					
5 1/2	19.20	0.304	4.892	4.9624	IEU	Е	6 040	7 250	372 182	44 074	1 265 805	55 933	
139,7	28,57	7,72	124,26	32,02			416	500	1 656	59 760	5 633	75 830	
1 3					IEU	X	6 940	9 190	471 430	55 827	1 265 805	55 933	
							479	634	2 098	75 690	5 633	75 830	
100					IEU	G	7 310	10 160	521 054	61 703	1 265 805	55 933	
							504	701	2 319	83 660	5 633	75 830	
					IEU	S	8 090	13 060	669 927	79 330	1 265 805	55 933	
							558	900	2 981	107 560	5 633	75 830	
5 1/2	21.90	0.361	4.778	5.8282	IEU	E	8 410	8 610	437 117	50 710	1 265 805	55 933	
139,7	32,59	9,17	121,36	37,60	30.		580	594	1 945	68 750	5 633	75 830	
											1 448 410	62 903	
											6 445	85 280	
											1 401 410	62 298	
					4 1						6 236	84 460	
					IEU	Х	10 020	10 910	553 682	64 233	1 265 805	55 933	
							691	752	2 464	87 090	5 633	75 830	
											1 448 410	62 903	
											6 445	85 280	
											1 401 410	68 062	
											6 236	92 280	
					IEU	G	10 750	12 060	611 964	70 994	1 265 805	55 933	
							741	832	2 723	96 250	5 633	75 830	
											1 448 410	62 903	
											6 445	85 280	
											1 619 235	72 483	
											7 206	98 270	
				10							1 401 410	62 298	
							27217				6 236	84 460	
1					IEU	S	12 680	15 510	786 811	91 278	1 448 410	62 903	
							874	1 069	3 501	123 750	6 445	85 280	
											1 619 235	62 903	
				1	1			1			7 206	85 280	
											1 401 410	62 298	
	1111										6 236	84 460	
											1 925 541	87 170	
- 7			100								8 569	118 190	

	14	15	16	17	18	19	20	21	22	23	24	25	26
	Тоо	l Joint D	ata							Dri	II Pipe Da	ata	
	Connection	Diamet	er of Pin a	nd Box	Tong 9		Cross S		Adjusted	Make-Up	Torsional	Capacity	Total
	Type				Leng		Area		Weight*	Torque	Ratio,		Dis-
		Outside	Inside	Elevator	Pin	Box	Pin	Box			Pin to Pipe	* 1	place-
				Upset									ment
													**
		W	d _{iu}	DE .	LPB	LB	AP	AB	11. /61	e		110	. /0.
				in.				.in.	lb/ft	ft-lb			gal./ft
	- 40 -			mm		- 40		m²	kg/m	Nm	4.00		m
	5 1/2 FH	7	4	5 11/16	8	10	10.371	11.670	21.61	27 966	1.27	0.946	1.277
	- 4 (011	177,8	101,6	144,5	203,2	254,0	66,91	75,29	32,2	37 920	4.00	11,75	15,86
	5 1/2 FH	7	4	5 11/16	8	10	10.371	11.670	21.61	27 966	1.00	0.946	1.277
	F 4/0 FII	177,8	101,6	144,5	203,2	254,0	66,91	75,29	32,2	37 920	0.01	11,75	15,86
	5 1/2 FH	7	4	5 11/16	8	10	10.371	11.670	21.61	27 966	0.91	0.946	1.277
	E 4/0 EU	177,8	101,6	144,5	203,2	254,0	66,91	75,29	32,2	37 920	0.74	11,75	15,86
	5 1/2 FH	7	4	5 11/16	8	10	10.371	11.670	21.61	27 966	0.71	0.946	1.277
	5 1/2 FH	177,8 7	101,6	144,5 5 11/16	203,2	254,0 10	66,91	75,29 11.670	32,2 24.28	37 920 27 966	1.10	11,75 0.906	15,86 1.277
	5 I/2 FH						10.371	7			1.10		
	5 1/0 EU	177,8 7	101,6 3 3/4	144,5 5 11/16	203,2	254,0 10	66,91	75,29 11.670	36,1 24.73	37 920 31 452	1.24	11,254 0.899	15,862 1.277
	5 1/2 FH		95,3	144,5			11.893				1.24		
	5 1/2 FH	177,8 7 3/8	4 11/16	6 9/64	203,2	254,0 10	76,73 11.480	75,29 10.646	36,8 23.94	42 640 31 149	1.23	11,17 0.929	15,86 1.295
	3 1/2 FH		119,1	156,0	203,2	254,0	74,06	68,68	35,6	42 230	1.23	11,54	16,09
	5 1/2 FH	187,3 7	4	5 11/16	8	10	10.371	11.670	24.28	27 966	0.87	0.906	1.277
	3 1/2 111	177,8	101,6	144,5	203,2	254,0	66,91	75,29	36,1	37 920	0.07	11,25	15,86
	5 1/2 FH	7	3 3/4	5 11/16	8	10	11.893	11.670	24.73	31 452	0.98	0.899	1.277
	3 1/2111	177,8	95,3	144,5	203,2	254,0	76,73	75,29	36,8	42 640	0.50	11,17	15,86
	5 1/2 IF	7 3/8	4 11/16	6 9/64	8	10	11.480	10.646	23.94	34 031	1.06	0.929	1.295
	0 1/2 11	187,3	119,1	156,0	203,2	254,0	74,06	68,68	35,6	46 140	1.00	11,54	16,09
	5 1/2 FH	7	4	5 11/16	8	10	10.371	11.670	24.28	27 966	0.79	0.906	1.277
	Walana Co	177,8	101,6	144,5	203,2	254,0	66,91	75,29	36,1	37 920		11,25	15,86
	5 1/2 FH	7	3 3/4	5 11/16	8	10	11.893	11.670	24.73	31 452	0.89	0.899	1.277
		177,8	95,3	144,5	203,2	254,0	76,73	75,29	36,8	42 640		11,17	15,86
	5 1/2 FH	7 1/4	3 1/2	5 11/16	8	10	13.316	14.468	25.70	36 241	1.02	0.892	1.285
		184,2	88,9	144,5	203,2	254,0	85,91	93,34	38,2	49 140		11,08	15,96
	5 1/2 IF	7 3/8	4 11/16	6 9/64	8	10	11.480	10.646	23.94	31 149	0.88	0.929	1.295
		187,3	119,1	156,0	203,2	254,0	74,06	68,68	35,6	42 230		11,54	16,09
100	5 1/2 FH	7	3 3/4	5 11/16	8	10	11.893	11.670	24.73	31 452	0.69	0.899	1.277
		177,8	95,3	144,5	203,2	254,0	76,73	75,29	36,8	42 640	11/1/2	11,17	15,86
	5 1/2 FH	7	3 1/2	5 11/16	8	10	13.316	11.670	25.17	31 452	0.69	0.892	1.277
		177,8	88,9	144,5	203,2	254,0	85,91	75,29	37,5	42 640		11,08	15,86
	5 1/2 IF	7 3/8	4 11/16	6 9/64	8	10	11.480	10.646	23.94	31 149	0.68	0.929	1.295
	The same tracks	187,3	119,1	156,0	203,2	254,0	74,06	68,68	35,6	42 230		11,54	16,09
	5 1/2 FH	7 1/2	3	5 11/16	8	10	15.869	17.365	27.01	43 585	0.95	0.881	1.293
		190,5	76,2	144,5	203,2	254,0	102,38	112,03	40,2	59 090		10,94	16,06
						211							

^{*} Weight of the pipe / tool joint assembly is based on the average pipe length of 29.4 ft plus tool joint length.

XV													
1	2	3	4	5	6	7	8	9	10	11	12	13	
0.		147.11			Pipe D	_			D (D ::			
Size:	Nominal	Wall	Inside	Section		Grade				ce Properties			
Outside	Weight	Thickness	Diameter		Upset				pe		Tool J		
Diameter				Pipe			Collapse	Internal	Tensile	Torsional	Tensile	Torsional	
				Body			Resistance	Yield	Yield	Yield	Yield	Yield	
								Pressure					
D		t	d	Α		Y	P _c	Pi					
in.	lb/ft	ii	n.	sq.in.			p:		lb	ft-lb	lb	ft-lb	
mm	kg/m	m	m	cm ²			ba	ar	kN	Nm	kN	Nm	
5 1/2	24.70	0.415	4.670	6.6296	IEU	Е	10 460	9 900	497 223	56 574	1 265 805	55 933	
139,7	36,76	10,54	118,62	42,77	VV		721	683	2 213	76 700	5 633	75 830	
											1 510 384	62 298	
									1		6 721	84 460	
15					IEU	X	12 930	12 540	629 816	71 661	1 265 805	55 933	
							892	865	2 803	97 160	5 633	75 830	
											1 448 410	62 903	
											6 445	85 280	PARTE YEAR
				9							1 265 805	56 452	
											5 633	76 540	
		The state of the s									1 448 410	64 734	
											6 445	87 770	
											1 619 235	72 483	
			V								7 206	98 270	
											1 510 384	62 298	
											6 721	84 460	VELVE
					IEU	G	14 010	13 860	696 112	79 204	1 448 410	62 903	
							966	956	3 098	107 380	6 445	85 280	
											1 619 235	62 903	
											7 206	85 280	
			7 9		M						1 448 410	64 734	
											6 445	87 770	
											1 619 235	72 483	
	11										7 206	98 270	
											1 510 384	62 298	
										7 4 1 9	6 721	84 460	policy.
					IEU	S	17 020	17 830	895 001	101 833	1 619 235	62 903	
							1 174	1 229	3 983	138 070	7 206	85 280	
			1 4 9 4 7								1 778 278	62 903	
											7 913	85 280	
											1 619 235	72 483	
											7 206	98 270	
											1 778 278	78 716	
											7 913	106 720	
											1 510 384	62 298	
											6 721	84 460	
											1 925 541	87 170	
			777								8 569	118 190	

	14	15	16	17	18	19	20	21	22	23	24	25	26
	Тоо	l Joint D	ata	7 1						Dri	II Pipe D	ata	
	Connection	Diamet	er of Pin a	nd Box	Tong 9	Space	Cross S	ectional	Adjusted	Make-Up	Torsional	Capacity	Total
	Type				Leng	th of	Area	a of	Weight*	Torque	Ratio,		Dis-
		Outside	Inside	Elevator	Pin	Box	Pin	Box			Pin to Pipe	*	place-
				Upset						100			ment
													* *
		W	d _{iu}	DE	LPB	LB	AP	AB					
				in.			sq	.in.	lb/ft	ft-lb		US g	gal./ft
				mm			CI	m²	kg/m	Nm		I/	m
	5 1/2 FH	7	4	5 11/16	8	10	10.371	11.670	26.74	27 966	0.99	0.868	1.277
		177,8	101,6	144,5	203,2	254,0	66,91	75,29	39,8	37 920		10,782	15,862
	5 1/2 IF	7 3/8	4 9/16	6 9/64	8	10	12.389	10.646	26.68	31 149	1.10	0.887	1.295
		187,3	1 15,9	156,0	203,2	254,0	79,93	68,68	39,7	42 230		11,02	16,09
	5 1/2 FH	7	4	5 11/16	8	10	10.371	11.670	26.74	27 966	0.78	0.868	1.277
0 0		177,8	101,6	144,5	203,2	254,0	66,91	75,29	39,8	37 920		10,78	15,86
	5 1/2 FH	7	3 3/4	5 11/16	8	10	11.893	11.670	27.20	31 452	0.88	0.861	1.277
		177,8	95,3	144,5	203,2	254,0	76,73	75,29	40,5	42 640		10,69	15,86
	5 1/2 FH	7 1/4	4	5 11/16	8	10	10.371	14.468	27.27	28 226	0.79	0.868	1.285
		184,2	101,6	144,5	203,2	254,0	66,91	93,34	40,6	38 270		10,78	15,96
	5 1/2 FH	7 1/4	3 3/4	5 11/16	8	10	11.893	14.468	27.73	32 367	0.90	0.861	1.285
	- 4/0 FIL	184,2	95,3	144,5	203,2	254,0	76,73	93,34	41,3	43 880	4.04	10,69	15,96
	5 1/2 FH	7 1/4	3 1/2	5 11/16	8	10	13.316	14.468	28.16	36 241	1.01	0.854	1.285
	5.4/0.IE	184,2	88,9	144,5	203,2	254,0	85,91	93,34	41,9	49 140	0.07	10,61	15,96
	5 1/2 IF	7 3/8	4 9/16	6 9/64	8	10	12.389	10.646	26.68	31 149	0.87	0.887	1.295
	F 1/0 EU	187,3	115,9	156,0	203,2	254,0	79,93	68,68	39,7	42 230	0.70	11,02	16,09
	5 1/2 FH	7	3 3/4	5 11/16 144,5	8 203,2	10 254,0	11.893	11.670	27.20 40,5	31 452 42 640	0.79	0.861	1.277
	5 1/2 FH	177,8 7	95,3 3 1/2	5 11/16	8	10	76,73 13.316	75,29 11.670	27.63	31 452	0.79	10,69 0.854	15,86 1.277
	3 1/2 1 11	177,8	88,9	144,5	203,2	254,0	85,91	75,29	41,1	42 640	0.75	10,61	15,86
	5 1/2 FH	7 1/4	3 3/4	5 11/16	8	10	11.893	14.468	27.73	32 367	0.82	0.861	1.285
	3 1/2 111	184,2	95,3	144,5	203,2	254,0	76,73	93,34	41,3	43 880	0.02	10,69	15,96
	5 1/2 FH	7 1/4	3 1/2	5 11/16	8	10	13.316	14.468	28.16	36 241	0.92	0.854	1.285
		184,2	88,9	144,5	203,2	254,0	85,91	93,34	41,9	49 140		10,61	15,96
	5 1/2 IF	7 3/8	4 9/16	6 9/64	8	10	12.389	10.646	26.68	31 149	0.79	0.887	1.295
		187,3	115,9	156,0	203,2	254,0	79,93	68,68	39,7	42 230		11,02	16,09
	5 1/2 FH	7	3 1/2	5 11/16	8	10	13.316	11.670	27.63	31 452	0.62	0.854	1.277
		177,8	88,9	144,5	203,2	254,0	85,91	75,29	41,1	42 640		10,61	15,86
7 9 3 10 (1)	5 1/2 FH	7	3 1/4	5 11/16	8	10	14.642	11.670	28.02	31 452	0.62	0.848	1.277
		177,8	82,6	144,5	203,2	254,0	94,46	75,29	41,7	42 640		10,53	15,86
	5 1/2 FH	7 1/4	3 1/2	5 11/16	8	10	13.316	14.468	28.16	36 241	0.71	0.854	1.285
		184,2	88,9	144,5	203,2	254,0	85,91	93,34	41,9	49 140	10,100	10,61	15,96
12014	5 1/2 FH	7 1/4	3 1/4	5 11/16	8	10	14.642	14.468	28.55	39 358	0.77	0.854	1.285
		184,2	82,6	144,5	203,2	254,0	94,46	93,34	42,5	53 360		10,61	15,96
	5 1/2 IF	7 3/8	4 9/16	6 9/64	8	10	12.389	10.646	26.68	31 149	0.61	0.887	1.295
		187,3	115,9	156,0	203,2	254,0	79,93	68,68	39,7	42 230		11,02	16,09
4000	5 1/2 FH	7 1/2	3	5 11/16	8	10	15.869	17.365	29.47	43 585	0.86	0.843	1.293
		190,5	76,2	144,5	203,2	254,0	102,38	112,03	43,9	59 090		10,47	16,06
					1					1000			

^{*} Weight of the pipe / tool joint assembly is based on the average pipe length of 29.4 ft plus tool joint length.

YV.							1		O Visit		(1)		
1	2	3	4	5	6 Pipe D	7	8	9	10	11	12	13	
Size:	Nominal	Wall	Inside	Section	_	Grade			Performant	ce Properties			
Outside	Weight	Thickness	Diameter	Area	Upset		80	Pi	pe	70 1 10 00 11100	Tool J	oint	
Diameter				Pipe			Collapse	Internal	Tensile	Torsional	Tensile	Torsional	
				Body			Resistance	Yield	Yield	Yield	Yield	Yield	
								Pressure					
D		t	d	Α			P _c	Pi					
in.	lb/ft	i		sq.in.			A1117/1117/	si	lb	ft-lb	lb	ft-lb	
mm	kg/m		m = 250	cm ²	IFIL	-		ar 7 000	kN	Nm FC 110	kN	Nm	
6	22.00	0.324	5.350	5.0019	IEU	Е	5 750	7 090	433 011	56 119	1 289 490	61 742	
152,4	32,74	8,23	135,89	32,27		.,	396	489	1 927	76 090	5 738	83 710	
	\$ C				IEU	Х	6 560	8 980	548 860	71 084	1 289 490	61 742	
3							452	619	2 442	96 380	5 738	83 710	
					IEU	G	6 890	9 920	606 635	78 567	1 289 490	61 742	
							475	684	2 700	106 520	5 738	83 710	
					IEU	S	7 530	12 750	779 959	101 014	1 289 490	61 742	
							519	879	3 471	136 950	5 738	83 710	
6	25.00	0.380	5.240	6.7084	IEU	E	7 880	8 310	503 190	63 973	1 289 490	61 742	
152,4	37,21	9,65	133,10	43,28			543	573	2 239	86 730	5 738	83 710	7.00
					IEU	X	9 330	10 530	637 374	81 033	1 289 490	61 742	
							643	726	2 836	109 860	5 738	83 710	
					IEU	G	9 990	11 640	704 466	89 563	1 289 490	61 742	
			1 4 /				689	803	3 135	121 430	5 738	83 710	
					IEU	S	11 660	14 960	905 742	115 152	1 401 410	62 298	
							804	1 031	4 031	156 120	6 236	84 460	
6 5/8	25.20	0.330	5.965	6.5262	IEU	E	4 790	6 540	489 465	70 580	1 448 419	73 661	
168,3	37,50	8,38	151,51	42,10			330	451	2 178	95 690	6 445	99 870	
					IEU	X	5 320	8 280	619 989	89 402	1 448 419	73 661	
							367	571	2 759	121 210	6 445	99 870	
					IEU	G	5 500	9 150	685 251	98 812	1 448 419	73 661	
							379	631	3 049	133 970	6 445	99 870	
					IEU	S	6 040	11 770	881 037	127 045	1 448 419	73 661	
							416	812	3 921	172 250	6 445	99 870	
6 5/8	27.30	0.362	5.901	7.1226	IEU	E	5 890	7 170	534 199	76 295	1 448 419	73 661	
168,3	40,63	9,19	149,89	45,95			406	494	2 377	103 440	6 445	99 870	
					IEU	Х	6 750	9 080	676 652	96 640	1 448 419	73 661	
				2			465	626	3 011	131 020	6 445	99 870	
					IEU	G	7 100	10 040	747 879	106 813	1 448 419	73 661	
							490	692	3 328	144 820	6 445	99 870	
					IEU	S	7 810	12 910	961 558	137 331	1 448 419	73 661	
							538	890	4 279	186 190	6 445	99 870	

	14	15	16	17	18	19	20	21	22	23	24	25	26
		Joint D		l.D	T (2	0 0		A.I L I		ill Pipe Da		Tatal
	Connection	Diamet	er of Pin a	nd Box	Tong S		Cross S		Adjusted	Make-Up	Torsional	Capacity	Total
	Type	Outside	Inside	Elevator	Leng Pin	Box	Are:	Box	Weight*	Torque	Ratio, Pin to Pipe		Dis-
		Outside	IIISIUE	Upset	FIII	DUX	FIII	DUX			Pili to Pipe		place- ment
				Opset									**
		W	d _{iu}	DE	LPB	LB	AP	AB					
			iu	in.				.in.	lb/ft	ft-lb		US	gal./ft
				mm				m²	kg/m	Nm		1/	m
	5 1/2 IF	7 3/8	4 13/16	6 9/64	8	10	10.548	10.646	23.69	30 871	1.10	1.148	1.510
		187,3	122,2	156,0	203,2	254,0	68,05	68,68	35,3	41 850		14,259	18,756
	5 1/2 IF	7 3/8	4 13/16	6 9/64	8	10	10.548	10.646	23.69	30 871	0.87	1.148	1.510
		187,3	122,2	156,0	203,2	254,0	68,05	68,68	35,3	41 850		14,26	18,76
4.0	5 1/2 IF	7 3/8	4 13/16	6 9/64	8	10	10.548	10.646	23.69	30 871	0.79	1.148	1.510
		187,3	122,2	156,0	203,2	254,0	68,05	68,68	35,3	41 850		14,26	18,76
	5 1/2 IF	7 3/8	4 13/16	6 9/64	8	10	10.548	10.646	23.69	30 871	0.61	1.148	1.510
		187,3	122,2	156,0	203,2	254,0	68,05	68,68	35,3	41 850		14,26	18,76
	5 1/2 IF	7 3/8	4 13/16	6 9/64	8	10	10.548	10.646	26.55	30 871	0.97	1.104	1.510
		187,3	122,2	156,0	203,2	254,0	68,05	68,68	39,5	41 850		13,713	18,756
Assistant Control	5 1/2 IF	7 3/8	4 13/16	6 9/64	8	10	10.548	10.646	26.55	30 871	0.76	1.104	1.510
		187,3	122,2	156,0	203,2	254,0	68,05	68,68	39,5	41 850		13,71	18,76
	5 1/2 IF	7 3/8	4 13/16	6 9/64	8	10	10.548	10.646	26.55	30 871	0.69	1.104	1.510
		187,3	122,2	156,0	203,2	254,0	68,05	68,68	39,5	41 850		13,71	18,76
	5 1/2 IF	7 3/8	4 11/16	6 9/64	8	10	11.480	10.646	26.84	31 149	0.54	1.100	1.510
	0 1/2 11	187,3	119,1	156,0	203,2	254,0	74,06	68,68	39,9	42 230	0.01	13,66	18,76
	6 5/8 FH	8	5	6 3/4	8	10	11.863	14.162	27.89	36 830	1.04	1.412	1.838
	0 3/0 1 11	203,2	127,0	171,5	203,2	254,0	76,54	91,37	41,5	49 930	1.04	17,539	22,830
	6 5/8 FH	8	5	6 3/4	8	10	11.863	14.162	27.89	36 830	0.82	1.412	1.838
	0 3/8 1 11										0.02		
	6 E /0 T.U	203,2	127,0	171,5	203,2	254,0	76,54	91,37	41,5	49 930	0.75	17,54	22,83
	6 5/8 FH	8	5	6 3/4	8	10	11.863	14.162	27.89	36 830	0.75	1.412	1.838
	0.5/0.511	203,2	127,0	171,5	203,2	254,0	76,54	91,37	41,5	49 930	0.50	17,54	22,83
	6 5/8 FH	8	5	6 3/4	8	10	11.863	14.162	27.89	36 830	0.58	1.412	1.838
	0.5/0.5/1	203,2	127,0	171,5	203,2	254,0	76,54	91,37	41,5	49 930	0.07	17,54	22,83
	6 5/8 FH	8	5	6 3/4	8	10	11.863	14.162	29.72	36 830	0.97	1.384	1.838
		203,2	127,0	171,5	203,2	254,0	76,54	91,37	44,2	49 930			22,830
	6 5/8 FH	8	5	6 3/4	8	10	11.863	14.162	29.72	36 830	0.76	1.384	1.838
		203,2	127,0	171,5	203,2	254,0	76,54	91,37	44,2	49 930		17,19	22,83
	6 5/8 FH	8	5	6 3/4	8	10	11.863	14.162	29.72	36 830	0.69	1.384	1.838
		203,2	127,0	171,5	203,2	254,0	76,54	91,37	44,2	49 930		17,19	22,83
	6 5/8 FH	8	5	6 3/4	8	10	11.863	14.162	29.72	36 830	0.54	1.384	1.838
		203,2	127,0	171,5	203,2	254,0	76,54	91,37	44,2	49 930		17,19	22,83

^{*} Weight of the pipe / tool joint assembly is based on the average pipe length of 29.4 ft plus tool joint length.

Standard Practice for Marking Tool Joints and Drill Pipe

Drill Pipe Marking

The following marks are applied as standard to the drill pipe body. Paint stenciling on Pipe Body

Example

TPS Manufacturer's Symbol	Spec. 5 D Specification	5 / 99 Date of Manufacture
3 ½" x 15.50 lb/ft Size x Weight	S 135 Grade	X Y Heat Number or Heat Code

Tool Joint Marking

The following marks are applied as standard to the tool joints. Die stamping on Pin and Box End



Example

253 Serial Number	SK Manufacturer's Symbol	VPI 23.03 Part Number
3/99 Date of Manufacture	NC 38 (3 1/2" IF	Heat Number or Heat Code

Other Marking can be performed on request.

Internal Coating of Drill Pipe

WE OFFER TOGETHER WITH TUBOSCOPE VETCO INTERNALY COATED DRILL PIPE FOR CORROSION PROTECTION AND IMPROVED HYDRAULIC EFFICIENCY OF DRILL PIPE.

Internally coated drill pipe have been increasingly used for more than three decades. As a passive corrosion protection, the coating acts as a barrier to avoid direct contact between the steel pipe and the corrosive medium (fluid/gases etc.), thus avoiding corrosion.

• Drilling:

The drilling fluids used today can be classified from 'non corrosive' up to 'extremely corrosive'.

Since within the lifetime of a drill string, the utilization will be for all different environments, corrosion caused by aggressive muds has to be considered.

Testing and Stimulation:

Downhole tests as well as stimulation services very often initiate extremely corrosive environments. Especially CO₂ and H₂S influence the corrosion rate. Acids used for stimulation purposes in connection with high bottomhole temperatures lead to high corrosion rates although stimulation periods are relatively short.

Storage of Drill Pipe:

Practically all drill pipe remain in storage for shorter resp. longer periods. This can happen directly at the rig site or at the pipe yard. During this time the uncoated internal drill pipe surface is very often subject to so called rack corrosion. Left drilling fluid, oxygene and condensates generate a corrosive environment, which attacks the internal surface of drill pipe.

Advantage of Internal Coating

Advantage of Internal Coatings

Corrosion Protection

Primarily corrosion within drill pipe starts as a type of pitting corrosion. Due to cyclical stresses encountered in drilling, any given section of the drill pipe in operation is permanently under tensile stress (weight of the string), internal respectively external pressure (mud system) and under alternate compressive and tensile stresses due to the deviation of the hole being drilled. The corrosion pittings develop into transverse cracks (notch effect). This phenomenon which is called "stress corrosion cracking" develops perpendicular to the main stress direction. Although the transverse cracks inside a drill pipe generally develop over the entire length, a certain preference for the end areas has been found in practice due to the change in cross sectional areas. Wash outs and/or ruptures predominantly occuring up to one meter behind the upsets are known in the drilling industry.

With today's application of internally coated drill pipe the internal corrosion can be controlled. Without internal corrosion no notch effect can occur.

Stress corrosion cracking with all its consequences such as wash-outs and/or pipe ruptures does not represent a problem anymore if internally coated drill pipe is used by drilling companies. Even wireline cuts which may develop after some time in service - especially within the tool joint and upset areas - do not limit the positive performance of internal coatings.

Hydraulic Efficiency

One major advantage of internally coated drill pipe is found in the improved hydraulic efficiency. Due to the very smooth (glossy) internal surface of the drill pipe, the pressure drop can be reduced considerably inside the drill string. This results in either energy savings during drilling or (more probably) in a higher drilling speed since a higher pressure is available at the bit.

- Energy savings of > 9 % and better

- Circulation rates > 14 % can be achieved

An additional positive effect is the reduction in deposit build-up achieved by the glossy and smooth internal surface. Moreover, the cleaning of internally coated pipe is much easier and more efficient.



AWARDED TO

PERFORATOR GmbH **Plant Facility Unit** Walkenried, Germany

CERTIFIED ARNCO 100XT™ HARDBANDER

FOR DEMONSTRATING THE ABILITY TO APPLY ARRICO 1953T* HARDBARDING ORDING TO THE RECOMMENDED PROCEDURES MANUAL VERSION 1.2. August 23, 2021



December 17, 2002

CERTIFICATE OF ACHIEVEMENT

AWARDED TO

PERFORATOR GmbH Plant Facility Unit Walkenried, Germany

CERTIFIED ARNCO 200XT™ HARDBANDER

FOR DEMONSTRATING THE ABILITY TO APPLY ARRICO 2008T** HARDBANDING ACCORDING TO THE RECOMMENDED PROCEDURES MANUAL VERSION 3.0, Scholar, 1981



November 14, 2003 Date



Certificates





November 14, 2003 Date

CERTIFICATE

The TÜV CERT Certification Body of TÜV Thüringen e.V.

certifies in accordance with TÜV CERT procedure that

PERFORATOR GmbH

ein Unternehmen der Schmidt, Kranz - Gruppe 37445 Walkenried / Germany

has established and applies a quality management system for

Development, manufacturing and service of pressing drill technology, drill pipes and general equipment for the mining industry

An audit was performed, Report No. 3336 20WG Do

Proof has been furnished that the requirements according to EN ISO 9001:2000

are fulfilled. The certificate is valid until. 2006-11-09 Certificate Registration No. 15 100 4008















7-0051

PERFORATOR® GmbH





PERFORATOR® NO-DIG



BERGBAUTECHNIK
MINING EQUIPMENT



TRÄNKEN, KUNSTHARZ-UND ZEMENTVERPRESSEN WATER & RESIN INJECTION, GROUTING





PERFORATOR GmbH

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