









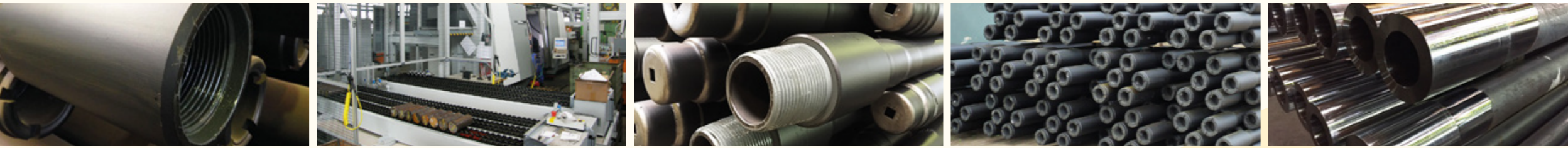


# Oil and Gasfield Drill Pipes





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**mts Perforator - tradition meets latest technology**

mts Perforator is continuing the 100 years old tradition of the Schmidt, Kranz Group (SK) which began building mining technique and tunneling systems in the 19th century. mts Perforator is part of this efficient and well-established Group together with various other manufacturing companies. mts Perforator combines proven tradition with continuous innovation, and offers a wide range of high-quality products. In addition, the cooperation within the SK Group enables all of the participating parties to benefit from synergies within the Group: an advantage that mts Perforator passes directly on to its customers.

**Quality made in Germany**

Diligence and precision are characteristics of mts Perforator technology and machines. The experienced team continuously improves the quality and operation mode of the systems, as well as developing completely new solutions for changing circumstances and surroundings. mts Perforator combines flexibility and cost efficiency with the highest service quality. Furthermore mts Perforator highly values every customer's wishes and strongly focuses on personal assistance to establish a satisfied long-term relationship. This is achieved by a small hierarchy, lean structures, 180 qualified employees and an efficient management.



Wolfgang Schmidt

**Your solution**

The main objective of mts Perforator is to find a balance between customer requirements and the requirements of nature and the environment. The technologically advanced products of mts Perforator allow to simplify people's life worldwide and use trenchless technology to conserve resources and focus on sustainability. If you are looking for a partner who offers the latest technology adapted to your individual requirements and actively supports you by planning and executing your projects, then is mts Perforator the right choice for optimal product solutions.



Gilbert Kimpel



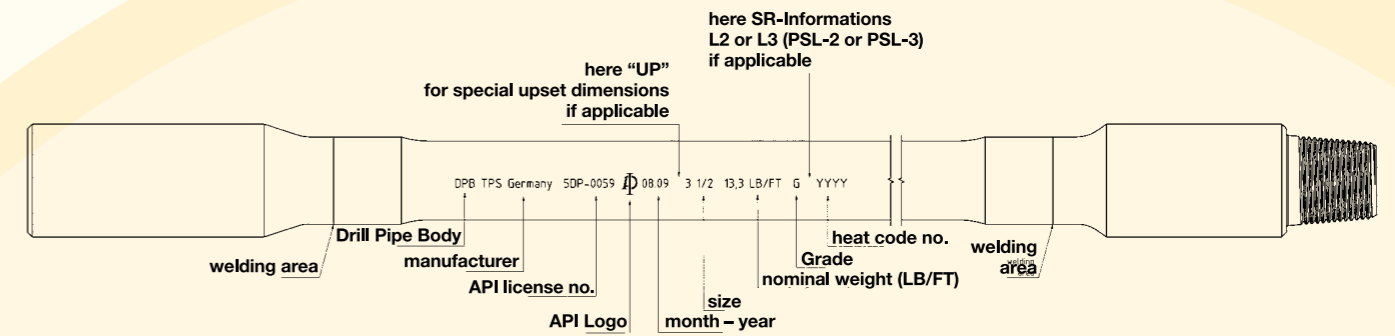
**Drill Pipes and Drilling Tools**

- OCTG drill pipes for oil and gas field
- Drill pipes and tools for DTH, rotary drilling and RC drilling
- Drill pipes and accessories for horizontal directional drilling

- ✓ API approved
- ✓ Upsetted pipe in grade E, X, G + S
- ✓ Tool joint materials acc. API 5DP
- ✓ Dimensions up to 5 1/2" pipe
- ✓ Hard banding acc. to ARNCO 100 XT, 150 XT, 300 XT 350 XT, Tuboscope TCS 8000, TCS Titanium
- ✓ Length: Range 1 - 3
- ✓ Non-destructive testing
  - Ultrasonic test acc. EN 1714
  - Magnetic particle inspection acc. ASTM-E709
- ✓ Destructive testing
  - Tensile test acc. DIN 50125
  - Bending test acc. API SPEC 5DP, latest edition
  - Charpy V-notch impact test acc. ASTM-A370

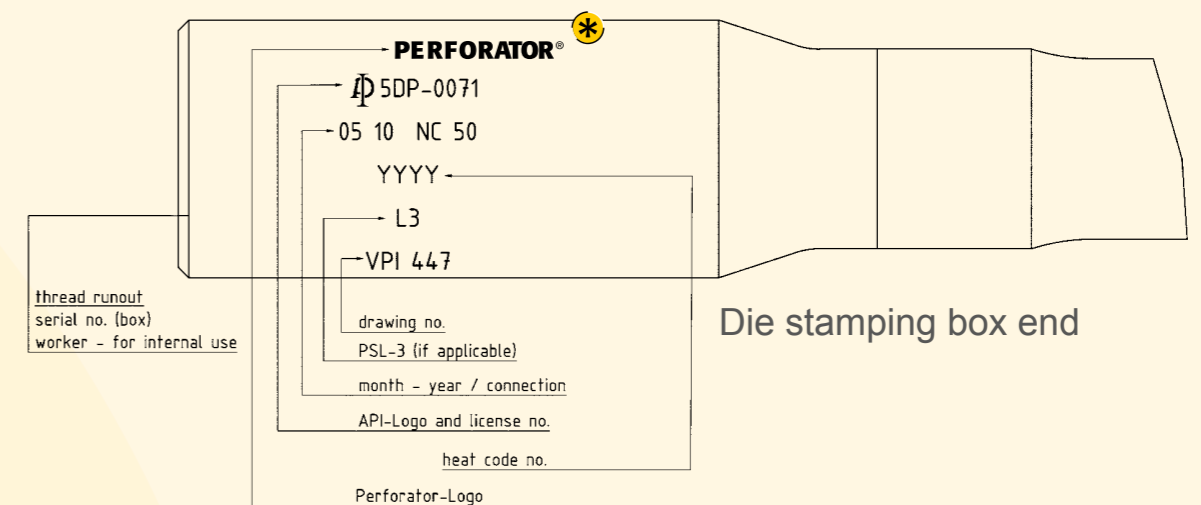
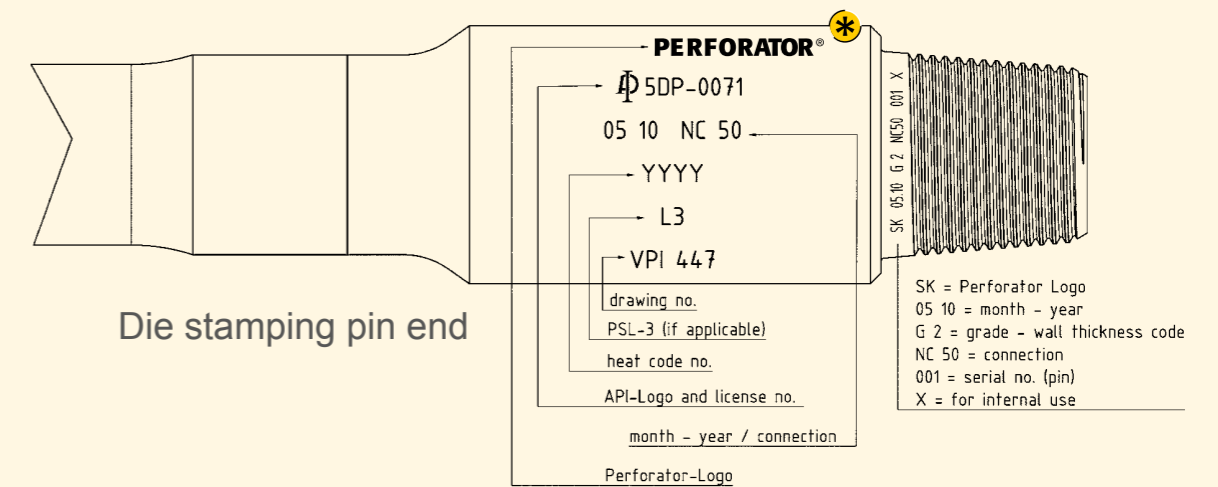
## Drill Pipe Marking

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



## Tool Joint Marking

The following marks are applied as standard to the tool joints. Die stamping on pin and box end.

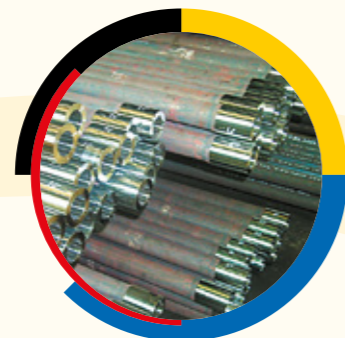


\* exemplary illustration

Other marking on request.



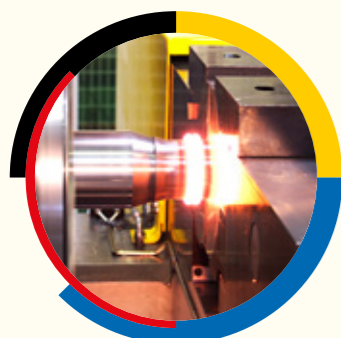
1. Engineering



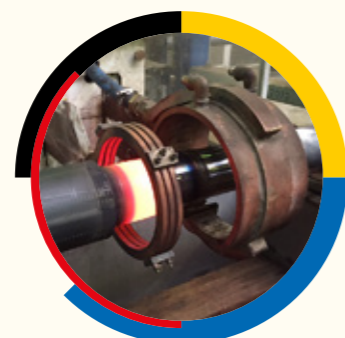
2. Pipes



3. Hardbanding



4. Friction Welding



5. Heat Treatment



6. Inspection

Drill Pipe		Friction welded Tool Joints	
Drill Pipe Internal Upset	IU	Numbered Connections	NC
External Upset	EU	Internal Flush	IF
Internal-External Upset	IEU	Full Hole	FH

acc. to API Spec. 5DP

Additional requirements can be designed and supplied on request.

Drill Pipe and Tool Joint Grades

Mechanical properties of API drill pipe grades					
Grade	Yield strength		Tensile strength	Elongation <sup>1</sup> in 2 inches % min.	API
	psi N/mm <sup>2</sup> min.	psi N/mm <sup>2</sup> max.			
E-75	75 000 515	105 000 725	100 000 690	see footnote	Spec. 5DP
X-95	95 000 655	125 000 860	105 000 725		Spec. 5DP
G-105	105 000 725	135 000 930	115 000 795	see footnote	Spec. 5DP
S-135	135 000 930	165 000 1140	145 000 1000	see footnote	Spec. 5DP

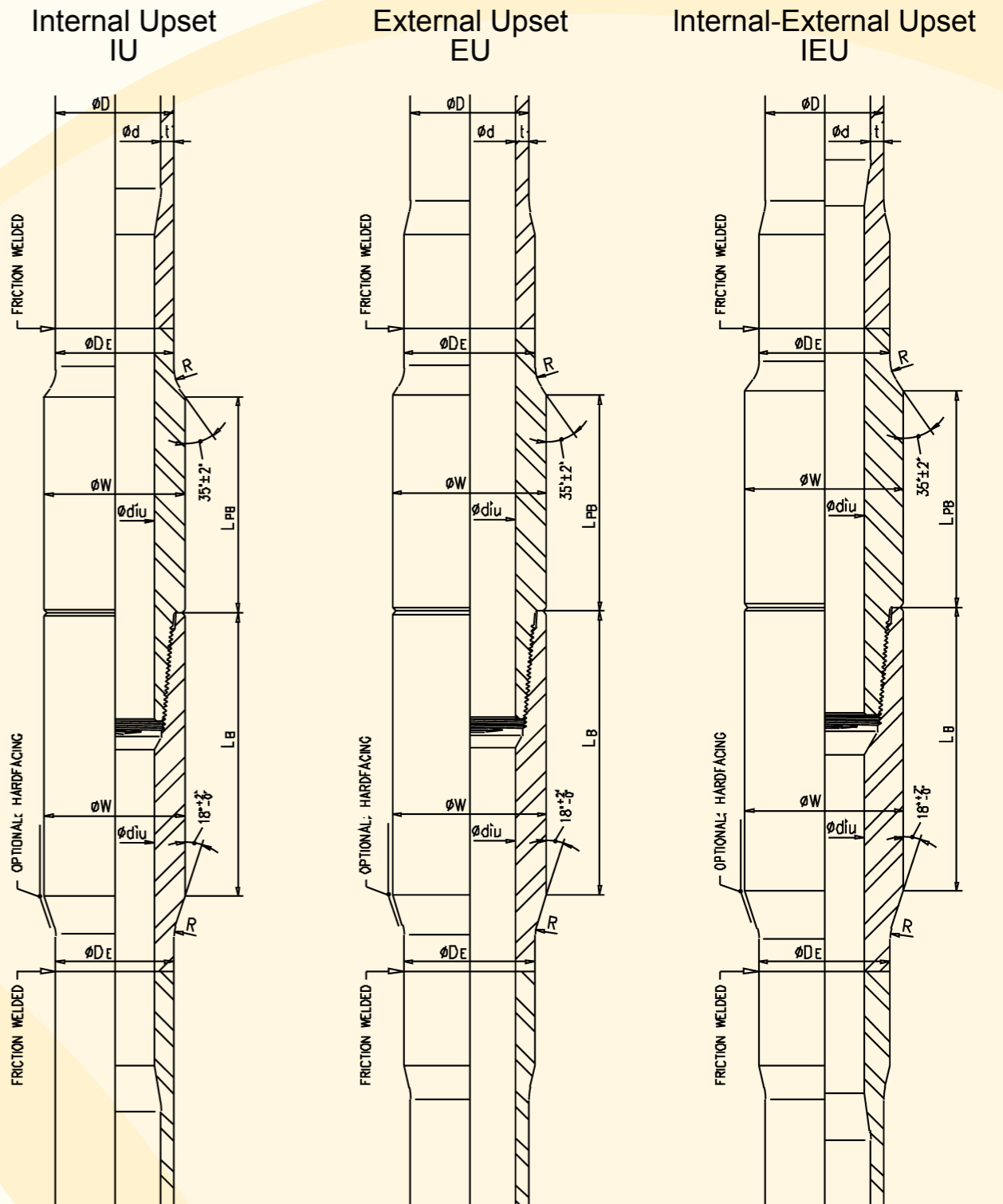
Mechanical properties of API tool joint grades				
Yield strength	Tensile strength	Elongation	Box	API
psi N/mm <sup>2</sup> min.	psi N/mm <sup>2</sup> min.	in 2 inches % min.	Hardness Brinell min.	
120 000 827	140 000 965	13	285	Spec. 5DP

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

$$e = 625.000 \frac{A^{0.2}}{U^{0.9}}$$

where:

- e = minimum elongation in 2 inches (50.80 mm) in percent rounded to nearest ½ 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.



Optional with 90° shoulder on box

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.

# mts Perforator® Drill Pipe: Dimensions and Performance Properties



Pipe Data											Tool Joint Data										Drill Pipe Data							
Size: Outside Diameter  D	Nominal Weight  lb/ft kg/m	Wall Thickness  t	Inside Diameter  d	Section Area Pipe Body  A	Type Upset	Grade	Performance Properties						Connection Type	Diameter of Pin and Box			Tong Space Length of		Cross Sectional Area of		Adjusted Weight*  lb/ft kg/m	Make-Up Torque  ft-lb Nm	Torsional Ratio, Pin to Pipe	Capacity	Total Dis- place- ment **  US gal./ft l/m			
							Pipe				Tool Joint			Outside	Inside	Elevator Upset	Pin	Box	Pin	Box								
							Collapse Resistance  P <sub>c</sub>	Internal Yield Pressure  P <sub>i</sub>	Tensile Yield	Torsional Yield	Tensile Yield	Torsional Yield																
in. mm	lb/ft kg/m	in. mm	sq.in. cm <sup>2</sup>			psi bar	lb kN	ft-lb Nm	lb kN	ft-lb Nm		in. mm			sq.in. cm <sup>2</sup>		lb/ft kg/m	ft-lb Nm		US gal./ft l/m								
2 3/8 60,3	6.65 9,90	0.280 7,11	1.815 46,10	1.8429 11,89	EU	E	15 600 1 076	15 470 1 067	138 220 615	6 250 8 470	313 680 1 396	6 800 9 220	NC 26 (2 3/8 IF)	3 3/8 85,7	1 3/4 44,5	2 9/16 65,1	7 177,8	8 203,2	2.531 16,33	2.457 15,85	7.05 10,5	3 500 4 750	1.09	0.134 1,664	0.241 2,993			
							EU	X	19 760 1 362	19 600 1 351	175 080 779	7 920 10 740		313 680 1 396	6 800 9 220	NC 26 (2 3/8 IF)	3 3/8 85,7	1 3/4 44,5	2 9/16 65,1	7 177,8	8 203,2	2.531 16,33	2.457 15,85	7.05 10,5	3 500 4 750	0.86	0.134 1,664	0.241 2,993
									EU	G	21 840 1 506	21 660 1 493		193 500 861	8 750 11 860		313 680 1 396	6 800 9 220	NC 26 (2 3/8 IF)	3 3/8 85,7	1 3/4 44,5	2 9/16 65,1	7 177,8	8 203,2	2.531 16,33	2.457 15,85	7.05 10,5	3 500 4 750
2 7/8 73,0	6.85 10,19	0.217 5,51	2.441 62,00	1.8120 11,69	EU	E	10 467 722	9 907 683			135 902 605	8 083 10 960	447 131 1 990	11 871 16 090	NC 31 (2 7/8 IF)	4 1/8 104,8	2 1/8 54,0	3 3/16 81,0		7 177,8	9 228,6	3.627 23,40	4.337 27,98	7.73 11,5	5 935 8 050	1.47	0.238 2,96	0.356 4,42
							EU	X	12 940 892	12 548 865	172 143 766	10 238 13 880	447 131 1 990	11 871 16 090		NC 31 (2 7/8 IF)	4 1/8 104,8	2 1/8 54,0	3 3/16 81,0	7 177,8	9 228,6	3.627 23,40	4.337 27,98	7.73 11,5	5 935 8 050	1.16	0.238 2,96	0.356 4,42
									EU	G	14 020 967	13 869 956	190 263 847	11 316 15 340			447 131 1 990	11 871 16 090	NC 31 (2 7/8 IF)	4 1/8 104,8	2 1/8 54,0	3 3/16 81,0	7 177,8	9 228,6	3.627 23,40	4.337 27,98	7.73 11,5	5 935 8 050
2 7/8 73,0	8.60 12,80	0.308 7,82	2.260 57,40	2.4831 16,02	EU	E	14 348 989	14 061 970			186 290 829	10 413 14 120	313 682 1 396	6 875 9 320	NC 26 (2 3/8 IF)	3 3/8 85,7	1 3/4 44,5	3 76,2		7 177,8	8 203,2	2.531 16,33	2.457 15,85	9.33 13,9	3 438 4 660	0.52	0.201 2,497	0.343 4,260
							EU	X	18 174 1 253	17 810 1 228	235 967 1 050	13 190 17 880	313 682 1 396	6 875 9 320		NC 26 (2 3/8 IF)	3 3/8 85,7	1 3/4 44,5	3 76,2	7 177,8	8 203,2	2.531 16,33	2.457 15,85	9.33 13,9	3 438 4 660	0.52	0.201 2,50	0.343 4,26
									EU	G	20 087 1 385	19 685 1 357	260 805 1 161	14 578 19 760	313 682 1 396		6 875 9 320	NC 26 (2 3/8 IF)	3 3/8 85,7	1 3/4 44,5	3 76,2	7 177,8	8 203,2	2.531 16,33	2.457 15,85	9.33 13,9	3 438 4 660	0.47
							EU	S			25 826 1 781	25 310 1 745	335 321 1 492	18 743 25 410	495 727 2 206	13 196 17 890	NC 31 (2 7/8 IF)		4 1/8 104,8	2 50,8	3 3/16 81,0	7 177,8	9 228,6	4.032 26,01	4.337 27,98	9.93 14,8	6 598 8 950	0.70
									EU	E	16 509 1 138	16 526 1 139	214 345 954	11 550 15 660	447 131 1 990	11 871 16 090		NC 31 (2 7/8 IF)	4 1/8 104,8	2 1/8 54,0	3 3/16 81,0	7 177,8	9 228,6	3.627 23,40	4.337 27,98	10.96 16,3	5 935 8 050	1.03
							EU	X			20 911 1 442	20 933 1 443	271 504 1 208	14 635 19 840	495 727 2 206	13 196 17 890	NC 31 (2 7/8 IF)		4 1/8 104,8	2 50,8	3 3/16 81,0	7 177,8	9 228,6	4.032 26,01	4.337 27,98	11.08 16,5	6 598 8 950	0.90
EU	G	23 112 1 594	23 137 1 595	300 083 1 335	16 176 21 930	495 727 2 206			13 196 17 890	NC 31 (2 7/8 IF)	4 1/8 104,8	2 50,8	3 3/16 81,0	7 177,8	9 228,6	4.032 26,01		4.337 27,98	11.08 16,5	6 598 8 950	0.82	0.187 2,32	0.356 4,42					
		EU	S	29 716 2 049	29 747 2 051	385 821 1 717	20 800 28 200	623 846 2 776	16 946 22 980		NC 31 (2 7/8 IF)	4 3/8 111,1	1 5/8 41,3	3 3/16 81,0	7 177,8	9 228,6	5.099 32,90	6.006 38,75	11.72 17,4	8 473 11 490	0.81	0.184 2,29	0.363 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.

# mts Perforator® Drill Pipe: Dimensions and Performance Properties



Pipe Data											Tool Joint Data										Drill Pipe Data												
Size: Outside Diameter D	Nominal Weight lb/ft kg/m	Wall Thickness t in. mm	Inside Diameter d in. mm	Section Area Pipe Body A sq.in. cm²	Type Upset	Grade	Performance Properties						Connection Type	Diameter of Pin and Box			Tong Space Length of		Cross Sectional Area of		Adjusted Weight* lb/ft kg/m	Make-Up Torque ft-lb Nm	Torsional Ratio, Pin to Pipe	Capacity US gal./ft l/m	Total Dis- place- ment **								
							Pipe				Tool Joint			Outside W in. mm	Inside d <sub>iu</sub> in. mm	Elevator Upset DE	Pin LPB	Box LB	Pin AP	Box AB													
							Collapse Resistance P <sub>c</sub>	Internal Yield Pressure P <sub>i</sub>	Tensile Yield	Torsional Yield	Tensile Yield	Torsional Yield																					
3 1/2 88,9	9.50 14,14	0.254 6,45	2.992 76,00	2.5902 16,71	EU	E	10 001	9 530	194 265	14 146	419 798	12 813	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								
							690	657	864	19 180	1 868	17 370																					
											587 309	18 107			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						
											2 614	24 550				120,7	68,3	98,4	203,2	266,7	30,80	32,59	16,2	12 280		4,46	6,52						
											EU	X		12 080	12 070	246 069	17 918	587 309	18 107	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	
											833	832		1 095	24 290	2 614	24 550			120,7	68,3	98,4	203,2	266,7	30,80	32,59	16,2	12 280		4,46	6,52		
											EU	G		13 060	13 340	271 971	19 805	587 309	18 107	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	
											900	920		1 210	26 850	2 614	24 550			120,7	68,3	98,4	203,2	266,7	30,80	32,59	16,2	12 280		4,46	6,52		
											EU	S		15 750	17 150	349 677	25 463	587 309	18 107	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	
											1 086	1 182		1 556	34 520	2 614	24 550			120,7	68,3	98,4	203,2	266,7	30,80	32,59	16,2	12 280		4,46	6,52		
							3 1/2 88,9	13.30 19,79	0.368 9,35	2.764 70,21	3.6209 23,36	EU		E	14 110	13 800	271 570	18 551	587 309	18 107	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
															973	952	1 208	25 150	2 614	24 550			120,7	68,3	98,4	203,2	266,7	30,80	32,59	21,0	12 280		3,851
				EU	X	17 880							17 480		343 989	23 498	649 160	20 326	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		
				1 233	1 205	1 531							31 860		2 889	27 560			127,0	65,1	98,4	203,2	266,7	34,13	44,94	21,7	13 780		3,83	6,60			
															587 309	18 107		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			
				2 614	24 550										120,7	68,3	98,4	203,2	266,7	30,80	32,59	21,0	12 280		3,85	6,52							
				EU	G	19 760							19 320		380 198	25 972	708 065	22 213	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		
				1 362	1 332	1 692							35 210		3 151	30 120			127,0	61,9	98,4	203,2	266,7	37,30	44,94	22,0	15 060		3,79	6,60			
															649 160	20 326		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			
				2 889	27 560										127,0	65,1	98,4	203,2	266,7	34,13	44,94	21,7	13 780		3,83	6,60							
															587 309	18 107		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	0.70	0.310	0.525			
				2 614	24 550										120,7	68,3	98,4	203,2	266,7	30,80	32,59	21,0	12 280		3,85	6,52							
				EU	S	25 400	24 840	488 826	33 393	842 442	26 515	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	0.3	0.531									
				1 751	1 713	2 175	45 270	3 749	35 950			127,0	54,0	98,4	203,2	266,7	44,52	44,94	22,5	17 980		3,73	6,60										
								708 065	22 213		NC 38 (3 1/2 IF)	5	2 7/16	3 7/8	8	10.5	5.781	6.966	14.75	11 106	0.67	0.305	0.531										
				3 151	30 120			127,0	61,9	98,4	203,2	266,7	37,30	44,94	22,0	15 060		3,79	6,60														
								776 408	25 673		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	0.31	0.537										
				3 455	34 810			133,4	34 810			133,4	68,3	98,4	177,8	254,0	40,92	46,84	22,1	17 400		3,85	6,67										
								838 258	27 760		NC 40 (4 FH)	5 1/4	2 9/16	3 7/8	7	10	6.857	7.260	14.99	13 880	0.83	0.308	0.537										
				3 730	37 640			133,4	37 640			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.

# mts Perforator® Drill Pipe: Dimensions and Performance Properties



Pipe Data											Tool Joint Data										Drill Pipe Data									
Size: Outside Diameter  D	Nominal Weight	Wall Thickness  t	Inside Diameter  d	Section Area Pipe Body  A	Type Upset	Grade	Performance Properties						Connection Type	Diameter of Pin and Box			Tong Space Length of		Cross Sectional Area of		Adjusted Weight*	Make-Up Torque	Torsional Ratio, Pin to Pipe	Capacity	Total Dis- place- ment **					
							Pipe				Tool Joint			Outside	Inside	Elevator Upset	Pin	Box	Pin	Box										
							Collapse Resistance  P <sub>c</sub>	Internal Yield Pressure  P <sub>i</sub>	Tensile Yield	Torsional Yield	Tensile Yield	Torsional Yield																		
in. mm	lb/ft kg/m	in. mm	sq.in. cm <sup>2</sup>			psi bar	lb kN	ft-lb Nm	lb kN	ft-lb Nm		in. mm			sq.in. cm <sup>2</sup>	lb/ft kg/m	ft-lb Nm		US gal./ft l/m											
3 1/2 88,9	15.50 23,07	0.449 11,40	2.602 66,09	4.3037 27,77	EU	E	16 770	16 840	322 776	21 086	649 160	20 326	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					
							1 156	1 161	1 436	28 590	2 889	27 560																		
							708 065	22 213			3 151	30 120		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				
							3 151	30 120																						
							649 160	19 174			2 889	26 000		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	0.91	0.276	0.525				
							2 889	26 000																						

\* 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.



# mts Perforator® Drill Pipe: Dimensions and Performance Properties



Pipe Data											Tool Joint Data										Drill Pipe Data				
Size: Outside Diameter D	Nominal Weight lb/ft kg/m	Wall Thickness t in. mm	Inside Diameter d in. mm	Section Area Pipe Body A sq.in. cm <sup>2</sup>	Type Upset	Grade	Performance Properties						Connection Type	Diameter of Pin and Box			Tong Space Length of		Cross Sectional Area of		Adjusted Weight* lb/ft kg/m	Make-Up Torque ft-lb Nm	Torsional Ratio, Pin to Pipe	Capacity US gal./ft l/m	Total Dis- place- ment **
							Pipe				Tool Joint			Outside W in. mm	Inside d <sub>iu</sub> in. mm	Elevator Upset DE in. mm	Pin LPB in. mm	Box LB in. mm	Pin AP sq.in. cm <sup>2</sup>	Box AB sq.in. cm <sup>2</sup>					
							Collapse Resistance P <sub>c</sub> psi bar	Internal Yield Pressure P <sub>i</sub> psi bar	Tensile Yield lb kN	Torsional Yield ft-lb Nm	Tensile Yield lb kN	Torsional Yield ft-lb Nm													
4 101,6	14.00 20,83	0.330 8,38	3.340 84,84	3.8048 24,55	IU	E	11 350	10 830	285 359	23 288	711 613	23 487	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
							783	747	1 270	31 570	3 167	31 840		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
					EU	E	11 350	10 830	285 359	23 288	901 167	33 625	NC 46 (4 IF)	6	3 1/4	4 1/2	7	10	7.363	9.853	16.05	16 813	1.44	0.453	0.699
							783	747	1 270	31 570	4 010	45 590		6	3 1/4	4 1/2	7	10	7.363	9.853	16.05	16 813	1.44	0.453	0.699
					EU	E	901 167	33 257	NC 46 (4 IF)	5 3/4	3 1/4	4 1/2	7	10	7.363	7.546	15.65	16 629	1.43	0.453	0.693				
							4 010	45 090		5 3/4	3 1/4	4 1/2	7	10	7.363	7.546	15.65	16 629	1.43	0.453	0.693				
					IU	X	14 380	13 720	361 455	29 498	776 408	25 673	NC 40 (4 FH)	5 1/4	2 11/16	4 3/16	7	10	6.342	7.260	15.53	12 837	0.87	0.441	0.678
							992	946	1 608	39 990	3 455	34 810		5 1/4	2 11/16	4 3/16	7	10	6.342	7.260	15.53	12 837	0.87	0.441	0.678
					IU	X	711 613	23 487	NC 40 (4 FH)	5 1/4	2 13/16	4 3/16	7	10	5.802	7.260	15.37	11 744	0.80	0.443	0.678				
							3 167	31 840		5 1/4	2 13/16	4 3/16	7	10	5.802	7.260	15.37	11 744	0.80	0.443	0.678				
					EU	X	14 380	13 720	361 455	29 498	901 167	33 625	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
							992	946	1 608	39 990	4 010	45 590		6	3 1/4	4 1/2	7	10	7.363	9.853	16.05	16 813	1.14	0.453	0.699
					EU	X	901 167	33 257	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				
							4 010	45 090		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				
					IU	G	15 900	15 160	399 503	32 603	897 163	30 114	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
							1 096	1 045	1 778	44 200	3 992	40 830		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
IU	G	776 408	25 673	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									
		3 455	34 810		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									
EU	G	15 900	15 160	399 503	32 603	901 167	33 625	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					
		1 096	1 045	1 778	44 200	4 010	45 590		6	3 1/4	4 1/2	7	10	7.363	9.853	16.05	16 813	1.03	0.453	0.699					
EU	G	901 167	33 257	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									
		4 010	45 090		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									
IU	S	20 140	19 490	513 647	41 918	1 080 137	36 363	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					
		1 389	1 344	2 286	56 830	4 807	49 300		5 1/2	2	4 3/16	7	10	8.873	9.371	16.65	18 182	0.87	0.429	0.683					
IU	S	838 258	27 760	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									
		3 730	37 640		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									
EU	S	20 140	19 490	513 647	41 918	1 048 429	39 230	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					
		1 389	1 344	2 286	56 830	4 666	53 190		6	3	4 1/2	7	10	8.590	9.853	16.43	19 615	0.94	0.448	0.699					
EU	S	1 048 429	34 057	NC 46 (4 IF)	5 3/4	3	4 1/2	7	10	8.590	7.546	16.02	17 028	0.81	0.448	0.693									
		4 666	46 170		5 3/4	3	4 1/2	7	10	8.590	7.546	16.02	17 028	0.81	0.448	0.693									
4 1/2 114,3	13.75 20,46	0.271 6,88	3.958 100,53	3.6004 23,23	IU	E	7 170	7 900	270 034	25 908	823 118	30 655	NC 46 (4 IF)	6	3 3/8	4 11/16	7	10	6.712	9.853	15.50	15 328	1.18	0.623	0.860
							494	545	1 202	35 130	3 663	41 560		6	3 3/8	4 11/16	7	10	6.712	9.853	15.50	15 328	1.18	0.623	0.860
4 1/2 114,3	13.75 20,46	0.271 6,88	3.958 100,53	3.6004 23,23	EU	E	7 170	7 900	270 034	25 908	849 268	33 824	NC 50 (4 1/2 IF)	6 1/4	3 7/8	5	7	10	6.917	9.044	15.25	16 912	1.31	0.637	0.870
							494	545	1 202	35 130	3 779	45 860		6 1/4	3 7/8	5	7	10	6.917	9.044	15.25	16 912	1.31	0.637	0.870

\* 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.



# mts Perforator® Drill Pipe: Dimensions and Performance Properties



Pipe Data											Tool Joint Data										Drill Pipe Data							
Size: Outside Diameter  D	Nominal Weight  lb/ft kg/m	Wall Thickness  t	Inside Diameter  d	Section Area Pipe Body  A	Type Upset	Grade	Performance Properties						Connection Type	Diameter of Pin and Box			Tong Space Length of		Cross Sectional Area of		Adjusted Weight*  lb/ft kg/m	Make-Up Torque  ft-lb Nm	Torsional Ratio, Pin to Pipe	Capacity	Total Dis- place- ment **  US gal./ft l/m			
							Pipe				Tool Joint			Outside	Inside	Elevator Upset	Pin	Box	Pin	Box								
							Collapse Resistance  P <sub>c</sub>	Internal Yield Pressure  P <sub>i</sub>	Tensile Yield	Torsional Yield	Tensile Yield	Torsional Yield																
in. mm	lb/ft kg/m	in. mm	in. mm	sq.in. cm <sup>2</sup>			psi bar	lb kN	ft-lb Nm	lb kN	ft-lb Nm		in. mm	in. mm	in. mm	in. mm	in. mm	sq.in. cm <sup>2</sup>	lb/ft kg/m	ft-lb Nm		US gal./ft l/m						
4 1/2 114,3	20.00 29,76	0.430 10,92	3.640 92,46	5.4981 35,47	IEU	E	12 960 894	12 540 865	412 359 1 835	36 901 50 030	1 048 429 4 666	39 659 53 770	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	22.35 33,3	19 830 26 890	1.07	0.525 6,521	0.867 10,769			
							1 048 429 4 666	39 230 53 190	NC 46 (4 IF)	6 152,4	3 76,2	4 11/16 119,1		7 177,8	10 254,0	8.590 55,42	9.853 63,57	21.92 32,6	19 615 26 590	1.06	0.525 6,52	0.860 10,68						
							EU	E		12 960 894	12 540 865	412 359 1 835	36 901 50 030	1 025 983 4 566	41 235 55 910	NC 50 (4 1/2 IF)	6 3/8 161,9	3 5/8 92,1	5 127,0	7 177,8	10 254,0	8.389 54,12	10.284 66,35	21.76 32,4	20 617 27 950	1.12	0.541 6,72	0.873 10,84
									1 025 983 4 566	41 025 55 620	NC 50 (4 1/2 IF)	6 1/4 158,8	3 5/8 92,1	5 127,0	7 177,8		10 254,0	8.389 54,12	9.044 58,35	21.54 32,1	20 513 27 810	1.11	0.541 6,72	0.870 10,81				
							IEU	E	12 960 894	12 540 865		412 359 1 835	36 901 50 030	976 158 4 344	34 780 47 150	4 1/2 FH	6 152,4	3 76,2	4 11/16 119,1	7 177,8	10 254,0	7.919 51,09	10.320 66,58	21.94 32,7	17 390 23 580	0.94	0.525 6,52	0.860 10,68
									IEU	X	16 420 1 132	15 890 1 096	522 321 2 324	46 741 63 370	1 183 911 5 268		44 871 60 840	NC 46 (4 IF)	6 1/4 158,8	2 3/4 69,9	4 11/16 119,1	7 177,8	10 254,0	9.719 62,70	12.258 79,08	22.68 33,8	22 436 30 420	0.96
							1 048 429 4 666	39 659 53 770			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	22.35 33,3	19 830 26 890	0.85	0.525 6,52	0.867 10,77				
							EU	X	16 420 1 132	15 890 1 096		522 321 2 324	46 741 63 370	1 025 983 4 566	41 235 55 910	NC 50 (4 1/2 IF)	6 3/8 161,9	3 5/8 92,1	5 127,0	7 177,8	10 254,0	8.389 54,12	10.284 66,35	21.76 32,4	20 617 27 950	0.88	0.541 6,72	0.873 10,84
									1 109 923 4 939	44 673 60 570	NC 50 (4 1/2 IF)	6 3/8 161,9	3 1/2 88,9	5 127,0	7 177,8		10 254,0	9.089 58,64	10.284 66,35	21.98 32,7	22 336 30 280	0.96	0.538 6,68	0.873 10,84				
							IEU	X	16 420 1 132	15 890 1 096		522 321 2 324	46 741 63 370	1 235 340 5 497	44 265 60 010	4 1/2 FH	6 152,4	2 1/2 63,5	4 11/16 119,1	7 177,8	10 254,0	10.079 65,03	10.320 66,58	22.59 33,6	22 133 30 010	0.95	0.515 6,40	0.860 10,68
									IEU	G	18 150 1 251	17 560 1 211	577 302 2 569	51 661 70 040	1 307 611 5 819		49 630 67 290	NC 46 (4 IF)	6 1/4 158,8	2 1/2 63,5	4 11/16 119,1	7 177,8	10 254,0	10.750 69,35	12.258 79,08	22.98 34,2	24 815 33 640	0.96
							1 235 340 5 497	44 265 60 010			4 1/2 FH	6 152,4	2 1/2 63,5	4 11/16 119,1	7 177,8	10 254,0	10.079 65,03		10.320 66,58	22.59 33,6	22 133 30 010	0.86	0.515 6,40	0.860 10,68				
							1 048 429 4 666	39 659 53 770				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	22.35 33,3	19 830 26 890	0.77	0.525 6,52	0.867 10,77			
							EU	G	18 150 1 251	17 560 1 211			577 302 2 569	51 661 70 040	1 109 923 4 939	44 673 60 570	NC 50 (4 1/2 IF)	6 3/8 161,9	3 1/4 82,6	5 127,0	7 177,8	10 254,0	10.414 67,19	10.284 66,35	21.98 32,7	25 242 34 220	0.98	0.532 6,61
									1 268 966 5 647	50 484 68 450	NC 50 (4 1/2 IF)		6 3/8 161,9	3 1/4 82,6	5 127,0	7 177,8		10 254,0	10.414 67,19	10.284 66,35	22.37 33,3	25 242 34 220	0.98	0.532 6,61	0.873 10,84			
							IEU	S	23 330 1 609	22 570 1 556		742 246 3 303	66 422 90 050	1 419 531 6 317	53 936 73 130	NC 46 (4 IF)	6 1/4 158,8	2 1/4 57,2	4 11/16 119,1	7 177,8	10 254,0	11.683 75,37	12.258 79,08	23.25 34,6	26 968 36 560	0.81	0.511 6,35	0.867 10,77
									1 183 911 5 268	44 871 60 840	NC 46 (4 IF)	6 1/4 158,8	2 3/4 69,9	4 11/16 119,1	7 177,8		10 254,0	9.719 62,70	12.258 79,08	22.68 33,8	22 436 30 420	0.68	0.52 6,46	0.867 10,77				
							EU	S	23 330 1 609	22 570 1 556		742 246 3 303	66 422 90 050	1 416 229 6 302	50 484 68 450	NC 50 (4 1/2 IF)	6 3/8 161,9	3 76,2	5 127,0	7 177,8	10 254,0	11.642 75,11	10.284 66,35	22.73 33,8	25 242 34 220	0.76	0.526 6,53	0.873 10,84
									1 416 229 6 302	57 801 78 370	NC 50 (4 1/2 IF)	6 5/8 168,3	3 76,2	5 127,0	7 177,8		10 254,0	11.642 75,11	12.836 82,81	23.20 34,5	28 900 39 180	0.87	0.526 6,53	0.880 10,93				
									1 268 966 5 647	50 484 68 450		NC 50 (4 1/2 IF)	6 3/8 161,9	3 1/4 82,6	5 127,0		7 177,8	10 254,0	10.414 67,19	10.284 66,35	22.37 33,3	25 242 34 220	0.76	0.532 6,61	0.873 10,84			

\* 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.

# mts Perforator® Drill Pipe: Dimensions and Performance Properties



Pipe Data											Tool Joint Data										Drill Pipe Data						
Size: Outside Diameter  D	Nominal Weight  lb/ft kg/m	Wall Thickness  t	Inside Diameter  d	Section Area Pipe Body  A	Type Upset	Grade	Performance Properties						Connection Type	Diameter of Pin and Box			Tong Space Length of		Cross Sectional Area of		Adjusted Weight*	Make-Up Torque	Torsional Ratio, Pin to Pipe	Capacity	Total Dis- place- ment **		
							Pipe				Tool Joint			Outside	Inside	Elevator Upset	Pin	Box	Pin	Box							
							Collapse Resistance  P <sub>c</sub>	Internal Yield Pressure  P <sub>i</sub>	Tensile Yield	Torsional Yield	Tensile Yield	Torsional Yield															
in. mm	lb/ft kg/m	in. mm	sq.in. cm <sup>2</sup>	psi bar	lb kN	ft-lb Nm	lb kN	ft-lb Nm	lb kN	ft-lb Nm	in. mm			sq.in. cm <sup>2</sup>	lb/ft kg/m	ft-lb Nm	US gal./ft l/m										
5 127,0	16.25 24,18	0.296 7,52	4.408 111,96	4.3743 28,22	IEU	E	6 940	7 770	328 074	35 044	939 098	37 676	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		
							479	536	1 460	47 510	4 179	51 080		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		
							559	678	1 849	60 180	4 179	51 080		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		
							594	750	2 044	66 520	4 179	51 080		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		
5 127,0	16.25 24,18	0.296 7,52	4.408 111,96	4.3743 28,22	IEU	E	9 830	13 990	590 532	63 080	1 109 923	44 673	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		
							678	965	2 628	85 520	4 939	60 570		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		
							594	750	2 044	66 520	4 179	51 080		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		
							594	750	2 044	66 520	4 179	51 080		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		
5 127,0	19.50 29,02	0.362 9,19	4.276 108,61	5.2746 34,03	IEU	E	9 960	9 500	395 596	41 167	939 098	37 676	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		
							687	655	1 760	55 810	4 179	51 080		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		
							479	536	1 460	47 510	4 179	51 080		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		
							IEU	E	9 960	9 500	395 596	41 167	939 098	37 676	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
									687	655	1 760	55 810	4 179	51 080		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
									479	536	1 460	47 510	4 179	51 080		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
							IEU	X	12 030	12 040	501 088	52 144	939 098	37 676	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
									829	830	2 230	70 700	4 179	51 080		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
									479	536	1 460	47 510	4 179	51 080		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
							IEU	G	13 000	13 300	553 834	57 633	1 109 923	44 900	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
									896	917	2 465	78 140	4 939	60 880		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
									479	536	1 460	47 510	4 939	60 880		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
IEU	S	15 670	17 100	712 072	74 100	1 268 966	51 447	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	0.89	0.718	1.056							
		1 080	1 179	3 169	100 460	5 647	69 750		6 1/2	3 1/4	5 1/8	7	10	10.414	11.548	22.15	25 724	0.89	0.718	1.056							
		479	536	1 460	47 510	5 647	69 750		6 1/2	3 1/4	5 1/8	7	10	10.414	11.548	22.15	25 724	0.89	0.718	1.056							
IEU	S	15 670	17 100	712 072	74 100	1 268 966	51 447	NC 50 (4 1/2 IF)	6 1/2	3	5 1/8	7	10	11.642	11.548	22.51	28 492	0.77	0.712	1.056							
		1 080	1 179	3 169	100 460	5 647	69 750		6 1/2	3	5 1/8	7	10	11.642	11.548	22.51	28 492	0.77	0.712	1.056							
		479	536	1 460	47 510	5 647	69 750		6 1/2	3	5 1/8	7	10	11.642	11.548	22.51	28 492	0.77	0.712	1.056							
IEU	S	15 670	17 100	712 072	74 100	1 268 966	51 447	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							
		1 080	1 179	3 169	100 460	5 647	69 750		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							
		479	536	1 460	47 510	5 647	69 750		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							
IEU	S	15 670	17 100	712 072	74 100	1 268 966	51 447	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							
		1 080	1 179	3 169	100 460	5 647	69 750		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							
		479	536	1 460	47 510	5 647	69 750		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							

\* 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.

# mts Perforator® Drill Pipe: Dimensions and Performance Properties



Pipe Data											Tool Joint Data										Drill Pipe Data					
Size: Outside Diameter D	Nominal Weight lb/ft kg/m	Wall Thickness t in. mm	Inside Diameter d in. mm	Section Area Pipe Body A sq.in. cm <sup>2</sup>	Type Upset	Grade	Performance Properties				Tool Joint		Connection Type	Diameter of Pin and Box			Tong Space Length of		Cross Sectional Area of		Adjusted Weight* lb/ft kg/m	Make-Up Torque ft-lb Nm	Torsional Ratio, Pin to Pipe	Capacity US gal./ft l/m	Total Dis- place- ment **	
							Collapse Resistance P <sub>c</sub>	Internal Yield Pressure P <sub>i</sub>	Tensile Yield	Torsional Yield	Tensile Yield	Torsional Yield		Outside	Inside	Elevator Upset DE	Pin	Box	Pin	Box						
																										psi bar
5 127,0	25.60 38,10	0.500 12,70	4.000 101,60	7.0686 45,60	IEU	E	13 500 931	13 120 905	530 145 2 359	52 257 70 850	1 109 923	44 673	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	
											4 939	60 570		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	
							939 098	37 676	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				
							4 179	51 080		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				
							17 100 1 179	16 620 1 146		671 517 2 988	66 192 89 740	1 109 923		44 900	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
												4 939		60 880	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
							1 268 966	51 447		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			
											5 647	69 750		6 1/2	3	5 1/8	7	10	11.642	11.548	28.05	28 492	0.86	0.628	1.056	
							1 416 229	56 985			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		
												6 302		77 260	6 1/2	3	5 1/8	7	10	13.316	11.670	28.39	31 452	0.95	0.640	1.074
					1 619 235	62 903	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					
								7 206	85 280			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			
					1 778 278	62 903		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				
									7 913			85 280	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		
					1 619 235	72 483			5 1/2 FH	7 206		98 270	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		
										7 913		106 720	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		
					1 778 278	78 716				5 1/2 FH	7 913	106 720	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		
											18 900 1 303	18 380 1 267	742 203 3 303	73 160 99 190	1 268 966	51 447	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
					5 647	69 750	6 1/2								3	5 1/8		7	10	11.642	11.548	28.05	28 492	0.78	0.628	1.056
					1 416 229	56 985	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			
6 302	77 260	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							
1 551 710	63 406	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								
			6 905	85 970	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						
1 619 235	62 903		5 1/2 FH	7 206	85 280	7		3 1/2	5 1/8		8	10	13.316	11.670	28.39	31 452		0.86	0.640	1.074						
				7 913	85 280	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						
1 778 278	62 903			5 1/2 FH	7 913	85 280		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						
					7 206	98 270		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						
1 619 235	72 483				5 1/2 FH	7 206	98 270	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							
						7 913	106 720	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							
1 778 278	78 716	5 1/2 FH				7 913	106 720	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							
						24 300 1 675	23 620 1 629	954 261 4 246	94 062 127 530	1 619 235	62 903	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		
7 206	85 280		7							3 1/4	5 1/8		8	10	14.642	11.670	28.78	31 452	0.67	0.634	1.074					
1 778 278	62 903		5 1/2 FH			7 913	85 280	7	3 1/4	5 1/8	8		10	14.642	11.670	28.78	31 452	0.67	0.634	1.074						
				7 206		98 270	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							
1 619 235	72 483			5 1/2 FH		7 206	98 270	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						
					7 913	106 720	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							
1 778 278	78 716				5 1/2 FH	7 913	106 720	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						

\* 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.

# mts Perforator® Drill Pipe: Dimensions and Performance Properties



Pipe Data											Tool Joint Data										Drill Pipe Data																	
Size: Outside Diameter  D	Nominal Weight  lb/ft kg/m	Wall Thickness  t mm	Inside Diameter  d mm	Section Area Pipe Body  A sq.in. cm <sup>2</sup>	Type Upset	Grade	Performance Properties						Connection Type	Diameter of Pin and Box			Tong Space Length of		Cross Sectional Area of		Adjusted Weight* lb/ft kg/m	Make-Up Torque ft-lb Nm	Torsional Ratio, Pin to Pipe	Capacity US gal./ft l/m	Total Dis- place- ment **													
							Pipe				Tool Joint			Outside W in. mm	Inside d <sub>iu</sub> in. mm	Elevator Upset DE	Pin LPB	Box LB	Pin AP sq.in. cm <sup>2</sup>	Box AB																		
							Collapse Resistance P <sub>c</sub> psi bar	Internal Yield Pressure P <sub>i</sub> lb kN	Tensile Yield lb kN	Torsional Yield ft-lb Nm	Tensile Yield lb kN	Torsional Yield ft-lb Nm																										
5 1/2 139,7	19.20 28,57	0.304 7,72	4.892 124,26	4.9624 32,02	IEU	E	6 040	7 250	372 182	44 074	1 265 805	55 933	5 1/2 FH	7 177,8	4 101,6	5 11/16 144,5	8 203,2	10 254,0	10.371 66,91	11.670 75,29	21.61 32,2	27 966 37 920	1.27	0.946 11,75	1.277 15,86													
							416	500	1 656	59 760	5 633	75 830																										
							6 940	9 190	471 430	55 827	1 265 805	55 933														5 1/2 FH	7 177,8	4 101,6	5 11/16 144,5	8 203,2	10 254,0	10.371 66,91	11.670 75,29	21.61 32,2	27 966 37 920	1.00	0.946 11,75	1.277 15,86
							479	634	2 098	75 690	5 633	75 830																										
5 1/2 139,7	21.90 32,59	0.361 9,17	4.778 121,36	5.8282 37,60	IEU	E	8 410	8 610	437 117	50 710	1 265 805	55 933	5 1/2 FH	7 177,8	4 101,6	5 11/16 144,5	8 203,2	10 254,0	10.371 66,91	11.670 75,29	24.28 36,1	27 966 37 920	1.10	0.906 11,254	1.277 15,862													
							580	594	1 945	68 750	5 633	75 830																										
							1 448 410	62 903	6 445	85 280	5 1/2 FH	7 177,8														3 3/4 95,3	5 11/16 144,5	8 203,2	10 254,0	11.893 76,73	11.670 75,29	24.73 36,8	31 452 42 640	1.24	0.899 11,17	1.277 15,86		
							1 401 410	62 298	6 236	84 460																												
5 1/2 139,7	21.90 32,59	0.361 9,17	4.778 121,36	5.8282 37,60	IEU	X	10 020	10 910	553 682	64 233	1 265 805	55 933	5 1/2 FH	7 177,8	4 101,6	5 11/16 144,5	8 203,2	10 254,0	10.371 66,91	11.670 75,29	24.28 36,1	27 966 37 920	0.87	0.906 11,25	1.277 15,86													
							691	752	2 464	87 090	5 633	75 830																										
							1 448 410	62 903	6 445	85 280	5 1/2 FH	7 177,8														3 3/4 95,3	5 11/16 144,5	8 203,2	10 254,0	11.893 76,73	11.670 75,29	24.73 36,8	31 452 42 640	0.98	0.899 11,17	1.277 15,86		
							1 401 410	68 062	6 236	92 280																												
5 1/2 139,7	21.90 32,59	0.361 9,17	4.778 121,36	5.8282 37,60	IEU	G	10 750	12 060	611 964	70 994	1 265 805	55 933	5 1/2 FH	7 177,8	4 101,6	5 11/16 144,5	8 203,2	10 254,0	10.371 66,91	11.670 75,29	24.28 36,1	27 966 37 920	0.79	0.906 11,25	1.277 15,86													
							741	832	2 723	96 250	5 633	75 830																										
							1 448 410	62 903	6 445	85 280	5 1/2 FH	7 177,8														3 3/4 95,3	5 11/16 144,5	8 203,2	10 254,0	11.893 76,73	11.670 75,29	24.73 36,8	31 452 42 640	0.89	0.899 11,17	1.277 15,86		
							1 619 235	72 483	7 206	98 270																												
5 1/2 139,7	21.90 32,59	0.361 9,17	4.778 121,36	5.8282 37,60	IEU	S	12 680	15 510	786 811	91 278	1 448 410	62 903	5 1/2 FH	7 177,8	3 3/4 95,3	5 11/16 144,5	8 203,2	10 254,0	11.893 76,73	11.670 75,29	24.73 36,8	31 452 42 640	0.69	0.899 11,17	1.277 15,86													
							874	1 069	3 501	123 750	6 445	85 280																										
							1 619 235	62 903	7 206	85 280	5 1/2 FH	7 177,8														3 1/2 88,9	5 11/16 144,5	8 203,2	10 254,0	13.316 85,91	11.670 75,29	25.17 37,5	31 452 42 640	0.69	0.892 11,08	1.277 15,86		
							1 401 410	62 298	6 236	84 460																												
5 1/2 139,7	21.90 32,59	0.361 9,17	4.778 121,36	5.8282 37,60	IEU	S	12 680	15 510	786 811	91 278	1 448 410	62 903	5 1/2 FH	7 177,8	3 3/4 95,3	5 11/16 144,5	8 203,2	10 254,0	11.893 76,73	11.670 75,29	24.73 36,8	31 452 42 640	0.69	0.899 11,17	1.277 15,86													
							874	1 069	3 501	123 750	6 445	85 280																										
							1 619 235	62 903	7 206	85 280	5 1/2 FH	7 177,8														3 1/2 88,9	5 11/16 144,5	8 203,2	10 254,0	13.316 85,91	11.670 75,29	25.17 37,5	31 452 42 640	0.69	0.892 11,08	1.277 15,86		
							1 401 410	62 298	6 236	84 460																												
5 1/2 139,7	21.90 32,59	0.361 9,17	4.778 121,36	5.8282 37,60	IEU	S	12 680	15 510	786 811	91 278	1 448 410	62 903	5 1/2 FH	7 177,8	3 76,2	5 11/16 144,5	8 203,2	10 254,0	15.869 102,38	17.365 112,03	27.01 40,2	43 585 59 090	0.95	0.881 10,94	1.293 16,06													
							874	1 069	3 501	123 750	6 445	85 280																										
							1 619 235	62 903	7 206	85 280	5 1/2 FH	7 177,8														3 1/2 88,9	5 11/16 144,5	8 203,2	10 254,0	13.316 85,91	11.670 75,29	25.17 37,5	31 452 42 640	0.69	0.892 11,08	1.277 15,86		
							1 401 410	62 298	6 236	84 460																												

\* 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.

# mts Perforator® Drill Pipe: Dimensions and Performance Properties



Pipe Data							Tool Joint Data											Drill Pipe Data										
Size: Outside Diameter	Nominal Weight	Wall Thickness	Inside Diameter	Section Area Pipe Body	Type Upset	Grade	Performance Properties					Connection Type	Diameter of Pin and Box			Tong Space Length of		Cross Sectional Area of		Adjusted Weight*	Make-Up Torque	Torsional Ratio, Pin to Pipe	Capacity	Total Displacement **				
							Collapse Resistance	Internal Yield Pressure	Tensile Yield	Torsional Yield	Tool Joint		Outside	Inside	Elevator Upset	Pin	Box	Pin	Box									
											Tensile Yield														Torsional Yield	W	d <sub>iu</sub>	DE
D	t	d	A	P <sub>c</sub>	P <sub>i</sub>	psi bar	lb kN	ft-lb Nm	lb kN	ft-lb Nm	in. mm			sq.in. cm <sup>2</sup>		lb/ft kg/m	ft-lb Nm	US gal./ft l/m										
5 1/2 139,7	24.70 36,76	0.415 10,54	4.670 118,62	6.6296 42,77	IEU	E	10 460 721	9 900 683	497 223 2 213	56 574 76 700	1 265 805 5 633	55 933 75 830	5 1/2 FH	7 177,8	4 101,6	5 11/16 144,5	8 203,2	10 254,0	10.371 66,91	11.670 75,29	26.74 39,8	27 966 37 920	0.99	0.868 10,782	1.277 15,862			
							X	12 930 892	12 540 865	629 816 2 803	71 661 97 160	1 265 805 5 633	55 933 75 830	5 1/2 FH	7 177,8	4 101,6	5 11/16 144,5	8 203,2	10 254,0	10.371 66,91	11.670 75,29	26.74 39,8	27 966 37 920	0.78	0.868 10,78	1.277 15,86		
								G	14 010 966	13 860 956	696 112 3 098	79 204 107 380	1 448 410 6 445	62 903 85 280	5 1/2 FH	7 177,8	3 3/4 95,3	5 11/16 144,5	8 203,2	10 254,0	11.893 76,73	11.670 75,29	27.20 40,5	31 452 42 640	0.79	0.861 10,69	1.277 15,86	
									S	17 020 1 174	17 830 1 229	895 001 3 983	101 833 138 070	1 619 235 7 206	62 903 85 280	5 1/2 FH	7 177,8	3 1/2 88,9	5 11/16 144,5	8 203,2	10 254,0	13.316 85,91	11.670 75,29	27.63 41,1	31 452 42 640	0.62	0.854 10,61	1.277 15,86
										IF	12 930 892	12 540 865	629 816 2 803	71 661 97 160	1 265 805 5 633	55 933 75 830	5 1/2 IF	7 177,8	3 3/4 95,3	5 11/16 144,5	8 203,2	10 254,0	12.389 79,93	10.646 68,68	26.68 39,7	31 149 42 230	0.87	0.887 11,02
						IF					14 010 966	13 860 956	696 112 3 098	79 204 107 380	1 448 410 6 445	62 903 85 280	5 1/2 IF	7 177,8	3 1/2 88,9	5 11/16 144,5	8 203,2	10 254,0	13.316 85,91	11.670 75,29	27.63 41,1	31 452 42 640	0.79	0.854 10,61
							IF				17 020 1 174	17 830 1 229	895 001 3 983	101 833 138 070	1 619 235 7 206	62 903 85 280	5 1/2 IF	7 177,8	3 1/4 82,6	5 11/16 144,5	8 203,2	10 254,0	14.642 94,46	11.670 75,29	28.02 41,7	31 452 42 640	0.62	0.848 10,53
								IF			12 930 892	12 540 865	629 816 2 803	71 661 97 160	1 265 805 5 633	55 933 75 830	5 1/2 IF	7 177,8	3 1/2 88,9	5 11/16 144,5	8 203,2	10 254,0	13.316 85,91	11.670 75,29	27.63 41,1	31 452 42 640	0.71	0.854 10,61
									IF		14 010 966	13 860 956	696 112 3 098	79 204 107 380	1 448 410 6 445	62 903 85 280	5 1/2 IF	7 177,8	3 1/4 82,6	5 11/16 144,5	8 203,2	10 254,0	14.642 94,46	11.670 75,29	28.02 41,7	31 452 42 640	0.77	0.854 10,61
										IF	17 020 1 174	17 830 1 229	895 001 3 983	101 833 138 070	1 619 235 7 206	62 903 85 280	5 1/2 IF	7 177,8	4 9/16 115,9	6 9/64 156,0	8 203,2	10 254,0	12.389 79,93	10.646 68,68	26.68 39,7	31 149 42 230	0.61	0.887 11,02
					IF	17 020 1 174					17 830 1 229	895 001 3 983	101 833 138 070	1 619 235 7 206	62 903 85 280	5 1/2 IF	7 177,8	3 76,2	5 11/16 144,5	8 203,2	10 254,0	15.869 102,38	17.365 112,03	29.47 43,9	43 585 59 090	0.86	0.843 10,47	1.293 16,06

\* 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.

# mts Perforator® Drill Pipe: Dimensions and Performance Properties



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Pipe Data											Tool Joint Data										Drill Pipe Data				
Size: Outside Diameter  D	Nominal Weight	Wall Thickness  t	Inside Diameter  d	Section Area Pipe Body  A	Type Upset	Grade	Performance Properties						Connection Type	Diameter of Pin and Box			Tong Space Length of		Cross Sectional Area of		Adjusted Weight*	Make-Up Torque	Torsional Ratio, Pin to Pipe	Capacity	Total Dis- place- ment **
							Pipe			Tool Joint				Outside	Inside	Elevator Upset	Pin	Box	Pin	Box					
							Collapse Resistance  P <sub>c</sub>	Internal Yield Pressure  P <sub>i</sub>	Tensile Yield	Torsional Yield	Tensile Yield	Torsional Yield													
in. mm	lb/ft kg/m	in. mm	sq.in. cm <sup>2</sup>	psi bar	lb kN	ft-lb Nm	lb kN	ft-lb Nm	in. mm	sq.in. cm <sup>2</sup>	lb/ft kg/m	ft-lb Nm	US gal./ft l/m												
6 152,4	22.00 32,74	0.324 8,23	5.350 135,89	5.0019 32,27	IEU	E	5 750	7 090	433 011	56 119	1 289 490	61 742	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
							396	489	1 927	76 090	5 738	83 710		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
							452	619	2 442	96 380	5 738	83 710		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
							475	684	2 700	106 520	5 738	83 710		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
6 152,4	25.00 37,21	0.380 9,65	5.240 133,10	6.7084 43,28	IEU	E	7 880	8 310	503 190	63 973	1 289 490	61 742	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
							543	573	2 239	86 730	5 738	83 710		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
							643	726	2 836	109 860	5 738	83 710		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
							689	803	3 135	121 430	5 738	83 710		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
6 5/8 168,3	25.20 37,50	0.330 8,38	5.965 151,51	6.5262 42,10	IEU	E	4 790	6 540	489 465	70 580	1 448 419	73 661	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
							330	451	2 178	95 690	6 445	99 870		8	5	6 3/4	8	10	11.863	14.162	27.89	36 830	0.82	1.412	1.838
							367	571	2 759	121 210	6 445	99 870		8	5	6 3/4	8	10	11.863	14.162	27.89	36 830	0.75	1.412	1.838
							379	631	3 049	133 970	6 445	99 870		8	5	6 3/4	8	10	11.863	14.162	27.89	36 830	0.58	1.412	1.838
6 5/8 168,3	27.30 40,63	0.362 9,19	5.901 149,89	7.1226 45,95	IEU	E	5 890	7 170	534 199	76 295	1 448 419	73 661	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
							406	494	2 377	103 440	6 445	99 870		8	5	6 3/4	8	10	11.863	14.162	29.72	36 830	0.76	1.384	1.838
							465	626	3 011	131 020	6 445	99 870		8	5	6 3/4	8	10	11.863	14.162	29.72	36 830	0.69	1.384	1.838
							490	692	3 328	144 820	6 445	99 870		8	5	6 3/4	8	10	11.863	14.162	29.72	36 830	0.54	1.384	1.838
6 5/8 168,3	27.30 40,63	0.362 9,19	5.901 149,89	7.1226 45,95	IEU	E	5 890	7 170	534 199	76 295	1 448 419	73 661	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
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							465	626	3 011	131 020	6 445	99 870		8	5	6 3/4	8	10	11.863	14.162	29.72	36 830	0.69	1.384	1.838
							490	692	3 328	144 820	6 445	99 870		8	5	6 3/4	8	10	11.863	14.162	29.72	36 830	0.54	1.384	1.838

\* 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.



WE OFFER TOGETHER WITH TUBOSCOPE VETCO INTERNALLY 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 as 'non corrosive' up to 'extremely corrosive'. Since within the life-time of a drilling 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 CO<sub>2</sub> and H<sub>2</sub>S 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, oxygen and condensates generate a corrosive environment, which attacks the internal surface of drill pipe.

## 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 occurring 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.

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