Oil and Gasfield Drill Pipes

MINERALL



mts PERFORATOR



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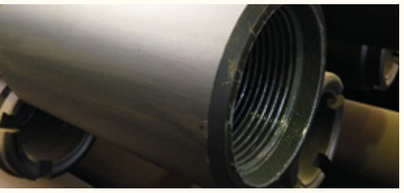
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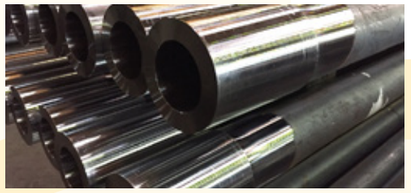
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mts Perforator - tradition meets latest technology

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.



Johann-Christian von Behr

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.

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

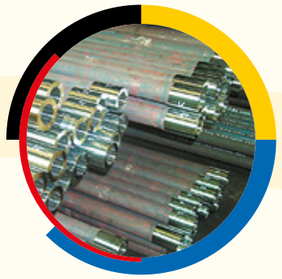
- OCTG drill pipes for oil and gas field
- Drill pipes and tools for DTH, rotary drilling and RC drilling
- Drill pipes and accessories for horizontal directional drilling

mts Perforator® Oil and Gasfield Drill Pipes

- ✓ 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



1. Engineering



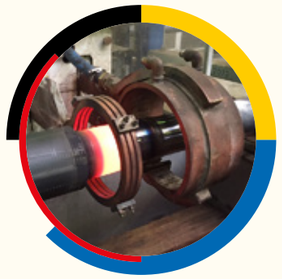
2. Pipes



3. Hardbanding



4. Friction Welding



5. Heat Treatment



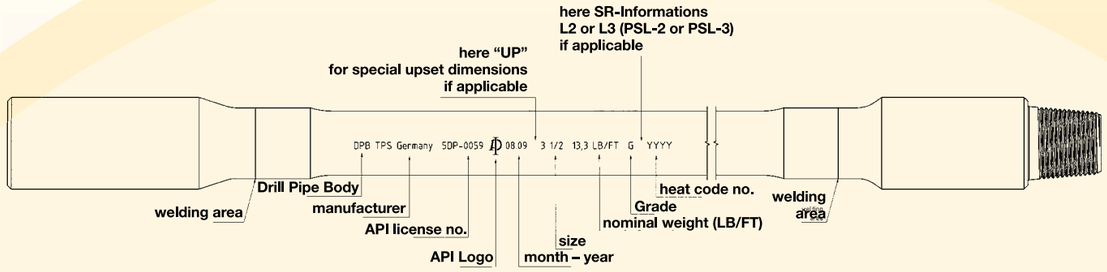
6. Inspection

5DP0071
7-1-0051

Standard Practice for Marking Tool Joints and Drill Pipe

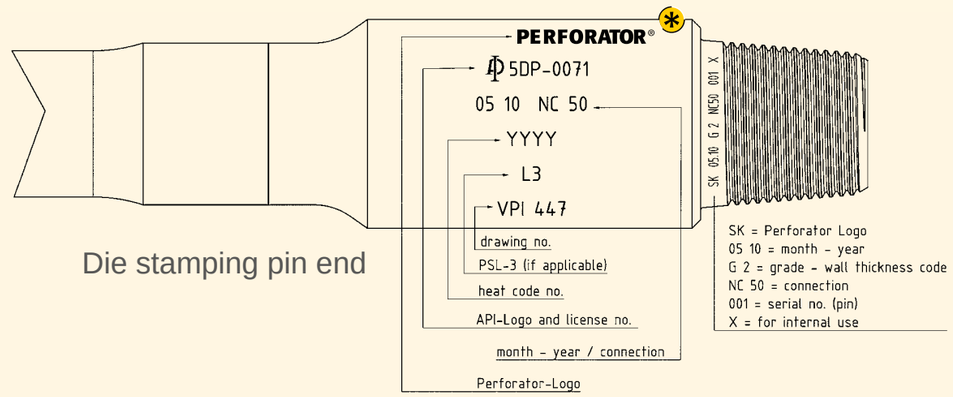
Drill Pipe Marking

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

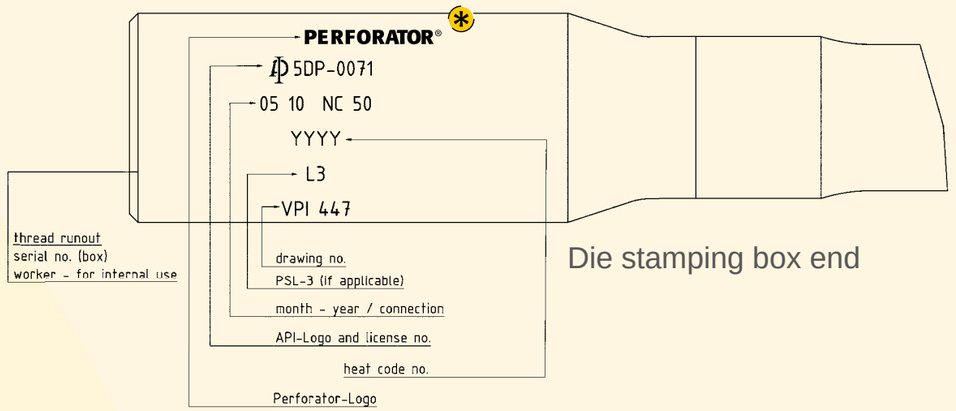


Tool Joint Marking

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



Die stamping pin end



Die stamping box end

exemplary illustration

Other marking on request.

mts Perforator® Drill Pipe and Tool Joint Grades

Drill Pipe

Drill Pipe Internal Upset	IU
External Upset	EU
Internal-External Upset	IEU
acc. to API Spec. 5DP	

Friction welded Tool Joints

Numbered Connections	NC
Internal Flush	IF
Full Hole	FH

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** psi N/mm² min.	psi N/mm² max.	**Tensile strength** psi N/mm² min.	**Elongation**[1] **in 2 inches** % **min.**	**API**
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 psi N/mm² min.	**Tensile strength** psi N/mm² min.	**Elongation** **in 2 inches** % **min.**	Box Hardness Brinell min.	API
120 000 827	**140 000** 965	**13**	**285**	Spec. 5DP

[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:

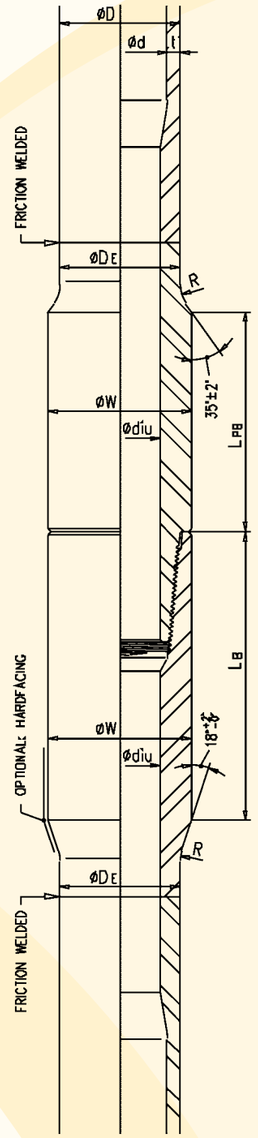
e = minimum elongation in 2 inches (50.80 mm) in percent rounded to nearest ½ percent.

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.

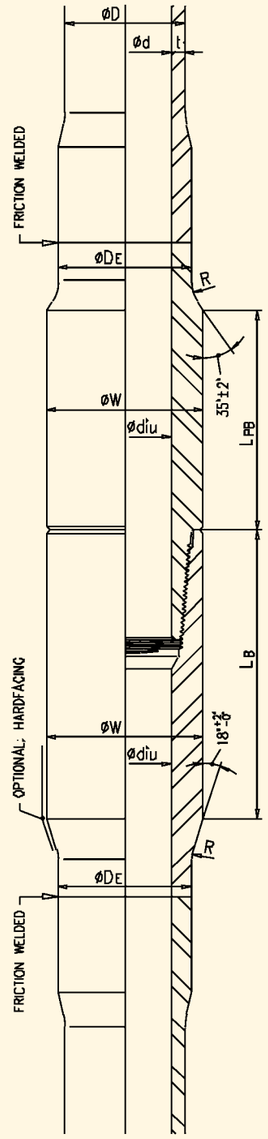
U = specified tensile strength, psi.

Dimensions of Drill Pipe with Friction Welded Tool Joints

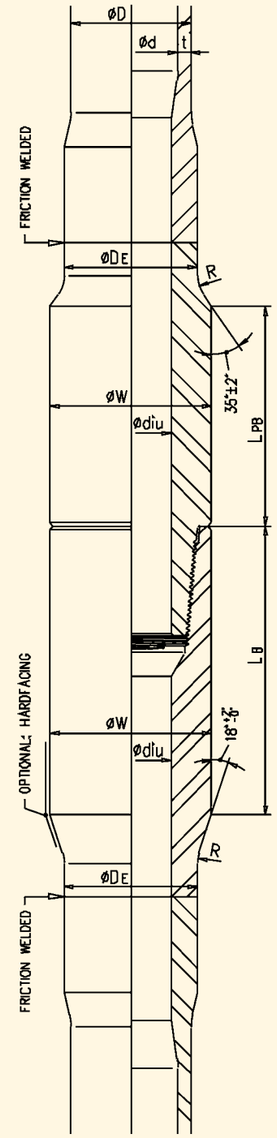
Internal Upset
IU



External Upset
EU



Internal-External Upset
IEU



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

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	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 Dis-place-ment **
							Pipe				Tool Joint				Outside	Inside	Elevator Upset	Pin	Box	Pin	Box					
							Collapse Resistance	Internal Yield Pressure	Tensile Yield	Torsional Yield	Tensile Yield	Torsional Yield															
D		t	d	A			P_c	P_i							W	d_{iu}	DE	LPB	LB	AP	AB					
in.	**lb/ft**	**in.**		**sq.in.**			**psi**		**lb**	**ft-lb**	**lb**	**ft-lb**			**in.**					**sq.in.**		**lb/ft**	**ft-lb**		**US gal./ft**	
mm	kg/m	mm		cm^2			bar		kN	Nm	kN	Nm			mm					cm^2		kg/m	Nm		l/m	
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**		**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**
60,3	9,90	7,11	46,10	11,89			1 076	1 067	615	8 470	1 396	9 220			85,7	44,5	65,1	177,8	203,2	16,33	15,85	10,5	4 750		1,664	2,993
					EU	**X**	**19 760**	**19 600**	**175 080**	**7 920**	**313 680**	**6 800**		**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**	**0.86**	**0.134**	**0.241**
							1 362	1 351	779	10 740	1 396	9 220			85,7	44,5	65,1	177,8	203,2	16,33	15,85	10,5	4 750		1,664	2,993
					EU	**G**	**21 840**	**21 660**	**193 500**	**8 750**	**313 680**	**6 800**		**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**
							1 506	1 493	861	11 860	1 396	9 220			85,7	44,5	65,1	177,8	203,2	16,33	15,85	10,5	4 750		1,664	2,993
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**		**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**
73,0	10,19	5,51	62,00	11,69			722	683	605	10 960	1 990	16 090			104,8	54,0	81,0	177,8	228,6	23,40	27,98	11,5	8 050		2,96	4,42
					EU	**X**	**12 940**	**12 548**	**172 143**	**10 238**	**447 131**	**11 871**		**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**
							892	865	766	13 880	1 990	16 090			104,8	54,0	81,0	177,8	228,6	23,40	27,98	11,5	8 050		2,96	4,42
					EU	**G**	**14 020**	**13 869**	**190 263**	**11 316**	**447 131**	**11 871**		**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**
							967	956	847	15 340	1 990	16 090			104,8	54,0	81,0	177,8	228,6	23,40	27,98	11,5	8 050		2,96	4,42
2 7/8	**8.60**	**0.308**	**2.260**	**2.4831**	**EU**	**E**	**14 348**	**14 061**	**186 290**	**10 413**	**313 682**	**6 875**		**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**
73,0	12,80	7,82	57,40	16,02			989	970	829	14 120	1 396	9 320			85,7	44,5	76,2	177,8	203,2	16,33	15,85	13,9	4 660		2,497	4,260
											447 131	**11 871**		**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**
											1 990	16 090			104,8	54,0	81,0	177,8	228,6	23,40	27,98	14,6	8 050		2,56	4,42
					EU	**X**	**18 174**	**17 810**	**235 967**	**13 190**	**313 682**	**6 875**		**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**
							1 253	1 228	1 050	17 880	1 396	9 320			85,7	44,5	76,2	177,8	203,2	16,33	15,85	13,9	4 660		2,50	4,26
											447 131	**11 871**		**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**
											1 990	16 090			104,8	54,0	81,0	177,8	228,6	23,40	27,98	14,6	8 050		2,56	4,42
					EU	**G**	**20 087**	**19 685**	**260 805**	**14 578**	**313 682**	**6 875**		**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**
							1 385	1 357	1 161	19 760	1 396	9 320			85,7	44,5	76,2	177,8	203,2	16,33	15,85	13,9	4 660		2,50	4,26
											447 131	**11 871**		**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**	**0.81**	**0.206**	**0.356**
											1 990	16 090			104,8	54,0	81,0	177,8	228,6	23,40	27,98	14,6	8 050		2,56	4,42
					EU	**S**	**25 826**	**25 310**	**335 321**	**18 743**	**495 727**	**13 196**		**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**
							1 781	1 745	1 492	25 410	2 206	17 890			104,8	50,8	81,0	177,8	228,6	26,01	27,98	14,8	8 950		2,53	4,42
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**		**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**
73,0	15,48	9,19	54,64	18,44			1 138	1 139	954	15 660	1 990	16 090			104,8	54,0	81,0	177,8	228,6	23,40	27,98	16,3	8 050		2,348	4,422
					EU	**X**	**20 911**	**20 933**	**271 504**	**14 635**	**495 727**	**13 196**		**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**
							1 442	1 443	1 208	19 840	2 206	17 890			104,8	50,8	81,0	177,8	228,6	26,01	27,98	16,5	8 950		2,32	4,42
											447 131	**11 871**		**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**
											1 990	16 090			104,8	54,0	81,0	177,8	228,6	23,40	27,98	16,3	8 050		2,35	4,42
					EU	**G**	**23 112**	**23 137**	**300 083**	**16 176**	**495 727**	**13 196**		**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**
							1 594	1 595	1 335	21 930	2 206	17 890			104,8	50,8	81,0	177,8	228,6	26,01	27,98	16,5	8 950		2,32	4,42
					EU	**S**	**29 716**	**29 747**	**385 821**	**20 800**	**623 846**	**16 946**		**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**
							2 049	2 051	1 717	28 200	2 776	22 980			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.

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	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 Dis-placement **
							Pipe				Tool Joint				Outside	Inside	Elevator Upset	Pin	Box	Pin	Box					
							Collapse Resistance	Internal Yield Pressure	Tensile Yield	Torsional Yield	Tensile Yield	Torsional Yield															
D		t	d	A			P_c	P_i							W	d_{iu}	DE	LPB	LB	AP	AB					
in.	**lb/ft**	**in.**		**sq.in.**			**psi**		**lb**	**ft-lb**	**lb**	**ft-lb**			**in.**					**sq.in.**		**lb/ft**	**ft-lb**		**US gal./ft**	
mm	kg/m	mm		cm^2			bar		kN	Nm	kN	Nm			mm					cm^2		kg/m	Nm		l/m	
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**		**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**
88,9	14,14	6,45	76,00	16,71			690	657	864	19 180	1 868	17 370			120,7	76,2	98,4	203,2	266,7	21,79	32,59	15,6	8 690		4,546	6,521
											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	**13.30**	**0.368**	**2.764**	**3.6209**	**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**
88,9	19,79	9,35	70,21	23,36			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	6,521
					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	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	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

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	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 Dis-placement **
							Pipe				Tool Joint				Outside	Inside	Elevator Upset	Pin	Box	Pin	Box					
							Collapse Resistance	Internal Yield Pressure	Tensile Yield	Torsional Yield	Tensile Yield	Torsional Yield															
D		t	d	A			P_c	P_i							W	d_{iu}	DE	LPB	LB	AP	AB					
in.	**lb/ft**	**in.**		**sq.in.**			**psi**		**lb**	**ft-lb**	**lb**	**ft-lb**			**in.**					**sq.in.**		**lb/ft**	**ft-lb**		**US gal./ft**	
mm	kg/m	mm		cm^2			bar		kN	Nm	kN	Nm			mm					cm^2		kg/m	Nm		l/m	
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**		**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**
88,9	23,07	11,40	66,09	27,77			1 156	1 161	1 436	28 590	2 889	27 560			127,0	65,1	98,4	203,2	266,7	34,13	44,94	24,8	13 780		3,428	6,596
											708 065	**22 213**		**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			127,0	61,9	98,4	203,2	266,7	37,30	44,94	25,1	15 060		3,39	6,60
											649 160	**19 174**		**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			120,7	65,1	98,4	203,2	266,7	34,13	32,59	24,3	13 000		3,43	6,52
											708 065	**19 174**		**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**	**0.91**	**0.273**	**0.525**
											3 151	26 000			120,7	61,9	98,4	203,2	266,7	37,30	32,59	24,5	13 000		3,39	6,52
					EU	**X**	**21 250**	**21 330**	**408 849**	**26 708**	**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**	**0.76**	**0.276**	**0.531**
							1 465	1 471	1 819	36 210	2 889	27 560			127,0	65,1	98,4	203,2	266,7	34,13	44,94	24,8	13 780		3,43	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**	**16.84**	**11 106**	**0.83**	**0.273**	**0.531**
											3 151	30 120			127,0	61,9	98,4	203,2	266,7	37,30	44,94	25,1	15 060		3,39	6,60
					EU	**G**	**23 480**	**23 570**	**451 886**	**29 520**	**842 442**	**26 515**		**NC 38 (3 1/2 IF)**	**5**	**2 1/8**	**3 7/8**	**8**	**10.5**	**6.900**	**6.966**	**17.19**	**13 258**	**0.90**	**0.268**	**0.531**
							1 619	1 625	2 011	40 020	3 749	35 950			127,0	54,0	98,4	203,2	266,7	44,52	44,94	25,6	17 980		3,33	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**	**16.84**	**11 106**	**0.75**	**0.273**	**0.531**
											3 151	30 120			127,0	61,9	98,4	203,2	266,7	37,30	44,94	25,1	15 060		3,39	6,60
											838 258	**27 760**		**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**
											3 730	37 640			133,4	65,1	98,4	177,8	254,0	44,24	46,84	25,4	18 820		3,43	6,67
					EU	**S**	**30 190**	**30 310**	**580 996**	**37 954**	**979 999**	**32 943**		**NC 40 (4 FH)**	**5 1/2**	**2 1/4**	**3 7/8**	**7**	**10**	**8.038**	**9.371**	**17.81**	**16 472**	**0.87**	**0.271**	**0.543**
							2 082	2 090	2 585	51 460	4 361	44 660			139,7	57,2	98,4	177,8	254,0	51,86	60,46	26,5	22 330		3,37	6,74

* 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	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 Dis-place-ment **
							Pipe				Tool Joint				Outside	Inside	Elevator Upset	Pin	Box	Pin	Box					
							Collapse Resistance	Internal Yield Pressure	Tensile Yield	Torsional Yield	Tensile Yield	Torsional Yield															
D		t	d	A			P_c	P_i							W	d_{iu}	DE	LPB	LB	AP	AB					
in.	**lb/ft**	**in.**		**sq.in.**			**psi**		**lb**	**ft-lb**	**lb**	**ft-lb**			**in.**					**sq.in.**		**lb/ft**	**ft-lb**		**US gal./ft**	
mm	kg/m	mm		cm^2			bar		kN	Nm	kN	Nm			mm					cm^2		kg/m	Nm		l/m	
4	**14.00**	**0.330**	**3.340**	**3.8048**	**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**
101,6	20,83	8,38	84,84	24,55			783	747	1 270	31 570	3 167	31 840			133,4	71,4	106,4	177,8	254,0	37,43	46,84	22,9	15 920		5,503	8,422
					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			152,4	82,6	114,3	177,8	254,0	47,50	63,57	23,9	22 800		5,63	8,68
											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			146,1	82,6	114,3	177,8	254,0	47,50	48,68	23,3	22 550		5,63	8,61
					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			133,4	68,3	106,4	177,8	254,0	40,92	46,84	23,1	17 400		5,48	8,42
											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			133,4	71,4	106,4	177,8	254,0	37,43	46,84	22,9	15 920		5,50	8,42
					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			152,4	82,6	114,3	177,8	254,0	47,50	63,57	23,9	22 800		5,63	8,68
											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			146,1	82,6	114,3	177,8	254,0	47,50	48,68	23,3	22 550		5,63	8,61
					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			139,7	61,9	106,4	177,8	254,0	47,41	60,46	24,1	20 410		5,42	8,48
											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			133,4	68,3	106,4	177,8	254,0	40,92	46,84	23,1	17 400		5,48	8,42
					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			152,4	82,6	114,3	177,8	254,0	47,50	63,57	23,9	22 800		5,63	8,68
											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			146,1	82,6	114,3	177,8	254,0	47,50	48,68	23,3	22 550		5,63	8,61
					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			139,7	50,8	106,4	177,8	254,0	57,25	60,46	24,8	24 650		5,33	8,48
											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			133,4	65,1	106,4	177,8	254,0	44,24	46,84	23,3	18 820		5,44	8,42
					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			152,4	76,2	114,3	177,8	254,0	55,42	63,57	24,5	26 590		5,56	8,68
											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			146,1	76,2	114,3	177,8	254,0	55,42	48,68	23,8	23 090		5,56	8,61
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**		**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**
114,3	20,46	6,88	100,53	23,23			494	545	1 202	35 130	3 663	41 560			152,4	85,7	119,1	177,8	254,0	43,30	63,57	23,1	20 780		7,738	10,682
					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			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. ** 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	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 Dis-placement **
							Pipe				Tool Joint				Outside	Inside	Elevator Upset	Pin	Box	Pin	Box					
							Collapse Resistance	Internal Yield Pressure	Tensile Yield	Torsional Yield	Tensile Yield	Torsional Yield															
D		t	d	A			P_c	P_i							W	d_{iu}	DE	LPB	LB	AP	AB					
in.	**lb/ft**	**in.**		**sq.in.**			**psi**		**lb**	**ft-lb**	**lb**	**ft-lb**			**in.**					**sq.in.**		**lb/ft**	**ft-lb**		**US gal./ft**	
mm	kg/m	mm		cm^2			bar		kN	Nm	kN	Nm			mm					cm^2		kg/m	Nm		l/m	
4 1/2	**16.60**	**0.337**	**3.826**	**4.4074**	**IEU**	**E**	**10 390**	**9 830**	**330 559**	**30 807**	**901 167**	**33 994**		**NC 46 (4 IF)**	**6 1/4**	**3 1/4**	**4 11/16**	**7**	**10**	**7.363**	**12.258**	**18.62**	**16 997**	**1.10**	**0.582**	**0.867**
114,3	24,70	8,56	97,18	28,43			716	678	1 471	41 770	4 010	46 090			158,8	82,6	119,1	177,8	254,0	47,50	79,08	27,7	23 040		7,229	10,769
											713 424	**26 620**		**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**
											3 175	36 090			152,4	82,6	119,1	177,8	254,0	47,50	63,57	27,1	18 050		7,23	10,68
					EU	**E**	**10 390**	**9 830**	**330 559**	**30 807**	**939 098**	**37 676**		**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**
							716	678	1 471	41 770	4 179	51 080			161,9	95,3	127,0	177,8	254,0	49,45	66,35	27,1	25 540		7,40	10,84
											939 098	**37 485**		**NC 50 (4 1/2 IF)**	**6 1/4**	**3 3/4**	**5**	**7**	**10**	**7.665**	**9.044**	**17.97**	**18 742**	**1.22**	**0.596**	**0.870**
											4 179	50 820			158,8	95,3	127,0	177,8	254,0	49,45	58,35	26,7	25 410		7,40	10,81
					IEU	**E**	**10 390**	**9 830**	**330 559**	**30 807**	**976 158**	**34 780**		**4 1/2 FH**	**6**	**3**	**4 11/16**	**7**	**10**	**7.919**	**10.320**	**18.58**	**17 390**	**1.13**	**0.576**	**0.860**
							716	678	1 471	41 770	4 344	47 150			152,4	76,2	119,1	177,8	254,0	51,09	66,58	27,7	23 580		7,15	10,68
											976 158	**34 384**		**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**
											4 344	46 620			146,1	76,2	119,1	177,8	254,0	51,09	51,70	27,1	23 310		7,15	10,61
					IEU	**X**	**12 760**	**12 450**	**418 708**	**39 022**	**1 048 429**	**39 659**		**NC 46 (4 IF)**	**6 1/4**	**3**	**4 11/16**	**7**	**10**	**8.590**	**12.258**	**18.99**	**19 830**	**1.02**	**0.577**	**0.867**
							880	858	1 863	52 910	4 666	53 770			158,8	76,2	119,1	177,8	254,0	55,42	79,08	28,3	26 890		7,17	10,77
											901 167	**33 994**		**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**
											4 010	46 090			158,8	82,6	119,1	177,8	254,0	47,50	79,08	27,7	23 040		7,23	10,77
											901 167	**33 625**		**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**
											4 010	45 590			152,4	82,6	119,1	177,8	254,0	47,50	63,57	27,1	22 800		7,23	10,68
					EU	**X**	**12 760**	**12 450**	**418 708**	**39 022**	**939 098**	**37 676**		**NC 50 (4 1/2 IF)**	**6 3/8**	**3 3/4**	**5**	**7**	**10**	**7.665**	**10.284**	**18.18**	**18 838**	**0.97**	**0.596**	**0.873**
							880	858	1 863	52 910	4 179	51 080			161,9	95,3	127,0	177,8	254,0	49,45	66,35	27,1	25 540		7,40	10,84
											939 098	**37 485**		**NC 50 (4 1/2 IF)**	**6 1/4**	**3 3/4**	**5**	**7**	**10**	**7.665**	**9.044**	**17.97**	**18 742**	**0.96**	**0.596**	**0.870**
											4 179	50 820			158,8	95,3	127,0	177,8	254,0	49,45	58,35	26,7	25 410		7,40	10,81
					IEU	**X**	**12 760**	**12 450**	**418 708**	**39 022**	**976 158**	**34 780**		**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**
							880	858	1 863	52 910	4 344	47 150			152,4	76,2	119,1	177,8	254,0	51,09	66,58	27,7	23 580		7,15	10,68
											976 158	**34 384**		**4 1/2 FH**	**5 3/4**	**3**	**4 11/16**	**7**	**10**	**7.919**	**8.013**	**18.18**	**17 192**	**0.88**	**0.576**	**0.854**
											4 344	46 620			146,1	76,2	119,1	177,8	254,0	51,09	51,70	27,1	23 310		7,15	10,61
					IEU	**G**	**13 820**	**13 760**	**462 782**	**43 130**	**1 048 429**	**39 659**		**NC 46 (4 IF)**	**6 1/4**	**3**	**4 11/16**	**7**	**10**	**8.590**	**12.258**	**18.99**	**19 830**	**0.92**	**0.577**	**0.867**
							953	949	2 059	58 480	4 666	53 770			158,8	76,2	119,1	177,8	254,0	55,42	79,08	28,3	26 890		7,17	10,77
											1 048 429	**39 230**		**NC 46 (4 IF)**	**6**	**3**	**4 11/16**	**7**	**10**	**8.590**	**9.853**	**18.55**	**19 615**	**0.91**	**0.577**	**0.860**
											4 666	53 190			152,4	76,2	119,1	177,8	254,0	55,42	63,57	27,6	26 590		7,17	10,68
					EU	**G**	**13 820**	**13 760**	**462 782**	**43 130**	**939 098**	**37 676**		**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**
							953	949	2 059	58 480	4 179	51 080			161,9	95,3	127,0	177,8	254,0	49,45	66,35	27,1	25 540		7,40	10,84
											939 098	**37 485**		**NC 50 (4 1/2 IF)**	**6 1/4**	**3 3/4**	**5**	**7**	**10**	**7.665**	**9.004**	**17.97**	**18 742**	**0.87**	**0.596**	**0.870**
											4 179	50 820			158,8	95,3	127,0	177,8	254,0	49,45	58,09	26,7	25 410		7,40	10,81
					IEU	**G**	**13 820**	**13 760**	**462 782**	**43 130**	**976 158**	**34 780**		**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**
							953	949	2 059	58 480	4 344	47 150			152,4	76,2	119,1	177,8	254,0	51,09	66,58	27,7	23 580		7,15	10,68
											976 158	**34 384**		**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**
											4 344	46 620			146,1	76,2	119,1	177,8	254,0	51,09	51,70	27,1	23 310		7,15	10,61
					IEU	**S**	**16 770**	**17 690**	**595 005**	**55 453**	**1 183 911**	**44 871**		**NC 46 (4 IF)**	**6 1/4**	**2 3/4**	**4 11/16**	**7**	**10**	**9.719**	**12.258**	**19.32**	**22 436**	**0.81**	**0.572**	**0.867**
							1 156	1 220	2 648	75 180	5 268	60 840			158,8	69,9	119,1	177,8	254,0	62,70	79,08	28,8	30 420		7,10	10,77
											1 048 429	**39 659**		**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**
											4 666	53 770			158,8	76,2	119,1	177,8	254,0	55,42	79,08	28,3	26 890		7,17	10,77
					EU	**S**	**16 770**	**17 690**	**595 005**	**55 453**	**1 109 923**	**44 673**		**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**
							1 156	1 220	2 648	75 180	4 939	60 570			161,9	88,9	127,0	177,8	254,0	58,64	66,35	27,7	30 280		7,32	10,84
											1 109 923	**44 166**		**NC 50 (4 1/2 IF)**	**6 1/4**	**3 1/2**	**5**	**7**	**10**	**9.089**	**9.044**	**18.40**	**22 083**	**0.80**	**0.589**	**0.870**
											4 939	59 880			158,8	88,9	127,0	177,8	254,0	58,64	58,35	27,4	29 940		7,32	10,81
					IEU	**S**	**16 770**	**17 690**	**595 005**	**55 453**	**1 235 340**	**44 769**		**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**
							1 156	1 220	2 648	75 180	5 497	60 700			158,8	63,5	119,1	177,8	254,0	65,03	82,10	29,3	30 350		7,03	10,77
											976 158	**34 780**		**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**
											4 344	47 150			152,4	76,2	119,1	177,8	254,0	51,09	66,58	27,7	23 580		7,15	10,68
											976 158	**34 384**		**4 1/2 FH**	**5 3/4**	**3**	**4 11/16**	**7**	**10**	**7.919**	**8.013**	**18.18**	**17 192**	**0.62**	**0.576**	**0.854**
											4 344	46 620			146,1	76,2	119,1	177,8	254,0	51,09	51,70	27,1	23 310		7,15	10,61

* 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	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 Dis-placement **
							Pipe				Tool Joint				Outside	Inside	Elevator Upset	Pin	Box	Pin	Box					
							Collapse Resistance	Internal Yield Pressure	Tensile Yield	Torsional Yield	Tensile Yield	Torsional Yield															
D		t	d	A			P_c	P_i							W	d_{iu}	DE	LPB	LB	AP	AB					
in.	**lb/ft**	**in.**		**sq.in.**			**psi**		**lb**	**ft-lb**	**lb**	**ft-lb**			**in.**					**sq.in.**		**lb/ft**	**ft-lb**		**US gal./ft**	
mm	kg/m	mm		cm^2			bar		kN	Nm	kN	Nm			mm					cm^2		kg/m	Nm		l/m	
4 1/2	**20.00**	**0.430**	**3.640**	**5.4981**	**IEU**	**E**	**12 960**	**12 540**	**412 359**	**36 901**	**1 048 429**	**39 659**		**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**
114,3	29,76	10,92	92,46	35,47			894	865	1 835	50 030	4 666	53 770			158,8	76,2	119,1	177,8	254,0	55,42	79,08	33,3	26 890		6,521	10,769
											1 048 429	**39 230**		**NC 46 (4 IF)**	**6**	**3**	**4 11/16**	**7**	**10**	**8.590**	**9.853**	**21.92**	**19 615**	**1.06**	**0.525**	**0.860**
											4 666	53 190			152,4	76,2	119,1	177,8	254,0	55,42	63,57	32,6	26 590		6,52	10,68
					EU	**E**	**12 960**	**12 540**	**412 359**	**36 901**	**1 025 983**	**41 235**		**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**
							894	865	1 835	50 030	4 566	55 910			161,9	92,1	127,0	177,8	254,0	54,12	66,35	32,4	27 950		6,72	10,84
											1 025 983	**41 025**		**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**
											4 566	55 620			158,8	92,1	127,0	177,8	254,0	54,12	58,35	32,1	27 810		6,72	10,81
					IEU	**E**	**12 960**	**12 540**	**412 359**	**36 901**	**976 158**	**34 780**		**4 1/2 FH**	**6**	**3**	**4 11/16**	**7**	**10**	**7.919**	**10.320**	**21.94**	**17 390**	**0.94**	**0.525**	**0.860**
							894	865	1 835	50 030	4 344	47 150			152,4	76,2	119,1	177,8	254,0	51,09	66,58	32,7	23 580		6,52	10,68
					IEU	**X**	**16 420**	**15 890**	**522 321**	**46 741**	**1 183 911**	**44 871**		**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**
							1 132	1 096	2 324	63 370	5 268	60 840			158,8	69,9	119,1	177,8	254,0	62,70	79,08	33,8	30 420		6,46	10,77
											1 048 429	**39 659**		**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**
											4 666	53 770			158,8	76,2	119,1	177,8	254,0	55,42	79,08	33,3	26 890		6,52	10,77
					EU	**X**	**16 420**	**15 890**	**522 321**	**46 741**	**1 025 983**	**41 235**		**NC 50 (4 1/2 IF)**	**6 3/8**	**3 5/8**	**5**	**7**	**10**	**8.389**	**10.284**	**21.76**	**20 617**	**0.88**	**0.541**	**0.873**
							1 132	1 096	2 324	63 370	4 566	55 910			161,9	92,1	127,0	177,8	254,0	54,12	66,35	32,4	27 950		6,72	10,84
											1 109 923	**44 673**		**NC 50 (4 1/2 IF)**	**6 3/8**	**3 1/2**	**5**	**7**	**10**	**9.089**	**10.284**	**21.98**	**22 336**	**0.96**	**0.538**	**0.873**
											4 939	60 570			161,9	88,9	127,0	177,8	254,0	58,64	66,35	32,7	30 280		6,68	10,84
					IEU	**X**	**16 420**	**15 890**	**522 321**	**46 741**	**1 235 340**	**44 265**		**4 1/2 FH**	**6**	**2 1/2**	**4 11/16**	**7**	**10**	**10.079**	**10.320**	**22.59**	**22 133**	**0.95**	**0.515**	**0.860**
							1 132	1 096	2 324	63 370	5 497	60 010			152,4	63,5	119,1	177,8	254,0	65,03	66,58	33,6	30 010		6,40	10,68
					IEU	**G**	**18 150**	**17 560**	**577 302**	**51 661**	**1 307 611**	**49 630**		**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**
							1 251	1 211	2 569	70 040	5 819	67 290			158,8	63,5	119,1	177,8	254,0	69,35	79,08	34,2	33 640		6,41	10,77
											1 235 340	**44 265**		**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**
											5 497	60 010			152,4	63,5	119,1	177,8	254,0	65,03	66,58	33,6	30 010		6,40	10,68
											1 048 429	**39 659**		**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**
											4 666	53 770			158,8	76,2	119,1	177,8	254,0	55,42	79,08	33,3	26 890		6,52	10,77
					EU	**G**	**18 150**	**17 560**	**577 302**	**51 661**	**1 109 923**	**44 673**		**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**	**0.532**	**0.873**
							1 251	1 211	2 569	70 040	4 939	60 570			161,9	82,6	127,0	177,8	254,0	67,19	66,35	32,7	34 220		6,61	10,84
											1 268 966	**50 484**		**NC 50 (4 1/2 IF)**	**6 3/8**	**3 1/4**	**5**	**7**	**10**	**10.414**	**10.284**	**22.37**	**25 242**	**0.98**	**0.532**	**0.873**
											5 647	68 450			161,9	82,6	127,0	177,8	254,0	67,19	66,35	33,3	34 220		6,61	10,84
					IEU	**S**	**23 330**	**22 570**	**742 246**	**66 422**	**1 419 531**	**53 936**		**NC 46 (4 IF)**	**6 1/4**	**2 1/4**	**4 11/16**	**7**	**10**	**11.683**	**12.258**	**23.25**	**26 968**	**0.81**	**0.511**	**0.867**
							1 609	1 556	3 303	90 050	6 317	73 130			158,8	57,2	119,1	177,8	254,0	75,37	79,08	34,6	36 560		6,35	10,77
											1 183 911	**44 871**		**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**
											5 268	60 840			158,8	69,9	119,1	177,8	254,0	62,70	79,08	33,8	30 420		6,46	10,77
					EU	**S**	**23 330**	**22 570**	**742 246**	**66 422**	**1 416 229**	**50 484**		**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**
							1 609	1 556	3 303	90 050	6 302	68 450			161,9	76,2	127,0	177,8	254,0	75,11	66,35	33,8	34 220		6,53	10,84
											1 416 229	**57 801**		**NC 50 (4 1/2 IF)**	**6 5/8**	**3**	**5**	**7**	**10**	**11.642**	**12.836**	**23.20**	**28 900**	**0.87**	**0.526**	**0.880**
											6 302	78 370			168,3	76,2	127,0	177,8	254,0	75,11	82,81	34,5	39 180		6,53	10,93
											1 268 966	**50 484**		**NC 50 (4 1/2 IF)**	**6 3/8**	**3 1/4**	**5**	**7**	**10**	**10.414**	**10.284**	**22.37**	**25 242**	**0.76**	**0.532**	**0.873**
											5 647	68 450			161,9	82,6	127,0	177,8	254,0	67,19	66,35	33,3	34 220		6,61	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

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	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 Dis-place-ment **
							Pipe				Tool Joint				Outside	Inside	Elevator Upset	Pin	Box	Pin	Box					
							Collapse Resistance	Internal Yield Pressure	Tensile Yield	Torsional Yield	Tensile Yield	Torsional Yield															
D		t	d	A			P_c	P_i							W	d_{iu}	DE	LPB	LB	AP	AB					
in.	**lb/ft**	**in.**		**sq.in.**			**psi**		**lb**	**ft-lb**	**lb**	**ft-lb**			**in.**					**sq.in.**		**lb/ft**	**ft-lb**		**US gal./ft**	
mm	kg/m	mm		cm^2			bar		kN	Nm	kN	Nm			mm					cm^2		kg/m	Nm		l/m	
5	**16.25**	**0.296**	**4.408**	**4.3743**	**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**
127,0	24,18	7,52	111,96	28,22			479	536	1 460	47 510	4 179	51 080			161,9	95,3	130,2	177,8	254,0	49,45	66,35	27,3	25 540		9,602	13,079
					IEU	**X**	**8 110**	**9 840**	**415 560**	**44 389**	**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**	**0.85**	**0.773**	**1.053**
							559	678	1 849	60 180	4 179	51 080			161,9	95,3	130,2	177,8	254,0	49,45	66,35	27,3	25 540		9,60	13,08
					IEU	**G**	**8 620**	**10 880**	**459 303**	**49 062**	**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**	**0.77**	**0.773**	**1.053**
							594	750	2 044	66 520	4 179	51 080			161,9	95,3	130,2	177,8	254,0	49,45	66,35	27,3	25 540		9,60	13,08
					IEU	**S**	**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			161,9	88,9	130,2	177,8	254,0	58,64	66,35	27,9	30 280		9,51	13,08
5	**19.50**	**0.362**	**4.276**	**5.2746**	**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**
127,0	29,02	9,19	108,61	34,03			687	655	1 760	55 810	4 179	51 080			161,9	95,3	130,2	177,8	254,0	49,45	66,35	31,4	25 540		9,080	13,079
											939 098	**37 868**		**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**
											4 179	51 340			165,1	95,3	130,2	177,8	254,0	67,19	66,35	31,7	25 670		9,08	13,12
											939 098	**37 485**		**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**
											4 179	50 820			158,8	95,3	130,2	177,8	254,0	49,45	58,35	31,1	25 410		9,08	13,04
					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			161,9	95,3	130,2	177,8	254,0	49,45	66,35	31,4	25 540		9,08	13,08
											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**	**21.53**	**22 336**	**0.86**	**0.724**	**1.053**
											4 939	60 570			161,9	88,9	130,2	177,8	254,0	58,64	66,35	32,0	30 280		8,99	13,08
					IEU	**G**	**13 000**	**13 300**	**553 834**	**57 633**	**1 109 923**	**44 900**		**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**
							896	917	2 465	78 140	4 939	60 880			165,1	88,9	130,2	177,8	254,0	58,64	74,50	32,4	30 440		8,99	13,12
											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**	**21.53**	**22 336**	**0.78**	**0.724**	**1.053**
											4 939	60 570			161,9	88,9	130,2	177,8	254,0	58,64	66,35	32,0	30 280		8,99	13,08
											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**
											5 647	69 750			165,1	82,6	130,2	177,8	254,0	67,19	74,50	33,0	34 880		8,92	13,12
					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**	**0.69**	**0.718**	**1.056**
							1 080	1 179	3 169	100 460	5 647	69 750			165,1	82,6	130,2	177,8	254,0	67,19	74,50	33,0	34 880		8,92	13,12
											1 416 229	**56 985**		**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**
											6 302	77 260			165,1	76,2	130,2	177,8	254,0	75,11	74,50	33,5	38 630		8,84	13,12
											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**	**23.07**	**31 703**	**0.86**	**0.708**	**1.060**
											6 905	85 970			168,3	69,9	130,2	177,8	254,0	82,39	82,81	34,3	42 980		8,79	13,17
											1 619 235	**72 483**		**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**
											7 206	98 270			184,2	88,9	130,2	203,2	254,0	85,91	93,34	34,9	49 140		8,99	13,44

* 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	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 Dis-placement **
							Pipe				Tool Joint				Outside	Inside	Elevator Upset	Pin	Box	Pin	Box					
							Collapse Resistance	Internal Yield Pressure	Tensile Yield	Torsional Yield	Tensile Yield	Torsional Yield															
D		t	d	A			P_c	P_i							W	d_{iu}	DE	LPB	LB	AP	AB					
in.	**lb/ft**	**in.**		**sq.in.**			**psi**		**lb**	**ft-lb**	**lb**	**ft-lb**			**in.**					**sq.in.**		**lb/ft**	**ft-lb**		**US gal./ft**	
mm	kg/m	mm		cm^2			bar		kN	Nm	kN	Nm			mm					cm^2		kg/m	Nm		l/m	
5	**25.60**	**0.500**	**4.000**	**7.0686**	**IEU**	**E**	**13 500**	**13 120**	**530 145**	**52 257**	**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**
127,0	38,10	12,70	101,60	45,60			931	905	2 359	70 850	4 939	60 570			161,9	88,9	130,2	177,8	254,0	58,64	66,35	40,3	30 280		7,937	13,079
											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			161,9	95,3	130,2	177,8	254,0	49,45	66,35	39,7	25 540		8,02	13,08
					IEU	**X**	**17 100**	**16 620**	**671 517**	**66 192**	**1 109 923**	**44 900**		**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**
							1 179	1 146	2 988	89 740	4 939	60 880			165,1	88,9	130,2	177,8	254,0	58,64	74,50	40,6	30 440		7,94	13,12
											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			165,1	82,6	130,2	177,8	254,0	67,19	74,50	41,2	34 880		7,86	13,12
											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			165,1	76,2	130,2	177,8	254,0	75,11	74,50	41,7	38 630		7,80	13,12
											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			177,8	88,9	130,2	203,2	254,0	85,91	75,29	42,2	42 640		7,95	13,34
											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			177,8	82,6	130,2	203,2	254,0	94,46	75,29	42,8	42 640		7,87	13,34
											1 619 235	**72 483**		**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**
											7 206	98 270			184,2	88,9	130,2	203,2	254,0	85,91	93,34	43,1	49 140		7,95	13,44
											1 778 278	**78 716**		**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**
											7 913	106 720			184,2	82,6	130,2	203,2	254,0	94,46	93,34	43,6	53 360		7,87	13,44
					IEU	**G**	**18 900**	**18 380**	**742 203**	**73 160**	**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**	**0.70**	**0.633**	**1.056**
							1 303	1 267	3 303	99 190	5 647	69 750			165,1	82,6	130,2	177,8	254,0	67,19	74,50	41,2	34 880		7,86	13,12
											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			165,1	76,2	130,2	177,8	254,0	75,11	74,50	41,7	38 630		7,80	13,12
											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			168,3	69,9	130,2	177,8	254,0	82,39	82,81	42,6	42 980		7,74	13,17
											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**	**0.86**	**0.640**	**1.074**
											7 206	85 280			177,8	88,9	130,2	203,2	254,0	85,91	75,29	42,2	42 640		7,95	13,34
											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**	**0.86**	**0.634**	**1.074**
											7 913	85 280			177,8	82,6	130,2	203,2	254,0	94,46	75,29	42,8	42 640		7,87	13,34
											1 619 235	**72 483**		**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**
											7 206	98 270			184,2	88,9	130,2	203,2	254,0	85,91	93,34	43,1	49 140		7,95	13,44
											1 778 278	**78 716**		**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**
											7 913	106 720			184,2	82,6	130,2	203,2	254,0	94,46	93,34	43,6	53 360		7,87	13,44
					IEU	**S**	**24 300**	**23 620**	**954 261**	**94 062**	**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**
							1 675	1 629	4 246	127 530	7 206	85 280			177,8	88,9	130,2	203,2	254,0	85,91	75,29	42,2	42 640		7,95	13,34
											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**	**0.67**	**0.634**	**1.074**
											7 913	85 280			177,8	82,6	130,2	203,2	254,0	94,46	75,29	42,8	42 640		7,87	13,34
											1 619 235	**72 483**		**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**
											7 206	98 270			184,2	88,9	130,2	203,2	254,0	85,91	93,34	43,1	49 140		7,95	13,44
											1 778 278	**78 716**		**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**
											7 913	106 720			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. ** 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	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 Dis-place-ment **
							Pipe				Tool Joint				Outside	Inside	Elevator Upset	Pin	Box	Pin	Box					
							Collapse Resistance	Internal Yield Pressure	Tensile Yield	Torsional Yield	Tensile Yield	Torsional Yield															
D		t	d	A			P_c	P_i							W	d_{iu}	DE	LPB	LB	AP	AB					
in.	**lb/ft**	**in.**		**sq.in.**			**psi**		**lb**	**ft-lb**	**lb**	**ft-lb**			**in.**					**sq.in.**		**lb/ft**	**ft-lb**		**US gal./ft**	
mm	kg/m	mm		cm^2			bar		kN	Nm	kN	Nm			mm					cm^2		kg/m	Nm		l/m	
5 1/2	**19.20**	**0.304**	**4.892**	**4.9624**	**IEU**	**E**	**6 040**	**7 250**	**372 182**	**44 074**	**1 265 805**	**55 933**		**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**
139,7	28,57	7,72	124,26	32,02			416	500	1 656	59 760	5 633	75 830			177,8	101,6	144,5	203,2	254,0	66,91	75,29	32,2	37 920		11,75	15,86
					IEU	**X**	**6 940**	**9 190**	**471 430**	**55 827**	**1 265 805**	**55 933**		**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**
							479	634	2 098	75 690	5 633	75 830			177,8	101,6	144,5	203,2	254,0	66,91	75,29	32,2	37 920		11,75	15,86
					IEU	**G**	**7 310**	**10 160**	**521 054**	**61 703**	**1 265 805**	**55 933**		**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**
							504	701	2 319	83 660	5 633	75 830			177,8	101,6	144,5	203,2	254,0	66,91	75,29	32,2	37 920		11,75	15,86
					IEU	**S**	**8 090**	**13 060**	**669 927**	**79 330**	**1 265 805**	**55 933**		**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**
							558	900	2 981	107 560	5 633	75 830			177,8	101,6	144,5	203,2	254,0	66,91	75,29	32,2	37 920		11,75	15,86
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**		**5 1/2 FH**	**7**	**4**	**5 11/16**	**8**	**10**	**10.371**	**11.670**	**24.28**	**27 966**	**1.10**	**0.906**	**1.277**
139,7	32,59	9,17	121,36	37,60			580	594	1 945	68 750	5 633	75 830			177,8	101,6	144,5	203,2	254,0	66,91	75,29	36,1	37 920		11,254	15,862
											1 448 410	**62 903**		**5 1/2 FH**	**7**	**3 3/4**	**5 11/16**	**8**	**10**	**11.893**	**11.670**	**24.73**	**31 452**	**1.24**	**0.899**	**1.277**
											6 445	85 280			177,8	95,3	144,5	203,2	254,0	76,73	75,29	36,8	42 640		11,17	15,86
											1 401 410	**62 298**		**5 1/2 FH**	**7 3/8**	**4 11/16**	**6 9/64**	**8**	**10**	**11.480**	**10.646**	**23.94**	**31 149**	**1.23**	**0.929**	**1.295**
											6 236	84 460			187,3	119,1	156,0	203,2	254,0	74,06	68,68	35,6	42 230		11,54	16,09
					IEU	**X**	**10 020**	**10 910**	**553 682**	**64 233**	**1 265 805**	**55 933**		**5 1/2 FH**	**7**	**4**	**5 11/16**	**8**	**10**	**10.371**	**11.670**	**24.28**	**27 966**	**0.87**	**0.906**	**1.277**
							691	752	2 464	87 090	5 633	75 830			177,8	101,6	144,5	203,2	254,0	66,91	75,29	36,1	37 920		11,25	15,86
											1 448 410	**62 903**		**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**
											6 445	85 280			177,8	95,3	144,5	203,2	254,0	76,73	75,29	36,8	42 640		11,17	15,86
											1 401 410	**68 062**		**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**
											6 236	92 280			187,3	119,1	156,0	203,2	254,0	74,06	68,68	35,6	46 140		11,54	16,09
					IEU	**G**	**10 750**	**12 060**	**611 964**	**70 994**	**1 265 805**	**55 933**		**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**
							741	832	2 723	96 250	5 633	75 830			177,8	101,6	144,5	203,2	254,0	66,91	75,29	36,1	37 920		11,25	15,86
											1 448 410	**62 903**		**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**
											6 445	85 280			177,8	95,3	144,5	203,2	254,0	76,73	75,29	36,8	42 640		11,17	15,86
											1 619 235	**72 483**		**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**
											7 206	98 270			184,2	88,9	144,5	203,2	254,0	85,91	93,34	38,2	49 140		11,08	15,96
											1 401 410	**62 298**		**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**
											6 236	84 460			187,3	119,1	156,0	203,2	254,0	74,06	68,68	35,6	42 230		11,54	16,09
					IEU	**S**	**12 680**	**15 510**	**786 811**	**91 278**	**1 448 410**	**62 903**		**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**
							874	1 069	3 501	123 750	6 445	85 280			177,8	95,3	144,5	203,2	254,0	76,73	75,29	36,8	42 640		11,17	15,86
											1 619 235	**62 903**		**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**
											7 206	85 280			177,8	88,9	144,5	203,2	254,0	85,91	75,29	37,5	42 640		11,08	15,86
											1 401 410	**62 298**		**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**
											6 236	84 460			187,3	119,1	156,0	203,2	254,0	74,06	68,68	35,6	42 230		11,54	16,09
											1 925 541	**87 170**		**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**
											8 569	118 190			190,5	76,2	144,5	203,2	254,0	102,38	112,03	40,2	59 090		10,94	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	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 Dis-place-ment **
							Pipe				Tool Joint				Outside	Inside	Elevator Upset	Pin	Box	Pin	Box					
							Collapse Resistance	Internal Yield Pressure	Tensile Yield	Torsional Yield	Tensile Yield	Torsional Yield															
D		t	d	A			P_c	P_i							W	d_{iu}	DE	LPB	LB	AP	AB					
in.	**lb/ft**	**in.**		**sq.in.**			**psi**		**lb**	**ft-lb**	**lb**	**ft-lb**			**in.**					**sq.in.**		**lb/ft**	**ft-lb**		**US gal./ft**	
mm	kg/m	mm		cm^2			bar		kN	Nm	kN	Nm			mm					cm^2		kg/m	Nm		l/m	
5 1/2	**24.70**	**0.415**	**4.670**	**6.6296**	**IEU**	**E**	**10 460**	**9 900**	**497 223**	**56 574**	**1 265 805**	**55 933**		**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**
139,7	36,76	10,54	118,62	42,77			721	683	2 213	76 700	5 633	75 830			177,8	101,6	144,5	203,2	254,0	66,91	75,29	39,8	37 920		10,782	15,862
											1 510 384	**62 298**		**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**
											6 721	84 460			187,3	115,9	156,0	203,2	254,0	79,93	68,68	39,7	42 230		11,02	16,09
					IEU	**X**	**12 930**	**12 540**	**629 816**	**71 661**	**1 265 805**	**55 933**		**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**
							892	865	2 803	97 160	5 633	75 830			177,8	101,6	144,5	203,2	254,0	66,91	75,29	39,8	37 920		10,78	15,86
											1 448 410	**62 903**		**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**
											6 445	85 280			177,8	95,3	144,5	203,2	254,0	76,73	75,29	40,5	42 640		10,69	15,86
											1 265 805	**56 452**		**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**
											5 633	76 540			184,2	101,6	144,5	203,2	254,0	66,91	93,34	40,6	38 270		10,78	15,96
											1 448 410	**64 734**		**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**
											6 445	87 770			184,2	95,3	144,5	203,2	254,0	76,73	93,34	41,3	43 880		10,69	15,96
											1 619 235	**72 483**		**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**
											7 206	98 270			184,2	88,9	144,5	203,2	254,0	85,91	93,34	41,9	49 140		10,61	15,96
											1 510 384	**62 298**		**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**
											6 721	84 460			187,3	115,9	156,0	203,2	254,0	79,93	68,68	39,7	42 230		11,02	16,09
					IEU	**G**	**14 010**	**13 860**	**696 112**	**79 204**	**1 448 410**	**62 903**		**5 1/2 FH**	**7**	**3 3/4**	**5 11/16**	**8**	**10**	**11.893**	**11.670**	**27.20**	**31 452**	**0.79**	**0.861**	**1.277**
							966	956	3 098	107 380	6 445	85 280			177,8	95,3	144,5	203,2	254,0	76,73	75,29	40,5	42 640		10,69	15,86
											1 619 235	**62 903**		**5 1/2 FH**	**7**	**3 1/2**	**5 11/16**	**8**	**10**	**13.316**	**11.670**	**27.63**	**31 452**	**0.79**	**0.854**	**1.277**
											7 206	85 280			177,8	88,9	144,5	203,2	254,0	85,91	75,29	41,1	42 640		10,61	15,86
											1 448 410	**64 734**		**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**
											6 445	87 770			184,2	95,3	144,5	203,2	254,0	76,73	93,34	41,3	43 880		10,69	15,96
											1 619 235	**72 483**		**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**
											7 206	98 270			184,2	88,9	144,5	203,2	254,0	85,91	93,34	41,9	49 140		10,61	15,96
											1 510 384	**62 298**		**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**
											6 721	84 460			187,3	115,9	156,0	203,2	254,0	79,93	68,68	39,7	42 230		11,02	16,09
					IEU	**S**	**17 020**	**17 830**	**895 001**	**101 833**	**1 619 235**	**62 903**		**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**
							1 174	1 229	3 983	138 070	7 206	85 280			177,8	88,9	144,5	203,2	254,0	85,91	75,29	41,1	42 640		10,61	15,86
											1 778 278	**62 903**		**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**
											7 913	85 280			177,8	82,6	144,5	203,2	254,0	94,46	75,29	41,7	42 640		10,53	15,86
											1 619 235	**72 483**		**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**
											7 206	98 270			184,2	88,9	144,5	203,2	254,0	85,91	93,34	41,9	49 140		10,61	15,96
											1 778 278	**78 716**		**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**
											7 913	106 720			184,2	82,6	144,5	203,2	254,0	94,46	93,34	42,5	53 360		10,61	15,96
											1 510 384	**62 298**		**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**
											6 721	84 460			187,3	115,9	156,0	203,2	254,0	79,93	68,68	39,7	42 230		11,02	16,09
											1 925 541	**87 170**		**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**
											8 569	118 190			190,5	76,2	144,5	203,2	254,0	102,38	112,03	43,9	59 090		10,47	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	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 Dis-place-ment **
							Pipe				Tool Joint				Outside	Inside	Elevator Upset	Pin	Box	Pin	Box					
							Collapse Resistance	Internal Yield Pressure	Tensile Yield	Torsional Yield	Tensile Yield	Torsional Yield															
D		t	d	A			P_c	P_i							W	d_{iu}	DE	LPB	LB	AP	AB					
in.	**lb/ft**	**in.**		**sq.in.**			**psi**		**lb**	**ft-lb**	**lb**	**ft-lb**			**in.**					**sq.in.**		**lb/ft**	**ft-lb**		**US gal./ft**	
mm	kg/m	mm		cm^2			bar		kN	Nm	kN	Nm			mm					cm^2		kg/m	Nm		l/m	
6	**22.00**	**0.324**	**5.350**	**5.0019**	**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**
152,4	32,74	8,23	135,89	32,27			396	489	1 927	76 090	5 738	83 710			187,3	122,2	156,0	203,2	254,0	68,05	68,68	35,3	41 850		14,259	18,756
					IEU	**X**	**6 560**	**8 980**	**548 860**	**71 084**	**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**	**0.87**	**1.148**	**1.510**
							452	619	2 442	96 380	5 738	83 710			187,3	122,2	156,0	203,2	254,0	68,05	68,68	35,3	41 850		14,26	18,76
					IEU	**G**	**6 890**	**9 920**	**606 635**	**78 567**	**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**	**0.79**	**1.148**	**1.510**
							475	684	2 700	106 520	5 738	83 710			187,3	122,2	156,0	203,2	254,0	68,05	68,68	35,3	41 850		14,26	18,76
					IEU	**S**	**7 530**	**12 750**	**779 959**	**101 014**	**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**	**0.61**	**1.148**	**1.510**
							519	879	3 471	136 950	5 738	83 710			187,3	122,2	156,0	203,2	254,0	68,05	68,68	35,3	41 850		14,26	18,76
6	**25.00**	**0.380**	**5.240**	**6.7084**	**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**
152,4	37,21	9,65	133,10	43,28			543	573	2 239	86 730	5 738	83 710			187,3	122,2	156,0	203,2	254,0	68,05	68,68	39,5	41 850		13,713	18,756
					IEU	**X**	**9 330**	**10 530**	**637 374**	**81 033**	**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**	**0.76**	**1.104**	**1.510**
							643	726	2 836	109 860	5 738	83 710			187,3	122,2	156,0	203,2	254,0	68,05	68,68	39,5	41 850		13,71	18,76
					IEU	**G**	**9 990**	**11 640**	**704 466**	**89 563**	**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**	**0.69**	**1.104**	**1.510**
							689	803	3 135	121 430	5 738	83 710			187,3	122,2	156,0	203,2	254,0	68,05	68,68	39,5	41 850		13,71	18,76
					IEU	**S**	**11 660**	**14 960**	**905 742**	**115 152**	**1 401 410**	**62 298**		**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**
							804	1 031	4 031	156 120	6 236	84 460			187,3	119,1	156,0	203,2	254,0	74,06	68,68	39,9	42 230		13,66	18,76
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**		**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**
168,3	37,50	8,38	151,51	42,10			330	451	2 178	95 690	6 445	99 870			203,2	127,0	171,5	203,2	254,0	76,54	91,37	41,5	49 930		17,539	22,830
					IEU	**X**	**5 320**	**8 280**	**619 989**	**89 402**	**1 448 419**	**73 661**		**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**
							367	571	2 759	121 210	6 445	99 870			203,2	127,0	171,5	203,2	254,0	76,54	91,37	41,5	49 930		17,54	22,83
					IEU	**G**	**5 500**	**9 150**	**685 251**	**98 812**	**1 448 419**	**73 661**		**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**
							379	631	3 049	133 970	6 445	99 870			203,2	127,0	171,5	203,2	254,0	76,54	91,37	41,5	49 930		17,54	22,83
					IEU	**S**	**6 040**	**11 770**	**881 037**	**127 045**	**1 448 419**	**73 661**		**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**
							416	812	3 921	172 250	6 445	99 870			203,2	127,0	171,5	203,2	254,0	76,54	91,37	41,5	49 930		17,54	22,83
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**		**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**
168,3	40,63	9,19	149,89	45,95			406	494	2 377	103 440	6 445	99 870			203,2	127,0	171,5	203,2	254,0	76,54	91,37	44,2	49 930		17,191	22,830
					IEU	**X**	**6 750**	**9 080**	**676 652**	**96 640**	**1 448 419**	**73 661**		**6 5/8 FH**	**8**	**5**	**6 3/4**	**8**	**10**	**11.863**	**14.162**	**29.72**	**36 830**	**0.76**	**1.384**	**1.838**
							465	626	3 011	131 020	6 445	99 870			203,2	127,0	171,5	203,2	254,0	76,54	91,37	44,2	49 930		17,19	22,83
					IEU	**G**	**7 100**	**10 040**	**747 879**	**106 813**	**1 448 419**	**73 661**		**6 5/8 FH**	**8**	**5**	**6 3/4**	**8**	**10**	**11.863**	**14.162**	**29.72**	**36 830**	**0.69**	**1.384**	**1.838**
							490	692	3 328	144 820	6 445	99 870			203,2	127,0	171,5	203,2	254,0	76,54	91,37	44,2	49 930		17,19	22,83
					IEU	**S**	**7 810**	**12 910**	**961 558**	**137 331**	**1 448 419**	**73 661**		**6 5/8 FH**	**8**	**5**	**6 3/4**	**8**	**10**	**11.863**	**14.162**	**29.72**	**36 830**	**0.54**	**1.384**	**1.838**
							538	890	4 279	186 190	6 445	99 870			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. ** Including drill pipe volume.

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 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_2 and H_2S 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.

Advantage of Internal Coating

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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