Date of Issue: May 2000
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ERRATA

1. Page 2, Section 3.36: Replace the word "seating" with "sealing".
2. Pages 11 and 12, Table 8: Replace with attached Table 8.
   Note: Three values in column 10 have changed and most of the values in Column 12 have changed. All changes are marked by a vertical bar.
3. Pages 13 and 14, Table 9: Replace with attached Table 9.
   Note: Most of the values in Column 12 have changed. All changes are marked by a vertical bar.
4. Page 16, Table 10, Column 13: For $4^1/_2$ in., 16.60 lb/ft, IEU X-95 drill pipe with a $4^1/_2$ H-90 tool joint connection, the Make-up Torque for Class 2 (Column 13) should read "13,013".
5. Page 17, Table 10, Column 6: For $4^1/_2$ in., 20.00 lb/ft, EU-S135 drill pipe with an NC50 tool joint connection, the New ID (Column 6) should read "3".
6. Page 17, Table 10, Column 7: For $5^1/_2$ in., 21.90 lb/ft IEU S-135 drill pipe with a $5^1/_2$ FH tool joint connection, the Make-up Torque (Column 7) should read "52,302".
7. Page 17, Table 10, Note 6: Replace "p =" with "P =".
8. Page 19, Table 12: Remove " (inch designations) from entire table. Replace "V-0.038 rad" with "V-0.038R" throughout table.
9. Pages 20–32, Figures 1 through 25: The units for Torsional yield strength and Recommended Make-up Torque should read "ft-lb".
10. Pages 35–38, Table 14: Replace with attached Table 14.
    Note: The drill collar bore sizes in the heading have been corrected. Any other change to the table is marked with a vertical bar.
11. Page 49, Table 17, headings for Columns (8), (9), and (10): Replace "ft/lb" with "ft-lb".
12. Page 53, Section 8.1: Remove "(see 11.2)".
13. Page 54, Equation 20: Replace "2000" with "20,000".
14. Page 59, Section 9.2, first sentence: Replace "factor b" with "9.1.2".
15 Page 93, Figure 73b, Heading: Replace "10.47" with "10.4".
16. Page 98, Section 11.6, Equation legend: For variable *x*, replace "D.1" with "0.1".
17. Page 101, Section 11.6.2: Replace "18,850" with "18,840".
18. Page 101, Section 12.1: Section should be attributed to reference "26", found in Appendix B.
19. Page 108, Section 12.1.a, Title: Replace "Slap" with "Slip".
20. Page 109, legend entry for "J" below Equation 24: Replace "$(D_4 - d_4)$" with "$(D^4 - d^4)$".

21. Page 112, Section 13.2.5: Replace "(also classified in accordance with Table 24)" with "(classified in accordance with Table 25)".

22. Page 127, Section 15, Note: Replace "C" with "B".

23. Page 129, Table 32: The units for make-up torque should read "ft-lb".

24. Page 130, Table 33: The units for make-up torque should read "ft-lb".

25. Page 133, Section A.6 (continued from page 132): Replace "m" in the legend for Poisson's ratio with "μ".

26. Page 133, Section A.8.1: Replace "q" in the legend for $^1/_2$ included angle of thread with "θ"; also delete reference to Figure 21 and 22 of Specification 7.

27. Page 136, Section A.10 (continued from page 135), left-hand column: Equation for "b" should read

$$C - \frac{tpr(L_{pc} - 0.625)}{12} + (2 \times \text{dedendum})$$

28. Page 137, Equation A.23: Replace "D_{aE}" with "D_{TE}".

29. Page 142, Section A.15.7, 2nd legend entry for "L_w": Add the words "for wrap contact" after ". . . pipe".

30. Pages 143 and 144, Table A-1, Column 10: Change the values of Stress Relief Groove Diameter as follows:

(1)	(10)
Connection Type	Stress Relief Groove Diameter
NC35	3.231000
NC38	3.508000
NC40	3.772000
NC44	4.117000
NC46	4.326000
NC50	4.742000
NC56	5.277000
NC61	5.839000
NC70	6.714000
NC77	7.402000
$4^1/_2$ REG	4.013000
$5^1/_2$ REG	4.869000
$6^5/_8$ REG	5.417000
$7^5/_8$ REG	6.349000
$8^5/_8$ REG	7.301000
$4^1/_2$ FH	4.180000
$4^1/_2$ SH	3.508000
5 XH	4.742000

Table 8—Mechanical Properties of New Tool Joints and New Grade E75 Drill Pipe

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	
								Mechanical Properties				
Drill Pipe Data				Tool Joint Data				Tensile Yield, lb		Torsional Yield, ft-lb		
Nominal Size in.	Nominal Weight lb/ft	Approx. Weight[1] lb/ft	Type Upset	Conn.	OD in.	ID in.	Drift Diameter[2] in.	Pipe[3]	Tool Joint[4]	Pipe[5]	Tool Joint[6]	
$2^{3}/_{8}$	4.85	5.26	EU	NC26(IF)	$3^{3}/_{8}$	$1^{3}/_{4}$	1.625	97817.	313681.	4763.	6875.b	
		4.95	EU	OH	$3^{1}/_{8}$	2	1.807	97817.	206416.	4763.	4526.p	
		5.05	EU	SLH90	$3^{1}/_{4}$	2	1.850	97817.	202670.	4763.	5075.p	00
		5.15	EU	WO	$3^{3}/_{8}$	2	1.807	97817.	195677.	4763.	4235.p	
	6.65	6.99	EU	NC26(IF)	$3^{3}/_{8}$	$1^{3}/_{4}$	1.625	138214.	313681.	6250.	6875.b	
		6.89	EU	OH	$3^{1}/_{4}$	$1^{3}/_{4}$	1.625	138214.	294620.	6250.	6305.b	
		6.71	IU	PAC	$2^{7}/_{8}$	$1^{3}/_{8}$	1.250	138214.	238504.	6250.	4672.P	
		6.78	EU	SLH90	$3^{1}/_{4}$	2	1.670	138214.	202850.	6250.	5075.p	
$2^{7}/_{8}$	6.85	7.50	EU	NC31(IF)	$4^{1}/_{8}$	$2^{1}/_{8}$	2.000	135902.	447130.	8083.	11790.p	
		6.93	EU	OH	$3^{3}/_{4}$	$2^{7}/_{16}$	2.253	135902.	223937.	8083.	5464.P	
		7.05	EU	SLH90	$3^{7}/_{8}$	$2^{7}/_{16}$	2.296	135902.	260783.	8083.	7513.p	00
		7.31	EU	WO	$4^{1}/_{8}$	$2^{7}/_{16}$	2.253	135902.	277553.	8083.	7015.p	
	10.40	10.87	EU	NC31(IF)	$4^{1}/_{8}$	$2^{1}/_{8}$	1.963	214344.	447130.	11554.	11790.p	
		10.59	EU	OH	$3^{7}/_{8}$	$2^{5}/_{32}$	1.963	214344.	345566.	11554.	8659.P	
		10.27	IU	PAC	$3^{1}/_{8}$	$1^{1}/_{2}$	1.375	214344.	272938.	11554.	5706.P	
		10.59	EU	SLH90	$3^{7}/_{8}$	$2^{5}/_{32}$	2.006	214344.	382765.	11554.	11227.p	
		11.19	IU	XH	$4^{1}/_{4}$	$1^{7}/_{8}$	1.750	214344.	505054.	11554.	13088.p	
		10.35	IU	NC26(SH)	$3^{3}/_{8}$	$1^{3}/_{4}$	1.625	214344.	313681.	11554.	6875.B	
$3^{1}/_{2}$	9.50	10.58	EU	NC38(IF)	$4^{3}/_{4}$	$2^{11}/_{16}$	2.563	194264.	587308.	14146.	18071.p	
		9.84	EU	OH	$4^{1}/_{2}$	3	2.804	194264.	392071.	14146.	11803.p	
		9.99	EU	SLH90	$4^{5}/_{8}$	3	2.847	194264.	366705.	14146.	12458.p	
		10.14	EU	WO	$4^{3}/_{4}$	3	2.804	194264.	419797.	14146.	12723.p	
$3^{1}/_{2}$	13.30	14.37	EU	H90	$5^{1}/_{4}$	$2^{3}/_{4}$	2.619	271569.	664050.	18551.	23443.p	
		13.93	EU	NC38(IF)	$4^{3}/_{4}$	$2^{11}/_{16}$	2.457	271569.	587308.	18551.	18071.p	
		13.75	EU	OH	$4^{3}/_{4}$	$2^{11}/_{16}$	2.414	271569.	559582.	18551.	17167.p	
		13.40	IU	NC31(SH)	$4^{1}/_{8}$	$2^{1}/_{8}$	2.000	271569.	447130.	18551.	11790.P	00
		13.91	EU	XH	$4^{3}/_{4}$	$2^{7}/_{16}$	2.313	271569.	570939.	18551.	16867.p	
	15.50	16.54	EU	NC38(IF)	5	$2^{9}/_{16}$	2.414	322775.	649158.	21086.	20095.p	
4	11.85	13.00	IU	H90	$5^{1}/_{2}$	$2^{13}/_{16}$	2.688	230755.	913708.	19474.	35308.p	
		13.52	EU	NC46(IF)	6	$3^{1}/_{4}$	3.125	230755.	901164.	19474.	33228.p	
		12.10	EU	OH	$5^{1}/_{4}$	$3^{15}/_{32}$	3.287	230755.	621357.	19474.	21903.p	
		12.91	EU	WO	$5^{3}/_{4}$	$3^{7}/_{16}$	3.313	230755.	782987.	19474.	28643.p	
	14.00	15.04	IU	NC40(FH)	$5^{1}/_{4}$	$2^{13}/_{16}$	2.688	285359.	711611.	23288.	23279.p	
		15.43	IU	H90	$5^{1}/_{2}$	$2^{13}/_{16}$	2.688	285359.	913708.	23288.	35308.p	
		15.85	EU	NC46(IF)	6	$3^{1}/_{4}$	3.125	285359.	901164.	23288.	33228.p	

(Table continued on next page.)

Table 8—Mechanical Properties of New Tool Joints and New Grade E75 Drill Pipe (Continued)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
								Mechanical Properties			
Drill Pipe Data				Tool Joint Data				Tensile Yield, lb		Torsional Yield, ft-lb	
Nominal Size in.	Nominal Weight lb/ft	Approx. Weight[1] lb/ft	Type Upset	Conn.	OD in.	ID in.	Drift Diameter[2] in.	Pipe[3]	Tool Joint[4]	Pipe[5]	Tool Joint[6]
4	14.00	15.02	EU	OH	$5^1/_2$	$3^1/_4$	3.125	285359.	759875.	23288.	27060.p
		14.35	IU	SH	$4^5/_8$	$2^9/_{16}$	2.438	285359.	512035.	23288.	15026.P
	15.70	16.80	IU	NC40(FH)	$5^1/_4$	$2^{11}/_{16}$	2.563	324118.	776406.	25810.	25531.p
		17.09	IU	H90	$5^1/_2$	$2^{13}/_{16}$	2.688	324118.	913708.	25810.	35308.p
		17.54	EU	NC46(IF)	6	$3^1/_4$	3.095	324118.	901164.	25810.	33228.p
$4^1/_2$	13.75	15.23	IU	H90	6	$3^1/_4$	3.125	270034.	938403.	25907.	38544.p
		15.36	EU	NC50(IF)	$6^5/_8$	$3^3/_4$	3.625	270034.	939096.	25907.	37269.p
		14.04	EU	OH	$5^3/_4$	$3^{31}/_{32}$	3.770	270034.	554844.	25907.	20678.p
		14.77	EU	WO	$6^1/_8$	$3^7/_8$	3.750	270034.	848619.	25907.	33492.p
	16.60	18.14	IEU	FH	6	3	2.875	330558.	976156.	30807.	34367.p
		17.92	IEU	H90	6	$3^1/_4$	3.125	330558.	938403.	30807.	38544.p
		17.95	EU	NC50(IF)	$6^5/_8$	$3^3/_4$	3.625	330558.	939096.	30807.	37269.p
		17.07	EU	OH	$5^7/_8$	$3^3/_4$	3.625	330558.	713979.	30807.	26936.p
		16.79	IEU	NC38(SH)	5	$2^{11}/_{16}$	2.563	330558.	587308.	30807.	18071.P
		18.37	IEU	NC46(XH)	$6^1/_4$	$3^1/_4$	3.125	330558.	901164.	30807.	33228.p
	20.00	21.64	IEU	FH	6	3	2.875	412358.	976156.	36901.	34367.p
		21.64	IEU	H90	6	3	2.875	412358.	1085665.	36901.	44948.p
		21.59	EU	NC50(IF)	$6^5/_8$	$3^5/_8$	3.452	412358.	1025980.	36901.	40915.p
		22.09	IEU	NC46(XH)	$6^1/_4$	3	2.875	412358.	1048426.	36901.	38998.p
	22.82	24.11	EU	NC50(IF)	$6^5/_8$	$3^5/_8$	3.452	471239.	1025980.	40912.	40915.p
		24.56	IEU	NC46(XH)	$6^1/_4$	3	2.875	471239.	1048426.	40912.	38998.p
5	19.50	22.28	IEU	$5^1/_2$ FH	7	$3^3/_4$	3.625	395595.	1448407.	41167.	62903.b
		20.85	IEU	NC50(XH)	$6^5/_8$	$3^3/_4$	3.625	395595.	939095.	41167.	37269.p
	25.60	28.27	IEU	$5^1/_2$ FH	7	$3^1/_2$	3.375	530144.	1619231.	52257.	62903.b
		26.85	IEU	NC50(XH)	$6^5/_8$	$3^1/_2$	3.375	530144.	1109920.	52257.	44456.p
$5^1/_2$	21.90	23.78	IEU	FH	7	4	3.875	437116.	1265802.	50710.	55687.p
	24.70	26.30	IEU	FH	7	4	3.875	497222.	1265802.	56574.	55687.p
$6^5/_8$	25.20	27.28	IEU	FH	8	5	4.875	489464.	1447697.	70580.	73224.p
$6^5/_8$	27.70	29.06	IEU	FH	8	5	4.875	534198.	1447697.	76295.	73224.p

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[1]Tool Joint plus drill pipe, for Range 2 steel pipe (See Appendix A for method of calculation).
[2]See Section 4.4.
[3]The tensile yield strength of Grade E drill pipe is based on 75,000 psi minimum yield strength.
[4]The tensile strength of the tool joint pin is based on 120,000 psi minimum yield and the cross sectional area at the root of the thread $^5/_8$ inch from the shoulder.
[5]The torsional yield strength is based on a shear strength of 57.7 percent of the minimum yield strength.
[6] p = pin limited yield; b = box limited yield; P or B indicates that tool joint could not meet 80 percent of tube torsion yield.

Table 9—Mechanical Properties of New Tool Joints and New High Strength Drill Pipe

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
								Mechanical Properties			
Drill Pipe Data				Tool Joint Data				Tensile Yield, lb		Torsional Yield, ft-lb	
Nominal Size in.	Nominal Weight lb/ft	Approx. Weight[1] lb/ft	Type Upset	Conn.	OD in.	ID in.	Drift Diameter[2] in.	Pipe[3]	Tool Joint[4]	Pipe[3]	Tool Joint[5]
$2^3/_8$	6.65	7.11	EU-X95	NC26(IF)	$3^3/_8$	$1^3/_4$	1.625	175072.	313681.	7917.	6875.b
		6.99	EU-X95	SLH90	$3^1/_4$	$1^{13}/_{16}$	1.670	175072.	270223.	7917.	6862.p
	6.65	7.11	EU-G105	NC26(IF)	$3^3/_8$	$1^3/_4$	1.625	193500.	313681.	8751.	6875.b
		6.99	EU-G105	SLH90	$3^1/_4$	$1^{13}/_{16}$	1.670	193500.	270223.	8751.	6862.P
$2^7/_8$	10.40	11.09	EU-X95	NC31(IF)	$4^1/_8$	2	1.875	271503.	495726.	14635.	13158.p
		10.95	EU-X95	SLH90	4	2	1.875	271503.	443971.	14635.	13119.p
	10.40	11.09	EU-G105	NC31(IF)	$4^1/_8$	2	1.875	300082.	495726.	16176.	13158.p
		10.95	EU-G105	SLH90	4	2	1.875	300082.	443971.	16176.	13119.p
	10.40	11.55	EU-S135	NC31(IF)	$4^3/_8$	$1^5/_8$	1.500	385820.	623844.	20798.	16809.p
		11.26	EU-S135	SLH90	$4^1/_8$	$1^5/_8$	1.500	385820.	572089.	20798.	17130.p
$3^1/_2$	13.30	14.60	EU-X95	H90	$5^1/_4$	$2^3/_4$	2.619	343988.	664050.	23498.	23443.p
		14.62	EU-X95	NC38(IF)	5	$2^9/_{16}$	2.438	343988.	649158.	23498.	20095.p
		14.06	EU-X95	SLH90	$4^3/_4$	$2^9/_{16}$	2.438	343988.	596066.	23498.	20709.p
	13.30	14.71	EU-G105	NC38(IF)	5	$2^7/_{16}$	2.313	380197.	708063.	25972.	22035.p
		14.06	EU-G105	SLH90	$4^3/_4$	$2^9/_{16}$	2.438	380197.	596066.	25972.	20709.p
	13.30	14.92	EU-S135	NC38(IF)	5	$2^1/_8$	2.000	488825.	842440.	33392.	26503.P
		14.65	EU-S135	SLH90	5	$2^1/_8$	2.000	488825.	789348.	33392.	27809.p
		15.13	EU-S135	NC40(4FH)	$5^3/_8$	$2^7/_{16}$	2.313	488825.	897161.	33392.	29764.p
	15.50	16.82	EU-X95	NC38(IF)	5	$2^7/_{16}$	2.313	408848.	708063.	26708.	22035.p
	15.50	17.03	EU-G105	NC38(IF)	5	$2^1/_8$	2.000	451885.	842440.	29520.	26503.p
		16.97	EU-G105	NC40(4FH)	$5^1/_4$	$2^9/_{16}$	2.438	451885.	838257.	29520.	27693.p
	15.50	17.57	EU-S135	NC40(4FH)	$5^1/_2$	$2^1/_4$	2.125	580995.	979996.	37954.	32693.p
4	14.00	15.34	IU-X95	NC40(FH)	$5^1/_4$	$2^{11}/_{16}$	2.563	361454.	776406.	29498.	25531.p
		15.63	IU-X95	H90	$5^1/_2$	$2^{13}/_{16}$	2.688	361454.	913708.	29498.	35308.p
		16.19	EU-X95	NC46(IF)	6	$3^1/_4$	3.125	361454.	901164.	29498.	33228.p
	14.00	15.91	IU-G105	NC40(FH)	$5^1/_2$	$2^7/_{16}$	2.313	399502.	897161.	32603.	29764.p
		15.63	IU-G105	H90	$5^1/_2$	$2^{13}/_{16}$	2.688	399502.	913708.	32603.	35308.p
		16.19	EU-G105	NC46(IF)	6	$3^1/_4$	3.125	399502.	901164.	32603.	33228.p
	14.00	16.19	IU-S135	NC40(FH)	$5^1/_2$	2	1.875	513646.	1080135.	41918.	36262.p
		15.63	IU-S135	H90	$5^1/_2$	$2^{13}/_{16}$	2.688	513646.	913708.	41918.	35308.p
		16.42	EU-S135	NC46(IF)	6	3	2.875	513646.	1048426.	41918.	38998.p
	15.70	17.52	IU-X95	NC40(FH)	$5^1/_2$	$2^7/_{16}$	2.313	410550.	897161.	32692.	29764.p
		17.23	IU-X95	H90	$5^1/_2$	$2^{13}/_{16}$	2.688	410550.	913708.	32692.	35308.p
		17.80	EU-X95	NC46(IF)	6	$3^1/_4$	3.125	410550.	901164.	32692.	33228.p
	15.70	17.52	IU-G105	NC40(FH)	$5^1/_2$	$2^7/_{16}$	2.313	453765.	897161.	36134.	29764.p
		17.23	IU-G105	H90	$5^1/_2$	$2^{13}/_{16}$	2.688	453765.	913708.	36134.	35308.p
		17.80	EU-G105	NC46(IF)	6	$3^1/_4$	3.125	453765.	901164.	36134.	33228.p
	15.70	18.02	EU-S135	NC46(IF)	6	3	2.875	583413.	1048426.	46458.	38998.p
$4^1/_2$	16.60	18.33	IEU-X95	FH	6	3	2.875	418707.	976156.	39022.	34367.p
		18.11	IEU-X95	H90	6	$3^1/_4$	3.125	418707.	938403.	39022.	38544.p
		18.36	EU-X95	NC50(IF)	$6^5/_8$	$3^3/_4$	3.625	418707.	939095.	39022.	37269.p
		18.79	IEU-X95	NC46(XH)	$6^1/_4$	3	2.875	418707.	1048426.	39022.	38998.p
$4^1/_2$	16.60	18.33	IEU-G105	FH	6	3	2.625	462781.	976156.	43130.	34367.p
		18.33	IEU-G105	H90	6	3	3.125	462781.	1085665.	43130.	44948.p
		18.36	EU-G105	NC50(IF)	$6^5/_8$	$3^3/_4$	3.625	462781.	939095.	43130.	37269.p
		18.79	IEU-G105	NC46(XH)	$6^1/_4$	3	2.875	462781.	1048426.	43130.	38998.p
	16.60	19.19	IEU-S135	FH	$6^1/_4$	$2^1/_2$	2.375	595004.	1235337.	55453.	44214.p

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(Table continued on next page.)

Table 9—Mechanical Properties of New Tool Joints and New High Strength Drill Pipe (Continued)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
								Mechanical Properties			
Drill Pipe Data				Tool Joint Data				Tensile Yield, lb		Torsional Yield, ft-lb	
Nominal Size in.	Nominal Weight lb/ft	Approx. Weight[1] lb/ft	Type Upset	Conn.	OD in.	ID in.	Drift Diameter[2] in.	Pipe[3]	Tool Joint[4]	Pipe[3]	Tool Joint[5]
$4^1/_2$	16.60	18.33	IEU-S135	H90	6	3	2.875	595004.	1085665.	55453.	44948.p
		18.62	EU-S135	NC50(IF)	$6^5/_8$	$3^1/_2$	3.375	595004.	1109920.	55453.	44456.p
		19.00	IEU-S135	NC46(XH)	$6^1/_4$	$2^3/_4$	2.625	595004.	1183908.	55453.	44359.p
	20.00	22.39	IEU-X95	FH	6	$2^1/_2$	2.375	522320.	1235337.	46741.	44214.p
		21.78	IEU-X95	H90	6	$3^1/_4$	3.125	522320.	938403.	46741.	38544.p
		22.08	EU-X95	NC50(IF)	$6^5/_8$	$3^1/_2$	3.375	522320.	1109920.	46741.	44456.p
		22.67	IEU-X95	NC46(XH)	$6^1/_4$	$2^3/_4$	2.625	522320.	1183908.	46741.	44359.p
	20.00	22.39	IEU-G105	FH	6	$2^1/_2$	2.375	577301.	1235337.	51661.	44214.p
		22.00	IEU-G105	H90	6	3	2.875	577301.	1085665.	51661.	44948.p
		22.08	EU-G105	NC50(IF)	$6^5/_8$	$3^1/_2$	3.375	577301.	1109920.	51661.	44456.p
		22.86	IEU-G105	NC46(XH)	$6^1/_4$	$2^1/_2$	2.375	577301.	1307608.	51661.	49297.p
	20.00	23.03	EU-S135	NC50(IF)	$6^5/_8$	3	2.875	742244.	1416225.	66421.	57534.p
		23.03	IEU-S135	NC46(XH)	$6^1/_4$	$2^1/_4$	2.125	742244.	1419527.	66421.	53800.p
	22.82	25.13	IEU-X95	FH	$6^1/_4$	$2^1/_4$	2.125	596903.	1347256.	51821.	48522.p
		24.24	EU-X95	NC50(IF)	$6^5/_8$	$3^1/_2$	3.375	596903.	1109920.	51821.	44456.p
		24.77	IEU-X95	NC46(XH)	$6^1/_4$	$2^3/_4$	2.625	596903.	1183908.	51821.	44359.p
	22.82	24.72	EU-G105	NC50(IF)	$6^5/_8$	$3^1/_4$	3.125	659735.	1268963.	57276.	51217.p
		24.96	IEU-G105	NC46(XH)	$6^1/_4$	$2^1/_2$	2.375	659735.	1307608.	57276.	49297.p
	22.82	25.41	EU-S135	NC50(IF)	$6^5/_8$	$2^3/_4$	2.625	848230.	1551706.	73641.	63393.p
5	19.50	22.62	IEU-X95	$5^1/_2$ FH	7	$3^3/_4$	3.625	501087.	1448407.	52144.	62903.b
		21.93	IEU-X95	H90	$6^1/_2$	$3^1/_4$	3.125	501087.	1176265.	52144.	51220.p
		21.45	IEU-X95	NC50(XH)	$6^5/_8$	$3^1/_2$	3.375	501087.	1109920.	52144.	44456.p
	19.50	22.62	IEU-G105	$5^1/_2$ FH	7	$3^3/_4$	3.625	553833.	1448407.	57633.	62903.b
		22.15	IEU-G105	H90	$6^1/_2$	3	2.875	553833.	1323527.	57633.	58008.p
		21.93	IEU-G105	NC50(XH)	$6^5/_8$	$3^1/_4$	3.125	553833.	1268963.	57633.	51217.p
	19.50	23.48	IEU-S135	$5^1/_2$ FH	$7^1/_4$	$3^1/_2$	3.375	712070.	1619231.	74100.	72213.p
		22.61	IEU-S135	NC50(XH)	$6^5/_8$	$2^3/_4$	2.625	712070.	1551706.	74100.	63393.p
	25.60	28.59	IEU-X95	$5^1/_2$ FH	7	$3^1/_2$	3.375	671515.	1619231.	66192.	62903.b
		27.87	IEU-X95	NC50(XH)	$6^5/_8$	3	2.875	671515.	1416225.	66192.	57534.b
	25.60	29.16	IEU-G105	$5^1/_2$ FH	$7^1/_4$	$3^1/_2$	3.375	742201.	1619231.	73159.	72213.p
		28.32	IEU-G105	NC50(XH)	$6^5/_8$	$2^3/_4$	2.625	742201.	1551706.	73159.	63393.b
	25.60	29.43	IEU-S135	$5^1/_2$ FH	$7^1/_4$	$3^1/_4$	3.125	954259.	1778274.	94062.	78716.b
$5^1/_2$	21.90	24.53	IEU-X95	FH	7	$3^3/_4$	3.625	553681.	1448407.	64233.	62903.b
		24.80	IEU-X95	H90	7	$3^1/_2$	3.125	553681.	1268877.	64233.	58033.p
	21.90	25.38	IEU-G105	FH	$7^1/_4$	$3^1/_2$	3.375	611963.	1619231.	70994.	72213.p
	21.90	26.50	IEU-S135	FH	$7^1/_2$	3	2.875	786809.	1925536.	91278.	86765.p
	24.70	27.85	IEU-X95	FH	$7^1/_4$	$3^1/_2$	3.375	629814.	1619231.	71660.	72213.p
$5^1/_2$	24.70	27.85	IEU-G105	FH	$7^1/_4$	$3^1/_2$	3.375	696111.	1619231.	79204.	72213.p
	24.70	27.77	IEU-S135	FH	$7^1/_2$	3	2.875	894999.	1925536.	101833.	86765.p
$6^5/_8$	25.20	27.15	IEU-X95	FH	8	5	4.875	619988.	1448416.	89402.	73224.p
	25.20	28.20	IEU-G105	FH	$8^1/_4$	$4^3/_4$	4.625	685250.	1678145.	98812.	85467.p
	25.20	29.63	IEU-S135	FH	$8^1/_2$	$4^1/_4$	4.125	881035.	2102260.	127044.	108353.p
	27.70	30.11	IEU-X95	FH	$8^1/_4$	$4^3/_4$	4.625	676651.	1678145.	96640.	85467.p
	27.70	30.11	IEU-G105	FH	$8^1/_4$	$4^3/_4$	4.625	747250.	1678145.	106813.	85467.p
	27.70	31.54	IEU-S135	FH	$8^1/_2$	$4^1/_4$	4.125	961556.	2102260.	137330.	108353.P

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[1]Tool Joint plus drill pipe, for Range 2 steel pipe (See Appendix A for method of calculation).
[2]See Section 4.4.
[3]The torsional yield strength is based on a shear strength of 57.7 percent of the minimum yield strength.
[4]The tensile strength of the tool joint pin is based on 120,000 psi yield and the cross sectional area at the root of the thread $^5/_8$ inch from the shoulder.
[5] p = pin limited yield; b = box limited yield; P or B indicates that tool joint could not meet 80 percent of tube torsion yield.

Table 14—Recommended Make-up Torque[1] for Rotary Shouldered Drill Collar Connections
(See footnotes for use of this table.)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Connection			Minimum Make-up Torque ft-lb[2]											
			Bore of Drill Collar, inches											
Size	Type	OD, in.	1	$1^1/_4$	$1^1/_2$	$1^3/_4$	2	$2^1/_4$	$2^1/_2$	$2^{13}/_{16}$	3	$3^1/_4$	$3^1/_2$	$3^3/_4$
API	NC 23	3	*2,508	*2,508	*2,508									
		$3^1/_8$	*3,330	*3,330	2,647									
		$3^1/_4$	4,000	3,387	2,647									
$2^3/_8$	Regular	3		*2,241	*2,241	1,749								
		$3^1/_8$		*3,028	2,574	1,749								
		$3^1/_4$		3,285	2,574	1,749								
$2^7/_8$	PAC[3]	3		*3,797	*3,797	2,926								
		$3^1/_8$		*4,966	4,151	2,926								
		$3^1/_4$		5,206	4,151	2,926								
$2^3/_8$	API IF	$3^1/_2$		*4,606	*4,606	3,697								
API	NC 26	$3^3/_4$		5,501	4,668	3,697								
$2^7/_8$	Regular	$3^1/_2$		*3,838	*3,838	*3,838								
		$3^3/_4$		5,766	4,951	4,002								
		$3^7/_8$		5,766	4,951	4,002								
$2^7/_8$	Slim Hole													
$2^7/_8$	Extra Hole	$3^3/_4$		*4,089	*4,089	*4,089								
$3^1/_2$	Double Streamline	$3^7/_8$		*5,352	*5,352	*5,352								
$2^7/_8$	Mod. Open	$4^1/_8$		*8,059	*8,059	7,433								
$2^7/_8$	API IF	$3^7/_8$		*4,640	*4,640	*4,640	*4,640							
API	NC 31	$4^1/_8$		*7,390	*7,390	*7,390	6,853							
$3^1/_2$	Regular	$4^1/_8$		*6,466	*6,466	*6,466	*6,466	5,685						
		$4^1/_4$		*7,886	*7,886	*7,886	7,115	5,685						
		$4^1/_2$		10,471	9,514	8,394	7,115	5,685						
$3^1/_2$	Slim Hole	$4^1/_4$		*8,858	*8,858	8,161	6,853	5,391						
		$4^1/_2$		10,286	9,307	8,161	6,853	5,391						
API	NC 35	$4^1/_2$				*9,038	*9,038	*9,038	7,411					
		$4^3/_4$				12,273	10,826	9,202	7,411					
		5				12,273	10,826	9,202	7,411					
$3^1/_2$	Extra Hole	$4^1/_4$				*5,161	*5,161	*5,161	*5,161					
4	Slim Hole	$4^1/_2$				*8,479	*8,479	*8,479	8,311					
$3^1/_2$	Mod. Open	$4^3/_4$				*12,074	11,803	10,144	8,311					
		5				13,283	11,803	10,144	8,311					
		$5^1/_4$				13,283	11,803	10,144	8,311					
$3^1/_2$	API IF	$4^3/_4$				*9,986	*9,986	*9,986	*9,986	8,315				
API	NC 38	5				*13,949	*13,949	12,907	10,977	8,315				
$4^1/_2$	Slim Hole	$5^1/_4$				16,207	14,643	12,907	10,977	8,315				
		$5^1/_2$				16,207	14,643	12,907	10,977	8,315				
$3^1/_2$	H-90[4]	$4^3/_4$				*8,786	*8,786	*8,786	*8,786	*8,786				
		5				*12,794	*12,794	*12,794	*12,794	10,408				
		$5^1/_4$				*17,094	16,929	15,137	13,151	10,408				
		$5^1/_2$				18,522	16,929	15,137	13,151	10,408				
4	Full Hole	5				*10,910	*10,910	*10,910	*10,910	*10,910				
API	NC 40	$5^1/_4$				*15,290	*15,290	*15,290	14,969	12,125				
4	Mod. Open	$5^1/_2$				*19,985	18,886	17,028	14,969	12,125				
$4^1/_2$	Double Streamline	$5^3/_4$				20,539	18,886	17,028	14,969	12,125				
		6				20,539	18,886	17,028	14,969	12,125				

(Table continued on next page.)

Table 14—Recommended Make-up Torque[1] for Rotary Shouldered Drill Collar Connections (Continued)
(See footnotes for use of this table.)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Connection			Minimum Make-up Torque ft-lb[2]											
			Bore of Drill Collar, inches											
00 Size	Type	OD, in.	1	$1^1/_4$	$1^1/_2$	$1^3/_4$	2	$2^1/_4$	$2^1/_2$	$2^{13}/_{16}$	3	$3^1/_4$	$3^1/_2$	$3^3/_4$
4	H-90[4]	$5^1/_4$				*12,590	*12,590	*12,590	*12,590	*12,590				
		$5^1/_2$				*17,401	*17,401	*17,401	*17,401	16,536				
		$5^3/_4$				*22,531	*22,531	21,714	19,543	16,536				
		6				25,408	23,671	21,714	19,543	16,536				
		$6^1/_4$				25,408	23,671	21,714	19,543	16,536				
$4^1/_2$	API Regular	$5^1/_2$				*15,576	*15,576	*15,576	*15,576	*15,576				
		$5^3/_4$				*20,609	*20,609	*20,609	19,601	16,629				
		6				25,407	23,686	21,749	19,601	16,629				
		$6^1/_4$				25,407	23,686	21,749	19,601	16,629				
API	NC 44	$5^3/_4$				*20,895	*20,895	*20,895	*20,895	18,161				
		6				*26,453	25,510	23,493	21,257	18,161				
		$6^1/_4$				27,300	25,510	23,493	21,257	18,161				
		$6^1/_2$				27,300	25,510	23,493	21,257	18,161				
$4^1/_2$	API Full Hole	$5^1/_2$					*12,973	*12,973	*12,973	*12,973	*12,973			
		$5^3/_4$					*18,119	*18,119	*18,119	*18,119	17,900			
		6					*23,605	*23,605	23,028	19,921	17,900			
		$6^1/_4$					27,294	25,272	23,028	19,921	17,900			
00		$6^1/_2$					27,294	25,272	23,028	19,921	17,900			
$4^1/_2$	Extra Hole	$5^3/_4$						*17,738	*17,738	*17,738	*17,738			
API	NC 46	6						*23,422	*23,422	22,426	20,311			
4	API IF	$6^1/_4$						28,021	25,676	22,426	20,311			
$4^1/_2$	Semi IF	$6^1/_2$						28,021	25,676	22,426	20,311			
5	Double Streamline	$6^3/_4$						28,021	25,676	22,426	20,311			
$4^1/_2$	Mod. Open													
$4^1/_2$	H-90[4]	$5^3/_4$						*18,019	*18,019	*18,019	*18,019			
		6						*23,681	*23,681	23,159	21,051			
		$6^1/_4$						28,732	26,397	23,159	21,051			
		$6^1/_2$						28,732	26,397	23,159	21,051			
		$6^3/_4$						28,732	26,397	23,159	21,051			
5	H-90[4]	$6^1/_4$						*25,360	*25,360	*25,360	*25,360	23,988		
		$6^1/_2$						*31,895	*31,895	29,400	27,167	23,988		
		$6^3/_4$						35,292	32,825	29,400	27,167	23,988		
		7						35,292	32,825	29,400	27,167	23,988		
$4^1/_2$	API IF	$6^1/_4$						*23,004	*23,004	*23,004	*23,004	*23,004		
API	NC 50	$6^1/_2$						*29,679	*29,679	*29,679	*29,679	26,675		
5	Extra Hole	$6^3/_4$						*36,742	35,824	32,277	29,966	26,675		
5	Mod. Open	7						38,379	35,824	32,277	29,966	26,675		
$5^1/_2$	Double Streamline	$7^1/_4$						38,379	35,824	32,277	29,966	26,675		
00 5	Semi-IF	$7^1/_2$						38,379	35,824	32,277	29,966	26,675		
$5^1/_2$	H-90[4]	$6^3/_4$						*34,508	*34,508	*34,508	34,142	30,781		
		7						*41,993	40,117	36,501	34,142	30,781		
		$7^1/_4$						42,719	40,117	36,501	34,142	30,781		
		$7^1/_2$						42,719	40,117	36,501	34,142	30,781		
$5^1/_2$	API Regular	$6^3/_4$						*31,941	*31,941	*31,941	*31,941	30,495		
		7						*39,419	*39,419	36,235	33,868	30,495		
		$7^1/_4$						42,481	39,866	36,235	33,868	30,495		
		$7^1/_2$						42,481	39,866	36,235	33,868	30,495		

(Table continued on next page.)

Table 14—Recommended Make-up Torque[1] for Rotary Shouldered Drill Collar Connections (Continued)
(See footnotes for use of this table.)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Connection			Minimum Make-up Torque ft-lb[2]											
			Bore of Drill Collar, inches											
Size	Type	OD, in.	1	1 1/4	1 1/2	1 3/4	2	2 1/4	2 1/2	2 13/16	3	3 1/4	3 1/2	3 3/4
5 1/2	API Full Hole	7						*32,762	*32,762	*32,762	*32,762	*32,762		
		7 1/4						*40,998	*40,998	*40,998	*40,998	*40,998		
		7 1/2						*49,661	*49,661	47,756	45,190	41,533		
		7 3/4						54,515	51,687	47,756	45,190	41,533		
API	NC 56	7 1/4							*40,498	*40,498	*40,498	*40,498		
		7 1/2							*49,060	48,221	45,680	42,058		
		7 3/4							52,115	48,221	45,680	42,058		
		8							52,115	48,221	45,680	42,058		
6 5/8	API Regular	7 1/2							*46,399	*46,399	*46,399	*46,399		
		7 3/4							*55,627	53,346	50,704	46,936		
		8							57,393	53,346	50,704	46,936		
		8 1/4							57,393	53,346	50,704	46,936		
6 5/8	H-90[4]	7 1/2							*46,509	*46,509	*46,509	*46,509		
		7 3/4							*55,708	*55,708	53,629	49,855		
		8							60,321	56,273	53,629	49,855		
		8 1/4							60,321	56,273	53,629	49,855		
API	NC 61	8							*55,131	*55,131	*55,131	*55,131		
		8 1/4							*65,438	*65,438	*65,438	61,624		
		8 1/2							72,670	68,398	65,607	61,624		
		8 3/4							72,670	68,398	65,607	61,624		
		9							72,670	68,398	65,607	61,624		
5 1/2	API IF	8							*56,641	*56,641	*56,641	*56,641	*56,641	
		8 1/4							*67,133	*67,133	*67,133	63,381	59,027	
		8 1/2							74,626	70,277	67,436	63,381	59,027	
		8 3/4							74,626	70,277	67,436	63,381	59,027	
		9							74,626	70,277	67,436	63,381	59,027	
		9 1/4							74,626	70,277	67,436	63,381	59,027	
6 5/8	API Full Hole	8 1/2							*67,789	*67,789	*67,789	*67,789	*67,789	67,184
		8 3/4							*79,544	*79,544	*79,544	76,706	72,102	67,184
		9							88,582	83,992	80,991	76,706	72,102	67,184
		9 1/4							88,582	83,992	80,991	76,706	72,102	67,184
		9 1/2							88,582	83,992	80,991	76,706	72,102	67,184
API	NC70	9							*75,781	*75,781	*75,781	*75,781	*75,781	*75,781
		9 1/4							*88,802	*88,802	*88,802	*88,802	*88,802	*88,802
		9 1/2							*102,354	*102,354	*102,354	101,107	96,214	90,984
		9 3/4							113,710	108,841	105,657	101,107	96,214	90,984
		10							113,710	108,841	105,657	101,107	96,214	90,984
		10 1/4							113,710	108,841	105,657	101,107	96,214	90,984
API	NC77	10							*108,194	*108,194	*108,194	*108,194	*108,194	*108,194
		10 1/4							*124,051	*124,051	*124,051	*124,051	*124,051	*124,051
		10 1/2							*140,491	*140,491	*140,491	140,488	135,119	129,375
		10 3/4							154,297	148,965	145,476	140,488	135,119	129,375
		11							154,297	148,965	145,476	140,488	135,119	129,375
7	H-90[4]	8							*53,454	*53,454	*53,454	*53,454	*53,454	*53,454
		8 1/4							*63,738	*63,738	*63,738	*63,738	60,971	56,382
		8 1/2							*74,478	72,066	69,265	65,267	60,971	56,382
7 5/8	API Regular	8 1/2							*60,402	*60,402	*60,402	*60,402	*60,402	*60,402
		8 3/4							*72,169	*72,169	*72,169	*72,169	*72,169	*72,169

(Table continued on next page.)

Table 14—Recommended Make-up Torque[1] for Rotary Shouldered Drill Collar Connections (Continued)
(See footnotes for use of this table.)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Connection			Minimum Make-up Torque ft-lb[2]											
			Bore of Drill Collar, inches											
00 Size	Type	OD, in.	1	$1^1/_4$	$1^1/_2$	$1^3/_4$	2	$2^1/_4$	$2^1/_2$	$2^{13}/_{16}$	3	$3^1/_4$	$3^1/_2$	$3^3/_4$
$7^5/_8$	API Regular	9							*84,442	*84,442	*84,442	84,221	79,536	74,529
		$9^1/_4$							96,301	91,633	88,580	84,221	79,536	74,529
		$9^1/_2$							96,301	91,633	88,580	84,221	79,536	74,529
$7^5/_8$	H-90[4]	9							*73,017	*73,017	*73,017	*73,017	*73,017	*73,017
		$9^1/_4$							*86,006	*86,006	*86,006	*86,006	*86,006	*86,006
		$9^1/_2$							*99,508	*99,508	*99,508	*99,508	*99,508	96,285
$8^5/_8$	API Regular	10							*109,345	*109,345	*109,345	*109,345	*109,345	*109,345
		$10^1/_4$							*125,263	*125,263	*125,263	*125,263	*125,263	125,034
		$10^1/_2$							*141,767	*141,767	141,134	136,146	130,777	125,034
$8^5/_8$	H-90[4]	$10^1/_4$							*113,482	*113,482	*113,482	*113,482	*113,482	*113,482
		$10^1/_2$							*130,063	*130,063	*130,063	*130,063	*130,063	*130,063
7	H-90[4]	$8^3/_4$								*68,061	*68,061	67,257	62,845	58,131
00	(with low torque face)	9								74,235	71,361	67,257	62,845	58,131
$7^5/_8$	API Regular	$9^1/_4$									*73,099	*73,099	*73,099	*73,099
	(with low torque face)	$9^1/_2$									*86,463	*86,463	82,457	77,289
		$9^3/_4$									91,789	87,292	82,457	77,289
		10									91,789	87,292	82,457	77,289
$7^5/_8$	H-90[4]	$9^3/_4$								*91,667	*91,667	*91,667	*91,667	*91,667
	(with low torque face)	10								*106,260	*106,260	*106,260	104,171	98,804
		$10^1/_4$								117,112	113,851	109,188	104,171	98,804
		$10^1/_2$								117,112	113,851	109,188	104,171	98,804
$8^5/_8$	API Regular	$10^3/_4$									*112,883	*112,883	*112,883	*112,883
	(with low torque face)	11									*130,672	*130,672	*130,672	*130,672
		$11^1/_4$									147,616	142,430	136,846	130,871
$8^5/_8$	H-90[4]	$10^3/_4$									*92,960	*92,960	*92,960	*92,960
	(with low torque face)	11									*110,781	*110,781	*110,781	*110,781
		$11^1/_4$									*129,203	*129,203	*129,203	*129,203

*Notes:

1. Torque figures preceded by an asterisk (*) indicate that the weaker member for the corresponding outside diameter (OD) and bore is the BOX; for all other torque values, the weaker member is the PIN.
2. In each connection size and type group, torque values apply to all connection types in the group, when used with the same drill collar outside diameter and bore, i.e. $2^3/_8$ API IF, API NC 26, and $2^7/_8$ Slim Hole connections used with $3^1/_2$ x $1^1/_4$ drill collars all have the same minimum make-up torque of 4600 ft. lb., and the BOX is the weaker member.
3. Stress-relief features are disregarded for make-up torque.

[1]Basis of calculations for recommended make-up torque assumed the use of a thread compound containing 40-60 percent by weight of finely powdered metallic zinc or 60 percent by weight of finely powdered metallic lead, with not more than 0.3 percent total active sulfur (reference the caution regarding the use of hazardous materials in Appendix G of Specification 7) applied thoroughly to all threads and shoulders and using the modified Screw Jack formula in A.8, and a unit stress of 62,500 psi in the box or pin, whichever is weaker.

[2]Normal torque range is tabulated value plus 10 percent. Higher torque values may be used under extreme conditions.

[3]Make-up torque for $2^7/_8$ PAC connection is based on 87,500 psi stress and other factors listed in footnote 1.

[4]Make-up torque for H-90 connection is based on 56,200 psi stress and other factors listed in footnote 1.

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