



 **Tenaris** NKK Tubes

NKKTubes, a Tenaris company in which JFE Engineering Corp. has a 49% shareholding, has manufacturing facilities located in Kawasaki city, Japan, specialized in the production of high quality seamless tubes for oil and gas and industrial applications with an annual production capacity of 280,000 tons.

Tenaris (TS: NYSE, Buenos Aires, Mexico and TEN: MTA Italy) is a leading global manufacturer and supplier of seamless steel pipe products and provider of pipe handling, stocking and distribution services to the oil and gas, energy and mechanical industries. It is also a leading regional supplier of welded steel pipes for gas pipelines in South America.

TenarisNKKTubes has inherited the technology, know how and specialist expertise associated with the production, manufacture and development of drill pipe from TenarisNKKTubes, which has produced high performance drill pipe and tool joints to outstanding quality standards since 1954.



▲ *Upsetting of drill pipe*



▲ *Magnetic particle inspection (MPI)*



▲ *Heat treatment for the weld zone*

## Quality and Manufacturing

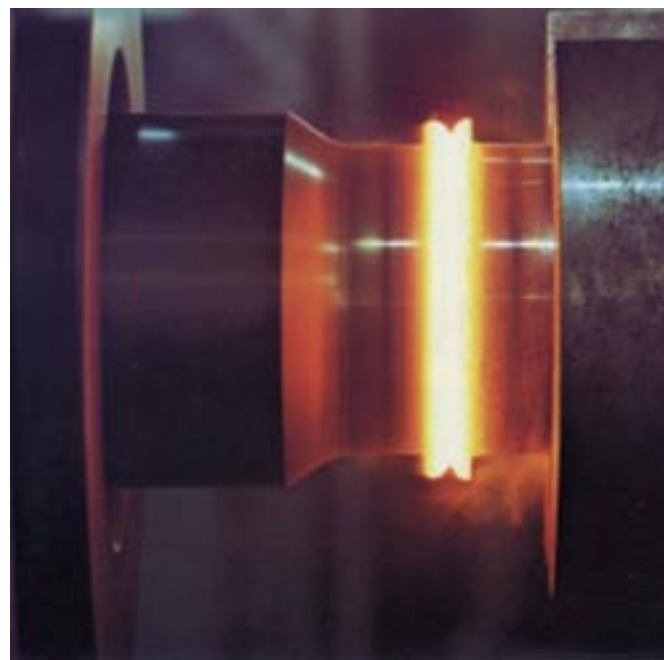
Drill pipes are manufactured as part of an integrated process accomplished in fully equipped state-of-the-art facilities at TenarisNKK Tubes.

Drill pipes and tool joints are assembled by friction welding. After removal of weld bead, each heat affected zone is quenched and tempered in a unique system to recover mechanical properties. Welded areas are inspected by UT and MPI.

Investment in quality and technology is a permanent commitment at TenarisNKK Tubes, which holds ISO 9001, ISO 14001, API Spec. 7 and API 5D certifications.

All employees are fully instructed in the importance of quality and rigorous quality management systems are applied in our operations.

All products are manufactured in accordance with customer's specifications and the most demanding international standards.



▲ *Friction weld (Break-type)*



▲ *Long and smooth taper of internal upset*

# Grades, Specifications and Availability

## DRILL PIPE MECHANICAL PROPERTIES

SPEC.	GRADE		YIELD STRENGTH		TENSILE STRENGTH		ELONGATION MIN	HARDNESS MAX	IMPACT VALUE*
			MIN	MAX	MIN	MAX			
			ksi (N/mm <sup>2</sup> )	ksi (N/mm <sup>2</sup> )	ksi (N/mm <sup>2</sup> )	ksi (N/mm <sup>2</sup> )			
API 5D	Group 1	E-75	75 (517)	105 (724)	100 (689)	–	API formula	–	40 (54)
		X-95	95 (655)	125 (862)	105 (724)	–	API formula	–	40 (54)
	Group 3	G-105	105 (724)	135 (931)	115 (793)	–	API formula	–	40 (54)
		S-135	135 (931)	165 (1138)	145 (1000)	–	API formula	–	40 (54)
NK series	High Strength	S140	140 (965)	165 (1138)	150 (1034)	–	API formula	39	80 (108)
		V150	150 (1034)	165 (1138)	160 (1102)	178 (1226)	API formula	40	80 (108)
	Sour Services	C95S	95 (655)	110 (758)	105 (724)	–	API formula	26	80 (108)
		C105S	105 (724)	120 (827)	115 (793)	–	API formula	29	80 (108)

\* Full size at room temperature

## TOOL JOINT MECHANICAL PROPERTIES

SPEC.	GRADE		YIELD STRENGTH		TENSILE STRENGTH	ELONGATION MIN	HARDNESS	IMPACT VALUE*
			MIN	MAX	MIN			
			ksi (N/mm <sup>2</sup> )	ksi (N/mm <sup>2</sup> )	ksi (N/mm <sup>2</sup> )			
API Spec. 7			120 (827)	–	140 (965)	13	Min 285	–
NK series	High Strength	TJ130	130 (896)	150 (1034)	150 (1034)	13	Min 301	40 (54)
		TJ95	95 (655)	110 (758)	105 (724)	13	(Max 26)	80 (108)
	Sour Services	TJ110	110 (758)	125 (862)	125 (862)	13	(Max 30)	80 (108)

\* Full size at room temperature

## DRILL PIPE AND TOOL JOINT CHEMICAL COMPOSITIONS

SPEC.	GRADE	C	Si (Max)	Mn	P (Max)	S (Max)	Cr	Mo
API 5D (Pipe body)	E, X, G, S	–	–	–	0.030	0.030	–	–
NK series (Pipe body)	S140	Max.	–	Max.	–	–	Max.	–
	V150	0.30	0.35	1.00	0.020	0.005	1.20	0.40~0.80
	C95S	0.25~0.30	0.35	0.40~1.00	0.020	0.005	0.80~1.20	0.20~0.80
	C105S	0.25~0.30	0.35	0.40~1.00	0.020	0.005	0.80~1.20	0.40~0.80
NK series (Tool joint)	TJ95	–	–	Max.	–	–	–	–
	TJ110	0.25~0.40	0.35	1.20	0.020	0.010	0.80~1.20	0.25~0.80

## DRILL PIPE SSCC RESISTANCE

GRADE		CRITERIA *
		% of SMYS
C95S	Pipe body	80
C105S	Pipe body	80

\* Method: NACE TM-01-77 Method A.  
Higher % SMYS can be supplied upon request.

## AVAILABLE SIZES AND GRADES

SIZE	NOMINAL WEIGHT	WALL THICKNESS	DRILL PIPE				TOOL JOINT	
			UPSET	API 5D		NK SERIES *	API	NK DSTJ™
				Group 1 E	Group 3 X G S			
in	lbs/ft	in						
2 3/8	6.65	0.280	EU	•	•	•	NC26	
2 7/8	10.40	0.362	IU **	•	•	•		
			EU	•	•	•	NC31	
3 1/2	9.50	0.254	IU **	•				
			EU	•			NC38	NK DSTJ™ NC38
	13.30	0.368	IU **	•	•	•		
			EU	•	•	•	NC38	NK DSTJ™ NC38
	15.50	0.449	IU **	•				
			EU	•	•	•	NC38	NK DSTJ™ NC38
							NC40	NK DSTJ™ NC40
		IEU**		•	•			
4***	14.00	0.330	IU	•	•	•	NC40	NK DSTJ™ NC40
			EU	•	•	•	NC46	NK DSTJ™ NC46
4 1/2	13.75	0.271	IU	•			NC46	NK DSTJ™ NC46
			EU	•			NC50	NK DSTJ™ NC50
	16.60	0.337	EU	•	•	•	NC50	NK DSTJ™ NC50
			IEU	•	•	•	NC46	NK DSTJ™ NC46
							4 1/2 FH	
	20.00	0.430	EU	•	•	•	NC50	NK DSTJ™ NC50
			IEU	•	•	•	NC46	NK DSTJ™ NC46
						4 1/2 FH		
5	16.25	0.296	IU **		•	•		
	19.50	0.362	EU **		•	•		
			IEU	•	•	•	NC50	NK DSTJ™ NC50
							5 1/2 FH	NK DSTJ™ 5 1/2 FH
25.60	0.500	EU **		•	•			
		IEU	•	•	•	NC50	NK DSTJ™ NC50	
						5 1/2 FH	NK DSTJ™ 5 1/2 FH	
5 1/2	21.90	0.361	IEU	•	•	•	5 1/2 FH	NK DSTJ™ 5 1/2 FH
	24.70	0.415	IEU	•	•	•	5 1/2 FH	NK DSTJ™ 5 1/2 FH

\* Proprietary Drill Pipe of TenarisNKK Tubes.

\*\* Available for tool joint specified by customer.

\*\*\* 11.85 lbs/ft & 15.70 lbs/ft are available upon request.

# NK DSTJ™

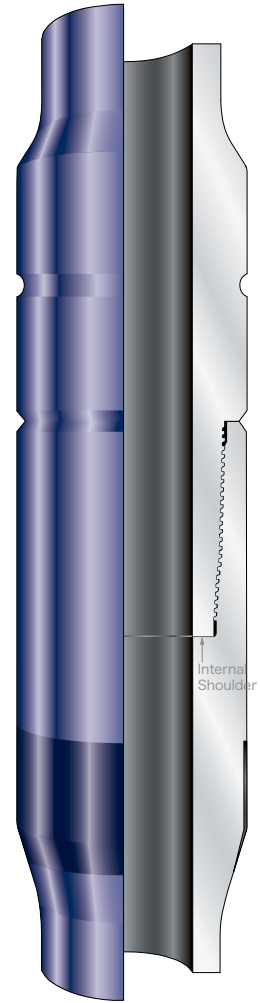
(DOUBLE SHOULDER TOOL JOINT)

## DESIGN

- Double shoulder connection (External & Internal).
- API Spec. 7 thread.
- Smooth bore. NK DSTJ™ tool joint pin ID is equal to the box ID.

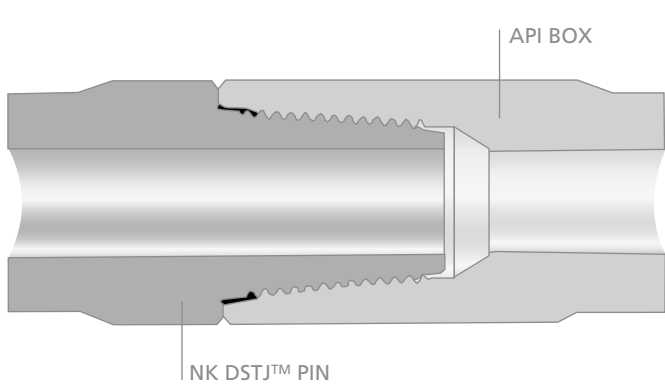
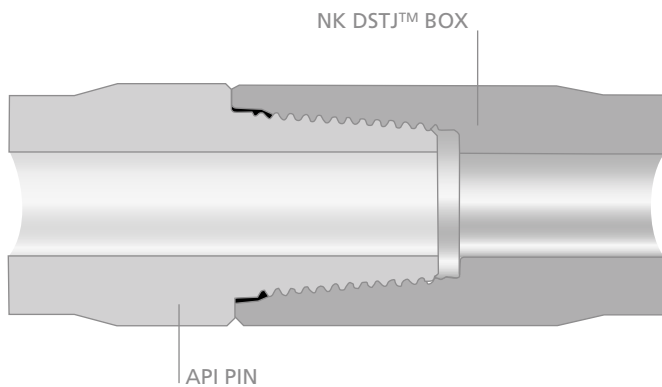
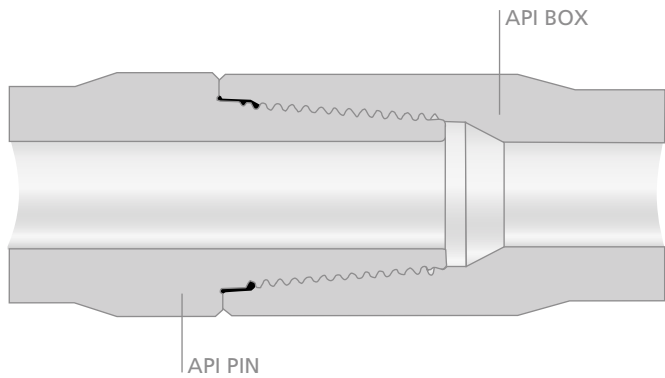
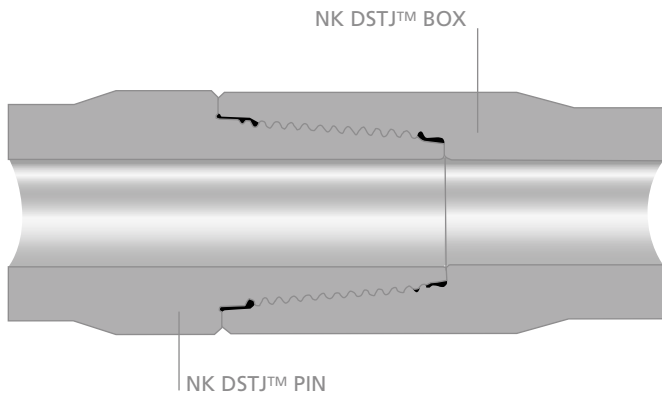
## FEATURES

- Interchangeability with API tool joint.
- High torque resistance.
- Same running speed as API tool joint.
- Longer durability & lower repair ratio than API tool joint.
- Bigger ID and/or smaller OD which translates into improved hydraulics and/or fish ability.
- Suitable for sour drilling (due to minimal hoop stress in box and lower tensile stress in pin).



## INTERCHANGEABILITY WITH API TOOL JOINT

NK DSTJ™ is interchangeable with API tool joint. Any kind of accessories and drill pipe with API connections can be made up with NK DSTJ™ drill pipe.



### HIGH TORQUE RESISTANCE

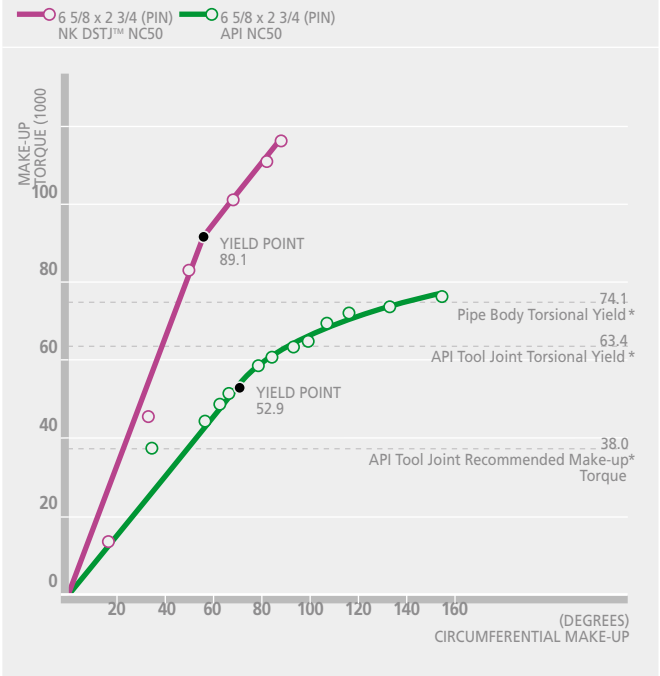
NK DSTJ™ has excellent torsional strength compared to API tool joint. NK DSTJ™ is suitable for deep well drilling, extended reach well or horizontal well drilling. Various applications, smaller OD and larger ID are available.

### Make-up Test

Diagram on the right shows torque resistance tests supporting the performance offered by NK DSTJ™ tool joint. The results reflect a higher performance of the NK DSTJ™ NC50 over the API NC50. This figure shows

the make-up torque curve of both tool joints (6 5/8" x 2 3/4"). Difference, as seen, is remarkable. In the case NK DSTJ™ NC50 would be attached to API S135 5" x 19.5 ft-lbs drill pipe, pipe body would yield before the tool joint does.

TOOL JOINT MAKE-UP TORQUE CURVE

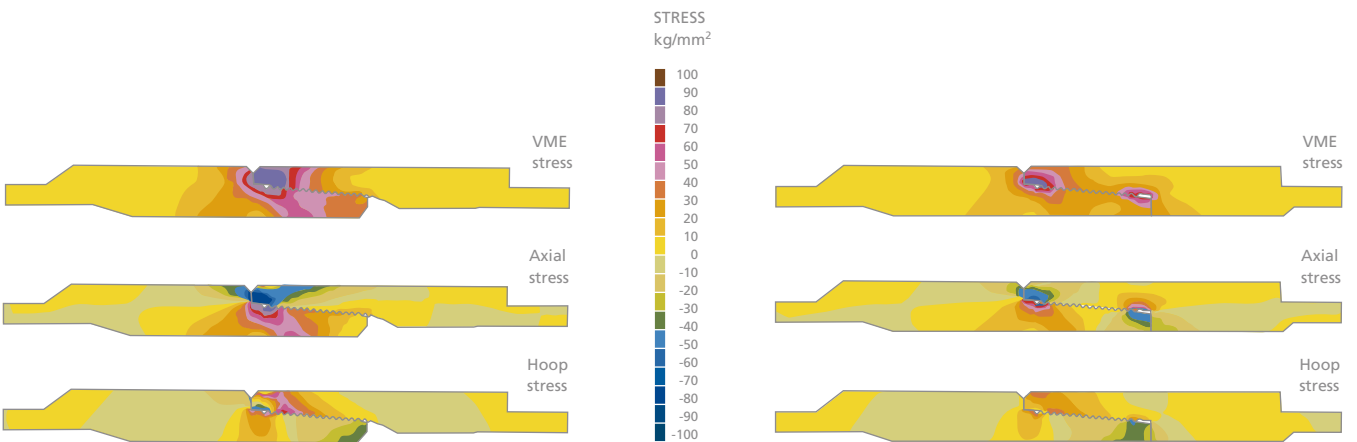


\*API RP 7G (16<sup>th</sup> edition, 1998)

### FEM Analysis

In the case of API NC50, very high VME stress and compression stress are found near external shoulder area and it is supposed that shoulder deformation will start soon.

NK DSTJ™ NC50 clearly indicates improved performance in comparison to standard API tool joint.



Pin: 6 5/8" OD x 2 3/4" ID  
 Box: 3 1/2" ID  
 Circumferential make-up: 40 Degrees  
 31,200 ft-lbs (42,300 N-m)

Pin: 6 5/8" OD x 2 3/4" ID  
 Box: 2 3/4" ID  
 Circumferential make-up: 20 Degrees  
 31,900 ft-lbs (43,300 N-m)

# NK DSTJ™

## TORSIONAL STRENGTH, TENSILE STRENGTH AND MAKE-UP TORQUE

NK DSTJ™ NC38					
ID	DATA	OD			
		5"	4 7/8"	4 3/4"	4 5/8"
<b>2 1/8"</b>	Torque (ft-lb)	36,060	<b>31,770</b>	<b>27,320</b>	<b>23,040</b>
	Tension (lb)	912,600	912,600	912,600	912,600
	Make-up (ft-lb)	25,200	22,200	19,100	16,100
<b>2 5/16"</b>	Torque (ft-lb)	32,400	<b>31,100</b>	<b>26,650</b>	<b>22,370</b>
	Tension (lb)	827,700	827,700	827,700	827,700
	Make-up (ft-lb)	22,700	21,800	18,700	15,700
<b>2 7/16"</b>	Torque (ft-lb)	29,750	29,580	<b>26,130</b>	<b>21,850</b>
	Tension (lb)	767,100	767,100	767,100	767,100
	Make-up (ft-lb)	20,800	20,700	18,300	15,300
<b>2 9/16"</b>	Torque (ft-lb)	26,930	26,770	<b>25,560</b>	<b>21,280</b>
	Tension (lb)	703,300	703,300	703,300	703,300
	Make-up (ft-lb)	18,900	18,700	17,900	14,900

NK DSTJ™ NC46					
ID	DATA	OD			
		6 1/4"	6 1/8"	6"	5 7/8"
<b>2 1/4"</b>	Torque (ft-lb)	74,400	<b>70,530</b>	<b>63,720</b>	<b>57,120</b>
	Tension (lb)	1,537,800	1,537,800	1,537,800	1,537,800
	Make-up (ft-lb)	52,100	49,400	44,600	40,000
<b>2 1/2"</b>	Torque (ft-lb)	68,310	67,990	<b>62,760</b>	<b>56,160</b>
	Tension (lb)	1,416,600	1,416,600	1,416,600	1,416,600
	Make-up (ft-lb)	47,800	47,600	43,900	39,300
<b>2 3/4"</b>	Torque (ft-lb)	61,410	61,120	60,830	<b>54,930</b>
	Tension (lb)	1,282,600	1,282,600	1,282,600	1,282,600
	Make-up (ft-lb)	43,000	42,800	42,600	38,500
<b>3"</b>	Torque (ft-lb)	53,690	53,440	53,180	52,920
	Tension (lb)	1,135,800	1,135,800	1,135,800	1,135,800
	Make-up (ft-lb)	37,600	37,400	37,200	37,000
<b>3 1/4"</b>	Torque (ft-lb)	45,130	44,910	44,700	44,480
	Tension (lb)	976,300	976,300	976,300	976,300
	Make-up (ft-lb)	31,600	31,400	31,300	31,100

NK DSTJ™ 5 1/2 FH					
ID	DATA	OD			
		7 1/4"	7 1/8"	7"	6 7/8"
<b>3"</b>	Torque (ft-lb)	<b>111,140</b>	<b>101,600</b>	<b>92,310</b>	<b>83,250</b>
	Tension (lb)	2,086,000	2,086,000	2,086,000	2,086,000
	Make-up (ft-lb)	77,800	71,100	64,600	58,300
<b>3 1/4"</b>	Torque (ft-lb)	<b>109,140</b>	<b>99,880</b>	<b>90,580</b>	<b>81,520</b>
	Tension (lb)	1,926,500	1,926,500	1,926,500	1,926,500
	Make-up (ft-lb)	76,400	69,900	63,400	57,100
<b>3 1/2"</b>	Torque (ft-lb)	99,930	<b>97,820</b>	<b>88,520</b>	<b>79,460</b>
	Tension (lb)	1,754,200	1,754,200	1,754,200	1,754,200
	Make-up (ft-lb)	70,000	68,500	62,000	55,600
<b>3 3/4"</b>	Torque (ft-lb)	88,290	87,930	<b>86,110</b>	<b>77,050</b>
	Tension (lb)	1,569,100	1,569,100	1,569,100	1,569,100
	Make-up (ft-lb)	61,800	61,600	60,300	53,900
<b>4"</b>	Torque (ft-lb)	75,640	75,330	75,020	<b>74,260</b>
	Tension (lb)	1,371,300	1,371,300	1,371,300	1,371,300
	Make-up (ft-lb)	52,900	52,700	52,500	52,000

NK DSTJ™ NC40					
ID	DATA	OD			
		5 1/2"	5 3/8"	5 1/4"	5 1/8"
<b>2 7/16"</b>	Torque (ft-lb)	40,500	40,280	<b>39,590</b>	<b>34,500</b>
	Tension (lb)	971,900	971,900	971,900	971,900
	Make-up (ft-lb)	28,400	28,200	27,700	24,200
<b>2 9/16"</b>	Torque (ft-lb)	37,530	37,320	37,120	<b>33,930</b>
	Tension (lb)	908,100	908,100	908,100	908,100
	Make-up (ft-lb)	26,300	26,100	26,000	23,800
<b>2 11/16"</b>	Torque (ft-lb)	34,370	34,190	34,000	<b>33,290</b>
	Tension (lb)	841,100	841,100	841,100	841,100
	Make-up (ft-lb)	24,100	23,900	23,800	23,300
<b>2 13/16"</b>	Torque (ft-lb)	31,040	30,860	30,690	30,520
	Tension (lb)	770,900	770,900	770,900	770,900
	Make-up (ft-lb)	21,700	21,600	21,500	21,400

NK DSTJ™ NC50					
ID	DATA	OD			
		6 5/8"	6 1/2"	6 3/8"	6 1/4"
<b>2 3/4"</b>	Torque (ft-lb)	88,380	<b>80,730</b>	<b>72,990</b>	<b>65,470</b>
	Tension (lb)	1,681,000	1,681,000	1,681,000	1,681,000
	Make-up (ft-lb)	61,900	56,500	51,100	45,800
<b>3"</b>	Torque (ft-lb)	80,240	<b>79,270</b>	<b>71,520</b>	<b>64,000</b>
	Tension (lb)	1,534,200	1,534,200	1,534,200	1,534,200
	Make-up (ft-lb)	56,200	55,500	50,100	44,800
<b>3 1/4"</b>	Torque (ft-lb)	71,200	70,890	<b>69,750</b>	<b>62,220</b>
	Tension (lb)	1,374,700	1,374,700	1,374,700	1,374,700
	Make-up (ft-lb)	49,800	49,600	48,800	43,600
<b>3 1/2"</b>	Torque (ft-lb)	61,270	61,000	60,720	<b>60,120</b>
	Tension (ft-lb)	1,202,400	1,202,400	1,202,400	1,202,400
	Make-up (ft-lb)	42,900	42,700	42,500	42,100
<b>3 3/4"</b>	Torque (ft-lb)	50,400	50,180	49,950	49,720
	Tension (lb)	1,017,400	1,017,400	1,017,400	1,017,400
	Make-up (ft-lb)	35,300	35,100	35,000	34,800

INTERCHANGEABILITY OF CONNECTIONS	
NUMBER CONNECTION	EQUIVALENT CONNECTION
NC38	3 1/2 IF
NC40	4 FH
NC46	4 IF
NC50	4 1/2 IF

Note Make-up torque is based on 70% of Torsional Yield Strength. TJ130 (SMYS 130ksi) is the standard tool joint for NK DSTJ™ (box-weak connections shown in bold type).

Other tool joint OD & ID combinations available upon request.

# Additional Processes



## Hardfacing

TenarisNKK Tubes can supply varieties of hardfacing using accumulated technology and experience and also provides commercially available hardfacing such as ARNCO series, ARMACOR, etc.

## Proprietary Hardfacing

### SERIES 1000

Fine particle hardfacing

### SERIES 3000

Coarse particle hardfacing with standard density

### SERIES 4000

Coarse particle hardfacing with high density

### SERIES 6000 & 8000

Hardfacing extends 3 3/4" over the wear area of the tool joint with finger protection on the tapered elevator shoulder.

The superior wear resistance and minimal casing wear properties of SERIES 6000 are due to its unique application method. SERIES 8000's fine surface can minimize casing wear.

## Tool joint break-in

Upon customer's request, TenarisNKK Tubes will conduct the break-in of tool joints to eliminate the rig handling time and ensure that the process is carried out in a controlled environment.

- 1 Apply an even coat of 50% zinc-base thread compound on pin and box.
- 2 After making up hand tight, the assembled components will be made up at the specified torque and then broken out.
- 3 After completing the required make and break cycles, the tool joints shall be separated and cleaned thoroughly.
- 4 Connections shall be visually inspected for thread damages.

If required, TenarisNKK Tubes will provide a certificate for break-in of tool joints.



## Accessories

TenarisNKK Tubes can supply drill pipe accessories such as drill collars, heavy weight drill pipes, and others from qualified sub-suppliers.

## UPSET DIMENSIONS AND WEIGHTS (GROUP 1)

DESIGNATIONS		PIPE BODY			CALCULATED WEIGHT		UPSET DIMENSIONS (in)							
SIZE	NOMINAL WEIGHT	OD	WT	ID	PLAIN END	UPSET	OD +1/8 -1/32	ID AT END OF PIPE ±1/16	LENGTH OF INTERNAL UPSET +1 1/2 -1/2	LENGTH OF INTERNAL TAPER Min	LENGTH OF EXTERNAL UPSET Min	LENGTH OF EXTERNAL TAPER		LENGTH END OF PIPE TO TAPER FADE OUT
												Min	Max	
in	lb/ft	in	in	in	lb/ft	lb	in	in	in	in	in	in	in	in
		D	t	d	w <sub>pe</sub>	e <sub>w</sub>	D <sub>ou</sub>	d <sub>ou</sub>	L <sub>iu</sub>	m <sub>iu</sub>	L <sub>eu</sub>	m <sub>eu</sub>	m <sub>eu</sub>	L <sub>eu</sub> +m <sub>eu</sub>

### INTERNAL-UPSET

<b>2 7/8</b>	10.40	2.875	0.362	2.151	9.72	3.20	2.875	1 5/16	1 3/4	1 1/2	—	—	—	—
<b>3 1/2</b>	9.50	3.500	0.254	2.992	8.81	4.40	3.500	2 1/4	1 3/4	—	—	—	—	—
	13.30	3.500	0.368	2.764	12.31	4.40	3.500	1 15/16	1 3/4	1 1/2	—	—	—	—
<b>3 1/2</b>	15.50	3.500	0.449	2.602	14.63	3.40	3.500	1 15/16	1 3/4	1 1/2	—	—	—	—
<b>4</b>	11.85	4.000	0.262	3.476	10.46	4.20	4.000	2 15/16	1 3/4	—	—	—	—	—
	14.00	4.000	0.330	3.340	12.93	4.60	4.250	2 3/4	1 3/4	2	—	—	—	—
<b>4 1/2</b>	13.75	4.500	0.271	3.958	12.24	5.20	4.750	3 3/8	1 3/4	—	—	—	—	—
<b>5</b>	16.25	5.000	0.296	4.408	14.87	6.60	5.000	3 3/4	1 3/4	—	—	—	—	—

### EXTERNAL-UPSET

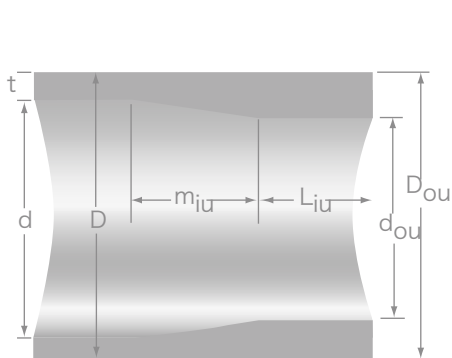
<b>2 3/8</b>	6.65	2.375	0.280	1.815	6.26	1.80	2.656	1.815	—	—	1 1/2	1 1/2	—	4
<b>2 7/8</b>	10.40	2.875	0.362	2.151	9.72	2.40	3.219	2.151	—	—	1 1/2	1 1/2	—	4
<b>3 1/2</b>	9.50	3.500	0.254	2.992	8.81	2.60	3.938	2.992	—	—	1 1/2	1 1/2	—	4
	13.30	3.500	0.368	2.764	12.31	4.00	3.938	2.602	2 1/4	2	1 1/2	1 1/2	—	4
<b>4</b>	11.85	4.000	0.262	3.476	10.46	2.80	3.938	2.602	—	—	1 1/2	1 1/2	—	4
	14.00	4.000	0.330	3.340	12.93	5.00	4.563	3.340	—	—	1 1/2	1 1/2	—	4
<b>4 1/2</b>	13.75	4.500	0.271	3.958	12.24	5.60	5.063	3.958	—	—	1 1/2	1 1/2	—	4
	16.60	4.500	0.337	3.826	14.98	5.60	5.063	3.826	—	—	1 1/2	1 1/2	—	4
	20.00	4.500	0.430	3.640	18.69	5.60	5.063	3.640	—	—	1 1/2	1 1/2	—	4

### INTERNAL-EXTERNAL UPSET

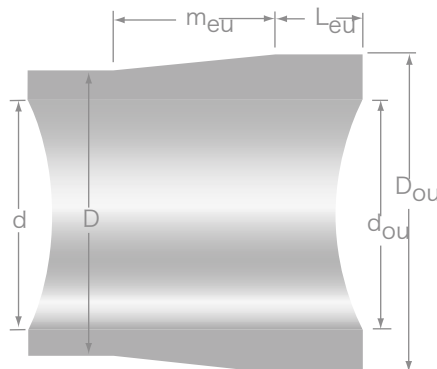
<b>4 1/2</b>	16.60	4.500	0.337	3.826	14.98	8.10	4.750	3 5/32	2 1/2	2	1 1/2	1	1 1/2	—
	20.00	4.500	0.430	3.640	18.69	8.60	4.781	3	2 1/4	2	1 1/2	1	1 1/2	—
<b>5</b>	19.50	5.000	0.362	4.276	17.93	8.60	5.188	3 11/16	2 1/4	2	1 1/2	1	1 1/2	—
	25.60	5.000	0.500	4.000	24.03	7.80	5.188	3 7/16	2 1/4	2	1 1/2	1	1 1/2	—
<b>5 1/2</b>	21.90	5.500	0.361	4.778	19.81	10.60	5.750	4	2 1/4	2	1 1/2	1	1 1/2	—
	24.70	5.500	0.415	4.670	22.54	9.00	5.750	4	2 1/4	2	1 1/2	1	1 1/2	—

\* Note: This data is based on API 5D (5th edition Oct. 2001).

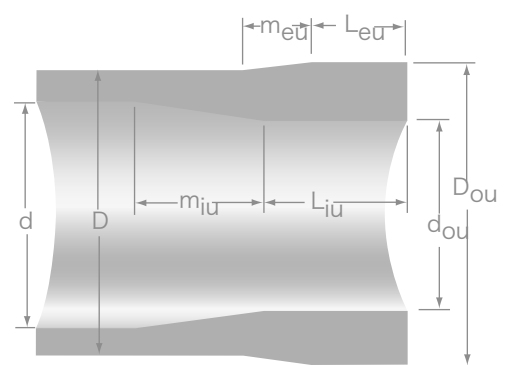
### INTERNAL UPSET



### EXTERNAL UPSET



### INTERNAL-EXTERNAL UPSET



## UPSET DIMENSIONS AND WEIGHTS (GROUP 3)

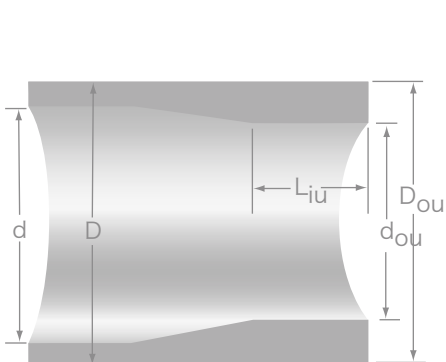
DESIGNATIONS		PIPE BODY			CALCULATED WEIGHT		UPSET DIMENSIONS (in.)					
SIZE	NOMINAL WEIGHT	OD	WT	ID	PLAIN END	UPSET	OD	ID AT END OF PIPE	LENGTH OF INTERNAL UPSET	LENGTH OF INTERNAL TAPER	LENGTH OF EXTERNAL UPSET	LENGTH END OF PIPE TO TAPER FADE OUT EXT. UPSET
					lb/ft	lb	+1/8 -1/32	±1/16	+1 1/2 -1/2	Min	Min	UPSET Max
in	lb/ft	in	in	in	lb/ft	lb	in	in	in	in	in	in
		D	t	d	w <sub>pe</sub>	e <sub>w</sub>	D <sub>ou</sub>	d <sub>ou</sub>	L <sub>iu</sub>	m <sub>iu</sub>	L <sub>eu</sub>	L <sub>eu</sub> +m <sub>eu</sub>
INTERNAL-UPSET												
<b>2 7/8</b>	10.40	2.875	0.362	2.151	9.72	5.40	2.875	1 5/16	3 1/2	—	—	—
<b>3 1/2</b>	13.30	3.500	0.368	2.764	12.31	7.40	3.500	1 5/16	3 1/2	—	—	—
<b>4</b>	14.00	4.000	0.330	3.340	12.93	8.80	4.250	2 5/8	3 1/2	—	—	—
<b>5</b>	16.25	5.000	0.296	4.408	14.87	13.60	5.000	3 9/16	3 1/2	—	—	—

EXTERNAL-UPSET												
<b>2 3/8</b>	6.65	2.375	0.280	1.815	6.26	4.60	2.656	1 9/16	4 1/4	—	3	5 1/2
<b>2 7/8</b>	10.40	2.875	0.362	2.151	9.72	6.20	3.250	1 15/16	4 1/4	—	3	5 1/2
<b>3 1/2</b>	13.30	3.500	0.368	2.764	12.31	10.20	4.000	2 1/2	4 1/4	—	3	5 1/2
	15.50	3.500	0.449	2.602	14.63	8.20	4.000	2 1/2	4 1/4	—	3	5 1/2
<b>4</b>	14.00	4.000	0.330	3.340	12.93	14.40	4.625	3 1/16	4 1/4	—	3	5 1/2
<b>4 1/2</b>	16.60	4.500	0.337	3.826	14.98	17.20	5.188	3 9/16	4 1/4	—	3	5 1/2
	20.00	4.500	0.430	3.640	18.69	16.00	5.188	3 7/16	4 1/4	—	3	5 1/2
<b>5</b>	19.50	5.000	0.362	4.276	17.93	21.60	5.750	3 15/16	4 1/4	—	3	5 1/2
	25.60	5.000	0.500	4.000	24.03	21.20	5.875	3 13/16	4 1/4	—	3	5 1/2

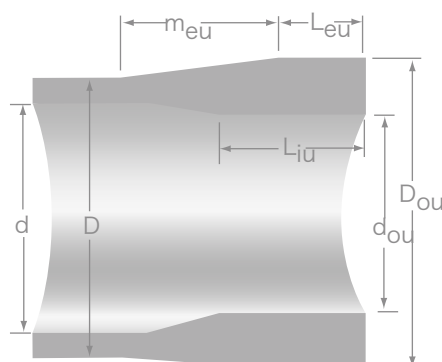
INTERNAL-EXTERNAL UPSET												
<b>3 1/2</b>	15.50	3.500	0.449	2.602	14.63	11.00	3.781	1 15/16	4 1/4	—	3	5 1/2
<b>4 1/2</b>	16.60	4.500	0.337	3.826	14.98	8.70	4.750	2 7/8	2 1/4	3	1 1/2	3
	20.00	4.500	0.430	3.640	18.69	17.60	4.781	2 13/16	4 13/16	3	3	5 1/2
<b>5</b>	19.50	5.000	0.362	4.276	17.93	16.80	5.188	3 9/16	4 9/16	3	3	5 1/2
	25.60	5.000	0.500	4.000	24.03	15.40	5.188	3 5/16	4 5/16	3	3	5 1/2
<b>5 1/2</b>	21.90	5.500	0.361	4.778	19.81	21.00	5.750	3 13/16	4 13/16	3	3	5 1/2
	24.70	5.500	0.415	4.670	22.54	18.40	5.750	3 13/16	4 13/16	3	3	5 1/2

\* Note: This data is based on API 5D (5th edition Oct. 2001).

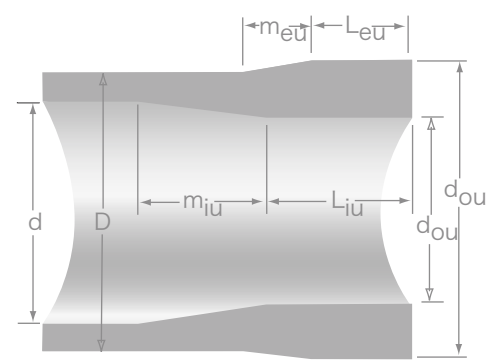
**INTERNAL UPSET**



**EXTERNAL UPSET**



**INTERNAL-EXTERNAL UPSET**



## TOOL JOINT DIMENSIONS (GROUPS 1 & 3)

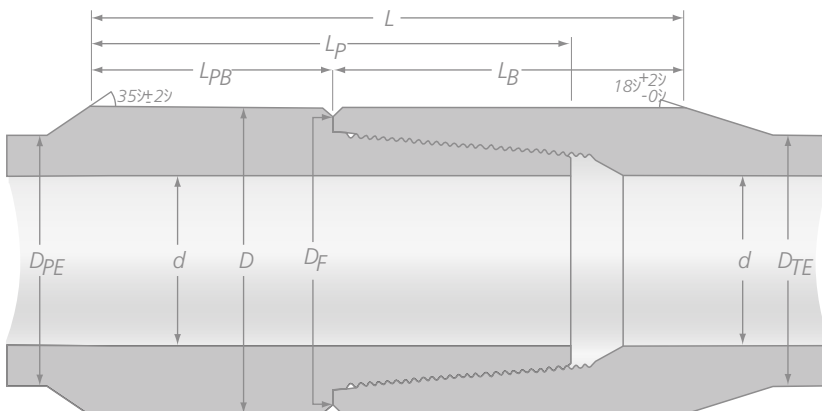
TOOL JOINT DESIGNATIONS	DRILL PIPE			TOOL JOINT								TORSIONAL RATIO, PIN TO DRILL PIPE					
	SIZE AND STYLE	NOMINAL WEIGHT	GRADE	OD OF PIN AND BOX	ID OF PIN	BEVEL DIA. OF PIN AND BOX SHOULDER	TOTAL LENGTH TOOL JOINT PIN	PIN TONG SPACE	BOX TONG SPACE	COMBINED LENGTH OF PIN AND BOX	DIA. OF PIN AT ELEVATOR UPSET		DIA. OF BOX AT ELEVATOR UPSET				
	in	lb/ft		±1/32	+1/64 -1/32	±1/64	+1/4 -3/8	±1/4	±1/4	±1/2	Max		Max				
	D			in	in	in	in	in	in	in	in		in				
		D	d	D <sub>F</sub>	L <sub>P</sub>	L <sub>PB</sub>	L <sub>B</sub>	L	D <sub>PE</sub>	D <sub>TE</sub>							
NC26	2 3/8 EU	6.65	E75	3 3/8	1 3/4	3 17/64	10	7	8	15	2 9/16	2 9/16	1.10				
			X95	3 3/8	1 3/4	3 17/64	10	7	8	15	2 9/16	2 9/16	0.87				
			G105	3 3/8	1 3/4	3 17/64	10	7	8	15	2 9/16	2 9/16	0.79				
NC31	2 7/8 EU	10.40	E75	4 1/8	2 1/8	3 61/64	10 1/2	7	9	16	3 3/16	3 3/16	1.03				
			X95	4 1/8	2	3 61/64	10 1/2	7	9	16	3 3/16	3 3/16	0.90				
			G105	4 1/8	2	3 61/64	10 1/2	7	9	16	3 3/16	3 3/16	0.82				
			S135	4 3/8	1 5/8	3 61/64	10 1/2	7	9	16	3 3/16	3 3/16	0.82				
NC38	3 1/2 EU	9.50	E75	4 3/4	2 11/16	4 37/64	11 1/2	8	10 1/2	18 1/2	3 7/8	3 7/8	0.91				
			X95	4 3/4	2 11/16	4 37/64	12	8	10 1/2	18 1/2	3 7/8	3 7/8	0.98				
			G105	5	2 9/16	4 37/64	12	8	10 1/2	18 1/2	3 7/8	3 7/8	0.87				
	13.30	9.50	X95	5	2 7/16	4 37/64	12	8	10 1/2	18 1/2	3 7/8	3 7/8	0.86				
			G105	5	2 1/8	4 37/64	12	8	10 1/2	18 1/2	3 7/8	3 7/8	0.80				
			S135	5	2 1/8	4 37/64	12	8	10 1/2	18 1/2	3 7/8	3 7/8	0.80				
			E75	5	2 9/16	4 37/64	12	8	10 1/2	18 1/2	3 7/8	3 7/8	0.97				
15.50	9.50	X95	5	2 7/16	4 37/64	12	8	10 1/2	18 1/2	3 7/8	3 7/8	0.83					
		G105	5	2 1/8	4 37/64	12	8	10 1/2	18 1/2	3 7/8	3 7/8	0.90					
NC40	3 1/2 EU	15.50	S135	5 1/2	2 1/4	5 1/64	11 1/2	7	10	17	3 7/8	3 7/8	0.87				
			4 IU	14.00	E75	5 1/4	2 13/16	5 1/64	11 1/2	7	10	17	4 3/16	4 3/16	1.01		
					X95	5 1/4	2 11/16	5 1/64	11 1/2	7	10	17	4 3/16	4 3/16	0.86		
					G105	5 1/2	2 7/16	5 1/64	11 1/2	7	10	17	4 3/16	4 3/16	0.93		
					S135	5 1/2	2	5 1/64	11 1/2	7	10	17	4 3/16	4 3/16	0.87		
NC46	4 EU	14.00	E75	6	3 1/4	5 23/32	11 1/2	7	10	17	4 1/2	4 1/2	1.43				
			X95	6	3 1/4	5 23/32	11 1/2	7	10	17	4 1/2	4 1/2	1.13				
			G105	6	3 1/4	5 23/32	11 1/2	7	10	17	4 1/2	4 1/2	1.02				
			S135	6	3	5 23/32	11 1/2	7	10	17	4 1/2	4 1/2	0.94				
	4 1/2 IU	13.75	14.00	E75	6	3 3/8	5 23/32	11 1/2	7	10	17	4 11/16	4 11/16	1.20			
				4 1/2 IEU	16.60	14.00	E75	6 1/4	3 1/4	5 23/32	11 1/2	7	10	17	4 11/16	4 11/16	1.09
	X95	6 1/4	3				5 23/32	11 1/2	7	10	17	4 11/16	4 11/16	1.01			
	G105	6 1/4	3				5 23/32	11 1/2	7	10	17	4 11/16	4 11/16	0.91			
	S135	6 1/4	2 3/4				5 23/32	11 1/2	7	10	17	4 11/16	4 11/16	0.81			
	E75	6 1/4	3				5 23/32	11 1/2	7	10	17	4 11/16	4 11/16	1.07			
	4 1/2 IEU	20.00	14.00	X95	6 1/4	2 3/4	5 23/32	11 1/2	7	10	17	4 11/16	4 11/16	0.96			
				G105	6 1/4	2 1/2	5 23/32	11 1/2	7	10	17	4 11/16	4 11/16	0.96			
				S135	6 1/4	2 1/4	5 23/32	11 1/2	7	10	17	4 11/16	4 11/16	0.81			
NC50	4 1/2 EU	13.75	E75	6 5/8	3 3/4	6 1/16	11 1/2	7	10	17	5	5	1.32				
			16.60	13.75	13.75	E75	6 5/8	3 3/4	6 1/16	11 1/2	7	10	17	5	5	1.23	
						X95	6 5/8	3 3/4	6 1/16	11 1/2	7	10	17	5	5	0.97	
						G105	6 5/8	3 3/4	6 1/16	11 1/2	7	10	17	5	5	0.88	
						S135	6 5/8	3 1/2	6 1/16	11 1/2	7	10	17	5	5	0.81	
	20.00	13.75	13.75	E75	6 5/8	3 5/8	6 1/16	11 1/2	7	10	17	5	5	1.02			
				X95	6 5/8	3 1/2	6 1/16	11 1/2	7	10	17	5	5	0.96			
				G105	6 5/8	3 1/2	6 1/16	11 1/2	7	10	17	5	5	0.86			
				S135	6 5/8	3	6 1/16	11 1/2	7	10	17	5	5	0.87			
				5 IEU	19.50	19.50	E75	6 5/8	3 3/4	6 1/16	11 1/2	7	10	17	5 1/8	5 1/8	0.92
							X95	6 5/8	3 1/2	6 1/16	11 1/2	7	10	17	5 1/8	5 1/8	0.86
							G105	6 5/8	3 1/4	6 1/16	11 1/2	7	10	17	5 1/8	5 1/8	0.89
							S135	6 5/8	2 3/4	6 1/16	11 1/2	7	10	17	5 1/8	5 1/8	0.86
E75	6 5/8	3 1/2	6 1/16				11 1/2	7	10	17	5 1/8	5 1/8	0.86				
25.60	19.50	19.50	X95	6 5/8	3	6 1/16	11 1/2	7	10	17	5 1/8	5 1/8	0.86				
			G105	6 5/8	2 3/4	6 1/16	11 1/2	7	10	17	5 1/8	5 1/8	0.87				

## TOOL JOINT DIMENSIONS (GROUPS 1 & 3) Continued

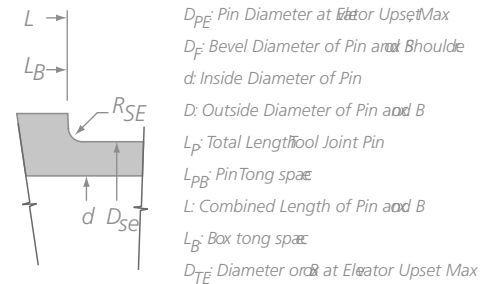
TOOL JOINT DESIGNATIONS	DRILL PIPE			TOOL JOINT									TORSIONAL RATIO, PIN TO DRILL PIPE
	SIZE AND STYLE	NOMINAL WEIGHT	GRADE	OD OF PIN AND BOX	ID OF PIN	BEVEL DIA. OF PIN AND BOX SHOULDER	TOTAL LENGTH TOOL JOINT PIN	PIN TONG SPACE	BOX TONG SPACE	COMBINED LENGTH OF PIN AND BOX	DIA. OF PIN AT ELEVATOR UPSET	DIA. OF BOX AT ELEVATOR UPSET	
	in	lb/ft		$\pm 1/32$	$+1/64$ $-1/32$	$\pm 1/64$	$+1/4$ $-3/8$	$\pm 1/4$	$\pm 1/4$	$\pm 1/2$	Max	Max	
	D		in	in	in	in	in	in	in	in	in	in	
			D	d	D <sub>F</sub>	L <sub>P</sub>	L <sub>PB</sub>	L <sub>B</sub>	L	D <sub>PE</sub>	D <sub>TE</sub>		
5 1/2 FH	5 IEU	19.50	E75	7	3 3/4	6 23/32	13	8	10	18	5 1/8	5 1/8	1.53
			X95	7	3 3/4	6 23/32	13	8	10	18	5 1/8	5 1/8	1.21
			G105	7	3 3/4	6 23/32	13	8	10	18	5 1/8	5 1/8	1.09
			S135	7 1/4	3 1/2	6 23/32	13	8	10	18	5 1/8	5 1/8	0.98
	25.60	E75	7	3 1/2	6 23/32	13	8	10	18	18	5 1/8	5 1/8	1.21
		X95	7	3 1/2	6 23/32	13	8	10	18	18	5 1/8	5 1/8	0.95
		G105	7 1/4	3 1/2	6 23/32	13	8	10	18	18	5 1/8	5 1/8	0.99
		S135	7 1/4	3 1/4	6 23/32	13	8	10	18	18	5 1/8	5 1/8	0.83
	5 1/2 IEU	21.90	E75	7	4	6 23/32	13	8	10	18	5 11/16	5 11/16	1.11
			X95	7	3 3/4	6 23/32	13	8	10	18	5 11/16	5 11/16	0.98
			G105	7 1/4	3 1/2	6 23/32	13	8	10	18	5 11/16	5 11/16	1.02
			S135	7 1/2	3	7 3/32	13	8	10	18	5 11/16	5 11/16	0.96
24.70	E75	7	4	6 23/32	13	8	10	18	18	5 11/16	5 11/16	0.99	
	X95	7 1/4	3 1/2	6 23/32	13	8	10	18	18	5 11/16	5 11/16	1.01	
	G105	7 1/4	3 1/2	6 23/32	13	8	10	18	18	5 11/16	5 11/16	0.92	
	S135	7 1/2	3	7 3/32	13	8	10	18	18	5 11/16	5 11/16	0.86	

\* Note: This data is based on API RP7G (16<sup>th</sup> edition Aug. 1998)  
Other tool joint dimensions available upon request.

### TAPER SHOULDER



### SQUARE SHOULDER



**NEW DRILL PIPE TORSIONAL, TENSILE, COLLAPSE AND INTERNAL PRESSURE (GROUPS 1 & 3)**

SIZE	NOMINAL WEIGHT	PLAIN END WEIGHT	WALL THICKNESS	ID	SECTION AREA OF PIPE BODY	POLAR SECTIONAL MODULUS	TORSIONAL YIELD STRENGTH			
							lb/ft			
							E	X	G	S
2 3/8	4.85	4.43	0.190	1.995	1.3042	1.321	4,760	6,030	6,670	8,570
	6.65	6.26	0.280	1.815	1.8429	1.733	6,250	7,920	8,750	11,250
2 7/8	6.85	6.16	0.217	2.441	1.8120	2.241	8,080	10,240	11,320	14,550
	10.40	9.72	0.362	2.151	2.8579	3.204	11,550	14,640	16,180	20,800
3 1/2	9.50	8.81	0.254	2.992	2.5902	3.923	14,150	17,920	19,800	25,460
	13.30	12.31	0.368	2.764	3.6209	5.144	18,550	23,500	25,970	33,390
	15.50	14.63	0.449	2.602	4.3037	5.847	21,090	26,710	29,520	37,950
4	11.85	10.46	0.262	3.476	3.0767	5.400	19,470	24,670	27,260	35,050
	14.00	12.93	0.330	3.340	3.8048	6.458	23,290	29,500	32,600	41,920
	15.70	14.69	0.380	3.240	4.3216	7.157	25,810	32,690	36,130	46,460
4 1/2	13.75	12.24	0.271	3.958	3.6005	7.184	25,910	32,820	36,270	46,630
	16.60	14.98	0.337	3.826	4.4074	8.543	30,810	39,020	43,130	55,450
	20.00	18.69	0.430	3.640	5.4981	10.232	36,900	46,740	51,660	66,420
	22.82	21.36	0.500	3.500	6.2832	11.345	40,910	51,820	57,280	73,640
5	16.25	14.87	0.296	4.408	4.3743	9.718	35,040	44,390	49,060	63,080
	19.50	17.93	0.362	4.276	5.2746	11.415	41,170	52,140	57,630	74,100
	25.60	24.03	0.500	4.000	7.0686	14.491	52,260	66,190	73,160	94,060
5 1/2	19.20	16.87	0.304	4.892	4.9624	12.221	44,070	55,830	61,700	79,330
	21.90	19.81	0.361	4.778	5.8282	14.062	50,710	64,230	70,990	91,280
	24.70	22.54	0.415	4.670	6.6296	15.688	56,570	71,660	79,200	101,830

\* Note: This data is based on API RP7G (16th edition Aug. 1998)

TENSILE STRENGTH DATA BASED ON MINIMUM VALUES (LOAD AT THE MINIMUM YIELD STRENGTH)				COLLAPSE PRESSURE (BASED ON MINIMUM VALUES)				INTERNAL PRESSURE (AT MINIMUM YIELD STRENGTH)			
GRADES											
lb				psi				psi			
E	X	G	S	E	X	G	S	E	X	G	S
97,820	123,900	136,940	176,070	11,040	13,980	15,460	19,030	10,500	13,300	14,700	18,900
138,210	175,070	193,500	248,790	15,600	19,760	21,840	28,080	15,470	19,600	21,660	27,850
135,900	172,140	190,260	244,620	10,470	12,940	14,020	17,030	9,910	12,550	13,870	17,830
214,340	271,500	300,080	385,820	16,510	20,910	23,110	29,720	16,530	20,930	23,140	29,750
194,260	246,070	271,970	349,680	10,000	12,080	13,060	15,740	9,530	12,070	13,340	17,150
271,570	343,990	380,200	488,820	14,110	17,880	19,760	25,400	13,800	17,480	19,320	24,840
322,770	408,850	451,880	580,990	16,770	21,250	23,480	30,190	16,840	21,300	23,570	30,310
230,760	292,290	323,060	415,360	8,380	9,980	10,710	12,610	8,600	10,890	12,040	15,470
285,360	361,450	399,500	513,650	11,350	14,380	15,900	20,140	10,830	13,720	15,160	19,490
324,120	410,550	453,770	583,410	12,900	16,340	18,050	23,210	12,470	15,790	17,460	22,440
270,030	342,040	378,050	486,060	7,170	8,410	8,960	10,280	7,900	10,010	11,070	14,230
330,560	418,710	462,780	595,000	10,390	12,760	13,820	16,770	9,830	12,450	13,760	17,690
412,360	522,320	577,300	742,240	12,960	16,420	18,150	23,330	12,540	15,890	17,560	22,580
471,240	596,900	659,730	848,230	14,810	18,770	20,740	26,670	14,580	18,470	20,420	26,250
328,070	415,560	459,300	590,530	6,940	8,110	8,620	9,830	7,770	9,840	10,880	13,990
395,590	501,090	553,830	712,070	9,960	12,020	13,000	15,670	9,500	12,040	13,300	17,100
530,140	671,520	742,200	954,260	13,500	17,100	18,900	24,300	13,130	16,630	18,380	23,630
372,180	471,430	521,050	669,930	6,040	6,940	7,310	8,090	7,250	9,190	10,160	13,060
437,120	553,680	611,960	786,810	8,410	10,020	10,750	12,670	8,610	10,910	12,060	15,510
497,220	629,810	696,110	895,000	10,460	12,930	14,010	17,020	9,900	12,540	13,860	17,830

## NEW DRILL PIPE AND TOOL JOINT MECHANICAL PROPERTIES (GROUP 1)

DRILL PIPE BODY				TOOL JOINT			DRIFT DIAMETER	MECHANICAL PROPERTIES			
NOMINAL SIZE	NOMINAL WEIGHT	APPROX. WEIGHT	UPSET TYPE	CONNECTION	OD	ID		TENSILE YIELD		TORSIONAL YIELD	
								PIPE	TOOL JOINT	PIPE	TOOL JOINT
in	lb/ft	lb/ft			in	in	in	lb	lb	ft-lb	ft-lb
2 3/8	4.85	5.26	EU	NC26 (IF)	3 3/8	1 3/4	1.625	97,817	313,681	4,763	6,875.b
	6.65	6.99	EU	NC26 (IF)	3 3/8	1 3/4	1.625	138,214	313,681	6,250	6,875.b
2 7/8	6.85	7.50	EU	NC31 (IF)	4 1/8	2 1/8	2.000	135,902	447,130	8,083	12,053.p
	10.40	10.87	EU	NC31 (IF)	4 1/8	2 1/8	1.963	214,344	447,130	11,554	12,053.b
		10.35	IU	NC26 (SH)	3 3/8	1 3/4	1.625	214,344	313,681	11,554	6,875.b
3 1/2	9.50	10.58	EU	NC38 (IF)	4 3/4	2 11/16	2.563	194,264	587,308	14,146	18,107.p
	13.30	13.93	EU	NC38 (IF)	4 3/4	2 11/16	2.457	271,569	587,308	18,551	18,107.p
	15.50	16.54	EU	NC38 (IF)	5	2 9/16	2.414	322,775	649,158	21,086	20,326.p
4	11.85	13.52	EU	NC46 (IF)	6	3 1/4	3.125	230,755	901,164	19,474	33,625.p
	14.00	15.04	IU	NC40 (FH)	5 1/4	2 13/16	2.688	285,359	711,611	23,288	23,487.p
		15.85	EU	NC46 (IF)	6	3 1/4	3.125	285,359	901,164	23,288	33,625.p
	15.70	16.80	IU	NC40 (FH)	5 1/4	2 11/16	2.653	324,118	776,406	25,810	25,673.p
		17.54	EU	NC46 (IF)	6	3 1/4	3.095	324,118	901,164	25,810	33,625.p
4 1/2	13.75	15.36	EU	NC50 (IF)	6 5/8	3 3/4	3.625	270,034	939,096	25,907	37,676.p
	16.60	17.95	EU	NC50 (IF)	6 5/8	3 3/4	3.625	330,558	939,096	30,807	37,676.p
		18.37	IEU	NC46 (XH)	6 1/4	3 1/4	3.125	330,558	901,164	30,807	33,993.p
	20.00	21.59	EU	NC50 (IF)	6 5/8	3 5/8	3.452	412,358	1,025,980	36,901	41,235.p
		22.09	IEU	NC46 (XH)	6 1/4	3	2.875	412,358	1,048,426	36,901	39,659.p
	22.82	24.11	EU	NC50 (IF)	6 5/8	3 5/8	3.452	471,239	1,025,980	40,912	41,235.p
5	19.50	22.28	IEU	5 1/2 FH	7	3 3/4	3.625	395,595	1,448,407	41,167	60,338.b
		20.85	IEU	NC50 (XH)	6 5/8	3 3/4	3.625	395,595	939,095	41,167	37,676.p
	25.60	28.27	IEU	5 1/2 FH	7	3 1/2	3.375	530,144	1,619,231	52,257	60,338.b
		26.85	IEU	NC50 (XH)	6 5/8	3 1/2	3.375	530,144	1,109,920	52,257	44,673.p
5 1/2	21.90	23.78	IEU	5 1/2 FH	7	4	3.875	437,116	1,265,802	50,710	56,045.p
	24.70	26.30	IEU	5 1/2 FH	7	4	3.875	497,222	1,265,802	56,574	56,045.p

\* Note: This data is based on API RP7G (16th edition Aug. 1998).

## NEW DRILL PIPE AND TOOL JOINT MECHANICAL PROPERTIES (GROUP 3)

DRILL PIPE BODY				TOOL JOINT			DRIFT DIAMETER	MECHANICAL PROPERTIES			
NOMINAL SIZE	NOMINAL WEIGHT	APPROX. WEIGHT	UPSET TYPE & GRADE	CONNECTION	OD	ID		TENSILE YIELD		TORSIONAL YIELD	
								PIPE	TOOL JOINT	PIPE	TOOL JOINT
in.	lb/ft	lb/ft			in.	in.	in.	lb	lb	ft-lb	ft-lb
2 3/8	6.65	7.11	EU-X95	NC26 (IF)	3 3/8	1 3/4	1.625	175,072	313,681	7,917	6,875.b
		7.11	EU-G105	NC26 (IF)	3 3/8	1 3/4	1.625	193,500	313,681	8,751	6,875.b
2 7/8	10.40	11.09	EU-X95	NC31 (IF)	4 1/8	2	1.875	271,503	495,726	14,635	13,389.p
		11.09	EU-G105	NC31 (IF)	4 1/8	2	1.875	300,082	495,726	16,176	13,389.p
		11.55	EU-S135	NC31 (IF)	4 3/8	1 5/8	1.500	385,820	623,844	20,798	17,170.p
	13.30	14.62	EU-X95	NC38 (IF)	5	2 9/16	2.438	343,988	649,158	23,498	20,326.p
		14.71	EU-G105	NC38 (IF)	5	2 7/16	2.313	380,197	708,603	25,972	22,213.p
		14.92	EU-S135	NC38 (IF)	5	2 1/8	2.000	488,825	842,440	33,392	26,515.p
	15.13	EU-S135	NC40 (4FH)	5 3/8	2 7/16	2.313	488,825	897,161	33,392	29,930.p	
3 1/2	15.50	16.82	EU-X95	NC38 (IF)	5	2 7/16	2.313	408,848	708,063	26,708	22,213.p
		17.03	EU-G105	NC38 (IF)	5	2 1/8	2.000	451,885	842,440	29,520	26,515.p
	16.97	EU-G105	NC40 (4FH)	5 1/4	2 9/16	2.438	451,885	838,257	29,520	27,760.p	
	17.57	EU-S135	NC40 (4FH)	5 1/2	2 1/4	2.125	580,995	979,996	37,954	32,943.p	

## NEW DRILL PIPE AND TOOL JOINT MECHANICAL PROPERTIES (GROUP 3) Continued

DRILL PIPE BODY				TOOL JOINT			DRIFT DIAMETER	MECHANICAL PROPERTIES				
NOMINAL SIZE	NOMINAL WEIGHT	APPROX. WEIGHT	UPSET TYPE & GRADE	CONNECTION	OD	ID		TENSILE YIELD		TORSIONAL YIELD		
					in	in		PIPE	TOOL JOINT	PIPE	TOOL JOINT**	
in	lb/ft	lb/ft			in	in	in	lb	lb	ft-lb	ft-lb	
<b>4</b>	14.00	15.34	IU-X95	NC40 (FH)	5 1/4	2 11/16	2.563	361,454	776,406	29,498	25,673.p	
		16.19	EU-X95	NC46 (IF)	6	3 1/4	3.125	361,454	901,164	29,498	33,625.p	
		15.91	IU-G105	NC40 (FH)	5 1/2	2 7/16	2.313	399,502	897,161	32,603	30,114.p	
		16.19	EU-G105	NC46 (IF)	6	3 1/4	3.125	399,502	901,164	32,603	33,625.p	
		16.19	IU-S135	NC46 (FH)	5 1/2	2	1.875	513,646	1,080,135	41,918	36,363.p	
		16.42	EU-S135	NC46 (IF)	6	3	2.875	513,646	1,048,426	41,918	39,229.p	
		15.70	17.52	IU-X95	NC40 (FH)	5 1/2	2 7/16	2.313	410,550	897,161	32,692	30,114.p
			17.80	EU-X95	NC46 (IF)	6	3 1/4	3.125	410,550	901,164	32,692	33,625.p
			17.52	IU-G105	NC40 (FH)	5 1/2	2 7/16	2.313	453,765	897,161	36,134	30,114.p
			17.80	EU-G105	NC46 (IF)	6	3 1/4	3.125	453,765	901,164	36,134	33,625.p
	18.02		EU-S135	NC46 (IF)	6	3	2.875	583,413	1,048,426	46,458	39,229.p	
<b>4 1/2</b>	16.60	18.36	EU-X95	NC50 (IF)	6 5/8	3 3/4	3.625	418,707	939,095	39,022	37,676.p	
		18.79	IEU-X95	NC46 (XH)	6 1/4	3	2.875	418,707	1,048,426	39,022	39,659.p	
		18.36	EU-G105	NC50 (IF)	6 5/8	3 3/4	3.625	462,781	939,095	43,130	37,676.p	
		18.79	IEU-G105	NC46 (XH)	6 1/4	3	2.875	462,781	1,048,426	43,130	39,659.p	
		18.62	EU-S135	NC50 (IF)	6 5/8	3 1/2	3.375	595,004	1,109,920	55,453	44,673.p	
		19.00	IEU-S135	NC46 (XH)	6 1/4	2 3/4	2.625	595,004	1,183,908	55,453	44,871.p	
		20.00	22.08	EU-X95	NC50 (IF)	6 5/8	3 1/2	3.375	522,320	1,109,920	46,741	44,673.p
			22.67	IEU-X95	NC46 (XH)	6 1/4	2 3/4	2.625	522,320	1,183,908	46,741	44,871.p
			22.08	EU-G105	NC50 (IF)	6 5/8	3 1/2	3.375	577,301	1,109,920	51,661	44,673.p
			22.86	IEU-G105	NC46 (XH)	6 1/4	2 1/2	2.375	577,301	1,307,608	51,661	49,630.p
			23.03	EU-S135	NC50 (IF)	6 5/8	3	2.875	742,244	1,416,225	66,421	57,800.p
			23.03	IEU-S135	NC46 (XH)	6 1/4	2 1/4	2.125	742,244	1,419,527	66,421	53,936.p
		22.82	24.24	EU-X95	NC50 (IF)	6 5/8	3 1/2	3.375	596,903	1,109,920	51,821	44,673.p
			24.77	IEU-X95	NC46 (XH)	6 1/4	2 3/4	2.625	596,903	1,183,908	51,821	44,871.p
			24.72	EU-G105	NC50 (IF)	6 5/8	3 1/4	3.125	659,735	1,268,963	57,276	51,447.p
		24.96	IEU-G105	NC46 (XH)	6 1/4	2 1/2	2.375	659,735	1,307,608	57,276	49,630.p	
		25.41	EU-S135	NC50 (IF)	6 5/8	2 3/4	2.625	848,230	1,551,706	73,641	63,406.p	
<b>5</b>	19.50	22.62	IEU-X95	5 1/2 FH	7	3 3/4	3.625	501,087	1,448,407	52,144	60,338.p	
		21.45	IEU-X95	NC50 (XH)	6 5/8	3 1/2	3.375	501,087	1,109,920	52,144	44,673.p	
		22.62	IEU-G105	5 1/2 FH	7	3 3/4	3.625	553,833	1,448,407	57,633	60,338.b	
		21.93	IEU-G105	NC50 (XH)	6 5/8	3 1/4	3.125	553,833	1,268,963	57,633	51,447.p	
		23.48	IEU-S135	5 1/2 FH	7 1/4	3 1/2	3.375	712,070	1,619,231	74,100	72,927.p	
		22.61	IEU-S135	NC50 (XH)	6 5/8	2 3/4	2.625	712,070	1,551,706	74,100	63,406.p	
		25.60	28.59	IEU-X95	5 1/2 FH	7	3 1/2	3.375	671,515	1,619,231	66,192	60,338.b
			27.87	IEU-X95	NC50 (XH)	6 5/8	3	2.875	671,515	1,416,225	66,192	56,984.b
			29.16	IEU-G105	5 1/2 FH	7 1/4	3 1/2	3.375	742,201	1,619,231	73,159	72,627.p
		28.32	IEU-G105	NC50 (XH)	6 5/8	2 3/4	2.625	742,201	1,551,706	73,159	63,406.b	
		29.43	IEU-S135	5 1/2 FH	7 1/4	3 1/4	3.125	954,259	1,778,274	94,062	76,156.b	
<b>5 1/2</b>	21.90	24.53	IEU-X95	5 1/2 FH	7	3 3/4	3.625	553,681	1,448,407	64,233	60,338.b	
		25.38	IEU-G105	5 1/2 FH	7 1/4	3 1/2	3.375	611,963	1,619,231	70,994	72,627.p	
		26.50	IEU-S135	5 1/2 FH	7 1/2	3	2.875	786,809	1,925,536	91,278	87,341.p	
		24.70	27.85	IEU-X95	5 1/2 FH	7 1/4	3 1/2	3.375	629,814	1,619,231	71,660	72,627.p
			27.85	IEU-G105	5 1/2 FH	7 1/4	3 1/2	3.375	696,111	1,619,231	79,204	72,627.p
		27.77	IEU-S135	5 1/2 FH	7 1/2	3	2.875	894,999	1,925,536	101,833	87,341.p	

\* This data is based on API RP7G (16th edition Aug. 1998).

\*\* Letter b indicates box torque; letter p, pin torque.



▲ Full automatic tensile tester



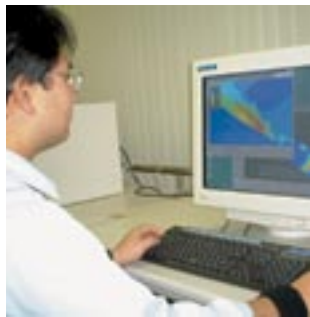
▲ NACE TM-01-77  
"Method A" constant tensile  
load testers

## Testing Facilities and R&D

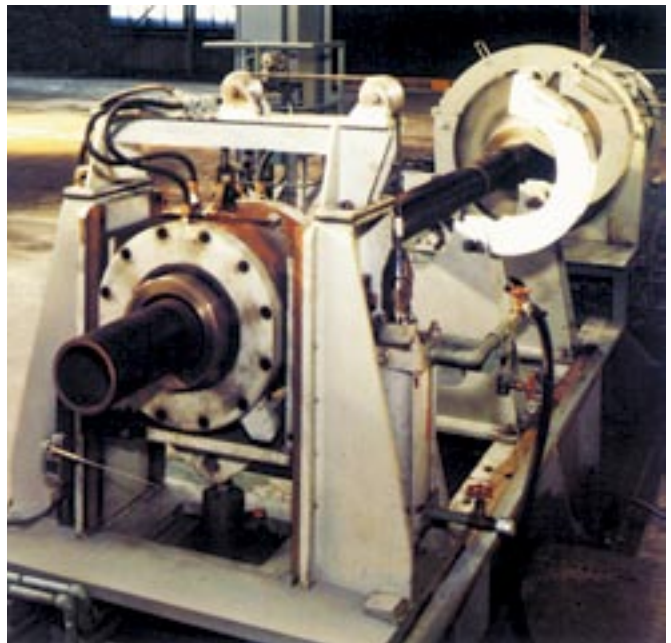
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▲ Design analysis using FEA  
method



▲ Rotary fatigue tester

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