Wedge 625™

4 1/2" TO 7"

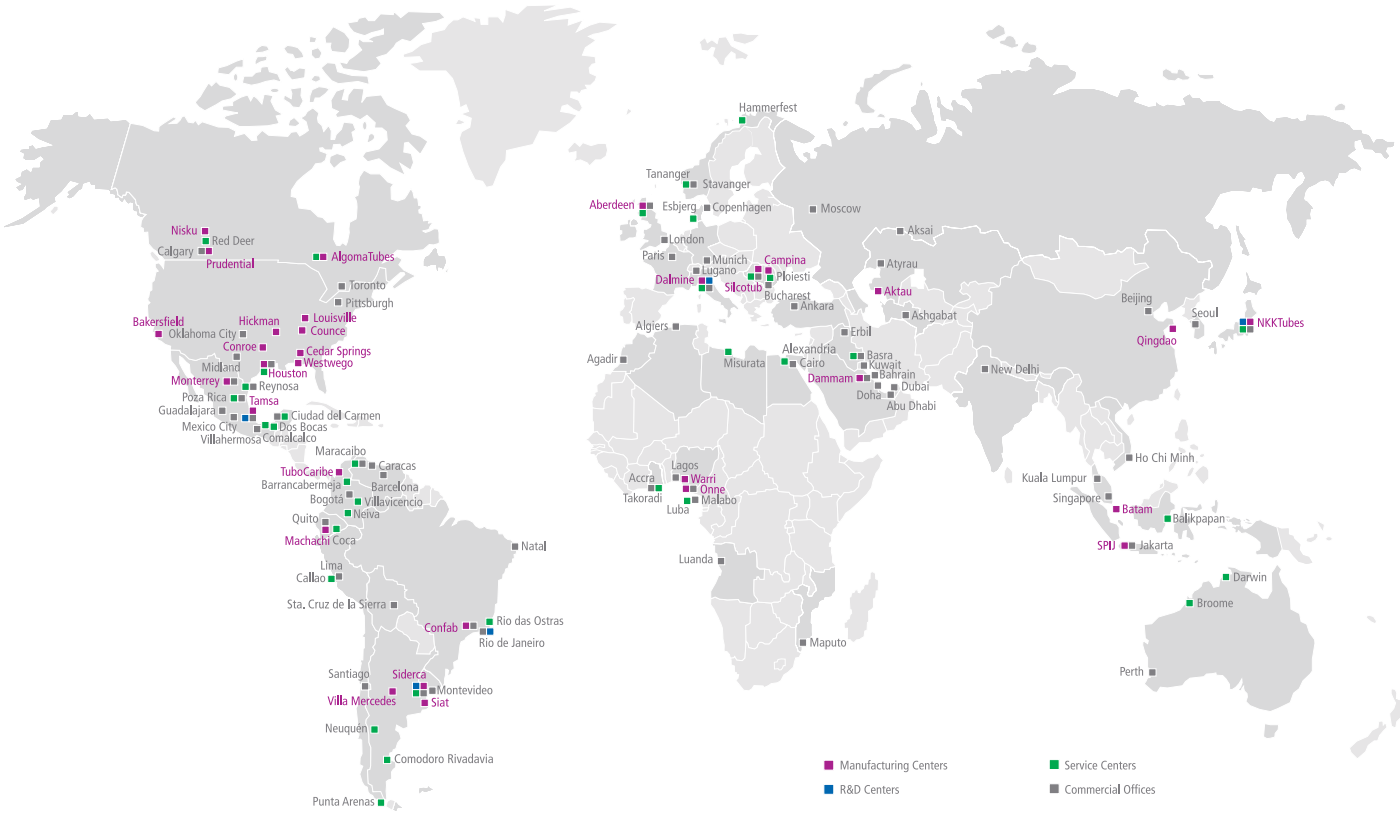
TenarisHydril

TenarisHydril

TenarisHydril offers outstanding premium connection design and technology worldwide. With a comprehensive range of high performance products backed by an extensive global field service network and licensed threading shops, we develop solutions to meet the needs of ever more demanding E&P environments.

TenarisHydril premium connections are supplied and supported by Tenaris, the leading manufacturer and supplier of steel tubes and integrated tubular services for the world's energy industry.

For further information please visit our website at www.tenaris.com.



Main attributes

SIZE AVAILABILITY

4 1/2" TO 7"

MAIN FEATURES

- Exceptional ratings in tension (90%) provided by the vanishing threads at the pin OD and the box ID.
- Over 94% ratings in compression provided by the stab flank contact of the dovetail, vanishing threads.
- 100% burst and collapse ratings provided by the two-way metal-to-metal mid seal locked in by the adjacent dovetail Wedge threads and reinforced by the step-to-step Wedge.
- 90% ratings in bending provided by the two-step Wedge threads and reinforced by the step-to-step Wedge design.
- Semi-flush integral connection with box OD approximately 5% over pipe body.

MAIN APPLICATIONS

- **Shales**
- **Horizontal and extended reach wells**
- Production casing and liners

OPTIONS

- Dopeless® technology

Key Features

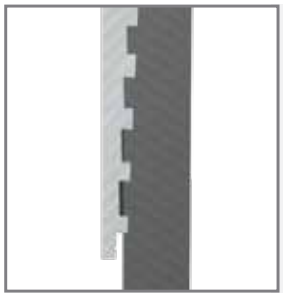
1

- Roller-stenciled make-up confirmation band.
- Vanishing thread in the pin for optimum tensile efficiency.
- Trouble-free make-up is developed through the rugged, coarse pitch thread.
- Semi-flush integral connection for smoother installation in the well.

2

- Outstanding torque, bending, and compression strength developed through the simultaneous engagement of opposing flanks of the two-step, Wedge threads.
- Exceptional torque retention developed by the step-to-step Wedge feature.
- 100% internal and external pressure rated locked-in metal-to-metal seal maintains gas sealing capability under high tension, compression, bending, and torsional loads.

3



- Vanishing thread in the box for optimum tensile efficiency.
- The steep tapered, two-step Wedge design allows for this semi-flush integral connection to approach the performance of bulkier traditional coupled connections.

Performance characteristics

The new Wedge 625™ connection, offers extra torque capacity and improved reliability. This integral semi flush connection has tapped into the field-proven history of the Wedge thread design as an enhanced solution for shale applications.

OUTSTANDING TORQUE CAPACITY

Operators working in demanding environments need connections that can offer extra torque resistance and improved safety margins. Thanks to its unique thread design, the Wedge 625™ connection provides exceptional operational torque limits, compared to the Wedge Series 500™.

The Wedge 625™ connection has undergone torsion to failure testing to obtain detailed product information in all the available sizes. This data was used to deduce the torque resistance values in order to offer better operational torque values and minimize the need for high safety margins.

TWO-STEP WEDGE DESIGN

The two-step design of the Wedge 625™ allows for a deeper stabbing during make-up, ensuring a faster make-up, reducing rig time and minimizing the risk of cross threading or galling.

The Wedge 625™ has over 90% ratings in bending provided by the simultaneous engagement of opposing flanks of the connection's two-step double-hooked dovetail threads. This effective bending capacity ensures improved performance in long-lateral horizontal shale wells with a large number of frac stages.

The two-step design allows the Wedge 625™ to feature a metal-to-metal seal at the mid step. The cone-to-cone seal helps maintain sealability when the connection is exposed to internal and external pressure environments, demonstrating an exceptional level of gas tight performance under high tension, compression, bending and torsional loads.

STEP-TO-STEP WEDGE THREAD DESIGN

The new step-to-step Wedge thread design increases the performance of the Wedge 625™ by creating a wedging effect on both the thread and the product as a whole. During make-up, the load bearing flanks of the large step and the stabbing flanks of the small step engage first, providing an additional wedging effect that is not present in other dovetail thread connections.

REINFORCED WEDGE LOCKING MECHANISM

The Wedge Series 500™ and Wedge Series 600™ share the same basic Wedge thread design. The double-wedge effect of the Wedge 625™ is the key to build on the field-proven strengths of the Wedge Series 500™, as it reinforces the locking mechanism of the Wedge design.

LABORATORY VALIDATION

Laboratory full scale tests validate the use of Wedge 625™ connections in complex shale operations. The applied shale test protocol integrates combined load sealability testing with internal pressure cycling to simulate the hydraulic fracturing process.

Thermal cycling tests are conducted to simulate the heating and cooling of pipes and connections during the fracturing process.

FATIGUE PERFORMANCE

Extensive cyclic testing shows that the Wedge 625™ can withstand higher fatigue loads than most semi flush connections. The fatigue performance of the Wedge 625™ is comparable to that of a threaded and coupled connection. This improved fatigue resistance allows the connection to safely serve in more demanding cyclic loads conditions generated by the combination of rotation and bending commonly found in shales and other extended reach applications.

FIELD HISTORY

The Wedge 625™ connection was introduced to the market in 2012. Since then, it has been successfully used in challenging operations worldwide, with over 3.5 million feet sold until today.

Its high torque capacity, semi-flush design and extraordinary fatigue performance make it ideal for reliably meeting the challenges of demanding extended reach wells.

TESTING PROTOCOL		SHALE WELL LIFE STAGE
Specimen Preparation Thread-Seal Interference Thread Taper	Specimen H-L Nom	Installation
Make/Break Properties Amount of Thread Compound Amount of Torque	FMU 7.2.3 H/L	Installation
Bake	Bake 7.3.2 24 hours at 275 °F	Production
Series A	T/C pi/po 7.3.3 CCW, CW, CCW Ambient	Installation / Production
Series A, Q3/Q4 with Gas	T/C po - Q3/Q4 w/ Gas 7.3.3 CCW, CW Ambient	Installation / Production
Bake	Bake 7.3.2 24 hours at 275 °F	Production
(25) 90% API Burst Cycles	T pi Cycles - Oil Elevated (275 °F)	Fracking
Series B with bending	T/C pi w B(20°) 7.3.4 CCW, CW Elevated (275 °F)	Installation / Production
	T/C pi w B(20°) 7.3.4 CCW, CW Ambient	Installation / Production
(5) 95% API Burst Cycles	T pi Cycles - Oil Elevated (275 °F)	Fracking
(5) 100% API Burst Cycles	T pi Cycles - Water Ambient	Fracking
(5) 100% API Burst Cycles	T pi Cycles - Gas Ambient	Fracking
Structural Test	T pi Cycles to F - Water	

After a thorough specimen preparation and setup resembling a demanding installation, the connection is subjected to a sequence of tests based on the ISO 13679 Standard and internal pressure cycling with oil, water and gas to simulate the combined loads experienced under challenging fracking and production of a shale well.

References

- T: Tension
- C: Compression
- pi: Internal pressure
- pe: External pressure
- B: Bending
- CW: Clockwise direction
- CCW: Counter-clockwise direction
- H-L: High thread interference and Low Seal interference
- FMU: Final make-up
- 7.2.3 refers to Section 7.2.3 of the ISO 13679 Standard.
- 7.3.2 refers to Section 7.3.2 of the ISO 13679 Standard.
- 7.3.3 refers to Section 7.3.3 of the ISO 13679 Standard.
- 7.3.4 refers to Section 7.3.4 of the ISO 13679 Standard.

Wedge 625™ Technical Table | 4 1/2" TO 5 1/2"

DESIGNATION		PIPE BODY			BOX OUTSIDE DIAMETER	CONNECTION INSIDE DIAMETER	MAKE-UP LOSS	CRITICAL SECTION AREA	TENSILE EFFICIENCY	COMPRESSION EFFICIENCY	JOINT YIELD STRENGTH					
Size	Nominal Weight	Wall Thickness	Inside Diameter	Drift Diameter							55 ksi	80 ksi	90 ksi	95 ksi	110 ksi	125 ksi
[in.]	[lb/ft]	[in.]	[in.]	[in.]	[in.]	[in.]	[in.]	[sq in.]	[%]	[%]	[x 1000 lb]					
4 1/2	13.50	0.290	3.920	3.795	4.714	3.849	4.830	3.491	91.0	94.5	192	279	314	332	384	436
	15.10	0.337	3.826	3.701	4.724	3.755	5.230	3.971	90.1	94.8	218	318	357	377	437	496
5	18.00	0.362	4.276	4.151	5.242	4.206	5.310	4.827	91.5	94.6	265	386	435	458	531	603
	21.40	0.437	4.126	4.001	5.256	4.056	5.600	5.719	91.3	95.5	315	457	515	543	629	715
	23.20	0.478	4.044	3.919	5.276	3.974	5.930	6.166	90.8	95.0	339	493	555	586	678	771
5 1/2	20.00	0.361	4.778	4.653	5.739	4.709	5.290	5.350	91.8	94.5	295	428	482	509	588	669
	23.00	0.415	4.670	4.545	5.766	4.601	5.600	6.053	91.3	94.5	333	484	545	575	666	757
	26.00	0.476	4.548	4.423	5.788	4.479	5.940	6.762	90.0	95.5	372	541	608	643	743	845

Wedge 625™ - Torque table | 4 1/2" TO 5 1/2"

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	MAKE UP TORQUE							OPERATING TORQUE (BY SMYS OF STEEL GRADE)						YIELD TORQUE (BY SMYS OF STEEL GRADE)					
			Minimum	Optimum	Maximum (BY SMYS OF STEEL GRADE)																	
					55 ksi	80 ksi	90 ksi	95 ksi	110 ksi	125 ksi	55 ksi	80 ksi	90 ksi	95 ksi	110 ksi	125 ksi	55 ksi	80 ksi	90 ksi	95 ksi	110 ksi	125 ksi
[in.]	[lb/ft]	[in.]	[ft.lb]	[ft.lb]	[ft.lb]	[ft.lb]	[ft.lb]	[ft.lb]	[ft.lb]	[ft.lb]	[ft.lb]	[ft.lb]	[ft.lb]	[ft.lb]	[ft.lb]	[ft.lb]	[ft.lb]	[ft.lb]	[ft.lb]	[ft.lb]	[ft.lb]	[ft.lb]
4 1/2	13.50	0.290	8000	9600	—	11300	12000	12000	13500	14000	—	11300	12000	12000	13500	14300	13000	15000	16000	16000	18000	19000
	15.10	0.337	9000	10800	—	13500	14300	15000	15800	15800	—	13500	14300	15000	15800	17300	15000	18000	19000	20000	21000	23000
5	18.00	0.362	10000	12000	13500	15800	16500	17300	17500	17500	13500	15800	16500	17300	18800	20000	18000	21000	22000	23000	25000	27000
	21.40	0.437	11000	13200	15800	18800	19300	19300	19300	19300	15800	18800	19500	20000	23000	24000	21000	25000	26000	27000	30000	32000
	23.20	0.478	12000	14400	17300	21000	21000	21000	21000	21000	17300	21000	23000	23000	26000	27000	23000	28000	30000	31000	34000	36000
5 1/2	20.00	0.361	11000	13200	15800	18800	19300	19300	19300	19300	15800	18800	19500	20000	23000	24000	21000	25000	26000	27000	30000	32000
	23.00	0.415	12000	14400	18000	21000	21000	21000	21000	21000	18000	22000	23000	23000	26000	28000	24000	29000	30000	31000	34000	37000
	26.00	0.476	14000	16800	20000	25000	25000	25000	25000	25000	20000	25000	26000	27000	29000	32000	27000	33000	35000	36000	39000	43000

- SMYS: Specified Minimum Yield Strength.
- For other unlisted technical data please visit www.tenaris.com or contact premiumconnections@tenaris.com

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For contact information, please visit
www.tenaris.com

For technical assistance, please contact
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