



Specialty Thread Connectors

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Tubular Products & Services

expro.com

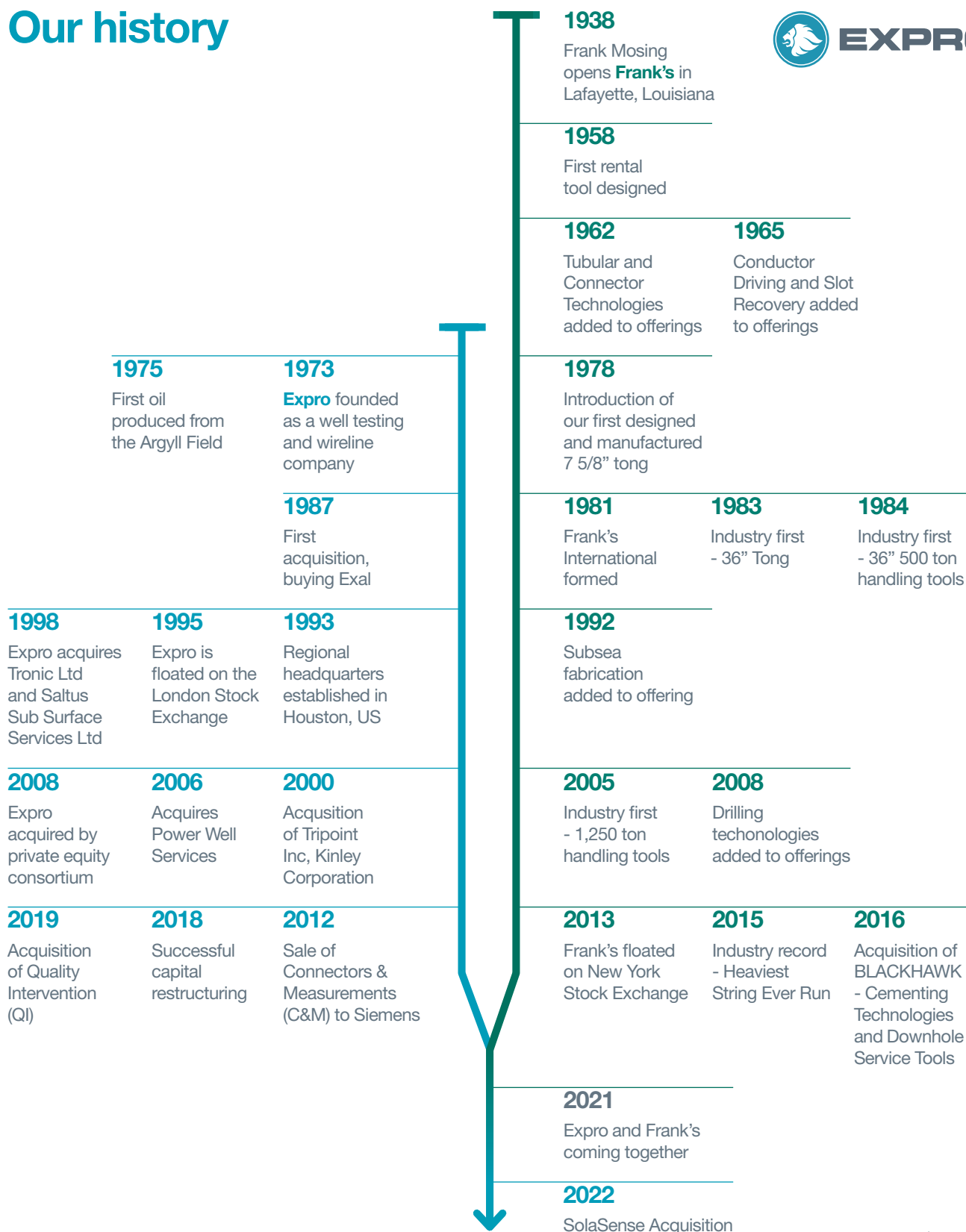
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Our history



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1.0 - Overview

For clients working across the entire well life cycle, Expro is the visionary full-cycle energy services expert offering novel, insightful solutions, dependable competency and award-winning safety.

We pioneered custom tubular fabrication solutions. As one of the first tubular service companies to fabricate top tensioned risers (TTR) for the Gulf of Mexico in the 1970s, we are now recognized as world leaders in this offering.

We have two unrivaled custom tubular facilities in Louisiana, one in New Iberia with waterfront access to the Port of Iberia and the other in Lafayette, both strategically located for fast and efficient delivery worldwide.

Our high-performance connectors are engineered and manufactured to the highest standards, yielding a product that stands up to the demanding requirements of today's complex well designs.

Partner with us to win the future with a new era of well productivity, efficiency and sustainability.

In 1989, through the agreement with Frank's Intl and Plexus the connector line was offered on the global market. The introduction of a proprietary connector greatly complemented Expro's products and services and laid the groundwork for Expro's future connector designs.

Expro is also a major stockist of large OD, heavy wall thickness, and high yield-strength pipe. Expro meets or exceeds the stringent requirements and conditions for jack-up, platform and deep-water drilling. This is inclusive of hammer-able/drivable, gas and water tight seals, high tension/compression loads, bending/fatigue life, and temperature requirements.

The tubular products are supported by in-house fabrication that conforms to various industry codes and special requirements specified by our customers. In-house welding ensures that rigid quality assurance requirements are adhered to on even the most routine fabrication assignments.

Expro is presently operating to procedures that comply with the requirements of ISO 9001, 2015 edition, and API Q1.



Lafayette, Louisiana



New Iberia, Louisiana

1938	1970	1999	2011	2020
Frank Mosing established Frank's Casing Crew & Rental Tools, inc.	Pipe department established to complement its tubular running & hammer operations	Double Drive Shoulder (DDS) Connectors begin running	Xtreme3™ Premium Thread Connectors begin running	Development of XT4™ Premium Thread Connector

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2.0 - Connector engineering, manufacturing and quality assurance

Expro is a trusted, global leader in custom engineering and design. Our innovative equipment and tools are designed to maximize operational efficiencies while minimizing HSE risks.

With the most skilled and experienced engineering professionals with multi-disciplinary talents, our engineering group is responsible for the design of new products and supporting existing core products, as well as providing technical support and management. Presently, we hold more than 200 U.S. and foreign patents. We maintain a strategic engineering presence in key regions across our network of locations in order to serve customers around the globe.

We provide engineering and technical support to ensure that all equipment used by Expro worldwide consistently delivers safe and reliable service that exceeds customer expectations.

Supplying project engineering and implementation support for major customer specific projects globally in order to address needs in an ever-changing industry. Functions include tool selection, specialty modifications and preparation of custom layouts, assisting with rig installations, survey review, and final documentation.

Working within state-of-the-art facilities, our engineers have the capabilities to design and develop new tools to meet our customers' expectations. Our staff provides an unmatched level of technical skill and dedication to excellence.



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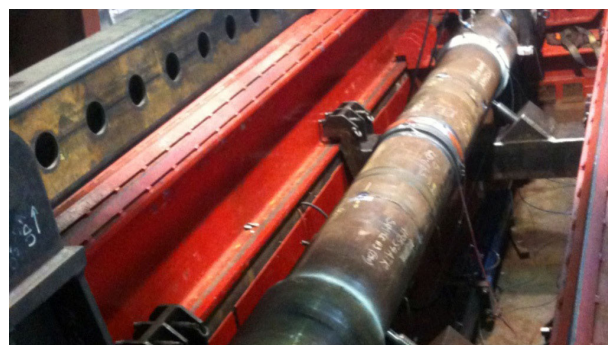
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2.0 - Connector engineering, manufacturing and quality assurance

Our tubular fabrication capabilities are wide-ranging and extend to fabricating girth welds in API 5L line pipe for products that are at or below the mudline such as conductor pipe, surface casing and intermediate casing ranging in diameters from 14 inches to 42 inches and material grades up to X-80. This includes LP/HP housing to pipe welds, receptacle to pipe welds, pipe-to-pipe and pipe-to connector welds, float shoe and float collar welds. In addition, our tubular fabrication capabilities extend to products above the mudline such as fabrication of top tensioned risers (TTRs), steel catenary risers (SCRs), fatigue sensitive flow lines (FSFL), drilling risers (DR), specialty joints (keel, stress, flex joints) and tendons. We can fabricate joint lengths ranging from just a few feet all the way up to 300 feet in length.

One of Expro's core areas of expertise is fabrication of girth welds to meet stringent customer fatigue and fracture toughness requirements. With a full understanding of the project fabrication technical requirements, welding procedures are developed and qualified utilizing premium welding consumables, automated fit-up technology and advanced welding equipment. Over the years, we have specialized in fabricating girth welds in various grades of pipe and forgings in a wide range of diameters and wall thicknesses to meet AWS C1, API X, DNV Class C, E, and F fatigue criteria. An extensive selection of fracture toughness values in weld metal and HAZ for material grades such as AISI 4130, AISI 8630, A 707 Gr. 3W, Gr. 1, ASTM A 694 Gr. F 65, API 5L X-80, X-70, X-65 and ASTM A 182 F-22 is available. Expro has developed a proprietary fit-up technique using an internal line-up clamp to achieve consistent fit-up from one weld to the next for fabrication of top tensioned risers and steel catenary risers. When human access to the pipe ID is limited, remote controlled grinding machines have been developed to grind the weld ID to meet fatigue requirements.

Project Management: Expro is experienced in successfully managing multiple large tubular fabrication projects simultaneously. Depending on the scope and size of the project, a project management team is assigned to interface between the client and Expro to address all project related needs, such as pipe load-in from trucks/barges, staging, fabrication, NDE, storing, long term maintenance, inventory, load out, logistics, documentation, etc.



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2.0 - Connector engineering, manufacturing and quality assurance

Forging

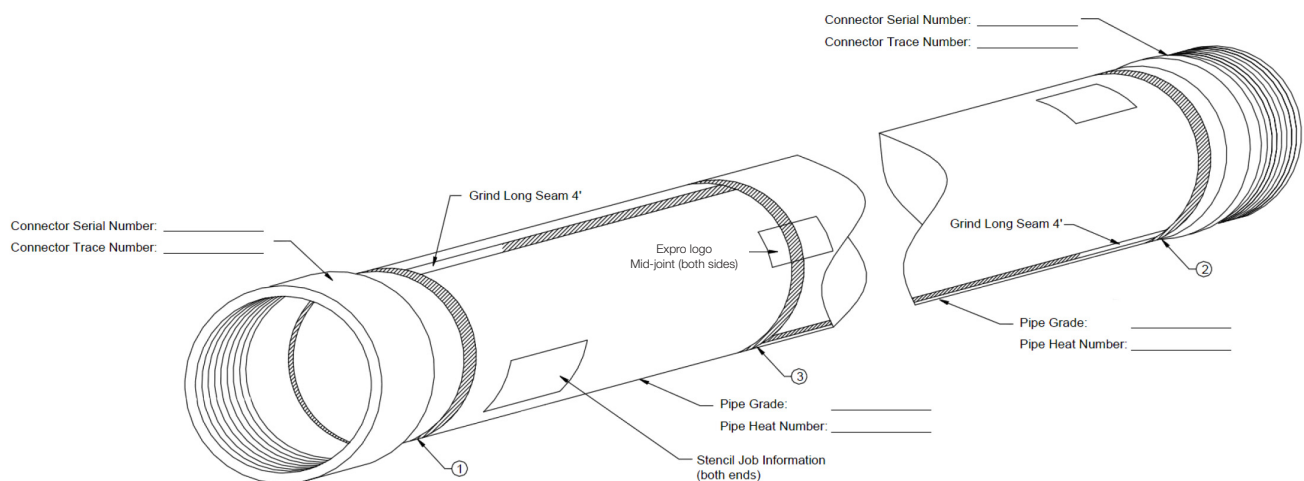
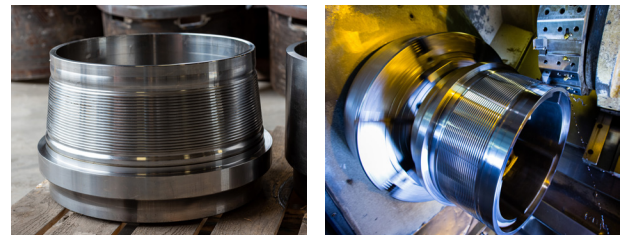
- Forgings are purchased to Expro's proprietary material specifications which outline minimum requirements for chemistry, strength, hardness and toughness properties
- Forgings are ultrasonically inspected and tracked throughout the entire manufacturing process by a unique serial number

Machining and phosphate coating

- Forgings are machined using CNC machines to ensure dimensional consistency
- Customized MRP gauges are utilized to verify dimensional accuracy
- Machined connectors are phosphate coated to Expro's proprietary coating specifications in order to minimize galling during make-up

Alignment and welding

- Connectors are aligned to pipe using end squareness gauges and specialized equipment to verify parallelism, when specified
- Welding of pipe to connectors is achieved by the use of welding procedures qualified to meet the requirements of industry codes and client specifications. Welding procedure qualification can include mechanical testing to meet simple code requirements to the more complex tests such as weldability and full scale fatigue testing



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3.0 - Service quality



Expro is a visionary full-cycle energy services expert offering novel, insightful solutions, dependable competency and award-winning safety. Our license to work is founded upon a solid reputation for competency and dependability, an innovative and unified worldwide team whose skills are constantly evolving with the industry, deep insight into the needs and preferences of our customers and unrelenting commitment to customer service quality."



Alistair Geddes
Chief Operating Officer

North and Latin America (NLA)

Customer job performance

2019	90.0%
2020	93.8%
2021	94.6%



Expro were recognized as strong leaders and contributors in pre-tour and floor meetings. Our team worked as a partner with our offshore personnel consistently demonstrating commitment to assist around the rig in activities outside of their base work scope.

Europe & Sub-Saharan Africa (ESSA)

Customer job performance

2019	92.4%
2020	93.8%
2021	94.1%



All Expro equipment worked with no problems at all. The crews were always available when needed and they kept everyone involved with what was happening with their operation. Crews integrated very well with all other vendors and drilling personnel.

Middle East & North Africa

Customer job performance

2019	90.0%
2020	93.1%
2021	95.4%



I want to take the time to recognize the fantastic job and the excellent performance done by the crew running the completion string in KZN-378 which have been achieved effectively in less operational time without comprising quality and safety.

Asia Pacific (APAC)

Customer job performance

2019	90.0%
2020	92.4%
2021	94.1%



Our team proactively planned and demonstrated clear communication and excellent support OE performance including a 100% safety record for the project.

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3.0 - Service quality

Quality assurance

Expro's quality assurance effort is far reaching in its effects. First and foremost, it provides the customer with the highest quality products available, while at the same time utilizing techniques and procedures that lower the cost of production. These savings result in the customer receiving a lower cost of goods without sacrificing quality.

Expro prides itself in providing reliable quality products and services through outstanding design and workmanship. Our continuous improvement efforts ensure that our products and services meet or exceed all customer requirements and expectations. Our executive management team is committed to supporting this quality management system (QMS) by providing competent and focused personnel, material resources, and technical assets throughout the entire organization.

A full, comprehensive quality assurance program enhances reliability and ensures process capability. Expro currently has documentation in-place that parallels with ISO 9001/API Q1. Meeting these standards ensures that our products and services are accepted worldwide.

From a quality assurance standpoint, detailed work procedures are developed for all aspects of the fabrication process and approved by the customer depending upon project and contract requirements before any work is performed. Expro operates a company-wide quality system with qualified and experienced personnel in the areas of welding, heat treatment, NDE, calibration of equipment, and generation of data books. Complete traceability of material is maintained at all times.



Applying thread running compound



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4.0 - Premium thread connectors and applications

Double Drive Shoulder (DDS) connector
Designed for hammering



Xtreme3™ and XT4™ Connector
Weld-on, designed for deepwater



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5.0 - Double Drive Shoulder (DDS) connector

A low cost, high strength drivable connector, the Double Drive Shoulder (DDS) Connector is designed to avoid premature back-out during both the driving of pipe and throughout the well's service life. Tapered press fit forces combined with an interlocking thread design help provide a solid and secure connection.

Drivable connection

- Design allows the drive forces to be carried on the double shoulder of the connector rather than threads
- Releasable, retrievable and reusable after driving
- Thread interference design is resistant to vibration
- Both OD and ID is flush with pipe
- Metal to metal seal at each of the two shoulders and an elastomer o-ring provide three seal points
- Integral lift sub/protector in combination with the HORSESHOE® and side door elevators eliminate the use of padeyes and slings
- Currently available in sizes 16 inches to 48 inches. Specialty sizes are available upon request

Premature back-out resistance:

- Micro-tapered pin and box threads create press-fit between the root and crest
- Interlocking threads with 15 degree negative angle "hooked" load flanks
- Low thread helix angle
- 30 degree negative angle interlocking double torque shoulders



Guiding male and female ends together



Connector on a job site

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5.1 - Double Drive Shoulder (DDS) connector specifications

Double Drive Shoulder (DDS) connector specifications

Pipe properties				DDS connector properties		
Pipe OD (in.) ^{1, 10}	Pipe wall (in.) ^{1, 11}	Pipe ID (in.) ¹²	Pipe weight (lbs/ft) ⁹	Connector OD (in) ¹³	Connector ID (in.) ¹³	Made-up loss (in.) ¹⁴
16	0.750	14.500	122.2	16.00	14.50	5.694
	1.000	14.000	160.2	16.00	14.00	5.694
20	0.750	18.500	154.2	20.00	18.50	5.694
	0.812	18.376	166.4	20.00	18.38	5.694
	1.000	18.000	202.9	20.00	18.00	5.694

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 4. Table footnotes may be found at the end of section 5 of this document

Pipe properties			Pipe body capacity data ¹						DDS connector capacity data ⁴							
Pipe OD (in.) ^{1, 10}	Pipe wall (in.) ^{1, 11}	Pipe grade ^{9, 5}	At-yield tension / compression (kips) ^{1, 3}	Ultimate tension / compression (kips) ^{1, 3}	At-yield bending (ft-kips) ³	Ultimate bending (ft-kips) ³	Burst pressure (psi) ^{1, 2}	External pressure (psi) ^{1, 2}	At-yield tension (kips) ⁴	Ultimate tension (kips) ^{4, 6}	At-yield compression (kips) ⁴	Ultimate compression (kips) ^{4, 6}	At-yield bending (ft-kips) ⁴	Ultimate bending (ft-kips) ^{4, 6}	Internal pressure (psi) ^{7, 8}	External pressure (psi) ^{7, 8}
16	0.750	X-56	2,012	2,551	611	774	4,642	2,476	767	973	1,713	2,171	232	294	4,642	2,476
		X-60	2,156	2,694	654	818	4,938	2,568	822	1,027	1,835	2,294	249	311	4,938	2,568
		X-65	2,335	2,766	709	839	5,356	2,686	890	1,054	1,988	2,355	269	319	5,356	2,686
	1.000	X-56	2,638	3,345	777	987	6,190	3,864	1,047	1,328	2,339	2,966	350	443	6,190	3,864
		X-60	2,827	3,534	832	1,040	6,584	4,065	1,122	1,403	2,507	3,133	375	468	6,584	4,065
		X-65	3,063	3,628	901	1,067	7,142	4,337	1,215	1,440	2,715	3,217	406	481	7,142	4,337
20	0.750	X-70	3,299	3,864	970	1,137	7,689	4,591	1,309	1,533	2,924	3,426	437	512	7,689	4,591
		X-56	2,539	3,220	982	1,244	3,714	1,581	966	1,225	2,149	2,724	373	472	3,714	1,581
		X-60	2,721	3,401	1,052	1,315	3,950	1,618	1,035	1,294	2,302	2,878	399	499	3,950	1,618
		X-65	2,948	3,492	1,140	1,350	4,285	1,663	1,121	1,328	2,494	2,955	432	512	4,285	1,663
	0.812	X-70	3,175	3,719	1,227	1,437	4,613	1,701	1,207	1,414	2,686	3,147	466	546	4,613	1,701
		X-56	2,743	3,475	1,054	1,335	4,021	1,876	1,168	1,482	2,351	2,981	448	568	4,021	1,876
		X-60	2,939	3,671	1,129	1,410	4,277	1,928	1,252	1,565	2,519	3,149	480	600	4,277	1,929
		X-65	3,184	3,769	1,223	1,448	4,639	1,994	1,356	1,607	2,729	3,233	520	616	4,639	1,994
		X-70	3,428	4,013	1,317	1,542	4,994	2,050	1,461	1,711	2,939	3,443	560	656	4,994	2,050
		X-80	3,940	4,434	1,513	1,703	5,719	2,143	1,669	1,878	3,359	3,779	640	720	5,719	2,143
	1.000	X-56	3,342	4,238	1,260	1,598	4,952	2,768	1,369	1,736	2,951	3,742	571	724	4,952	2,768
		X-60	3,581	4,476	1,350	1,688	5,267	2,882	1,467	1,834	3,162	3,953	612	765	5,267	2,882
		X-65	3,879	4,596	1,463	1,733	5,713	3,030	1,590	1,883	3,426	4,058	663	786	5,713	3,030
		X-70	4,178	4,894	1,575	1,845	6,151	3,163	1,712	2,006	3,689	4,322	714	837	6,151	3,163

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5.1 - Double Drive Shoulder (DDS) connector specifications

Double Drive Shoulder (DDS) connector specifications (continued)

Pipe properties				DDS connector properties		
Pipe OD (in.) ^{1, 10}	Pipe wall (in.) ^{1, 11}	Pipe ID (in.) ¹²	Pipe weight (lbs/ft) ⁹	Connector OD (in.) ¹³	Connector ID (in.) ¹³	Made-up loss (in.) ¹⁴
22	0.750	20.500	170.2	22.00	20.50	5.694
	1.000	20.000	224.3	22.00	20.00	5.694
24	0.750	22.500	186.2	24.00	22.50	5.730
	1.000	22.000	246.6	24.00	22.00	8.238
	1.500	21.00	360.5	24.00	21.00	11.950

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Pipe properties			Pipe body capacity data ¹						DDS connector capacity data ⁴							
Pipe OD (in.) ^{1, 10}	Pipe wall (in.) ^{1, 11}	Pipe grade ^{9, 5}	At-yield tension / compression (kips) ^{1, 3}	Ultimate tension / compression (kips) ^{1, 3}	At-yield bending (ft-kips) ³	Ultimate bending (ft-kips) ³	Burst pressure (psi) ^{1, 2}	External pressure (psi) ^{1, 2}	At-yield tension (kips) ⁴	Ultimate tension (kips) ^{4, 6}	At-yield compression (kips) ⁴	Ultimate compression (kips) ^{4, 6}	At-yield bending (ft-kips) ⁴	Ultimate bending (ft-kips) ^{4, 6}	Internal pressure (psi) ^{7, 8}	External pressure (psi) ^{7, 8}
22	0.750	X-56	2,803	3,554	1,200	1,522	3,376	1,268	1,065	1,350	2,368	3,003	455	577	3,376	1,268
		X-60	3,004	3,855	1,286	1,650	3,591	1,290	1,141	1,426	2,537	3,172	488	610	3,591	1,290
		X-65	3,254	4,105	1,393	1,757	3,895	1,318	1,236	1,464	2,749	3,256	528	626	3,895	1,318
		X-70	3,504	4,506	1,501	1,929	4,194	1,340	1,331	1,559	2,960	3,468	569	666	4,194	1,340
	1.000	X-56	3,694	4,684	1,546	1,960	4,502	2,341	1,513	1,918	3,259	4,132	694	880	4,502	2,341
		X-60	3,958	5,079	1,656	2,126	4,788	2,423	1,621	2,027	3,492	4,365	744	930	4,788	2,423
		X-65	4,288	5,409	1,794	2,264	5,194	2,529	1,756	2,081	3,783	4,481	806	954	5,194	2,529
		X-70	4,618	5,937	1,932	2,485	5,592	2,621	1,891	2,216	4,074	4,772	868	1,016	5,592	2,621
24	0.750	X-80	5,310	5,977	2,222	2,501	6,403	2,780	2,162	2,432	4,656	5,238	992	1,115	6,403	2,780
		X-56	3,067	3,889	1,441	1,826	3,095	1,023	1,410	1,787	2,584	3,277	661	838	3,095	1,023
		X-60	3,286	4,108	1,543	1,929	3,292	1,037	1,510	1,888	2,769	3,461	709	886	3,292	1,037
		X-65	3,560	4,218	1,672	1,981	3,571	1,054	1,636	1,938	3,000	3,554	768	909	3,571	1,054
		X-70	3,834	4,492	1,801	2,110	3,844	1,067	1,762	2,064	3,230	3,784	827	968	3,844	1,067
	1.000	X-56	4,046	5,130	1,861	2,360	4,127	1,978	1,856	2,354	3,388	4,295	852	1,080	4,127	1,978
		X-60	4,335	5,419	1,994	2,493	4,389	2,037	1,989	2,487	3,630	4,537	913	1,140	4,389	2,037
		X-65	4,696	5,563	2,160	2,559	4,761	2,111	2,155	2,553	3,932	4,658	989	1,171	4,761	2,111
		X-70	5,057	5,925	2,327	2,725	5,126	2,174	2,321	2,719	4,235	4,961	1,064	1,247	5,126	2,174

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5.1 - Double Drive Shoulder (DDS) connector specifications

Double Drive Shoulder (DDS) connector specifications (continued)

Pipe properties				DDS connector properties		
Pipe OD (in.) ^{1, 10}	Pipe wall (in.) ^{1, 11}	Pipe ID (in.) ¹²	Pipe weight (lbs/ft) ⁹	Connector OD (in.) ¹³	Connector ID (in.) ¹³	Made-up loss (in.) ¹⁴
26	0.750	24.500	202.3	26.00	24.50	5.730
	1.000	24.000	267.0	26.00	24.00	8.238
	1.250	23.500	330.4	26.00	23.50	8.166
	1.500	23.000	392.5	26.00	23.00	11.950

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Pipe properties			Pipe body capacity data ¹						DDS connector capacity data ⁴							
Pipe OD (in.) ^{1, 10}	Pipe wall (in.) ^{1, 11}	Pipe grade ^{9, 5}	At-yield tension / compression (kips) ^{1, 3}	Ultimate tension / compression (kips) ^{1, 3}	At-yield bending (ft-kips) ³	Ultimate bending (ft-kips) ³	Burst pressure (psi) ^{1, 2}	External pressure (psi) ^{1, 2}	At-yield tension (kips) ⁴	Ultimate tension (kips) ^{4, 6}	At-yield compression (kips) ⁴	Ultimate compression (kips) ^{4, 6}	At-yield bending (ft-kips) ⁴	Ultimate bending (ft-kips) ^{4, 6}	Internal pressure (psi) ^{7, 8}	External pressure (psi) ^{7, 8}
26	0.750	X-56	3,332	4,224	1,704	2,159	2,826	1,182	1,531	1,941	2,802	3,553	782	991	2,826	1,182
		X-60	3,570	4,462	1,825	2,281	3,028	1,192	1,640	2,050	3,002	3,753	838	1,047	3,028	1,192
		X-65	3,867	4,581	1,977	2,342	3,281	1,195	1,777	2,105	3,253	3,853	908	1,075	3,281	1,195
		X-70	4,165	4,878	2,129	2,494	3,533	1,195	1,914	2,242	3,503	4,103	977	1,144	3,533	1,195
	1.000	X-56	4,398	5,576	2,206	2,797	3,769	2,252	2,019	2,560	3,680	4,666	1,010	1,281	3,769	2,252
		X-60	4,712	5,890	2,364	2,954	4,038	2,336	2,163	2,704	3,943	4,929	1,082	1,353	4,038	2,336
		X-65	5,105	6,047	2,561	3,033	4,375	2,434	2,343	2,776	4,272	5,061	1,173	1,389	4,375	2,434
		X-70	5,498	6,440	2,757	3,230	4,711	2,523	2,524	2,957	4,600	5,389	1,263	1,480	4,711	2,523
	1.250	X-56	5,443	6,900	2,678	3,395	4,711	3,767	2,542	3,223	4,734	6,002	1,246	1,580	4,711	3,767
		X-60	5,832	7,289	2,869	3,587	5,048	3,918	2,724	3,405	5,072	6,340	1,335	1,669	5,048	3,918
		X-65	6,318	7,483	3,109	3,682	5,468	4,092	2,951	3,495	5,495	6,509	1,446	1,713	5,468	4,092
		X-70	6,804	7,969	3,347	3,921	5,889	4,249	3,178	3,722	5,917	6,932	1,558	1,825	5,889	4,249
	1.500	X-56	6,465	8,197	3,121	3,957	5,653	5,379	2,985	3,784	5,463	6,926	1,433	1,816	5,653	5,379
		X-60	6,927	8,659	3,344	4,180	6,057	5,652	3,198	3,998	5,853	7,316	1,535	1,919	6,057	5,652
		X-65	7,504	8,889	3,622	4,291	6,562	5,980	3,465	4,104	6,341	7,512	1,663	1,970	6,562	5,980
		X-70	8,082	9,467	3,902	4,570	7,067	6,293	3,731	4,371	6,829	7,999	1,791	2,098	7,067	6,293

Well Construction

Tubular Products & Services

5.1 - Double Drive Shoulder (DDS) connector specifications

Double Drive Shoulder (DDS) connector specifications (continued)

Pipe properties				DDS connector properties		
Pipe OD (in.) ^{1, 10}	Pipe wall (in.) ^{1, 11}	Pipe ID (in.) ¹²	Pipe weight (lbs/ft) ⁹	Connector OD (in.) ¹³	Connector ID (in.) ¹³	Made-up loss (in.) ¹⁴
28	0.750	26.500	218.3	28.00	26.50	5.730
	1.000	26.000	288.4	28.00	26.00	8.238
	1.250	25.500	357.1	28.00	25.50	8.166

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Pipe properties			Pipe body capacity data ¹						DDS connector capacity data ⁴							
Pipe OD (in.) ^{1, 10}	Pipe wall (in.) ^{1, 11}	Pipe grade ^{9, 5}	At-yield tension/compression (kips) ^{1, 3}	Ultimate tension/compression (kips) ^{1, 3}	At-yield bending (ft-kips) ³	Ultimate bending (ft-kips) ³	Burst pressure (psi) ^{1, 2}	External pressure (psi) ^{1, 2}	At-yield tension (kips) ⁴	Ultimate tension (kips) ^{4, 6}	At-yield compression (kips) ⁴	Ultimate compression (kips) ^{4, 6}	At-yield bending (ft-kips) ⁴	Ultimate bending (ft-kips) ^{4, 6}	Internal pressure (psi) ^{7, 8}	External pressure (psi) ^{7, 8}
28	0.750	X-56	3,596	4,558	1,988	2,520	2,625	953	1,650	2,093	3,024	3,834	914	1,158	2,625	953
		X-60	3,852	4,815	2,130	2,662	2,812	953	1,768	2,211	3,240	4,050	979	1,223	2,812	953
		X-65	4,173	4,943	2,308	2,733	3,046	953	1,916	2,269	3,510	4,158	1,060	1,256	3,046	953
		X-70	4,494	5,264	2,485	2,911	3,281	953	2,063	2,417	3,780	4,428	1,142	1,337	3,281	953
	1.000	X-56	4,750	6,022	2,580	3,271	3,500	1,947	2,179	2,763	3,977	5,043	1,181	1,498	3,500	1,947
		X-60	5,089	6,361	2,764	3,455	3,750	2,009	2,335	2,919	4,261	5,327	1,266	1,582	3,750	2,009
		X-65	5,513	6,531	2,994	3,547	4,062	2,080	2,530	2,997	4,616	5,469	1,371	1,624	4,062	2,080
		X-70	5,937	6,955	3,225	3,777	4,375	2,141	2,724	3,191	4,972	5,824	1,477	1,730	4,375	2,141
	1.250	X-56	5,882	7,458	3,138	3,979	4,375	3,192	2,749	3,485	5,114	6,484	1,462	1,853	4,375	3,192
		X-60	6,302	7,878	3,363	4,203	4,687	3,299	2,945	3,681	5,480	6,850	1,566	1,958	4,687	3,299
		X-65	6,828	8,088	3,643	4,315	5,078	3,417	3,191	3,780	5,936	7,032	1,696	2,010	5,078	3,417
		X-70	7,353	8,613	3,923	4,596	5,468	3,519	3,436	4,025	6,393	7,489	1,827	2,140	5,468	3,519

Well Construction

Tubular Products & Services

5.1 - Double Drive Shoulder (DDS) connector specifications

Double Drive Shoulder (DDS) connector specifications (continued)

Pipe properties				DDS connector properties		
Pipe OD (in.) ^{1, 10}	Pipe wall (in.) ^{1, 11}	Pipe ID (in.) ¹²	Pipe weight (lbs/ft) ⁹	Connector OD (in.) ¹³	Connector ID (in.) ¹³	Made-up loss (in.) ¹⁴
30	0.750	28.500	234.3	30.00	28.50	5,730
	1.000	28.000	309.7	30.00	28.00	8,238
	1.250	27.500	383.8	30.00	27.50	8,166
	1.500	27.000	456.6	30.00	27.00	11,950

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Pipe properties			Pipe body capacity data ¹						DDS connector capacity data ⁴							
Pipe OD (in.) ^{1, 10}	Pipe wall (in.) ^{1, 11}	Pipe grade ^{9, 5}	At-yield tension/ compression (kips) ^{1, 3}	Ultimate tension /compression (kips) ^{1, 3}	At-yield bending (ft-kips) ³	Ultimate bending (ft-kips) ³	Burst pressure (psi) ^{1, 2}	External pressure (psi) ^{1, 2}	At-yield tension (kips) ⁴	Ultimate tension (kips) ^{4, 6}	At-yield compression (kips) ⁴	Ultimate compression (kips) ^{4, 6}	At-yield bending (ft-kips) ⁴	Ultimate bending (ft-kips) ^{4, 6}	Internal pressure (psi) ^{7, 8}	External pressure (psi) ^{7, 8}
30	0.750	X-56	3,859	4,893	2,294	2,909	2,476	564	1,770	2,244	3,246	4,116	1,055	1,338	2,476	564
		X-60	4,135	5,168	2,458	3,073	2,633	567	1,896	2,370	3,478	4,348	1,131	1,414	2,633	567
		X-65	4,479	5,306	2,663	3,155	2,856	572	2,054	2,434	3,768	4,464	1,225	1,451	2,856	572
		X-70	4,824	5,651	2,868	3,359	3,075	575	2,212	2,592	4,058	4,754	1,319	1,546	3,075	575
	1.000	X-56	5,101	6,468	2,983	3,782	3,301	1,201	2,342	2,970	4,269	5,413	1,367	1,733	3,301	1,201
		X-60	5,466	6,832	3,196	3,995	3,511	1,221	2,509	3,137	4,574	5,718	1,464	1,831	3,511	1,221
		X-65	5,921	7,015	3,462	4,101	3,809	1,245	2,719	3,221	4,956	5,871	1,587	1,879	3,809	1,245
		X-70	6,377	7,470	3,729	4,368	4,100	1,265	2,928	3,430	5,337	6,252	1,709	2,002	4,100	1,265
	1.250	X-56	6,322	8,015	3,635	4,609	4,127	1,978	2,871	3,640	5,497	6,969	1,661	2,105	4,127	1,978
		X-60	6,774	8,467	3,895	4,869	4,389	2,037	3,076	3,845	5,889	7,362	1,779	2,224	4,389	2,037
		X-65	7,338	8,693	4,220	4,999	4,761	2,111	3,332	3,947	6,380	7,558	1,927	2,283	4,761	2,111
		X-70	7,903	9,257	4,544	5,324	5,126	2,174	3,589	4,204	6,871	8,049	2,076	2,432	5,126	2,174
	1.500	X-56	7,520	9,535	4,254	5,393	4,952	2,768	3,471	4,401	6,345	8,045	1,955	2,478	4,952	2,768
		X-60	8,058	10,072	4,557	5,697	5,267	2,882	3,719	4,648	6,799	8,498	2,094	2,618	5,267	2,882
		X-65	8,729	10,341	4,937	5,849	5,713	3,030	4,029	4,772	7,365	8,725	2,269	2,688	5,713	3,030
		X-70	9,401	11,012	5,317	6,229	6,151	3,163	4,339	5,082	7,932	9,291	2,443	2,862	6,151	3,163

Well Construction

Tubular Products & Services

5.1 - Double Drive Shoulder (DDS) connector specifications

Double Drive Shoulder (DDS) connector specifications (continued)

Pipe properties				DDS connector properties		
Pipe OD (in.) ^{1, 10}	Pipe wall (in.) ^{1, 11}	Pipe ID (in.) ¹²	Pipe weight (lbs/ft) ⁹	Connector OD (in.) ¹³	Connector ID (in.) ¹³	Made-up loss (in.) ¹⁴
36	1.000	34.000	373.8	36.00	34.00	8.238
	1.250	33.500	463.9	36.00	33.50	8.166
	1.500	33.000	552.7	36.00	33.00	11.950
	2.000	32.000	726.2	36.00	32.00	11.950

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Pipe properties			Pipe body capacity data ¹						DDS connector capacity data ⁴							
Pipe OD (in.) ^{1, 10}	Pipe wall (in.) ^{1, 11}	Pipe grade ^{9, 5}	At-yield tension /compression (kips) ^{1, 3}	Ultimate tension /compression (kips) ^{1, 3}	At-yield bending (ft-kips) ³	Ultimate bending (ft-kips) ³	Burst pressure (psi) ^{1, 2}	External pressure (psi) ^{1, 2}	At-yield tension (kips) ⁴	Ultimate tension (kips) ^{4, 6}	At-yield compression (kips) ⁴	Ultimate compression (kips) ^{4, 6}	At-yield bending (ft-kips) ⁴	Ultimate bending (ft-kips) ^{4, 6}	Internal pressure (psi) ^{7, 8}	External pressure (psi) ^{7, 8}
36	1.000	X-56	6,223	7,817	4,415	5,546	2,751	752	2,721	3,450	5,144	6,522	1,954	2,477	2,751	752
		X-60	6,619	8,290	4,696	5,882	2,926	759	2,916	3,645	5,511	6,889	2,093	2,617	2,926	759
		X-65	7,180	8,532	5,094	6,053	3,174	767	3,159	3,742	5,970	7,073	2,268	2,687	3,174	767
		X-70	7,729	9,093	5,484	6,451	3,417	774	3,402	3,985	6,430	7,532	2,442	2,861	3,417	774
	1.250	X-56	7,723	9,702	5,404	6,789	3,439	1,325	3,498	4,436	6,635	8,412	2,443	3,097	3,439	1,325
		X-60	8,215	10,289	5,748	7,199	3,657	1,349	3,748	4,685	7,109	8,886	2,617	3,272	3,657	1,349
		X-65	8,911	10,589	6,235	7,409	3,967	1,380	4,061	4,810	7,702	9,123	2,835	3,359	3,967	1,380
		X-70	9,593	11,285	6,712	7,896	4,271	1,405	4,373	5,123	8,294	9,716	3,054	3,577	4,271	1,405
	1.500	X-56	9,201	11,559	6,350	7,977	4,127	1,978	4,204	5,330	7,664	9,716	2,893	3,668	4,127	1,978
		X-60	9,787	12,258	6,754	8,459	4,389	2,037	4,504	5,630	8,211	10,260	3,099	3,874	4,389	2,037
		X-65	10,616	12,616	7,326	8,706	4,761	2,111	4,879	5,780	8,895	10,530	3,358	3,978	4,761	2,111
		X-70	11,429	13,445	7,887	9,278	5,126	2,174	5,225	6,155	9,580	11,220	3,616	4,236	5,126	2,174
	2.000	X-56	12,091	15,188	8,116	10,196	5,502	3,270	5,638	7,148	10,540	13,360	3,765	4,773	5,502	3,270
		X-60	12,860	16,107	8,633	10,812	5,852	3,423	6,041	7,551	11,290	14,110	4,034	5,042	5,852	3,423
		X-65	13,949	16,577	9,364	11,128	6,348	3,627	6,544	7,752	12,230	14,490	4,370	5,177	6,348	3,627
		X-70	15,018	17,667	10,081	11,859	6,834	3,813	7,047	8,256	13,170	15,430	4,706	5,513	6,834	3,813

Well Construction

Tubular Products & Services

5.1 - Double Drive Shoulder (DDS) connector specifications

Double Drive Shoulder (DDS) connector specifications (continued)

Pipe properties				DDS connector properties		
Pipe OD (in.) ^{1, 10}	Pipe wall (in.) ^{1, 11}	Pipe ID (in.) ¹²	Pipe weight (lbs/ft) ⁹	Connector OD (in) ¹³	Connector ID (in.) ¹³	Made-up loss (in.) ¹⁴
38	1.500	35.000	584.7	38.00	35.00	11.950
42	1.500	39.000	648.8	42.00	39.00	11.950
	2.000	38.000	854.4	42.00	38.00	11.950

Note:

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Pipe properties			Pipe body capacity data ¹						DDS connector capacity data ⁴							
Pipe OD (in.) ^{1, 10}	Pipe wall (in.) ^{1, 11}	Pipe grade ^{9, 5}	At-yield tension / compression (kips) ^{1, 3}	Ultimate tension / compression (kips) ^{1, 3}	At-yield bending (ft-kips) ³	Ultimate bending (ft-kips) ³	Burst pressure (psi) ^{1, 2}	External pressure (psi) ^{1, 2}	At-yield tension (kips) ⁴	Ultimate tension (kips) ^{4, 6}	At-yield compression (kips) ⁴	Ultimate compression (kips) ^{4, 6}	At-yield bending (ft-kips) ⁴	Ultimate bending (ft-kips) ^{4, 6}	Internal pressure (psi) ^{7, 8}	External pressure (psi) ^{7, 8}
38	1.500	X-56	9,735	12,229	7,122	8,947	3,909	1,768	4,447	5,639	8,102	10,270	3,245	4,115	3,909	1,768
		X-60	10,354	12,968	7,575	9,488	4,158	1,815	4,765	5,956	8,680	10,850	3,477	4,346	4,158	1,815
		X-65	11,231	13,347	8,217	9,765	4,510	1,872	5,162	6,115	9,404	11,140	3,767	4,462	4,510	1,872
		X-70	12,091	14,224	8,846	10,407	4,856	1,921	5,559	6,512	10,120	11,860	4,057	4,752	4,856	1,921
42	1.500	X-56	10,802	13,569	8,800	11,055	3,537	1,415	4,935	6,257	8,975	11,380	4,012	5,087	3,537	1,415
		X-60	11,489	14,390	9,360	11,724	3,762	1,444	5,287	6,609	9,617	12,020	4,299	5,373	3,762	1,444
		X-65	12,462	14,810	10,153	12,066	4,081	1,479	5,728	6,786	10,410	12,340	4,657	5,517	4,081	1,479
		X-70	13,416	15,783	10,931	12,859	4,393	1,508	6,169	7,226	11,210	13,140	5,015	5,875	4,393	1,508
	2.000	X-56	14,225	17,869	11,318	14,217	4,716	2,546	6,648	8,429	12,380	15,700	5,271	6,683	4,716	2,546
		X-60	15,129	18,950	12,037	15,077	5,016	2,643	7,123	8,904	13,270	16,580	5,647	7,059	5,016	2,643
		X-65	16,411	19,503	13,057	15,517	5,441	2,769	7,717	9,142	14,370	17,030	6,118	7,248	5,441	2,769
		X-70	17,668	20,784	14,057	16,537	5,858	2,879	8,311	9,736	15,480	18,130	6,589	7,718	5,858	2,879

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Tubular Products & Services

5.1 - Double Drive Shoulder (DDS) connector specifications

Double Drive Shoulder (DDS) connector specifications (continued)

Pipe properties				DDS connector properties		
Pipe OD (in.) ^{1, 10}	Pipe wall (in.) ^{1, 11}	Pipe ID (in.) ¹²	Pipe weight (lbs/ft) ⁹	Connector OD (in) ¹³	Connector ID (in.) ¹³	Made-up loss (in.) ¹⁴
48	1.250	45.500	624.1	48.00	45.50	8.166
	1.500	45.000	744.9	48.00	45.00	11.950
	2.000	44.000	982.6	48.00	44.00	11.950

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Pipe properties			Pipe body capacity data ¹						DDS connector capacity data ⁴							
Pipe OD (in.) ^{1, 10}	Pipe wall (in.) ^{1, 11}	Pipe grade ^{9, 5}	At-yield tension / compression (kips) ^{1, 3}	Ultimate tension / compression (kips) ^{1, 3}	At-yield bending (ft-kips) ³	Ultimate bending (ft-kips) ³	Burst pressure (psi) ^{1, 2}	External pressure (psi) ^{1, 2}	At-yield tension (kips) ⁴	Ultimate tension (kips) ^{4, 6}	At-yield compression (kips) ⁴	Ultimate compression (kips) ^{4, 6}	At-yield bending (ft-kips) ⁴	Ultimate bending (ft-kips) ^{4, 6}	Internal pressure (psi) ^{7, 8}	External pressure (psi) ^{7, 8}
48	1.250	X-56	10,391	13,053	9,863	12,390	2,579	631	4,800	6,086	8,931	11,320	4,551	5,771	2,579	631
		X-60	11,051	13,842	10,491	13,140	2,743	636	5,143	6,429	9,569	11,960	4,877	6,096	2,743	636
		X-65	11,988	14,246	11,380	13,523	2,975	641	5,571	6,600	10,360	12,280	5,283	6,258	2,975	641
		X-70	12,906	15,182	12,251	14,412	3,203	646	6,000	7,029	11,160	13,070	5,689	6,665	3,203	646
	1.500	X-56	12,402	15,579	11,651	14,636	3,095	1,023	5,664	7,182	10,280	13,040	5,313	6,736	3,095	1,023
		X-60	13,191	16,522	12,392	15,521	3,292	1,037	6,069	7,586	11,020	13,770	5,692	7,115	3,292	1,037
		X-65	14,308	17,004	13,442	15,974	3,571	1,054	6,575	7,788	11,930	14,140	6,167	7,305	3,571	1,054
		X-70	15,404	18,121	14,471	17,024	3,844	1,067	7,080	8,294	12,850	15,060	6,641	7,779	3,844	1,067
	2.000	X-56	16,358	20,549	15,052	18,908	4,127	1,978	7,307	9,264	13,860	17,580	6,751	8,560	4,127	1,978
		X-60	17,399	21,792	16,009	20,052	4,389	2,037	7,829	9,786	14,850	18,570	7,233	9,042	4,389	2,037
		X-65	18,873	22,428	17,366	20,637	4,761	2,111	8,481	10,040	16,090	19,060	7,836	9,283	4,761	2,111
		X-70	20,318	23,902	18,695	21,993	5,126	2,174	9,134	10,690	17,330	20,300	8,439	9,886	5,126	2,174

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5.1 - Double Drive Shoulder (DDS) connector specifications

DDS connector capacity table notes

The tables provided include the most up to date DDS connector and pipe body capacity information currently available. DDS connectors are intended to fit a range of applications which may include use of pipe sizes and grades not included in these tables.

Information regarding pipe sizes and grades not featured within these tables should be requested from Expro. The following notes should be acknowledged by users as they evaluate the DDS connector and pipe body capacities within these tables:

1. Pipe body capacity data is determined using nominal dimensions and nominal pipe grade in association with parameters established by API TR 5C3, 1st Edition, 2008. Various pipe body OD/ID configurations and material grades not listed within these tables are available per request.
2. Pipe body internal and external pressures are rated based on 87.5% minimum wall thickness, established by API TR 5C3, 1st Edition, 2008.
3. Pipe body at-yield and ultimate capacity data are determined on the basis of nominal pipe body dimensions and nominal material grade SMYS and UTS, respectively.
4. DDS capacity data is based on finite element analysis (FEA), physical testing, and/or interpolation of complimentary DDS connector capacities developed through FEA and physical testing, relevant to the connector size and operational envelope.
5. DDS is offered as a "weld-on" connection and as a "thread-on" connection. Various forging materials and pipe blank materials not listed within these tables are available per request.
6. DDS ultimate tension, ultimate compression, and ultimate bending data are based on the minimum UTS of the pipe or forging material, and/or statistical analysis of completed physical testing.
7. DDS internal and external pressure ratings are based on physical testing and/or FEA analysis. In most cases, DDS connectors exhibit internal/external pressure capacities that meet or exceed these capacities of the pipe body to which the connector is attached.
8. DDS internal and external pressure capacity data is consistent with API TR 5C3, 1st Edition, 2008.
9. Pipe weight and pipe grade are consistent with API Specification 5L.
10. Pipe OD is shown in these tables as a nominal dimension. It should be noted that the actual pipe OD is subject to ovality and tolerance variation per API Specification 5CT.
11. Pipe wall (thickness) is shown in these tables as a nominal dimension. It should be noted that this wall thickness is subject to ovality and tolerance variation per API Specification 5CT.
12. Pipe ID shown in these tables is determined by subtracting 2 times the associated wall thickness from the nominal pipe OD.
13. DDS connector OD and connector ID are shown in these tables as nominal dimensions.
14. DDS made-up loss is the total length of connector system after making up the pin and box connection. Made-up loss considers weld-on/thread-on pin length, weld-on/thread-on box length, and the distance between the nose and shoulder of each box and pin: "Pin length" + "Box length" – "pin/box nose-to-shoulder distance" = "made-up length".
15. DDS make-up torque is specific to the connector size. However, DDS connectors are capable of enduring higher pre-loads due to higher make-up torques. Operations requiring higher make-up torques than advertised in these tables must be approved by Expro.

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6.0 - Xtreme3™ connector

The Xtreme3™ Connector is a deep-water, premium threaded connection featuring a standard metal seal and a negative load flank ensuring increased performance and reliability. This connector was developed for the three provinces governing its name: Extreme Tension, Extreme Compression, and Extreme Bending.

Standard features

- Angle of thread cone allows for optimized stress distribution across the thread pattern, and a centered load distribution in relation to the pipe wall
- Negative load flank on the teeth keeps the threads engaged under loading and prevents “jump-out”
- Optimized thread relief grooves alleviate stress in critical locations on the connector
- A deep-stab, lower alignment face allows for quicker make-up and cross-thread prevention
- Available reservoirs reduce excess dope build up and subsequent dope pressure

Seals

- Internal metal to metal seal allows for a more reliable seal at higher pressures
- External environmental O-ring Seal for sea water

Connector FEA & testing

- Internal analysis is verified by external testing conducted by Stress Engineering
- Elastic/Plastic Finite Element Analysis
- Physical Testing
- ISO 13679:2002 Modified CAL I Series B with Bending / API RP 5C5: 2003 CAL I
- Harmonic Fatigue Testing



Specifications	
Size range (in.)	20" to 42"
Shouldering torque range (min. / max.) ft - lb	60,000 / 80,000 (size dependent)
Thread starts	Single / multi
Turns to make-up	3.5 / <1

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6.1 - 20-inch Xtreme3™ specifications

20-inch Xtreme3™ specifications

Pipe body properties			20-inch Xtreme3™ connector properties					
Pipe O.D. (in.) ¹¹	Pipe wall (in.) ¹¹	Pipe ID (in.) ¹¹	Connector O.D (in.) ¹⁴	Connector ID (in.) ¹⁴	Pin length (in.) ¹⁴	Box length (in.) ¹⁴	Made-up length (in.) ^{14,15}	Make-up torque (ft-lbs.) ¹⁶
20.00	0.625	18.750	21.50	18.25	11.387	11.375	16.853	60,000
	0.812	18.376						64,000 68,000

Note:

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20" Xtreme3™ capacity data

Forging material yield (ksi) ⁵	At-yield tension (kips) ⁴	Ultimate tension (kips) ⁴	At-yield compression (kips) ⁴	Ultimate compression (kips) ⁴	At-yield bending (ft-kips) ⁴	Ultimate bending (ft-kips) ⁴	Internal pressure (psi) ⁷	External pressure (psi) ⁷
70	2,640	3,093	2,030	2,379	1,479	1,733	4,973	2,820
90	3,395	4,149	2,611	3,191	1,902	2,293	5,684	3,016
100	3,772	4,610	2,901	3,545	2,113	2,547	5,684	3,016

Pipe OD (in.) ¹¹	Pipe wall thickness (in.) ¹¹	Pipe weight (lbs/ft) ¹¹	Pipe grade ¹⁰	At-yield tension / compression (kips) ³	Ultimate tension / compression (kips) ³	At-yield bending (ft-kips) ³	Ultimate bending (ft-kips) ³	Burst pressure (psi) ¹	External pressure (psi) ²
20	0.625	129.4	X-56	2,153	2,704	842	1,058	3,095	1,023
			X-65	2,484	2,952	972	1,155	3,571	1,054
			X-70	2,674	3,146	1,046	1,231	3,844	1,067
			X-80	3,062	3,446	1,198	1,349	4,402	1,089
	0.812	166.6	X-56	2,770	3,480	1,064	1,337	4,021	1,876
			X-65	3,196	3,798	1,228	1,459	4,639	1,994
			X-70	3,441	4,048	1,322	1,555	4,994	2,050
			X-80	3,940	4,434	1,513	1,703	5,719	2,143

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6.1 - 20-inch Xtreme3™ Super Duty specifications

20-inch Xtreme3™ Super Duty specifications

Pipe body properties			20-inch Xtreme3™ Super Duty connector properties					
Pipe O.D. (in.) ¹¹	Pipe wall (in.) ¹¹	Pipe ID (in.) ¹¹	Connector O.D (in.) ¹⁴	Connector ID (in.) ¹⁴	Pin length (in.) ¹⁴	Box length (in.) ¹⁴	Made-up length (in.) ^{14,15}	Make-up torque (ft-lbs.) ¹⁶
20.00	0.625	18.750	21.88	18.00	14.48	14.35	19.40	60,000
	0.812	18.376						64,000
	1.000	18.000						68,000

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20" Xtreme3™ Super Duty - capacity data

Forging material yield (ksi) ⁵	At-yield tension (kips) ⁴	Ultimate tension (kips) ⁴	At-yield compression (kips) ⁴	Ultimate compression (kips) ⁴	At-yield bending (ft-kips) ⁴	Ultimate bending (ft-kips) ⁴	Internal pressure (psi) ⁷	External pressure (psi) ⁷
90	4,060	4,872	3,933	4,720	1,527	1,833	7,000	4,991
100	4,511	5,413	4,370	5,244	1,697	2,036	7,000	4,991

Pipe OD (in.) ¹¹	Pipe wall thickness (in.) ¹¹	Pipe weight (lbs/ft) ¹¹	Pipe grade ¹⁰	At-yield tension / compression (kips) ³	Ultimate tension / compression (kips) ³	At-yield bending (ft-kips) ³	Ultimate bending (ft-kips) ³	Burst pressure (psi) ¹	External pressure (psi) ²
20	0.625	129.4	X-56	2,153	2,704	842	1,058	3,095	1,023
			X-65	2,484	2,952	972	1,155	3,571	1,054
			X-70	2,674	3,146	1,046	1,231	3,844	1,067
			X-80	3,062	3,446	1,198	1,349	4,402	1,089
	0.812	166.6	X-56	2,770	3,480	1,064	1,337	4,021	1,876
			X-65	3,196	3,798	1,228	1,459	4,639	1,994
			X-70	3,441	4,048	1,322	1,555	4,994	2,050
			X-80	3,940	4,434	1,513	1,703	5,719	2,143

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6.1 - 22-inch Xtreme3™ specifications

22-inch Xtreme3™ specifications

Pipe body properties			22-inch Xtreme3™ connector properties					
Pipe O.D. (in.) ¹¹	Pipe wall (in.) ¹¹	Pipe ID (in.) ¹¹	Connector O.D. (in.) ¹⁴	Connector ID (in.) ¹⁴	Pin length (in.) ¹⁴	Box length (in.) ¹⁴	Made-up length (in.) ^{14,15}	Make-up torque (ft-lbs.) ¹⁶
22.00	1.000	20.000	23.75	20.00	10.977	10.954	16.023	60,000
	1.250	19.500						64,000
	1.500	19.000						68,000

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22" Xtreme3™ - capacity data

Forging material yield (ksi) ⁵	At-yield tension (kips) ⁴	Ultimate tension (kips) ⁴	At-yield compression (kips) ⁴	Ultimate compression (kips) ⁴	At-yield bending (ft-kips) ⁴	Ultimate bending (ft-kips) ⁴	Internal pressure (psi) ⁷	External pressure (psi) ⁷
70	3,270	3,831	2,672	3,130	1,816	2,127	8,352	8,524
90	4,205	5,139	3,435	4,199	2,335	2,854	9,545	9,457
100	4,672	5,710	3,816	4,665	2,594	3,171	9,545	9,457

Pipe OD (in.) ¹¹	Pipe wall thickness (in.) ¹¹	Pipe weight (lbs/ ft) ¹¹	Pipe grade ¹⁰	At-yield tension / compression (kips) ³	Ultimate tension / compression (kips) ³	At-yield bending (ft-kips) ³	Ultimate bending (ft-kips) ³	Burst pressure (psi) ¹	External pressure (psi) ²
22	1	224.5	X-70	4,637	5,456	1,941	2,283	5,592	2,621
			X-80	5,310	5,977	2,222	2,501	6,403	2,780
	1.25	227.3	X-70	5,728	6,738	2,344	2,757	6,990	3,957
			X-80	6,559	7,382	2,684	3,021	8,004	4,323
	1.5	328.7	X-70	6,791	7,989	2,717	3,196	8,388	5,196
			X-80	7,776	8,752	3,111	3,501	9,605	5,787

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6.1 - 26-inch Xtreme3™ specifications

26-inch Xtreme3™ specifications

Pipe body properties			26-inch Xtreme3™ connector properties					
Pipe O.D. (in.) ¹¹	Pipe wall (in.) ¹¹	Pipe ID (in.) ¹¹	Connector O.D. (in.) ¹⁴	Connector ID (in.) ¹⁴	Pin length (in.) ¹⁴	Box length (in.) ¹⁴	Made-up length (in.) ^{14,15}	Make-up torque (ft-lbs.) ¹⁶
26.00	0.75	24.500	27.75	24.25	11.51	11.25	16.60	60,000
	1.00	24.000		24.00				64,000 68,000

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26" Xtreme3™ - capacity data

Forging material yield (ksi) ⁵	At-yield tension (kips) ⁴	Ultimate tension (kips) ⁴	At-yield compression (kips) ⁴	Ultimate compression (kips) ⁴	At-yield bending (ft-kips) ⁴	Ultimate bending (ft-kips) ⁴	Internal pressure (psi) ⁷	External pressure (psi) ⁷
70	3,750	4,392	2,725	3,192	2,952	3,458	4,711	2,523
90	4,821	5,892	3,504	4,282	3,795	4,639	5,384	2,675
100	5,357	6,546	3,893	4,757	4,217	5,154	5,384	2,675

Pipe OD (in.) ¹¹	Pipe wall thickness (in.) ¹¹	Pipe weight (lbs/ ft) ¹¹	Pipe grade ¹⁰	At-yield tension / compression (kips) ³	Ultimate tension / compression (kips) ³	At-yield bending (ft-kips) ³	Ultimate bending (ft-kips) ³	Burst pressure (psi) ¹	External pressure (psi) ²
26	0.75	202.4	X-56	3,367	4,230	1,721	2,162	2,857	831
			X-60	3,581	4,485	1,831	2,293	3,038	840
			X-65	3,884	4,616	1,986	2,360	3,296	850
	1.00	267.3	X-56	4,445	5,584	2,229	2,801	3,809	1,672
			X-60	4,728	5,921	2,371	2,970	4,051	1,713
			X-65	5,128	6,094	2,572	3,057	4,395	1,764

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6.1 - 28-inch Xtreme3™ specifications

28-inch Xtreme3™ specifications

Pipe body properties			28-inch Xtreme3™ connector properties					
Pipe O.D. (in.) ¹¹	Pipe wall (in.) ¹¹	Pipe ID (in.) ¹¹	Connector O.D. (in.) ¹⁴	Connector ID (in.) ¹⁴	Pin length (in.) ¹⁴	Box length (in.) ¹⁴	Made-up length (in.) ^{14,15}	Make-up torque (ft-lbs.) ¹⁶
28.00	0.750	26.500	29.875	26.25	11.47	11.45	16.52	60,000
	1.000	26.000		26.00				64,000 68,000

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28" Xtreme3™ capacity data

Forging material yield (ksi) ⁵	At-yield tension (kips) ⁴	Ultimate tension (kips) ⁴	At-yield compression (kips) ⁴	Ultimate compression (kips) ⁴	At-yield bending (ft-kips) ⁴	Ultimate bending (ft-kips) ⁴	Internal pressure (psi) ⁷	External pressure (psi) ⁷
70	4,267	4,999	3,236	3,791	3,453	4,045	4,375	2,141
90	5,486	6,706	4,161	5,086	4,440	5,427	5,000	2,236
100	6,096	7,451	4,623	5,651	4,933	6,030	5,000	2,236

Pipe OD (in.) ¹¹	Pipe wall thickness (in.) ¹¹	Pipe weight (lbs/ ft) ¹¹	Pipe grade ¹⁰	At-yield tension / compression (kips) ³	Ultimate tension / compression (kips) ³	At-yield bending (ft-kips) ³	Ultimate bending (ft-kips) ³	Burst pressure (psi) ¹	External pressure (psi) ²
28	0.75	218.5	X-56	3,364	4,565	2,009	2,524	2,653	681
			X-60	3,865	4,841	2,137	2,676	2,821	687
			X-65	4,192	4,982	2,318	2,754	3,060	694
	1.00	288.6	X-56	4,800	6,030	2,607	3,275	3,537	1,415
			X-60	5,106	6,395	2,773	3,473	3,762	1,444
			X-65	5,538	6,582	3,008	3,575	4,081	1,479

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6.1 - 36-inch Xtreme3™ specifications

36-inch Xtreme3™ specifications

Pipe body properties			36-inch Xtreme3™ connector properties					
Pipe O.D. (in.) ¹¹	Pipe wall (in.) ¹¹	Pipe ID (in.) ¹¹	Connector O.D. (in.) ¹⁴	Connector ID (in.) ¹⁴	Pin length (in.) ¹⁴	Box length (in.) ¹⁴	Made-up length (in.) ^{14,15}	Make-up torque (ft-lbs.) ¹⁶
36.00	0.750	34.500	36.125	32	12.062	12.062	16.697	68,000
	1.000	34.000						74,000
	1.500	33.000						80,000
	2.000	32.000						

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36" Xtreme3™ - capacity data

Forging material yield (ksi) ⁵	At-yield tension (kips) ⁴	Ultimate tension (kips) ⁴	At-yield compression (kips) ⁴	Ultimate compression (kips) ⁴	At-yield bending (ft-kips) ⁴	Ultimate bending (ft-kips) ⁴	Internal pressure (psi) ⁷	External pressure (psi) ⁷
70	3,460	4,060	8,940	10,470	5,173	6,718	6,805	5,839

Pipe OD (in.) ¹¹	Pipe wall thickness (in.) ¹¹	Pipe weight (lbs/ ft) ¹¹	Pipe grade ¹⁰	At-yield tension / compression (kips) ³	Ultimate tension / compression (kips) ³	At-yield bending (ft-kips) ³	Ultimate bending (ft-kips) ³	Burst pressure (psi) ¹	External pressure (psi) ²
36	0.75	282.6	X-56	4,700	5,905	3,381	4,248	2,063	336
			X-60	4,999	6,262	3,596	4,505	2,194	337
			X-65	5,423	6,445	3,901	4,636	2,380	338
	1.00	374.2	X-56	6,223	7,817	4,415	5,546	2,751	752
			X-60	6,619	8,290	4,696	5,882	2,926	759
			X-65	7,180	8,532	5,094	6,053	3,174	767
	1.50	553.2	X-60	9,787	12,258	6,754	8,459	4,389	2,037
			X-65	10,616	12,616	7,326	8,706	4,761	2,111
			X-70	11,429	13,445	7,887	9,278	5,126	2,174
			X-80	13,087	14,729	9,031	10,164	5,869	2,280
	2.00	726.9	X-60	12,860	16,107	8,633	10,812	5,852	3,423
			X-65	13,949	16,577	9,364	11,128	6,348	3,627
			X-70	15,018	17,667	10,081	11,859	6,834	3,813
			X-80	17,197	19,354	11,544	12,992	7,826	4,153

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6.1 - 36-inch Xtreme3™ Super Duty specifications

36-inch Xtreme3™ Super Duty specifications

Pipe body properties			36-inch Xtreme3™ Super Duty connector properties					
Pipe O.D. (in.) ¹¹	Pipe wall (in.) ¹¹	Pipe ID (in.) ¹¹	Connector O.D. (in.) ¹⁴	Connector ID (in.) ¹⁴	Pin length (in.) ¹⁴	Box length (in.) ¹⁴	Made-up length (in.) ^{14,15}	Make-up torque (ft-lbs.) ¹⁶
36.00	1.000	34.000	36.375	30.180	15.500	15.500	20.223	68,000
	1.500	33.000						74,000
	2.000	32.000						80,000

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36" Xtreme3™ Super Duty - capacity data

Forging material yield (ksi) ⁵	At-yield tension (kips) ⁴	Ultimate tension (kips) ⁴	At-yield compression (kips) ⁴	Ultimate compression (kips) ⁴	At-yield bending (ft-kips) ⁴	Ultimate bending (ft-kips) ⁴	Internal pressure (psi) ⁷	External pressure (psi) ⁷
90	8,818	10,777	12,299	15,032	10,052	12,285	7,777	6,355
100	9,798	11,757	13,666	16,399	11,169	13,402	7,777	6,355

Pipe OD (in.) ¹¹	Pipe wall thickness (in.) ¹¹	Pipe weight (lbs/ ft) ¹¹	Pipe grade ¹⁰	At-yield tension / compression (kips) ³	Ultimate tension / compression (kips) ³	At-yield bending (ft-kips) ³	Ultimate bending (ft-kips) ³	Burst pressure (psi) ¹	External pressure (psi) ²
36	1.00	374.2	X-56	6,223	7,817	4,415	5,546	2,751	752
			X-60	6,619	8,290	4,696	5,882	2,926	759
			X-65	7,180	8,532	5,094	6,053	3,174	767
	1.50	553.2	X-60	9,787	12,258	6,754	8,459	4,389	2,037
			X-65	10,616	12,616	7,326	8,706	4,761	2,111
			X-70	11,429	13,445	7,887	9,278	5,126	2,174
			X-80	13,087	14,729	9,031	10,164	5,869	2,280
	2.00	726.9	X-60	12,860	16,107	8,633	10,812	5,852	3,423
			X-65	13,949	16,577	9,364	11,128	6,348	3,627
			X-70	15,018	17,667	10,081	11,859	6,834	3,813
			X-80	17,197	19,354	11,544	12,992	7,826	4,153

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6.1 - Xtreme3™ specifications

Xtreme3™ connector capacity table notes

The tables provided include the most up to date Xtreme3™ connector and pipe body capacity information currently available. Xtreme3™ connectors are intended to fit a range of applications which may include use of pipe sizes and grades not included in these tables.

Information regarding pipe sizes and grades not featured within these tables should be requested from Expro. The following notes should be acknowledged by users as they evaluate Xtreme3™ connector and pipe body capacities within these tables:

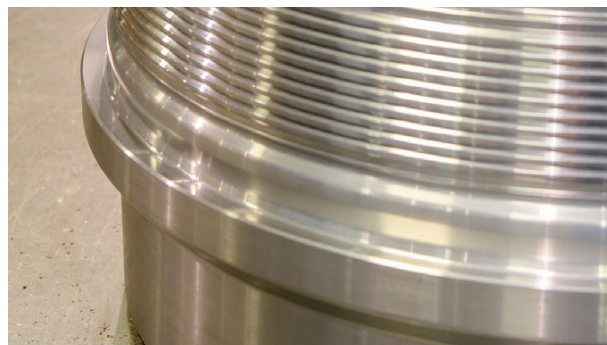
1. Pipe burst pressure is calculated per API TR 5C3 using the minimum wall thickness and material strength allowed by Expro SPEC 029.
2. Pipe external pressure is calculated per API RP 1111 using the nominal pipe dimensions and the minimum allowable material strength.
3. Pipe tension and compression are calculated per API TR 5C3 using nominal dimensions and minimum material strength allowed by Expro SPEC 029.
4. At-yield and ultimate capacities are based on the material strength, Finite Element Analysis (FEA), and physical testing when available.
5. Forging material yield is the minimum yield strength allowed per the Expro specification. Various forged materials and grades are available upon request.
7. Internal and external pressure capacities are structural capacities based on FEA, physical testing, and/or pressure vessel calculations using the critical areas of the connection.
9. Gas tight leak pressure is the highest pressure obtained during an API RP 5C5:2003, modified CAL I test. Related capacities are determined through extrapolation of this testing and FEA.
10. Pipe grades are consistent with those in API Specification 5L.
11. Pipe OD, wall thickness, ID, and weight are nominal values and the actual product will fall within FI specification tolerances.
14. All Xtreme3™ dimensional properties are nominal values and the actual product may be larger or smaller.
15. Made-up length is the nominal distance between welds once the connection is made-up.
16. Make-up torque is the minimum, optimum, and maximum torque to be used in operation. Xtreme3™ connections are capable of enduring higher make-up torques, but the use of higher torques will need written approval from engineering prior to use.
17. Rated Capacities are fully supported by API RP 5C5:2017 testing.

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7.0 - Xtreme3™ GT (Gas Tight) connector

Customer demand drove the necessity for a gas tight Xtreme3™ Connector, and Expro's engineering team quickly addressed that need. The first design iterations focused on optimizing the 22-inch Xtreme3™ connection by implementing gas tight capabilities and improving connector mechanical performance. The result is a robust, gas tight connector capable of withstanding the rigors of deepwater conditions, while sustaining the reliability of the Xtreme3™ Connector.



ISO 13679 Load Testing

Given the proprietary nature of Expro's gas tight connector design, it is critical that our customers can rely on standardized testing procedures that provide a safe operating combined load envelope. Beyond "in-house" analysis, high-resolution FEA and a rigorous ISO 13679 modified CAL I test were conducted.

The testing proved out a gas tight sealability envelope for a 90 ksi connector against an X-80, 1-inch wall thickness, casing tubular. Two quadrant combined load testing was conducted on three test products. The modified CAL I protocol included the addition of bending to the combined load testing, as well as the use of gas rather than water, internal to the connection.

ISO 13679 testing protocol defines minimum and maximum tolerance cases for each testing case. ISO 13679 further defines a sequence of load steps and time-dependent holding points, as well as methods for leak detection, in order to verify the integrity of the connection under gas tight conditions.

Material Selection and Threading

All gas tight forgings are processed and selected using Expro's forging specifications. Expro uses a proprietary thread form, proven by the Xtreme3™ connector, to thread the gas tight connections to specific tolerance cases in order to ensure a reliable metal-to-metal seal throughout loading conditions. All connection surfaces are sandblasted and phosphate-coated immediately following machining in an effort to create an antigalling surface treatment. Anti-rotation pocket geometry can also be machined into the connector pins upon request.

The 22-inch Xtreme3™ GT connector is a robust solution for deep-water applications. Not only is this connector mechanically sound under extreme loading scenarios, but its gas tight seal can withstand such conditions as well. This connector is available in both 90 ksi and 100 ksi forgings. Weld-neck geometry allows the connector to be welded to a range of connector OD measurements.

Anti-rotation features have been developed and are available for this connector.

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7.1 - 22-inch Xtreme3™ GT (Gas Tight) specifications

22-inch Xtreme3™ GT specifications

Pipe body properties			22-inch Xtreme3™ GT connector properties					
Pipe O.D. (in.) ¹¹	Pipe wall (in.) ¹¹	Pipe ID (in.) ¹¹	Connector O.D. (in.) ¹⁴	Connector ID (in.) ¹⁴	Pin length (in.) ¹⁴	Box length (in.) ¹⁴	Made-up length (in.) ^{14,15}	Make-up torque (ft-lbs.) ¹⁶
22.00	1.000	20.000	23.75	19.00	14.485	14.353	19.381	72,000
	1.250	19.500						76,000
	1.500	19.000						80,000

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22" Xtreme3™ GT connector - capacity data

Forging material yield (ksi) ⁵	At-yield tension (kips) ⁴	Ultimate tension (kips) ⁴	At-yield compression (kips) ⁴	Ultimate compression (kips) ⁴	At-yield bending (ft-kips) ⁴	Ultimate bending (ft-kips) ⁴	Internal pressure (psi) ⁷	Gas leak pressure (psi) ⁹	External pressure (psi) ⁷
90	4,804	5,871	4,450	5,438	2,010	2,456	9,545	5,779	9,457
100	5,337	6,404	4,944	5,932	2,233	2,679	9,545	5,779	9,457

Pipe OD (in.) ¹¹	Pipe wall thickness (in.) ¹¹	Pipe weight (lbs/ ft) ¹¹	Pipe grade ¹⁰	At-yield tension / compression (kips) ³	Ultimate tension / compression (kips) ³	At-yield bending (ft-kips) ³	Ultimate bending (ft-kips) ³	Burst pressure (psi) ¹	External pressure (psi) ²
22	1	224.5	X-70	4,637	5,456	1,941	2,283	5,592	2,621
			X-80	5,310	5,977	2,222	2,501	6,403	2,780
	1.25	227.3	X-70	5,728	6,738	2,344	2,757	6,990	3,957
			X-80	6,559	7,382	2,684	3,021	8,004	4,323
	1.5	328.7	X-70	6,791	7,989	2,717	3,196	8,388	5,196
			X-80	7,776	8,752	3,111	3,501	9,605	5,787

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7.1 - Xtreme3™ specifications

Xtreme3™ connector capacity table notes

The tables provided include the most up to date Xtreme3™ connector and pipe body capacity information currently available. Xtreme3™ connectors are intended to fit a range of applications which may include use of pipe sizes and grades not included in these tables.

Information regarding pipe sizes and grades not featured within these tables should be requested from Expro. The following notes should be acknowledged by users as they evaluate Xtreme3™ connector and pipe body capacities within these tables:

1. Pipe burst pressure is calculated per API TR 5C3 using the minimum wall thickness and material strength allowed by Expro SPEC 029.
2. Pipe external pressure is calculated per API RP 1111 using the nominal pipe dimensions and the minimum allowable material strength.
3. Pipe tension and compression are calculated per API TR 5C3 using nominal dimensions and minimum material strength allowed by Expro SPEC 029.
4. At-yield and ultimate capacities are based on the material strength, Finite Element Analysis (FEA), and physical testing when available.
5. Forging material yield is the minimum yield strength allowed per the Expro specification. Various forged materials and grades are available upon request.
7. Internal and external pressure capacities are structural capacities based on FEA, physical testing, and/or pressure vessel calculations using the critical areas of the connection.
9. Gas tight leak pressure is the highest pressure obtained during an API RP 5C5:2003, modified CAL I test. Related capacities are determined through extrapolation of this testing and FEA.
10. Pipe grades are consistent with those in API Specification 5L.
11. Pipe OD, wall thickness, ID, and weight are nominal values and the actual product will fall within FI specification tolerances.
14. All Xtreme3™ dimensional properties are nominal values and the actual product may be larger or smaller.
15. Made-up length is the nominal distance between welds once the connection is made-up.
16. Make-up torque is the minimum, optimum, and maximum torque to be used in operation. Xtreme3™ connections are capable of enduring higher make-up torques, but the use of higher torques will need written approval from engineering prior to use.
17. Rated Capacities are fully supported by API RP 5C5:2017 testing.

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8.0 - XT4™ GT Connector - Gas Tight series

Expro is meeting new demands with new and innovative technologies and capabilities to solve our customers' complex drilling challenges. Our Products and Services and Engineering groups provide engineering and support for customer-specific projects globally to address the evolving needs of an ever-changing industry. An example of our success in innovation is our XT4™ GT casing connector line.

Our latest 22" XT4™ GT weld-on connector delivers reliable seal performance in the most complex deep water and ultra-deep water operations. The XT4™ GT connector was designed around our four core parameters of Extreme Tension, Extreme Compression, Extreme Bending and Extreme Temperature.



Standard features

- Angle of thread cone allows for optimized stress distribution across the thread pattern
- Negative load flank on the teeth keeps the threads engaged under loading and prevents "jump-out"
- Contoured noses and shoulders, helping stresses of pin & box during loading
- Deep-stab and self-alignment faces allow for quick, reliable make-up and cross-thread prevention
- Field proven thread design provides operators with both visual and mechanical indicators to verify proper connection make-up.
- Elliptical transitions before and after threads reduce stress & fatigue on threads
- Elevator Lift shoulder for handling
- High make-up torques help prevent back-out due to vibration
- Anti-Rotation features available upon request

Seals

- Proven gas tight internal metal-to-metal seal
- Successful completion of certification in accordance with API 5C5:2017 CAL I+ elevated temperature (275°F)
- External environmental O-ring seal with back-up PTFE ring seal

Connector FEA & Testing

- **Internal analysis is verified by external testing conducted by Stress Engineering in Houston, TX**
- Elastic/Plastic Finite Element Analysis
- Physical Testing
- Successful completion of certification in accordance with API 5C5:2017 CAL I+ elevated temperature (275° F)
- Harmonic Fatigue Testing

Specifications

Size range (in.)	20" to 22"
Make-up Torque Range (min / optimal / max)	72,000 / 76,000 / 80,000 ft-lbs
Thread Starts	Single
Turns to Make-Up	3.5

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8.1 - 22" XT4™ GT Standard specifications

22-inch XT4™ GT specifications

Pipe body properties			22-inch XT4™ GT connector properties					
Pipe O.D. (in.) ¹¹	Pipe wall (in.) ¹¹	Pipe ID (in.) ¹¹	Connector O.D. (in.) ¹⁴	Connector ID (in.) ¹⁴	Pin length (in.) ¹⁴	Box length (in.) ¹⁴	Made-up length (in.) ^{14,15}	Make-up torque (ft-lbs.) ¹⁶
22.00	1.000	20	23.75	19.00	14.6875	14.6875	19.816	72,000
	1.250	19.5						76,000
	1.500	19						80,000

- Note:
1. These tables are subject to change at any time without notice
 2. All information provided within this document is for reference use only
 3. The customer is solely responsible for determining if the connection capacities provided will be sufficient for use
 4. Table footnotes may be found at the end of section 8 of this document

22-inch XT4™ GT - capacity data

Forging material yield ⁵ (ksi)	Rated tension ¹⁷ (kips)	Ultimate tension ⁴ (ksi)	Rated compression ¹⁷ (kips)	Ultimate compression ⁴ (kips)	Rated bending ¹⁷ (ft-kips)	Ultimate bending ⁴ (ft-kips)	Rated internal pressure ¹⁷ (psi)	Rated external pressure ¹⁷ (psi)
90	5,428	6,549	3,765	5,582	2,488	3,002	10,601	5,910

Pipe OD (in.) ¹¹	Pipe wall thickness (in.) ¹¹	Pipe weight (lbs/ft) ¹¹	Pipe grade ¹⁰	At-yield tension / compression (kips) ³	Ultimate tension / compression (kips) ³	At-yield bending (ft-kips) ³	Ultimate bending (ft-kips) ³	Burst pressure (psi) ¹	External pressure (psi) ²
22	1	224.5	X-70	4,637	5,456	1,941	2,283	5,592	2,621
			X-80	5,310	5,977	2,222	2,501	6,403	2,780
	1.25	277.3	X-70	5,728	6,738	2,344	2,757	6,990	3,957
			X-80	6,559	7,382	2,684	3,021	8,004	4,323
	1.5	328.7	X-70	6,791	7,989	2,717	3,196	8,388	5,196
			X-80	7,776	8,752	3,111	3,501	9,605	5,787

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8.1 - XT4™ GT specifications

XT4™ GT connector capacity table notes

The tables provided include the most up to date XT4™ GT connector and pipe body capacity information currently available. XT4™ GT connectors are intended to fit a range of applications which may include use of pipe sizes and grades not included in these tables.

Information regarding pipe sizes and grades not featured within these tables should be requested from Expro. The following notes should be acknowledged by users as they evaluate XT4™ GT connector and pipe body capacities within these tables:

1. Pipe burst pressure is calculated per API TR 5C3 using the minimum wall thickness and material strength allowed by Expro SPEC 029.
2. Pipe external pressure is calculated per API RP 1111 using the nominal pipe dimensions and the minimum allowable material strength.
3. Pipe tension and compression are calculated per API TR 5C3 using nominal dimensions and minimum material strength allowed by Expro SPEC 029.
4. At-yield and ultimate capacities are based on the material strength, Finite Element Analysis (FEA), and physical testing when available.
5. Forging material yield is the minimum yield strength allowed per the Expro specification. Various forged materials and grades are available upon request.
7. Internal and external pressure capacities are structural capacities based on FEA, physical testing, and/or pressure vessel calculations using the critical areas of the connection.
9. Gas tight leak pressure is the highest pressure obtained during an API RP 5C5:2003, modified CAL I test. Related capacities are determined through extrapolation of this testing and FEA.
10. Pipe grades are consistent with those in API Specification 5L.
11. Pipe OD, wall thickness, ID, and weight are nominal values and the actual product will fall within FI specification tolerances.
14. All Xtreme3™ and XT4™ dimensional properties are nominal values and the actual product may be larger or smaller.
15. Made-up length is the nominal distance between welds once the connection is made-up.
16. Make-up torque is the minimum, optimum, and maximum torque to be used in operation. Xtreme3™ connections are capable of enduring higher make-up torques, but the use of higher torques will need written approval from engineering prior to use.
17. Rated Capacities are fully supported by API RP 5C5:2017 testing.



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