XLW-GT Connectors

XLW-GT connectors are the gas-tight evolution of our robust and reliable XLW wedge thread connector. XLW-GT connectors are designed and tested to seal full pipe body gas pressure envelopes for critical-service casing applications.

XLW-GT connectors deliver a robust set of performance features for challenging onshore and offshore wells: full pipe body strength, gas-tight metal seals, excellent fatigue resistance, and wedge thread technology.

Requests for gas-tight sealability in 20-inch and larger casing sizes were once exceptional. Gas-tight, large-bore casing connectors are now a common industry requirement. XL Systems addresses this need with our XLW-GT connector, a gas-tight version of our highly successful XLW connector.

XLW-GT connectors borrow many design and performance features from XLW connectors: full pipe body structural strength, wedge thread design, and a metal-to-metal primary pressure seal. Added features include an enhanced seal design for reliable gas-tight performance, fatigue testing, and weld-on pin and box connectors machined from forged rings.

XLW-GT connectors include full ISO 13679 CAL I-E (gas) or API 5C5 CAL I (gas) sealability testing in multiple connector sizes. These rigorous tests demonstrate that even at worst-case geometric tolerance conditions, connectors match full pipe body gas pressure envelopes.

XLW-GT connectors, like other XL Systems wedge thread connectors, do not require a mechanical anti-rotation device to prevent unintended connector back-off.

XLW-GT connectors are available in

20- to 30-inch

sizes

for onshore and offshore gas-tight surface casing applications

Typical Applications

- Casing strings and liner strings with gas pressure sealing requirements
- Deepwater casing strings run in open water
- Casing for deviated wells
- Drilling with casing
- Gas storage wells

XLW-GT Connectors

Unique Features and Benefits

Metal-to metal seal

Industry experience is that metal-to-metal seals are preferred for long-term gas pressure containment. Not all metal seals are gas-tight designs. The XLW-GT metal seal is designed and tested to be reliably gas-tight.

Weld-on pin and box forgings

XLW-GT connector pins and boxes are machined from high-strength forged rings. Compared to XLW connectors, the XLW-GT pin forging provides uniformly higher-strength material properties and enhances connector strength and sealability.

Wedge thread technology

Wedge thread connectors have unique make-up and performance characteristics which enable robust and reliable field performance: deep-stabbing, low-torque spin-up, slim connector profiles, high strength efficiency, and high torque resistance.

100% Pipe body strength

XLW-GT connector strength meets or exceeds pipe body for all strength ratings: tension, compression, bending, internal pressure, and external pressure.

Proven performance

Targeted full-scale physical testing of the product line verifies connector strength ratings and sealability envelopes. Testing includes gas sealability tests, full-scale bending tests, and full-scale fatigue tests.

No mechanical anti-rotation device

XL Systems wedge thread connector designs including XLW-GT do not require mechanical anti-rotation devices. Make-up torque energy stored as interference over the full wedge thread length prevents unintended connector back-off.

Visual make-up indicator

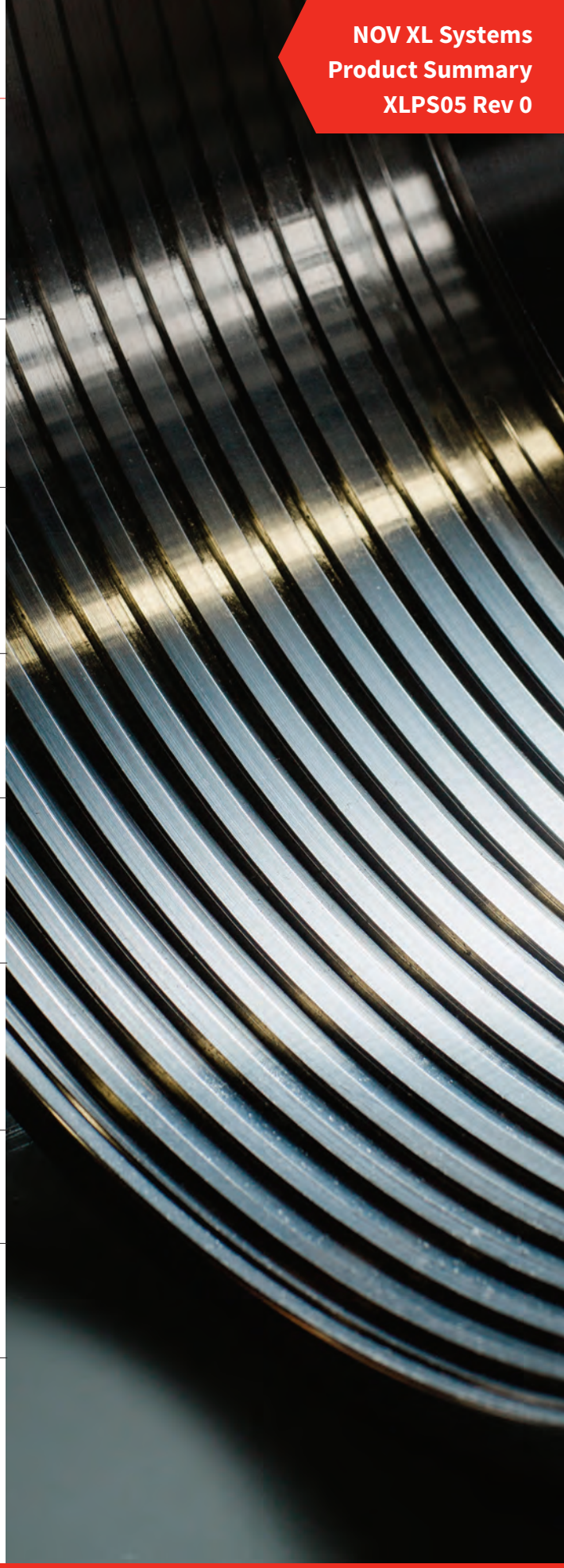
A machined band on XLW-GT pin connectors provides a clear indication that the proper make-up position is achieved.

Excellent fatigue performance

Fatigue testing shows excellent fatigue performance with SAF values less than 2.00 in most connector sizes.

Built on experience

The XLW-GT connector design inherits over 35 years of XL Systems experience designing, manufacturing, and running large-bore wedge thread connectors.



20- to 30-inch Sizes

XLW-GT connectors are designed for robust and reliable performance in the most demanding onshore and offshore surface casing, liner string, and conductor applications.

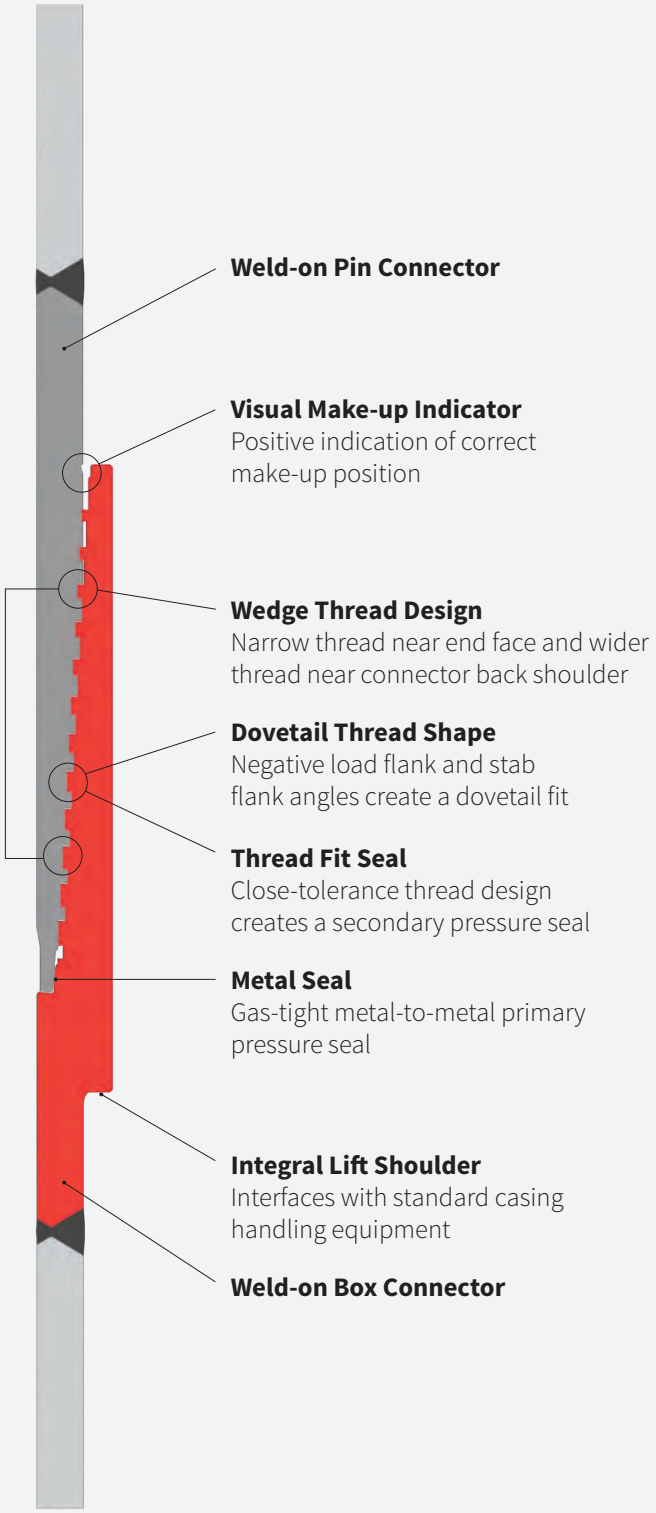
The primary pressure seal for XLW-GT connectors is a metal-to-metal seal on the ID side of the threads. This seal maintains robust gas-tight sealability at full pipe body pressure ratings. The wedge thread design provides a secondary thread-fit seal.

XLW-GT connectors match full pipe body structural strength in a compact connector profile. Wedge thread technology eliminates the need for a thick torque shoulder, simultaneously providing robust connector strength and generous ID and OD clearances.

An integral lift shoulder is incorporated on XLW-GT box connectors for easy running and handling on the rig using standard casing elevators.

XLW-GT connectors share favorable field make-up characteristics with all XL Systems wedge connectors: fast make-up, deep stabbing, low-torque spin-up, high torque capacity, and built-in resistance to unintended back-off.

XLW-GT connectors make-up in approximately 3 turns from stab to full make-up and do not require a mechanical anti-rotation device to prevent unintended connector back-off.



Analysis and Physical Testing Summary

Digital design and simulation tools such as finite element analysis (FEA) were used extensively to develop the XLW-GT connector design. These tools were particularly useful in developing the new metal seal design and associated dimensional tolerances. However, the only reliable measure of connector sealability performance is full-scale tests under combined axial, bending, and pressure loads. XL Systems has completed testing to API 5C5 CAL I (gas) criteria or ISO 13679 CAL I-E (gas) for several XLW-GT connectors sizes.

The table below is a summary of the XLW-GT connector physical testing scope completed to date. XL Systems Engineering Technical Briefs are available with detailed information for each test series.

Fatigue testing measures the response of the XLW-GT connector to cyclic stresses such as in-service exposure to ocean waves. Fatigue life data from the tested 22 x 1.00 XLW-GT connector size is used to benchmark and calibrate digital simulation tools which predict connector fatigue performance for all XLW-GT connector sizes.

Highlights of the gas sealability tests include:

- Tests followed API 5C5 CAL I (gas) or ISO 13679 CAL I-E (gas) testing protocols which have similar requirements.
- For each connector size, three test samples were machined to three different worst-case dimensional tolerance combinations: Specimens 1, 4, and 5. Testing the Specimen 4 tolerance condition is not required by either testing standard but was added by XL Systems since this tolerance combination can be a worst-case for wedge thread connector sealability.
- Connection test load envelopes were based on 95% pressure ratings for the pipe body using actual (measured) material yield stress. This is the rigorous 'full pipe body' testing envelope.
- Make and break tests plus combined loading sealability tests were completed as required by the standards. Series A tests included tension, compression, internal pressure, and external pressure. Series B tests included tension, compression, bending, and internal pressure. Limit load tests were completed.
- All test samples successfully completed the full testing protocol with no leaks and no catastrophic connector failures.

Physical test type and number of XLW-GT connector samples tested

Pipe size (inch)	Pipe grade	Connector grade	Gas sealability combined loading	Fatigue
20 x 0.750	X80	M95	3	
22 x 1.000	X80	M95	3	9
22 x 1.250	X80	M95	3	
22 x 1.500	X80	M95	3	

Connector Performance Data Sheets

XL Systems maintains a library of connector performance data sheets or 'spec sheets' for all of our connector products on the nov.com website. Select the **Specs Direct** link from the XL Systems homepage at **nov.com/xlsystems**. Pipe and connector performance data change from time to time and users are encouraged to obtain up-to-date product data for each project.

XLW and XLW-GT Non-Interchangeability

It is important to emphasize that XLW and XLW-GT connectors are not interchangeable and will not thread together. Users are cautioned to segregate XLW and XLW-GT connector inventories to prevent field problems.

Field Service Procedures

See the following XL Systems field service procedures for additional information on running and handling pipe with XLW-GT connectors:

FSPXL0007 Wedge thread connector storage, inspection, and repair

FSPXL0012 XLW & XLW-GT connector field service procedure

FSPXL0019 Approved thread compounds

Connector Material Grades

XLW-GT connectors are produced to NOV XL Systems material specifications in three primary grades: M70, M80, and M95. The table below shows recommended connectors grades matched to API 5L pipe grades. Other standard connector grades with higher strength or special alloying are available.

Connector Grade	Connector Yield Strength	API 5L Pipe Grade					
		X52	X56	X60	X65	X70	X80
M70	70.0 ksi = 483 MPa	R	R	R	R	R	NR
M80	80.5 ksi = 555 MPa	O	O	O	O	O	R
M95	95.0 ksi = 655 MPa	O	O	O	O	O	R

R — Recommended pipe and connector grade combination

O — Optional grade combination for higher connector strength

NR — Not recommended

Connector Groups

The XLW-GT connector is a weld-on design and the same connector body can be used with multiple pipe wall thicknesses. Connector design groups are summarized in the table below. Each color block within a given diameter column identifies a unique connector design. Connectors within a color block group will thread together without specially fabricated crossover joints.

	Diameter (inch)					
Wall thickness (inch)	20	22	24	26	28	30
0.500						
0.625						
0.750						
0.812						
1.000						
1.125						
1.250						
1.500						

XLW-GT Design Group 1

XLW-GT Design Group 2

XLW-GT Design Group 3

XLW-GT Design Group 4