XL Systems

XLW-S Connectors

XLW-S large bore casing connectors are an improved evolution of our robust and reliable XLW wedge thread connector. XLW-S connectors maintain the same characteristics as XLW and utilizes innovative features from XLW-GT to create a superior gas tight design. XLW-S connectors are designed and tested to seal full pipe body envelopes for critical service casing applicaitons to API 5C5 CAL I (Gas).

XLW-S connectors deliver a robust set of performance features for challenging onshore and offshore applications: full pipe body strength, full pipe body pressure ratings, excellent fatigue resistance, and wedge thread technology. XLW-S connectors are ideally suited for critical casing strings where both pressure ratings and structural strength are design drivers.

The XLW-S connector features a flush ID profile and integral lift shoulder on the box which makes for easy running and handling on the rig. The tapered wedge thread design provides for deep stabbing, low torque spin-up, and fast make-up times. XLW-S connectors, like other XL Systems wedge thread connectors, do not require a mechanical anti-rotation device to prevent unintended connector back-off.

XLW-S connectors borrow many design and performance features from XLW and XLW-GT connectors: full pipe body structural strength, wedge thread design, and a metal-to-metal primary pressure seal. Added features include a slimmer profile that provides a more cost-effective option and enhanced seal and thread design for reliable sealing and fatigue performance.

XLW-S connectors are supported by FEA analysis and full API 5C5 CAL I (Gas) sealability testing. This rigorous testing demonstrates that even worst-case geometric tolerance conditions, connectors match full pipe body pressure envelopes. XLW-S connectors were designed and developed with the latest digital design and simulation tools to create a new evolution in wedge thread performance.

XLW-S connectors are available in

20- to 48-in

sizes

Up to 1.00 -inch wall

for onshore and offshore conductor and casing applications

Typical Applications

- Casing strings and liner strings with liquid pressure sealing requirements
- Heavily loaded surface casing strings
- Deepwater casing strings run in open water
- Conductors for subsea wells
- Casing for deviated wells
- Drilling with casing

XLW-S Connector

Unique Features and Benefits

Metal-to- metal seal

The XLW-S connector primary pressure seal is a metal-to-metal seal on the ID side of the threads. This new and enhanced seal has been successfully tested to API 5C5 CAL-I gas sealability combined load testing.

Dual Seal Design

In addition to the primary metal seal, the XLW-S wedge thread design provides a secondary thread-fit seal.

Hybrid Design

XLW-S pin connectors are integral-threaded directly on the pipe body. XLW-S box connectors are machined from high-strength forged rings and welded to the pipe body.

Optimized Geometry

The new slim design used the latest digital design and simulation tools to reduce material while optimizing performance.

100% Pipe Body Performance

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

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.

No Mechanical Anti-Rotation Device

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

Visual Make-Up Indicator

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

Robust Field Service History

XLW-S connector borrows more than 20 years of successful field service history in demanding offshore projects of the XLW family of connectors.

Built on Experience

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

XLW-S Connectors

20- to 48-inch Sizes

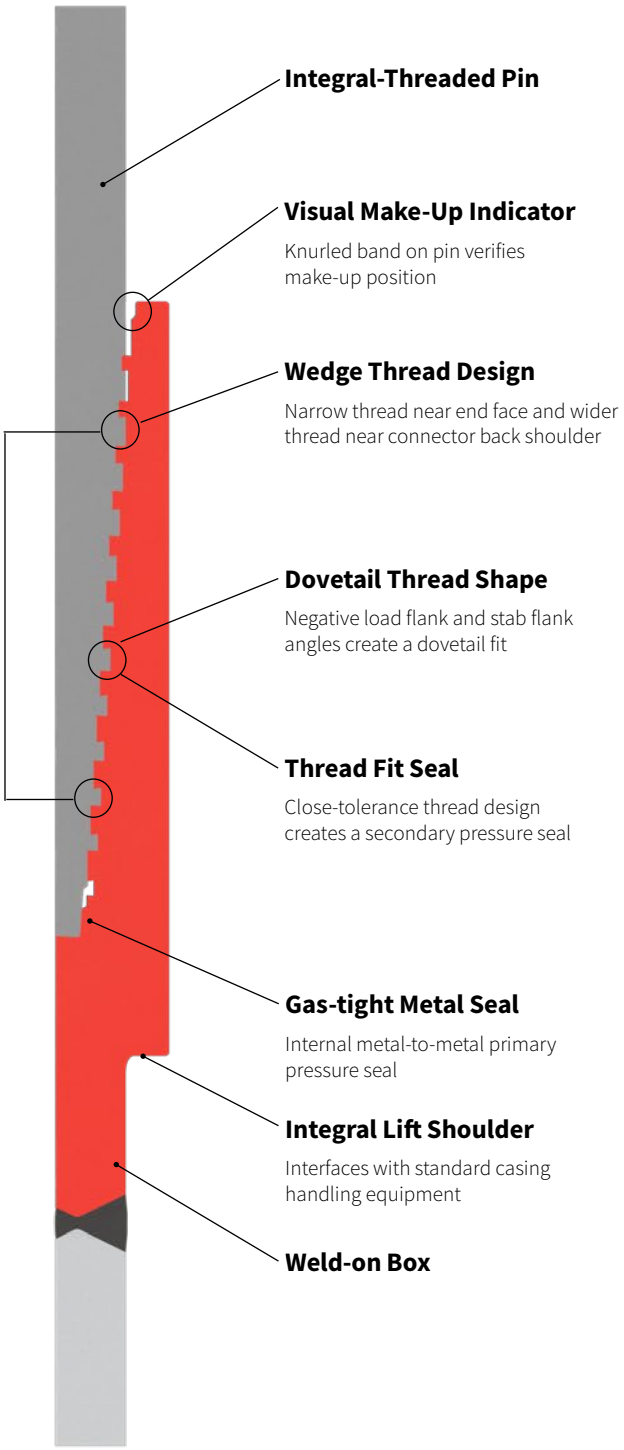
XLW-S connectors are designed for robust and reliable performance in demanding onshore and offshore surface casing, liner string, and conductor applications. The connector wedge thread design provides for easy handling and fast connector make-up on the rig.

The primary pressure seal for XLW-S connectors is a metal-to- metal seal on the ID side of the threads. This seal is rated at full pipe body pressure for gas service.

XLW-S 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. XLW-S connectors feature a true flush ID profile in all sizes and an integral lift shoulder on the OD of the box connector.

The XLW-S thread design features a dovetail thread shape with negative load flank and stab flank angles. This geometry provides for smooth load transfer across the thread interface and prevents thread jump-out failures under extreme overload conditions.

XLW-S 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.



XLW-S Connectors

Analysis and Physical Testing Summary

Digital design and simulation tools such as finite element analysis (FEA) were extensively used to develop the XLW-S connector design. These tools were particularly useful in developing the new metal seal design and associated dimensional tolerances which are based on the highly successful XLW-GT connector.

However, the most reliable measure of connector sealability performanceis a full-scale test under combined axial, bending, and pressure loads. XL Systems has completed testing to API RP 5C5 CAL I (Liquid & Gas) for the XLW-S connector & full scale harmonic fatigue testing.

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

Highlights of the tests include:

- Test followed API RP 5C5 CAL I (liquid & Gas) testing protocols.
- CAL I consisted of one Specimen 1 sample and one Specimen 5 sample.
- Make and break testing was completed as defined per API RP 5C5 for make-up torque targets, and number of make and breaks per end.
- 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 standard for CAL I testing. Series A test included tension, compression, internal, and external pressure. Series B tests included tension, compression, bending, and internal pressure. Limit load testing included tension to failure and 50% tension with intemal pressure to failure.
- All test samples successfully completed the full testing protocol with no leaks or catastrophic connector failures.
- Full scale harmonic fatigue testing of 8 samples

Physical Test Type and Number of XLW-S Connector Samples Tested

Pipe Size (Inch)	Pipe Grade	Connector Grade	CAL I- Liquid Sealability Combined Loading
22 x 1.00	X80	M80	API 5C5:2017 CAL I (Liquid)
22 x 1.00	X80	M80	API 5C5:2017 CALI (Gas)
22 x 1.00	X80	M80	Harmonic Fatigue Testing - 8 Samples

Connector Performance Data Sheets

XL Systems maintains a library of connector performance data sheets or “spec sheets” for all 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, XLW-GT, and XLW-S Non-Interchangeability

It is important to emphasize that XLW-S connectors are not interchangeable with any other XL System XLW products. Due to the evolution in wedge thread design, it is important to segregate XLW, XLW-S, and XLW-GT connector inventories

Connector Material Grades

XLW-S connectors are produced to NOV XL Systems material specifications in three primary grades: M70, M80, and M95. The table below shows recommended connector grades matched to API 5L pipe grades. Other standard connector grades with higher strength or special alloying are available upon request. Contact XL Systems sales or engineering for more information on possible availability.

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

Field Service Procedure

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

FSPXL0007 Wedge Thread Connector Field Inspection, and Repair Procedure

FSPXL0019 Approved Thread Compounds

FSPXL0032 XLW-S Field Service Procedure