TenarisHydril offers outstanding premium connection design and technology worldwide. With a comprehensive range of high performance products supported by an extensive global field service network and licensed threading facilities, 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 pipes and integrated tubular services to the world’s energy industry. For further information please visit our website at www.tenaris.com/tenarishydril
Quality assured products

By manufacturing premium connections as part of an integrated process of pipe design, production, treatment and finishing.

We respond promptly and flexibly to changes in required specifications and other unexpected conditions while maintaining the highest quality standards expected by the industry.

Tenaris has a wide international network of licensed threading facilities to reach every area where our TenarisHydril products are used. These facilities, which are qualified and regularly audited by Tenaris technicians, provide accessories and carry out repairs of damaged products.

For further information about the licensed threading shops, their qualifications and capacity, please visit our website: www.tenaris.com/tenarishydril.

Premium connection groups

TenarisHydril Premium connections are divided into three types: Blue™ Series, Wedge Series 500™ and Legacy Series.

Our Dopeless® technology, a dry multiple layer coating that replaces storage and running compound, is available for certain connections.

For the purposes of clarity, within this manual our premium connections series will be organized in the following manner:

<table>
<thead>
<tr>
<th>GROUP 1</th>
<th>GROUP 2</th>
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</thead>
<tbody>
<tr>
<td>Blue™</td>
<td>Wedge Series 500™</td>
</tr>
<tr>
<td>Blue™ Near Flush</td>
<td>MACII™</td>
</tr>
<tr>
<td>Blue™ Thermal Liner</td>
<td>SLX™</td>
</tr>
<tr>
<td>MS™</td>
<td>PH6™, PH4™ and CS®</td>
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<tr>
<td>3SB™</td>
<td></td>
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<tr>
<td>HW™</td>
<td></td>
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<tr>
<td>PJD™</td>
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<td>ER™</td>
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</tbody>
</table>

**BLUE - WEDGE - LEGACY SERIES**

Our connections offer the most advanced design and technology worldwide.
Quick Start Running Guidelines

Connection preparation

It is extremely important for connection performance to follow recommended guidelines in order to apply running and thread lock compound properly.

It is highly recommended to install handling plugs to integral connections any time the pipe is moved to or from the rig floor.

Torque application

Always use TenarisHydril connections recommended torque values. Updated values can be found at our website: www.tenaris.com/tenarsi-hydril.

NOTE: FOR WEDGE SERIES 500™ SIZES 10 3/4" AND LARGER, EITHER APPLY THE TARGET TORQUE TWICE OR HOLD THE TORQUE FOR SEVERAL SECONDS.

Alignment

1. Check for traveling block and rotary hole alignment. If misalignment is excessive and cannot be corrected, Chrome Running Guidelines may be required.

2. Check centerlines of the suspended pin over the box, making adjustments if necessary.

   REFER EQUIPMENT / SERVICE TOOLS DETAIL IN THE RUNNING SECTION.

   REFER TO STABBING DETAIL IN THE RUNNING SECTION.

Rotation speeds

1. Spin in at 15 RPM or slower.

2. For final makeup, use low gear and do not exceed 5 RPM.

   REFER TO MAKE-UP DETAIL IN THE RUNNING SECTION.

Chrome

1. Care should be exercised with chrome steels (9% or higher). Particular attention should be paid to avoid damage to the connection during handling and running operations.

2. In addition to the procedures listed in this manual, apply Chrome Running Guidelines for stainless steels and high alloy materials.

   REFER TO THE CHROME RUNNING GUIDELINES.

Dopeless® technology

1. For our Dopeless® option the general guideline applies, except for cleaning, visual inspection and running and thread lock compound application.

   REFER TO THE DOPELESS® RUNNING GUIDELINES.

PRE-RUNNING
Running compound application.
Maximize the benefits of your pipes and TenarisHydril premium connections. Have a Tenaris Field Services specialist on hand during your inspection, running and pulling operations.

Pre-running

1. Locate and inspect all necessary accessories and tools on location, such as: pup joints, crossovers, float equipment, stabbing guides, handling plugs, single-joint elevators, thread compound, etc.

2. Verify interchangeability with size, weight and connection type.

   REFER TO PREMIUM CONNECTION CATALOGUE.

Drifting

1. Be careful not to damage connections during drifting operations.

2. Drifting should be done prior to cleaning or inspecting.

3. Blow out the pipe ID from box to pin to completely remove loose mill scale and accumulated debris.

4. Ensure drift mandrels conform to API dimensional requirements (Reference API Specification 5CT) or specified special drift requirements.

5. Drift from box to pin.

6. Pipes that do not pass the drift test should be marked with a red paint band on either side where drift is sticking and then laid aside for further investigation. “No drift” should be marked on pipe to avoid confusion with other types of damage.

Cleaning

1. Clean connections using one of the following methods. (Diesel is difficult to remove from the threads and is not recommended as a cleaning solvent):
   • A nonmetallic brush and cleaning solvent.
   • Steam clean with water and cleaning solvent.
   • A rotary bristle brush with jetted water and cleaning solvents.
   • High pressure water blast.

2. Wipe or blow out solvents and/or water from thread roots and from the bottom of the box.
   During freezing weather, be careful to ensure that no moisture remains on the connection. Ice may prevent proper seal and shoulder engagement during make-up.

<table>
<thead>
<tr>
<th>PRODUCTS &amp; SIZES</th>
<th>LENGTH</th>
<th>DIAMETER</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>inch</td>
<td>mm</td>
</tr>
<tr>
<td><strong>CASING AND LINERS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smaller than 9 5/8”</td>
<td>6</td>
<td>152</td>
</tr>
<tr>
<td>9 5/8” to 13 3/8”</td>
<td>12</td>
<td>305</td>
</tr>
<tr>
<td>Larger than 13 3/8”</td>
<td>12</td>
<td>305</td>
</tr>
<tr>
<td><strong>TUBING</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 7/8” and smaller</td>
<td>42</td>
<td>1,067</td>
</tr>
<tr>
<td>3 1/2” and larger</td>
<td>42</td>
<td>1,067</td>
</tr>
</tbody>
</table>

d= Nominal pipe body internal diameter
Check tables C.31 and E.31 in the last version of API 5CT
Inspecting

1. Only Tenaris plants and Authorized Repair Facilities produce genuine TenarisHydril connections. Group 1 genuine threads can be identified by the stencil on the pipe body. Group 2 genuine threads can be identified by a low stress roller mark on the pin and box connection.

2. Connections should be situated so that the joints may be rolled 360 degrees to facilitate complete cleaning and inspection.

3. Inspect all connections for damage such as out of round, handling damage, dents, mashed areas, rust and scale. Seal areas must be free of longitudinal or transverse cuts, scratches, corrosion pitting, rust and scale. Segregate all pipe with suspect connection damage. Further evaluation and hand repair must be performed by a Tenaris Field Service Specialist.

Connection preparation

1. Handle all pipes with thread protectors in place.

2. API-Modified thread running compound is recommended for Group 1 and Group 2 connections. For the suitability of a particular thread compound for a specific connection, consult the list at www.tenaris.com/tenarishydril.

3. A thermal grade running compound is recommended when the service temperature exceeds 250°F / 120°C.

4. An Arctic grade running compound is recommended during freezing weather. The compound should be kept free of contamination by water and ice particles. It should also be kept warm in freezing conditions using a doghouse or warming devices.

For specific instructions, see Running and Thread Lock Compound Application Section

Running

EQUIPMENT / SERVICE TOOLS

1. Slip-type elevators are recommended for integral and special clearance coupled connections. Elevators should not be set on the upset or connection area.

2. Collar-type elevators are suitable for use on coupled connections. When using collar-type elevators on integral connections or special clearance coupled connections, the bored ID of the elevators should be able to pass over the box connection OD and shoulder onto a lift plug. An internal diameter of approximately 0.5% more than the section OD is recommended.

3. Bottleneck elevators are not recommended.

4. Single-joint elevators are recommended as they improve stabbing alignment and promote safer operations. When running integral or special clearance coupled connections, ensure elevators are bored to the appropriate diameter and are used in conjunction with a handling plug.

5. Check for traveling block and rotary hole alignment.

6. If misalignment is excessive and cannot be corrected, Chrome Running Guidelines may be required.

7. Power tongs are required for final torque application. Dies that are improperly mounted or poorly maintained can damage the pipe body. Torque measurement equipment must be calibrated.

8. The use of torque turn monitoring system is recommended for Group 1 connections, except for TSH ER™ and TSH BTL™ for which it is not necessary. The use of torque turn equipment is not necessary for the proper make-up of Group 2 connections. If torque-turn equipment is used, verify calibration dates on load cells.
Handling

1. Handle all pipes with thread protectors in place.

2. If pipes are to be left on the rack for an extended period of time prior to running, apply a suitable compound to the thread and seal areas. Place dry, clean and damage-free thread protectors on all connections.

3. Any accidental mishandling is cause for re-inspection of connections.

4. Before rolling or hoisting integral connections joints, install a handling plug in the box end and ensure pin-end protectors are in place. Boxes that will not accept a handling plug should be set aside.

5. Special care should be taken with CRA and sour service materials to avoid damage to pipe surface.

Stabbing

1. To prevent damage from accidental mishandling, the pin thread protector should not be removed until the joint is ready to stab.

2. While the pin is hanging in the derrick and the box is suspended in the rotary table, remove the pin protector and handling plug. Clean and re-inspect the connections if conditions warrant.

3. Check centerlines of the suspended pin over the box, making adjustments if necessary. If misalignment is excessive and cannot be corrected, Chrome Running Guidelines may be required.

4. Precautions must be taken to keep the running compound free of contaminants.

5. The use of a stabbing guide on the box end is recommended.

6. If an automated pipe racking system is not used, ensure pin is stabbed vertically with the assistance of someone on the stabbing board and lower joint carefully to avoid damaging connections.

7. If an error occurs when stabbing or the pipe tilts to one side after stabbing, pick up, clean connections then inspect and repair as required. Do not roll pin into box if an error occurs when stabbing.

Make-up

1. When combining different weights (IE: 5” 15 lb/ft with 5” 18 lb/ft) or different grades (IE: L80 with P110) use the lower of the two torque values.
2. Pipe wrenches, rig tongs and spinning chains are not recommended for the final torque application.

*NOTE: GIVEN THE VARIOUS SHAPES AND SIZES OF TUBULAR ACCESSORIES, RIG TONGS MAY NEED TO BE EMPLOYED. DURING MAKE-UP ACCURATE TORQUE MEASURING EQUIPMENT MUST BE USED.*

3. Power tongs are required to obtain final recommended torque values.

4. During make-up, pipe must be vertical and allowed to spin freely, which may require slacking off or unlatching the elevator.

5. The power tong lead line should be attached to a back-up post, leveled and positioned at a 90° angle to the power tongs.

6. Do not latch back-up tongs over the box ends. Do not use pipe wrenches as back-up tongs, as they may damage the pipe body.

7. For thin-walled or plastic coated pipe, full wrap-around back-ups should be used to reduce the tendency for damaging pipe or coating.

8. Rotation speed should not exceed 15 RPM during spin in and not exceed 5 RPM for final make-up in low gear.

9. Monitor rotation speed for irregularities. Irregular speeds may indicate connection misalignment. Joints made-up at irregular speeds should be backed out and inspected for possible damage.

10. If the pipe has a tendency to wobble greatly during make-up due to harmonics, wind, or rig motion, reduce the make-up rotation speed to prevent damage.

11. If excessive wobbling persists despite reduced rotation speed, stop using the power tongs and proceed with Chrome Running Guidelines.

12. Power tongs should be in low gear at approximately one turn prior to connection shouldering.

For CB connections that have installed rings, run in low gear during entire make-up.

13. For Wedge Series 500™ connections use the following procedure on the first joint to ensure sufficient torque is reached and not lost to other variables in the make-up system such as rig motion, misalignment or tong inconsistencies: Make up the first joint to the published target torque and relax the tongs.

13.1. Draw a longitudinal line across the pin and box and reapply the published target torque.

13.2. If the drawn line does not move more than ½" after the second application of torque, continue running the rest of the string normally using the published target torque.

13.3. If the drawn line does move more than ½" after the second application of torque, this indicates a portion of the torque was absorbed by other variables in the make-up system. If this occurs, follow these steps:

- Increase the target torque by 15% and re-apply the torque.
- Draw a second line and apply the original, published target torque.
- If the second drawn line doesn’t move more than ½", continue running the rest of the string normally using the 15% higher target torque.
- If the second drawn line does move more than ½", recheck the alignment, dope application and tong function, then continue to repeat this procedure from step 13.1 above until the drawn line doesn’t move more than ½”.

It is best practice to repeat this procedure in the event the tongs are changed out during the running of the pipe.

14. Make up connections to the target torque. For Wedge Series 500™ connection sizes 10 3/4" and larger, either apply the target torque twice or hold the torque for several seconds. For Wedge Series 500™ connection sizes smaller than 10 3/4", apply target torque only once without hold.

For Group 1 Connections refer to make-up acceptance criteria section.
15. During freezing weather, maximum make-up torque may be needed to overcome running compound viscosity and ensure adequate make-up is attained.

16. When using tubing as a workstring or test string, hand make-up for the first 1 or 2 turns will extend the life of the connection.

17. If making up pipe from racked back stands, it is best practice to re-tong all connections before running downhole.

Pulling

BREAKOUT

1. It is recommended to use weight compensator to avoid thread damage.

2. Use power tongs in low gear to break out connections.

3. Do not hammer on connections to assist breakout as this may damage pipe or connections.

4. During breakout and spinout, pipe must be vertical and allowed to spin freely, which may necessitate slacking off or unlatching elevators.

5. To break out a Group 1 coupled connection, the back up tong must be set on the coupling central area. For Group 2 coupled connections, the back up tongs must be set on the pipe body below the coupling.

6. Rotation speed should not exceed 15 RPM.

Lowering

1. Pipes should be picked up and lowered carefully. Care should be exercised in setting floor slips to avoid shock-loading the string.

2. Ensure elevator slips are set well below connection area.

3. Keep handling plug in the box connection until the joint is lowered and set in the floor slips. The plug will help keep drilling mud off the thread and seal areas if overflow occurs.

4. If fill-up is required during running, the handling plug should be left installed in the box to prevent the fill-up hose from damaging box threads and seals.

5. Do not hammer on box to break handling plug free. If necessary, hammer on the flange of the handling plug.

ALIGNMENT
Align the pipe with the coupling axis.
7. Excess torque during breakout or irregular rotation speed indicates poor alignment that may cause damage. Rotational movement should be stopped until the cause is determined and corrected.

8. Care should be exercised when lifting the pin out of the box. Maintaining breakout rotation and keeping the pin centered in the box when disengaging can prevent thread hang-up and damage.

Standing back/laying down

1. Handle all pipes with protectors in place.

2. Using a mustache brush, re-distribute the existing running compound on the connection when standing back for extended periods.

3. Apply a clean, undamaged thread protector to the pin end and stand back on platform. The protector should be on straight and tight.

4. Tubing set back in the derrick must be properly supported with a bellyband to prevent excessive bending.

End of Job / Storage

1. A water-displacing, corrosion-inhibiting, storage compound should be applied on clean and dry pin and box connections when storing.

2. Any used connections should be cleaned to remove dope, mud and corrosive fluids. Apply storage compound and install clean, undamaged thread protectors. Practices consistent with API RP 5C1 are recommended.

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NOTE: ANY DAMAGED CONNECTIONS ALSO REQUIRE PROTECTION. AFTER INSPECTION, THE DAMAGE MAY BE FIELD REPAIRABLE. FAILURE TO APPLY PROTECTORS OR STORAGE COMPOUND MAY RENDER THE CONNECTIONS UNSUITABLE FOR REPAIR AND THE WHOLE JOINT AS SCRAP.

3. Reject connections must be properly marked.