TenarisHydril Wedge 451™ Connection

Scope

These guidelines apply specifically to the use of Wedge 451™ connections. This document is part of the TenarisHydril Running Manual and provides an overview of best practices for this specific product. It should be used in conjunction with the rest of the sections within the TenarisHydril Running Manual.

Tenaris Field Service representative can modify these guidelines when circumstances dictate. Implementation will only occur if the specialist deems the modification to be non-detrimental to product integrity. All modifications need to be explained and agreed with the client representative prior to implementation and fully documented in the running report.

References

- FTD29356 - Premium Connection Approved Thread Compounds
- GDL31457 - Recommended guidelines for the field inspection of TenarisHydril connections
- GDL23352 - Torque Application
- GDL23355 - Wedge™ Series Make up Acceptance
- GDL23349 - Pre-Running Preparation
- GDL23351 - Handling / Lift Plugs

Equipment, Material & Documents

1. Verify the appropriate thread compound is available.

2. Refer to document FTD29356 for a list of compounds approved by Tenaris.

3. Latest version of the specific Product Data Sheet can be obtained from Tenaris website. In case this is not available, request the data sheet from the local Technical Sales representative.

4. Verify elevators utilized to lift pipe and/or string comply with API Specification 8C (latest revision). Refer to Wedge 451™ data sheet for coupling face dimensions and maximum load capacity.

Pre-Running

1. Never move or handle pipe without the correct thread protectors securely in place.

2. Ensure connections are clean and free of debris and / or contaminants, cleaning methods employed should conform to the recommendations contained within TenarisHydril Running Manual (GDL23349 - Pre-Running Preparation).

3. Verify all pipe and accessories have genuine TenarisHydril manufactured connections.

4. Visually inspect thread area prior to running, ensuring no damage is evident.

5. Verify the compatibility of the Wedge 451™ connection with accessories such as cement heads, safety valves, cross overs, etc.

6. Verify material grade of all accessories ensuring compatibility with main string.

7. If handling plugs are used, check availability of minimum of 3 to ensure efficiency of running process.

8. Check the handling plugs are genuine TenarisHydril threads and are correct for the size and weight of the connection, this will be stamped on the plug.

9. Check the handling plugs are in good condition and fit correctly onto the pipe.

10. Make up the plug by hand and then snug up tight with the assistance of a bar inserted into the holes of the flange. When correctly installed there should be no threads visible on the handling / lift plug nor should the box face contact the flange.

11. Check the extension plate of the slip type elevators actuates on the handling plug, ensuring the slips are set on the pipe body below the connection.

12. Verify handling plug number and maximum lift capacity. Never exceed the maximum lift capacity.

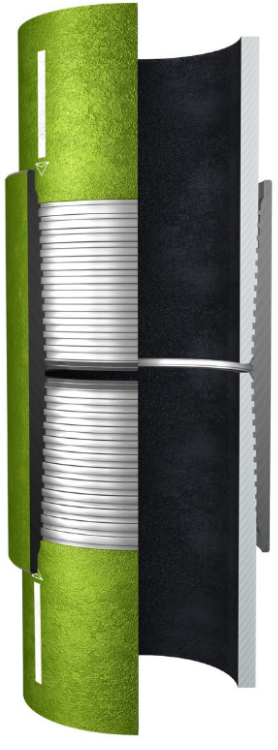
13. Refer to GDL23351 - Handling / Lift Plugs, for the care and use of handling and lift plugs.

Inspection

1. Inspection criteria for Wedge™ Series 400 connections are outlined in GDL31457, Recommended Guidelines for the Field Inspection of TenarisHydril Connections.

2. Light scratches on pin nose are acceptable as long as there is no protruding metal.

Wedge 451™ Configuration



Thread Compound Application

1. Storage compound should be completely cleaned from the connections.

2. Apply a thin coating of thread compound on the full pin end only, the thread form should be clearly visible.

3. Do not apply running compound to the box end. If thread compound has been applied previously, remove before running.

4. If pipe is received from Tenaris as RunReady™ with running compound already applied, no additional cleaning or compound application is required prior to running.

Thread Lock Application

1. Connections should be clean and dry when applying thread lock.

2. Thread lock should be applied to 50% of the threads at the back of the pin connection.

3. Running compound should then be applied to 50% of the threads at the back of the box connection.

Torque Application

1. Computer make up equipment is recommended for Wedge 451™ connections.

2. Set tong dump valve at optimum torque then test on pipe body.

3. Check calibration certificates of computer equipment and any torque gauge used for make-up.

4. Apply the specified torques as indicated on the Wedge 451™ data sheet. Do not apply thread compound manufacturer's friction factor.

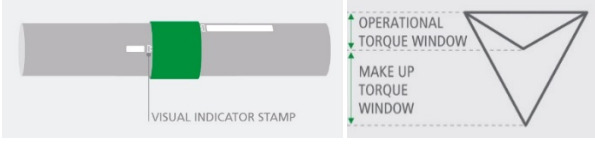
5. The make up criteria for Wedge 451™ connection is the attainment of optimum torque along with the coupling face final position.

6. When computer equipment is used, there is no need to verify the coupling face final position.

7. If computer equipment is not used, ensure correct torque is applied and verify the final position of the coupling with the aid of the make up visual indicator stamp described in point 7 below. Frequency of verification should be agreed with the Tenaris Field Services Representative and documented in the running report. It is suggested to visually check the first 5 joints, then every 20 joints during the job.

8. Wedge 451™ is correctly assembled when both box faces finish within the region of the visual indicator stamp corresponding to the torque applied, as detailed below:

- The visual indicator is an inverted triangle stamp. Refer to sketch on next page.
- If using data sheet make up torques, coupling face should finish within the make up torque window.
- If exceeding data sheet maximum make up torque, the coupling face should finish anywhere within the minimum finish point and maximum finish point for operational torque.
- It is possible for the pin noses on the field and mill end to come into contact after make up.



VISUAL INDICATOR STAMP

9. On the first connection make up:

- Once optimum torque has been attained relax the tong.
- Draw a longitudinal line across pin and box and re-apply optimum torque without breaking out the connection.
- If movement over 1" is witnessed for the drawn line on the field pin end:

  - Check for factors that are absorbing the applied torque. Often the issue is caused by excessive application of thread compound. Recheck alignment and tong function, making adjustments as necessary.

  - Draw a second line, re-apply optimum torque without breaking out the connection and check the new drawn line does not move beyond 1".

  - Repeat this process without breaking out the connection until rotation is less than 1" after re-applying optimum torque.

  - After repeating this process twice or more with rotation exceeding 1". Reduce the amount of thread compound on the following connection and repeat the process until less than 1" of rotation occurs on the first make up attempt.

- Only if the re-application of torque does not result in movement above 1” continue running the rest of the string normally applying optimum torque once only along with the adjusted amount of thread compound.

10. Refer to GDL23352, Torque Application.

11. When thread locking Wedge 451™ connections apply optimum torque at low RPM, then relax the tong and re-apply optimum torque once. Verify that the correct final position is reached.

12. When mixing weights / grades ensure compatibility of design and proceed as follows:

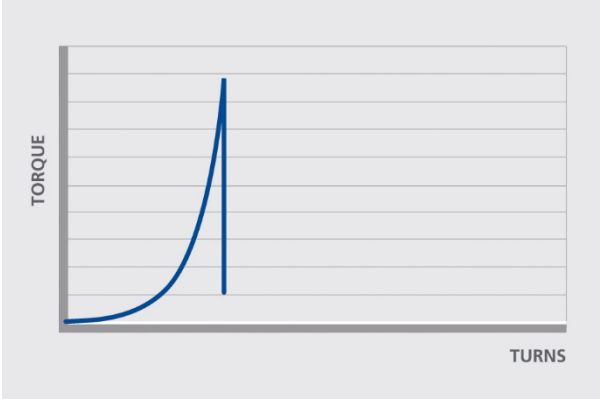
- Place back up tong on the pipe body below the coupling for making up connections.
- If using recommended make up torques, apply the optimum make up torque value corresponding to the weight/grade of pin member to be assembled.
- If using operational torques, apply the lower operational torque value of the two connections.
- Operational torque of all connections within a Wedge 451™ string with mixed grades / weights is that of the lower grade or weight.

13. Coupling rotation when applying make up torque is acceptable as long as both ends of coupling stay within the appropriate make up windows for the applied torque.

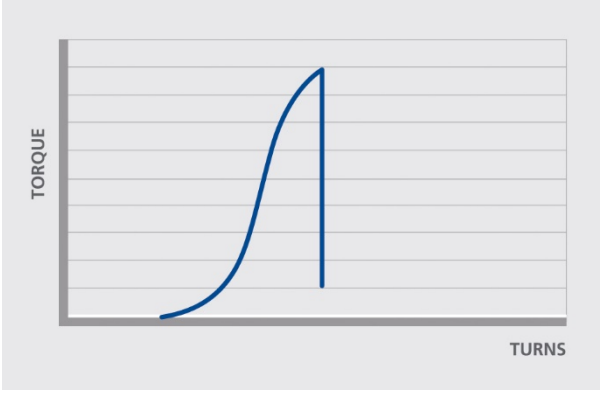
14. When computer equipment is used, reference torque should be set at 5% of optimum torque.

15. Set the computer turns to 2 initially, then adjust as necessary to attain good graph depiction.

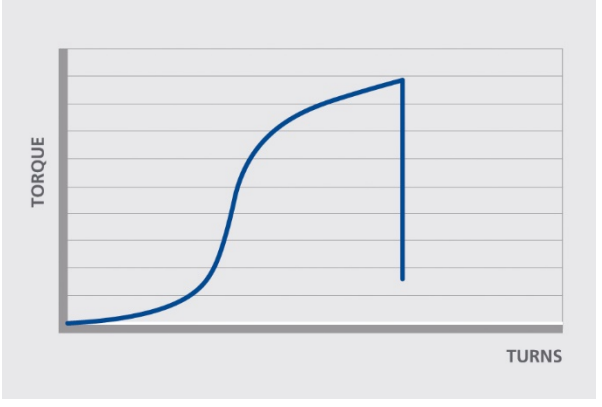
16. Graph profiles should be similar to the ones on the following pages.



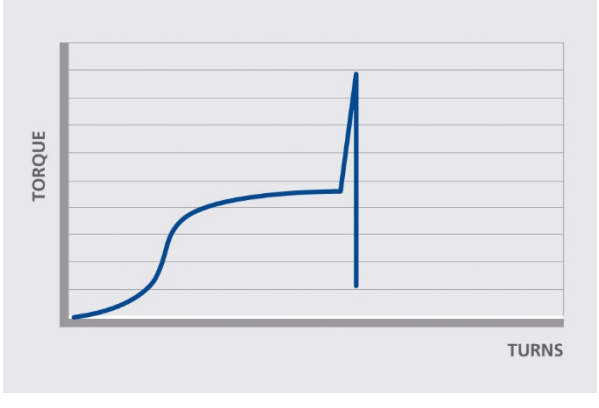
TYPICAL MU CHART



EXAMPLE - COUPLING ROTATION

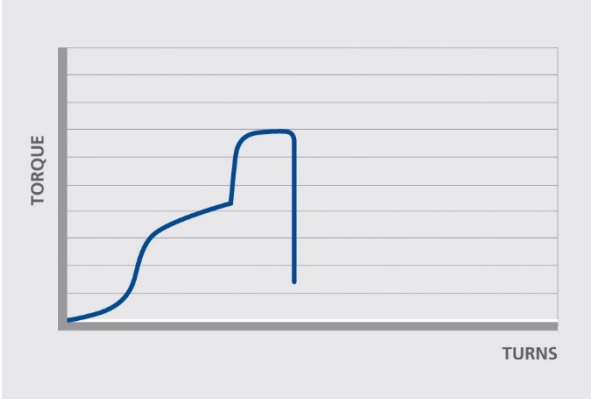


EXAMPLE - HIGH TORQUE & COUPLING ROTATION



EXAMPLE- HIGH TORQUE AND PIN/PIN CONTACT

17. Below is an example of a non-acceptable graph on Wedge 451™ due to yielding.



EXAMPLE - YIELDED CONNECTION

18. Refer to GDL23355, Wedge™ Series Make up Acceptance, for further explanation.

Running

1. The use of a stabbing guide is strongly recommended.

2. The use of a weight compensator is strongly recommended for chrome, pipe with an OD ≥ 14" and stands of 3 joints with an OD ≥ 7".

3. To avoid cross-threading, stab pipe in a smooth controlled fashion ensuring the pipe is vertical when doing so. Continue to support and stabilize the pipe throughout the stabbing and make up operation.

4. Upon commencement of initial rotation use low RPM (5 RPM or below) to ensure the pipe has not cross-threaded during stabbing. If cross threading is evident, immediately reverse rotate the pipe, completely disassemble, clean and inspect both connections.

5. Maximum assembly speeds are indicated in the table below. These are applicable for running in singles with power tong or CRT and assuming ideal conditions.

MATERIAL	OD	SPIN IN RPM	FINAL MAKE-UP RPM
Carbon Steel	< 8 5/8"	40	15
	≥ 8 5/8"	25	10

6. Conditions may dictate lower assembly speeds than the maximums indicated. High winds or excessive-pipe movement among other variables will necessitate a lower RPM be used.

7. Walk chrome pipe all the way in to hand tight position, then apply power tong at low RPM (do not exceed 5 RPM) for final make up.

8. Apply the back up tong on the pipe body below the coupling. Never apply the back up tong over the coupling.

9. A factor which may preclude complete assembly is excessive thread compound applied to the connection, reduce the quantity applied if this is the case.

Downhole Rotation

1. Tenaris recommends utilizing the minimum amount of torque necessary to break the friction between the tubing or casing and the well bore if downhole rotation of the string is required.

2. Wedge 451™ connections should not be rotated beyond the specified operating torque and the RPM should be limited to 40 RPM or lower.

3. Care should be taken to gradually increase or decrease torque when rotating to allow the stored kinetic energy to dissipate and prevent connection yield or break out.

4. Caution is advised as torque measurement accuracy and dump valve response time can vary depending on the equipment utilized.

Pulling

1. Automatic stabbing system or stabber is highly recommended to maintain pipe in a vertical position.

2. The use of a weight compensator is strongly recommended for chrome, pipe with an OD ≥ 14" and stands of three joints with an OD ≥ 7".

3. Apply the back up tong on the pipe body below the coupling.

4. Apply power tong in low RPM (3-5 RPM) to break out the connection, ensuring the pipe is stabilized during the break out process.

5. If coupling starts to rotate, stop and apply the back up tongs on the lower side of the coupling.

6. Do not exceed 15 RPM during spin out.

7. It is recommended the stabbing guide is used when lifting the pin from the box to prevent hang up of the threads.

8. Visual inspection is recommended to classify the thread condition; any rejected connections should be clearly marked and segregated for further investigation.

9. Apply clean, dry thread protectors after applying storage compound on clean, dry connections.

10. Storage / thread compound should always be applied to connections post job, even rejects.