Coiled Tubes and Seamless Line Pipe with One Supplier
Tenaris has produced high technology flowlines & risers for onshore, shallow and deepwater applications. Now Tenaris is also leading manufacturer and supplier of coiled line pipe worldwide.
We offer a broad range of coiled tubes products for downhole and subsea applications. Within the subsea applications, Tenaris offers coiled line pipe HFI welded that can be used for offshore injection for gas lift, hydrate mitigation and chemical injection or small bore production lines.

The company produces coiled line pipe to API 5LCP or DNV OSF 101 standards in sizes ranging from 1” to 5”OD with tube wall thickness ranging from 2mm to 7.8mm. API recognizes Tenaris facilities as the first and only manufacturer certified to produce material to the API 5LCP specification. Tenaris manufactures products with yield strengths from 52,000psi to 110,000psi, though most pipeline applications are X65C and X70C grade.

All line pipe manufactured is supplied in coil form, and these strings range from 2 km to 7 km long depending on diameter. Tenaris manufactures the pipe and applies external corrosion coating, usually a three-layer system (FBE plus copolymer adhesive plus HDPE or PP top coat) and with an improved cleanliness integrity to NAS 8, 7 or 6 levels.

Coiled line pipe allows several miles of flowline to be installed with minimum pipe-to-pipe girth welds, eliminating costly welding, heat-treating, x-ray, and inspection steps. Equipment needs and installation times are reduced allowing wells to come online faster and at lower costs. Tenaris coiled line pipe is at the forefront of subsea technology and provides our customers operational advantages.

Our coiled line pipe offers an economical alternative to conventional subsea flowlines and control lines, as well as onshore surface or buried flowlines for gathering system tie-ins and gas injection. Benefits include:

**Coiled Line Pipe Grades**

X-52- C  
X-65- C  
X-70- C  
X-80- C  
Per API 5LCP or DNV-05-F101
The best of both worlds
With the incorporation of the Precision Tube Technology following the Maverick acquisition, Tenaris can now support the oil and gas industry with the best of both worlds: seamless and HFI welded products. We are uniquely positioned to support any customers’ installation or operational requirements.

Tenaris now can bundle a unique offer with a wide range of products for the following applications: subsea flowlines, onshore or offshore for gathering systems, gas injection, chemical injection, hydrate mitigation, low temperature, HP/HT and artic services:

- Risers
  - Production/Injection Risers (SCR, TTR)
  - Export Risers (SCR, TTR)
  - Pipes for Drilling Risers
  - Completion/Workover Risers
  - Pipes for Different types of Hybrid Risers
- Flowlines and export lines
- Structural Pipe for Jack up, Rigs and Platforms
- Coiled Line Pipe
- Mother Pipe for Umbilicals
- Choke and Kill Lines
- Clad Pipe
- Fabrication services such as Double joint and Anode installation
- Hot Induction Bends
- Anticorrosive and Concrete coating
- Wet Insulation and Pipe in Pipe
- Supply Chain Management
- Research & Development

Tenaris has successfully delivered high quality seamless and HFI welded coiled line pipe in every part of the globe (from the Gulf of Mexico to New Zealand). The examples on the left include offshore projects that have used Tenaris’s seamless and coiled line pipe together.
Hot Induction Bends

Tenaris offers hot induction bends using a process that improves mechanical properties.

Background
Bends for Line Pipe projects can be produced using two different manufacturing processes. In the traditional method, Hot Induction Bending (HIB) is followed by Stress Relieving (SR). With the second process, HIB is followed by off-line full quenching in a tank plus tempering (Q&T). Although the traditional method is fast and less expensive, Q&T produces a more homogeneous product.

Aim
Two years ago, Tenaris, working with European benders, started a full characterization program to compare the quality achieved using both manufacturing processes. The program covered seamless pipe in X60 and X65 steel grades with a dimensional range from 168.3 (6-5/8”) to 508 mm (20”) OD and 8 (0.315”) to 30 mm (1.180”) WT. The most important parameters of the HIB were explored (bending temperature, strain rate, chemical composition, on-line quenching and stress relieving conditions).

Special interrupted hot tensile tests on mother pipes were also performed to characterize the hot deformability behaviour as a function of the chemical composition, grain size, deformation temperature and strain level. Data collected during the hot tensile tests helped to define the set up parameters of the trials performed and increased understanding of how the process affects bends metallurgy.

Results
The traditional process gives place to less homogeneous microstructures among the different portions of the final bend (tangent lengths, transition zones and bend body), as well as between the different characteristic axes (extrados, intrados, upper and bottom neutral axes).

The different thermomechanical processes that each portion of the pipe undergoes lead to different expected final properties in terms of yield strength, charpy, hardness and corrosion resistance.

Even when the process parameters are properly controlled, the transition zones undergo different thermomechanical deformation than the bend body, and failures are often located in these areas.

Tenaris’s characterization program analyzed as-bent samples and tempering curves. The results showed microstructures that were more than 50% ferrite, revealing the low quenching efficiency of the on-line water cooling. Hot deformability test performed on different steels showed a very common yielding mechanism.

Results of these trials were compared to Tenaris’s industrial experience with bends produced by HIB followed by off-line full Q&T. Bends produced with this process showed uniform mechanical properties (tensile and charpy) and no corrosion failures (HIC and FPBT).

Conclusions
The off-line full Q&T method produces more homogeneous bend properties, which can lead to better performance.

Based on the analysis, Tenaris encourages customers to consider the reasons why the off-line full Q&T is the preferred process for demanding applications, such as high steel grades, heavy wall thicknesses, low design temperatures and sour service.

Tenaris’s industrial experience with bends produced by HIB followed by off-line full Q&T shows uniform mechanical properties and no corrosion failures.
LEMS Technology Provides More Accurate Information

The offshore industry demands tighter dimensional tolerances on pipe ends in order to reduce installation cycle time. For line pipe that is subject to high dynamic loads, such as Steel Catenary Risers and fatigue sensitive flowlines, a full geometrical assessment of pipe ends ensures better alignment prior to welding and minimizes the Hi/Lo differential.

Tenaris’s new Laser End Measurement System (LEMS) measures pipe end dimensions online using laser optical displacement sensors. This high-precision laser tool performs an automated dimensional inspection and measures external and internal diameters, wall thickness, external and internal ovality and eccentricity. It generates a complete list of the dimensions of each pipe and reduces logistical costs of pipe handling.

Applications
- Simplifies welding operations by identifying families and marking the pipe ends to indicate the area to be welded.
- Replaces manual inspection and provides 100 percent automated process control.
- Provides information about each pipe end (OD, ID and WT max, average and min).

Advantages
- Records 100 percent of the data, which can be customized, on a CD.
- A full dimensional scan of pipe ends with very detailed characterization (up to 1000 measurements).
- Online inspection generates data immediately, reducing time, logistics and cost.
- Reduces the chance for human error.
- Sorts information by families or best sequence for welding, based on customer requirements.

Tenaris LEMS can measure pipe from 6 5/8” to 16” OD, take up to 1,000 measurements per turn and measure the distance from the pipe end up to 100 mm.

With Tenaris you will get the pipe plus data on a CD. These data, which are tailored to your needs, can help reduce installation cycle time.

LEMS measures external and internal diameters, wall thickness, external and internal ovality and eccentricity.

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