

Thermomechanically treated...

...seamless steel tubes...

...produced in one production step...

...with **RAPID COOLING TECHNOLOGY**...

...offer a wide range of opportunities!

TOUGHT TUBES
RAPID COOLING TECHNOLOGY

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ToughTubes

ToughTubes – thermomechanically treated seamless steel tubes – offer a wide range of opportunities. High strength, excellent toughness, improved weldability. These are only a few desirable properties which can be achieved with thermomechanical treatment. Through accurate control of temperature and forming parameters material characteristics can be generated, which are not achievable with conventional production technologies, e.g. the optimal combination of high strength and excellent toughness.

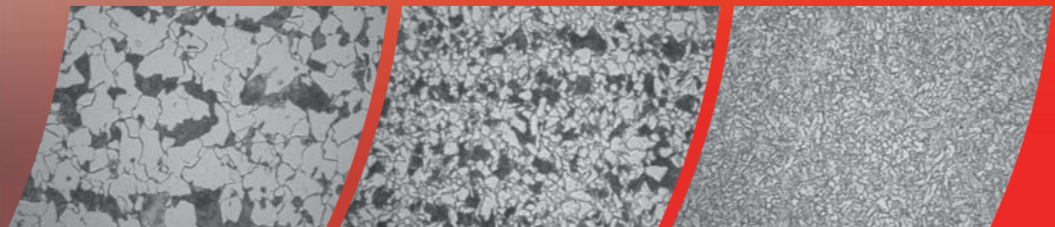


Why ToughTubes?

The following high strength seamless steel tube requirements can be achieved with ToughTubes:

- improved weldability (low CEQ)
- high strength (yield strength, tensile strength, hardness) in combination with excellent toughness (high impact energy absorption)
- good cold forming properties
- improved surface quality
- extremely fine grain size

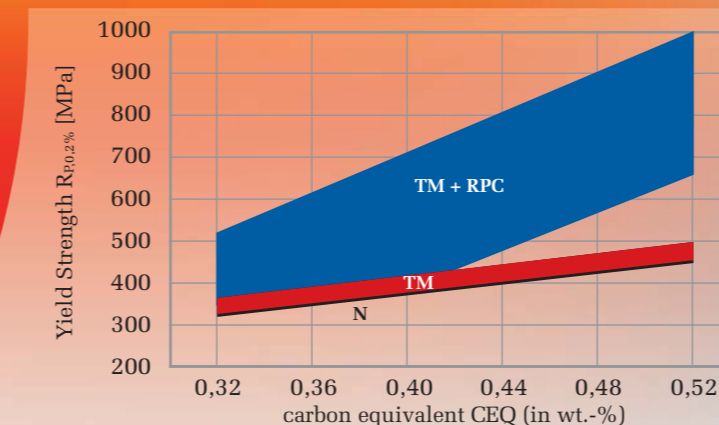
microstructure



normalized rolling
normalized rolling with rapid pipe cooling
ToughTubes temperature controlled rolling with rapid pipe cooling

How material properties are influenced by the rolling process

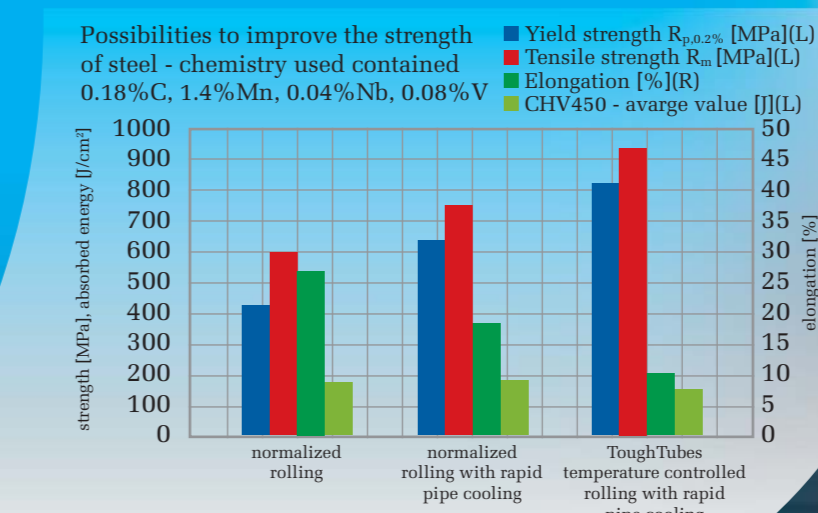
The diagram demonstrates how material properties can be influenced by the production process. Thermomechanical treatment in combination with rapid cooling technology offers a wide range of opportunities at lower CEQ and therefore improved weldability.



N = normalized rolled
TM = thermomechanically rolled
TM + RPC = thermomechanically rolled + rapid pipe cooling

Comparison of the results applying different processes

Responding to customer's material property requirements voestalpine Tubulars can produce seamless steel tubes by one of the following three production methods.



Fields of application

ToughTubes is the right choice when improved weldability, high strength in combination with excellent toughness, good cold forming properties and improved surface quality are required.

ToughTubes can be used as...

- High strength Line Pipe
- Mechanical Tubes
- Automotive products

ToughTubes' product properties offer a wide range of applications.