

# ULTRA 600

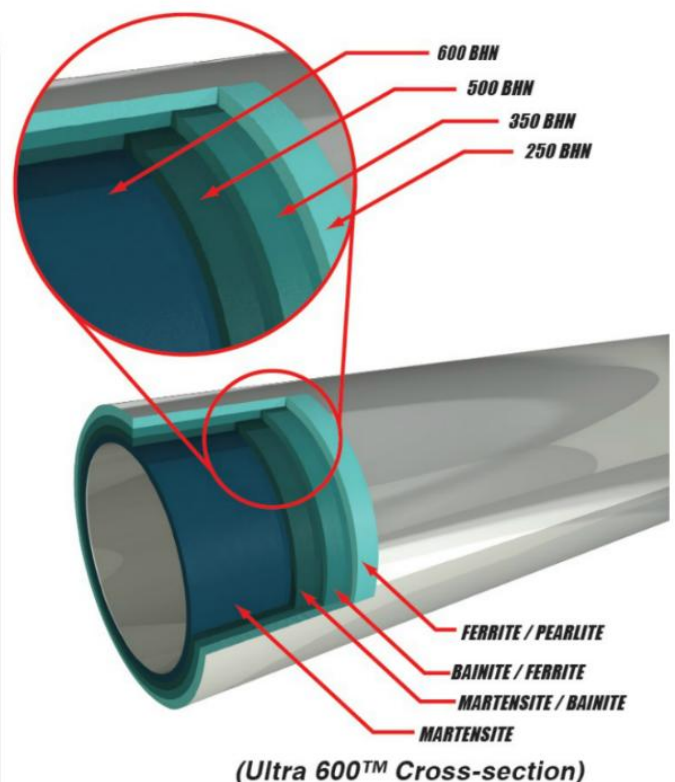
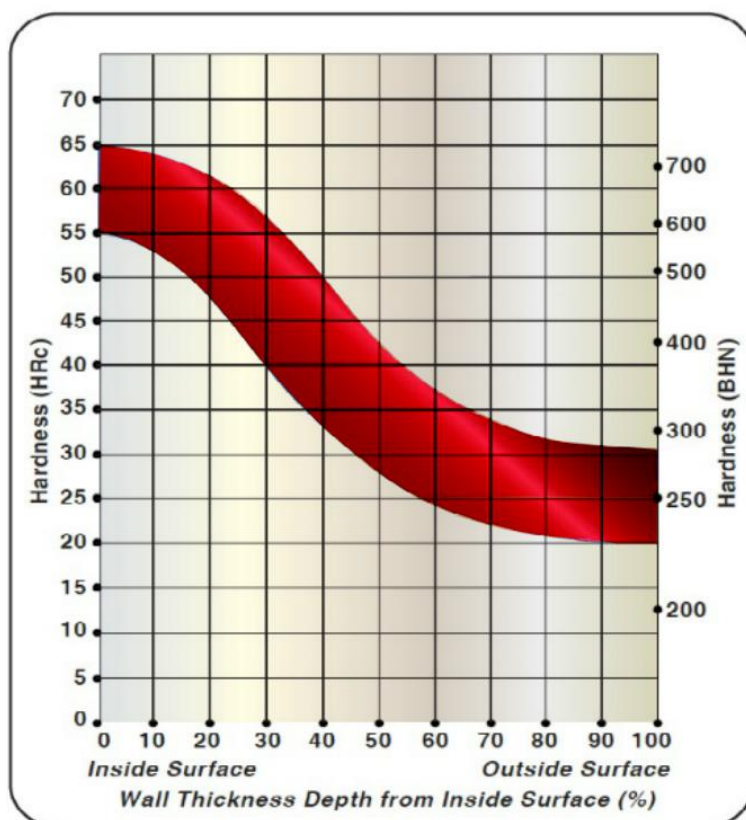
## SPECIFICATION



**ABRASION RESISTANT  
PIPING SYSTEMS**

ultratechpipe.com

Ultra 600 begins with steel pipe of a proprietary chemistry. The induction hardening process results in a monolithic pipe with outstanding inner abrasion resistance and tapering hardness profile to an outer wall resistant to impact.



Ultra Tech's abrasion-resistant piping systems are manufactured to meet specific applications for operations moving highly abrasive materials. Our capabilities to produce custom sized Bends, Laterals, Tee's and Wyes' makes Ultra Tech your complete source for even the most challenging application solutions:

## RAW MATERIAL

- Steel to be a medium carbon steel suitable for achieving the required through-wall hardness gradient for ULTRA 600 Pipe
- Chemical requirements for raw steel shall be in accordance with UT100 Specification for carbon steel pipe suitable for induction hardening.
- Steel practice for material to be used for ULTRA 600 Pipe shall be in accordance with UT100 Specification
- Dimensional properties of raw pipe (UT 100 Pipe) shall fully conform to the requirements of ASTM A53 Grade B for ERW piping
- Minimum tensile and yield strength in accordance with UT100 Specification

## PROCEDURE QUALIFICATION

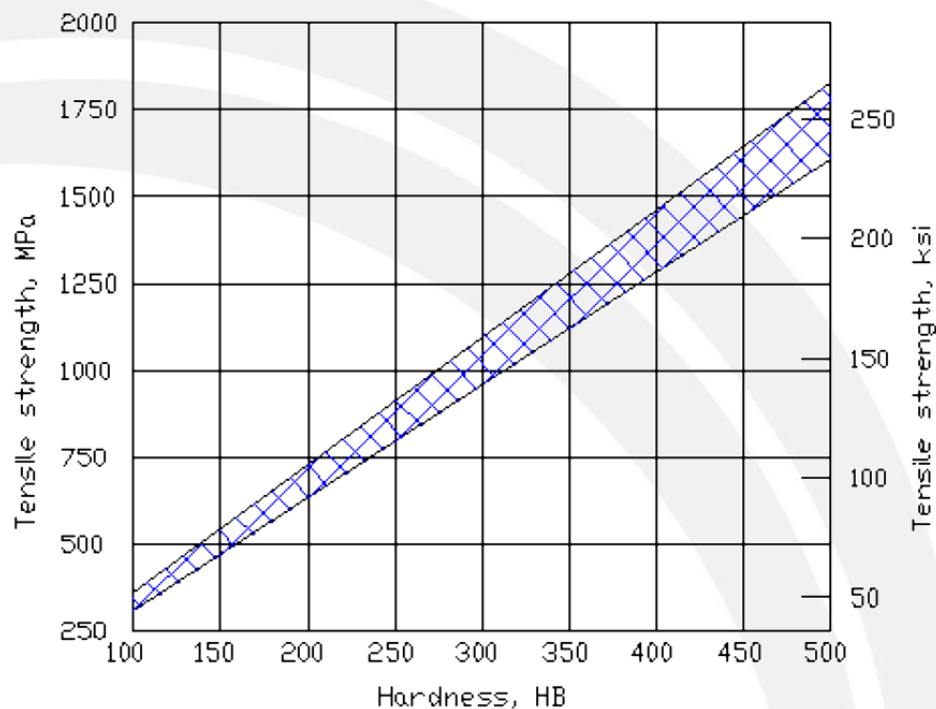
- Procedure qualification is to be performed on each combination of material as follows:
  - Heat number of steel
  - Pipe diameter
  - Wall thickness
  - Process parameters shall be documented and archived for each procedure qualification trial
  - Coupons removed from trial piece shall be tested as follows:
    - ID hardness
    - OD hardness
    - Through wall hardness profile
- Procedure qualification is predicated upon through wall hardness conforming to ULTRA 600 Hardness Gradient
- Procedure qualification tests performed in house or by an independent testing laboratory
- Approved procedure is to be documented and provided to manufacturing for processing of ULTRA 600 Pipe

## MANUFACTURING

- Raw pipe shall be heat treated in accordance with the approved parameters derived from the procedure qualification testing
- During processing a serial number is to be assigned to each joint of pipe for future tracibility
- Each pipe shall be trimmed on each end to remove “end effects” to ensure uniform heat treating throughout the usable length of pipe
- After pipe is cut to length the pipe shall be inspected for compliance to the following requirements:
  - ID hardness
  - OD hardness
  - Straightness
  - Ovality
  - Squareness of cut
- After inspection each pipe is to be allocated for storage or spooling for a specific work order
- Piping shall be spooled for the work order in accordance with specific information provided by engineering
- Pipe fabrication shall be governed by qualified welding procedures per ASME Section IX
  - Prior to shipping pipe shall be given a final inspection to ensure conformance to the following items: ID hardness
  - Length
  - Fit-up
  - Geometric requirements of components
  - Weld quality
  - Surface condition
  - Tagging
  - Additional requirements specified on the purchase order

## PROPERTIES

- Ultra 600 Induction Hardened pipe shall have the following properties:
  - Mechanical properties
    - ID hardness 55 – 65 HRC
    - OD hardness 20 – 30 HRC
    - Chemical properties as specified in UT100 Specification
    - Dimensional properties: Induction-hardening alters the microstructure of steel and may result in an outside diameter up to 1% larger than that specified by ASTM A53 Grade B
    - Tensile strengths are increased by the heat treating process to a level approximated by figure 5 from ASM Handbook Volume 1 Properties and Selection: Irons, Steels, and High-Performance Alloys (1990) page 457



**Fig.5** Relation between tensile strength and Brinell hardness for steels in the as-rolled, normalized, or quenched and tempered condition. The tensile strength in ksi is approximately one-half the Brinell hardness number and in Mpa is approximately 3½ times the Brinell hardness number.