



BOILER AND PRESSURE VESSEL QUALITY STEEL

Product Description

Boiler and Pressure vessel quality steel is special quality steel with an ability to withstand pressure at different temperatures whether ambient, low or high. These steels are plain carbon-manganese or low alloy steel manufactured with highest quality standard in order to make them comply with special characteristics like high strength, toughness at sub-zero temperatures and good weldability. These steel plates are normally used in as rolled, normalized or normalized and tempered or in quenched and tempered condition as per the standards. The product characteristics are developed with proper control of steel chemistry, rolling and heat treatment process. The steel is able to withstand the varied combination of post weld simulation heat treatment meeting the strength and toughness.

Product Application

Steel for pressure vessels are mainly used to manufacture boilers, drums, pressure vessels and piping, heat exchangers, storage tanks etc. This steel is suitable for mechanical hot / cold forming and welding.

Supply condition (As per the specification)

As Rolled (AR) / Normalised / Normalised + Tempered / Quenched + Tempered.



Product Key Salient Features

- Plates are manufactured with state of art steelmaking, hot rolling and heat treatment facilities meeting the customized project requirements.
- Clean steel technology ensures the steel to be lower in tramp elements and impurities (S&P). Vacuum degassing for removal of dissolved gases and Ca-treatment for steel cleanliness.
- Steel is made as per the project specific requirements for meeting the product characteristics with respect to steel chemistry, strength, toughness and through thickness properties etc along with properties after simulation heat treatment cycles.
- Steel plates will be edge trimmed, UT tested with customized length and good surface quality as per the requirement with prior agreement. The plates can be supplied in shot blasted and primer coated condition as per requirements.

Special Requirements

Steel can be available with certain special product requirements for different grade of steel with prior agreement

1. For intermediate and high temperature application: (IS 2002, ASTM A515, ASTM A204, EN 10028-2)

- Vacuum Degassing
- Restricted chemistry and carbon equivalent
- Product analysis
- Simulation PWHT on test coupons
- Elevated temperature tensile testing
- Through thickness properties (Z test)

2. For moderate and low temperature application: (IS 2041, ASTM A516, ASTM A537, EN 10028-3)

- Vacuum Degassing
- Restricted chemistry and carbon equivalent
- Product analysis
- Simulation PWHT on test coupons
- Charpy impact test in transverse direction
- Elevated temperature tensile testing
- Through thickness properties (Z test)

3. For Elevated temperature application (Cr-Mo low alloy ASTM A 387)

- Vacuum Degassing
- Restricted chemistry
- Temper embrittlement factor (J and X factor)
- Charpy impact test in transverse direction
- Product analysis
- Simulation PWHT on test coupons
- Elevated temperature tensile testing
- Through thickness properties (Z test)

Chemical Properties

- The chemical composition will be in accordance with the relevant product standard. (IS/ASTM/EN)
- For ASTM product specification, elements other than product standard will be as per ASTM A20.
- Special requirement with respect to restriction on individual elements or carbon equivalent (IIW) can be accepted with prior agreement.

Mechanical Properties

- Mechanical properties will be as per the relevant product specification.
- Additional/supplementary requirements like impact toughness test, Z-test, Simulation PWHT, Hardness, elevated temperature test can be accepted with prior agreements.
- Test frequency and sample location and orientation will be as per the relevant specification. However, specific requirements apart from specification can be agreed upon.
- Special restriction on tensile properties can be taken up with prior agreement.

Product Capability

| Product name* | Specification / Grade | Thickness (mm)** | Width (mm)** |
|----------------------|-----------------------|------------------|--------------|
| Thermostar 516-55 | ASTM A 516 Gr 55 | 6.0-90.0 | 1250-4500 |
| Thermostar 516-60 | ASTM A 516 Gr 60 | | |
| Thermostar 516-65 | ASTM A 516 Gr 65 | | |
| Thermostar 516-70 | ASTM A 516 Gr 70 | | |
| Thermostar 2002-1 | IS 2002 Gr 1 | 6.0-90.0 | 1250-4500 |
| Thermostar 2002-2 | IS 2002 Gr 2 | | |
| Thermostar 2002-3 | IS 2002 Gr 3 | | |
| Thermostar 2041-R220 | IS 2041 R220 | 6.0-90.0 | 1250-4500 |
| Thermostar 2041-R260 | IS 2041 R260 | | |
| Thermostar 2041-R275 | IS 2041 R275 | | |
| Thermostar 2041-R355 | IS 2041 R355 | | |
| Thermostar 2041-H235 | IS 2041 H235 | | |
| Thermostar 2041-H265 | IS 2041 H265 | | |
| Thermostar 2041-H295 | IS 2041 H295 | | |
| Thermostar 2041-H355 | IS 2041 H355 | 6.0-80.0 | |
| Thermostar 515-60 | ASTM A 515 Gr 60 | 6.0-90.0 | 1250-4500 |
| Thermostar 515-65 | ASTM A 515 Gr 65 | | |
| Thermostar 515-70 | ASTM A 515 Gr 70 | | |
| Thermostar 204-A | ASTM A204 Gr A | 6.0-80.0 | 1250-4500 |
| Thermostar 204-B | ASTM A204 Gr B | | |
| Thermostar 204-C | ASTM A204 Gr C | | |
| Thermostar P235GH | EN 10028-2 P235GH | 6.0-90.0 | 1250-4500 |
| Thermostar P265GH | EN 10028-2 P265GH | | |
| Thermostar P295GH | EN 10028-2 P295GH | | |
| Thermostar P355GH | EN 10028-2 P355GH | | |
| Thermostar 16Mo3 | EN 10028-2 16Mo3 | 6.0-80.0 | |
| Thermostar P275NH | EN 10028-3 P275NH | 6.0-90.0 | 1250-4500 |
| Thermostar P275NL1 | EN 10028-3 P275NL1 | | |
| Thermostar P275NL2 | EN 10028-3 P275NL2 | | |
| Thermostar P355NH | EN 10028-3 P355NH | 6.0-80.0 | |
| Thermostar P355NL1 | EN 10028-3 P355NL1 | | |
| Thermostar P355NL2 | EN 10028-3 P355NL2 | | |
| Thermostar P460NH | EN 10028-3 P460NH | 6.0-80.0 | |
| Thermostar P460NL1 | EN 10028-3 P460NL1 | | |
| Thermostar P460NL2 | EN 10028-3 P460NL2 | | |
| Thermostar 537-1 | ASTM A537 CI 1 | 6.0-80.0 | 1250-4500 |
| Thermostar 537-2 | ASTM A537 CI 2 | 6.0-90.0 | |
| Thermostar 517-F | ASTM A517 Gr F | 6.0-65.0 | 1250-4500 |
| Thermostar 517-S | ASTM A517 Gr S | 6.0-50.0 | |
| Thermostar 387-12 | ASTM A387 Gr 12 | 6.0-80.0 | 1250-4500 |
| Thermostar 387-11 | ASTM A387 Gr 11 | | |
| Thermostar 387-22 | ASTM A387 Gr 22 | | |

- The grades and the plate thickness beyond the above mentioned ranges can be taken on case to case basis. The size capability given is feasible thickness and width band however, actual sizes need to be assessed for capability.
- The product supply condition will be as per the applicable relevant standard

Pressure Vessel Steel For Sour Service

1. Pressure vessel steel for sour service are special steel in normalised heat treated condition. These steel grades are manufactured with clean steel technology for control of tramp elements and impurities (sulphur and phosphorous). Steel is processed through vacuum degassing and calcium treatment for inclusion morphology.
2. The use of special steelmaking practice giving high steel cleanliness gives excellent resistance to wet H₂S cracking such as HIC. These steel grades also display excellent weldability and toughness properties.
3. They are particularly suitable for pressure equipment in both refinery and gas treatment applications under sour service conditions, where wet H₂S corrosion can be a problem.
4. Testing and certification of steel for resistant to Hydrogen Induced cracking (HIC) and Sulphide Stress Corrosion Cracking (SSCC) test as per the relevant NACE TM 0284 / TM0177 and ISO 15156 standards.
5. This steel is characterized by various special product technical condition as per the project requirements:
 - Vacuum Degassing
 - Restricted chemistry and carbon equivalent
 - Product analysis
 - Simulation PWHT on test coupons
 - Charpy impact test in transverse direction
 - Elevated temperature tensile testing
 - Through thickness properties (Z test)
 - HIC / SSCC resistant and NACE compliance

Product Capability

| Product name* | Specification / Grade | Thickness (mm)** | Width (mm)** |
|----------------------|-----------------------|------------------|--------------|
| Thermostar 516-55 | ASTM A 516 Gr 55 | 6.0-80.0 | 1250-4500 |
| Thermostar 516-60 | ASTM A 516 Gr 60 | | |
| Thermostar 516-65 | ASTM A 516 Gr 65 | | |
| Thermostar 516-70 | ASTM A 516 Gr 70 | | |
| Thermostar 2041-R220 | IS 2041 R220 | 6.0-80.0 | 1250-4500 |
| Thermostar 2041-R260 | IS 2041 R260 | | |
| Thermostar 2041-R275 | IS 2041 R275 | | |

- The grades and the plate thickness beyond the above mentioned ranges can be taken on case to case basis. HIC /SSCC complied for plate thickness upto 80mm, however plate will be NACE compliance with thickness >80-90mm
- The size capability given is feasible thickness and width band however, actual sizes need to be assessed for capability.

Tolerances

| | |
|------------------------------|--|
| Thickness | Thickness tolerance as per ASTM A20 / EN 10029 |
| Length and Width | Tolerance as per the requirements of ASTM A20 / EN 10029 |
| Flatness | Tolerance as per the ASTM A20 / EN 10029 |
| Surface Quality | As per ASTM A20 / EN 10163 |
| Ultrasonic test (For plates) | As per ASTM 578 / EN 10160. |

Note: Tighter tolerances on dimensions and flatness can be supplied on case to case basis.

ArcelorMittal Nippon Steel India

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