

Data sheet: A8.2

Hot rolled strip for Tube & Pipe (Excluding API; Refer to data sheet A8.1 for API)

General description

ArcelorMittal South Africa developed several steels for application in the Tube and Pipe industry. This data sheet describes the specifications and properties for these steels

The following steel specifications suitable for Tube and Pipe manufacturing are available:

- SAE/AISI 1008 (Si 0,03%)
- EN 10219 -1- S275 J0H (YS275 Tube) *1
- EN 10219 -1- S355 MH (S355 Tube) *2
- EN 10025 -2- S275JR+AR (Pipe) *3

Notes:

*1; J0 = Impact tests @ 0 degrees; H = Hollow sections

*2; M = Thermo mechanical rolling; H = Hollow sections

*3; JR = Impact tests @ room temperature (Optional); AR = As-rolled

Steel making

Steel for the production of Tube and Pipe is manufactured through either the electric arc furnace (EAF) or basic oxygen furnace (BOF) route and is continuously cast. Casting parameters are carefully controlled for homogeneity of composition, uniformity of structure and improved surface quality.

The lower strengths are produced using the normal alloying elements such as carbon, manganese and silicon. The higher strength grades, i.e. S355 are micro-alloyed with niobium and/or vanadium for grain refinement and precipitation strengthening. These high strength low alloy (HSLA) grades offer higher strength and toughness and their low carbon equivalent content improved weldability and formability.

All Tube & Pipe grades are normally fully killed and aluminium treated to ensure a fine grain steel.

Hot rolling

The steel is thermo-mechanically controlled rolled on a continuous hot strip mill. Parameters such as reheat, finishing and coiling temperature are closely monitored and controlled to achieve the optimum combination of mechanical properties. Other parameters critically controlled during hot rolling include strip profile, dimensions, shape and surface.

For further information, contact:

ArcelorMittal South Africa Limited, PO Box 2, Vanderbijlpark 1900. Toll free number 0800 005043

Care has been taken to ensure that the information in this data sheet is accurate. Mittal Steel South Africa Limited does not, however, assume responsibility for any inaccuracies or misinterpretations of this data. We are continuously engaged in product development and revised data sheets will be issued from time to time. Please ensure that you have the most recent issue. Effective date: July 2010

Chemical composition

The chemical composition for Tube and Pipe steels vary according to the different specification requirements. The following table indicate the specific chemical compositions:

Table 1. Chemical composition (ladle analysis, percent) per specification

| Grade | C max | Mn ¹ max | P max | S max | Si | Nb, Ti |
|-----------------|-------|---------------------|-------|-------|-------------|------------|
| 1008 (Si 0,03%) | 0,10 | 0,50 | 0,025 | 0,025 | 0,005-0,035 | - |
| S275 Tube | 0,20 | 1,50 | 0,025 | 0,040 | 0,035 max | - |
| S355 Tube | 0,14 | 1,50 | 0,025 | 0,030 | 0,15-0,25 | 0,050 each |
| S275 Pipe | 0,21 | 1,50 | 0,035 | 0,010 | 0,15-0,25 | - |

Mechanical properties

ArcelorMittal South Africa supplies strip with mechanical properties conforming to those specified for the final product. The onus rests with the pipe manufacturer to prove that the pipe conforms to the specification requirements after forming, welding and heat treatment. The mechanical property requirements indicated in the table below apply to the formed pipe.

Any supplementary requirements should be negotiated prior to ordering.

Table 2. Mechanical properties as per specification

| Grade | Yield strength (MPa) | Tensile strength (MPa) | Minimum elongation A ₅ (%) | Impact Test ² (J) |
|-----------------|----------------------|---------------------------|---------------------------------------|------------------------------|
| 1008 (Si 0,03%) | None | None | None | None |
| S275 Tube | 275-375 | 430/415 ¹ -530 | 20 | 27 @ 0°C |
| S355 Tube | 355-475 | 450-550 | 22 | 27 @ 0°C |
| S275 Pipe | Min. 275 | 410-560 | 23 | 27 @ 20 °C (Optional) |

Note:

1. Min. TS of 415 MPa from 3 mm upwards
2. Min 6mm thickness (On enquiry only)

Dimensions

For more detail on available dimensions, refer to the data sheet: Hot Strip Mill Product Dimensions (file reference A1.1).

Table 3. Available dimensions

| API 5L | Supply condition | Thicknesses (mm) | Widths (mm) |
|-----------------|---------------------------|-------------------------|--|
| 1008 (Si 0,03%) | Mill edge | 1,0 - 13,0 | 800 - 1 850 ^{1:2} |
| S275 Tube | Mill edge | 2,0 - 6,0 | 800 - 1 850 ^{1:2} |
| S355 Tube | Mill edge | 2,5 - 6,0 | 1185 - 1580 ^{1:2} |
| S275 Pipe | Mill edge Side trimmed | 3,0 - 13,0 3,0 - 8,0 | 1070 - 1800 ^{1:2} On enquiry |

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Notes:

1. Width range is also limited to the available slab widths
2. Although the maximum width is shown as being 1 850 mm mill edge, this is subject to width to thickness ratio restrictions.

Dimensional tolerances

ArcelorMittal South Africa produces steel grades according to tolerances as specified in the data sheet: Hot Strip Mill Product Tolerances (file reference A1.2).

Weldability

Tube and Pipe steels are readily weldable by means of the usual metal arc processes as well as resistance welding process. The most widely used processes are longitudinal high frequency resistance welding and spiral submerged arc welding. With regard to arc welding processes, acceptable results can be obtained if specific attention is given to ensure:

- a. Correct wire and flux combinations to ensure matching tensile strength.
- b. Acceptable welding parameters such as heat input and preheat (where applicable).

When welding hot rolled strip, reference should be made to BS 5135: 1984 'Specification for the arc welding of carbon and carbon manganese steels'.

Resistance welding processes require sufficient fusion, good weld bead profile and adequate heat treatment of the weld area to ensure acceptable results.

The carbon equivalent value should be calculated from the values of the chemical composition indicated on the test certificates for the strip concerned.

The formula to be used is:
$$CE = C + \frac{Mn}{6} + \frac{Cr + Mo + V}{5} + \frac{Ni + Cu}{15}$$

Galvanizing

All the listed qualities are suitable for galvanizing. Please note that due to different Silicon contents, different galv pickups can be expected.

Certification

All material described in this data sheet is supplied with test certificates.

Supply conditions

All material described in this data sheet is supplied in terms of price lists 120 and ArcelorMittal South Africa's General Conditions of Sale.

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