ITM Materials, Quality and Tolerances: Stainless Steel

General Information

Specification Scope:

This specification applies to general tube, food processing and hygienic applications to AS1528.1.

Other Standards:

ASTM A249 & A269 - Boiler, heat exchanger and condenser tubes.

ASTM A554 - General & Architectural Application.

Available Sizes:

Tube sizes range from 6.35 mm to 203.2 mm outside diameter.

Grades and Material:

AS 1528.1 tube is made from stainless cold-rolled strip to ASTM A240M.

Grade 304L, 316L Stainless Steel.

Manufacture:

Automatic tig welding with no addition of filler metal.

Heat Treatment:

Tube is not post weld heat treated except for standards ASTM A269 & A249 where tube is annealed.

Material Tests

Grades	TP 304	TP 304L	TP 316	TP 316L
C max	0.07	0.03	0.08	0.03
Mn max	2.00	2.00	2.00	2.00
P max	0.045	0.045	0.045	0.045
S max	0.03	0.03	0.03	0.03
Si max	0.75	0.75	0.75	0.75
Cr	17.5 -- 19.5	17.5 -- 19.5	16 -- 18	16 -- 18
Ni	8 -- 10.5	8 -- 12	10 -- 14	10 -- 14
N max	0.10	0.10	0.10	0.10
Mo	--	--	2.00-3.00	2.00-3.00

Mechanical Tests

Except tube made to ASTM A249 and specifically requested otherwise Yield stress, Tensile tests & Hardness Mn - Manganese tests are from coil manufactured to ASTM A240M.

Yield Stress (Coil)

TP 304 & TP 316	205 MPa min
TP 316L & TP304L	170 MPa min

Tensile Stress (Coil)

TP 304 & TP 316	515 MPa min
TP 316L & TP 304L	485 MPa min

Elongation (Coil)

40% Minimum (50mm test piece)

Hardness Tests (Coil)

TP 304 & TP 304L	92 HRB / 202 HB30 max
TP 316 & TP 316L	95 HRB / 217 HB30 max

Tube Weld Integrity Tests

Reverse Bend Test:

Flatten to 2 times material thickness.

Flare / Cone Test:

Minimum 1.21 tube diameter (60 deg included angle).

Flange Test:

Minimum 1.10-1.15 tube diameter.

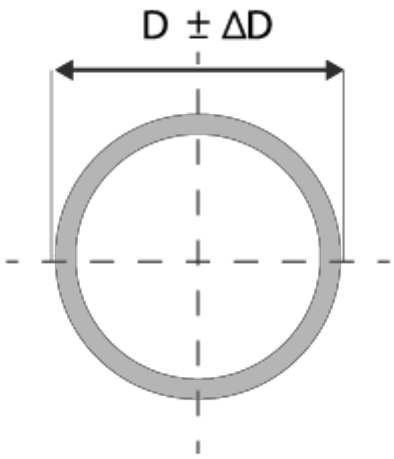
Eddy Current Test:

All tube diameters are on-line eddy-current tested.

Outside Tube Tolerance:

Outside diameter (OD) to AS 1528.1

O/D ≤ 34.93 µm	± 0.13 µm
38.1 ≤ O/D ≤ 76.2 µm	± 0.25 µm
101.6 ≤ O/D ≤ 127.0µm	± 0.38 µm
152.4 ≤ O/D	± 0.76 µm



Ovality:

Difference between maximum and minimum diameters at any one cross section to be within max & min sizes as above.

Wall Thickness Tolerance:

Wall thickness tolerance shall be +/- 10% of nominal wall thickness.

Weld Bead:

Tubes smaller than 31.75mm diameter may be supplied without cold working of inner weld bead. Larger sizes shall be provided in either the cold-worked, or cold-worked annealed condition.

Straightness:

Each tube shall be straight to within 2mm in any 1000mm length.

Length Tolerance:

Standard length 6 metres -0 /+35 mm Cut to exact length jobs, by agreement (+/- 1 mm).

Finish

Ends:

Sizes to 203.2 deburred both ends.

Finish Internal:

Tubes with diameter greater than or equal to 31.8 mm are internally cold worked (Internal weld beaded to tube surface). Tubes with diameter less than 31.8 mm are in as welded condition and internal weld height is controlled to a minimum height.

Finish External:

Available as follows:

As welded condition (external weld bead removed). May have forming, straightening and weld polish cross hatch marking.

Standard Polished equivalent to 320 Grit - typical Ra = 0.5µm to 0.8 µm. Minor form marks may be visible – see AS 1528.1 standard for more information.

Documentation

Packaging:

Polished Tube is individually plastic sleeved in a bundle with steel strapped cleats and plywood for forklift plate.

Traceability:

AS 1528.1 requires controlled batch traceability from raw material to finished tube. For traceability purpose the tube is inkjet marked identifying sizes, standard, grade, batch & trace numbers and manufactures identification.

Test Certificate:

AS 1528.1 raw material test certificates are available on request in accordance with EN 10204 type 3.1.