

ASTM A105 Flange Standard Specification

Standard Specification for Carbon Steel Forgings for Piping Applications

ASTM A105 covers forged carbon steel piping components for ambient and higher temperature service in pressure systems includes flanges, fittings, valves and similar parts ordered either to dimensions specified by MSS, ASME or API.

This specification does not cover raw material which round bar and seamless tubular produced piping components.

Chemical Requirements of ASTM A105 Forging Flange - Table 1

Chemical Composition	
Element	Composition, %
Carbon	0.35 max
Manganese	0.60-1.05
Phosphorus	0.035 max
Sulfur	0.040 max
Silicon	0.10-0.35
Copper	0.40 max ^A
Nickel	0.40 max ^A
Chromium	0.30 max ^{A,B}
Molybdenum	0.12 max ^{A,B}
Vanadium	0.08 max

A: The sum of copper, nickel, chromium, molybdenum and vanadium shall not exceed 1.00%.

B: The sum of chromium and molybdenum shall not exceed 0.32%.

Mechanical Properties of ASTM A105 Flange - Table 2

Mechanical Properties ^A	
Tensile strength, min, ksi [MPa]	70 [485]
Yield strength, min, ksi [MPa] ^B	36 [250]
Elongation in 2 in, or 50 mm, min, %	
Basic minimum elongation for walls 5/16 in. [7.9 mm] and over in thickness, strip tests.	30
When standard round 2-in. or 50-mm gauge length or smaller proportionally sized specimen with the gauge length equal to 4D is used	22
For strip tests, a deduction for each 1/32-in. [0.8 mm] decrease in wall thickness below 5/16 in. [7.9 mm] from the basic minimum elongation of the percentage points of table 3	1.5C
Reduction of area, min, %D	30
Hardness, HBW, max	187

A: For small forgings, see 8.3.4.

B: Determined by either the 0.2% offset method or the 0.5% extension-under-load method.

C: See table 3 for computed minimum values.

D: For round specimens only.

Elongations - Table 3

Computed Minimum Values		
Wall Thickness		Elongation in 2 in. or 50mm, min, %
in	mm	
5/16 (0.312)	7.9	30
9/32 (0.281)	7.1	28.5
1/4 (0.250)	6.4	27
7/32 (0.219)	5.6	25.5
3/16 (0.188)	4.8	24
5/32 (0.156)	4	22.5
1/8 (0.125)	3.2	21
3/32 (0.094)	2.4	19.5
1/16 (0.062)	1.6	18

Heat treatment

Heat treatment is not required except for flanges above Class 300, flanges of special design where the design pressure or design temperature are not known and for items over 4" NPS and above Class 300. When heat treatment is required, annealing, normalizing, Normalize and temper, normalize and quench and tempering shall be the applied methods.

Heat treatment

Hardness shall be 137 to 187 HB. Flanges that not in this hardness range shall be rejected.

Hydrostatic Tests

Follow with Supplementary Requirement S57 in A961/A961M.

Welding Repair

Repair of defects is permitted, it shall be made by a process that does not reduce undesirably high levels of hydrogen in the welded a

All forgings repaired by welding shall be post-weld heat treated between 1100 °F [593°C] and the lower transformation temperature for a minimum of 1/2 h/in. [1/2 h/25.4 mm] of maximum section thickness, or alternatively annealed, normalized and tempered, or quenched and tempered. If the forging was not previously heat treated, the original tempering temperature was exceeded, or the forging was fully heat treated in the post weld cycle, then the forging flange shall be tested in Section 7.

The mechanical properties shall tested in comply with Section IX of ASME Boiler and Pressure Vessel Code. Conform with table 2 for thermal condition of repair-welded forgings.

Markings

For small dimension flanges where the marking space less than 1 in [25 mm] in any direction, test reports are mandatory and marking be restricted to only such symbols or codes as are necessary to identify the parts with test reports.

In case there is no space for marking directly on the products, it shall be discussed by buyer and manufacturer.

For more information please view <https://www.pipelifittingflange.com>