Pipe Specification A106

Specification

A106 NPS 1/8 -- 48 ANSI Schedules to 160

Scope

Covers SEAMLESS carbon steel nominal wall pipe for high-temperature service, suitable for bending, flanging and similar forming operations.

NPS 1 1/2 and under may be either hot finished or cold drawn. NPS 2 and larger shall be hot finished unless otherwise specified.

Kinds of Steel Permitted For For Pipe Material

Killed Steel
Open-hearth
Electric-furnace
Basic-oxygen

Hot-Dipped Galvanizing

Not covered in specification.

Permissible Variations in Wall Thickness

The minimum wall thickness at any point shall not be more than 12.5% under the nominal wall thickness specified.

Chemical Requirements

	Grade A	Grade B	Grade C
Carbon max. %	0.25	0.30	0.35
Manganese %	0.27 to 0.93	0.29 to 1.06	0.29 to 1.06
Phosporous, max. %	0.025	0.025	0.025
Sulfur, max. %	0.025	0.025	0.025
Silicon, min. %	0.10	0.10	0.10

Tensile Requirements

Seamless			
	Grade A	Grade B	Grade C
Tensile Strength, min., psi	48,000	60,000	70,000
Yield Strength, min., psi	30,000	35,000	40,000

Hydrostatic Testing

Inspection test pressures produce a stress in the pipe wall equal to 60% or specified minimum yield strength (SMYS) at room temperature.

Maximum Pressures are not to exceed 2500 psi for NPS 3 and under and 2800 psi for the larger sizes. Pressure is maintained for not less than 5 seconds.

Permissible Variations in Weights per Foot

Weight of any length shall not vary more than 10% over and 3.5% under that specified. NOTE - NPS 4 and smaller - weighed in lots. Larger sizes - by length

Permissible Variations in Outside Diameter

Outside Diameter at any point shall not vary from standard specified more than -

NPS	Over	Under
1 1/2 and smaller	1/64"	1/32"
2 -- 4	1/32"	1/32"
5 -- 8	1/16"	1/32"
10 -- 18	3/32"	1/32"
20 -- 26	1/8"	1/32"

Mechanical Tests Specified

Tensile Test - NPS 8 and larger - either transverse or longitudinal acceptable

Smaller than NPS 8 -- weighed in lots. Larger sizes -- by length.

Flattening Test - NPS 2 and larger.

Bending Test(Cold) - NPS 2 and under.

For normal A106 uses:
Degree of Bend = 90
Diameter of Mandrel = 12 x nom. dia. of pipe

For close coiling:
Degree of Bend = 180
Diameter of Mandrel = 8 x nom. diameter of pipe

Number of Tests Required

	NPS	On One Length From Each Lot of
Tensile	5 and smaller	400 or less
	6 and larger	200 or less
Bonding	2 and smaller	400 or less
Flattening	2 through 5	400 or less
	6 and over	200 or less

Lengths

Lengths required shall be specified on order. No "jointers" permitted unless otherwise specified. If no definite lengths required, following practice applies:

Single Random -- 16' - 22'. 5% may be 12' - 16'

Double Random -- Minimum length 22', Minimum average 35'. 5% may be 16' - 22'.

Required Markings on Each Length (On Tags attached to each Bundle in case of Bundled Pipe)

Rolled Stamped or Stenciled (Mfrs. option)
- Manufacturer's name or brand.
- Length of pipe.
- A106 A, A106 B, A106 C. ANSI schedule number.
- Hydrostatic test pressure and/or NDE or NH if neither is specified
- Weight per foot (NPS 4 and larger)
- Additional "S" if tested supplementary requirements.

General Information

* Unless otherwise specified, pipe furnished with plain ends.
* Purchaser may specify NDE in lieu of hydrostatic test or neither.
* Surface finish standards are outlined in specification.

ASTM A 106
Seamless Pressure Pipe
Submittal Data — Grades A & B

Scope
Covers seamless carbon steel Grades A & B pipe for high pressure and high temperature service. Pipe is suitable for bending, flanging, and similar forming operations and for welding. Applications include: Refineries, Power Plants, Boilers, Ship Building, and other specialized applications.

Heat Treatment
Hot-finished pipe need not be heat treated. Cold-drawn pipe shall be heat treated after the final cold draw pass at a temperature of 1200°F or higher.

Hydrostatic & Nondestructive Electric Testing
Hydrostatic inspection test pressure is 2500 psi for sizes NPS 2 and under. Test pressure shall be maintained for a minimum of 5 seconds.

When specified by the purchaser, pipe may be tested by the nondestructive electric test in lieu of the hydrostatic test.

End Finish
Plain End:
NPS 1-1/2 and smaller shall be either plain end square cut or plain end beveled at the option of the manufacturer. NPS 2 ends shall be beveled to angle 30° +5°, -0° with a root face of 1/16" ± 1/32".

Threaded Pipe:
Threads comply with ANSI Standard B 1.20.1

Couplings:
Couplings comply with ASTM Standard A 865

Available Coatings
ASTM A 106 seamless pipe is available in four different coatings:

- Exclusive Blue Diamond® Coating
- Hot-Dipped Galvanized
- Pickled and Oiled
- Bare

Chemical Requirements Composition, % Max

Carbon[A]	Manganese	Phosphorus	Sulfur
.25	0.27/0.93	.035	.035

Silicon	Copper[B]	Nickel[B]	Chromium[B]
0.10 Min	.40	.40	.15

Molybdenum[B]	Vanadium[B]
.15	.08

[A]For each reduction of 0.01% below the specified carbon maximum, an increase of 0.06% manganese above the specified maximum will be permitted up to a maximum of 1.35%

[B]The combination of these five elements shall not exceed 1.00%

Tensile Requirements

Yield Strength, min	35,000 psi
Tensile Strength, min	60,000 psi
Elongation in 2"	35% Minimum

Bending Test (Cold) For NPS 2 and under

	Degree Of Bend	Diameter of Mandrel
Standard	90°	12 X pipe O.D.
Close Coiling	180°	8 X pipe O.D.

Frequency of Tests
Tensile tests and flattening tests are required on one length of pipe from each lot of 400 lengths or fraction thereof for each size.

Dimensions and Weights
The dimensions and weights furnished under this specification are in agreement with the standardized dimensions and weights specified in ANSI B 36.10.

ASTM A 106
Seamless Pressure Pipe
Grades A & B

Submittal Data

Plain End Dimensions Schedules 40 & 80

		Schedule 40		Schedule 80	
Nominal Size	O.D. Inches	Wall	Weight, Lb/Ft	Wall	Weight, Lb/Ft
1/8	0.405	.068	0.24	.095	0.31
1/4	0.540	.088	0.43	.119	0.54
3/8	0.675	.091	0.57	.126	0.74
1/2	0.840	.109	0.85	.147	1.09
3/4	1.050	.113	1.13	.154	1.48
1	1.315	.133	1.68	.179	2.17
1-1/4	1.660	.140	2.27	.191	3.00
1-1/2	1.900	.145	2.72	.200	3.63
2	2.375	.154	3.66	.218	5.03

Plain End Dimensions Schedules 160 & XXS

		Schedule 160		Schedule XXS	
Nominal Size	O.D. Inches	Wall	Weight, Lb/Ft	Wall	Weight, Lb/Ft
1/8	0.405	N/A	N/A	N/A	N/A
1/4	0.540	N/A	N/A	N/A	N/A
3/8	0.675	N/A	N/A	N/A	N/A
1/2	0.840	.188	1.31	.294	1.72
3/4	1.050	.219	1.95	.308	2.44
1	1.315	.250	2.85	.358	3.66
1-1/4	1.660	.250	3.77	.382	5.22
1-1/2	1.900	.281	4.86	.400	6.41
2	2.375	N/A	N/A	N/A	N/A

Permissible Variations in Wall Thickness
Minimum wall thickness at any point shall not be more than 12.5% under nominal wall thickness specified. Maximum wall thickness at any point shall not be greater than 20.0% over nominal wall thickness.

Workmanship
Visual imperfections such as scabs, seams, laps or tears shall not exceed 5% of the nominal wall thickness.

Permissible Variations in Outside Diameter

NPS 1-1/2 and under	± 1/64”
NPS 2	± 1/32”

Permissible Variations in Weight per Foot
Pipe shall not vary more than 10% over and 3.5% under the standard specified.

Product Marking
Each length of pipe is continuously stenciled to show the manufacturer, specification (A106), size (O.D. & wall), “A & B” for Grades A & B, 2500 psi, length and heat number

Manufacturing Location
All products furnished manufactured in the USA.

Hot-Dipped Galvanized
Pipe is galvanized to the requirements of ASTM A 53. The average weight of zinc coating shall not be less than 1.8 ounces per square foot of surface (inside and outside).

When galvanized pipe is bent or otherwise fabricated to a degree that causes the zinc coating to stretch or compress beyond the limit of elasticity, some flaking of the coating may occur.