



Designation: B673 – 21

# Standard Specification for Nickel-Iron-Chromium-Molybdenum and Iron-Nickel-Chromium-Molybdenum-Copper Welded Pipe<sup>1</sup>

This standard is issued under the fixed designation B673; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope\*

1.1 This specification covers UNS N08925, UNS N08354, and UNS N08926<sup>2</sup> welded pipe for general corrosion applications.

1.2 This specification covers pipe sizes in schedules shown in [Table 1](#).

1.3 ASTM International has adopted definitions whereby some grades, such as UNS N08904, previously in this specification were recognized as stainless steels, because those grades have iron as the largest element by mass percent. Such grades are under the oversight of ASTM Committee A01 and its subcommittees. The products of N08904 previously covered in this specification are now covered by Specification [A312/A312M](#).

1.4 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.5 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to become familiar with all hazards including those identified in the appropriate Safety Data Sheet (SDS) for this product/material as provided by the manufacturer, to establish appropriate safety, health, and environmental practices, and determine the applicability of regulatory limitations prior to use.*

1.6 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee B02 on Nonferrous Metals and Alloys and is the direct responsibility of Subcommittee B02.07 on Refined Nickel and Cobalt and Their Alloys.

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<sup>2</sup> New designation established in accordance with ASTM E527 and SAE J1086, Practice for Numbering Metals and Alloys (UNS).

## 2. Referenced Documents

2.1 *ASTM Standards*:<sup>3</sup>

[A312/A312M Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes](#)

[B775 Specification for General Requirements for Nickel and Nickel Alloy Welded Pipe](#)

[E527 Practice for Numbering Metals and Alloys in the Unified Numbering System \(UNS\)](#)

2.2 *ANSI Standards*:<sup>4</sup>

[B2.1 Pipe Threads](#)

[B31.10 Power Piping](#)

[B36.10 Welded and Seamless Wrought Steel Pipe](#)

[B36.19 Stainless Steel Pipe](#)

## 3. Classification

3.1 *Class 1*—Welded, cold worked, solution treated, and nondestructively tested in accordance with [8.3.1](#).

3.2 *Class 2*—Welded, cold worked, solution treated, and nondestructively tested in accordance with [8.3.2](#).

3.3 *Class 3*—As welded, solution treated, and nondestructively tested in accordance with [8.3.1](#).

## 4. General Requirement

4.1 Material furnished under this specification shall conform to the applicable requirements of Specification [B775](#) unless otherwise provided herein.

## 5. Ordering Information

5.1 Orders for material under this specification should include the following information:

5.1.1 Alloy name or UNS number,

5.1.2 *Class*,

5.1.3 *Quantity* (feet or number of lengths),

5.1.4 *Size* (nominal size or outside diameter and schedule number or average wall thickness),

<sup>3</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

<sup>4</sup> Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

\*A Summary of Changes section appears at the end of this standard

**TABLE 1 Dimensions of Welded Pipe**

NOTE 1—The following table is a partial reprint of Table 1 of ANSI B36.19.

NOTE 2—The decimal thicknesses listed for the respective pipe sizes represent their nominal wall dimensions.

NOTE 3—1 in. = 25.4 mm.

Nominal Pipe Size, in.	Outside Diameter		Nominal Wall Thickness									
	in.	mm	Schedule in.	5S <sup>A</sup> mm	Schedule in.	10S <sup>A</sup> mm	Schedule in.	40S mm	Schedule in.	80S mm	Schedule in.	160S mm
1/8	0.405	10.29	...	...	0.049	1.25	0.068	1.73	0.095	2.41	...	...
1/4	0.540	13.72	...	...	0.065	1.65	0.088	2.24	0.119	3.02	...	...
3/8	0.675	17.15	...	...	0.065	1.65	0.091	2.31	0.126	3.20	...	...
1/2	0.840	21.34	0.065	1.65	0.083	2.11	0.109	2.77	0.147	3.73	0.187	4.75
3/4	1.050	26.67	0.065	1.65	0.083	2.11	0.113	2.87	0.154	3.91	0.218	5.54
1	1.315	33.40	0.065	1.65	0.109	2.77	0.133	3.38	0.179	4.46	0.250	6.35
1 1/4	1.660	42.16	0.065	1.65	0.109	2.77	0.140	3.56	0.191	4.85	0.250	6.35
1 1/2	1.900	48.26	0.065	1.65	0.109	2.77	0.145	3.68	0.200	5.08	0.281	7.14
2	2.375	60.33	0.065	1.65	0.109	2.77	0.154	3.91	0.218	5.54	0.343	8.71
2 1/2	2.875	73.03	0.083	2.11	0.120	3.05	0.203	5.16	0.276	7.01	0.375	9.52
3	3.500	88.90	0.083	2.11	0.120	3.05	0.216	5.49	0.300	7.62	0.438	11.12
3 1/2	4.000	101.60	0.083	2.11	0.120	3.05	0.226	5.74	0.318	8.08	...	...
4	4.500	114.30	0.083	2.11	0.120	3.05	0.237	6.02	0.337	8.56	0.581	13.41
5	5.563	141.30	0.109	2.77	0.134	3.40	0.258	6.55	0.375	9.52	0.625	15.88
6	6.625	168.30	0.109	2.77	0.134	3.40	0.280	7.11	0.432	10.97	0.718	18.24
8	8.625	219.07	0.109	2.77	0.148	3.76	0.322	8.18	0.500	12.70	0.906	23.01
10	10.750	273.05	0.134	3.40	0.165	4.19	0.365	9.27	0.500 <sup>B</sup>	12.70 <sup>B</sup>	1.125	28.58
12	12.75	323.85	0.156	3.96	0.180	4.57	0.375	9.52	0.500 <sup>B</sup>	12.70 <sup>B</sup>	1.312	33.32
14	14.00	355.60	0.156 <sup>C</sup>	3.96	0.188	4.78	0.375	9.52	0.500	12.70	...	...
16	16.00	406.40	0.165 <sup>C</sup>	4.19	0.188	4.78	0.375	9.52	0.500	12.70	...	...
18	18.00	457.20	0.165 <sup>C</sup>	4.19	0.188	4.78	0.375	9.52	0.500	12.70	...	...
20	20.00	508.00	0.188 <sup>C</sup>	4.78	0.218 <sup>C</sup>	5.54	0.375	9.52	0.500	12.70	...	...
22	22.00	558.80	0.188 <sup>C</sup>	4.78	0.218 <sup>C</sup>	5.54	0.375	9.52	0.500	12.70	...	...
24	24.00	609.60	0.218 <sup>C</sup>	5.54	0.250	6.35	0.375	9.52	0.500	12.70	...	...
30	30.00	762.00	0.250 <sup>C</sup>	6.35	0.312	7.92	0.375	9.52	0.500	12.70	...	...

<sup>A</sup> Schedule 5S and 10S wall thicknesses do not permit threading in accordance with ANSI B2.1.

<sup>B</sup> These do not conform to ANSI B31.10.

<sup>C</sup> These do not conform to ANSI for Welded and Seamless Wrought Steel Pipe (ANSI B36.10).

Document Preview

5.1.5 *Length*—Specify cut length or random,

5.1.6 *Certification*—State if certification or a report of test results is required,

5.1.7 *Purchaser Inspection*—State which tests or inspections are to be witnessed,

5.1.8 *Ends*—Plain ends cut and deburred will be furnished, unless otherwise specified, and

5.1.9 *Samples for Product (Check) Analysis*—State whether samples shall be furnished.

## 6. Materials and Manufacture

6.1 Pipe shall be made from flat-rolled alloy by an automatic welding process with no addition of filler metal. Subsequent to welding and before final solution treatment, Class 1 and Class 2 material shall be cold worked either in both weld and base metal or in weld metal only.

NOTE 1—The recommended heat treatment shall consist of heating to a temperature of 1975 to 2150°F (1080 to 1180°C) for UNS N08354, or 2010 to 2100°F (1100 to 1150°C) for UNS N08925 and UNS N08926, followed by quenching in water or rapid cooling by other means.

6.2 Pipe shall be furnished with oxide removed. When solution treatment is performed in a protective atmosphere, descaling is not necessary.

NOTE 2—Pipe produced with the addition of filler metal is available. The manufacturer must be consulted for applicable requirements.

## 7. Chemical Composition

7.1 The material shall conform to the requirements as to chemical composition prescribed in **Table 2**.

7.2 If a product (check) analysis is performed by the purchaser, the material shall conform to the product (check) analysis variations prescribed in Specification **B775**.

## 8. Mechanical Properties and Other Requirements

8.1 *Tension Test*—The tensile properties of the material at room temperature shall conform to those shown in **Table 3**.

**TABLE 2 Chemical Requirements**

Element	UNS N08925	UN N08354	UNS N08926
Carbon, max	0.020	0.030	0.020
Manganese, max	1.0	1.00	2.00
Phosphorus, max	0.045	0.030	0.03
Sulfur, max	0.030	0.010	0.01
Silicon, max	0.50	1.00	0.5
Nickel	24.0 to 26.0	34.0 to 36.0	24.00 to 26.00
Chromium	19.0 to 21.0	22.0 to 24.0	19.00 to 21.00
Molybdenum	6.0 to 7.0	7.0 to 8.0	6.0 to 7.0
Copper	0.8 to 1.5	...	0.5 to 1.5
Nitrogen	0.1 to 0.2	0.17 to 0.24	0.15 to 0.25
Iron <sup>A</sup>	balance	balance	balance

<sup>A</sup> Iron shall be determined arithmetically by difference.