



Standard Specification for STAINLESS AND HEAT-RESISTING CHROMIUM- NICKEL-MANGANESE STEEL PLATE, SHEET, AND STRIP¹

This Standard is issued under the fixed designation A 412; 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 reappraisal.

1. Scope

1.1 This specification² covers annealed, and annealed and cold-rolled, chromium-nickel-manganese austenitic stainless and heat-resisting steel plate, sheet, and strip.

1.1.1 Type 201 is satisfactory for applications where severe forming characteristics are not too important. Type 201 is nonmagnetic when annealed, but is magnetic after cold working.

1.1.2 Type 202 is satisfactory for applications where severe forming characteristics are important. Type 202 is nonmagnetic when annealed, but is slightly magnetic after cold working.

1.1.3 Types XM-10 and XM-11 are intended for applications where normal forming characteristics are important. They are nonmagnetic in the annealed condition and also after 10 percent cold working.

1.1.4 Type XM-14 is intended for applications requiring service at cryogenic temperatures. It is nonmagnetic in the annealed condition and slightly magnetic after cold working.

1.1.5 Type XM-19 is intended for applications requiring added corrosion resistance and high strength. It is readily formed and welded.

1.1.6 Type XM-29 is intended for applications requiring good formability and good weldability. It is nonmagnetic even when severely cold formed.

NOTE 1—The values stated in U.S. customary units are to be regarded as the standard.

2. General Requirements for Delivery

2.1 Material furnished under this specifica-

tion shall conform to the applicable requirements of the current edition of ASTM Specification A 480, General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip.³

3. Ordering Information

3.1 Orders for material under this specification shall include the following information:

3.1.1 Quantity (weight or number of pieces),

3.1.2 Name of material (stainless steel),

3.1.3 Condition (see Section 6),

3.1.4 Dimensions,

3.1.5 Form (plate, sheet, or strip),

3.1.6 Edge, strip only (see Specification A 480),

3.1.7 Type (Table 1),

3.1.8 ASTM designation and date of issue, and

3.1.9 Additions to the specification or special requirements.

NOTE 2—A typical ordering description is as follows: 100 pieces, high-strength cold-rolled stainless steel strip, 0.050 by 16 by 120 in., Type 201, ½-Hard temper, tensile strength 150,000 psi min, ASTM A 412 dated ———

4. Process

4.1 The steel shall be made by one or more of the following processes: electric-arc, elec-

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² For ASME Boiler and Pressure Vessel Code applications see related Specification SA-412 in Section II of that code.

³ Annual Book of ASTM Standards, Part 3.



tric-induction, or other suitable commercial processes.

5. Chemical Requirements

5.1 The steel shall conform to the requirements as to chemical composition specified in Table 1.

6. Conditions

6.1 Sheet and strip may be specified in one of the following conditions:

Type	Condition
201	annealed quarter-hard half-hard three quarter-hard full-hard
202	annealed quarter-hard
XM-10	annealed
XM-11	cold rolled 10 percent annealed
XM-14	cold rolled 10 percent annealed
XM-19	annealed
XM-29	annealed

6.2 Plate may be specified in the hot-rolled annealed, hot-rolled annealed and descaled, or hot-rolled annealed and polished condition (see Section 9 of Specification A 480).

7. Mechanical Requirements

7.1 The material shall conform to the requirements as to mechanical properties specified in Table 2.

8. Bend Test Specimens

8.1 Bend test specimens shall withstand cold bending without cracking when subjected to either the free-bend method or the controlled-bend (V-block) method at the condition specified by Tables 3 or 4, respectively. The choice of method of test for materials in physical conditions other than annealed shall be at the option of the seller.

8.2 The axis of the bend test specimen shall be parallel to the direction of rolling.

8.3 The bend test specimen shall be bent around a diameter equal to the product of the bend factor times the nominal thickness of the test specimen.

8.3.1 Free-bend test specimens shall be bent cold, either by pressure or by blows. However, in case of dispute, tests shall be made by pressure.

8.3.2 Controlled-bend (V-block) test specimens shall be bent cold by means of V-blocks or a mating punch and die having an included

angle of 45 deg and with proper curvature of surface at the bend areas to impart the desired shape and diameter of bend to the specimen.

9. Tension Test Specimens

9.1 The tension test specimen for the quarter-hard, half-hard, three quarter-hard, and full-hard tempers shall be selected in the transverse direction wherever possible. The tension test specimens shall conform to Sections 7, 8, 9, and 10 of ASTM Methods and Definitions A 370, for Mechanical Testing of Steel Products.¹

NOTE 3—For plate material up to and including $\frac{3}{4}$ in. (19.1 mm) thick, the sheet-type tension specimen described in Section 8 (Fig. 5) of Methods A 370 is also permitted.

10. Number of Tests

10.1 In the case of sheet and strip produced in coil form, at least one tension test and one bend test shall be taken from each end of each coil. When material is produced in sheet, strip, or plate form, at least one tension and one bend test shall be made on each 100 or less sheets, strips, or plates of the same gage and heat produced under the same processing conditions.

11. Test Methods

11.1 The yield strength shall be determined by the offset method as described in Methods A 370. The limiting permanent offset shall be 0.2 percent of the gage length of the specimen. An alternate method of determining yield strength may be used, based on the following total extensions under load:

Yield Strength, min, psi (MPa)	Total Extension Under Load in 2-in. or 50 mm Gage Length, incl
45 000 (310)	0.0071 (0.180 mm)
75 000 (515)	0.0098 (0.249 mm)
110 000 (760)	0.0125 (0.318 mm)
135 000 (930)	0.0144 (0.366 mm)
140 000 (965)	0.0148 (0.376 mm)

11.2 The requirements of this specification for yield strength will be considered as having been fulfilled if the extension under load for the specified yield strength does not exceed the specified values. The value obtained in this manner should not, however, be taken as the actual yield strength for 0.2 percent per-

¹ Annual Book of ASTM Standards, Parts 1, 2, 3, 4, 5, and 10.