
Standard Specification for

Stainless Clad Deformed and Plain Round Steel Bars for Concrete Reinforcement

AASHTO Designation: MP 13M/MP 13-04 (2006)



1. SCOPE

- 1.1. This specification covers the stainless steel clad concrete reinforcement bars in cut lengths or coils, deformed and plain round. The standard sizes and dimensions of deformed bars and their number designations shall be those listed in Table 1 [Table 2].
- Note 1**—For coils of deformed bars, the capacity of industrial equipment limits the maximum bar size that can be straightened.
- 1.2. Bars are of three minimum yield levels: namely, 300 MPa [40000 psi], 420 MPa [60000 psi], and 520 MPa [75000 psi], designated as Grade 300 [40], Grade 420 [60], and Grade 520 [75], respectively.
- 1.3. Hot-rolled plain rounds, in sizes up to and including 50.8 mm [2 in.] in diameter in coils or cut lengths, when specified for dowels, spirals, and structural ties or supports shall be furnished under this specification in Grade 300 [40], Grade 420 [60], and Grade 520 [75] (Note 2).
For ductility properties (elongation and bending), test provisions of the nearest nominal diameter deformed bar size shall apply. Those requirements providing for deformations and marking shall not be applicable.
- Note 2**—The weight for plain rounds smaller than 9.5 mm [$\frac{3}{8}$ in.] in diameter shall be computed on the basis of the size in ASTM A 510.
- 1.4. Welding of the material in this specification should not be attempted since no experience has been demonstrated regarding weldability of this product. Mechanical coupling should be specified for bars requiring continuous longitudinal connection. Mechanical couplings must conform to ASTM A 276, UNS S31803.
- 1.5. This specification is applicable for orders in either SI units (MP 13M) or in inch-pound units (MP 13). SI units and inch-pound units are not necessarily equivalent. Inch-pound units are shown in brackets in the text for clarity, but they are the applicable values when the material is ordered to MP 13.

Table 1—Deformed Bar Designation Numbers, Nominal Masses, Nominal Dimensions, and Deformation Requirements, SI Units

Bar Designation No. ^b	Nominal Mass, kg/m	Nominal Dimensions ^a			Deformation Requirements, mm		
		Diameter, mm	Cross-Sectional Area, mm ²	Perimeter, mm	Maximum Average Spacing	Minimum Average Height	Maximum Gap (Chord of 12.5% of Nominal Perimeter)
10	0.560	9.5	71	29.9	6.7	0.38	3.6
13	0.994	12.7	129	39.9	8.9	0.51	4.9
16	1.552	15.9	199	49.9	11.1	0.71	6.1
19	2.235	19.1	284	59.8	13.3	0.97	7.3
22	3.042	22.2	387	69.8	15.5	1.12	8.5
25	3.973	25.4	510	79.8	17.8	1.27	9.7
29	5.060	28.7	645	90.0	20.1	1.42	10.9
32	6.404	32.3	819	101.3	22.6	1.63	12.4
36	7.907	35.8	1006	112.5	25.1	1.80	13.7
43	11.38	43.0	1452	135.1	30.1	2.16	16.5
57	20.24	57.3	2581	180.1	40.1	2.59	21.9

^a The nominal dimensions of a deformed bar are equivalent to those of a plain round bar having the same mass per meter as the deformed bar.

^b Bar designation numbers approximate the number of millimeters of the nominal diameter of the bar.

Table 2—Deformed Bar Designation Numbers, Nominal Weights, Nominal Dimensions, and Deformation Requirements, U.S. Customary Units

Bar Designation No. ^b	Nominal Weight, lb/ft	Nominal Dimensions ^a			Deformation Requirements, in.		
		Diameter, in.	Cross-Sectional Area, in. ²	Perimeter, in.	Maximum Average Spacing	Minimum Average Height	Maximum Gap (Chord of 12.5% of Nominal Perimeter)
3	0.376	0.375	0.11	1.178	0.262	0.015	0.143
4	0.668	0.500	0.20	1.571	0.350	0.020	0.191
5	1.043	0.625	0.31	1.963	0.437	0.028	0.239
6	1.502	0.750	0.44	2.356	0.525	0.038	0.286
7	2.044	0.875	0.60	2.749	0.612	0.044	0.334
8	2.670	1.000	0.79	3.142	0.700	0.050	0.383
9	3.400	1.128	1.00	3.544	0.790	0.056	0.431
10	4.303	1.270	1.27	3.990	0.889	0.064	0.487
11	5.313	1.410	1.56	4.430	0.987	0.071	0.540
14	7.65	1.693	2.25	5.32	1.185	0.085	0.648
18	13.60	2.257	4.00	7.09	1.58	0.102	0.864

^a The nominal dimensions of a deformed bar are equivalent to those of a plain round bar having the same weight per foot as the deformed bar.

^b Bar designation numbers are based on the number of eighth of an inch included in the nominal diameter of the bars.

2. REFERENCED DOCUMENTS

2.1. AASHTO Standards:

- R 11, Indicating Which Places of Figures Are to Be Considered Significant in Specified Limiting Values
- T 244, Mechanical Testing of Steel Products
- T 285, Bend Test for Bars for Concrete Reinforcement

- 2.2. *ASTM Standards:*
- A 6/A 6M, General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling
 - A 264, Specification for Stainless Chromium-Nickel Steel-Clad Plate
 - A 276, Specification for Stainless Steel Bars and Shapes
 - A 510, Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel
 - A 510M, Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel [Metric]
 - A 700, Standard Practices for Packaging, Marking, and Loading Methods for Steel Products for Shipment
 - A 959, Standard Guide for Specifying Harmonized Standard Grade Compositions for Wrought Stainless Steels
 - E 190, Test Method for Guided Bend Test for Ductility of Welds
 - G 12, Test Method for Nondestructive Measurement of Film Thickness of Pipeline Coatings on Steel
- 2.3. *Military Standards:*
- MIL-STD-129, Marking for Shipment and Storage
 - MIL-STD-163, Steel Mill Products Preparation for Shipment and Storage
- 2.4. *Federal Standard:*
- Fed. Std. No. 123, Marking for Shipment (Civil Agencies)

3. TERMINOLOGY

- 3.1. *Definition of Terms Specific to This Standard:*
- 3.1.1. *completed bar*—steel bar with stainless cladding and deformations (if deformed).
- 3.1.2. *deformed bar*—steel bar with protrusions; a bar that is intended for use as reinforcement in reinforced concrete construction.
- 3.1.2.1. *Discussion*—The surface of the bar is provided with lugs or protrusions that inhibit longitudinal movement of the bar relative to the concrete surrounding the bar in such construction. The lugs or protrusions conform to the provisions of this specification.
- 3.1.3. *deformations*—protrusions on a deformed bar.
- 3.1.4. *metallurgical bonding*—the joining of metals so as to form a permanent joint between the mating surfaces. The principal requirements of joining two metals to achieve a metallurgical bond are thoroughly clean surfaces, heat energy, and mechanical pressure.
- 3.1.5. *plain bar*—a round, square, or hexagonal steel bar without protrusions.
- 3.1.6. *rib*—longitudinal protrusion on a deformed bar.
- 3.1.7. *stainless clad bar*—steel bar with stainless cladding for corrosion protection.

- 3.1.7.1. *Discussion*—The stainless cladding on the surface of the bar is provided by means of metallurgical bonding with the base steel. The stainless cladding offers corrosion protection to the level provided by the thickness of the alloy furnished. The stainless steel clad reinforcement shall conform to the provisions of this specification.

4. ORDERING INFORMATION

- 4.1. *Orders for material under this specification should include the following information:*
- 4.1.1. Quantity (mass) [weight],
 - 4.1.2. Name of material (stainless clad deformed and plain round steel bars for concrete reinforcement),
 - 4.1.3. Size,
 - 4.1.4. Cut length or coils,
 - 4.1.5. Deformed or plain round,
 - 4.1.6. Grade,
 - 4.1.7. Packaging (see Section 19),
 - 4.1.8. AASHTO designation and year of issue,
 - 4.1.9. Certified mill test reports (if desired), and
 - 4.1.10. Country of origin, which identifies producer and where material was produced.

Note 3—A typical ordering description is as follows: 10 000 kg , stainless clad deformed and plain round steel bars for concrete reinforcement, No. 25, 18 m long, deformed, Grade 420, in secured lifts, to MP 13M/MP 13-___. Certified mill test reports are required. Metric: Bundles shall have tags identifying producer, heat/lot number, and where material was manufactured. [10 tons, stainless clad deformed and plain round steel bars for concrete reinforcement, No. 8, 60 ft 0 in. long, deformed, Grade 60, in secured lifts, to MP 13M/MP 13-___. Certified mill test reports are required.] Customary: Bundles shall have tags identifying producer, heat/lot number, and where material was manufactured.

5. MATERIALS AND MANUFACTURE

- 5.1. The bars shall be rolled from properly identified heats/lots of stainless clad and core steel billets.

6. CHEMICAL REQUIREMENTS OF BAR

- 6.1. The manufacturer shall make an analysis of each heat/lot of steel from test samples taken preferably on the finished product. The percentages of required elements identified in Table 3 shall be determined along with identification of stainless alloy cladding, and conformance of its analysis with ASTM A 276, Type 316 or Type 316L.