
Standard Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement

AASHTO Designation: M 322M/M 322-22

Technically Revised: 2022

Technical Subcommittee: 4f, Metals

ASTM Designation: A996/A996M-16



**American Association of State Highway and Transportation Officials
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1. SCOPE

- 1.1. This specification covers rail-steel and axle-steel bars for concrete reinforcement. Three types of product are included, designated with a “rail symbol” and an “R” for bars made of rail-steel and with an “A” for bars made of axle-steel. The standard sizes and dimensions of deformed bars and their number designations are given in Table 1. All sizes and grades of all types may not be readily available; manufacturers should be consulted to verify availability.
- 1.2. The text of this specification references notes and footnotes that provide explanatory material. These notes and footnotes, excluding those in tables and figures, shall not be considered as requirements of the specification.
- 1.3. Type “rail symbol” and Type R are of two minimum yield levels, namely 350 MPa [50,000 psi] and 420 MPa [60,000 psi], designated as Grade 350 [50] and Grade 420 [60], respectively. Type A is of two minimum yield levels, namely 300 MPa [40,000 psi] and 420 MPa [60,000 psi], designated as Grade 300 [40] and Grade 420 [60].
- 1.4. The weldability of the steel is not a requirement of this specification.
- 1.5. This specification is applicable for orders in either SI units (M 322M) or inch-pound units (M 322).
- 1.6. The values stated in either SI units or inch-pound units are to be regarded as standard. Within the text, the inch-pound units are shown in brackets. The values stated must be used independently of the other. Combining values from the two systems may result in nonconformance with the specification.
- 1.7. *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 establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

Table 1—Deformed Bar Designation Numbers, Nominal Masses [Weights], Nominal Dimensions, and Deformation Requirements

Bar Designation No.	Nominal Mass [Weight], kg/m [lb/ft]	Nominal Dimensions ^a			Deformation Requirements, mm		
		Diameter, mm [in.]	Cross-Sectional Area, mm ² [in. ²]	Perimeter, mm [in.]	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
[3]	[0.376]	[0.375]	[0.11]	[1.178]	[0.262]	[0.015]	[0.143]
13	0.994	12.7	129	39.9	8.9	0.51	4.9
[4]	[0.668]	[0.500]	[0.20]	[1.571]	[0.350]	[0.020]	[0.191]
16	1.552	15.9	199	49.9	11.1	0.71	6.1
[5]	[1.043]	[0.625]	[0.31]	[1.963]	[0.437]	[0.028]	[0.239]
19	2.235	19.1	284	59.8	13.3	0.97	7.3
[6]	[1.502]	[0.750]	[0.44]	[2.356]	[0.525]	[0.038]	[0.286]
22	3.042	22.2	387	69.8	15.5	1.12	8.5
[7]	[2.044]	[0.875]	[0.60]	[2.749]	[0.612]	[0.044]	[0.334]
25	3.973	25.4	510	79.8	17.8	1.27	9.7
[8]	[2.670]	[1.000]	[0.79]	[3.142]	[0.700]	[0.050]	[0.383]
29	5.060	28.7	645	90.0	20.1	1.42	10.9
[9]	[3.400]	[1.128]	[1.00]	[3.544]	[0.790]	[0.056]	[0.431]
32	6.404	32.3	819	101.3	22.6	1.63	12.4
[10]	[4.303]	[1.270]	[1.27]	[3.990]	[0.889]	[0.064]	[0.487]
36	7.907	35.8	1006	112.5	25.1	1.80	13.7
[11]	[5.313]	[1.410]	[1.56]	[4.430]	[0.987]	[0.071]	[0.540]

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

2. REFERENCED DOCUMENTS

2.1. *AASHTO Standard:*

- T 244, Mechanical Testing of Steel Products

2.2. *ASTM Standards:*

- A700, Standard Guide for Packaging, Marking, and Loading Methods for Steel Products for Shipment
- A751, Standard Test Methods, Practices and Terminology for Chemical Analysis of Steel Products
- E29, Standard Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications
- E290, Standard Test Methods for Bend Testing of Material for Ductility

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. *Description of Terms Specific to This Standard:*