

SECOND
PRINTING

MSP-2-01

FULL SPACE

CONTINUOUS FULL SPACINGS

FULL SPACE

MANUAL OF STANDARD PRACTICE

12d for #6, 7, 8
[#19, #22, #25]
6d for #3, 4, 5
[#10, #13, #16]

Detailing
Dimension

Hook
A or G

Beam

90°

Beam

135°



6d, 3"
[75 mm] Min.



CONCRETE REINFORCING STEEL INSTITUTE

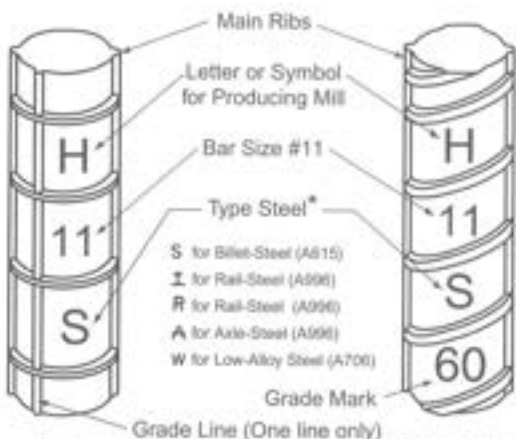
DATE: MAY 2003

ASTM STANDARD INCH-POUND REINFORCING BARS

BAR SIZE DESIGNATION	NOMINAL DIMENSIONS		
	AREA (in. ²)	WEIGHT (lb/ft)	DIAMETER (in.)
#3	0.11	0.376	0.375
#4	0.20	0.668	0.500
#5	0.31	1.043	0.625
#6	0.44	1.502	0.750
#7	0.60	2.044	0.875
#8	0.79	2.670	1.000
#9	1.00	3.400	1.128
#10	1.27	4.303	1.270
#11	1.56	5.313	1.410
#14	2.25	7.65	1.693
#18	4.00	13.60	2.257

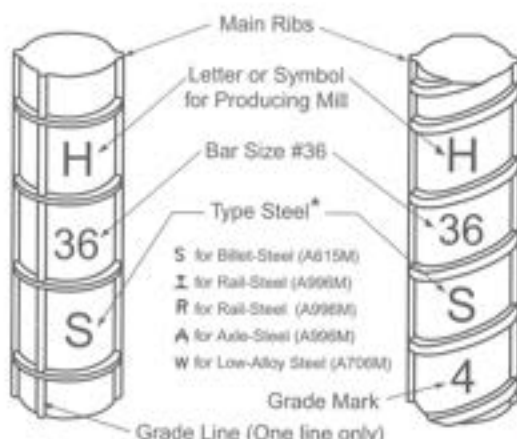
The current A615 specification covers bar sizes #14 and #18 in Grade 60, and bar sizes #11, #14 and #18 in Grade 75. The current A706 specification also covers bar sizes #14 and #18. Bar sizes #9 through #18 are not included in the A996 specification.

MATERIAL SPECIFICATIONS FOR REINFORCING BARS



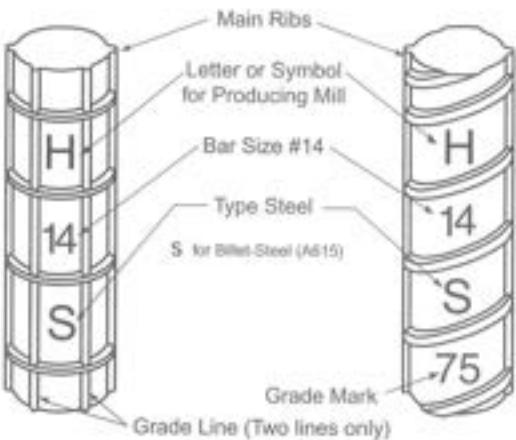
*Bars marked with an S and W meet both A615 and A706

GRADE 60

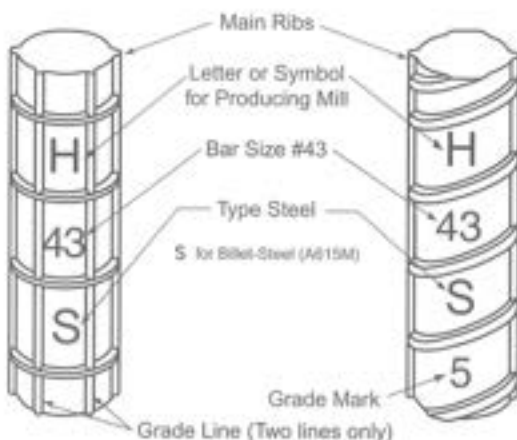


*Bars marked with an S and W meet both A615 and A706

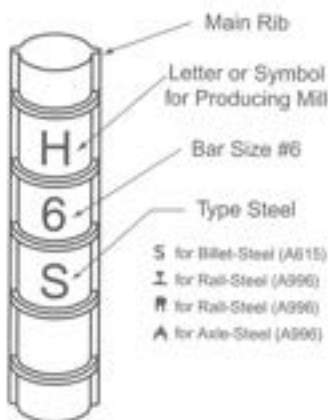
GRADE 420



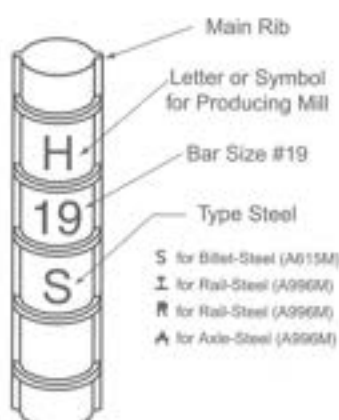
GRADE 75



GRADE 520



GRADES 40 AND 50



GRADES 300 AND 350

MATERIAL SPECIFICATIONS FOR REINFORCING BARS

1.6.2 Project Drawings and Project Specifications

The Architect/Engineer should indicate on the project drawings or in the project specifications:

- The welding of reinforcing bars shall conform to the ANSI/AWS D1.4 Welding Code;
- The type and location of welded splices of reinforcing bars;
- Other required welding.

ANSI/AWS D1.4 requires the Contractor to prepare a written welding procedure specification (WPS) for each welded splice conforming to the requirements of the Welding Code. The ASTM A706/A706M specification requires the reinforcing bar Producer to report the chemical composition and carbon equivalent of the steel. For billet-steel reinforcing bars, the ASTM A615/A615M specification requires the Producer to determine the percentages of certain chemical elements including carbon and manganese. Reporting these material properties should be required in the project specifications so that the Contractor will have the carbon equivalent available for the reinforcing bars to be welded.

1.6.3 CRSI Recommendations

1. Minimize manual arc welding in the field, wherever possible. Consider the use of mechanical splices as an alternative to welded splices.
2. Where arc-welded splices are used, the following are required:
 - a. Welding should conform to ANSI/AWS D1.4 "Structural Welding Code—Reinforcing Steel"
 - b. Mill test analysis of the reinforcing bars for calculating "carbon equivalent" (C.E.)
 - c. Adjustment of welding techniques to suit C.E. values and job-site temperatures
 - d. The correct strength, grade, and size of low-hydrogen electrodes, kept oven dry
 - e. Qualification tests to certify all welders before beginning a construction project and periodically thereafter during long-term projects
 - f. Continuous supervision of all welding operations
 - g. Radiography or other suitable nondestructive inspection of a percentage of welds (normally about 25 percent of the welds selected at random)
 - h. Occasional quality control tests of actual welds removed from the structure when nondestructive test results are unsatisfactory
3. Chemical analyses are not ordinarily meaningful for rail-steel and axle-steel reinforcing bars. Welding of these types of bars is not recommended.

4. Unless approved by the Architect/Engineer, never permit field welding of crossing bars for assembly and fastening of reinforcement. Such welds, called "tack" welding or "spot" welding, may affect the strength and ductility of the bars. Reinforcement should be assembled and fastened with tie wire to avoid harming the bars.

1.7. Identification Marks*—ASTM Standard Reinforcing Bars

The ASTM specifications for reinforcing bars require identification marks to be rolled into the surface on one side of the bar to denote the Producer's mill designation, bar size, type of steel, and minimum yield designation. Grade 60 [420] bars show these marks in the following order:

- 1st—Producing Mill (usually a letter)
- 2nd—Bar Size Number (#3 through #11, #14, #18 [#10 through #57])
- 3rd—Type of Steel:

S for Billet-Steel (A615/A615M)

W for Low-Alloy Steel (A706/A706M)

I for Rail-Steel (A996/A996M)

R for Rail-Steel (A996/A996M)

A for Axle-Steel (A996/A996M)

- 4th—Minimum Yield Strength Designation

A mark for minimum yield designation or grade is required for Grade 60 [420] and Grade 75 [520] bars only. Grade 60 [420] bars can either have one single longitudinal line (a grade line) or the number 60 [4] (a grade mark). Grade 75 [520] bars can either have two grade lines or the grade mark 75 [5].

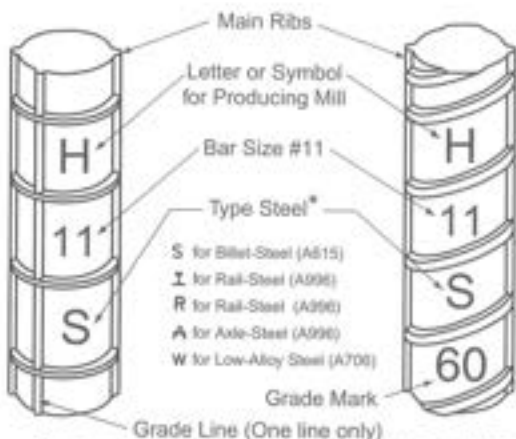
A grade line is smaller and is located between the two main longitudinal ribs which are on opposite sides of all bars rolled in the United States. A grade line must be continued through at least 5 deformation spaces, and it may be placed on the same side of the bar as the other markings or on the opposite side.

Grade 40 [300] and 50 [350] bars are required to have only the first three identification marks. No grade mark or grade line for minimum yield strength is required.

VARIATIONS: Bar identification marks may also be oriented to read horizontally (at 90° to those illustrated). Grade mark numbers may be placed within separate consecutive deformation spaces to read vertically or horizontally.

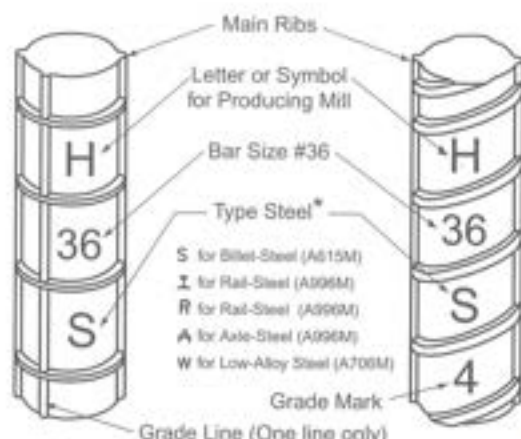
*See Appendix A for complete identification marks of Grade 60 [420] reinforcing bars produced by all U.S. Producers. The marks, listed alphabetically by producing mill, include the identification requirements of ASTM and the deformation pattern used by each mill.

MATERIAL SPECIFICATIONS FOR REINFORCING BARS



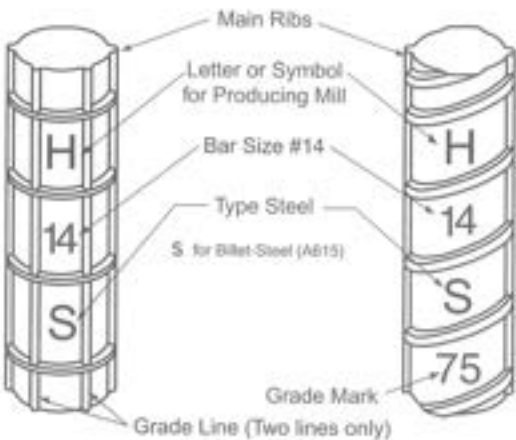
*Bars marked with an S and W meet both A615 and A706

GRADE 60

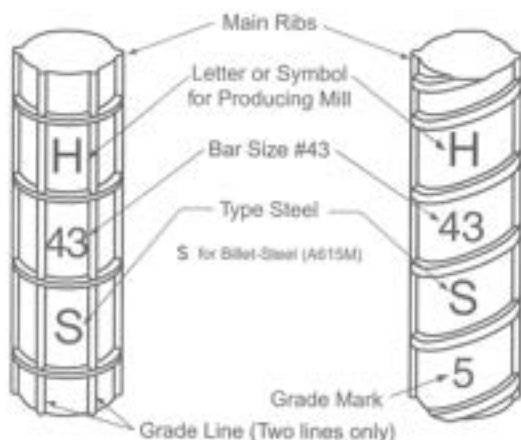


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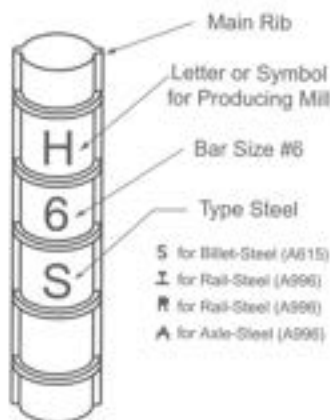
GRADE 420



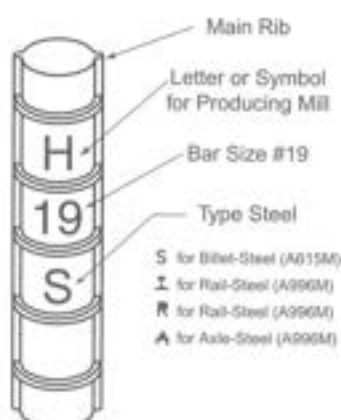
GRADE 75



GRADE 520



GRADES 40 AND 50



GRADES 300 AND 350