



STEEL REINFORCING BARS

QUICK-CARDS® A SIMPLE QUICK-REFERENCE GUIDE

Based on the CRSI
the ACI and the
ASTM Standards

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REINFORCING BARS (REBAR) BASICS & IDENTIFICATION

REINFORCING BAR (REBAR) BASICS

- Rebar is short for reinforcing bar.
- Rebar is also known as reinforcing steel and reinforcement steel.
- Rebar is a steel bar or mesh of steel wires used as a tensile device in reinforced concrete and reinforced masonry structures.
- Rebar is used to strengthen and hold the concrete in compression.
- Concrete is strong under compression, but has weak tensile strength.
- Rebar significantly increases the tensile strength of the structure.
- Rebar's surface is often patterned to form a better bond with the concrete.
 - The deformed pattern on a rebar helps concrete adhere to the rebar surface.
 - Specific pattern is not specified but spacing and the height of the "bumps" is regulated.
- Most common type of rebar is carbon steel.
 - Other readily available rebar types include stainless steel, galvanized steel, epoxy-coated, low carbon chromium, etc.

ASTM REINFORCING BARS (MIL/POUND)

Bar Size Designation	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	3.49	1.125
#10	1.27	4.302	1.250
#11	1.56	5.313	1.406
#14	3.00	10.65	1.660
#18	6.00	21.30	2.250

The current ASTM specification covers bar sizes #3 and #18 in Grade 60 and bar sizes #3, #4 and #18 in Grade 75. The current ASTM specification covers bar sizes #4 and #14 in Grade 40 and #10 through #18 are not included in this ASTM.

ASTM REINFORCING BARS (METRIC)

Bar Size Designation	Area (mm ²)	Weight (kg/m)	Diameter (mm)
A30	71	0.360	9.5
A36	129	0.584	12.7
A40	199	1.002	16.0
A55	284	1.375	20.0
A63	357	1.742	22.2
A75	509	2.472	25.4
A92	645	3.090	28.7
A103	809	3.924	32.3
A135	1306	6.167	40.0
A180	2452	11.98	48.0
A227	2841	13.94	57.3

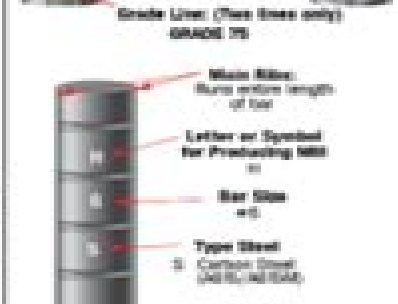
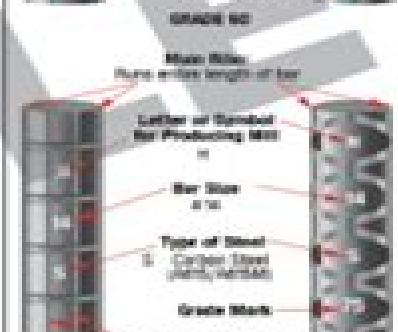
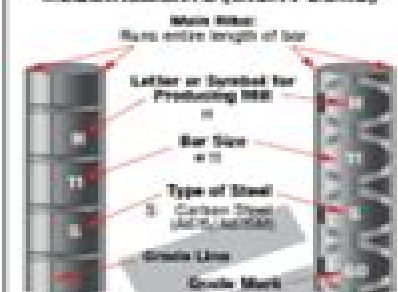
The current ASTM specification covers bar sizes A30 and A103 in Grade 60 and bar sizes A36, A40 and A103 in Grade 75. The current ASTM specification covers bar sizes A40 and A103 in Grade 40 and #10 through #18 are not included in this ASTM.

REINFORCING BAR IDENTIFICATION

- 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.
- Required Identification Markings on Reinforcing Bars:
 - 1st Marking - Point of Origin / Producing Mill**
Letter(s) or symbol(s) of producing mill
 - 2nd Marking - Size Designation**
Bar Size Number (#3 through #18, #19, #21) (#10 through #57)
 - 3rd Marking - Type of Reinforcing Steel**
Type of Steel usually either "C" for carbon steel (ASTM A615) or "W" for low-alloy steel (ASTM A706)
 - S** Carbon-Steel (A615/A615M)
 - A** Alloy-Steel (A995/A995M)
 - W** Low-Alloy Steel (A706/A706M)
 - SS** Stainless Steel (A955/A955M)
 - CS** Low-Carbon Chromium (A1005/A1005M)
 - R** or **II** Rail-Steel (A996/A996M)

- 4th Marking - Yield Strength Designation**
 - Minimum Yield Strength Designation/Grade Marking (60, 75, 80, 100, 120) or by the addition of one line (90) or two lines (70), three lines (80, 100) or four lines (70) that must be at least five deformation spaces long.
 - Grade 60 bars can either have one single longitudinal line (a grade line) or the number 60 (a grade mark).
 - Grade 75 bars can either have two grade lines or the grade mark 75.
 - A grade line is smaller and is located between the two main longitudinal ribs which are on opposite sides of all bars noted in the U.S.
 - 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 and 50 bars are required to have only the first three identification marks (no grade mark or grade line for minimum yield strength designation is required).
- Bar identification marks can be oriented vertically (as illustrated on this page) or horizontally (at 90° to those illustrated).
- Grade mark numbers must be placed within separate consecutive deformation spaces to read vertically or horizontally.

ASTM REINFORCING BAR MARKING REQUIREMENTS (MIL/POUND)



DEFORMATION GAP



REINFORCING BAR DEFORMATION REQUIREMENTS

Bar Size	Max. Average Spacing (inches)	Min. Average Height (inches)	Max. Gap (inches)
#3 (#30)	0.262	0.076	0.043
#4 (#40)	0.360	0.076	0.091
#5 (#50)	0.407	0.076	0.239
#6 (#60)	0.520	0.076	0.296
#7 (#70)	0.642	0.094	0.334
#8 (#80)	0.760	0.094	0.383
#9 (#90)	0.889	0.094	0.427
#10 (#100)	1.000	0.076	0.540
#11 (#110)	1.000	0.094	0.640
#14 (#140)	1.50	0.094	0.894

1 Deformation of rebar diameter.
2 (Note) of 0.1% of nominal perimeter. See figure for measurement of the gap.

Crsi Detailing Manual

Concrete Reinforcing Steel Institute

A red circular graphic with a gradient, appearing as a stylized arrow or a partial circle, located to the right of the text 'Concrete Reinforcing Steel Institute'.

Crsi Detailing Manual:

SP-66(04): ACI Detailing Manual-2004 , *CRSI Recommended Practice for Placing Reinforcing Bars* Concrete Reinforcing Steel Institute, Raymond C. Reese, 1959 **Manual of Standard Practice** Concrete Reinforcing Steel Institute, 2003 Building Code Requirements for Structural Concrete (ACI 318-05) and Commentary (ACI 318R-05) ACI Committee 318, 2005 Building Code Requirements for Structural Concrete (ACI 318-08) and Commentary ACI Committee 318, American Concrete Institute, 2008 The quality and testing of materials used in construction are covered by reference to the appropriate ASTM standard specifications Welding of reinforcement is covered by reference to the appropriate AWS standard Uses of the Code include adoption by reference in general building codes and earlier editions have been widely used in this manner The Code is written in a format that allows such reference without change to its language Therefore background details or suggestions for carrying out the requirements or intent of the Code portion cannot be included The Commentary is provided for this purpose Some of the considerations of the committee in developing the Code portion are discussed within the Commentary with emphasis given to the explanation of new or revised provisions Much of the research data referenced in preparing the Code is cited for the user desiring to study individual questions in greater detail Other documents that provide suggestions for carrying out the requirements of the Code are also cited **State and Local Highway Training and Technology Resources**, 1989 This directory brings together training resource data as reported from technology transfer centers state highway agencies professional organizations universities and the Federal Highway Administration It gives specific information on available training resources on bridges drainage engineering equipment management other resources road surface roadside safety subgrade traffic control and winter Structural Design Guide to the ACI Building Code Edward S. Hoffman, David P. Gustafson, Albert J. Gouwens, 2013-03-09 This book is intended to guide practicing structural engineers familiar with earlier ACI building codes into more profitable routine designs with the ACI 1995 Building Code ACI 318 95 Each new ACI Building Code expresses the latest knowledge of reinforced concrete in legal language for safe design application Beginning in 1956 with the introduction of ultimate strength design each new code offered better utilization of high strength reinforcement and the compressive strength of the concrete itself Each new code thus permitted more economy as to construction material but achieved it through more detailed and complicated design calculations In addition to competition requiring independent structural engineers to follow the latest code for economy it created a professional obligation to follow the latest code for accepted levels of structural safety The increasing complexity of codes has encouraged the use of computers for design and has stimulated the development of computer based handbooks Before computer software can be successfully used in the structural design of buildings preliminary sizes of structural elements must be established from handbook tables estimates or experienced first guesses for input into the computer **Reinforcing Bar Detailing**, 1988 **Building Inspection Manual** Karl F. Schmid, 2014-06-24 This new book

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