METHODS OF SAMPLING AND TESTING
MT 414-23
METHOD OF ACCEPTANCE FOR REINFORCING STEEL

1 Scope

1.1 This procedure describes the sampling and acceptance methods for reinforcing steel when random sampling is requested by the Project Manager.

1.2 Acceptance of reinforcing steel is based on documentation and sampling (as required or requested).

1.3 This method is applicable to carbon-steel and corrosion resistant (i.e., stainless steel and chromium alloyed steel) reinforcing steel.

2 Referenced Documents

AASHTO

M 31 Deformed and Plain Carbon and Low-Alloy Steel Bars for Concrete Reinforcement
M 334 Uncoated, Corrosion-Resistant, Deformed and Plain Chromium Alloyed, Billet-Steel Bars for Concrete Reinforcement and Dowels

ASTM

A615 Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
A955 Standard Specification for Deformed and Plain Stainless-Steel Bars for Concrete Reinforcement
A1035 Standard Specification for Deformed and Plain, Low-Carbon, Chromium, Steel Bars for Concrete Reinforcement

MDT

Standard Specifications for Road and Bridge Construction
Materials Manual of Test Procedures
MT 601 Materials Sampling, Testing, and Acceptance Guide Index

3 Required Documents

3.1 For each shipment of reinforcing steel delivered to the project, the contractor shall furnish the required documents specified in Standard Specifications § 555.03.5.

3.2 A shipment is defined as the entire quantity of reinforcing bars in each truckload delivered to the project. When reinforcing steel is shipped via rail, a shipment is 20 tons, or a fraction thereof.

4 Random Sampling

4.1 Corrosion resistant reinforcing steel is to be sampled and tested for acceptance. MDT reserves the right to sample and test carbon-steel reinforcing steel. Reinforcing steel is randomly sampled as requested by the Project Manager. Samples will be taken, at a minimum, following the frequency identified in MT 601. Sampling will be done by the contractor as directed by the Project Manager and witnessed by MDT personnel.

5 Sample Locations

5.1 The following are locations within the structure where reinforcing steel samples may be taken, or the remaining portion of the sampled bar may be placed, without adverse effect on the structure. The Bridge Bureau must be contacted if clarification is required on the location of any sample bar.

5.1.1 Footing

The outermost bar in the mat may be sampled. The portion of the bar remaining shall be centered in the footing and used as is.

5.1.2 Column

The bar nearest the centerline of bent at centerline of structure may be sampled. The sample shall be taken from the top end. The remaining portion of the bar may be used as is.

5.1.3 Slab - Transverse Steel

Take sample from bar in bottom layer. Center remaining portion of bar between curbs.

5.1.4 Slab - Longitudinal Steel

Take sample from any line of bars in bottom of slab adjacent to edge of a beam at the end of slab.

5.1.5 Curb

No sample need be taken.

5.1.6 Bent Cross Beam

The center bar in bottom layer at bottom of beam may be sampled. Center remaining portion of bar between columns.

5.1.7 T Type Pier Cap

The center bar in bottom layer at top of cap may be sampled. Center remaining portion of bar over column.

5.2 Forward samples immediately to the Materials Bureau for testing in accordance with AASHTO M 31 or AASHTO M 334.

5.3 Keep the sampled shipment separate from the other reinforcing steel shipments on the project until test results have been received.

5.4 Reinforcing steel taken for the purpose of sampling may have to be replaced in the structure. When replacement is necessary, it shall be done by the contractor at no cost to MDT.

5.5 If re-sampling occurs under Section 6.1 because of a failure, the contractor will need to replace the sampled portion plus the required lap length.

6 Failing Steel

6.1 In the event that a sample of reinforcing steel fails, two additional (check) samples representing the original sample that failed may be submitted. The check samples must be from the same lot and heat number as the original sample. Both of the check samples must meet specifications before the shipment will be accepted.

Note: Both check samples must be witnessed by MDT as being from the same lot and heat number as the original sample. Factory samples submitted with the shipment are not acceptable for sample submission.

6.2 If both of the check samples fail, the steel may be rejected in accordance with Section 6.3 or a price reduction may be assessed in accordance with Section 6.4.

6.3 MDT may order the failing steel to be removed and replaced at no cost to MDT.

6.4 If the Project Manager determines that the steel is usable, a price reduction will be assessed against the contractor. The price reduction will be calculated using the following formula:

$$P = A \times B$$

Where:

A = total invoice price of reinforcing steel in the lot.*
B = 10%, 20% or 30% dependent upon departure from specifications; the value to be used shall be determined by the Project Manager.
P = Price reduction for the lot.

* A lot is defined as all of the bars of one bar number and pattern of deformation contained in an individual shipment.

7 Standard Weights, Diameters and Number Designations

7.1 The standard weights and diameters of deformed reinforcing bars and their number designations shall be those listed in Table 1.

7.1.1 The four minimum yield levels of bars are: 40,000 psi; 60,000 psi; 75,000 psi, and 100,000 psi, designated as Grade 40, Grade 60, Grade 75, and Grade 100, respectively.

7.1.2 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.

7.1.3 Bar numbers are based on the number of eighths of an inch included in the nominal diameter of the bars.

TABLE 1
Rebar Dimension Reference

Bar Size[a]	Nominal Diameter, In. [mm]	Weight lb/ft [kg/m].
3 [10]	0.375 [9.5]	0.376 [0.560]
4 [13]	0.500 [12.7]	0.668 [0.994]
5 [16]	0.625 [15.69]	1.043 [1.552]
6 [19]	0.750 [19.1]	1.502 [2.235]
7 [22]	0.875 [22.2]	2.044 [3.042]
8 [25]	1.000 [25.4]	2.670 [3.973]
9 [29]	1.128 [28.7]	3.400 [5.060]
10 [32]	1.270 [32.3]	4.303 [6.404]
11 [36]	1.410 [35.8]	5.313 [7.907]
14 [43]	1.693 [43.0]	7.650 [11.38]
18 [57]	2.257 [57.3]	13.600 [20.24]

[a]Bar size is based on the number of eighths of an inch included in the nominal diameter of the bars. [Bar size in metric units.]