METHODS OF SAMPLING AND TESTING
MT 414-09
METHOD OF ACCEPTANCE FOR REINFORCING STEEL

1 Scope:

1.1 The procedure set forth in this method will be followed for the acceptance of all reinforcing steel. The acceptance will be based on certain documents and random sampling.

2 Referenced Documents:

2.1 ***AASHTO:***
M 31 Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement

ASTM:
A 615 Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement

3 Required Documents:

3.1 For each shipment of reinforcing steel delivered to the project, the contractor shall furnish two copies each of the following documents to the Project Manager:

3.1.1 Shipping invoice that shows the weight of all the steel in the shipment.

Note 1 - In the event the steel does not meet the specification requirements, a copy of the manufacturer's invoiced price per pound for this material must be provided.

3.1.2 A signed and dated contractors Certificate of Compliance (Form 406).

3.2 A shipment shall consist of the entire amount of reinforcing steel in each truckload delivered to the project. When a shipment is made by railroad, each 20 tons or fraction thereof will be considered a shipment.

3.3 The Project Manager will retain one set of the documents shown above for his files. The other set will be forwarded to the Materials Bureau after the Project Manager has indicated on the invoice the method by which the steel was accepted. One of the following statements, together with the Project Manager's signature, will be shown on the invoice sent to Helena:

3.3.1 *"Shipment accepted on Form 46 and Form 406, no sample taken."*

3.3.2 *"Shipment accepted on Form 46 and Form 406 and acceptable test results."*

4 Random Sample Requirement:

4.1 In addition to the required documents, a minimum random sampling procedure will be adopted.

4.2 As shipments of steel arrive on the project, it will be the responsibility of the Project Manager to decide how many samples, if any, he will take and when and where they will be taken. Sampling will be done by the contractor as directed by the Project Manager in accordance with MT-601, using table 1 as a guide to indicate the minimum number of samples to be taken.

4.3 The following are locations in 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.

4 Random Sample Requirement: (continued)

4.3.1 *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.

4.3.2 *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.

4.3.3 *Slab* - Transverse Steel - Take sample from bar in bottom layer. Center remaining portion of bar between curbs.

4.3.4 *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.

4.3.5 *Curb* - No sample need be taken.

4.3.6 *Bent Cross Beam* - The center bar in bottom layer at bottom of beam may be sampled. Center remaining portion of bar between columns.

4.3.7 *T Type Pier Cap* - The center bar in bottom layer at top of cap may be sampled. Center remaining portion of bar over column.

4.3.8 If re-sampling under paragraph 6.1.1.1 becomes necessary because of a failure, it will be necessary for the contractor to replace the sampled portion plus the required lap length.

4.4 Samples taken will be forwarded immediately to the Materials Bureau for testing in accordance with ASTM A 615 or AASHTO M 31.

4.5 The shipment under test shall be kept separate from the other steel on the project until test results have been received.

4.6 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 the State.

5 Domestic Materials:

5.1 No steel will be accepted if it does not comply with Montana Standard Specification for Road and Bridge Construction, Section 106.09.

6 Failing Steel:

6.1 In case there is a failure in any size tested under this random sampling procedure, the steel may be rejected in accordance with 6.1.1 or, a price reduction will be assessed in accordance with 6.1.2.

6.2 The failing steel may be ordered removed and replaced at no cost to the State if either of the two check samples fail as described in paragraph 6.1.1.1, below.

6.3 In the event that a sample of reinforcing steel fails, two additional samples representing the sample that failed may be submitted. Both of the check samples must meet specifications before the shipment will be accepted without price reduction.

6.4 If the Bridge Engineer 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:

6 Failing Steel: (continued)

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 Bridge Engineer.

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 three minimum yield levels of bars are: 40,000 psi; 60,000 psi; and 75,000 psi, designated as Grade 40, Grade 60, and Grade 75, 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
English Version

Bar Size	Nominal Dia. Inches	Wt. Lb. Per Ft.	Minimum Sampling Frequency per Project
3	.375	.376	No sample for less than 2 tons 1 sample for ea. 5 tons or fraction
4	.500	.668	No sample for less than 5 tons 1 sample for ea. 40 tons or fraction
5	.625	1.043	No sample for less than 5 tons 1 sample for ea. 40 tons or fraction
6	.750	1.502	No sample for less than 5 tons 1 sample for ea. 85 tons or fraction
7	.875	2.044	No sample for less than 5 tons 1 sample for ea. 85 tons or fraction
8	1.000	2.670	No sample for less than 10 tons 1 sample for ea. 150 tons or fraction
9	1.128	3.400	No sample for less than 10 tons 1 sample for ea. 150 tons or fraction
10	1.270	4.303	No sample for less than 10 tons 1 sample for ea. 240 tons or fraction
11	1.410	5.313	No sample for less than 10 tons 1 sample for ea. 240 tons or fraction
14	1.693	7.650	One sample
18	2.257	13.600	One sample

TABLE 1
Metric Version

Bar Size	Nominal Dia. mm	Wt. Kg/m	Minimum Sampling Frequency per Project
10	9.5	0.560	No sample for less than 2 metric tons (t) 1 sample for ea. 5 metric tons (t)or fraction
13	12.7	0.994	No sample for less than 5 metric tons (t) 1 sample for ea. 36 metric tons (t)or fraction
16	15.69	1.552	No sample for less than 5 metric tons (t) 1 sample for ea. 36 metric tons (t)or fraction
19	19.1	2.235	No sample for less than 5 metric tons (t) 1 sample for ea. 77 metric tons (t)or fraction
22	22.2	3.042	No sample for less than 5 metric tons (t) 1 sample for ea. 77 metric tons (t)or fraction
25	25.4	3.973	No sample for less than 9 metric tons (t) 1 sample for ea. 136 metric tons (t)or fraction
29	28.7	5.060	No sample for less than 9 metric tons (t) 1 sample for ea. 136 metric tons (t)or fraction
32	32.3	6.404	No sample for less than 9 metric tons (t) 1 sample for ea. 218 metric tons (t)or fraction
36	35.8	7.907	No sample for less than 9 metric tons (t) 1 sample for ea. 218 metric tons (t)or fraction
43	43.0	11.38	One sample
57	57.3	20.24	One sample