Kentucky Method 64-101-08
Revised 05/19/08
Supersedes 64-101-06
Dated 05/04/06

TESTING AND ACCEPTANCE OF STEEL REINFORCING BARS (UNCOATED AND COATED)

1. SCOPE:

1.1. The Kentucky Transportation Cabinet's (KYTC) acceptance procedure for plain (uncoated) steel reinforcing bars requires certification of test results for all heats, then appropriate project sampling, followed by testing. Certified test results may only originate from manufacturers included on the Division of Material's (Division) current List of Approved Materials (LAM).

The KYTC's acceptance procedures for epoxy coated steel reinforcing bars requires certification of all bars prior to coating. The epoxy coating shall be applied only by epoxy coaters included on the LAM.

1.2 Whoever supplies reinforcing steel to a KYTC project, whether the manufacturer, coater, or fabricator, must provide proper documentation. This shall consist of at a minimum 1) TC 64-122 for each shipment, 2) certified mill test reports for each heat, 3) certifications from the steel and powder manufacturers and from the coater. Certifications shall include a statement of compliance with the applicable specifications and shall be dated and signed by a responsible party.

2. MANUFACTURER'S RESPONSIBILITIES:

2.1. Gaining LAM Status: Reinforcing steel manufacturers desiring to be included on the LAM shall abide by all requirements listed herein. The manufacturer shall submit a Quality Control Program to the Division. For a Quality Control Program to be acceptable it must meet the following criteria:

2.1.1. Testing equipment shall be tested and calibrated by an approved independent company at least annually and a copy of the certification submitted to the Division.

2.1.2. A Quality Control Inspector shall perform all tests and inspections as required in section 2.3.

2.1.3. Identity of heats shall be maintained from melting pot to delivery to fabricator, coater and ultimately the jobsite.

2.1.4. Records of test results shall be available for inspection for five years.

2.1.5. A certified mill test shall be furnished with each shipment of steel. The certified mill test shall contain the results of all applicable ASTM tests on a per heat basis:

that is; nominal weight, yield and tensile strengths, elongation, 180° bend test, height of deformations and phosphorous content.

2.1.6. Reinforcing steel shipped directly to the jobsite by the manufacturer shall meet the requirements of section 2.2. and section 3.1.2.

2.1.7. The manufacturer shall participate as required in a cooperative test program with the Division as described in section 2.4.

2.2. Heat Identification Requirements: The fabricator or manufacturer shall provide a definite means whereby the various heat numbers in each shipment can be positively identified and, if necessary, separated from the remainder of the shipment. Individual bundles of bars shall be identified by tags or other acceptable means and tied into sub-bundles as necessary to provide positive heat identification.

2.3. Testing And Acceptance Criteria:

2.3.1. General:

2.3.1.1. All testing shall be performed in accordance with standard ASTM procedures. Manufacturers shall have their testing equipment calibrated at least annually and copies of the calibration results shall be furnished to the KYTC. Additionally, regular cooperative testing shall be performed by the KYTC and the manufacturer. Samples, when requested, shall be submitted prepaid by the manufacturer.

2.3.1.2. Bar properties to be tested are yield strength, tensile strength, elongation, 180° bend, weight per foot, deformations and phosphorus content. The manufacturer shall provide chemical, mechanical and physical properties for each heat being considered for approval. Strength results will be rounded to the nearest 1000 psi.

2.3.1.3. The failure of any property of any test specimen shall be cause for rejection of the heat.

2.4. Cooperative Testing:

2.4.1. Samples for ASTM A 615 cooperative testing shall consist of 20 bars (2 bars per heat) from 10 different heats (if possible) 60” in length, representing each bar size produced up to and including a #11 (36 mm) bar. If the number of bar sizes produced are fewer than 10, make up the difference by duplicating bar sizes sufficient to represent 10 different heats (if possible). If the cooperating facility also produces ASTM A 706 steel, provide two additional samples for each of these sizes as well with as many different heats represented as possible.

2.4.2. Cooperative testing shall consist of the following test data; YIELD in pounds per square inch, TENSILE in pounds per square inch, ELONGATION in percent, and

WEIGHT in pounds per foot. Each bar will be submitted to the appropriate bend test as well. The methods of tests shall be in accordance with ASTM A 615, A 706, A 955 and/or A 996 as appropriate. Submit test data from the cooperating facility for the above parameters on the heats of steel represented by the samples and provide actual weight/length [lb/ft] of the samples tested at your facility. Indicate what bar sizes the mill produces, what type steel (A 615 or A 706), and if the samples are of coil or straight stock. Also submit a copy of the most recent calibration/certification for tensile equipment utilized.

2.4.3. The average test results for the same heat and bar size run at each laboratory shall not vary more between laboratories than the following:

Pounds Per Foot	± 1 Percent
Yield	± 4 Percent
Tensile	± 4 Percent
Elongation	± 3 Percent

2.4.4. Any heat failing to meet section 2.4.3 may be resampled. The resampling shall consist of three bars from the same heat.

2.4.5. At least 90% of comparable test values must be within the limits of section 2.4.3 to obtain or continue LAM status.

2.5. Removal From LAM: Maintaining LAM status will be contingent upon compliance with all requirements contained in this section and section 5.

3. FABRICATOR'S RESPONSIBILITIES:

3.1. Gaining LAM Status: Fabricators desiring to be included on the LAM shall abide by all applicable requirements listed herein.

3.1.1. Purchase reinforcing steel from a manufacturer or epoxy coater on the LAM maintained by the Division.

3.1.2. Identity of heats shall be maintained at all times and documentation shall be provided as required in section 2.2. Coated reinforcing steel shall also be accompanied by copies of all documentation provided by the coater.

3.2. Removal From LAM: Maintaining LAM status will be contingent upon compliance with all requirements contained in this section and section 5.

4. COATER'S RESPONSIBILITIES:

4.1. Gaining LAM Status: Epoxy coaters desiring to be included on the LAM shall abide by all requirements listed herein. The coater must agree to abide by the current edition of Kentucky Standard Specifications for Road and Bridge Construction (Specifications)

(specifically section 811.10) and submit and obtain approval of its Quality Control Program from the Division. For the Quality Control Program to be acceptable, the coater must, as a minimum, comply with the following:

4.1.1. All reinforcing steel for coating shall be from a manufacturer on the LAM maintained by the Division.

4.1.2. Identity of heats shall be maintained at all times as required in section 2.2.

4.1.3. Use only epoxy powder shown on the LAM. A written manufacturer's certification for this resin shall be submitted annually to the Division.

4.1.4. Perform the following quality functions (KM 64-102) and record test results:

4.1.4.1. Monitor blast cleaning operations at least every two hours to insure conformance to pictorial standards A Sp 10, B Sp 10, or C Sp 10 of SSPC Vis 1 and to maintain proper etch pattern.

4.1.4.2. Insure that bars are coated within 8 hours after blast cleaning.

4.1.4.3. Check temperature of bar just prior to coating to insure powder manufacturer's application temperature is met.

4.1.4.4. Check daily to insure that the minimum curing time recommended by the powder manufacturer has elapsed prior to the coated bars reaching the water bath.

4.1.4.5. Check the coating thickness with a thumb wheel pulloff gauge. The thickness gauge will be calibrated for accuracy at least daily and the results recorded on the quality control report. The thickness will be measured according to ASTM A 775. The coating thickness shall be 7 to 12 mils inclusive. Thickness measurements will be taken as often as necessary, but at least one bar from each 60 minutes of production time shall be documented. If the coating on the bar checked does not meet the thickness requirements, that bar shall be rejected and additional bars (usually adjacent to the original test bar) shall be checked to determine the extent of the problem. Either an insufficient or excessive film thickness will be cause for rejection of the coated bars.

4.1.4.6. Check for Continuity of Coating:

4.1.4.6.1. An operational in-line 67.5-V, 80,000 ohms wet-sponge type direct-current holiday (defect) detector with an automated holiday counter shall be provided for each strand of the production line. In-line and hand-held holiday detectors shall be operated and maintained in accordance with the

manufacturer's instructions.

4.1.4.6.2. Compare the accuracy of the in-line holiday detector with a hand-held holiday detector at least once a production shift. Holiday counts from both the hand-held and in-line holiday detectors shall be recorded on the inspection form.

4.1.4.6.3. When any bar has more than two holidays per linear foot or a total defective area exceeding 0.25 percent of the surface area per linear foot, the holidays shall be repaired with approved touch-up material. When any bar has more than five holidays per linear foot or a total defective area exceeding 0.5 percent of the surface area per linear foot, the bar shall be rejected. When any bar is found that requires touch-up or rejection, additional bars (usually adjacent to the problem bar) shall be checked to determine the extent of the problem.

4.1.4.7. Check the flexibility of the coating by bending one bar of each size coated per shift, but with a minimum of two tests per eight hour shift. The bars are to be bent around a pin equal in diameter to the bar size in inches as per ASTM A 775 Table I. Bend the bar at room temperature through an arc of 180^{o} after rebound. The coating should not show any visible cracks.

4.1.5 Submit CRSI (Concrete Reinforced Steel Institute) ECR Plant Certification, the latest audit results and any response to CRSI.

4.2. Removal From LAM: Maintaining LAM status will be contingent upon compliance with all requirements contained in this section and section 5.

5. CONDITIONS FOR REMOVAL FROM LAM:

5.1. The following conditions will result in probation or removal from the LAM:

5.1.1. Failure to comply with the minimum criteria for each approved list.

5.1.2. Frequently recurring instances of check sample failure.

5.1.3. Inclusion of unapproved heats or grades in shipments.

5.1.4. Lack of sufficient heat identification.

5.1.5. Furnishing of non-specification material.

5.2. Once a manufacturer, fabricator or coater is removed from an approved list, reinstatement may be requested after a period of three months, providing the reason(s) for removal is (are) recognized and corrected.

6. TESTING OF JOBSITE CHECK SAMPLES:

6.1. Plain and Coated Steel: All six mechanical test properties listed in 2.1.5 shall be performed on each sample.

6.2. Coated Steel: In Addition to 6. 1, thickness of coating will be measured according to ASTM A 775.

APPROVED _____

DIRECTOR
DIVISION OF MATERIALS

DATE 05/19/08

Kentucky Method 64-101-08
Revised 05/19/08
Supersedes 64-101-06
Dated 05/04/06

Attachments

km10108.doc

FABRICATOR'S HEAT NUMBER IDENTIFICATION OF REINFORCING BARS

County _____ Project Number _____

Supplier _____ Supplier Number _____

Bar List Number(s) _____ Fabricator _____

Drawing Number _____ Station _____ Contractor _____

The following table lists heat numbers and mill marks so that each heat number involved may be positively identified and separated, if necessary, at destination.

BAR LIST OR ORDER NO.	BAR TYPE OR MARK	BAR SIZE	GRADE	WEIGHT (Lbs.)	MANUFACTURER (Mill Mark)	HEAT NO.

I certify that all the heats listed above and contained in this shipment meet the requirements **of the current Kentucky Method 64-101 and Kentucky Standard Specifications section 8**11.02. Manufacturer's certified test results have been furnished to the Division of Materials.

Date _____ _____
Signature of Authorized Representative

Load _____of _____

QUALITY CONTROL REPORT

_____
(COMPANY NAME)

I GENERAL INFORMATION -

COUNTY_____PROJECT_____
Epoxy Lot No. _____Date_____
Type Epoxy Used_____ Mfg.'s Cert. of Epoxy Powder_____
Bar Size(s)_____Pretested Heat No.(s)_____
Rebar Supplier_____Fabricator_____

II REQUIREMENTS PRIOR AND DURING APPLICATION OF COATING -

Blast Cleaned to Conform to pictorial standards A Sp 10, B Sp 10, or C Sp 10 of
SSPC Vis 1_____
Bars coated within 8 hours of blast cleaning_____
Bars at epoxy manufacturer's recommended temperature_____°C (°F.) to _____°C (°F.)
1)_____°C (°F.) 2)_____°C (°F.) 3)_____°C (°F.)
Curing time from leaving coating chamber until arrival at water bath _____seconds

III REQUIRED PROPERTIES OF COATED BARS -

Thickness gauge calibration standard _____mils. Today's reading _____mil
Coating thickness, one sample from each 30 minutes of production time will be tested, 7 to 12 mil.
Work sheet on page 2_____

_____

Check coated bars for no contamination, free from holes, cracks, and damaged areas. One bar will be tested from each 30 minutes of production time with a visual scanning of the other bars.

_____

_____

Holidays, maximum of two per 2 per foot, one sample from each 30 minutes of production time shall be tested.
Work sheet on page 2 _____

Bend test will be taken on one bar of each size per 8 hour shift, but with a minimum of two. Bend 120° around required pin 20°C (68°) - 29.4°C (85°F) 1)_____ 2)_____

IV GENERAL REQUIREMENTS AFTER COATING -

All damaged areas repaired within 24 hours_____
Bundles of coated bars tied with protective materials _____
Bundles loaded on trucks with caution and protective dunnage _____

_____
Inspectors Signature

EPOXY WORKSHEET

Heat No. ____________________
____
____
____
____
____

Date ____
Powder Manufacturer _________________________
Powder Lots Used _______________, _____________
_______________ , _____________

Temp. ___________°

Bar Size	Thickness (mils)																	No. Holidays