Iowa Department of Transportation

SPECIAL PROVISIONS
FOR
HANGER ASSEMBLY

Hardin County
BRFN-065-6(42)--39-42

Effective Date
July 20, 2010

THE STANDARD SPECIFICATIONS, SERIES 2009, ARE AMENDED BY THE FOLLOWING ADDITIONS AND MODIFICATIONS. THESE ARE SPECIAL PROVISIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

090073.01 DESCRIPTION

This item shall include all furnishing, fabricating, testing and installing of the hanger assemblies in accordance with the details shown on the plans and these special provisions. Hanger assembly shall consist of structural strands, anchor sockets, pins, cotter pins, threaded rods, nuts, washers, and strand spacers.

090073.02 MATERIALS

A. Structural Strand.

Structural strand shall be ASTM A 586 class A coating inner wires; class C coating outer wires. All strands shall be prestretched to 55% of the breaking strength in accordance with ASTM A 586.

A test for modulus of elasticity and breaking strength shall be performed for each manufactured length of strand in accordance with ASTM A 586. The gauge length of the specimen shall be 100 inches. The strand shall have the anchor sockets attached to each end and shall be loaded through the sockets. The socketing procedures used for the test specimen and assemblies shipped to site shall be identical. If the test specimen fails to meet the minimum breaking strength requirement, another test sample shall be cut from the same manufactured length and tested. Should it also fail, the manufactured length of strand may be rejected. If rejected, the contractor shall furnish new strand length that is subject to the same testing and approval procedures outlined herein. The contractor shall not be compensated for the cost including testing costs of the rejected strand. All tests results shall be submitted to the Engineer for approval.

B. Anchor Sockets.

Anchor sockets labeled in the plans as open strand socket and socket with internal threads shall conform to the requirements of ASTM A 148 and federal specification RR-S-550D. The anchor sockets shall be galvanized in accordance with ASTM A 123.

All anchor sockets and the socketed zinc connections shall meet or exceed the minimum breaking strength of the designated structural strand attached and shall at least be grade 105/85. Each socket to be installed as part of the structure shall be proof loaded to 55% of the breaking strength of the attached structural strand following attachment of the structural strand.

Each socket type shall be subjected to radiographic inspection in accordance with the following frequency: first, sixth, sixteenth, thirty-sixth, seventy-sixth, and one hundred thirty-sixth socket. Radiographic shot schedule of castings shall be submitted by the Contractor to the Engineer for approval for each socket type. Radiographic inspection shall be performed by the Contractor and witnessed by the Engineer in accordance with the following ASTM Specifications, as applicable:

ASTM E 94 - Standard Recommended Practice for Radiographic Inspection
ASTM E 142 - Controlling Quality of Radiographic Testing
ASTM E 446 - Standard Reference Radiographs for Steel Castings up to 2 inches in Thickness

The Contractor shall perform and provide certification for radiographic inspections to the Engineer for approval. Inspections shall be performed by approved ASNT-TC-1A examiners. (ASNT – American Society for Nondestructive Testing)

All sockets shall be fully inspected by the magnetic particle method conforming to the requirements of ASTM E 709 and acceptance standard ASTM E 125.

The anchor sockets shall be Charpy V-notch impact tested in accordance with ASTM A 781, Supplemental Requirement S9. The testing frequency shall be the same as for the radiographic testing. The samples shall withstand an impact of 25 ft-lbf at 40°F.

Large sand spots, inclusions and blow holes, as determined by the Engineer, shall be cause for rejection of the casting.

Defects exceeding the degree shown in the following table shall be cause for rejection of a socket.

Category	Defect	Degree Permitted
A	Gas Porosity	3
B	Sand Slag Inclusions	3
C	Shrinkage:	
	Type 1	3
	Type 2	3
	Type 3	3
	Type 4	3
D	Crack	Not Permitted
E	Hot Tear	Not Permitted
F	Insert	Not Permitted
G	Mottling	Not Permitted

If a socket is rejected, all other sockets from the same heat shall be radiographically inspected at the Contractor's expense.

Rejected castings may be repaired at the sole discretion of the Engineer. If approved by the engineer, all repairs shall be at the Contractor's expense.
Minor defects may be removed by grinding or chipping without welding repair, provided the following requirements are complied with:

- The depth of the defect does not exceed 3% of the specified dimension.
- The removal of metal does not appreciably affect the strength of the casting, as determined by the Engineer.
- The remaining wall thickness is equal to or greater than the required minimum wall thickness.
- The surrounding metal is ground to a smooth contour with the elimination of apparent stress risers.

Defects exceeding those defined above may be repaired by welding if approved by the Engineer. All proposed repair procedures shall be submitted in writing to the Engineer and shall include a description of the defect, the size and the shape of the excavation, the welding specification, amount of preheat, and post heat to be utilized.

Pin holes for open strand sockets shall be line bored to the tolerances and finish in accordance with Articles 2408.02 M and 2408.03, H of the Standard Specifications.

C. Pins.

The pins connecting the open strand sockets to the hanger plate shall conform to the requirements of ASTM A 668, Class H. Supplemental Requirements S6 and S7 shall apply. Ultrasonic testing frequency shall be the same as for the radiographic testing of the anchor sockets.

The pins shall be Charpy V-notch impact tested in accordance with ASTM A 673, P frequency. The samples shall withstand an impact of 25 ft-lbf at 40°F.

Pin diameter tolerance and finish in accordance with Articles 2408.02, M and 2408.03, H of the Standard Specifications.

The pins shall be galvanized in accordance with ASTM A 123.

D. Cotter Pins.

The cotter pins shall be stainless steel Type 316.

E. Threaded Rods, Nuts, Washers.

The threaded rods shall conform to the requirements of ASTM A 668, Grade H. The threaded rods shall be Charpy V-notch impact tested in accordance with ASTM A 673, P frequency. The samples shall withstand an impact of 25 ft-lbf at 40°F.

Nuts shall be in accordance with ASTM A 563, Grade DH3. Washers shall be in accordance with ASTM F 436, Type III.

Threaded Rods, nuts and washer shall be galvanized in accordance with ASTM A 153.

090073.03 FABRICATION

The structural strand shall be socketed in the anchor sockets using zinc conforming to prime western grade or higher purity zinc as defined by ASTM B 6.

Measurement and marking of the structural strand shall be carried out under well defined uniform temperature conditions, under cover or at night, and while the strand is held under dead load tension.

Upon fabrication of the complete hanger assembly, the final length of each socketed hanger strand shall be measured and recorded to within 0.001 of a foot at a measuring tension equivalent to the dead load tension as shown on the Contract Drawings. The actual length, as measured above shall not vary more than +/- 1/2 inches from the designed/calculated length (including any temperature adjustment). This deviation between the design/calculated length and actual length shall be recorded for each hanger assembly and stamped onto each respective bottom anchor socket of the completed hanger assembly.

Any deviation over the specified limits of +/- 1/2 inches shall be rejected and replaced with a new hanger assembly.

At the time the structural strands are measured, the Contractor shall place a permanent paint stripe on the top surface of the strand which shall be referenced to eliminate any change in length of the hanger strand due to twisting.

All hanger assemblies shall be preassembled and delivered to the site as complete units. The hanger assemblies shall be packaged on reels with a minimum diameter of 5 feet.

After the structural strand is prestretched, it shall not be pulled into a curve that is smaller than 5 feet.

The hanger assemblies shall be stored in a clean, dry area.

The Contractor shall submit certification of the following:

- manufacture of strand to this specification
- tensile strength of strand
- modulus of elasticity of strand
- actual breaking strength
- prestretching, measuring and proof loading
- material certification of sockets, pins, threaded rods, nuts, and washers

Working drawings shall be submitted for all hanger assemblies for approval by the Engineer prior to commencing with the work.

090073.04 INSTALLATION

The hangers shall be installed without twist. The distance between the bottom of the bottom anchor socket and the centerline of the hanger pin shall be adjusted by subtracting the deviation stamped on the bottom anchor socket from the theoretical distance between the bottom of the bottom anchor socket and the centerline of the hanger pin.

090073.05 METHOD OF MEASUREMENT AND BASIS OF PAYMENT

A. Method of Measurement

Lump Sum. No method of measurement.

B. Basis of Payment

The cost of furnishing, fabricating, testing and installing of the hanger assemblies including structural strand, anchor sockets, pins, threaded rods, nuts, washers, cotter pins, and strand spacers and for galvanizing shall be included in the lump sum price bid for Hanger Assembly.