

460 STRUCTURAL STEEL AND MISCELLANEOUS METALS.
(REV 7-27-04) (FA 7-28-04) (1-05)

SUBARTICLE 460-2.1 (Page 535) is deleted and the following substituted:

460-2.1 General: Meet the material requirements of Section 502 and Division III, with specific reference to Sections 961 through 964.

Except where otherwise shown in the plans, use structural steel for all major members, and rivet steel for all rivets. Use either cast steel or cast iron for castings, as shown in the plans.

Field install all shear connectors which are located on the top flange of steel girders and beams after the deck forms are in place. Do not install top flange shear connectors at the fabrication plant. Install all shear connectors, regardless of location, in accordance with Section 502.

For paint, meet the requirements of Section 971.

SUBARTICLE 460-2.3 (Page 536) is deleted and the following substituted:

460-2.3 Fabricator Qualifications: Fabricate structural steel girders and girder framing in a shop certified under the AISC Quality Certification for Major Steel Bridge. Fabricate steel pedestrian bridges in a shop certified under the AISC Quality Certification for Simple Steel Bridge. Perform fabrication and non-destructive testing in accordance with the current applicable edition of the ANSI/AASHTO/AWS D1.5 Bridge Welding Code. For tubular components, perform fabrication and non-destructive testing in accordance with AWS D1.1. Perform welding procedures and welder certifications in accordance with the applicable AWS welding code and submit the procedures and certifications to the Engineer for approval prior to performing any welding on the project.

SUBARTICLE 460-27.1 (Pages 548 and 549) is deleted and the following substituted:

460-27.1 General: Mark the weight on members weighing more than 3 tons [3 metric tons]. Pack bolts and rivets of one length and diameter, and loose nuts or washers of each size, separately. Ship pins, small parts, and small packages of bolts, rivets, washers, and nuts in boxes, crates, kegs, or barrels of convenient sizes. Plainly display a list and description of the contained material on the outside of each shipping container. Keep the weight of all tools and erection material separate.

The Engineer will allow metal die stamping in the fabrication of structural steel in conformance with the requirements specified herein. Do not use die stamps on fracture-critical members, or near the edges of plate members subject to tensile stresses. The Engineer will accept numbers, letters, or combinations thereof impressed into steel components for the purpose of identifying the fabricated member in lieu of paint, metal tags, or other methods of identification.

The Contractor may accomplish marking of fabricated structural steel as required herein and in 460-12.4 by the use of paint, attached metal tags, or low stress dies with blunt-nosed continuous or blunt-nosed interrupted dot die stamps (i.e., dies manufactured to produce impressions that are rounded at the bottom of the impression).

The maximum allowed depth of the impression is 1/32 or 0.031 inch [0.8 mm]. Use die stamping tools that make character sizes with corresponding face radii as shown in the following table:

Size of Steel Die Stamp Markings	
Character Size inch [mm]	Minimum Face Radii inch [mm]
0.125 [3]	0.007 [0.2]
0.1875 [5]	0.004 [0.1]
0.250 [6]	0.010 [0.3]
0.3750 [10]	0.014 [0.4]
0.5000 [13]	0.020 [0.5]

In all cases, ensure that shop drawings submitted by the fabricator indicate proposed location of all low stress metal die stamping.

For bridge members, the Contractor may apply the low stress metal die stamping at the following locations:

(1) Girder field splices or beam ends:

- a. Outer fourth of top flange splice plates.
- b. Middle third of web splice plates.
- c. Outer half of girder flange bolt hole pattern at splice.
- d. Within 6 inches [150 mm] of bearing stiffeners in the top flange areas at

end of girder.

(2) Diaphragms:

- a. The preferred location is the middle portion of a top horizontal diaphragm bracing member.
- b. In lieu of the above, the middle of the bottom horizontal diaphragm bracing member.

(3) Other members: Clearly indicate the location on shop drawings submitted for approval.

Make any marking to be done at the mill, as required by AASHTO M 160 (ASTM A 6) [AASHTO M 160M (ASTM A 6M)], in no more than one place on each piece. The Contractor may use die stamping, using low-stress blunt-nosed continuous or low-stress blunt-nosed interrupted dot steel dies.

ARTICLE 460-34 (Page 552) is expanded by the following:

Field install top flange shear connectors, at locations shown in the Contract Documents, in accordance with Section 502.

ARTICLES 460-36 through 460-39 (Pages 552-554) are deleted and the following substituted:

460-36 Painting.

Meet the painting requirements of Section 560 or Section 561, as specified.

460-37 Method of Measurement.

460-37.1 General: The quantities to be paid for will be the items covered by this Section, completed and accepted, and may include the following:

460-37.2 Structural Steel: The quantity of structural steel entering into and becoming a part of the completed structure, and accepted by the Engineer, to be paid for will be at the plan quantity, in pounds [kilograms], or at the lump sum price for Structural Steel, as specified.

460-37.3 Structural Steel Weights:

460-37.3.1 Table: Structural steel weights will be the computed weights, assuming the weight per cubic foot [cubic meter] of the various metals to be as follows:

Structural and Rivet Steel	490 lbs [7,850 kg]
Steel Castings and Forgings.....	490 lbs [7,850 kg]
Gray-Iron Castings.....	450 lbs [7,210 kg]
Malleable Iron.....	480 lbs [7,690 kg]
Phosphor Bronze	562 lbs [9,000 kg]
Wrought Iron.....	485 lbs [7,770 kg]
Lead.....	706 lbs [11,310 kg]

460-37.3.2 Rolled Shapes, Bars, Plates, and Pipe Railings: The weights of rolled shapes, bars, plates, and pipe railings will be computed on the basis of the nominal weights as given in manufacturers' handbooks, using the dimensions shown in the plans. The weight of shims shown in the plans will be included in the quantity of Structural Steel.

460-37.3.3 Deductions and Allowances: No deductions from the computed weight of rolled steel will be made for copes, clips, sheared edges, punchings, borings, drillings, milling, or planing, and no allowance will be made for the weight of weld metal or for overrun in weight.

460-37.3.4 Rivets and High-Strength Bolts: The weights of shop and field rivets and of high-strength bolts, including nuts and washers, all as installed and accepted, will be computed on the basis of average lengths in accordance with the following table:

Diameter of Rivet or Bolt	3/4 inch [M20]	7/8 inch [M22]	1 inch [M24]
Weight per 100 lbs [kg]	50 [24]	100 [45]	150 [61]

460-37.4 Ladders and Platforms: Where so shown in the proposal, ladders and platforms will be paid for as a separate item. The quantity to be paid for will be at the lump sum price or as plan quantity, in pounds [kilograms], for Ladders and Platforms, whether aluminum or steel is used.

460-37.5 Endwall Grates: The quantity to be paid for will be at the unit price per pound [kilogram] for Endwall Grate.

460-37.6 Expansion Joint Seals: The quantity to be paid for will be the length, in feet [meters], of Expansion Joint Seal measured in place, along the centerline of the seal, completed and accepted.

460-37.7 Machinery and Castings: The quantity to be paid for will be at the Contract lump sum price.

460-37.8 Aluminum Railings: The quantity to be paid for will be the plan quantity, in feet [meters], of Aluminum Railings installed in accordance with the plans. The quantity shall be

considered full compensation for all incidental materials, including anchor bolts, nuts, washers and resilient pads.

460-38 Basis of Payment.

460-38.1 General: Prices and payments will be full compensation for all work specified in this Section, including welding and all paint materials and painting. No separate payment will be made for falsework or other erection expense.

460-38.2 Items Included Under Structural Steel: For the purpose of payment, shear connectors, shoes, rockers, pins, masonry plates, anchor bolts, and lead bearing plates for fixed spans will be classified as Structural Steel. Structural Steel will also include all parts of rolled or cast steel which can be fabricated by the ordinary structural shop methods usual for fixed structures, and all bolts and anchors used to fasten machinery to structural parts or to masonry. Where aluminum ladders and platforms are shown in the plans as alternates to steel ladders and platforms which are specified to be included in the lump sum item for Structural Steel, the aluminum ladders and platforms, if used, will be included in such payment as Structural Steel. When the furnishing and installation of welded shear connectors is required by the plans, the quantities will be determined in the same manner as required for the accompanying Item of Structural Steel. Payment for shear connectors will be included in the accompanying Item of Structural Steel.

460-38.3 Machinery and Castings: Machinery and Castings will include winding drums, tread plates, pistons and cylinders, eccentrics, pivots, trunnions and their cast supports, shafts, spools, gears, racks, bearings, couplings, clutches, brakes (unless part of the prime mover), discs, cast sheaves and wheels, rollers, valves, pins about whose axis the connecting parts rotate, screws, wedges, toggles, bridge locks, cranks, axles, hooks, wrenches, turned bolts attaching machinery parts, and similar parts which require machine shop work and which are not included in any other class.

460-38.4 Payment Items: Payment will be made under:

Item No.	460- 1-	Structural Steel - per pound.
Item No.	2460- 1-	Structural Steel - per kilogram.
Item No.	460- 2-	Structural Steel - lump sum.
Item No.	2460- 2-	Structural Steel - lump sum.
Item No.	460- 3-	Machinery and Castings - lump sum.
Item No.	2460- 3-	Machinery and Castings - lump sum.
Item No.	460- 4-	Ladders and Platforms - lump sum.
Item No.	2460- 4-	Ladders and Platforms - lump sum.
Item No.	460- 5-	Endwall Grate - per pound.
Item No.	2460- 5-	Endwall Grate - per kilogram.
Item No.	460- 6-	Ladders and Platforms - per pound.
Item No.	2460- 6-	Ladders and Platforms - per kilogram.
Item No.	460- 7-	Expansion Joint Seal - per foot.
Item No.	2460- 7-	Expansion Joint Seal - per meter.
Item No.	460- 70-	Aluminum Railings - per foot.
Item No.	2460- 70-	Aluminum Railings - per meter.