

ITEM 442

METALS FOR STRUCTURES

442.1 Description. These specifications shall govern for materials such as structural steel, wrought iron, bronze, and other metals used in structures, except reinforcing steel.

442.2 Materials

- A. Unless otherwise indicated by these specifications, structural steel shall be carbon steel conforming to the requirements of ASTM Designation A 36.
- B. Miscellaneous Steel. Unless otherwise shown on the plans, structural steel for members such as shoes, diaphragms, stiffeners, lateral bracing, etc., shall conform to ASTM Designation A36 or A500, Grade B.
- C. Stud shear connectors, slab anchors and anchors on armor joints and finger joints shall conform to the requirements of ASTM Designation A108, cold drawn bars or Grades 1015, 1018, or 1020, either semi or fully killed.

Tensile properties as determined by tests of bar stock after drawing or finishing shall conform to the following:

Tensile Strength (Min.)	60,000 psi
Yield Strength (Min.)	50,000 psi
Elongation (Min.)	20% in 2-inches
Reduction of Area (Min.)	50%

Tensile properties shall be determined in accordance with the applicable section of ASTM Designation A370.

The manufacturer shall certify that the studs or anchors, as delivered, conform with the material requirements of this section.

D. Steel piling shall conform to the following:

<u>Type</u>	<u>ASTM Designation</u>
Steel H Piling	A 36
Metal Shell Piling (heavier than 10 gauge)	A 252, Grade 2 or A36
Sheet Piling (Rolled)	A 328, Grade A
Sheet Piling (Formed)	A 570, Grade A

A mill certificate shall be furnished by the manufacturer certifying to the results of the tests required by the governing specifications.

E. Galvanized sheet metal shall conform to the requirements of ASTM Designation A446 and or ASTM Designation A525, coating G90.

F. Threaded fasteners shall conform to the following:

1. Standard Bolts - ASTM Designation A307.
2. High Strength Bolts - ASTM Designation A325.

G. Plain and threaded bars used for anchorage purposes shall conform to the requirements of ASTM Designation A36. Headed bolts and nuts shall conform to the requirements of ASTM Designation A307, Grade A. When high strength anchor bolts are designated on the plans, they shall conform to the requirements of ASTM Designation A193-B-7. Nuts for high strength anchor bolts shall conform to ASTM Designation A194-2H.

Threads for anchor bolts and nuts shall be UNC Series, Class 2 fit for 1 inch diameter and smaller. Threads for anchor bolts and nuts over 1 inch diameter shall be 8UN Series, Class 2 fit.

All anchor bolts and nuts, when galvanized, shall be tapped or chased after galvanizing. Anchor bolts shall not be galvanized unless otherwise noted on the plans.

A mill test report or certification will be required indicating that the material conforms to these requirements. When heat treated material is specified or required, the test report for certification relative to the heat treating process shall be submitted.

- H. Corrosion resistance (stainless steel) shall conform to the following:
  - 1. Plate, sheet and strip fasteners where no welding is required shall conform to ASTM Designation A167, Type 316 or 304.
  - 2. Plate, sheet and strip fasteners where welding is required shall conform to ASTM Designation A167, Type 316L or 304L.
- I. Steel pipe shall conform to ASTM Designation A53, Grade B.
- J. Steel tubing shall conform to ASTM Designation A500, Grade B, unless otherwise shown on the plans or herein. Tubing conforming to API Standard 5LX, Grade 52 may be used. Hydrostatic testing shall not be required on API 5LX tubing.
- K. Copper products shall conform to the following:
  - 1. Sheet, strip and plate shall conform to ASTM Designation B133, #110.
  - 2. Rod, bar and shapes shall conform to ASTM Designation B308, Alloy 6061-T6.
- L. Lead sheets shall be of uniform thickness, free from surface imperfections and manufactured from pig lead conforming to ASTM Designation B29.
- M. Aluminum structural shapes, bars, grating and stair threads shall conform to ASTM Designation B221 and B308, alloy 6061-T6.
- N. Deck plates shall conform to ASTM Designation A242 or A440.

442.3 Galvanizing. Galvanizing shall be in accordance with ASTM Designation A123, ASTM A153 and ASTM A386, as applicable, using 2 ounces per square foot of surface area.

Galvanizing touch-up shall be by the application of zinc dust-zinc oxide paint conforming to the requirements of Federal Specification TT-P-641b, or by application of repair compounds conforming to the requirements of Federal Specification O-G-93 (stick only), in accordance with manufacturer's recommendations.

442.4 Measurement. Measurement of the quantity of structural metal furnished and placed will be based on the weight of the metal in the fabricated structures, including the quantity of bolts used in connections.

The weight of paint and all boxes, crates and other containers used for packing, together with sills, blocking and rods used for supporting or protecting members during transportation shall be excluded. Where increases in size or weights of members have been made which was not ordered by the Engineer, but approved by him, measurement will be made on the sizes or weights given on the project plans. No measurement will be made of deposited weld metal.

In determining the weight of structural metal in truss spans, I-beam spans and plate girder spans, such items as bearing plates, lead sheets, anchor bolts, drains and all other metal for which no separate measurement is specified shall be considered as structural steel.

The quantity of structural steel for concrete girder or slab spans shall include the weight of all structural shapes and plates used in drains and structural shapes and plates used in armoring roadway joints.

The weight of metal to be paid for shall be based on computed weights.

Before final payment is made, the Contractor shall furnish the Engineer four sets of shop bills showing the calculated weights of all parts of the structure. The weights shall be computed from the approved shop detail drawings.

442.5 Payment. Structural metal measured as provided above will be paid for at the unit price bid per pound for various items as set forth on the bid proposal and as called for in the specifications for the quantity shown on the plans and in the proposal, which prices shall be full compensation for furnishing all materials and for all fabrication, shop work, transportation, erection, paint and painting and for furnishing all equipment, tools, labor and incidentals necessary to complete the work.

There are line code(s), description(s), and unit(s) for this item.

END OF ITEM 442

## SUMMARY SHEET

### ITEM 442 - METALS FOR STRUCTURES

#### Other Specifications Required

Item 447, Painting and Protective Coating

Item 445, Structural Bolting

#### Reference Standards

##### 1. ASTM Standards:

- |         |         |
|---------|---------|
| a. A 36 | n. A167 |
| b. A500 | o. A 53 |
| c. A108 | p. B133 |
| d. A370 | q. B308 |
| e. A252 | r. B 29 |
| f. A328 | s. B221 |
| g. A570 | t. A242 |
| h. A446 | u. A440 |
| i. A525 | v. A123 |
| j. A307 | w. A153 |
| k. A325 | x. A386 |
| l. A193 |         |
| m. A194 |         |

##### 2. API Standards:

API 5LX

##### 3. Federal Specifications:

- a. TT-P-641b
- b. O-G-93

#### Description:

Discusses furnishing and fabrication of metals for all types of structures.

#### Payment:

At the unit price bid per pound.

DO NOT INCLUDE THIS SHEET IN THE CONTRACT SPECIFICATIONS