

## MATERIAL SPECIFICATION

### ITEM 715.07----25 - DUCTILE IRON CASTINGS

#### 1. SCOPE:

1.01 This specification covers the material and pattern requirements for ductile iron castings.

#### 2. MATERIAL REQUIREMENTS:

##### 2.01 Patterns:

- A. **Patterns furnished by the Contractor.** Patterns to be furnished by the Contractor shall be designated in the contract documents. If a necessary pattern is not specified as furnished by the Canal Corporation, the pattern shall be furnished by the Contractor. The pattern shall become the property of the Canal Corporation, and shall be furnished with an appropriate storage container as determined by the Engineer.

The pattern shall be constructed of a "Select" grade of mahogany, kiln dried, coated with three (3) coats of varnish, and rubbed down for a smooth finish. If the pattern is constructed of multiple pieces of work, the contact surfaces shall be cleaned of all dust and other foreign matter, prior to joining. The varnish and any glue used in the fabrication of the pattern shall be suitable for long term storage in an unheated and humid environment. The dimensions of the pattern shall take into account the shrinkage and machining of the casting. The pattern shall also meet the appropriate standard established by the Bureau of Standards, the American Foundrymen's Association, the Steel Founder's Society of America, or the Malleable Iron Research Institute.

- B. **Patterns furnished by the Canal Corporation.** Patterns to be furnished by the Canal Corporation shall be designated on the contract documents. The pattern shall be furnished to the Contractor without charge, and shall be made available for pick-up at the Canal Corporation's Fonda, N.Y. Maintenance Facility, upon prior notice of at least four (4) days.

The pattern, and storage container if applicable, shall remain the property of the Canal Corporation.

- C. **General pattern requirements.** Any core boxes required to make the casting shall be furnished by the manufacturer.

The core boxes, patterns, and storage containers shall be delivered to the Fonda Maintenance Facility in good condition as determined by the Engineer, as soon as the patterns are no longer needed.

Any defective core boxes, patterns, or storage containers shall be repaired or replaced by the Contractor, to the satisfaction of the Engineer, at no cost to the Canal Corporation.

##### 2.02 Castings:

- A. Ductile iron castings shall conform to the requirements of ASTM A536 with ASTM A781 Supplementary Requirements S4 (Ultrasonic Examination), S6 (Certification), S8 (Marking), and S12 (Test Report), unless otherwise specified on the plans.
- B. The dimensional tolerances of the finished casting, as compared to the plan dimensions, shall be in accordance with the following table unless otherwise specified in the contract documents:

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#### 2. MATERIAL REQUIREMENTS: (cont'd)

##### 2.02 Castings (cont'd)

###### Plan Dimension

Up to 1"  
Over 1" to 3", incl.  
Over 3" to 7", incl.  
Over 7" to 20", incl.  
Over 20" to 100", incl.  
Over 100"

###### Tolerances

+3/32" -1/32"  
+4/32" -3/32"  
+5/32" -4/32"  
+6/32" -5/32"  
+8/32" -6/32"  
+10/32" -7/32"

Machined dimensions shall meet the tolerances called for on the approved working drawings.

- C. Test specimens shall show a fracture having a silky or fine granular structure throughout.
- D. Castings shall be true to pattern in form and dimensions, with rounded corners, and all inside angles shall have ample fillets.
- E. All castings shall be free of pouring faults, sponginess, cracks, cold shunts, shrink holes, and porosity.
- F. All castings shall be cleaned and free of loose scale and sand, fins, seams, gates, risers, and other irregularities.
- G. Blow holes and other defects appearing upon finished castings shall be so located that a straight line laid in any direction will not cut a total length of defect at a ratio greater than 1/2" in any one foot of length, nor shall any single defect exceed 1/2" in any dimension, or have an area greater than 1/4 square inch. Defects shall not have a depth greater than 10% of the actual wall thickness but in no case greater than 1/4".
- H. Castings with any defects, or accumulation of defects, which impair the strength or machineability of the casting, as determined by the Chief Engineer, shall be rejected.
- I. Castings which have been, or are being repaired shall be rejected.
- J. Large castings may be subjected to non-destructive tests if required by the contract documents or to determine extent of defects.
- K. An identification number, as assigned by the Canal Corporation, shall be scribed into the casting by the manufacturer, on a non-wearing surface that does not affect the strength of the casting.
- L. Ductile cast iron (A536) shall be determined from grade requirements shown in the item specifications or as shown on the plans.

##### 2.03 Testing

- A. **Visual.** Castings shall be visually inspected at the foundry after they are cleaned, after heat treatment, and after any repairs are made to the casting.

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#### **2. MATERIAL REQUIREMENTS:** (cont'd)

##### **2.03 Testing**

- B. **Ultrasonic.** All castings that have solid sections 3" or greater in thickness shall be ultrasonically tested in accordance with ASTM A609, Procedure A, Quality Level 3, Castings that do not meet this test will be rejected. Test results, whether positive or negative, shall be submitted to the Engineer.

#### **3. BASIS OF ACCEPTANCE:**

- 3.01 Acceptance of the casting shall be based upon shop inspection at the manufacturing plant by representatives of the Canal Corporation, or on the basis of inspection at the project site by the Engineer. Certified copies of the results of the chemical, physical, and non-destructive tests required by the specifications shall be submitted as required under ASTM A781M, Supplementary Requirements S12.