


DRAWN HK	DATE 11/18/92	 <b>TRUCK CORPORATION</b> 415 EAST DUNDEE OTTAWA, KANSAS 66067 (913) 242-2200 FAX (913) 242-6117	SHEET 1 OF 4
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APPROVED <i>[Signature]</i>	11-18-92	ENGINEERING SPECIFICATION OR INSTRUCTIONS	ESN-0011 EO 922744

DUCTILE IRON CASTINGS

SCOPE: This specification covers casting made of ductile iron also known as nodular iron, where the graphite is spheroidal in shape (REF ASTM A644).

1. Drawing Requirements

Design engineering is responsible to indicate on the drawing.

- A. Amount of additional material and areas for clean-up on machined dimensions. Maybe specified as a note on drawing.
- B. Draft angle to be used for removing pattern from mold. Maybe specified as a note on drawing.
- C. Location of identification markings. Vendor's trademark, part numbers, etc.
- D. Any area of no weld repair.
- E. Areas where magnaflux or gammaray inspection to a higher level than stated in this specification is required.

2. Requirements

Castings produced under this specification are required to meet all aspects stated here in and ASTM A536.

A. Mechanical Properties

Grade	60-40	65-45	80-55	100-70	120-40
Tensile Strength Min PSI	60,000	65,000	80,000	100,000	120,000
Yield Strength Min PSI	40,000	45,000	55,000	70,000	90,000
Elongation in 2 inch Min %	18	12	6	3	2
Brinell Hardness Range	137-187	149-207	179-255	299-285	269-383

B. Chemical Properties


Selected by supplier.

C. Heat Treatment

Grade 60-40 will normally be fully annealed.  
 Grade 65-45, 80-55 maybe as cast or heat treated.  
 Grade 100-70, 120-90 require a quench and temper, or normalize and temper.

Heat treatment is supplier's responsibility to produce specified mechanical properties.

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D. Dimensions and Tolerances

Unless otherwise specified on drawing, as cast dimensions shall be to the following dimensions:

Angles	$\pm 1^\circ$
<u>Dimension</u>	<u>Tolerance</u>
0-12"	+ 1/8-3/32
13"-24"	+3/16-1/8
25"-UP	+ 1/4-1/8

Machined dimensions: The foundry is to allow enough material for full clean-up as indicated on the drawing.

E. Identification Markings

Each casting shall be identified by foundry symbol, part number in the location shown on the drawing. In addition, the heat and/or lot shall be identified.

F. Workmanship


Casting shall represent good practice and be free from shrinks, blow holes, unfused chaplets, cracks, porosity or any other defect which in "Ottawa's" opinion would adversely affect the service of the part. Liquid or pressure tight castings shall be tested by the foundry to specified pressure shown on drawing.

G. Repairs

Repairs to castings shall be made by methods approved by purchaser. Repairs to castings may be made except in areas designated on the drawing as "no weld repair".

1. Major repairs or surface to be machined.
  - A. Preheat casting to 400°F Min.
  - B. Oxy-acetylene weld using oxweld #9 rod or arc weld with high nickel rod such as INCO Ni rod 55, Eutectic Xuper 2240, Nodultec 2250.
  - C. Anneal entire casting at 1650°F for 1 hour Min or 1 hour per inch of section thickness. Cool to 1300°F at 50°F maximum rate per hour.
  
2. Minor repair where surface will not be machined.
  - A. Preheat to 350°F.
  - B. Arc weld with INCO 55 Electrode or Eutectic 2240, 2250.
  - C. Stress relieve at 200°F for 1 hour Min or 1 hour per inch of section thickness.

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Vendors may submit alternate weld procedure for approval by Ottawa. Ottawa is to be notified when major weld repairs are required. Major weld repairs are considered to be 2 square inches of area and 25% of thickness or larger.

3. Quality Assurance Provisions

A. Responsibility for Inspection

The supplier is responsible for the performance of such inspections as is necessary to insure compliance with the purchase order requirements and this specification. The purchaser reserves the right to perform any inspection deemed necessary to verify conformance to the specified requirements, and to require proof of testing to be furnished.

B. Examination

1. Visual

All castings of each lot shall be examined to determine compliance with requirements, visual defects, workmanship, identifications, etc.

2. Dimensional

A representative number of castings in each lot shall be measured to determine compliance with requirements.

C. Test Coupons

1. Test coupons shall be poured with each heat. A micro structure sample shall be poured with the approximate last casting of each heat.

2. Test coupons shall receive the same thermal treatment as the castings represented.

3. Test specimens obtained from test coupons shall be per ASTM A536.

4. Mechanical properties for test specimens shall be determined as described in ASTM A536 and must meet mechanical properties.


D. Casting Soundness

1. Unless otherwise specified all casting are expected to meet ASTM E125 class 3 magnetic particle inspection. If a higher grade is required either on entire casting or any portion of a casting, requirement shall be shown on drawing.

2. Magnetic particle inspection and interpretation shall be per ASTM E109 or E138, ASTM E125.

3. Unless Otherwise stated on purchase order (1) casting per heat shall be examined to determine compliance.

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4. Sample Castings

- A. Unless otherwise specified, sample castings are expected to meet all specifications and requirements.
- B. The foundry procedure, processing and practice used on a sample casting shall be followed on all subsequent castings.
- C. Foundry requested changes may require additional sample castings. Purchaser to determine need of further sample castings.

5. Rejection

- A. Castings shall be rejected for failure to meet requirements of this specification or any other applicable specifications or documents.
- B. Castings shall be rejected for failure to conform substantially with accepted sample casting.

6. Documentation

- A. Applicable Documents
  - 1. Ottawa Drawing of part
  - 2. ASTM A536
  - 3. ASTM E109
  - 4. ASTM E125
  - 5. ASTM E138
- B. Reference Documents
  - 1. SAE J434
  - 2. ASTM A370
  - 3. ASTM A644
  - 4. ASTM E8

7. Preservation and Shipment

- A. Preservation and shipment shall be per good commercial practice.
- B. Packing and marking shall be adequate to ensure acceptance and safe delivery by the carrier for the mode of transportation selected.
- C. Purchase order may specify alternative methods.