

Instruction
Hardware Engineering

No. LMS 5-1

Subject: Castings

APPROVED BY Manager, Hardware Engineering

STATUS Maintenance Revision

PURPOSE Defines the general workmanship and quality requirements related to ferrous and nonferrous metal castings. Requirements of this instruction are applicable to all L-3 Communications Corporation, Link Simulation & Training Division (hereafter referred to as Link) personnel involved in the machining and inspection of cast parts.

AFFECTED FUNCTIONS Hardware Engineering
Manufacturing

REFERENCES

PCP C3-3	Castings
ASTM E155	Standard Reference Radiographs for Inspection of Aluminum and Magnesium Castings
ASTM E186	Standard Reference Radiographs for Heavy-walled (2 to 4 1/2 in. [51 mm to 114 mm]) Steel Castings
ASTM E192	Standard Reference for Radiographs for Investment Steel Castings of Aerospace Applications
ASTM E446	Standard Reference for Radiographs for Steel Castings up to 2 in. (51 mm) in Thickness
MIL-STD-2175	Castings, Classification and Inspection of

INSTRUCTION

1. Requirements
 - 1.1 Classification of castings. Unless otherwise specified on the engineering drawing, castings shall be Class 4, Grade D and shall meet all requirements and quality assurance provisions of MIL-STD-2175.

- 1.2 Surface defects: steel investment castings. Except for:
- a. Surfaces required to be continuous for sealing purposes (e.g., O-Ring grooves, etc.)
 - b. Threads
 - c. Surfaces whose width is less than five times the maximum allowable size of the defect, the maximum allowable size of surface defects (i.e., gas holes, shrinkage cavities, nicks, dents, and dross) shall be in accordance with Table I.

Surface defects may be removed by blending to the extent that the surface remains within the “as cast” form dimensions specified on the drawing.

Table I Maximum Size of Surface Defects

APPLICABLE “SURFACE STANDARD SPECIFIED ON THE DRAWING	DEFECT (MAJOR DIAMETER) CLASS AS DEFINED BY MIL-STD-2175			
	1	2	3	4
1	0	1/32 (0.079)	*	*
2	1/32 (0.079)	1/16 (0.159)	*	*
3	1/16 (0.159)	1/8 (0.318)	*	*
NONE	3/32 (0.238)	*	*	*

Dimensions in inches (cm).

0 = No defects are allowed which cannot be removed within the drawing dimensional tolerance.

* = No limit has been established.

- 1.3 Machining of castings. If machining operations reveal internal defects such as porosity, gas holes, shrinkage cavities, etc., machining operations shall be stopped immediately. The machinist shall request the Quality Assurance (QA) Organization representative to determine whether to continue machining operations or reject the casting. This will be done as follows:
- a. Using the drawing to determine the casting class and grade, select the applicable radiographic standard specified (ASTM, E155, E192, E186, or E446) from Quality Assurance Organization.
 - b. Use an instruction to measure the device, measure the defect formed on the applicable part and compare against the radiographic standard.

- 1.4 Repair. Castings shall not be repaired by welding without prior written approval of the Engineering Organization and Quality Assurance Organization concurrence.
2. Quality Assurance Provisions
 - 2.1 Inspection. Inspections shall be conducted to assure compliance with the engineering drawing, the purchase order or subcontract, and this instruction. (The QA representatives refer to Process Control Manual, Procedure C3-3.)
3. Preparation For Delivery (Not applicable)