

MIL-STD-1880(AT)
5 May 1983

MILITARY STANDARD
CYLINDERS, RINGS AND SHROUDS, TURBINE,
CAST, ACCEPTANCE CRITERIA FOR



FSC 2835

MIL-STD-1880(AT)

DEPARTMENT OF DEFENSE
Washington, DC 20301

Cylinders, Rings and Shrouds, Turbine, Cast, Acceptance Criteria for.

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1. This Military Standard is approved for use by US Army Tank-Automotive Command, Department of the Army, and is available for use by all Departments and Agencies of the Department of Defense.

2. Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: US Army Tank-Automotive Command, ATTN: DRSTA-GSS, Warren, MI 48090, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document, or by letter.

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FOREWARD

The procedures covered in this standard shall be used to provide nondestructive testing acceptance criteria for cast cylinders, rings, shrouds, and finish machined and assembled parts. This is not an acquisition document.

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1. SCOPE

1.1 Purpose. This standard is intended to be used to insure case turbine cylinders, rings, shrouds, and finish machined and assembled parts meet prescribed nondestructive testing acceptance criteria.

1.2 Scope. This standard covers the nondestructive testing acceptance criteria for cast cylinders, rings, shrouds, and finish machined and assembled parts.

1.2.1 Classification. Unless otherwise specified on the engineering drawing, castings shall be classified in accordance with the required level of radiographic inspection as follows:

- | | |
|----------|--|
| P7050-P1 | - Radiographic inspection in accordance with 4.1.2a. |
| P7050-P2 | - Radiographic inspection in accordance with 4.1.2b. |

Note: When no classification (suffix) is specified, inspection shall be in accordance with P7050-P1.

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2. REFERENCED DOCUMENTS

2.1 Issues of documents. The following documents of the issue in effect on date of invitation for bids or request for proposal, form a part of this standard to the extent specified herein.

SPECIFICATIONS
MILITARY

MIPD-W-62416	- Welding, Fusion, Process for.
MIPD-W-62418	- Electron Beam Welding, Process for.
MIPD-C-62429	- Castings, Stainless and Low Alloy Steel, Inspection of.
MIPD-U-62430	- Ultrasonic Inspection.
MIPD-W-62431	- Welded Joints, Inspection of.
MIPD-R-62432	- Radiographic Inspection.
MIPD-P-62434	- Penetrant Inspection.
MIPD-N-62441	- Casting, Investment, Nickel Base (713C).
MIPD-C-62445	- Casting, Investment, Nickel Base (0021).
MIPD-N-62446	- Casting, Investment, Nickel Base (C101).

(Copies of specifications, standards, drawings, and publications required by contractor in connection with specific acquisition functions should be obtained from the acquisition activity, or as directed by the contracting officer.)

(Copies of MIPD Specifications and Standards may be obtained from the US Army Tank-Automotive Command, ATTN: DRSTA-GSS, Warren, MI 48090.)

2.2 Other publications. The following documents form a part of this standard to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

SOCIETY OF AUTOMOTIVE ENGINEERS (SAE)
SAE Standards and Recommended Practices

AMS 5786	- Wire, Welding, Nickel Base (Hastelloy W).
AMS 5837	- Wire, Welding, Nickel Base (625).

(Application for copies should be addressed to the Society of Automotive Engineers, Inc., 400 Commonwealth Avenue, Warrendale, PA 15096.)

(Technical society and technical association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.)

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3. DEFINITIONS (not applicable)

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4. GENERAL REQUIREMENTS

4.1 Acceptance criteria.

4.1.1 Surface imperfections (visual and fluorescent penetrant). The limits for imperfections in the material shall be as follows:

- a. There shall be no evidence of cracks, folds, dross, cold shuts, and hot tears.
- b. The presence of mold ridges, fins, and gate witnesses shall be not acceptable in the hot gas flow path. In other areas, positive metal (mold ridges, fins, gate witnesses) up to 0.030 inch (.762 mm) in height shall be acceptable.
- c. All other indications not specified in 4.1.1a and 4.1.1b shall be acceptable.

4.1.2 Internal imperfections (radiographic). Castings containing radiographic evidence of internal defects shall be acceptable provided they do not exceed the following limits of acceptability:

- a. P7050-P1 shall meet the radiographic acceptance requirements of MIPD-C-62429, classification P1.
- b. P7050-P2 shall meet the radiographic acceptance requirements of MIPD-C-62429, classification P2.

4.1.3 Weld joint defects (visual, fluorescent, and ultrasonic). Electron beam welded joints shall meet the limits of acceptability specified in MIPD-W-62418 with the following exceptions:

- a. Full penetration shall be required for 95 percent of weld length.
- b. Partial penetration or lack of weld shall be permitted for 5 percent of the weld length.

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5. DETAIL REQUIREMENTS

5.1 Reports. Unless otherwise specified on the purchase order, the supplier shall furnish with each shipment, three copies of a certificate stating the following:

- a. Purchase order number.
- b. Part number, revision letter, and serial number.
- c. Quantity.
- d. Conformance to this standard, latest revision.

5.2 Test methods.

5.2.1 Visual and fluorescent penetrant. Castings, finish machined parts, and electron beam welded joints shall be visually examined and fluorescent penetrant inspected in accordance with MIPD-P-62434, Method P1 to verify conformance to 4.1.1 (see 5.3.3.5).

5.2.2 Radiographic. Castings shall be radiographically inspected in accordance with MIPD-R-62432 to verify conformance to 4.1.2.

5.2.3 Ultrasonic. Electron beam welded joints shall be ultrasonically inspected in accordance with MIPD-U-62430 to verify conformance to 4.1.3.

5.2.4 Grain size. Unless otherwise specified on the engineering drawing, grain size inspection shall not be required.

5.3 Rework. Except for the specific methods stated herein, all other methods used for general rework shall require Government approval prior to use.

5.3.1 Blend areas. Blending shall be limited to the following:

- a. Blending shall not exceed minimum dimensions and surface finish requirements of the engineering drawing.
- b. The blend area diameter shall be at least 10 times the blend depth.
- c. After blending, inspection of blend area shall be in accordance with 5.2.1.

5.3.2 Electron beam weld areas. Electron beam weld joints may be reworked in accordance with the requirements of MIPD-W-62418.

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5.3.3 Weld rework of castings. Weld rework of castings shall be permitted by Government approval with the exception of those areas which will provide a surface for electron beam welding and with the following weld rework dimensional limitations:

- a. The maximum size of the weld rework area shall be equal to a 0.500 inch (12.7mm) diameter circle with maximum depth of 0.125 inch (3.175 mm).
- b. Two weld rework areas of maximum size shall be permitted per casting.
- c. More than two weld rework areas shall be permitted per casting provided the total amount of area for all weld rework does not exceed the area of two 0.500 inch (12.7 mm) diameter circles (0.393 square inch/253.55 square mm).
- d. Weld rework areas shall be separated by a minimum distance equal to four times the major dimension of the larger weld rework area.

5.3.3.1 Approval. Weld rework of cast cylinders, rings, or shrouds shall be permitted when the rework procedure has been approved in writing by the acquisition activity. The supplier shall submit a detailed rework procedure in writing to the acquisition activity for each part configuration.

5.3.3.2 Procedure. The weld rework procedure shall include but not be limited to the following requirements:

- a. The defective area shall be removed from the casting by routing or machining.
- b. The routed or machined area shall be chemically etched to remove any flowed metal. The area shall then be inspected in accordance with the requirements of this specification.
- c. Approved filler materials used for weld rework shall be as follows:

<u>Casting alloy</u>	<u>Filler alloy</u>
M3602 (713C)	AMS 5786 (Hastelloy W)
M3612 (0021)	AMS 5786 (Hastelloy W)
M3617 (C101)	AMS 5837 (625)

- d. The prepared area shall be welded in accordance with the requirements of MIPD-W-62416.
- e. After completion of weld rework, the casting shall be stress relieved as specified on the weld rework instructions.
- f. The weld reworked area shall be clearly marked (encircled with a ring of white paint) on the casting.

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5.3.3.3 Inspection of weld rework. Radiographic, visual, and fluorescent penetrant inspection of the weld rework area shall be performed in accordance with the requirements for a class 1 weld as defined in MIPD-W-62431.

5.3.3.3.1 Acceptance limits. After any weld rework, castings shall be capable of passing all engineering drawing and applicable specification requirements.

5.3.3.4 Rework records. Rework records shall be shipped together with the castings and shall include photographs of the defective area, size of the rework area (dimensions), and radiographs of the weld reworked area.

5.3.3.5 Surface conditions. Acceptance criteria of borderline cases of imperfections shall be determined after the casting has been either sand or grit blasted to meet the surface roughness (AA arithmetic average) specified on the engineering drawing.

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STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL*(See Instructions - Reverse Side)*

1. DOCUMENT NUMBER MIL-STD-1880(AT)		2. DOCUMENT TITLE Cylinders, Rings and Shrouds, Turbine, Cast, Acceptance Criteria for	
3a. NAME OF SUBMITTING ORGANIZATION		4. TYPE OF ORGANIZATION (Mark one) <input type="checkbox"/> VENDOR <input type="checkbox"/> USER <input type="checkbox"/> MANUFACTURER <input type="checkbox"/> OTHER (Specify): _____	
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a. Paragraph Number and Wording:			
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