

NOTICE OF CHANGE

INCH-POUND

MIL-STD-1869(AT)
Notice 1
13 May 1991

MILITARY STANDARD

TURBINE BLADES AND VANES, CAST;
ACCEPTANCE CRITERIA FOR

TO ALL HOLDERS OF MIL-STD-1869(AT):

1. THE FOLLOWING PAGES OF MIL-STD-1869(AT), HAVE BEEN REVISED AND SUPERSEDED THE PAGES LISTED.

<u>NEW PAGE</u>	<u>DATE</u>	<u>SUPERSEDED PAGE</u>	<u>DATE</u>
9	13 May 1991	9	23 November 1987
10	23 November 1987	10	Reprinted without change
11	13 May 1991	11	23 November 1987
12	13 May 1991	12	23 November 1987
17	23 November 1987	17	Reprinted without change
18	13 May 1991	18	23 November 1987
19	23 November 1987	19	Reprinted without change
20	13 May 1991	20	23 November 1987

2. RETAIN THIS NOTICE AND INSERT BEFORE TABLE OF CONTENTS.

3. Holders of MIL-STD-1869(AT) will verify that page changes and additions indicated above have been entered. This notice page will be retained as a check sheet. This issuance, together with appended pages, is a separate publication. Each notice is to be retained be stocking points until the military standard is completely revised or canceled.

AMSC N/A

FSC 2835

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4. Changes from previous issue. The margins of this standard are marked with vertical lines to indicate where changes from the previous issue were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous issue.

Custodian:
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Preparing activity:
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(Project 2835-A025)

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- (2) Porosity, inclusions, positive metal, and shrinkage shall be acceptable provided indications do not exceed 0.045 inch dimension or number more than four indications per casting. Isolated indications less than 0.015 inch shall be considered unratable.

5.1.3.3 Grain size. Acceptable grain size of turbine vane castings shall be in accordance with the applicable turbine vane drawing requirements and specifications.

5.1.3.4 Surface coating. Surface coating of turbine vanes shall meet the acceptance criteria of the applicable turbine vane drawing and the exceptions specified by typical coating acceptance limits (see figure 7).

5.1.3.4.1 Burnish marks. Burnish marks (see 3.2.4) shall be permitted on the coating of turbine vanes provided the coating is not removed below the allowable drawing thickness specified.

5.1.3.4.2 Unacceptable defects. A coating on turbine vanes is unacceptable if there is evidence of defects such as chips, spalls, blisters and crazing (see 3.1). Exceptions are indicated on figure 7.

5.1.3.4.3 Airfoil leading and trailing edge. Coating imperfections shall be allowed on the same airfoil leading and trailing edge within the following limits:

- a. 0.030 inch maximum dimension.
- b. 0.25 inch distance of closest approach to another indication.
- c. All indications must originate at, or cross over the leading or trailing edge radius.

5.2 Identification marking.

5.2.1 Types I and II. Turbine blade castings shall be identified in accordance with the applicable drawing and the following:

- a. Each casting shall be marked with the part number and revision letter on the airfoil in accordance with AS478, method 6A or 30.
- b. Each casting shall be marked with the casting source identifying letter (assigned by the acquisition activity) and casting lot number (see 3.1) on the root bottom in accordance with AS478, method 2B1 or 2C1.

NOTE: Type II only - The casting source's identifying letter shall be assigned by the procuring activity.

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- c. Each casting shall be marked with a symbol signifying the material as specified in the applicable material specification. The symbol shall be marked in accordance with AS478, method 1A when so specified on the applicable drawing.
- d. Inspection stamp specified in MIL-STD-6866 and the applicable material specification shall not be required on subject castings.

5.2.2 Type III. Turbine vane castings shall be identified on the airfoil in accordance with applicable drawing requirements. Each casting shall be marked with the part number and revision number, master heat or master heat code, and coating symbol, where applicable, in accordance with AS478, method 6A or 30.

5.3 Rework. Coated and uncoated turbine blade/vane castings or finish-machined turbine blades/vanes with imperfections exceeding the limits specified in the acceptance criteria (see 5.1) may be reworked provided the minimum dimensions and applicable drawing requirements are met. Coating on cast and finish-machined turbine blades/vanes shall be removed before rework.

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6. NOTES

6.1 Intended use. The procedures covered by this standard are intended to insure cast turbine blades and vanes meet prescribed material acceptance criteria.

6.2 Subject term (key word) listing.

Acceptance criteria

Air-cooled

Blades

Cast

Solid

Turbine blades

Turbine vanes

Vanes

6.3 Supersession data. This standard supersedes AVCO Lycoming Division specification no. P7074E, dated 14 September 1988 (type I); P7077B, dated 24 August 1987 (type II); and P7073F, dated 22 September 1987 (type III).

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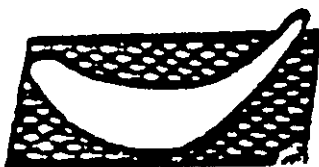
TABLE I. Visual and fluorescent penetrant acceptance limits (type I).

Type of indication	Casting area A	Casting area B	Casting area C
Unratable AS-CAST	0.005 inch or less maj. dim. 0.010 (0.25) or less maj. dim.	0.005 inch or less maj. dim. 0.010 (0.25) or less maj. dim.	0.005 inch or less maj. dim. 0.010 (0.25) or less maj. dim.
Machined	Not allowed	0.030 inch maj. dim. 4 per side 0.250 inch at closest aprch.	0.030 inch maj. dim. 8 per side 0.250 inch at closest aprch.
Pits, blowholes, bottomed porosity	Not allowed	0.015 inch maj. dim. 8 max. 0.10 inch maj. dim. 2 max. 0.060 inch min.	0.020 inch maj. dim. 8 max. 0.10 inch maj. dim. 2 max. 0.060 inch min.
Clusters of indications (Ratable plus unratable) Indv. ind. in cluster Ind. per cluster Max. size Clusters per side Dis. betw. clusters or single indications (Ratable or unratable)	Not allowed	0.030 inch maj. dim. 50% of maj. dim. up to 0.010 inch 4 per side 0.125 closest aprch.	0.030 inch maj. dim. 50% of maj. dim. up to 0.010 inch 8 per side 0.125 closest aprch.
Positive metal: Size Height Frequency Distance	0.030 inch maj. dim. 50% of maj. dim. up to 0.010 inch 4 per side 0.125 closest aprch.	0.030 inch maj. dim. 50% of maj. dim. up to 0.010 inch 4 per side 0.125 closest aprch.	0.030 inch maj. dim. 50% of maj. dim. up to 0.010 inch 8 per side 0.125 closest aprch.

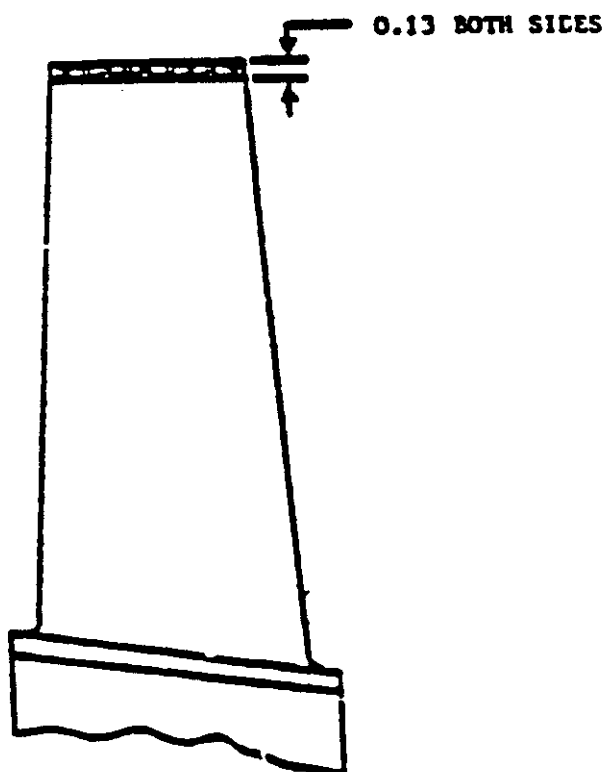
NOTES:

- Clusters or single indications shall not be opposite, related or interconnected.
- Any ratable indication which breaks an edge shall be cause for rejection.
- Where two surfaces of different classification adjoin at a corner, the following conditions apply:
 - Casting areas B and C to casting area A surfaces: Allowable indications on casting area B or C surfaces must be 0.010 inch from the corner which adjoins a casting area A surface.
 - Casting area B or C surfaces: Allowable indications on a casting area B or C surface must be 0.005 inch from the corner which adjoins another casting area B or C surface.

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EXCLUDING BLADE
FILLET RADI
(CONCAVE & CONVEX)



NOTES:

- (1) Requirements of 5.1.1.3.4 apply to the illustrated shaded areas. ✓
- (2) Leading and trailing edge radii shall be considered shaded areas. ✓

FIGURE 4. Coating defects (type I).

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TABLE II. Visual and fluorescent penetrant acceptance limits (Type II).

Type of indication	Casting area A	Casting area B	Casting area C
Unratable AS-CAST Machined	0.005 inch or less 0.010 inch or less	0.010 inch or less major dimension	0.010 inch or less major dimension
Pits, blowholes, bottomed porosity	Not allowed	0.030 inch maj. dim. 4 per side 0.060 inch at closest approach	0.030 inch maj. dim. 8 per side 0.060 inch at closest approach
Clusters of indications (Ratable plus unratable) Individual indication in cluster Indications per cluster Max. size Clusters per side Distance between clusters or single indications (Ratable or unratable)	Not allowed	0.015 inch major dim. 8 max. 0.10 inch major dim. 1 max. 0.060 inch min.	0.015 inch major dim. 8 max. 0.10 inch major dim. 2 max. 0.060 inch min.
Positive metal: Size Height Frequency Distance	0.030 inch major dim. 50% of major dim. up to 0.010 inch 4 per side 0.125 closest approach	0.030 inch major dim. 50% of major dim. up to 0.010 inch 4 per side 0.125 closest approach	0.030 inch major dim. 50% of major dim. up to 0.010 inch 8 per side 0.125 closest approach

NOTES:

- Clusters or single indications shall not be opposite or relatable.
- Any ratable indication which breaks an edge shall be cause for rejection.
- Where two surfaces of different classifications adjoin at a corner, the following conditions apply:
 - Casting areas B and C to casting area A surfaces: Allowable indications on casting area B or C surfaces must be 0.010 inch from the corner which adjoins a casting area A surface.
 - Casting area B or C surfaces: Allowable indications on a casting area B or C surface must be 0.005 inch from the corner which adjoins another casting area B or C surface.

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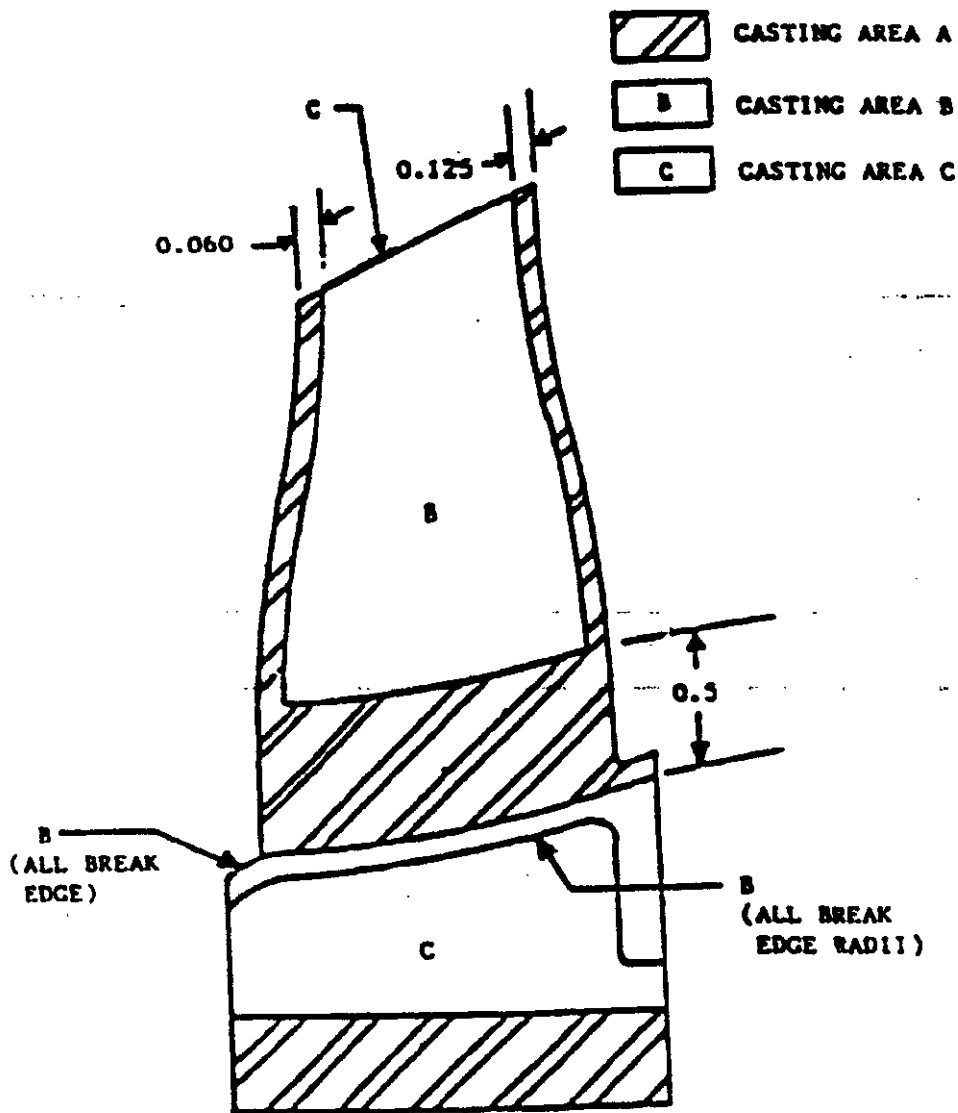


FIGURE 5. Typical casting areas (type II).

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TABLE III. Visual and fluorescent penetrant acceptance limits (type III).

Type of indication	Casting area A	Casting area B	Casting area C
Unratable	0.010 inch or less	0.010 inch or less major dimension	0.010 inch or less major dimension
Pits, blowholes, bottomed porosity	Not allowed	0.045 inch major dim. 6 per side 0.060 inch at closest approach	0.045 inch major dim. 8 per side 0.060 inch at closest approach
Clusters of indications (Ratable plus unratable) Individual indication in cluster Indications per cluster Max. size Clusters per side Distance between clusters or single indications (Ratable or unratable)	Not allowed	0.015 inch major dim. 8 max. 0.12 inch major dim. 1 max. 0.060 inch min.	0.020 inch major dim. 8 max. 0.10 inch major dim. 2 max. 0.060 inch min.
Positive metal: Size Height Frequency Distance	0.030 inch major dim. 50% of major dim. up to 0.010 inch 4 per side 0.125 closest approach	0.030 inch major dim. 50% of major dim. up to 0.010 inch 4 per side 0.125 closest approach	0.030 inch major dim. 50% of major dim. up to 0.010 inch 8 per side 0.125 closest approach

NOTES:

1. Clusters or single indications shall not be opposite or relatable.
2. Any ratable indication which breaks an edge shall be cause for rejection.
3. Where two surfaces of different classifications adjoin at a corner, the following conditions apply:
 - a. Casting areas B and C to casting area A surfaces: Allowable indications on casting area B or C surfaces must be 0.010 inch from the corner which adjoins a casting area A surface.
 - b. Casting area B or C surfaces: Allowable indications on a casting area B or C surface must be 0.005 inch from the corner which adjoins another casting area B or C surface.