



Designation: A997/A997M – 23

# Standard Practice for Investment Castings, Surface Acceptance Standards, Visual Examination<sup>1</sup>

This standard is issued under the fixed designation A997/A997M; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope\*

1.1 This practice covers the acceptance criteria for surface inspection of investment castings by visual examination.

1.2 This practice is expressed in both inch-pound units and in SI units; however, unless the purchase order or contract specifies the applicable M-specification designation (SI units), the inch-pound units shall apply.

1.3 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in nonconformance with the standard.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

## 2. Terminology

### 2.1 Definitions of Terms Specific to This Standard:

2.1.1 *linear discontinuity, n*—a discontinuity whose length is equal to or greater than three times its width. Cracks and cold shuts are examples of linear discontinuity.

<sup>1</sup> This practice is under the jurisdiction of ASTM Committee A01 on Steel, Stainless Steel and Related Alloys and is the direct responsibility of Subcommittee A01.18 on Castings.

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2.1.2 *nonrelevant indication, n*—an indication that is caused by a condition or type of discontinuity that is not rejectable.

2.1.3 *positive metal, n*—raised metal on the casting surface, usually associated with the breakdown of the mold and its replacement with the casting metal.

2.1.4 *surface pit, n*—a nonlinear depression in the cast surface whose length is less than three times its width. Surface pits may be the result of gas or non-metallic inclusions.

2.1.5 *surface roughness, n*—a measure of surface texture, usually determined by the use of a comparator or calibrated device.

## 3. Ordering Information

3.1 The inquiry or order should specify the following information:

3.1.1 *Acceptance Level*—More than one acceptance level may be specified for different surfaces of the same casting (see Section 4),

3.1.2 If any types of discontinuities are unacceptable,

3.1.3 Casting surfaces to be examined,

3.1.4 Number of castings to be examined, and

3.1.5 Additional acceptance criteria as applicable to all or portions of the casting surface.

## 4. Acceptance Criteria

4.1 Levels of acceptance for visual inspection are listed in Table 1.

4.2 Parts shall not exhibit any linear discontinuities.

4.3 Surface roughness and surface pits that will be removed by machining are considered acceptable.

4.4 Surface discontinuities not covered in this practice shall be a matter of agreement between the purchaser and the manufacturer.

\*A Summary of Changes section appears at the end of this standard

**TABLE 1 Visual Inspection Acceptance Criteria<sup>A,B</sup>**

Surface Feature	Level II	Level III	Level IV
Surface Pits <sup>C,D,E</sup>	0.030 in. [0.76 mm] diameter by 0.015 in. [0.38 mm] deep with no more than 1 per in. <sup>2</sup> [645 mm <sup>2</sup> ]	0.060 in. [1.52 mm] diameter by 0.030 in. [0.76 mm] deep with no more than 1 per in. <sup>2</sup> [645 mm <sup>2</sup> ]	0.060 in. [1.52 mm] diameter by 0.030 in. [0.76 mm] deep with no more than 4 per in. <sup>2</sup> [645 mm <sup>2</sup> ]
Positive Metal <sup>D,E</sup>	0.060 in. [1.52 mm] diameter by 0.015 in. [0.38 mm] high with no more than 1 per in. <sup>2</sup> [645 mm <sup>2</sup> ]	0.125 in. [3.18 mm] diameter by 0.030 in. [0.76 mm] high with no more than 1 per in. <sup>2</sup> [645 mm <sup>2</sup> ]	0.125 in. [3.18 mm] diameter by 0.030 in. [0.76 mm] high with no more than 4 per in. <sup>2</sup> [645 mm <sup>2</sup> ]
Parting Line and Ejector Pin Marks Height or Depth <sup>C</sup>	0.005 in. [0.13 mm]	0.010 in. [0.25 mm]	0.020 in. [0.51 mm]
Gate Height <sup>F</sup>	0.015 in. [0.38 mm]	0.030 in. [0.76 mm]	0.045 in. [1.14 mm]
Surface Roughness <sup>E</sup>	100 µin. [2.5 µm]	125 µin. [3.2 µm]	200 µin. [5.0 µm]

<sup>A</sup> Features in excess of those specified in the table are not acceptable.

<sup>B</sup> Level I criteria may be established in the future depending on need.

<sup>C</sup> Maximum surface pit, parting line, and ejector pin mark depth shall not violate drawing minimum wall thickness.

<sup>D</sup> Surface pits or positive metal less than 0.010 in. [0.25 mm] diameter and less than 0.010 in. [0.25 mm] deep or high shall be considered non-relevant.

<sup>E</sup> Determined by comparator or tactile source.

<sup>F</sup> Machined and non-machined surfaces

## SUMMARY OF CHANGES

Committee A01 has identified the location of selected changes to this standard since the last issue (A997 – 08 (2018)) that may impact the use of this standard. (Approved March 1, 2023.)

- (1) Revised 1.2 to template language.
- (2) Added new 1.3 and renumbered remaining subsections.
- (3) Revised definition in 2.1.5.
- (4) Added new definition in 2.1.2.
- (5) Updated to dual designation.

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