Designation: A 903/A 903M – 99 (Reapproved 2007)

Standard Specification for Steel Castings, Surface Acceptance Standards, Magnetic Particle and Liquid Penetrant Inspection[1]

This standard is issued under the fixed designation A 903/A 903M; 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 (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This specification covers acceptance criteria for the surface inspection of steel castings when nondestructively examined by magnetic particle or liquid penetrant inspection.

1.2 This specification is to be used wherever the inquiry, contract, order, or specification states that the acceptance standards for magnetic particle or liquid penetrant inspection shall be in accordance with Specification A 903/A 903M.

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

2. Referenced Documents

2.1 *ASTM Standards:* [2]

E 165 Test Method for Liquid Penetrant Examination

E 709 Guide for Magnetic Particle Examination

3. Terminology

3.1 *Definitions:*

3.1.1 *linear indications*—an indication whose length is equal to or greater than three times its width shall be classified as a linear indication.

3.1.2 *nonlinear indications*—an indication whose length is less than three times its width shall be classified as nonlinear.

3.1.3 *relevant indications*—relevant indications are indications which result from mechanical discontinuities. Only indications whose major dimension exceeds 1/16 in. [1.6 mm] shall be considered relevant.

4. Ordering Information

4.1 The inquiry and order should indicate the following information:

4.1.1 *Nondestructive Practice*—Test Method E 165 for liquid penetrant inspection or Guide E 709 for magnetic particle inspection. Unless a specific technique within a practice is specified, the choice shall be the option of the manufacturer.

4.1.2 *Personnel Qualifications*.

4.1.3 *Extent of Inspection*—The number of castings and the extent of casting surfaces to be examined.

4.1.4 *Acceptance Level*—If more than one acceptance level is specified for different locations, a nondestructive test drawing identifying acceptance levels and locations should accompany the inquiry and order.

4.1.5 *Supplementary Requirements*, if any.

5. Personnel Qualifications

5.1 Personnel performing examination shall be qualified in accordance with an acceptable written procedure as agreed upon between the purchaser and manufacturer.

6. Evaluation of Indications

6.1 All relevant indications shall be evaluated in terms of the acceptance criteria.

6.2 Mechanical discontinuities are indicated by bleed-out of the penetrant or retention of the magnetic particle examination medium. However, false indications may be produced by localized surface irregularities, metallurgical discontinuities, or magnetic permeability variations. Any indication in excess of the acceptance criteria which is believed to be false may be

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

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reexamined. Surface conditioning may precede reexamination. When agreed upon between the manufacturer and purchaser, the liquid penetrant method may be used to verify the presence of surface discontinuities which had been previously indicated by the magnetic particle method.

6.3 Broad areas of fluorescence, pigmentation, or particle accumulation which may mask indications of discontinuities are unacceptable, and such areas will be cleaned and reexamined.

7. Acceptance Criteria

7.1 Individual relevant linear and nonlinear indications exceeding the specified acceptance levels in Table 1 are unacceptable.

7.2 Ten or more relevant indications, although individually acceptable, are collectively unacceptable when they occur in any 6 in. ^{2}[38.7 cm.^{2}] of casting surface, with the major dimension of this area not to exceed 6 in. [152 mm] taken in the most unfavorable orientation relative to the indications being evaluated.

TABLE 1 Surface Inspection Acceptance Criteria Indication Size, in. [mm]

Type	Level I	Level II	Level III	Level IV	Level V
Linear	1/16 [1.6]	1/8 [3.2]	3/16 [4.8]	1/4 [6.4]	3/8 [9.5]
Nonlinear	1/8 [3.2]	3/16 [4.8]	3/16 [4.8]	1/4 [6.4]	3/8 [9.5]

7.3 When the casting surface is being inspected to Acceptance Levels I, II, or III the following relevant indications, although individually acceptable are collectively unacceptable when they are grouped as described in 7.3.1 and 7.3.2.

7.3.1 Four or more in a line, separated by 1/16 in. [1.6 mm] or less edge-to-edge.

7.3.2 Four or more that are clustered and individually separated from the nearest adjoining indication by 1/16 in. [1.6 mm] or less edge-to-edge.

7.4 When the casting surface is being inspected to Acceptance Levels IV or V, individually acceptable relevant indications grouped as described in 7.3.1 and 7.3.2 shall be considered a single relevant linear and nonlinear indication respectively, and be evaluated in accordance with 7.1.

8. Certification

8.1 The manufacturer shall certify that inspection was performed in accordance with the appropriate practice (Test Method E 165 for liquid penetrant inspection or Guide E 709 for magnetic particle inspection) and that the parts were found to meet the requirements of the specified inspection level of Specification A 903/A 903M (including year-date).

8.2 When certified test reports are required by the purchaser, Supplementary Requirement S1 shall be specified.

SUPPLEMENTARY REQUIREMENTS

The following supplementary requirements shall apply only when specified by the purchaser in the contract or order.

S1. Certified Test Reports

S1.1 A certified test report shall be furnished by the manufacturer, listing the following as a minimum:

S1.1.1 Customer name,

S1.1.2 Purchase order number,

S1.1.3 Material,

S1.1.4 Description of part,

S1.1.5 Vendor name,

S1.1.6 NDE procedure,

S1.1.7 Acceptance criteria,

S1.1.8 Vendor control number,

S1.1.9 Name of inspector, and

S1.1.10 Inspector qualification level.

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