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Steel castings — Radiographic inspection

Pièces moulées en acier — Contrôle radiographique

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Reference number
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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 4993 was prepared by Technical Committee ISO/TC 17, *Steel*.

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

Steel castings — Radiographic inspection

0 Introduction

For the interpretation of radiographs and the assignment of radiographic quality levels to a casting, it is necessary to use a standard set of reference radiographs. The reference radiographs available from ASTM (see clause 2) are the only internationally used and recognized documents that may be used for this purpose.

1 Scope and field of application

This International Standard specifies the general requirements for the radiography of steel castings by means of X rays or gamma rays in accordance with procedures given in ISO 5579 and ISO 1027.

2 References

ISO 1027, *Radiographic image quality indicators for non-destructive testing — Principles and identification*.

ISO 5579, *Non-destructive testing — Radiographic examination of metallic materials by X- and gamma rays — Basic rules*.

Adjunct to ASTM E446, *Standard reference radiographs for steel castings up to 2 in. (51 mm) in thickness*.¹⁾

Adjunct to ASTM E186, *Standard reference radiographs for heavy-walled (2 to 4 1/2-in. (51 to 114 mm)) steel castings*.¹⁾

Adjunct to ASTM E280, *Standard reference radiographs for heavy-walled (4 1/2 to 12-in. (114 to 305 mm)) steel castings*.¹⁾

Adjunct to ASTM E192, *Standard reference radiographs of investment steel castings of aerospace applications*.¹⁾

3 Basis of purchase

3.1 The request for radiographic examination and all pertinent information relating thereto, such as sensitivity, coverage and acceptance criteria, shall be indicated in the enquiry and order.

3.2 Unless otherwise specified in the enquiry and order, the radiographic coverage may be of two types, i.e. pilot or regular production inspection. For both types, the manufacturing plan shall show the area to be examined and the frequency of examination and shall be subject to agreement between the supplier and purchaser.

3.3 If requirements are imposed for which no accepted ISO or other standard or document is available, a detailed specification of such requirements shall be provided.

4 Time of examination

4.1 Unless otherwise requested in the enquiry and order, the radiographic examination may be performed at any point in the manufacturing cycle, before or after the final heat-treatment.

4.2 The surface shall be conditioned, if necessary, so that surface irregularities cannot mask or be confused with discontinuities.

4.3 Any type of penetrameter or image quality indicator may be used, provided that the sensitivity level indicated by the purchaser is achieved.

1) Reference radiographs may be purchased from:

American Society for Testing and Materials
1916 Race Street
Philadelphia, PA 19103, U.S.A.

5 Personnel qualifications

5.1 Operations shall be carried out by qualified personnel. The system of qualification shall be agreed upon between the purchaser and founder and shall form a part of the technical specification, or be stated in the enquiry or request to bid.

6 Shooting sketches

6.1 Shooting sketches for pilot radiography

When requested in the order or enquiry, preliminary shooting sketches shall be prepared by the supplier for submission with the radiographs of the pilot casting for approval by the customer. These sketches shall show the area of the part to be examined, and shall include the following information for each exposure.

- 6.1.1** The gamma source or kilovoltage used.
- 6.1.2** The location of radiation in relation to the area covered, and the film.
- 6.1.3** The physical size of the source.
- 6.1.4** The area covered by the film.
- 6.1.5** The placement of the film and location markers.
- 6.1.6** The film-to-source distance.
- 6.1.7** The placement of the image quality indicators or penetrameters and the image quality value.
- 6.1.8** The section thickness.
- 6.1.9** The number and types of films used.
- 6.1.10** The film identification.
- 6.1.11** The thickness and type of intensifying screens.
- 6.1.12** The value of density required.

6.1.13 The geometrical unsharpness.

6.1.14 The conditions of development of films.

6.2 Shooting sketches for production radiography

The preliminary shooting sketch may, by mutual agreement between the supplier and the purchaser, be adjusted at the time of examination of the first casting sample. Subsequent production castings shall be examined in accordance with the finalized shooting sketches, which shall include the information in 6.1.1 to 6.1.14. Any new criteria established for the radiography of the production castings, such as changes in the percentage of coverage of the part or changes in the acceptance standards, shall be stated.

7 Rejection/Acceptance criteria

The rejection/acceptance criteria shall be specified in the purchase order and shall be based on the applicable documents referenced in clause 2 (adjuncts to ASTM E446, E186, E280, E192).

8 Foundry responsibility

Unless otherwise specified at the time of the enquiry or order, the responsibility of the supplier (foundry) is limited to the attainment of the standards specified in the order, in all castings or portions of castings specifically calling for radiographic examination. Castings or portions of castings not required to be radiographically examined by the foundry shall not be subject to rejection based upon results of any subsequent radiographic examination. Also, castings shall not be subject to rejection based upon radiographic re-examination subsequent to their acceptance on the basis of the original radiography, if such examination is carried out by techniques other than those agreed upon at the time of the enquiry and order, and/or in a manner different from that described in the finalized shooting sketch (6.2).

9 Records

Unless otherwise agreed upon between the supplier and purchaser, records of radiographic inspection shall be kept by the supplier for a period of at least 5 years.

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