
International Standard



1027

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Radiographic image quality indicators for non-destructive testing — Principles and identification

Indicateurs de qualité d'image radiographique pour les essais non destructifs — Principes et identification

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Foreword

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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.

International Standard ISO 1027 was developed by Technical Committee ISO/TC 44, *Welding and allied processes*, and was circulated to the member bodies in April 1982.

It has been approved by the member bodies of the following countries:

Australia	India	Poland
Belgium	Ireland	Romania
Canada	Italy	Spain
China	Japan	Sweden
Czechoslovakia	Korea, Dem. P. Rep. of	Switzerland
Egypt, Arab Rep. of	Korea, Rep. of	USA
Finland	Netherlands	USSR
France	New Zealand	
Hungary	Pakistan	

The member bodies of the following countries expressed disapproval of the document on technical grounds:

Germany, F. R.
United Kingdom

This International Standard cancels and replaces ISO Recommendation R 1027-1969, of which it constitutes a technical revision.

Radiographic image quality indicators for non-destructive testing — Principles and identification

0 Introduction

The detection of an imperfection in a product subjected to X or gamma radiography depends on the quality of the resultant radiograph.

This quality, which itself depends on the radiographic technique used, should be checked with an image quality indicator (IQI).

It is recommended that one or other of the two image quality indicators specified below should be used.

For the proper use of IQI see ISO 2504.

1 Scope and field of application

This International Standard defines the characteristics of image quality indicators for non-destructive testing used in radiography and specifies the symbols which allow the identification of these indicators. Notwithstanding that the basic experience was based on radiography of steel, this International Standard is intended for general application on all metals. However, for particular materials (for example, aluminium and its alloys) complementary International Standards may be issued.

2 References

ISO 3, *Preferred numbers — Series of preferred numbers*.

ISO 17, *Guide to the use of preferred numbers and of series of preferred numbers*.

ISO 2504, *Radiography of welds and viewing conditions for films — Utilization of recommended patterns of image quality indicators (IQI)*

ISO 5576, *Industrial radiology — Non-destructive testing — Vocabulary*.¹⁾

3 Definitions

The definitions of the principal terms relating to radiographic techniques used in this International Standard are given in ISO 5576.

4 Manufacture

The material used for manufacturing the indicators should have a specified coefficient of absorption as close as possible to that of the part being examined. If the indicator has a protective covering, this should not be so absorbent as to affect the visibility of wires or holes.

5 Required characteristics

5.1 Wire type image quality indicator

5.1.1 Specifications

The indicator consists of a series of wires of minimum length 25 mm. These are mounted side by side, parallel, with a distance between the axes of the wires of not less than three times the wire diameter and not less than 5 mm, and arranged in order of increasing diameter. The diameter sizes should be determined as a consecutive series of numbers taken in general from the R 10²⁾ series of preferred numbers, taking the millimetre as the unit. Exceptionally, and in particular for use with thick material, the R 20²⁾ series of preferred numbers may be used. An example of a wire type image quality indicator is given in figure 1.

1) At present at the stage of draft.

2) See ISO 3 and ISO 17. Allowing for rounding, the R 10 series of preferred numbers is a geometrical progression, unlimited in either direction, with a ratio of $\sqrt[10]{10}$ and including unity; a superior series is, for instance, the R 20 series of preferred numbers, with a ratio of $\sqrt[20]{10}$.

5.1.2 Dimensional tolerances¹⁾

The permitted tolerances on the wire diameters for the R 10 series of preferred numbers are given in table 1 below.

Table 1 – Permitted tolerances on wire diameters

Wire diameter, <i>d</i>	Tolerance
mm	mm
0 < <i>d</i> ≤ 0,125	± 0,005
0,125 < <i>d</i> ≤ 0,5	± 0,01
0,5 < <i>d</i> ≤ 1,6	± 0,02
1,6 < <i>d</i> ≤ 4	± 0,03

5.2 Step and hole type image quality indicator

5.2.1 Specifications

The indicator consists of a part or an assembly having a series of steps. Each step has one or more circular holes of a diameter equal to the thickness *e* of the step.

The thickness of the steps, and the diameters of the holes, should be determined as a consecutive series of numbers taken in general from the R 10²⁾ series of preferred numbers, taking the millimetre as the unit. Exceptionally, and in particular for use with thick material, the R 20²⁾ series of preferred numbers may be used.

Steps with a thickness greater than or equal to 0,8 mm have only a single hole. Steps with a thickness of less than 0,8 mm may have two or more holes arranged differently from step to step.

The distance from the centre of the hole to the edge of the step, or between the edges of two holes, should in no case be less than the hole diameter plus 1 mm. Examples of step and hole type image quality indicators are given in figure 2.

5.2.2 Dimensional tolerances¹⁾

The permitted tolerances on the step thicknesses and hole diameters for the R 10 series of preferred numbers are given in table 2, below.

Table 2 – Permitted tolerances on step thicknesses and hole diameters

Step thickness, <i>e</i> , or hole diameter	Tolerance
mm	mm
0 < <i>e</i> ≤ 0,5	+0,015 0
0,5 < <i>e</i> ≤ 1	+0,020 0
1 < <i>e</i> ≤ 2,5	+0,025 0
2,5 < <i>e</i> ≤ 5	+0,030 0
5 < <i>e</i> ≤ 10	+0,036 0

6 Identification of image quality indicators

Each image quality indicator should carry one or more symbols of identification such that by examination of the radiograph it is possible to determine the following characteristics :

- the specification with which the IQI complies, with ISO reference;
- the number of elements (wires or holes);
- the length of wires (on the wire IQI only);
- the diameter of the largest element (wire or hole);
- the preferred number series used (R 10 or R 20);
- the material of which the IQI is made.

1) These tolerances are correct for steel. For other metals or alloys, it is recommended that production conditions be such that the tolerances are as near as possible to those fixed for steel.

2) See ISO 3 and ISO 17. Allowing for rounding, the R 10 series of preferred numbers is a geometrical progression, unlimited in either direction, with a ratio of $\sqrt[10]{10}$ and including unity; a superior series is, for instance, the R 20 series of preferred numbers, with a ratio of $\sqrt[20]{10}$.

Dimensions in millimetres
 d = wire diameter

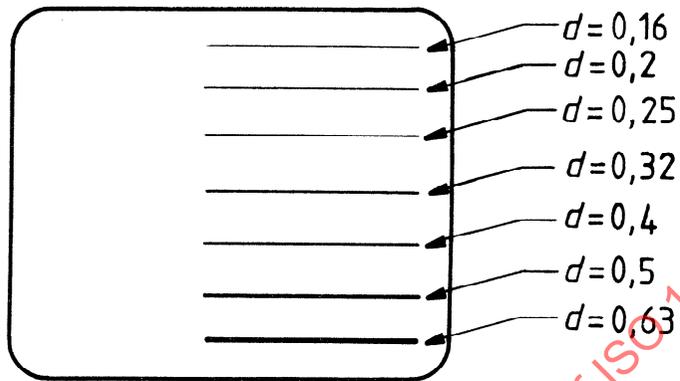
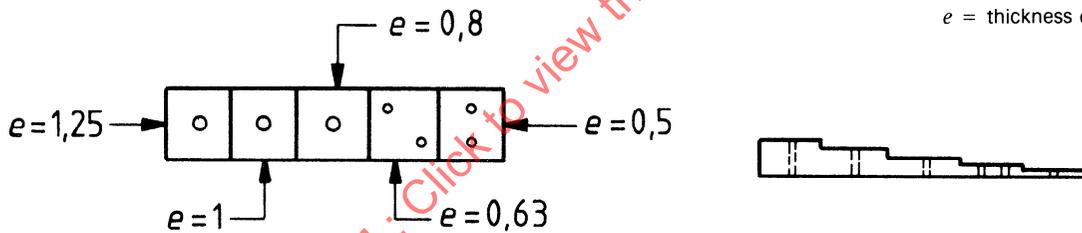
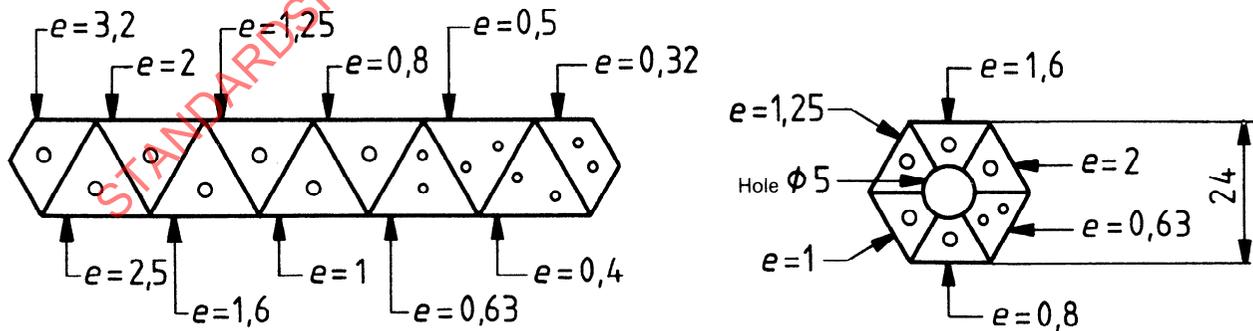


Figure 1 — Example of wire type image quality indicator

Dimensions in millimetres
 e = thickness of steps



NOTE — As alternatives to the step arrangement shown above, the steps may be arranged as indicated below



NOTE — In each step, holes should be drilled in accordance with the requirements of 5.2.

Figure 2 — Examples of step and hole type image quality indicators

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