
**Non-destructive testing — Image
quality of radiographs —**

**Part 2:
Determination of the image quality
value using step/hole-type image
quality indicators**

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*Essais non destructifs — Qualité d'image des radiogrammes —
Partie 2: Détermination de l'indice de qualité d'image à l'aide
d'indicateurs à trous et à gradins*

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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. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 19232-2 was prepared by the European Committee for Standardization (CEN) in collaboration with ISO Technical Committee TC 135, *Non-destructive testing*, Subcommittee SC 5, *Radiation methods*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 19232-2:2004), of which it constitutes a minor revision with the following changes:

- updated references;
- statement that EN wire IQIs of EN 462-2:1994[1] and its designation are identical to ISO wire IQIs and its designation, as defined in this part of ISO 19232;
- replacement of film by detector, which includes film and digital detectors.

It also incorporates the Technical Corrigendum, ISO 19232-2:2004/Cor. 1:2007.

ISO 19232 consists of the following parts under the general title *Non-destructive testing — Image quality of radiographs*:

- *Part 1: Determination of the image quality value using wire-type image quality indicators*
- *Part 2: Determination of the image quality value using step/hole-type image quality indicators*
- *Part 3: Image quality classes*
- *Part 4: Experimental evaluation of image quality values and image quality tables*
- *Part 5: Determination of the image unsharpness value using duplex wire-type image quality indicators*

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Non-destructive testing — Image quality of radiographs —

Part 2:

Determination of the image quality value using step/hole-type image quality indicators

1 Scope

This part of ISO 19232 specifies a device and a method for the determination of the image quality of radiographs using step/hole-type image quality indicators.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 5580, *Non-destructive testing — Industrial radiographic illuminators — Minimum requirements*

ISO/IEC 17050-1, *Conformity assessment — Supplier's declaration of conformity — Part 1: General requirements*

ISO 19232-4, *Non-destructive testing — Image quality of radiographs — Part 4: Experimental evaluation of image quality values and image quality tables*

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3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1

image quality

characteristic of a radiographic image which determines the degree of detail it shows

3.2

image quality indicator

IQI

device comprising a series of elements of graded dimensions which enable a measure of the image quality to be obtained

Note 1 to entry: The elements of IQI are commonly wires or steps with holes.

3.3

image quality value

measure of the image quality required or achieved and is equal to the thinnest element which can be detected on the radiograph

Note 1 to entry: For step/hole-type IQIs, the element numbers are the hole numbers as given in [Table 1](#).

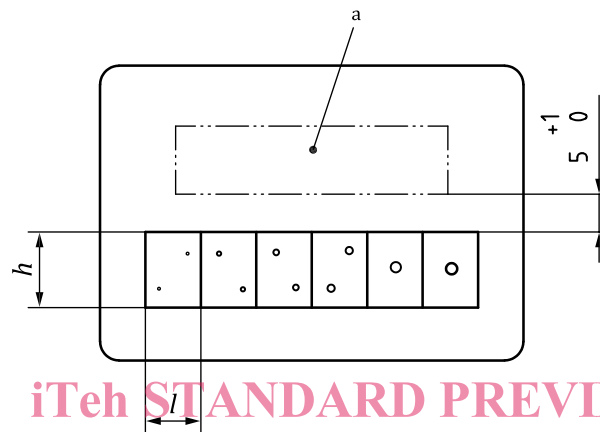
4 Specification for step/hole-type image quality indicators

4.1 Dimensions, manufacture, designation

4.1.1 Dimensions

The IQI system is based on a series of 18 steps of different thicknesses and holes of corresponding diameters which are specified in [Table 1](#) along with the relevant tolerances and the hole numbers. These steps and holes have been subdivided into four overlapping ranges of six consecutive hole numbers, viz. H 1 to H 6, H 5 to H 10, H 9 to H 14, and H 13 to H 18.

Dimensions in millimetres



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Key

	IQI No.			
	H 1	H 5	H 9	H 13
h	10 mm	10 mm	10 mm	15 mm
l	5 mm	7 mm	7 mm	15 mm
a	Space for identification marking.			

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Figure 1 — Step/hole-type image quality indicator

4.1.2 Manufacture

The steps of thicknesses lower than 0,8 mm shall contain two holes of the same diameter. The steps of thicknesses equal or higher than 0,8 mm shall contain one hole. The minimum distance from the centre of a hole to the edge of the step, or to the edge of the second hole in that step, shall be the hole diameter plus 1 mm. The holes shall be perpendicular to the surface and shall not have a bevelled edge.

4.1.3 Designation

The written designation of an image quality indicator shall be labelled with the letters IQI, the number of this part of ISO 19232, the number of the smallest hole as specified in [Table 1](#) (e.g. H 5), and the symbol denoting the IQI material (e.g. FE).

EXAMPLE IQI ISO 19232-2-H 5 FE

IQIs with the designation EN 462-2[1] are considered to be identical to IQIs with the designation ISO 19232-2.

Table 1 — Hole numbers, hole diameters, step thicknesses, and tolerances of the range of IQIs

Dimensions in millimetres

Range of image quality indicators				Step/hole		
H 1	H 5	H 9	H 13	element (hole) number	nominal hole diameter and step thickness	nominal hole diameter and step thickness tolerances
x				H 1	0,125	+ 0,015 0
x				H 2	0,160	
x				H 3	0,200	
x				H 4	0,250	
x	x			H 5	0,320	
x	x			H 6	0,400	
	x			H 7	0,500	
	x			H 8	0,630	+ 0,020 0
	x	x		H 9	0,800	
	x	x		H 10	1,000	
		x		H 11	1,250	+ 0,025 0
		x		H 12	1,600	
		x	a	H 13	2,000	
		x	a	H 14	2,500	
			a	H 15	3,200	+ 0,030 0
			a	H 16	4,000	
			a	H 17	5,000	
			a	H 18	6,300	+ 0,036 0

^a These values may be used for special applications by agreement between contracting parties.

4.2 Material

All parts of the IQI shall consist of the same material and shall be embedded in a protective covering material which shall not affect the image quality value.

See [Table 2](#) for usual IQI materials.

4.3 Marking

The marking applied on the IQI (see [Figure 1](#)) shall give the following information:

- number of the smallest hole printed next to the smallest hole;
- letters identifying the IQI material used, e.g. FE;
- ISO letters.

EXAMPLE H 5 FE ISO

IQIs with the letters EN are considered to be identical to IQIs with the letters ISO.

The radiographic image of the identification shall not cause glare when the radiograph is viewed. It is recommended that the absorption of the marking is not more than twice the absorption of the thickest step.

4.4 Declaration of conformity

Each IQI shall be delivered with a declaration of conformity according to ISO/IEC 17050-1 which confirms that the IQI complies with this part of ISO 19232. For identification, the IQI shall be numbered and marked by the producer.

5 Use of image quality indicators

5.1 Selection

The IQI shall be selected in accordance with the material under test and its thicknesses.

Whenever possible, the IQI shall be of the same type of material as the specimen under test. For other cases, see ISO 19232-4.

Table 2 — Types of IQI and material used for selected groups of materials

IQI marking	Hole number from Table 1	IQI material	Suitable for testing of the following materials
H 1 CU H 5 CU H 9 CU H 13 CU	H 1 to H 6 H 5 to H 10 H 9 to H 14 H 13 to H 18	Copper	Copper, zinc, tin, and their alloys
H 1 FE H 5 FE H 9 FE H 13 FE	H 1 to H 6 H 5 to H 10 H 9 to H 14 H 13 to H 18	Steel (low alloyed) <small>ISO 19232-2:2013</small>	Ferrous materials
H 1 TI H 5 TI H 9 TI H 13 TI	H 1 to H 6 H 5 to H 10 H 9 to H 14 H 13 to H 18	Titanium	Titanium and its alloys
H 1 AL H 5 AL H 9 AL H 13 AL	H 1 to H 6 H 5 to H 10 H 9 to H 14 H 13 to H 18	Aluminium	Aluminium and its alloys

5.2 Arrangement

When the radiograph is taken, the IQI shall be placed on the side of the section under test facing the source of radiation and remote from the detector.

If this is not possible, the IQI may be placed adjacent to the side of the section under test nearest the detector. To indicate that this arrangement has been used, the image of a letter “F” shall be visible on the radiograph near the IQI marking.

The IQI shall be placed on the object, in an area where the thickness is as uniform as possible.

Special arrangements are determined by application standards.

6 Determination of image quality value

In determining the image quality value, the conditions for viewing radiographs specified in ISO 5580 shall be observed. The number of the smallest hole which is clearly visible on the radiograph shall be taken as the image quality value. When the step contains two holes, both shall be clearly visible.

In general, the image quality value shall be determined for every radiograph in radiographic examinations for which a verification of image quality is required.

If steps have been taken to guarantee that radiographs of similar test objects and regions are produced with identical exposure and processing techniques and no differences in the image quality value are likely, the image quality need not be verified for every radiograph, the extent of image quality verification being subject to agreement between the contracting parties.

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