INTERNATIONAL STANDARD

ISO 19232-3

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Non-destructive testing — Image quality of radiographs —

Part 3: Image quality classes for ferrous metals

Essais non destructifs — Qualité d'image des radiogrammes —

Partie 3: Classes de qualité d'image pour des métaux ferreux

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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 19232-3 was prepared by CEN (as EN 462-3:1996) and was adopted, under a special “fast-track procedure”, by Technical Committee ISO/TC 135, *Non-destructive testing*, Subcommittee SC 5, *Radiation methods*, in parallel with its approval by the ISO member bodies.

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

— *Part 1: Image quality indicators (wire type) — Determination of image quality value*

— *Part 2: Image quality indicators (step/hole type) — Determination of image quality value*

— *Part 3: Image quality classes for ferrous metals*

— *Part 4: Experimental evaluation of image quality values and image quality tables*

— *Part 5: Image quality indicators (duplex wire type) — Determination of image unsharpness value*

Non-destructive testing — Image quality of radiographs —

Part 3:
Image quality classes for ferrous metals

1 Scope

This part of ISO 19232 specifies the minimum image quality values to ensure a uniform radiographic quality. It applies to the two types of image quality indicator as detailed in ISO 19232-1 for wire type IQI and ISO 19232-2 for step/hole type IQI and for the two techniques described in ISO 5579. Values are specified for the two classes of radiographic technique specified in ISO 5579 and for ferrous metals.

2 Normative references

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

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

ISO 19232-1, *Non-destructive testing — Image quality of radiographs — Part 1: Image quality indicators (wire type) — Determination of image quality value*

ISO 19232-2, *Non-destructive testing — Image quality of radiographs — Part 2: Image quality indicators (step/hole type) — Determination of image quality value*

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

ISO 11699-1, *Non-destructive testing — Industrial radiographic film — Part 1: Classification of film systems for industrial radiography*

ISO 17636, *Non-destructive testing of welds — Radiographic testing of fusion-welded joints*

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

3 Definitions

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

3.1
classification of radiographic techniques
see ISO 5579

3.2
image quality indicator (IQI)
see ISO 19232-1 and ISO 19232-2

3.3
image quality value
see ISO 19232-1 and ISO 19232-2

3.4
image quality table
see ISO 19232-4

Additional definitions are given in ISO 5579.

4 Image quality classes

4.1 Single-wall radiography

The image quality classes given in Tables 1 to 4 can be obtained if the requirements of ISO 5579 are met:

— Image quality class A for the class A radiographic technique (see ISO 5579)

— Image quality class B for the class B radiographic technique (see ISO 5579).

Image quality values given in Tables 1 to 4 apply in cases where the IQI is placed on the source side. If it is not possible to place the IQI on the source side it may be placed on the film side. Tables 1 to 4 cannot be applied in this case.

NOTE The use of exceptional arrangements (for example: use of an iridium 192 source for thin plate sections) can result in obtaining different image quality values from those specified (see footnotes of Tables 1 to 4).

4.2 Double-wall radiography

The image quality classes given in Tables 5 to 12 can be obtained if the requirements of ISO 5579 are met:

— Image quality class A for the class A radiographic technique (see ISO 5579)

— Image quality class B for the class B radiographic technique (see ISO 5579).

NOTE The use of exceptional arrangements can result in obtaining different image quality values from those specified (see footnotes of Tables 6, 8, 10 and 12).

When using double wall radiographic technique, the penetrated thickness "w" can be the sum of both wall thicknesses "t".

Tables 5 to 8 indicate the image quality values corresponding to the image quality classes A and B for a double-wall test with interpretation of the two walls, the IQI being placed on the source side of the object (IQI on the source side).

Tables 9 to 12 indicate the image quality values corresponding to the image quality classes A and B for a double-wall test with interpretation of the single image, the IQI being placed on the film side of the object (IQI on the film side).

Tables 9 to 12 may also be used to indicate the image quality corresponding to the double-wall/double image technique when the IQI is placed on the film side. This may be the case of elliptical radiographs according to ISO/DIS 17636.

5 Arrangement

To determine the image quality, when the radiograph is being taken, the IQI shall be placed on the source side of the section under test. If this is not possible, the IQI may be placed adjacent to the side of the section under test nearest the film. To indicate that this latter arrangement has been used, the image of the letter F shall be visible immediately next to the IQI marking on the radiograph.

The IQI shall always be placed on the object under test 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.

For wire type IQIs the number of the thinnest wire which is still visible on the radiograph shall be taken as the image quality value achieved. The image of a wire is accepted to be visible if a continuous length of at least 10 mm is clearly visible in a region of uniform optical density.

For step/hole type IQIs the number of the smallest hole which is visible on the radiograph shall be taken as the image quality value. When the step contains two holes, both shall be visible.

In general, the image quality value shall be determined for every radiograph. 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.

Single-wall technique; IQI on source side

Table 1 — Wire IQI

Image quality class A							
Nominal thickness t mm							IQI value[a]
				to		1,2	W 18
above		1,2	to		2		W 17
above		2	to		3,5		W 16
above		3,5	to		5		W 15
above		5	to		7		W 14
above		7	to		10		W 13
above		10	to		15		W 12
above		15	to		25		W 11
above		25	to		32		W 10
above		32	to		40		W 9
above		40	to		55		W 8
above		55	to		85		W 7
above		85	to		150		W 6
above		150	to		250		W 5
above		250					W 4

[a] When using Ir 192 sources, IQI values worse than listed values may be accepted as follows:

10 mm to 24 mm: up to 2 values
above 24 mm to 30 mm: up to 1 value

Table 2 — Step and hole IQI

Image quality class A							
Normal thickness t mm							IQI value[a]
				to		2	H 3
above		2	to		3,5		H 4
above		3,5	to		6		H 5
above		6	to		10		H 6
above		10	to		15		H 7
above		15	to		24		H 8
above		24	to		30		H 9
above		30	to		40		H 10
above		40	to		60		H 11
above		60	to		100		H 12
above		100	to		150		H 13
above		150	to		200		H 14
above		200	to		250		H 15
above		250	to		320		H 16
above		320	to		400		H 17
above		400					H 18

[a] When using Ir 192 sources, IQI values worse than listed values may be accepted as follows:

10 mm to 24 mm: up to 2 values

above 24 mm to 30 mm: up to 1 value

Single-wall technique; IQI on source side

Table 3 — Wire IQI

Image quality class B						
Nominal thickness t mm						IQI value[a]
			to		1,5	W 19
above	1,5	to		2,5		W 18
above	2,5	to		4		W 17
above	4	to		6		W 16
above	6	to		8		W 15
above	8	to		12		W 14
above	12	to		20		W 13
above	20	to		30		W 12
above	30	to		35		W 11
above	35	to		45		W 10
above	45	to		65		W 9
above	65	to		120		W 8
above	120	to		200		W 7
above	200	to		350		W 6
above	350					W 5

[a] When using Ir 192 sources, IQI values worse than listed values may be accepted as follows:

12 mm to 40 mm: up to 1 value

Table 4 — Step/hole IQI

Image quality class B						
Nominal thickness t mm						IQI value[a]
			to		2,5	H 2
above	2,5	to		4		H 3
above	4	to		8		H 4
above	8	to		12		H 5
above	12	to		20		H 6
above	20	to		30		H 7
above	30	to		40		H 8
above	40	to		60		H 9
above	60	to		80		H 10
above	80	to		100		H 11
above	100	to		150		H 12
above	150	to		200		H 13
above	200	to		250		H 14

[a] When using Ir 192 sources, IQI values worse than listed values may be accepted as follows:

12 mm to 40 mm: up to 1 value

Double-wall technique; Double image; IQI on source side

Table 5 — Wire IQI

Image quality class A						
Penetrated thickness w mm						IQI value
			to	1,2		W 18
above	1,2	to	2			W 17
above	4	to	3,5			W 16
above	8	to	5			W 15
above	12	to	7			W 14
above	20	to	12			W 13
above	30	to	18			W 12
above	40	to	30			W 11
above	60	to	40			W 10
above	80	to	50			W 9
above	100	to	60			W 8
above	150	to	85			W 7
above	200	to	120			W 6
above	120	to	220			W 5
above	220	to	380			W 4
above	380					W 3

Table 6 — Step/hole IQI

Image quality class A						
Penetrated thickness w mm						IQI value[a]
			to	1		H 3
above	2,5	to	2			H 4
above	4	to	3,5			H 5
above	8	to	5,5			H 6
above	12	to	10			H 7
above	20	to	19			H 8
above	30	to	35			H 9

[a] When using Ir 192 sources, IQI values worse than listed values may be accepted as follows:

up to 3,5 mm: up to 2 values
above 3,5 mm to 10 mm: up to 1 value

Double-wall technique; Double image; IQI on source side

Table 7 — Wire IQI

Image quality class B					
Penetrated thickness w mm					IQI value
		to	1,5		W 19
above	1,5	to	2,5		W 18
above	2,5	to	4		W 17
above	4	to	6		W 16
above	6	to	8		W 15
above	8	to	15		W 14
above	15	to	25		W 13
above	25	to	38		W 12
above	38	to	45		W 11
above	45	to	55		W 10
above	55	to	70		W 9
above	70	to	100		W 8
above	100	to	170		W 7
above	170	to	250		W 6
above	250				W 5

Table 8 — Step/hole IQI

Image quality class B					
Penetrated thickness w mm					IQI value[a]
		to	1		H 2
above	1	to	2,5		H 3
above	2,5	to	4		H 4
above	4	to	6		H 5
above	6	to	11		H 6
above	11	to	20		H 7
above	20	to	35		H 8

[a] When using Ir 192 sources, IQI values worse than listed values may be accepted as follows:

4 mm to 11 mm: up to 1 value