



**SLOVENSKI STANDARD**  
**oSIST prEN ISO 5580:2023**  
**01-april-2023**

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**Neporušitveno preskušanje - Osvetljevalne naprave za industrijsko radiografijo - Minimalne zahteve (ISO/DIS 5580:2023)**

Non-destructive testing - Industrial radiographic illuminators - Minimum requirements (ISO/DIS 5580:2023)

Zerstörungsfreie Prüfung - Betrachtungsgeräte für die industrielle Radiographie - Minimale Anforderungen (ISO/DIS 5580:2023)

Essais non destructifs - Négatoscopes utilisés en radiographie industrielle - Exigences minimales (ISO/DIS 5580:2023)

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19.100      Neporušitveno preskušanje      Non-destructive testing

**oSIST prEN ISO 5580:2023**

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## Non-destructive testing — Industrial radiographic illuminators — Minimum requirements

*Essais non destructifs — Négatoscopes utilisés en radiographie industrielle — Exigences minimales*

ICS: 19.100

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ISO copyright office  
CP 401 • Ch. de Blandonnet 8  
CH-1214 Vernier, Geneva  
Phone: +41 22 749 01 11  
Email: [copyright@iso.org](mailto:copyright@iso.org)  
Website: [www.iso.org](http://www.iso.org)

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# Contents

	Page
Foreword.....	iv
<b>1 Scope.....</b>	<b>1</b>
<b>2 Normative references.....</b>	<b>1</b>
<b>3 Terms and definitions.....</b>	<b>1</b>
<b>4 Characteristics of radiographic illuminators.....</b>	<b>1</b>
4.1 Mechanical construction.....	1
4.2 Viewing screen.....	2
4.3 Luminance.....	2
4.4 Colour of light.....	3
4.5 Diffusion of light.....	3
4.6 Uniformity of illumination.....	3
4.7 Distributing light.....	3
4.8 Anti-glare device.....	3
4.9 Heating.....	3
<b>5 Determination of certain characteristics.....</b>	<b>3</b>
5.1 General.....	3
5.2 Divergence and dispersion of light of diffusing screens.....	3
5.3 Uniformity of screen luminance.....	4
5.4 Nominal power consumption.....	5
<b>6 Marking.....</b>	<b>5</b>
<b>7 Recommendations for use.....</b>	<b>5</b>

[oSIST prEN ISO 5580:2023](https://standards.iteh.ai/catalog/standards/sist/1b5d222e-6744-4177-8894-23b3792e6fcb/osist-pren-iso-5580-2023)

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## ISO/DIS 5580:2022(E)

### 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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 135, *Non-destructive testing*, Subcommittee SC 5, *Radiographic testing*.

This second edition cancels and replaces the first edition (ISO 5580:1985), which has been technically revised.

The main changes are as follows:

- Normative references added (2.);
- Exact specification for luminance measurement equipment required (4.3);
- Notes on luminance control of illuminators added (4.3);
- A range of permitted light colours was added (4.4);
- “Lamps” replaced by “Light sources”, so LEDs can be used too (7.);
- “Film density” was replaced by “optical density” throughout the document;
- And other minor corrections of wording.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

# Non-destructive testing — Industrial radiographic illuminators — Minimum requirements

## 1 Scope

This International Standard specifies the minimum requirements for industrial illuminators used for viewing radiographs.

The function of the illuminator is to provide enough diffuse light for viewing of developed radiographic films (radiographs).

The illuminator shall guarantee the same safety of personnel as an electric apparatus with maximum voltage, insulation and earthing which is required by corresponding safety standards of electro technics in each country where these are applied.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

CIE S 017/E: 2020, International Lighting Vocabulary, 2<sup>nd</sup> Edition

ISO/CIE 19476, *Characterization of the performance of illuminance meters and luminance meters*

ISO 5576, *Non-destructive testing — Industrial X-ray and gamma-ray radiology — Vocabulary*

[https://standards.iteh.ai/catalog/standards/sist/1b5d222e-6744-4177-8894-](https://standards.iteh.ai/catalog/standards/sist/1b5d222e-6744-4177-8894-23b3792e6fcb/osist-pr-en-iso-5580-2023)

## 3 Terms and definitions

No terms and definitions are listed in this document. For the purposes of this document, the terms and definitions given in ISO 5576 apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

## 4 Characteristics of radiographic illuminators

### 4.1 Mechanical construction

An illuminator consists of the housing with one of the sides being the viewing screen illuminated from the inside. This screen can itself be the diffusing screen. This housing may also contain a system for thermal protection of the radiographs; this system may or may not be ventilated.

Generally, dry radiographs should be viewed. For possible viewing of wet radiographs in the dark room the illuminator shall be so designed as to prevent penetration of the liquid if the radiograph comes into contact with the screen.

## ISO/DIS 5580:2022(E)

## 4.2 Viewing screen

The screens shall be easy to clean and shall be made of a material which is resistant to scratching during cleaning processes recommended by the manufacturer and during film viewing.

NOTE The screen may be a combination of elements, all of which should be resistant to heat in terms of deformation and discoloration.

The size of the screens shall allow the viewing of a radiograph without excessive glare reaching the eyes of the operator. Should the illuminator be used for viewing radiographs of different sizes, internal or external covering masks shall be provided.

## 4.3 Luminance

The screen luminance required depends on the optical density of the radiographs. The luminance shall be measured with a luminance meter in  $\text{cd}/\text{m}^2$  in accordance with ISO/CIE 19476 using a  $V(\lambda)$  spectral responsivity. The following minimum screen luminance  $L_{\min}$  is recommended for the perception of information at various optical densities  $D$  of the illuminated radiograph.

The luminance  $L$  (or brightness) of the illuminated radiograph shall be not less than:

- $30 \text{ cd}/\text{m}^2$  for optical densities  $D \leq 2,5$ ;
- $10 \text{ cd}/\text{m}^2$  for optical densities  $D > 2,5$ .

and, wherever possible, approximately  $100 \text{ cd}/\text{m}^2$  or higher. These minimum values require the following screen luminance  $L_{\min}$  according to [Table 1](#):

**Table 1 — Minimum screen luminance  $L_{\min}$  depending on the optical density  $D$  of the radiograph**

optical density $D$	Minimum screen luminance $L_{\min}$ $\text{cd}/\text{m}^2$
1,0	300
1,5	1 000
2,0	3 000
2,5	10 000
3,0	10 000
3,5	30 000
4,0	100 000
4,5	300 000

Note 1 At  $L_{\max} > 300\,000 \text{ cd}/\text{m}^2$  the viewed radiograph will absorb so much light, that it heats up itself and will curl as a result of this single side heating by the illumination light. Viewing at such high luminance should be limited to seconds only.

The illuminator shall be equipped with a variable and continuous control of the screen luminance.

Note 2 Illumination control should be realized using constant current. A pulsed current will irritate standard, non-integrating densitometer circuits resulting in wrong density measures. Pulsed current illumination control requires the application of integrating densitometers over several pulses. In this case, correct density readings at various illumination levels should be verified before usage.



#### 4.4 Colour of light

The colour of the light used to illuminate the radiograph is normally white. The Correlated Colour Temperature (CCT, see CIE S 017/E) shall be in the range between 2 500 K up to 7 000 K. However, in the case of a film with an emulsion type yielding a non-white image, light with adapted colours may be used if they have been recommended by the film manufacturer.

#### 4.5 Diffusion of light

If the illuminator has a diffusing screen, the light shall be sufficiently divergent so that the eyes of the observer receive rays from all parts of the screen. The diffusion factor  $\sigma'$  shall exceed 0,7 (see 5.2).

#### 4.6 Uniformity of illumination

The screen shall be uniformly illuminated, the uniformity factor  $g$  being higher than 0,5 (see 5.3).

#### 4.7 Distributing light

The housing, blinds and covering masks shall be constructed in such a manner that no disturbing light hinders the viewing of the radiographs (see 5.1).

#### 4.8 Anti-glare device

Each illuminator shall be fitted with an anti-glare device, which, by manual or automatic operation, prevents the operator from being subjected to excessive light brightness when the radiograph is removed.

#### 4.9 Heating

Appropriate precautions shall be taken to ensure that the temperature of the housing does not exceed 60 °C at the usual contact surfaces after 1 h of intermittent operation (50 % switched on with maximum of 15 s duration at an ambient temperature of 20 °C). Further precautions shall be taken to ensure that a radiograph of optical density of 2 does not warp after a continuous viewing time of 1 min and 1 h of intermittent operation of the illuminator.

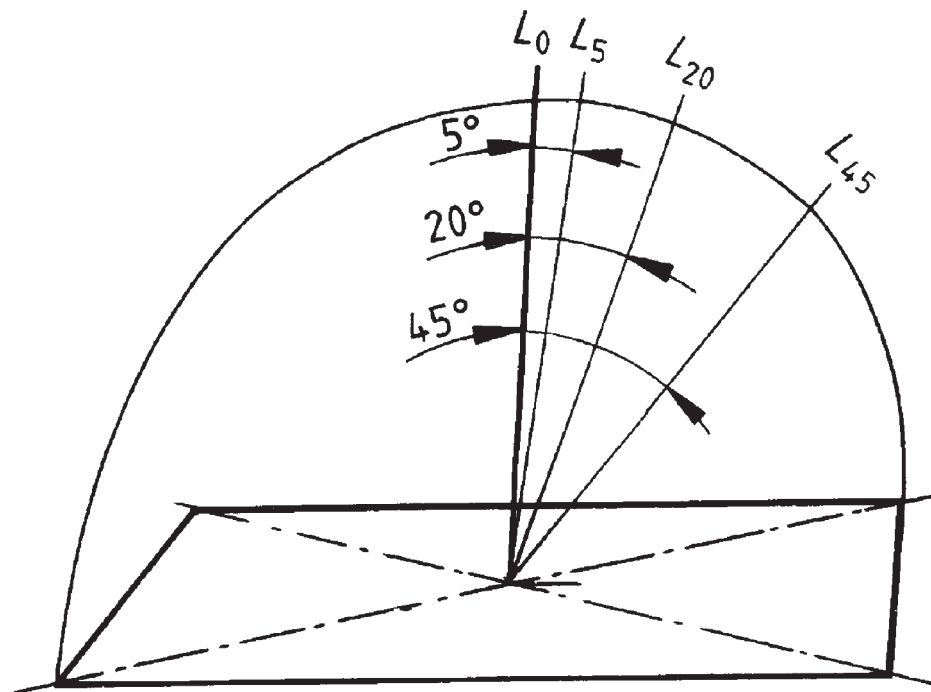
### 5 Determination of certain characteristics

#### 5.1 General

All photometric measurements shall be carried out in a darkened room. The luminance meter has to be used in the middle part of its measuring range. Moreover, light escaping from the illuminator even when the viewing screen is completely masked shall not affect the measurements.

#### 5.2 Divergence and dispersion of light of diffusing screens

The luminance shall be measured on a semi-circle, the centre of which is the centre of the screen and the diameter of which is approximately the same as the maximum dimension of the screen, but at least 50 cm. The luminance shall be measured with the aid of an appropriate luminance meter, the sensitive surface of which is a tangent to the curve of the circle (see Figure 1).

**Key**

$L_0$	luminance measured in normal direction to the screen	$L_{20}$	luminance measured in 20° inclination from normal direction to the screen
$L_5$	luminance measured in 5° inclination from normal direction to the screen	$L_{45}$	luminance measured in 45° inclination from normal direction to the screen

**Figure 1 — Light luminance measurement**

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These measurements shall be made at angles of 45° ( $L_{45}$ ), 20° ( $L_{20}$ ) and 5° ( $L_5$ ) related to the normal. The diffusion factor  $\sigma'$  shall be calculated according to the [formula \(1\)](#).

$$\sigma' = \frac{L_{45} + L_{20}}{2L_5} \quad (1)$$

where

- $\sigma'$  is the diffusion factor;
- $L_5$  is the screen luminance measured at an angle of 5°;
- $L_{20}$  is the screen luminance measured at an angle of 20°;
- $L_{45}$  is the screen luminance measured at an angle of 45°.

The measurements shall be made successively in both senses of rotation.

**5.3 Uniformity of screen luminance**

The measurements shall be made with the aid of an illumination photometer or other suitable instrument. If the screen is rectangular, it shall be divided into squares, each side of the squares measuring 3,5 cm, the luminance of each being measured separately. If the screen is circular, the same basic procedure shall be followed. In both cases, the network of the squares shall be so arranged that the middle square is centred in the middle of the screen.