

AS/NZS 4356.5:1996
IEC 1262-5:1994

Australian/New Zealand Standard[®]

**Medical electrical equipment—
Characteristics of electro-optical
X-ray image intensifiers**

**Part 5: Determination of the
detective quantum efficiency**

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This Joint Australian/New Zealand Standard was prepared by Joint Technical Committee HT/23, Medical Diagnostic Imaging Equipment. It was approved on behalf of the Council of Standards Australia on 14 September 1995 and on behalf of the Council of Standards New Zealand on 11 September 1995. It was published on 5 March 1996.

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Australasian College of Physical Scientists and Engineers in Medicine
 Australian Academy of Dento-Maxillo-Facial Radiologists
 Australian and New Zealand Society of Nuclear Medicine
 Australian Chamber of Commerce and Industry
 Australian Dental Association
 Australian Dental Industry Association
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PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee HT/23 on Medical Diagnostic Imaging Equipment, as a Joint Standard.

It is identical with and has been reproduced from IEC 1262-5:1994, *Medical electrical equipment—Characteristics of electro-optical X-ray image intensifiers*, Part 5: *Determination of the detective quantum efficiency*.

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For the purpose of this Standard, the IEC text should be modified as follows:

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- (b) *Decimal marker* Substitute a full point for a comma where it appears as a decimal marker.
- (c) *References* The references to international Standards should be replaced by references to the following Australian or Joint Australian/New Zealand Standards:

*Reference to International Standard
or other publication*

Australian/New Zealand Standard

IEC

AS/NZS

788 Medical radiology—Terminology

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CONTENTS

	Page
1 Scope	1
2 Normative reference	1
3 Terminology	1
3.1 Definitions	1
3.2 Degree of requirements and reading instructions	2
4 Requirements	3
4.1 Test set-up	3
4.2 X-RAY IMAGE INTENSIFIER - Operating conditions	3
4.3 Input radiation	3
4.4 TEST DEVICE	4
4.5 Measurement equipment	4
5 Determination of the DETECTIVE QUANTUM EFFICIENCY	6
5.1 Preparation	6
5.2 Measurement	7
5.3 Corrections	8
5.4 Determination	8
6 Presentation of the DETECTIVE QUANTUM EFFICIENCY	9
7 Statement of compliance	9
Figure 1 - Geometrical relationship of RADIATION SOURCE and INPUT APERTURE	10
Annexes	
A Terminology - Index of terms	11
B Representative test set-up	12
C Representative scintillation pulse-height spectra	13
D Bibliography	14

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AUSTRALIAN/NEW ZEALAND STANDARD

**MEDICAL ELECTRICAL EQUIPMENT –
CHARACTERISTICS OF ELECTRO-OPTICAL
X-RAY IMAGE INTENSIFIERS –****Part 5: Determination of the detective quantum efficiency****1 Scope**

This International Standard applies to ELECTRO-OPTICAL X-RAY IMAGE INTENSIFIERS for medical use, as components of diagnostic X-RAY EQUIPMENT. This International Standard describes a method of determining the DETECTIVE QUANTUM EFFICIENCY (DQE) of X-RAY IMAGE INTENSIFIERS by analysis of the single gamma-ray photon scintillation pulse-height spectrum. The method of this standard applies only to ELECTRO-OPTICAL X-RAY IMAGE INTENSIFIERS having output radiance decay rates approximately equal to or faster than that of a P-20 phosphor.

2 Normative reference

The following standard contains provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 788: 1984, *Medical Radiology – Terminology*

3 Terminology**3.1 Definitions**

For the purposes of this International Standard, the following definitions apply together with those given in IEC 788. The definitions given below take preference over those given in IEC 788 when differences occur.

3.1.1 *XRII*: An abbreviation for ELECTRO-OPTICAL X-RAY IMAGE INTENSIFIER.

3.1.2 *ENTRANCE PLANE*: The plane perpendicular to the axis of symmetry of the XRII and grazing the part of the XRII, including its housing, that protrudes most in the direction of the RADIATION SOURCE.

3.1.3 *ENTRANCE FIELD*: For an XRII, the area in the ENTRANCE PLANE that can be used for the transmission of an X-RAY PATTERN under specific conditions.

3.1.4 Not used.

3.1.5 *SOURCE TO ENTRANCE PLANE DISTANCE (abbreviation SED)*: The distance between the FOCAL SPOT of the X-RAY TUBE and the ENTRANCE PLANE of the XRII.

3.1.6 *CENTRE OF THE OUTPUT IMAGE*: The centre of the smallest circle circumscribing the OUTPUT IMAGE.

3.1.7 *CENTRE OF THE ENTRANCE FIELD*: That point in the ENTRANCE PLANE which is imaged at the CENTRE OF THE OUTPUT IMAGE.

3.1.8 *CENTRAL AXIS*: The line perpendicular to the ENTRANCE PLANE passing through the CENTRE OF THE ENTRANCE FIELD.

3.1.9 Not used.

3.1.10 *EFFECTIVE APERTURE*: The area of the INPUT SCREEN of the XRII which is irradiated by the RADIATION SOURCE through the INPUT APERTURE.

NOTE - Due to geometrical enlargement and the source size, the diameter of this area is always larger than the diameter of the INPUT APERTURE itself.

3.1.11 *DETECTIVE QUANTUM EFFICIENCY (abbreviation DQE)*: The ratio of the squared signal-to-noise ratio present at the output of a RADIATION DETECTOR to the squared signal-to-noise ratio present at the input of that RADIATION DETECTOR.

3.1.12 *QUANTUM ABSORPTION EFFICIENCY*: The number of photons incident at the input of a RADIATION DETECTOR that yield a signal at the output of the RADIATION DETECTOR divided by the total number of incident photons.

3.1.13 *INPUT APERTURE*: The aperture that determines the cross-sectional area of a RADIATION BEAM.

3.1.14 *SINGLE GAMMA-RAY PHOTON PULSE*: The number of light photons emitted by the OUTPUT SCREEN of the XRII attributable to the interaction of one gamma-ray photon of specific energy in the INPUT SCREEN of the XRII.

3.2 Degree of requirements and reading instructions

In this International Standard the auxiliary verb:

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| – “shall” | implies that compliance with a requirement is mandatory for compliance with the standard; |
| – “should” | implies that compliance with a requirement is strongly recommended but is not mandatory for compliance with the standard; |
| – “may” | implies that compliance with a requirement is permitted to be accomplished in a particular manner, for compliance with the standard; |

and the following words have the meaning:

- | | |
|--------------|---|
| – “specific” | when used in combination with parameters or conditions: refers to a particular value or standardized arrangement, usually to those required in an IEC Standard or a legal requirement; see IEC 788, rm-74-01. |
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