

STANDARDS AUSTRALIA/STANDARDS NEW ZEALAND

Joint Amendment No. 1
to
AS/NZS 4184.2.6:1995
Evaluation and routine testing in medical imaging departments
Part 2.6: Constancy tests—X-ray equipment for computed tomography

CORRECTION

The 1996 edition of AS/NZS 4184.2.6 is amended as follows; the amendment should be inserted in the appropriate place.

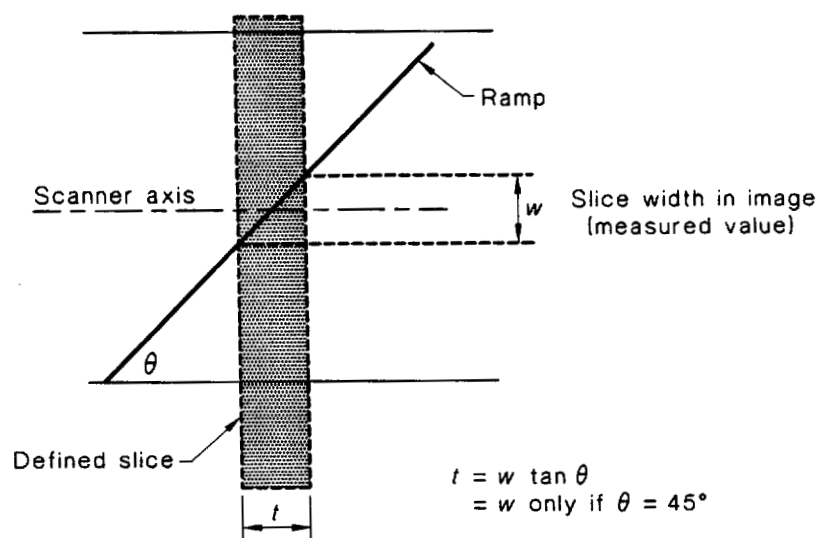
SUMMARY: This Amendment applies to Appendix ZZ.

Published on 5 May 1996.

AMDT
No. 1
MAY
1996

Page 21 Appendix ZZ

Add the following Figure after 'see below':



AS/NZS 4184.2.6:1995
IEC 1223-2-6:1994

Australian/New Zealand Standard[®]

**Evaluation and routine testing
in medical imaging departments**

**Part 2.6: Constancy tests—
X-ray equipment for computed
tomography**



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AS/NZS 4184.2.6:1995

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 31 July 1995 and on behalf of the Council of Standards New Zealand on 7 August 1995. It was published on 5 December 1995.

The following interests are represented on Committee HT/23:

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
 Australian Institute of Radiography
 Australian Radiation Laboratory
 Department of Defence, Australia
 Environment Protection Authority, N.S.W.
 Health Department, W.A.
 Ministry of Commerce, New Zealand
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 Radiation Health Standing Committee
 Royal Australasian College of Radiologists
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This Standard was issued in draft form for comment as DR 94263.

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AS/NZS 4184.2.6:1995

Australian/New Zealand Standard[®]

**Evaluation and routine testing
in medical imaging departments**

**Part 2.6: Constancy tests—
X-ray equipment for computed
tomography**

PUBLISHED JOINTLY BY:

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Homebush NSW 2140 Australia

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ISBN 0 7337 0032 2



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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.

This Standard is identical to and has been reproduced from IEC 1223-2-6:1994 *Evaluation and routine testing in medical imaging departments Part 2-6: Constancy tests—X-ray equipment for computed tomography*.

In the text of this Standard, the following print types are used:

- (i) Terms used throughout the Standard, which have been defined in Clause 3 and which are also in the annex IN SMALL CAPITALS
- (ii) Marginal bars are added to the text wherever the requirements of the Standard have been varied to meet Australian and New Zealand requirements, these variations are detailed in Appendix ZZ.

* An asterisk is placed before each Clause for which rationale is included in Annex D.

Under arrangements made between Standards Australia/Standards New Zealand and the IEC, as well as certain other Standards organizations, users of this Standard are advised that the number of this Standard is not reproduced on each page; its identity is shown only on the cover.

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

- (a) *Terminology* The words ‘this Australian/New Zealand Standard’ should replace the words ‘this International Standard’ wherever they appear.
- (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:

<i>Reference to International Standard or other publication</i>		<i>Australian/New Zealand Standard</i>	
IEC		AS/NZS	
788	Medical radiology—Terminology	—	
1223	Evaluation and routine testing in medical imaging departments	4184	Evaluation and routine testing in medical imaging departments
1223-1	Part 1: General aspects	4184.1	Part 1: General aspects
1223-2-1	Part 2-1: Constancy tests—Film processors	4184.2.1	Part 2.1: Constancy tests—Film processors
1223-2-2	Part 2-2: Constancy tests—Radio- graphic cassettes and film changers —Film-screen contact and relative sensitivity of the screen-cassette assembly	4184.2.2	Part 2.2: Constancy tests—Radio- graphic cassettes and film changes —Film-screen contact and relative sensitivity of the screen-cassette assembly
1223-2-3	Part 2-3: Constancy tests—Dark- room safelight conditions	4184.2.3	Part 2.3: Constancy tests—Dark- room safelight conditions

The terms ‘normative’ and ‘informative’ have been used in this Standard to define the application of the appendix and annexes to which they apply. A ‘normative’ appendix/annex is an integral part of a Standard, whereas an ‘informative’ appendix is only for information and guidance.

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First published as AS/NZS 4184.2.6:1995.

AUSTRALIAN/NEW ZEALAND STANDARD

**EVALUATION AND ROUTINE TESTING
IN MEDICAL IMAGING DEPARTMENTS –****Part 2–6: Constancy tests –
X-ray equipment for computed tomography****1 Scope and object****1.1 Scope**

This part of IEC 1223 applies to RADIOLOGICAL INSTALLATIONS with diagnostic X-RAY EQUIPMENT for COMPUTED TOMOGRAPHY.

This standard is intended to assist in the establishment and operation of a QUALITY ASSURANCE PROGRAMME in the diagnostic X-ray department.

This standard is a part of a series of Particular Publications (standards and technical reports) which give methods of tests for the constancy of properties of diagnostic imaging systems as described in IEC 1223-1 (see clause 2).

1.2 Object

This part of IEC 1223 defines:

- variables which describe the imaging performance of the above RADIOLOGICAL INSTALLATIONS;
- methods of checking whether variations in measured variables meet ESTABLISHED CRITERIA;

in order to ensure that the conditions for adequate imaging performance of the X-RAY EQUIPMENT for COMPUTED TOMOGRAPHY are maintained whilst unnecessary IRRADIATION of the PATIENT is avoided.

The methods are based upon either simple measurements using appropriate test equipment or assessments of other information.

The aim of the methods is to detect any significant variation in the level of variables with respect to reference levels of performance. These reference levels are determined following an ACCEPTANCE TEST or a STATUS TEST.

Guidance is given to indicate the degree of variation in any variable which might require appropriate remedial action.

Because RADIOLOGICAL INSTALLATIONS differ widely from each other, it is not possible to specify target values and criteria for the variables in this standard, which are generally applicable.

This standard is not intended to deal with:

- aspects of mechanical or electrical safety;
- optimization of imaging performance;
- special applications of COMPUTED TOMOGRAPHY, for instance quantitative COMPUTED TOMOGRAPHY.

With regard to the measurements, reference is made to methods described in related publications, which for practical reasons should be carried out prior to the application of the methods described in this standard (see clause 2).

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of IEC 1223. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties to agreements based on this part of IEC 1223 are encouraged to investigate the possibility of applying the most recent editions of the normative documents listed below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 788: 1984, *Medical radiology – Terminology*

IEC 1223-1: 1993, *Evaluation and routine testing in medical imaging departments – Part 1: General aspects*

IEC 1223-2-1: 1993, *Evaluation and routine testing in medical imaging departments – Part 2-1: Constancy tests – Film processors*

IEC 1223-2-2: 1993, *Evaluation and routine testing in medical imaging departments – Part 2-2: Constancy tests – Radiographic cassettes and film changers – Film-screen contact and relative sensitivity of the screen-cassette assembly*

IEC 1223-2-3: 1993, *Evaluation and routine testing in medical imaging departments – Part 2-3: Constancy tests – Darkroom safelight conditions*

IEC 1223-2-12: 19XX, *Evaluation and routine testing in medical imaging departments – Part 2-12: Constancy tests – Film illuminators (under consideration)*

3 Terminology

3.1 Degree of requirements

In this part of IEC 1223 the verbal form:

"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.

The term:

- "specific" when used with parameters or conditions: refers to a particular value or standardized arrangement, usually to those required in an IEC publication or a legal requirement.
- "specified" when used with parameters or conditions: refers to a value or arrangement to be chosen for the purpose under consideration and indicated usually in ACCOMPANYING DOCUMENTS.

3.2 Use of terms

In this part of IEC 1223, terms printed in SMALL CAPITALS are used as defined in IEC 788, 3.3 of this standard or other IEC publications referenced in annex A. Where a defined term is used as a qualifier in another defined or undefined term it is not printed in capital letters, unless the concept thus qualified is defined, or recognized as a derived term without definition.

NOTE – Attention is drawn to the fact that in cases where the concept addressed is not strongly confined to the definition given in one of the publications listed above, a corresponding term is printed in lower-case letters.

3.3 Definitions

3.3.1 COMPUTED TOMOGRAPHY DOSE INDEX (CTDI): Integral of the DOSE PROFILE along a line perpendicular to the tomographic plane from -7 times T to $+7$ times T (where T is the NOMINAL TOMOGRAPHIC SLICE THICKNESS), divided by the product of the NOMINAL TOMOGRAPHIC SLICE THICKNESS and the number of tomograms N produced in a single scan.

$$CTDI = \int_{-7 \times T}^{+7 \times T} \frac{D(z)}{N \times T} dz$$

where

T is the NOMINAL TOMOGRAPHIC SLICE THICKNESS;

N is the number of tomograms produced in a single scan;

$D(z)$ is the DOSE PROFILE along a line z perpendicular to the tomographic plane.

NOTE – A scan can consist of a number of tomograms (slices).

3.3.2 COMPUTED TOMOGRAPHY NUMBER (CT NUMBER): Number used to represent the mean X-ray attenuation associated with each elemental area of the computed tomography image.

NOTE – The COMPUTED TOMOGRAPHY NUMBER is normally expressed in Hounsfield units. Measured values of attenuation are transformed into COMPUTED TOMOGRAPHY NUMBERS using the international Hounsfield scale, using the expression:

$$\text{CT NUMBER of material} = \frac{\mu_{\text{material}} - \mu_{\text{water}}}{\mu_{\text{water}}} \times 1\,000$$

where

μ is the linear attenuation coefficient.

The CT NUMBER scale is defined so that water has a value of 0 and air a value of 1 000.