

AS/NZS 4394:1996
IEC 613:1989

Australian/New Zealand Standard®

**Electrical, thermal and loading
characteristics of rotating anode
X-ray tubes for medical diagnosis**

STANDARDS AUSTRALIA



STANDARDS NEW ZEALAND



Documents

Document Sharing Hub

AS/NZS 4394:1996

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 11 April 1996 and on behalf of the Council of Standards New Zealand on 22 April 1996. It was published on 5 July 1996.

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
 Department of Public Works and Services, N.S.W.
 Environment Protection Authority, N.S.W.
 Health Department, W.A.
 Ministry of Commerce, New Zealand
 Ministry of Health, New Zealand
 Queensland Health
 Radiation Health Standing Committee
 Royal Australasian College of Radiologists
 South Australian Health Commission
 United Dental Hospital, Sydney
 University of Sydney
 University of Waikato, New Zealand

Review of Standards. To keep abreast of progress in industry, Joint Australian/New Zealand Standards are subject to periodic review and are kept up to date by the issue of amendments or new editions as necessary. It is important therefore that Standards users ensure that they are in possession of the latest edition, and any amendments thereto.

Full details of all Joint Standards and related publications will be found in the Standards Australia and Standards New Zealand Catalogue of Publications; this information is supplemented each month by the magazines 'The Australian Standard' and 'Standards New Zealand', which subscribing members receive, and which give details of new publications, new editions and amendments, and of withdrawn Standards.

Suggestions for improvements to Joint Standards, addressed to the head office of either Standards Australia or Standards New Zealand, are welcomed. Notification of any inaccuracy or ambiguity found in a Joint Australian/New Zealand Standard should be made without delay in order that the matter may be investigated and appropriate action taken.

AS/NZS 4394:1996

Australian/New Zealand Standard[®]

**Electrical, thermal and loading
characteristics of rotating anode
X-ray tubes for medical diagnosis**

PUBLISHED JOINTLY BY:

STANDARDS AUSTRALIA
1 The Crescent,
Homebush NSW 2140 Australia

STANDARDS NEW ZEALAND
Level 10, Standards House,
155 The Terrace,
Wellington 6001 New Zealand

ISBN 0 7337 0558 8



Documents

Document Sharing Hub

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 with and has been reproduced from IEC 613:1989, *Electrical, thermal and loading characteristics of rotating anode X-ray tubes for medical diagnosis*.

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/New Zealand Standards:

<i>Reference to International Standard</i>		<i>Australian/New Zealand Standard</i>	
IEC		AS/NZS	
601	Medical electrical equipment	3200	Approval and test specification— Medical electrical equipment
601-2-7	Part 2-7: Particular requirements for the safety of high voltage diagnostic X-ray generators	3200.2.7	Part 2.7: Particular requirements for safety—High-voltage generators of diagnostic X-ray equipment
788	Medical radiology—Terminology	—	

© Copyright – STANDARDS AUSTRALIA/STANDARDS NEW ZEALAND

Users of Standards are reminded that copyright subsists in all Standards Australia and Standards New Zealand publications and software. Except where the Copyright Act allows and except where provided for below no publications or software produced by Standards Australia or Standards New Zealand may be reproduced, stored in a retrieval system in any form or transmitted by any means without prior permission in writing from Standards Australia or Standards New Zealand. Permission may be conditional on an appropriate royalty payment. Australian requests for permission and information on commercial software royalties should be directed to the head office of Standards Australia. New Zealand requests should be directed to Standards New Zealand.

Up to 10 percent of the technical content pages of a Standard may be copied for use exclusively in-house by purchasers of the Standard without payment of a royalty or advice to Standards Australia or Standards New Zealand.

Inclusion of copyright material in computer software programs is also permitted without royalty payment provided such programs are used exclusively in-house by the creators of the programs.

Care should be taken to ensure that material used is from the current edition of the Standard and that it is updated whenever the Standard is amended or revised. The number and date of the Standard should therefore be clearly identified.

The use of material in print form or in computer software programs to be used commercially, with or without payment, or in commercial contracts is subject to the payment of a royalty. This policy may be varied by Standards Australia or Standards New Zealand at any time.

CONTENTS

Clause	Page
1. Scope and object	1
1.1 Scope	1
1.2 Object	1
2. Introduction	1
3. Terminology	1
3.1 Degree of requirements	1
3.2 Definitions	1
4. Electrical characteristics of an X-RAY TUBE	1
4.1 X-ray tube voltage	1
4.2 Nominal X-ray tube voltage	2
4.3 Limited X-ray tube voltage	2
4.4 X-ray tube current	2
4.5 Cathode emission characteristic	2
5. LOADING of an X-RAY TUBE	3
5.1 Loading	3
5.2 X-ray tube load	3
5.3 Loading factor	3
5.4 Loading time	3
6. Input power	4
6.1 Anode input power	4
6.2 Nominal anode input power	4
6.3 Equivalent anode input power	4
6.4 X-ray tube assembly input power	5
7. Thermal characteristics of an ANODE	5
7.1 Anode heat content	5
7.2 Maximum anode heat content	5
7.3 Anode heating curve	5
7.4 Anode cooling curve	6
7.5 Verification	6
8. Thermal characteristics of an X-RAY TUBE ASSEMBLY	7
8.1 X-ray tube assembly heat content	7
8.2 Maximum X-ray tube assembly heat content	7
8.3 X-ray tube assembly heating curve	8
8.4 X-ray tube assembly cooling curve	8
8.5 Maximum continuous heat dissipation	8
9. RADIOGRAPHIC RATINGS of an X-RAY TUBE	9
9.1 Single load rating	9
9.2 Serial load rating	9
9.3 Decreasing input power rating	10
Table 1 — List of the characteristic quantities and their units	10
ANNEX A — Terminology	11
ANNEX B — Guidance on type testing	12

First published as AS/NZS 4394:1996.

AUSTRALIAN/NEW ZEALAND STANDARD

ELECTRICAL, THERMAL AND LOADING CHARACTERISTICS OF ROTATING ANODE X-RAY TUBES FOR MEDICAL DIAGNOSIS

1. Scope and object

1.1 Scope

This International Standard applies to ROTATING ANODE X-RAY TUBES and X-RAY TUBE ASSEMBLIES intended for use in medical diagnosis.

1.2 Object

This International Standard covers definitions of electrical, thermal and loading characteristics of the devices with relation to their behaviour during and after energization and, where appropriate, methods of presentation, determination and verification of these characteristics.

2. Introduction

This International Standard is intended to provide a common basis for the indication of data on ROTATING ANODE X-RAY TUBES and X-RAY TUBE ASSEMBLIES and to facilitate the application of RADIOGRAPHIC RATINGS by the user, basing these on standardized conditions as given in the ACCOMPANYING DOCUMENTS.

3. Terminology

3.1 Degree of requirements

In this International Standard the auxiliary verb

- “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.

3.2 Definitions

Definitions of terms printed in small capital letters and not contained in this International Standard are used as given in IEC 788: Medical Radiology — Terminology, first edition 1984. See annex A, Terminology.

The numbering rm-... in the sub-clauses headed “Definition” refers to IEC 788.

Note. — The French terms in Sub-clauses 7.2, 8.1 and 8.2 and the definitions in Sub-clauses 4.4.1 and 6.2.1 deviate from those given in IEC 788, which latter will be revised accordingly.

4. Electrical characteristics of an X-RAY TUBE

4.1 X-ray tube voltage

4.1.1 Definition rm-36-02

Potential difference applied to an X-RAY TUBE between the ANODE and the CATHODE.

4.1.2 Units

X-RAY TUBE VOLTAGE shall be given as the peak value, in KILOVOLTS.