



SLOVENSKI STANDARD

SIST EN 60789:1995

01-maj-1995

Characteristics and test conditions of radionuclide imaging devices - Anger type gamma cameras (IEC 789:1992)

Characteristics and test conditions of radionuclide imaging devices - Anger type gamma cameras

Merkmale und Prüfbedingungen für bildgebende Systeme in der Nuklearmedizin - Einkristall Gamma-Kameras

Caractéristiques et conditions d'essai des dispositifs d'imagerie par radionucléides - Caméras gamma de type anger

[SIST EN 60789:1995](#)

[https://standards.iteh.ai/catalog/standards/sist/ccc80de2-32fd-4ccd-9e0c-](https://standards.iteh.ai/catalog/standards/sist/ccc80de2-32fd-4ccd-9e0c-ca21751e0084/sist-en-60789-1995)

[ca21751e0084/sist-en-60789-1995](https://standards.iteh.ai/catalog/standards/sist/ccc80de2-32fd-4ccd-9e0c-ca21751e0084/sist-en-60789-1995)

Ta slovenski standard je istoveten z: EN 60789:1993

ICS:

11.040.50 Radiografska oprema Radiographic equipment

SIST EN 60789:1995 **en**

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN 60789:1995](#)

<https://standards.iteh.ai/catalog/standards/sist/ccc80de2-32fd-4ccd-9e0c-ca21751e0084/sist-en-60789-1995>

EUROPEAN STANDARD

EN 60789

NORME EUROPEENNE

EUROPÄISCHE NORM

September 1993

UDC 615.849:616-073.75:771-31:778.332:620.1

Descriptors: Medical electrical equipment, radiology equipment, gamma ray, imaging device, test conditions

ENGLISH VERSION

Characteristics and test conditions of
radionuclide imaging devices; Anger type gamma
cameras
(IEC 789:1992)

Caractéristiques et conditions
d'essai des dispositifs
d'imagerie par radionucléides;
gamma caméras de type Anger
(CEI 789:1992)

Merkmale und Prüfbedingungen
für bildgebende Systeme in der
Nuklearmedizin; Einkristall
Gamma-Kameras
(IEC 789:1992)

(standards.iteh.ai)

SIST EN 60789:1995

This European Standard was approved by CENELEC on 1993-07-06.

CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B-1050 Brussels

FOREWORD

At the request of the CENELEC Technical Committee TC 62, Electrical equipment in medical practice, the International Standard IEC 789:1992 was submitted to the CENELEC Unique Acceptance Procedure (UAP) for acceptance as an European Standard. This procedure started in October 1992.

The text of the International Standard was approved by CENELEC as EN 60789 on 6 July 1993.

The following dates were proposed:

- latest date of publication of an identical national standard (dop) 1994-06-01
- latest date of withdrawal of conflicting national standards (dow) 1994-06-01

For products which have complied with the relevant national standard before 1994-06-01, as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production until 1999-06-01. (standards.iteh.ai)

Annexes designated "normative" are part of the body of the standard. In this standard, annex ZA is normative.

<https://standards.iteh.ai/catalog/standards/sist/c3c80de2-32fd-4ccd-9e0c-ca21751e0084/sist-en-60789-1995>

ENDORSEMENT NOTICE

The text of the International Standard IEC 789:1992 was approved by CENELEC as a European Standard without any modification.

ANNEX ZA (normative)

OTHER INTERNATIONAL PUBLICATIONS QUOTED IN THIS STANDARD
WITH THE REFERENCES OF THE RELEVANT EUROPEAN PUBLICATIONS

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

NOTE : When the international publication has been modified by CENELEC common modifications, indicated by (mod), the relevant EN/HD applies.

IEC Publication	Date	Title	EN/HD	Date
601-1	1988	Medical electrical equipment Part 1: General requirements for safety	EN 60601-1 EN 60601-1/A11 EN 60601-1/A12	1990 1993 1993
788	1984	Medical radiology - Terminology	HD 501 S1	1988
789	1984	Characteristics and test conditions of radionuclide imaging devices	-	-

<https://standards.iteh.ai/catalog/standards/sist/ccc80de2-32fd-4ccd-9e0c-ca21751e0084/sist-en-60789-1995>

Other publication quoted:

NEMA NU 1 1986 Performance measurements of scintillation cameras

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN 60789:1995](#)

<https://standards.iteh.ai/catalog/standards/sist/ccc80de2-32fd-4ccd-9e0c-ca21751e0084/sist-en-60789-1995>

NORME
INTERNATIONALE
INTERNATIONAL
STANDARD

CEI
IEC
789

Deuxième édition
Second edition
1992-01

Caractéristiques et conditions d'essai des
dispositifs d'imagerie par radionucléides;
gamma caméras de type Anger

iTeh STANDARD PREVIEW

(standards.iteh.ai)
Characteristics and test conditions of
radionuclide imaging devices;
Anger type gamma cameras

<https://standards.iteh.ai/catalog/standards/sist/ccc80dc2-52fd-4ccd-9e0c-ca21751e0084/sist-en-60789-1995>

© CEI 1992 Droits de reproduction réservés — Copyright — all rights reserved

Aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de l'éditeur.

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

Bureau Central de la Commission Electrotechnique Internationale 3, rue de Varembe Genève, Suisse



Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

CODE PRIX
PRICE CODE

Q

Pour prix, voir catalogue en vigueur
For price, see current catalogue

CONTENTS

	Page
FOREWORD	5
INTRODUCTION	7
Clause	
1 Scope and object	9
2 Terminology and definitions	9
3 Test methods	9
3.1 Measurements of SYSTEM SENSITIVITY	9
3.2 LINE SPREAD FUNCTIONS, FWHM, FWTM and EW	11
3.3 NON-UNIFORMITY OF RESPONSE	13
3.4 Measurement of INTRINSIC ENERGY SPECTRUM (without COLLIMATOR)	15
3.5 Measurement of INTRINSIC MULTIPLE WINDOW SPATIAL REGISTRATION	17
3.6 Measurement of INTRINSIC SPATIAL NON-LINEARITY	17
3.7 Measurement of COUNT RATE CHARACTERISTIC	19
3.8 Shield leakage test	19
4 ACCOMPANYING DOCUMENTS	19
Table 1 - Radionuclides and PULSE AMPLITUDE ANALYSER WINDOWS to be used for performance measurements	23
Annex A - Terminology and definitions	25
Figures	30

(standards.iteh.ai)

[SIST EN 60789:1995](#)

[Radionuclides and PULSE AMPLITUDE ANALYSER WINDOWS to be used
for performance measurements](#)

[Le0084/sist-en-60789-1995](#)

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**CHARACTERISTICS AND TEST CONDITIONS
OF RADIONUCLIDE IMAGING DEVICES;
ANGER TYPE GAMMA CAMERAS**

FOREWORD

- 1) The formal decisions or agreements of the IEC on technical matters, prepared by Technical Committees on which all the National Committees having a special interest therein are represented, express, as nearly as possible, an international consensus of opinion on the subjects dealt with.
- 2) They have the form of recommendations for international use and they are accepted by the National Committees in that sense.
- 3) In order to promote international unification, the IEC expresses the wish that all National Committees should adopt the text of the IEC recommendation for their national rules in so far as national conditions will permit. Any divergence between the IEC recommendation and the corresponding national rules should, as far as possible, be clearly indicated in the latter.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

This International Standard has been prepared by Sub-Committee 62C: High-energy radiation equipment and equipment for nuclear medicine of IEC Technical Committee No. 62: Electrical equipment in medical practice.

The text of this Standard is based on the following documents:

Six Months' Rule	Report on Voting	Two Months' Procedure	Report on Voting
62C(CO)53	62C(CO)55	62C(CO)58	62C(CO)65

Full information on the voting for the approval of this Standard can be found in the Voting Reports indicated in the above table.

The following IEC publications are quoted in this Standard:

IEC 601-1: 1988, *Medical electrical equipment - Part 1: General requirements for safety.*

IEC 788: 1984, *Medical radiology - Terminology.*

IEC 789: 1984 (First edition): *Characteristics and test conditions of radionuclide imaging devices.*

Other publication quoted:

NEMA NU 1: 1986, *Performance measurements of scintillation cameras.*

INTRODUCTION

This is a revised, second edition of IEC 789 (1984). The title has been changed from "Characteristics and test conditions of radionuclide imaging devices" to "Characteristics and test conditions of radionuclide imaging devices; Anger type gamma cameras", due to the fact that the parts dealing with radionuclide scanners and hybrid systems in the earlier edition have been omitted in this revision, because these devices are now of minor importance.

The test methods specified in this Standard have been selected to reflect as much as possible the clinical use of GAMMA CAMERAS. It is intended that the test methods be carried out by manufacturers, thereby enabling them to declare the characteristics of GAMMA CAMERAS on a common basis.

To come to a closer agreement, some of the requirements have been aligned with those of NEMA* Standards Publication NU 1 (1986) and some tests have been added (Measurement of INTRINSIC NON-UNIFORMITY OF RESPONSE (3.3.1), Measurement of intrinsic point source sensitivity variation (3.3.4), Measurement of INTRINSIC ENERGY SPECTRUM (3.4), Measurement of INTRINSIC MULTIPLE WINDOW SPATIAL REGISTRATION (3.5)).

With regard to the measurement and evaluation of the NON-UNIFORMITY OF RESPONSE (3.3.3), the smoothing operation on the raw data enhances the visual perception of the NON-UNIFORMITY OF RESPONSE (3.3.3.1 through 3.3.3.3).

Also, the NEMA requirements for the measurement and evaluation of the INTRINSIC SPATIAL NON-LINEARITY give adequate results and avoid the necessity of specifying yet another phantom (3.6.1 and 3.6.2).

[SIST EN 60789:1995](https://standards.iteh.ai/catalog/standards/sist/ccc80de2-32fd-4ccd-9e0c-0084/sist-en-60789-1995)

[https://standards.iteh.ai/catalog/standards/sist/ccc80de2-32fd-4ccd-9e0c-](https://standards.iteh.ai/catalog/standards/sist/ccc80de2-32fd-4ccd-9e0c-0084/sist-en-60789-1995)

In this Standard, the following print types are used: [0084/sist-en-60789-1995](https://standards.iteh.ai/catalog/standards/sist/ccc80de2-32fd-4ccd-9e0c-0084/sist-en-60789-1995)

- requirements, compliance with which can be tested and definitions: in roman type;
- explanations, advice, introductions, general statements, exceptions and references: in smaller roman type;
- *test specifications: in italic type;*
- TERMS DEFINED IN CLAUSE 2 OF THE GENERAL STANDARD OR THIS STANDARD: SMALL CAPITALS.

The requirements are followed by specifications for the relevant tests.

* National Electrical Manufacturers Association, 2101 L Street, N.W., Washington, D.C. 20037, U.S.A.

CHARACTERISTICS AND TEST CONDITIONS OF RADIONUCLIDE IMAGING DEVICES; ANGER TYPE GAMMA CAMERAS

1 Scope and object

The object of this Standard is to specify terminology and test methods for declaring the characteristics of Anger type GAMMA CAMERAS. These consist of a COLLIMATOR, a DETECTOR SHIELD, and a RADIATION DETECTOR ASSEMBLY, together with recording and display devices.

2 Terminology and definitions

For the purposes of this Standard, the definitions given in IEC 788 apply, together with the supplementary definitions given in annex A.

Defined terms are printed in small capitals.

3 Test methods

iTeh STANDARD PREVIEW
(standards.iteh.ai)

All measurements shall be performed with the PULSE AMPLITUDE ANALYSER WINDOW settings specified in table 1.

[SIST EN 60789:1995](https://standards.iteh.ai/catalog/standards/sist/ccc80de2-32fd-4ccd-9e0c-175170105155/sist-60789-1995)

[https://standards.iteh.ai/catalog/standards/sist/ccc80de2-32fd-4ccd-9e0c-](https://standards.iteh.ai/catalog/standards/sist/ccc80de2-32fd-4ccd-9e0c-175170105155/sist-60789-1995)

Additional measurements with other settings, as specified by the manufacturer, can be performed. Before the measurements are performed the camera shall be adjusted by the procedure normally used by the manufacturer for an installed unit and shall not be adjusted specially for the measurement of specific parameters.

Unless otherwise specified, measurements shall be carried out at count rates not exceeding 20 000 counts per second.

3.1 Measurements of SYSTEM SENSITIVITY

The measurement shall be carried out using the cylindrical phantom of polymethylmethacrylate as specified in figure 2. The plane source shown in figure 1 shall be placed in the cylindrical hole with the dimensions shown in figure 2, the remainder of the hole shall then be filled by a cylindrical part the dimensions of which are also shown in figure 2. The phantom, including the source, shall be placed on the COLLIMATOR (distance $d = 0$) and centered on the COLLIMATOR AXIS.

The measured value shall be expressed in counts $s^{-1} \cdot Bq^{-1}$.

NOTE - Measurements of SYSTEM SENSITIVITY without scatter, using the source cuvette of figure 1 placed directly on the COLLIMATOR FRONT FACE, may be carried out.