



**SLOVENSKI STANDARD**  
**oSIST prEN IEC 61675-2:2024**  
**01-julij-2024**

---

**Naprave za opazovanje radioaktivnih elementov - Karakteristike in preskusni pogoji - 2. del: Gama kamere za planarno slikanje, slikanje celega telesa in slikanje SPECT**

Radionuclide imaging devices - Characteristics and test conditions - Part 2: Gamma cameras for planar, wholebody, and SPECT imaging

Bildgebende Systeme in der Nuklearmedizin - Merkmale und Prüfbedingungen - Teil 2: Gammakameras für planare Bildgebung, mit Ganzkörper-Zusatz und Gammakameras zur Einzelphotonen-Emissions-Tomographie (SPECT)

Dispositifs d'imagerie par radionucléides - Caractéristiques et conditions d'essai - Partie 2: Gamma-caméras pour l'imagerie planaire, l'imagerie du corps entier et l'imagerie spect

<https://standards.iteh.ai/>

<https://standards.iteh.ai/catalog/standards/sist/9d8b9f71-8c35-4b92-8f24-96cbee63d283/osist-pren-iec-61675-2-2024>

**Ta slovenski standard je istoveten z: prEN IEC 61675-2:2024**

---

**ICS:**

11.040.50      Radiografska oprema      Radiographic equipment

**oSIST prEN IEC 61675-2:2024**      **en**





# 62C/912/CDV

## COMMITTEE DRAFT FOR VOTE (CDV)

PROJECT NUMBER:

**IEC 61675-2 ED3**

DATE OF CIRCULATION:

**2024-05-31**

CLOSING DATE FOR VOTING:

**2024-08-23**

SUPERSEDES DOCUMENTS:

**62C/871/CD, 62C/889A/CC**

IEC SC 62C : EQUIPMENT FOR RADIOTHERAPY, NUCLEAR MEDICINE AND RADIATION DOSIMETRY	
SECRETARIAT: Germany	SECRETARY: Ms Regina Geierhofer
OF INTEREST TO THE FOLLOWING COMMITTEES:	PROPOSED HORIZONTAL STANDARD: <input type="checkbox"/> Other TC/SCs are requested to indicate their interest, if any, in this CDV to the secretary.
FUNCTIONS CONCERNED: <input type="checkbox"/> EMC <input type="checkbox"/> ENVIRONMENT <input checked="" type="checkbox"/> QUALITY ASSURANCE <input type="checkbox"/> SAFETY	
<input checked="" type="checkbox"/> SUBMITTED FOR CENELEC PARALLEL VOTING <b>Attention IEC-CENELEC parallel voting</b> The attention of IEC National Committees, members of CENELEC, is drawn to the fact that this Committee Draft for Vote (CDV) is submitted for parallel voting.  The CENELEC members are invited to vote through the CENELEC online voting system.	<input type="checkbox"/> NOT SUBMITTED FOR CENELEC PARALLEL VOTING

This document is still under study and subject to change. It should not be used for reference purposes.

Recipients of this document are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

Recipients of this document are invited to submit, with their comments, notification of any relevant "In Some Countries" clauses to be included should this proposal proceed. Recipients are reminded that the CDV stage is the final stage for submitting ISC clauses. (SEE [AC/22/2007](#) OR [NEW GUIDANCE DOC](#)).

TITLE:

**Radionuclide imaging devices - Characteristics and test conditions - Part 2: Gamma cameras for planar, wholebody, and SPECT imaging**

PROPOSED STABILITY DATE: 2031

NOTE FROM TC/SC OFFICERS:

**Copyright © 2024 International Electrotechnical Commission, IEC.** All rights reserved. It is permitted to download this electronic file, to make a copy and to print out the content for the sole purpose of preparing National Committee positions. You may not copy or "mirror" the file or printed version of the document, or any part of it, for any other purpose without permission in writing from IEC.

## CONTENTS

1			
2			
3	FOREWORD.....		4
4	INTRODUCTION.....		6
5	1 Scope.....		7
6	2 Normative references .....		7
7	3 Terms and definitions .....		7
8	4 Test methods.....		15
9	4.1 General.....		15
10	4.2 Planar imaging.....		16
11	4.2.1 SYSTEM SENSITIVITY .....		16
12	4.2.2 SPATIAL RESOLUTION .....		18
13	4.2.3 SPATIAL NON-LINEARITY .....		23
14	4.2.4 NON-UNIFORMITY OF RESPONSE .....		24
15	4.2.5 BAD PIXEL reporting .....		27
16	4.2.6 ENERGY RESOLUTION .....		28
17	4.2.7 Intrinsic MULTIPLE WINDOW SPATIAL REGISTRATION .....		29
18	4.2.8 COUNT RATE performance .....		31
19	4.2.9 Shield leakage test .....		33
20	4.3 Wholebody imaging.....		34
21	4.3.1 Scanning constancy.....		34
22	4.3.2 SPATIAL RESOLUTION without scatter .....		35
23	4.4 Tomographic imaging (SPECT) .....		38
24	4.4.1 Test of PROJECTION geometry.....		38
25	4.4.2 Measurement of SPECT SYSTEM SENSITIVITY .....		42
26	4.4.3 Scatter measurement.....		45
27	4.4.4 SPECT SYSTEM SPATIAL RESOLUTION .....		49
28	4.4.5 Whole Body SPECT .....		51
29	4.4.6 Tomographic image quality and accuracy .....		52
30	5 ACCOMPANYING DOCUMENTS .....		62
31	5.1 General.....		62
32	5.2 General parameters for GAMMA CAMERAS .....		62
33	5.2.1 COLLIMATORS .....		62
34	5.2.2 Shield leakage values .....		62
35	5.2.3 Pre-set PULSE AMPLITUDE ANALYSER WINDOWS .....		62
36	5.2.4 INTRINSIC ENERGY RESOLUTION .....		62
37	5.2.5 COLLIMATOR dependent quantities .....		62
38	5.2.6 COUNT RATE CHARACTERISTICS .....		62
39	5.2.7 Measured COUNT RATE that is 80 % of the corresponding TRUE COUNT		
40	RATE .....		63
41	5.2.8 Dimensions of the DETECTOR FIELD OF VIEW .....		63
42	5.2.9 Non-uniformity characteristics.....		63
43	5.2.10 INTRINSIC SPATIAL RESOLUTION (FWHM) of the DETECTOR HEAD without		
44	COLLIMATOR.....		63
45	5.2.11 INTRINSIC SPATIAL NON-LINEARITY.....		63
46	5.2.12 Intrinsic MULTIPLE WINDOW SPATIAL REGISTRATION .....		63

47	5.3	GAMMA CAMERA based wholebody imaging system.....	63
48	5.3.1	Scanning constancy.....	63
49	5.3.2	SPATIAL RESOLUTION.....	63
50	5.4	SPECT.....	63
51	5.4.1	Calibration measurements of COR.....	63
52	5.4.2	Measurement of head tilt.....	63
53	5.4.3	Measurement of COLLIMATOR hole misalignment.....	63
54	5.4.4	TRANSVERSE RESOLUTION (radial and tangential).....	63
55	5.4.5	AXIAL RESOLUTION.....	63
56	5.4.6	Axial PIXEL size.....	63
57	5.4.7	Transaxial PIXEL size.....	64
58	5.4.8	DETECTOR POSITIONING TIME.....	64
59	5.4.9	NORMALIZED VOLUME SENSITIVITY.....	64
60	5.4.10	SCATTER FRACTIONS $SF_i$ and $SF$ .....	64
61	5.4.11	Wholebody SPECT spatial resolution and performance.....	64
62	5.4.12	Image Quality Scan set up and phantom ACTIVITY concentration.....	64
63	5.4.13	Image quality.....	64
64	5.4.14	Accuracy of ATTENUATION correction and scatter correction.....	64
65	5.4.15	Accuracy of SPECT and CT image registration.....	64
66	5.4.16	Accuracy of quantitation.....	64
67		Bibliography.....	65
68		Index of defined terms.....	66
69			
70		Figure 1 – Geometry of PROJECTIONS.....	9
71		Figure 2 – Cylindrical phantom.....	14
72		Figure 3 – Container.....	17
73		Figure 4 – Slit phantom.....	19
74		Figure 5 – Source arrangement for intrinsic measurements.....	20
75		Figure 6 – Calculation of FWHM.....	22
76		Figure 7 – Uniform source.....	25
77		Figure 8 – Small shielded liquid source.....	30
78		Figure 9 – Source positions for scanning constancy for wholebody imaging.....	<b>Error! Bookmark not defined.</b>
79		Figure 10 – Cylindrical phantom.....	44
80		Figure 11 – Phantom insert with holders for the scatter source.....	46
81		Figure 12 – Evaluation of scatter fraction.....	48
82		Figure 13 – Reporting transverse resolution.....	50
83		Figure 14 – Cross-section of body phantom.....	53
84		Figure 15 – Phantom insert with hollow spheres.....	55
85		Figure 16: Image quality phantom position for data acquisition with masses.....	56
86		Figure 17 – Placement of ROIs in the phantom background.....	58
87		Figure 18: Placement of quantitative ROIs in phantom background.....	59
88			
89		Table 1 – RADIONUCLIDES and ENERGY WINDOWS to be used for performance	
90		measurements.....	16
91			

92

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

93

94

95

96

97

**RADIONUCLIDE IMAGING DEVICES –  
CHARACTERISTICS AND TEST CONDITIONS –**

98

**Part 2: Gamma cameras for planar, wholebody, and SPECT imaging**

99

100

**FOREWORD**

101 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising  
102 all national electrotechnical committees (IEC National Committees). The object of IEC is to promote  
103 international co-operation on all questions concerning standardization in the electrical and electronic fields. To  
104 this end and in addition to other activities, IEC publishes International Standards, Technical Specifications,  
105 Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC  
106 Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested  
107 in the subject dealt with may participate in this preparatory work. International, governmental and non-  
108 governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely  
109 with the International Organization for Standardization (ISO) in accordance with conditions determined by  
110 agreement between the two organizations.

111 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international  
112 consensus of opinion on the relevant subjects since each technical committee has representation from all  
113 interested IEC National Committees.

114 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National  
115 Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC  
116 Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any  
117 misinterpretation by any end user.

118 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications  
119 transparently to the maximum extent possible in their national and regional publications. Any divergence  
120 between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in  
121 the latter.

122 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity  
123 assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any  
124 services carried out by independent certification bodies.

125 6) All users should ensure that they have the latest edition of this publication.

126 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and  
127 members of its technical committees and IEC National Committees for any personal injury, property damage or  
128 other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and  
129 expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC  
130 Publications.

131 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is  
132 indispensable for the correct application of this publication.

133 9) IEC draws attention to the possibility that the implementation of this document may involve the use of (a)  
134 patent(s). IEC takes no position concerning the evidence, validity or applicability of any claimed patent rights in  
135 respect thereof. As of the date of publication of this document, IEC had not received notice of (a) patent(s),  
136 which may be required to implement this document. However, implementers are cautioned that this may not  
137 represent the latest information, which may be obtained from the patent database available at  
138 <https://patents.iec.ch>. IEC shall not be held responsible for identifying any or all such patent rights.

139 IEC 61675-2 has been prepared by subcommittee 62C: Equipment for radiotherapy, nuclear  
140 medicine and radiation dosimetry, of IEC technical committee 62: Medical equipment,  
141 software, and systems. It is an International Standard.

142 This third edition cancels and replaces the second edition published in 2015. It combines  
143 IEC 60789:1992, IEC 61675-2:1998, IEC 61675-2:1998/AMD1:2004, and IEC 61675-3:1998. It  
144 has been modified to address systems based on pixelated semi-conductor detectors. Tests for  
145 wholebody SPECT performance and quantitative SPECT image accuracy have been added. It  
146 has been reformatted, updated, and partly aligned with NEMA NU 1-2018. Due to the lack of  
147 market share of SPECT-systems operated in coincidence mode all such tests have been  
148 removed. This edition constitutes a technical revision.

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

Draft	Report on voting
XX/XX/FDIS	XX/XX/RVD

150  
151 Full information on the voting for its approval can be found in the report on voting indicated in  
152 the above table.

153 The language used for the development of this International Standard is English.

154 This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in  
155 accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement,  
156 available at [www.iec.ch/members\\_experts/refdocs](http://www.iec.ch/members_experts/refdocs). The main document types developed by  
157 IEC are described in greater detail at [www.iec.ch/publications](http://www.iec.ch/publications).

158 In this standard, the following print types are used:

159 – TERMS DEFINED IN CLAUSE 3 OF THIS STANDARD OR LISTED IN THE INDEX OF DEFINED TERMS:  
160 SMALL CAPITALS.

161 The requirements are followed by specifications for the relevant tests.

162 The committee has decided that the contents of this document will remain unchanged until the  
163 stability date indicated on the IEC website under [webstore.iec.ch](http://webstore.iec.ch) in the data related to the  
164 specific document. At this date, the document will be

- 165 • reconfirmed,
- 166 • withdrawn,
- 167 • replaced by a revised edition, or
- 168 • amended.

169

[oSIST prEN IEC 61675-2:2024](https://standards.iteh.ai/)

<https://standards.iteh.ai/catalog/standards/sist/9d8b9f71-8c35-4b92-8f24-96cbec63d283/osist-pren-iec-61675-2-2024>

170

## INTRODUCTION

171 The test methods specified in this part of IEC 61675 have been selected to reflect as much as  
172 possible the clinical use of GAMMA CAMERAS for planar imaging, PLANAR WHOLEBODY IMAGING  
173 EQUIPMENT, and SINGLE PHOTON EMISSION COMPUTED TOMOGRAPHY (SPECT). It is intended that  
174 the test methods are carried out by manufacturers thereby enabling them to describe the  
175 characteristics of the systems on a common basis.

176

**iTeh Standards**  
**(<https://standards.iteh.ai>)**  
**Document Preview**

[oSIST prEN IEC 61675-2:2024](https://standards.iteh.ai/catalog/standards/sist/9d8b9f71-8c35-4b92-8f24-96cbee63d283/osist-pren-iec-61675-2-2024)

<https://standards.iteh.ai/catalog/standards/sist/9d8b9f71-8c35-4b92-8f24-96cbee63d283/osist-pren-iec-61675-2-2024>



# RADIONUCLIDE IMAGING DEVICES – CHARACTERISTICS AND TEST CONDITIONS –

## Part 2: Gamma cameras for planar, wholebody, and SPECT imaging

177  
178  
179  
180  
181  
182

### 183 **1 Scope**

184 This part of IEC 61675 specifies terminology and test methods for describing the  
185 characteristics of GAMMA CAMERAS equipped with PARALLEL HOLE COLLIMATORS that are capable  
186 of planar imaging. Additional tests are specified for those GAMMA CAMERAS that are capable of  
187 SINGLE PHOTON EMISSION COMPUTED TOMOGRAPHY (SPECT) or planar wholebody imaging  
188 (PLANAR WHOLEBODY IMAGING EQUIPMENT) or SPECT wholebody imaging. SPECT systems may  
189 also be equipped with a CT system for hybrid imaging.

190 These GAMMA CAMERAS consist of a gantry, single or multiple DETECTOR HEADS, and a  
191 computer for data acquisition, processing, storage, and display. The DETECTOR HEADS may  
192 contain single or multiple scintillation crystals or solid state detectors.

193 Novel camera designs with multiple DETECTOR HEADS that are not capable of planar acquisition  
194 are not included in the scope of this standard.

### 195 **2 Normative references**

196 The following documents are referred to in the text in such a way that some or all of their  
197 content constitutes requirements of this document. For dated references, only the edition  
198 cited applies. For undated references, the latest edition of the referenced document (including  
199 any amendments) applies.

200 IEC TR 60788:2004, *Medical electrical equipment – Glossary of defined terms*

201 IEC 61675-1:2022, *Radionuclide imaging devices – Characteristics and test conditions –*  
202 *Part 1: Positron emission tomographs*

203 IEC 63073-1:2020, *Dedicated radionuclide imaging devices – Characteristics and test*  
204 *conditions – Part 1: Cardiac SPECT*

### 205 **3 Terms and definitions**

206 For the purposes of this document the terms and definitions given in IEC TR 60788:2004,  
207 IEC 63071-1:2020 and IEC 61675-1:2022 (some of which are repeated here for convenience),  
208 and the following terms and definitions apply.

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

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

#### 213 **3.1**

##### 214 **ADDRESS PILE UP**

215 <GAMMA CAMERA> false address calculation of an artificial event which passes the ENERGY  
216 WINDOW, but is formed from two or more events by the PILE UP EFFECT

217 **3.2**  
 218 **AXIAL FIELD OF VIEW**  
 219 dimensions of a slice through the TOMOGRAPHIC VOLUME parallel to and including the SYSTEM  
 220 AXIS

221 Note 1 to entry: In practice it is specified only by its axial dimension given by the distance between the centres of  
 222 the outermost defined IMAGE PLANES plus the average of the measured AXIAL SLICE WIDTH measured as EQUIVALENT  
 223 WIDTH (EW).

224 **3.3**  
 225 **AXIAL RESOLUTION**  
 226 for tomographs with sufficiently fine axial sampling fulfilling the sampling theorem, SPATIAL  
 227 RESOLUTION along a line parallel to the SYSTEM AXIS

228 **3.4**  
 229 **BAD PIXEL**  
 230 detector pixel within the DETECTOR FIELD OF VIEW of the detector that has been physically or  
 231 electronically turned off such that gamma rays which interact in that pixel are not recorded by  
 232 the camera

233 [SOURCE: IEC 63073-1:2020, 3.2]

234 **3.5**  
 235 **CENTRE OF ROTATION**  
 236 **COR**  
 237 origin of that coordinate system, which describes the PROJECTIONS of a transverse slice with  
 238 respect to their orientation in space

239 Note 1 to entry: The CENTRE OF ROTATION of a transverse slice is given by the intersection of the SYSTEM AXIS with  
 240 the mid-plane of the corresponding OBJECT SLICE.

241 Note 2 to entry: The second note to entry concerns the French text only.

242 **3.6**  
 243 **COLLIMATOR AXIS**  
 244 straight line which passes through the geometrical centre of the exit field and entrance field of  
 245 the COLLIMATOR

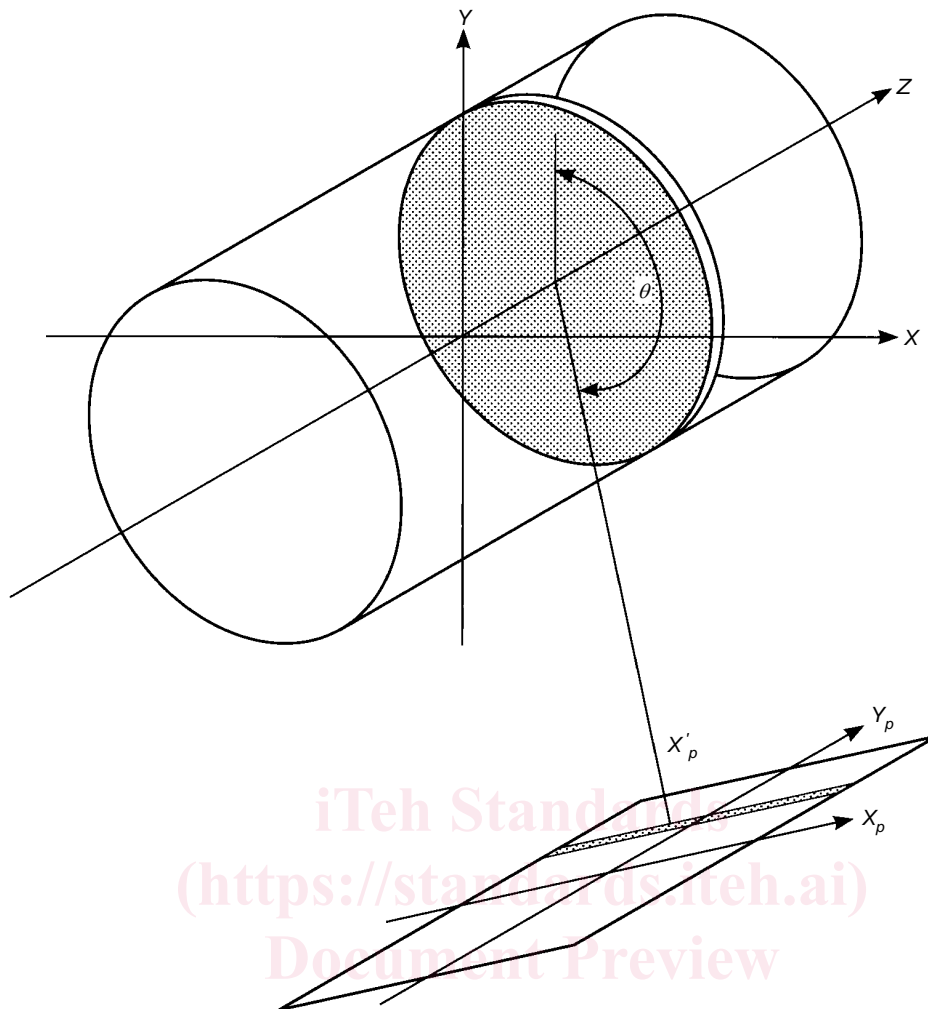
246 **3.7**  
 247 **COLLIMATOR FRONT FACE**  
 248 surface of the COLLIMATOR which is closest to the object being imaged

249 **3.8**  
 250 **COORDINATE SYSTEM OF PROJECTION**  
 251 Cartesian system of the IMAGE MATRIX of each two-dimensional PROJECTION with axes  $X_p$  and  
 252  $Y_p$

253 Note 1 to entry: Axes  $X_p$  and  $Y_p$  are defined by the axes of the IMAGE MATRIX.

254 Note 2 to entry: The  $Y_p$  axis and the PROJECTION of the SYSTEM AXIS onto the COLLIMATOR FRONT FACE have to be  
 255 in parallel.

256 Note 3 to entry: The origin of the COORDINATE SYSTEM OF PROJECTION may be the centre of the IMAGE MATRIX (see  
 257 Figure 1).



IEC 151/98

258

259 NOTE The FIXED COORDINATE SYSTEM  $X, Y, Z$  has its origin at the centre of the TOMOGRAPHIC VOLUME (shown as a  
 260 cylinder), the  $Z$ -axis being the SYSTEM AXIS. The COORDINATE SYSTEM OF PROJECTION  $X_p, Y_p$  is shown for a  
 261 PROJECTION ANGLE  $\theta$ . For each  $\theta$ , the one-dimensional PROJECTION of the marked OBJECT SLICE has the address  
 262 range shown (hatched). Within this range the CENTRE OF ROTATION is projected onto the address  $X_p$  (offset).

263

**Figure 1 – Geometry of PROJECTIONS**

264 **3.9**265 **COUNT LOSS**

266 difference between measured COUNT RATE and TRUE COUNT RATE, which is caused by the finite  
 267 RESOLVING TIME of the instrument

268 [SOURCE: IEC 61675-1:2022, 3.8.1]

269 **3.10**270 **COUNT RATE**

271 number of counts per unit of time

272 [SOURCE: IEC 61675-1:2022, 3.8.2]

273 **3.11**274 **COUNT RATE CHARACTERISTIC**

275 function giving the relationship between observed COUNT RATE and TRUE COUNT RATE

276 [SOURCE: IEC TR 60788:2004, rm-34-21]

277 **3.12**

278 **DETECTOR FIELD OF VIEW**

279 **FOV**

280 region of the detector within which events are included in the display image, and for which all  
281 performance specifications are provided

282 Note 1 to entry: The note to entry regarding the abbreviation concerns the French text only.

283 **3.13**

284 **DETECTOR HEAD TILT**

285 deviation of the COLLIMATOR AXIS from orthogonality with the SYSTEM AXIS

286 **3.14**

287 **DETECTOR POSITIONING TIME**

288 fraction of the total time spent on an acquisition which is not used in collecting data

289 **3.15**

290 **DETECTOR PIXEL**

291 smallest discrete unit of a pixelated DETECTOR HEAD that is able to provide distinct energy,  
292 spatial, and timing information about detected photons

293 **3.16**

294 **EMISSION COMPUTED TOMOGRAPHY**

295 **ECT**

296 imaging method for the representation of the spatial distribution of RADIONUCLIDES in selected  
297 two-dimensional slices through the object

298 **3.17**

299 **ENERGY WINDOW**

300 range defining the energy of the signals accepted by the device for further processing

301 **3.18**

302 **EQUIVALENT WIDTH**

303 **EW**

304 width of that rectangle having the same area and the same height as the response function,  
305 e.g., the POINT SPREAD FUNCTION

306 [SOURCE: IEC TR 60788:2004, rm-34-45]

307 **3.19**

308 **FIXED COORDINATE SYSTEM**

309 Cartesian system with axes X, Y, and Z

310 Note 1 to entry: Z being the SYSTEM AXIS.

311 Note 2 to entry: The origin of the FIXED COORDINATE SYSTEM is defined by the centre of the TOMOGRAPHIC VOLUME  
312 (see Figure 1).

313 Note 3 to entry: The SYSTEM AXIS is orthogonal to all transverse slices.

314 **3.20**

315 **IMAGE MATRIX**

316 arrangement of MATRIX ELEMENTS in a preferentially Cartesian coordinate system

317 **3.21**

318 **IMAGE PLANE**

319 plane assigned to a plane in the OBJECT SLICE

320 Note 1 to entry: Usually the IMAGE PLANE is the mid-plane of the corresponding OBJECT SLICE.

### 321 **3.22**

#### 322 **INTRINSIC ENERGY RESOLUTION**

323 FULL WIDTH AT HALF MAXIMUM of the full energy absorption peak in the INTRINSIC ENERGY  
324 SPECTRUM for a specified RADIONUCLIDE

### 325 **3.23**

#### 326 **INTRINSIC ENERGY SPECTRUM**

327 measured histogram of pulse heights for the DETECTOR HEAD without COLLIMATOR

328 Note 1 to entry: The pulse height should be expressed as corresponding energy.

### 329 **3.24**

#### 330 **INTRINSIC NON-UNIFORMITY OF RESPONSE**

331 NON-UNIFORMITY OF RESPONSE of the DETECTOR HEAD without COLLIMATOR

### 332 **3.25**

#### 333 **INTRINSIC SPATIAL NON-LINEARITY**

334 SPATIAL NON-LINEARITY of the DETECTOR HEAD without COLLIMATOR

### 335 **3.26**

#### 336 **INTRINSIC SPATIAL RESOLUTION**

337 <GAMMA CAMERA> SPATIAL RESOLUTION in air for a specified RADIONUCLIDE measured without  
338 the COLLIMATOR

### 339 **3.27**

#### 340 **LINE SOURCE**

341 straight RADIOACTIVE SOURCE approximating a  $\delta$ -function in two dimensions and being constant  
342 (uniform) in the third dimension

### 343 **3.28**

#### 344 **LOW-ENERGY-TAIL RATIO**

345 ratio of the counts measured in an energy window of width  $2 * E_{FWHM}$  centred at energy  $E_{peak} -$   
346  $2 * E_{FWHM}$  divided by the counts measured in an energy window of width  $2 * E_{FWHM}$  centred at an  
347 energy of  $E_{peak}$ , where  $E_{peak}$  is the peak energy of the RADIOISOTOPE being measured and  
348  $E_{FWHM}$  is the energy resolution of the detector

349 [SOURCE: IEC 63073-1:2020, 3.12]

### 350 **3.29**

#### 351 **MATRIX ELEMENT**

352 smallest unit of an IMAGE MATRIX, which is assigned in location and size to a certain volume  
353 element of the object (VOXEL)

### 354 **3.30**

#### 355 **MULTIPLE WINDOW SPATIAL REGISTRATION**

356 measured position of a source as a function of the ENERGY WINDOW setting

### 357 **3.31**

#### 358 **NORMALIZED VOLUME SENSITIVITY**

359 VOLUME SENSITIVITY divided by the AXIAL FIELD OF VIEW of the tomograph or the phantom  
360 length, whichever is the smaller

### 361 **3.32**

#### 362 **OBJECT SLICE**

363 slice in the object

364 Note 1 to entry: The physical property of this slice that determines the measured information is displayed in the  
365 tomographic image.

366 **3.33**

367 **OFFSET**

368 deviation of the position of the PROJECTION of the COR ( $X'_p$ ) from  $X_p = 0$  (see Figure 1)

369 **3.34**

370 **PARALLEL HOLE COLLIMATOR**

371 COLLIMATOR with a number of apertures, the axes of which are parallel

372 **3.35**

373 **PILE UP EFFECT**

374 false measurement of the pulse amplitude, due to the absorption of two or more gamma rays,  
375 reaching the same radiation detector within the RESOLVING TIME

376 **3.36**

377 **PIXEL**

378 MATRIX ELEMENT in a two-dimensional IMAGE MATRIX

379 **3.37**

380 **PLANAR WHOLEBODY IMAGING EQUIPMENT**

381 <GAMMA CAMERA> GAMMA CAMERA, with one or two DETECTOR HEAD(S), in which the image of an  
382 extended object is formed by moving the DETECTOR HEAD(S) or the object in the axial direction  
383 relative to each other

384 **3.38**

385 **POINT SOURCE**

386 RADIOACTIVE SOURCE approximating a  $\delta$ -function in all three dimensions

387 **3.39**

388 **POINT SPREAD FUNCTION**

389 **PSF**

390 scintigraphic image of a POINT SOURCE

391 **3.40**

392 **PROJECTION**

393 transformation of a three-dimensional object into its two-dimensional image or of a two-  
394 dimensional object into its one-dimensional image, by integrating the physical property which  
395 determines the image along the direction of the PROJECTION BEAM

396 Note 1 to entry: This process is mathematically described by line integrals in the direction of PROJECTION and  
397 called the Radon-transform.

398 **3.41**

399 **PROJECTION ANGLE**

400 angle at which the PROJECTION is measured or acquired

401 Note 1 to entry: See Figure 1.

402 **3.42**

403 **PROJECTION BEAM**

404 determines the smallest possible volume in which the physical property which determines the  
405 image is integrated during the measurement process

406 Note 1 to entry: Its shape is limited by the SPATIAL RESOLUTION in all three dimensions and may vary with photon  
407 energy and COLLIMATOR design.

408 Note 2 to entry: In SPECT the PROJECTION BEAM usually has the shape of a long thin diverging cone.