

JIS

JAPANESE
INDUSTRIAL
STANDARD

Translated and Published by
Japanese Standards Association

JIS Z 4520 : 2007

(JEMIMA/JSA)

**Test procedures for germanium
gamma-ray detectors**

ICS 17.240

Reference number : **JIS Z 4520 : 2007 (E)**

Foreword

This translation has been made based on the original Japanese Industrial Standard established by the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee according to the proposal of establishing a Japanese Industrial Standard from Japan Electric Measuring Instruments Manufacturers' Association (JEMIMA)/Japanese Standards Association (JSA) with a draft of Industrial Standard based on the provision of Article 12 Clause 1 of the Industrial Standardization Law.

This Standard has been made based on **IEC 60973 : 1989** *Test procedures for germanium gamma-ray detectors* for the purposes of making it easier to compare this Standard with International Standard; to prepare Japanese Industrial Standard conforming with International Standard; and to propose a draft of an International Standard which is based on Japanese Industrial Standard.

Attention is drawn to the possibility that some parts of this Standard may conflict with a patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have technical properties. The relevant Minister and the Japanese Industrial Standards Committee are not responsible for identifying the patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have the said technical properties.

Date of Establishment: 2007-09-20

Date of Public Notice in Official Gazette: 2007-09-20

Investigated by: Japanese Industrial Standards Committee

Standards Board

Technical Committee on Testing and Measurement
Technology

JIS Z 4520 : 2007, First English edition published in 2008-03

Translated and published by: Japanese Standards Association
4-1-24, Akasaka, Minato-ku, Tokyo, 107-8440 JAPAN

In the event of any doubts arising as to the contents,
the original JIS is to be the final authority.

© JSA 2008

All rights reserved. Unless otherwise specified, 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.

Printed in Japan

KK/AT

Contents

	Page
Introduction.....	1
1 Scope.....	1
2 Normative references	1
3 Terms and definitions	1
4 Structure	2
4.1 General	2
4.2 Detector classification	2
5 General test conditions	4
6 Energy spectroscopy measurement	4
6.1 Recommended radiation source	4
6.2 Connection method of test equipment	5
6.3 Determination of peak area	6
6.4 Determination of peak channel	9
6.5 Determination of FWHM, FW0.1M and FW0.02M of peak	9
6.6 Determination of peak-to-Compton ratio	9
6.7 Determination of energy resolution	10
6.8 Determination of total noise linewidth and detector contribution	11
6.9 Determination of peak asymmetry	11
6.10 Determination of energy resolution of well-type coaxial detector	12
6.11 Preferred energy	12
7 Determination of counting efficiency	13
7.1 Efficiency for a point source at 25.0 cm	13
7.2 Determination of gamma-ray counting efficiency of well-type coaxial detector	14
8 Window thickness index	15
9 Timing	15
9.1 Measurement system of timing resolution	15
9.2 Determination of timing resolution	16
10 Temperature cycle	17
10.1 Temperature cyclable detector	17
10.2 Annealable detector	17
Annex (informative) Comparison table between JIS and corresponding International Standard	19

Test procedures for germanium gamma-ray detectors

Introduction This Japanese Industrial Standard has been prepared based on the first edition of **IEC 60973** *Test procedures for germanium gamma-ray detectors* published in 1989.

The portions given dotted underlines are the matters in which the contents of the original International Standard have been modified. A list of modifications with the explanations is given in Annex (informative).

1 Scope This Standard specifies the test procedures for performance and characteristics of the germanium gamma-ray detectors, which are important to manufacturers and users. The test procedures for germanium gamma-ray detectors used for the high-resolution gamma-ray spectroscopy are mainly specified.

NOTE : The International Standard corresponding to this Standard is as follows.

In addition, the symbols which denote the degree of correspondence in the contents between **JIS** and the relevant International Standard are IDT (identical), MOD (modified) and NEQ (not equivalent) according to **ISO/IEC Guide 21**.

IEC 60973:1989 *Test procedures for germanium gamma-ray detectors*
(MOD)

2 Normative references The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. If the indication of the year of publication is given to these referred standards, only the edition of the indicated year constitutes the provision of this Standard but the revision and amendment made thereafter do not apply. The normative references without the indication of the year of coming into effect apply only to the most recent editions (including amendments).

JIS Z 4001 *Glossary of terms used in nuclear energy*

JIS Z 8103 *Glossary of terms used in measurement*

IEC 60333:1993 *Nuclear instrumentation—Semiconductor charged-particle detectors—Test procedures*

IEC 60759:1983 *Standard test procedures for semiconductor X-ray energy spectrometers*

3 Terms and definitions For the purposes of this Standard, the definitions given in **JIS Z 4001** and **JIS Z 8103**, and the following definitions apply.

- a) **ion implantation** a process in which a beam of energetic ions incident upon the surface of crystal results in the implantation of those ions into crystal
- b) **full width at half maximum, FWHM** the full width of a distribution measured at half the maximum value of peak