

An American National Standard

IEEE Standard Test Procedure for Geiger-Müller Counters

Sponsor

Institute of Electrical and Electronics Engineers

Approved May 28, 1969

Reaffirmed May 30, 1974

Reaffirmed September 18, 1980

Reaffirmed September 28, 1990

IEEE Standards Board

Approved December 23, 1969

Reaffirmed October 16, 1974

Reaffirmed May 3, 1985

Reaffirmed February 27, 1991

American National Standards Institute

© Copyright 1970 by

The Institute of Electrical and Electronics Engineers, Inc

No part of this publication may be reproduced in any form, in an electronic retrieval system or otherwise, without the prior written permission of the publisher.

IEEE Standards documents are developed within the Technical Committees of the IEEE Societies and the Standards Coordinating Committees of the IEEE Standards Board. Members of the committees serve voluntarily and without compensation. They are not necessarily members of the Institute. The standards developed within IEEE represent a consensus of the broad expertise on the subject within the Institute as well as those activities outside of IEEE which have expressed an interest in participating in the development of the standard.

Use of an IEEE Standard is wholly voluntary. The existence of an IEEE Standard does not imply that there are no other ways to produce, test, measure, purchase, market, or provide other goods and services related to the scope of the IEEE Standard. Furthermore, the view point expressed at the time a standard is approved and issued is subject to change brought about through developments in the state of the art and comments received from users of the standard. Every IEEE Standard is subjected to review at least once every five years for revision or reaffirmation. When a document is more than five years old, and has not been reaffirmed, it is reasonable to conclude that its contents, although still of some value, do not wholly reflect the present state of the art. Users are cautioned to check to determine that they have the latest edition of any IEEE Standard.

Comments for revision of IEEE Standards are welcome from any interested party, regardless of membership affiliation with IEEE. Suggestions for changes in documents should be in the form of a proposed change of text, together with appropriate supporting comments.

Interpretations: Occasionally questions may arise regarding the meaning of portions of standards as they relate to specific applications. When the need for interpretations is brought to the attention of IEEE, the Institute will initiate action to prepare appropriate responses. Since IEEE Standards represent a consensus of all concerned interests, it is important to ensure that any interpretation has also received the concurrence of a balance of interests. For this reason IEEE and the members of its technical committees are not able to provide an instant response to interpretation requests except in those cases where the matter has previously received formal consideration.

Comments on standards and requests for interpretations should be addressed to:

Secretary, IEEE Standards Board
345 East 47th Street
New York, NY 10017
USA

FOREWORD

This publication presents standard test procedures for Geiger-Müller counter radiation detectors. These detectors, originally announced by Geiger and Müller in 1928, represented a major step forward in the detection and counting of individual radioactive events. Standard test procedures are desirable so that measurements may have the same meaning to all manufacturers and users.

This Standard is not intended to imply that all tests described herein are mandatory, but only that such tests as are carried out on Geiger-Müller counters should be performed in accordance with the procedures given herein.

ACKNOWLEDGMENT

The Institute wishes to acknowledge its indebtedness to those who have so freely given of their time and knowledge and have conducted experimental work on which many of the IEEE publications are based. The IEEE assumes proprietary responsibility for this Standard and will review it periodically and make revisions as required to keep it up to date. Comments from users are welcomed and should be addressed to: Secretary, IEEE Standards Committee, 345 East 47th Street, New York, N.Y. 10017.

The Radiation Detectors Committee of the IEEE Nuclear Science Group in cooperation with the Electron Tubes Standards Committee of the IEEE Electron Devices Group produced and reviewed a number of drafts culminating in this Standard.

Nuclear Instruments and Detectors Committee of IEEE Nuclear Science Group

G. A. Morton, *Chair*
L. Costrell, *Secretary*
R. K. Abele (*Project Leader*)

J. L. Blankenship
W. L. Brown
R. L. Butenhoff
J. A. Coleman
D.C. Cook

F. S. Goulding
T. R. Kohler
W. W. Managan
H. M. Mann
G. L. Miller
G. A. Morton

W. G. Spear
S. Wagner
F. J. Walter
H. R. Wasson
A. L. Whetstone

Nuclear Instruments and Detectors Committee—Electron Tubes Committee—Joint Sub-Committee

R. K. Abele, *Chair*

A. Di Lauro
F. M. Glass

J. M. Rochelle

H. N. Wilson
R. E. Zedler

Subsequently the proposal was reviewed and approved by American National Standards Committee N42, Nuclear Instruments. The membership of N42 at the time of balloting was:

American Chemical Society.....	L.P. Remsberg, Jr.
American Conference of Governmental Industrial Hygienists	J. Lieberman
American Industrial Hygiene Association	W.H. Ray
	(Alt.) G.A. Olson
American Nuclear Society	W.C. Lipinski
	(Alt.) T. Mulcahey
American Society of Mechanical Engineers	R. C. Austin
American Society for Testing and Materials.....	J. L. Kuranz
	(Alt.) J. Bystrom
Atomic Industrial Forum.....	W.J. Lepeska
Electric Light and Power Group	G.S. Keeley
Health Physics Society	J.B.H. Kuper
	(Alt.) R. L. Butenhoff
Institute of Electrical and Electronics Engineers	L. Costrell
	L. H. Horn
	L. Kornblith
	J. J. Loving
	(Alt.) J. Forster
Instrument Society of America	M. T. Slind
	(Alt.) J. E. Kaveckis
Manufacturing Chemists Association	M. G. Mason
National Electrical Manufacturers Association.....	T. Hamburger
Oak Ridge National Laboratory	F. W. Manning
Scientific Apparatus Makers Association.....	R. Breen
Underwriters' Laboratories.....	L. H. Horn
	(Alt.) R. E. Dufour
U.S. Atomic Energy Commission	
Division of Biology and Medicine	H. R. Wasson
Division of Reactor Development and Technology	G. O. Poyet
U.S. Department of the Army	
Matériel Command	A. E. Cohen
Office of Civil Defense Mobilization.....	C. R. Siebentritt, Jr.
	(Alt.) R. H. Sandwina
U.S. Department of Commerce	
National Bureau of Standards	L. Costrell
U.S. Department of Health, Education, and Welfare Public Health Service	
	H. J. L. Rechen
	(Alt.) R. Peterson
U.S. Naval Research Laboratory.....	D. C. Cook
<i>Members-at-Large</i>	J. G. Bellian
	O. W. Bilharz
	J. M. Gallagher, Jr.
	S. H. Hanauer
	V. A. Moore
	R. F. Shea

CLAUSE	PAGE
1. GENERAL	1
2. TEST CONDITIONS.....	1
2.1 Radiation Background.....	1
2.2 Ambient Temperature	1
2.3 Radiation Sources	1
2.4 Geiger-Müller Counter Test Circuits	2
3. GEIGER-MÜLLER COUNTER PARAMETERS	3
3.1 Background Counting Rate.....	3
3.2 Response to Ionizing Radiation	3
3.3 Geiger-Müller Threshold	4
3.4 Plateau Characteristics	4
3.5 Life	4
3.6 Radial Sensitivity (End-Window Counter).....	5
3.7 Longitudinal Sensitivity (Cylindrical Counter)	5
3.8 Temperature Dependence.....	5
3.9 Hysteresis	6
3.10 Photosensitivity	6
4. MEASUREMENTS OF GEIGER-MÜLLER PULSE CHARACTERISTICS	6
4.1 Current Pulse.....	6
4.2 Pulseshape	7
5. TEST EQUIPMENT	7
5.1 Voltmeter	7
5.2 Ammeter.....	7
5.3 Oscilloscope	7
5.4 Counting System	8
5.5 Count-Rate Meter.....	8
5.6 High-Voltage Supply	8
5.7 Capacitance Bridge	8
6. BIBLIOGRAPHY	8
7. GLOSSARY.....	9
8. SYMBOLS.....	11