

INTERNATIONAL STANDARD

**Metallic communication cable test methods –
Part 4-10: Electromagnetic compatibility (EMC) – Shielded screening attenuation
test method for measuring the screening effectiveness of feed-throughs and
electromagnetic gaskets double coaxial method**



THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2009 IEC, Geneva, Switzerland

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 either IEC or IEC's member National Committee in the country of the requester.

If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland
Email: inmail@iec.ch
Web: www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

- Catalogue of IEC publications: www.iec.ch/searchpub

The IEC on-line Catalogue enables you to search by a variety of criteria (reference number, text, technical committee,...). It also gives information on projects, withdrawn and replaced publications.

- IEC Just Published: www.iec.ch/online_news/justpub

Stay up to date on all new IEC publications. Just Published details twice a month all new publications released. Available on-line and also by email.

- Electropedia: www.electropedia.org

The world's leading online dictionary of electronic and electrical terms containing more than 20 000 terms and definitions in English and French, with equivalent terms in additional languages. Also known as the International Electrotechnical Vocabulary online.

- Customer Service Centre: www.iec.ch/webstore/custserv

If you wish to give us your feedback on this publication or need further assistance, please visit the Customer Service Centre FAQ or contact us:

Email: csc@iec.ch
Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00

INTERNATIONAL STANDARD

**Metallic communication cable test methods –
Part 4-10: Electromagnetic compatibility (EMC) – Shielded screening attenuation
test method for measuring the screening effectiveness of feed-throughs and
electromagnetic gaskets double coaxial method**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

PRICE CODE

ICS 33.120.10; 33.100

ISBN 2-8318-1039-4

CONTENTS

FOREWORD.....	3
1 Scope.....	5
2 Normative references	5
3 Terms and definitions	5
4 Principle of the test method	8
5 Procedure.....	10
5.1 Equipment.....	10
5.2 Dynamic range	11
5.3 Sample preparation	11
6 Measurement	11
6.1 General.....	11
6.2 Screening attenuation	11
6.3 Transfer impedance.....	11
7 Expression of results.....	11
7.1 Transfer impedance.....	11
7.2 Screening attenuation	12
7.3 Requirements.....	12
Annex A (informative) Background for the measurement of the shielding effectiveness of feed-throughs and electromagnetic gaskets	13
Bibliography.....	22
Figure 1 – A two-port	6
Figure 2 – Equivalent circuit of the test set-up and definition of Z_T	7
Figure 3 – Cross-section of a typical feed-through configuration	9
Figure 4 – Cross-section of the test fixture with a connector.....	9
Figure 5 – Cross-section of the test fixture with an electromagnetic gasket.....	10
Figure A.1 – Cross-section of a typical feed-through configuration	13
Figure A.2 – Cross-section of the test fixture with a connector.....	14
Figure A.3 – Equivalent circuit of the test setup with the shunt admittance y of the feed-through	14
Figure A.4 – TDR step response at input-port of test fixture.....	16
Figure A.5 – View of the test fixture connected to a network analyzer	17
Figure A.6 – Top view of the test fixture.....	17
Figure A.7 – Detailed view of the contact area	17
Figure A.8 – Detailed view of the captivation for the conductive O-ring test	18
Figure A.9 – Isolation of the network analyzer.....	19
Figure A.10 – Isolation of the test fixture when characterizing an ideal short (metal plate)	19
Figure A.11 – Measured operational screening transmission when characterizing a typical conductive O-ring	20
Figure A.12 – Transfer impedance Z_T of a typical conductive O-ring	20
Figure A.13 – Screening attenuation a_s of a typical conductive O-ring.....	21

INTERNATIONAL ELECTROTECHNICAL COMMISSION

METALLIC COMMUNICATION CABLE TEST METHODS –**Part 4-10: Electromagnetic compatibility (EMC) –
Shielded screening attenuation test method for measuring
the screening effectiveness of feed-throughs and
electromagnetic gaskets double coaxial method**

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with an IEC Publication.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 62153-4-10 has been prepared by IEC technical committee 46: Cables, wires, waveguides, R.F. connectors, R.F. and microwave passive components and accessories.

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

FDIS	Report on voting
46/319/FDIS	46/322/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts of the IEC 62153 series, under the general title: *Metallic communication cable test methods*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date *Metallic communication cable test methods* indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

This document is a preview generated by EVS

METALLIC COMMUNICATION CABLE TEST METHODS –

Part 4-10: Electromagnetic compatibility (EMC) – Shielded screening attenuation test method for measuring the screening effectiveness of feed-throughs and electromagnetic gaskets double coaxial method

1 Scope

This part of 62153-4-10 details a coaxial method suitable for determining the transfer impedance and/or screening attenuation of feed-throughs and electromagnetic gaskets.

The shielded screening attenuation test set-up according to IEC 62153-4-4 (triaxial method) has been modified to take into account the particularities of feed-throughs and gaskets.

A wide dynamic and frequency range can be applied to test even super screened feed-throughs and gaskets with normal instrumentation from low frequencies up to the limit of defined transversal waves in the coaxial circuits at approximately 4 GHz.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC/TR 62152:2004, *Background of terms and definitions of cascaded two-ports*

IEC 62153-4-4, *Metallic communication cable test methods – Part 4-4: Electromagnetic compatibility (EMC) – Shielded screening attenuation test method for measuring of the screening attenuation as up to and above 3 GHz*

IEC 62153-4-7, *Metallic communication cable test methods – Part 4-7: Electromagnetic compatibility (EMC) – Test method for measuring the transfer impedance and the screening - or the coupling attenuation – Tube in tube method*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1

operational (Betriebs) transfer function in the forward direction H_{B21} or the operational (Betriebs) scattering parameter S_{21}

quotient of the reflected square root of power wave fed into the reference impedance of the output of the two-port and the unreflected square root of the power wave consumed at the input of the two-port