

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Connectors for electrical and electronic equipment – Product requirements –
Part 2-012: Circular connectors – Detail specification for connectors with inner
push-pull locking based on M12 connector interfaces according to
IEC 61076-2-101, IEC 61076-2-109, IEC 61076-2-111 and IEC 61076-2-113**

**Connecteurs pour équipements électriques et électroniques – Exigences de
produit –**

**Partie 2-012: Connecteurs circulaires – Spécification particulière relative aux
connecteurs avec verrouillage interne de type pousser-tirer fondée sur les
interfaces de connecteur M12 conformément à l'IEC 61076-2-101,
l'IEC 61076-2-109, l'IEC 61076-2-111 et l'IEC 61076-2-113**



THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2020 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.

Droits de reproduction réservés. Sauf indication contraire, 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'IEC ou du Comité national de l'IEC du pays du demandeur. Si vous avez des questions sur le copyright de l'IEC ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de l'IEC de votre pays de résidence.

IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
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 corrigendum or an amendment might have been published.

IEC publications search - webstore.iec.ch/advsearchform

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 It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

IEC Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

Electropedia - www.electropedia.org

The world's leading online dictionary on electrotechnology, containing more than 22 000 terminological entries in English and French, with equivalent terms in 16 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IEC Glossary - std.iec.ch/glossary

67 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

A propos de l'IEC

La Commission Electrotechnique Internationale (IEC) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

A propos des publications IEC

Le contenu technique des publications IEC est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

Recherche de publications IEC -

webstore.iec.ch/advsearchform

La recherche avancée permet de trouver des publications IEC en utilisant différents critères (numéro de référence, texte, comité d'études,...). Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

IEC Just Published - webstore.iec.ch/justpublished

Restez informé sur les nouvelles publications IEC. Just Published détaille les nouvelles publications parues. Disponible en ligne et une fois par mois par email.

Service Clients - webstore.iec.ch/csc

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: sales@iec.ch.

Electropedia - www.electropedia.org

Le premier dictionnaire d'électrotechnologie en ligne au monde, avec plus de 22 000 articles terminologiques en anglais et en français, ainsi que les termes équivalents dans 16 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

Glossaire IEC - std.iec.ch/glossary

67 000 entrées terminologiques électrotechniques, en anglais et en français, extraites des articles Termes et Définitions des publications IEC parues depuis 2002. Plus certaines entrées antérieures extraites des publications des CE 37, 77, 86 et CISPR de l'IEC.

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Connectors for electrical and electronic equipment – Product requirements –
Part 2-012: Circular connectors – Detail specification for connectors with inner
push-pull locking based on M12 connector interfaces according to
IEC 61076-2-101, IEC 61076-2-109, IEC 61076-2-111 and IEC 61076-2-113**

**Connecteurs pour équipements électriques et électroniques – Exigences de
produit –
Partie 2-012: Connecteurs circulaires – Spécification particulière relative aux
connecteurs avec verrouillage interne de type pousser-tirer fondée sur les
interfaces de connecteur M 12 conformément à l'IEC 61076-2-101,
l'IEC 61076-2-109, l'IEC 61076-2-111 et l'IEC 61076-2-113**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 31.220.10

ISBN 978-2-8322-8643-2

**Warning! Make sure that you obtained this publication from an authorized distributor.
Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.**

CONTENTS

FOREWORD	7
1 Scope	10
2 Normative references	10
3 Terms and definitions	12
4 Technical information	12
4.1 Systems of levels	12
4.1.1 Performance levels	12
4.1.2 Compatibility levels, according to IEC 61076-1	13
4.2 Classification into climatic categories	13
4.3 Contact terminations	13
4.4 Available connector codings	14
4.5 Ratings	15
4.6 Marking	15
4.7 Safety aspects	15
5 Dimensional information	15
5.1 General	15
5.2 Survey of styles and variants	15
5.2.1 General	15
5.2.2 Fixed connectors	15
5.2.3 Free connectors	21
5.3 Interface dimensions	34
5.3.1 Push-pull housing	34
5.3.2 A-coding	38
5.3.3 B-coding	39
5.3.4 C-coding	40
5.3.5 D-coding	41
5.3.6 P-coding	42
5.3.7 H-coding	43
5.3.8 X-coding	44
5.3.9 K-coding	45
5.3.10 L-coding	46
5.3.11 M-coding	47
5.3.12 U-coding	48
5.3.13 T-coding	49
5.3.14 Type 1-coding	50
5.3.15 Type 2-coding	51
5.3.16 Type 3-coding	52
5.3.17 Type 4-coding	53
5.4 Gauges – Sizing gauges and retention force gauges	54
6 Characteristics	54
6.1 Classification into climatic category	54
6.2 Electrical characteristics	54
6.2.1 Voltage proof	54
6.2.2 Rated voltage – Rated impulse voltage – Pollution degree	55
6.2.3 Current-carrying capacity	55
6.2.4 Contact resistance	55

6.2.5	Insulation resistance.....	55
6.2.6	Transmission performance.....	55
6.3	Mechanical characteristics	55
6.3.1	Mating Interface.....	55
6.3.2	Push-pull locking mechanism.....	56
6.4	Other characteristics	57
6.4.1	Vibration (sinusoidal).....	57
6.4.2	Shock	57
6.4.3	Degree of protection provided by enclosures (IP code).....	57
7	Test schedule	57
7.1	General.....	57
7.2	Test schedule	58
7.2.1	Test group P – Preliminary.....	58
7.2.2	Test group AP – Dynamic/Climatic	58
7.2.3	Test group BP – Mechanical endurance	58
7.2.4	Test group CP – Electrical load	59
7.2.5	Test group DP – Chemical resistivity	59
7.2.6	Test group EP – Connection method tests	59
7.2.7	Test group FP – Electrical transmission requirements.....	59
Annex A (normative)	Inner diameter of the male push-pull connector body	60

Figure 1 – Style EF_M12_PPI – Fixed connector, female contacts, with inner push-pull and screw locking, mounting with thread M12 × 1, with wire/cable ends, single hole mounting thread M16 × 1,5

16

Figure 2 – Style FF_M12_PPI – Fixed connector, female contacts, with inner push-pull and screw locking, mounting with thread M12 × 1, with wire/cable ends, single hole mounting thread M20 × 1,5

17

Figure 3 – Style GF_M12_PPI – Fixed connector, female contacts, with inner push-pull and screw locking, mounting with thread M12 × 1, with wire/cable ends, single hole mounting thread M16 × 1,5, mounting orientation.....

18

Figure 4 – Style HF_M12_PPI – Fixed connector, female contacts, with inner push-pull and screw locking, mounting with thread M12 × 1, with wire/cable ends, single hole mounting thread M20 × 1,5, mounting orientation.....

19

Figure 5 – Style IF_M12_PPI – Fixed connector, female contacts, with inner push-pull and screw locking, mounting with thread M12 × 1, with wire/cable ends, single hole mounting thread M17 × 1,0, rear orientation.....

20

Figure 6 – Style JM_PPI – Rewirable connector, male contacts, straight version, with inner push-pull locking

22

Figure 7 – Style KM_PPI – Rewirable connector, male contacts, right-angled version, with inner push-pull locking.....

23

Figure 8 – Style LM_PPI – Non-rewirable connector, male contacts, straight version, with inner push-pull locking.....

24

Figure 9 – Style MM_PPI – Non-rewirable connector, male contacts, right-angled version, with inner push-pull locking

24

Figure 10 – Style NM_PPI – Non-rewirable connector, male contacts, right angled higher version, with inner push-pull locking.....

25

Figure 11 – Style JF_M12_PPI – Rewireable connector, with female contacts, straight version, with inner push-pull and screw locking.....

26

Figure 12 – Style KF_M12_PPI – Rewireable connector, with female contacts, right-angled version, with inner push-pull and screw locking

26

Figure 13 – Style LF_M12_PPI – Non-rewireable connector, with female contacts, straight version, with inner push-pull and screw locking	27
Figure 14 – Style MF_M12_PPI – Non-rewireable connector, with female contacts, right-angled version, with inner push-pull and screw locking	28
Figure 15 – Style NF_M12_PPI – Non-rewireable connector, female contacts, right angled higher version, with inner push-pull and screw locking.....	29
Figure 16 – Style JF_PPI_PPO – Rewireable connector, with female contacts, straight version, with inner and outer push-pull locking.....	30
Figure 17 – Style KF_PPI_PPO – Rewireable connector, with female contacts, right-angled version, with inner and outer push-pull locking	30
Figure 18 – Style LF_PPI_PPO – Non-rewireable connector, with female contacts, straight version, with inner and outer push-pull locking	31
Figure 19 – Style MF_PPI_PPO – Non-rewireable connector, with female contacts, right-angled version, with inner and outer push-pull locking	32
Figure 20 – Style NF_PPI_PPO – Non-rewireable connector, female contacts, right angled higher version, with inner and outer push-pull locking.....	33
Figure 21 – Front view of the female side of the push-pull housing using the example of an A-coded connector	34
Figure 22 – Side view of the female side of the push-pull housing using the example of an A-coded connector	35
Figure 23 – Front view of the male side of the push-pull housing using the example of a D-coded connector.....	37
Figure 24 – Side view of the male side of the push-pull housing using the example of a D-coded connector.....	37
Figure 25 – Front view of the female side of the push-pull housing for A-coding.....	38
Figure 26 – Side view of the female side of the push-pull housing for A-coding.....	39
Figure 27 – Front view of the female side of the push-pull housing for B-coding.....	39
Figure 28 – Side view of the female side of the push-pull housing for B-coding.....	40
Figure 29 – Front view of the female side of the push-pull housing for C-coding	40
Figure 30 – Side view of the female side of the push-pull housing for C-coding.....	41
Figure 31 – Front view of the female side of the push-pull housing for D-coding	41
Figure 32 – Side view of the female side of the push-pull housing for D-coding.....	42
Figure 33 – Front view of the female side of the push-pull housing for P-coding.....	42
Figure 34 – Side view of the female side of the push-pull housing for P-coding.....	43
Figure 35 – Front view of the female side of the push-pull housing for H-coding	43
Figure 36 – Side view of the female side of the push-pull housing for H-coding.....	44
Figure 37 – Front view of the female side of the push-pull housing for X-coding.....	44
Figure 38 – Side view of the female side of the push-pull housing for X-coding.....	45
Figure 39 – Front view of the female side of the push-pull housing for K-coding.....	45
Figure 40 – Side view of the female side of the push-pull housing for K-coding.....	46
Figure 41 – Front view of the female side of the push-pull housing for L-coding.....	46
Figure 42 – Side view of the female side of the push-pull housing for L-coding	47
Figure 43 – Front view of the female side of the push-pull housing for M-coding	47
Figure 44 – Side view of the female side of the push-pull housing for M-coding	48
Figure 45 – Front view of the female side of the push-pull housing for S-coding.....	48
Figure 46 – Side view of the female side of the push-pull housing for S-coding.....	49

Figure 47 – Front view of the female side of the push-pull housing for T-coding	49
Figure 48 – Side view of the female side of the push-pull housing for T-coding	50
Figure 49 – Front view of the female side of the push-pull housing for Type 1	50
Figure 50 – Side view of the female side of the push-pull housing for Type 1	51
Figure 51 – Front view of the female side of the push-pull housing for Type 2	51
Figure 52 – Side view of the female side of the push-pull housing for Type 2	52
Figure 53 – Front view of the female side of the push-pull housing for Type 3	52
Figure 54 – Side view of the female side of the push-pull housing for Type 3	53
Figure 55 – Front view of the female side of the push-pull housing for Type 4	53
Figure 56 – Side view of the female side of the push-pull housing for Type 4	54
Figure A.1 – Inner diameter of the free male connector body	60
Table 1 – Available connector codings	14
Table 2 – Styles of fixed connectors	16
Table 3 – Dimensions of style EF_M12_PPI, Figure 1	17
Table 4 – Dimensions of style FF_M12_PPI, Figure 2	17
Table 5 – Dimensions of style GF_M12_PPI, Figure 3	18
Table 6 – Dimensions of style HF_M12_PPI, Figure 4	19
Table 7 – Dimensions of style IF_M12_PPI, Figure 5	20
Table 8 – Styles of free connectors	21
Table 9 – Dimensions of style JM_PPI, Figure 6	22
Table 10 – Dimensions of style KM_PPI, Figure 7	23
Table 11 – Dimensions of style LM_PPI, Figure 8	24
Table 12 – Dimensions of style MM_PPI, Figure 9	25
Table 13 – Dimensions of style NM_PPI, Figure 10	25
Table 14 – Dimensions of style JF_M12_PPI, Figure 11	26
Table 15 – Dimensions of style KF_M12_PPI, Figure 12	27
Table 16 – Dimensions of style LF_M12_PPI, Figure 13	27
Table 17 – Dimensions of style MF_M12_PPI, Figure 14	28
Table 18 – Dimensions of style NF_M12_PPI, Figure 15	29
Table 19 – Dimensions of style JF_PPI_PPO, Figure 16	30
Table 20 – Dimensions of style KF_PPI_PPO, Figure 17	31
Table 21 – Dimensions of style LF_PPI_PPO, Figure 18	31
Table 22 – Dimensions of style MF_PPI_PPO, Figure 19	32
Table 23 – Dimensions of style NF_PPI_PPO, Figure 20	33
Table 24 – Dimensions of the push-pull housing (female side)	36
Table 25 – Dimensions of the push-pull housing (male side)	38
Table 26 – Dimensions of the push-pull housing specific to A-coding	39
Table 27 – Dimensions of the push-pull housing specific to B-coding	40
Table 28 – Dimensions of the push-pull housing specific to C-coding	41
Table 29 – Dimensions of the push-pull housing specific to D-coding	42
Table 30 – Dimensions of the push-pull housing specific to P-coding	43
Table 31 – Dimensions of the push-pull housing specific to H-coding	44

Table 32 – Dimensions of the push-pull housing specific to X-coding	45
Table 33 – Dimensions of the push-pull housing specific to K-coding	46
Table 34 – Dimensions of the push-pull housing specific to L-coding	47
Table 35 – Dimensions of the push-pull housing specific to M-coding	48
Table 36 – Dimensions of the push-pull housing specific to S-coding	49
Table 37 – Dimensions of the push-pull housing specific to T-coding	50
Table 38 – Dimensions of the push-pull housing specific to Type 1	51
Table 39 – Dimensions of the push-pull housing specific to Type 2	52
Table 40 – Dimensions of the push-pull housing specific to Type 3	53
Table 41 – Dimensions of the push-pull housing specific to Type 4	54
Table 42 – Insertion and withdrawal forces for the locking mechanism	57
Table 43 – Number of test specimens	58
Table 44 – Test group BP	59
Table A.1 – Inner diameter of the body of the free male connector, dimension ϕ	60

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**CONNECTORS FOR ELECTRICAL AND ELECTRONIC EQUIPMENT –
PRODUCT REQUIREMENTS –****Part 2-012: Circular connectors – Detail specification for connectors with
inner push-pull locking based on M12 connector interfaces according to
IEC 61076-2-101, IEC 61076-2-109, IEC 61076-2-111 and IEC 61076-2-113**

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 far 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 itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 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 61076-2-012 has been prepared by subcommittee 48B: Electrical connectors, of IEC technical committee 48: Electrical connectors and mechanical structures for electrical and electronic equipment.

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

FDIS	Report on voting
48B/2813/FDIS	48B/2831/RVD

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

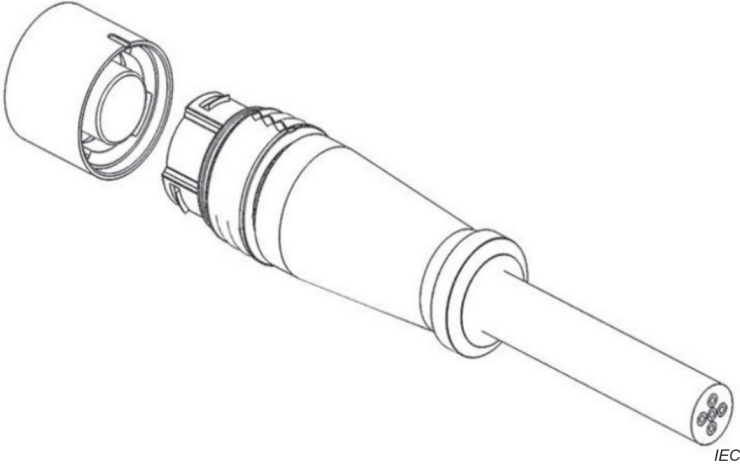
This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 61076 series, published under the general title *Connectors for electrical and electronic equipment – Product requirements*, can be found on the IEC website.

Future standards in this series will carry the new general title as cited above. Titles of existing standards in this series will be updated at the time of the next edition.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific document. At this date, the document will be

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

IEC SC 48B – Electrical connectors Specification available from: IEC General secretariat Or from the addresses shown on the inside cover.	IEC 61076-2-012 Ed.1
Detail specification in accordance with IEC 61076-1	
	Circular M12 inner push-pull connectors for power and/or signal and/or data transmission Fixed connectors with female contacts and inner push-pull mechanism, mateable with plugs with inner push-pull locking or M12 screw locking Free cable connectors with male contacts and inner push-pull locking Two types of free cable connectors with female contacts, with inner push-pull mechanism and either M12 screw or outer push-pull mechanism according to IEC 61076-2-010 Rewirable – Non-rewirable Fixed connectors, with rear or single hole (front) mounting Straight and right-angled free cable connectors

CONNECTORS FOR ELECTRICAL AND ELECTRONIC EQUIPMENT – PRODUCT REQUIREMENTS –

Part 2-012: Circular connectors – Detail specification for connectors with inner push-pull locking based on M12 connector interfaces according to IEC 61076-2-101, IEC 61076-2-109, IEC 61076-2-111 and IEC 61076-2-113

1 Scope

This part of IEC 61076 specifies circular connectors with an inner push-pull locking mechanism of a size derived from and thus being compatible with M12 screw-locking connectors and with mating interfaces according to IEC 61076-2-101, IEC 61076-2-109, IEC 61076-2-111 and IEC 61076-2-113.

A female fixed connector with inner push-pull locking according to this document is intermateable with a correspondingly coded male free connector with M12 screw-locking according to IEC 61076-2-101, IEC 61076-2-109, IEC 61076-2-111 or IEC 61076-2-113.

NOTE 1 M12 is the dimension of the thread of the screw-locking mechanism of circular connectors with M12 screw-locking.

This document covers both:

- a) power connectors with current ratings up to 16 A and voltage ratings up to 630 V, typically used for power supply of electrical equipment used in industrial premises, and
- b) connectors for data and signal transmission with frequencies up to 500 MHz.

NOTE 2 The power connectors are not suitable as power distribution socket-outlets in electrical installations of buildings.

These connectors consist of both fixed and free connectors, either rewirable or non-rewirable, with M12 inner push-pull locking as explained above. Male connectors have round contacts from Ø0,6 mm up to Ø1,5 mm.

This document covers various types of connectors identified by their "codings" with different contact arrangement, not mutually interchangeable.

The design of the inner push-pull mechanism prevents the unintended mating of the male inner push-pull free connector with the female connector with M12 screw-locking even for identical coding.

Some styles of free connectors with female contacts covered in this document are equipped with both inner and outer push-pull locking for intermateability also with correspondingly coded male fixed or free connectors according to IEC 61076-2-010.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 60050-581-2008, *International Electrotechnical Vocabulary – Part 581: Electromechanical components for electronic equipment*