

EXPERT REPORT

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2nd Edition

2008 (E)

Overview of the present status of the Standards referred to in OIML D 11 - *General Requirements for Electronic Measuring Instruments* (2004)

Revue du statut actuel des Normes référencées dans le Document OIML D 11 -
Exigences générales pour les instruments de mesure électroniques (2004)

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ORGANISATION INTERNATIONALE
DE MÉTROLOGIE LÉGALE

INTERNATIONAL ORGANIZATION
OF LEGAL METROLOGY

Foreword

The International Organization of Legal Metrology (OIML) is a worldwide, intergovernmental organization whose primary aim is to harmonize the regulations and metrological controls applied by the national metrological services, or related organizations, of its Member States. The main categories of OIML publications are:

International Recommendations (OIML R), which are model regulations that establish the metrological characteristics required of certain measuring instruments and which specify methods and equipment for checking their conformity; the OIML Member States shall implement these Recommendations to the greatest possible extent;

International Documents (OIML D), which are informative in nature and intended to improve the work of the metrological services;

International Basic Publications (OIML B), which define the operating rules of the various OIML structures and systems;

International Guides (OIML G), which are informative in nature and which are intended to give guidelines for the application of certain requirements to legal metrology.

OIML Draft Recommendations, Documents and Guides are developed by Technical Committees or Subcommittees which are formed by the Member States. Certain international and regional institutions also participate on a consultation basis. Cooperative agreements are established between the OIML and certain institutions, such as ISO and the IEC, with the objective of avoiding contradictory requirements; consequently, manufacturers and users of measuring instruments, test laboratories, etc. may simultaneously apply OIML publications and those of other institutions.

International Recommendations, Documents and Guides are published in French (F) and English (E) and are subject to periodic revision.

Additionally, the OIML participates in the publication of **Vocabularies (OIML V)** and periodically commissions legal metrology Experts to write **Expert Reports (OIML E)**. Expert Reports are intended to provide information and advice to metrological authorities, and are written solely from the viewpoint of their author, without the involvement of a Technical Committee or Subcommittee, nor that of the CIML. Thus they do not necessarily represent the views of the OIML.

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1 Introduction

Following a suggestion by participants in the meeting of OIML TC 5/SC 1 (*Electronic instruments*) held on 21–22 October 2002 in Delft, the author of this Report published - in his capacity of Secretary of OIML TC 5/SC 1 - an overview of the status at that time of the ISO and IEC Standards referred to in OIML D 11 in OIML Bulletin Volume XLVI - Number 4 - October 2005.

In this way, OIML TC/SC members were informed of changes without having to wait for an official revision of OIML D 11. Such updated information can assist OIML TCs and SCs in drawing up draft OIML Recommendations, to comply with the statement in the beginning of Annex A of OIML D 11: “*All normative documents are subject to revision, and the users of this Document are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.*”

Since the initial Bulletin article was published, more Standards referred to in OIML D 11 were revised or replaced. Therefore, the Secretary of TC 5/SC 1 carried out an updated overview of changes in the Standards referred to. Initially, this was intended to be published again in the OIML Bulletin but it was observed that this would lead to a relatively large article. Therefore, in a discussion with the BIML Director on 22 September 2006, it was concluded that publication as an Expert Report on the OIML web site would be more appropriate. Another advantage of such a publication is that it can easily be updated at any moment. This resulted in the publication of Expert Report E 5 (2006). As updating Standards is a continuous process, in 2008 it was deemed appropriate to review this publication and a new edition was published (2008).

It must, however, be stressed that the information given in this Report is merely an overview of the current situation, and - due to the fact that it has been approved neither by TC 5/SC 1 (or even discussed in this Subcommittee), nor by the CIML - it is published here for informational purposes only and does not have the status of a formal addendum to D 11.

The new versions of the Standards have not been reviewed for their contents, so it is up to the TCs and SCs to review and decide for themselves about the applicability of the latest version(s) in draft OIML Recommendations and Documents they are drawing up.

The information in the tables below is based on the following web sites (situation as at 23 June 2008):

IEC Standards: http://www.iec.ch/searchpub/cur_fut.htm

ISO Standards: http://www.iso.org/iso/iso_catalogue.htm

Mostly, the text is an exact copy of the text supplied by ISO and IEC on their web sites.

The quoted corrigenda to the IEC Standards can be downloaded free of charge from the IEC web site:

http://www.iec.ch/searchpub/cur_fut.htm

This Report replaces the publication in OIML Bulletin Volume XLVI - Number 4 - October 2005 and also the previous edition of OIML E 5 (2006). It is the intention of the author to update this publication as regularly as possible; new editions will be announced in the OIML Bulletin and on the OIML web site.

The contents of the columns "New description of the Standard / remarks" and "Major technical changes" are, as far as available, based on the information on the web sites of ISO and IEC and/or published in the relevant new Standard. This applies for both the English and the French texts; so the texts in both these languages have not been compared by the author.

2 Additions compared to the previous publications

Compared to the initial publication of this overview (OIML Bulletin Volume XLVI - Number 4 - October 2005), the following additions were made in OIML E 5 (2006):

D 11	Old Standards	New Standards
[9]	IEC 60068-2-30 (1980-01) Amm 1 (1985-08)	IEC 60068-2-30 (2005-08)
[29]	IEC 61000-4-3 consolidated edition (2002-09)	IEC 61000-4-3 (2006-02)
[30]	IEC 61000-4-4 (2004-07)	Correction 1 (2006-08)
[31]	IEC 61000-4-5 (2001-04)	IEC 61000-4-5 (2005-11)
[32]	IEC 61000-4-6 (2003-05) Amm 1 (2004-10)	IEC 61000-4-6 (2006-05)
[39]	IEC 61326 (2002-02) Corr 1 (2002-07)	IEC 61326 (2002-02) Corr 1 (2002-07)
		IEC 61326-1 (2005-12)
		IEC 61326-2-1 (2005-12)
		IEC 61326-2-2 (2005-12)
		IEC 61326-2-3 (2006-07)
		IEC 61326-2-4 (2006-06)
		IEC 61326-2-5 (2006-06)
		IEC 61326-2-6 (2005-12)
		IEC 61326-3-1 (draft)
		IEC 61326-3-2 (draft)
[40]	ISO 16750-2 (2003)	ISO 16750-2 (2006)

And, besides a few editorial changes, the following additions have been made in this new edition (2008) compared to the previous publication of E 5 (2006):

D 11	Old Standards	New Standards
[1]	VIM 1993	OIML V 2-200 (2007)
[2]	OIML B 3 (2003)	Amm 1 added
[4]	IEC 60068-2-1 (1990-05) Amm 1 (1993-02) Amm2 (1994-06)	IEC 60068-2-1 (2007-03)
[5]	IEC 60068-2-2 (1974) Amm. 1 (1993) Amm. 2 (1994)	IEC 60068-2-2 (2007-07)
[6]	IEC 60068-2-6 (1995-03) Corr 1 (1995-03)	IEC 60068-2-6 (2007-12)
[10]	IEC 60068-2-31 (1969-01)	IEC 60068-2-31 (2008-05)
[12]	IEC 60068-2-64 (1993-05) Corr 1 (1993-10)	IEC 60068-2-64 (2008-04)

[19]	IEC 60529 (2001-02) IEC 60529 Corr.1 (2003-01)	Corr.2 (2007-10) added
[27]	IEC 61000-4-1 (2000-4)	<u>IEC 61000-4-1 (2006-10)</u>
[29]	IEC 61000-4-3 consolidated edition (2002-09)	AM1 (2007) added
[30]	IEC 61000-4-4 (2004-07)	Corr. 1 (2006-08) Corr. 2 (2007-06) added
[39]	IEC 61326 (2002-02) Corrigendum 1 (2002-07)	Deleted
	IEC 61326-1 (2005-12)	Corr. 1 (2008-02) added
	IEC 61326-2-2 (2005-12)	Corr. 1 (2007-11) added
	IEC 61326-2-6 (2005-12)	Corr. 1 (2007-09) added
	IEC 61326-3-1 (draft)	IEC 61326-3-1 (2008-11)
	IEC 61326-3-2 (draft)	IEC 61326-3-2 (2008-01)
[41]	ISO 7637-1 (2002)	Amd. 1 (2008) added
[42]	ISO 7637-2 (2004)	Amd 1 (2008) added
[43]	ISO 7637-3 (1995)	ISO 7637-3 (2007)

For more clarity, all the titles of the Standards referred to have been added (in italic) in this publication.

Reference in D 11: 2004	Standard referred to in D 11: 2004	Present Standard as at 23 June 2008	Title and new description of the Standard, and remarks	Major technical changes
[1]	International Vocabulary of Basic and General Terms in Metrology (VIM) (1993)	OIML V 2-200 (2007)	<p><i>International vocabulary of metrology -- Basic and general concepts and associated terms (VIM)</i></p> <p>OIML V 2-200 (2007) provides a set of definitions and associated terms, in English and French, for a system of basic and general concepts used in metrology, together with concept diagrams to demonstrate their relations. Additional information is given in the form of examples and notes under many definitions.</p> <p>This Vocabulary is meant to be a common reference for scientists and engineers, as well as teachers and practitioners, involved in planning or performing measurements, irrespective of the level of measurement uncertainty and irrespective of the field of application. It is also meant to be a reference for governmental and inter-governmental bodies, trade associations, accreditation bodies, regulators and professional societies.</p>	Completely revised
[2]	OIML B 3 (2003) (formerly P1)	OIML B 3 (2003) Amm. 2006	<p><i>OIML Certificate System for Measuring Instruments</i></p> <p>Gives rules for issuing, registering and using OIML Certificates</p>	Instead of one, several Issuing Authorities in that State can now be designated per category of instruments
[4]	IEC 60068-2-1 (1990-05) Amm 1 (1993-02) Amm2 (1994-06)	IEC 60068-2-1 (2007-03)	<p><i>Environmental testing - Part 2-1: Tests - Test A: Cold</i></p> <p>Deals with cold tests applicable to both non heat-dissipating and heat-dissipating specimens. For non heat-dissipating specimens, Tests Ab and Ad do not deviate essentially from earlier issues. Test Ae has been added primarily for testing equipment that requires being operational throughout the test, including the conditioning periods.</p> <p>The object of the cold test is limited to the determination of the ability of components, equipment or other articles to be used, transported or stored at low temperature.</p> <p>Cold tests covered by this Standard do not enable the ability of specimens to withstand or operate during the temperature variations to be assessed. In this case, it would be necessary to use IEC 60068-2-14.</p>	This sixth edition deals with cold tests applicable both to non heat-dissipating and heat-dissipating specimens. For non heat-dissipating specimens, Tests Ab and Ad do not deviate essentially from earlier issues. Test Ae has been added primary for testing equipment that requires being operational throughout the test including the conditioning

Reference in D 11: 2004	Standard referred to in D 11: 2004	Present Standard as at 23 June 2008	Title and new description of the Standard, and remarks	Major technical changes
			<p>The cold tests are subdivided as follows: - Cold tests for non heat-dissipating specimens * with gradual change of temperature, Ab; - Cold test for heat-dissipating specimens * with gradual change of temperature, Ad, * with gradual change of temperature, specimen powered throughout, Ae.</p> <p>The procedures given in this Standard are normally intended for specimens that achieve temperature stability during the performance of the test procedure.</p> <p>Temperature chamber(s) are constructed and verified in accordance with specifications IEC 60068-3-5 and IEC 60068-3-7.</p> <p>Further guidance for dry heat and cold tests can be found in IEC 60068-3-1 and general guidance in IEC 60068-1.</p>	periods.
[5]	IEC 60068-2-2 (1974) Amm. 1 (1993) Amm. 2 (1994)	IEC 60068-2-2 (2007-07)	<p><i>Environmental testing - Part 2-2: Tests - Test B: Dry heat</i></p> <p>Deals with dry heat tests applicable both to heat-dissipating and non heat-dissipating specimens. For non heat-dissipating specimens, Tests Bb and Bd do not deviate essentially from earlier issues.</p> <p>The object of the dry heat test is limited to the determination of the ability of components, equipment or other articles to be used, transported or stored at high temperature.</p> <p>These dry heat tests do not enable the ability of specimens to withstand or operate during the temperature variations to be assessed. In this case, it would be necessary to use IEC 60068-2-14 Test N: Change of temperature.</p> <p>The dry heat tests are subdivided as follows:</p> <p>Dry heat test for non heat-dissipating specimens</p> <ul style="list-style-type: none"> - with gradual change of temperature, Bb. <p>Dry heat tests for heat-dissipating specimens</p> <ul style="list-style-type: none"> - with gradual change of temperature, Bd; - with gradual change of temperature, specimen powered throughout, Be. <p>The procedures given in this Standard are normally intended for specimens that achieve temperature stability during the performance of the test procedure.</p>	<p>The main changes from the previous edition are as follows: Tests Ba and Bc have been deleted since they were more severe than Test Nb, IEC 60068-2-14: Change of temperature. Secondly it was considered justified to delete the 3 % value on the temperature difference between the chamber air and the wall temperatures. Thirdly it is proposed that the test specimen be powered throughout the test where required; and, finally, the annexes have been removed.</p>

Reference in D 11: 2004	Standard referred to in D 11: 2004	Present Standard as at 23 June 2008	Title and new description of the Standard, and remarks	Major technical changes
[6]	IEC 60068-2-6 (1995-03) Corr 1 (1995-03)	IEC 60068-2-6 (2007-12)	<p><i>Environmental testing - Part 2-6: Tests - Test Fc: Vibration (sinusoidal)</i></p> <p>Gives a method of test which provides a standard procedure to determine the ability of components, equipment and other articles, hereinafter referred to as specimens, to withstand specified severities of sinusoidal vibration. If an item is to be tested in an unpackaged form, that is without its packaging, it is referred to as a test specimen. However, if the item is packaged then the item itself is referred to as a product and the item and its packaging together are referred to as a test specimen. The purpose of this test is to determine any mechanical weakness and/or degradation in the specified performance of specimens and to use this information, in conjunction with the relevant specification, to decide upon the acceptability of the specimens. In some cases, the test method may also be used to demonstrate the mechanical robustness of specimens and/or to study their dynamic behavior. Categorization of components can also be made on the basis of a selection from within the severities quoted in the test.</p>	<p>The major changes with regard to the previous edition concern:</p> <ul style="list-style-type: none"> - Reference to the latest version of IEC 60068-2-47: Mounting - Simplification of the layout of the Standard by replacing some tables with text. - Addition of the test report requirements (see Clause 13).
[9]	IEC 60068-2-30 (1980-01) Amm 1 (1985-08)	IEC 60068-2-30 (2005-08)	<p><i>Environmental testing - Part 2-30: Tests - Test Db: Damp heat, cyclic (12 h + 12 h cycle)</i></p> <p>Determines the suitability of components, equipment or other articles for use, transportation and storage under conditions of high humidity - combined with cyclic temperature changes and, in general, producing condensation on the surface of the specimen. If the test is being used to verify the performance of a specimen whilst it is being transported or stored in packaging then the packaging will normally be fitted when the test conditions are being applied. For small, low mass specimens, it may be difficult to produce condensation on the surface of the specimen using this procedure; users should consider the use of an alternative procedure such as that given to IEC 60068-2-38.</p>	<p>The main changes with respect to the previous edition are listed below:</p> <ul style="list-style-type: none"> - editorial changes, - addition of normative references, - addition of guidance for temperature tolerances, - period for recovery has been extended.

Reference in D 11: 2004	Standard referred to in D 11: 2004	Present Standard as at 23 June 2008	Title and new description of the Standard, and remarks	Major technical changes
[10]	IEC 60068-2-31 (1969-01)	IEC 60068-2-31 (2008-05)	<p><i>Environmental testing - Part 2-31: Tests - Test Ec: Rough handling shocks, primarily for equipment-type specimens</i></p> <p>Deals with a test procedure for simulating the effects of rough handling shocks, primarily in equipment-type specimens, the effects of knocks, jolts and falls which may be received during repair work or rough handling in operational use. This procedure does not simulate the effects of impacts received during transportation as loosely constrained cargo. Where the effects of loose cargo transportation are to be assessed, test Ee: Bounce should be used. Also this procedure does not simulate the effects of shock applied to installed equipments. Where this effect is to be assessed refer to test Ea: Shock. Testing should only be specified for equipment likely to receive such rough handling, for example those of small to medium size and mass, and should only be applied to those faces and corners where there is a risk of such treatment being encountered. In general, equipment which is frequently handled and serviced (for example field equipment and unit spares) can be considered at risk, whereas equipment forming an integral part of a permanent installation would not normally be considered at risk and need not be tested. Testing may not be applicable to fragile unprotected equipment of irregular shape (for example aircraft nose radar) which, when removed from the installation would be contained in a handling frame or jig. It may however be applicable to these items of equipment when they are in their transit case or in their handling frame or jig. For equipment which stands only on one face (for example the normal base) the test is generally only applied to that face. Shock tests are performed on the specimen when fixed to the test machine. Drop and topple, free fall, repeated free fall and bounce tests are performed with the specimen free.</p>	<p>This second edition cancels and replaces the first edition, published in 1969 and constitutes a technical revision.</p> <p>The major changes with regard to the previous edition concern the introduction of soft packaging tests, where appropriate.</p> <p>This new edition of IEC 60068-2-31 now incorporates the second edition of IEC 60068-2-32 (1975). IEC 60068-2-32 will be withdrawn once this Standard has been issued.</p>

Reference in D 11: 2004	Standard referred to in D 11: 2004	Present Standard as at 23 June 2008	Title and new description of the Standard, and remarks	Major technical changes
[11]	IEC 60068-2-47 (1999-10)	IEC 60068-2-47 (2005-4)	<p><i>Environmental testing - Part 2-47: Test - Mounting of specimens for vibration, impact and similar dynamic tests</i></p> <p>This Standard provides methods for mounting products, whether packaged or unpackaged, as well as mounting requirements for equipment and other articles, for the series of dynamic tests in IEC 60068-2, that is impact (Test E), vibration (Test F) and acceleration, steady-state (Test G). When they are fastened to the test apparatus and subjected to these tests, whether packaged or unpackaged, they are referred to as specimens.</p>	The major technical changes with regard to the second edition are related to specific guidance on the testing of packaged products.
[12]	IEC 60068-2-64 (1993-05) Corr 1 (1993-10)	IEC 60068-2-64 (2008-04)	<p><i>Environmental testing - Part 2-64: Tests - Test Fh: Vibration, broadband random and guidance</i></p> <p>Demonstrates the adequacy of specimens to resist dynamic loads without unacceptable degradation of its functional and/or structural integrity when subjected to the specified random vibration test requirements. Broadband random vibration may be used to identify accumulated stress effects and the resulting mechanical weakness and degradation in the specified performance. This information, in conjunction with the relevant specification, may be used to assess the acceptability of specimens. This standard is applicable to specimens which may be subjected to vibration of a stochastic nature resulting from transportation or operational environments, for example in aircraft, space vehicles and land vehicles. It is primarily intended for unpackaged specimens, and for items in their transportation container when the latter may be considered as part of the specimen itself. However, if the item is packaged, then the item itself is referred to as a product and the item and its packaging together are referred to as a test specimen. This standard may be used in conjunction with IEC 60068-2-47:2005, for testing packaged products. If the specimens are subjected to vibration of a combination of random and deterministic nature resulting from transportation or real life environments, for example in aircraft, space vehicles and for items in their transportation container, testing with pure random may not be sufficient. See IEC 60068-3-8:2003 for estimating the dynamic vibration environment of the specimen and based on that, selecting the appropriate test method.</p>	<p>This second edition cancels and replaces the first edition, published in 1993, and constitutes a technical revision.</p> <p>The major changes with regard to the previous edition concern the removal of Method 1 and Method 2, replaced by a single method, and replacement of Annex A with suggested test spectra and removal of Annex C.</p> <p>Also included in this revision is the testing of soft packed specimens.</p>

Reference in D 11: 2004	Standard referred to in D 11: 2004	Present Standard as at 23 June 2008	Title and new description of the Standard, and remarks	Major technical changes
[19]	IEC 60529 (2001-02) IEC 60529 Corr.1 (2003-01)	IEC 60529 (2001-02) IEC 60529 Corr.1 (2003-01) IEC 60529 Corr.2 (2007-10)	<i>Degrees of protection provided by enclosures (IP Code)</i> Applies to the classification of degrees of protection provided by enclosures for electrical equipment with a rated voltage not exceeding 72.5 kV.	Both Corr. 1 and Corr. 2 apply to French text only
[27]	IEC 61000-4-1 (2000-4)	<u>IEC 61000-4-1 (2006-10)</u>	<i>Electromagnetic compatibility (EMC) - Part 4-1: Testing and measurement techniques - Overview of IEC 61000-4 series</i> The object of this part of IEC 61000 is to give applicability assistance to the technical committees of IEC or other bodies, users and manufacturers of electrical and electronic equipment on EMC Standards within the IEC 61000-4 series on testing and measurement techniques and to provide general recommendations concerning the choice of relevant tests. This Standard has the status of a basic EMC publication in accordance with IEC Guide 107.	Changes introduced in this third edition are for the purpose of updating the text to include reference to the latest publications of the IEC 61000-4 series.
[29]	IEC 61000-4-3 consolidated edition (2002-09)	IEC 61000-4-3 (2006-02) AM1 (2007) Consolidated edition (2008)	<i>Electromagnetic compatibility (EMC) - Part 4-3 : Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test</i> Is applicable to the immunity requirements of electrical and electronic equipment to radiated electromagnetic energy. It establishes test levels and the required test procedures. The object of this Standard is to establish a common reference for evaluating the immunity of electrical and electronic equipment when subjected to radiated, radio-frequency electromagnetic fields. The test method documented in this part of IEC 61000 describes a consistent method to assess the immunity of an equipment or system against a defined phenomenon. This part deals with immunity tests related to the protection against RF electromagnetic fields from any source. Particular considerations are devoted to the protection against radio-frequency	The third edition cancels and replaces the first edition published in 2002 and its amendment 1 (2002), and constitutes a technical revision. The test frequency range may be extended up to 6 GHz to take account of new services. The calibration of the field as well as the checking of power amplifier linearity of the immunity chain are specified.

Reference in D 11: 2004	Standard referred to in D 11: 2004	Present Standard as at 23 June 2008	Title and new description of the Standard, and remarks	Major technical changes
			<p>emissions from digital radiotelephones and other RF emitting devices.</p> <p>This Standard is an independent test method. Other test methods may not be used as substitutes for claiming compliance with this Standard.</p> <p>This consolidated version consists of the third edition (2006) and its Amendment 1 (2007). Therefore, no need to order the Amendment in addition to this publication.</p> <p>It has the status of a basic EMC publication in accordance with IEC Guide 107.</p>	
[30]	IEC 61000-4-4 (2004-07)	Corr. 1 (2006-08) Corr. 2 (2007-06)	<p><i>Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test</i></p> <p>Establishes a common and reproducible reference for evaluating the immunity of electrical and electronic equipment when subjected to electrical fast transient/bursts on supply, signal, control and earth ports. The test method documented in this part of IEC 61000-4 describes a consistent method to assess the immunity of an equipment or system against a defined phenomenon.</p> <p>The Standard defines:</p> <ul style="list-style-type: none"> - test voltage waveform; - range of test levels; - test equipment; - verification procedures of test equipment; - test set-up; - test procedure. <p>The Standard gives specifications for laboratory and post-installation tests.</p> <p>The corrigenda can be downloaded free of charge: http://www.iec.ch/cgi-bin/getcorr.pl/iec61000-4-4-cor1{ed2.0}b.pdf?file=iec61000-4-4-cor1{ed2.0}b.pdf and http://www.iec.ch/cgi-bin/getcorr.pl/iec61000-4-4-cor2{ed2.0}b.pdf?file=iec61000-4-4-cor2{ed2.0}b.pdf </p>	Corr. 1: Figure 4 replaced Corr 2: 6.2.2 changed

Reference in D 11: 2004	Standard referred to in D 11: 2004	Present Standard as at 23 June 2008	Title and new description of the Standard, and remarks	Major technical changes
[31]	IEC 61000-4-5 (2001-04)	IEC 61000-4-5 (2005-11)	<p><i>Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test</i></p> <p>Relates to the immunity requirements, test methods, and range of recommended test levels for equipment to unidirectional surges caused by overvoltages from switching and lightning transients. Several test levels are defined which relate to different environment and installation conditions. These requirements are developed for and are applicable to electrical and electronic equipment.</p> <p>The object of this Standard is to establish a common reference for evaluating the immunity of electrical and electronic equipment when subjected to surges. The test method documented in this part of IEC 61000 describes a consistent method to assess the immunity of an equipment or system against a defined phenomenon.</p> <p>This Standard defines:</p> <ul style="list-style-type: none"> - a range of test levels; - test equipment; - test setups; - test procedures. <p>The task of the described laboratory test is to find the reaction of the EUT under specified operational conditions, to surge voltages caused by switching and lightning effects at certain threat levels.</p> <p>It is not intended to test the capability of the EUT's insulation to withstand high-voltage stress. Direct injections of lightning currents, i.e. direct lightning strikes, are not considered in this Standard.</p> <p>It has the status of a basic EMC publication in accordance with IEC Guide 107.</p>	This second edition cancels and replaces the first edition published in 1995 and its Amendment 1 (2000), and constitutes a technical revision. Particularly, the clauses relating to coupling/decoupling networks and to test setups are more detailed.
[32]	IEC 61000-4-6 (2003-05) Amm 1 (2004-10)	IEC 61000-4-6 (2006-05) Amm 2 (2006-03) Consolidated edition (2006-05)	<p><i>Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields</i></p> <p>This part of IEC 61000-4 relates to the conducted immunity requirements of electrical and electronic equipment to electromagnetic disturbances coming from intended radio-frequency (RF) transmitters in the frequency range 9 kHz up to 80 MHz. Equipment not having at least one conducting cable (such as mains supply, signal line or earth connection) which can couple the equipment to the disturbing</p>	The consolidated version is based on the second edition (2003), its Amendment 1 (2004), and its Amendment 2 (2006). It bears the edition number 2.2.

Reference in D 11: 2004	Standard referred to in D 11: 2004	Present Standard as at 23 June 2008	Title and new description of the Standard, and remarks	Major technical changes
			<p>RF fields is excluded.</p> <p>The object of this Standard is to establish a common reference for evaluating the functional immunity of electrical and electronic equipment when subjected to conducted disturbances induced by radio-frequency fields. The test method documented in this part of IEC 61000 describes a consistent method to assess the immunity of an equipment or system against a defined phenomenon.</p>	
[37]	IEC 61000-6-1 (1997-07)	IEC 61000-6-1 (2005-3)	<p><i>Electromagnetic compatibility (EMC) - Part 6-1: Generic Standards - Immunity for residential, commercial and light-industrial environments</i></p> <p>Applies to electrical and electronic apparatus intended for use in residential, commercial and light-industrial environments. Immunity requirements in the frequency range 0 Hz to 400 GHz are covered. No tests need to be performed at frequencies where no requirements are specified.</p> <p>This generic EMC immunity Standard is applicable if no relevant dedicated product or product-family EMC immunity Standard exists. This Standard applies to apparatus intended to be directly connected to a low-voltage public mains network or connected to a dedicated DC source which is intended to interface between the apparatus and the low-voltage public mains network. This Standard applies also to apparatus which is battery operated or is powered by a non-public, but non-industrial, low voltage power distribution system if this apparatus is intended to be used in the locations described below. The environments encompassed by this Standard are residential, commercial and light industrial locations, both indoor and outdoor. The following list, although not comprehensive, gives an indication of locations which are included:</p> <ul style="list-style-type: none"> - residential properties, for example houses, apartments; - retail outlets, for example shops, supermarkets; - business premises, for example offices, banks; - areas of public entertainment, for example cinemas, public bars, dance halls; - outdoor locations, for example petrol stations, car parks, amusement and sports centres; - light-industrial locations, for example workshops, laboratories, service centres. <p>Locations which are characterised by being supplied directly at low voltage from</p>	<p>This second edition constitutes a technical revision. Specific technical changes have been introduced to Tables 1 to 4. The frequency range for tests according to IEC 61000-4-3 has been extended above 1 GHz according to technologies used in this frequency area. The use of TEM waveguide testing according to IEC 61000-4-20 has been introduced for certain products and the testing requirements according to IEC 61000-4-11 have been amended significantly.</p>

Reference in D 11: 2004	Standard referred to in D 11: 2004	Present Standard as at 23 June 2008	Title and new description of the Standard, and remarks	Major technical changes
			the public mains network are considered to be residential, commercial or light-industrial. The object of this Standard is to define the immunity test requirements for apparatus specified in the scope in relation to continuous and transient, conducted and radiated disturbances including electrostatic discharges. The immunity requirements have been selected to ensure an adequate level of immunity for apparatus at residential, commercial and light-industrial locations. The levels do not, however, cover extreme cases, which may occur at any location, but with an extremely low probability of occurrence. Not all disturbance phenomena have been included for testing purposes in this Standard but only those considered as relevant for the equipment covered by this Standard. These test requirements represent essential electromagnetic compatibility immunity requirements. Test requirements are specified for each port considered.	
[38]	IEC 61000-6-2 (1999-01)	IEC 61000-6-2 (2005-01)	<p><i>Electromagnetic compatibility (EMC) - Part 6-2: Generic Standards - Immunity for industrial environments</i></p> <p>Applies to electrical and electronic apparatus intended for use in industrial environments, as described below.</p> <p>Immunity requirements in the frequency range 0 Hz to 400 GHz are covered. No tests need to be performed at frequencies where no requirements are specified.</p> <p>This generic EMC immunity Standard is applicable if no relevant dedicated product or product-family EMC immunity Standard exists.</p> <p>This Standard applies to apparatus intended to be connected to a power network supplied from a high or medium voltage transformer dedicated to the supply of an installation feeding manufacturing or similar plant, and intended to operate in or in proximity to industrial locations, as described below. This Standard applies also to apparatus which is battery operated and intended to be used in industrial locations. The environments encompassed by this Standard are industrial, both indoor and outdoor.</p> <p>Industrial locations are in addition characterised by the existence of one or more of the following:</p> <ul style="list-style-type: none"> - industrial, scientific and medical (ISM) apparatus (as defined in CISPR 11); - heavy inductive or capacitive loads are frequently switched; 	This second edition constitutes a technical revision. Specific technical changes have been introduced to Tables 1 to 4. The frequency range for tests according to IEC 61000-4-3 has been extended above 1 GHz according to technologies used in this frequency area. The use of TEM waveguide testing according to IEC 61000-4-20 has been introduced for certain products and the testing requirements according to IEC 61000-4-11 have been amended significantly.

Reference in D 11: 2004	Standard referred to in D 11: 2004	Present Standard as at 23 June 2008	Title and new description of the Standard, and remarks	Major technical changes
			<p>- currents and associated magnetic fields are high.</p> <p>The object of this Standard is to define immunity test requirements for apparatus defined in the scope in relation to continuous and transient, conducted and radiated disturbances, including electrostatic discharges.</p> <p>The immunity requirements have been selected to ensure an adequate level of immunity for apparatus at industrial locations. The levels do not, however, cover extreme cases, which may occur at any location, but with an extremely low probability of occurrence. Not all disturbance phenomena have been included for testing purposes in this Standard, but only those considered as relevant for the equipment covered by this Standard. These test requirements represent essential electromagnetic compatibility immunity requirements</p>	
[39]	IEC 61326 (2002-02) Corrigendum 1 (2002-07)	IEC 61326-1 (2005-12) Corr. 1 (2008-02)	<p><i>Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1: General requirements</i></p> <p>This part of IEC 61326 specifies requirements for immunity and emissions regarding electromagnetic compatibility (EMC) for electrical equipment, operating from a supply or battery of less than 1 000 V AC or 1 500 V DC or from the circuit being measured, intended for professional, industrial-process, industrial-manufacturing and educational use, including equipment and computing devices.</p>	The IEC 61326 series cancels and replaces IEC 61326: 2002 and constitutes a technical revision.
		IEC 61326-2-1 (2005-12)	<p><i>Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 2-1: Particular requirements - Test configurations, operational conditions and performance criteria for sensitive test and measurement equipment for EMC unprotected applications.</i></p> <p>This part of IEC 61326 specifies more detailed test configurations, operational conditions and performance criteria for equipment with test and measurement circuits (both internal and/or external to the equipment) that are not EMC protected for operational and/or functional reasons, as specified by the manufacturer.</p>	

Reference in D 11: 2004	Standard referred to in D 11: 2004	Present Standard as at 23 June 2008	Title and new description of the Standard, and remarks	Major technical changes
		IEC 61326-2-2 (2005-12) Corr. 1 (2007-11)	<p><i>Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 2-2: Particular requirements - Test configurations, operational conditions and performance criteria for portable test, measuring and monitoring equipment used in low-voltage distribution systems.</i></p> <p>This part of IEC 61326 specifies more detailed test configurations, operational conditions and performance criteria for equipment which is used for testing, measuring or monitoring of protective measures in low-voltage distribution systems, and powered by battery and/or from the circuit measured, and portable.</p>	
		IEC 61326-2-3 (2006-07)	<p><i>Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 2-3: Particular requirements - Test configuration, operational conditions and performance criteria for transducers with integrated or remote signal conditioning.</i></p> <p>This part of IEC 61326 specifies more detailed test configurations, operational conditions and performance criteria for transducers with integrated or remote signal conditioning. Applies only to transducers characterized by their ability to transform, with the aid of an auxiliary energy source, a non-electric quantity to a process-relevant electrical signal, and to output the signal at one or more ports.</p>	
		IEC 61326-2-4 (2006-06)	<p><i>Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 2-4: Particular requirements - Test configurations, operational conditions and performance criteria for insulation monitoring devices according to IEC 61557-8 and for equipment for insulation fault location according to IEC 61557-9.</i></p> <p>This part of IEC 61326 specifies more detailed test configurations, operational conditions and performance criteria than IEC 61326-1 for equipment for</p> <ul style="list-style-type: none"> - insulation monitoring according to IEC 61557-8 - insulation fault location according to IEC 61557-9. <p>This applies to insulation monitoring devices and insulation fault location systems permanently or semi-permanently connected to the distribution system.</p>	

Reference in D 11: 2004	Standard referred to in D 11: 2004	Present Standard as at 23 June 2008	Title and new description of the Standard, and remarks	Major technical changes
		IEC 61326-2-5 (2006-06)	<p><i>Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 2-5: Particular requirements - Test configurations, operational conditions and performance criteria for field devices with interfaces according to IEC 61784-1, CP 3/2.</i></p> <p>This part of IEC 61326 treats the particular features for EMC testing of field devices with interfaces according to IEC 61784-1, CP 3/2. This part of IEC 61326 covers only the field-bus interface of the equipment.</p>	
		IEC 61326-2-6 (2005-12) Corr. 1 (2007-09)	<p><i>Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 2-6: Particular requirements - In vitro diagnostic (IVD) medical equipment.</i></p> <p>This part of IEC 61326 specifies minimum requirements for immunity and emissions regarding electromagnetic compatibility for in vitro diagnostic medical equipment, taking into account the particularities and specific aspects of this electrical equipment and their electromagnetic environment.</p>	
		IEC 61326-3-1 (2008-01)	<p><i>Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 3-1: Immunity requirements for equipment performing or intended to perform safety related functions (functional safety) - General industrial applications.</i></p> <p>IEC 61326-1 applies to this part of IEC 61326 but is limited to systems and equipment for industrial applications intended to perform safety functions as defined in IEC 61508 with SIL 1-3. The electromagnetic environments encompassed by this product family Standard are industrial, both indoor and outdoor, as described for industrial locations in IEC 61000-6-2 or defined in 3.7 of IEC 61326-1. Equipment and systems intended for use in other electromagnetic environments, for example, in the process industry or in environments with potentially explosive atmospheres, are excluded from the scope of this product family Standard, IEC 61326-3-1.</p>	

Reference in D 11: 2004	Standard referred to in D 11: 2004	Present Standard as at 23 June 2008	Title and new description of the Standard, and remarks	Major technical changes
		IEC 61326-3-2 (2008-01)	<p><i>Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 3-2: Immunity requirements for equipment performing or intended to perform safety related function (functional safety) - Industrial applications with particular EM environment.</i></p> <p>IEC 61326-1 applies to this part of IEC 61326 but is limited to systems and equipment for industrial applications within a specified electromagnetic environment and intended to perform safety functions as defined in IEC 61508 with SIL 1-3. The electromagnetic environments encompassed by this product family Standard are industrial, both indoor and outdoor, as they can be found in industrial applications with an electromagnetic environment having specified characteristics (for example, process industry). The difference between the electromagnetic environment covered by this Standard compared to the general industrial environment (see IEC 61326-3-1) is due to the mitigation measures employed against electromagnetic phenomena leading to a specified electromagnetic environment.</p>	
[40]	ISO 16750-2 (2003)	ISO 16750-2 (2006)	<p><i>Road vehicles - Environmental conditions and testing for electrical and electronic equipment - Part 2: Electrical loads</i></p> <p>ISO 16750-2:2006 applies to electric and electronic systems/components for vehicles. It describes the potential environmental stresses and specifies tests and requirements recommended for the specific mounting location on/in the vehicle.</p>	Several tests have been changed and 4.1 (Tolerances for voltages etc.) and 4.8 (Ground reference and supply offset) have been added. But Tables 1 and 2 (basis for 14.2.1 in OIML D 11) are unchanged.
[41]	ISO 7637-1 (2002)	ISO 7637-1 (2002) Amd. 1 (2008)	<p><i>Road vehicles -- Electrical disturbances from conduction and coupling -- Part 1: Definitions and general considerations</i></p> <p>This part of ISO 7637 defines the basic terms relating to electrical disturbances from conduction and coupling used in its other parts, and gives general information on the whole of ISO 7637 and common to all parts.</p>	<p>Amd. 1:</p> <ul style="list-style-type: none"> - new paragraph in the Introduction - new paragraph at the end of clause 4 - new Annex A (Normative)

Reference in D 11: 2004	Standard referred to in D 11: 2004	Present Standard as at 23 June 2008	Title and new description of the Standard, and remarks	Major technical changes
[42]	ISO 7637-2 (2004)	ISO 7637-2 (2004) Amd 1 (2008)	<p><i>Road vehicles -- Electrical disturbances from conduction and coupling -- Part 2: Electrical transient conduction along supply lines only</i></p> <p>This part of ISO 7637 specifies bench tests for testing the compatibility to conducted electrical transients of equipment installed on passenger cars and light commercial vehicles fitted with a 12 V electrical system or commercial vehicles fitted with a 24 V electrical system for both injection and the measurement of transients.</p>	Amd. 1 replaces Annex A (Normative) - Function Performance Status Classification (FPSC)
[43]	ISO 7637-3 (1995)	ISO 7637-3 (2007)	<p><i>Road vehicles -- Electrical disturbances from conduction and coupling -- Part 3: Electrical transient transmission by capacitive and inductive coupling via lines other than supply lines</i></p> <p>This part of ISO 7637 establishes a bench top test for the evaluation of the immunity of devices under test (DUTs) to transient transmission by coupling via lines other than supply lines. The test transient pulses simulate both fast and slow transient disturbances, such as those caused by the switching of inductive loads and relay contact bounce.</p>	Completely revised

In addition to the Standards quoted in OIML D 11, the following IEC Standard gives guidance for the choice of vibration test(s): IEC 60068-3-8 (2003-08) <i>Environmental testing - Part 3-8: Supporting documentation and guidance - Selecting amongst vibration tests</i>	
Description of the Standard IEC 60068-3-8	Introduction to the Standard IEC 60068-3-8
<p>This Standard IEC 60068-3-8 provides guidance for selecting amongst the IEC 60068-2 stationary vibration test methods Fc sinusoidal, Fh random and F(x) Mixed mode vibration. The different steady-state test methods and their aims are briefly described in Clause 4. Transient test methods are not included. For vibration testing, the environmental conditions, especially the dynamic conditions for the specimen, should be known. This Standard helps to collect information about the environmental conditions (Clause 5), to estimate or measure the dynamic conditions (Clause 6) and gives examples to enable decisions to be made on the most applicable environmental vibration test method. Starting from the condition, the method of selecting the appropriate test is given. Since real life vibration conditions are dominated by vibration of a random nature, random testing should be the commonly used method, see Table 1, Clause 7. The methods included hereafter may be used to examine the vibration response of a specimen under test before, during and after vibration testing. The selection for the appropriate excitation method is described in Clause 8 and tabulated in Table 2. In this standard specification, writers will find information concerning vibration test methods and guidance for their selection. For guidance on test parameters, or severities of one of the test methods, reference should be made to the normative references.</p>	<p>Components, equipment and other electrotechnical products, hereinafter called specimens, can be subjected to different kinds of vibration during manufacture, transportation or in service. In the IEC 60721-3 Standards, those different vibration environments are tabulated into classes characterizing stationary and transient vibration conditions. The Standards in the IEC 60068-2 series describe methods for testing with stationary or transient vibration. There will be three Standards in the IEC 60068-2 series for environmental testing that specify test methods employing stationary vibration:</p> <p>Part 2-6 Test Fc: Vibration (sinusoidal),</p> <p>Part 2-64 Test Fh: Vibration, broad-band random (digital control) and guidance, and</p> <p>Part 2-80 Test F-: Mixed mode testing (under consideration)</p>