

INTERNATIONAL STANDARD

NORME INTERNATIONALE



**Specification for the testing of balanced and coaxial information technology cabling –
Part 1: Installed balanced cabling as specified in ISO/IEC 11801-1 and related standards**

**Spécification relative aux essais des câblages symétriques et coaxiaux des technologies de l'information –
Partie 1: Câblages symétriques installés selon les spécifications de l'ISO/IEC 11801-1 et des normes connexes**



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CONTENTS

FOREWORD.....	9
INTRODUCTION.....	11
1 Scope.....	12
2 Normative references	13
3 Terms, definitions and abbreviations	15
3.1 Terms and definitions.....	15
3.2 Acronyms.....	17
4 Reference measurement procedures for electrical properties.....	18
4.1 General.....	18
4.2 Common measurement considerations.....	19
4.2.1 Test equipment consideration	19
4.2.2 Network analyser test requirements	19
4.2.3 Test set-up	19
4.2.4 Termination of conductor pairs	19
4.2.5 Reference loads for calibration	20
4.2.6 Test configurations	20
4.2.7 Coaxial cables and test leads for network analysers	21
4.2.8 Balanced test leads	21
4.2.9 Balun requirements.....	22
4.2.10 Balunless.....	24
4.2.11 Network analyser measurement precautions.....	24
4.2.12 Data reporting and accuracy	25
4.2.13 Frequency step size.....	25
4.3 DC loop resistance.....	25
4.3.1 Objective	25
4.3.2 Test method	25
4.3.3 Test equipment and set-up	25
4.3.4 Procedure.....	26
4.3.5 Test report.....	26
4.3.6 Uncertainty	26
4.3.7 DC loop resistance recalculation.....	26
4.4 Direct current (DC) resistance unbalance.....	27
4.4.1 Objective	27
4.4.2 Test method	27
4.4.3 Test equipment and set-up	27
4.4.4 Procedure.....	27
4.4.5 Test report.....	28
4.4.6 Uncertainty	28
4.5 Direct current (DC) resistance unbalance between pairs	28
4.5.1 Objective	28
4.5.2 Test method	28
4.5.3 Test equipment and set-up	29
4.5.4 Procedure.....	29
4.5.5 Test report.....	29
4.5.6 Uncertainty	29
4.6 Insertion loss	29

4.6.1	Objective	29
4.6.2	Test method	30
4.6.3	Test equipment and set-up	30
4.6.4	Procedure.....	30
4.6.5	Temperature correction.....	31
4.6.6	Uncertainty	31
4.7	Propagation delay and delay skew	31
4.7.1	Objective	31
4.7.2	Test method	31
4.7.3	Test equipment and set-up	32
4.7.4	Procedure.....	32
4.7.5	Test report.....	32
4.7.6	Uncertainty	33
4.8	Near-end cross-talk (NEXT) and power sum NEXT	33
4.8.1	Objective	33
4.8.2	Test method	33
4.8.3	Test equipment and set-up	33
4.8.4	Procedure.....	34
4.8.5	Test report.....	35
4.8.6	Uncertainty	35
4.9	Attenuation to crosstalk ratio, near end (ACR-N) and power sum ACR-N	35
4.9.1	Objective	35
4.9.2	Test method	35
4.9.3	Test equipment and set-up	35
4.9.4	Procedure and calculation	35
4.9.5	Test report.....	35
4.9.6	Uncertainty	36
4.10	Far-end cross-talk (FEXT) and power sum FEXT	36
4.10.1	Objective	36
4.10.2	Test method	36
4.10.3	Test equipment and set-up	36
4.10.4	Procedure.....	37
4.10.5	Test report.....	38
4.10.6	Uncertainty of FEXT measurements.....	38
4.11	Attenuation to crosstalk ratio, far end (ACR-F).....	38
4.11.1	Objective	38
4.11.2	Calculation	38
4.11.3	Test report.....	39
4.11.4	Uncertainty	39
4.12	Return loss	39
4.12.1	Objective	39
4.12.2	Test method	39
4.12.3	Test equipment and set-up	39
4.12.4	Procedure.....	40
4.12.5	Test report.....	40
4.12.6	Uncertainty	40
4.13	PS alien near end crosstalk (PS ANEXT – Exogenous crosstalk)	41
4.13.1	Objective	41
4.13.2	Test method	41

4.13.3	Test equipment and set-up	41
4.13.4	Procedure.....	42
4.14	PS attenuation to alien crosstalk ratio, far end crosstalk (PS AACR-F – Exogenous crosstalk).....	44
4.14.1	Objective	44
4.14.2	Test method	44
4.14.3	Test equipment and set-up	44
4.14.4	Procedure.....	45
4.15	Unbalance attenuation, near end	48
4.15.1	Objective	48
4.15.2	Test method	48
4.15.3	Test equipment and set-up	48
4.15.4	Procedure.....	49
4.15.5	Test report.....	52
4.15.6	Uncertainty	52
4.16	Unbalance attenuation, far end	52
4.16.1	Objective	52
4.16.2	Test method	52
4.16.3	Test equipment and set-up	52
4.16.4	Procedure.....	53
4.16.5	Test report.....	54
4.16.6	Uncertainty	54
4.17	Coupling attenuation	54
5	Field test measurement requirements for electrical properties	54
5.1	Introductory remark.....	54
5.2	Cabling configurations tested.....	55
5.3	Field test parameters	55
5.3.1	General	55
5.3.2	Optional field test parameters.....	56
5.3.3	Inspection of workmanship and connectivity testing	56
5.3.4	Propagation delay and delay skew.....	58
5.3.5	Length	58
5.3.6	Insertion loss.....	59
5.3.7	NEXT, power sum NEXT.....	59
5.3.8	ACR-N and power sum ACR-N	60
5.3.9	ACR-F, power sum ACR-F	60
5.3.10	Return loss	60
5.3.11	Direct current (DC) loop resistance.....	60
5.3.12	Direct current (DC) resistance unbalance between pairs.....	60
5.3.13	Alien crosstalk parameters.....	60
5.4	Data reporting and accuracy	61
5.4.1	General	61
5.4.2	Detailed results	62
5.4.3	Summary results.....	62
5.4.4	Reporting requirements for power sum alien crosstalk	65
5.4.5	General	66
5.4.6	Consistency checks for field testers.....	66
5.4.7	Evaluation of consistency tests.....	66
5.4.8	Administration system applicability	67

5.4.9	Test equipment adapter cords for link testing.....	67
5.4.10	User cords and channel testing.....	67
6	Field tester measurement accuracy requirements	67
6.1	General.....	67
6.2	Measurement accuracy specifications common to level IIE, level III, level IIIIE, level IV, level V and level VI field testers	72
6.3	Accuracy performance requirements for level IIE field testers	73
6.4	Accuracy performance requirements for level III field testers	75
6.5	Accuracy performance requirements for level IIIIE field testers	77
6.6	Accuracy performance requirements for level IV field testers	78
6.7	Accuracy performance requirements for level V field testers	80
6.8	Accuracy performance requirements for level VI field testers	82
6.9	Field tester requirements applicable to alien crosstalk measurements.....	85
6.10	Procedures for determining field tester parameters	85
6.10.1	General	85
6.10.2	Output signal balance (OSB)	85
6.10.3	Common mode rejection (CMR).....	86
6.10.4	Residual NEXT	87
6.10.5	Dynamic accuracy	88
6.10.6	Source/load return loss.....	89
6.10.7	Random noise floor.....	89
6.10.8	Residual FEXT	89
6.10.9	Directivity	90
6.10.10	Tracking	91
6.10.11	Source match	91
6.10.12	Return loss of remote termination	92
6.10.13	Constant error term of the propagation delay measurement function.....	92
6.10.14	Error constant term proportional to propagation delay of the propagation delay measurement function	92
6.10.15	Constant error term of the delay skew measurement function	92
6.10.16	Constant error term of the length measurement function.....	93
6.10.17	Error constant proportional to the length of measurement function (assuming the cables are taken from the same drum).....	93
6.10.18	Constant error term of the DC resistance measurement function	93
6.10.19	Error constant term proportional to DC resistance of the DC resistance measurement function	93
6.10.20	Measurement floor for alien crosstalk testing during field testing	93
6.11	Measurement error models	94
6.11.1	General	94
6.11.2	Error model for the insertion loss measurement function.....	95
6.11.3	Error model for the NEXT measurement function	95
6.11.4	Error model for the power sum NEXT measurement function	96
6.11.5	Error model for the ACR-N measurement function	96
6.11.6	Error model for the power sum ACR-N measurement function.....	97
6.11.7	Error model for the ELFEXT or ACR-F measurement function.....	97
6.11.8	Error model for the power sum ELFEXT and PS ACR-F measurement functions.....	98
6.11.9	Error model for the return loss measurement function.....	98
6.11.10	Error model for the propagation delay measurement function.....	99
6.11.11	Error model for the delay skew measurement function	100

6.11.12	Error model for the length measurement function.....	100
6.11.13	Error model for the DC loop resistance measurement function.....	100
6.12	Network analyser measurement comparisons	101
6.12.1	General	101
6.12.2	Comparison method.....	101
Annex A (informative) Uncertainty and variability of field test results.....		103
A.1	General.....	103
A.2	Marginal results reporting	103
A.3	Nominal accuracy	103
A.4	Variability in link measurements not included in the measurement accuracy	104
A.5	Variability in channel measurements	104
A.6	Field tester accuracy checks.....	105
A.6.1	General	105
A.6.2	Manipulating cords of link adapter	105
A.6.3	Exchanging adapters to main and remote field tester units	105
A.6.4	Location of main and remote field tester units	105
A.6.5	Use of previously characterized links	105
A.6.6	Use separately characterized links using laboratory equipment	105
A.6.7	Guidelines for correct installation testing	106
Annex B (informative) Reference laboratory test configuration for alien crosstalk testing		107
B.1	General.....	107
B.2	Test parameters.....	107
B.3	Link and channel construction.....	107
B.4	Determination of number of disturbing links or channels	109
B.5	Computation of results	109
B.5.1	General	109
B.5.2	Computation of Class I and Class II results.....	109
B.6	Test report	110
Annex C (informative) General information on power sum alien crosstalk performance of installations		111
Annex D (informative) Baluns.....		112
D.1	General.....	112
D.2	Legacy test baluns	112
Annex E (normative) Requirements for field testing of alien crosstalk		115
E.1	General.....	115
E.2	Power sum alien crosstalk	115
E.2.1	Objective	115
E.2.2	Test method	115
E.2.3	Test equipment and set-up	115
E.2.4	Measuring ANEXT loss	116
E.2.5	Measuring AFEXT loss	116
E.2.6	Procedure.....	117
E.2.7	Selection of test ports	120
E.2.8	Test report.....	122
E.2.9	Uncertainty of PS alien crosstalk measurements.....	122
Bibliography.....		123

Figure 1 – Resistor load.....	19
Figure 2 – Reference planes for permanent link, CP link and channel.....	21
Figure 3 – 180° hybrid used as a balun.....	22
Figure 4 – Loop resistance measurement.....	26
Figure 5 – DC resistance unbalance measurement.....	28
Figure 6 – Insertion loss test configuration.....	30
Figure 7 – NEXT test configuration.....	33
Figure 8 – FEXT test configuration.....	37
Figure 9 – Return loss test configuration.....	40
Figure 10 – ANEXT measurement.....	42
Figure 11 – Alien far end crosstalk measurement.....	45
Figure 12 – Unbalance attenuation, near end test configuration.....	49
Figure 13 – Back-to-back balun differential mode insertion loss measurement.....	50
Figure 14 – Back-to-back balun common mode insertion loss measurement.....	50
Figure 15 – Unbalance performance test of the measurement balun.....	51
Figure 16 – Unbalance attenuation far end test configuration.....	53
Figure 17 – Correct pairing.....	57
Figure 18 – Incorrect pairing.....	58
Figure 19 – Example of equipment tolerance region (NEXT).....	61
Figure 20 – Block diagram for measuring output signal balance.....	86
Figure 21 – Block diagram to measure common mode rejection.....	87
Figure 22 – Block diagram for measuring residual NEXT.....	88
Figure 23 – Block diagram for measuring dynamic accuracy.....	88
Figure 24 – Principle of measurement of residual NEXT.....	90
Figure 25 – Principle of alternate measurement of residual FEXT.....	90
Figure 26 – Alien crosstalk measurement floor test for the channel test configuration.....	94
Figure 27 – Alien crosstalk measurement floor test for the link test configurations.....	94
Figure A.1 – Source of variability during link testing.....	104
Figure D.1 – Configurations for qualifying test baluns.....	112
Figure D.2 – 180° hybrid used as a balun.....	113
Figure E.1 – Schematic diagram to measure channel ANEXT loss.....	116
Figure E.2 – AFEXT loss measurement test configuration.....	117
Figure E.3 – Flow chart of the alien crosstalk test procedure.....	121
Table 1 – Mixed mode S-parameter nomenclature.....	22
Table 2 – Test balun performance characteristics.....	23
Table 3 – Estimated uncertainty of unbalance, near end measurement.....	52
Table 4 – Estimated uncertainty of unbalance, far end measurement.....	54
Table 5 – Optional field test parameter measurement requirements.....	56
Table 6 – Summary of reporting requirements for field test equipment (1 of 3).....	63
Table 7 – Minimum reporting requirements for PS ANEXT and PS AACR-F.....	66
Table 8 – Worst case propagation delay, delay skew, DC resistance and length measurement accuracy for level IIE, level III, level IV, level V, and VI test instruments.....	68

Table 9 – Worst case insertion loss, NEXT, ACR-N, ELFEXT/ACR-F and return loss measurement accuracy for level IIE test instruments.....	69
Table 10 – Worst case insertion loss, NEXT, ACR-N, ELFEXT/ACR-F and return loss measurement accuracy for level III test instruments.....	69
Table 11 – Worst case insertion loss, NEXT, ACR-N, ELFEXT/ACR-F and return loss measurement accuracy for level IIIe test instruments.....	70
Table 12 – Worst case insertion loss, NEXT, ACR-N, ACR-F and return loss measurement accuracy for level IV test instruments.....	70
Table 13 – Worst case insertion loss, NEXT, ACR-N, ACR-F and return loss measurement accuracy for level V.....	71
Table 14 – Worst case insertion loss, NEXT, ACR-N, ACR-F and return loss measurement accuracy for level VI (Using Class I).....	71
Table 15 – Worst case insertion loss, NEXT, ACR-N, ACR-F and return loss measurement accuracy for level VI (Using Class II).....	72
Table 16 – Propagation delay, delay skew, DC resistance and length accuracy performance specifications for level IIE, III, IIIE, IV and V testers.....	72
Table 17 – Propagation delay, delay skew, DC resistance, DC resistance unbalance between pairs and length accuracy performance specifications for level VI testers.....	72
Table 18 – Level IIE field tester accuracy performance parameters per IEC guidelines.....	74
Table 19 – Level III field tester accuracy performance parameters per IEC guidelines.....	76
Table 20 – Level IIIE field tester accuracy performance parameters per IEC guidelines.....	77
Table 21 – Level IV field tester accuracy performance parameters per IEC guidelines.....	79
Table 22 – Level V field tester accuracy performance parameters per IEC guidelines.....	81
Table 23 – Level VI field tester accuracy performance parameters per IEC guidelines.....	83
Table D.1 – Legacy test balun performance characteristics.....	114

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**SPECIFICATION FOR THE TESTING OF BALANCED AND
COAXIAL INFORMATION TECHNOLOGY CABLING –****Part 1: Installed balanced cabling as specified
in ISO/IEC 11801-1 and related standards**

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International Standard IEC 61935-1 has been prepared by IEC technical committee 46: Cables, wires, waveguides, RF connectors, RF and microwave passive components and accessories.

This fifth edition cancels and replaces the fourth edition, published in 2015. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) the upper frequency goes up to 2 000 MHz;
- b) it introduces a new level of field tester (level VI to 2 000 MHz);
- c) error models and requirements for level VI testers are improved and updated.

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

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46/725/FDIS	46/730/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 61935 series, published under the general title *Specification for the testing of balanced and coaxial information technology cabling*, can be found on the IEC website.

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INTRODUCTION

Telecommunication cabling, once specified uniquely by each telecommunications application, has evolved into a generic cabling system. Telecommunications applications now use the ISO/IEC 11801-1 cabling standard to meet their cabling requirements. Formerly, connectivity tests and visual inspection were deemed sufficient to verify a cabling installation. Now users need more comprehensive testing in order to ensure that the link will support telecommunications applications that are designed to operate on the generic cabling system. This part of IEC 61935 addresses reference laboratory and field test methods and provides a comparison of these methods.

Transmission performance depends on cable characteristics, connecting hardware, patch cords and cross-connect cabling, the total number of connections and the care with which they are installed and maintained. IEC 61935 (all parts) provides test methods for installed cabling and pre-fabricated cable assemblies. These test methods, where appropriate, are based on those used for components of the cable assembly.

This Part 1 contains the test methods required for installed cabling. Part 1-1 provides requirements for the optional testing of TCL and ELTCTL. Part 1-2 provides requirements for the optional testing of resistance unbalance. Part 2 contains the test methods required for patch cords and work area cords.

SPECIFICATION FOR THE TESTING OF BALANCED AND COAXIAL INFORMATION TECHNOLOGY CABLING –

Part 1: Installed balanced cabling as specified in ISO/IEC 11801-1 and related standards

1 Scope

This part of IEC 61935 specifies reference measurement procedures for cabling parameters and the requirements for field tester accuracy to measure cabling parameters identified in ISO/IEC 11801-1.

This document applies when the cable assemblies are constructed of cables complying with IEC 61156 (all parts), and connecting hardware as specified in IEC 60603-7 (all parts) or IEC 61076-3-104, IEC 61076-3-110, IEC 61076-2-101 and IEC 61076-2-109. Where cables and/or connectors do not comply with these standards, then additional tests may be required.

This document is organized as follows:

- reference laboratory measurement procedures on cabling topologies are specified in Clause 4. In some cases, these procedures may be used in the field (see IEC TR 61156-1-2:2009/AMD1:2014);
- descriptions and requirements for measurements in the field are specified in Clause 5;
- performance requirements for field testers and procedures to verify performance are specified in Clause 6.

NOTE 1 This document does not include tests that are normally performed on the cables and connectors separately. These tests are described in IEC 61156-1 and IEC 60603-7 or IEC 61076-3-104, IEC 61076-3-110, IEC 61076-2-101 and IEC 61076-2-109, respectively.

NOTE 2 Wherever possible, cables and connectors used in cable assemblies, even if they are not described in IEC 61156 or IEC 60603-7, IEC 61076-3-104, IEC 61076-3-110, IEC 61076-2-101 and IEC 61076-2-109, are tested separately according to the tests given in the relevant generic specification. In this case, most of the environmental and mechanical tests described in this standard can be omitted.

This document relates to performance with respect to 100 Ω cabling. For 120 Ω or 150 Ω cabling, the same principles apply but the measurement system should correspond to the nominal impedance level.

Field tester types include certification, qualification and verification. Certification testing is performed for the rigorous needs of commercial/industrial buildings to this document. Qualification testing is described in IEC 61935-3. Qualification testing determines whether the cabling will support certain network technologies (e.g. 1000BASE-T, 100BASE-TX, 10G Base-T). Qualification testers do not have traceable accuracy to national standards and only provide confidence that specific applications will work. Verification testers only verify connectivity.

Throughout this document, 4-pair cabling is assumed. The test procedures described in this document may also be used to evaluate one or two pair balanced cabling. However, 2-pair cabling links that share the same sheath with other links are tested as 4-pair cabling.

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 60169-15, *Radio-frequency connectors – Part 15: R.F. coaxial connectors with inner diameter of outer conductor 4.13 mm (0.163 in) with screw coupling – Characteristic impedance 50 ohms (Type SMA)*

IEC 60169-22, *Radio-frequency connectors – Part 22: R.F. two-pole bayonet coupled connectors for use with shielded balanced cables having twin inner conductors (Type BNO)*

IEC 60512-25-9, *Connectors for electronic equipment – Tests and measurements – Part 25-9: Signal integrity tests – Test 25i: Alien crosstalk*

IEC PAS 60512-27-200, *Connecteurs for electrical and electronic equipment – Tests and measurements – Part 27-200: Additional specifications for signal integrity tests up to 2 000 MHz on IEC 60603-7 series connectors – Tests 27a to 27g*

IEC 60603-7 (all parts), *Connectors for electronic equipment – Part 7: Detail specification for 8-way, shielded, free and fixed connectors*

IEC 60603-7-71, *Connectors for electronic equipment – Part 7-71: Detail specification for 8-way, shielded, free and fixed connectors, for data transmission with frequencies up to 1 000 MHz*

IEC 60603-7-81, *Connectors for electronic equipment – Part 7-81: Detail specification for 8-way, shielded, free and fixed connectors, for data transmissions with frequencies up to 2 000 MHz*

IEC 60603-7-82, *Connectors for electronic equipment – Part 7-82: Detail specification for 8-way, 12 contacts, shielded, free and fixed connectors, for data transmission with frequencies up to 2 000 MHz*

IEC 61076-2-101, *Connectors for electronic equipment – Product requirements – Part 2-101: Circular connectors – Detail specification for M12 connectors with screw-locking*

IEC 61076-2-109, *Connectors for electronic equipment – Product requirements – Part 2-109: Circular connectors – Detail specification for connectors M12 × 1 with screw-locking, for data transmission frequencies up to 500 MHz*

IEC 61076-3-104, *Connectors for electrical and electronic equipment – Product requirements – Part 3-104: Detail specification for 8-way, shielded free and fixed connectors for data transmissions with frequencies up to 2 000 MHz*

IEC 61076-3-110, *Connectors for electronic equipment – Product requirements – Part 3-110: Detail specification for free and fixed connectors for data transmission with frequencies up to 3 000 MHz*

IEC 61156 (all parts), *Multicore and symmetrical pair/quad cables for digital communications*

IEC 61156-1, *Multicore and symmetrical pair/quad cables for digital communications – Part 1: Generic specification*

IEC TR 61156-1-2:2009, *Multicore and symmetrical pair/quad cables for digital communications – Part 1-2: Electrical transmission characteristics and test method of symmetrical pair/quad cables*
IEC TR 61156-1-2:2009/AMD1:2014

IEC 61156-5, *Multicore and symmetrical pair/quad cables for digital communications – Part 5: Symmetrical pair/quad cables with transmission characteristics up to 1 000 MHz – Horizontal floor wiring – Sectional specification*

IEC 61156-6, *Multicore and symmetrical pair/quad cables for digital communications – Part 6: Symmetrical pair/quad cables with transmission characteristics up to 1 000 MHz – Work area wiring – Sectional specification*

IEC 61156-9, *Multicore and symmetrical pair/quad cables for digital communications – Part 9: Cables for channels with transmission characteristics up to 2 GHz – Sectional specification*

IEC 61156-10, *Multicore and symmetrical pair/quad cables for digital communications – Part 10: Cables for cords with transmission characteristics up to 2 GHz – Sectional specification*

IEC 61169-16, *Radio-frequency connectors – Sectional specification – RF coaxial connectors with inner diameter of outer conductor 7 mm (0,276 in) with screw coupling – Characteristics impedance 50 Ω (75 Ω) (type N)*

IEC 61935-1-1, *Specification for the testing of balanced communication cabling in accordance with ISO/IEC 11801 and coaxial information technology cabling – Part 1-1: Additional requirements for the measurement of transverse conversion loss and equal level transverse conversion transfer loss*

IEC 61935-1-2, *Specification for the testing of balanced and coaxial information technology cabling – Part 1-2: Installed balanced cabling as specified in ISO/IEC 11801 – Additional requirements for measurement of resistance unbalance with field test instrumentation*

IEC 62153-4-9, *Metallic communication cable test methods – Part 4-9: Electromagnetic compatibility (EMC) – Coupling attenuation of screened balanced cables, triaxial method*

IEC 62153-4-11, *Metallic communication cable test methods – Part 4-11: Electromagnetic compatibility (EMC) – Coupling attenuation or screening attenuation of patch cords, coaxial cable assemblies, pre-connectorised cables – Absorbing clamp method*

IEC 62153-4-14, *Metallic communication cable test methods – Part 4-14: Electromagnetic compatibility (EMC) – Coupling attenuation of cable assemblies (Field conditions) absorbing clamp method*

ISO/IEC 11801-1, *Information technology – Generic cabling for customer premises – Part 1: General requirements*

ISO/IEC 14763-11, *Information technology – Implementation and operation of customer premises cabling – Part 1: Administration*

ISO/IEC 14763-2, *Information technology – Implementation and operation of customer premises cabling – Part 2: Planning and installation*

¹ Withdrawn.