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INTERNATIONAL STANDARD

NORME INTERNATIONALE

Testing of balanced and coaxial information technology cabling – Part 3: Installed cabling as specified in ISO/IEC 15018 and related standards

Essais des câblages de technologies de l'information symétriques et coaxiaux – Partie 3: Câblages installés selon les spécifications de l'ISO/CEI 15018 et des normes connexes

IEC 61935-3:2008

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CONTENTS

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TESTING OF BALANCED AND COAXIAL INFORMATION TECHNOLOGY CABLING –

Part 3: Installed cabling as specified in ISO/IEC 15018 and related standards

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International Standard IEC 61935-3 has been prepared by IEC technical committee 46: Cables, wires, waveguides, R.F. connectors, R.F. and microwave passive components and accessories.

This bilingual version, published in 2009-04, corresponds to the English version.

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

FDIS	Report on voting
46/261/FDIS	46/268/RVD

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

The French version of this standard has not been voted upon.

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

A list of all the parts of the IEC 61935 series, under the general title *Testing of balanced and coaxial information technology cabling*, can be found on the IEC website. Future standards in this series will carry the new general title as cited above.

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

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- withdrawn,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

INTRODUCTION

Telecommunication cabling for homes has evolved into the specification and deployment of generic cabling. This generic cabling system for homes is specified within ISO/IEC 15018. Formerly, there had been no test requirement for home cabling. Connectivity tests and visual inspection were, at best, random and insufficient. However, bandwidth requirements of the home applications are ever increasing and home-owners need assurance that their generic cabling will indeed support intended network technologies that are delivered to the home and distributed throughout the home. This part of IEC 61935 addresses both verification and qualification of home cabling.

TESTING OF BALANCED AND COAXIAL INFORMATION TECHNOLOGY CABLING –

Part 3: Installed cabling as specified in ISO/IEC 15018 and related standards

1 Scope

This part of IEC 61935 specifies conformance testing for home cabling. These conformance tests include visual inspection, verification testing and either qualification testing or certification testing. Documentation for the test results are also specified.

2 Normative references

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

IEC 60728-1, *Cable networks for television signals, sound signals and interactive services – Part 1: System performance of forward paths*

IEC 60728-12, *Cabled distribution systems for television and sound signals – Part 12: Electromagnetic compatibility of systems*

ISO/IEC 11801, *Information technology – Generic cabling for customer premises*

ISO/IEC 15018, *Information technology – Generic cabling for homes*

3 Terms and definitions

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

3.1
certification
measurements of installed cabling specified in ISO/IEC 11801 (e.g., class D, class E, class F); this requires field testers with traceable accuracy to national standards

3.2
qualification
measurements of installed cabling for specific network technologies (e.g., 100BASE-T, 1000BASE-T, IEEE 1394b[1)]): the measurement accuracy of field testers is not traceable to national standards

3.3
verification
measurements of installed cable or cabling for continuity; no other transmission performance parameters other than connectivity are measured

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1) IEEE 1394b: 2002, *High Performance Serial Bus (High Speed Supplement)*

4 Home cabling conformance

4.1 Applications to be supported

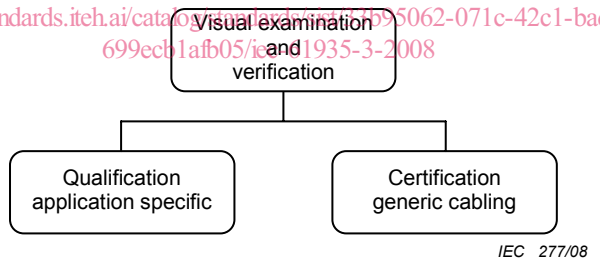
Applications that may be supported in home cabling are:

– ICT: such as 10, 100 1000BASE-T, IEEE 1394 being the most popular;
– analog telephone, ISDN and DSL applications;
– BCT: VHF/UHF TV signals (up to 862 MHz), FM radio signals;
– satellite TV signals, CCTV;
– control applications.

4.2 General

Telecommunications cabling (e.g., voice, data, video, security, audio, control) can be damaged during the construction phases of rough-in, drywall installation, and even during the siding of the exterior. Many of these damaging faults result from causes such as nails and staples penetrating the cable, severe kinks in the cable where the cable was pulled through a drilled hole in a stud or joist, or a cable tear where the cable sheath and conductors are damaged from pulling the cable. For these reasons, telecommunications cabling shall yield to a process to ensure conformance. This process includes:

a) visual examination of the cabling;
b) verification testing of the cabling;
c) qualification testing or certification testing of the cabling, and
d) producing a documented report of results.



4.3 Visual inspection

Whenever it is possible, visual inspection of each cable run shall be made after the cable has been installed, but prior to installation of insulation and drywall. Visual inspection may include but is not limited to

a) obvious damage to cable (condition and workmanship);
b) separation from EMC sources;
c) incorrect bend radi, and
d) noticeable excessive cable length.

4.4 Verification

Verification testing is performed after cable placement and prior to the installation of insulation and drywall and shall be performed to ensure proper end-to-end connectivity. Coaxial cable shall be verified to ensure connectivity to the remote end with an absence of shorts between the centre conductor and the outer shield. Twisted-pair cabling verification tests shall include:

a) continuity to the remote end;
b) length,
c) no shorts between any two or more conductors;
d) crossed pairs;
e) reversed pairs,
f) split pairs, and
g) any other mis-wiring;
h) continuity of screens (if any).

Verification testing for twisted pair shall be accomplished with connectors on both ends of the cable. Nevertheless, temporary housings may be used for later finish-out of the cabling.

Verification testing for cables used in certain applications may not be terminated at both ends with an 8-position modular jack (for example audio cable for speakers or cable for control systems).

5 Qualification and certification testing

5.1 General

Qualification or certification testing of the cabling shall be performed after the trim-out of cabling. Typically, certification testing is performed for the rigorous needs of home cabling for commercial use while qualification testing is performed for dwelling homes.

5.2 Qualification testing

Qualification testing will determine if the cabling will support certain network technologies (e.g., 1000BASE-T, 100BASE-T, IEEE 1394). For example two cabling runs (cable A and cable B) pass the verification test. A qualification test may show that cable A is only capable of supporting 10BASE-T, while cable B is able to support Gigabit Ethernet. Qualification testers do not have traceable accuracy to national standards but do provide confidence that specific applications will work.

5.3 Certification testing

Certification testing will determine if the cabling meets or exceeds the specific cabling measurements specified in ISO/IEC 11801[2)]. For example, installed class D cabling is measured in the frequency range of 1 MHz to 100 MHz for specific cabling characteristic requirements such as propagation delay, delay skew, insertion loss, NEXT, PSNEXT, ELFEXT, PSELFEXT and return loss. Certification testers have traceable accuracy to national standards, and certification testing is recommended for mission critical cabling installations where defects can cause significant economic damages to the network owner.

5.4 Documentation

The qualification tests shall be summarized within a documented report generated by the test instrument. A copy of the test results summary shall be provided to the owner of the home as well as placed in the distribution centre.

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2) The measurements are specified in ISO/IEC 11801, second edition, 2002.

6 Qualification field test instrument

6.1 General

This clause applies to field test measurements of installed home cabling designed in accordance with ISO/IEC 15018.

The information contained in this clause uses the links defined in ISO/IEC 15018 and specifies parameters for qualification field testers.

6.2 Cabling configurations tested

The cabling test configurations are described in ISO/IEC 15018.

6.3 Qualification field test parameters

6.3.1 Wire map

A conductor map test is intended to verify correct pin termination of the 8-pin connectors at each end of twisted pair cabling and to check for installation connectivity errors. For each of the conductors in the cable and the screen(s), if any, the conductor map indicates:

a) continuity to the remote end;
b) shorts between any two or more conductors/screen(s);
c) transposed pairs;
d) reversed pairs;
e) split pairs;
f) any other connection errors;
g) continuity of screens (if any).

Correct connectivity of telecommunications outlet/connectors is defined in ISO/IEC 15018 (or equivalent) and is illustrated in Figure 1(for four pair cables).

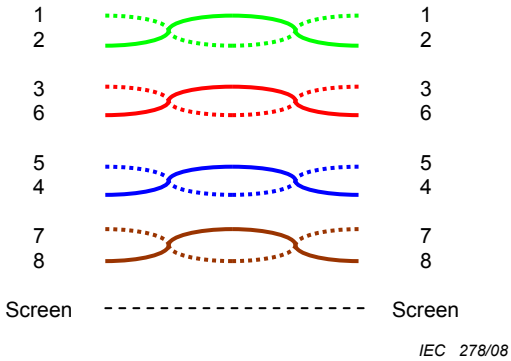

Figure 1 – Correct pairing

A reversed pair occurs when the polarity of one wire pair is reversed at one end of the link (also called a tip/ring reversal). See Figure 2a for an illustration of a reversed pair.

A transposed pair occurs when the two conductors in a wire pair are connected to the position for a different pair at the remote connection. See Figure 2b for an illustration of transposed pairs.

NOTE Transposed pairs are sometimes referred to as crossed pairs.