INTERNATIONAL STANDARD

NORME INTERNATIONALE

IEC
CEI
61196-1-1

First edition
Première édition
2007-04

Coaxial communication cables –

Part 1-1:
Capability approval for coaxial cables

Câbles coaxiaux de communication –

Partie 1-1:
Agrément de savoir-faire pour câbles coaxiaux

Reference number
Numéro de référence
IEC/CEI 61196-1-1:2007

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Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

PRICE CODE
CODE PRIX L

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COAXIAL COMMUNICATION CABLES –

Part 1-1: Capability approval for coaxial cables

FOREWORD

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International Standard IEC 61196-1-1 has been prepared by subcommittee 46A: Coaxial cables, of IEC technical committee 46: Cables, wires, waveguides, r.f. connectors, r.f. and microwave passive components and accessories.

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

FDIS	Report on voting
46A/779/FDIS	46A/791/RVD

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

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

This part of IEC 61196 is one of a series of standards being developed for *coaxial communication cables*. The series will comprise the following parts:

Part 1:	Generic specification – General, definitions and requirements
Part 1-1:	Capability approval for coaxial cables
Part 1-1XX:	Electrical test methods
Part 1-2XX:	Environmental test methods
Part 1-3XX:	Mechanical test methods
Part 1-4XX:	Electromagnetic compatibility test methods
Part 4:	Sectional specification for radiating cables
Part 5:	Sectional specification for CATV trunk and distribution cables
Part 5-1:	Blank detail specification for CATV trunk distribution cables
Part 6:	Sectional specification for drop cables
Part 6-1:	Blank detail specification for CATV drop cables

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- withdrawn;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

Quality systems are intended to give confidence to the customers. It is presumed that a supplier whose full organization complies with ISO 9000 is able to assess the quality of his services (services can be a product).

However, to assess the quality of the services is obviously not sufficient from a customer point of view. The customer's concern is the quality of the product. That means the compliance to a given specification. The IEC Quality Assessment System for Electronic Components (IECQ) product/process approval procedures Qualification Approval (QA), Capability Approval (CA) and Technology Approval (TA) are intended to ensure that all products delivered under one of them will comply to a given specification. These procedures are described in QC 001002-3.

As a first step, to achieve this task, the three procedures just mentioned require as a prerequisite the manufacturer's approval (described in Clause 2 of QC 001002-3 and which is basically an ISO 9000 approval with the relevant technical scope, plus IECQ requirements as defined in 2.3.2 of QC 001002-3). Manufacturer's Approval ensures that all the actions taken for QA, CA or TA will be under control and well documented.

The second step is the qualifying stage, which is sometimes called type Approval.

In case of Qualification Approval (QA), the purpose of this stage is to demonstrate the validity of the design file of a given product. (Ideally, the design file should contain the process and the control files).

In case of Capability Approval (CA) or Technology Approval (TA), this stage is intended to demonstrate the ability of the supplier to design, manufacture, control and supply any product within declared boundaries.

The third step is the maintainability of the approval.

In case of Qualification Approval, it is based on final tests, lot by lot tests and periodic tests. These tests achieved on final products are intended to demonstrate that there is not any major deviation from the characteristics of the delivered product. They are independent of the eventual deviation of the process manufacture.

In case of Capability or Technology Approval, this third step is based on the observation of the process by itself.

The Capability Approval policy is based on the relationship which exists between each step of the process and the characteristics of a capability qualifying component (CQC), which may be specially designed for this purpose, or taken from production.

The tests achieved on these CQC are intended to demonstrate that the process does not deviate and therefore that the final product will be in the expected limits. The Technology Approval assumes that the assessment of the process line parameters is sufficient to guarantee that the final product will be in the expected limits. The advantage of TA and CA comes from the assumption that all the relationships between the deviation of each parameter all along the process line are well known and controlled.

This assumption is not wrong if the different steps of manufacture are independent (electronic components as discrete devices), but for the cable manufacture, these steps are interdependent and the influence on the final product of any deviation of any parameters is not obvious.

Therefore, though the TA certainly brings some improvement to CA, the approval for communication cables should be based on CA in that it uses CQCs to ensure that the process does not deviate. These CQCs should, together, cover the full technology within the declared limits.

COAXIAL COMMUNICATION CABLES –

Part 1-1: Capability approval for coaxial cables

1 Scope

This International standard applies to Capability Approval requirements for coaxial communication cables as specified in generic specification IEC 61196-1.

It specifies the requirements for a manufacturer seeking approval of his capability to design (if applicable), manufacture, inspect, test and release coaxial communication cables as defined in his capability manual.

Manufacturer's Approval, which embodies all the relevant requirements of ISO 9001, is a prerequisite for granting Capability Approval but a manufacturer may apply for Manufacturer's Approval and Capability Approval concurrently.

NOTE 1 This document was written in order to be used in case of third party certification; however, it may be used as the basis for second party or self certification.

NOTE 2 When certification is required, CA should be used according to the following. CA may also be used for second party or self-assessment.

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 60027 (all parts), *Letter symbols to be used in electrical technology*

IEC 60050 (all parts), *International Electrotechnical vocabulary*

IEC 60617-DB:2001[1)], *Graphical symbols for diagrams*

IEC 61196-1, *Coaxial communication cables – Part 1: Generic specification – General, definitions and requirements*

ISO 1000, *SI Units and recommendations for the use of their multiples and of certain other units*

ISO 9000, *Quality management systems – Fundamentals and vocabulary*

ISO 9001, *Quality management systems – Requirements*

IECQ 001002-3:1998, *IEC Quality Assessment System for Electronic Components (IECQ) – Rules of Procedure. Part 3: Approval procedures*

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1) "DB" refers to the IEC on-line database.

3 Terms and definitions

For the purpose of this document, the terms and definitions given in IEC 61196-1 and the following apply.

3.1
Capability Manual (of a manufacturer)
CM
complete description of design rules, manufacturer processes and test procedures including the limit and the verification procedures

NOTE The capability manual is the basic document for granting a Capability Approval.

3.2
Capability Qualifying Components
CQCs
test specimens specially designed or taken from production, used for verifying capability limit in accordance with the relevant generic specification

3.3
process boundaries
range of well-controlled products claimed by the manufacturer for each stage of manufacturing (regarding a family of products)

3.4
rework
redoing of some normal manufacturing process or operation, before or after final inspection or delivery, for example, strip and sheath

3.5
repair
operation different from a production operation, which incorporates the making good of a non-conforming feature, for example, the repair of pinholes

4 Units, symbols and terminology

Units, graphical symbols and terminology shall, wherever possible, be taken from the following documents:

IEC 60027 (all parts), IEC 60050 (all parts), IEC 60617 and ISO 1000.

Other symbols shall be defined in the capability manual and/or relevant specification.

5 Quality assessment procedures

5.1 General

5.1.1 Eligibility for Capability Approval

Any company which is operating a quality management system governing the design (if applicable), manufacturing and testing of communication cables in the factory, which is applying for the approval, shall be eligible.

5.1.2 Subcontracting

The subcontracting of manufacturing process, or the purchase of raw material or piece-parts shall conform to the requirements of 4.2.2 of QC 001002-3. In this context, the subcontracting of the complete process up to final test is not allowable under Capability Approval for communication cables.

However, if both manufacturers have Capability Approval for the same family of product, subcontracting is allowed under Capability Approval.

5.1.3 Rework and repair

Rework and repair before final inspection shall be governed by the requirements of 4.7 of QC 001002-3, and described in the capability manual.

5.2 Procedures for the demonstration of capability

5.2.1 Application for Capability Approval

A mandatory prerequisite to an application for Capability Approval is manufacturer's approval to ISO 9001.

However, a manufacturer may apply for ISO 9001 and Capability Approval concurrently, or Capability Approval after the award of ISO 9001.

Applications shall not be accepted from trading or similar companies which do not have significant manufacturing facilities in digital communication cables, but which buy in the final product for final testing at the trading company.

5.2.2 Granting of Capability Approval

Capability Approval shall be granted by the National Certification Body.

5.2.3 Capability manual

Each manufacturer shall prepare a capability manual for approval by a National Supervising Inspectorate (NSI) which at least should contain or give reference to the following:

a) description of the cable families with references to sectional specifications;

b) identification of available machinery related to each cable family;

c) description or flow charts of the manufacturing process and its component stages, including the description of process boundaries at each manufacturing stage and the test/control points;

d) construction's techniques;

e) definition of any subcontracted work;

f) policy on rework, repair;

g) references to individual quality plans;

h) use of statistical quality control techniques;

i) programme for obtaining and maintaining the Capability Approval.

5.2.4 Quality plans

The manufacturer shall prepare a quality plan for each cable family, which shall normally contain at least:

a) design objectives and review stage (if applicable);

b) process objectives and review stage;

c) quality objectives and review stage;

d) objective and subjective acceptance criteria.

5.2.5 Capability Qualifying Components (CQCs)

The demonstration of the capability shall be made by inspecting the agreed range of manufacturing stages according to the Quality Plan:

a) the range of manufacturing stages shall cover the significant aspects of the process and limits of the declared capability;

b) the CQCs to be tested in order to evaluate the process stage shall be:

   1) a production component, or

   2) a finished product for the aspects related to the stage of production;

c) an adequate number of stages of manufacturing process, involving Capability Qualifying Components (CQCs), as agreed between manufacturer and the National Supervising Inspectorate, to be tested in order to demonstrate the capability across the family of cables for which approval is sought;

d) there will be a number of production samples or finished products sufficient to represent all the range of the capability process boundaries, including final test;

e) the auditing of the process stages consists of the evaluation of the controls carried out at each stage, together with the machinery capabilities for the manufacturing within the boundaries, and all related documentation;

f) examination of the statistical production quality indices in the stages of manufacturing related to the Quality Plan;

g) as guidance, an example of a manufacturing schematic is given in Annex A. This is of value in identifying the primary stage of manufacture and the process CQC specifications which will be required for the demonstration of capability.

5.2.6 Demonstration and verification of capability

The demonstration and verification of the capability shall be achieved as follows.

a) Tests selected from the Quality Plan as being appropriate to the demonstration of capability on all material/processes used for released products shall be carried out using samples taken from the production stages and finished products.

b) A programme for the demonstration and acceptance of Capability Approval shall be prepared and agreed upon between the National Supervising Inspectorate and the manufacturer.

5.2.7 Procedure to be followed in the event of CQC's failure

If during the initial Capability Approval demonstration a CQC fails to meet the specified test requirements and exceeds the permitted number of failures, the manufacturer shall:

either

a) amend the scope of his declared capability, with the agreement of the National Supervising Inspectorate,

or

b) investigate the failure to establish its cause as being either failure of the test itself, e.g. test equipment failure or operator error, or design or process failure.

If the cause of failure is established as a failure of the test itself, then subject to the agreement of the National Supervising Inspectorate, either the CQC which apparently failed

or a new one, if appropriate, shall be returned to the test schedule after the necessary corrective action has been taken. If a new CQC is to be used, it shall be subjected to all the tests in the given sequence of the test schedule(s) appropriate to the original CQC.

If the cause of failure is established as a design or process failure, a test programme agreed upon between the manufacturer and the National Supervising Inspectorate shall be performed to demonstrate that the cause of the failure has been eradicated and that all corrective measures have been carried out and documented. When this has been accomplished, the full test sequences shall be repeated using new CQCs.

Some types of minor failures not affecting quality of the service during the life of the product could be accepted in agreement between National Supervising Inspectorate and manufacturer.

5.2.8 Capability Approval report

A Capability Approval report is prepared to be a basis for the award of the Capability Approval. The Capability Approval report shall include a concise description of the manufacturer's declared capability and the results obtained for all the test programme agreed for the inspection.

5.3 Capability Approval certificate

When Capability Approval has been granted, a certificate shall be issued to the manufacturer by the National Supervising Inspectorate.

The certificate shall contain the following information:

a) reference number;

b) identification of manufacturer and place of manufacturing;

c) abstract of description of the capability;

d) reference to capability manual or other equivalent documentation;

e) identify and signature of the authority issuing the certificate.

5.4 Procedures following the granting of Capability Approval

5.4.1 Maintenance of Capability Approval

Maintenance of Capability Approval is ensured by a successful audit of the capability over the approved boundary conditions. This verification can be achieved by one of the following methods:

a) related acceptance criteria at prescribed intervals;

b) periodic witnessing of tests at the test control points by the National Supervising Inspectorate;

c) a combination of a) and b);

d) by reference to records relating to routine production cables where the relevant process controls/inspections demonstrate the requirements.

The choice of maintenance method shall be defined in the capability manual.

5.4.2 Changes to/or alteration of the Capability Approval

The manufacturer shall report any modification likely to affect the validity of the Capability Approval, and the National Supervising Inspectorate shall decide whether it is necessary to repeat all or some of the Capability Approval tests.