

PVE 4.1

Keurmerk Active and Passive In-house materials

Document name PVE Keurmerk 4.1.doc
Project name Keurmerk
Classification Public
Author Hein van Schooten NLkabel en
Philip Hendriks NLkabel
on behalf of College of Experts
Location of File NLkabel
Lange Voorhout 90
2514 EJ Den Haag

Document status Final
Completion date 1-7-2016
Version no. 4.1
Number of pages 54

Approved by Mathieu Andriessen NLkabel

Signature



This document is the property of NLkabel and must not be reproduced or retransmitted in any form without express permission.

NLkabel does not accept responsibility for any errors or omissions within the document, or circulation of document updates information

Document information

Version control

Version	Date	Reason of update	Initials
0.1	12-12-2007	First draft in document form.	JL
0.2/b	07-02-2008	Adjustments in norm and specs	JL
0.3	04-03-2008	Discussions at Veenendaal	JL
0.4	12-03-2008	Last minor points	JL
1.0	25-03-2008	Final version	JL
1.1	07-05-2008	Additional information	JW
1.2	08-05-2008	Appeal and use of logo	JW
1.3	25-06-2008	Clarify some criteria	JL
1.4	25-09-2008	Round one testing results	JL/JW/JPC
1.5	01-12-2008	Remarks KEURMERKINSTITUUT (S. Stravers) inserted	JPC
1.6	6-1-2009	Remarks CVD 12 December 2008 inserted	JPC
2.0	23-2-2009	Correction page 17 footnote 10 inserted	JPC
2.1	29-4-2009	<ul style="list-style-type: none"> Production change added in chapter 7 2nd paragraph to make this article also applicable in case of a new producer 3 dB relaxation allowance added as footnote 30 chapter 10.2 Clamping force F-connector changed footnote 81/82 in chapter 10.5 	JPC
3.0	11-5-2010	General update and new products added	JPC
3.1	15 -2-2011	Amendment process step added	JPC
4.0 concept	24-5-2012	General update	JPC
4.0 concept 2	20-9-2012	Update chapter 6,7,8	RdD
4.0 concept 3	13-2-2014	General update and review	JPC
4.0 Final	1-7-2014	General update and review	JPC
4.1 concept 3	15-01-2015	Update, review and editorial revision	RdD

Reviewed by

Name	Date	Signature
"College van Deskundigen": John Louwerse Ziggo Arjan Meijering Ziggo Kees van den Nieuwendijk Delta John Raeskin Technetix Alfred Kuiken Hirschmann Roland Schepers Hemmink Arno Albricht Teleste Rogier den Dekker Keurmerkinstituut Hein van Schooten NLkabel Philip Hendriks NLkabel	3-5-2016	p/o

Table of content

1	INTRODUCTION	5
2	SCOPE	6
3	DEFINITIONS AND NORMATIVE REFERENCES	7
3.1	DEFINITIONS.....	7
3.2	NORMATIVE REFERENCES.....	8
4	PROCEDURE: QUALIFYING FOR KABEL KEUR	9
FIG 1.	10
4.1	REQUIREMENTS	11
4.2	APPLICATION.....	11
4.3	QUOTE	11
4.4	CERTIFICATION PROCEDURE	11
OPTION 1	11
OPTION 2	12
OPTION 3	12
4.5	SAMPLES	12
4.6	PROTOTYPES	12
4.7	INTERMEDIATE RESULTS.....	12
4.8	USE OF THE “KABEL KEUR” QUALITY MARK	12
4.9	TRACE-ABILITY OF CERTIFIED PRODUCTS	12
4.10	ANNUAL SURVEILLANCE	13
4.11	RECERTIFICATION	13
4.12	DISAPPROVAL UPON SURVEILLANCE	13
4.13	LAYING AN APPEAL	13
5	VALIDITY AND ABUSE	14
6	ORGANISATION	15
7	SPECIAL PRODUCTS	17
8	GENERAL REQUIREMENTS, LABELING AND PACKAGING.....	18
8.1	GENERAL REQUIREMENTS	18
8.2	PRODUCT LABELING AND PACKAGING REQUIREMENTS.....	20
9	PASSIVE COMPONENTS	22
9.1	WALL OUTLET.....	22
9.2	TWO WAY SPLITTERS	23
9.3	CABLE	24
9.3.1	<i>Cable (equipment fly-lead)</i>	<i>24</i>
9.3.2	<i>Coax installation cable (indoor mounting cable)</i>	<i>25</i>
9.3.3	<i>Coax 9 (indoor mounting cable).....</i>	<i>26</i>
9.4	CONNECTORS AND ADAPTORS	28
9.5	DIPLEX FILTER	29

9.6	PORT TERMINATOR.....	30
9.7	HDMI CABLE.....	31
9.8	UTP PATCH CABLE.....	32
10	ACTIVE COMPONENTS.....	33
10.1	AMPLIFIER	33
10.2	AMPLIFIER	35
11	APPENDIX A: LOGO'S.....	38
12	APPENDIX B: F-CONNECTORS	40
13	APPENDIX C: IEC-CONNECTORS	43
14	APPENDIX D: CABLE CLAMP	47
15	APPENDIX E: PULL FORCE IEC FEMALE CONNECTOR.....	50
16	APPENDIX F: MEASUREMENT PROTOCOL FERRITE HDMI CABLE	51
17	APPENDIX G: EXAMPLE LETTER.....	53

1 Introduction

NLkabel, the association of Dutch cable providers, has issued a quality certification mark for in-house cabling system components under the brand name “Kabel Keur”. Kabel Keur’s goal is to help consumers find and select coaxial cables, splitters, connectors and amplifiers with a quality level that equals or exceeds specification limits set by Kabel Keur. The specifications are set to enable subscribers to enjoy uninterrupted cable services including state-of-the-art multimedia services offered by Dutch cable providers.

The growing number of services demands high performance in-house cabling-systems to meet the necessary high quality of service. Frequently in-house cabling-systems, with components such as coaxial cables, splitters, connectors and amplifiers have become obsolete and are a cause of a reduced quality of service to the subscriber. The subscriber can perceive this as a poor quality of the service provided by the cable provider, though the cause is mostly the subscriber’s poor quality in-home network.

To guide consumers to buy qualified products and materials within a broader market of (sometimes inferior) products, the Dutch cable providers, united in NLkabel (their trade organization) have now introduced the quality mark “Kabel Keur”. “Kabel Keur” identifies independently inspected and approved materials and products. Only materials and products, which have passed approval tests successfully, get the qualification mark “Kabel Keur”.

To create awareness of the Kabel Keur quality mark and its benefits, cable providers promote the certified products by means of several promotional activities, amongst that the Internet site www.Kabelkeur.nl.

To qualify for certification a manufacturer or trader can ask the Keurmerkinstituut to investigate and test its products. The Keurmerkinstituut is an independent accredited agency, selected by NLkabel, and well equipped to ensure that the certification procedure is operated according to the “Kabel Keur” mark rules and regulations. The requesting supplier hands over a completed application form. By handing over this form the requesting supplier enters into consent with NLkabel and Keurmerkinstituut. This consent regulates the full process of acquiring and applying the “Kabel Keur” certification mark. Requesting suppliers bear the costs involved. Application forms can be downloaded from www.keurmerk.nl.

The PVE is a dynamic document. At least once a year a college of experts (CVD) and Keurmerkinstituut decide if the document needs editing to assure that consumers get the quality of products to assure a high quality of service. Proposed alterations are announced and discussed with the participating partners before becoming operational. For all products, both for new products and for products that already received a “Kabel Keur” certification mark, there is a 3-year transition period. It is preferred that new products comply with the latest PVE requirements from the start.

In order to keep up with technical developments and respond to new requirements an amendment to the current PVE can be issued by the college of Experts (CVD). This amendment will be published on the Keurmerkinstituut website and will be distributed directly to the participating manufacturers and traders. The legal impact of the amendment is equal to that of the corresponding PVE. The amendment is considered to be an integral part of the current PVE.

2 **Scope**

Kabel Keur is a private quality mark for components for a multimedia network. Kabel Keur is applicable to components defined in this document, meant for in-house home networks. A home network that meets the Kabel Keur requirements is suitable for the Dutch cable market.

3 Definitions and normative references

3.1 Definitions

“Kabel Keur”	“Kabel Keur” is a certification mark. Products carrying this mark as a label enable, if applied properly, the construction of a high quality in-home Multimedia network that consumers have no need to complain about.
Consumer packaging	A packaging for end-user application.
Factory packaging	A packaging for private label companies and installation contractors. Not for end-user sale / resell purposes.
Coaxial cable	Asymmetrical cable that is in this context the most suitable transport medium for Multimedia signals of a broad frequency spectrum.
Wall outlet	A device to connect the customer equipment to the fixed in-house network.
Splitter	A device that is a part of the connection between one source to two or more destinations in a multimedia coaxial home network.
Connector	A device that connects a coaxial cable to a source or a destination in a multimedia home network.
Adaptor	A device that enables matching between two connections.
Amplifier	A device that is able to increase the signal level to cover larger distances or/and to split the signal.
HDMI cable	HDMI cable (High-Definition Multimedia Interface) is a compact cable for transmitting uncompressed digital data.
Diplex filter	A device that combines or separates frequency ranges.
Terminator	A device that terminates a connection.
Special product	A device specially designed for Dutch Cable Operators.
“Programma van Eisen” (PVE-document)	Specifications that products have to meet to obtain the “Kabel Keur” certification mark, as well as guidelines and instructions for the use of the “Kabel Keur” Certification mark. The last version of the PVE is called the current PVE.
Amendment	Changes, additions to a PVE, being an integral part of the current PVE
Private label products	Certified product that are sold under a different (private) label.
College of experts (CVD)	Experts drafting the specifications (PVE document).
NLkabel	The branch organization of Dutch cable providers.
Dutch Cable Operators	Dutch Multi Service Operators (MSO’s) who are a member of NLkabel.
Participating partners	Parties involved in Kabel Keur certification.
“Kabel Keur” certification Agency	Independent institute contracted by NLkabel to execute the qualification process.
Qualified product certification agency	A qualified product certification agency is an institution accredited by the Council of accreditation (Netherlands), or foreign sister organization, for the concerned subject. The council of accreditation must be dovetailed to the European Cooperation for Accreditation and/or international Accreditation forum, INC.
Qualified lab or laboratory	A qualified lab or laboratory is an accredited organization by the Netherlands Counsel of Accreditation or a foreign sister organization. The Counsel of Accreditation, which looks after the accreditation, must be dovetailed to the European Cooperation for Accreditation and/or the International Accreditation Forum, INC. The laboratory must perceptible

	have qualified its test activities in accordance with the quality system ISO 17025. If the test activities would probably not be within the scope of the accreditation then the institute must in a different way show that the activities are carried out within the existing ISO 17025-quality system.
Vendor statement	A written statement that a product fulfils a requirement in the PVE.
Vefica	The Dutch Society of Manufacturers and Suppliers to the Broadband Industry.

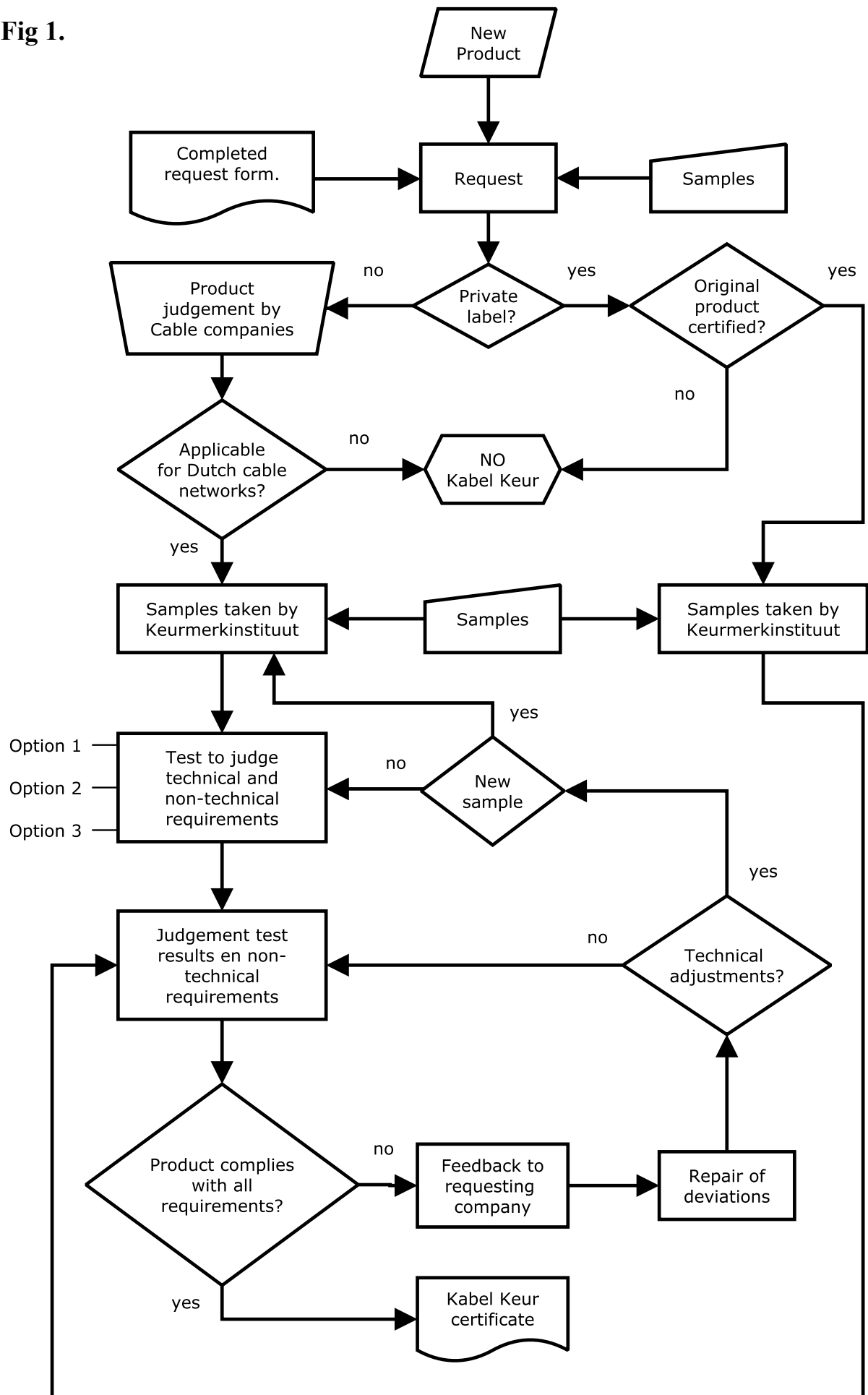
3.2 Normative references

Reference norm	Name	Version
NEN-EN 50083-2	Cable networks for television signals, sound signals and interactive services - Part 2: Electromagnetic compatibility for equipment	2012
NEN-EN 50117-2-1	Coaxial cables - Part 2-1: Sectional specification for cables used in cabled distribution networks - Indoor drop cables for systems operating at 5 MHz - 1000 MHz	2005
NEN-EN 50117-2-4	Coaxial cables - Part 2-4: Sectional specification for cables used in cabled distribution networks - Indoor drop cables for systems operating at 5 MHz - 3000 MHz	2004
NEN-EN 50117-2-4:A1	Amendment A1	2008
NEN-EN 50117-2-4:A2	Amendment A2	2013
NEN-EN 50289-1-6	Communication cables - Specifications for test methods Part 1-6: Electrical test methods - Electromagnetic performance	2002
IEC 61000-4-5	Electromagnetic compatibility (EMC) Part 4-5: Testing and measurement techniques - Surge immunity test	2007
IEC 60068-1	Environmental testing – Part 1: General and guidance	2013
NEN-IEC 60728-2	Cable networks for television signals, sound signals and interactive services - Part 2: Electromagnetic compatibility for equipment	2010
NEN-EN-IEC 60728-3	Cable networks for television signals, sound signals and interactive services - Part 3: Active wideband equipment for cable networks	2011
NEN-EN-IEC 60728-4	Cable networks for television signals, sound signals and interactive services - Part 4: Passive wideband equipment for coaxial cable networks	2008
NEN-EN-IEC 60728-11	Cable networks for television signals, sound signals and interactive services - Part 11: Safety	2010
NEN-EN-IEC 61169-1	NEN-EN-IEC 61169-1:2013 en - Radio-frequency connectors - Part 1: Generic specification - General requirements and measuring methods	2013
NEN-EN-IEC 61169-2	Radio-frequency connectors - Part 2: Sectional specification - Radio frequency coaxial connectors of type 9,52	2007
NEN-EN-IEC 61169-24	Radio-frequency connectors - Part 24: Sectional specification - Radio frequency coaxial connectors with screw coupling, typically for use in 75 Ω cable networks (type F)	2010

4 Procedure: Qualifying for Kabel Keur

The flowchart in figure 1 shows the certification procedure for Kabel Keur. products marketed under private labels need to be certified separately. Aspects that are not subject to difference from the originally certified product (original product), including technical specifications, may be excluded in the certification process for private label products.

Fig 1.



4.1 Requirements

This document describes the requirements products have to meet to qualify for the “Kabel Keur” certification mark. The “Kabel Keur” certification mark is protected and registered by NLkabel. These requirements are composed by a college of experts consisting of representatives of Dutch Cable Providers as well as leading manufacturers.

4.2 Application

To apply for certification, requesting suppliers can obtain an application form from Keurmerkinstituut. Only completed and signed forms will be considered. This includes the required attachments named on the application form. By signing the form the requesting supplier declares to abide the rules and regulations for using the certification “Kabel Keur” mark as stated in this PVE. After a completed entry form has been received, Keurmerkinstituut will judge whether the products in the application are within the scope of the PVE. The NLkabel members of the CVD will decide whether the products can be applied successfully in the Dutch cable operation environment. The interoperability of products is a key decisive factor. If not, the certification procedure will be stopped. Products omitted from the PVE are not covered.

4.3 Quote

After receipt of a completed and signed application form the Keurmerkinstituut shall offer a proposal for examination and will charge the costs of application upfront. If the contract is granted, these application costs will be deducted from the final bill.

4.4 Certification procedure

To be able to complete the certification procedure, Keurmerkinstituut requires the information specified in the general requirements (method). This generally means the following:

- Product specification sheet
- Representative product samples (see 6.5 for details), including product marking (batch codes, product codes, logo's, etc.)
- Packaging samples, including any directions for use
- Declarations and statements regarding CE, RoHS, Besluit Beheer verpakkingen
- An ISO 9001 certificate for the production process
- Complaints procedure and complaints file (registration after the initial certification)
- Any other documents to show compliance with the requirements
- Extract Chamber of Commerce registration

For the purpose of the certification, a product includes any packaging, information and labeling as it is sold. If factory packaging is applicable the applier should indicate this.

Testing of compliance to technical requirements is reported to Keurmerkinstituut by a qualified laboratory. A representative sample is tested in one of three ways.

Option 1

The applicant requests a qualified laboratory to test the product. The laboratory reports to Keurmerkinstituut and all communication with the laboratory is through Keurmerkinstituut.

Option 2

Keurmerkinstituut boards testing of the product to a qualified laboratory. The laboratory reports to Keurmerkinstituut and communication with the laboratory is through Keurmerkinstituut.

Option 3

The applicant arranges the product testing. Keurmerkinstituut has a qualified laboratory witness the testing and this laboratory reports to Keurmerkinstituut.

Based on the laboratory report Keurmerkinstituut will evaluate validity of the tests and the compliance with technical requirements. Keurmerkinstituut also evaluates the validity of the tested sample and the qualification of the laboratory.

4.5 Samples

The requesting supplier informs Keurmerkinstituut when the first production batch is available. From this batch a number of samples must be selected for testing and evaluation. The quantity is product related, determined by the spread of production parameters and the batch quantity, but will minimal consist of:

- coaxial cables: 25 samples of 6 meters
- all other passive products (incl fly-leads): 50 samples
- active products: 25 samples

From these samples Keurmerkinstituut will select a number of products to be tested for Kabel Keur.

4.6 Prototypes

If the available samples cannot be considered to be representative for the production series, they will be handled as a prototype. Prototypes can be tested and assessed in the same way as real certification, accept that the prototype product will not be certified. As soon as representative samples become available, test results from the prototype tests can be re-used after an assessment confirms that these samples are technically identical to the prototype.

4.7 Intermediate results

The requesting supplier will be offered the opportunity to solve deviations from the requirements if needed. After modification, compliance with the requirements concerned will have to be assessed again. NLkabel will judge whether technical modifications require additional retesting of requirements that may be influenced by the modification. Extra costs will be charged additionally.

4.8 Use of the “Kabel Keur” quality mark

During the certificate validity period the certificate holder has the right to display the “Kabel Keur” quality mark as long as the applicable regulatory requirements described in ‘Richtlijnen gebruik logo “Kabel Keur”’ (Appendix A) are taken into account.

4.9 Trace-ability of certified products

Keurmerkinstituut will maintain and manage an overview of certified products. This overview will be made available to the consumer on the “Kabel Keur” certification mark website.

4.10 Annual surveillance

Within the time period that the certificate is valid, annual surveillances will be carried out to safeguard continuous fulfillment of the requirements of the “Kabel Keur” certification mark. Keurmerkinstituut has established a process and procedure for this. The costs of these intermediate inspections will be charged to the quality mark holder in agreement with the initial quote for inspection wherever possible.

At least the following aspects will be evaluated during an annual surveillance:

- Verification of the (agreed) specifications or parts of (agreed) specifications¹
- Evaluation of customer/operator complaint registration
- Inspection of the quality system (of the certification holder and/or of the production location)
- Product labeling

4.11 Recertification

When a certificate expires, the right to use the Kabel Keur mark on a product automatically ends. To continue the use of the mark, the product has to be re-certified. A re-certification assessment has to show that the product meets all the requirements of the PVE version that is applicable at the time.

A re-certification assessment consists of at least an annual surveillance assessment, extended with verification of technical specifications as following:

Verification of the (agreed) technical specifications or parts of (agreed) technical specifications by means of laboratory testing. At least two parameters will be measured if product specifications are unmodified, and requirements are unchanged. If product specifications are modified, at least the modified parameters will be measured. If requirements have changed, at least the changed parameters will be measured.

4.12 Disapproval upon surveillance

When a surveillance or recertification reveals that a product deviates from one or more requirements, the certificate holder is given the opportunity to respond with a cause and extent analysis and corrective/preventive measures. Keurmerkinstituut evaluates the response and measures and verifies their implementation. In the case of a technical non-conformity, the voting members CVD will be consulted in assessing the response and planning the verification. Information about the product and the assessment is shared or brought out only after explicit permission of the certificate holder. If conformity can not be demonstrated within the deadline, the certificate for the respective product is revoked. If after that it is demonstrated that the requirements are met, the Kabel Keur certificate can still be extended.

4.13 Laying an Appeal

Products can be rejected for inspection (see 6.2) or can be given the mark “failed” in the certification process. In either case the requesting supplier can lodge an appeal at the college of appeal. This college is comprised of two independent subject experts who are not employed by any of the parties involved in Kabel Keur. This college will judge whether there are reasons to revise the decision taken by NLkabel to reject a certification. If this is the case the requesting supplier can request the college to ask that the tests are repeated by another qualified laboratory. If possible, costs for this will be charged to the party responsible for the need to re-evaluate the tests.

¹ Administrative check by Keurmerkinstituut

5 Validity and abuse

The validity period of a certificate is 3 years. After this period the product must be recertified. In case the requirements for the product are unchanged there is the possibility to extend this period ones with 2 years. An annual surveillance will be carried out.

Whenever a supplier wants to changes the product specification or production of certified products it is the supplier's responsibility to first communicate the new specifications to Keurmerkinstituut. Before intended changes to certified products are implemented, it has to be ensured that the Kabel Keur requirements are still met. Technical changes are submitted to the voting members (cable companies) of the College of Experts of Kabel Keur. It is then decided whether additional measurements are necessary. Additional measurements start a new certification period of three years. When it is decided that no measurements are needed, the current certification period remains unchanged. Non-technical changes may still require other means of verification, like ISO 9001 certification of production (§see general requirements) in case of change of manufacturer. If additional verification is necessary, the supplier will be informed accordingly.

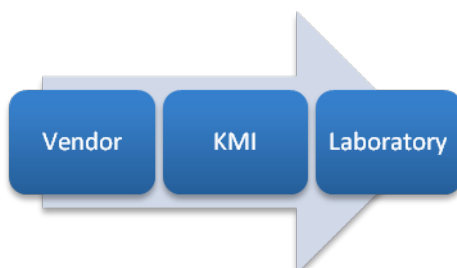
In case a participating or non-participating supplier carries the certification mark illegally NLkabel will take juridical steps to stop and prevent such abuse.

6 Organisation

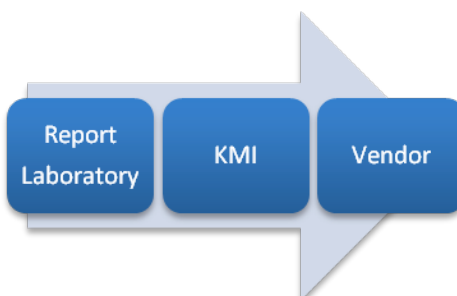
NLkabel is assisted by a group of experts (“College van Deskundigen”, CVD). This CVD defines the requirements for high performance components for In-house networks. These requirements are documented in this document, called “Programma van Eisen”, abbreviated as PVE. The PVE document is public and, along with other documents, published on NLkabel’s website via links to process partners who are responsible for document distribution. New versions of the PVE documents also will be, as a standard process step, distributed by mail to all participating partners in the “Kabel Keur” certification process. NLkabel has an agreement with Keurmerkinstituut (abbreviated as KMI in the figures below), in which is stated that Keurmerkinstituut will be responsible for all operational activities. Keurmerkinstituut is in this context responsible for version control and distribution of all process documentation and for all operational activities to enable requesting suppliers to obtain the certification mark. All operational costs linked to obtaining the certification mark, such as the costs that Keurmerkinstituut makes and the laboratory costs for the testing, are at the expense of the requesting suppliers.



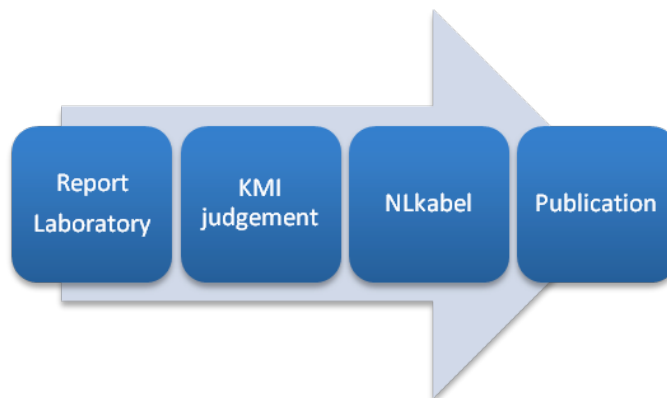
A requesting supplier who wants to acquire the certification mark for certain materials can submit a request for this to Keurmerkinstituut. Materials can only be inspected if the requesting supplier agrees with the set of rules and regulations that have been laid down by NLkabel in the PVE. This set of rules and regulations indicates how the testing process is organized and what the general conditions are. Keurmerkinstituut boards the testing to a qualified laboratory by default (see 4.4 for details).



The laboratory examines the material on behalf of Keurmerkinstituut according to the testing requirements (PVE Active and Passive in-house materials) and reports the results to Keurmerkinstituut. Keurmerkinstituut assesses the outcome and notifies to the requesting supplier on its findings. If the materials are approved then Keurmerkinstituut, after being instructed to do so by NLkabel, will issue a certificate that allows the requesting supplier to bear the certification mark for the examined material. On the certificate the type and validity period of the inspected material is stated.



Keurmerkinstituut reports the results of the certification process and which materials have obtained a certificate to NLkabel. NLkabel ensures that a list of approved material is available for consumers and retailers (for example by publication on the Internet site).



NLkabel and Keurmerkinstituut agreed that only qualified personnel will carry out the tests and appraisal.

Minimal capabilities required for testing:

Training : Applicable technical Bachelor degree

Experience : Two years in testing, for instance in quality control, a laboratory, or certification

Minimal capabilities required for assessment:

Training : Applicable technical Bachelor degree

Experience : Two years within a certification body or comparable

7 Special products

Dutch Cable Operators prefer to certify all in home cable devices. This makes it easier for subscribers to identify high quality approved products. Kabel Keur certified products are normally sold to the customer via a retail shop for use in all Dutch Cable networks.

Special products are developed for a single Dutch Cable Operator or group of Dutch Cable Operators and are not generally available via general retail stores. Distribution of these products takes place via installation kits used by subscribers (“self install kits”) or via Dutch Cable Operator’s own retail shops.

Requirements for special products are normally not incorporated in this PVE. This is due to the competitor-sensitivity of the specs. However the requirements of Kabel Keur products as specified in chapter 8 are nonetheless also required for special products.

Special products must, apart from the Kabel Keur logo, contain a notification to which Dutch Cable operator the product applies. Special products can also be common and be used by the majority of Cable Operators and, in this case, the notification is not required.

At the request for certification of a Special Product to Keurmerkinstituut the requesting vendor will supply a list of product requirements as specified by the Cable operator. On the basis of these requirements Keurmerkinstituut will ask Telefication to test the product.

8 General requirements, labeling and packaging

This chapter details general information for all devices that opt for the “Kabel Keur” certification mark. All information that is provided by the applicant may be verified. Any misleading information is not permitted.

8.1 General requirements

Item	Description	Remark	Method
8.1.1	Standard product specification sheet is available	In Dutch or English	Demonstration of document
8.1.2a	Compliance to applicable EU directives	In Dutch or English	CE declaration
8.1.2b	Compliance as applicable to: ROHS	In Dutch or English	Certificate / statement
8.1.2c	Compliance as applicable to: WEEE	In Dutch or English for active components	Membership to a collective or individual notification
8.1.2d	Besluit beheer verpakkingen ²	Dutch implementation of EU Directive ²	Vendor statement
8.1.4	Use of PVC's and PVdC's not allowed	for additions to the technical product, including packaging, cover parts and other components that are not covered in the technical requirements	Material specifications
8.1.5a	ISO 9001 certification of the production process leading to the product		Certificate from an accredited institute
8.1.5b	Requesting supplier must have a compliant registration system and must report once per half year on the “Kabel Keur” items.		Complaints file and procedures
8.1.6	The product is given permission to continue the certification procedure.	The usability of a product in the Dutch cable market is reviewed (usability in Dutch market situation, see 4.2)	Review by the representatives of the Dutch Cable Providers of the College of Experts (CVD)
8.1.7	Materials used for all contact interfaces must have good electrical-, corrosion-, cpd- and durability characteristics	The used alloy materials in the device must have a low step voltage ($\leq 0,5V$ electro chemical potential difference referenced to copper) in relation to each other to minimize corrosion effects	Information on the elements used in the (plating) material. This is generally included on the specification sheet (8.1.1).
8.1.8	Operational temperature range 0-55°C, unless specified differently in the product requirements tables hereafter	Specs will only be tested at a temperature of 20-25°C unless otherwise specified	Vendor statement. This is generally included on the specification sheet (8.1.1).

² Directive 94/62/EC of the European Parliament and of the Council of the European Union of 20 December 1994 on packaging and packaging waste (OJ L 365), as last amended by Directive 2004/12/EC of the European Parliament and the Council of the European Union of 11 February 2004 (OJ L 47) and Articles 10.15 to 10.18, 10.64, second paragraph, and 15.32 of the Environmental Management Act

8.1.9	At least a 3 years warranty	Within the warranty period the provider shall replace failing products for free as long they are used in accordance with the instructions for use provided	Product information
-------	-----------------------------	--	---------------------

8.2 Product labeling and packaging requirements

Identification labeling items:

- | | | |
|--------------------------------------|---|--|
| a. Article number | e. Logo complete monochrome ³ | i. Installation instruction ⁴ |
| b. Product identification and number | f. Logo simplified ³ | j. User guide ⁵ |
| c. Batch number | g. Logo complete full colour ³ | k. Area of application ⁶ |
| d. Contact details vendor | h. Text "Kabel Keur certified" ³ | |

Item	Description	Remark	Method
8.2.1	Consumer packaging carries the labeling items a, b, d, g and k	Identification refers to labeling item list under 8.2	Sample
8.2.2	Factory packaging carries the label items a, b, c and d	Identification refers to labeling item list under 8.2; If c is on the product itself, it is not required on the factory packaging	Sample
8.2.3	Factory packaging is only used for supply to Private label companies (re-brand and re-pack) and for direct deliveries to contractors and/or cable companies for installation purposes. Suppliers and their customers do not sell or resell the product without an approved Consumer packaging to consumers. The holder of the certificate and his customers and/or resellers ensure that this will formally be contracted by means of an agreement between the supplier and the customer (for example in the terms of delivery)	Coaxial cable may be sold to consumers in factory packaging as an exception	Agreement (example letter in appendix G)
8.2.4	The product carries the label items specified under "Remark" per product type 1. Wall Outlet 2. Two way splitter 3. Connector 4. Port terminator	Identification refers to labeling item list under 8.2 b, c, f, i b, c, f, i i not applicable	Sample

³ Refers to: "Richtlijn Logo gebruik Kabel Keur", appendix A. For a minimum required logo's, g > f > e > h.

⁴ An installation instruction has the intention to show the user how the product must be assembled, installed, mounted or fitted and what is the purpose of the product. The form of an Installation instruction can be a booklet or leaflet with text and images or the Installation instruction can be printed on the packaging. The installation instruction is packet in combination with the product. The text is drafted (at least) in Dutch. Required information is specified per product type in appendix H.

⁵ A user guide, also commonly known as manual, is a technical communication document intended to give assistance to users for installation and usage of the product. There is a user guide per Kabel Keur product and it explains both in written text and associated images the operation of the product and a clear installation instruction. The user guide is packed in combination with the product and is drafted (at least) in Dutch. Required information is specified per product type in appendix H.

⁶ The area of application defines the area where a product can be practiced and must be printed on the Consumer packaging of a product.

	5. Adaptor 6. Cable 7. Fly lead 8. Amplifier 9. HDMI cable 10. UTP cable 11. Diplex filter 12. Special product	not applicable b, c, f b, c, f b, c, g, j b, c, f b, c, f b, c, f, i b, c, f, i/j If a batch number (c) is on every available packaging, it is not required on the product itself A user guide (j) is not required in a Factory packaging	
--	---	--	--

9 Passive components

Requirements are tested in the order as specified in this document.

9.1 Wall outlet

Device description: one port wall-outlet

For measurement purposes the tested samples shall be fitted with a Kabel Keur certified cable of 15 cm and a Kabel Keur F-type connector. Applicant is responsible for correct fitting of the cable and connector supplied by Keurmerkinstituut.

Item	Description	Remark	Specification	Tolerance	Measurement Protocol
9.1.1	Impedance	5-1218 MHz	75 Ω		Vendor statement
9.1.2	Connector in		cable clamp ⁷ / F (C9, C12)		Appendix D / B
9.1.3	Connectors out		F, IEC		Appendix B, C
9.1.4	Insertion loss after power surge ⁸	5 - 1006 MHz	$\leq 0,5$ dB		IEC 60728-4 §4.3
		1006 – 1218 MHz	$\leq 1,0$ dB		
9.1.5	Return loss after power surge ⁸	5 – 15 MHz	≥ 14 dB		IEC 60728-4 §4.6 with a relaxation as specified in §5.3.4.1
		15 – 40 MHz	≥ 18 dB		
		40 - 1218 MHz	≥ 18 dB - 1.5 dB/oct.		
9.1.6	Galv. Isolation 2120 V DC	Inner conductor input > inner conductor output	$\leq 0,7$ mA		IEC 60728-11 §10
9.1.7	Galv. Isolation 230 V AC 50 Hz	Inner conductor input > inner conductor output	≤ 8.0 mA RMS		IEC 60728-11 §10
9.1.8	Screening effectiveness	5-30 MHz	≥ 95 dB		NEN-EN 50083-2: 2012
		30-300 MHz	≥ 95 dB		
		300-470 MHz	≥ 90 dB		
		470-950 MHz	≥ 85 dB		
		950-1218 MHz	≥ 70 dB		

⁷ No specific design or protocol is mandatory for the cable clamp ('butterfly'), direct screw connection is not allowed. Cable clamp must be designed to fit cable types as specified in chapter 10.3.

⁸ A power surge of 1 kV pulse as specified in IEC 1000-4-5, level 2 (rise time 1.2 μ sec/fall time 50 μ sec) is put on the input before measurement.

9.2 Two way Splitters

Device description: two-way splitter

Item	Description	Remark	Specification	Tolerance	Measurement Protocol
9.2.1	Impedance	5-1218 MHz	75 Ω		Vendor statement
9.2.2	Connector in/out		F and/or IEC		Appendix B, C
9.2.3	Insertion loss in > out	5 – 860 MHz	$\leq 4,0 \text{ dB}^9$		IEC 60728-4 §4.3
		860 – 1006 MHz	$\leq 4,3 \text{ dB}^9$		
		1006 - 1218 MHz	$\leq 5.0 \text{ dB}^9$		
9.2.4	Return loss	5 – 40 MHz	$\geq 18 \text{ dB}$		IEC 60728-4 §4.6
		40 – 1218 MHz	$\geq 18 \text{ dB} - 1.5 \text{ dB/oct.}$		
9.2.5	Isolation out > out	5 – 15 MHz	$\geq 20 \text{ dB}$		IEC 60728-4 §4.2
		15 – 40 MHz	$\geq 26 \text{ dB}$		
		40 - 1218 MHz	$\geq 26 \text{ dB} - 1.5 \text{ dB/oct.}$		
9.2.6	Intermodulation		-105 dBc		A minimum IMD of -105 dBc shall be measured at the output(s) while applying two carriers (60 & 65 MHz), out to out, @ 120 dB μ V/60 dBmV, after 1kV Combination Wave (1,2 μ S rise time/50 μ S duration) has been applied at each port. Test setup according to IEC 60728-4 §4.8
9.2.7	Screening effectiveness	5-30 MHz 30-300 MHz 300-470 MHz 470-950 MHz 950-1218 MHz	$\geq 95 \text{ dB}$ $\geq 95 \text{ dB}$ $\geq 90 \text{ dB}$ $\geq 85 \text{ dB}$ $\geq 70 \text{ dB}$		NEN-EN 50083-2: 2012

⁹ A relaxation of 0,5 dB is allowed in case the two-splitter is equipped with special ingress- or high voltage protection features.

9.3 Cable

9.3.1 Cable (equipment fly-lead)

Device description: coaxial cable with fixed connectors

Item	Description	Remark	Specification	Tolerance	Measurement Protocol
9.3.1.1	Impedance	5 - 1218 MHz	75 Ω		Vendor statement
9.3.1.2	Bend without damage	90 degrees angle	75 mm radius		Bend and stretch cable four times in the specified angle and bending radius. Inspect for visible damage
9.3.1.3	Connector in / out		F and / or IEC		Appendix B, C
9.3.1.4	F male max. nut torque	When equipped with F-connectors	3,95 Nm		
9.3.1.5	Return loss	5 – 40 MHz	≥ 20 dB		IEC 60728-3 ¹⁰
		40 – 1218 MHz	≥ 20 dB - 1.5 dB/oct.		
9.3.1.6	Insertion Loss	Measurement freq. 862 MHz	Cable attenuation $\leq 0,5$ dB/m, connector loss $\leq 0,4$ dB per connector, max. fly-lead attenuation $\leq 5,8$ dB		IEC 60728-4 §4.3 ¹⁰
9.3.1.7	Screening effectiveness ¹¹	5-15 MHz	≤ 5 m Ω /m (transfer impedance)		NEN-EN 50289-1-6, triaxial method
		15-30 MHz	$\leq 2,5$ m Ω /m (transfer impedance)		
		30 - 1000 MHz	≥ 95 dB		
		1000 - 1218 MHz	≥ 85 dB		

¹⁰ A pull force of 60 N is applied to the housing of the connectors in the direction of the cable for 60 seconds before the measurement.

¹¹ Inspired by NEN-EN 50117-2-5

9.3.2 Coax installation cable (indoor mounting cable)

Device description: Coaxial cable

For measurement purposes the tested samples (length 6 m) shall be fitted with Kabel Keur certified F-type connectors. Applicant is responsible for correct fitting of the connectors supplied by Keurmerkinstituut.

Item	Description	Remark	Specification	Tolerance	Measurement protocol
9.3.2.1	Impedance	5-1218 MHz	75 Ω		Vendor statement
9.3.2.2	Material center conductor		Solid copper / copper cladded steel / silver cladded copper		Vendor statement
9.3.2.3	Material outer conductor		Aluminum/copper laminated foil which is bonded to the dielectric, a tinned, copper cladded or full copper braid or a combination		Vendor statement
9.3.2.4	Material dielectric		PE		Vendor statement
9.3.2.5	Material jacket		PVC		Vendor statement
9.3.2.6	Bend without damage	90 degrees angle	70 mm radius		Bend and stretch cable four times in the specified angle and bending radius. Inspect for visible damage
9.3.2.7	Insertion loss	@ 862 MHz	≤ 27 dB/100m		IEC 60728-4 §4.3
9.3.2.8	Return loss	5-30 MHz	≥ 27 dB		IEC 60728-4 §4.6 NEN-EN 50117-2-4
		30-470 MHz	≥ 23 dB		
		470-1006 MHz	≥ 20 dB		
		1006 – 1218 MHz	≥ 18 dB		
9.3.2.9	Screening effectiveness ¹²	5-15 MHz	≤ 5 m Ω /m (transfer impedance)		NEN-EN 50289-1-6, triaxial method
		15-30 MHz	$\leq 2,5$ m Ω /m (transfer impedance)		
		30 - 1006 MHz	≥ 95 dB		
		1006 - 1218 MHz	≥ 85 dB		
9.3.2.10	Diameter jacket		7,00 mm	+ 0,0 mm / -0,7 mm	Vendor statement
9.3.2.11	Diameter dielectric		4,8 mm	$\pm 0,2$ mm	Vendor statement
9.3.2.11.1	Diameter dielectric plus foil		<5,1 mm		Micrometer method
9.3.2.12	Diameter Center conductor		0,7 - 1,15 mm		Micrometer method

¹² Inspired by NEN-EN 50117-2-5

9.3.3 Coax 9 (indoor mounting cable)

Device description: Coaxial cable

For measurement purposes the tested samples (length 6 m) shall be fitted with Kabel Keur certified F-type connectors. Applicant is responsible for correct fitting of the connectors supplied by Keurmerkinstituut.

Item	Description	Remark	Specification	Tolerance	Protocol
9.3.3.1	Impedance	5-1218 MHz	75 Ω		Vendor statement
9.3.3.2	Material center conductor		Solid copper / copper clad steel / silver clad copper		Vendor statement
9.3.3.3	Material outer conductor		Aluminum/copper laminated foil which is bonded to the dielectric, a tinned, copper clad or full copper braid or a combination		Vendor statement
9.3.3.4	Material dielectric		Gas injected PE		Vendor statement
9.3.3.5	Material jacket		UV stabile PVC		Vendor statement
9.3.2.6	Bend without damage	90 degrees angle	70 mm radius		Bend and stretch cable four times in the specified angle and bending radius. Inspect for visible damage
9.3.3.7	Insertion loss	@ 860 MHz	18 dB/100m	+0% / -10%	IEC 60728-4 §4.3
9.3.3.8	Return loss	5-30 MHz	≥ 27 dB		IEC 60728-4 §4.6
		30-470 MHz	≥ 23 dB		
		470-1006 MHz	≥ 20 dB		
		1006 – 1218 MHz	≥ 18 dB		
9.3.3.9	Screening effectiveness ¹³	5-15 MHz	≤ 5 m Ω /m (transfer impedance)		NEN-EN 50289-1-6, triaxial method
		15-30 MHz	$\leq 2,5$ m Ω /m (transfer impedance)		
		30 - 1006 MHz	≥ 95 dB		
		1006 - 1218 MHz	≥ 85 dB		
9.3.3.10	Diameter jacket		7,10 mm	$\pm 0,2$ mm	
9.3.3.11	Diameter dielectric plus		<5,1 mm		Micrometer

¹³ Inspired by NEN-EN 50117-2-5

	foil				method
9.3.3.12	Diameter dielectric		4,80 mm	± 0,15 mm	
9.3.3.13	Diameter Center conductor		1,10 mm	± 0,05 mm	

9.4 Connectors and adaptors

Device description: An adaptor is a combination of two connectors. The specifications are valid for adaptors and separate connectors

For measurement purposes the tested samples shall be fitted with a Kabel Keur certified cable of 15 cm.

Applicant is responsible for correct fitting of the cable and connector supplied by Keurmerkinstituut.

Item	Description	Remark	Specification	Tolerance	Protocol
9.4.1	Mounting principles	For F-type only	Not twist-on type		
9.4.2	Impedance	5-1218 MHz	75 Ω		Vendor statement
9.4.3	Pull force	Connector to connector, after 10 insertions	≥ 20 N		Appendix E ¹⁴
9.4.4	Mechanical parameters				Appendix B, C
9.4.5	Return loss	5 – 40 MHz	≥ 20 dB		IEC 60728-4 §4.6
		40 – 1218 Mhz	≥ 20 dB - 1.5 dB/oct.		
9.4.6	Screening effectiveness	5 – 30 MHz 30 – 300 MHz 300 - 470 MHz 470 - 950 MHz 950 - 1218 MHz	>95 dB >95 dB >90 dB >85 dB >70 dB		IEC 60728-2

¹⁴ Push on male F connectors will measured according to the procedure mentioned in appendix E.

9.5 Diplex filter

Device description: RTV diplex/data filter

Item	Description	Remark	Specification	Tolerance	Protocol
9.5.1.1	Impedance	5-1006 MHz	75 Ω		Vendor statement
9.5.1.2	Connector in/out		In IEC female TV IEC male R IEC female		Appendix C
9.5.1.3	Insertion loss in -> TV	5 – 70 MHz	$\leq 1,0$ dB		IEC 60728-4 §4.3
		120-140 MHz	$\leq 1,0$ dB		
		140-862 MHz	$\leq 0,5$ dB		
		862-1006	$\leq 0,8$ dB		
9.5.1.4	Insertion loss in -> R	5 – 70 MHz	$\geq 25,0$ dB		IEC 60728-4 §4.3
		87,5-108 MHz	$\leq 2,0$ dB		
9.5.1.5	Return loss TV	5- 70 MHz 120 – 1006 MHz	≥ 14 dB ≥ 14 dB		IEC 60728-4 §4.6
9.5.1.6	Return loss R	87,5-108 MHz	≥ 10 dB		IEC 60728-4 §4.6
9.5.1.7.	Return loss In	5-70 MHz	≥ 14 dB		IEC 60728-4 §4.6
		87,5-108 MHz	≥ 10 dB		
		120-1006 MHz	≥ 14 dB		
9.5.1.8	Isolation TV-R	5 – 70 MHz	≥ 25 dB		IEC 60728-4 §4.2
		87,5-108 MHz	≥ 16 dB		
		120 – 1006 MHz	≥ 25 dB		
9.5.1.9	Screening effectiveness	5-30 MHz 30-300 MHz 300-470 MHz 470-950 MHz 950-1006 MHz	≥ 95 dB ≥ 95 dB ≥ 90 dB ≥ 85 dB ≥ 70 dB		NEN-EN 50083-2:2012

9.6 Port terminator

Device description: Termination resistor

Item	Description	Remark	Specification	Tolerance	Protocol
9.6.1.1	Impedance	5 - 1218 MHz	75 Ω		Vendor statement
9.6.1.2	Frequency range	5 - 1218 MHz			
9.6.1.3	Return loss	5 – 40 MHz	≥ 20 dB		IEC 60728-4 §4.6
		40 – 1218 MHz	≥ 20 dB - 1.5 dB/oct.		
9.6.1.4	Torque (rotation) F-type (if applicable)		≥ 5 Nm		
9.6.1.5	Connector		F/IEC-connector		Appendix B, C
9.6.1.6	Screening effectiveness	5-30 MHz 30-300 MHz 300-470 MHz 470-950 MHz 950-1218 MHz	≥ 95 dB ≥ 95 dB ≥ 90 dB ≥ 85 dB ≥ 70 dB		NEN-EN 50083-2:2012

9.7 HDMI cable

Device description: HDMI (High-Definition Multimedia Interface) is a compact audio/video interface for transmitting uncompressed digital data. HDMI supports, on a single cable, any TV or PC video format, including standard, enhanced, and high-definition video, up to 8 channels of digital audio, and the Consumer Electronics Control signal

Item	Description	Remark	Specification	Tolerance	Protocol
9.7.1	Construction		Fully shielded cable. Molded ends. Inner hood connected 360 degrees to the connector for complete end shielding.		HDMI Specification High Speed (category 2 or higher)
9.7.2	Interface		HDMI-A Interface[1]		HDMI Specification High Speed (category 2 or higher)
9.7.3	Ferrite	Both sides of the cable should contain a ferrite to prevent unwanted e-gress and ingress (shortcut shielding currents 0-1GHz).	Ferrite specification Impedance $\geq 200 \text{ Ohm @ } 1 \text{ GHz}$		See Appendix F
9.7.4	Marking		HDMI label is printed on the cable (label) or the connector		Label format corresponding to www.hdmi.org
9.7.5	HDMI approved		The vendor must provide a certificate of HDMI ATC compliance and an ATC testing result		

9.8 UTP patch cable

Device description: unshielded twisted pair patch-cable

Item	Description	Remark	Specification	Tolerance	Protocol
9.8.1	Type		Category 5e		
9.8.2	Certificate of conformance		Intertek ETL or equivalent certificate for verification to ANSI/TIA-568-B.2 must be supplied		
9.8.3	Wire pairs and diameter		4 stranded pairs 24 AWG copper		
9.8.4	Test reports		A full test report for verification to ANSI/TIA-568-B.2, the protocol must be supplied		
9.8.5	Connectors		RJ45 with 50 µm gold plated contacts		
9.8.6	Suitable for		10/100/1000 Base-T		
9.8.7	Max. length		30 m		

10 Active components

10.1 Amplifier

Device description: Amplifier (862 MHz) with one or multiple outputs, either wall mounted or push-on.

Item	Description	Remark	Specification	Tolerance	Protocol
10.1.1	Gain forward path (port – port) range	85 - 862 MHz	1 – 9 dB equal or stepped and not adjustable	$\pm 1,5 \text{ dB}^{15}$	IEC60728-3 §5.6
10.1.2	Cable compensating slope	85 - 862 MHz	$\leq 1,5 \text{ dB}$, see figure 1		
10.1.3	Gain return path (port – port) range - Forward gain $\geq 7 \text{ dB}$ - Forward gain $< 7 \text{ dB}$ - Gain ripple/error	5 - 65 MHz	0 - 5 dB 0 - 2 dB	$\pm 1,0 \text{ dB}$	IEC60728-3 §5.6
10.1.4	Connectors in- out		F and/or IEC		Appendix B, C
10.1.5	Isolation	RF-IN to Outputs	5 - 65 MHz	$\geq 26 \text{ dB}$	IEC 60728-4 §4.2
		Outputs to RF-IN	85 - 862 MHz	$\geq 26 \text{ dB}$	
		Outputs to Outputs	5 – 15 MHz	$\geq 20 \text{ dB}$	
		Outputs to Outputs	15 - 65 MHz	$\geq 30 \text{ dB}$	
		Outputs to Outputs	85 - 862 MHz	$\geq 26 \text{ dB}$	
10.1.6	Return loss input	5 – 40 MHz	$\geq 18 \text{ dB}$		IEC60728-3 §5.5
		40 – 65 MHz	$\geq 18 \text{ dB}$ (F > 40 MHz - 1.5 dB/oct., $\geq 10 \text{ dB}$)		
		85 – 862 MHz	$\geq 18 \text{ dB}$ (F > 40 MHz - 1.5 dB/oct., $\geq 10 \text{ dB}$)		
10.1.7	Return loss output	5 – 40 MHz	$\geq 18 \text{ dB}$		IEC60728-3 §5.5
		40 – 65 MHz	$\geq 18 \text{ dB}$ (F > 40 MHz - 1.5 dB/oct., $\geq 10 \text{ dB}$)		
		85 – 862 MHz	$\geq 18 \text{ dB}$ (F > 40 MHz - 1.5 dB/oct., $\geq 10 \text{ dB}$)		
10.1.8	Noise figure	5-65 MHz	$\leq 18 \text{ dB}$		IEC 60728-3 §4.4
		85-120 MHz	$\leq 9 \text{ dB}$		
		120-862 MHz	$\leq 8 \text{ dB}$		

¹⁵ Gain forward path tolerance including temperature variation and gain ripple are indicated in figure 1.

10.1.9	Nominal input level (PAL) ¹⁶		≤ 77 dBμV		
10.1.10	Forward path distortion	CSO. @ (77+gain) dBμV output CTB. @ (77+gain) dBμV output	< - 64 dBc ¹⁷ < - 64 dBc		IEC 60728-3
10.1.11	Reverse path distortion (in band)	Second order IMA (2-tone) @ 115 dBμV input Third order intermodulation distortion @ 115 dBμV input	< - 50 dB < - 50 dB		IEC 60728-4 §4.8 ¹⁸
10.1.12	Reverse path distortion into forward path	2 nd and 3 rd order intermodulation @ 115 dBμV reverse path input @ 58 dBμV forward path input level	< - 66 dBc		IEC 60728-4 §4.8 (Measured at forward output port) ¹⁷
10.1.13	Spurious/oscillation	5-65 MHz 85-862 MHz	≤ -20 dBμV	To be measured on all In- and Output ports. All ports terminated.	Measuring method Spectrum analyzer, no additional signals connected
10.1.14	Group delay 5-10 MHz Group delay 10-65 MHz Group delay 85-120 MHz Group delay 120-862 MHz	Δ 2 MHz Δ 2 MHz Δ 4.43 MHz Δ 4.43 MHz	≤ 30 ns ≤ 10 ns ≤ 20 ns ≤ 10 ns		IEC 60728-3 §5.9
10.1.15	Surge protection	1 kV on input, rise time 1.2 μsec/fall time 50 μsec			IEC 60728-3 §5.9
10.1.16	Galv. Isolation 2120 V DC	Inner conductor input > inner conductor output	≤ 0.7 mA		IEC 60728-11 §10
10.1.17	Galv. Isolation 230 V AC	Inner conductor input > inner conductor output	≤ 8.0 mA RMS		IEC 60728-11 §10
10.1.18	Screening effectiveness, class A	5-30 MHz 30-300 MHz 300-470 MHz 470-862 MHz	85 dB 85 dB 80 dB 75 dB		IEC 60728-2
10.1.19	Operating temperature range		0 – 40 °C		Vendor

¹⁶ For measurement purposes, comparison and specification an input load of 42 Cenelec channels must be used.

¹⁷ Measured at output level (output level = input level + gain).

¹⁸ IEC60728-4 §4.8 describes the 2-tone measurements for passives. In 60728 Part-3 §4.7 for active components, the method of measurement has been changed to a CINR-test. Kabel Keur sticks to the two-tone method as it is still in general use.

					statement
10.1.20	Power	Including power supply if applicable	< 7 W		
10.1.21	Grounding	Not applicable for push-on amplifiers	Connection for 2.5 mm cable		
10.1.22	Port termination	n-1 output have a 75 ohm termination			

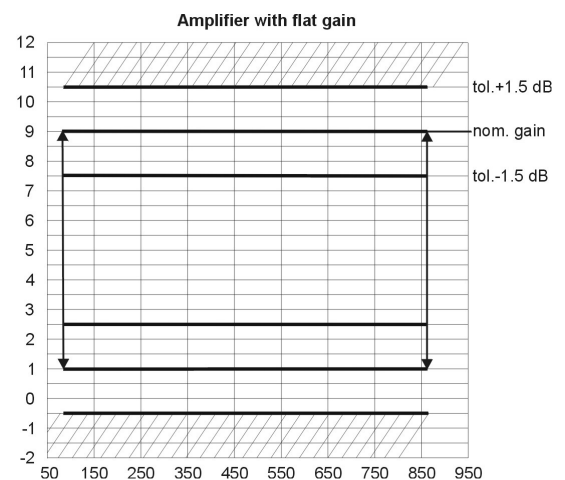
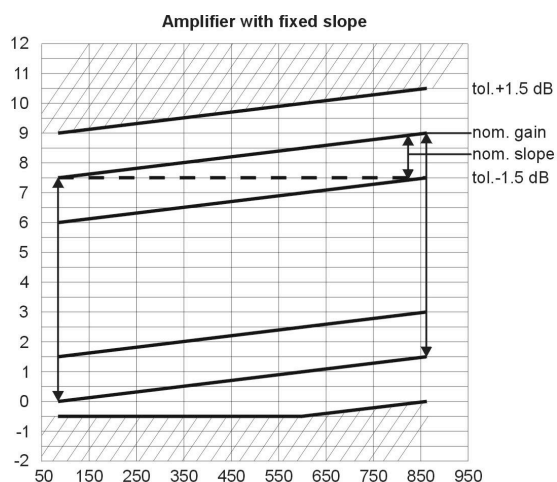


Figure 1

10.2 Amplifier

Device description: Amplifier (1006 MHz) with one or multiple (n) outputs, either wall mounted or push-on.

Item	Description	Remark	Specification	Tolerance	Protocol
10.2.1	Gain forward path (port – port) range	85 - 1006 MHz	1 – 11 dB equal or stepped and not adjustable	$\pm 1,5 \text{ dB}^{19}$	IEC60728-3 §5.6
10.2.2	Cable compensating slope	85 – 1006 MHz	$\leq 2,0 \text{ dB}$, see figure 2		
10.2.3	Gain return path (port – port) range - Forward gain $\geq 7 \text{ dB}$ - Forward gain $< 7 \text{ dB}$ - Gain ripple/error	5 - 65 MHz	0 - 5 dB 0 - 2 dB	$\pm 1,0 \text{ dB}$	IEC60728-3 §5.6
10.2.4	Connectors in- out		F and/or IEC		Appendix B, C
10.2.5	Isolation	RF-IN to Outputs	5 - 65 MHz	$\geq 26 \text{ dB}$	IEC 60728-4 §4.2
		Outputs to RF-IN	85 - 1006 MHz	$\geq 26 \text{ dB}$	
		Outputs to	5 – 15 MHz	$\geq 20 \text{ dB}$	

¹⁹ Gain forward path tolerance including temperature variation and gain ripple are indicated in figure 2.

		Outputs				
		Outputs to Outputs	15 - 65 MHz	≥ 30 dB		
		Outputs to Outputs	85 - 1006 MHz	≥ 26 dB		
10.2.6	Return loss input		5 – 40 MHz	≥ 18 dB		IEC60728-3 & 5.5
			40 – 65 MHz	≥ 18 dB (F > 40 MHz - 1.5 dB/oct., ≥ 10 dB)		
			85 – 1006 MHz	≥ 18 dB (F > 40 MHz - 1.5 dB/oct., ≥ 10 dB)		
10.2.7	Return loss output		5 – 40 MHz	≥ 18 dB		
			40 – 65 MHz	≥ 18 dB (F > 40 MHz - 1.5 dB/oct., ≥ 10 dB)		
			85 – 1006 MHz	≥ 18 dB (F > 40 MHz - 1.5 dB/oct., ≥ 10 dB)		
10.2.8	Noise figure		5-65 MHz	≤ 18 dB		IEC 60728-3 §4.4
			85-120 MHz	≤ 9 dB		
			120-1006 MHz	≤ 8 dB		
10.2.9	Nominal input level (PAL) ²⁰			≤ 77 dBuV		
10.2.10	Forward path distortion	CSO @ (77+gain) dBuV output		< - 65 dBc ²¹		IEC 60728-3
		CTB @ (77+gain) dBuV output		< - 66 dBc		
10.2.11	Reverse path distortion (in band)	Second order IMA (2-tone) @ 115 dBμV input		< - 50 dB		IEC 60728-4 §4.8 ²²
		Third order intermodulation distortion @ 115 dBμV input		< - 50 dB		
10.2.12	Reverse path distortion into forward path	2 nd and 3 rd order intermodulation @ 115 dBμV reverse path input @ 58 dBμV forward path input level		< - 66 dBc		IEC 60728-4 §4.8 ²² (measured at forward output port)
10.2.13	Spurious/oscillation	5-65 MHz 85-1006 MHz		≤ -20 dBμV	To be measured on all In- Output ports. All ports terminated.	Measuring method Spectrum analyzer, no additional signals connected

²⁰ For measurement purposes, comparison and specification an input load of 42 Cenelec channels must be used.

²¹ Measured at output level (output level = input level + gain)

²² IEC60728-4 §4.8 describes the 2-tone measurements for passives. In 60728 Part-3 § 4.7 for active components, the method of measurement has been changed to a CINR-test. Kabel Keur sticks to the two-tone method as it is still in general use.

10.2.14	Group delay 5-10 MHz	Δ 2 MHz	≤ 30 ns		IEC 60728-3 §5.9
	Group delay 10-65 MHz	Δ 2 MHz	≤ 10 ns		
	Group delay 85-120 MHz	Δ 4.43 MHz	≤ 20 ns		
	Group delay 120-1006 MHz	Δ 4.43 MHz	≤ 10 ns		
10.2.15	Surge protection	1 kV on input, rise time 1.2 μ sec/fall time 50 μ sec			IEC 60728-3 §5.9
10.2.16	Galv. Isolation 2120 V DC	Inner conductor input > inner conductor output	≤ 0.7 mA		IEC 60728-11 §10
10.2.17	Galv. Isolation 230 V AC	Inner conductor input > inner conductor output	≤ 8.0 mA RMS		IEC 60728-11 §10
10.2.18	Screening effectiveness, class A		5-30 MHz 30-300 MHz 300-470 MHz 470-1006 MHz	85 dB 85 dB 80 dB 75 dB	IEC 60728-2
10.2.19	Operating temperature range			0 - +40 ⁰ C	Vendor statement
10.2.20	Power		Not applicable for push-on amplifiers	< 7 W	
10.2.21	Grounding			Connection for 2.5 mm cable	
10.2.22	Port termination		n-1 output have a 75 ohm termination		

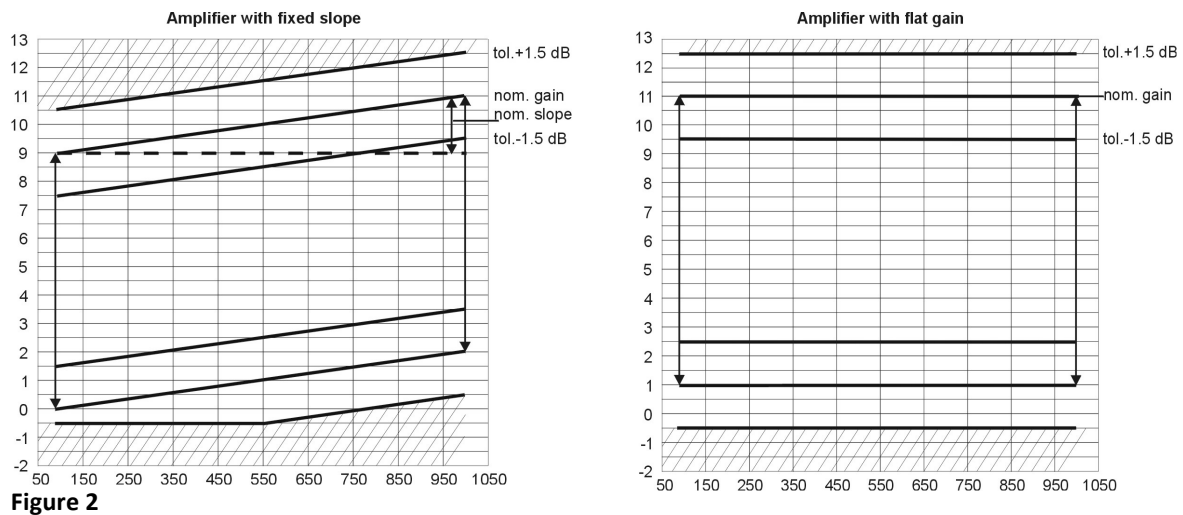


Figure 2

11 Appendix A: Logo's

Note: For product labeling see article 8.2

The Kabel Keur logo uses the following colors:

Blue: pms 2935 Green: pms 375



Logo Complete Full Color, the original Kabel Keur logo, has a minimum width of 10 mm.



Logo Complete Monochrome. This logo offers the possibility to display a grayscale picture in newspapers.



Logo Simplified should only be used in cases where the original logo cannot be placed on the product due to minimal format requirements. The Logo Simplified is only allowed on products and not on packaging. The Logo Simplified has a minimum width of 5 mm.

The Kabel Keur logo can be used together with a theme. In this case the minimum dimension is 30 mm for the logo.

The theme should be minimum corps 8 (centered). The theme line must never be smaller than the width of the logo.



't Beste beeld heeft Kabel Keur

The Kabel Keur logo must always be placed on white background. Logo's on the technical product may be placed on a transparent background as an exception, if there is a strong contrast.



The Kabel Keur logo can also be placed diap. Mind: Strainer print for packaging materials on a dark or transparent background.

High resolution Logo files will at request be provided by NLkabel

Address:

Lange Voorhout 90 2514 EJ Den Haag Telefoon: 070 - 305 33 33

12 Appendix B: F-connectors

Description of F-connectors

This type of connector has screw locking with a 3/8-32UNEF-2"B" thread or a push-on F-male connector, this push-on connector does not have a screw/spinning lock nut as it has a spring mechanism. Normally, the plug will be a free connector, the socket a fixed connector. The design of the male connector may either such that the inner conductor of the cable serves as the male contact, or such that the center (male) contact is independent of the cable inner conductor.

Physical dimensions

The physical characteristics of the F-connector must be able to be in accordance with the dimensions as stated in IEC 61169-24 2009.

Mechanical strength/withstand tightening torque

The F-ports shall be able to withstand the minimum specified tightening torque without damage. A male F-push-on connector should provide a minimum of 20 Nm pull strength (when disconnecting the F-male push-on from the female).

Test gauge acceptance F-female connector

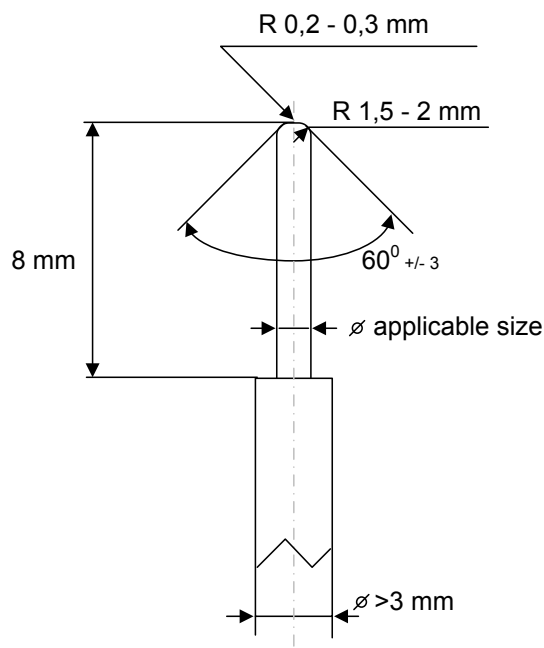


Figure 3

The female contact of the F-connector for general products shall at least be able to accept male contacts/test gauges with a diameter range between 0.51-1.2 mm.

Clamp force/withdrawal test

To verify that the center female contact of the socket does not suffer from deformation when mated with the range of inner conductors specified, a test has been advised which measures the force required to withdraw the selection of precision test gauges, out of the female connector under test.

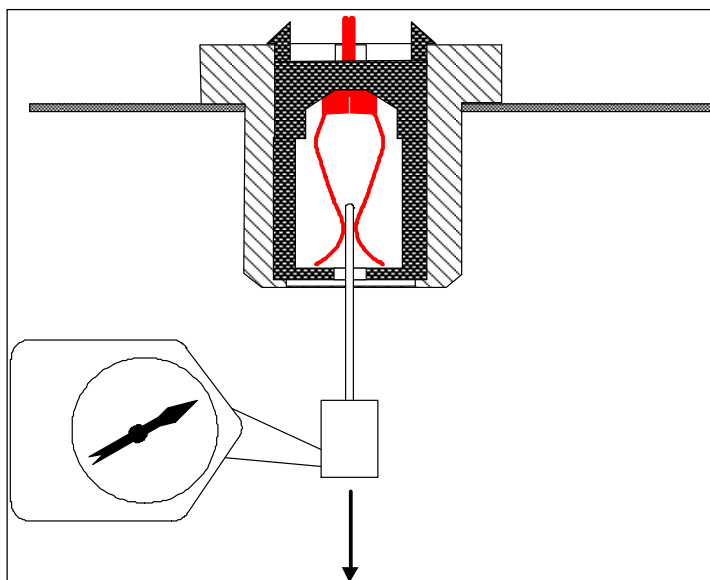


Figure 4: Example of Clamp force test set up

General Products					
Test sequence	1	2	3	4	5
Test gauge diameter (mm)	0.51	1.2	0.51	1.2	0.51
Clamping force min. (gram)			30		30
Clamping force tests must be performed with a duration of 10 seconds and at room temperature					
Test gauge tolerance: +/- 0.01 mm					

Insertion force test

To verify that the center female contact of the socket does not suffer from deformation when mated with the range of inner conductors specified, a test has been advised which measures the force required to insert the selection of precision test gauges, into the female connector under test.

Depending on test gauge diameter a sliding scale of the insertion force is presented in the table below:

General Products			
Test sequence	1	2	3
Test gauge diameter (mm)	0.51	0.80	1.2
Insertion force (gram)	≤ 300	≤ 800	≤ 1700
Test must be performed at room temperature			
Test gauge tolerance: +/- 0.01 mm			

The insertion force applied at the applicable test gauge diameter, as mentioned in this table, shall not exceed mentioned insertion force values.

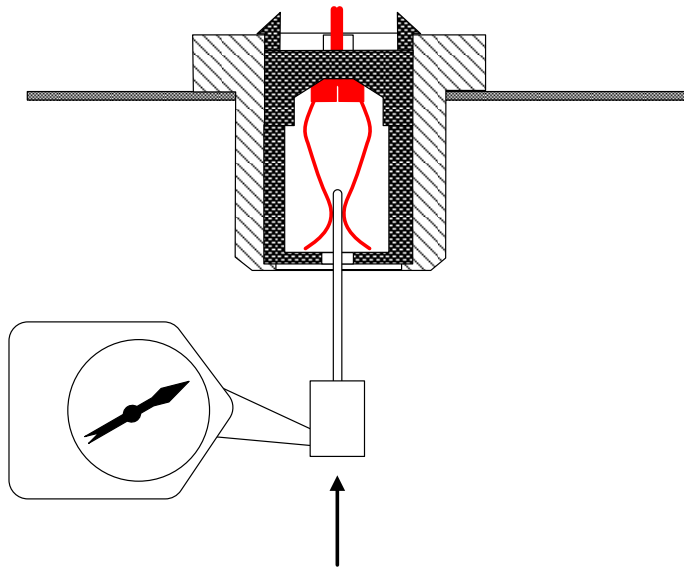


Figure 5: Example of Insertion force test set up

13 Appendix C: IEC-connectors

Description of IEC type connectors (type 9,52)

This type of connector has a push pull fitting without locking. Normally, the plug will be a free connector, the socket a fixed connector. The design of the plug may be such that the inner pin conductor serving as the male contact.

Physical dimensions

The physical characteristics of the IEC-connectors should be able to be in accordance with the dimensions as stated in IEC 61169-2, 2007.

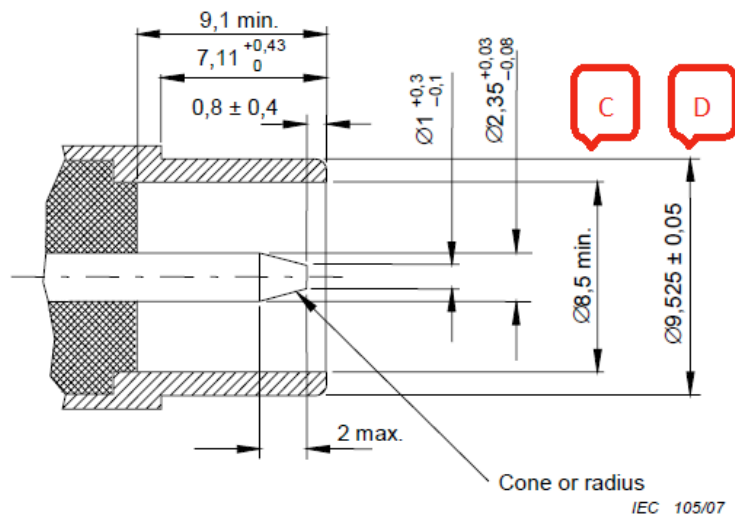


Figure 1a – Sliding male connector

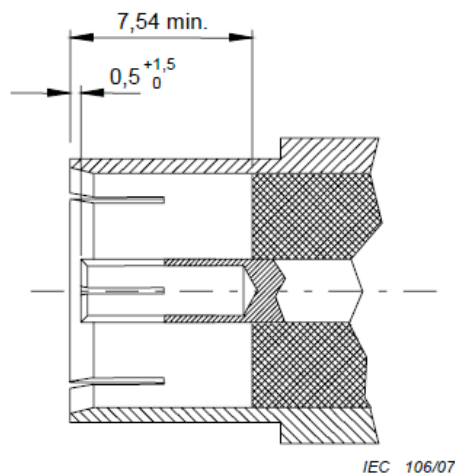


Figure 6

For moulded IEC-connectors there are following relaxations to the dimensions as stated in IEC-61169-2:

- For size "C" there is a relaxation from 8.5 mm min. to **7.9 mm** min. due to tooling angle.
- For size "D" there is a relaxation from 9.525 ± 0.05 mm (9.520 to 9.530 mm) to 9.45 - 9.57 mm (no tolerance).

IEC acceptance tests

To verify the acceptable quality level the following test to ascertain the resilience of the conductor to insertion and withdrawal of a selection of precision test pins, into and out of the connector under test.

The tests are to determine:

- A. Resilience of inner-pin
- B. Resilience of outer-conductor
- C. Torque resistance of inner-pin

A. The test gauge dimensions for “**resilience of inner-pin**” are shown as follows:

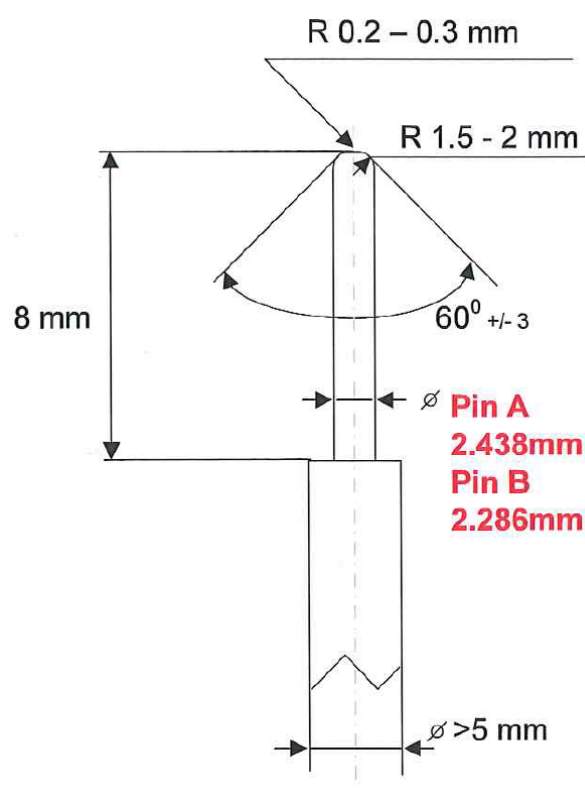


Figure 7

	Dimensions (mm)	
		Tolerance
Test gauge A \varnothing	2.438	0, -0.01
Test gauge B \varnothing	2.286	+0.01, 0
Weight of test gauge B should be 30 gram		

In the first instance, use test gauge A with maximum diameter. This gauge must be inserted fully into the inner-pin of the IEC-female connector. Then insert fully the test gauge B with the minimum diameter. The test gauge B (minimum diameter) must not fall out after inserting the maximum diameter gauge A and sufficient clamping force should be left.

B. The test gauge dimensions for “**resilience of outer-conductor**” are shown as follows:

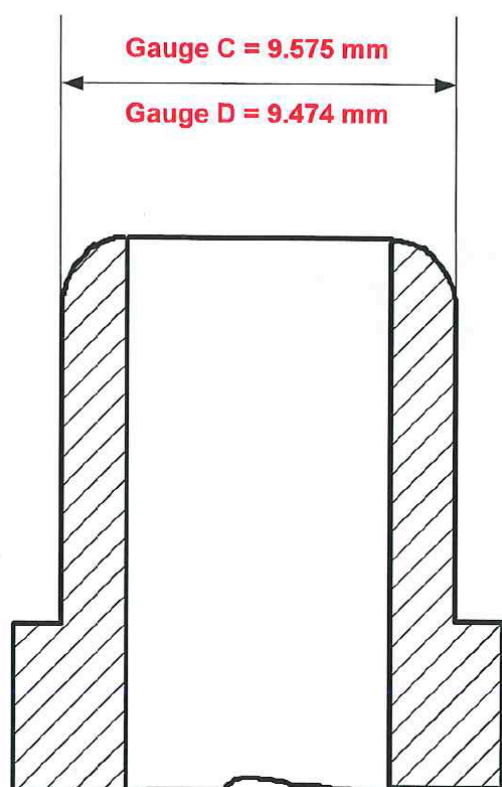


Figure 8

	Dimensions (mm)	
		Tolerance
Test gauge C \varnothing	9.575	0, -0.01
Test gauge D \varnothing	9.474	+0.01, 0
Weight of test gauge D should be 150 gram		

First insert the test gauge C with maximum diameter, this gauge must be inserted fully into the outer-conductor of the IEC-female connector.

Then insert the test gauge D with minimum diameter. Test gauge D (minimum diameter) must not fall out after inserting the maximum diameter gauge C and sufficient clamping force should be left.

Torque resistance of inner-pin

This test is to check rotation of the inner-pins of the IEC-male connector.

The inner-pin must withstand an applied force of 0.4 Nm without any signs of rotation or damage.

For fly lead connectors an applied force of 0.2 Nm without any signs of rotation or damage will apply.

Torque test example:



Figure 9

14 Appendix D: Cable clamp

Description of center conductor construction

The type of the cable clamp and its center conductor construction is depending on the manufacturer. The design of the center conductor construction should be such that the inner conductor of the cable serves as the male contact.

Physical dimensions

Depending on supplier construction.

Mechanical strength/withstand tightening torque

N/A

Test gauge acceptance cable clamp center conductor construction

The center conductor construction of a cable clamp regarding Wall Outlets shall at least be able to accept male contacts/test gauges with a diameter range between 0.51-1.2 mm.

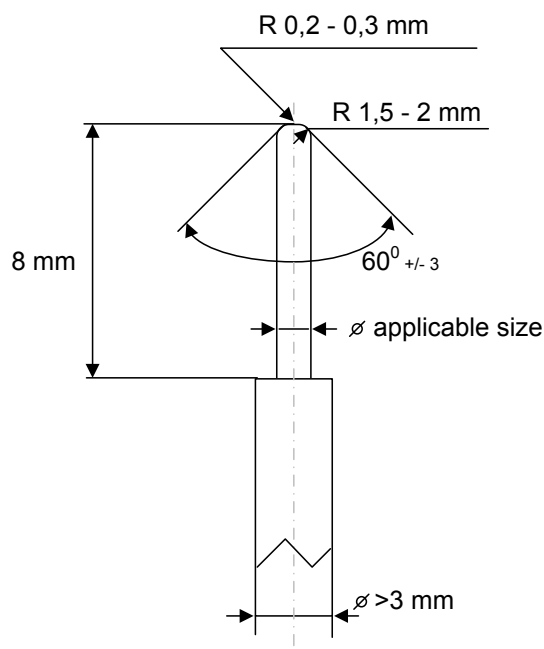


Figure 10

Clamp force/withdrawal test

To verify that the center conductor construction of the cable clamp does not suffer from deformation when mated with the range of inner conductors specified, a test has been advised which measures the force required to withdraw the selection of precision test gauges, out of the center conductor under test.

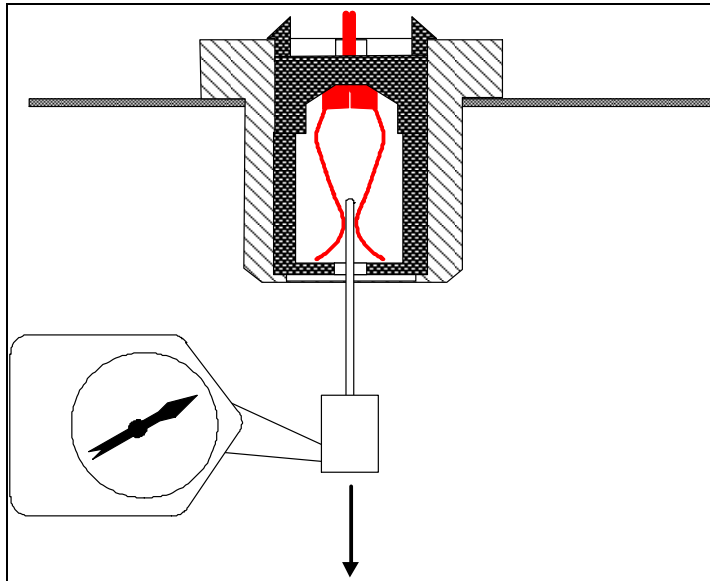


Figure 11: Example of Clamp force test set up on F-connector

Spring construction only:

Wall Outlet center conductor construction					
Test sequence	1	2	3	4	5
Test gauge diameter (mm)	0.51	1.2	0.51	1.2	0.51
Clamping force min. (gram)			30		30
Clamping force tests must be performed with a duration of 10 seconds and at room temperature					
Test gauge tolerance: +/- 0.01 mm					

Spring construction in combination with fixing screw:

Wall Outlet center conductor construction					
Test sequence	1	2			
Test gauge diameter (mm)	0.51	1.2			
Clamping force min. (gram)	30	30			
Clamping force tests must be performed with a duration of 10 seconds and at room temperature					
Test gauge tolerance: +/- 0.01 mm					

Insertion force test

To verify that the center conductor construction of the cable clamp does not suffer from deformation when mated with the range of inner conductors specified, a test has been advised which measures the force required to insert the selection of precision test gauges, into the center conductor construction.

Depending on test gauge diameter a sliding scale of the insertion force is presented in the table below:

Wall Outlet center conductor construction			
Test sequence	1	2	3
Test gauge diameter (mm)	0.51	0.80	1.2
Insertion force (gram)	≤ 300	≤ 800	≤ 1700
Test must be performed at room temperature			
Test gauge tolerance: ± 0.01 mm			

The insertion force applied at the applicable test gauge diameter, as mentioned in this table, shall not exceed mentioned insertion force values.

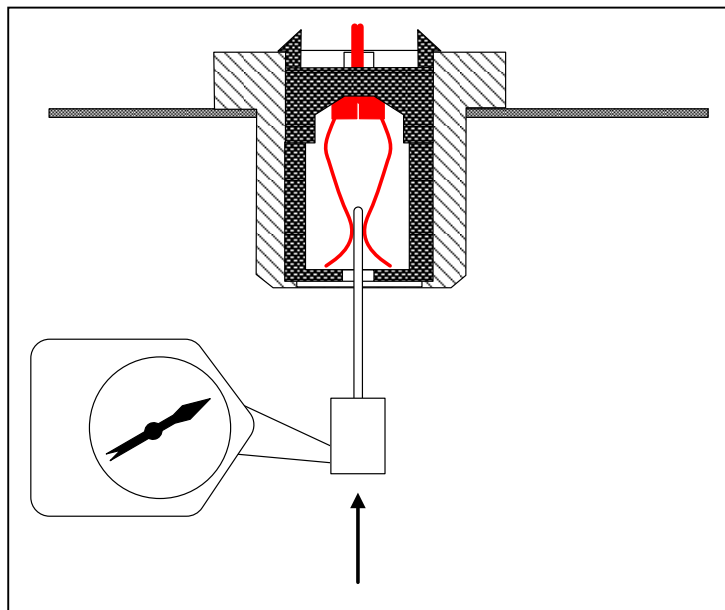


Figure 12: Example of Insertion force test set up on F-connector

15 Appendix E: Pull force IEC female connector

The pull force is the minimum force required to pull a IEC connector fully out without mechanical assistance. Pull force is deemed to be of primary importance in the measurement of the IEC connector. If too much force is required to remove the IEC connector then there is a greater possibility of damage to the wall outlet. If there is too little force required to remove the IEC connector then there is the risk of the plug just falling out or moving enough within for the signal to become intermittent.

Test procedure

The Connector Under Test shall be new and unused.

The extraction force testing should be undertaken after cycle testing. The ideal test uses a hardened steel mandrel conforming to the dimensions given in IEC 60169-2. No lubrication of the test mandrel is permitted for any of the tests listed.

- Insert/Extract the test mandrel fully, co-axially with the jack, ensuring there is no side force applied.
- Repeat for 10 insertion/extraction cycles.
- Physically inspect the terminals and body of the CUT for wear, and test for electrical continuity.
- If the CUT meets the pass/fail criteria, continue the test.

Using a standard mandrel the extraction force is to be tested for the CUT.

- Insert the test mandrel fully, co-axially with the jack, ensuring there is no side force applied.
- Measure and record the extraction force.

Pass/fail criteria:

- The extraction force shall be within limits shown in clause 9.4.1.5.
- Physically inspect the terminals and body of the CUT for wear, and test for electrical continuity.

16 Appendix F: Measurement protocol ferrite HDMI cable

Ferrite Specification and Test Method:

1 Ferrite Impedance

Both sides of the HDMI-cable should contain a ferrite to prevent unwanted e-gress and ingress (shortcut shielding currents 0-1GHz).

Specification:

Each ferrite on the cable must have an impedance of: ≥ 200 Ohm measured at 1000 MHz.

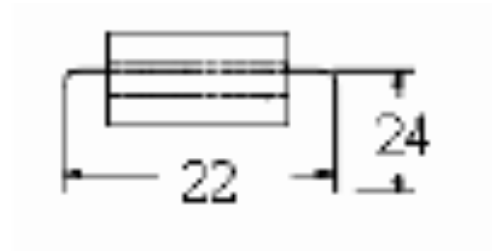
2 Test Method

Test equipment: a LCR meter with test fixture capable of measuring the ferrite impedance up to 1000 MHz
e.g. Impedance Analyzer HP4991A
Test fixture HP16092A

Test wire dimensions: $\varnothing 0.5$ mm x 70 mm (length)

Turns: 1

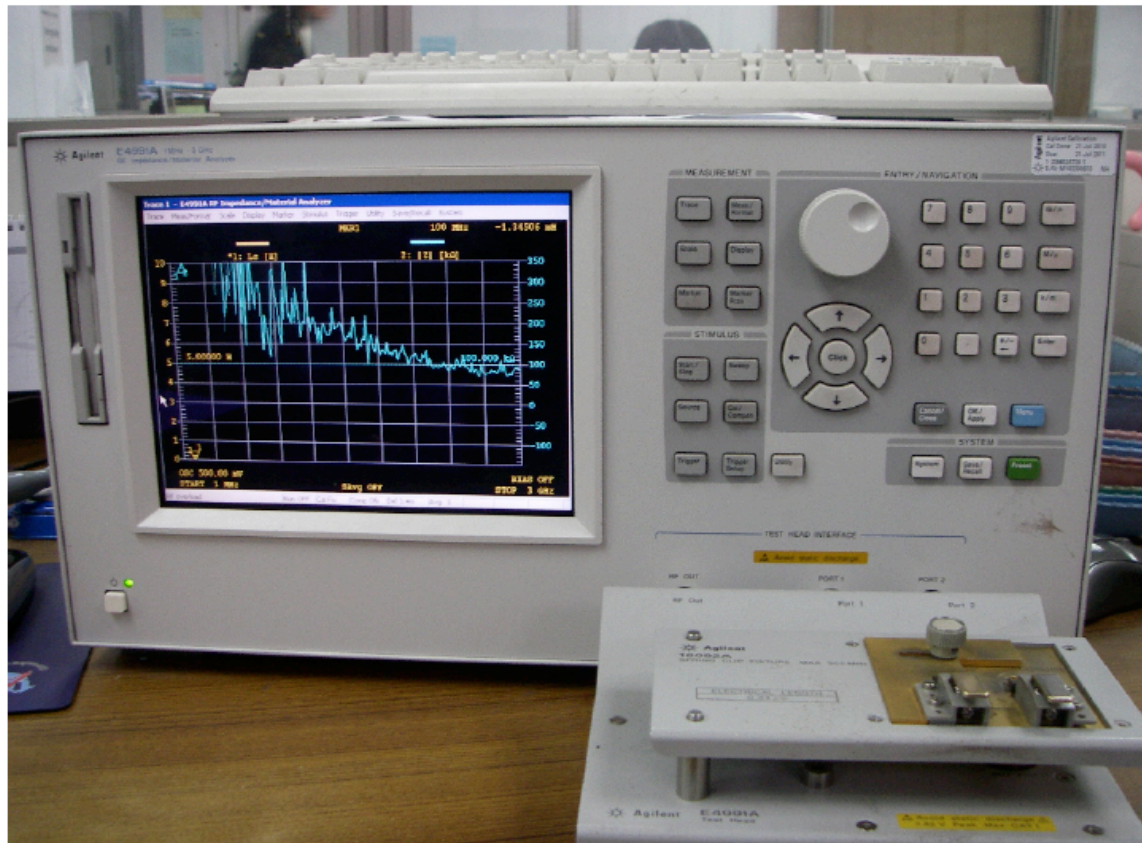
Remark: the test wire should be centered inside the ferrite



3 Interpretation result

Due to possible deviations a tolerance of -10% (≥ 180 Ohm) can be accepted.

IMPEDANCE ANALYZER:E4991A



Test Fixture



17 Appendix G: Example letter

Example letter for requirements Kabel Keur products in a factory packing²³ (English version)

Concerns: Kabel Keur Products:

Dear xxxxxxxxxxxxxxxxxxxx

“Kabel Keur” is a quality certification mark for broadband in-home network products, initiated in 2008 by NLKabel (Dutch Association of Broadbandcable service providers). Today a variety of products have been tested and certified. Xxxxx xx is allowed to use the “Kabel Keur” logo on the products that have tested to fulfil the severe requirements of “Kabel Keur”. The Appendix gives an overview of these certified products

The products in the accompanying list however are (OEM) products in a factory packaging Your company also buys one or more of these (OEM) products. “Kabel Keur” requires these products will only be used for purposes of installation. It is not allowed to further distribute them ore sell them to consumers.

Products having “Kabel Keur” may only be sold to consumers taking into account the “Kabel Keur” requirements concerning packaging and accompanying instructions for use etc.

We ask you to support the guidelines edited by “Kabel Keur”. We assume you will respect the requirements and follow the guidelines. In case you don’t we will not be able to supply you the specific “Kabel Keur” parts/products anymore. We are sure we both would be sorry about that.

We expect with this letter we have informed you adequately.

With kind regards,

Company:

Name:

(Dutch version)

Betreft: Kabel Keur producten

Geachte / Beste xxxxxxxxxxxx

“Kabel Keur”, het kwaliteitskeurmerk voor producten voor binnenhuisinstallaties, is in 2008 door NLkabel (vereniging van Nederlandse Kabelbedrijven) geïnitieerd. Inmiddels hebben wij verschillende bestaande roducten laten certificeren. Deze producten, waarvoor xxxxxxxx het “Kabel Keur” logo mag voeren, voldoen aan de strenge eisen van “Kabel Keur”. In de bijlage treft u een overzicht aan van de producten welke zijn gecertificeerd.

De producten volgens bijgaande lijst zijn echter (OEM) producten in een fabrieksverpakking.
Ook uw bedrijf neemt een of meerdere van deze (OEM) producten af.

²³ Voorbeeld brief “Voorwaarden Kabelkeur producten in fabrieksverpakking”

Volgens de voorwaarden die Kabel Keur stelt, mogen deze producten alleen gebruikt worden voor installatiedoeleinden en is het niet toegestaan deze producten verder te distribueren c.q. te verkopen aan consumenten en/of door te verkopen.

“Kabel Keur” producten die aan de consument worden geleverd, moeten voldoen aan de door NL Kabel in het kader van het “Kabel Keur” gestelde eisen met betrekking tot de verpakking, gebruiksaanwijzing e.d.

Wij verzoeken u mee te werken aan de richtlijnen zoals Kabel Keur die heeft opgesteld.

Wij gaan er van uit dat u de voorwaarde zult respecteren en overeenkomstig zult handelen. Het niet opvolgen hiervan zou anders inhouden dat wij de betreffende Kabel Keur producten niet meer aan u mogen leveren. Voor alle partijen is dat uiteraard geen wenselijke situatie.

Wij vertrouwen erop u met deze brief op de juiste wijze op de hoogte te hebben gesteld.

Met vriendelijke groet,

XXXXXXXXXXXXXXXXXX

Firma

Naam