# PVE Keurmerk Active and Passive In-house materials

Document name	PVE Keurmerk v3.0.doc
Project name	Keurmerk
Classification	Public
Author	J.P. Cnossen NLKabel on behalf
	of College of Experts
Location of File	NLkabel
	Lange Voorhout 90
	2514 EJ Den Haag

Document status	Final
Completion date	1 June 2010
Version no.	V3.0
Number of pages	49

Approved by

R van Esch NLKabel

Signature

C.J.

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.

## 1 Document information

#### 1.1 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 KMI (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> <li>Production change added in chapter 7 2<sup>nd</sup> paragraph to make this article also applicable in case of a new producer</li> <li>3 dB relaxation allowance added as footnote 30 chapter 10.2</li> <li>Clamping force F-connector changed footnote 81/82 in chapter 10.5</li> </ul>	JPC
3.0	11-5-2010	General update and new products added	JPC

## 1.2 Reviewed by

Name	Date	Signature
"College van Deskundigen":	1 June 2010	
Cok Arkestijn Ziggo		
John Louwerse UPC NL		p/o Thomas
John Raeskin Technetix		
Henk van Dok Hirschmann		
Robert Schotman Hemmink		
Sander Stravers KMI		
	<u> </u>	

## 2 Table of content

1	Document information	. 2
	1.1 Version control	. 2
	1.2 Reviewed by	. 2
2	Table of content	. 3
3	Introduction	. 5
4	Scope	. 6
5	Definitions, abbreviations and references	. 7
6	Organization	. 9
7	Validity and abuse	11
8	Qualifying for certification procedure	12
	8.1 Qualifying for certification	12
	8.2 Applying for certification	12
	8.3 Prototypes	12
	8.4 Quote	12
	8.5 Certification	13
	8.5.1 Option 1	13
	8.5.2 Option 2	13
	8.5.3 Option 3	14
	8.6 Intermediate results	14
	8.7 Quality assurance	14
	8.8 Laying an Appeal	14
	8.9 Use of the "Kabel Keur" quality mark	15
	8.10 Trace-ability of certified products	15
	8.11 Annual surveillance	15
	8.12 Re-certification	15
9	Special products	16
10	General requirements, labeling and packaging	17
	10.1 General requirements	17
	10.2 Product labeling and packaging requirements	18
11	Passive components	20
	11.1 AOP	20
	11.2 Wall outlet	21
	11.3 Two way Splitters	22
	11.4 Cable	23
	11.4.1 Cable (equipment fly-lead)	23
	11.4.2 Coax installation cable (indoor mounting cable)	24
	11.4.3 Coax 9 (indoor mounting cable)	25
	11.5 Connectors and adaptors	26
	11.5.1 IEC Male / Female connector	26
	11.5.2 F-type connector	26
	••	

12	Active components	27
	12.1 Amplifier	27
13	HDMI cable	30
14	SCART cable	32
15	Diplex filter	33
16	Port terminator	34
17	Special products	35
Appe	ndix A: Logo's	36
Appe	ndix B: F-connectors	38
Appe	ndix C: IEC connectors	42
Арре	ndix D: Cable clamp	46

## 3 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 such services demands high performance in-house cabling-systems to meet the high quality of service associated with their services. 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 only 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 branch 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 <u>www.Kabel Keur.nl</u>.

To qualify for certification a manufacturer or trader can ask the Keurmerkinstituut (KMI) 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. Firstly, KMI investigates whether the technical specifications in theory meet the requirements. To make this possible, the requesting supplier hands over a completed application form. By handing over this form the requesting supplier enters into a consent with NLkabel and KMI. 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 at the NLkabel Website (www.NLkabel.nl) or be applied for at KMI Zoetermeer (www.keurmerk.nl).

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

## 4 Scope

This specification is for all in-house components of an integrated multimedia coaxial home network suitable for the Dutch cable market.

## 5 Definitions, abbreviations and references

"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.
"Abonnee Overname	A device that separates the cable operators network (MSO responsibility
Punt" (AOP)	domain) from the in-home network (subscriber responsibility domain).
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.
SCART cable	SCART cable, is a 21-pin connector cable for connecting audio-visual (AV) equipment together.
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"	Specifications that products have to meet to obtain the "Kabel Keur"
(PVE-document)	certification mark, as well as guidelines and instructions for the use of the "Kabel Keur" Certification mark.
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	All parties involved in Kabel Keur certification.

"Kabel Keur" certification	Independent institute contracted by NLkabel to execute the qualification
Agency	process.
Qualified product	A qualified product certification agency is an institution accredited by the
certification agency	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 preferably
	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.
Vefica	The Dutch Society of Manufacturers and Suppliers to the Broadband
	Industry.

## 6 Organization

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", KMI, in which is stated that KMI will be responsible for all operational activities. KMI 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 which KMI 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 KMI. 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. KMI boards the testing to a qualified laboratory.



The laboratory examines the material on behalf of KMI according to the testing requirements (PVE Active and Passive in-house materials) and reports the results to KMI. KMI assesses the outcome and notifies to the requesting supplier on its findings. If the materials are approved then KMI, 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.



KMI 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 KMI 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 Validity and abuse

The validity period of a qualification certificate is 3 years. When the validity period of three years is expired the certificate can be extended after a re-evaluation.

Whenever a supplier changes the product specification or production of certified products it is the supplier's responsibility to immediately communicate the new specifications to NLkabel (KMI). NLkabel (KMI) will then judge whether the result of the changes necessitate re-certification. If so, the supplier will be informed accordingly.

In case a participating or non-participating supplier carries the certification mark illegally on non-certified products NLkabel will take whatever juridical steps it deems necessary to stop and prevent such abuse.

## 8 Qualifying for certification procedure

## 8.1 Qualifying for certification

This document mainly describes the technical requirements products have to meet to qualify for the "Kabel Keur" certification mark. The "Kabel Keur" certification mark is protected and registered by NLkabel. A college of experts comprising representatives of Dutch Cable Providers as well as leading manufacturers draft these requirements. Before testing a product the college of experts (CVD) will judge the applicability of a product in the Dutch market. The interoperability of products is a key decisive factor.

### 8.2 Applying for certification

To apply for certification, requesting suppliers can obtain an application form from KMI. Only completed and signed forms will be considered. By signing the form the requesting supplier declares himself in agreement with NLkabel to abide by the rules and regulations for using the certification "Kabel Keur" mark. After a completed entry form has been received, KMI will judge whether the products in the application are within the scope of the PVE. The next step consists of offering the products to NLkabel's members involved, who will judge whether the products can be applied successfully in the Dutch cable operation environment. If not, the certification procedure will be stopped. Products omitted from the PVE are not covered

### 8.3 Prototypes

For prototypes a pre-certification inspection can be applied for. In consultation with the requesting supplier KMI will choose of parts that require inspection. The results of the pre-certification inspection will be reported back to the requesting supplier. However this report will not contain a decision whether or not to allow the product to carry the certification mark. Dependant on the chosen parts for pre-certification inspection, the results from the pre-certification inspection can be used in the final certification procedure. KMI will however judge whether the prototypes being pre-inspected are equivalent to the final product. This pre-certification inspection will only be executed for products intended for commercial production.

### 8.4 Quote

After reception of a completed entry form KMI will issue a quote for the certification of applied products. For this quote, application costs will be charged. If a final order for certification is received, the application costs will be credited.

#### 8.5 Certification

To be able to complete a certification KMI requires the following:

- Technical specifications
- Product marking (batch codes, product codes for traceability etc.)
- Product information (directions for use, packing information etc.)
- Product samples (initial submission)

There are 3 options to enter the qualification process.

8.5.1 Option 1

This option is applicable when the requesting supplier:

- can demonstrate that its production process is ISO 9001 certified by a qualified certification agency and
- can give clear insight in the maximum spread of production parameters (for instance material specifications and dimensions) and production instructions.

By means of a lab test of the presented products KMI will inspect whether or not the technical requirements are met. To fulfill this, a number of samples per product type will be inspected in a qualified lab. The requesting supplier informs KMI when the first production batch is available. A "nulserie" or "null series" batch is allowed. KMI will then, if possible at acceptable cost, physically select a number of samples and inspect these. The number will be dependent on the product, determined by the spread of production parameters and the batch quantity. If the product complies with the requirements of this PVE, KMI will inform NLkabel of the outcome. Contact with the lab is only via KMI.

8.5.2 Option 2

This option is applicable when the requesting supplier:

- can demonstrate that its production process is ISO 9001 certified by a qualified certification agency,
- can give clear insight in the maximum spread of production parameters (for instance material specifications and dimensions) and production instructions and furthermore
- is able to demonstrate by means of recent lab reports from a qualified lab, that its products meet the technical requirements as stated in this PVE and that all procedures (for instance the procedure of taking samples) can be verified to be in agreement with this PVE (see also 8.5.1).

If the opinion of KMI is that the lab reports show that the PVE requirements and procedures are met sufficiently, the KMI will inform NLkabel of this outcome.

#### 8.5.3 Option 3

This option is applicable in the case of an already certified product that is sold under a private label. The rights and duties of a requesting (private label) supplier must be defined in a so-called "private label" agreement.

When the requesting (private label) supplier has handed over a completed and signed form, the KMI will issue a quote for a judgment of differences between the private label product and the original certified product. The differences will be mainly product information (packaging/directions for use), terms of delivery, complaints processes, quality system supplier etc. A lab investigation is not, in principle, needed in this case.

When the judgment process is completed with a positive result, the requesting (private label) supplier will be granted their own certificate that will also be announced as their certificate on the website.

8.6 Intermediate results

After testing (option 1) or the reports/procedures inspection (option 2) KMI will issue a oneoff interim result report to the requesting supplier. The requesting supplier will be offered the opportunity to solve minor deviations from the technical requirements if needed. Extra KMI handling costs will be charged additionally, because they are not contained in the original quote.

#### 8.7 Quality assurance

When products are approved the requesting supplier will acquire the "Kabel Keur" certification mark for the approved product for a period of three years. The requesting supplier will receive a certificate issued by NLkabel citing the product and period of validity. Depending on the product, the production process quality, or the results of testing randomly taken samples (see 8.12), the period of three years can be reduced.

8.8 Laying an Appeal

Products can be rejected for inspection (see 8.1) or can be given the mark "failed" in the inspection 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.

8.9 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 in accordance with the rules described in the specifications of the product. The "Kabel Keur" certification mark is granted for as long as the applicable regulatory requirements described in 'Richtlijnen gebruik' logo "Kabel Keur" are taken into account.

#### 8.10 Trace-ability of certified products

KMI 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.

8.11 Annual surveillance

Within the time period that the certificate is valid, intermediate inspections will be carried out to safeguard continuous fulfillment of the technical requirements of the "Kabel Keur" certification mark. KMI has established a process and procedure for this. The costs of these intermediate inspections will be charged to the inspecting 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) specifications
- Evaluation of customer/operator complaint registration
- Inspection of the quality system (of the certification holder and/or of the production location)
- Product labeling

#### 8.12 Re-certification

When the validity period of three years is expired the certificate can be extended after reevaluation.

At least the following aspects will be evaluated during the re-evaluation:

- Evaluation of customer/operator complaint registration
- Inspection of the quality system (of the certification holder and/or of the production location)
- Product labeling
- Verification of the (agreed) technical specifications or parts of (agreed) technical specifications. At least two parameters will be measured in a laboratory if product specifications are unmodified. When product specifications are modified the CVD decides which parameters will be measured. The product has to comply with the version of the PVE current at the time of re-certification...

## 9 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 10 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 MSOs and, in this case, the notification is not required.

A selection of CVD members, consisting of the vendor of the special product(s), the MSO intending to supply the special product(s), NLKabel, KMI and Telefication will specify the Kabel Keur requirements for special products and will decide whether the special product fulfils the requirements of Kabel Keur. These requirements will be derived from similar non-special product specifications in the PVE.

### 10 General requirements, labeling and packaging

This chapter details general information for all devices that opt for the "Kabel Keur" certification mark.

Item	description	remark
10.1.1	Standard product specification sheet.	In Dutch or English
10.1.2	Copy of the device applicable certificates / statements showing	In Dutch or English. The
	compliance to:	requirement is that the
	CE (Low Voltage Directive 93/68/EEG plus publ. page L216 (1997)) in	product complies with
	case of active equipment	these directives if
	ROHS	applicable and that this is
	WEEE	demonstrable.
10.1.3	Durability statement	
	Requesting supplier must hold and demonstrate <sup>1</sup> a valid ISO	
	9001:2000 certificate for the production process leading to the	
	specified product.	
	Requesting supplier must have a compliant registration system and	
	must report once per half year on the "Kabel Keur" items.	
10.1.4	Usability in Dutch market situation (see 8.1).	If the item is usable in the
	Before the inspection process starts the usability of a product in the	Dutch cable the product will
	Dutch cable market will be reviewed by the College of Experts	be given permission to
	$(CVD)^2$ .	enter the inspection
		process.
10.1.5	Materials used for all contact interfaces	Materials must have good
	Information on the elements used in the (plating) material.	electrical-, corrosion- <sup>3</sup> , cpd-
		and durability
		characteristics.
10.1.6	Instructions for use:	
	It is essential that 'where important' an overview of external factors	
	that can have influence on the performance of the product are	
	submitted	
10.1.7	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. "Kabel Keur" products must have at	
	least a 3 year warranty period.	

#### 10.1 General requirements

<sup>&</sup>lt;sup>1</sup> Demonstration only at the start of the inspection process of a specific supplier

<sup>&</sup>lt;sup>2</sup> Reviews will be carried out by the technical departments of Dutch Cable Providers on behalf of the CVD

of the CVD <sup>3</sup> The used alloy materials in the device must have a low step voltage (≤ 0,5V electro chemical potential difference referenced to copper) in relation to each other to minimize corrosion effects.

10.2	Product	labeling and	packaging	requirements
------	---------	--------------	-----------	--------------

Item	description	requirement
10.2.1	Identifications:	
	a. Article number	
	b. Product identification and number	
	c. Batch number	
	d. Contact details vendor	
	e. Logo complete monochrome <sup>4</sup>	
	f. Logo simplified <sup>4</sup>	
	g. Logo complete full colour <sup>4</sup>	
	h. Text "Kabel Keur certified"	
	i. User guide <sup>5</sup>	
	j. Installation instruction <sup>6</sup>	
	k. Area of application <sup>7</sup>	
10.2.2	Requirements Consumer packaging:	Box: a, b, d, g, k
	(identification refers to 10.2.1)	Blister a, b, d, g, k
		Reel, roll: a, b, d, g, k
		Foil: a, b, d, g, k
		Alternatives: a, b, d, g, k
10.2.3.	Requirements Factory packaging <sup>8910</sup> for supply to	Box: a, b, c ( in case not on the product itself), d
	Private label companies and Installation-Contractors.	Blister a, b, c (in case not on the product itself), d
	Not for consumer sale/resell purposes:	Reel, roll: a, b, c ( in case not on the product itself), d

<sup>&</sup>lt;sup>4</sup> Refers to: "Richtlijn Logo gebruik Kabel Keur juli 2009 (Appendix A)

<sup>&</sup>lt;sup>5</sup> A user guide, also commonly known as manual, is a technical communication document intended to give assistance to users of a product on installation and use. There is a guide per Kabel Keur product and it contains both a written text and associated images. The user guide is packed in combination with the product and is drafted (at least) in Dutch.

<sup>&</sup>lt;sup>6</sup> A simplified user guide that has the intention to show to 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 guide can be a booklet or leaflet with text and images or the Installation guide can be printed on the packaging. The installation guide is packet in combination with the product. The text is drafted (at least) in Dutch.

<sup>&</sup>lt;sup>7</sup> The area of application defines the area where a product can be practiced and must be printed on the Consumer packaging of a product.

<sup>&</sup>lt;sup>8</sup> Factory packaging is only allowed for supply to Private label companies (re-brand and re-pack) and for direct deliveries to contractors for installation purposes. Factory packaging must not be used for reselling to consumers.

<sup>&</sup>lt;sup>9</sup> A user guide (i) or Installation guide (j) is not required for a product in Factory packaging.

<sup>&</sup>lt;sup>10</sup> Suppliers and their customers are not allowed to sell or resell Products without an approved

Consumer packaging to consumers. The holder of the certificate, his customers and or resellers

	(identification refers to 10.2.1)	Foil: a, b, c ( in case not on the product itself), d Alternatives: a, b, c ( in case not on the product itself), d
10.2.4	Requirements per product type	
	AOP	b,c,f/g,i
	Wall Outlet	b,c,f/g,i
	Two way splitter	b,c,f/g,j
	Connector	j
	Port terminator	not applicable
	Adaptor	not applicable
	Cable	b, c <sup>11</sup> , f/g/h
	Fly lead	b, c <sup>11</sup> , f/g/h
	Amplifier	b, c, g, i
	HDMI cable	b, c, f/g/h
	Scart cable	b, c, f/g/h
	Diplex filter	b, c, f/g, j
	Special product	b, c, f/g, i/j
		1

have to 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).

<sup>11</sup> Batch number must be on the product or on the (factory) packaging of the product.

### 11 Passive components

#### 11.1 AOP

#### Device description: fully isolated system outlet

item	description	remark	specification	tolerance	protocol
11.1.1	Impedance	5-1000 MHz	75 Ω	75 Ω	
					statement
11.1.2	Connector in		F / cable clamp <sup>12</sup>		Appendix B
			(C6, C9, C12)		
11.1.3	Connector out		F or IEC		Appendix B, C
11.1.4	Insertion loss in > out	5 - 1000 MHz	0,5 dB	± 0,4 dB	IEC 60728-4 §4.3
11.1.5	Return loss input port	5 - 65 MHz	≥ 18 dB <sup>13</sup>		IEC 60728-4 §4.6
		65 - 1000 MHz	≥ 18 dB <sup>13</sup>		
11.1.6	Return loss output port	5 - 65 MHz	$\geq$ 18 dB <sup>13</sup>		
		65 - 1000 MHz	$\geq$ 18 dB <sup>13</sup>		
11.1.7	Surge protection	On input	1kV		IEC 1000-4-5
11.1.8	Galv. Isolation 2120 V DC	Inner conductor input >	≤ 0.7 mA	< 0.7 mA	
		inner conductor output	-,		§10
		Outer conductor input >	≤ 0,7 mA		
		outer conductor output			
11.1.9	Galv. Isolation 230 V AC	Inner conductor input >	≤ 8.0 mA RMS		
		inner conductor output			
		Outer conductor input >	≤ 8.0 mA RMS		
		outer conductor output			
11.1.10	Screening effectiveness	5- 1000 MHz	Class A		IEC 60728-2
					46
11.1.11	Operating temperature		0 - 55 °C		10
11 1 12	range Grounding		Composition for		
11.1.12	Grounding		Connection for		
1		1	2.5mm cable	1	1

<sup>&</sup>lt;sup>12</sup> No specific design or protocol is mandatory for the cable clamp ('butterfly')

<sup>&</sup>lt;sup>13</sup> Specification at f<40 MHz and -1.5dB/oct. f>40 MHz

<sup>&</sup>lt;sup>14</sup> 1 kV pulse (rise time 1.2 µsec/fall time 50 µsec)

<sup>&</sup>lt;sup>15</sup> After this test the unit still has to meet its insertion loss and return loss specifications

<sup>&</sup>lt;sup>16</sup> Insertion loss and return loss must comply to specifications to be measured at temperatures extremes.

#### 11.2 Wall outlet

#### Device description: two port system wall-outlet

item	description	Remark	specification	tolerance	Protocol
11.2.1	Impedance	5-1000 MHz	75 Ω		vendor
					statement
11.2.2	Connector in		cable clamp <sup>17</sup> /		Appendix D / B
			F		
11.2.3	Connectors out		F/IEC		Appendix B, C
11.2.4	Insertion loss in > TV out	5 - 65 MHz	≤ 1,5 dB		IEC 60728-4 §4.3
		120 - 1000 MHz	≤ 1,5 dB		_
11.2.5	Insertion loss in > R out	87,5 – 108 MHz	≤ 2,5 dB		
11.2.6	Return loss input port	5 - 65 MHz	≥ 18 dB		IEC 60728-4
		87,5 – 108 MHz	≥ 10 dB		§4.6 <sup>18</sup>
		120 - 1000 MHz	≥ 18 dB <sup>19</sup>		
11.2.7	Return loss in > R as	87,5 – 108 MHz	≥ 14 dB		
	above				
11.2.8	Return loss in > TV as	5 - 65 MHz	≥ 18 dB		
	above	120 - 1000 MHz	≥ 18 dB		-
11.2.9	Isolation TV - R	5 - 65 MHz	≥ 20 dB		IEC 60728-4 §4.2
		87,5 – 108 MHz	≥ 16 dB		
		120 - 1000 MHz	≥ 20 dB		
11.2.10	Surge protection	On input	1kV		IEC 1000-4-5
					level 2 <sup>20 21</sup>
11.2.11	Galv. Isolation 2120 V DC	Inner conductor input >	≤ 0,7 mA		IEC 60728-11
		inner conductor output			§10
11.2.12	Galv. Isolation 230 V AC	Inner conductor input >	≤ 8.0 mA RMS		
		inner conductor output			
11.2.13	Screening effectiveness	5- 1000 MHz	Class A		IEC 60728-2
11.2.14	Operating temperature		0 - 55 °C		22
	range				

<sup>&</sup>lt;sup>17</sup> No specific design or protocol is mandatory for the cable clamp ('butterfly'), direct screw connection not allowed

<sup>&</sup>lt;sup>18</sup> A relaxation as specified in IEC 60728-4 paragraph 5.3.4.1 is admitted

<sup>&</sup>lt;sup>19</sup> Specific at f<40 MHz and -1,5 dB/oct. f>40 MHz

<sup>&</sup>lt;sup>20</sup> 1 kV pulse (rise time 1.2 µsec/fall time 50 µsec)

<sup>&</sup>lt;sup>21</sup> After this test the unit still has to meet its insertion loss and return loss specifications

 $<sup>^{\</sup>rm 22}$  Insertion loss and return loss must  $% 10^{-10}$  comply to specifications to be measured at temperature

extremes

#### 11.3 Two way Splitters

Device descrip	ption: two	o way	splitter

item	Description	Remark	specification	tolerance	Protocol	
11.3.1	Impedance	5-1000 MHz	75 Ω		vendor	
					statement	
11.3.2	Connector in/out <sup>23</sup>		F / IEC		Appendix B, C	
11.3.3	Insertion loss in > out <sup>24</sup>	5 – 470 MHz	≤ 4,0 dB		IEC 60728-4	
		470 – 860 MHz	≤ 4,0 dB		§4.3	
		860 – 1000 MHz	≤ 4,3 dB			
11.3.4	Return loss input <sup>25</sup>	5 – 15 MHz	≥ 20 dB		IEC 60728-4	
		15 – 860 MHz	≥ 22 dB		§4.6	
		860 – 1000 MHz	≥ 15 dB			
11.3.5	Isolation out > out $^{25}$	5 – 15 MHz	≥ 20 dB		IEC 60728-4	
		15 – 65 MHz	≥ 26 dB		§4.2	
		65 – 860 MHz	≥ 26 dB			
		860 - 1000 MHz	≥ 18 dB			
11.3.6	Intermodulation	A minimum IMD of -105	-105 dBc		IEC 60728-4	
		dBc shall be measured at			§4.8	
		the output(s) while				
		applying two carriers (60 &				
		65 MHz), out to out, @				
		120 dBµV/60 dBmV, after				
		1kV Combination Wave				
		(1,2μS rise time/50μS				
		duration) has been applied				
		at each port.				
11.3.7	Screening effectiveness	5- 1000 MHz	Class A		IEC 60728-2	

<sup>&</sup>lt;sup>23</sup> Component may be equipped with either an IEC or F connector or a combination of both

 $<sup>^{\</sup>rm 24}$  A relaxation of 0,5 dB is allowed in case the two-splitter is equipped with special ingress- or high voltage protection features

 $<sup>^{\</sup>rm 25}$  Specific at f<40 MHz and -1,5 dB/oct, f>40 MHz

#### 11.4 Cable

#### 11.4.1 Cable (equipment fly-lead)

#### Device description: coaxial cable with fixed connectors

item	description	remark	specification	tolerance	Protocol
11.4.1.1	Impedance	5-1000 MHz	75 Ω		vendor
					statement
11.4.1.2	Cable length		max. 10,1		
			meters <sup>26</sup>		
11.4.1.3	Return loss	5 – 1000 MHz	≥ 18 dB		IEC 60728-4
					§4.6
11.4.1.4	Insertion Loss <sup>27</sup>	Measurement freq.	Cable		IEC 60728-4
		862 MHz	attenuation		§4.3
			≤0,5 dB/m,		
			connector loss ≤		
			0,4 dB per		
			connector		
11.4.1.5	Tensile strength (t = 60 s) <sup>28</sup>		≥ 60 N		29
11.4.1.6	Connector in/out	Molded	F / IEC <sup>30</sup>		Appendix B , C
11.4.1.7	F male nut torque	Equipped with F- connectors	3,95 Nm		
11.4.1.8	Screening	5- 1000 MHz	Class A		IEC 60728-2
	effectiveness				
11.4.1.9	Bend radius without		50 mm		31
	damaging the cable				

<sup>&</sup>lt;sup>26</sup> Length is without connectors

Attenuation other cable lengths in proportion

<sup>&</sup>lt;sup>28</sup> Pull force applied to the connectors

<sup>&</sup>lt;sup>29</sup> After this test the unit still has to meet its insertion loss and return loss specifications

<sup>&</sup>lt;sup>30</sup> Component may be equipped with either an IEC or F connector or a combination of both

<sup>&</sup>lt;sup>31</sup> For testing: Bend and stretch cable four times in an angle of 90 degrees with a diameter of the bending radius. No physical damage may appear and the screening and impedance irregularity requirements still have to be met

### 11.4.2 Coax installation cable (indoor mounting cable)

#### Device description: Coaxial cable

item	description	remark	specification	tolerance	Protocol
11.4.2.1	Impedance	5-1000 MHz	75 Ω		vendor
					statement
11.4.2.2	Insertion loss	@ 860 MHz	≤ 27 dB/100m		IEC 60728-4 §4.3
11.4.2.3	Material centre		solid copper /		
	conductor		copper cladded		
			steel / silver		
			cladded copper		
11.4.2.4	Material outer		Aluminium/copper		
	conductor		laminated foil		
			which is bonded		
			to the dielectric, a		
			tinned, copper		
			cladded or full		
			copper braid or a		
			combination		
11.4.2.5	Material dielectric		PE		vendor
					statement
11.4.2.6	Material jacket		PVC		vendor
					statement
11.4.2.7	Diameter Center		0,7 - 1,15 mm		
	conductor				
11.4.2.8	Diameter dielectric		4,80 mm	± 0,2 mm	
11.4.2.9	Diameter jacket		7,00 mm	+ 0,0 mm	
				/	
				-0,7 mm	
11.4.2.10	Bend radius without		70 mm		32
	damaging the cable				
11.4.2.11	Return loss	5-30 MHz	≥ 27 dB		IEC 60728-4 §4.6
		30-470 MHz	≥ 23 dB		
		470-862 MHz	≥ 20 dB		
11.4.2.12	Screening effectiveness	5- 1000 MHz	Class A		IEC 60728-2

<sup>&</sup>lt;sup>32</sup> For testing: Bend and stretch cable four times in an angle of 90 degrees with a diameter of the bending radius. No physical damage may appear and the screening and impedance irregularity requirements still have to be met

#### 11.4.3 Coax 9 (indoor mounting cable)

#### Device description: Coaxial cable

r					
item	description	remark	specification	tolerance	Protocol
11.4.3.1	Impedance	5-1000 MHz	75 Ω <sup>33</sup>		vendor
					statement
11.4.3.2	Insertion loss	@ 860 MHz	18 dB/100m	+0%/-10%	IEC 60728-4
					§4.3
11.4.3.3	Material center		solid copper /		vendor
	conductor		copper cladded		statement
			steel / silver		
			cladded copper		
11.4.3.4	Material outer		Aluminium/copper		vendor
	conductor		laminated foil		statement
			which is bonded		
			to the dielectric, a		
			tinned, copper		
			cladded or full		
			copper braid or a		
			combination		
11.4.3.5	Material dielectric		Gas injected PE		vendor
					statement
11.4.3.6	Material jacket		UV stabile PVC		vendor
					statement
11.4.3.7	Diameter Center		1,10 mm	± 0,05	
	conductor			mm	
11.4.3.8	Diameter dielectric		4,80 mm	± 0,15	
				mm	
11.4.3.9	Diameter jacket		7,10 mm	± 0,2 mm	
11.4.3.10	Bend radius without		35 mm		34
	damaging the cable				
11.4.3.11	Return loss <sup>35</sup>	5 - 30 MHz	≥ 27 dB		IEC 60728-4
		30 – 470 MHz	≥ 27 dB		§4.6
		470-1000 MHz	≥ 24 dB		
11.4.3.12	Screening	5- 1000 MHz	Class A		IEC 60728-2
	effectiveness				

<sup>&</sup>lt;sup>33</sup> All equipment should be designed for a 75 Ohm environment (vendor statement)

<sup>&</sup>lt;sup>34</sup> For testing: Bend and stretch cable four times in an angle of 90 degrees with a diameter of the bending radius. No physical damage may appear and the screening and impedance

irregularity requirements still have to be met

<sup>&</sup>lt;sup>35</sup> In each frequency band 3 peak return loss values up to 3 dB lower than the stated limits are permissible

#### 11.5 Connectors and adaptors (an adaptor is a combination of two connectors)

#### 11.5.1 IEC Male / Female connector

#### Device description: connector IEC male and IEC female

item	description	remark	specification	tolerance	Protocol
11.5.1.1	Impedance	5-1000 MHz	75 Ω		vendor
					statement
11.5.1.2	Return loss	5 – 1000 MHz	≥ 20 dB <sup>36</sup>		IEC 60728-4
					§4.6
11.5.1.3	Screening effectiveness		Class A		IEC 60728-2
11.5.1.4	Mechanical parameters <sup>37</sup>				Appendix B, C
11.5.1.5	Pull force	Pull force after 10	≥4 Kgf		
		matting's			

#### 11.5.2 F-type connector

Device description: connector F-type male and F-type female

item	description	remark	specification	tolerance	Protocol
11.5.2.1	Impedance	5-1000 MHz	75 Ω		vendor
					statement
11.5.2.2	Return loss	5 – 1000 MHz	≥ 20 dB <sup>38</sup>		IEC 60728-4
					§4.6
11.5.2.3	Screening effectiveness		Class A		IEC 60728-2
11.5.2.4.	Mechanical parameters		compression or		Appendix B, C
			one time mount		
			only		

<sup>&</sup>lt;sup>36</sup> 1,5 dB.oct

 $<sup>^{37}</sup>$  Mechanical parameters only (dimensions, mating force)  $^{38}_{\phantom{38}}$  1,5 dB.oct

### 12 Active components

#### 12.1 Amplifier

Device description: Amplifier with one or multiple outputs, either wall mounted or pushon.

item	description		remark	specification	tolerance	Protocol
12.1.1	Gain forward p	oath (port – port)	85 - 862 MHz	1 – 9 dB <sup>39</sup>	± 1,5 dB <sup>40</sup>	IEC 60728-4
	range	range				§4.3
12.1.2	Cable compens	sating slope	85 - 862 MHz	≤ 1,5 dB <sup>40</sup>		
12.1.3	Gain return pa	th (port – port) range	5 - 65 MHz			IEC 60728-4
	- Forwa	ard gain ≥7 dB		0 - 5 dB		§4.3
	- Forwa	ard gain <7 dB		0 - 2 dB		
12.1.4	Gain ripple/err	or	5 - 65 MHz		± 1,0 dB	
12.1.5.	Connectors in-	out		F, IEC		Appendix B, C
12.1.6	Isolation	<b>RF-IN to Outputs</b>	5 - 65 MHz	≥ 26 dB		IEC 60728-4
		Outputs to RF-IN	85 - 862 MHz	≥ 26 dB		§4.2
		Outputs to Outputs	5 – 15 MHz	≥ 20 dB		
		Outputs to Outputs	15 - 65 MHz	≥ 30 dB		
		Outputs to Outputs	85 - 862 MHz	≥ 26 dB		
12.1.7	Return loss inp	out <sup>41</sup>	5 – 65 MHz	≥ 18 dB		IEC 60728-4
			85 – 862 MHz	≥ 18 dB		§4.6
12.1.8	Return loss ou	tput <sup>42</sup>	5 – 65 MHz	≥ 18 dB		
			85 – 862 MHz	≥ 18 dB		
12.1.9	Noise figure		5-65 MHz	≤ 18 dB		IEC 60728-4
			85-120 MHz	≤ 9 dB		§4.4
			120-862 MHz	≤ 8 dB		
12.1.10	Nominal input	level (PAL) <sup>43</sup>		≤ 77 dBuV		
12.1.11	Forward	CSO. @ (77+gain) dBu	IV output	< - 64 dBc <sup>44</sup>		IEC 60728-3
	path					§4.2.3
	distortion	CTB . @ (77+gain) dB	uV output	< - 64 dBc <sup>44</sup>		IEC 60728-3
						§4.2.2

<sup>&</sup>lt;sup>39</sup> Unit may have either equal gain outputs or stepped gain outputs. Low gain amplifiers have preferable no adjustable gain.

<sup>&</sup>lt;sup>40</sup> Gain forward path tolerance including temperature variation and gain ripple are indicated in the figures below

<sup>&</sup>lt;sup>41</sup> Specification at f<40 MHz and -1,5/oct (f>40MHz)

<sup>&</sup>lt;sup>42</sup> Specification at f<40 MHz and -1,5/oct (f>40MHz)

<sup>&</sup>lt;sup>43</sup> Input channel load consists of 42 FM Channels, between 30-50 analogue (PAL) channels and 30-50 digital (QAM) signals

<sup>&</sup>lt;sup>44</sup> Measured at output level (output level = input level + gain)

-	1			1		
12.1.12	Reverse path distortion (in	Second order IMA (2 dBuV input	e-tone) @ 115	< - 50 dB		IEC 60728-4 §4.8
	band)	Third order intermo	dulation	< - 50 dB		IEC 60728-4
	,	distortion @ 115 dB	μV input			§4.8
12.1.13	Reverse path	2 <sup>nd</sup> and 3 <sup>rd</sup> order inte	ermodulation @	< - 72 dBc		IEC 60728-4
	distortion	115 dBµV reverse pa	ath input @ 58			§4.8
	into forward	$dB\mu V$ forward path i	nput level			(measured at
	path					forward output
			1			port)
12.1.14	Spurious/oscill	ation	5-65 MHz	≤ -20 dBuV	To be	Measuring
			85-862 MHz		on all In-	method
					Output	Spectrum
					ports. All	analyzer, no
					ports	signals
					terminateu.	connected
12.1.15	Group delay 5-	10 MHz	Δ2MHz	≤ 30 ns		IEC 60728-4
12.1.16	Group delay 10-65 MHz		Δ2MHz	≤ 10 ns		§4.4
12.1.17	Group delay 85	5-120 MHz	Δ 4.43 MHz	≤ 20 ns		-
	Group delay 12	20-862 MHz	Δ 4.43 MHz	≤ 10 ns		
12.1.18	Surge protection	on	On input	1kV		IEC 1000-4-5 level 2 <sup>45</sup>
12.1.19	Galv. Isolation	2120 V DC	Inner	≤ 0.7 mA		IEC 60728-11
			conductor			§10
			conductor			
			output			
12.1.20	Galv. Isolation	230 V AC	Inner	≤ 8.0 mA RMS		IEC 60728-11
			conductor			§10
			conductor			
			output			
12.1.21	Screening effe	ctiveness	5- 1000 MHz	Class A		IEC 60728-2
12.1.22	Operating tem	perature range		0 - +40 <sup>0</sup> C		
12.1.23	Power			< 7 W <sup>46</sup>		
12.1.24	Grounding			Connection for		
				2.5 mm cable		

 $<sup>^{\</sup>rm 45}$  1 kV pulse (rise time 1.2  $\mu sec/fall$  time 50  $\mu sec$ 

<sup>&</sup>lt;sup>46</sup> Including power supply ( when applicable)





## 13 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 <u>TV</u> or <u>PC</u> video format, including standard, enhanced, and <u>high-definition video</u>, up to 8 channels of digital audio, and the Consumer Electronics Control signal.

item	description	Remark	specification	tolerance	Protocol
13.1.1	Construction		Fully shielded cable. Molded ends. Inner hood connected 360 degrees to the connector for complete end shielding.		HDMI Specification High Speed (category 2) (
13.1.2	Interface		HDMI-A Interface <u>[1]</u>		HDMI Specification High Speed (category 2)
13.1.3	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 200 Ohm @ 100 MHz		
13.1.4	Marking		"Kabel Keur certified" and HDMI label must be printed on the cable (label) or the connector <sup>47</sup>		

<sup>47</sup> Label format corresponding to www.hdmi.org

13.1.5	HDMI approved	The ve provid	ndor must e a	
		certific	ate of HDMI	
		ATC co	ompliance	
		and ar	ATC testing	
		result		

## 14 SCART cable

Device description: SCART (from *Syndicat des Constructeurs d'Appareils Radiorécepteurs et Téléviseurs, Radio and Television Receiver Manufacturer's Association*) is a <u>French</u>originated standard and associated 21-pin connector for connecting audio-visual (AV) equipment together. SCART is the most common method of connecting audio-visual equipment together, and has become a standard connector for such. The official standard for SCART is <u>CENELEC</u> document number EN 50049-1. SCART is sometimes referred to as the IEC 933-1 standard.

item	description	Remark	specification	tolerance	Protocol
14.1.1	Construction		Cable assembled with SCART connectors(Euro connector) Shielding: All video and audio connections separately shielded		CENELEC EN 50049-1 (IEC 933-1) IEC 60807-9 EN50157 (General req. Of AV link of SCART connection)
14.1.2	Interface		SCART[2]		CENELEC EN 50049-1 (IEC 933-1) IEC 60807-9 EN50157 (General req. Of AV link of SCART connection)
14.1.3	Video attenuation		0-5 MHz <0,5 dB		
14.1.4	Electrical requirements		Video: 6*75 Ohm coaxial Audio: 4*>= 0,1 mm2, stereo Maximum resistance of interconnected contact pins < 5 ohm		
14.1.5	Connector details		21 pins, male connector. All pins wired.		
14.1.7	Video/audio requirements		Crosstalk: < -35 dB		

## 15 Diplex filter

## Device description: RTV duplex/data filter

item	Description	Remark	specification[3]	tolerance	Protocol
15.1.1	Impedance	5-862 MHz	75 Ω		vendor statement
15.1.2	Connector in/out		In IEC female TV IEC male R IEC female		Appendix C
15.1.3	Insertion loss in > TV	5 – 70 MHz	≤ 1,0 dB		IEC 60728-4 §4.3
		120-140 MHz	≤ 1,0 dB		
		140-862 MHz	≤ 0,5 dB		
15.1.4	Insertion loss in > TV	5 – 70 MHz	≥ 25,0 dB		IEC 60728-4 §4.3
		87,5-108 MHz	≤ 2,0 dB		
15.1.5	Return loss TV	5-70 MHz	≥14 dB		IEC 60728-4 §4.6
		120-862 MHz	≥14 dB		
15.1.6	Return loss R	87,5-108 MHz	10 dB		IEC 60728-4 §4.6
15.1.7.	Return loss In	5-70 MHz	≥14 dB		IEC 60728-4 §4.6
		87,5-108 MHz	10 dB		
		120-862 MHz	≥14 dB		
15.1.8	Isolation TV-R	5 – 70 MHz	≥ 25 dB		IEC 60728-4 §4.2
		87,5-108 MHz	≥16 dB		
		120 – 862 MHz	≥ 25 dB		
15.1.9	Screening effectiveness	5- 1000 MHz	Class A		IEC 60728-2

## 16 Port terminator

item	description	remark	specification	tolerance	Protocol
16.1.1	Impedance	5-1000 MHz	75 Ω		vendor statement
16.1.2	Frequency range	5-1000 MHz			
16.1.3	Return loss	5 – 40 MHz	≥ 30 dB		IEC 60728-4 §4.6
		40-1000 MHz	≥ 30 dB <sup>48</sup>	-	
16.1.4	Torque (rotation)		≥5 Nm		
16.1.5	Connector		F-connector <sup>49</sup>		
16.1.6	Screening effectiveness	5- 1000 MHz	Class A		IEC 60728-2

#### Device description: Termination resistor

\_\_\_\_\_

<sup>&</sup>lt;sup>48</sup> - 1,5 dB/oct. F>40 MHz

<sup>49</sup> Connector must comply with chapter 11.5.2. parameters

## 17 Special products

Vendor confidential

Procedure: see chapter 9

## Appendix A: Logo's

Note: For product labeling see PVE 3.0 article 10.2 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 black and white picture in newspapers or when there is no other possibility.



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.



The Kabel Keur logo must always be placed on a neutral colored background. Preference is white or else transparent.



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

## Appendix B: F-connectors

### **1** Description of F-connectors

This type of connector has screw locking with a 3/8-32UNEF-2"B"thread. Normally, the plug will be a free connector, the socked a fixed connector. The design of the plug may either such that the inner conductor of the cable serves as the male contact, or such that the centre (male) contact is independent of the cable inner conductor.

#### 2 Physical dimensions

The physical characteristics of the F-connectors should be able to be in accordance with the dimensions as stated in IEC 169-24.

#### 3 Mechanical strength/withstand tightening torque

The F-ports shall be able to withstand the minimum specified tightening torque without damage.

#### 4 Test gauge acceptance F-female connector

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. Only the female F-connector at the input of the AOP should be able to accept male contacts/test gauges with a diameter range between 0.51-1.6 mm.



5 Clamp force/withdrawal test

To verify that the centre 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: 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	temperature					

AOP (input connector only)					
Test sequence	1	2	3	4	5
Test gauge diameter (mm)	0.51	1.6	0.51	1.6	0.51
Clamping force min. (gram)			30		30
Clamping force tests must be performed with a duration of 10 seconds and at room					
temperature					

#### 6 Insertion force test

To verify that the centre 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:

Gauge diameter (mm)	Insertion force
	(gram)
0.51	300
0.55	349
0.60	415
0.65	487
0.70	565
0.75	649
0.80	738
0.85	833
0.90	934
0.95	1041
1.00	1153
1.05	1272

1.10	1396	
1.15	1525	
1.20	1661	
1.60 2953		
Insertion force tests must be performed at room temperature		

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



Figure: Example of Insertion force test set up

## Appendix C: IEC connectors

### 1 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 socked a fixed connector. The design of the plug may be such that the inner pin conductor serving as the male contact.

#### 2 Physical dimensions

The physical characteristics of the IEC-connectors should be able to be in accordance with the dimensions as stated in IEC 169-2.



		$\pm 0.070$		$\pm 0.05$	$\pm 0.4$			
in	0.051	0.093	0.317	0.375	1/32	0.280	23/64	19/64
	min		min			min	min	min
		$\pm 0.003$		$\pm 0.002$	$\pm 1/64$			

For molded IEC-connectors there are following relaxations to the dimensions as stated in IEC-169-2:

- For size "C" there is a relaxation from 8.05 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).

#### 4 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:



Dimensions (mm)	
	Tolerance

Test gauge A Ø	2.438	0, -0.01
Test gauge B Ø	2.286	+0.01, 0

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:



	Dimensions (mm)		
		Tolerance	
Test gauge A Ø	9.575	0, -0.01	
Test gauge B Ø	9.474	+0.01, 0	

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.

C. Torque resistance of inner-pin

This test is designed 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.

Appendix D: Cable clamp

## Appendix D

### Cable Clamp centre conductor construction:

#### **1** Description of centre conductor construction

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

#### 2 Physical dimensions

Depending on supplier construction.

#### 3 Mechanical strength/withstand tightening torque

N.a..

#### 4 Test gauge acceptance cable clamp centre conductor construction

The centre 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. Only the centre conductor construction of a cable clamp regarding the AOP should be able to accept male contacts/test gauges with a diameter range between 0.51-1.6 mm.



#### 5 Clamp force/withdrawal test

To verify that the centre 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 centre conductor under test.



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

## Spring construction only:

Wall Outlet centre 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					

Clamping force tests must be performed with a duration of 10 seconds and at room temperature

AOP centre conductor construction					
Test sequence	1	2	3	4	5
Test gauge diameter (mm)	0.51	1.6	0.51	1.6	0.51
Clamping force min. (gram)			30		30
Clamping force tests must be performed with a duration of 10 seconds and at room					
temperature					

## Spring construction in combination with fixing screw:

Wall Outlet centre 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					

AOP centre conductor construction					
Test sequence	1	2			
Test gauge diameter (mm)	0.51	1.6			
Clamping force min. (gram)	30	30			
Clamping force tests must be performed with a duration of 10 seconds and at room temperature					

#### 6 Insertion force test

To verify that the centre 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 centre conductor construction.

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

Gauge diameter (mm)	Insertion force	
	(gram)	
0.51	300	
0.55	349	
0.60	415	
0.65	487	
0.70	565	
0.75	649	
0.80	738	
0.85	833	
0.90	934	
0.95	1041	
1.00	1153	
1.05	1272	
1.10	1396	
1.15	1525	
1.20	1661	
1.60	2953	
Insertion force tests must be performed at room temperature		

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



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