Authorised and notified according to Article 10 of the Council Directive 89/106/EEC of 21 December 1988 on the approximation of laws, regulations and administrative provisions of Member States relating to construction products

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European technical approval ETA-13/0792

(English language translation, the original version is in German language)

Handelsbezeichnung *Trade name*	**FLAMRO Variant N II KS**
Zulassungsinhaber *Holder of approval*	**FLAMRO Brandschutz-Systeme GmbH Am Sportplatz 2 56291 Leiningen GERMANY**
Zulassungsgegenstand und Verwendungszweck *Generic type and use of construction product*	**Abschottung** *Penetration seal*
Geltungsdauer vom *Validity from* bis *to*	**25.06.2013** **07.11.2016**
Herstellwerk *Manufacturing plant*	**FLAMRO Brandschutz-Systeme GmbH Am Sportplatz 2 56291 Leiningen GERMANY**
Diese Europäische technische Zulassung umfasst *This European technical approval contains*	**18 Seiten inklusive 4 Anhänge** *18 pages including 4 Annexes*

I LEGAL BASES AND GENERAL CONDITIONS

1 This European technical approval is issued by Österreichisches Institut für Bautechnik in accordance with:

- Council Directive 89/106/EEC of 21 December 1988 on the approximation of laws, regulations and administrative provisions of Member States relating to construction products[1] modified by Council Directive 93/68/EEC[2] and Regulation (EC) N° 1882/2003 of the European Parliament and of the Council[3];
- Bauproduktegesetz. LGBl. V Nr. 33/1994;
- Common Procedural Rules for Requesting, Preparing and the Granting of European technical approvals set out in the Annex to Commission Decision 94/23/EC[4];
- Guideline for European technical approval of "Fire Stopping and Fire Sealing Products" ETAG N° 026, Part 2: Penetration Seals.

2 The Österreichisches Institut für Bautechnik is authorized to check whether the provisions of this European technical approval are met. Checking may take place in the manufacturing plant(s). Nevertheless, the responsibility for the conformity of the products to the European technical approval and for their fitness for the intended use remains with the holder of the European technical approval.

3 This European technical approval is not to be transferred to manufacturers or agents of manufacturers other than those indicated on page 1, or manufacturing plants other than those indicated on page 1 of this European technical approval.

4 This European technical approval may be withdrawn by Österreichisches Institut für Bautechnik, in particular pursuant to information by the Commission according to Article 5(1) of Council Directive 89/106/EEC.

5 Reproduction of this European technical approval including transmission by electronic means shall be in full. However, partial reproduction can be made with the written consent of Österreichisches Institut für Bautechnik. In this case partial reproduction has to be designated as such. Texts and drawings of advertising brochures shall not contradict or misuse the European technical approval.

6 The European technical approval is issued by the approval body in its official language. This version corresponds fully to the version circulated in EOTA. Translations into other languages have to be designated as such.

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1 Official Journal of the European Communities N° L 40, 11.2.1989, p. 12
2 Official Journal of the European Communities N° L 220, 30.8.1993, p. 1
3 Official Journal of the European Union N° L 284, 31.10.2003, p.1
4 Official Journal of the European Communities N° L 17, 20.1.1994, p. 34

II SPECIFIC CONDITIONS OF THE EUROPEAN TECHNICAL APPROVAL

1 Definition of product(s) and intended use

1.1 Definition of the product

1.1.1 FLAMRO Variant N II KS

"FLAMRO Variant N II KS" is designed and installed in accordance with the ETA-holder's design and installation instructions, deposited at the Österreichisches Institut für Bautechnik. In accordance to the technical data-sheet "FLAMRO Variant N II KS" will be used for occupied or open conduits.

Type of penetration seal system: Pipe closure device - collar (see ETAG 026-2, clause 1.1, table 1-1). "FLAMRO Variant N II KS" consists of a fire protection collar which comprises of a steel housing and the intumescent inlay in accordance to ETA-10/0117 (reaction to fire class E according to EN 13501-1). All components are factory-produced by the ETA-holder or a supplier. The ETA-holder is ultimately responsible for "FLAMRO Variant N II KS". For installation of "FLAMRO Variant N II KS" see Annex C. The fire protection collar type "FLAMRO Variant N II A" is supplied in several sizes – see table below.

Collar type	Inlay size (mm)	Inlay thickness (mm)
N II A, Ø 32 mm	7,0 x 25,4	1,5 – 2,5
N II A, Ø 40 mm	7,0 x 25,4	1,5 - 2,5
N II A, Ø 50 mm	7,0 x 25,4	1,5 - 2,5
N II A, Ø 63 mm	13,5 x 25,4	1,5 - 2,5
N II A, Ø 75 mm	13,5 x 25,4	1,5 - 2,5
N II A, Ø 90 mm	18,3 x 25,4	1,5 - 2,5
N II A, Ø 110 mm	19,2 x 25,0	1,5 - 2,5
N II A, Ø 125 mm	19,2 x 38,0	1,5 - 2,5

1.1.2 Additional components

The collar is installed underneath floors or on both sides of a wall and fixed by rods with nuts or metal anchors. For further details see Annex C and the technical literature of the manufacturer.

Gypsum plaster or cementitious mortar may be used to seal the annular gap between conduit and opening edge.

For closing joints a non-combustible material (class A1 or A2-s1,d0 according to EN 13501-1) with a dimensionally stable, as e.g. concrete, cementitious mortar or gypsum plaster, shall be used.

The ends of occupied or empty conduits may be sealed with "ROKU® AC Brandschutzkitt", "ROKU® Brandschutzkitt 1000", "Kerafix® Firestop Putty" or "Kerafix® Brandschutzsilikon" or with Plugs. For further details see technical literature of the manufacturer.

1.2 Intended use and use category

1.2.1 Intended use

The intended use of "FLAMRO Variant N II KS" is to reinstate the fire resistance performance of flexible wall constructions, rigid wall constructions and rigid floor constructions where they are penetrated by flexible PVC or polyolefine conduits.

The specific elements of construction that "FLAMRO Variant N II KS" may be used to provide a penetration seal in, are as follows:

Flexible walls:	The wall must have a minimum thickness of 100 mm and comprise timber or steel studs lined on both faces with minimum 2 layers of 12,5 mm thick boards. For timber stud walls there must be a minimum distance of 100 mm of the seal to any stud and the cavity between stud and seal must be closed with minimum 100 mm insulation of Class A1 or A2 (in accordance with EN 13501-1).
Rigid walls:	The wall must have a minimum thickness as given in Annex C and comprise concrete, aerated concrete or masonry, with a minimum density of 650 kg/m³.
Rigid floors:	The floor must have a minimum thickness as given in Annex C and comprise concrete with a minimum density of 2400 kg/m³ (floor type A) or 550 kg/m³ (floor type B) respectively.

The supporting construction must be classified in accordance with EN 13501-2 for the required fire resistance period.

This ETA does not cover use of this product as a penetration seal in sandwich panel constructions.

"FLAMRO Variant N II KS" may be used to provide a penetration seal with conduits made of PVC according to EN 61386-21 and EN 61386-22 or Polyolefin according to EN 61386-21 and EN 61386-22. The requirements are according to the technical data sheet of the producer. The conduits may be lead single or in bundles through the fire protection collar type "FLAMRO Variant N II A". The maximum inner diameter of a single conduit has to be 50,5 mm (63 mm outer diameter), wall thickness between 0,5 mm and 0,8 mm. The maximum diameter of a single cable has to be 21 mm.

The fire protection collar may be filled completely with conduits or conduit bundles. The maximum size of the fire protection collar is 125 mm. The maximum distance between the intumescent inlay and the conduit or conduit bundle may be 15 mm. Conduits shall be supported at maximum 450 mm away from both faces of wall constructions and maximum 420 mm from the upper face of floor constructions. All cables according to the group "small" specified in EN 1366-3:2009-07 with a diameter up to 21 mm may be used.

The provisions made in this European technical approval are based on an assumed working life of the "FLAMRO Variant N II KS" of 10 years, provided that the conditions laid down in sections 4.2, 5.1 and 5.2 for the packaging, transport, storage, installation, use and repair are met. The indications given on the working life cannot be interpreted as a guarantee given by the producer or the Approval Body, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

1.2.2 Use category

The use category of the intumescent inlay according to EOTA TR 024 of "FLAMRO Variant N II KS" is Type X.

2 Characteristics of the product and methods of verification

The identification tests and the assessment of the fitness for use according to the Essential Requirements were carried out in compliance with the "ETA Guideline no. 026-Part 2" concerning Penetration Seals– edition January 2008 (called ETAG 026-2 in this ETA).

ETAG clause No.	ETA clause No.	Characteristic	Assessment of characteristic
		Mechanical resistance and stability	Not relevant
Safety in case of fire			
2.4.1	2.1	Reaction to fire	See clause 2.1
2.4.2	2.2	Resistance to fire	See clause 2.2
Hygiene, health and environment			
2.4.3	2.3	Air permeability	No performance determined
2.4.4	2.4	Water permeability	No performance determined
2.4.5	2.5	Release of dangerous substances	See clause 2.5
Safety in use			
2.4.6	2.6	Mechanical resistance and stability	No performance determined
2.4.7	2.7	Resistance to impact/movement	No performance determined
2.4.8	2.8	Adhesion	No performance determined
Protection against noise			
2.4.9	2.9	Airborne sound insulation	No performance determined
Energy economy and heat retention			
2.4.10	2.10	Thermal properties	No performance determined
2.4.11	2.11	Water vapour permeability	No performance determined
General aspects relating to fitness for use			
2.4.12	2.12	Durability and serviceability	See clause 2.12

2.1 Reaction to fire

The material for the metal casing is classified Class A1 according to Commission Decision 96/603/EC.

The inlay made in accordance to ETA-10/0117 fulfils the requirements for reaction to fire class E according to EN 13501-1.

For closing joints a non-combustible material (class A1 or A2-s1,d0 according to EN 13501-1) with a dimensionally stable, as e.g. concrete, cementitious mortar or gypsum plaster, shall be used.

2.2 Resistance to fire

"FLAMRO Variant N II KS" has been tested according to EN 1366-3:2004 and EN 1366-3:2009, installed within apertures in flexible walls (drywalls), rigid walls (aerated concrete blocks) and high density and low density concrete floors.

For details of classification and plastic conduits covered see Annex C.

The seals may only be penetrated by the services listed in Annex C. Other parts or support constructions must not penetrate the seal.

For details of suitable wall and floor constructions see clause 1.2.1 and Annex C.

The supporting construction must be classified in accordance with EN 13501-2 for the required fire resistance period.

The following conditions apply to seals within any of the above constructions:

The service support construction must be fixed to the building element containing the penetration seal or a suitable adjacent building element, on both sides of the penetration in such a manner that in the case of fire, no additional load is imposed on the seal. Furthermore it is assumed that this support is maintained on the unexposed side, for the required period of fire resistance.

Specific considerations:

> Conduits must be perpendicular to the seal surface.
> The classifications relate to U/C (capped outside the furnace/uncapped inside). For further information refer to national regulations.
> Other parts or service support constructions must not penetrate the seal.

2.3 Air permeability

For annular gaps sealed with cementitious mortar or gypsum plaster no performance has been determined.

2.4 Water permeability

For annular gaps sealed with cementitious mortar or gypsum plaster no performance has been determined.

2.5 Release of dangerous substances

According to the manufacturer's declaration, the product specification has been compared with the list of dangerous substances of the European Commission to verify that it does not contain such substances above the acceptable limits.

A written declaration in this respect was submitted by the ETA-holder.

In addition to the specific clauses relating to dangerous substances contained in this ETA, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the Construction Product Directive, these requirements need also to be complied with, when and where they apply.

2.6 Mechanical resistance and stability

Due to the nature and size of penetration seals, made from "FLAMRO Variant N II KS", impact tests and a classification according to EOTA TR 001 are not possible.

2.7 Resistance to impact / movement

Due to the nature and size of penetration seals, made from "FLAMRO Variant N II KS", impact tests and a classification according to EOTA TR 001 are not possible.

2.8 Adhesion

The collars have to be fixed with metal anchors or threaded rods and must be done according to the technical data sheet for "FLAMRO Variant N II KS".

2.9 Airborne sound insulation

No performance determined.

2.10 Thermal properties

No performance determined.

2.11 Water vapour permeability

No performance determined.

2.12 Durability

The intumescent product according to ETA-10/0117 fulfils the requirements of use category X in accordance with EOTA TR 024. As conclusion the materials can be exposed to the conditions in interiors with/without moisture loads and external weathering, without expecting significant changes in their fire protection characteristics. No significant changes in expansion ratio and expansion pressure of the material were observed after exposure to a constant temperature of 80 °C and exposure to permanent water immersion.

3 Evaluation of Conformity and CE marking

3.1 Attestation of Conformity system

According to the decision 1999/454/EC of the European Commission[5] the system 1 of attestation of conformity applies.

This system of attestation of conformity is defined as follows:

System 1: Certification of the conformity of the product by a notified certification body on the basis of:

a) Tasks for the manufacturer:
   1) factory production control
   2) further testing of samples taken at the factory by the manufacturer in accordance with a prescribed test plan

b) Tasks for the notified body:
   3) initial type-testing of the product
   4) initial inspection of factory and of factory production control
   5) continuous surveillance, assessment and approval of factory production control

3.2 Responsibilities

3.2.1 Tasks of the Manufacturer

3.2.1.1 Factory production control

The manufacturer shall exercise permanent internal control of production. All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic manner in the form of written policies and procedures, including records of results performed. This production control system shall insure that the product is in conformity with this European technical approval.

The manufacturer shall draw up and keep up-to-date documents defining the factory production control that applies. The documentation to be carried out by the manufacturer and the applicable procedures shall be appropriate to the product and manufacturing process.

[5] Official Journal of the European Communities N° L 178, 14.7.1999, p. 52

The factory production control shall ensure the conformity of the product to an appropriate level. This involves:

a) the preparation of documented procedures and instructions relating to factory production control operations.
b) the effective implementation of these procedures and instructions.
c) the recording of these procedures and their results.
d) the use of these results to correct any deviations, repair the effects of such deviations, treat any resulting instances of non-conformity and, if necessary, revise the factory production control to rectify the cause of non-conformity.
e) a procedure to ensure that both the approval Body and the Notified (Certification) Bodies are advised before any significant change to the product, its components or manufacturing process, is made.
f) a procedure to ensure that personnel involved in the production processes and the quality control procedures are qualified and adequately trained to carry out their required tasks.
g) that all testing and measuring equipment is maintained and up to date calibration records are documented.
h) maintenance of records to ensure every batch produced is clearly labelled with the batch number, which allows traceability to its production to be identified.

The manufacturer may only use components stated in the technical documentation of this European technical approval.

For the components which the ETA-holder does not manufacture by himself, he shall make sure that factory production control carried out by the other manufacturers gives the guaranty of the components compliance with the European technical approval.

The factory production control and the provisions taken by the ETA-holder for components not produced by himself shall be in accordance with the control plan[6] relating to this European technical approval which is part of the technical documentation of this European technical approval. The "Control Plan" is laid down in the context of the factory production control system operated by the manufacturer and deposited at the Österreichisches Institut für Bautechnik.

The results of factory production control shall be recorded and evaluated in accordance with the provisions of the control plan.

3.2.1.2 Other tasks of the manufacturer

The manufacturer shall, on the basis of a contract, involve a body (bodies) which is (are) approved for the tasks referred to in section 3.1 in the field of penetration seals in order to undertake the actions laid down in section 3.3. For this purpose, the "control plan" referred to in sections 3.2.1.1 and 3.2.2 shall be handed over by the manufacturer to the approved body or bodies involved.

The manufacturer shall make a declaration of conformity, stating that the construction product is in conformity with the provisions of this European technical approval.

3.2.2 Tasks of Notified Bodies

The Notified Body (Bodies) shall perform the:

> initial type-testing of the product (for system1)
The results of the tests performed as part of the assessment for the European technical approval may be used unless there are changes in the production line or plant. In such cases, the necessary initial type testing has to be agreed between the Österreichisches Institut für Bautechnik and the Notified Bodies involved.

[6] The control plan is a confidential part of the European technical approval and only handed over to the Notified Body or Bodies involved in the procedure of conformity.

> initial inspection of factory and of factory production control
The Notified Body (Bodies) shall ascertain that, in accordance with the control plan, the factory (in particular the employees and the equipment) and the factory production control are suitable to ensure continuous and orderly manufacturing of the components according to the specifications mentioned in clause 2 of this ETA.

> continuous surveillance, assessment and approval of factory production control
The Notified Body (Bodies) shall visit the factory at least twice a year or once a year for surveillance of this manufacturer having a FPC system complying with a quality management system covering the manufacturing of the approval product components. It has to be verified that the system of factory production control and the specified automated manufacturing process are maintained taking into account the control plan.

These tasks shall be performed in accordance with the provisions laid down in the control plan of this European technical approval.

The Notified Body (Bodies) shall retain the essential points of its (their) actions referred to above and state the results obtained and conclusions drawn in a written report.

The Notified Body involved by the manufacturer shall issue an EC certificate of conformity of the product stating the conformity with the provisions of this European technical approval.

In cases where the provisions of the European technical approval and its control plan are no longer fulfilled the certification body shall withdraw the certificate of conformity and inform the Österreichisches Institut für Bautechnik without delay.

3.3 CE marking

The CE marking shall be affixed on the product itself, on a label attached to it, on its packaging or on the commercial documents accompanying the components of the product. The letters "CE" shall be followed by the identification number of the Notified Body involved and be accompanied by the following additional information:

> the name or identifying mark and address of the ETA-holder

> the last two digits of the year in which the CE marking was affixed

> the number of the EC certificate of conformity for the product

> the number of the European technical approval

> the number of the ETAG (ETAG N° 026 part 2)

> the designation of the product (trade name)

> the use category in accordance with the ETA section 1 and 2

> see ETA-13/0792 for other relevant characteristics

4 Assumptions under which the fitness of the product(s) for the intended use was favourably assessed

4.1 Manufacturing

The European technical approval is issued for the product on the basis of agreed data/information, deposited with Österreichisches Institut für Bautechnik, which identifies the product that has been assessed and judged. Changes to the product or production process, which could result in this deposited data/information being incorrect, should be notified to Österreichisches Institut für Bautechnik before the changes are introduced. Österreichisches Institut für Bautechnik will decide whether or not such changes affect the ETA and consequently the validity of the CE marking on the basis of the ETA and if so whether further assessment or alterations to the ETA, shall be necessary.

4.2 Installation

The ETA is issued under the assumption that the installation of the approval product shall be in accordance with the manufacturer's technical literature. Additional marking of the seal shall be done in case of national requirements.

1. Seal the opening:

   The aperture around the pipe is filled with gypsum plaster or cementitious mortar over the full thickness of the wall/floor on both sides.
2. Clean the plastic pipe. Remove all plaster/mortar or dust from the pipe in the area where the Firestop collar is to be installed.
3. Place the Firestop Collar around the plastic pipe(s) and close the collar. No tools, pins or screws are necessary.
4. Fasten the Firestop Collar:

   After marking the fastening points on the bottomside of the floor/wall, the fire collar has to be fastened with metal anchors/fasteners according to the technical data sheet. If required by national prescriptions mark the penetration seal with an identification plate containing the required information. In such a case fasten the identification plate in a visible position next to the seal.
5. Seal the endings of empty conduits with e. g. "ROKU® AC Brandschutzkitt"
6. Repeat installation on the other side of the wall

Additional marking of the seal shall be done in case of national requirements.

5 Indications to the manufacturer

5.1 Packaging, transport and storage

In the accompanying document and/or on the packaging the manufacturer shall give information as to transport and storage.

At least the following shall be indicated: storing temperature, type of storage, maximum duration of storage and required data related to minimum temperature for transport and storage.

5.2 Use, maintenance, repair

The "FLAMRO Variant N II KS" should be installed and used as described earlier in this document.

The assessment of the fitness for use is based on the assumption that damage, for example caused by accidental impact, is repaired. The relevant manufacturer instructions shall be followed.

On behalf of Österreichisches Institut für Bautechnik

Rainer Mikulits
Managing Director

Member of EOTA

ANNEX A

REFERENCE DOCUMENTS

A.1 References to standards mentioned in the ETA:

EN 1366-3:2009	Fire resistance tests for service installations - Part 3: Penetration seals
EN 13501-1	Fire classification of construction products and building elements – Part 1: Classification using test data from reaction to fire tests
EN 13501-2	Fire classification of construction products and building elements – Part 2: Classification using test data from fire resistance tests

A.2 Other reference documents:

EOTA TR 024	Characterisation, Aspects of Durability and Factory Production Control for Reactive Materials, Components and Products

Material Safety Data Sheet according to 1907/2006/EC for "FLAMRO Variant N II KS".

ANNEX B

DESCRIPTION OF PRODUCT(S) & PRODUCT LITERATURE

B.1 "FLAMRO Variant N II KS"

A detailed specification of the product is contained in document "Identification/Product Specification and Control Plan" relating to this European technical approval which is a non-public part of this ETA.

Technical product literature:

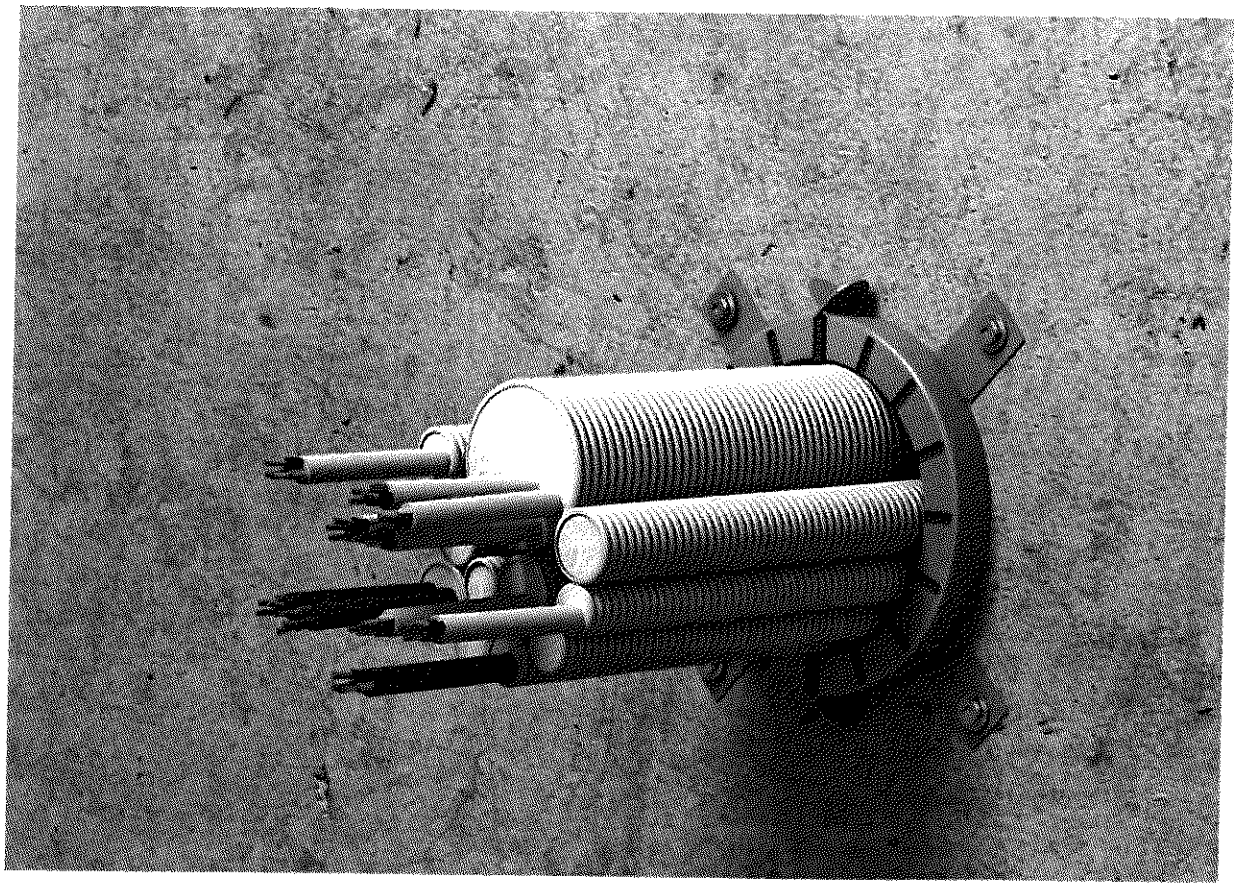
> Technical data sheet and instructions for use "FLAMRO Variant N II KS"

B.2 Gypsum plaster

Any gypsum plaster suitable for use with flexible wall constructions or the intended type of rigid walls or floors may be used.

B.3 Cementitious mortar

Any cementitious mortar suitable for use with the intended type of rigid walls or floors may be used.



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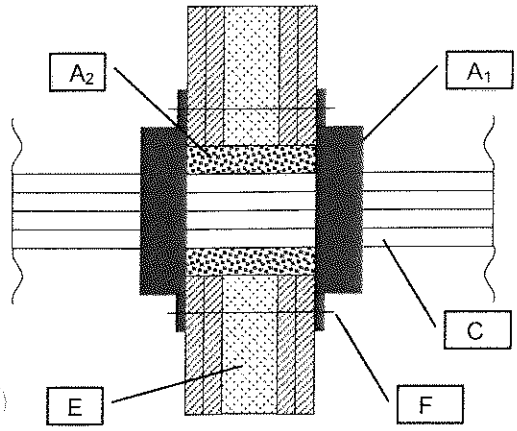
ANNEX C

RESISTANCE TO FIRE CLASSIFICATION OF PENETRATION SEALS MADE FROM "FLAMRO Variant N II KS"

Flexible walls



A_1 Collar

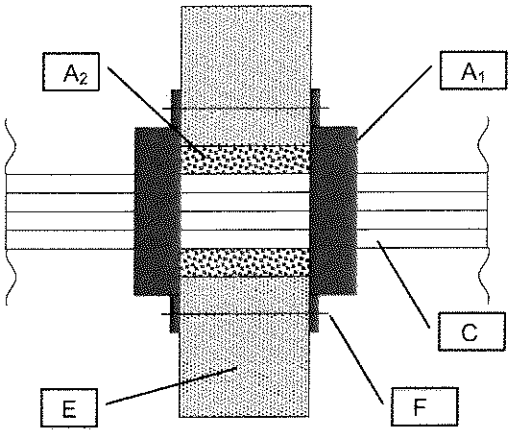
A_2 Annular gap seal

C Bundle of conduits (open or occupied with cables)

E Building element

F Fixing of the collar

Rigid walls



A_1 Collar

A_2 Annular gap seal

C Bundle of conduits (open or occupied with cables)

E Building element

F Fixing of the collar

C.1 Installation in flexible and rigid walls according to 1.2.1, minimum wall thickness 100 mm

Penetration seal:

Collar "FLAMRO Variant N II A" on both sides (A_1), annular gap filled with gypsum plaster (A_2) over the entire thickness of the wall. In case of a rigid wall cementitious mortar may be used as an alternative to gypsum plaster. The smallest suitable fire protection collar for the particular conduit resp. conduit bundle has to be used. The maximum inner diameter of the collar may be 30 mm larger than the conduit resp. the conduit bundle. The maximum nominal diameter of the collar is 125 mm. The minimum distance between collars of this type is 100 mm. Conduits may be empty to fully occupied For single penetrations the maximum outer diameter of the conduit is 63 mm. For conduit bundles the maximum outer diameter is 125 mm. The minimum length of the conduits has to be 200 mm on both sides of the wall, measured from the wall surface. Collars fixed on both sides of the wall with rods ≥ M6 and nuts through the wall. In high density rigid walls alternatively metal anchors with minimum Ø 6 mm may be used. Ends of conduits have to be sealed with "ROKU AC Brandschutzkitt", or "ROKU® Brandschutzkitt 1000", "Kerafix® Firestop Putty", "Kerafix® Brandschutzsilikon" on both sides of the wall over a depth of minimum 10 mm or with Plugs.

PVC	Conduit diameter d_c (mm)	Conduit wall thickness (mm)	Classification
DN 16	10,9	0,3 – 0,5	EI 120-U/C
DN 20	14,2	0,3 – 0,5	EI 120-U/C
DN 25	18,6	0,3 – 0,6	EI 120-U/C
DN 32	24,3	0,3 – 0,6	EI 120-U/C
DN 40	31,3	0,3 – 0,6	EI 120-U/C
DN 50	40,0	0,3 – 0,5	EI 120-U/C
DN 63	50,5	0,3 – 0,5	EI 120-U/C

Polyolefin	Conduit diameter d_c (mm)	Conduit wall thickness (mm)	Classification
DN 16	10,4	0,3 – 0,8	EI 120-U/C
DN 20	13,6	0,3 – 0,8	EI 120-U/C
DN 25	17,9	0,4 – 0,8	EI 120-U/C
DN 32	23,4	0,4 – 0,8	EI 120-U/C
DN 40	30,0	0,5 – 0,8	EI 120-U/C
DN 50	38,8	0,5 – 0,8	EI 120-U/C
DN 63	48,8	0,7 – 0,8	EI 120-U/C

C.2 Rigid walls according to 1.2.1, minimum wall thickness 150 mm

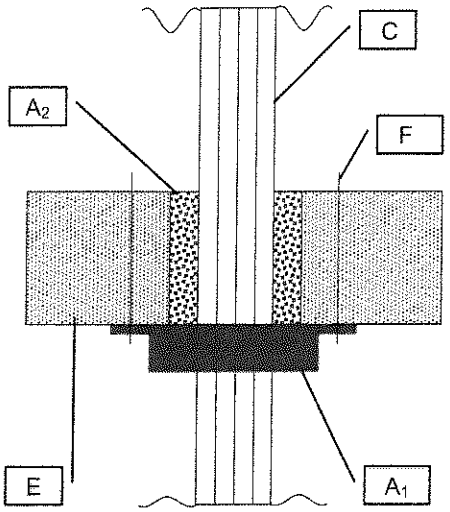
Penetration seal:

Collar "FLAMRO Variant N II A" on both sides (A_1), annular gap filled with cementitious mortar (A_2) over the entire thickness of the wall. The smallest suitable fire protection collar for the particular conduit resp. conduit bundle has to be used. The maximum inner diameter of the collar may be 30 mm larger than the conduit resp. the conduit bundle. The maximum nominal diameter of the collar is 125 mm. The minimum distance between collars of this type is 100 mm. Conduits have to be either empty or fully occupied (total cross section of the cables is almost 100 % of the inner Diameter of the conduit, no further cable may fit in the conduit). For single penetrations the maximum outer diameter of the conduit is 63 mm. For conduit bundles the maximum outer diameter is 125 mm. The minimum length of the conduits has to be 200 mm on both sides of the wall, measured from the wall surface. Collars fixed on both sides of the wall with rods ≥ M6 and nuts through the wall. In high density rigid walls alternatively metal anchors with minimum Ø 6 mm may be used. Ends of conduits have to be sealed with "ROKU AC Brandschutzkitt", or "ROKU® Brandschutzkitt 1000", "Kerafix® Firestop Putty", "Kerafix® Brandschutzsilikon" on both sides of the wall over a depth of minimum 10 mm or with Plugs.

PVC	Conduit diameter d_c (mm)	Conduit wall thickness (mm)	Classification
DN 16	10,9	0,3 – 0,5	EI 120-U/C
DN 20	14,2	0,3 – 0,5	EI 120-U/C
DN 25	18,6	0,3 – 0,6	EI 120-U/C
DN 32	24,3	0,3 – 0,6	EI 120-U/C
DN 40	31,3	0,3 – 0,6	EI 120-U/C
DN 50	40,0	0,3 – 0,5	EI 120-U/C
DN 63	50,5	0,3 – 0,5	EI 120-U/C

Polyolefin	Conduit diameter d_c (mm)	Conduit wall thickness (mm)	Classification
DN 16	10,4	0,3 – 0,8	EI 120-U/C
DN 20	13,6	0,3 – 0,8	EI 120-U/C
DN 25	17,9	0,4 – 0,8	EI 120-U/C
DN 32	23,4	0,4 – 0,8	EI 120-U/C
DN 40	30,0	0,5 – 0,8	EI 120-U/C
DN 50	38,8	0,5 – 0,8	EI 120-U/C
DN 63	48,8	0,7 – 0,8	EI 120-U/C

Rigid floor



A_1	Collar
A_2	Annular gap seal
C	Bundle of conduits (open or occupied with cables)
E	Building element (floor)
F	Fixing of the collar

C.3 Rigid floor according to 1.2.1

Penetration seal:
Collar "FLAMRO Variant N II A" (A_1) on the underside of the floor, annular gap filled either with gypsum plaster or cementitious mortar (A_2) over the entire thickness of the floor. The smallest suitable fire protection collar for the particular conduit resp. conduit bundle has to be used. The maximum inner diameter of the collar may be 30 mm larger than the conduit resp. the conduit bundle. The maximum nominal diameter of the collar is 125 mm. The minimum distance between collars of this type may be 0 mm. Conduits have to be either empty or fully occupied (total cross section of the cables is almost 100 % of the inner Diameter of the conduit, no further cable may fit in the conduit). For single penetrations the maximum outer diameter of the conduit is 63 mm. For conduit bundles the maximum outer diameter is 125 mm. The minimum length of the conduits has to be 200 mm on both sides of the wall, measured from the wall surface. Collar fixed on the underside of the floor with rods ≥ M6 and nuts through the floor. In high density rigid floors alternatively metal anchors with minimum Ø 6 mm may be used. Ends of conduits have to be sealed with "ROKU AC Brandschutzkitt", or "ROKU® Brandschutzkitt 1000", "Kerafix® Firestop Putty", "Kerafix® Brandschutzsilikon" on both sides of the floor over a depth of minimum 10 mm or with Plugs.

PVC	Conduit diameter d_c (mm)	Conduit wall thickness (mm)	Classification
DN 16	10,9	0,3 – 0,5	EI 120-U/C
DN 20	14,2	0,3 – 0,5	EI 120-U/C
DN 25	18,6	0,3 – 0,6	EI 120-U/C
DN 32	24,3	0,3 – 0,6	EI 120-U/C
DN 40	31,3	0,3 – 0,6	EI 120-U/C
DN 50	40,0	0,3 – 0,5	EI 120-U/C
DN 63	50,5	0,3 – 0,5	EI 120-U/C

Polyolefin	Conduit diameter d_c (mm)	Conduit wall thickness (mm)	Classification
DN 16	10,4	0,3 – 0,8	EI 120-U/C
DN 20	13,6	0,3 – 0,8	EI 120-U/C
DN 25	17,9	0,4 – 0,8	EI 120-U/C
DN 32	23,4	0,4 – 0,8	EI 120-U/C
DN 40	30,0	0,5 – 0,8	EI 120-U/C
DN 50	38,8	0,5 – 0,8	EI 120-U/C
DN 63	48,8	0,7 – 0,8	EI 120-U/C

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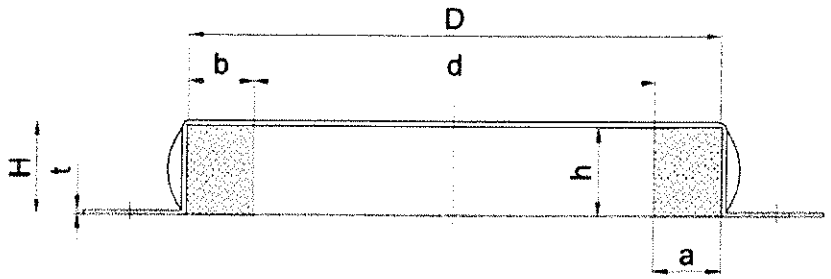
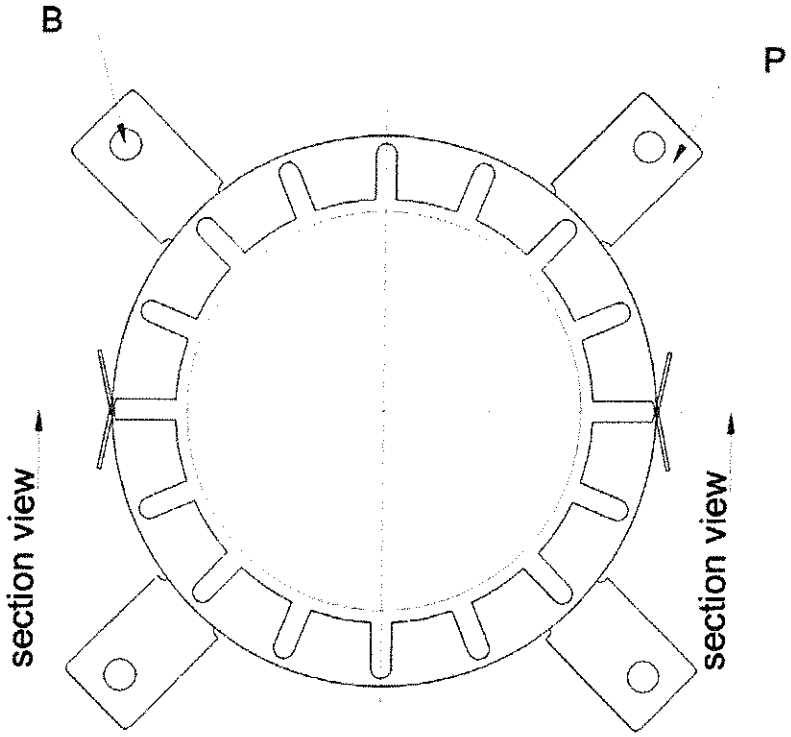
ANNEX D
Pipe collar – sizes





Collar	d (mm)	D (mm)	b (mm)	t (mm)	H (mm)	P (pcs)	h (mm)	a (mm)	B (mm)
Ø 32 mm	36	50	7,0	0,6	26,0	2	25,4	6,4 ± 0,5	6,0
Ø 40 mm	44	58	7,0	0,6	26,0	2	25,4	6,4 ± 0,5	6,0
Ø 50 mm	54	68	7,0	0,6	26,0	2	25,4	6,4 ± 0,5	6,0
Ø 63 mm	67	94	13,5	0,6	26,0	4	25,4	12,8 ± 1,0	6,0
Ø 75 mm	79	106	13,5	0,6	26,0	4	25,4	12,8 ± 1,0	6,0
Ø 90 mm	94	132	18,3	1,1	26,6	4	25,4	17,1 ± 1,0	9,0
Ø 110 mm	114	155	20,5	1,1	26,6	4	25,4	19,2 ± 1,5	9,0
Ø 125 mm	129	172	20,5	1,1	40,0	4	38,1	19,2 ± 1,5	9,0