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European Technical Assessment

**ETA-19/0155
of 29/03/2019**

General Part

Technical Assessment Body issuing the European Technical Assessment

Instytut Techniki Budowlanej

Trade name of the construction product

Roxtec RS seal

Product family to which the construction product belongs

Fire Stopping and Fire Sealing Products.
Penetration Seals

Manufacturer

ROXTEC INTERNATIONAL A.B.
Box 540
S-37123 Karlskrona
Sweden

Manufacturing plant

ROXTEC INTERNATIONAL A.B.
Rombvägen 2
S-371 60 Karlskrona
Sweden

This European Technical Assessment contains

26 pages including 3 Annexes which form an integral part of this Assessment

This European Technical Assessment is issued in accordance with regulation (EU) No 305/2011, on the basis of

European Assessment Document EAD 350454-00-1104 "Fire Stopping and Fire Sealing Products. Penetration Seals"

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Specific Part

1 Technical description of the product

The Roxtec RS seal is a round, modular system penetration seal, comprising a steel frame (SLFRS sleeve) into which elastomeric block (RS seal) is installed, compressed around the service with the use of a compression mechanism, which is integrated in the seal. Elastomeric block consists of two halves. The components of the seal are presented in table below and Annex B.

Component	Description	Sizes
Blocks (RS seals)		
RS	Circular block, for cables and metal pipes, made of blue and black, halogen-free EPDM rubber, with stainless steel fittings and bolts	RS 25 to RS 125
	Circular block, for metal pipes, made of blue and black, halogen-free EPDM rubber, with stainless steel fittings and bolts	RS 150 to RS 300
RS OMD	Circular block, for cables, made of blue and black, halogen-free EPDM rubber, with stainless steel fittings and bolts	RS OMD 25 to RS 125 OMD
Metal frames (SLFRS sleeves)		
SLF SLF EXTENDED SLF SQ	Round, metal frame with flange; can be bolted or cast to structures; made of stainless steel, galvanised steel or coated carbon steel	SLF 25 to SLF 300
SLFO SLFO EXTENDED SLFO SQ	Round, openable, metal frame with flange; can be bolted or cast to structures; made of stainless steel or galvanised carbon steel	SLFO 25 to SLFO 300

The Roxtec RS seal block has an adaptable center with removable layers. The Roxtec RS OMD Seal block has removable layers on both inside and outside of the block, to enable adjusting to fit non-standard sleeve sizes.

Steel sleeves are available in different sizes, non-openable (Roxtec SLF sleeve) and openable (Roxtec SLFO sleeve) variants.

Roxtec RS seals are used to form single penetration seals where metal pipes or cables penetrate walls and floors.

Auxiliary products, used with Roxtec RS seals to form penetration seals are:

- stone mineral wool insulation (pipe or cable insulation) in accordance with EN 14303 or EN 13162, with reaction to fire class A1, according to EN 13501-1, and with minimum density of 100 kg/m³,
- loose, stone mineral wool insulation (used to fill cavities in separating elements) in accordance with EN 14303 or EN 13162, with reaction to fire class A1, according to EN 13501-1, compressed to the density of at least 100 kg/m³,
- Roxtec Lubricant, produced by ROXTEC INTERNATIONAL A.B., with the nominal density of 890 kg/m³, used for lubrication of Roxtec RS seal components.

2 Specification of the intended use in accordance with the applicable European Assessment Document (EAD)

2.1 Intended use

The intended use of Roxtec RS seal is to reinstate the fire resistance performance of rigid wall or rigid floor constructions, where they are penetrated by single cables or metal pipes.

The specific elements of construction that the Roxtec RS seal may be used to provide a penetration seal in, are as follows:

Rigid walls: The wall must have a minimum thickness of 200 mm and comprise concrete, reinforced concrete, aerated concrete, ceramic brick, cavity brick or checker brick, with a minimum density of 600 kg/m³.

Rigid floors: The floor must have a minimum thickness of 200 mm and comprise concrete, reinforced concrete or aerated concrete, with a minimum density of 600 kg/m³.

The supporting construction shall be classified in accordance with EN 13501-2 for the required fire resistance period (equal to or greater than specified in Annex C).

Roxtec RS seal may be used to provide a penetration seal with specific single cables and metal pipes (according to Annexes A and C).

Details of penetration seals are provided in Annex C. Additional provisions are provided in Annex A. For the installation procedure see Roxtec installation instructions.

Pipes or cables shall be supported at maximum 400 mm away from both faces of the wall constructions and from the upper face of floor constructions.

The performances given in this European Technical Assessment are based on an assumed working life of the product of 25 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer or the Technical Assessment 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.

2.2 Use category

Roxtec RS seal with sleeves of stainless or galvanised steel – use category: Type X.

Roxtec RS seal with sleeves of coated carbon steel – use category: Type Z₂.

Products that meet requirements for type X, meet the requirements for all other types. Products that meet requirements for type Y₁ also meet the requirements for type Y₂, Z₁ and Z₂. Products that meet the requirements for type Y₂ also meet the requirements for type Z₁ and Z₂. Products that meet the requirements for type Z₁, also meet the requirements for type Z₂.

Use category types are as follows:

Type X: intended for use in conditions exposed to weathering.

Type Y₁: intended for use at temperatures below 0°C with exposure to UV but no exposure to rain.

Type Y₂: intended for use at temperatures below 0°C, but with no exposure to rain nor UV.

Type Z₁: intended for use in internal conditions with humidity equal to or higher than 85% RH, excluding temperatures below 0°C.

Type Z₂: intended for use in internal conditions with humidity lower than 85% RH, excluding temperatures below 0°C, without exposure to rain or UV.

3 Performance of the product and references to the methods used for its assessment

3.1 Performance of the product

3.1.1 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Class B-s1,d0
Resistance to fire	Annex C

3.1.2 Hygiene, health and the environment (BWR 3)

No performance assessed.

3.1.3 Safety and accessibility in use (BWR 4)

Essential characteristic	Performance
Durability	Roxtec RS seal with sleeves of stainless or galvanised steel – use category: Type X Roxtec RS seal with sleeves of coated carbon steel – use category: Type Z ₂

3.1.4 Protection against noise (BWR 5)

No performance assessed.

3.1.5 Energy economy and heat retention (BWR 6)

No performance assessed.

3.2 Methods used for the assessment

The assessment of the product has been made in accordance with the European Assessment Document EAD 350454-00-1104 "Fire Stopping and Fire Sealing Products. Penetration Seals".

4 Assessment and verification of constancy of performance (AVCP) system applied, with reference to its legal base

According to Decision 99/454/EC of the European Commission, as amended by Decision 2001/596/EC of the European Commission the system 1 of assessment and verification of constancy of performance applies (see Annex V to Regulation (EU) No 305/2011).

5 Technical details necessary for the implementation of the AVCP system, as provided in the applicable European Assessment Document (EAD)

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited in Instytut Techniki Budowlanej.

For type testing the results of the tests performed as part of the assessment for the European Technical Assessment shall be used unless there are changes in the production line or plant. In such cases the necessary type testing has to be agreed between Instytut Techniki Budowlanej and the notified body.

Issued in Warsaw on 29/03/2019 by Instytut Techniki Budowlanej



Anna Panek, MSc
Deputy Director of ITB

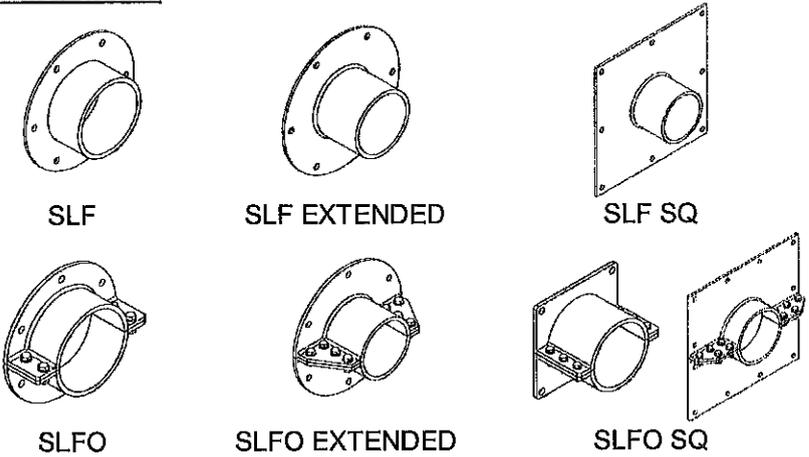
Additional provisions

- The Roxtec RS seal shall be fixed on one or both sides of the wall or fixed at the top of the floor (for details see Annex C).
- The diameter of the opening in separating element shall not be greater of more than 19 mm than the outside diameter of metal sleeves of Roxtec RS seals.
- The flanges of steel sleeves collar shall be fixed to the wall or the floor by steel fasteners (8 x 65 mm) or cast into the wall or floor. Number and arrangement of fasteners depends on the type of the sleeve. The flange of the sleeve may be additionally glued to the separating element by means of elastic, polyurethane based joint sealant.
- In case of Roxtec RS seals installed form one side of the supporting construction ("single Roxtec RS seals"), the cavity inside the supporting construction is filled with loose mineral wool, compressed to the density of at least 100 kg/m³.
- In case of Roxtec RS seals installed form both sides of the supporting construction ("double Roxtec RS seals"), the cavity inside the supporting construction is not filled with loose mineral wool.
- Cables and pipes are insulated by means of stone mineral wool of density minimum 100 kg/m³. In specific cases, the mineral wool is placed only in the supporting construction cavity (for details see Annex C).
- Penetration seals may be placed in line and cluster orientation in the separating element.
- There may be no distance between adjacent penetration seals (between the flanges of the SLFRS frames) in separating elements.
- Classifications given in Annex C for steel and copper pipes are also valid for other metal pipes with:
 - thermal conductivity lower than respectively steel and copper, and
 - melting point at least equal to respectively steel and copper, and greater than:
 - 843 °C for the fire resistance class EI 30 and E 30,
 - 903 °C for the fire resistance class EI 45 and E 45,
 - 946 °C for the fire resistance class EI 60 and E 60,
 - 1006 °C for the fire resistance class EI 90 and E 90,
 - 1049 °C for the fire resistance class EI 120 and E 120,
 - 1109 °C for the fire resistance class EI 180 and E 180,
 - 1153 °C for the fire resistance class EI 240 and E 240.
- Classifications given in Annex C for locally insulated metal pipes or locally insulated cables does not cover non-insulated pipes or cables. The length, thickness and density of a local insulation may be increased but may not be reduced.
- Classifications given in Annex C for single cables is valid only when cable supports does not pass through the seal.
- Subsequent exchange of services in the penetration seals is permitted, provided that the changed services are covered by this ETA provisions.
- Services are placed in angle 90° to the supporting construction.

Roxtec RS seal	Annex A of European Technical Assessment ETA-19/0155
Additional provisions	

Components of Roxtec RS seals

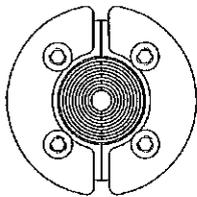
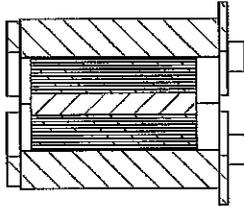
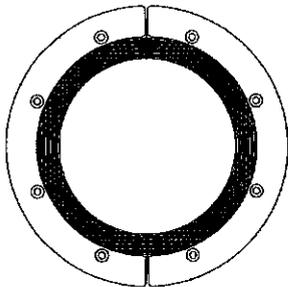
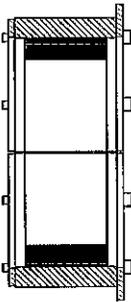
Round frame / sleeve:



Seal (block):

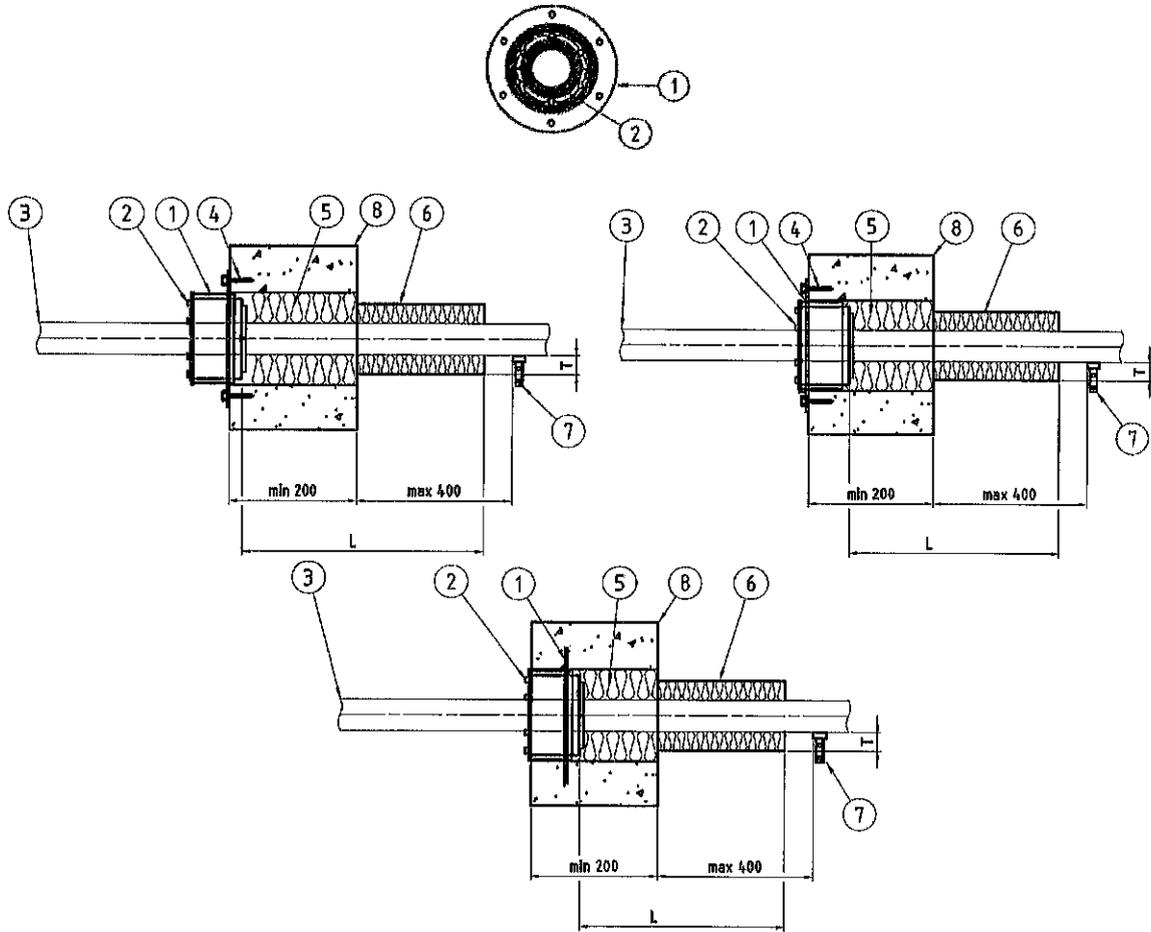


Examples of seals (blocks):

Front view	Cross section
	
	

Roxtec RS seal	Annex B of European Technical Assessment ETA-19/0155
Components of Roxtec RS seal	

Fig. C1. Single cables penetration seals in rigid wall, made with use of single Roxtec RS seals



- 1 SLFRS sleeve
- 2 RS seal
- 3 Cable
- 4 Lightweight concrete screw Ø8 x 65 mm
- 5 Cavity insulation (loose stone mineral wool, compressed to the density of $\geq 100 \text{ kg/m}^3$)
- 6 Additional cable insulation (stone mineral wool insulation density of $\geq 100 \text{ kg/m}^3$)
- 7 Cable support
- 8 Rigid wall, with a minimum thickness of 200 mm

Roxtec RS seal

Annex C1

Construction details of penetration seals
Single cables penetration seals in rigid wall

of European
Technical Assessment
ETA-19/0155

Resistance to fire classification of single cables in rigid wall, made in accordance with fig. C1 and Annex A.

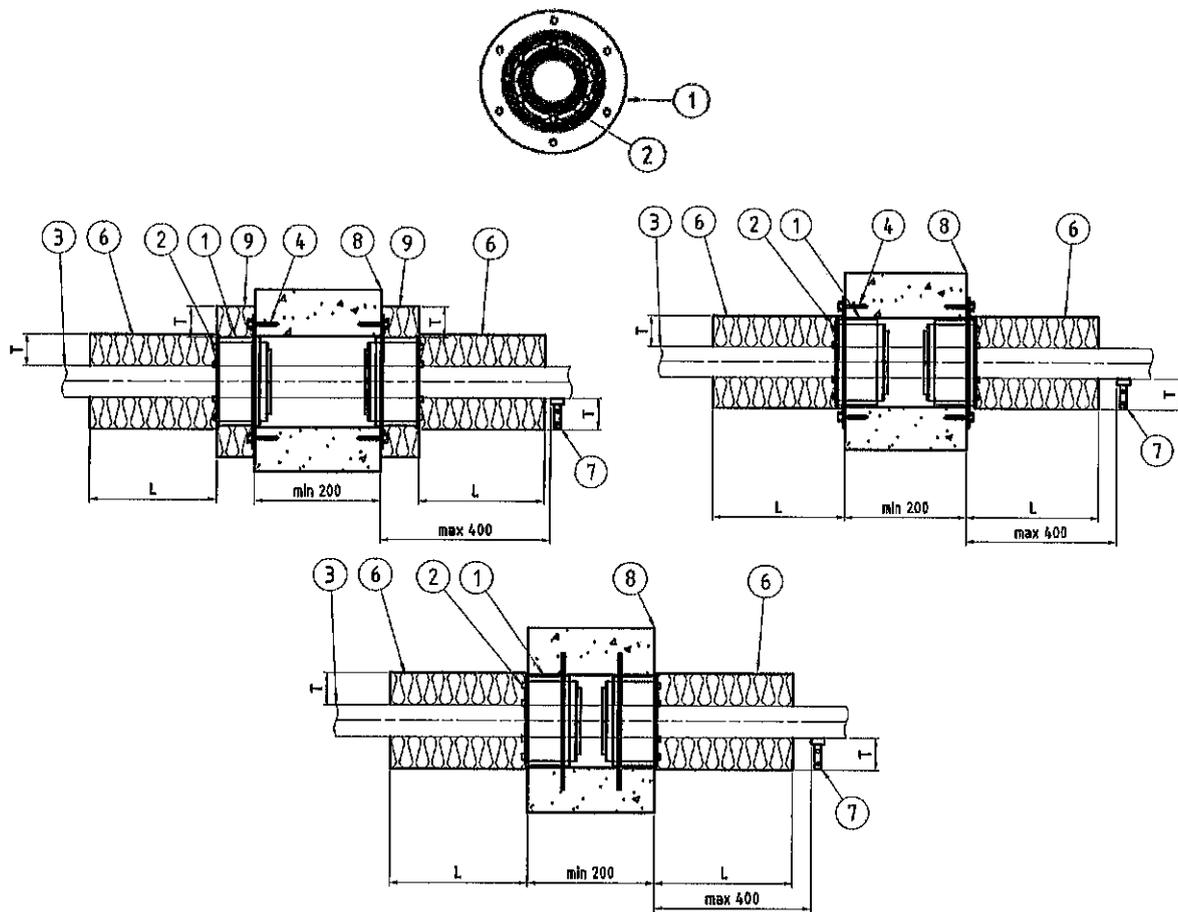
Type of cable ¹⁾	Mineral wool insulation length, L	Mineral wool insulation thickness, T	Fire resistance class
Small cables, with diameter ≤ 21 mm	200 mm	cavity only ²⁾	EI 120
	250 mm	60 mm	EI 240
Medium cables, with diameter ≤ 50 mm	350 mm	30 mm	EI 90 / E 120
	550 mm	30 mm	EI 120
	500 mm	90 mm	EI 120 / E 240
Large cables, with diameter ≤ 80 mm	350 mm	30 mm	EI 90 / E 120
	650 mm	90 mm	EI 120 / E 240

¹⁾ Classification covers all cable types currently and commonly used in building practice in EU with a diameter not greater than specified, except tied bundles, waveguides and non-sheathed cables (wires); optical fibre cables are covered

²⁾ "cavity only" means that only the cavity is filled over the length "L"

Roxtec RS seal	Annex C2 of European Technical Assessment ETA-19/0155
Resistance to fire classification of penetration seals Single cables penetration seals in rigid wall	

Fig. C2. Single cables penetration seals in rigid wall, made with use of double Roptec RS seals



- 1 SLFRS sleeve
- 2 RS seal
- 3 Cable
- 4 Lightweight concrete screw $\text{Ø}8 \times 65 \text{ mm}$
- 6 Additional cable insulation (stone mineral wool insulation density of $\geq 100 \text{ kg/m}^3$)
- 7 Cable support
- 8 Rigid wall, with a minimum thickness of 200 mm
- 9 Protruding sleeve insulation (stone mineral wool insulation density of $\geq 100 \text{ kg/m}^3$)

Roptec RS seal	Annex C3
Construction details of penetration seals Single cables penetration seals in rigid wall	of European Technical Assessment ETA-19/0155

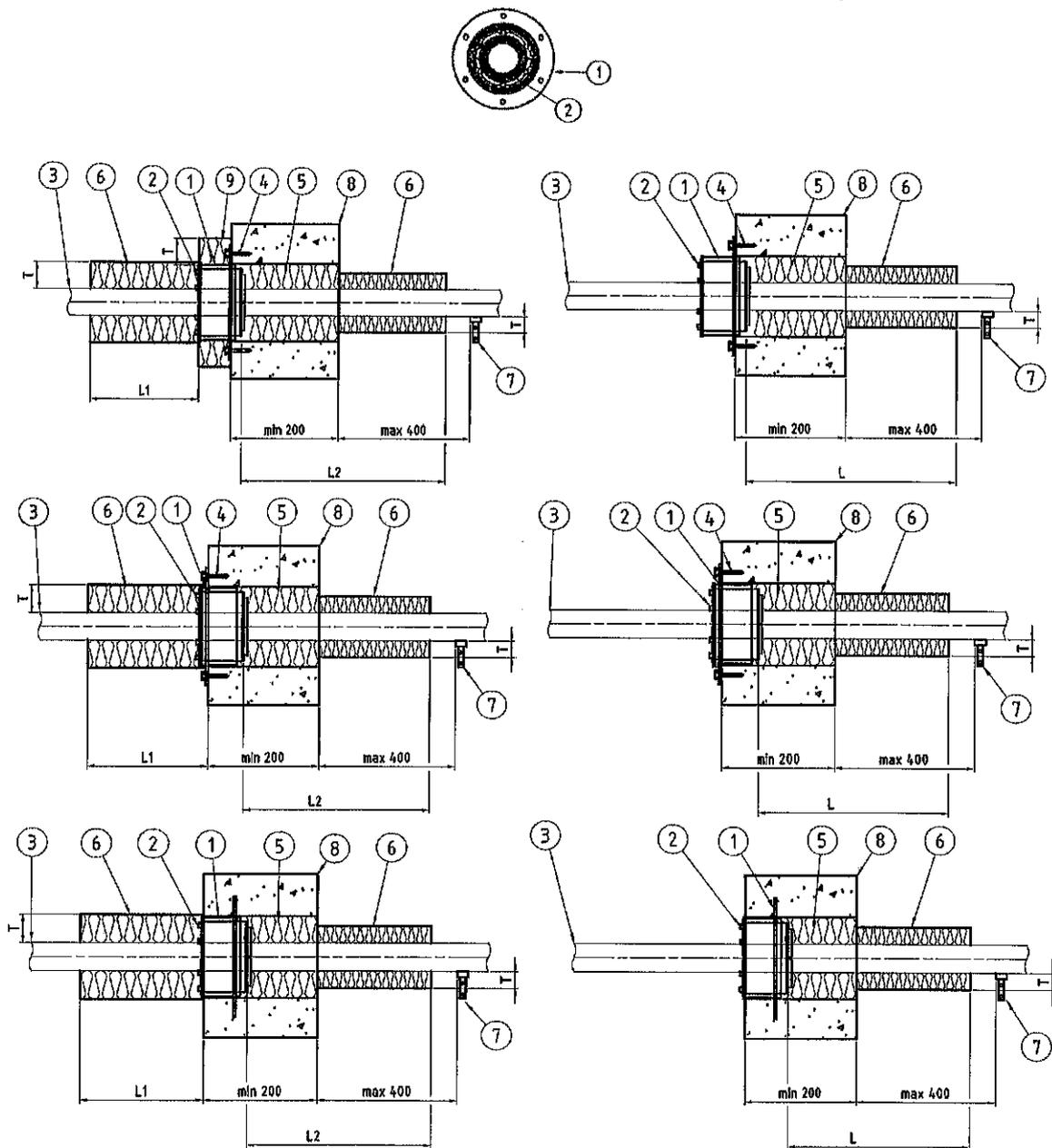
Resistance to fire classification of single cables in rigid wall, made in accordance with fig. C2 and Annex A.

Type of cable ¹⁾	Mineral wool insulation length, L	Mineral wool insulation thickness, T	Fire resistance class
Small cables, with diameter ≤ 21 mm	100 mm	30 mm	EI 120 / E 240
Medium cables, with diameter ≤ 50 mm	175 mm	30 mm	EI 120 / E 240
Large cables, with diameter ≤ 80 mm	200 mm	30 mm	EI 120 / E 240

¹⁾ Classification covers all cable types currently and commonly used in building practice in EU with a diameter not greater than specified, except tied bundles, waveguides and non-sheathed cables (wires); optical fibre cables are covered

Roxtec RS seal	Annex C4 of European Technical Assessment ETA-19/0155
Resistance to fire classification of penetration seals Single cables penetration seals in rigid wall	

Fig. C3. Copper pipes penetration seals in rigid wall, made with use of single Roxtec RS seals



- 1 SLFRS sleeve
- 2 RS seal
- 3 Copper pipe
- 4 Lightweight concrete screw $\varnothing 8 \times 65$ mm
- 5 Cavity insulation (loose stone mineral wool, compressed to the density of $\geq 100 \text{ kg/m}^3$)
- 6 Additional pipe insulation (stone mineral wool insulation density of $\geq 100 \text{ kg/m}^3$)
- 7 Pipe support
- 8 Rigid wall, with a minimum thickness of 200 mm
- 9 Protruding sleeve insulation (stone mineral wool insulation density of $\geq 100 \text{ kg/m}^3$)

Roxtec RS seal

Annex C5

Construction details of penetration seals
Copper pipes penetration seals in rigid wall

of European
Technical Assessment
ETA-19/0155

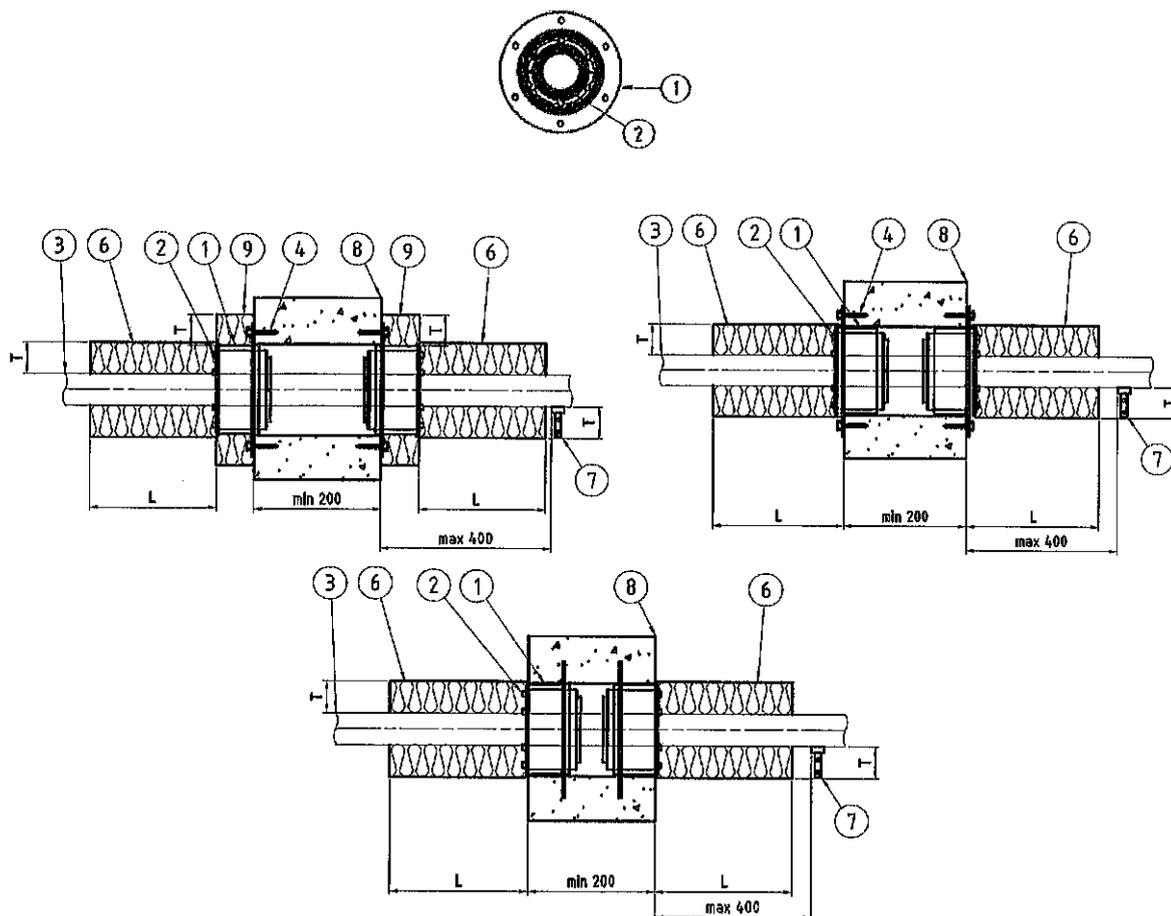
Resistance to fire classification of copper pipes in rigid wall, made in accordance with fig. C3 and Annex A.

Copper pipe		Mineral wool insulation length, L1	Mineral wool insulation length, L or L2	Mineral wool insulation thickness, T	Fire resistance class
Pipe diameter \varnothing , mm	Pipe wall thickness t, mm				
$\leq 8,0$	$\geq 0,8$	–	200 mm	cavity only ¹⁾	EI 240 – U/C EI 240 – U/U EI 240 – C/U EI 240 – C/C
$8,0 < \varnothing \leq 22,0$	$\geq 1,0$	–	400 mm	30 mm	EI 240 – U/C EI 240 – U/U EI 240 – C/U EI 240 – C/C
$22,0 < \varnothing \leq 26,0$	$\geq 1,1$	–	600 mm	60 mm	EI 60 / E 120 – U/C EI 60 / E 120 – U/U EI 60 / E 120 – C/U EI 60 / E 120 – C/C
		650 mm	650 mm	90 mm	EI 90 / E 120 – U/C EI 90 / E 120 – U/U EI 90 / E 120 – C/U EI 90 / E 120 – C/C
$26,0 < \varnothing \leq 42,0$	$1,3 \leq t \leq 14,2$	650 mm	650 mm	90 mm	EI 90 / E 120 – U/C EI 90 / E 120 – U/U EI 90 / E 120 – C/U EI 90 / E 120 – C/C
	$1,5 \leq t \leq 14,2$	–	600 mm	60 mm	EI 60 / E 120 – U/C EI 60 / E 120 – U/U EI 60 / E 120 – C/U EI 60 / E 120 – C/C
$42,0 < \varnothing \leq 54,0$	$1,4 \leq t \leq 14,2$	650 mm	650 mm	90 mm	EI 90 / E 120 – U/C EI 90 / E 120 – U/U EI 90 / E 120 – C/U EI 90 / E 120 – C/C
	$1,5 \leq t \leq 14,2$	–	700 mm	60 mm	EI 60 / E 120 – U/C EI 60 / E 120 – U/U EI 60 / E 120 – C/U EI 60 / E 120 – C/C
$54,0 < \varnothing \leq 108,0$	$2,0 \leq t \leq 14,2$	650 mm	650 mm	90 mm	EI 90 / E 120 – U/C EI 90 / E 120 – U/U EI 90 / E 120 – C/U EI 90 / E 120 – C/C

¹⁾ "cavity only" means that only the cavity is filled over the length "L"

Roxtec RS seal	Annex C6 of European Technical Assessment ETA-19/0155
Resistance to fire classification of penetration seals Copper pipes penetration seals in rigid wall	

Fig. C4. Copper pipes penetration seals in rigid wall, made with use of double Roxtec RS seals



- 1 SLFRS sleeve
- 2 RS seal
- 3 Copper pipe
- 4 Lightweight concrete screw Ø8 x 65 mm
- 6 Additional pipe insulation (stone mineral wool insulation density of $\geq 100 \text{ kg/m}^3$)
- 7 Pipe support
- 8 Rigid wall, with a minimum thickness of 200 mm
- 9 Protruding sleeve insulation (stone mineral wool insulation density of $\geq 100 \text{ kg/m}^3$)

Roxtec RS seal

Annex C7

Construction details of penetration seals
Copper pipes penetration seals in rigid wall

of European
Technical Assessment
ETA-19/0155

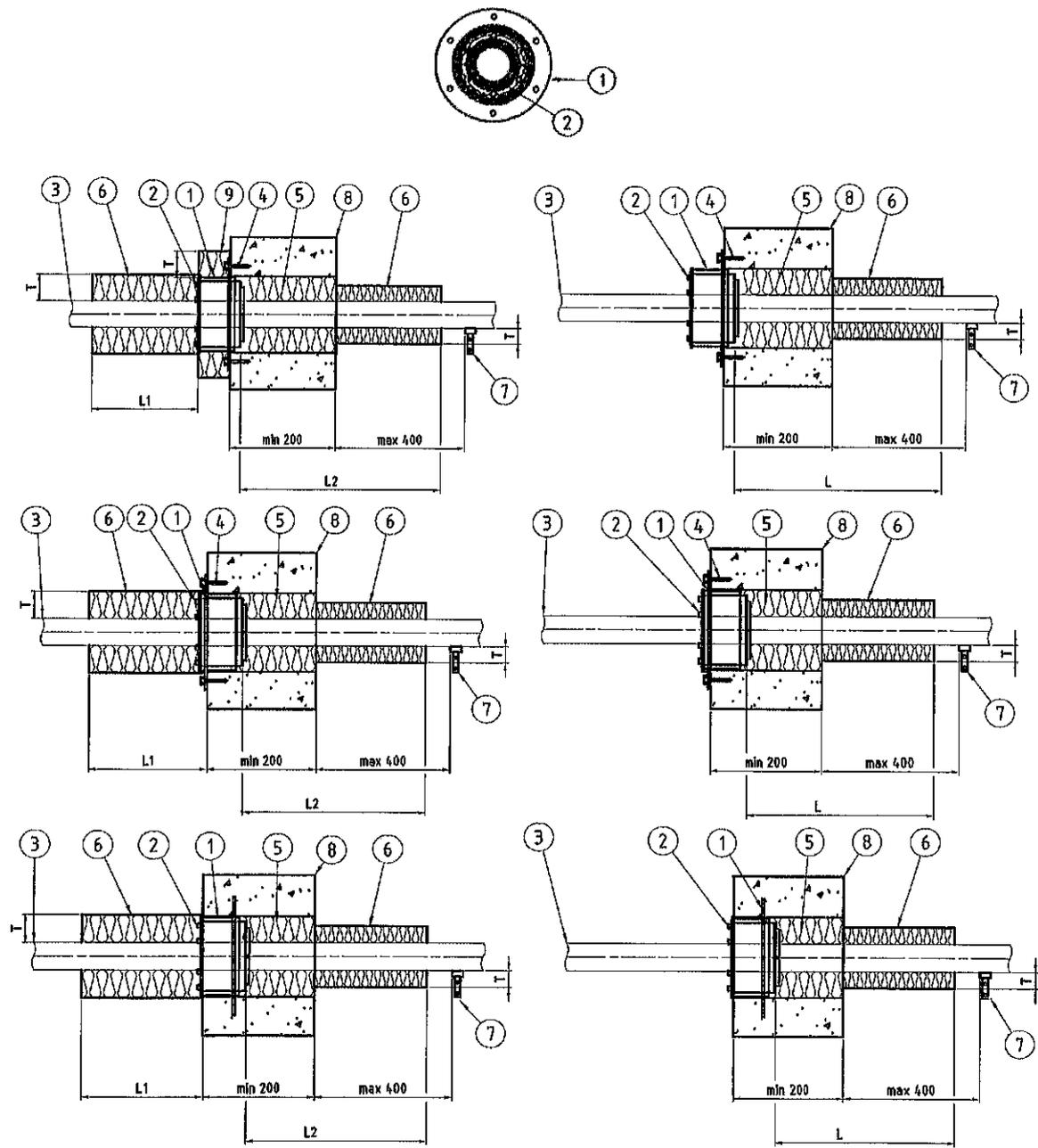
Resistance to fire classification of copper pipes in rigid wall, made in accordance with fig. C4 and Annex A.

Copper pipe		Mineral wool insulation length, L	Mineral wool insulation thickness, T	Fire resistance class
Pipe diameter \varnothing , mm	Pipe wall thickness t, mm			
$\leq 8,0$	$\geq 0,8$	– ¹⁾	– ¹⁾	EI 180 / E 240 – U/C EI 180 / E 240 – U/U EI 180 / E 240 – C/U EI 180 / E 240 – C/C
$8,0 < \varnothing \leq 15,0$	$\geq 0,9$	– ¹⁾	– ¹⁾	EI 90 / E 180 – U/C EI 90 / E 180 – U/U EI 90 / E 180 – C/U EI 90 / E 180 – C/C
	$\geq 1,0$	290 mm	30 mm	EI 120 / E 240 – U/C EI 120 / E 240 – U/U EI 120 / E 240 – C/U EI 120 / E 240 – C/C
$15,0 < \varnothing \leq 22,0$	$\geq 1,0$	–	–	EI 90 / E 180 – U/C EI 90 / E 180 – U/U EI 90 / E 180 – C/U EI 90 / E 180 – C/C
	$\geq 1,1$	290 mm	30 mm	EI 120 / E 240 – U/C EI 120 / E 240 – U/U EI 120 / E 240 – C/U EI 120 / E 240 – C/C
$22,0 < \varnothing \leq 42,0$	$1,5 \leq t \leq 14,2$	290 mm	30 mm	EI 120 / E 240 – U/C EI 120 / E 240 – U/U EI 120 / E 240 – C/U EI 120 / E 240 – C/C
$42,0 < \varnothing \leq 54,0$	$1,5 \leq t \leq 14,2$	250 mm	60 mm	EI 120 / E 240 – U/C EI 120 / E 240 – U/U EI 120 / E 240 – C/U EI 120 / E 240 – C/C
$54,0 < \varnothing \leq 108,0$	$2,0 \leq t \leq 14,2$	585 mm	90 mm	EI 90 / E 240 – U/C EI 90 / E 240 – U/U EI 90 / E 240 – C/U EI 90 / E 240 – C/C

¹⁾ “–” means that there is no pipe insulation

Roxtec RS seal	Annex C8 of European Technical Assessment ETA-19/0155
Resistance to fire classification of penetration seals Copper pipes penetration seals in rigid wall	

Fig. C5. Steel pipes penetration seals in rigid wall, made with use of single Roxtec RS seals



- 1 SLFRS sleeve
- 2 RS seal
- 3 Steel pipe
- 4 Lightweight concrete screw Ø8 x 65 mm
- 5 Cavity insulation (loose stone mineral wool, compressed to the density of $\geq 100 \text{ kg/m}^3$)
- 6 Additional pipe insulation (stone mineral wool insulation density of $\geq 100 \text{ kg/m}^3$)
- 7 Pipe support
- 8 Rigid wall, with a minimum thickness of 200 mm
- 9 Protruding sleeve insulation (stone mineral wool insulation density of $\geq 100 \text{ kg/m}^3$)

Roxtec RS seal	Annex C9
Construction details of penetration seals Steel pipes penetration seals in rigid wall	of European Technical Assessment ETA-19/0155

Resistance to fire classification of steel pipes in rigid wall, made in accordance with fig. C5 and Annex A.

Steel pipe		Mineral wool insulation length, L1	Mineral wool insulation length, L or L2	Mineral wool insulation thickness, T	Fire resistance class
Pipe diameter \varnothing , mm	Pipe wall thickness t, mm				
$\leq 40,0$	$1,5 \leq t \leq 14,2$	–	250 mm	30 mm	EI 120 – U/C EI 120 – U/U EI 120 – C/U EI 120 – C/C
$40,0 < \varnothing \leq 75,0$	$2,0 \leq t \leq 14,2$	–	500 mm	30 mm	EI 120 – U/C EI 120 – U/U EI 120 – C/U EI 120 – C/C
$75,0 < \varnothing \leq 160,0$	$2,0 \leq t \leq 14,2$	470 mm	470 mm	120 mm	EI 90 / E 120 – C/U EI 90 / E 120 – C/C EI 90 / E 120 – U/C
$160,0 < \varnothing \leq 236,0$	$2,0 \leq t \leq 14,2$	600 mm	600 mm	120 mm	EI 60 / E 120 – C/U EI 60 / E 120 – C/C EI 60 / E 120 – U/C

1) “–” means that there is no pipe insulation

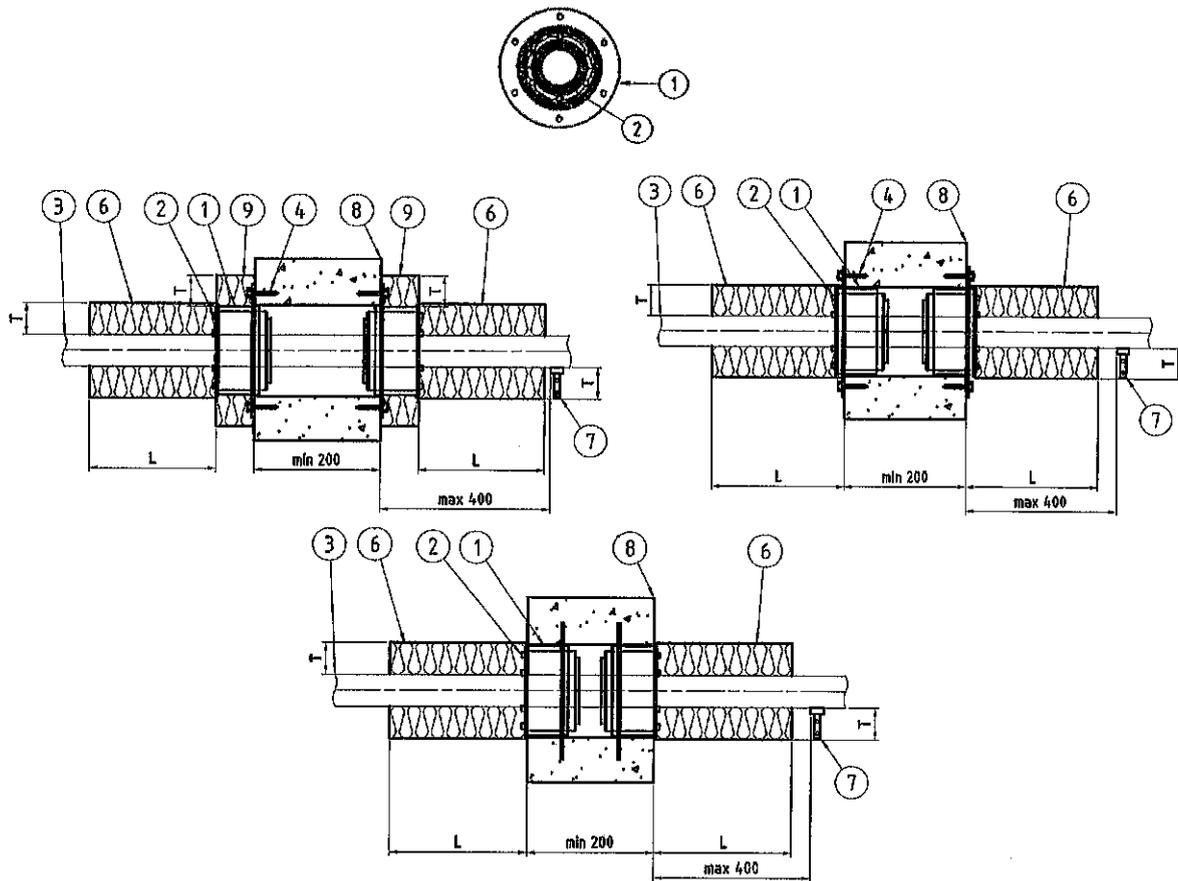
Roxtec RS seal

Resistance to fire classification of penetration seals
Steel pipes penetration seals in rigid wall

Annex C10

of European
Technical Assessment
ETA-19/0155

Fig. C6. Steel pipes penetration seals in rigid wall, made with use of double Roxtec RS seals



- 1 SLFRS sleeve
- 2 RS seal
- 3 Steel pipe
- 4 Lightweight concrete screw $\text{Ø}8 \times 65 \text{ mm}$
- 6 Additional pipe insulation (stone mineral wool insulation density of $\geq 100 \text{ kg/m}^3$)
- 7 Pipe support
- 8 Rigid wall, with a minimum thickness of 200 mm
- 9 Protruding sleeve insulation (stone mineral wool insulation density of $\geq 100 \text{ kg/m}^3$)

Roxtec RS seal

Annex C11

Construction details of penetration seals
Steel pipes penetration seals in rigid wall

of European
Technical Assessment
ETA-19/0155

Resistance to fire classification of steel pipes in rigid wall, made in accordance with fig. C6 and Annex A.

Steel pipe		Mineral wool insulation length, L	Mineral wool insulation thickness, T	Fire resistance class
Pipe diameter \varnothing , mm	Pipe wall thickness t, mm			
$\leq 40,0$	$1,5 \leq t \leq 14,2$	100 mm	30 mm	EI 120 / E 240 – U/C EI 120 / E 240 – U/U EI 120 / E 240 – C/U EI 120 / E 240 – C/C
$40,0 < \varnothing \leq 68,0$	$2,0 \leq t \leq 14,2$	250 mm	60 mm	EI 240 – U/C EI 240 – U/U EI 240 – C/U EI 240 – C/C
$68,0 < \varnothing \leq 75,0$	$2,0 \leq t \leq 14,2$	250 mm	60 mm	EI 240 – U/C EI 240 – U/U EI 240 – C/U EI 240 – C/C
$75,0 < \varnothing \leq 160,0$	$2,0 \leq t \leq 14,2$	700 mm	120 mm	EI 90 / E 240 – C/U EI 90 / E 240 – C/C EI 90 / E 240 – U/C
$160,0 < \varnothing \leq 236,0$	$2,0 \leq t \leq 14,2$	900 mm	120 mm	EI 90 / E 240 – C/U EI 90 / E 240 – C/C EI 90 / E 240 – U/C

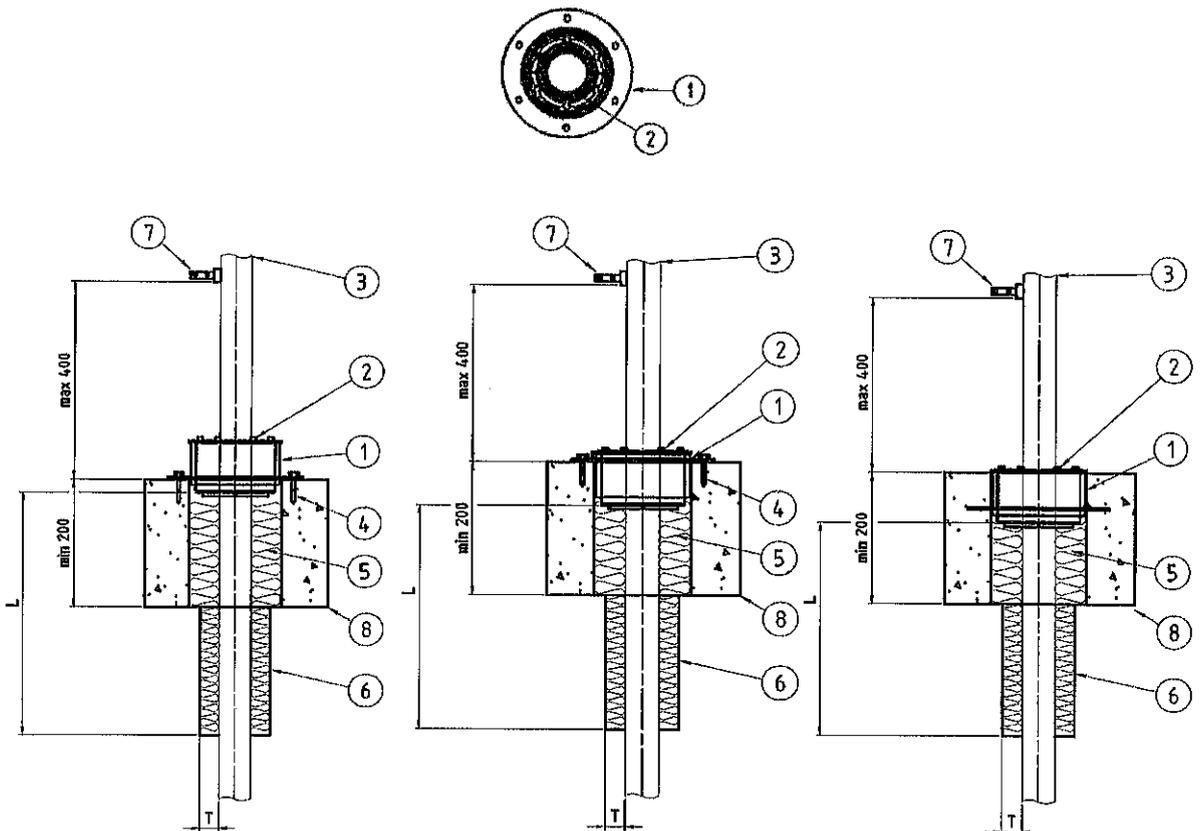
Roxtec RS seal

Annex C12

Resistance to fire classification of penetration seals
Steel pipes penetration seals in rigid wall

of European
Technical Assessment
ETA-19/0155

Fig. C7. Single cables penetration seals in rigid floor, made with use of single Roxtec RS seals



- 1 SLFRS sleeve
- 2 RS seal
- 3 Cable
- 4 Lightweight concrete screw $\varnothing 8 \times 65$ mm
- 5 Cavity insulation (loose stone mineral wool, compressed to the density of $\geq 100 \text{ kg/m}^3$)
- 6 Additional cable insulation (stone mineral wool insulation density of $\geq 100 \text{ kg/m}^3$)
- 7 Cable support
- 8 Rigid floor, with a minimum thickness of 200 mm

Roxtec RS seal

Annex C13

Construction details of penetration seals
Single cables penetration seals in rigid floor

of European
Technical Assessment
ETA-19/0155

Resistance to fire classification of single cables in rigid floor, made in accordance with fig. C7 and Annex A.

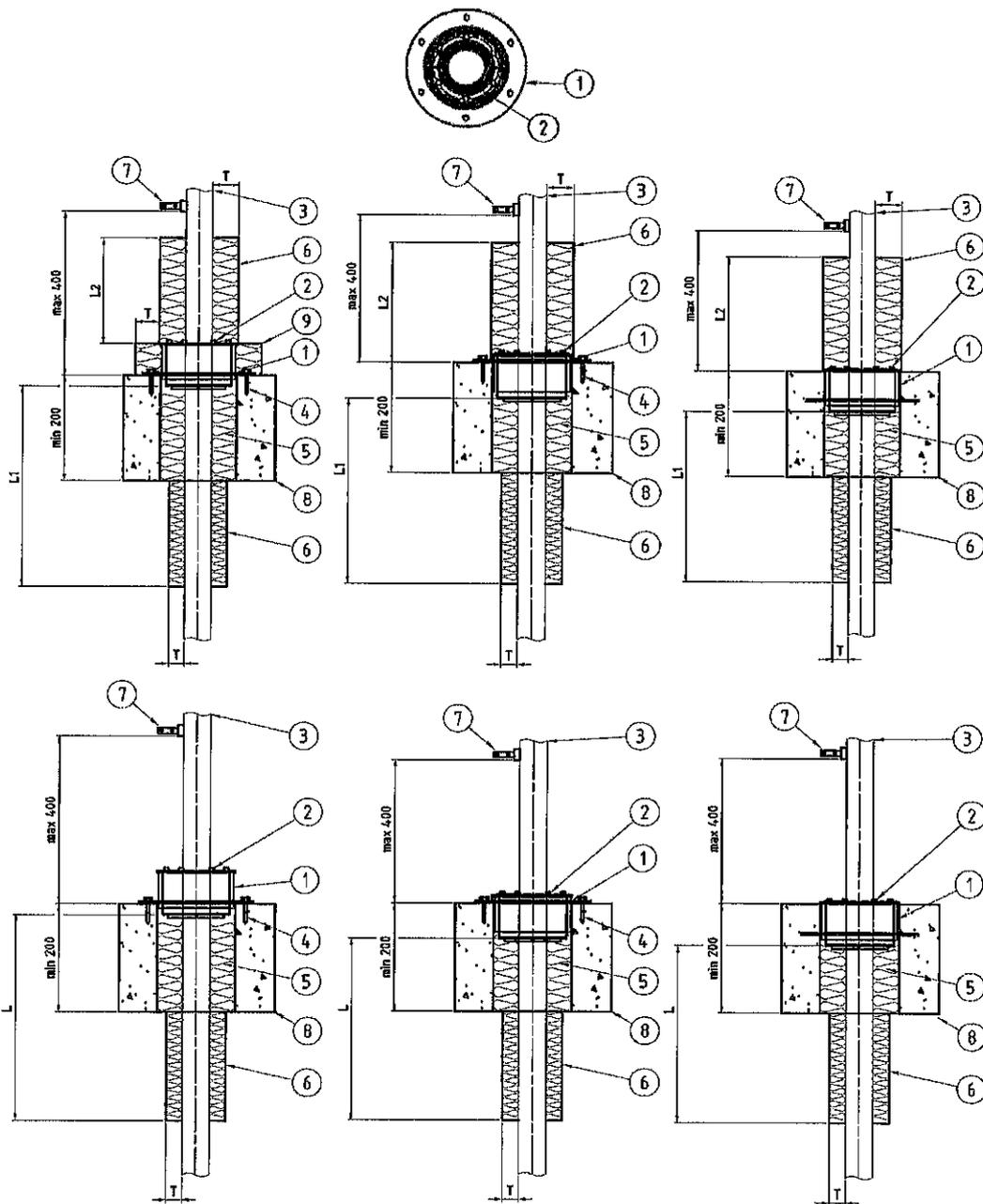
Type of cable ¹⁾	Mineral wool insulation length, L	Mineral wool insulation thickness, T	Fire resistance class
Small cables, with diameter ≤ 21 mm	50 mm	cavity only	EI 180
Medium cables, with diameter ≤ 50 mm	400 mm	30 mm	EI 120 / E 180
Large cables, with diameter ≤ 80 mm	400 mm	30 mm	EI 120 / E 180

¹⁾ Classification covers all cable types currently and commonly used in building practice in EU with a diameter not greater than specified, except tied bundles, waveguides and non-sheathed cables (wires); optical fibre cables are covered

²⁾ "cavity only" means that only the cavity is filled over the length "L"

Roxtec RS seal	Annex C14 of European Technical Assessment ETA-19/0155
Resistance to fire classification of penetration seals Single cables penetration seals in rigid floor	

Fig. C8. Copper pipes penetration seals in rigid floor, made with use of single Roxtec RS seals



- 1 SLFRS sleeve
- 2 RS seal
- 3 Copper pipe
- 4 Lightweight concrete screw $\varnothing 8 \times 65$ mm
- 5 Cavity insulation (loose stone mineral wool, compressed to the density of $\geq 100 \text{ kg/m}^3$)
- 6 Additional pipe insulation (stone mineral wool insulation density of $\geq 100 \text{ kg/m}^3$)
- 7 Pipe support
- 8 Rigid floor, with a minimum thickness of 200 mm
- 9 Protruding sleeve insulation (stone mineral wool insulation density of $\geq 100 \text{ kg/m}^3$)

Roxtec RS seal	Annex C15
Construction details of penetration seals Copper pipes penetration seals in rigid floor	of European Technical Assessment ETA-19/0155

Resistance to fire classification of copper pipes in rigid floor, made in accordance with fig. C8 and Annex A.

Copper pipe		Mineral wool insulation at the bottom of the floor		Mineral wool insulation at the top of the floor		Fire resistance class
Pipe diameter \varnothing , mm	Pipe wall thickness t, mm	length, L1 or L	thickness, T	length, L2	thickness, T	
$8,0 < \varnothing \leq 22,0$	$\geq 1,0$	600 mm	30 mm	–	–	EI 240 – U/C EI 240 – U/U EI 240 – C/U EI 240 – C/C
$22,0 < \varnothing \leq 42,0$	$1,5 \leq t \leq 14,2$	500 mm	60 mm	–	–	EI 90 / E 120 – U/C EI 90 / E 120 – U/U EI 90 / E 120 – C/U EI 90 / E 120 – C/C
		590 mm	60 mm	300 mm	60 mm	EI 120 / E 240 – U/C EI 120 / E 240 – U/U EI 120 / E 240 – C/U EI 120 / E 240 – C/C
$42,0 < \varnothing \leq 54,0$	$1,5 \leq t \leq 14,2$	500 mm	60 mm	–	–	EI 60 / E 120 – U/C EI 60 / E 120 – U/U EI 60 / E 120 – C/U EI 60 / E 120 – C/C
		675 mm	60 mm	400 mm	60 mm	EI 120 / E 240 – U/C EI 120 / E 240 – U/U EI 120 / E 240 – C/U EI 120 / E 240 – C/C
$54,0 < \varnothing \leq 108,0$	$2,0 \leq t \leq 14,2$	400 mm	90 mm	400 mm	90 mm	EI 60 / E 120 – U/C EI 60 / E 120 – U/U EI 60 / E 120 – C/U EI 60 / E 120 – C/C
		735 mm	90 mm	685 mm	90 mm	EI 90 / E 240 – U/C EI 90 / E 240 – U/U EI 90 / E 240 – C/U EI 90 / E 240 – C/C

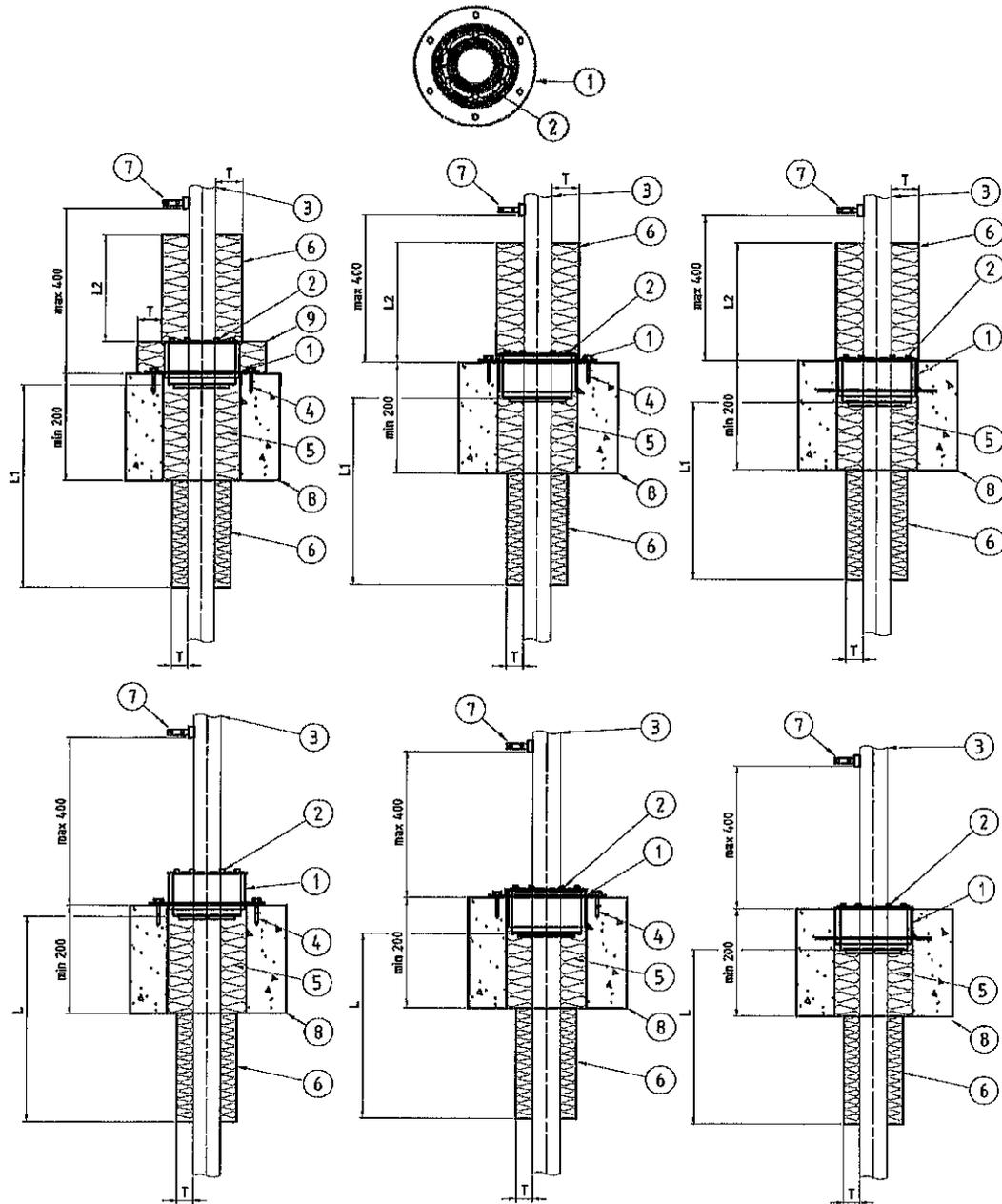
Roxtec RS seal

Annex C16

Resistance to fire classification of penetration seals
Copper pipes penetration seals in rigid floor

of European
Technical Assessment
ETA-19/0155

Fig. C9. Steel pipes penetration seals in rigid floor, made with use of single Roxtec RS seals



- 1 SLFRS sleeve
- 2 RS seal
- 3 Steel pipe
- 4 Lightweight concrete screw Ø8 x 65 mm
- 5 Cavity insulation (loose stone mineral wool, compressed to the density of $\geq 100 \text{ kg/m}^3$)
- 6 Additional pipe insulation (stone mineral wool insulation density of $\geq 100 \text{ kg/m}^3$)
- 7 Pipe support
- 8 Rigid floor, with a minimum thickness of 200 mm
- 9 Protruding sleeve insulation (stone mineral wool insulation density of $\geq 100 \text{ kg/m}^3$)

Roxtec RS seal

Annex C17

Construction details of penetration seals
Steel pipes penetration seals in rigid floor

of European
Technical Assessment
ETA-19/0155

Resistance to fire classification of steel pipes in rigid floor, made in accordance with fig. C9 and Annex A.

Steel pipe		Mineral wool insulation at the bottom of the floor		Mineral wool insulation at the top of the floor		Fire resistance class
Pipe diameter \varnothing , mm	Pipe wall thickness t, mm	length, L1 or L	thickness, T	length, L2	thickness, T	
$\leq 40,0$	$1,5 \leq t \leq 14,2$	250 mm	30 mm	–	–	EI 120 – U/C EI 120 – U/U EI 120 – C/U EI 120 – C/C
		320 mm	30 mm	–	–	EI 240 – U/C EI 240 – U/U EI 240 – C/U EI 240 – C/C
$40,0 < \varnothing \leq 75,0$	$2,0 \leq t \leq 14,2$	500 mm	30 mm	–	–	EI 120 – U/C EI 120 – U/U EI 120 – C/U EI 120 – C/C
		615 mm	60 mm	–	–	EI 180 / E 240 – U/C EI 180 / E 240 – U/U EI 180 / E 240 – C/U EI 180 / E 240 – C/C
$75,0 < \varnothing \leq 160,0$	$2,0 \leq t \leq 14,2$	470 mm	120 mm	470 mm	120 mm	EI 120 – C/U EI 120 – C/C EI 120 – U/C
		840 mm	120 mm	1010 mm	120 mm	EI 240 – C/U EI 240 – C/C EI 240 – U/C
$160,0 < \varnothing \leq 236,0$	$2,0 \leq t \leq 14,2$	600 mm	120 mm	600 mm	120 mm	EI 90 / E 120 – C/U EI 90 / E 120 – C/C EI 90 / E 120 – U/C
		1050 mm	120 mm	1210 mm	120 mm	EI 240 – C/U EI 240 – C/C EI 240 – U/C

Roxtec RS seal

Annex C18

Resistance to fire classification of penetration seals
Steel pipes penetration seals in rigid floor

of European
Technical Assessment
ETA-19/0155