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Designated according to Article 29 of Regulation (EU) No 305/2011

Member of EOTA

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# European Technical Assessment

# ETA 18/0691 of 07.10.2025

## General part

| | |
|---|---|
| **Technical Assessment Body issuing the ETA: ITeC**<br>ITeC has been designated according to Article 29 of Regulation (EU) No 305/2011 and is member of EOTA (European Organisation for Technical Assessment). | |
| **Trade name of the construction product** | **Ultimate Protect Slab 4.0**<br>**Ultimate Protect Slab 4.0 Alu 1** |
| **Product family to which the construction product belongs** | Fire protective products. |
| **Manufacturer** | **SAINT-GOBAIN ISOVER G+H AG**<br>Bürgermeister-Grünzweig-Straße 1<br>D-67059 Ludwigshafen<br>Germany |
| **Manufacturing plant(s)** | According to Annex N kept by ITeC. |
| **This European Technical Assessment contains** | 17 pages including 2 annexes which form an integral part of this assessment<br>and<br>Annex N, which contains confidential information and is not included in the European Technical Assessment when that assessment is publicly available. |
| **This European Technical Assessment is issued in accordance with Regulation (EU) 305/2011, on the basis of** | European Assessment Document EAD 350142-00-1106. |
| **This version replaces** | ETA 18/0691 issued on 12.12.2022. |

**General comments**

Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document.

Communication of this European Technical Assessment, including transmission by electronic means, shall be in full (excepted the confidential Annex(es)).

# Specific parts of the European Technical Assessment

## 1 Technical description of the product

Ultimate Protect Slab 4.0 is a fire protective slab made of mineral wool [1] impregnated with a synthetic binder. Ultimate Protect Slab 4.0 Alu 1 is the faced product version with a reinforced aluminium foil of 78 g/m$^2$. Both Ultimate Protect Slab 4.0 and Ultimate Protect Slab 4.0 Alu 1 are CE marked according to EN 14303 [2].

**Table 1:** Dimensions and density Ultimate Protect Slab 4.0 & Alu 1.

| Characteristic | Nominal value | Tolerance |
|---|---|---|
| Density (kg/m$^3$) at 23ºC, 50% RH | 66 | ± 10 % |
| Length (mm) | 1200 | ± 2 % |
| Width (mm) | 600 | ± 1,5 % |
| Thickness (mm) | 50, 70, 90 | -2/+5 |

Assembled systems require additional products for their installation, as described in the annexes of this ETA. These products are not covered by this ETA and cannot be CE marked on its basis, as well as the installed system as a whole.

## 2 Specification of the intended use(s) in accordance with the applicable EAD

Ultimate Protect Slab 4.0 and Ultimate Protect Slab 4.0 Alu 1 are intended for the fire protection of ventilation rectangular steel ducts and multi-compartment smoke extraction rectangular steel ducts, i.e. category according to section 1.2.2 of EAD 350142-00-1106:

- Type 9: Fire protective products that contribute to the fire resistance of technical services assemblies in buildings.

The environmental use conditions assessed correspond to the following use category according to section 1.2.3 of EAD 350142-00-1106:

- Type $Z_2$: Internal conditions excluding temperatures below 0°C, with humidity below 85% RH.

The provisions made in this ETA are based on a working life of the product of at least 25 years, provided that the conditions laid down in the manufacturer's instructions for the installation, use and maintenance are met. These provisions are based upon the current state of the art and the available knowledge and experience.

The indications given as to the working life cannot be interpreted as a guarantee given by the manufacturer or Assessment Body but are to be regarded only as a means for choosing the appropriate product(s) in relation to the expected economically reasonable working life of the works.

[1] Manufactured fibres of Ultimate Protect Slab 4.0 and Ultimate Protect Slab 4.0 Alu 1 are certified by EUCEB in conformity with the Note Q of Regulation (EC) No 1272/2008.

[2] EN 14303 Thermal insulation products for building equipment and industrial installations. Factory made mineral wool (MW) products. Specification.

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

## 3.1 Performance of the product

The assessment of Ultimate Protect Slab 4.0 and Ultimate Protect Slab 4.0 Alu 1 has been performed in accordance with EAD 350142-00-1106 *Fire protective board, slab and mat products and kits (September 2017)*.

**Table 2:** Performance of the product.

| **Product:** Ultimate Protect Slab 4.0<br>Ultimate Protect Slab 4.0 Alu 1 | | | | **Intended use:** Fire protective product |
|---|---|---|---|---|
| **Basic requirement** | **Essential characteristic** | | | **Performance** |
| BWR 2<br>Safety in case of fire | Reaction to fire | | | A1 |
| | Resistance to fire | Ventilation | (50 mm) | EI 30 (ve-ho i ↔ o) S |
| | | | (70 mm) | EI 60 (ve-ho i ↔ o) S |
| | | | (90 mm) | EI 120 (ve-ho i ↔ o) S |
| | | Smoke extraction | (90 mm) | EI 120 (ve-ho) S 500 multi |
| | Durability | | | Type $Z_2$ |
| BWR 6<br>Energy economy and heat retention | Thermal conductivity, $\lambda_{10,dry}$ | | | 0,031 W/(m·K) |

The rest of characteristics included in EAD 350142-00-1106 have not been assessed in this ETA.

## 3.2 Methods used for the assessment

### 3.2.1 Reaction to fire

The performance of Ultimate Protect Slab 4.0 and Ultimate Protect Slab 4.0 Alu 1 has been tested according to EN ISO 1182[3] and EN ISO 1716 [4]. Classification is given in accordance with EN 13501-1 [5] and Regulation (EU) 2016/364.

### 3.2.2 Resistance to fire

The fire resistance performance has been determined following the test and assessment methods given in Annex A for ventilation ducts and Annex B for multi-compartment smoke extraction ducts.

### 3.2.3 Durability

The durability of Ultimate Protect Slab 4.0 and Ultimate Protect Slab 4.0 Alu 1 has been assessed for Type $Z_2$ conditions in accordance with section 2.2.2.3 of EAD 350142-00-1106 and EN 14303.

[3] EN ISO 1182 Reaction to fire tests for products. Non-combustibility test.

[4] EN ISO 1716 Reaction to fire tests for products. Determination of the gross heat of combustion (calorific value).

[5] EN 13501-1 Fire classification of construction products and building elements. Part 1: Classification using data from reaction to fire tests.

### 3.2.4 Thermal conductivity

The thermal conductivity of Ultimate Protect Slab 4.0 and Ultimate Protect Slab 4.0 Alu 1 has been tested in accordance with EN 12667 [6].

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

According to the Decision 1999/454/EC of the European Commission, the system of AVCP (see EC delegated Regulation (EU) No 568/2014 amending Annex V to Regulation (EU) 305/2011) given in the following table applies.

**Table 3:** AVCP System.

| Product(s) | Intended use(s) | Level(s) or class(es) | System(s) |
|---|---|---|---|
| Fire protective products | For fire compartmentation and/or fire protection or fire performance | Any | 1 |

## 5 Technical details necessary for the implementation of the AVCP system, as foreseen in the applicable EAD

All the necessary technical details for the implementation of the AVCP system are laid down in the Control Plan deposited with the ITeC and agreed in accordance with EAD 350142-00-1106, section 3.

The Control Plan is a confidential part of the ETA and only handed over to the notified product certification body involved in the assessment and verification of constancy of performance.

The factory production control operated by the manufacturer shall be in accordance with the above-mentioned Control Plan.

Issued in Barcelona on 7 October 2025

by the Catalonia Institute of Construction Technology.

Institut de Tecnologia de la Construcció de Catalunya

Ferran Bermejo Nualart
Technical Director, ITeC

[6] EN 12667 Thermal performance of building materials and products. Determination of thermal resistance by means of guarded hot plate and heat flow meter methods. Products of high and medium thermal resistance.

# ANNEX A. Specification and assessment of ventilation rectangular ducts fire protected with Ultimate Protect Slab 4.0 and Ultimate Protect Slab 4.0 Alu 1

## A.1 Horizontal ventilation duct

### A.1.1 Resistance to fire performance

The ventilation duct assembly has been tested according to EN 1366-1 [7] and has a resistance to fire performance as follows:

- EI 30 (ho i ↔ o) S with 50 mm slabs.
- EI 60 (ho i ↔ o) S with 70 mm slabs.
- EI 120 (ho i ↔ o) S with 90 mm slabs.

### A.1.2 Installation requirements

The provisions given in this ETA, which are based on the tests performed, should be followed. However, the range of installed systems will vary depending on the design of the ventilation ductwork and, therefore, the system installation should be carried out in accordance with the manufacturer's instructions.

#### A.1.2.1 Duct

Rectangular steel duct made from folded 0,7 mm thickness sheets, with maximum dimensions of the internal duct section of 1250 mm x 1000 mm (width x height), and the characteristics given in the next table.

**Table A.1.1:** Rectangular steel duct specification.

| Duct | Duct tightness class | Maximum segment length | Stiffeners |
|---|---|---|---|
| EI 30 with 50 mm slabs | Class B or better according to EN 1507 [8] | 1500 mm | Not required |
| EI 60 with 70 mm slabs | | 1500 mm | Yes (*) |
| EI 120 with 90 mm slabs | | 1250 mm | Yes (*) |

(*) One internal stiffener per duct segment positioned at midpoint as shown in figure A.1.1. The stiffeners are steel threaded rods of diameter 8 mm, placed inside a steel pipe with outer diameter 16 mm and thickness 2 mm. The steel rods are fixed to the duct using 4 washers of external diameter 70 mm and thickness 1 mm, inside and outside the duct, and M8 nuts.

As shown in figure A.1.2, the joints between duct segments consist of steel flanges of size 30 mm, spot welded to the duct sections every 140 mm, bolted together in the corners with M10 bolts and nuts and held together with steel clamps (at maximum distance to the corners of 130 mm, and between clamps of

[7] EN 1366-1 Fire resistance tests for service installation. Part 1: Ducts.

[8] EN 1507 Ventilation for buildings. Sheet metal air ducts with rectangular section. Requirements for strength and leakage.

250 mm). Ceramic tape of 3 mm x 20 mm is installed between the flanges. All duct sections corners and folded duct plate seams are sealed with an acrylic seal from the inside.



**Figure A.1.1**: Internal stiffeners (for EI 60 and EI 120 ducts).

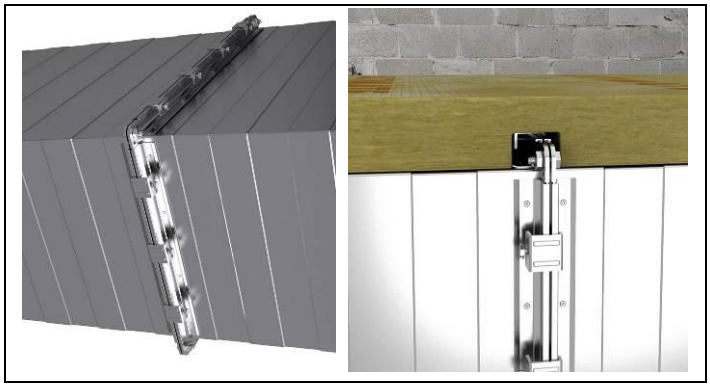


**Figure A.1.2**: Example of joints between duct segments.

Duct side branches, T-pieces or direction changing pieces can be installed according to the manufacturer's instructions.

The duct is assessed to work at a pressure difference in fire conditions as shown in the next table.

**Table A.1.2:** Pressure difference.

| Duct | Pressure difference (fire conditions) |
|---|---|
| EI 30 with 50 mm slabs | – 500 Pa to + 500 Pa |
| EI 60 with 70 mm slabs | – 500 Pa to + 500 Pa |
| EI 120 with 90 mm slabs | – 300 Pa to + 300 Pa |

### A.1.2.2 Duct suspension elements

The steel duct suspension elements will be designed and positioned in accordance with section 13.6.1 of EN 1366-1 and section 9.2.2 of EN 15882-1 to limit the maximum stresses in the rods and fixings to the values given in Table 7 of EN 1366-1. As a tested reference, shown in figure A.1.3, the main characteristics of the suspension elements are given in the next table.

**Table A.1.3:** Tested suspension elements description for reference.

| | Duct EI 30 with 50 mm slabs | Duct EI 60 with 70 mm slabs | Duct EI 120 with 90 mm slabs |
|---|---|---|---|
| Maximum stress of steel rods in cold conditions | 6 MPa | 9 MPa | 3 MPa |
| Maximum distance from the rods to the duct side | 50 mm | 50 mm | 10 mm |
| Maximum distance between suspension elements | 1800 mm | 1785 mm | 1330 mm |
| Position of the suspension elements | 25 mm to 125 mm from the duct joints, 175 mm to 375 mm from the insulation joints | | |

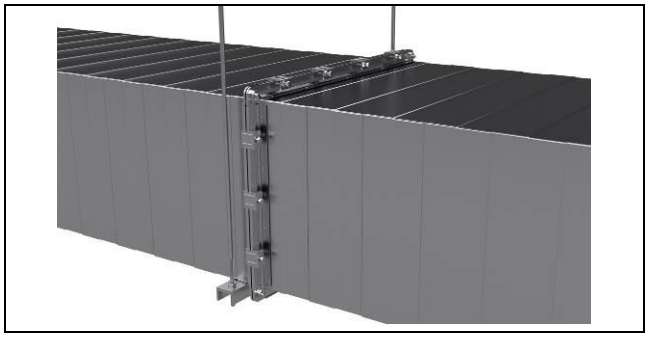


**Figure A.1.3**: Example of duct suspension elements.

### A.1.2.3 Fire protective insulation

The duct is cladded with Ultimate Protect Slab 4.0 or Ultimate Protect Slab 4.0 Alu 1, according to section 1 of this ETA, positioned with staggered joints and fixed using steel welding pins of diameter 2,7 mm and nominal length 52 mm (for 50 mm slabs), 72 mm (for 70 mm slabs) or 93 mm (for 90 mm slabs), and 30 mm washers. The maximum distance between pins is 260 mm, and of the pins to the duct edges or slab joints is 80 mm. The slabs on the upper side of the duct are installed without pins. An example of slabs and pins installation at the downside is shown in figure A.1.4.

Fire Protect Screws from Isover G+H of length 100 mm (for 50 mm slabs), 140 mm (for 70 mm slabs) or 180 mm (for 90 mm slabs) are used as fixing between slabs at maximum distance of 260 mm, as shown in figure A.1.5 (through the side slabs into the upper and downside slabs).

In the case of Ultimate Protect Slab 4.0 Alu 1, all joints between slabs are finished with Protect Black Tape, as shown in figure A.1.6.




**Figure A.1.4**: Ultimate Protect Slab 4.0 installation (duct downside).



**Figure A.1.5**: Fire Protect Screws for slabs fixing.

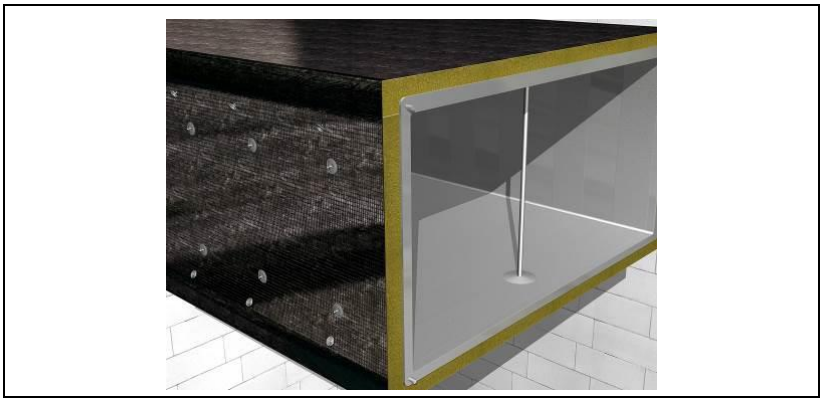


**Figure A.1.6**: Example of Ultimate Protect Slab 4.0 Alu 1 installation.

### A.1.2.4 Supporting construction

The wall through which the duct passes is described in the next table.

**Table A.1.4:** Wall characteristics.

| Duct | Type | Minimum thickness | Minimum resistance to fire |
|---|---|---|---|
| EI 30 with 50 mm slabs | Flexible (*) or rigid wall | 70 mm | EI 30 |
| EI 60 with 70 mm slabs | Flexible (*) or rigid wall | 100 mm | EI 60 |
| EI 120 with 90 mm slabs | Rigid wall with minimum density of 650 kg/m$^3$ | 150 mm | EI 120 |

(*) For flexible wall constructions with steel studs, reinforcing steel studs shall be installed in horizontal and vertical direction at all edges of the aperture.

### A.1.2.5 Wall penetration seal

The penetration seal is shown in figure A.1.7.

The gap between the steel duct and the supporting construction is 50 mm maximum.

The duct is fixed at both sides of the wall with steel L-profiles (30 mm x 30 mm x 3 mm, and length according to the duct dimensions) along the longest sides (for a ventilation duct EI 30) or all four sides (for a ventilation duct EI 60 and EI 120). The duct is riveted to the L-profiles with steel rivets of Ø3,2 mm x 10 mm every 100 mm. The horizontal L-profiles are extended 220 mm further out from the duct at each side and fixed to the wall using mechanical fixings as given in the next table.

**Table A.1.5:** Mechanical fixing of L-profile to the wall.

| Duct | Fixing means |
|---|---|
| EI 30 with 50 mm slabs | 2 wall anchors M6 x 52 mm at each end of the profile |
| EI 60 with 70 mm slabs | 2 wall anchors M6 x 65/54 mm at each end of the profile |
| EI 120 with 90 mm slabs | 2 steel screws of Ø7,5 mm x 62 mm at each end of the profile |

The gap between the steel duct and the supporting construction is fitted with compressed Ultimate Protect Slab 4.0. In the case of a ventilation duct EI 120 with 90 mm slabs, the insulation is coated at both sides of the penetration with intumescent paint Protect BSF from Isover G+H, applied at an approximate dry film thickness of 2 mm.

At both sides of the penetration, the duct fire protective insulation Ultimate Protect Slab 4.0 or Ultimate Protect Slab 4.0 Alu 1 is glued to the penetration surface using silicate glue Protect BSK from Isover G+H, applied at an approximate rate of 0,66 g/cm².

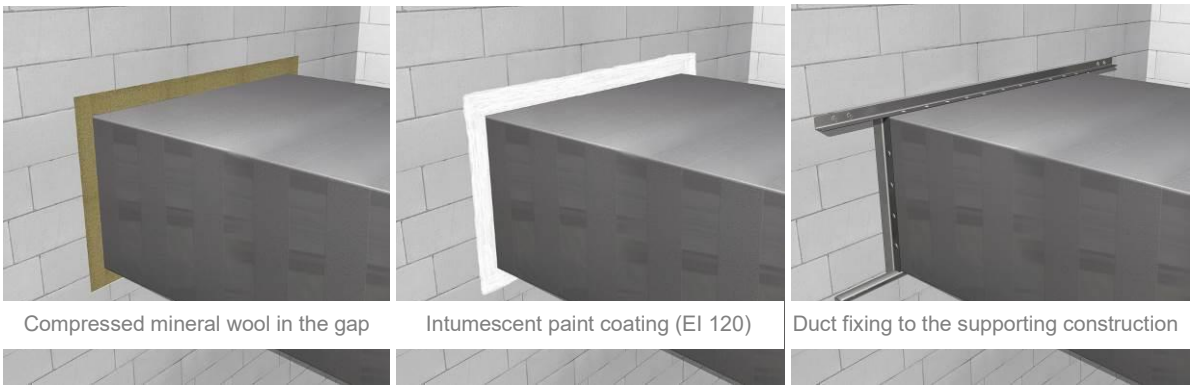






**Figure A.1.7**: Example of wall penetration seal.

## A.2 Vertical ventilation duct

### A.2.1 Resistance to fire performance

The ventilation duct assembly has been tested according to EN 1366-1 and has a resistance to fire performance as follows:

- EI 30 (ve i ↔ o) S with 50 mm slabs.
- EI 60 (ve i ↔ o) S with 70 mm slabs.
- EI 120 (ve i ↔ o) S with 90 mm slabs.

### A.2.2 Installation requirements

The provisions given in this ETA, which are based on the tests performed, should be followed. However, the range of installed systems will vary depending on the design of the ventilation ductwork and, therefore, the system installation should be carried out in accordance with the manufacturer's instructions.

#### A.2.2.1 Duct

Rectangular steel duct made from folded 0,7 mm thickness sheets, with maximum dimensions of the internal duct section of 1250 mm x 1000 mm (width x height), and the characteristics given in the next table.

**Table A.2.1:** Rectangular steel duct specification.

| Duct | Duct tightness class | Maximum segment length | Stiffeners |
|---|---|---|---|
| EI 30 with 50 mm slabs | Class B or better according to EN 1507 | 1500 mm | Not required |
| EI 60 with 70 mm slabs | | 1500 mm | Yes (*) |
| EI 120 with 90 mm slabs | | 1250 mm | Yes (*) |

(*) One internal stiffener per duct segment positioned at midpoint as shown in figure A.1.1. The stiffeners are steel threaded rods of diameter 8 mm, placed inside a steel pipe with outer diameter 16 mm and thickness 2 mm. The steel rods are fixed to the duct using 4 washers of external diameter 70 mm and thickness 1 mm, inside and outside the duct, and M8 nuts.

As shown in figure A.2.2, the joints between duct segments consist of steel flanges of size 30 mm, spot welded to the duct sections every 140 mm, bolted together in the corners with M10 bolts and nuts and held together with steel clamps (at maximum distance to the corners of 130 mm, and between clamps of 250 mm). Ceramic tape of 3 mm x 20 mm is installed between the flanges. All duct sections corners and folded duct plate seams are sealed with an acrylic seal from the inside.



**Figure A.2.1**: Internal stiffeners (for EI 60 and EI 120 ducts).

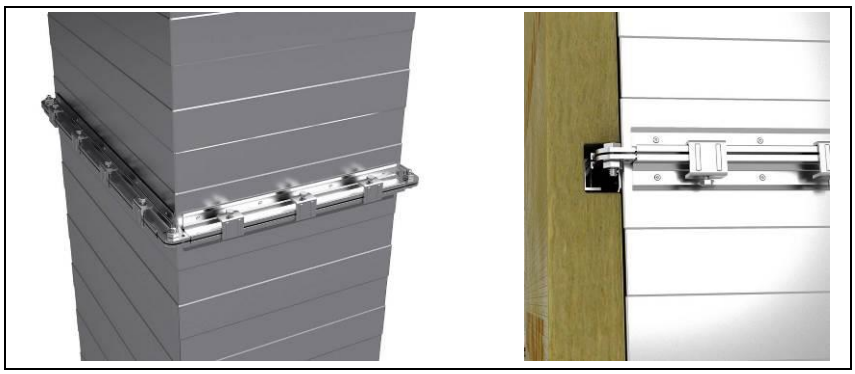


**Figure A.2.2**: Example of joints between duct segments.

Duct side branches, T-pieces or direction changing pieces can be installed according to the manufacturer's instructions.

The duct can pass through any number of storeys provided that the distance between floors, where the duct is supported (see section A.2.2.4), does not exceed 5 m and the limitation on buckling is satisfied. To prevent damage to the construction from buckling of vertical ducts, the ratio between the length (height) of the duct fire exposed in the compartment to the smallest lateral dimension across the outside face of the duct does not exceed 8:1, unless additional lateral supports are provided. If additional supports are provided, the ratio of the distance between the additional supports, or the distance between the supports and the supporting construction, to the smallest lateral dimension across the outside face of the duct shall not exceed 8:1.

The duct is assessed to work at a pressure difference in fire conditions as shown in the next table.

**Table A.2.2:** Pressure difference.

| Duct | Pressure difference (fire conditions) |
|---|---|
| EI 30 with 50 mm slabs | – 500 Pa to + 500 Pa |
| EI 60 with 70 mm slabs | – 500 Pa to + 500 Pa |
| EI 120 with 90 mm slabs | – 500 Pa to + 500 Pa |

### A.2.2.2 Fire protective insulation

The duct is cladded with Ultimate Protect Slab 4.0 or Ultimate Protect Slab 4.0 Alu 1, according to section 1 of this ETA, positioned with staggered joints and fixed using steel welding pins of diameter 2,7 mm and nominal length 52 mm (for 50 mm slabs), 72 mm (for 70 mm slabs) or 93 mm (for 90 mm slabs), and 30 mm washers. The maximum distance between pins is 260 mm, and of the pins to the duct edges or slab joints is 80 mm. An example of slabs and pins installation is shown in figure A.2.3.

Fire Protect Screws from Isover G+H of length 100 mm (for 50 mm slabs), 140 mm (for 70 mm slabs) or 180 mm (for 90 mm slabs) are used as fixing between slabs at maximum distance of 260 mm, as shown in figure A.2.4 (through the long side slabs into the short side slabs).

In the case of Ultimate Protect Slab 4.0 Alu 1, all joints between slabs are finished with Protect Black Tape.

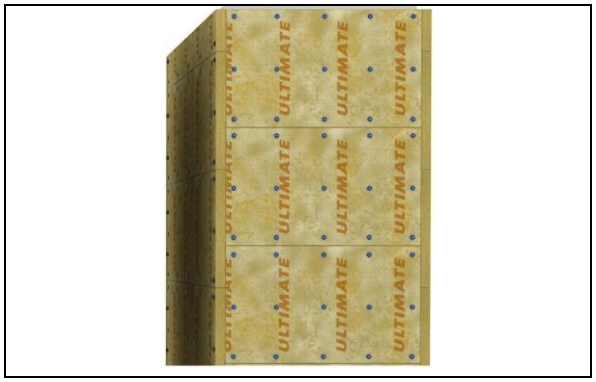



**Figure A.2.3**: Ultimate Protect Slab 4.0 installation.



**Figure A.2.4**: Fire Protect Screws for slabs fixing.

### A.2.2.3 Supporting construction

The floor through which the duct passes is made of aerated concrete (or other type of rigid floor) with minimum density of 650 kg/m$^3$ and the characteristics as given in the next table.

**Table A.2.3:** Rigid floor characteristics.

| Duct | Minimum thickness | Minimum resistance to fire |
|---|---|---|
| EI 30 with 50 mm slabs | 100 mm | EI 30 |
| EI 60 with 70 mm slabs | 100 mm | EI 60 |
| EI 120 with 90 mm slabs | 150 mm | EI 120 |

### A.2.2.4 Floor penetration seal

The penetration seal is shown in figure A.2.5.

The gap between the steel duct and the supporting construction is 50 mm maximum.

In the case of ducts EI 30 and EI 60, the duct is fixed with steel L-profiles at all four sides, only on top of the floor. In the case of ducts EI 120, the duct is fixed with steel L-profiles at all four sides, both on top

and bottom of the floor. The duct is riveted to the L-profiles (30 mm x 30 mm x 3 mm and length according to the duct dimensions) with steel rivets of Ø3,2 mm x 10 mm every 100 mm. The long L-profiles are extended 220 mm further out from the duct at each side and fixed to the floor using 2 steel screws of Ø7,5 mm x 62 mm at each end of the profile.

The gap between the steel duct and the supporting construction is fitted with compressed Ultimate Protect Slab 4.0. In the case of a ventilation duct EI 120 with 90 mm slabs, the insulation is coated at both sides of the penetration with intumescent paint Protect BSF from Isover G+H, applied at an approximate dry film thickness of 2 mm.

At both sides of the penetration, the duct fire protective insulation Ultimate Protect Slab 4.0 or Ultimate Protect Slab 4.0 Alu 1 is glued to the penetration surface using silicate glue Protect BSK from Isover G+H, applied at an approximate rate of 0,66 g/cm².

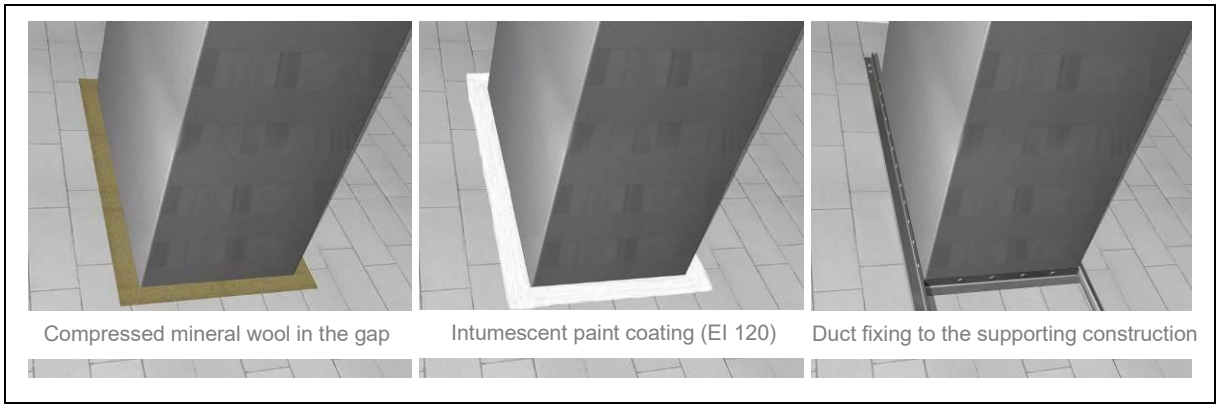



**Figure A.2.5**: Example of floor penetration seal.

# ANNEX B. Specification and assessment of multi-compartment smoke extraction rectangular ducts fire protected with Ultimate Protect Slab 4.0 and Ultimate Protect Slab 4.0 Alu 1 of 90 mm thickness

## B.1 Resistance to fire performance

The multi-compartment smoke extraction duct assembly has been tested according to EN 1366-8[9] and has a resistance to fire performance of EI 120 (ve-ho) S 500 multi.

## B.2 Installation requirements

The provisions given in this ETA, which are based on the tests performed, should be followed. However, the range of installed systems will vary depending on the design of the smoke extraction ductwork and, therefore, the system installation should be carried out in accordance with the manufacturer's instructions.

### B.2.1 Duct

Rectangular steel duct of tightness class B or better, according to EN 1507, made from folded 1,0 mm thickness sheets. The maximum dimensions of internal duct section are 1250 mm x 1000 mm (width x height for horizontal ducts) and the segment length 1500 mm.

Each duct segment has 5 internal stiffeners evenly distributed as shown in figure B.2.1. The stiffeners are steel threaded rods of diameter 8 mm, placed inside a steel pipe with outer diameter 17,5 mm and thickness 2,35 mm. The steel rods are fixed to the duct using 4 washers of external diameter 70 mm and thickness 1 mm, inside and outside the duct, and M8 nuts.

As shown in figure B.2.2, the joints between duct segments consist of steel flanges of size 30 mm, spot welded to the duct sections every 140 mm, bolted together in the corners with M10 bolts and nuts and held together with steel clamps (at maximum distance to the corners of 130 mm, and between clamps of 250 mm). Ceramic tape of 3 mm x 20 mm is installed between the flanges. All duct sections corners and folded duct plate seams are sealed with an acrylic seal from the inside.

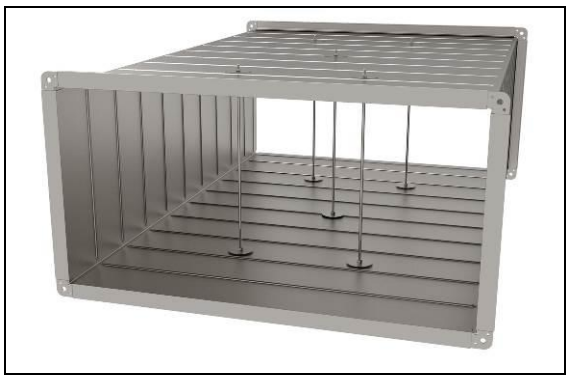


**Figure B.2.1**: Duct internal stiffeners.



**Figure B.2.2**: Joints between duct segments.

[9] EN 1366-8 Fire resistance tests for service installation. Part 8: Smoke extraction ducts.

Duct side branches, T-pieces or direction changing pieces can be installed according to the manufacturer's instructions.

In the case of vertical ducts, the duct can pass through any number of storeys provided that the distance between floors, where the duct is supported (see section B.2.5), does not exceed 5 m and the limitation on buckling is satisfied. To prevent damage to the construction from buckling of vertical ducts, the ratio between the length (height) of the duct fire exposed in the compartment to the smallest lateral dimension across the outside face of the duct does not exceed 8:1, unless additional lateral supports are provided. If additional supports are provided, the ratio of the distance between the additional supports, or the distance between the supports and the supporting construction, to the smallest lateral dimension across the outside face of the duct shall not exceed 8:1.

The duct is assessed to work at a pressure difference in fire conditions between – 500 Pa to + 500 Pa.

### B.2.2 Duct suspension elements for horizontal ducts

The steel duct suspension elements will be designed and positioned in accordance with section 13.6.1 of EN 1366-1 and section 9.2.2 of EN 15882-1 to limit the maximum stresses in the rods and fixings to the values given in Table 7 of EN 1366-1.

As a tested reference, shown in figure B.2.3, the duct is suspended with hangers consisting of steel rod at maximum stress of 4 MPa. The distance from the rods to the vertical side of the duct is 10 mm approximately. The largest distance between suspension elements is 1530 mm. The hangers and support profile are positioned at approximately 50 mm from the duct joints.

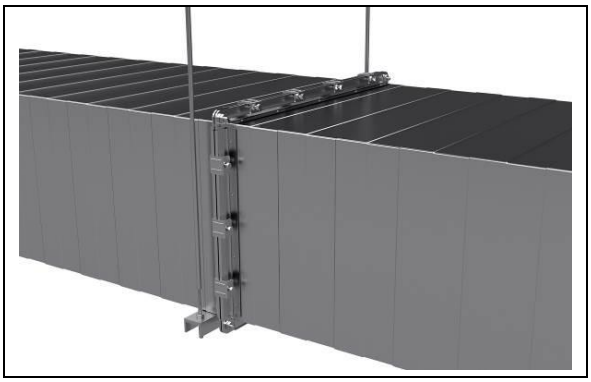


**Figure B.2.3**: Horizontal duct suspension elements.

### B.2.3 Fire protective insulation

The duct is cladded with Ultimate Protect Slab 4.0 or Ultimate Protect Slab 4.0 Alu 1 of 90 mm thickness, according to section 1 of this ETA, positioned with staggered joints and fixed using steel welding pins of diameter 2,7 mm and nominal length 93 mm, and 30 mm washers. The maximum distance between pins is 260 mm. The distance of the pins to the duct edges or slab joints is 80 mm. In the case of horizontal ducts, the slabs on the upper side of the duct are installed without pins. Examples of slabs and pins installation are shown in figure A.1.4 for horizontal ducts and A.2.3 for vertical ducts.

Fire Protect Screws from Isover G+H of length 180 mm are used as fixing between slabs at maximum distance of 260 mm, as shown in figure A.1.5 for horizontal ducts and A.2.4 for vertical ducts.

In the case of Ultimate Protect Slab 4.0 Alu 1, all joints between slabs are finished with Protect Black Tape.

### B.2.4 Supporting construction

#### B.2.4.1 Walls passed by horizontal ducts

The wall through which the duct passes is made of aerated concrete (or other type of rigid wall) with a minimum thickness of 150 mm and a minimum density of 650 kg/m$^3$.

#### B.2.4.2 Floors passed by vertical ducts

The floor through which the duct passes is made of aerated concrete (or other type of rigid floor) with a minimum thickness of 150 mm and a minimum density of 650 kg/m$^3$.

### B.2.5 Penetration seal

The penetration seal is shown in figure A.1.7 for horizontal ducts and A.2.5 for vertical ducts.

The gap between the steel duct and the supporting construction is 50 mm maximum.

The duct is fixed at both sides of the penetration to the supporting construction with steel L-profiles (30 mm x 30 mm x 3 mm and length according to the duct dimensions) along all four duct sides. The duct is riveted to the L-profiles with steel rivets of Ø3,2 mm x 10 mm every 100 mm. The long L-profiles are extended 220 mm further out from the duct at each side and fixed to the supporting construction using at each end of the profile 2 steel screws of Ø7,5 mm x 62 mm.

The gap between the steel duct and the supporting construction is fitted with compressed Ultimate Protect Slab 4.0. The insulation is coated at both sides of the penetration with intumescent paint Protect BSF from Isover G+H, applied at an approximate dry film thickness of 2 mm.

At both sides of the penetration, the duct fire protective insulation Ultimate Protect Slab 4.0 or Ultimate Protect Slab 4.0 Alu 1 is glued to the penetration surface using silicate glue Protect BSK from Isover G+H, applied at an approximate rate of 0,66 g/cm².