



UL INTERNATIONAL (UK) LTD  
 Womersley House, Building C,  
 The Guildway,  
 Old Portsmouth Road,  
 Guildford. GU3 1LR.  
 United Kingdom.



designated according to Article 29 of the Regulation (EU) No 305/2011 and member of EOTA (European Organisation for Technical Assessment, www.eota.eu)

## European Technical Assessment

**ETA 18/0159**  
**of 16/02/2018**

**Technical Assessment Body issuing the ETA and designated according to Article 29 of the Regulation (EU) No 305/2011: UL International (UK) Ltd**

**Trade name of the construction product**

ORYX Grafite FR

**Product family to which the construction product belongs**

Fire Stopping and Sealing Product:  
 • Penetration Seals

**Manufacturer**

ORYX Fire Protection B.V.  
 Hoogschaijksestraat 15  
 5374 EC  
 Schaijk  
 The Netherlands

**Manufacturing plant(s)**

A/001

**This European Technical Assessment contains**

26 pages including 1 Annex which forms an integral part of this assessment.

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

EAD 350454-00-1104, September 2017

Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document and should be identified as such.

Communication of this European Technical Assessment, including transmission by electronic means, shall be in full. However, partial reproduction may be made, with the written consent of the issuing Technical Assessment Body. Any partial reproduction has to be identified as such.

## Table of Contents

<b>I.</b>	<b>SPECIFIC PARTS OF THE EUROPEAN TECHNICAL ASSESSMENT</b>	<b>3</b>
1	Technical description of the product	3
2	Specification of the intended uses of the product in accordance with the applicable European Assessment Document (Hereinafter EAD): EAD 350454-00-1104	3
3	Performance of the product and references to the methods used for its assessment	5
4	ASSESSMENT AND VERIFICATION OF CONSTANCY OF PERFORMANCE (HEREINAFTER AVCP) SYSTEM APPLIED, WITH REFERENCE TO ITS LEGAL BASE	6
5	Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD	6
6	Issued on:	7
	<b>ANNEX A – Resistance to Fire Classification – ORYX Grafite FR</b>	<b>8</b>
B.1	Rigid floor constructions according to 1.2.1 with thickness of minimum 150 mm	8
A.1.1	Penetration seal with plastic pipe	8
A.1.2	Penetration seal with metal pipe including continued interrupted (CI) or minimum 500 mm long local interrupted (LI) combustible insulation	10
A.1.3	ORYX Grafite FR penetration seal with non-insulated metal pipes in rigid floors min. 150 mm thick	11
A.1.4	Penetration seal with metal pipe including continued sustained (CS) combustible insulation	12
A.1.5	Penetration seal with cables	13
B.2	Rigid wall constructions according to 1.2.1 with wall thickness of minimum 150 mm	14
A.2.1	Penetration seal with plastic pipe	14
A.2.2	Penetration seal with metal pipe including continued interrupted (CI) or minimum 500 mm long local interrupted (LI) combustible insulation	16
A.2.3	Penetration seal with metal pipe including continued sustained (CS) combustible insulation	17
A.2.4	ORYX Grafite FR penetration seal with non-insulated metal pipes in rigid walls min. 150 mm thick	18
A.2.5	Penetration seal with plastic pipe	19
B.3	Flexible or rigid wall constructions according to 1.2.1 with wall thickness of minimum 100 mm	20
A.3.1	Penetration seal with plastic pipe	20
A.3.2	Penetration seal with plastic pipe	21
A.3.3	Penetration seal with metal pipe including continued sustained (CS) combustible insulation	22
B.4	Flexible wall constructions according to 1.2.1 with wall thickness of minimum 130 mm	23
A.4.1	Penetration seal with metal pipe including continued sustained (CS) combustible insulation	23
	<b>ANNEX B – Airborne Sound Insulation Classification – ORYX Grafite FR</b>	<b>24</b>
B.5	ORYX Grafite FR, 50mm wide x 25mm thick (no backing material), in the following configuration	24
B.6	ORYX Grafite FR, 50mm wide x 25mm thick (no backing material). Plaster board fixed to exposed cassette, in the following configuration	25
B.7	ORYX Grafite FR, 20mm wide x 30mm thick sealant (both sides) with 40mm stone mineral wool backing, in the following configuration	26

## I. SPECIFIC PARTS OF THE EUROPEAN TECHNICAL ASSESSMENT

### 1 Technical description of the product

- 1) ORYX Grafite FR is a fire resistant, intumescent sealant used to form a penetration seal around metallic pipes, plastic pipes and electrical cables to reinstate the fire resistance performance of wall and floor constructions, where they have been provided with apertures for the penetration of services.
- 2) The ORYX Grafite FR is supplied in liquid form contained within 310 ml cartridges and 600 ml foils. The sealant is gunned into the aperture in the separating element/ elements, around the service or services, to a specified depth utilizing, where applicable, stone wool as a backing material.
- 3) The applicant has presented a declaration that the product and/or constituents of the product contains no substances which have been classified as dangerous according to Directive 67/548/EEC and Regulation (EC) No. 1272/2008 and listed in the 'indicative list on dangerous substances' of the EGDS – taking into account the installation conditions of the construction product and the release scenarios resulting from there.

In addition to the specific clauses relating to dangerous substances contained in this European Technical Assessment, 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 Products Regulation, these requirements need also to be complied with, when and where they apply.

- 4) The use category of ORYX Grafite FR in relation to BWR 3 (Health, hygiene and environment) is IA1, S/W3.

### 2 Specification of the intended uses of the product in accordance with the applicable European Assessment Document (Hereinafter EAD): EAD 350454-00-1104

Detailed information and data is given in Annex A.

- 1) The intended use of ORYX Grafite FR is to reinstate the fire resistance performance of flexible wall constructions, rigid wall constructions and rigid floor constructions where they are penetrated by various metal pipe services with combustible insulation, plastic pipes and electrical cables.
- 2) The specific elements of construction that the system ORYX Grafite FR 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 steel studs or timber studs* lined on both faces with minimum 2 layers of 12.5 mm thick boards.
Rigid walls:	The wall must have a minimum thickness of 100 mm and comprise concrete, aerated concrete or masonry, with a minimum density of 650 kg/m <sup>3</sup> .
Rigid floors:	The floor must have a minimum thickness of 150 mm and comprise aerated concrete or concrete with a minimum density of 650 kg/m <sup>3</sup> .

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

- 3) The ORYX Grafite FR may be used to provide a penetration seal with specific single insulated metal pipes, plastic pipes and with specific electrical cables, single or in a bundle (for details see Annex A).

- 4) Apertures in the separating element shall be maximum 339 mm diameter. The annular space/gap around the services shall, where required, be infilled with stone wool insulation backing material and ORYX Grafite FR sealant applied to both faces or ORYX Grafite FR is applied to a full depth of 100 mm. Blank seals (without services) are not permitted. For full details, see Annex A.
- 5) Pipes shall be supported at maximum 300 mm away from both faces of the wall constructions and from the upper face of floor constructions.
- 6) The provisions made in this European Technical Assessment are based on an assumed working life of the ORYX Grafite FR of 10 years, provided that the conditions laid down in sections manufacturer's instructions and datasheet for the packaging/transport/ storage/installation/use/ repair are met. The indications given on the working life cannot be interpreted as a guarantee given by the producer, 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.
- 7) Type Y<sub>2</sub> (-5°/70°C): Intended for use at internal or external sheltered conditions with high or other humidity classes, including temperatures below 0°C but without exposure to rain or UV. Includes classes Z<sub>1</sub> & Z<sub>2</sub>

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

Product-type: Sealant		Intended use: Penetration Seal
Assessment method	Essential characteristic	Product performance
<b>BWR 2 Safety in case of fire</b>		
EN 13501-1	Reaction to fire	Class E
EN 13501-2	Resistance to fire	Annex A
<b>BWR 3 Hygiene, health and environment</b>		
EN 1026	Air permeability	No performance determined
EAD 350454-00-1104, Annex C	Water permeability	No performance determined
Declaration of manufacturer & EN 16516	Content, emission and/or release of dangerous substances	Use categories: IA1, S/W3 Declaration of manufacturer
<b>BWR 4 Safety in use</b>		
EOTA TR 001:2003	Mechanical resistance and stability	No performance determined
EOTA TR 001:2003	Resistance to impact/movement	No performance determined
EOTA TR 001:2003	Adhesion	No performance determined
EAD 350454-00-1104, Clause 2.2.9	Durability	Y <sub>2</sub> (-5°/70°C)
<b>BWR 5 Protection against noise</b>		
EN 10140-1,2,4,5/ EN ISO 717-1	Airborne sound insulation	Annex B
<b>BWR 6 Energy economy and heat retention</b>		
EN 12664, EN 12667, EN 12939, EN ISO 8990, EN ISO 6946, EN ISO 14683, EN ISO 10211, EN ISO 10456	Thermal properties	No performance determined
EN ISO 12572, EN 12086, EN ISO 10456	Water vapour permeability	No performance determined

**4 ASSESSMENT AND VERIFICATION OF CONSTANCY OF PERFORMANCE (HEREINAFTER AVCP) SYSTEM APPLIED, WITH REFERENCE TO ITS LEGAL BASE**

According to the decision 1999/454/EC – Commission Decision of date 22nd June 1999 on the procedure for attesting the conformity of construction products pursuant to Article 20(2) of Council Directive 89/106/EEC as regards fire stopping, fire sealing and fire protective products, published in the Official Journal of the European Union (OJEU) L178/52 of 14/07/1999, see <http://eur-lex.europa.eu/JOIndex.do> of the European Commission<sup>1</sup>, as amended, the system(s) of assessment and verification of constancy of performance (see Annex V to Regulation (EU) No 305/2011) given in the following table(s) applies (apply).

Product(s)	Intended use(s)	Level(s) or class(es)	System(s)
Fire stopping and Fire Sealing 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 provided for in the applicable EAD**

Tasks of the manufacturer:

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 ensure that the product is in conformity with this European technical Assessment.

The manufacturer may only use initial / raw / constituent materials stated in the technical documentation of this European Technical Assessment.

The factory production control shall be in accordance with the Control Plan of 18<sup>th</sup> April 2013 relating to the European technical assessment ETA 18/0159 issued on 16/02/2018 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 UL International (UK) Ltd.

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

<sup>1</sup> Official Journal of the European Communities L178/52 of 14/7/1999

Other tasks of the manufacturer

Additional information

The manufacturer shall provide a technical data sheet and an installation instruction with the following minimum information:

(a) Technical data sheet:

- Field of application:
- Building elements for which the penetration seal is suitable, type and properties of the building elements like minimum thickness, density, and - in case of lightweight constructions – the construction requirements.
- Limits in size, minimum thickness etc. of the penetration seal
- Construction of the penetration seal including the necessary components and additional products (e.g. backfilling material) with clear indication whether they are generic or specific.
- Services which the penetration seal is suitable, type and properties of the services like material, diameter, thickness etc. in case of pipes including insulation materials; necessary/allowed supports/fixings (e.g. cable trays)

(b) Installation instruction:

- Steps to be followed
- Procedure in case of retrofitting
- Stipulations on maintenance, repair and replacement

**6 Issued on:**

**16<sup>th</sup> February 2018**

Report by:



D. Yates  
Project Engineer  
Building and Life Safety Technologies

Reviewed by:



C. Johnson  
Staff Engineer  
Building and Life Safety Technologies

**For and on behalf of UL International (UK) Ltd.**

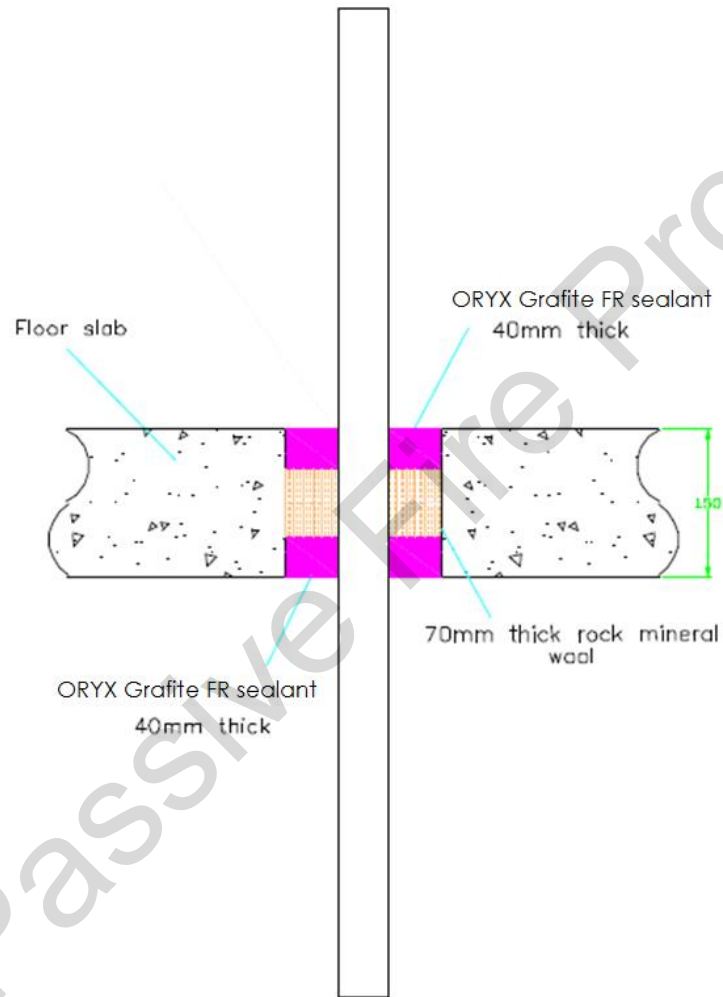
## ANNEX A – Resistance to Fire Classification – ORYX Grafite FR

### B.1 Rigid floor constructions according to 1.2.1 with thickness of minimum 150 mm

#### A.1.1 Penetration seal with plastic pipe

**Penetration Seal:** Combustible pipes fitted centrally with a single 40 mm deep ORYX Grafite FR to both sides of the floor backed to full depth with Stone wool insulation 90kg/m<sup>3</sup>.

Construction details:





### A.1.1.1

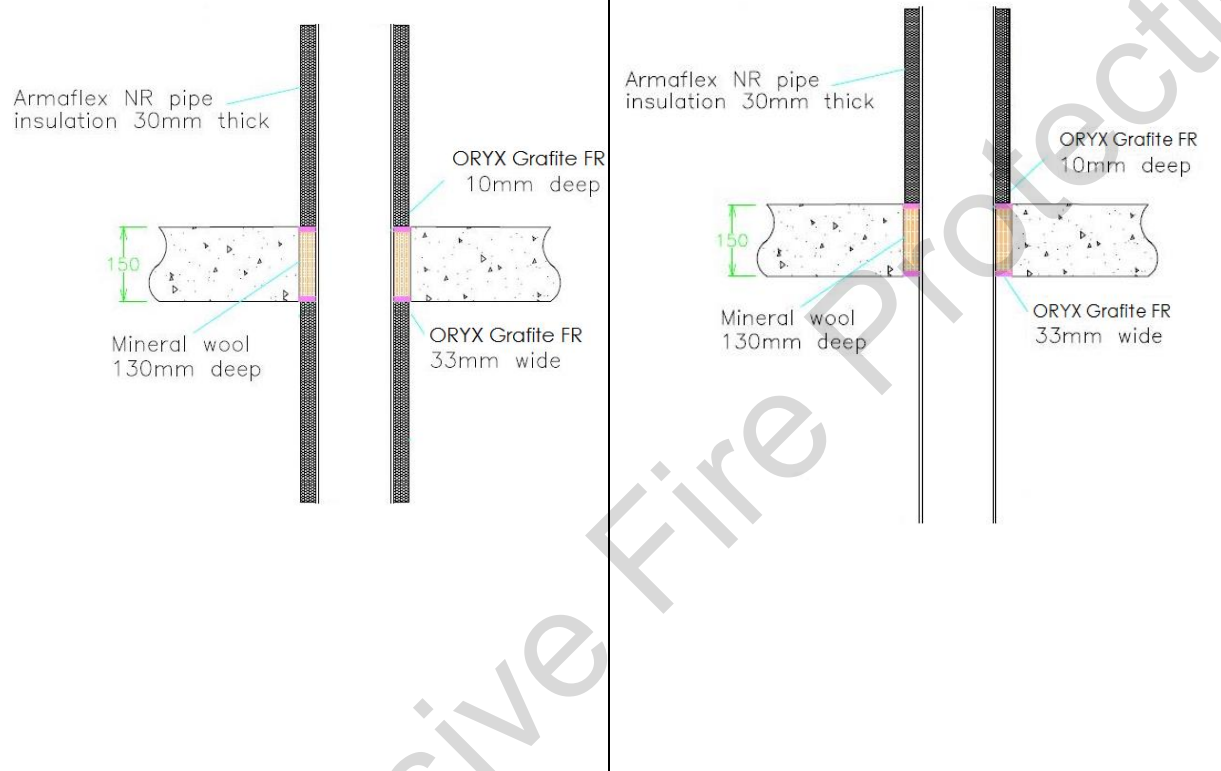
Services	Aperture diameter (mm)	Classification
PVC-U pipe according to EN 1329-1, EN 1452-2 and EN 1453-1		
Diameter 20 mm, wall thickness 1.5mm	35	EI 120-U/U, EI 120-C/U, EI 120-U/C, EI 120-C/C
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1 ABS pipe according to EN 1455-1 and SAN+PVC pipe according to EN 1565-1		
Diameter 75 mm, wall thickness 3 mm	125	E 60-C/U, E 60-U/C, E 60-C/C EI 45-C/U, EI 45-U/C, EI 45-C/C
MLCP <sup>#</sup> pipe according to EN 21003-1 and EN 21003-2		
Diameter 16 mm, wall thickness 2.4 mm	36	E 240-C/U, E 240-U/C, E 240-C/C EI 90-C/U, EI 90-U/C, EI 90-C/C
Diameter 20 mm, wall thickness 2.5mm	35	E 120-U/U, E 120-C/U, E 120-U/C, E 120-C/C EI 15-U/U, EI 15-C/U, EI 15-U/C, EI 15-C/C
Diameter 20 mm, wall thickness 3 mm	50	EI 240-C/U, EI 240-U/C, EI 240-C/C
Diameter 25 mm, wall thickness 2.5 mm	55	E 240-C/U, E 240-U/C, E 240-C/C EI 20-C/U, EI 20-U/C, EI 20-C/C
Diameter 40 mm, wall thickness 4 mm	80	EI 90-C/U, EI 90-U/C, EI 90-C/C
Diameter 50 mm, wall thickness 4.5 mm	90	EI 20-C/U, EI 20-U/C, EI 20-C/C
Diameter 63 mm, wall thickness 6 mm	113	E 30-C/U, E 30-U/C, E 30-C/C EI 20-C/U, EI 20-U/C, EI 20-C/C
Diameter 90 mm, wall thickness 9 mm	150	EI 20-C/U, EI 20-U/C, EI 20-C/C

<sup>#</sup> Multilayer composite pipe – PE-RT/Al/PE-RT

**A.1.2 Penetration seal with metal pipe including continued interrupted (CI) or minimum 500 mm long local interrupted (LI) combustibile insulation**

**Penetration Seal:** Metal pipes with 30 mm Armaflex Class O or K-Flex ST continuous, interrupted or minimum 500 mm long local to both or just the top side of the floor, interrupted insulation (CI or LI), fitted centrally in the aperture with a single 10 mm deep ORYX Grafite FR seal to both sides of the floor backed to full depth with Stone wool insulation 90kg/m<sup>3</sup>.

Construction details:



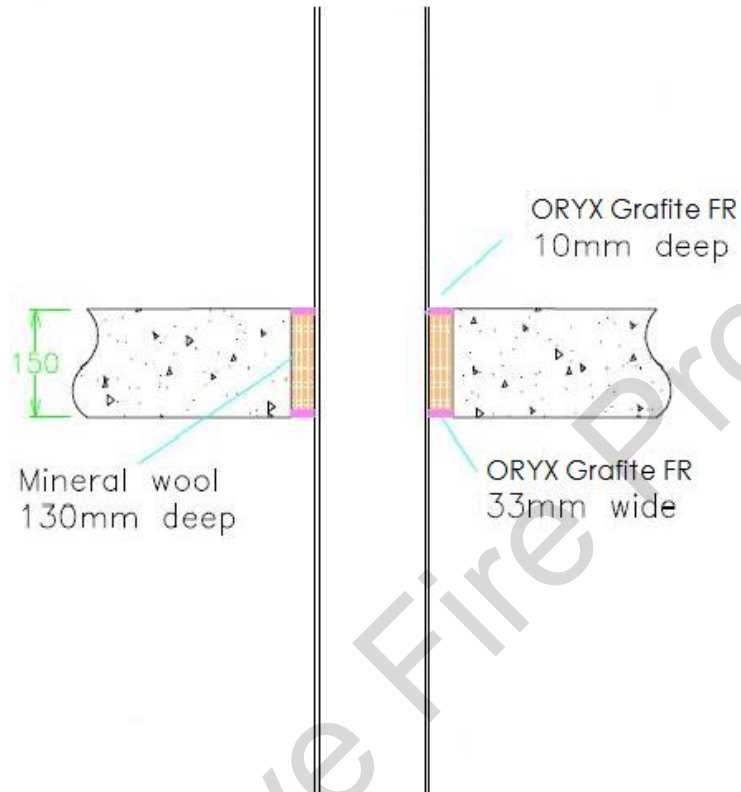
**A.1.2.1**

Services	Aperture diameter (mm)	Classification
<b>Steel pipe</b>		
Diameter 40 mm, wall thickness 2 – 14.2 mm	112	EI 240–C/U, EI 240–U/C, EI 240–C/C

**A.1.3 ORYX Grafite FR penetration seal with non-insulated metal pipes in rigid floors min. 150 mm thick**

**Penetration Seal:** Metal pipes without insulation, fitted centrally in the aperture with a single 10 mm deep ORYX Grafite FR seal to both sides of the floor backed to full depth with Stone wool insulation 90kg/m<sup>3</sup>.

Construction details:



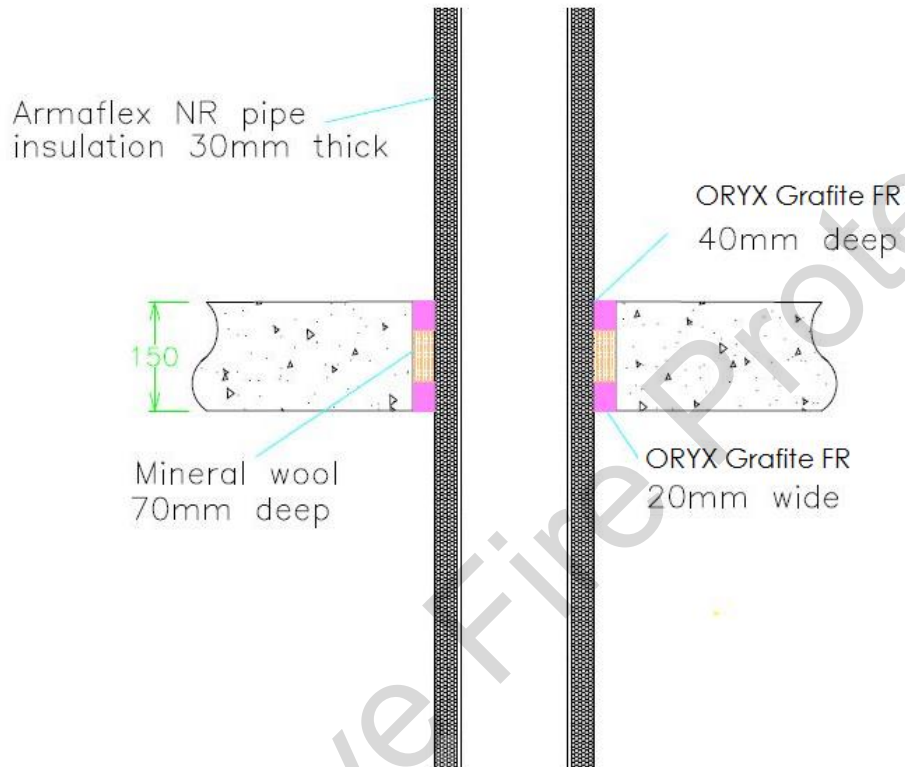
**A.1.3.1**

Services	Aperture diameter (mm)	Classification
Steel pipe		
Diameter 40 mm, wall thickness 2 – 14.2 mm	112	E 240-C/U, E 240-U/C, E 240-C/C EI 60-C/U, EI 60-U/C, EI 60-C/C

#### A.1.4 Penetration seal with metal pipe including continued sustained (CS) combustible insulation

**Penetration Seal:** Metal pipes with 30 mm Armaflex Class O or K-Flex ST continuous, sustained insulation (CS), fitted centrally in the aperture with a single 40 mm deep ORYX Grafite FR seal to both sides of the floor backed to full depth with Stone wool insulation 90kg/m<sup>3</sup>.

Construction details:



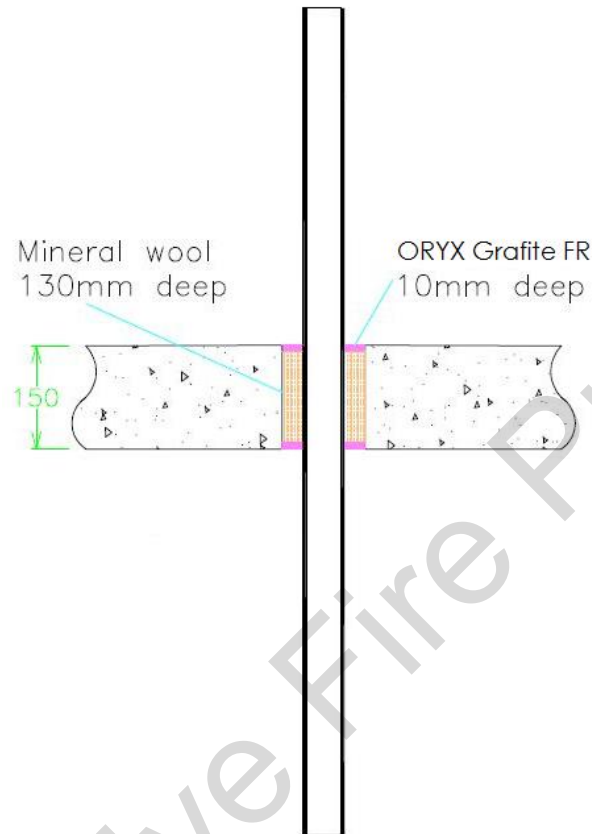
##### A.1.4.1

Services	Aperture diameter (mm)	Classification
<b>Steel pipe</b>		
Diameter 89 mm, wall thickness 4 – 14.2 mm	190	EI 60-C/U, EI 60-U/C, EI 60-C/C

### A.1.5 Penetration seal with cables

**Penetration Seal:** Electrical cables, fitted centrally in the aperture with a single 10 mm deep ORYX Grafite FR seal to both sides of the floor backed to full depth with Stone wool insulation 90kg/m<sup>3</sup>.

Construction details:



#### A.1.5.1

Services	Aperture diameter (mm)	Classification
Bundle of 4No. Type A3 + 1No. Type C3 cables	102	E 240, EI 90
1No. Type E cable	102	EI 240

Type A3 cable = 5 x 1.5 mm<sup>2</sup> core HD604.5 electrical cable with XLPE insulation, EVA sheath and 15 mm diameter

Type C3 cable = 4 x 95 mm<sup>2</sup> core HD604.5 electrical cable with XLPE insulation, EVA sheath and 42 mm diameter

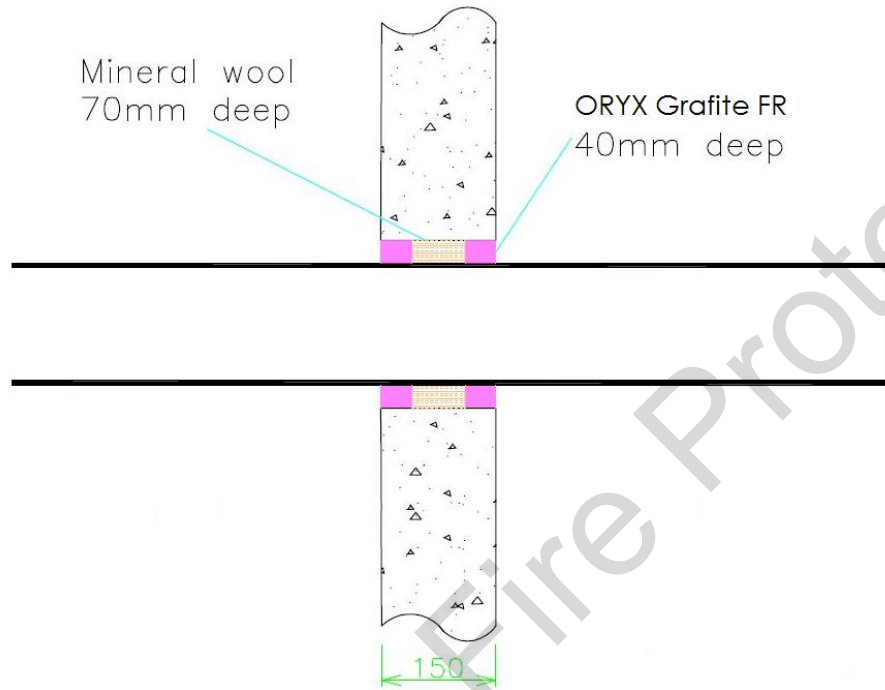
Type E cable = 1 x 185 mm<sup>2</sup> core HD603.3 electrical cable with PVC insulation, PVC sheath and 23-27 mm diameter

**B.2 Rigid wall constructions according to 1.2.1 with wall thickness of minimum 150 mm**

**A.2.1 Penetration seal with plastic pipe**

**Penetration Seal:** Combustible pipes fitted centrally with a single 40 mm deep ORYX Grafite FR to both sides of the wall backed to full depth with Stone wool insulation 90kg/m<sup>3</sup>.

Construction details:



### A.2.1.1

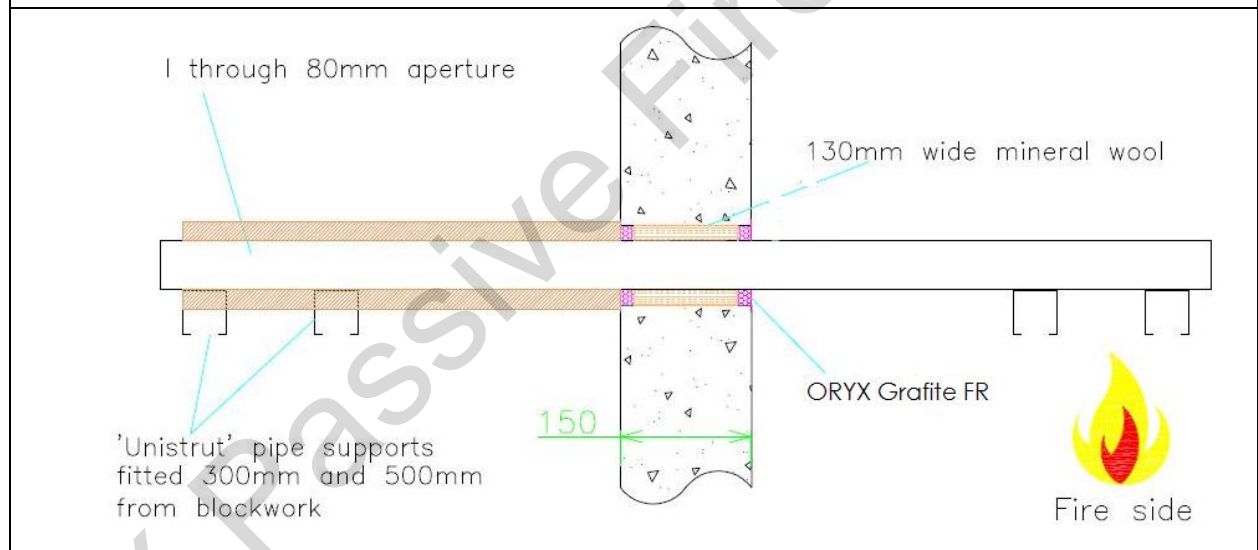
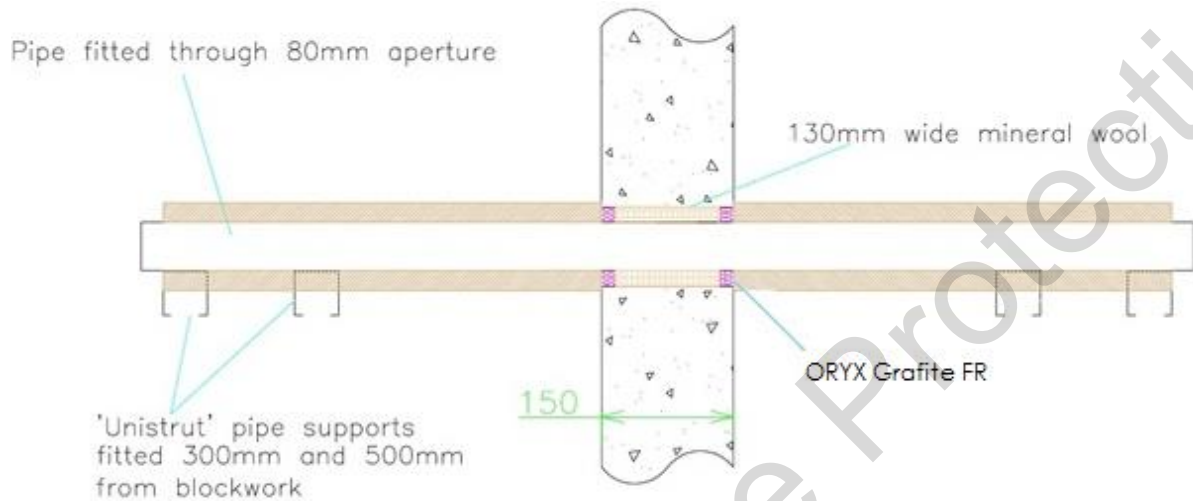
Services	Aperture diameter (mm)	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1*		
Diameter 20 mm, wall thickness 1.2 mm	35	EI 120-U/U, EI 120-C/U, EI 120-U/C, EI 120-C/C
Diameter 40 mm, wall thickness 3 mm	80	EI 240-C/U, EI 240-U/C, EI 240-C/C
Diameter 55 mm, wall thickness 2.2 mm	105	EI 180-C/U, EI 180-U/C, EI 180-C/C
Diameter 82 mm, wall thickness 2.5 mm	132	E 30-C/U, E 30-U/C, E 30-C/C EI 15-C/U, EI 15-U/C, EI 15-C/C
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS pipe according to EN 1455-1 and SAN+PVC pipe according to EN 1565-1^		
Diameter 20 mm, wall thickness 2 mm	35	EI 120-U/U, EI 120-C/U, EI 120-U/C, EI 120-C/C
Diameter 40 mm, wall thickness 3 mm	80	EI 240-C/U, EI 240-U/C, EI 240-C/C
Diameter 55 mm, wall thickness 3.2 mm	105	EI 120-C/U, EI 120-U/C, EI 120-C/C
MLCP <sup>#</sup> pipe according to EN 21003-1 and EN 21003-2		
Diameter 16 mm, wall thickness 2.4 mm	36	EI 180-C/U, EI 180-U/C, EI 180-C/C
Diameter 20 mm, wall thickness 2.5mm	35	EI 120-U/U, EI 120-C/U, EI 120-U/C, EI 120-C/C
Diameter 20 mm, wall thickness 3 mm	50	EI 180-C/U, EI 180-U/C, EI 180-C/C
Diameter 25 mm, wall thickness 3 mm	55	E 180-C/U, E 180-U/C, E 180-C/C EI 90-C/U, EI 90-U/C, EI 90-C/C
Diameter 40 mm, wall thickness 4 mm	80	E 180-C/U, E 180-U/C, E 180-C/C EI 15-C/U, EI 15-U/C, EI 15-C/C
Diameter 50 mm, wall thickness 4.5 mm	90	E 60-C/U, E 60-U/C, E 60-C/C EI 15-C/U, EI 15-U/C, EI 15-C/C
Diameter 63 mm, wall thickness 6 mm	113	EI 60-C/U, EI 60-U/C, EI 60-C/C
Diameter 90 mm, wall thickness 9 mm	150	E 45-C/U, E 45-U/C, E 45-C/C EI 30-C/U, EI 30-U/C, EI 30-C/C

<sup>#</sup> Multilayer composite pipe – PE-RT/Al/PE-RT

### A.2.2 Penetration seal with metal pipe including continued interrupted (CI) or minimum 500 mm long local interrupted (LI) combustible insulation

**Penetration Seal:** Metal pipes with 25 mm Armaflex Class O or K-Flex ST insulation, fitted centrally in the aperture with a single 10 mm deep ORYX Grafite FR seal to both sides of the wall backed to full depth with Stone wool insulation 90kg/m<sup>3</sup>.

Construction details:



#### A.2.2.1

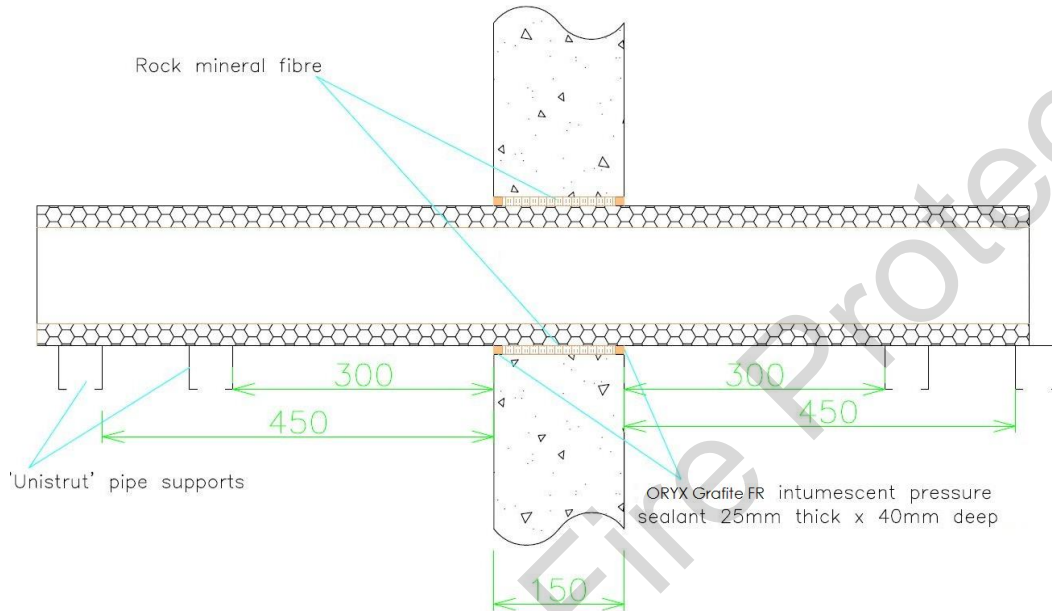
Services	Aperture diameter (mm)	Insulation length (mm)	Classification
<b>Steel pipe</b>			
Diameter 40 mm, wall thickness 3.2 – 14.2 mm	80	Continuous	E 240–C/U, E 240 U/C, E 240 C/C
		500 min.	EI 180 C/U, EI 180 U/C, EI 180 C/C
<b>Copper pipe</b>			
Diameter 35 mm, wall thickness 1.5 – 14.2 mm	80	Continuous	E 240–C/U, E 240 U/C, E 240 C/C
		500 min.	EI 180 C/U, EI 180 U/C, EI 180 C/C
			E 240–C/U, E 240 U/C, E 240 C/C
			EI 120 C/U, EI 120 U/C, EI 120 C/C



### A.2.3 Penetration seal with metal pipe including continued sustained (CS) combustible insulation

**Penetration Seal:** Metal pipes with 25 mm Armaflex Class O or K-Flex ST insulation, fitted centrally in the aperture with a single 40 mm deep ORYX Grafite FR seal to both sides of the wall backed to full depth with Stone wool insulation 90kg/m<sup>3</sup>.

Construction details:



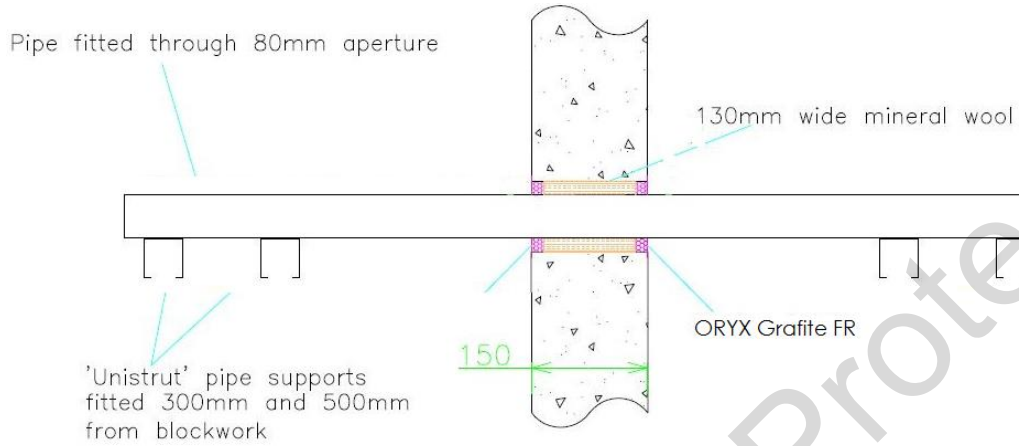
#### A.2.3.1

Services	Aperture diameter (mm)	Classification
<b>Steel pipe</b>		
Diameter 89 mm, wall thickness 4 -14.2 mm	190	E 120-C/U, E 120 U/C, E 120 C/C EI 60 C/U, EI 60 U/C, EI 60 C/C

**A.2.4 ORYX Grafite FR penetration seal with non-insulated metal pipes in rigid walls min. 150 mm thick**

**Penetration Seal:** Metal pipes without insulation, fitted centrally in the aperture with a single 10 mm deep ORYX Grafite FR seal to both sides of the wall backed to full depth with Stone wool insulation 90kg/m<sup>3</sup>.

Construction details:

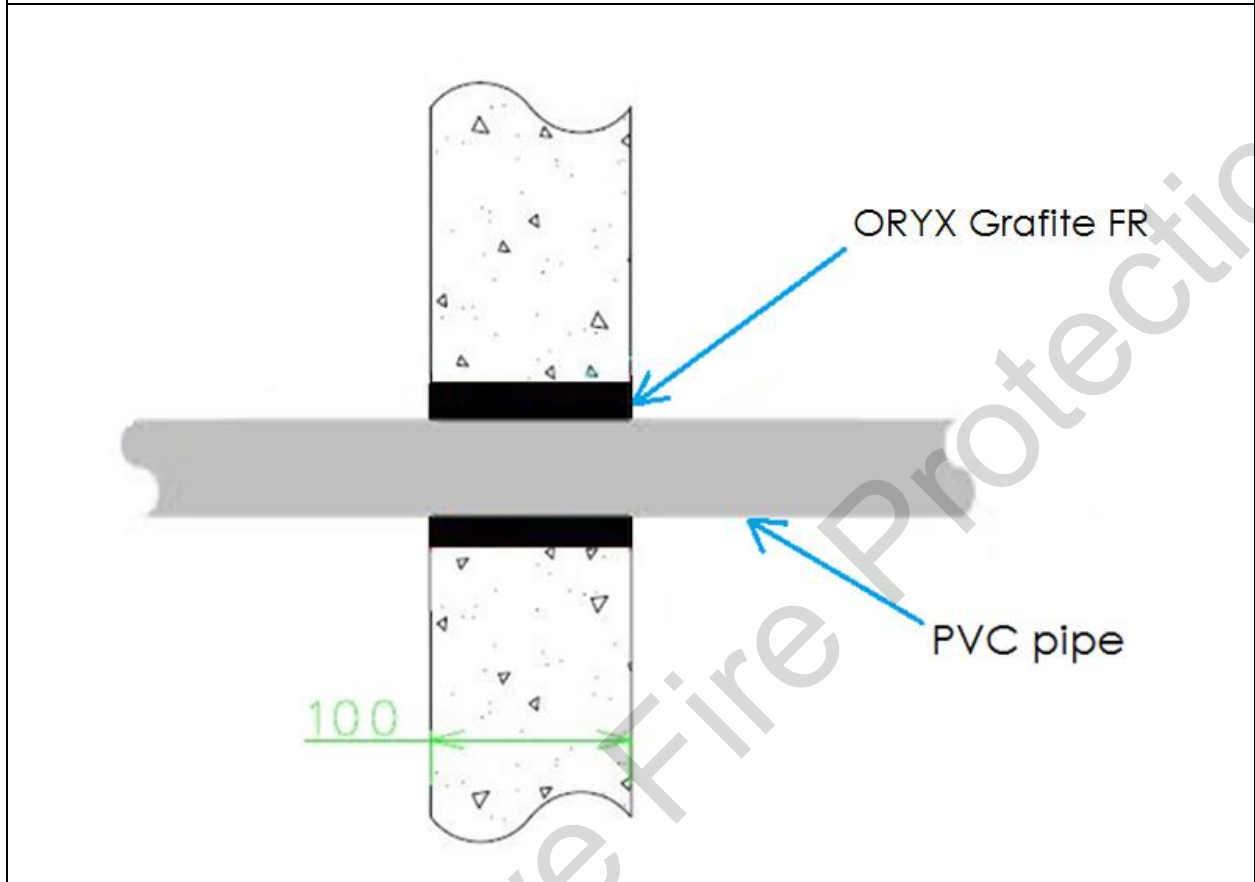


**A.2.4.1**

Services	Aperture diameter (mm)	Classification
Steel pipe	80	E 180-C/U, E 180 U/C, E 180 C/C EI 20 C/U, EI 20 U/C, EI 20 C/C
Diameter 40 mm, wall thickness 3.2 – 14.2 mm		
Copper pipe	80	E 240-C/U, E 240 U/C, E 240 C/C EI 30 C/U, EI 30 U/C, EI 30 C/C
Diameter 35 mm, wall thickness 1.5 – 14.2 mm		

### A.2.5 Penetration seal with plastic pipe

**Penetration Seal:** Combustible pipes fitted centrally with 100 mm deep ORYX Grafite FR applied around the pipe to full depth (100 mm) of the wall.



#### A.2.5.1

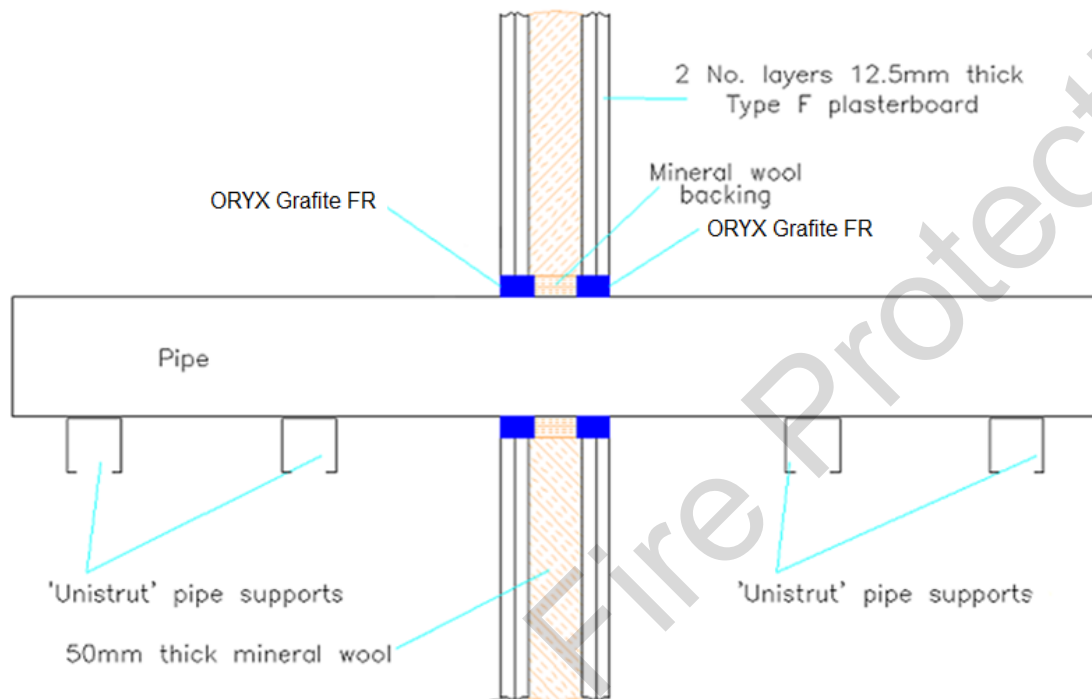
Services	Aperture diameter (mm)	Seal width (mm)	Classification
PVC-U pipe according to EN 1329-1, EN 1452-2 and EN 1453-1			
Diameter 55 mm, wall thickness 3.2mm	85	15	EI 90-U/C, EI 90-C/C
Diameter 160 mm, wall thickness 4mm	200	20	E 90-U/C, E 90-C/C EI 60-U/C, EI 60-C/C

### B.3 Flexible or rigid wall constructions according to 1.2.1 with wall thickness of minimum 100 mm

#### A.3.1 Penetration seal with plastic pipe

**Penetration Seal:** Combustible pipes fitted centrally with a single 30 mm deep ORYX Grafite FR to both sides of the wall backed to full depth with mineral wool insulation 33kg/m<sup>3</sup>.

Construction details:



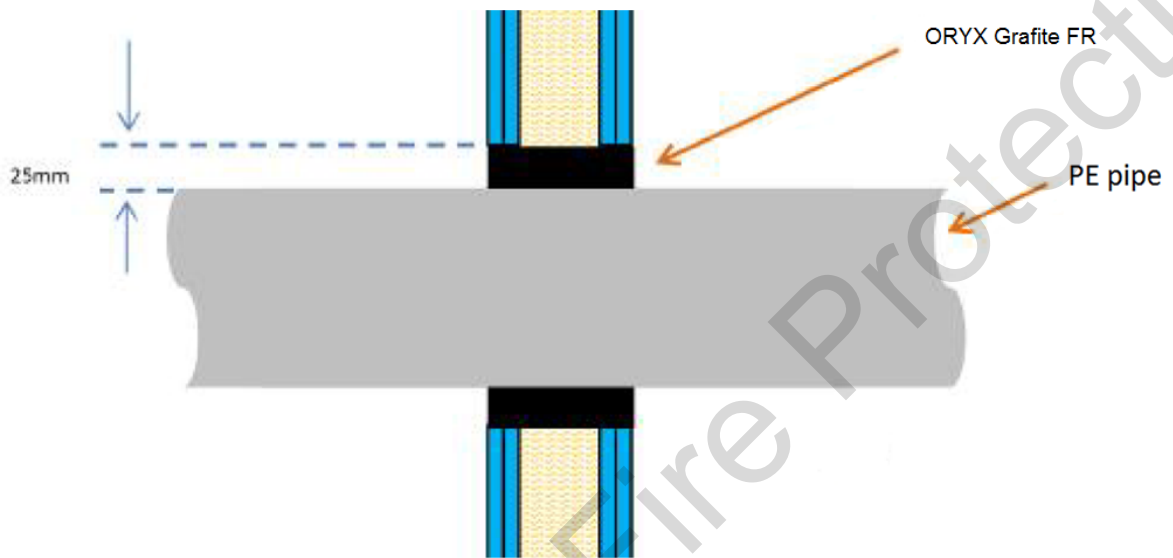
##### A.3.1.1

Services	Aperture diameter (mm)	Seal width (mm)	Classification
PVC-U pipe according to EN 1329-1, EN 1452-2 and EN 1453-1			
Diameter 20 mm, wall thickness 1.0mm	32	6	EI 120-U/U, EI 120-C/U, EI 120-U/C, EI 120-C/C
Diameter 40 mm, wall thickness 1.9-3.0mm	60	10	EI 120-U/U, EI 120-C/U, EI 120-U/C, EI 120-C/C
Diameter 110 mm, wall thickness 1.8	150	20	E 120-U/U, E 120-C/U, E 120-U/C, E 120-C/C EI 90-U/U, EI 90-C/U, EI 90-U/C, EI 90-C/C
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS pipe according to EN 1455-1 and SAN+PVC pipe according to EN 1565-1			
Diameter 32 mm, wall thickness 2 mm	52	10	EI 120-U/U, EI 120-C/U, EI 120-U/C, EI 120-C/C
Diameter 40 mm, wall thickness 2.4-3.7 mm	60	10	EI 120-U/U, EI 120-C/U, EI 120-U/C, EI 120-C/C
Diameter 75 mm, wall thickness 4.5 mm	105	15	EI 120-U/U, EI 120-C/U, EI 120-U/C, EI 120-C/C
Diameter 75 mm, wall thickness 4.5-6.8 mm	105	15	EI 60-U/U, EI 60-C/U, EI 60-U/C, EI 60-C/C
PP pipe according to EN 1451-1			
Diameter 50 mm, wall thickness 4.6mm	80	15	120-U/U, EI 120-C/U, EI 120-U/C, EI 120-C/C

### A.3.2 Penetration seal with plastic pipe

**Penetration Seal:** Combustible pipes fitted centrally with 100 mm deep ORYX Grafite FR applied around the pipe to full depth (100 mm) of the wall

Construction details:



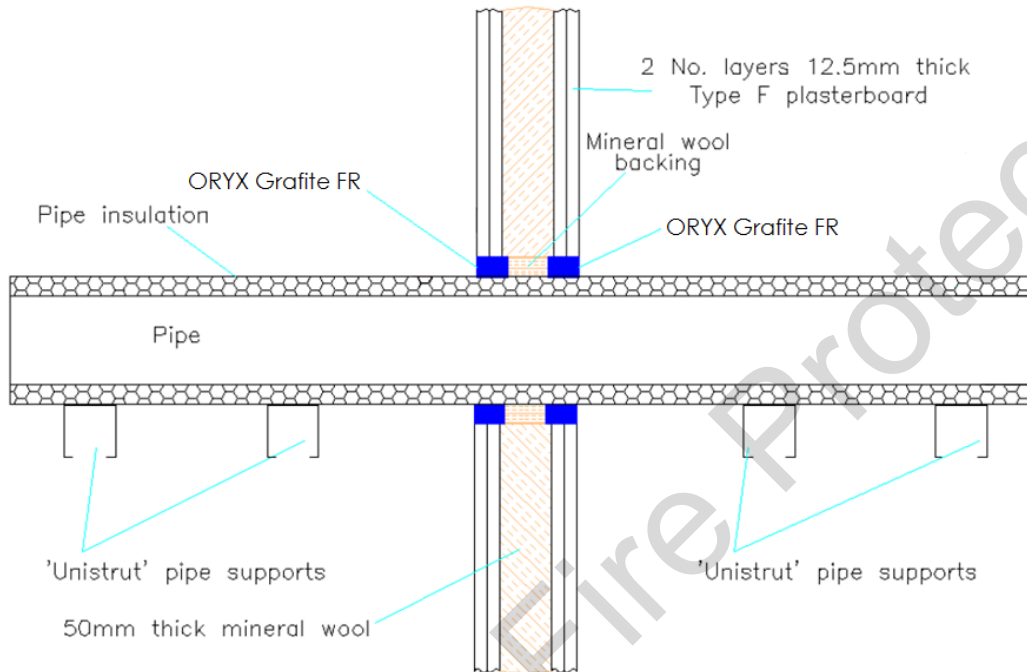
#### A.3.2.1

Services	Aperture diameter (mm)	Seal width (mm)	Classification
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS pipe according to EN 1455-1 and SAN+PVC pipe according to EN 1565-1			
Diameter 160 mm, wall thickness 10.2 mm	210	25	EI 90-U/C, EI 90-C/C
Diameter 110 mm, wall thickness 8.2 mm	160	25	EI 90-U/C, EI 90-C/C

### A.3.3 Penetration seal with metal pipe including continued sustained (CS) combustible insulation

**Penetration Seal:** Metal pipes with K-Flex ST or Armaflex Class O continuous, sustained insulation (CS), fitted centrally in the aperture with a single 30 mm deep ORYX Grafite FR to both sides of the wall backed to full depth with mineral wool insulation 33kg/m<sup>3</sup>.

Construction details:



#### A.3.3.1

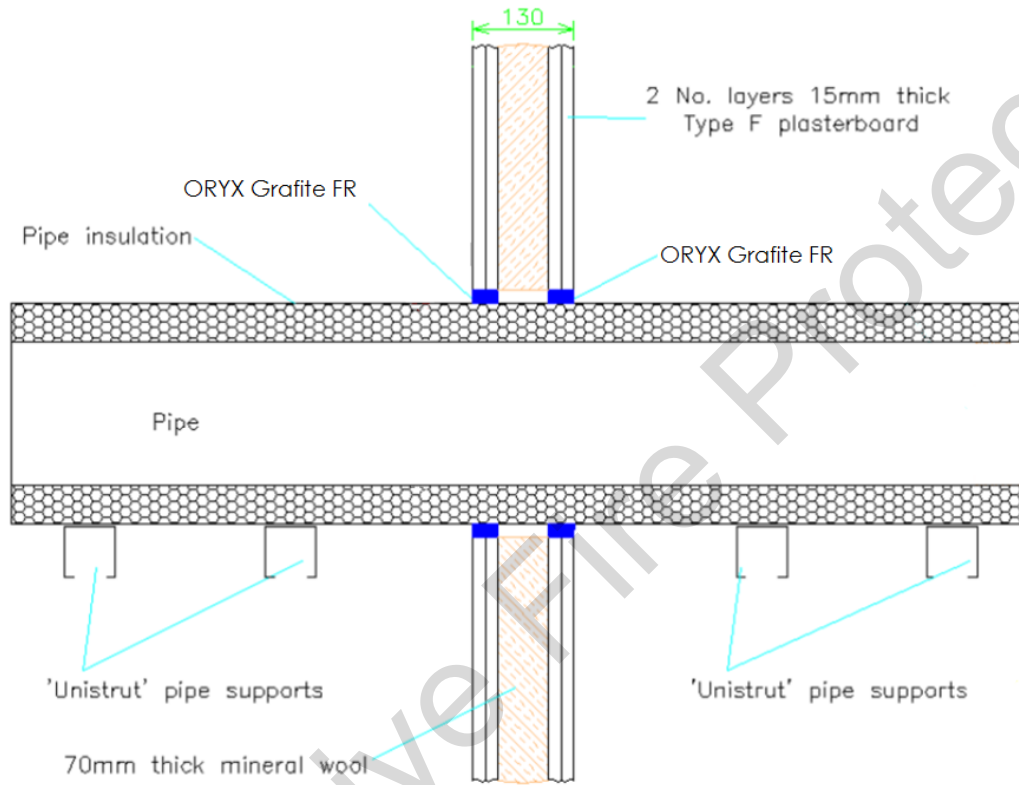
Services	Aperture diameter (mm)	Seal width (mm)	Pipe insulation thickness (mm)	Classification
Steel pipe				
Diameter 115 mm, wall thickness 2.0mm	173	10	19	E 120-C/U, E 120-U/C, E 120-C/C EI 90-C/U, EI 90-U/C, EI 90-C/C
Diameter 115 mm, wall thickness 2.0mm	173-209	10-15	19-32	E 120-C/U, E 120-U/C, E 120-C/C EI 90-C/U, EI 90-U/C, EI 90-C/C
Diameter 89 mm, wall thickness 1.5	135	10	13	E 120-C/U, E 120-U/C, E 120-C/C EI 90-C/U, EI 90-U/C, EI 90-C/C
Diameter 89 mm, wall thickness 1.5	135-169	10-15	13-25	E 120-C/U, E 120-U/C, E 120-C/C EI 90-C/U, EI 90-U/C, EI 90-C/C

**B.4 Flexible wall constructions according to 1.2.1 with wall thickness of minimum 130 mm**

**A.4.1 Penetration seal with metal pipe including continued sustained (CS) combustible insulation**

**Penetration Seal:** Metal pipes with K-Flex ST or Armaflex Class O continuous, sustained insulation (CS), fitted centrally in the aperture with a single 30 mm deep ORYX Grafite FR to both sides of the wall backed to full depth with mineral wool insulation 33kg/m<sup>3</sup>.

Construction details:

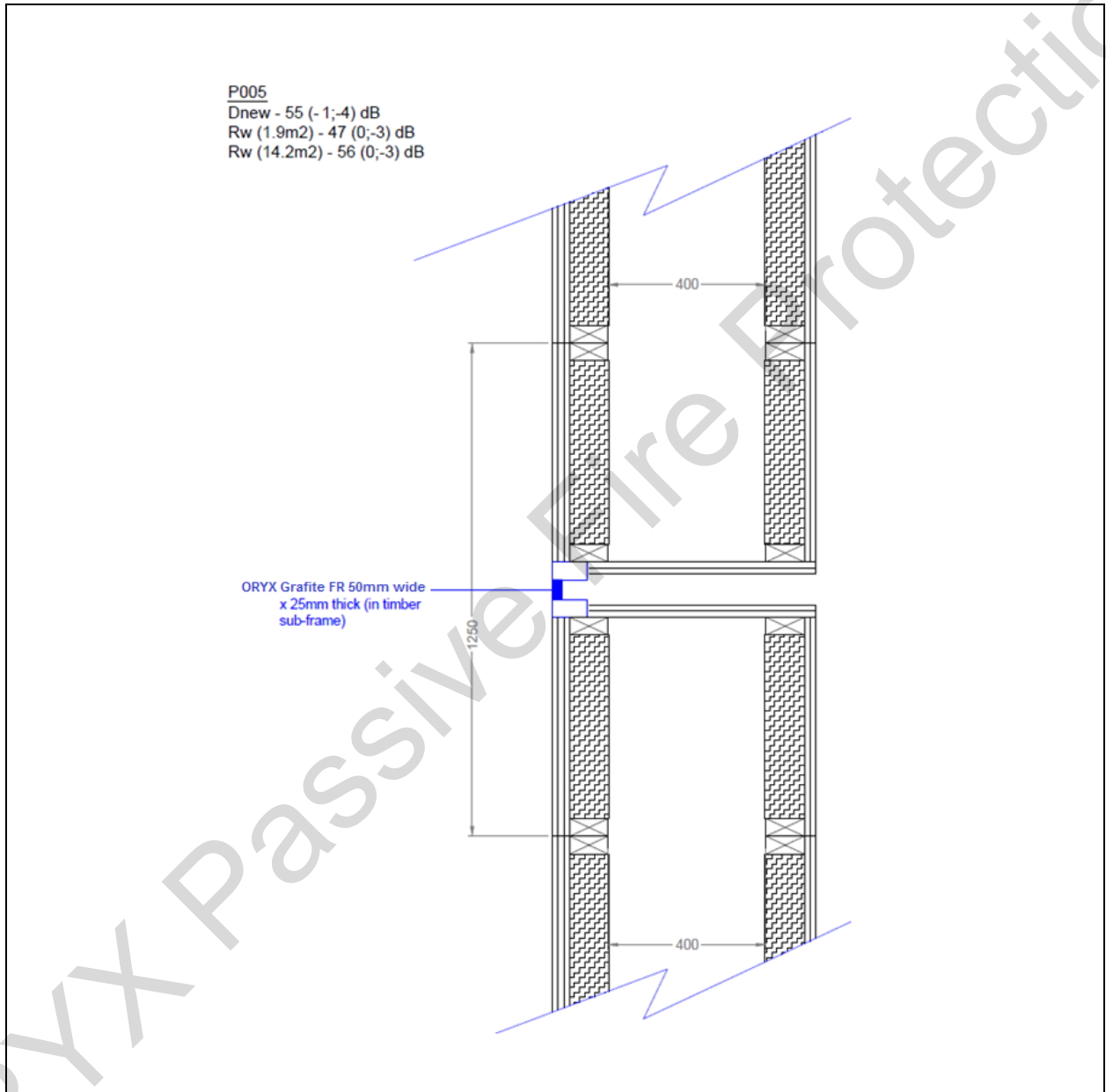


**A.4.1.1**

Services	Aperture diameter (mm)	Seal width (mm)	Pipe insulation thickness (mm)	Classification
Steel pipe				
Diameter 219 mm, wall thickness 7.0mm	339	20	40	EI 120-C/U, EI 120-U/C, EI 120-C/C

## ANNEX B – Airborne Sound Insulation Classification – ORYX Grafite FR

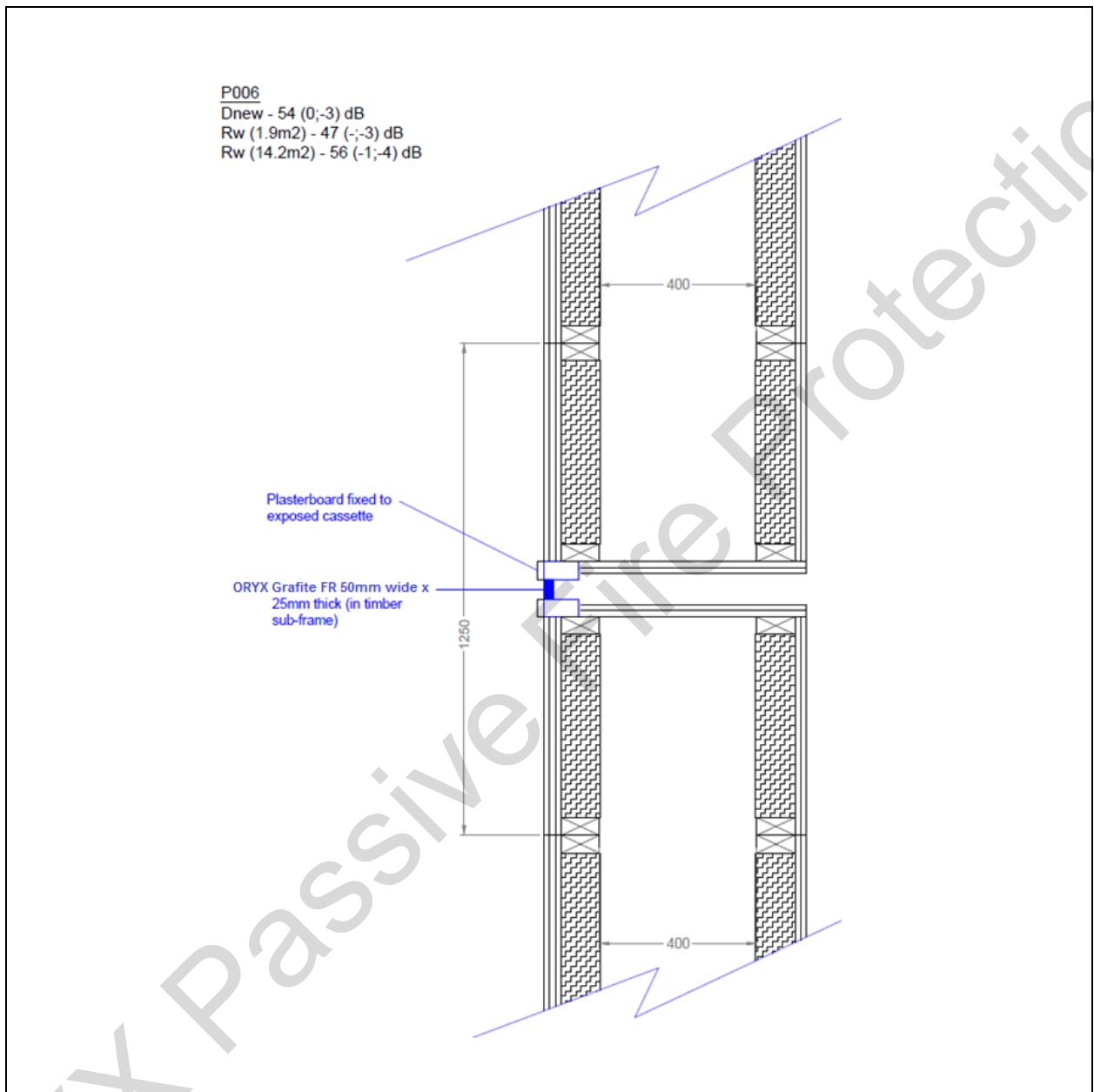
### B.5 ORYX Grafite FR, 50mm wide x 25mm thick (no backing material), in the following configuration



BWR 5 Protection against noise		
Basic requirement for construction work	Basic Requirement	Performance
EN 10140-2/ EN ISO 717-1	Airborne sound insulation	Rw(C;Ctr)= 56 (0;-3) dB

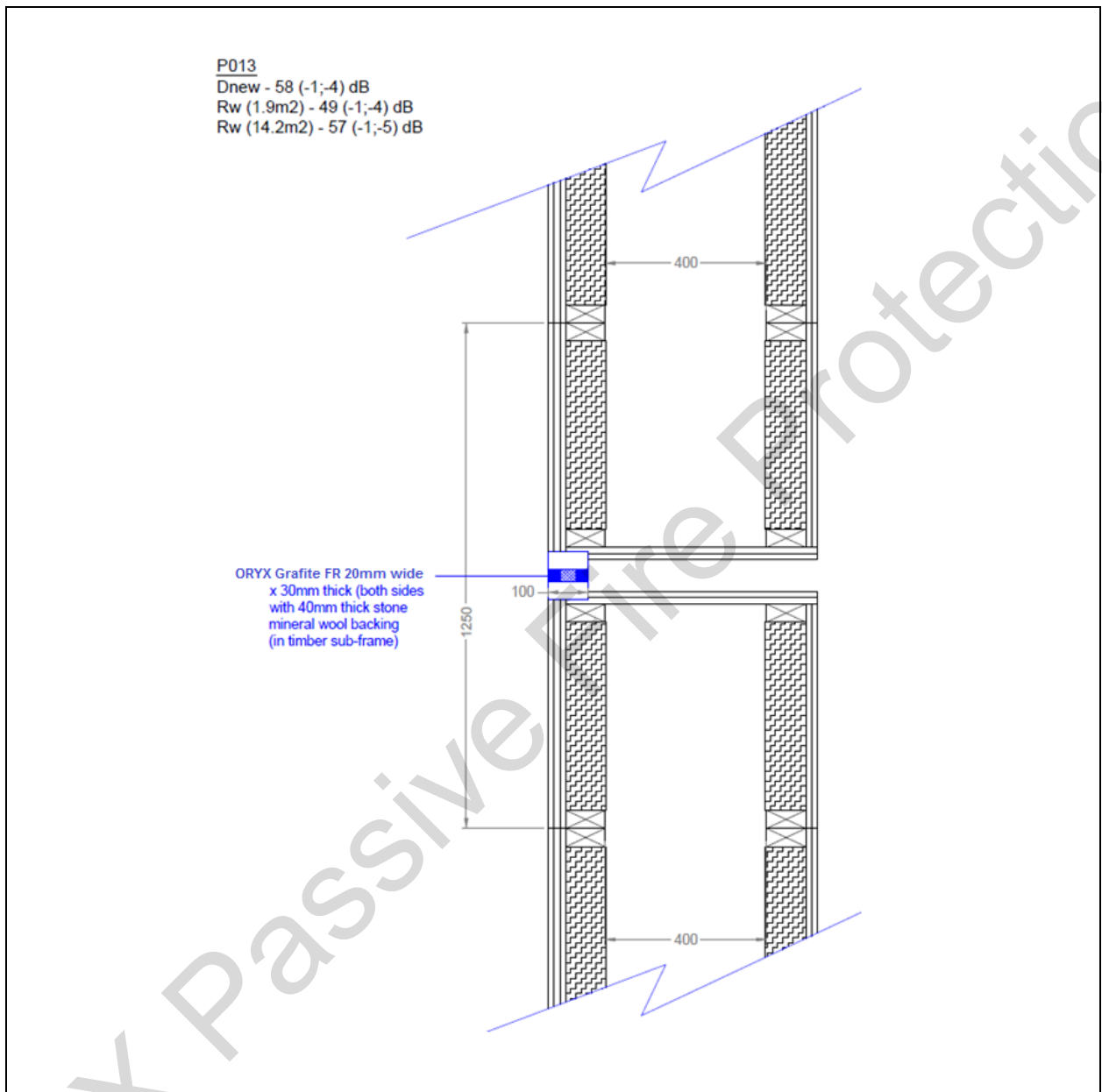


**B.6 ORYX Grafite FR, 50mm wide x 25mm thick (no backing material). Plaster board fixed to exposed cassette, in the following configuration**



BWR 5 Protection against noise		
Basic requirement for construction work	Basic Requirement	Performance
EN 10140-2/ EN ISO 717-1	Airborne sound insulation	Rw(C;Ctr)= 56 (-1;-4) dB

**B.7 ORYX Grafite FR, 20mm wide x 30mm thick sealant (both sides) with 40mm stone mineral wool backing, in the following configuration**



BWR 5 Protection against noise		
Basic requirement for construction work	Basic Requirement	Performance
EN 10140-2/ EN ISO 717-1	Airborne sound insulation	Rw(C;Ctr)= 57 (-1;-5) dB