FIRE RESISTANCE CLASSIFICATION REPORT No. 16229C

Owner of the classification report

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Introduction

This classification report defines the classification assigned to single pipe penetration seals including plastic pipes and aluminium composite pipes in wall and floor constructions – sealing system type: BIS Pacifyre® MKII FireSleeve in combination with BIS Pacifyre® FPM Mortar, CE Acrylic kit, Tangit FP 430 Acrylic kit or gypsum – in accordance with the procedures given in EN 13501-2:2007+A1:2009: Fire classification of products and building elements – Part 2: Classification using data from fire resistance tests, excluding ventilation services.

This classification report consists of 42 pages and 3 annexes and may only be used or reproduced in its entirety.

1 Details of classified product

1.1 General

The elements, plastic and aluminium composite pipes, sealed by means of BIS Pacifyre® MKII FireSleeve in combination with BIS Pacifyre® FPM Mortar, CE Acrylic kit, Tangit FP 430 Acrylic kit or gypsum, are defined as single pipe penetration seals.

1.2 Description

The elements, single pipe penetration seals including plastic and aluminium composite pipes, are composed of a pipe sealing – brand and type: BIS Pacyfire® MKII FireSleeve – and an annular sealing – brand and type: BIS Pacyfire® FPM mortar, CE Acrylic kit, Tangit FP 430 Acrylic kit or gypsum with a mineral wool backfilling – are fully described in the test reports, in support of this classification, listed in paragraph 2.1.

1.2.1 Seal design variations – rigid floor construction

Following variations of the seal design have been used for single pipe penetration seals in an aerated concrete floor construction (thickness: 150 mm; density: 550 kg/m³):

Plastic pipes:

i) a pipe sealing (type: BIS Pacyfire® MKII FireSleeve – design group A: intumescent layer thickness: 1 x 4 mm) and a mortar annular sealing (type: BIS Pacyfire® FPM mortar);

ii) a pipe sealing (type: BIS Pacyfire® MKII FireSleeve – design group B: intumescent layer thickness: 2 x 4 mm) and a mortar annular sealing (type: BIS Pacyfire® FPM mortar);

iii) a pipe sealing (type: BIS Pacyfire® MKII FireSleeve – design group A: intumescent layer thickness: 1 x 4 mm) and an acrylic annular sealing (type: CE Acrylic kit) provided with a stone wool backfilling;

iv) a pipe sealing (type: BIS Pacyfire® MKII FireSleeve – design group B: intumescent layer thickness: 2 x 4 mm) and an acrylic annular sealing (type: CE Acrylic kit) provided with a stone wool backfilling;

Aluminium composite pipes:

v) a pipe sealing (type: BIS Pacyfire® MKII FireSleeve – design group A: intumescent layer thickness: 1 x 4 mm) and a mortar annular sealing (type: BIS Pacyfire® FPM mortar);

vi) a pipe sealing (type: BIS Pacyfire® MKII FireSleeve – design group A: intumescent layer thickness: 1 x 4 mm) and an acrylic annular sealing (type: CE Acrylic kit) provided with a stone wool backfilling.

The first support of the services on the unexposed side has been installed at a height of 400 mm from the top of the floor construction.

1.2.2 Seal design variations – rigid wall construction

Following variations of the seal design have been used for single pipe penetration seals in an aerated concrete wall construction (thickness: 150 mm; density: 550 kg/m³):

Plastic pipes:

vii) a pipe sealing (type: BIS Pacyfire® MKII FireSleeve – design group A: intumescent layer thickness: 1 x 4 mm) and a mortar annular sealing (type: BIS Pacyfire® FPM mortar);

viii) a pipe sealing (type: BIS Pacyfire® MKII FireSleeve – design group B: intumescent layer thickness: 2 x 4 mm) and a mortar annular sealing (type: BIS Pacyfire® FPM mortar);

ix) a pipe sealing (type: BIS Pacyfire® MKII FireSleeve – design group A: intumescent layer thickness: 1 x 4 mm) and a mortar annular sealing (type: BIS Pacyfire® FPM mortar). Zero distance between multiple pipes;

Aluminium composite pipes:

x) a pipe sealing (type: BIS Pacyfire® MKII FireSleeve – design group A: intumescent layer thickness: 1 x 4 mm) and a mortar annular sealing (type: BIS Pacyfire® FPM mortar);

xi) a pipe sealing (type: BIS Pacyfire® MKII FireSleeve – design group A: intumescent layer thickness: 1 x 4 mm) and an acrylic annular sealing (type: CE Acrylic kit) provided with a stone wool backfilling.

The first support of the services on the unexposed side has been installed at a distance of 380 mm from the surface of the wall construction.

1.2.3 Seal design variations – flexible wall construction

Following variations of the seal design have been used for single pipe penetration seals in a flexible wall construction (thickness: 100 mm; constructed as prescribed in the European Standard EN 1366-3:2009 § 7.2):

Plastic pipes:

xii) a pipe sealing (type: BIS Pacyfire® MKII FireSleeve – design group A: intumescent layer thickness: 1 x 4 mm), an acrylic annular sealing (type: Tangit FP 430 Acrylic kit) provided with a stone wool backfilling and mineral wool insulation (classification A1 or A2 according to EN 13501-1 – density: 100 ± 15 kg/m³, thickness: 50 mm) inside the flexible wall over a width of 100 mm around the seal.

xiii) a pipe sealing (type: BIS Pacyfire® MKII FireSleeve – design group B: intumescent layer thickness: 2 x 4 mm), an acrylic annular sealing (type: Tangit FP 430 Acrylic kit) provided with a stone wool backfilling and mineral wool insulation (classification A1 or A2 according to EN 13501-1 – density: 100 ± 15 kg/m³, thickness: 50 mm) inside the flexible wall over a width of 100 mm around the seal.

Plastic pipes 45°:

xiv) a pipe sealing (type: BIS Pacyfire® MKII FireSleeve – design group A: intumescent layer thickness: 1 x 4 mm), a gypsum annular sealing provided with a stone wool backfilling and mineral wool insulation (classification A1 or A2 according to EN 13501-1 – density: 100 ± 15 kg/m³, thickness: 50 mm) inside the flexible wall over a width of 100 mm around the seal.

Aluminium composite pipes:

xv) a pipe sealing (type: BIS Pacyfire® MKII FireSleeve – design group A: intumescent layer thickness: 1 x 4 mm), an acrylic annular sealing (type: Tangit FP 430 Acrylic kit) provided with a stone wool backfilling and mineral wool insulation (classification A1 or A2 according to EN 13501-1 – density: 100 ± 15 kg/m³, thickness: 50 mm) inside the flexible wall over a width of 100 mm around the seal.

The first support of the services on the unexposed side has been installed at a distance of 350 mm from the surface of the wall construction.

2 Test reports/EXAP-reports and test results in support of the classification

2.1 Test reports/EXAP-reports

Name of the laboratory	Report ref. no.	Name of the owner	Date of the test	Method
WFRGENT nv	16182A	J. Van Walraven Holding BV	14/08/2013	EN 1366-3:2009 EN 1363-1:2012
WFRGENT nv	16229A	J. Van Walraven Holding BV	9/10/2013	EN 1366-3:2009 EN 1363-1:2012
MPA NRW	210006339	J. Van Walraven Holding BV	14/12/2012	EN 1366-3 :2009 EN 1363-1:1999
WFRGENT nv	16863A	J. Van Walraven Holding BV	7/11/2014	EN 1366-3:2009 EN 1363-1:2012
WFRGENT nv	16864A	J. Van Walraven Holding BV	7/11/2014	EN 1366-3:2009 EN 1363-1:2012

Exposure conditions during the fire resistance test:

Temperature/time curve: standard as in EN 1363-1:1999 and EN 1363-1:2012.

Direction of exposure:

- floor construction: the test specimens were exposed to the fire from below;
- wall construction: the test specimens were exposed to the fire from one side.

Pipe end configuration U/C – uncapped inside the furnace / capped outside the furnace – according to *Table 2: Pipe end configuration* of EN 1366-3:2009.

2.2 Test results

2.2.1 Plastic pipes – rigid floor construction

See test report No. 16182A.

Seal variation i), ii), iii) and iv) of clause 1.2 of this report.

Parameter	Result (minutes)			
Pipe No.	**Thermal insulation – I**	**Integrity – E**		
	ΔT_M = 180°C	Ignition of cotton pad	Spontaneous and sustained flaming	Failure with gap gauge
A1	132(1)	132(1)	132(1)	132(1)
A2	61(2)	61(2)	61	61(2)
A3	130(2)	130(2)	130	130(2)
A4	61(2)	61(2)	61	61(2)
A5	132(1)	132(1)	132(1)	132(1)
A6	108	112(2)	112	112(2)
A7	132(1)	132(1)	132(1)	132(1)
A8	113	115(2)	115	115(2)
A9	132(1)	132(1)	132(1)	132(1)
A10	55	57(2)	57	57(2)
B1	132(1)	132(1)	132(1)	132(1)
B3	132(1)	132(1)	132(1)	132(1)
B4	132(1)	132(1)	132(1)	132(1)
B7	132(1)	132(1)	132(1)	132(1)
B8	132(1)	132(1)	132(1)	132(1)
B9	132(1)	132(1)	132(1)	132(1)
B10	132(1)	132(1)	132(1)	132(1)
C1	132(1)	132(1)	132(1)	132(1)
C4	132(1)	132(1)	132(1)	132(1)
C5	132(1)	132(1)	132(1)	132(1)
C6	132(1)	132(1)	132(1)	132(1)
C8	132(1)	132(1)	132(1)	132(1)
C9	132(1)	132(1)	132(1)	132(1)
C10	132(1)	132(1)	132(1)	132(1)
D1	66(2)	66(2)	66	66(2)
D2	132(1)	132(1)	132(1)	132(1)
D3	132(1)	132(1)	132(1)	132(1)
D4	132(1)	132(1)	132(1)	132(1)
D5	132(1)	132(1)	132(1)	132(1)
D6	132(1)	132(1)	132(1)	132(1)
D7	76(2)	76(2)	76	76(2)
D8	63	65(2)	65	65(2)
D9	132(1)	132(1)	132(1)	132(1)
D10	132(1)	132(1)	132(1)	132(1)

See test report No. 16864A.

Seal variation i) and ii) of clause 1.2 of this report.

Parameter	Result (minutes)			
Pipe No.	**Thermal insulation – I**	**Integrity – E**		
	ΔT_M = 180°C	Ignition of cotton pad	Spontaneous and sustained flaming	Failure with gap gauge
A1	132(1)	132(1)	132(1)	132(1)
A2	132(1)	132(1)	132(1)	132(1)
B1	132(1)	132(1)	132(1)	132(1)
B2	79(2)	79(2)	79	79(2)

2.2.2 Aluminium composite pipes – rigid floor construction

See test report No. 16182A.

Seal variation v) and vi) of clause 1.2 of this report.

Parameter	Results (minutes)			
Pipe No.	**Thermal insulation – I**	**Integrity – E**		
	ΔT_M = 180°C	Ignition of cotton pad	Spontaneous and sustained flaming	Failure with gap gauge
B5	88	132(1)	132(1)	132(1)
B6	132(1)	132(1)	132(1)	132(1)
C3	132(1)	132(1)	132(1)	132(1)
C7	132(1)	132(1)	132(1)	132(1)

2.2.3 Plastic pipes – rigid wall construction

See test report No. 16229A.

Seal variation vii), viii) and ix) of clause 1.2 of this report.

Parameter	Results (minutes)			
Pipe No.	**Thermal insulation – I**	**Integrity – E**		
	ΔT_M = 180°C	Ignition of cotton pad	Spontaneous and sustained flaming	Failure with gap gauge
A1	76(2)	76(2)	76	76(2)
A2	132(1)	132(1)	132(1)	132(1)
A3	132(1)	132(1)	132(1)	132(1)
A4	61(2)	61(2)	61	61(2)
A5	132(1)	132(1)	132(1)	132(1)
A6	120(2)	120(2)	120	120(2)
A7	63(2)	63(2)	63	63(2)

Parameter	Results (minutes)			
Pipe No.	**Thermal insulation – I**	**Integrity – E**		
	ΔT_M = 180°C	Ignition of cotton pad	Spontaneous and sustained flaming	Failure with gap gauge
B12 (PE)	132(1)	132(1)	132(1)	132(1)
B12 (PP)	132(1)	132(1)	132(1)	132(1)
B12 (PVC)	132(1)	132(1)	132(1)	132(1)
B3	132(1)	132(1)	132(1)	132(1)
B4	132(1)	132(1)	132(1)	132(1)
B5	132(1)	132(1)	132(1)	132(1)
B6	132(1)	132(1)	132(1)	132(1)
B7	132(1)	132(1)	132(1)	132(1)
C2	132(1)	132(1)	132(1)	132(1)
C3	132(1)	132(1)	132(1)	132(1)
C5	132(1)	132(1)	132(1)	132(1)
C6	132(1)	132(1)	132(1)	132(1)
C7	132(1)	132(1)	132(1)	132(1)
D3	132(1)	132(1)	132(1)	132(1)
D4	132(1)	132(1)	132(1)	132(1)
D5	132(1)	132(1)	132(1)	132(1)

2.2.4 Aluminium composite pipes – rigid wall construction

See test report No. 16229A.

Seal variation x) and xi) of clause 1.2 of this report.

Parameter	Results (minutes)			
Pipe No.	**Thermal insulation – I**	**Integrity – E**		
	ΔT_M = 180°C	Ignition of cotton pad	Spontaneous and sustained flaming	Failure with gap gauge
C1	123	132(1)	132(1)	132(1)
C4	132(1)	132(1)	132(1)	132(1)
D6	132(1)	132(1)	132(1)	132(1)
D7	132(1)	132(1)	132(1)	132(1)

2.2.5 Plastic pipes – flexible wall construction

See test report No. 210006339.

Seal variation xii), xiii) and xiv) of clause 1.2 of this report.

Parameter	Results (minutes)			
Pipe No.	**Thermal insulation – I**	**Integrity – E**		
	ΔT_M = 180°C	Ignition of cotton pad	Spontaneous and sustained flaming	Failure with gap gauge
A1	80	96(3)	96(3)	96(3)
A2	84(2)	84(2)	84	84(2)
A4	65	64	64	64(2)
A5	51	51	51	51(2)
A6	72	84(2)	84	84(2)
A7	83	93(2)	93	93(2)
B1	96(3)	96(3)	96(3)	96(3)
B2	96(3)	96(3)	96(3)	96(3)
B4	73	96(3)	96(3)	96(3)
B5	96(3)	96(3)	96(3)	96(3)
B6	94	96(3)	96(3)	96(3)
C1	96(3)	96(3)	96(3)	96(3)
C2	73(2)	73(2)	73	73(2)
C3	96(3)	96(3)	96(3)	96(3)
C4	96(3)	96(3)	96(3)	96(3)
C8	96(3)	96(3)	96(3)	96(3)
D1	96(3)	96(3)	96(3)	96(3)
E3	96(3)	96(3)	96(3)	96(3)
E6	96(3)	96(3)	96(3)	96(3)

See test report No. 16863A.

Seal variation xii) and xiii) of clause 1.2 of this report.

Parameter	Results (minutes)			
Pipe No.	**Thermal insulation – I**	**Integrity – E**		
	ΔT_M = 180°C	Ignition of cotton pad	Spontaneous and sustained flaming	Failure with gap gauge
A1	72	125(4)	125(4)	125(4)
A2	46(2)	46(2)	46	46(2)
B1	125	125(4)	125(4)	125(4)
B2	85(2)	85(2)	85	85(2)
C1	125	125(4)	125(4)	125(4)
C2	95(2)	95(2)	95	95(2)

2.2.6 Aluminium composite pipes – flexible wall construction

See test report No. 210006339.

Seal variation xv) of clause 1.2 of this report.

Parameter	Results (minutes)			
Pipe No.	**Thermal insulation – I**	**Integrity – E**		
	ΔT_M = 180°C	Ignition of cotton pad	Spontaneous and sustained flaming	Failure with gap gauge
D8	47	96(3)	96(3)	96(3)
E8	96(3)	96(3)	96(3)	96(3)

(1) 132 minutes, no failure. The test was stopped after 132 minutes at the request of the sponsor.

(2) No failure until spontaneous and sustained flaming of this single pipe penetration seal. From this moment on these characteristics could no longer be evaluated.

(3) 96 minutes, no failure. The test was stopped after 96 minutes at the request of the sponsor.

(4) 125 minutes, no failure. The test was stopped after 125 minutes at the request of the sponsor.

3 Classification and field of application

3.1 Reference of classification

This classification has been carried out in accordance with clause 7 of EN 13501-2:2007+A1:2009.

3.2 Classification

3.2.1 Single pipe penetration seals including plastic pipes – rigid floor construction

3.2.1.1 Plastic pipes with Walraven BIS Pacifyre® MKII FireSleeve pipe sealing and Walraven BIS Pacifyre® FPM Mortar annular sealing – rigid floor construction

Seal types i) and ii) according to 1.2.

PP-pipes
designation: AGRU – according to EN ISO 1873-1, ÖNORM B 5174 and DIN 8077/8078

pipe		pipe sealing		annular sealing	
Ø (mm)	wall thickness (mm)	identification number	design group	annular space a_1 (mm)	separation a_2 (mm)
32	2.0	215 4 030032	A	0-110	≥ 0
110	2.7	215 4 108110	A	0-125	≥ 0
110	15.1	215 4 108110	A	0-110	≥ 0
32 to 110	**2.0/2.7[5] to 15.1**	[6]	**A**	**0-110**	**≥ 0**
125	3.1	215 8 123125	B	0-120	≥ 200
160	4.0	215 8 159161	B	0-110	≥ 200
125 to 160	**3.1/4.0[5]**	[6]	**B**	**0-110**	**≥ 200**

PE 100-pipes
designation: AGRU – according to EN ISO 1872-1, EN 12201, EN 13244 and DIN 8074/8075
designation: EUROTTANTA – according to EN 12201-2, EN 1622 and EN ISO 15494
designation: DYKA – according to EN 12201

pipe		pipe sealing		annular sealing	
Ø (mm)	wall thickness (mm)	type	design group	annular space a_1 (mm)	separation a_2 (mm)
32	2.0	215 4 030032	A	0-130	≥ 200
110	2.7	215 4 108110	A	0-70	≥ 0
110	15.1	215 4 108110	A	0-125	≥ 0
32 to 110	**2.7 to 15.1**	[6]	**A**	**0-70**	**≥ 0**
32 to 110	**2.0/2.7[5] to 15.1**	[6]	**A**	**0-70**	**≥ 200**
125	3.1	215 8 123125	B	0-115	≥ 200
160	4.0	215 8 159161	B	0-110	≥ 200
160	9.5	215 8 159161	B	0-110	≥ 200

125 to 160	**3.1/4.0[5] to 9.5**	[6]	**B**	**0-110**	**≥ 200**

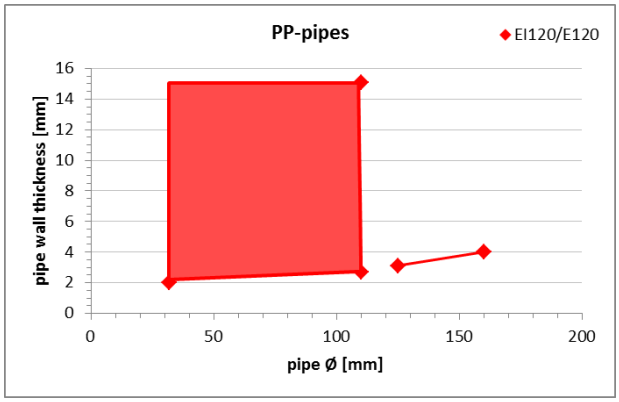
PVC-U-pipes
designation: WKT – according to EN ISO 1452, EN ISO 15493 and DIN 8061/8062
designation: WAVIN – according to EN ISO 1453 and KOMO-BRL 2023

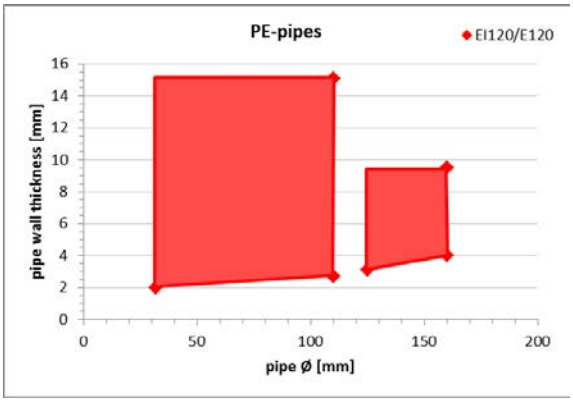
pipe		pipe sealing		annular sealing	
Ø (mm)	wall thickness (mm)	identification number	design group	annular space a_1 (mm)	separation a_2 (mm)
32	1.9	215 4 030032	A	0-120	≥ 200
110	2.2	215 4 108110	A	0-120	≥ 200
110	8.1	215 4 108110	A	0-125	≥ 0
32 to 110	**1.9/2.2[5] to 8.1**	[6]	**A**	**0-120**	**≥ 200**
125	2.5	215 8 123125	B	0-115	≥ 200
160	3.2	215 8 159161	B	0-100	≥ 200
160	11.8	215 8 159161	B	0-115	≥ 200
125 to 160	**2.5/3.2[5] to 11.8**	[6]	**B**	**0-100**	**≥ 200**

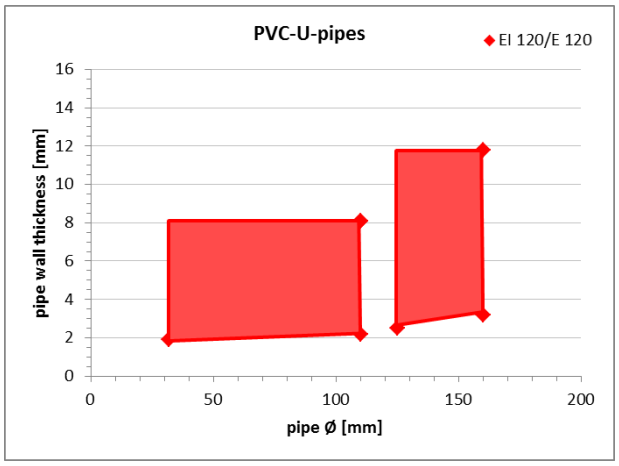
The results are valid for PVC-U pipes according to EN 1329-1, EN 1453-1 and EN1452-1 and PVC-C pipes according to EN 1566-1.

[5] interpolation of minimum pipe wall thickness within pipe diameter range.

[6] pipe sealing identification number according to pipe diameter, within the required design group (A or B).







EI 120-U/C, EI 90-U/C, EI 60-U/C, EI 45-U/C,

EI 30-U/C, EI 20-UC, EI 15-U/C

E 120-U/C, E 90-U/C, E 60-U/C, E 45-U/C, E 30-U/C, E 15-U/C

PP-pipes
designation: AGRU – according to EN ISO 1873-1, ÖNORM B 5174 and DIN 8077/8078

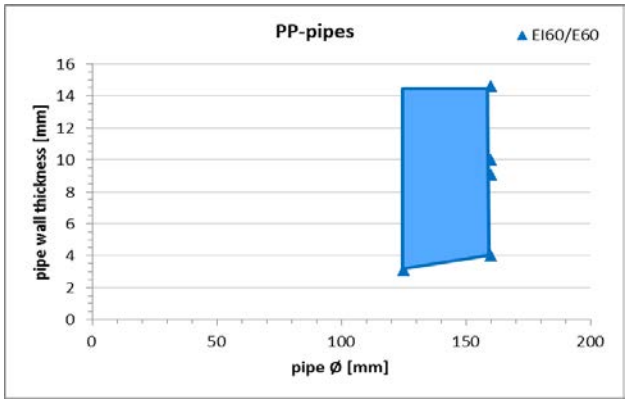
pipe		pipe sealing		annular sealing	
Ø (mm)	wall thickness (mm)	identification number	design group	annular space a_1 (mm)	separation a_2 (mm)
125	3.1	215 8 123125	B	0-120	≥ 200
160	4.0	215 8 159161	B	0-110	≥ 200
160	9.1	215 8 159161	B	0-110	≥ 200
160	10.0	215 8 159161	B	0-110	≥ 200
160	14.6	215 8 159161	B	0-120	≥ 200
125 to 160	**3.1/4.0[5] to 14.6**	[6]	**B**	**0-110**	**≥ 200**

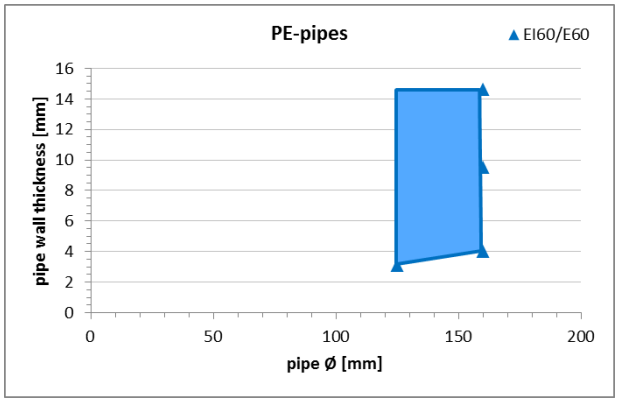
PE 100-pipes
designation: AGRU – according to EN ISO 1872-1, EN 12201, EN 13244 and DIN 8074/8075
designation: EUROTTANTA – according to EN 12201-2, EN 1622 and EN ISO 15494

pipe		pipe sealing		annular sealing	
Ø (mm)	wall thickness (mm)	identification number	design group	annular space a_1 (mm)	separation a_2 (mm)
125	3.1	215 8 123125	B	0-115	≥ 200
160	4.0	215 8 159161	B	0-110	≥ 200
160	9.5	215 8 159161	B	0-110	≥ 200
160	14.6	215 8 159161	B	0-110	≥ 200
125 to160	**3.1/4.0[5] to 14.6**	[6]	**B**	**0-110**	**≥ 200**

[5] interpolation of minimum pipe wall thickness within pipe diameter range.

[6] pipe sealing identification number according to pipe diameter, within the required design group (A or B).





EI 60-U/C, EI 45-U/C,
EI 30-U/C, EI 20-UC, EI 15-U/C

E 60-U/C, E 45-U/C, E 30-U/C, E 15-U/C

3.2.1.2 Plastic pipes with Walraven BIS Pacifyre® MKII FireSleeve pipe sealing and CE Acrylic kit annular sealing – rigid floor construction

Seal types iii) and iv) according to 1.2.

PP-pipes
designation: AGRU – according to EN ISO 1873-1, ÖNORM B 5174 and DIN 8077/8078

pipe		pipe sealing		annular sealing	
Ø (mm)	wall thickness (mm)	identification number	design group	annular space a_1 (mm)	separation a_2 (mm)
32	2.0	215 4 030032	A	0-30	≥ 200
110	2.7	215 4 108110	A	0-30	≥ 200
110	15.1	215 4 108110	A	0-35	≥ 200
32 to 110	**2.0/2.7[5] to 15.1**	[6]	**A**	**0-30**	**≥ 200**
125	3.1	215 8 123125	B	0-30	≥ 200

PE 100-pipes or PE 80-pipes
designation: AGRU – according to EN ISO 1872-1, EN 12201, EN 13244 and DIN 8074/8075
designation: EUROTTANTA – according to EN 12201-2, EN 1622 and EN ISO 15494
designation: DYKA – according to EN 12201-2

pipe		pipe sealing		annular sealing	
Ø (mm)	wall thickness (mm)	identification number	design group	annular space a_1 (mm)	separation a_2 (mm)
32	2.0	215 4 030032	A	0-25	≥ 200
110	2.7	215 4 108110	A	0-30	≥ 200
110	15.1	215 4 108110	A	0-30	≥ 200
32 to 110	**2.0/2.7[5] to 15.1**	[6]	**A**	**0-25**	≥ 200
125	3.1	215 8 123125	B	0-20	≥ 200

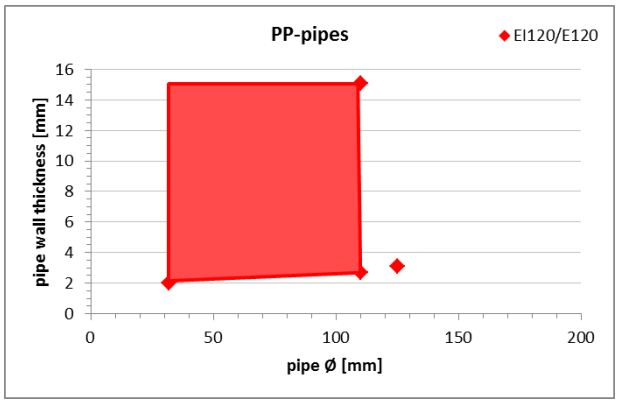
PVC-U-pipes
designation: WKT – according to EN ISO 1452, EN ISO 15493 and DIN 8061/8062
designation: WAVIN – according to EN ISO 1453 and KOMO-BRL 2023
designation: DYKA – according to EN ISO 1452-2

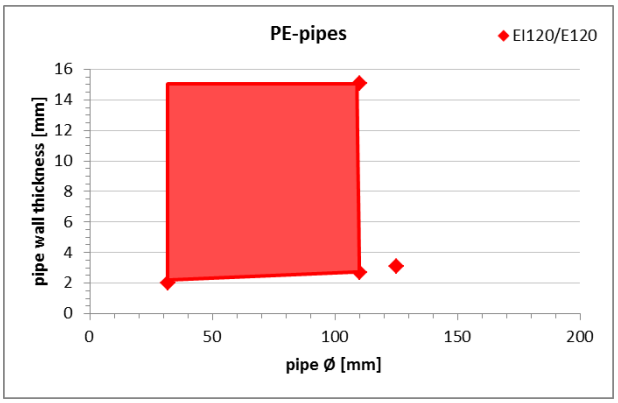
pipe		pipe sealing		annular sealing	
Ø (mm)	wall thickness (mm)	identification number	design group	annular space a_1 (mm)	separation a_2 (mm)
32	1.6	215 4 030032	A	0-35	≥ 200
110	2.2	215 4 108110	A	0-35	≥ 200
110	8.1	215 4 108110	A	0-35	≥ 200
32 to 110	**1.6/2.2[5] to 8.1**	[6]	**A**	**0-35**	**≥ 200**
125	2.5	215 8 123125	B	0-30	≥ 200

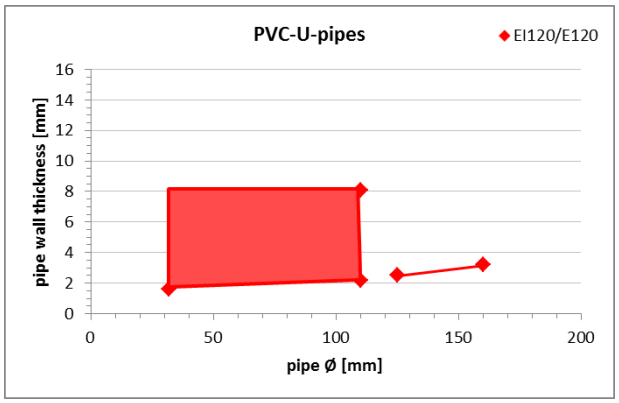
160	3.2	215 8 159161	B	10-40	≥ 200
125 to 160	**2.5/3.2[5]**	[6]	**B**	**10-30**	**≥ 200**
The results are valid for PVC-U pipes according to EN 1329-1, EN 1453-1 and EN1452-1 and PVC-C pipes according to EN 1566-1.					

[5] interpolation of minimum pipe wall thickness within pipe diameter range.

[6] pipe sealing identification number according to pipe diameter, within the required design group (A or B).







EI 120-U/C, EI 90-U/C, EI 60-U/C, EI 45-U/C,
EI 30-U/C, EI 20-UC, EI 15-U/C

E 120-U/C, E 90-U/C, E 60-U/C, E 45-U/C,
E 30-U/C, E 15-U/C

PE 100-pipes
designation: AGRU – according to EN ISO 1872-1, EN 12201, EN 13244 and DIN 8074/8075

pipe		pipe sealing		annular sealing	
Ø (mm)	wall thickness (mm)	identification number	design group	annular space a_1 (mm)	separation a_2 (mm)
125	3.1	215 8 123125	B	0-20	≥ 200
160	4.0	215 8 159161	B	10-30	≥ 200
125 to 160	**3.1/4.0[5]**	[6]	**B**	**10-20**	**≥ 200**

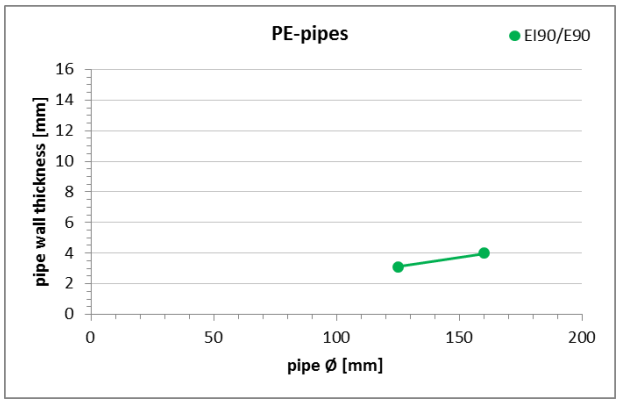
PVC-U-pipes
designation: WKT – according to EN ISO 1452, EN ISO 15493 and DIN 8061/8062
designation: WAVIN – according to EN ISO 1453 and KOMO-BRL 2023

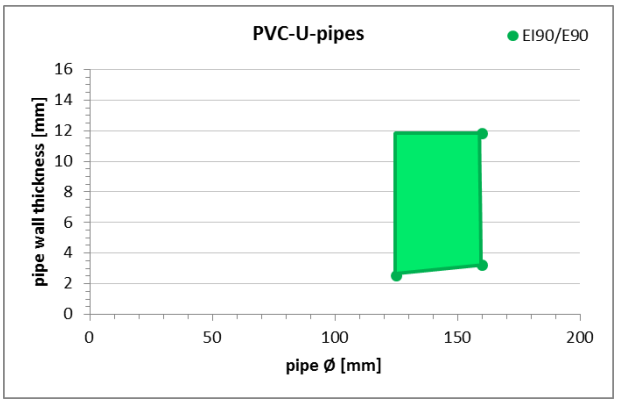
pipe		pipe sealing		annular sealing	
Ø (mm)	wall thickness (mm)	identification number	design group	annular space a_1 (mm)	separation a_2 (mm)
125	2.5	215 8 123125	B	0-30	≥ 200
160	3.2	215 8 159161	B	10-40	≥ 200
160	11.8	215 8 159161	B	0-30	≥ 200
125 to 160	**2.5/3.2[5] to 11.8**	[6]	**B**	**0-30**	**≥ 200**

The results are valid for PVC-U pipes according to EN 1329-1, EN 1453-1 and EN1452-1 and PVC-C pipes according to EN 1566-1.

[5] interpolation of minimum pipe wall thickness within pipe diameter range.

[6] pipe sealing identification number according to pipe diameter, within the required design group (A or B).





EI 90-U/C, EI 60-U/C, EI 45-U/C,
EI 30-U/C, EI 20-UC, EI 15-U/C

E 90-U/C, E 60-U/C, E 45-U/C,
E 30-U/C, E 15-U/C

PP-pipes
designation: AGRU – according to EN ISO 1873-1, ÖNORM B 5174 and DIN 8077/8078

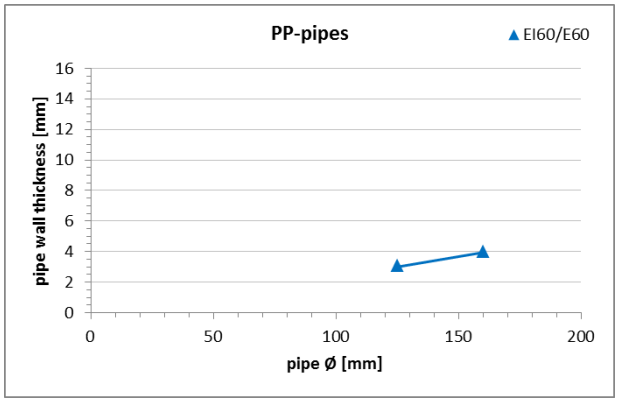
pipe		pipe sealing		annular sealing	
Ø (mm)	wall thickness (mm)	identification number	design group	annular space a_1 (mm)	separation a_2 (mm)
125	3.1	215 8 123125	B	0-30	≥ 200
160	4.0	215 8 159161	B	5-30	≥ 200
125 to 160	**3.1/4.0[5]**	[6]	**B**	**5-30**	**≥ 200**

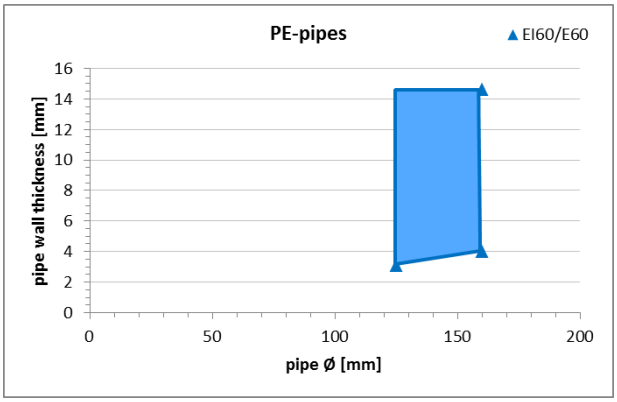
PE 100-pipes
designation: AGRU – according to EN ISO 1872-1, EN 12201, EN 13244 and DIN 8074/8075
designation: EUROTTANTA – according to EN 12201-2, EN 1622 and EN ISO 15494

pipe		pipe sealing		annular sealing	
Ø (mm)	wall thickness (mm)	identification number	design group	annular space a_1 (mm)	separation a_2 (mm)
125	3.1	215 8 123125	B	0-20	≥ 200
160	4.0	215 8 159161	B	10-30	≥ 200
160	14.6	215 8 159161	B	0-20	≥ 200
125 to 160	**3.1/4.0[5] to 14.6**	[6]	**B**	**10-30**	**≥ 200**

[5] interpolation of minimum pipe wall thickness within pipe diameter range.

[6] pipe sealing identification number according to pipe diameter, within the required design group (A or B).





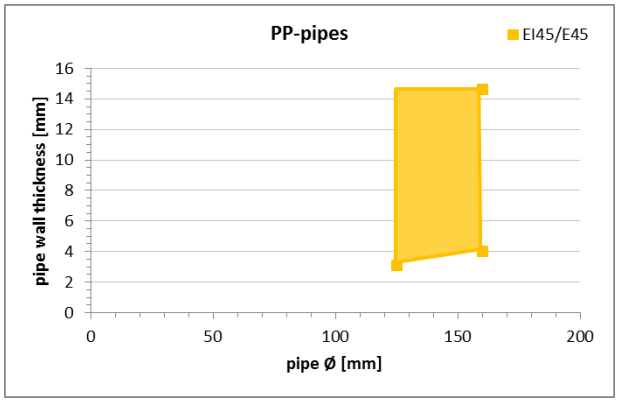
EI 60-U/C, EI 45-U/C,
EI 30-U/C, EI 20-UC, EI 15-U/C

E 60-U/C, E 45-U/C, E 30-U/C, E 15-U/C

PP-pipes
designation: AGRU – according to EN ISO 1873-1, ÖNORM B 5174 and DIN 8077/8078

pipe		pipe sealing		annular sealing	
Ø (mm)	wall thickness (mm)	identification number	design group	annular space a_1 (mm)	separation a_2 (mm)
125	3.1	215 8 123125	B	0-30	≥ 200
160	4.0	215 8 159161	B	5-30	≥ 200
160	14.6	215 8 159161	B	0-30	≥ 200
125 to 160	**3.1/4.0[5] to 14.6**	[6]	**B**	**5-30**	**≥ 200**

[5] interpolation of minimum pipe wall thickness within pipe diameter range.
[6] pipe sealing identification number according to pipe diameter, within the required design group (A or B).



EI 45-U/C, EI 30-U/C, EI 20-UC, EI 15-U/C

E 45-U/C, E 30-U/C, E 15-U/C

3.2.2 Single pipe penetration seals including aluminium composite pipes – rigid floor construction

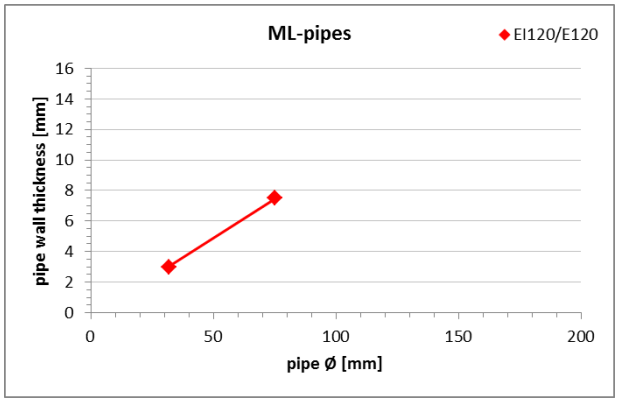
3.2.2.1 Aluminium composite pipes with Walraven BIS Pacifyre® MKII FireSleeve pipe sealing and Walraven BIS Pacifyre® FPM Mortar annular sealing – rigid floor construction

Seal type v) according to 1.2.

PE-RT Type II / Al / PE-RT Type II-pipes
designation: UPONOR MLCP – according to EN ISO 21003 and DIN 16836

pipe		pipe sealing		annular sealing	
Ø (mm)	wall thickness (mm)	identification number	design group	annular space a_1 (mm)	separation a_2 (mm)
32	3.0	215 4 030032	A	0-110	≥ 200
75	7.5	215 4 075077	A	0-100	≥ 200
32 to 75	**3.0/7.5[5] to 14.2**	[6]	**A**	**0-100**	**≥ 200**

[5] interpolation of minimum pipe wall thickness within pipe diameter range.
[6] pipe sealing identification number according to pipe diameter, within the required design group (A or B).



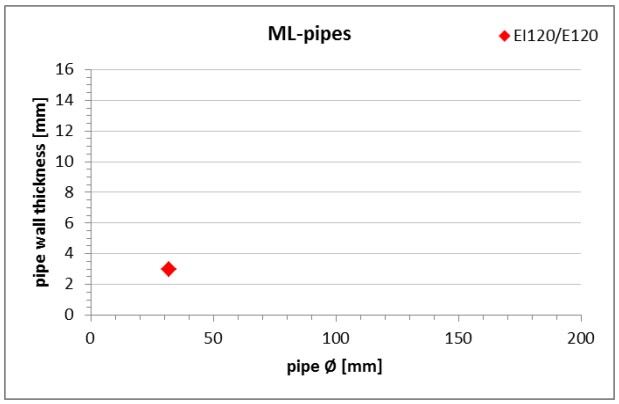
EI 120-U/C, EI 90-U/C, EI 60-U/C, EI 45-U/C,
EI 30-U/C, EI 20-UC, EI 15-U/C

E 120-U/C, E 90-U/C, E 60-U/C, E 45-U/C,
E 30-U/C, E 15-U/C

3.2.2.2 Aluminium composite pipes with Walraven BIS Pacifyre® MKII FireSleeve pipe sealing and CE Acrylic kit annular sealing – rigid floor construction

Seal type vi) according to 1.2.

PE-RT Type II / Al / PE-RT Type II-pipes designation: UPONOR MLCP – according to EN ISO 21003 and DIN 16836					
pipe		pipe sealing		annular sealing	
Ø (mm)	wall thickness (mm)	identification number	design group	annular space a_1 (mm)	separation a_2 (mm)
32	3.0	215 4 030032	A	0-30	≥ 200



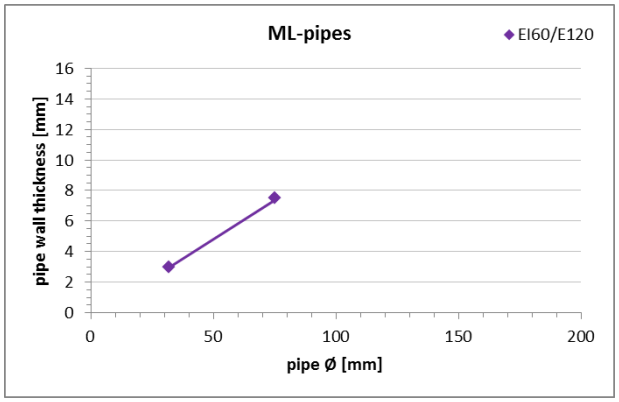
EI 120-U/C, EI 90-U/C, EI 60-U/C, EI 45-U/C,
EI 30-U/C, EI 20-UC, EI 15-U/C

E 120-U/C, E 90-U/C, E 60-U/C, E 45-U/C,
E 30-U/C, E 15-U/C

PE-RT Type II / Al / PE-RT Type II-pipes
designation: UPONOR MLCP – according to EN ISO 21003 and DIN 16836

pipe		pipe sealing		annular sealing	
Ø (mm)	wall thickness (mm)	identification number	design group	annular space a_1 (mm)	separation a_2 (mm)
32	3.0	215 4 030032	A	0-30	≥ 200
75	7.5	215 4 075077	A	0-30	≥ 200
32 to 75	**3.0/7.5[5] to 14.2**	[6]	**A**	**0-30**	**≥ 200**

[5] interpolation of minimum pipe wall thickness within pipe diameter range.
[6] pipe sealing identification number according to pipe diameter, within the required design group (A or B).



EI 60-U/C, EI 45-U/C,
EI 30-U/C, EI 20-UC, EI 15-U/C

E 120-U/C, E 90-U/C, E 60-U/C, E 45-U/C,
E 30-U/C, E 15-U/C

3.2.3 Single pipe penetration seals including plastic pipes – rigid wall construction

3.2.3.1 Plastic pipes with Walraven BIS Pacifyre® MKII FireSleeve pipe sealing and Walraven BIS Pacifyre® FPM Mortar annular sealing – rigid wall construction

Seal types vii), viii) and ix) according to 1.2.

PP-pipes
designation: AGRU – according to EN ISO 1873-1, ÖNORM B 5174 and DIN 8077/8078

pipe		pipe sealing		annular sealing	
Ø (mm)	wall thickness (mm)	identification number	design group	annular space a_1 (mm)	separation a_2 (mm)
32	2.0	215 4 030032	A	0-100	≥ 0
110	2.7	215 4 108110	A	0-100	≥ 0
110	15.1	215 4 108110	A	0-100	≥ 0
32 to 110	**2.0/2.7[5] to 15.1**	[6]	**A**	**0-100**	**≥ 0**
125	3.1	215 8 123125	B	0-95	≥ 200
160	4.0	215 8 159161	B	0-90	≥ 200
125 to 160	**3.1/4.0[5]**	[6]	**B**	**0-90**	**≥ 200**

PE 100-pipes or PE 80-pipes
designation: AGRU – according to EN ISO 1872-1, EN 12201, EN 13244 and DIN 8074/8075
designation: EUROTTANTA – according to EN 12201-2, EN 1622 and EN ISO 15494
designation: DYKA – according to EN 12201-2

pipe		pipe sealing		annular sealing	
Ø (mm)	wall thickness (mm)	identification number	design group	annular space a_1 (mm)	separation a_2 (mm)
32	2.0	215 4 030032	A	5-95	≥ 0
110	2.7	215 4 108110	A	0-120	≥ 0
110	15.1	215 4 108110	A	0-105	≥ 0
32 to 110	**2.0/2.7[5] to 15.1**	[6]	**A**	**5-105**	**≥ 0**
125	3.1	215 8 123125	B	0-95	≥ 200
160	4.0	215 8 159161	B	0-90	≥ 200
160	9.5	215 8 159161	B	5-85	≥ 200
125 to 160	**3.1/4.0[5] to 9.5**	[6]	**B**	**0-90**	**≥ 200**

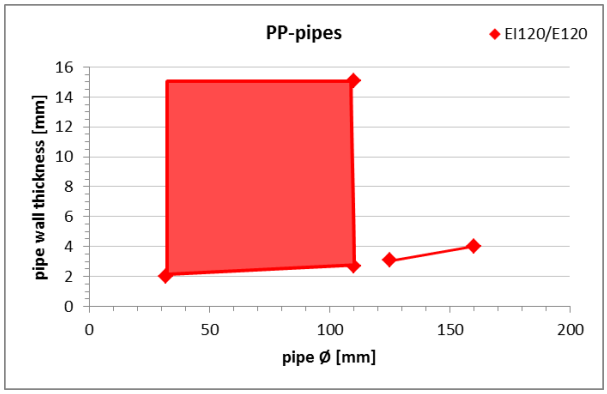
PVC-U-pipes
designation: WKT – according to EN ISO 1452, EN ISO 15493 and DIN 8061/8062
designation: WAVIN – according to EN ISO 1453 and KOMO-BRL 2023
designation: DYKA – according to EN ISO 1452-2

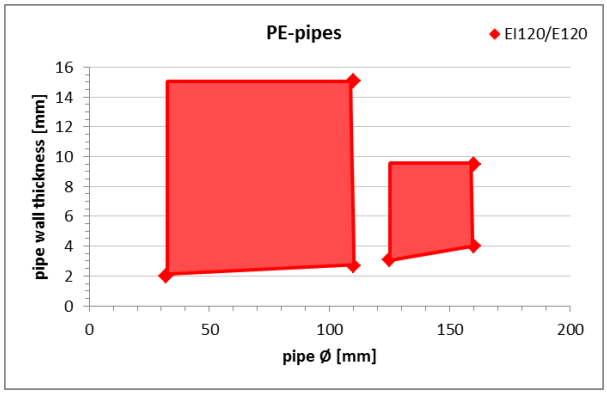
pipe		pipe sealing		annular sealing	
Ø (mm)	wall thickness (mm)	identification number	design group	annular space a_1 (mm)	separation a_2 (mm)
32	1.6	215 4 030032	A	0-100	≥ 200
110	2.2	215 4 108110	A	0-100	≥ 0
110	8.1	215 4 108110	A	0-100	≥ 0
32 to 110	**2.2 to 8.1**	[6]	**A**	**0-100**	**≥ 0**

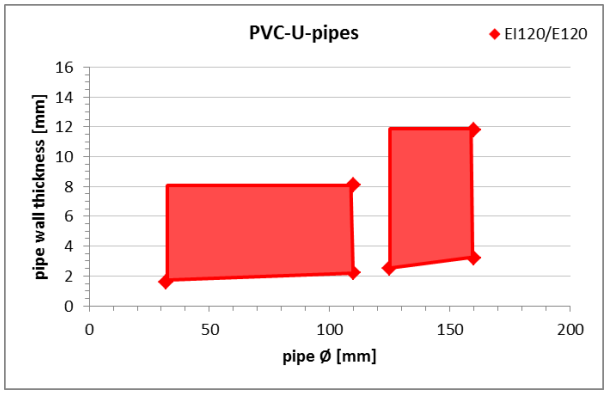
PVC-U-pipes
designation: WKT – according to EN ISO 1452, EN ISO 15493 and DIN 8061/8062
designation: WAVIN – according to EN ISO 1453 and KOMO-BRL 2023
designation: DYKA – according to EN ISO 1452-2

pipe		pipe sealing		annular sealing	
Ø (mm)	wall thickness (mm)	identification number	design group	annular space a_1 (mm)	separation a_2 (mm)
32 to 110	**1.6/2.2[5] to 8.1**	[6]	**A**	**0-100**	**≥ 200**
125	2.5	215 8 123125	B	0-95	≥ 200
160	3.2	215 8 159161	B	0-90	≥ 200
160	11.8	215 8 159161	B	0-90	≥ 200
125 to 160	**2.5/3.2[5] to 11.8**	[6]	**B**	**0-90**	**≥ 200**
The results are valid for PVC-U pipes according to EN 1329-1, EN 1453-1 and EN1452-1 and PVC-C pipes according to EN 1566-1.					

[5] interpolation of minimum pipe wall thickness within pipe diameter range.
[6] pipe sealing identification number according to pipe diameter, within the required design group (A or B).







EI 120-U/C, EI 90-U/C, EI 60-U/C, EI 45-U/C, EI 30-U/C, EI 20-UC, EI 15-U/C

E 120-U/C, E 90-U/C, E 60-U/C, E 45-U/C, E 30-U/C, E 15-U/C

PP-pipes
designation: AGRU – according to EN ISO 1873-1, ÖNORM B 5174 and DIN 8077/8078

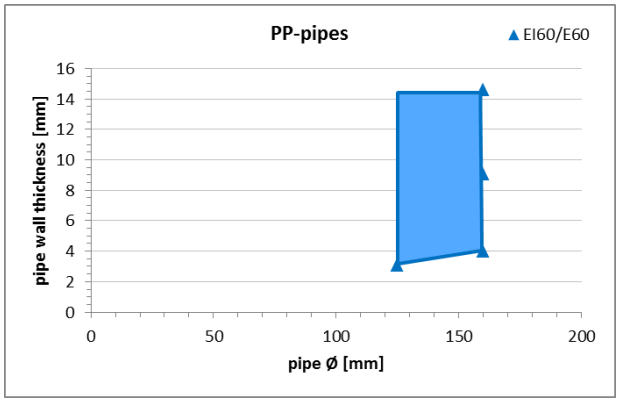
pipe		pipe sealing		annular sealing	
Ø (mm)	wall thickness (mm)	identification number	design group	annular space a_1 (mm)	separation a_2 (mm)
125	3.1	215 8 123125	B	0-95	≥ 200
160	4.0	215 8 159161	B	0-90	≥ 200
160	9.1	215 8 159161	B	0-90	≥ 200
160	14.6	215 8 159161	B	0-90	≥ 200
125 to 160	**3.1/4.0[5] to 14.6**	[6]	**B**	**0-90**	**≥ 200**

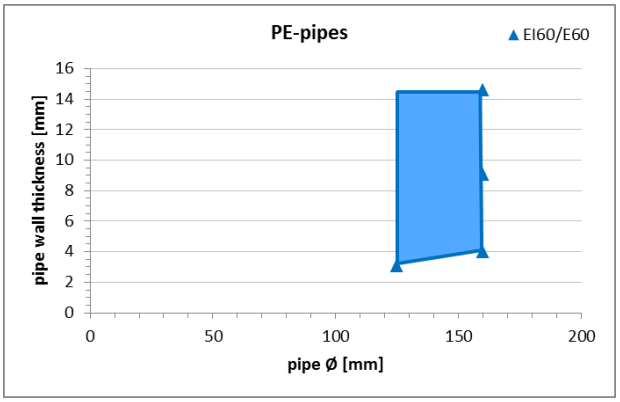
PE 100-pipes
designation: AGRU – according to EN ISO 1872-1, EN 12201, EN 13244 and DIN 8074/8075
designation: EUROTTANTA – according to EN 12201-2, EN 1622 and EN ISO 15494

pipe		pipe sealing		annular sealing	
Ø (mm)	wall thickness (mm)	identification number	design group	annular space a_1 (mm)	separation a_2 (mm)
125	3.1	215 8 123125	B	0-95	≥ 200
160	4.0	215 8 159161	B	0-90	≥ 200
160	9.5	215 8 159161	B	5-85	≥ 200
160	14.6	215 8 159161	B	0-90	≥ 200
125 to 160	**3.1/4.0[5] to 14.6**	[6]	**B**	**5-85**	**≥ 200**

[5] interpolation of minimum pipe wall thickness within pipe diameter range.

[6] pipe sealing identification number according to pipe diameter, within the required design group (A or B).





EI 60-U/C, EI 45-U/C,
EI 30-U/C, EI 20-UC, EI 15-U/C

E 60-U/C, E 45-U/C, E 30-U/C, E 15-U/C

3.2.4 Single pipe penetration seals including aluminium composite pipes – rigid wall construction

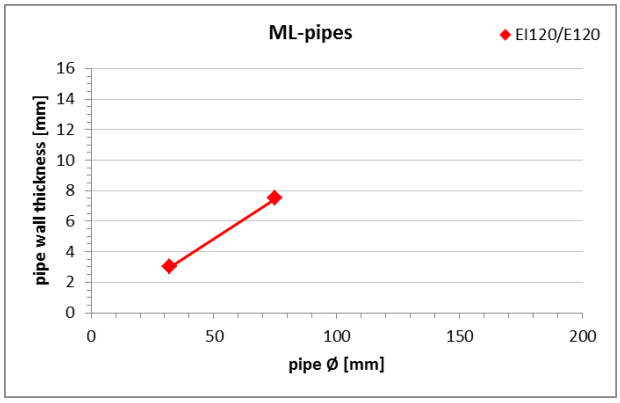
3.2.4.1 Aluminium composite pipes with Walraven BIS Pacifyre® MKII FireSleeve pipe sealing and Walraven BIS Pacifyre® FPM Mortar annular sealing – rigid wall construction

Seal type x) according to 1.2.

PE-RT Type II / Al / PE-RT Type II-pipes
designation: UPONOR MLCP – according to EN ISO 21003 and DIN 16836

pipe		pipe sealing		annular sealing	
Ø (mm)	wall thickness (mm)	identification number	design group	annular space a_1 (mm)	separation a_2 (mm)
32	3.0	215 4 030032	A	0-100	≥ 200
75	7.5	215 4 075077	A	0-35	≥ 200
32 to 75	**3.0/7.5[5]**	**[6]**	**A**	**0-35**	**≥ 200**

[5] interpolation of minimum pipe wall thickness within pipe diameter range.
[6] pipe sealing identification number according to pipe diameter, within the required design group (A or B).



EI 120-U/C, EI 90-U/C, EI 60-U/C, EI 45-U/C,
EI 30-U/C, EI 20-UC, EI 15-U/C

E 120-U/C, E 90-U/C, E 60-U/C, E 45-U/C,
E 30-U/C, E 15-U/C

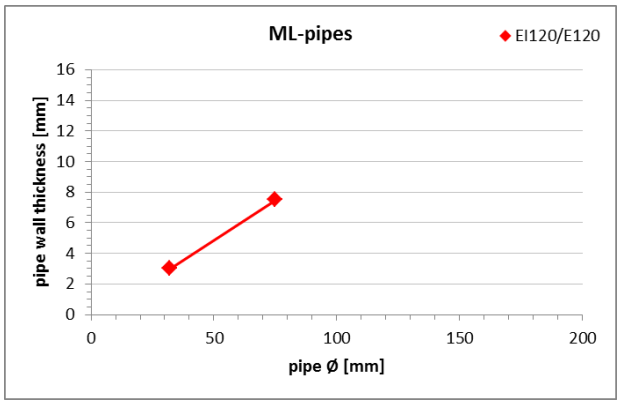
3.2.4.2 Aluminium composite pipes with Walraven BIS Pacifyre® MKII FireSleeve pipe sealing and CE Acrylic kit annular sealing – rigid wall construction

Seal type xi) according to 1.2.

PE-RT Type II / Al / PE-RT Type II-pipes
designation: UPONOR MLCP – according to EN ISO 21003 and DIN 16836

pipe		pipe sealing		annular sealing	
Ø (mm)	wall thickness (mm)	identification number	design group	annular space a_1 (mm)	separation a_2 (mm)
32	3.0	215 4 030032	A	0-35	≥ 200
75	7.5	215 4 075077	A	8-35	≥ 200
32 to 75	**3.0/7.5[5]**	[6]	**A**	**8-35**	**≥ 200**

[5] interpolation of minimum pipe wall thickness within pipe diameter range.
[6] pipe sealing identification number according to pipe diameter, within the required design group (A or B).



EI 120-U/C, EI 90-U/C, EI 60-U/C, EI 45-U/C, EI 30-U/C, EI 20-UC, EI 15-U/C

E 120-U/C, E 90-U/C, E 60-U/C, E 45-U/C, E 30-U/C, E 15-U/C

3.2.5 Single pipe penetration seals including plastic pipes – flexible wall construction

3.2.5.1 Plastic pipes with Walraven BIS Pacifyre® MKII FireSleeve pipe sealing and Tangit FP 430 Acrylic kit annular sealing – flexible wall construction

Seal types xii) and xiii) according to 1.2.

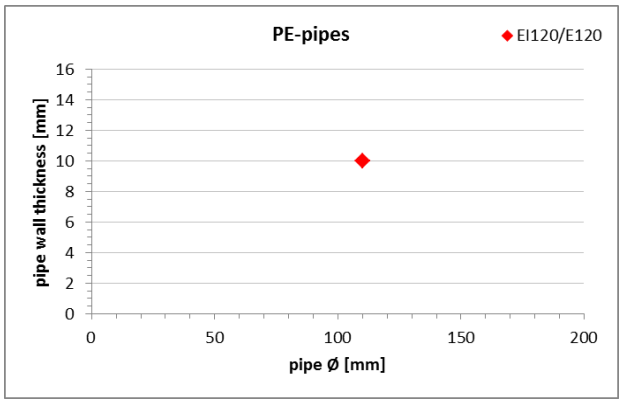
PE 100-pipes
designation: AGRU – according to EN ISO 1872-1, EN 12201, EN 13244 and DIN 8074/8075

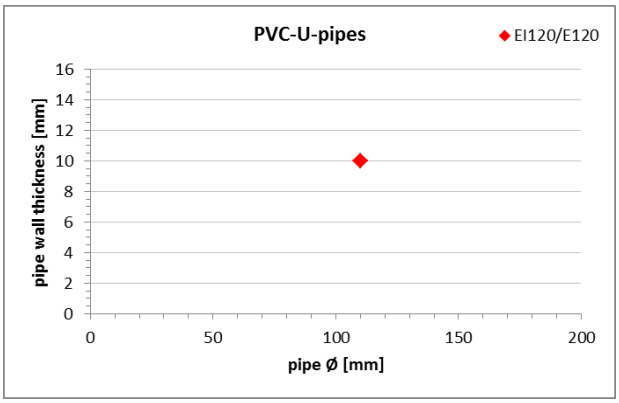
pipe		pipe sealing		annular sealing	
Ø (mm)	wall thickness (mm)	identification number	design group	annular space a_1 (mm)	separation a_2 (mm)
110	10.0	215 4 108110	A	0-20	≥ 200

PVC-U-pipes
designation: WKT – according to EN ISO 1452, EN ISO 15493 and DIN 8061/8062

pipe		pipe sealing		annular sealing	
Ø (mm)	wall thickness (mm)	identification number	design group	annular space a_1 (mm)	separation a_2 (mm)
110	2.0	215 4 108110	A	0-20	≥ 200

The results are valid for PVC-U pipes according to EN 1329-1, EN 1453-1 and EN1452-1 and PVC-C pipes according to EN 1566-1.





EI 120-U/C, EI 90-U/C, EI 60-U/C, EI 45-U/C,
EI 30-U/C, EI 20-UC, EI 15-U/C

E 120-U/C, E 90-U/C, E 60-U/C, E 45-U/C,
E 30-U/C, E 15-U/C

PP-pipes
designation: AGRU – according to EN ISO 1873-1, ÖNORM B 5174 and DIN 8077/8078

pipe		pipe sealing		annular sealing	
Ø (mm)	wall thickness (mm)	identification number	design group	annular space a_1 (mm)	separation a_2 (mm)
32	2.0	215 4 030032	A	17-28	≥ 0
110	2.7	215 4 108110	A	20-21	≥ 0
32 to 110	**2.0 to 2.7**	[6]	**A**	**20-21**	**≥ 0**
110	10.0	215 4 108110	A	0-20	≥ 200
32 to 110	**2.0/2.7[5] to 10.0**	[6]	**A**	**0-20**	**≥ 200**
125	3.1	215 8 123125	B	17-25	≥ 200

PE 100-pipes and PE 80-pipes
designation: AGRU – according to EN ISO 1872-1, EN 12201, EN 13244 and DIN 8074/8075
designation: DYKA – according to EN 12201-2

pipe		pipe sealing		annular sealing	
Ø (mm)	wall thickness (mm)	identification number	design group	annular space a_1 (mm)	separation a_2 (mm)
32	2.0	215 4 030032	A	14-30	≥ 0
110	2.7	215 4 108110	A	12-26	≥ 0
32 to 110	**2.0 to 2.7**	[6]	**A**	**14-26**	**≥ 0**
110	10.0	215 4 108110	A	0-20	≥ 200
32 to 110	**2.0/2.7[5] to 10.0**	[6]	**A**	**0-20**	**≥ 200**
125	3.1	215 8 123125	B	20-22	≥ 200
180	4.4	215 8 180182	B	16-24	≥ 200
125 to 180	**3.1/4.4[5]**	[6]	**B**	**20-22**	**≥ 200**

PVC-U-pipes
designation: WKT – according to EN ISO 1452, EN ISO 15493 and DIN 8061/8062
designation: WAVIN – according to EN ISO 1453 and KOMO-BRL 2023
designation: DYKA – according to EN ISO 1452-2 and EN 1329

pipe		pipe sealing		annular sealing	
Ø (mm)	wall thickness (mm)	identification number	design group	annular space a_1 (mm)	separation a_2 (mm)
32	1.6	215 4 030032	A	19-24	≥ 0
110	2.0	215 4 108110	A	0-20	≥ 200
110	8.1	215 4 108110	A	0-34	≥ 0
32 to 110	**1.6/2.0[5] to 8.1**	[6]	**A**	**0-20**	**≥ 200**
125	2.5	215 8 123125	B	20-24	≥ 200
160	3.2	215 8 159161	B	20-21	≥ 200
160	11.8	215 8 159161	B	20-25	≥ 200
125 to 160	**2.5/3.2[5] to 11.8**	[6]	**B**	**20-21**	**≥ 200**
180	3.6	215 8 180182	B	18-25	≥ 200
160 to 180	**3.2/3.6[5]**	[6]	**B**	**20-21**	**≥ 200**
160 to 180	**11.8/3.6[5]**	[6]	**B**	**20-25**	**≥ 200**

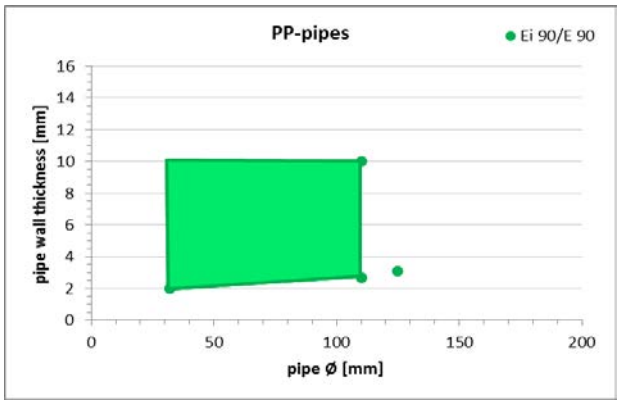
The results are valid for PVC-U pipes according to EN 1329-1, EN 1453-1 and EN1452-1 and PVC-C pipes according to EN 1566-1.

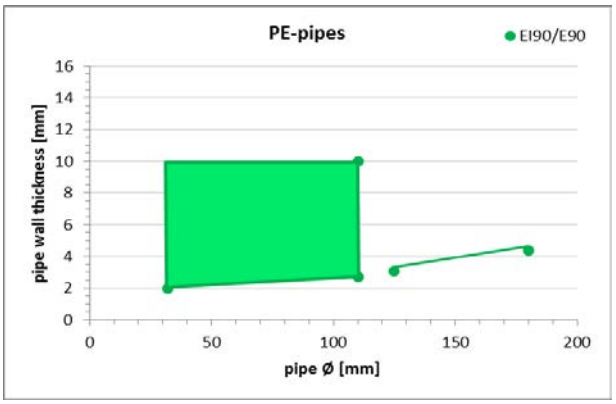
PVC-U-pipes
designation: DYKA – according to EN 1401

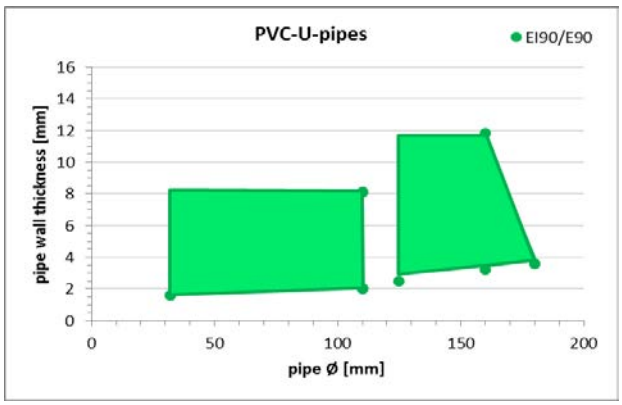
pipe		pipe sealing		annular sealing	
Ø (mm)	wall thickness (mm)	identification number	design group	annular space a_1 (mm)	separation a_2 (mm)
110	2	215 4 108110	A	17-23	≥ 200

(5) interpolation of minimum pipe wall thickness within pipe diameter range.

(6) pipe sealing identification number according to pipe diameter, within the required design group (A or B).







EI 90-U/C, EI 60-U/C, EI 45-U/C,
EI 30-U/C, EI 20-UC, EI 15-U/C

E 90-U/C, E 60-U/C, E 45-U/C,
E 30-U/C, E 15-U/C

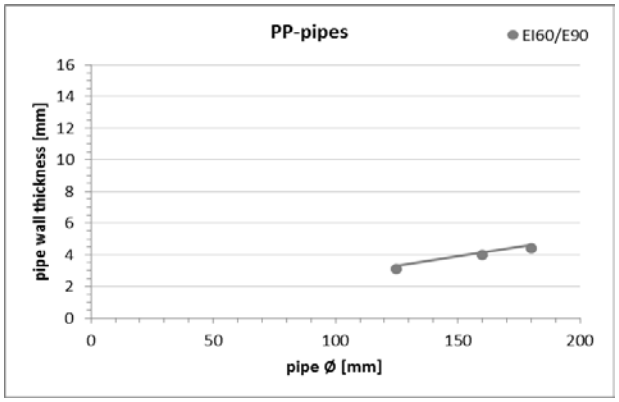
PP-pipes
designation: AGRU – according to EN ISO 1873-1, ÖNORM B 5174 and DIN 8077/8078

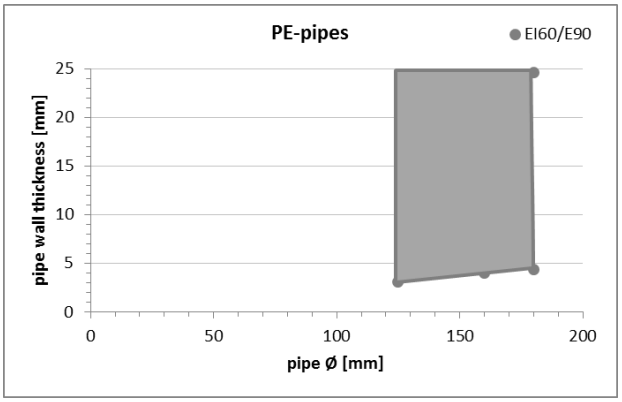
pipe		pipe sealing		annular sealing	
Ø (mm)	wall thickness (mm)	identification number	design group	annular space a_1 (mm)	separation a_2 (mm)
125	3.1	215 8 123125	B	17-25	≥ 200
160	4.0	215 8 159161	B	0-30	≥ 200
180	4.4	215 8 180182	B	16-21	≥ 200
125 to 180	**3.1/4.4[5]**	[6]	**B**	**17-21**	**≥ 200**

PE 100-pipes or PE 80-pipes
designation: AGRU – according to EN ISO 1872-1, EN 12201, EN 13244 and DIN 8074/8075
designation: EUROTTANTA – according to EN 12201-2, EN 1622 and EN ISO 15494

pipe		pipe sealing		annular sealing	
Ø (mm)	wall thickness (mm)	identification number	design group	annular space a_1 (mm)	separation a_2 (mm)
125	3.1	215 8 123125	B	20-22	≥ 200
160	4.0	215 8 159161	B	18-21	≥ 200
180	4.4	215 8 180182	B	16-24	≥ 200
180	24.6	215 8 180182	B	20	≥ 200
125 to 180	**3.1/4.4[5] to 24.6**	[6]	**B**	**20**	**≥ 200**

[5] interpolation of minimum pipe wall thickness within pipe diameter range.
[6] pipe sealing identification number according to pipe diameter, within the required design group (A or B).





EI 60-U/C, EI 45-U/C,
EI 30-U/C, EI 20-UC, EI 15-U/C

E 90-U/C, E 60-U/C, E 45-U/C,
E 30-U/C, E 15-U/C

PP-pipes
designation: AGRU – according to EN ISO 1873-1, ÖNORM B 5174 and DIN 8077/8078

pipe		pipe sealing		annular sealing	
Ø (mm)	wall thickness (mm)	identification number	design group	annular space a_1 (mm)	separation a_2 (mm)
125	3.1	215 8 123125	B	20-22	≥ 200
160	4.0	215 8 159161	B	19-20	≥ 200
180	4.4	215 8 180182	B	16-21	≥ 200
180	16.4	215 8 180182	B	15-21	≥ 200
125 to 180	**3.1/4.4[5] to 16.4**	[6]	**B**	**20-21**	**≥ 200**

PE 100-pipes or PE 80-pipes
designation: AGRU – according to EN ISO 1872-1, EN 12201, EN 13244 and DIN 8074/8075
designation: EUROTTANTA – according to EN 12201-2, EN 1622 and EN ISO 15494
designation: DYKA – according to EN 12201-2

pipe		pipe sealing		annular sealing	
Ø (mm)	wall thickness (mm)	identification number	design group	annular space a_1 (mm)	separation a_2 (mm)
32	2.0	215 4 030032	A	14-30	≥ 0
110	2.7	215 4 108110	A	12-26	≥ 0
32 to 110	**2.0 to 2.7**	[6]	**A**	**14-26**	**≥ 0**
110	15.1	215 4 108110	A	20-22	≥ 200
160	10.0	215 8 159161	B	0-30	≥ 200
32 to 110	**2.0/2.7[5] to 15.1**	[6]	**A**	**20-22**	**≥ 200**

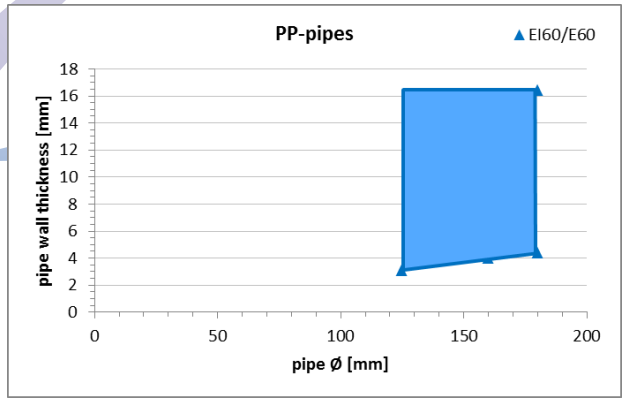
PVC-U-pipes
designation: WKT – according to EN ISO 1452, EN ISO 15493 and DIN 8061/8062
designation: WAVIN – according to EN ISO 1453 and KOMO-BRL 2023

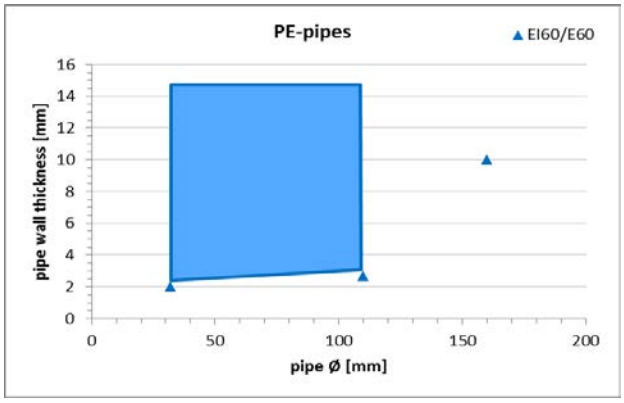
pipe		pipe sealing		annular sealing	
Ø (mm)	wall thickness (mm)	identification number	design group	annular space a_1 (mm)	separation a_2 (mm)
125	2.5	215 8 123125	B	20-24	≥ 200
160	3.2	215 8 159161	B	20-21	≥ 200
160	11.8	215 8 159161	B	20-25	≥ 200
180	3.6	215 8 180182	B	18-25	≥ 200
180	13.3	215 8 180182	B	17-23	≥ 200
125 to 180	**2.5/3.6[5] to 13.3**	[6]	**B**	**20-21**	**≥ 200**

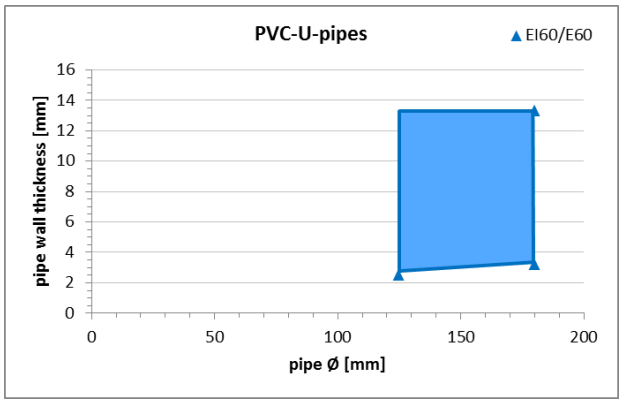
The results are also valid for PVC-U pipes according to EN 1329-1, EN1453-1 and PVC-C pipes according to EN 1566-1.

[5] interpolation of minimum pipe wall thickness within pipe diameter range.

[6] pipe sealing identification number according to pipe diameter, within the required design group (A or B).





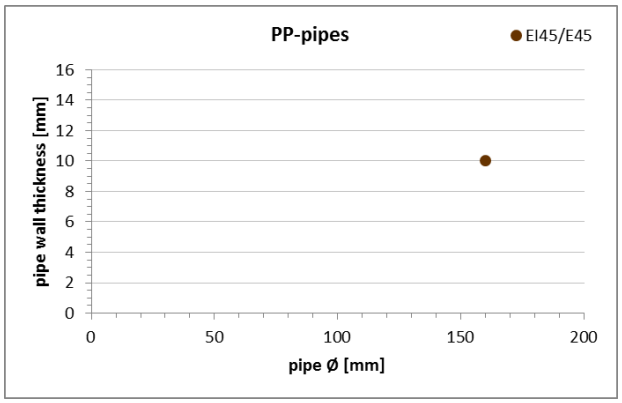


EI 60-U/C, EI 45-U/C,
EI 30-U/C, EI 20-UC, EI 15-U/C

E 60-U/C, E 45-U/C, E 30-U/C, E 15-U/C

PP-pipes
designation: AGRU – according to EN ISO 1873-1, ÖNORM B 5174 and DIN 8077/8078

pipe		pipe sealing		annular sealing	
Ø (mm)	wall thickness (mm)	identification number	design group	annular space a_1 (mm)	separation a_2 (mm)
160	10.0	215 8 159 161	B	0-35	≥ 200



EI 45-U/C,
EI 30-U/C, EI 20-UC, EI 15-U/C

E 45-U/C, E 30-U/C, E 15-U/C

3.2.5.2 Plastic pipes with Walraven BIS Pacifyre® MKII FireSleeve pipe sealing and a gypsum annular sealing – flexible wall construction

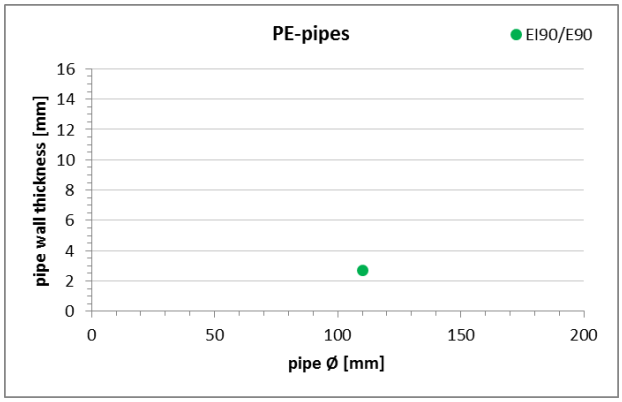
Seal types xiv) according to 1.2.

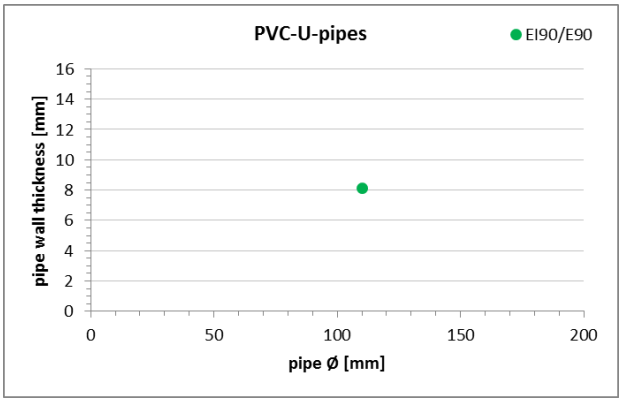
PE 100-pipes
designation: AGRU – according to EN ISO 1872-1, EN 12201, EN 13244 and DIN 8074/8075

pipe		pipe sealing		annular sealing	
Ø (mm)	wall thickness (mm)	identification number	design group	annular space a_1 (mm)	separation a_2 (mm)
110	2.7	215 4 108110	A	10-30	≥ 200

PVC-U-pipes
designation: WKT – according to EN ISO 1452, EN ISO 15493 and DIN 8061/8062

pipe		pipe sealing		annular sealing	
Ø (mm)	wall thickness (mm)	identification number	design group	annular space a_1 (mm)	separation a_2 (mm)
110	8.1	215 4 108110	A	18-20	≥ 200



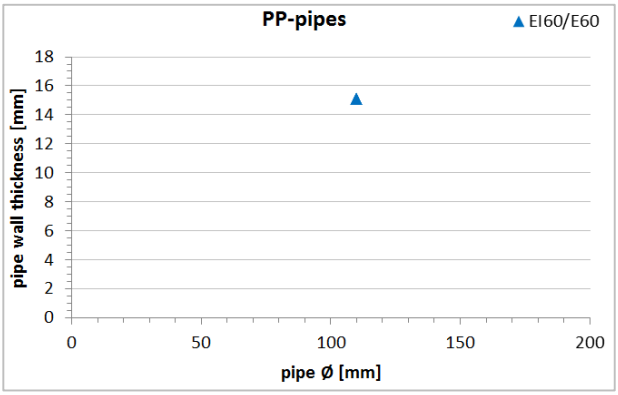


EI 90-U/C, EI 60-U/C, EI 45-U/C,
EI 30-U/C, EI 20-UC, EI 15-U/C

E 90-U/C, E 60-U/C, E 45-U/C,
E 30-U/C, E 15-U/C

PP-pipes
designation: Aquatherm – SDR 7,4 – ISO 21003

pipe		pipe sealing		annular sealing	
Ø (mm)	wall thickness (mm)	identification number	design group	annular space a_1 (mm)	separation a_2 (mm)
110	15.1	215 8 159 161	B	10-35	≥ 200



EI 60-U/C, EI 45-U/C, EI 30-U/C,

EI 20-UC, EI 15-U/C

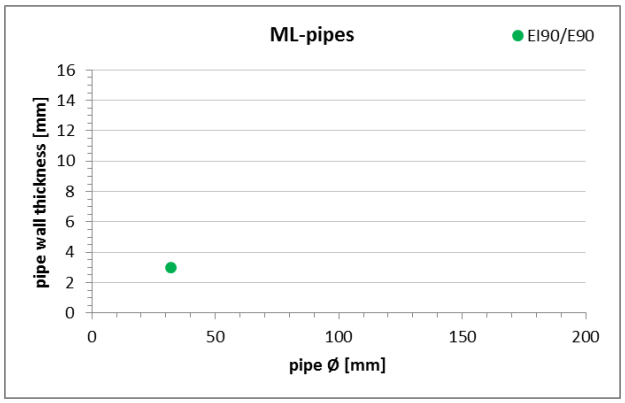
E 90-U/C, E 60-U/C, E 45-U/C,
E 30-U/C, E 15-U/C

3.2.6 Single pipe penetration seals including aluminium composite pipes – flexible wall construction

3.2.6.1 Aluminium composite pipes with Walraven BIS Pacifyre® MKII FireSleeve pipe sealing and Tangit FP 430 Acrylic kit annular sealing – flexible wall construction

Seal type xv) according to 1.2.

PE-RT Type II / Al / PE-RT Type II-pipes designation: UPONOR MLCP – according to EN ISO 21003 and DIN 16836					
pipe		pipe sealing		annular sealing	
Ø (mm)	wall thickness (mm)	identification number	design group	annular space a_1 (mm)	separation a_2 (mm)
32	3.0	215 4 030032	A	19-23	≥ 200



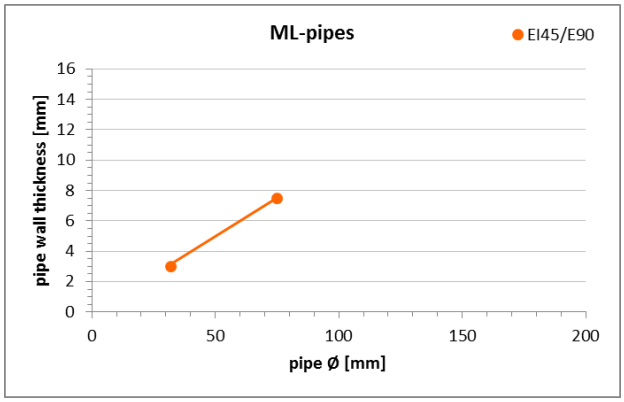
EI 90-U/C, EI 60-U/C, EI 45-U/C,
EI 30-U/C, EI 20-UC, EI 15-U/C

E 90-U/C, E 60-U/C, E 45-U/C,
E 30-U/C, E 15-U/C

PE-RT Type II / Al / PE-RT Type II-pipes
designation: UPONOR MLCP – according to EN ISO 21003 and DIN 16836

pipe		pipe sealing		annular sealing	
Ø (mm)	wall thickness (mm)	identification number	design group	annular space a_1 (mm)	separation a_2 (mm)
32	3.0	215 4 030032	A	19-23	≥ 200
75	7.5	215 4 075077	A	18-23	≥ 200
32 to 75	**3.0/7.5[5]**	[6]	**A**	**19-23**	**≥ 200**

[5] interpolation of minimum pipe wall thickness within pipe diameter range.
[6] pipe sealing identification number according to pipe diameter, within the required design group (A or B).



EI 45-U/C, EI 30-U/C, EI 20-UC, EI 15-U/C

E 90-U/C, E 60-U/C, E 45-U/C,
E 30-U/C, E 15-U/C

3.3 Field of direct application

3.3.1 Orientation

- the results of seal designs i), ii), iii), iv), v) and vi) are applicable in a floor;
- the results of seal designs vii), viii), ix), x), xi), xii), xiii), xiv) and xv) are applicable in a wall.

3.3.2 Supporting construction

a) rigid floor constructions – seal designs i), ii), iii), iv), v), and vi):
   - the test results may be applied to a concrete or masonry floor of a thickness equal to 150 mm and a density equal or greater than 550 kg/m³;

b) rigid wall constructions – seal designs vii), viii), ix), x) and xi):
   - the test results may be applied to a concrete or masonry wall of a thickness equal to 150 mm and a density equal or greater than 550 kg/m³;

c) flexible wall constructions – seal designs x), xi), xii), xiv) and xv):
   - the test results may be applied to all flexible wall constructions with a 90 minute fire resistance classification provided:
     - the construction is classified in accordance with EN 13501-2;
     - the construction has an overall thickness of 100 mm;
     - two layers of gypsum boards – overall board layer thickness: 12.5 mm – are applied on both sides of the construction;
     - flexible walls with timber studs are constructed with two layers of gypsum boards on both sides, no part of the penetration seal is closer than 100 mm to a stud, the cavity is closed between the penetration seal and the stud, and minimum 100 mm of insulation of class A1 or A2 according to EN 13501-1 is provided within the cavity between the penetration seal and the stud;
   - the test results cover applications with or without aperture framing;
   - the test results do not cover sandwich panel constructions and flexible walls where the lining does not cover the studs on both sides;
   - the test results may be applied to concrete or masonry elements of an overall thickness equal to 100 mm.

3.3.3 Field of direct application of single pipe penetration seals including plastic or aluminium composite pipes

a) the direct field of application rules apply to the nominal dimensions of services;

b) the test results may not be extended to a multiple penetration seal;

c) pipe closure device:

- the test results of the maximum pipe closure device size within design group A (intumescent layer thickness: 4 mm) or within design group B (intumescent layer thickness: 2 x 4 mm), corresponding with the maximum tested pipe diameter size within these design groups for a certain fire resistance classification, cover smaller pipe closure device sizes within these design groups, corresponding with smaller pipe diameter sizes;
- the thickness of the active component (intumescent layer) may be changed, provided that this thickness is higher than the calculated value from the straight line that connects the maximum pipe closure device sizes within design groups A and B in a thickness-pipe diameter diagram, according to *Figure E.8 – Diagram illustrating the selection of sizes of pipe closure devices for plastic pipes included in the test* of EN 1366-3:2009;

d) pipe end configuration

Table E.1 – Field of application rules for pipe end configuration of EN 1366-3:2009:

		Tested			
		U/U	C/U	U/C	C/C
Covered	U/U	Y	N	N	N
	C/U	Y	Y	N	N
	U/C	Y	Y	Y	N
	C/C	Y	Y	Y	Y
Y = acceptable, N = not acceptable					

e) pipe material

- the pipe material range permitted is the range covered by the test;
- the test results on pipes made from PVC-U according to EN 1329-1, EN 1453-1 or EN 1452-1 are valid for pipes made from PVC-U according to EN 1329-1, EN 1453-1 and EN 1452-1 as well as pipes made from PVC-C according to EN 1566-1 – see also tables above;
- the test results on pipes made from PE-HD according to EN 1519-1 or EN 12666-1 are valid for pipes made from PE according to and EN 12201-2,

EN 1519-1 and EN 12666-1, for pipes made from ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1;

f) pipe wall thickness
   - the pipe wall thickness range between the wall thicknesses tested is covered for a particular size of the pipe closure device;
   - the maximum pipe wall thickness tested with the maximum pipe closure device size within design group A or within design group B, corresponding with the maximum tested pipe diameter within these design groups for a certain fire resistance classification period, is valid for smaller pipe closure device sizes within these design groups, corresponding with smaller pipe diameters;
   - the test results may be interpolated for design groups not included in the test, according to *Figure E.9 – Diagram illustrating the field of application rules for the pipe wall thickness for pipe closure devices of a particular length group for plastic pipes*.

g) pipe orientation
   - for seal design variations i) until xiii) and xv), the pipes may only be installed perpendicular to the penetration seal;
   - for seal design variation xiv), the pipes may be installed between 45° and 90° to the penetration seal in horizontal way.

h) separations
   - the annular space between the pipe and the supporting construction, defined as a_1 in *Figure E.2 – Standard configuration for single pipe penetration seals*, shall remain within the range given in the tables in § 3.2;
   - the separation a_2, defined in *Figure E.2 – Standard configuration for single pipe penetration seals*, may be increased – see tables in § 3.2. The critical pipe approach was applied for determining the minimum value of a_2, based on pipes with a 0 mm separation included in the tests;
   - the test results are valid for clustered pipes, provided the separations a_2 are respected in practice;

i) pipe insulation
   - the test results do not cover insulated pipes.

3.3.4 Service support construction

- for seal design variations i), ii), iii), iv), v) and vi), the distance from the floor surface to the nearest support position is equal to or smaller than 400 mm;
- for seal design variations vii), viii), ix), x) and xi), the distance from the wall surface to the nearest support position is equal to or smaller than 380 mm;
- for seal design variations xii), xiii), xiv) and xv), the distance from the wall surface to the nearest support position is equal to or smaller than 350 mm.

4 Limitations

This classification report does not represent type approval nor certification of the product.

According to the information mentioned by the sponsor on the technical information sheet there was no product standard for CE marking available at the time the classification report for the tested material/product was drafted.

When such a product standard is published, this report may be submitted again to the laboratory to evaluate the adequacy of the report for CE marking.

SIGNED

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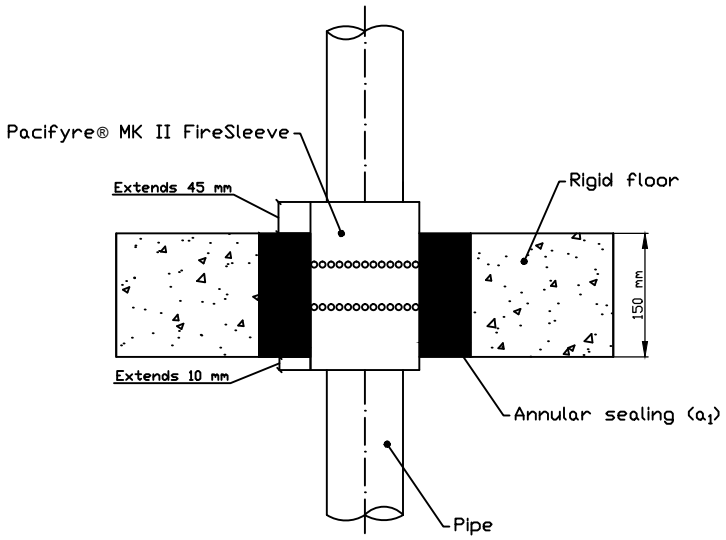
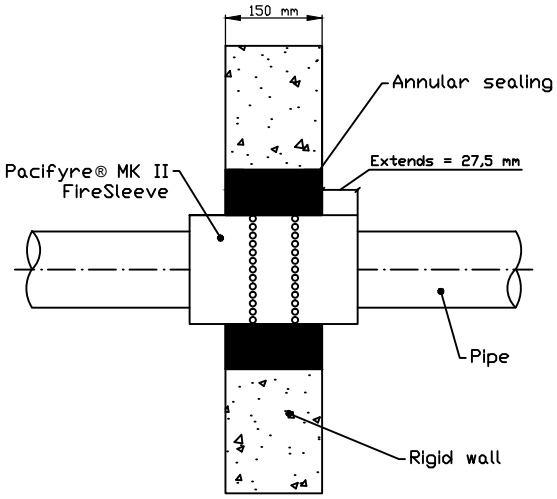
This document is the original version of this classification report and is written in English.

Sections

Drawing 1: single pipe penetration in a rigid floor construction.
Valid for seal design variations: i), ii), iii), iv), v) and vi)

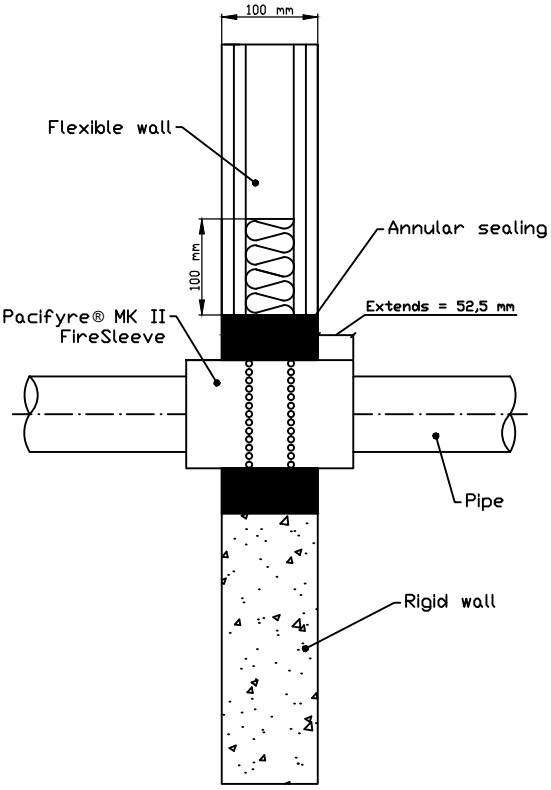


Drawing 2: single pipe penetration in a rigid wall construction.
Valid for seal design variations: vii), viii), x) and xi)

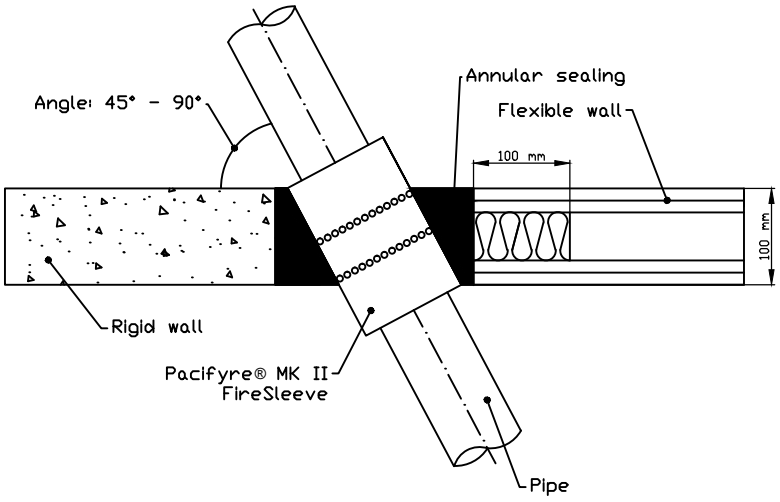


Horizontal sections

Drawing 3: single pipe penetration in a flexible or rigid wall construction.
Valid for seal design variations: xii) and xv)

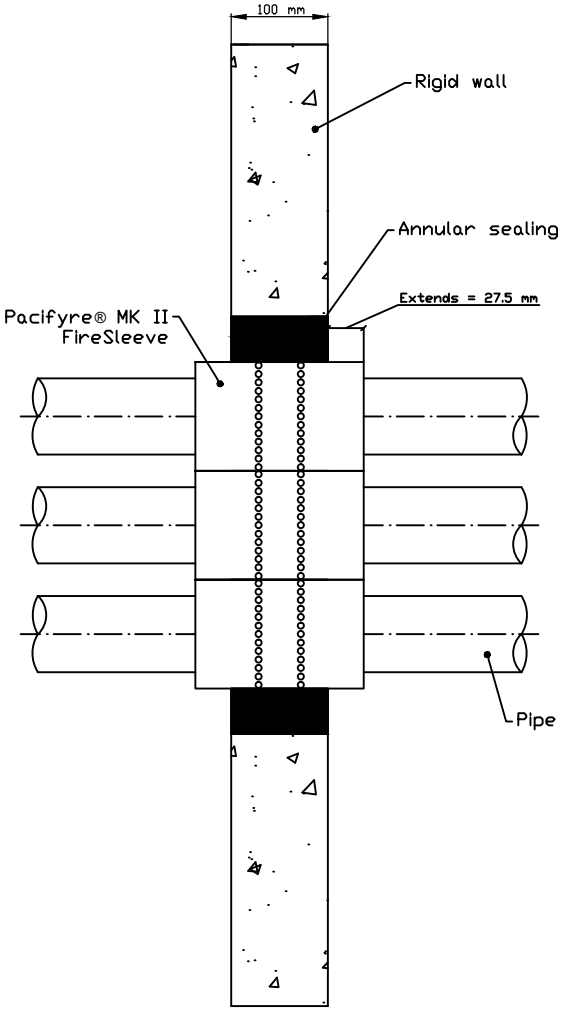


Drawing 4: single pipe penetration in a flexible or rigid wall construction.
Valid for seal design variation: xiv)

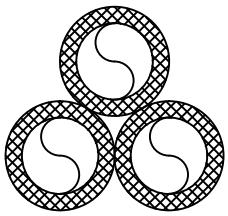


Sections - Top view / Front view

Drawing 5: single pipe penetration with zero distance in a rigid wall construction. Valid for seal variation ix) with pipe separation a_2 = 0 mm.



Drawing 7: Front view valid for the pipes in a wall construction (see drawing 5).
Top view valid for the pipe in a floor construction (see drawing 6).



Drawing 6: single pipe penetration with zero distance in a rigid floor construction. Valid for seal variation i) with pipe separation a_2 = 0 mm.