



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 24/0374
of 28/05/2024

Technical Assessment Body issuing the ETA and designated according to Article 29 of the Regulation (EU) No 305/2011: UL International (Netherlands) B.V.

Trade name of the construction product

GRAFT FR Collar

Product family to which the construction product belongs

Fire Stopping and Sealing Product:
• Penetration Seals

Manufacturer

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Huddersfield, West Yorkshire
HD1 6SB, UK
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Manufacturing plant(s)

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This European Technical Assessment contains

105 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.

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I. SPECIFIC PARTS OF THE EUROPEAN TECHNICAL ASSESSMENT

1 Technical description of the product

- 1) GRAFT FR Collar is a pipe closure device used to form penetration seals where combustible pipes, cables and metal pipes with insulation penetrate walls and floors.
- 2) The GRAFT FR Collar is supplied with intumescent liner complete within metal steel shell, to be clamped around the service and screw fixed back to the supporting element. The GRAFT FR Collar may be supplied with powder coated steel or stainless steel shells.
- 3) In flexible walls, gaps between the pipe and the construction below 8mm must have a bead of GRAFT FR Acrylic to cover the opening, and for gaps 8mm or above, the seal must be plugged with 25mm deep GRAFT FR Acrylic.

In rigid walls, gaps between the pipe and the construction below 8mm must have a bead of GRAFT FR Acrylic to cover the opening, and for gaps 8mm or above, the seal must be plugged with 20mm deep GRAFT FR Acrylic on 20mm deep backing of stonewool, alternatively 40 mm deep GRAFT FR Acrylic with no backing.

In floors, gaps between the pipe and the construction below 10mm must have 20mm deep stonewool to plug the opening, alternatively 20 mm deep GRAFT FR Acrylic with no backing, and for gaps 10mm or above, the seal must be plugged with 10mm deep GRAFT FR Acrylic on 40mm deep backing of stonewool, alternatively 50 mm deep GRAFT FR Acrylic with no backing. For collars installed on top side of floors, gaps between the pipe and the top side of the collar must have a bead of GRAFT FR Acrylic to cover the opening.

GRAFT FR Collar are oversized to allow for the natural gradient of pipework for flow purposes and inconsistencies of pipe installation.

- 4) The applicant has submitted a written 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.

- 5) The use category of GRAFT FR Collar in relation to BWR 3 (Hygiene, health and environment) is IA1, S/W2

2 Specification of the intended uses of the product in accordance with the applicable European Assessment Document (Hereinafter EAD): EAD 350454-00-1104: 2017

Detailed information and data is given in Annex A.

The intended use of system GRAFT FR Collar is to reinstate the fire resistance performance of flexible wall and rigid wall and floor constructions, where they are penetrated by services.

- 1) The specific elements of construction that the system GRAFT FR Collar may be used to provide a penetration seal in, are as follows:
 - a. Flexible walls: The wall must have a minimum thickness of 75 mm and comprise steel studs or timber studs* lined on both faces with minimum 1 layer of 12.5 mm thick boards. Flexible wall solutions may also be used in rigid walls, with a minimum density of 350 kg/m³.
 - b. Timber walls: The wall must have a minimum thickness of 100 mm and comprise solid wood or cross-laminated timber.
 - c. Rigid walls: The wall must have a minimum thickness of 75 mm and comprise concrete, aerated concrete or masonry, with a minimum density of 650 kg/m³.
 - d. 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/m³.
 - e. Timber floors: The floor must have a minimum thickness of 150 mm and comprise solid wood or cross-laminated timber.

* no part of the penetration seal may be closer than 100 mm to a stud, the cavity must be closed between the penetration seal and the stud, and minimum 100 mm of insulation of class A1 or A2 according to EN 13501-1 must be provided within the cavity between the penetration seal and the stud.

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

GRAFT Fire Protection Systems which involve services penetrating both sides of a flexible wall may also be used in the situation where the services penetrates one side of the wall only and the remaining side of the wall is not penetrated at the same point (i.e. the services continues on the inside of the wall). All fire integrity and thermal insulation ratings for such single-sided penetrations remain the same as for the equivalent double-sided penetration.

- 2) The system GRAFT FR Collar may be used to provide a penetration seal with specific supporting constructions and substrates (for details see Annex A).
- 3) Where single sided top face seals are described in Annex A, these can also be used in composite floors.
- 4) Where PP pipes are mentioned in Annex A, this includes PP-MV, PP-H, PP-R and similar if the pipe is according to EN 1451-1 or DIN 8077/8078. Where PE pipes are mentioned, this includes PE-LD, PE-MD, PE-HD, PE-X and similar according to EN 1519-1, EN 12201-2 or EN 12666-1.
- 5) Solutions in Annex A for 100 mm thick flexible walls and 150 mm thick rigid floors, can be used in timber walls limited to EI 90, and in timber floors limited to EI 120 (see 2.1). In timber walls and floors, gaps between the pipe and the construction must be plugged with 25 mm deep GRAFT FR Acrylic on 25 mm deep backing of stone-wool on both sides before collars are attached, with minimum 80 mm long wood screws in walls, and 100 mm long wood screws in floors. The minimum annular gap must be 10 mm wide, and the maximum aperture sizes must be Ø 180 mm in walls and Ø 220 mm in floors. For larger apertures, the annular gap must be 10 mm (+/- 2 mm).
- 6) The system GRAFT FR Collar may be used in all angles between 90° and 45° in all directions for pipes with maximum diameter of 50 mm, combined with oversized collars with maximum size of 160 mm.

- 7) Where pipes are placed against a wall or a floor, so a collar can not be installed in practical, half a collar shell of the double diameter than the pipe can be used. The half collar shell must be placed towards the surface of the wall or floor, and the maximum allowed pipe diameter is 160 mm, with a maximum collar size of 315 mm.
- 8) In places where it is impossible to use screws, it is allowed to use screws on one half of a collar shell, with GRAFT FR Adhesive fixing the other half of the collar shell without screws, with a maximum allowed collar size of 200 mm. The half of a collar shell which locks the other half in place, must be the half where screws are used.
- 9) The provisions made in this European Technical Assessment are based on an assumed working life of the GRAFT FR Collar of 25 years, provided that the conditions laid down in the manufacturers datasheet and instructions 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.
- 10) Type Z₂: intended for uses in internal conditions with humidity lower than 85% RH excluding temperatures below 0°C, without exposure to rain or UV.

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

Product-type: Pipe Collar		Intended use: Penetration Seal
Assessment method	Essential characteristic	Product Performance
BWR 2 Safety in case of fire		
EN 13501-1	Reaction to fire	No performance determined
EN 13501-2	Resistance to fire	Annex A
BWR 3 Hygiene, health and environment		
EN 1026	Air permeability	Annex B
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/W2 Declaration of manufacturer
BWR 4 Safety in use		
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	Z ₂
BWR 5 Protection against noise		
EN 10140-1,2,4,5/ EN ISO 717-1	Airborne sound insulation	R _w (C;Ctr): 58 (-1;-7)
BWR 6 Energy economy and heat retention		
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 <https://eur-lex.europa.eu/oj/direct-access.html>) of the European Commission¹, 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 7th February 2023 relating to the European Technical Assessment ETA 24/0374 issued on 28/05/2024 which is part of the technical documentation of this European Technical Assessment. The "Control Plan" is laid down in the context of the factory production control system operated by the manufacturer and deposited at UL International (Netherlands) B.V.

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

¹ 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. pipe trays)

(b) Installation instruction:

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

6 Issued on:

28 May 2024

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Verified by:



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Built Environment

For and on behalf of UL International (Netherlands) B.V.

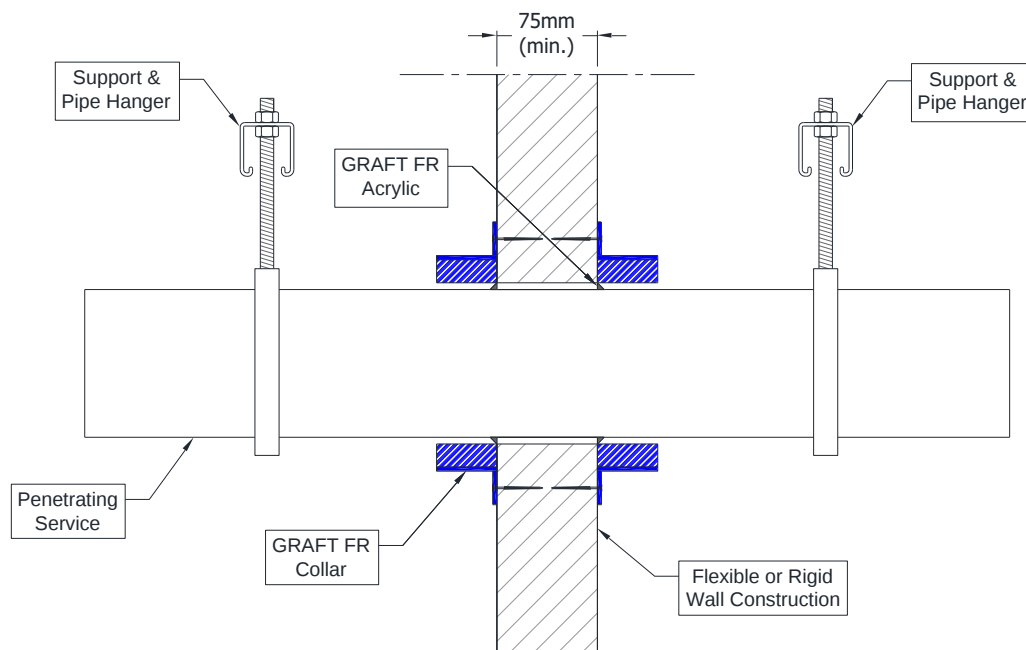
ANNEX A – Resistance to Fire Classification – GRAFT FR Collar

A.1 Flexible or rigid wall constructions with wall thickness of minimum 75 mm

A.1.1 Penetration seals, in drywalls and concrete/masonry walls

Penetration Seal: Combustible pipes fitted with GRAFT FR Collar, to both sides of the wall.

Construction details:

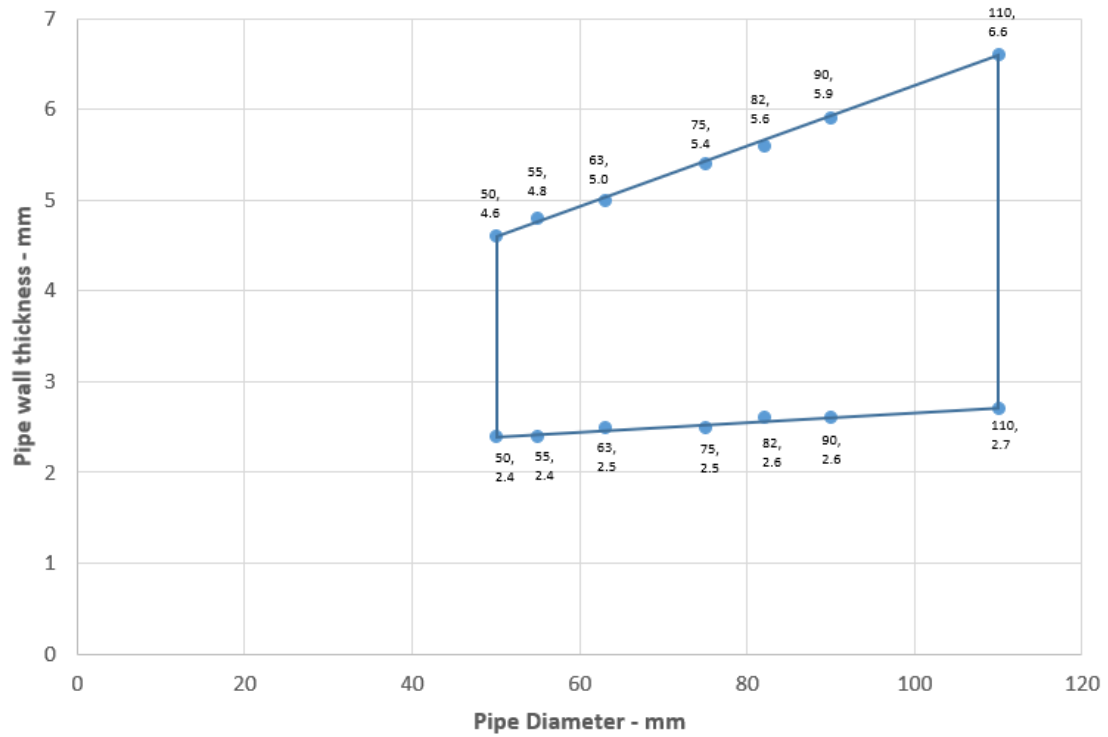


A.1.1.1

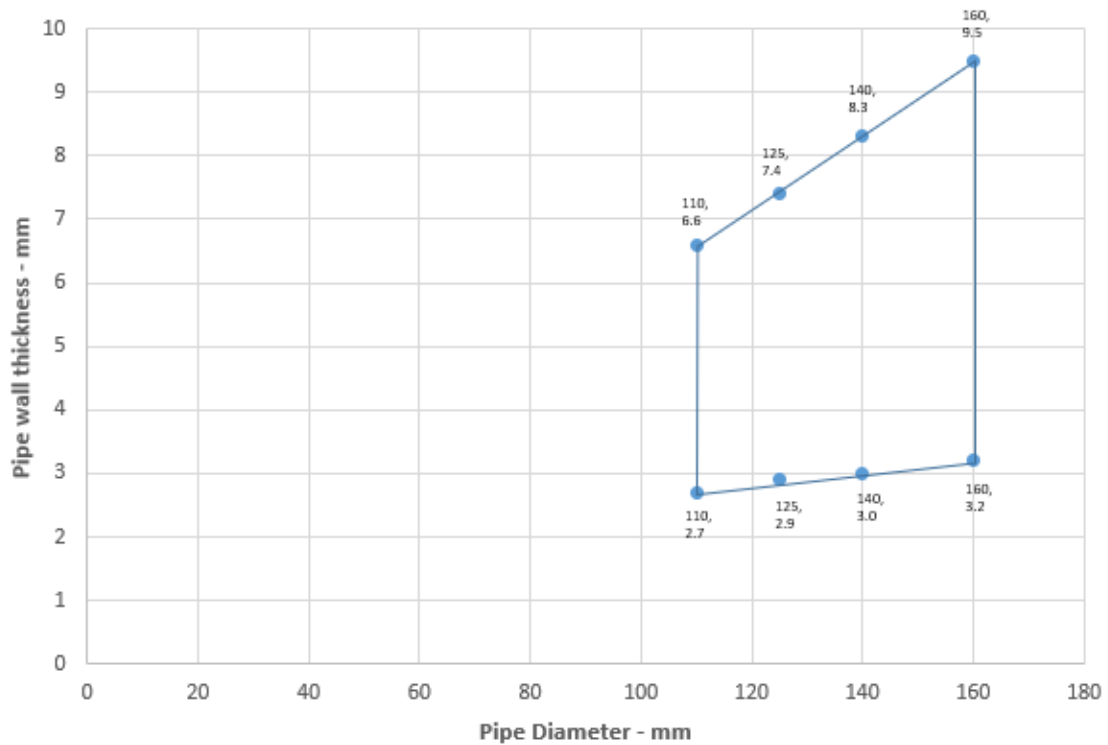
Services	Collar Inlay	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1 and PVC-C according to EN 1566-1		
Diameter 32 mm, wall thickness 2.4-4.6 mm	30 x 3.0 mm	E 60 U/U, E 60 C/U, E 60 U/C, E 60 C/C EI 30 U/U, EI 30 C/U, EI 30 U/C, EI 30 C/C
Diameter 40 mm, wall thickness 2.4-4.6 mm		
Diameter 50 mm, wall thickness 2.4-4.6 mm*		
Diameter 55 mm, wall thickness 2.4-4.8 mm*	30 x 3.2 mm	E 60 U/C, E 60 C/C EI 30 U/C, EI 30 C/C
Diameter 63 mm, wall thickness 2.5-5.0 mm*	30 x 3.6 mm	
Diameter 75 mm, wall thickness 2.5-5.4 mm*	30 x 4.2 mm	
Diameter 82 mm, wall thickness 2.6-5.6 mm*	30 x 4.6 mm	
Diameter 90 mm, wall thickness 2.6-5.9 mm*	30 x 5.0 mm	
Diameter 110 mm, wall thickness 2.7-6.6 mm*	30 x 6.0 mm	E 60 U/C, E 60 C/C EI 45 U/C, EI 45 C/C
Diameter 125 mm, wall thickness 2.9-7.4 mm*	60 x 8.8 mm	
Diameter 140 mm, wall thickness 3.0-8.3 mm*	60 x 11.5 mm	
Diameter 160 mm, wall thickness 3.2-9.5 mm*	60 x 15.0 mm	

* Typical pipe diameters shown, see below graph for intermediate sizes

PVC Pipes 50-110 / 30 mm Collar - U/C



PVC Pipes 125-160 / 60 mm Collar - U/C

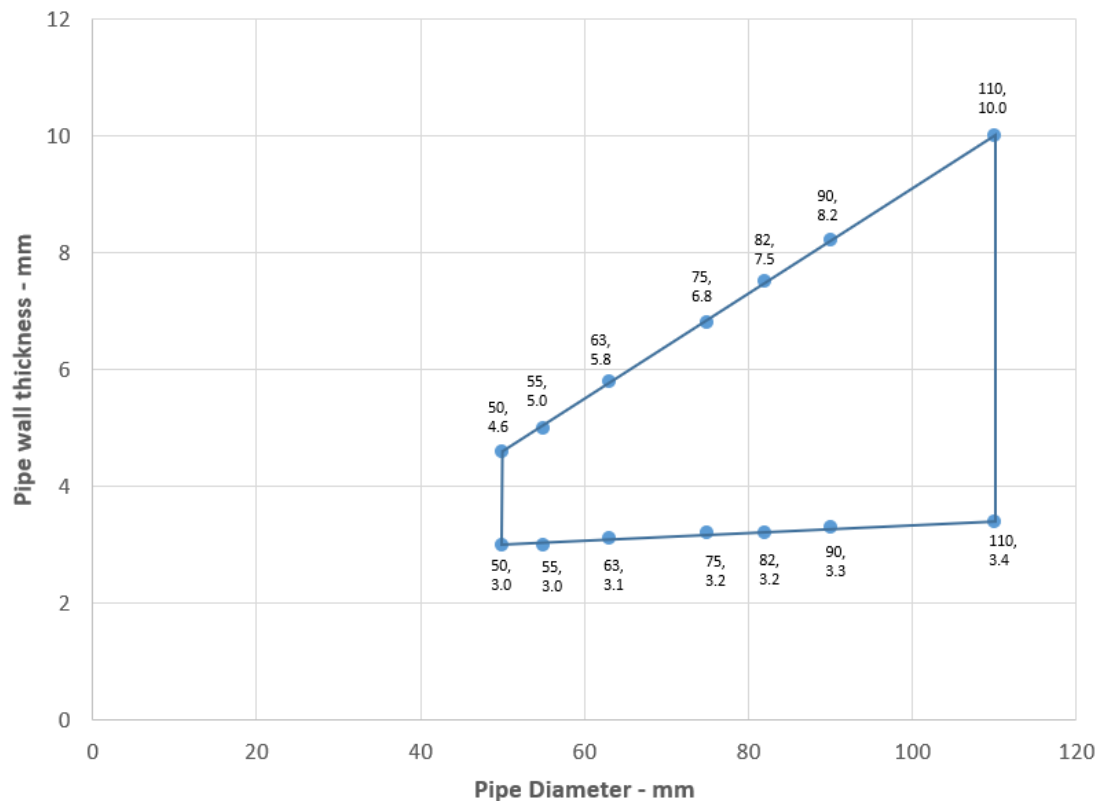


A.1.2

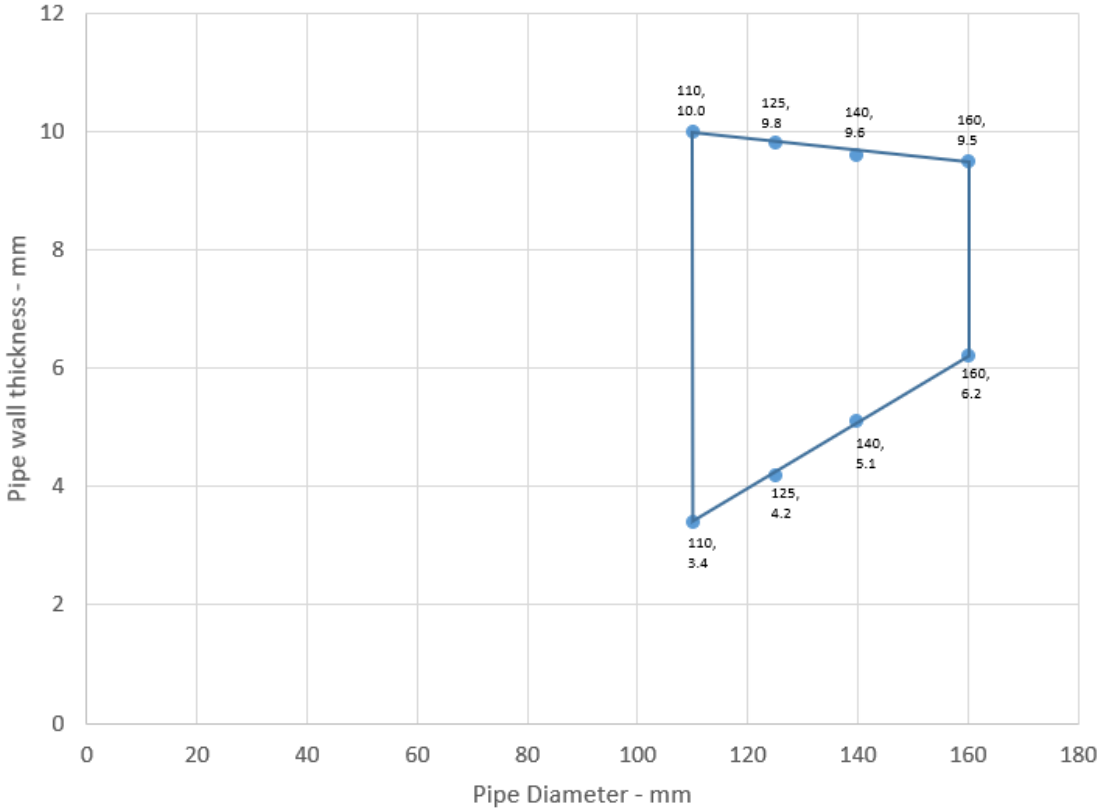
Services	Collar Inlay	Classification
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1		
Diameter 32 mm, wall thickness 3.0-4.6 mm	30 x 3.0 mm	E 60 U/C, E 60 C/C EI 30 U/C, EI 30 C/C
Diameter 40 mm, wall thickness 3.0-4.6 mm		
Diameter 50 mm, wall thickness 3.0-4.6 mm		
Diameter 55 mm, wall thickness 3.0-5.0 mm*	30 x 3.2 mm	
Diameter 63 mm, wall thickness 3.1-5.8 mm*	30 x 3.6 mm	
Diameter 75 mm, wall thickness 3.2-6.8 mm*	30 x 4.2 mm	
Diameter 82 mm, wall thickness 3.2-7.5 mm*	30 x 4.6 mm	
Diameter 90 mm, wall thickness 3.3-8.2 mm*	30 x 5.0 mm	EI 60 U/C, EI 60 C/C
Diameter 110 mm, wall thickness 3.4-10.0 mm*	30 x 6.0 mm	
Diameter 125 mm, wall thickness 4.2-9.8 mm*	60 x 8.8 mm	E 60 U/C, E 60 C/C EI 45 U/C, EI 45 C/C
Diameter 140 mm, wall thickness 5.1-9.6 mm*	60 x 11.5 mm	
Diameter 160 mm, wall thickness 6.2-9.5 mm*	60 x 15.0 mm	

* Typical pipe diameters shown, see below graph for intermediate sizes

PE Pipes 50-110 / 30 mm Collar - U/C



PE Pipes 125-160 / 60 mm Collar - U/C

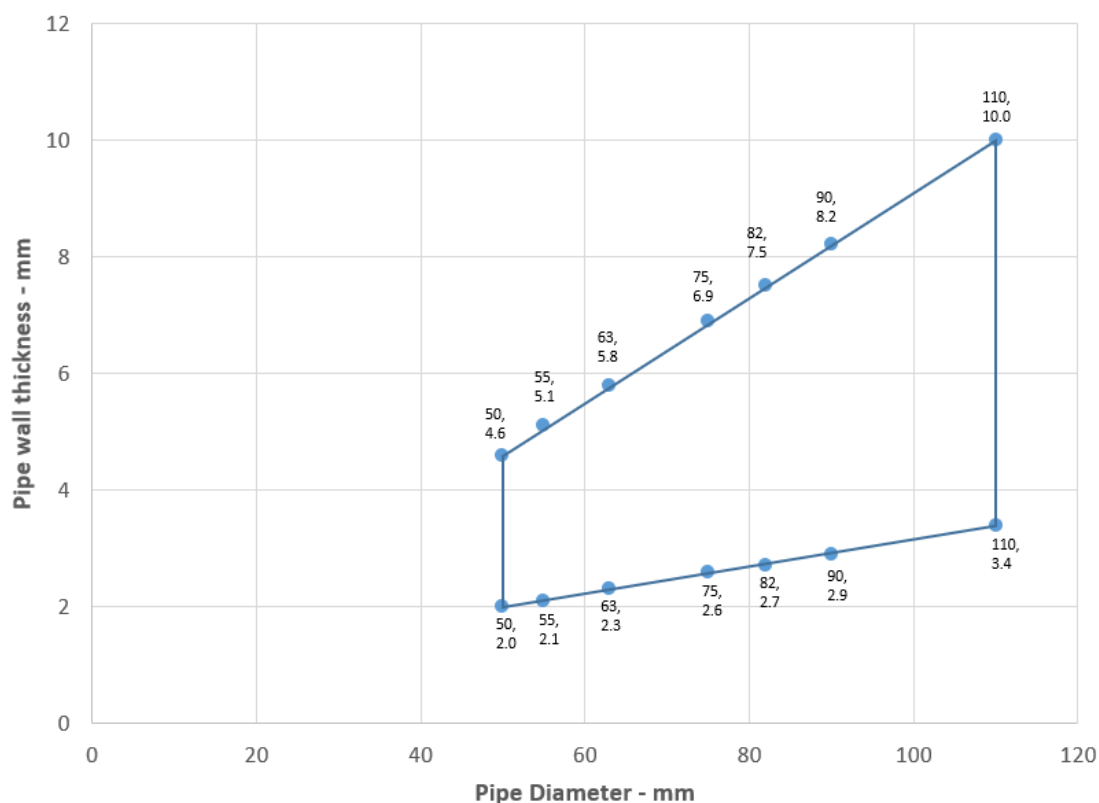


A.1.3

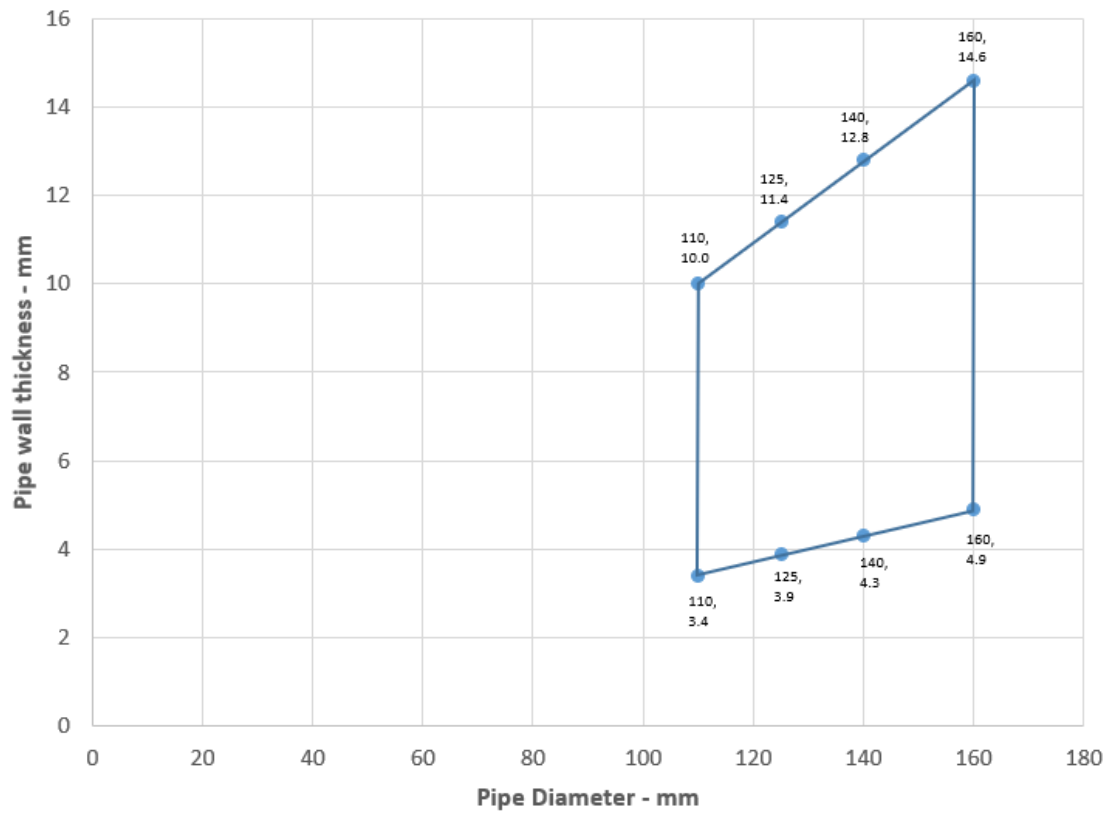
Services	Collar Inlay	Classification
PP pipe according to EN 1451-1		
Diameter 32 mm, wall thickness 2.0-4.6 mm	30 x 3.0 mm	E 60 U/U, E 60 C/U, E 60 U/C, E 60 C/C EI 30 U/U, EI 30 C/U, EI 30 U/C, EI 30 C/C
Diameter 40 mm, wall thickness 2.0-4.6 mm		
Diameter 50 mm, wall thickness 2.0-4.6 mm		
Diameter 55 mm, wall thickness 2.1-5.1 mm*	30 x 3.2 mm	E 60 U/C, E 60 C/C EI 30 U/C, EI 30 C/C
Diameter 63 mm, wall thickness 2.3-5.8 mm*	30 x 3.6 mm	
Diameter 75 mm, wall thickness 2.6-6.9 mm*	30 x 4.2 mm	
Diameter 82 mm, wall thickness 2.7-7.5 mm*	30 x 4.6 mm	
Diameter 90 mm, wall thickness 2.9-8.2 mm*	30 x 5.0 mm	
Diameter 110 mm, wall thickness 3.4-10.0 mm*	30 x 6.0 mm	E 60 U/C, E 60 C/C EI 45 U/C, EI 45 C/C
Diameter 125 mm, wall thickness 3.9-11.4 mm*	60 x 8.8 mm	
Diameter 140 mm, wall thickness 4.3-12.8 mm*	60 x 11.5 mm	
Diameter 160 mm, wall thickness 4.9-14.6 mm*	60 x 15.0 mm	EI 60 U/C, EI 60 C/C

* Typical pipe diameters shown, see below graph for intermediate sizes

PP Pipes 50-110 / 30 mm Collar



PP Pipes 125-160 / 60 mm Collar - U/C

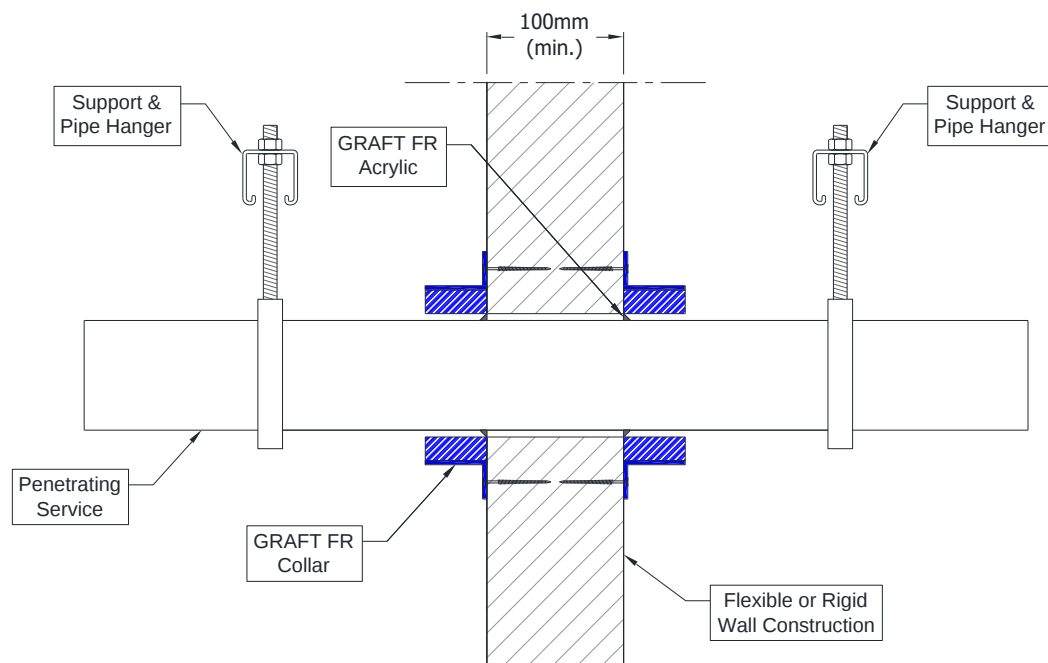


A.2 Flexible or rigid wall constructions with wall thickness of minimum 100 mm

A.2.1 Penetration seals, in drywalls and concrete/masonry walls

Penetration Seal: Combustible pipes fitted with GRAFT FR Collar, to both sides of the wall.

Construction details:

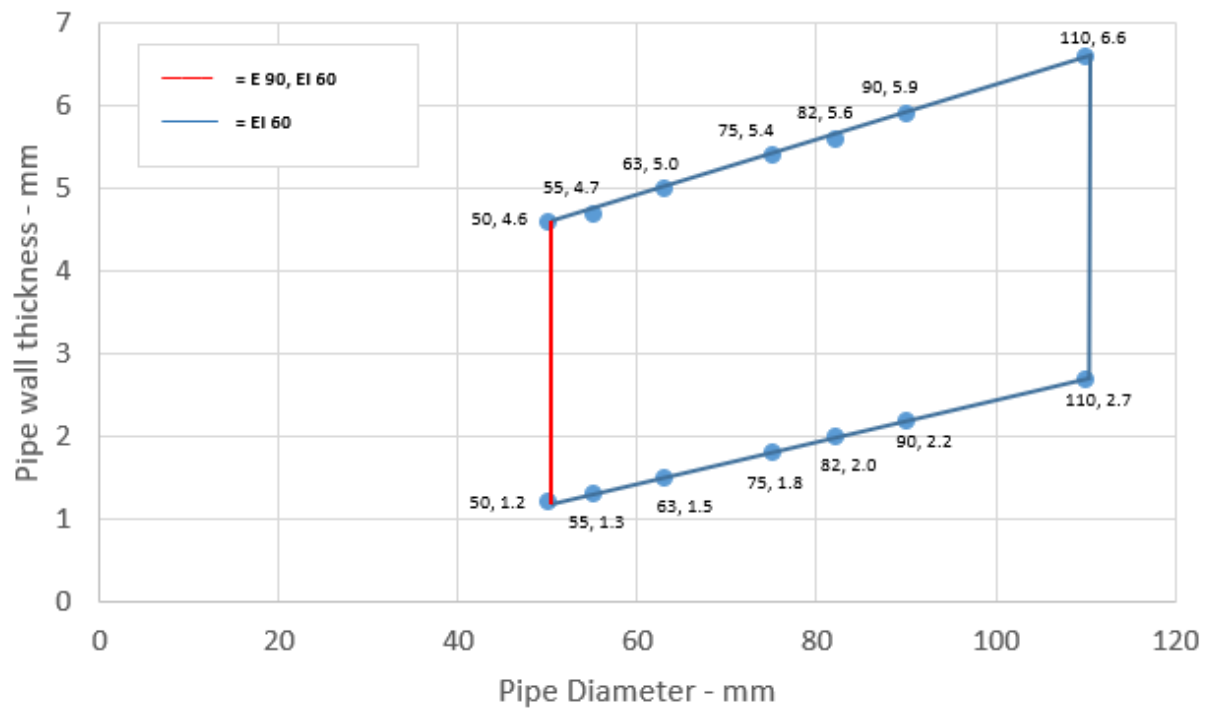


A.2.1.1.1

Services	Collar Inlay	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1 and PVC-C according to EN 1566-1		
Diameter 32 mm, wall thickness 1.2-3.7 mm	30 x 3.0 mm	E 90 U/C, E 90 C/C EI 60 U/C, EI 60 C/C
Diameter 40 mm, wall thickness 1.2-3.7 mm		
Diameter 50 mm, wall thickness 1.2-4.6 mm*		
Diameter 55 mm, wall thickness 1.3-4.7 mm*	30 x 3.2 mm	EI 60 U/C, EI 60 C/C
Diameter 63 mm, wall thickness 1.5-5.0 mm*	30 x 3.6 mm	
Diameter 75 mm, wall thickness 1.8-5.4 mm*	30 x 4.2 mm	
Diameter 82 mm, wall thickness 2.0-5.6 mm*	30 x 4.6 mm	
Diameter 90 mm, wall thickness 2.2-5.9 mm*	30 x 5.0 mm	
Diameter 110 mm, wall thickness 2.7-6.6 mm*	30 x 6.0 mm	

* Typical pipe diameters shown, see below graph for intermediate sizes

PVC Pipes 50-110 / 30 mm Collar - U/C

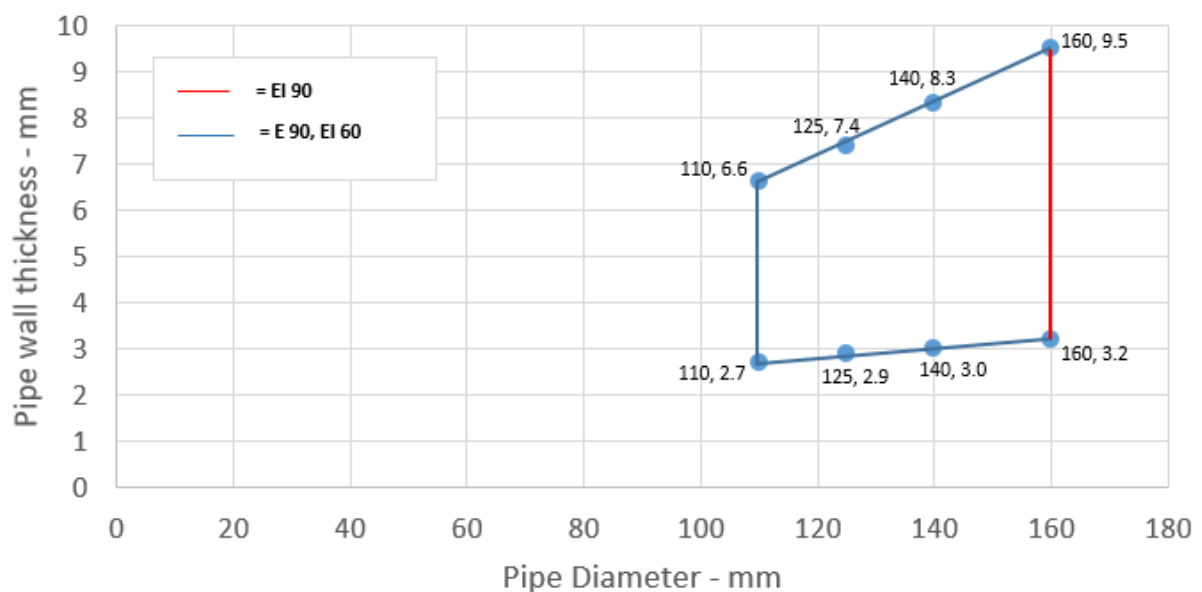


A.2.1.1.2

Services	Collar Inlay	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1 and PVC-C according to EN 1566-1		
Diameter 110 mm, wall thickness 2.7-6.6 mm*	50 x 6.0 mm	E 90 U/U, E 90 C/U, E 90 U/C, E 90 C/C EI 60 U/U, EI 60 C/U, EI 60 U/C, EI 60 C/C
Diameter 125 mm, wall thickness 2.9-7.4 mm*	50 x 8.8 mm	
Diameter 140 mm, wall thickness 3.0-8.3 mm*	50 x 11.5 mm	
Diameter 160 mm, wall thickness 3.2-9.5 mm*	50 x 15.0 mm	EI 90 U/C, EI 90 C/C

* Typical pipe diameters shown, see below graph for intermediate sizes

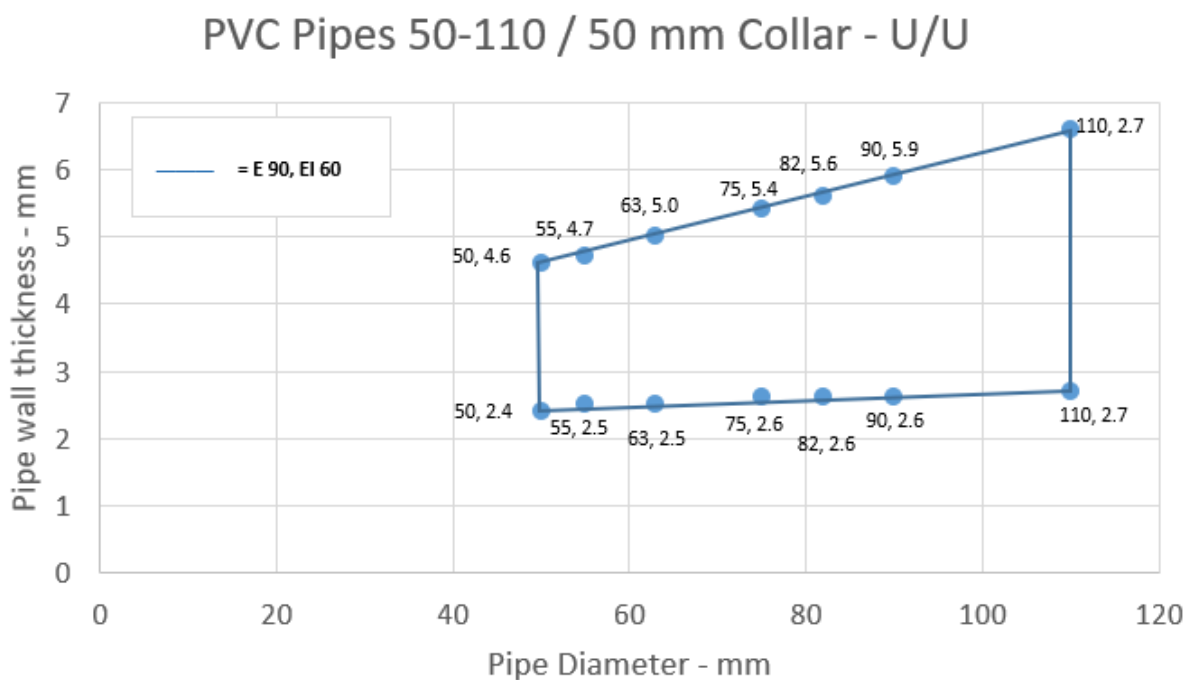
PVC Pipes 110-160 / 50 mm Collar - U/C



A.2.1.1.3

Services	Collar Inlay	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1 and PVC-C according to EN 1566-1		
Diameter 32 mm, wall thickness 2.4-4.6 mm	30 x 3.0 mm	E 90 U/U, E 90 C/U, E 90 U/C, E 90 C/C EI 60 U/U, EI 60 C/U, EI 60 U/C, EI 60 C/C
Diameter 40 mm, wall thickness 2.4-4.6 mm		
Diameter 50 mm, wall thickness 2.4-4.6 mm		
Diameter 55 mm, wall thickness 2.5-4.7 mm*	50 x 3.2 mm	
Diameter 63 mm, wall thickness 2.5-5.0 mm*	50 x 3.6 mm	
Diameter 75 mm, wall thickness 2.6-5.4 mm*	50 x 4.2 mm	
Diameter 82 mm, wall thickness 2.6-5.6 mm*	50 x 4.6 mm	
Diameter 90 mm, wall thickness 2.6-5.9 mm*	50 x 5.0 mm	
Diameter 110 mm, wall thickness 2.7-6.6 mm*	50 x 6.0 mm	

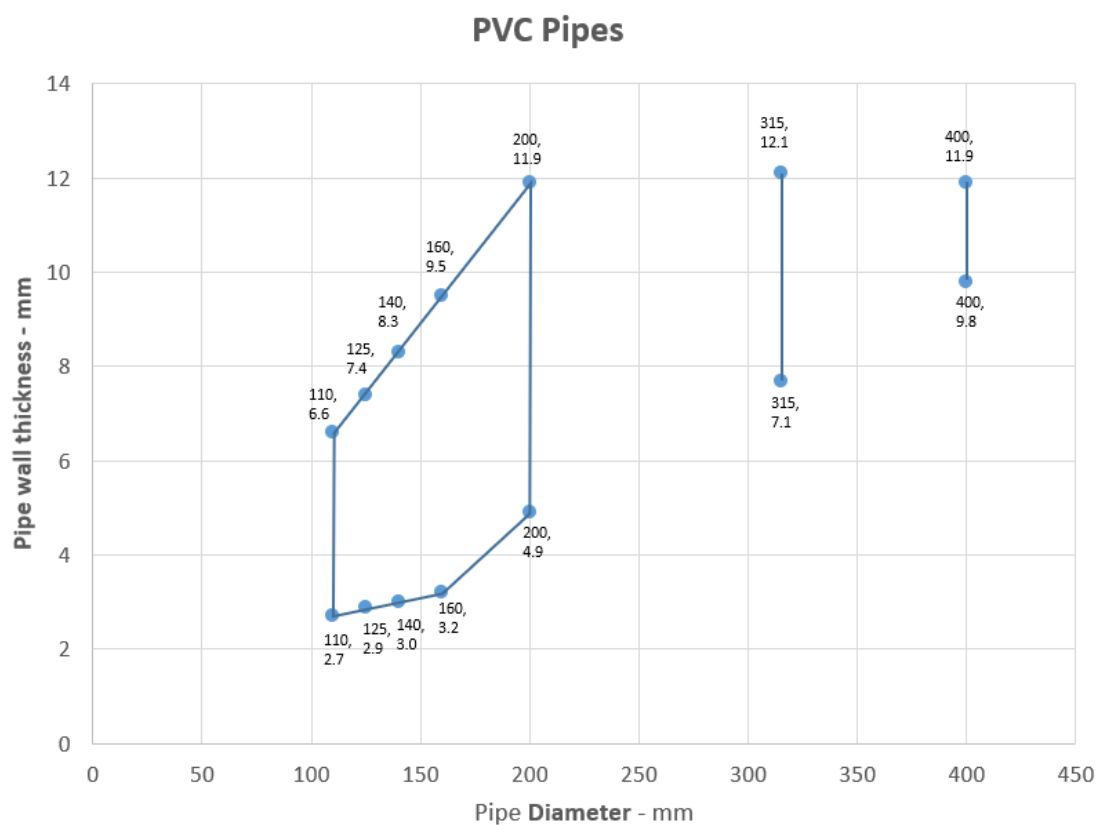
* Typical pipe diameters shown, see below graph for intermediate sizes



A.2.1.1.4

Services	Collar Inlay	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1 and PVC-C according to EN 1566-1		
Diameter 110 mm, wall thickness 2.7-6.6 mm*	60 x 6.0 mm	E 90 U/U, E 90 C/U, E 90 U/C, E 90 C/C EI 60 U/U, EI 60 C/U, EI 60 U/C, EI 60 C/C
Diameter 125 mm, wall thickness 2.9-7.4 mm*	60 x 9.0 mm	EI 60 U/U, EI 60 C/U
Diameter 140 mm, wall thickness 3.0-8.3 mm*	60 x 11.5 mm	
Diameter 160 mm, wall thickness 3.2-9.5 mm*	60 x 15.0 mm	
Diameter 200 mm, wall thickness 4.9-11.9 mm*	60 x 18 mm	EI 120 U/C, EI 120 C/C
Diameter 315 mm, wall thickness 7.1-12.1 mm*	75 x 30 mm	EI 90 C/C
Diameter 400 mm, wall thickness 9.8-11.9 mm*	100 x 40 mm	E 120 C/C EI 90 C/C

* Typical pipe diameters shown, see below graphs for intermediate sizes

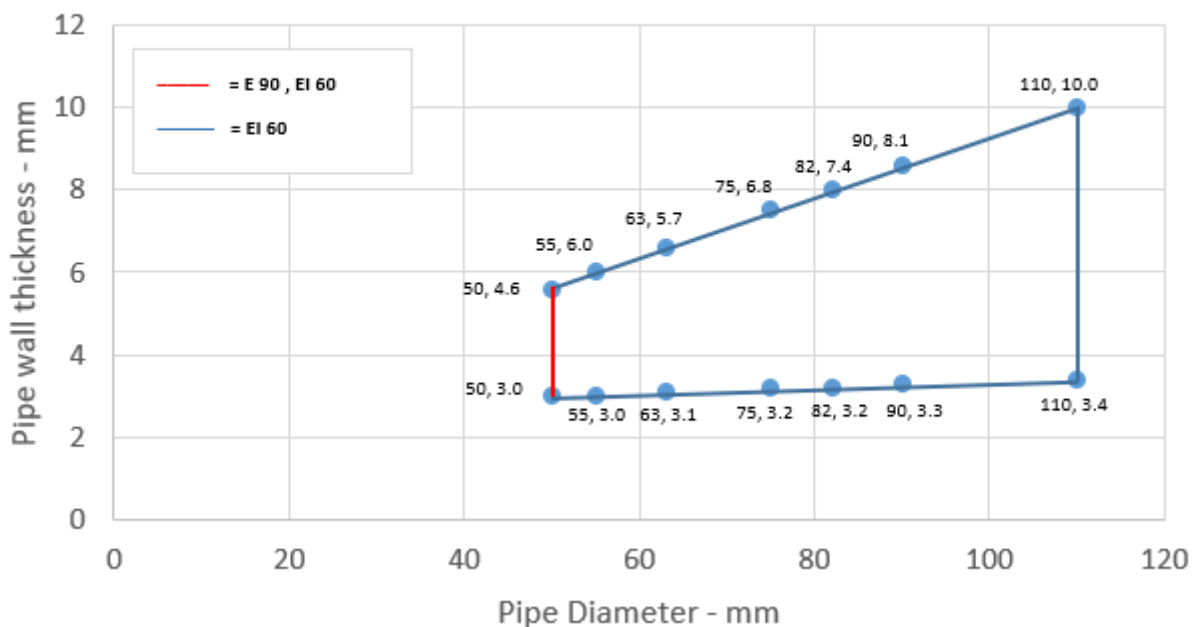


A.2.1.2

Services	Collar Inlay	Classification
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1		
Diameter 32 mm, wall thickness 3.0-4.6 mm	30 x 3.0 mm	E 90 U/U, E 90 C/U, E 90 U/C, E 90 C/C EI 45 U/U, EI 45 C/U, EI 45 U/C, EI 45 C/C
Diameter 40 mm, wall thickness 3.0-4.6 mm		
Diameter 50 mm, wall thickness 3.0-4.6 mm		
Diameter 32 mm, wall thickness 3.0-5.6 mm		E 90 U/C, E 90 C/C EI 60 U/C, EI 60 C/C
Diameter 40 mm, wall thickness 3.0-5.6 mm		
Diameter 50 mm, wall thickness 3.0-5.6 mm*		
Diameter 55 mm, wall thickness 3.0-6.0 mm*	30 x 3.2 mm	EI 60 U/C, EI 60 C/C
Diameter 63 mm, wall thickness 3.1-6.6 mm*	30 x 3.6 mm	
Diameter 75 mm, wall thickness 3.2-7.5 mm*	30 x 4.2 mm	
Diameter 82 mm, wall thickness 3.2-8.0 mm*	30 x 4.6 mm	
Diameter 90 mm, wall thickness 3.3-8.6 mm*	30 x 5.0 mm	
Diameter 110 mm, wall thickness 3.4-10.0 mm*	30 x 6.0 mm	

* Typical pipe diameters shown, see below graph for intermediate sizes

PE Pipes 50-110 / 30 mm Collar - U/C

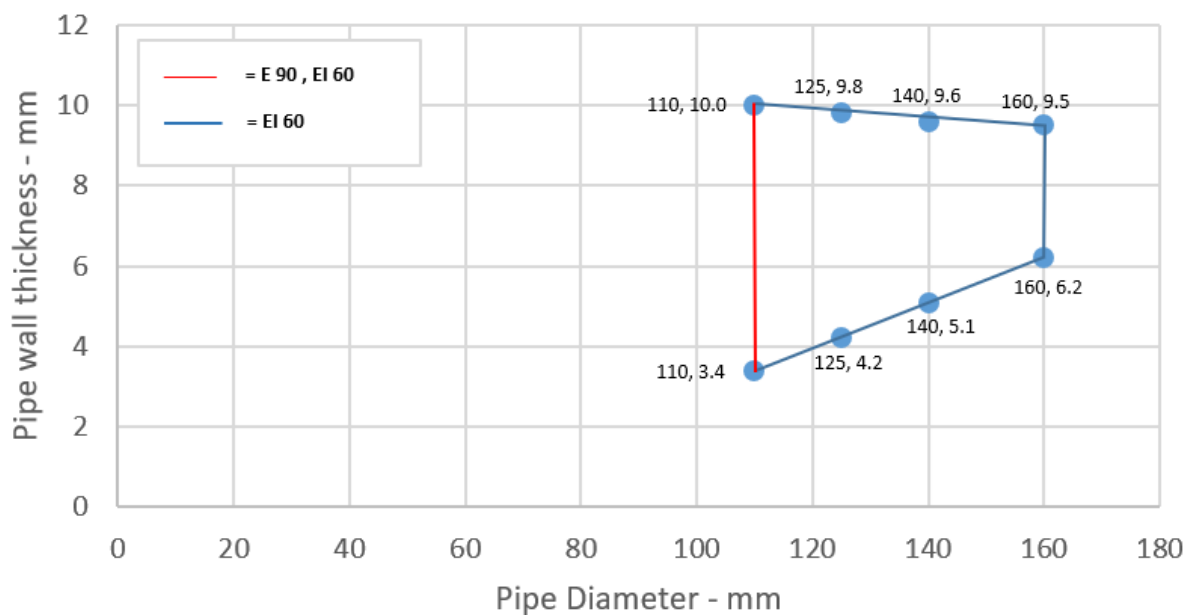


A.2.1.2.1

Services	Collar Inlay	Classification
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1		
Diameter 110 mm, wall thickness 3.4-10.0 mm*	50 x 6.0 mm	E 90 U/U, E 90 C/U, E 90 U/C, E 90 C/C EI 60 U/U, EI 60 C/U, EI 60 U/C, EI 60 C/C
Diameter 125 mm, wall thickness 4.2-9.8 mm*	50 x 9.0 mm	EI 60 U/C, EI 60 C/C
Diameter 140 mm, wall thickness 5.1-9.6 mm*	50 x 11.5 mm	
Diameter 160 mm, wall thickness 6.2-9.5 mm*	50 x 15.0 mm	

* Typical pipe diameters shown, see below graph for intermediate sizes

PE pipes 110-160 / 50 mm Collar - U/C

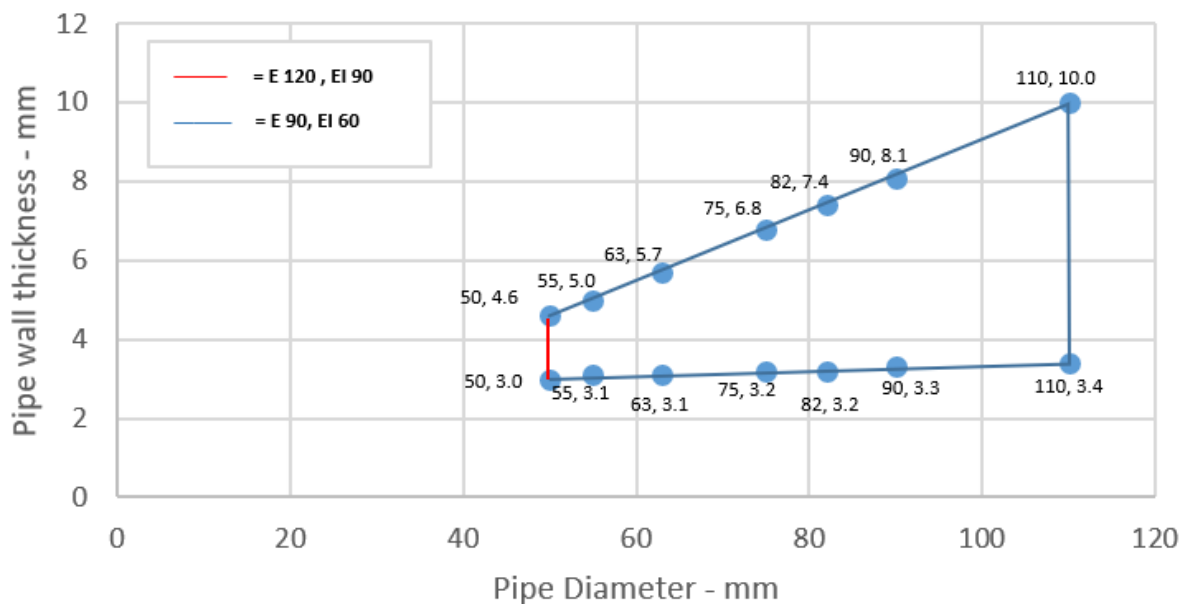


A.2.1.2.2

Services	Collar Inlay	Classification
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1		
Diameter 32 mm, wall thickness 3.0-4.6 mm	50 x 3.0 mm	E 120 U/U, EI 90 U/U
Diameter 40 mm, wall thickness 3.0-4.6 mm		
Diameter 50 mm, wall thickness 3.0-4.6 mm*		
Diameter 55 mm, wall thickness 3.1-5.0 mm*	50 x 3.2 mm	E 90 U/U, E 90 C/U, E 90 U/C, E 90 C/C EI 60 U/U, EI 60 C/U, EI 60 U/C, EI 60 C/C
Diameter 63 mm, wall thickness 3.1-5.7 mm*	50 x 3.6 mm	
Diameter 75 mm, wall thickness 3.2-6.8 mm*	50 x 4.2 mm	
Diameter 82 mm, wall thickness 3.2-7.4 mm*	50 x 4.6 mm	
Diameter 90 mm, wall thickness 3.3-8.1 mm*	50 x 5.0 mm	
Diameter 110 mm, wall thickness 3.4-10.0 mm*	50 x 6.0 mm	

* Typical pipe diameters shown, see below graph for intermediate sizes

PE Pipes 50-110 / 50 mm Collar - U/U

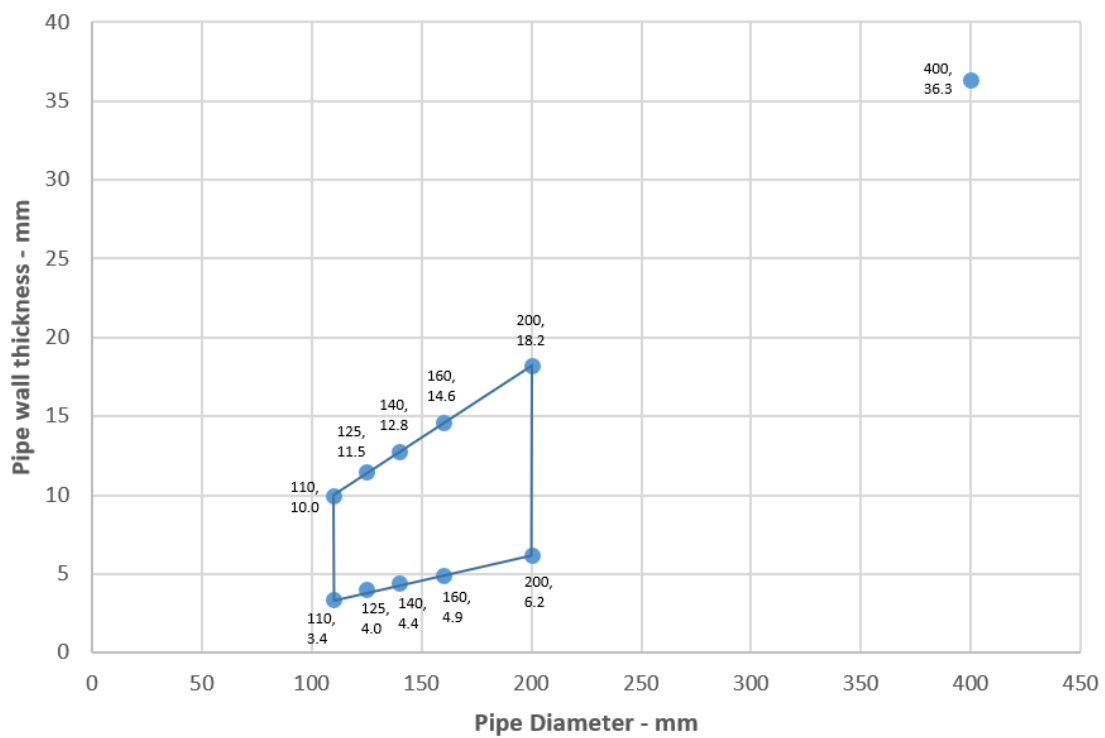


A.2.1.2.3

Services	Collar Inlay	Classification
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1		
Diameter 110 mm, wall thickness 3.4-10.0 mm*	60 x 6.0 mm	E 90 U/U, E 90 C/U, E 90 U/C, E 90 C/C EI 60 U/U, EI 60 C/U, EI 60 U/C, EI 60 C/C
Diameter 125 mm, wall thickness 4.0-11.5 mm*	60 x 8.8 mm	
Diameter 140 mm, wall thickness 4.4-12.8 mm*	60 x 11.5 mm	
Diameter 160 mm, wall thickness 4.9-14.6 mm*	60 x 15.0 mm	EI 90 U/U, EI 90 C/U, EI 90 U/C, EI 90 C/C
Diameter 200 mm, wall thickness 6.2-18.2 mm*	60 x 18.0 mm	E 120 U/C, E 120 C/C EI 90 U/C, EI 90 C/C
Diameter 400 mm, wall thickness 36.3 mm*	100 x 40.0 mm	EI 90 C/C

* Typical pipe diameters shown, see below graphs for intermediate sizes

PE Pipes

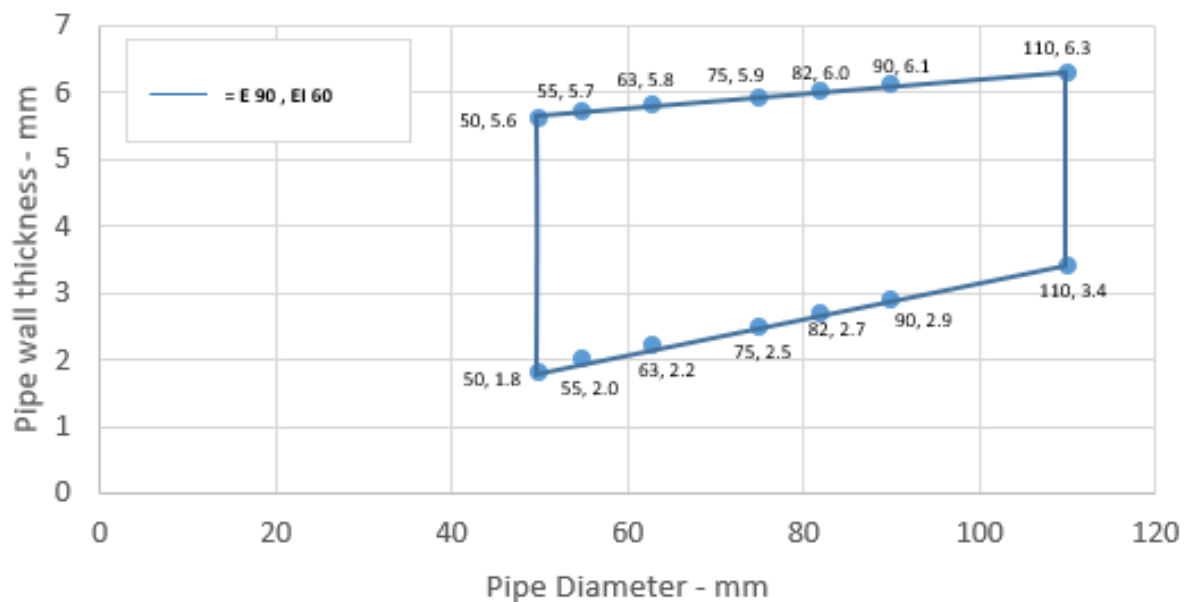


A.2.1.3

Services	Collar Inlay	Classification
PP pipe according to EN 1451-1		
Diameter 32 mm, wall thickness 3.0-5.6 mm	30 x 3.0 mm	E 90 U/C, E 90 C/C EI 60 U/C, EI 60 C/C
Diameter 40 mm, wall thickness 3.0-5.6 mm		
Diameter 50 mm, wall thickness 3.0-5.6 mm		
Diameter 32 mm, wall thickness 1.8-4.6 mm	30 x 3.0 mm	E 90 U/U, E 90 C/U, E 90 U/C, E 90 C/C EI 60 U/U, EI 60 C/U, EI 60 U/C, EI 60 C/C
Diameter 40 mm, wall thickness 1.8-4.6 mm		
Diameter 50 mm, wall thickness 1.8-4.6 mm		
Diameter 50 mm, wall thickness 1.8-5.6 mm*	30 x 3.0 mm	E 90 U/C, E 90 C/C EI 60 U/C, EI 60 C/C
Diameter 55 mm, wall thickness 2.0-5.7 mm*	30 x 3.2 mm	
Diameter 63 mm, wall thickness 2.2-5.8 mm*	30 x 3.6 mm	
Diameter 75 mm, wall thickness 2.5-5.9 mm*	30 x 4.2 mm	
Diameter 82 mm, wall thickness 2.7-6.0 mm*	30 x 4.6 mm	
Diameter 90 mm, wall thickness 2.9-6.1 mm*	30 x 5.0 mm	
Diameter 110 mm, wall thickness 3.4-6.3 mm*	30 x 6.0 mm	

* Typical pipe diameters shown, see below graph for intermediate sizes

PP Pipes 50-110 / 30 mm Collar - U/C

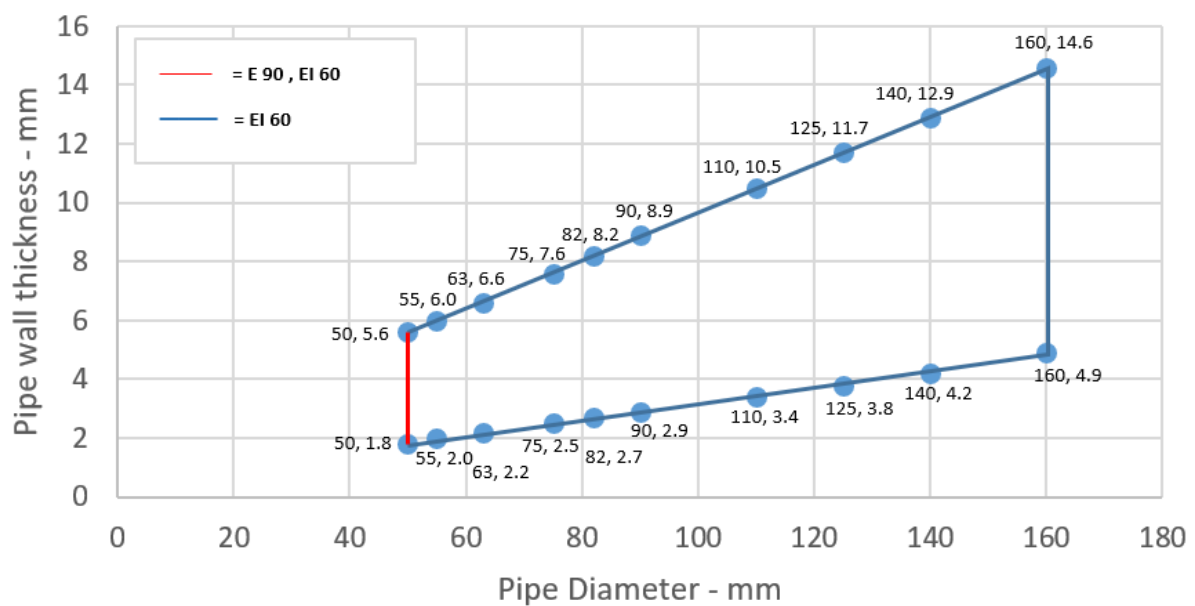


A.2.1.3.1

Services	Collar Inlay	Classification
PP pipe according to EN 1451-1		
Diameter 50 mm, wall thickness 1.8-5.6 mm*	50 x 3.0 mm	E 90 U/C, E 90 C/C EI 60 U/C, EI 60 C/C
Diameter 55 mm, wall thickness 2.0-6.0 mm*	50 x 3.2 mm	EI 60 U/C, EI 60 C/C
Diameter 63 mm, wall thickness 2.2-6.6 mm*	50 x 3.6 mm	
Diameter 75 mm, wall thickness 2.5-7.6 mm*	50 x 4.2 mm	
Diameter 82 mm, wall thickness 2.7-8.2 mm*	50 x 4.6 mm	
Diameter 90 mm, wall thickness 2.9-8.9 mm*	50 x 5.0 mm	
Diameter 110 mm, wall thickness 3.4-10.5 mm*	50 x 6.0 mm	
Diameter 125 mm, wall thickness 3.8-11.7 mm*	50 x 8.8 mm	
Diameter 140 mm, wall thickness 4.2-12.9 mm*	50 x 11.5 mm	
Diameter 160 mm, wall thickness 4.9-14.6 mm*	50 x 15.0 mm	

* Typical pipe diameters shown, see below graph for intermediate sizes

PP Pipes 50-160 / 50 mm Collar - U/C

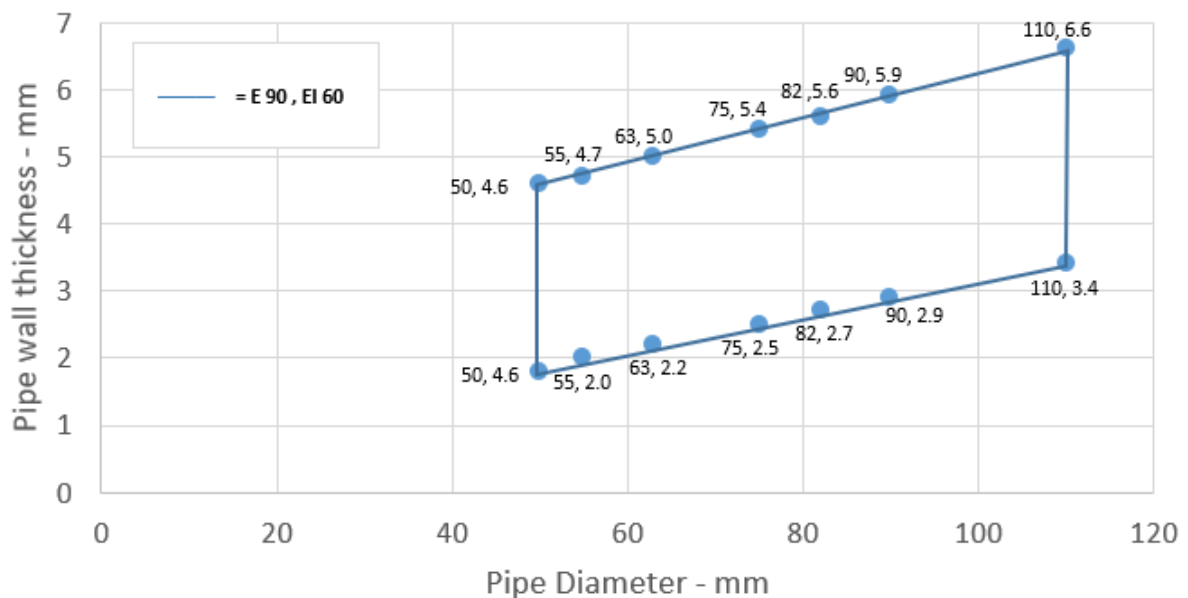


A.2.1.3.2

Services	Collar Inlay	Classification
PP pipe according to EN 1451-1		
Diameter 50 mm, wall thickness 1.8-4.6 mm*	50 x 3.0 mm	E 90 U/U, E 90 C/U, E 90 U/C, E 90 C/C EI 60 U/U, EI 60 C/U, EI 60 U/C, EI 60 C/C
Diameter 55 mm, wall thickness 2.0-4.7 mm*	50 x 3.2 mm	
Diameter 63 mm, wall thickness 2.2-5.0 mm*	50 x 3.6 mm	
Diameter 75 mm, wall thickness 2.5-5.4 mm*	50 x 4.2 mm	
Diameter 82 mm, wall thickness 2.7-5.6 mm*	50 x 4.6 mm	
Diameter 90 mm, wall thickness 2.9-5.9 mm*	50 x 5.0 mm	
Diameter 110 mm, wall thickness 3.4-6.6 mm*	50 x 6.0 mm	

* Typical pipe diameters shown, see below graph for intermediate sizes

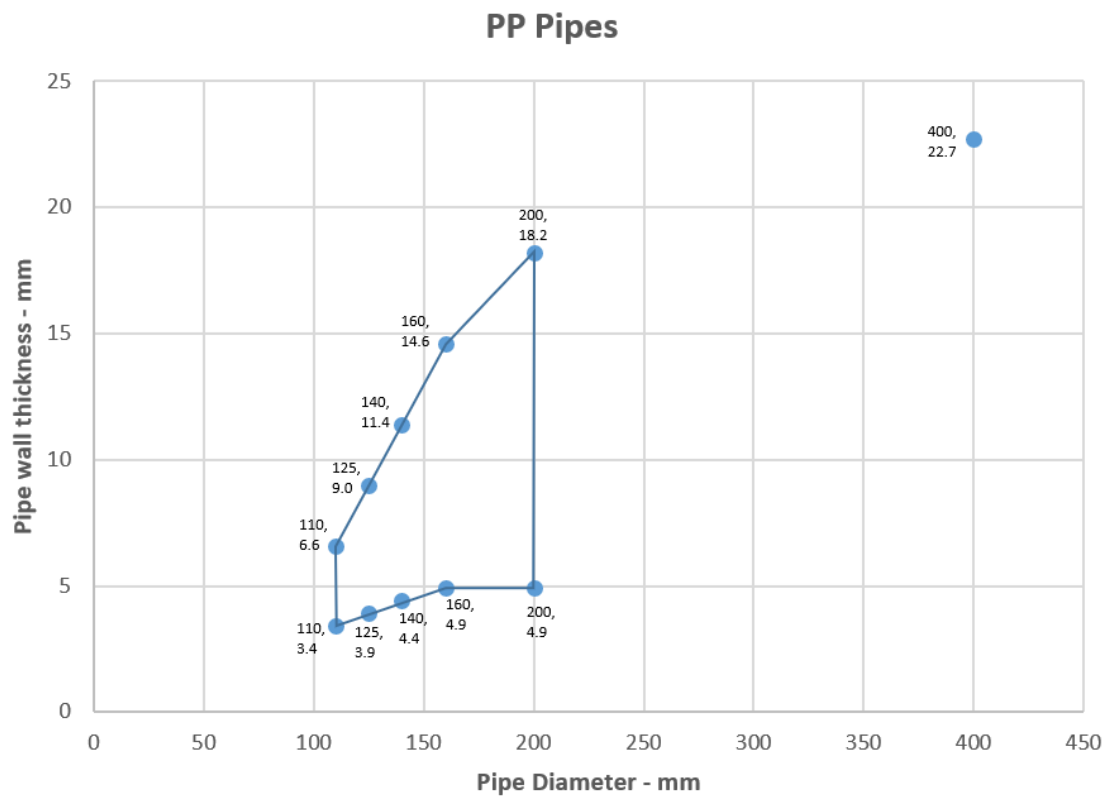
PP Pipes 50-110 / 50 mm Collar - U/U



A.2.1.3.3

Services	Collar Inlay	Classification
PP pipe according to EN 1451-1		
Diameter 110 mm, wall thickness 3.4-6.6 mm*	60 x 6.0 mm	E 90 U/U, E 90 C/U, E 90 U/C, E 90 C/C EI 60 U/U, EI 60 C/U, EI 60 U/C, EI 60 C/C
Diameter 125 mm, wall thickness 3.9-9.0 mm*	60 x 9.0 mm	EI 60 U/U, EI 60 C/U, EI 60 U/C, EI 60 C/C
Diameter 140 mm, wall thickness 4.4-11.4 mm*	60 x 11.5 mm	
Diameter 160 mm, wall thickness 4.9-14.6 mm*	60 x 15.0 mm	
Diameter 200 mm, wall thickness 4.9-18.2 mm*	60 x 18.0 mm	E 120 U/C, E 120 C/C EI 90 U/C, EI 90 C/C
Diameter 400 mm, wall thickness 22.7 mm*	100 x 40.0 mm	EI 60 C/C

* Typical pipe diameters shown, see below graphs for intermediate sizes



A.2.1.4.1

Services	Collar Inlay	Classification
Wavin SiTech + PP-M B according to EN 13501-1		
32-40 mm diameter/ 1.8 mm wall thickness	50 x 3.0 mm	EI 120 U/U
50 mm diameter/ 1.8 mm wall thickness	50 x 3.2 mm	
75 mm diameter/ 1.8-2.5 mm wall thickness	50 x 4.2 mm	E 120 U/U, EI 60 U/U
90 mm diameter/ 1.8-2.9 mm wall thickness	50 x 5.0 mm	
110 mm diameter/ 1.8-3.4 mm wall thickness	50 x 6.0 mm	
Aquatherm Green SDR9 MF PP-RP according to ISO 21003		
32 mm diameter/3.0-5.6 mm wall thickness	30 x 3.0 mm	EI 120 C/C
40 mm diameter/3.0-5.6 mm wall thickness	50 x 3.0 mm	
50 mm diameter/3.0-5.6 mm wall thickness	50 x 3.2 mm	
63 diameter/3.6-7.0 mm wall thickness	50 x 3.6 mm	E 120 C/C, EI 60 C/C
75 diameter/4.1-8.4 mm wall thickness	50 x 4.2 mm	
90 diameter/4.7-10.1 mm wall thickness	50 x 5.0 mm	
110 diameter/5.6-12.3 mm wall thickness	50 x 6.0 mm	
Geberit Silent PP according to DIN 4102		
32-50 mm diameter/ 1.8 mm wall thickness	50 x 3.0 mm	EI 120 U/U
75 mm diameter/1.8-2.5 mm wall thickness	50 x 4.2 mm	E 120 U/U, EI 60 U/U
90 mm diameter/1.8-2.9 mm wall thickness	50 x 5.0 mm	
110 mm diameter/1.8-3.4 mm wall thickness	50 x 6.0 mm	
160 mm diameter/1.8-4.9 mm wall thickness	60 x 15.0 mm	EI 90 U/C
Polo-Kal NG Poloplast PP-MV according to DIN 4102		
32-40 mm diameter/1.8-2.0 mm wall thickness	50 x 3.0 mm	EI 120 U/U
50 mm diameter/1.8-2.0 mm wall thickness	50 x 3.2 mm	
75 mm diameter/1.9-2.6 mm wall thickness	50 x 4.2 mm	E 120 U/U, EI 90 U/U
90 mm diameter/1.9-2.9 mm wall thickness	50 x 5.0 mm	
110 mm diameter/2.0-3.4 wall thickness	50 x 6.0 mm	
Diameter 125 mm, wall thickness 3.9 mm	60 x 9.0 mm	E 120 U/U, EI 120 U/C
Diameter 160 mm, wall thickness 4.9 mm	60 x 15 mm	EI 120 U/U
Rehau Raupiano Plus PP-DD according to DIN 4102		
40 mm diameter/1.8 mm wall thickness	50 x 3.0 mm	E 120 U/U, EI 90 U/U
50 mm diameter/1.8 mm wall thickness	50 x 3.2 mm	
75 mm diameter/1.8-2.2 mm wall thickness	50 x 4.2 mm	E 120 U/U, EI 60 U/U
90 mm diameter/1.8-2.4 mm wall thickness	50 x 5.0 mm	
110 mm diameter/1.8-2.7 mm wall thickness	50 x 6.0 mm	
Diameter 125 mm, wall thickness 3.1 mm	60 x 9.0 mm	EI 120 U/U
Diameter 160 mm, wall thickness 3.9 mm	60 x 15.0 mm	

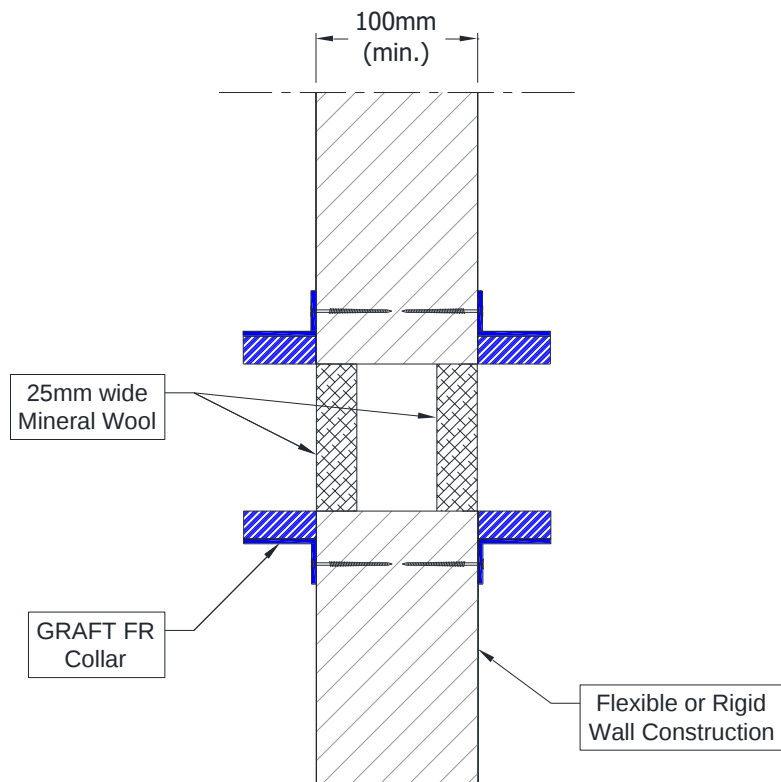
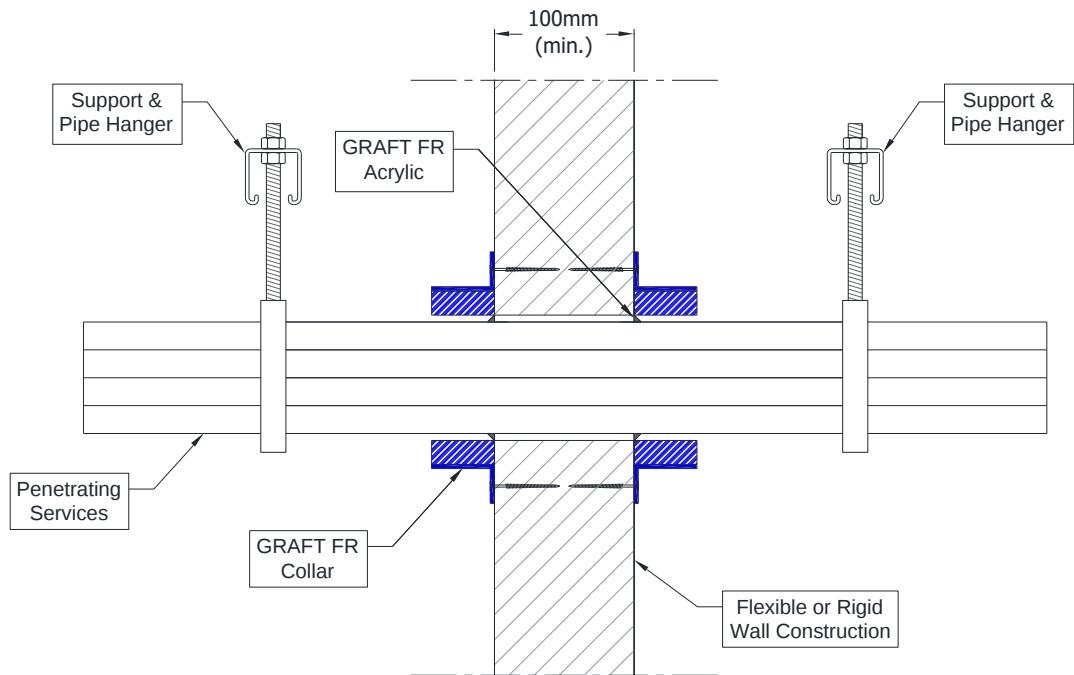
A.2.1.4.1

Services	Collar Inlay	Classification
BluePower Multilayer pipe – TR02-PP according to EN 1451-1		
32-40 mm diameter/1.8 mm wall thickness	50 x 3.0 mm	E 120 U/U, EI 90 U/U
50 mm diameter/1.8 mm wall thickness	50 x 3.2 mm	
75 mm diameter/1.8-2.5 mm wall thickness	50 x 4.2 mm	E 120 C/U, EI 60 C/U
90 mm diameter/1.8-2.9 mm wall thickness	50 x 5.0 mm	
110 mm diameter/1.8-3.4 mm wall thickness	50 x 6.0 mm	
125 mm diameter/2.3-3.8 mm wall thickness	60 x 9.0 mm	EI 60 C/U
160 mm diameter/3.4-4.9 mm wall thickness	60 x 15.0 mm	EI 90 C/U
Uponor Decibel according to EN 1451-1		
50 mm diameter/ 2.0 mm wall thickness	50 x 3.0 mm	E 120 U/U, EI 60 U/U
75 mm diameter/ 2.6 mm wall thickness	50 x 4.2 mm	
110 mm diameter/ 3.8 mm wall thickness	50 x 6.0 mm	
Wavin AS+ pipes according to EN 12056 and DIN 1986-100		
50 mm diameter / 3.0 mm wall thickness	50 x 3.0 mm	E 120 U/U, EI 90 U/U
75 mm diameter / 3.5 mm wall thickness	50 x 4.2 mm	E 120 U/C, EI 60 U/C
90 mm diameter / 4.6 mm wall thickness	50 x 5.0 mm	
110 mm diameter / 5.3 mm wall thickness	50 x 6.0 mm	
125 mm diameter / 5.3 mm wall thickness	60 x 9.0 mm	
160 mm diameter / 5.6 mm wall thickness	60 x 15.0 mm	E 120 U/C, EI 90 U/C
200 mm diameter / 6.0 mm wall thickness	60 x 18.0 mm	
PVC rectangular duct		
110 mm x 54 mm / approx. 2.0mm wall thickness	60 x 9.0mm	E 120 U/U, EI 60 U/U

A.2.2 Penetration seals, in drywalls and concrete/masonry walls

Penetration Seal: Cables and pipes fitted with GRAFT FR Collar, to both sides of the wall.

Construction details:



A.2.2.1

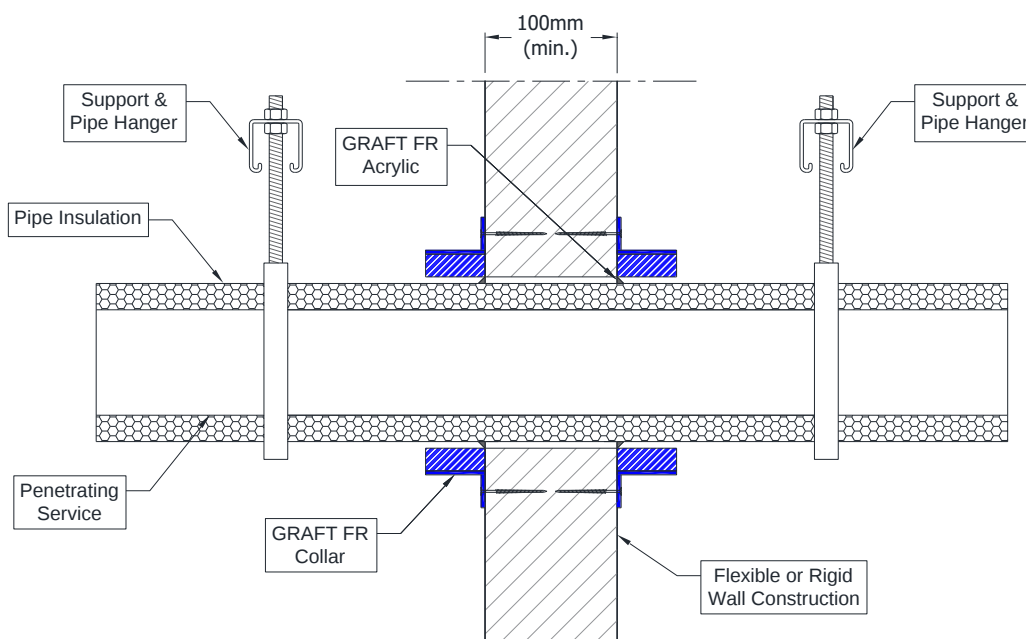
Services	Collar	Collar Inlay	Classification
Cables up to 21 mm Ø, in partial or fully filled tied bundles up to 110 mm Ø (Collar internal diameter to match cable bundle size)	Up to 110 mm collar at 30 mm height	Between 3.0 and 6.0 mm	E 120, EI 60
Cables up to 80 mm Ø, in partial or fully filled tied bundles up to 160 mm Ø (Collar internal diameter to match cable bundle size)	Up to 110 mm collar at 50 mm height, 125-160 mm at 60 mm height	Between 3.0 and 15.0 mm	E 120, EI 60
PVC pipes up to 40 mm Ø, wall thickness 1.0-3.7 mm with or without cables up to 21 mm Ø, in partial or fully filled pipe bundles up to 160 mm Ø	Up to 110 mm collar at 50 mm height, 125-160 mm at 60 mm height	Between 3.0 and 15.0 mm	EI 90 U/C
PE pipes up to 40 mm Ø, wall thickness 2.0-3.7 mm with or without cables up to 21 mm Ø, in partial or fully filled pipe bundles up to 160 mm Ø			
PP pipes up to 40 mm Ø, wall thickness 1.8-3.7 mm with or without cables up to 21 mm Ø, in partial or fully filled pipe bundles up to 160 mm Ø			
None (blank). Hole behind collar to be fitted with minimum 25 mm thick stone mineral wool insulation at minimum 33 kg/m ³ .	Up to 110 mm collar at 30 mm height	Between 3.0 and 6.0 mm	E 120, EI 60
None (blank). Hole behind collar to be fitted with minimum 25 mm thick stone mineral wool insulation at minimum 33 kg/m ³ .	160 mm collar at 60 mm height	15.0 mm	EI 120
PEX pipe in pipe system			
Diameter up to 25 mm pipes, wall thickness 0.6 mm, in bundles up to 55 mm	55 mm collar at 30 mm height	3.2 mm	E 120 C/C, EI 90 C/C
Diameter up to 42 mm pipes, wall thickness up to 1.0 mm, in bundles up to 160 mm	Up to 110 mm collar at 50 mm height, 125-160 mm at 60 mm height	Between 3.0 and 15.0 mm	EI 60 C/C

PVC, PE and PP pipes can be mixed in the same bundle.

A.2.3 Penetration seals, in drywalls and concrete/masonry walls

Penetration Seal: CS (Continuous Sustained) insulated metallic pipes fitted with GRAFT FR Collar, to both sides of the wall.

Construction details:

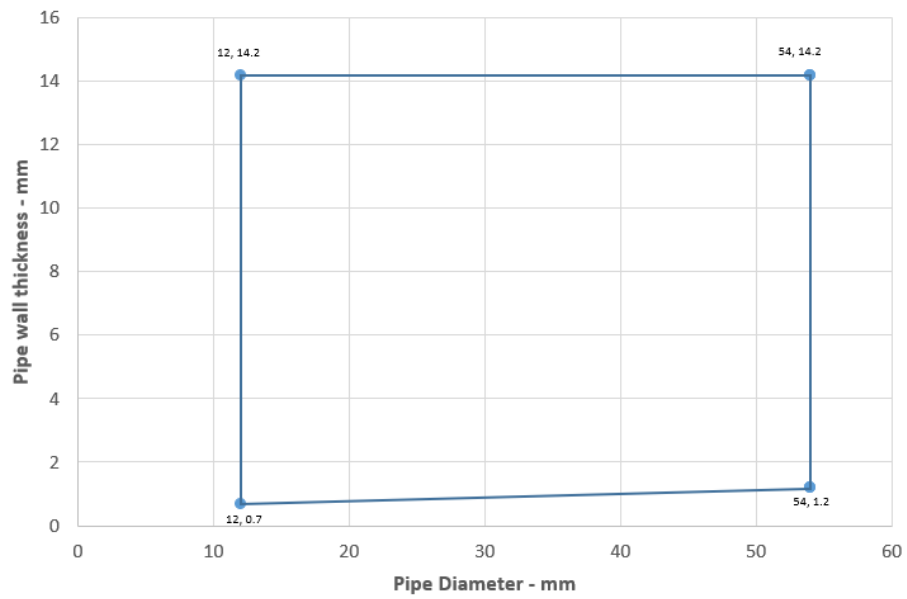


A.2.3.1

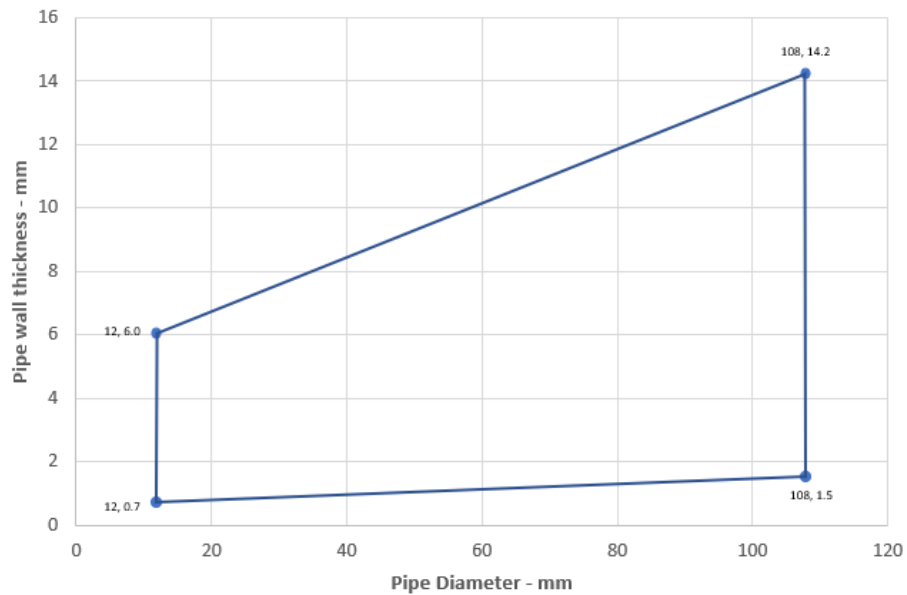
Services	Insulation	Collar	Classification
Copper pipe or mild steel			
Maximum diameter 54 mm, wall thickness 0.7-14.2 mm*	9-50 mm thick Elastomeric insulation minimum class B-s3, d0	Up to 110 mm collar at 50 mm height, 125-160 mm at 60 mm height	E 90 C/C, EI 60 C/C
Maximum diameter 12 mm, wall thickness 0.7-6.0 mm	15 mm thick Phenolic Foam insulation	Up to 50 mm collar at 50 mm height	EI 120 C/C
Maximum diameter 108 mm, wall thickness 0.7-14.2 mm*	25 mm thick Phenolic Foam insulation	Up to 110 mm collar at 50 mm height, 125-200 mm at 60 mm height, 250-315 mm at 75 mm height	E 120 C/C, EI 90 C/C
Maximum diameter 108 mm, wall thickness 0.7-14.2 mm*	26-100 mm thick Phenolic Foam insulation		EI 60 C/C
Maximum diameter 159 mm, wall thickness 0.7-14.2 mm*	25 mm thick Phenolic Foam insulation	Up to 200 mm collar at 60 mm height, 250-315 mm at 75 mm height, 400 mm at 100 mm height	EI 60 C/C
Maximum diameter 159 mm, wall thickness 0.7-14.2 mm*	26-100 mm thick Phenolic Foam insulation		EI 45 C/C
Diameter 54 mm, wall thickness 1.2 mm	20 mm thick PE foam insulation	Ø 110 x 50 x 6.0 mm	E 120 C/C, EI 90 C/C
Diameter 54 mm, wall thickness 1.2 mm	40 mm thick PU foam insulation	Ø 160 x 60 x 15.0 mm	E 120 C/C, EI 60 C/C
Alupex pipe			
Maximum diameter 75 mm, wall thickness 2.25-4.6 mm*	9-50 mm thick Elastomeric insulation minimum class B-s3, d0	Up to 110 mm collar at 50 mm height, 125-200 mm at 60 mm height	E 90 C/C, EI 60 C/C

* Typical pipe diameters shown, see below graphs for intermediate sizes

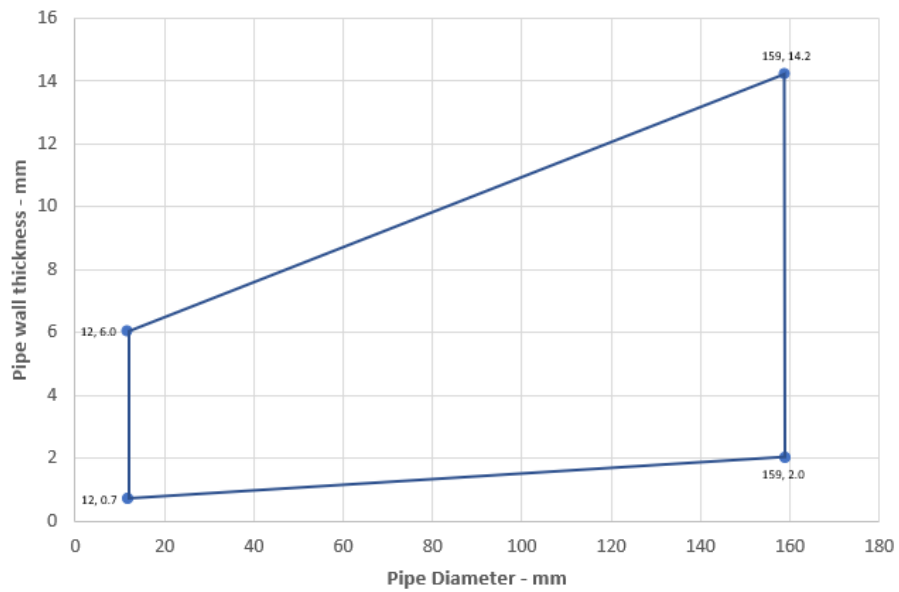
Copper or Steel Pipes 32-54 / 9-50 mm Elastomeric Insulation



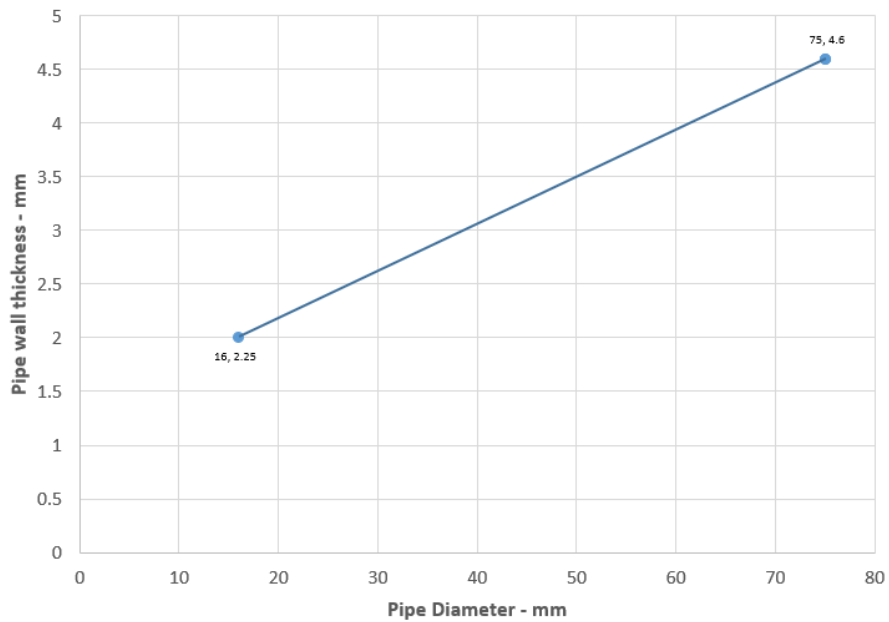
Copper or Steel Pipes 12-108 / 25-100 mm Phenolic Foam Insulation



**Copper or Steel Pipes 12-159 / 25 or 26-100 mm Phenolic
Foam Insulation**



Alupex Pipes 16-75 / 9-50 mm Elastomeric Insulation - C/C

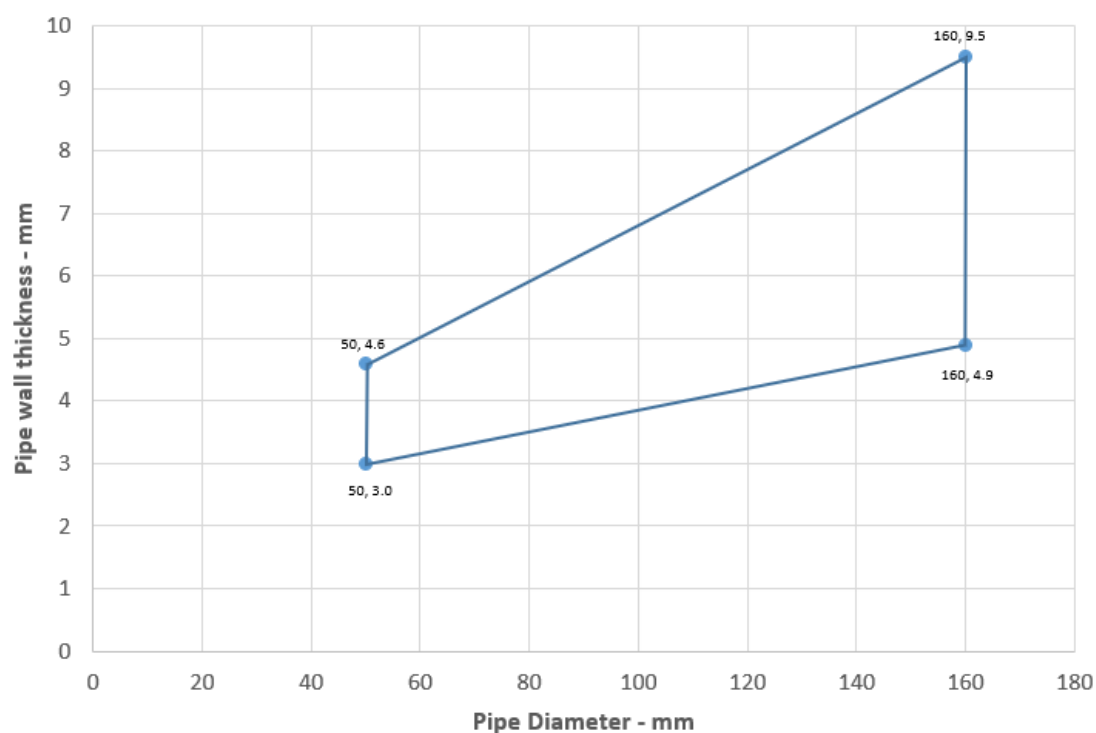


A.2.3.1.1

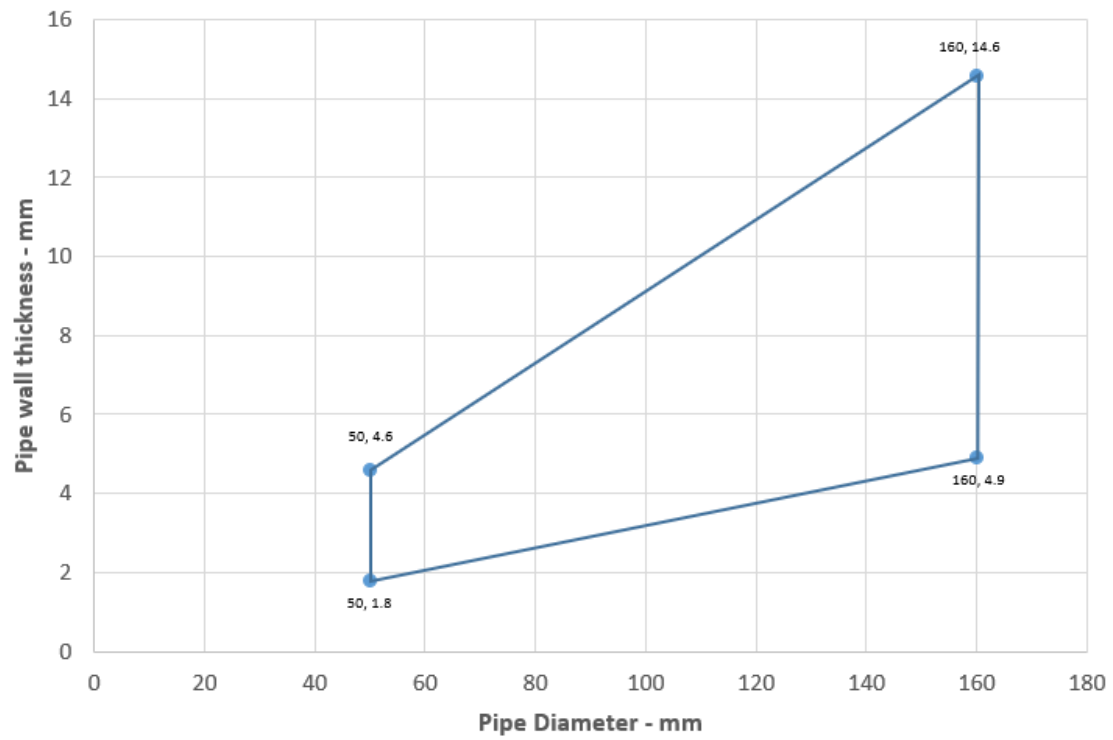
Services	Insulation	Collar	Classification
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1			
Maximum diameter 160 mm, wall thickness 3.0-9.5 mm*	9-50 mm thick Elastomeric insulation minimum class D-s3, d0	Up to 110 mm collar at 50 mm height, 125-200 mm at 60 mm height, 250-315 mm at 75 mm height	EI 90 C/C
Diameter 160 mm, wall thickness 4.9-9.5 mm			EI 120 C/C
PP pipe according to EN 1451-1			
Maximum diameter 160 mm, wall thickness 1.8-14.6 mm*	9-50 mm thick Elastomeric insulation minimum class D-s3, d0	Up to 110 mm collar at 50 mm height, 125-200 mm at 60 mm height, 250-315 mm at 75 mm height	EI 90 C/C
Diameter 160 mm, wall thickness 4.9-14.6 mm			EI 120 C/C

* Typical pipe diameters shown, see below graphs for intermediate sizes

PE Pipes 50-160 with Elastomeric Insulation - C/C



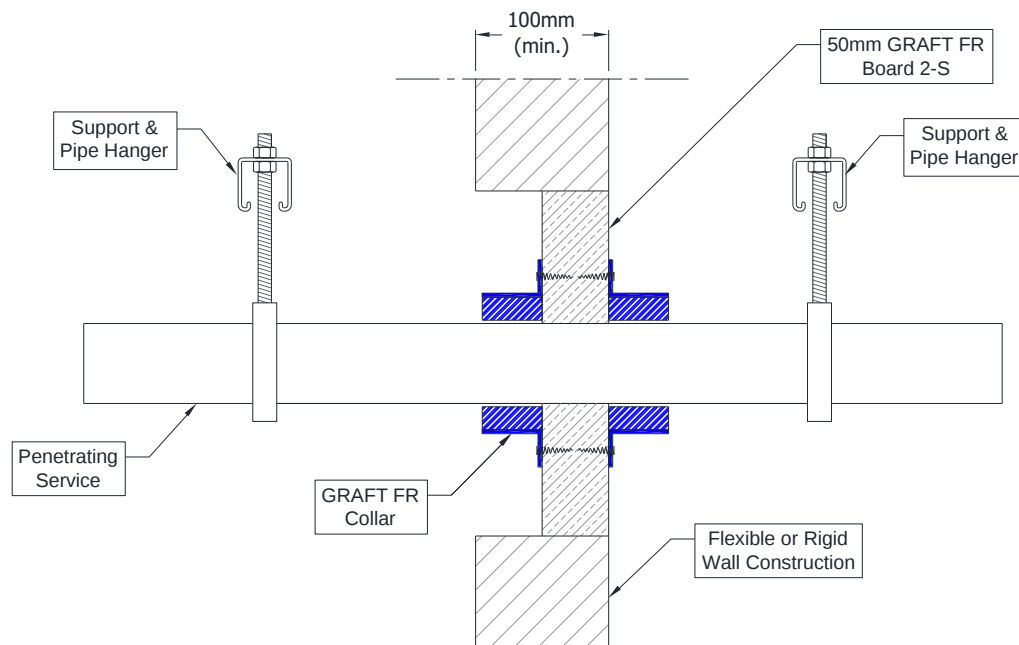
PP Pipes 50-160 with Elastomeric Insulation - C/C



A.2.4 Penetration seals, in drywalls and concrete/masonry walls

Penetration Seal: Combustible pipes fitted with GRAFT FR Collar, to both sides of the GRAFT FR Board. Minimum separation between penetration seals and seal edges of 50 mm (Configuration 1 & 2). Maximum seal size 1200 mm wide x 600 mm high.

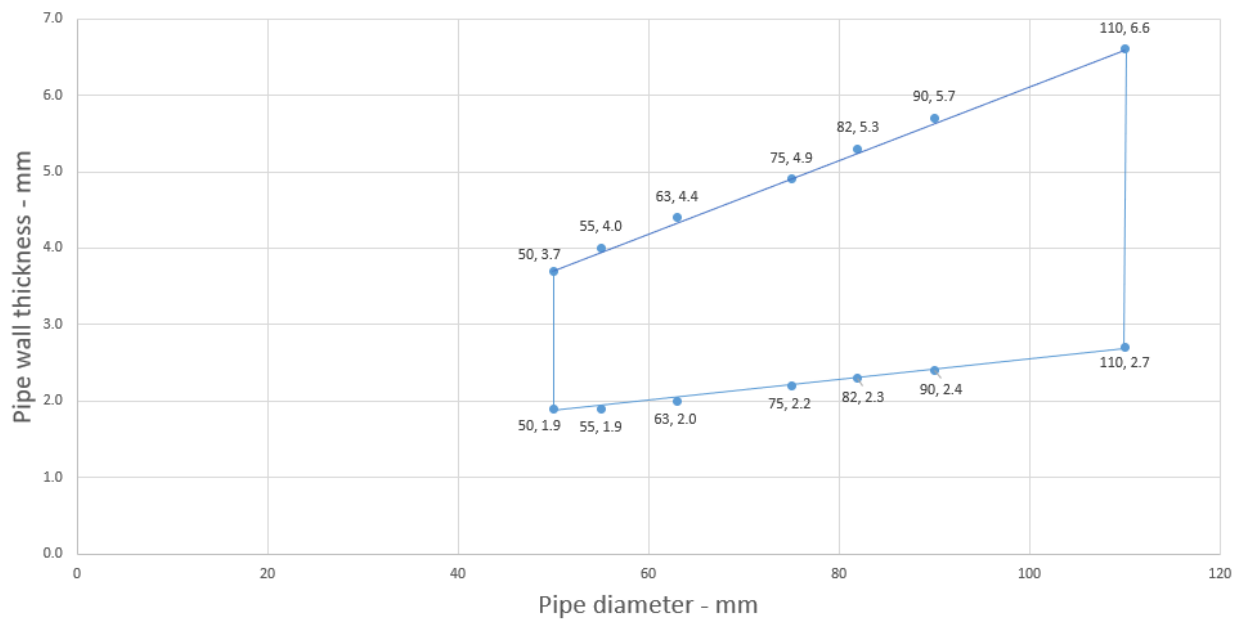
Construction details:



A.2.4.1

Services	Collar Inlay	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1 and PVC-C according to EN 1566-1		
32-50 mm diameter / 1.9-3.7 mm wall thickness	50 x 3.0 mm	E 120 U/C, EI 60 U/C
55 mm, / 1.9-4.0 mm wall thickness	50 x 3.2 mm	E 90 U/C, EI 60 U/C
63 mm, / 2.0-4.4 mm wall thickness	50 x 3.6 mm	
75 mm, / 2.2-4.9 mm wall thickness	50 x 4.2 mm	
82 mm, / 2.3-5.3 mm wall thickness	50 x 4.6 mm	
90 mm, / 2.4-5.7 mm wall thickness	50 x 5.0 mm	
110 mm diameter / 2.7-6.6 mm wall thickness	50 x 6.0 mm	

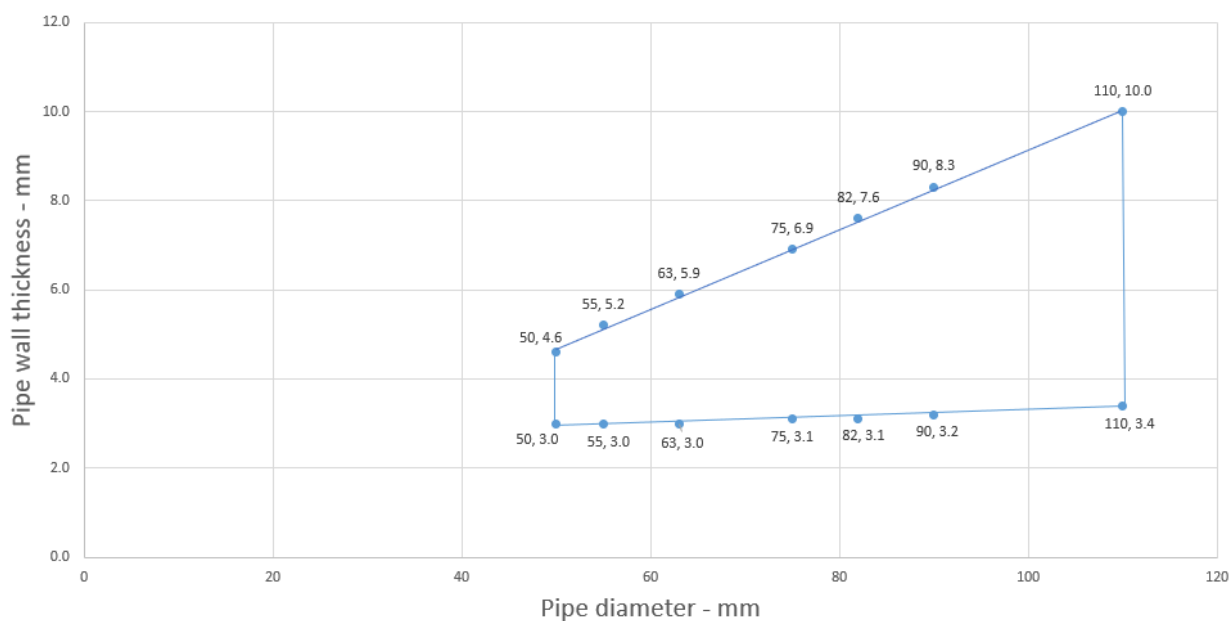
PVC pipes 50-110 / 50 mm Collar - U/C



A.2.4.2

Services	Collar Inlay	Classification
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1		
32-50 mm diameter / 3.0-4.6 mm wall thickness	50 x 3.0 mm	E 120 U/C, EI 60 U/C
55 mm, / 3.0-5.2 mm wall thickness	50 x 3.2 mm	E 90 C/C, EI 60 C/C
63 mm, / 3.0-5.9 mm wall thickness	50 x 3.6 mm	
75 mm, / 3.1-6.9 mm wall thickness	50 x 4.2 mm	
82 mm, / 3.1-7.6 mm wall thickness	50 x 4.6 mm	
90 mm, / 3.2-8.3 mm wall thickness	50 x 5.0 mm	
110 mm, / 3.4-10.0 mm wall thickness	50 x 6.0 mm	

PE pipes 50-110 / 50 mm Collar - C/C

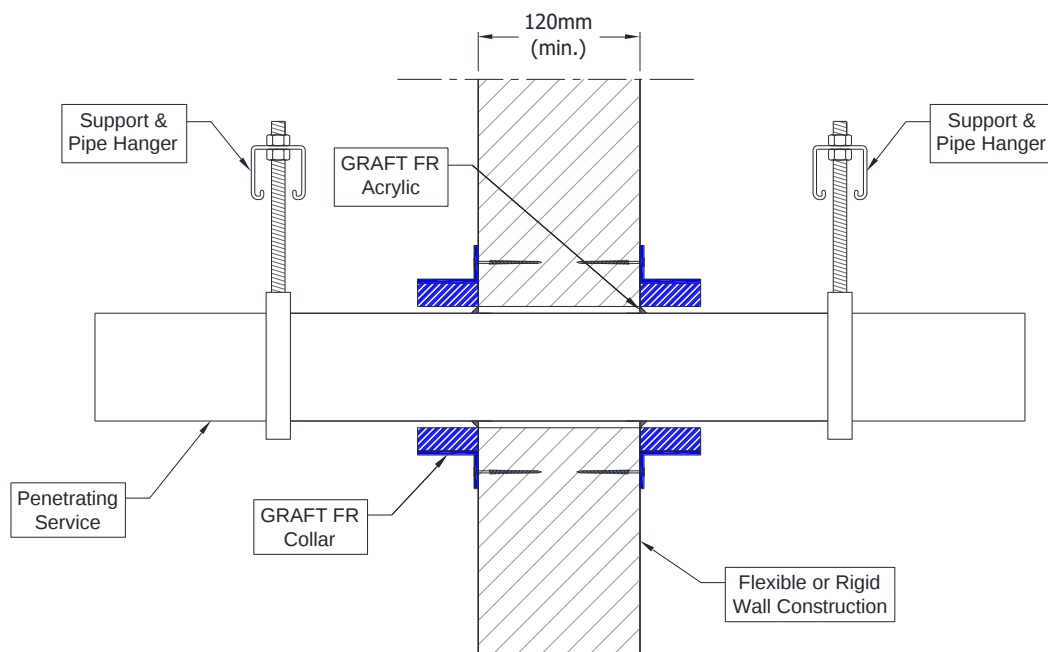


A.3 Flexible or rigid wall constructions with wall thickness of minimum 120 mm

A.3.1 Penetration seals, in drywalls and concrete/masonry walls

Penetration Seal: Combustible pipes fitted with GRAFT FR Collar, to both sides of the wall.

Construction details:

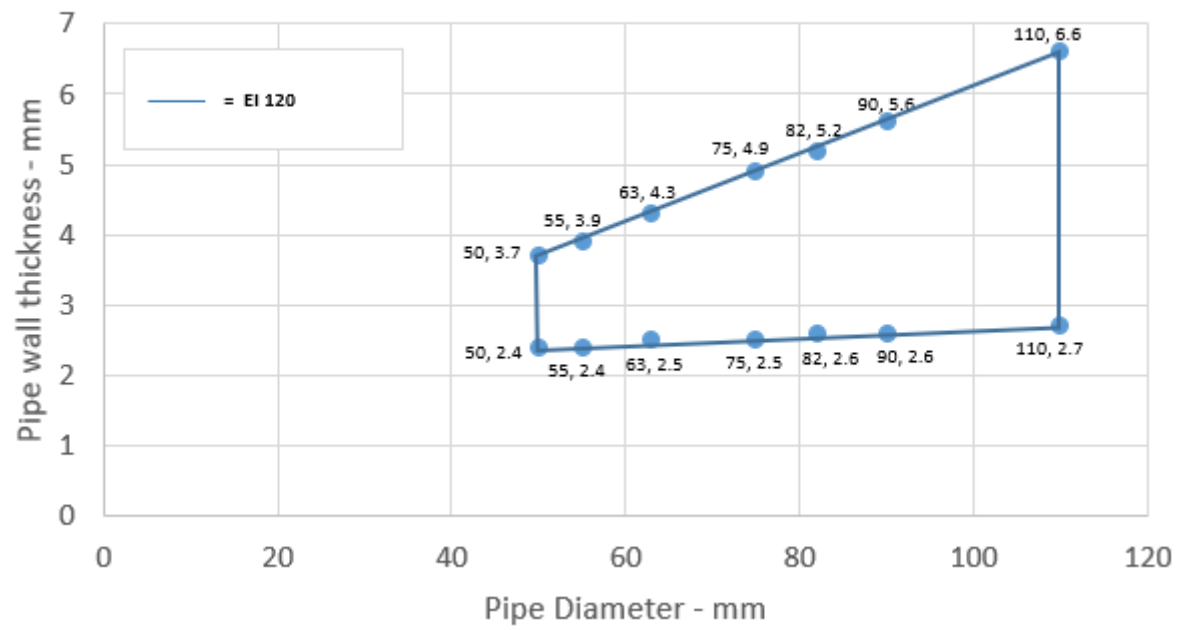


A.3.1.1

Services	Collar Inlay	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1 and PVC-C according to EN 1566-1		
Diameter 32-50 mm, wall thickness 2.4-3.7 mm*	50 x 3.0 mm	EI 120 C/C
Diameter 55 mm, wall thickness 2.4-3.9 mm*	50 x 3.2 mm	
Diameter 63 mm, wall thickness 2.5-4.3 mm*	50 x 3.6 mm	
Diameter 75 mm, wall thickness 2.5-4.9 mm*	50 x 4.2 mm	
Diameter 82 mm, wall thickness 2.6-5.2 mm*	50 x 4.6 mm	
Diameter 90 mm, wall thickness 2.6-5.6 mm*	50 x 5.0 mm	
Diameter 110 mm, wall thickness 2.7-6.6 mm*	50 x 6.0 mm	

* Typical pipe diameters shown, see below graph for intermediate sizes

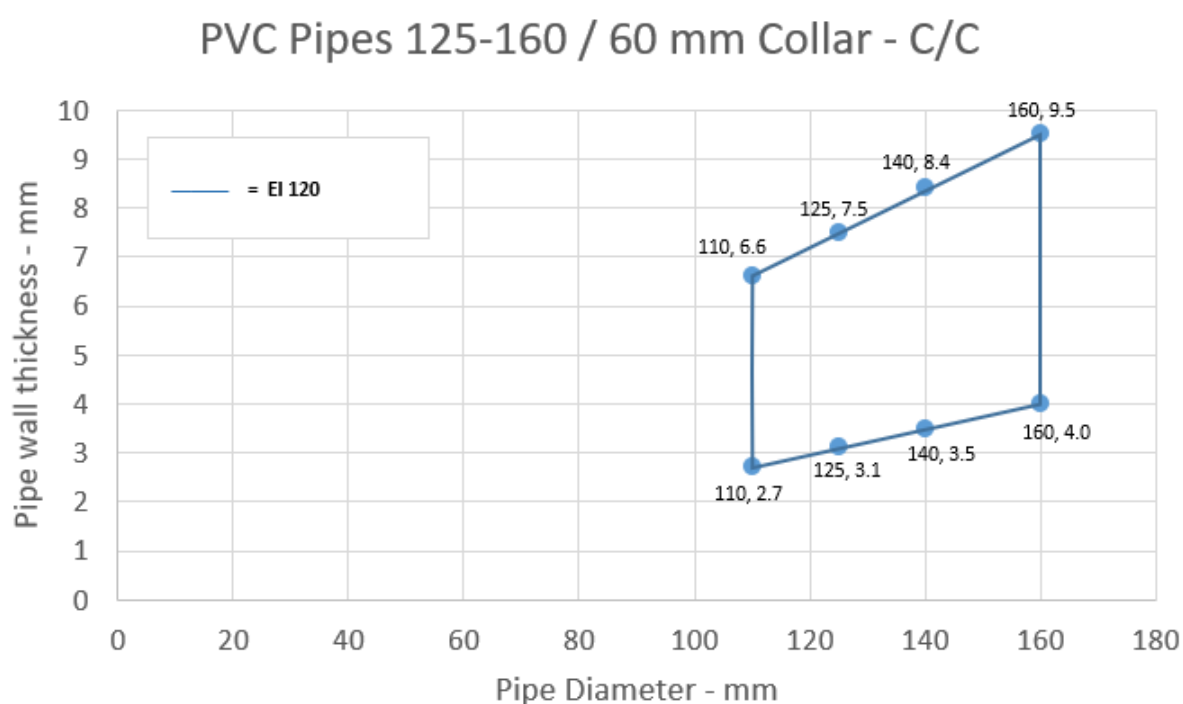
PVC Pipes 50-110 / 50 mm Collar -C/C



A.3.1.1.1

Services	Collar Inlay	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1 and PVC-C according to EN 1566-1		
Diameter 110 mm, wall thickness 2.7-6.6 mm*	50 x 6.0 mm	EI 120 C/C
Diameter 125 mm, wall thickness 3.1-7.5 mm*	60 x 8.8 mm	
Diameter 140 mm, wall thickness 3.5-8.4 mm*	60 x 11.5 mm	
Diameter 160 mm, wall thickness 4.0-9.5 mm*	60 x 15.0 mm	

* Typical pipe diameters shown, see below graph for intermediate sizes

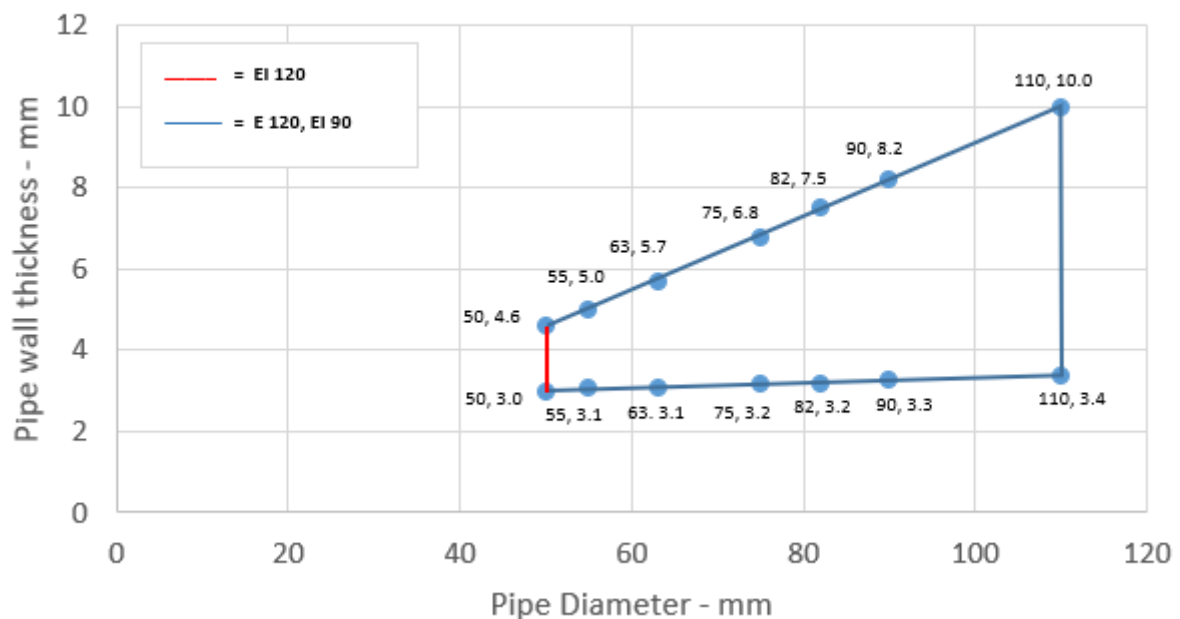


A.3.1.2

Services	Collar Inlay	Classification
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1		
Diameter 32-50 mm, wall thickness 3.0-4.6 mm*	50 x 3.0 mm	EI 120 C/C
Diameter 55 mm, wall thickness 3.1-5.0 mm*	50 x 3.2 mm	E 120 C/C, EI 90 C/C
Diameter 63 mm, wall thickness 3.1-5.7 mm*	50 x 3.6 mm	
Diameter 75 mm, wall thickness 3.2-6.8 mm*	50 x 4.2 mm	
Diameter 82 mm, wall thickness 3.2-7.5 mm*	50 x 4.6 mm	
Diameter 90 mm, wall thickness 3.3-8.2 mm*	50 x 5.0 mm	
Diameter 110 mm, wall thickness 3.4-10.0 mm*	50 x 6.0 mm	EI 120 C/C
Diameter 110 mm, wall thickness 3.4 mm*	50 x 6.0 mm	

* Typical pipe diameters shown, see below graph for intermediate sizes

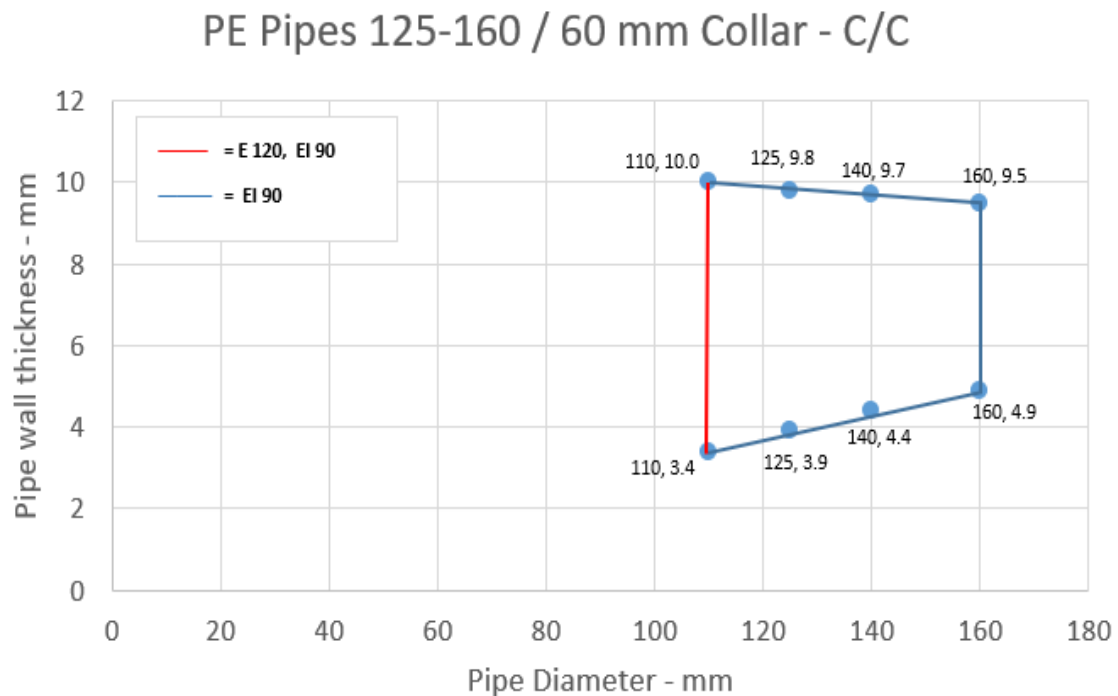
PE Pipes 50-110 / 50 mm Collar - C/C



A.3.1.2.1

Services	Collar Inlay	Classification
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1		
Diameter 110 mm, wall thickness 3.4-10.0 mm*	50 x 6.0 mm	E 120 C/C, EI 90 C/C
Diameter 125 mm, wall thickness 3.9-9.8 mm*	60 x 8.8 mm	EI 90 C/C
Diameter 140 mm, wall thickness 4.4-9.7 mm*	60 x 11.5 mm	
Diameter 160 mm, wall thickness 4.9-9.5 mm*	60 x 15.0 mm	EI 120 C/C

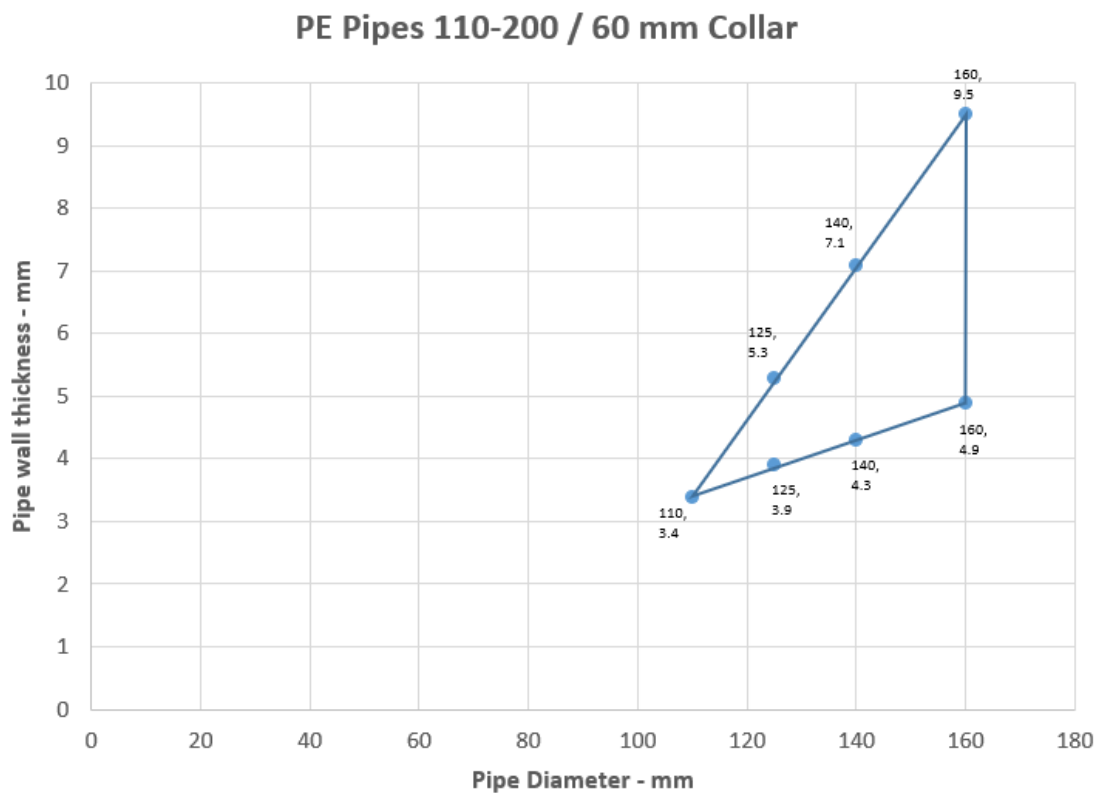
* Typical pipe diameters shown, see below graph for intermediate sizes



A.3.1.2.2

Services	Collar Inlay	Classification
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1		
Diameter 110 mm, wall thickness 3.4 mm*	50 x 6.0 mm	EI 120 C/C
Diameter 125 mm, wall thickness 3.9-5.3 mm*	60 x 8.8 mm	
Diameter 140 mm, wall thickness 4.3-7.1 mm*	60 x 11.5 mm	
Diameter 160 mm, wall thickness 4.9-9.5 mm*	60 x 15.0 mm	

* Typical pipe diameters shown, see below graph for intermediate sizes

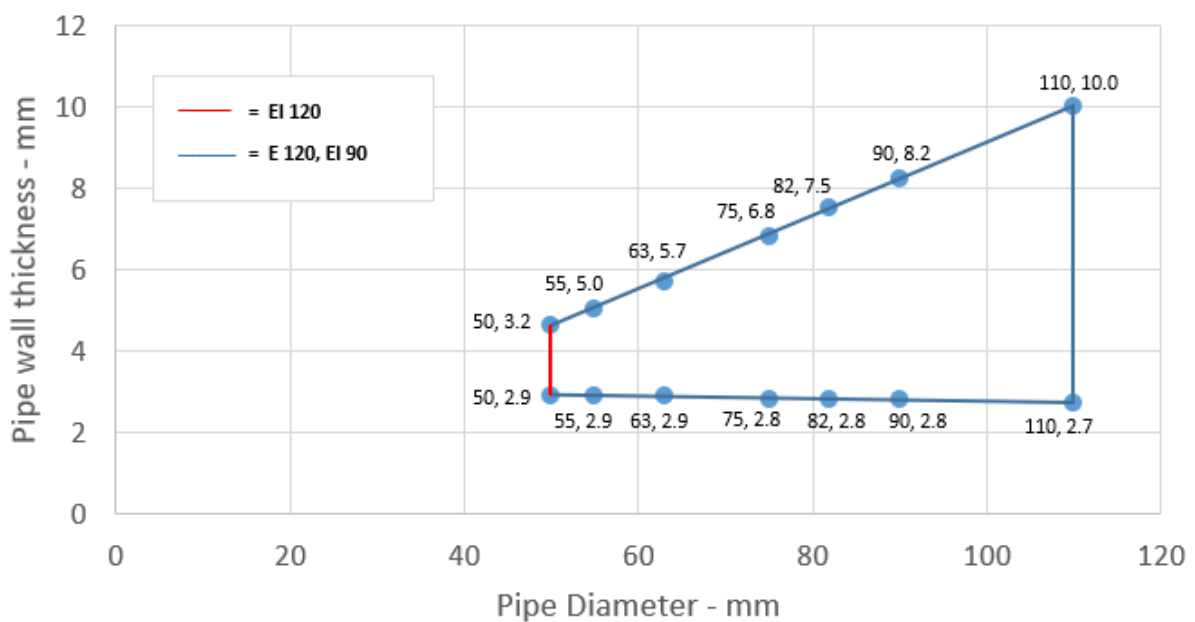


A.3.1.3

Services	Collar Inlay	Classification
PP pipe according to DIN 8077/8078		
Diameter 32-50 mm, wall thickness 2.9-4.6 mm	50 x 3.0 mm	EI 120 C/C
Diameter 55 mm, wall thickness 2.9-5.0 mm*	50 x 3.2 mm	E 120 C/C, EI 90 C/C
Diameter 63 mm, wall thickness 2.9-5.7 mm*	50 x 3.6 mm	
Diameter 75 mm, wall thickness 2.8-6.8 mm*	50 x 4.2 mm	
Diameter 82 mm, wall thickness 2.8-7.5 mm*	50 x 4.6 mm	
Diameter 90 mm, wall thickness 2.8-8.2 mm*	50 x 5.0 mm	
Diameter 110 mm, wall thickness 2.7-10 mm*	50 x 6.0 mm	

* Typical pipe diameters shown, see below graph for intermediate sizes

PP Pipes 50-110 / 50 mm Collar - C/C

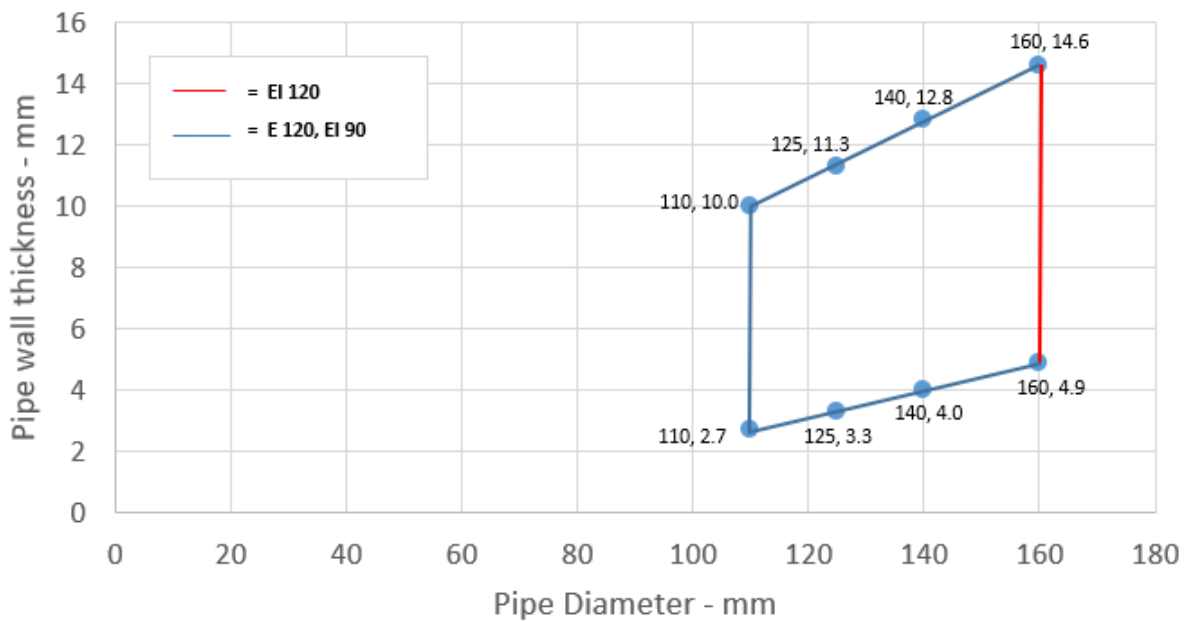


A.3.1.3.1

Services	Collar Inlay	Classification
PP pipe according to DIN 8077/8078		
Diameter 110 mm, wall thickness 2.7-10 mm*	50 x 6.0 mm	E 120 C/C, EI 90 C/C
Diameter 125 mm, wall thickness 3.3-11.3 mm*	60 x 8.8 mm	
Diameter 140 mm, wall thickness 4.0-12.8 mm*	60 x 11.5 mm	
Diameter 160 mm, wall thickness 4.9-14.6 mm*	60 x 15.0 mm	EI 120 C/C

* Typical pipe diameters shown, see below graph for intermediate sizes

PP Pipes 125-160 / 60 mm collar - C/C

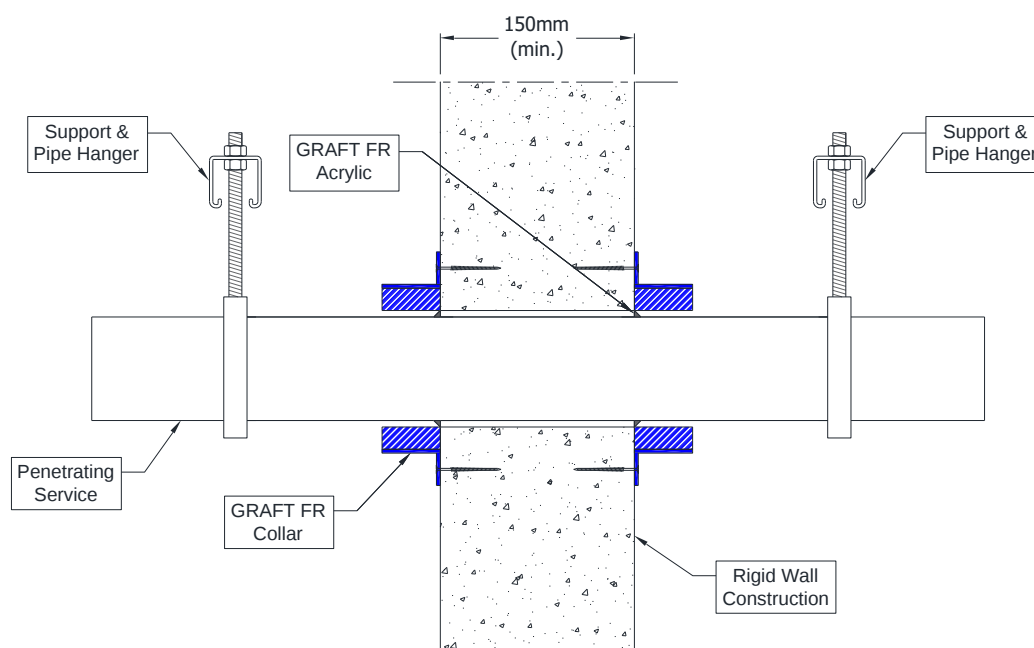


A.4 Rigid walls constructions with wall thickness of minimum 150 mm

A.4.1 Penetration seals, in concrete/masonry walls

Penetration Seal: Combustible pipes fitted with GRAFT FR Collar, to both sides of the wall.

Construction details:

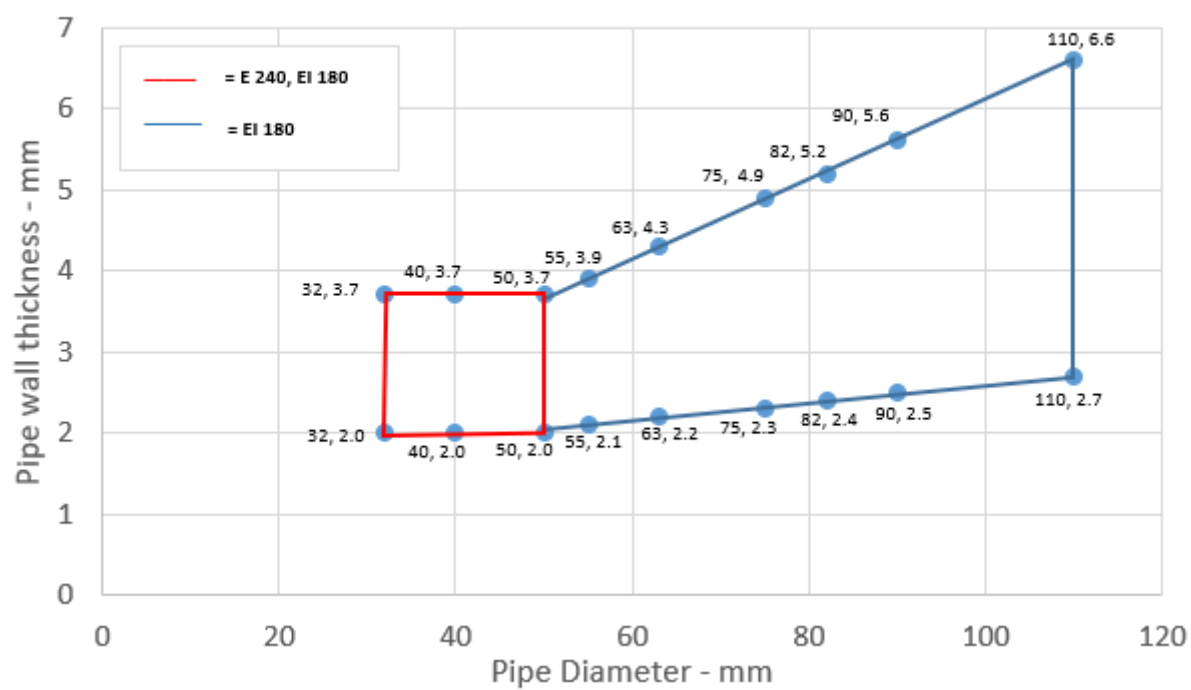


A.4.1.1

Services	Collar Inlay	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1 and PVC-C according to EN 1566-1		
Diameter 32 mm, wall thickness 2.0-3.7 mm*	50 x 3.0 mm	E 240 U/U, E 240 C/U, E 240 U/C, E 240 C/C EI 180 U/U, EI 180 C/U, EI 180 U/C, EI 180 C/C
Diameter 40 mm, wall thickness 2.0-3.7 mm*		
Diameter 50 mm, wall thickness 2.0-3.7 mm*		
Diameter 55 mm, wall thickness 2.1-3.9 mm*	50 x 3.2 mm	EI 180 U/U, EI 180 C/U, EI 180 U/C, EI 180 C/C
Diameter 63 mm, wall thickness 2.2-4.3 mm*	50 x 3.6 mm	
Diameter 75 mm, wall thickness 2.3-4.9 mm*	50 x 4.2 mm	
Diameter 82 mm, wall thickness 2.4-5.2 mm*	50 x 4.6 mm	
Diameter 90 mm, wall thickness 2.5-5.6 mm*	50 x 5.0 mm	
Diameter 110 mm, wall thickness 2.7-6.6 mm*	50 x 6.0 mm	

* Typical pipe diameters shown, see below graph for intermediate sizes

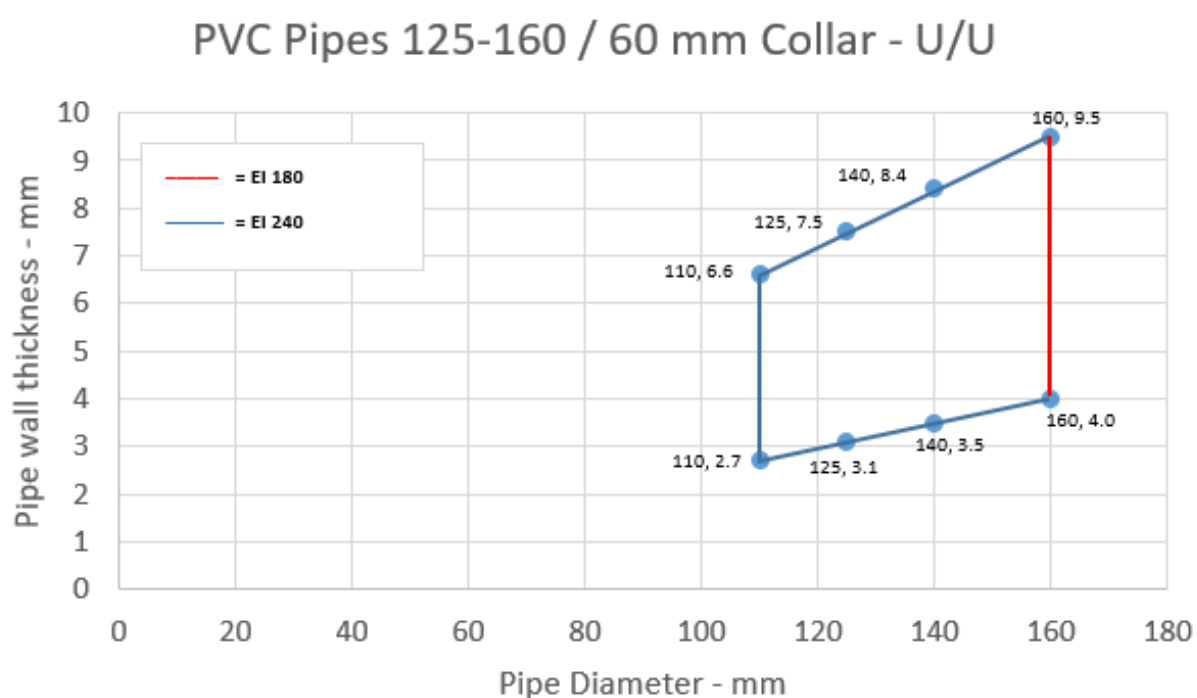
PVC Pipes 32-110 / 50 mm Collar - U/U



A.4.1.1.1

Services	Collar Inlay	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1 and PVC-C according to EN 1566-1		
Diameter 110 mm, wall thickness 2.7-6.6 mm*	50 x 6.0 mm	EI 180 U/U, EI 180 C/U, EI 180 U/C, EI 180 C/C
Diameter 125 mm, wall thickness 3.1-7.5 mm*	60 x 8.8 mm	EI 240 U/U, EI 240 C/U, EI 240 U/C, EI 240 C/C
Diameter 140 mm, wall thickness 3.5-8.4 mm*	60 x 11.5 mm	
Diameter 160 mm, wall thickness 4.0-9.5 mm*	60 x 15.0 mm	
Diameter 315 mm, wall thickness 9.2 mm	75 x 18 mm	EI 120 C/C

* Typical pipe diameters shown, see below graph for intermediate sizes

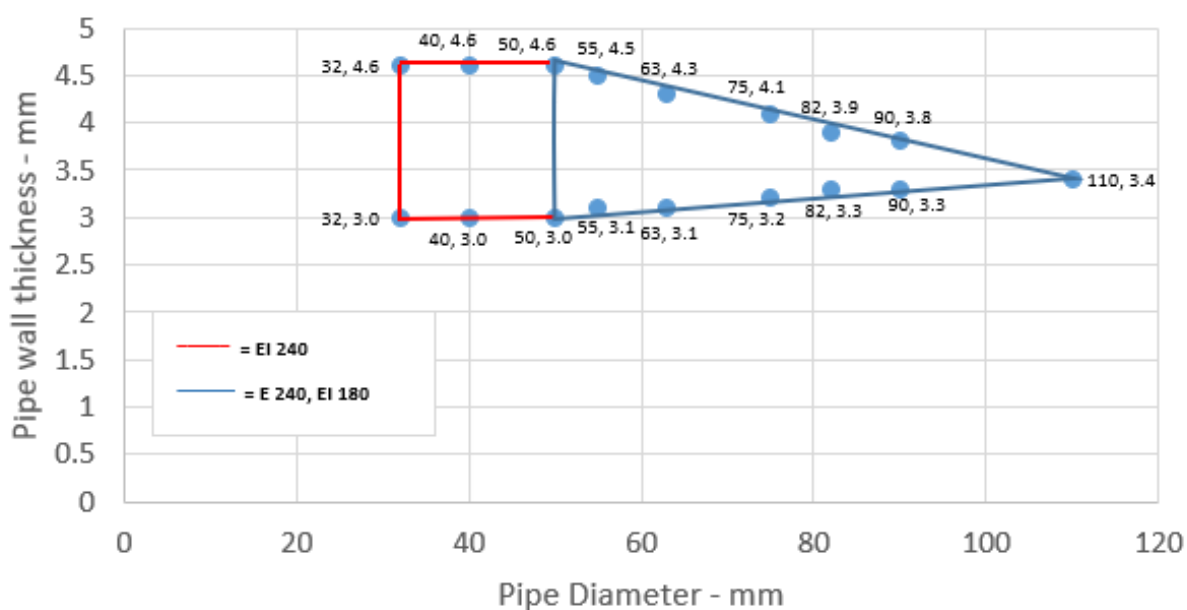


A.4.1.2

Services	Collar Inlay	Classification
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1		
Diameter 32 mm, wall thickness 3.0-4.6 mm*	50 x 3.0 mm	EI 240 U/U, EI 240 C/U, EI 240 U/C, EI 240 C/C
Diameter 40 mm, wall thickness 3.0-4.6 mm*		
Diameter 50 mm, wall thickness 3.0-4.6 mm*		
Diameter 55 mm, wall thickness 3.1-4.5 mm*	50 x 3.2 mm	E 240 U/U, E 240 C/U, E 240 U/C, E 240 C/C EI 180 U/U, EI 180 C/U, EI 180 U/C, EI 180 C/C
Diameter 63 mm, wall thickness 3.1-4.3 mm*	50 x 3.6 mm	
Diameter 75 mm, wall thickness 3.2-4.1 mm*	50 x 4.2 mm	
Diameter 82 mm, wall thickness 3.3-3.9 mm*	50 x 4.6 mm	
Diameter 90 mm, wall thickness 3.3-3.8 mm*	50 x 5.0 mm	
Diameter 110 mm, wall thickness 3.4 mm*	50 x 6.0 mm	

* Typical pipe diameters shown, see below graph for intermediate sizes

PE Pipes 32-110 / 50 mm Collar-U/U

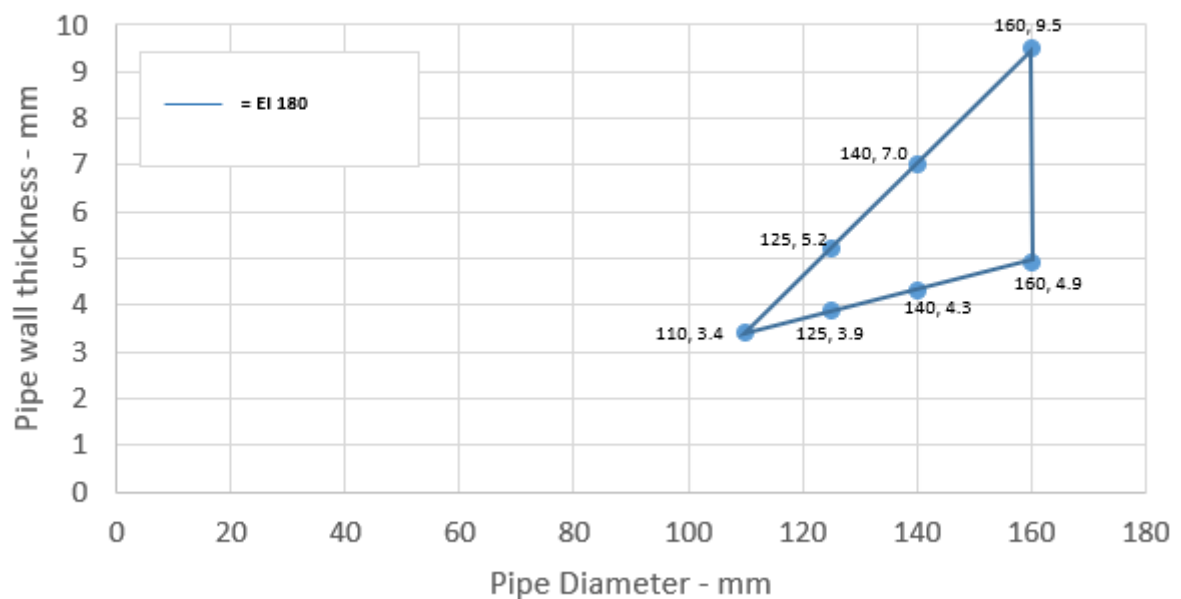


A.4.1.2.1

Services	Collar Inlay	Classification
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1		
Diameter 110 mm, wall thickness 3.4 mm*	50 x 6.0 mm	E 240 U/U, E 240 C/U, E 240 U/C, E 240 C/C EI 180 U/U, EI 180 C/U, EI 180 U/C, EI 180 C/C
Diameter 125 mm, wall thickness 3.9-5.2 mm*	60 x 9.0 mm	EI 180 U/U, EI 180 C/U, EI 180 U/C, EI 180 C/C
Diameter 140 mm, wall thickness 4.3-7.0 mm*	60 x 11.5 mm	
Diameter 160 mm, wall thickness 4.9-9.5 mm*	60 x 15.0 mm	
Diameter 200 mm, wall thickness 18.2 mm	75 x 10.8 mm	EI 60 C/C
Diameter 250 mm, wall thickness 22.7 mm	75 x 12.6 mm	E 120 C/C EI 90 C/C

* Typical pipe diameters shown, see below graph for intermediate sizes

PE Pipes 125-160 / 60 mm Pipes - U/U

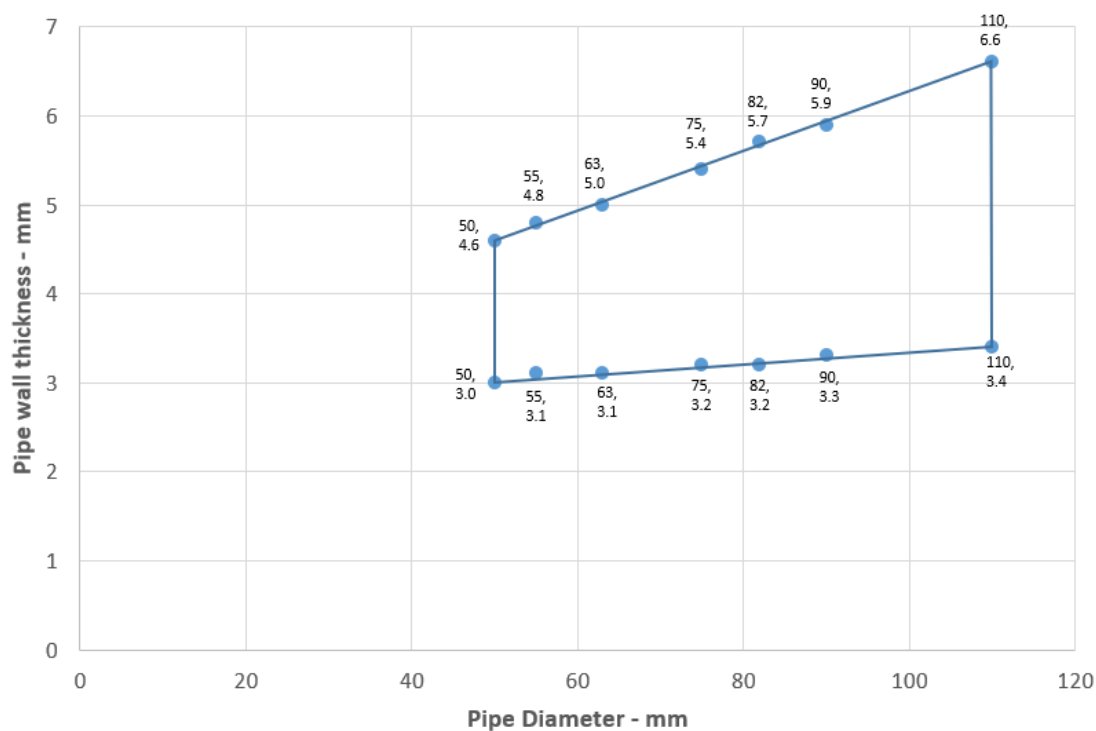


A.4.1.2.2

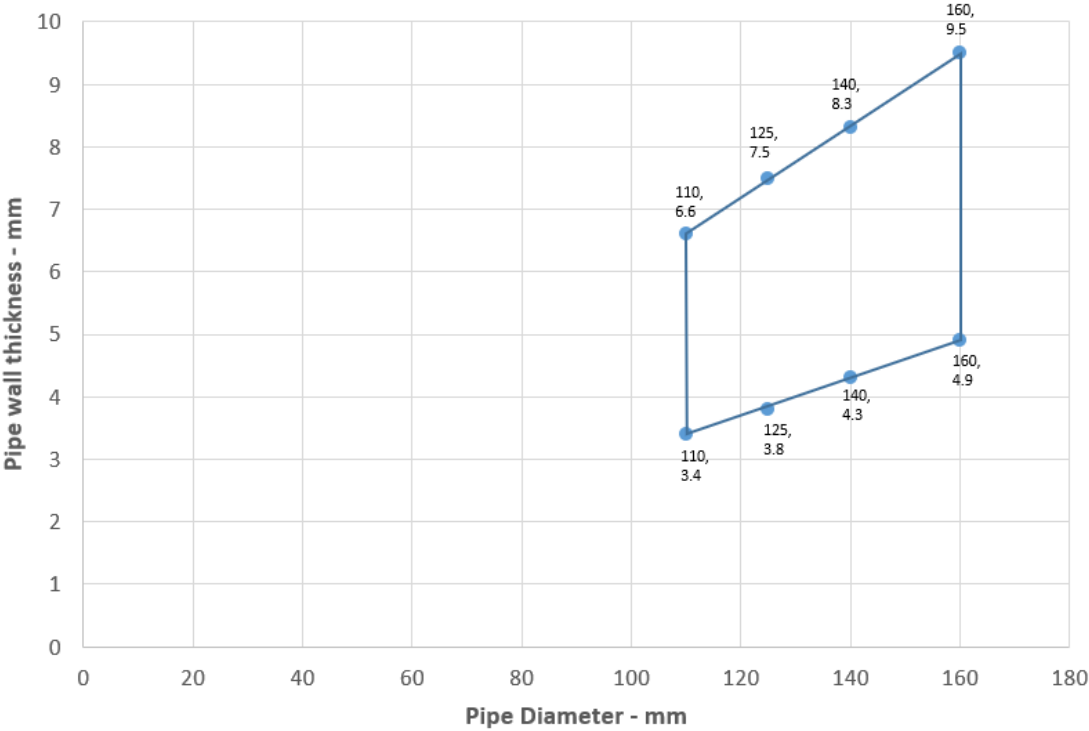
Services	Collar Inlay	Classification
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1		
Diameter 50 mm, wall thickness 3.0-4.6 mm*	50 x 3.0 mm	EI 240 U/U, EI 240 C/U, EI 240 U/C, EI 240 C/C
Diameter 55 mm, wall thickness 3.1-4.8 mm*	50 x 3.2 mm	E 180 U/C, E 180 C/C EI 120 U/C, EI 120 C/C
Diameter 63 mm, wall thickness 3.1-5.0 mm*	50 x 3.6 mm	
Diameter 75 mm, wall thickness 3.2-5.4 mm*	50 x 4.2 mm	
Diameter 82 mm, wall thickness 3.2-5.7 mm*	50 x 4.6 mm	
Diameter 90 mm, wall thickness 3.3-5.9 mm*	50 x 5.0 mm	
Diameter 110 mm, wall thickness 3.4-6.6 mm*	50 x 6.0 mm	
Diameter 125 mm, wall thickness 3.8-7.5 mm*	60 x 9.0 mm	
Diameter 140 mm, wall thickness 4.3-8.3 mm*	60 x 11.5 mm	
Diameter 160 mm, wall thickness 4.9-9.5 mm*	60 x 15.0 mm	EI 180 U/U, EI 180 C/U, EI 180 U/C, EI 180 C/C

* Typical pipe diameters shown, see below graph for intermediate sizes

PE Pipes 50-110 / 50 mm Collar



PE Pipes 125-160 / 60 mm Collar

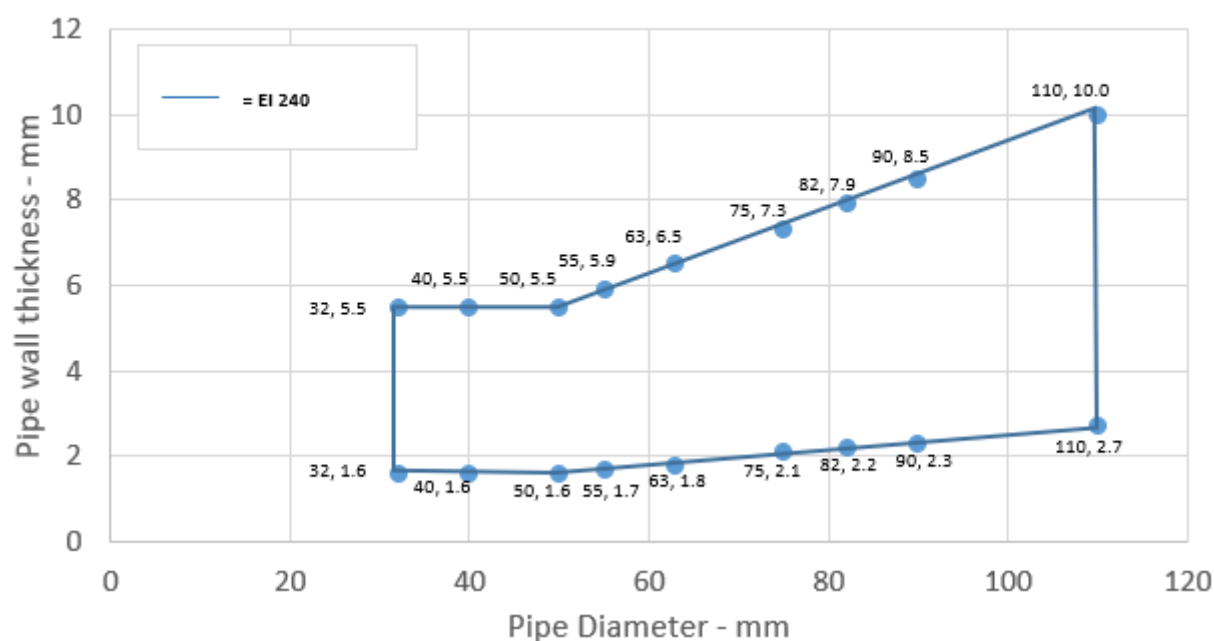


A.4.1.3

Services	Collar Inlay	Classification
PP pipe according to EN 1451-1		
Diameter 32 mm, wall thickness 1.6-5.5 mm*	30 x 3.0 mm	EI 240 U/C, EI 240 C/C
Diameter 40 mm, wall thickness 1.6-5.5 mm*		
Diameter 50 mm, wall thickness 1.6-5.5 mm*		
Diameter 55 mm, wall thickness 1.7-5.9 mm*	50 x 3.2 mm	
Diameter 63 mm, wall thickness 1.8-6.5 mm*	50 x 3.6 mm	
Diameter 75 mm, wall thickness 2.1-7.3 mm*	50 x 4.2 mm	
Diameter 82 mm, wall thickness 2.2-7.9 mm*	50 x 4.6 mm	
Diameter 90 mm, wall thickness 2.3-8.5 mm*	50 x 5.0 mm	
Diameter 110 mm, wall thickness 2.7-10.0 mm*	50 x 6.0 mm	

* Typical pipe diameters shown, see below graph for intermediate sizes

PP Pipes 32-110 / 50 mm Collar - U/C

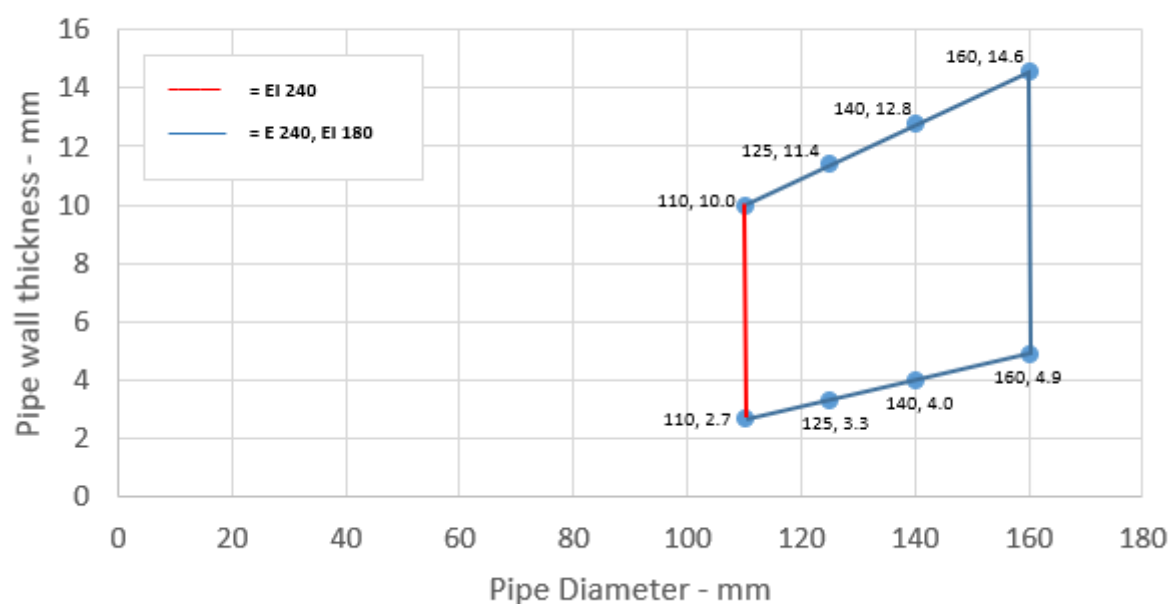


A.4.1.3.1

Services	Collar Inlay	Classification
PP pipe according to EN 1451-1		
Diameter 110 mm, wall thickness 2.7-10.0 mm*	50 x 6.0 mm	EI 240 U/C, EI 240 C/C
Diameter 125 mm, wall thickness 3.3-11.4 mm*	60 x 9.0 mm	E 240 U/C, E 240 C/C EI 180 U/C, EI 180 C/C
Diameter 140 mm, wall thickness 4.0-12.8 mm*	60 x 11.5 mm	
Diameter 160 mm, wall thickness 4.9-14.6 mm*	60 x 15.0 mm	

* Typical pipe diameters shown, see below graph for intermediate sizes

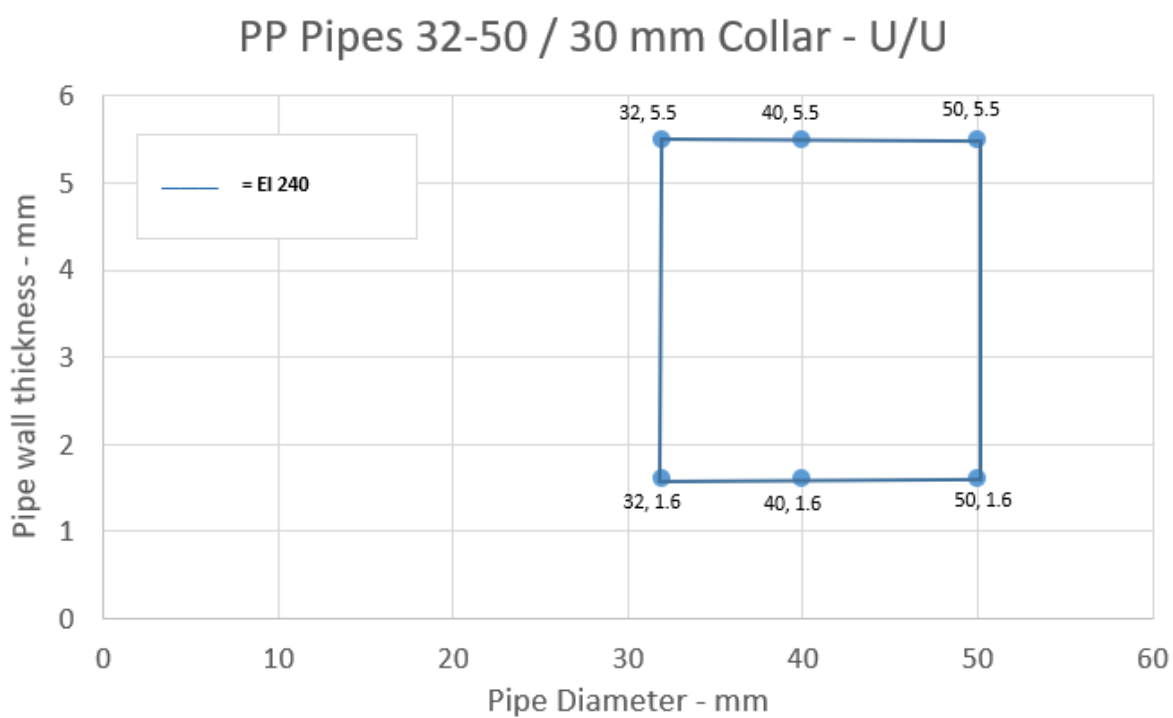
PP Pipes 125-160 / 60 mm Collar - U/C



A.4.1.3.2

Services	Collar Inlay	Classification
PP pipe according to EN 1451-1		
Diameter 32 mm, wall thickness 1.6-5.5 mm*	30 x 3.0 mm	EI 240 U/U, EI 240 C/U, EI 240 U/C, EI 240 C/C
Diameter 40 mm, wall thickness 1.6-5.5 mm*		
Diameter 50 mm, wall thickness 1.6-5.5 mm*		

* Typical pipe diameters shown, see below graph for intermediate sizes

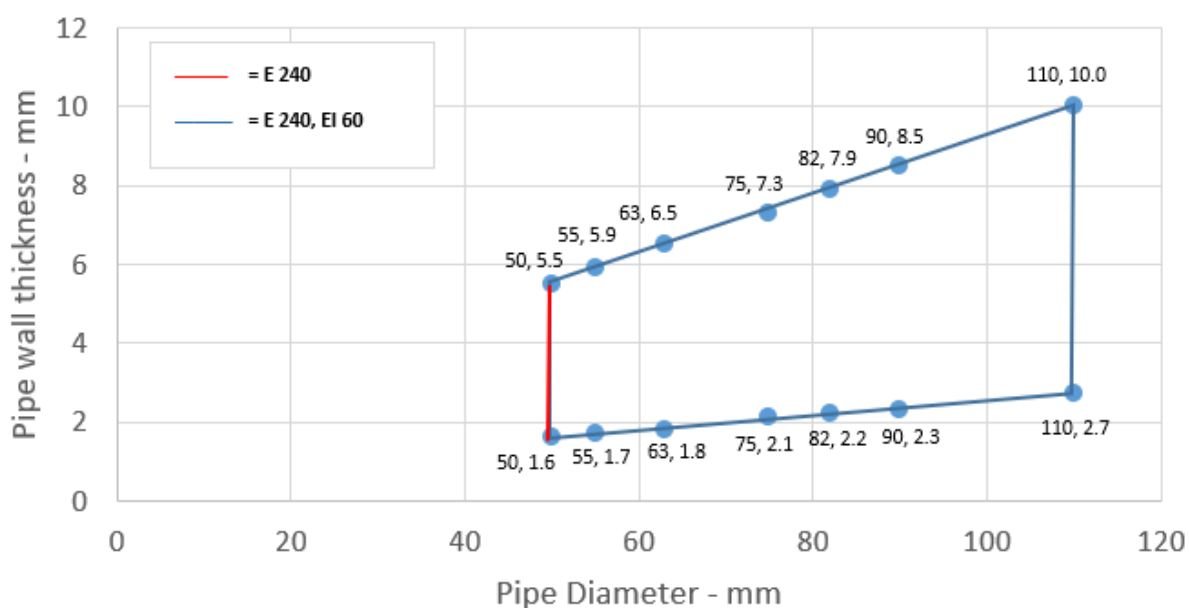


A.4.1.3.3

Services	Collar Inlay	Classification
PP pipe according to EN 1451-1		
Diameter 50 mm, wall thickness 1.6-5.5 mm*	50 x 3.0 mm	EI 240 U/U, EI 240 C/U, EI 240 U/C, EI 240 C/C
Diameter 55 mm, wall thickness 1.7-5.9 mm*	50 x 3.2 mm	E 240 U/U, E 240 C/U, EI 60 U/U, EI 60 C/U
Diameter 63 mm, wall thickness 1.8-6.5 mm*	50 x 3.6 mm	
Diameter 75 mm, wall thickness 2.1-7.3 mm*	50 x 4.2 mm	
Diameter 82 mm, wall thickness 2.2-7.9 mm*	50 x 4.6 mm	
Diameter 90 mm, wall thickness 2.3-8.5 mm*	50 x 5.0 mm	
Diameter 110 mm, wall thickness 2.7-10.0 mm*	50 x 6.0 mm	

* Typical pipe diameters shown, see below graph for intermediate sizes

PP Pipes 55-110 / 50 mm Collar - U/U

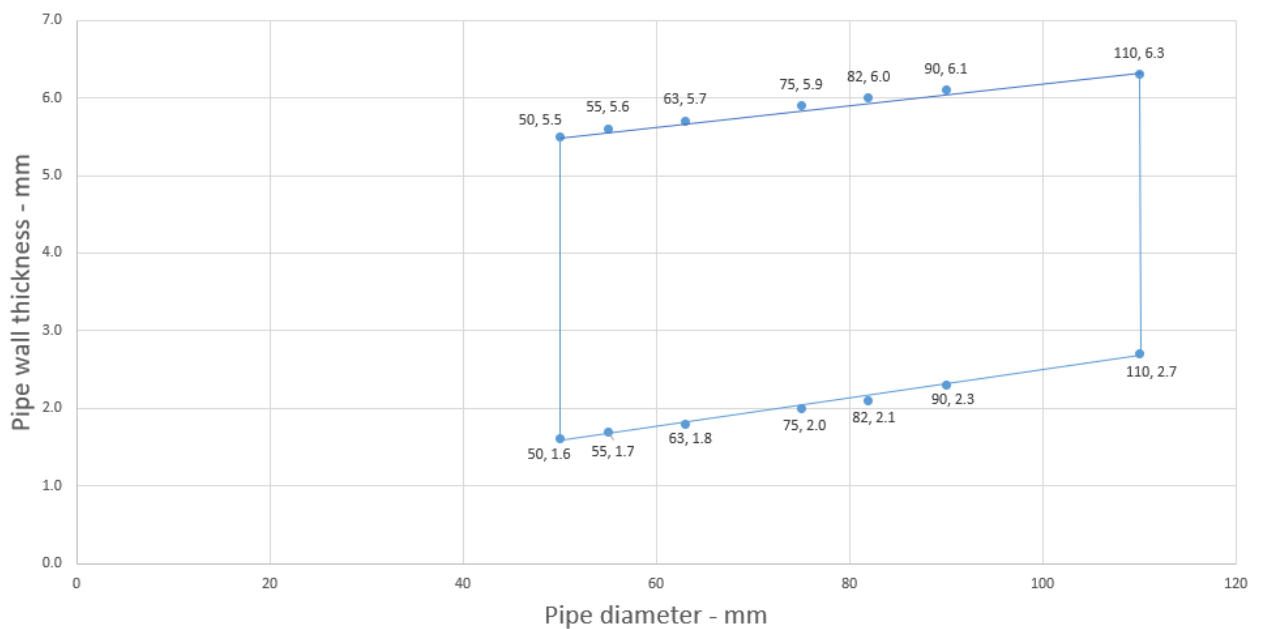


A.4.1.3.4

Services	Collar Inlay	Classification
PP pipe according to EN 1451-1		
Diameter 50 mm, wall thickness 1.6-5.5 mm*	50 x 3.0 mm	EI 240 U/U, EI 240 C/U, EI 240 U/C, EI 240 C/C
Diameter 55 mm, wall thickness 1.7-5.6 mm*	50 x 3.2 mm	E 240 U/U, EI 90 U/U
Diameter 63 mm, wall thickness 1.8-5.7 mm*	50 x 3.6 mm	
Diameter 75 mm, wall thickness 2.0-5.9 mm*	50 x 4.2 mm	
Diameter 82 mm, wall thickness 2.1-6.0 mm*	50 x 4.6 mm	
Diameter 90 mm, wall thickness 2.3-6.1 mm*	50 x 5.0 mm	
Diameter 110 mm, wall thickness 2.7-6.3 mm	50 x 6.0 mm	

* Typical pipe diameters shown, see below graph for intermediate sizes

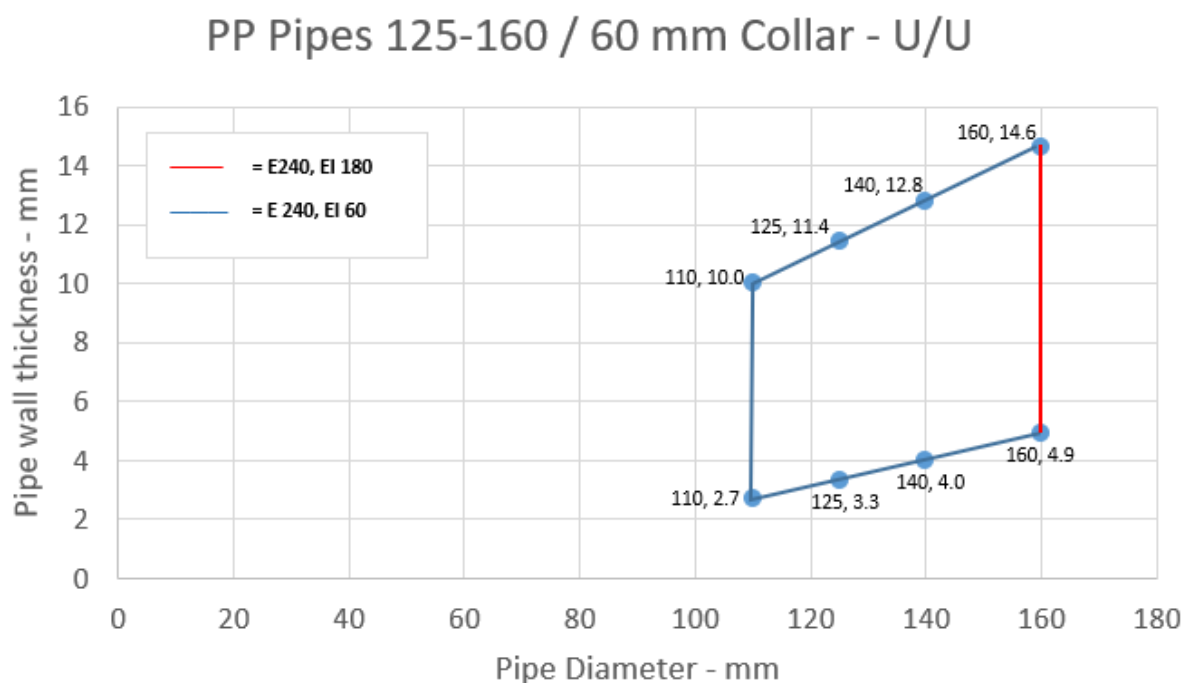
PP pipes 50-110 / 50 mm Collar - U/U



A.4.1.3.5

Services	Collar Inlay	Classification
PP pipe according to EN 1451-1		
Diameter 110 mm, wall thickness 2.7-10.0 mm*	60 x 6.0 mm	E 240 U/U, E 240 C/U, EI 60 U/U, EI 60 C/U
Diameter 125 mm, wall thickness 3.3-11.4 mm*	60 x 8.8 mm	
Diameter 140 mm, wall thickness 4.0-12.8 mm*	60 x 11.5 mm	
Diameter 160 mm, wall thickness 4.9-14.6 mm*	60 x 15.0 mm	E 240 U/U, E 240 C/U, E 240 U/C, E 240 C/C EI 180 U/U, EI 180 C/U, EI 180 U/C, EI 180 C/C

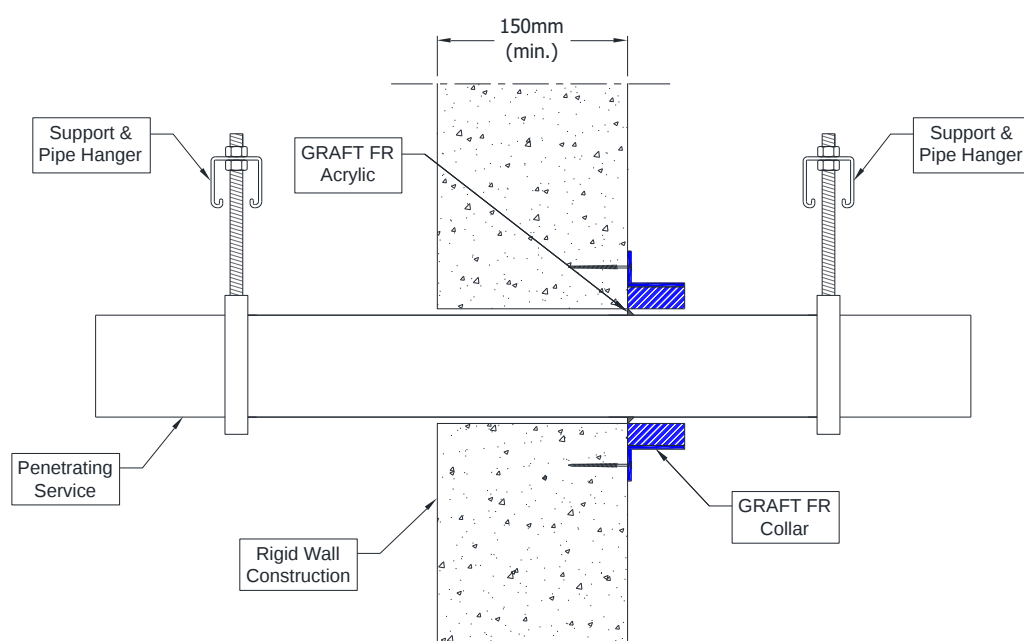
* Typical pipe diameters shown, see below graph for intermediate sizes



A.4.2 Penetration seals, in concrete/masonry walls

Penetration Seal: Combustible pipes fitted with single GRAFT FR Collar, to either side of the wall.

Construction details:

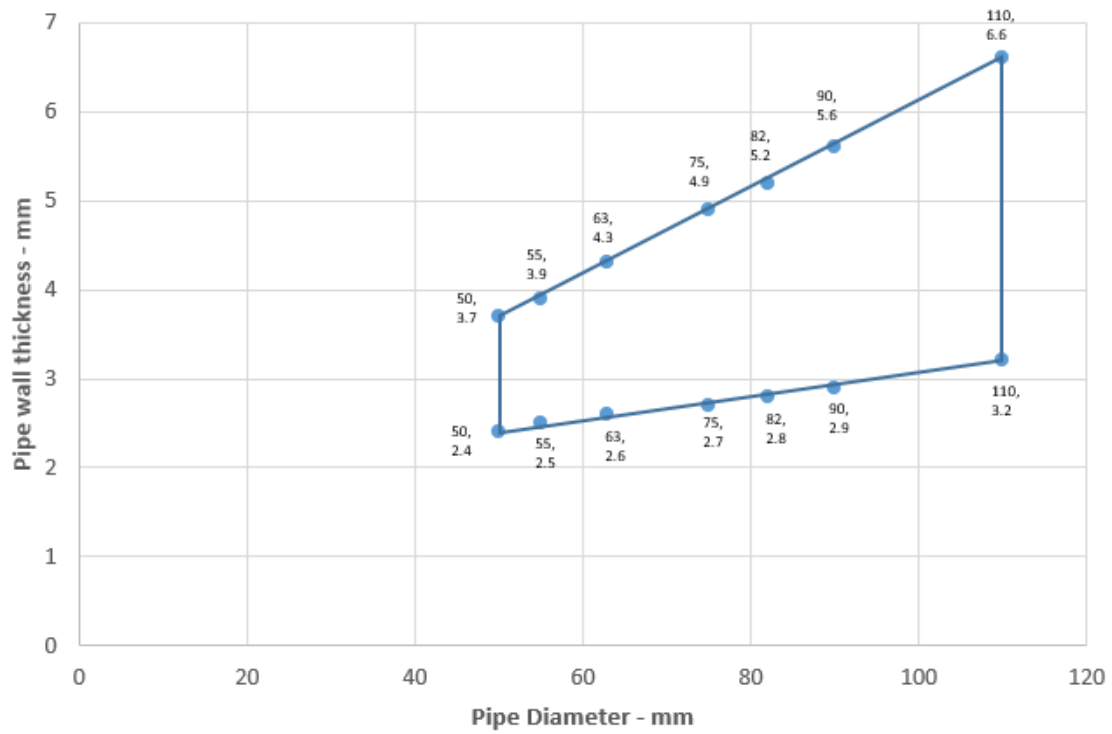


A.4.2.1

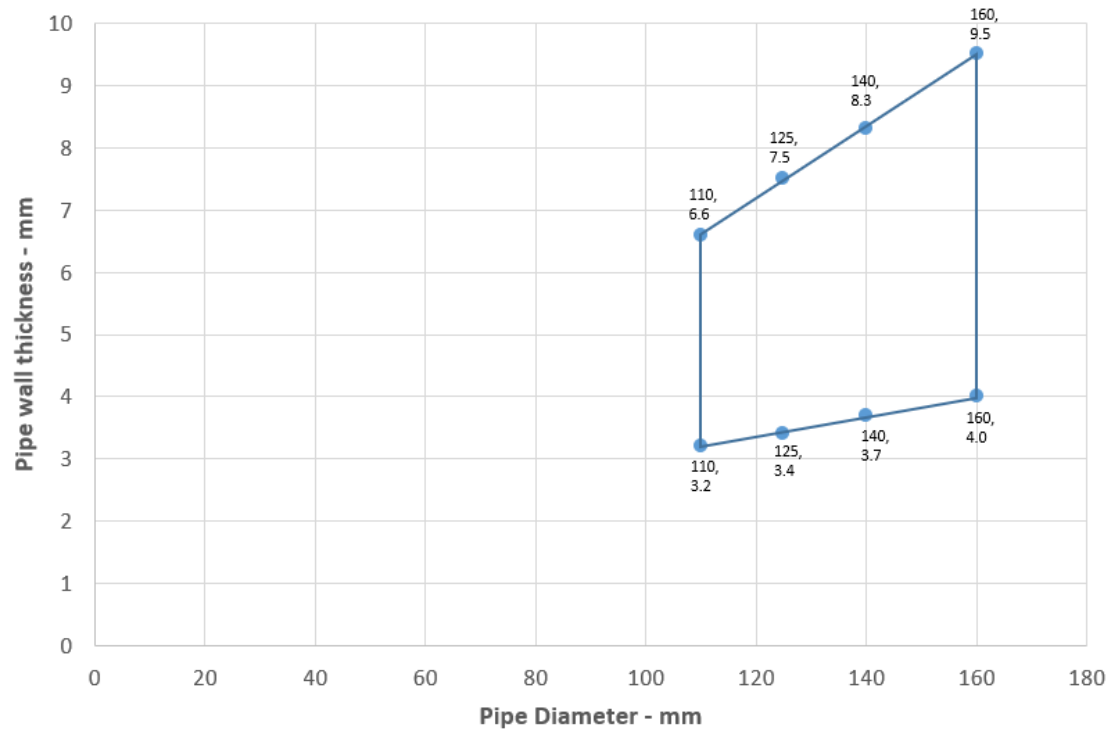
Services	Collar Inlay	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1 and PVC-C according to EN 1566-1		
Diameter 32 mm, wall thickness 2.4-3.7 mm	50 x 3.0 mm	E 240 U/C, E 240 C/C EI 180 U/C, EI 180 C/C
Diameter 40 mm, wall thickness 2.4-3.7 mm		
Diameter 50 mm, wall thickness 2.4-3.7 mm*		
Diameter 55 mm, wall thickness 2.5-3.9 mm*	50 x 3.2 mm	E 180 U/C, E 180 C/C EI 120 U/C, EI 120 C/C
Diameter 63 mm, wall thickness 2.6-4.3 mm*	50 x 3.6 mm	
Diameter 75 mm, wall thickness 2.7-4.9 mm*	50 x 4.2 mm	
Diameter 82 mm, wall thickness 2.8-5.2 mm*	50 x 4.6 mm	
Diameter 90 mm, wall thickness 2.9-5.6 mm*	50 x 5.0 mm	
Diameter 110 mm, wall thickness 3.2-6.6 mm*	50 x 6.0 mm	
Diameter 125 mm, wall thickness 3.4-7.5 mm*	60 x 8.8 mm	EI 120 U/C, EI 120 C/C
Diameter 140 mm, wall thickness 3.7-8.3 mm*	60 x 11.5 mm	
Diameter 160 mm, wall thickness 4.0-9.5 mm*	60 x 15.0 mm	

* Typical pipe diameters shown, see below graph for intermediate sizes

PVC-U Pipes 50-110 / 50 mm Collar



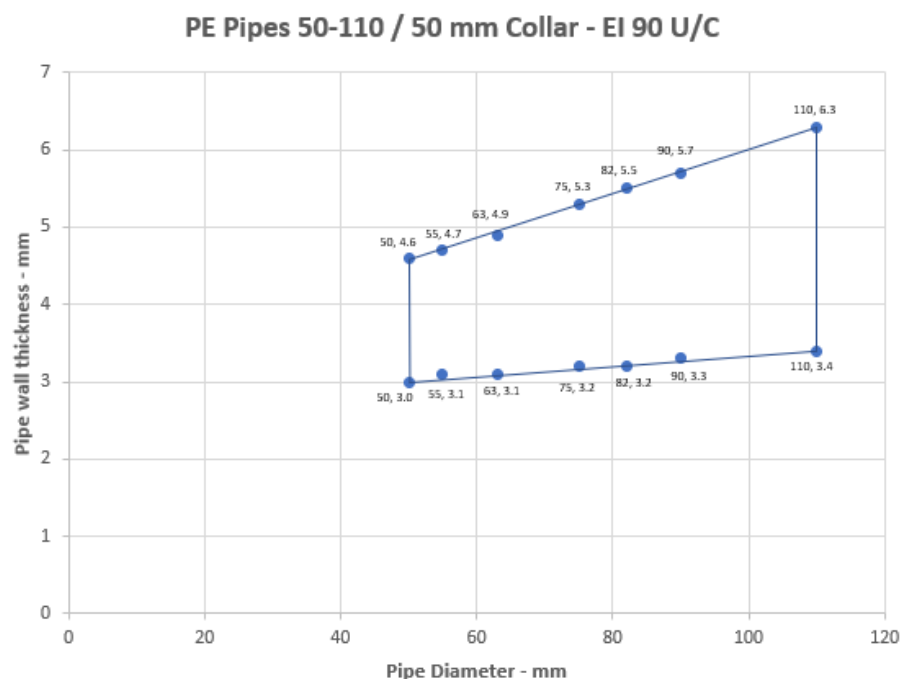
PVC-U Pipes 125-160 / 60 mm Collar



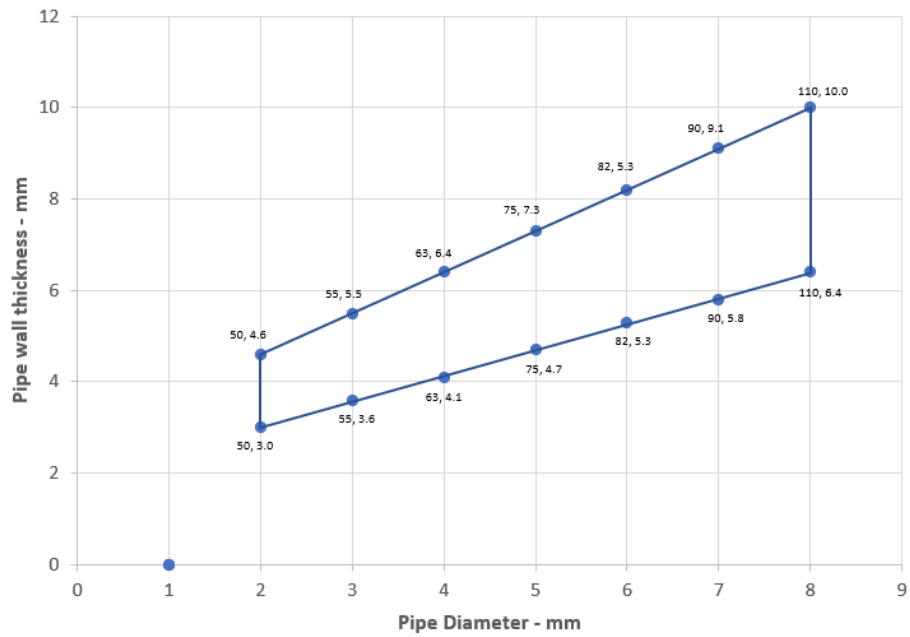
A.4.2.2

Services	Collar Inlay	Classification
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1		
Diameter 32 mm, wall thickness 3.0-4.6 mm	50 x 3.0 mm	E 180 U/C, E 180 C/C EI 120 U/C, EI 120 C/C
Diameter 40 mm, wall thickness 3.0-4.6 mm		
Diameter 50 mm, wall thickness 3.0-4.6 mm		
Diameter 55 mm, wall thickness 3.1-4.7 mm*	50 x 3.2 mm	EI 90 U/C, EI 90 C/C
Diameter 63 mm, wall thickness 3.1-4.9 mm*	50 x 3.6 mm	
Diameter 75 mm, wall thickness 3.2-5.3 mm*	50 x 4.2 mm	
Diameter 82 mm, wall thickness 3.2-5.5 mm*	50 x 4.6 mm	
Diameter 90 mm, wall thickness 3.3-5.7 mm*	50 x 5.0 mm	
Diameter 110 mm, wall thickness 3.4-6.3 mm*	50 x 6.0 mm	
Diameter 55 mm, wall thickness 3.6-5.5 mm*	50 x 3.2 mm	EI 60 U/C, EI 60 C/C
Diameter 63 mm, wall thickness 4.1-6.4 mm*	50 x 3.6 mm	
Diameter 75 mm, wall thickness 4.7-7.3 mm*	50 x 4.2 mm	
Diameter 82 mm, wall thickness 5.3-8.2 mm*	50 x 4.6 mm	
Diameter 90 mm, wall thickness 5.8-9.1 mm*	50 x 5.0 mm	
Diameter 110 mm, wall thickness 6.4-10.0 mm*	50 x 6.0 mm	

* Typical pipe diameters shown, see below graph for intermediate sizes



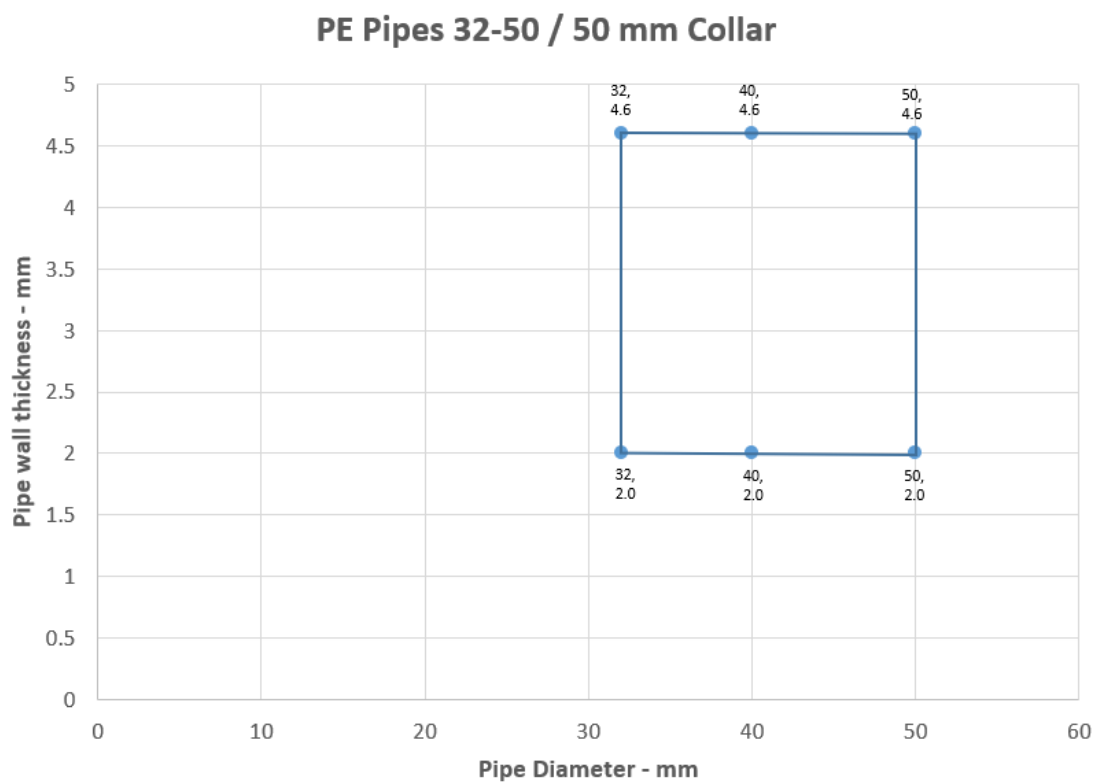
PE Pipes 50-110 / 50 mm Collar - EI 60 U/C



A.4.2.3

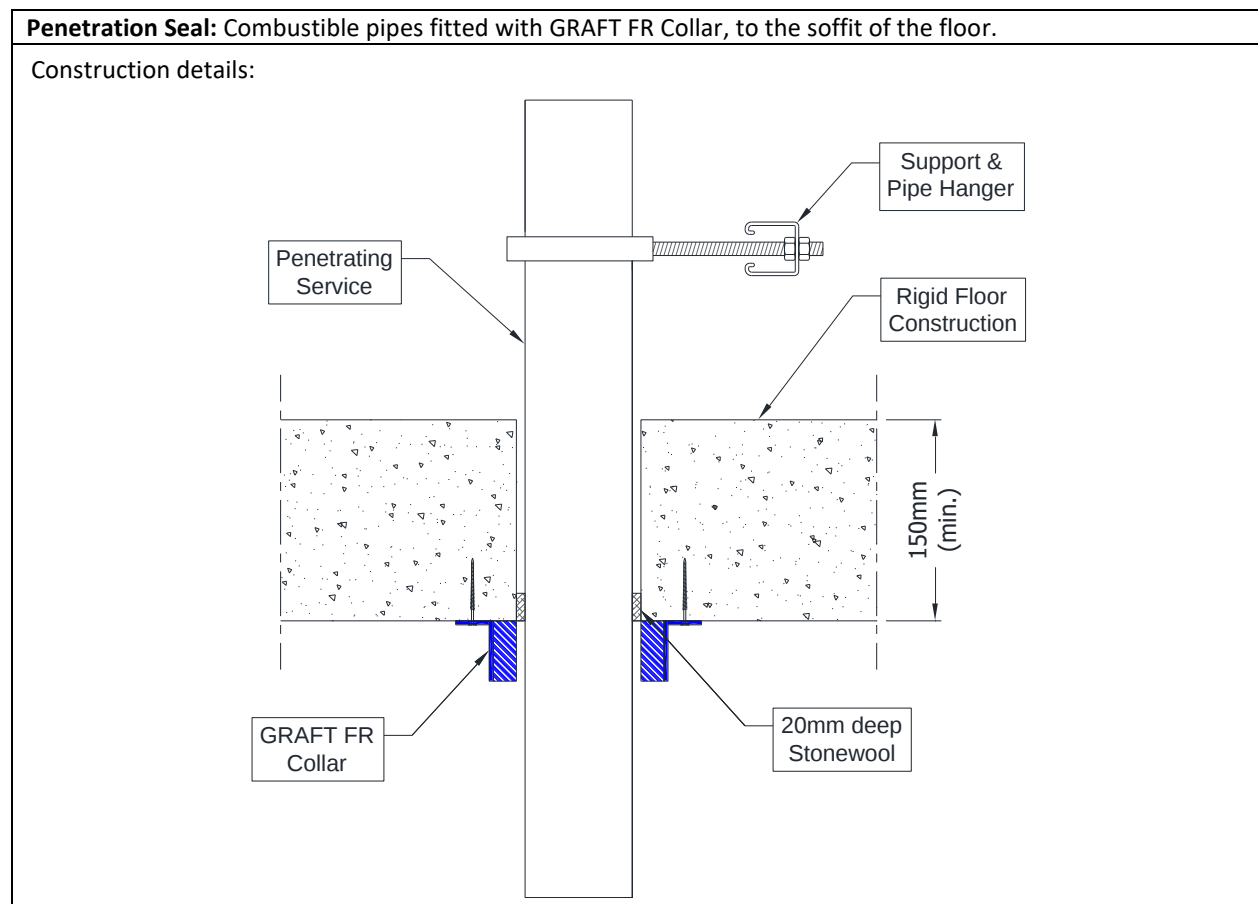
Services	Collar Inlay	Classification
PP pipe according to EN 1451-1	50 x 3.0 mm	EI 90 U/C, EI 90 C/C
Diameter 32 mm, wall thickness 2.0-4.6 mm		
Diameter 40 mm, wall thickness 2.0-4.6 mm		
Diameter 50 mm, wall thickness 2.0-4.6 mm		

* Typical pipe diameters shown, see below graph for intermediate sizes



A.5 Rigid floor constructions with floor thickness of minimum 150 mm

A.5.1 Penetration seals, surface mounted in concrete floors

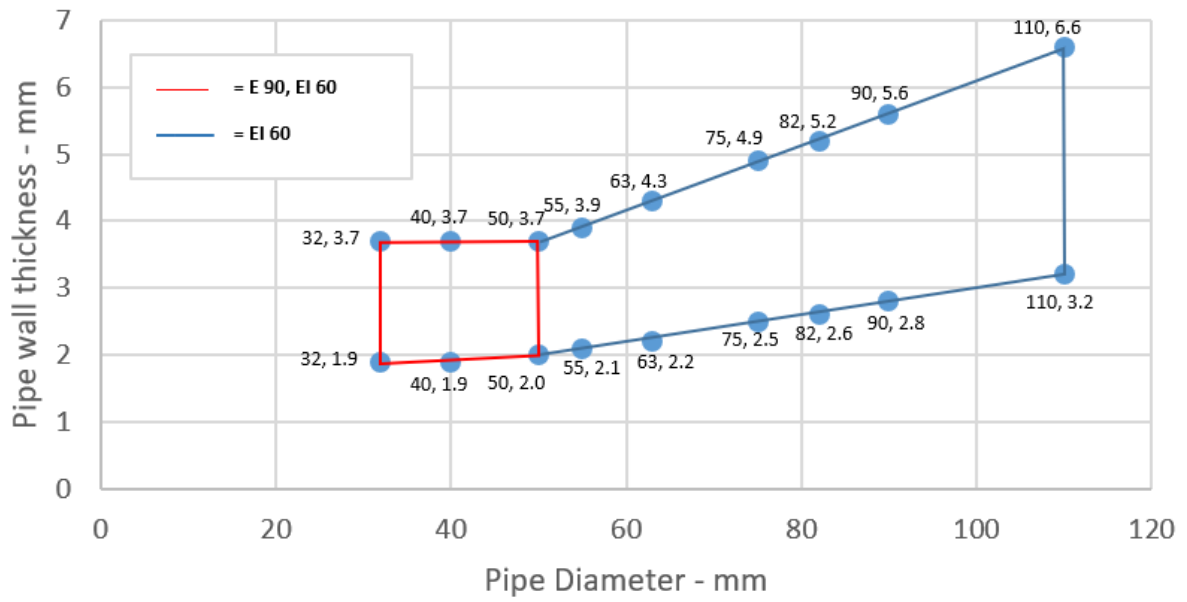


A.5.1.1

Services	Collar Inlay	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1 and PVC-C according to EN 1566-1		
Diameter 32 mm, wall thickness 1.9-3.7 mm*	30 x 3.0 mm	E 90 U/U, E 90 C/U, E 90 U/C, E 90 C/C EI 60 U/U, EI 60 C/U, EI 60 U/C, EI 60 C/C
Diameter 40 mm, wall thickness 1.9-3.7 mm*		
Diameter 50 mm, wall thickness 2.0-3.7 mm*		
Diameter 55 mm, wall thickness 2.1-3.9 mm*	30 x 3.2 mm	EI 60 U/U, EI 60 C/U, EI 60 U/C, EI 60 C/C
Diameter 63 mm, wall thickness 2.2-4.3 mm*	30 x 3.6 mm	
Diameter 75 mm, wall thickness 2.5-4.9 mm*	30 x 4.2 mm	
Diameter 82 mm, wall thickness 2.6-5.2 mm*	30 x 4.6 mm	
Diameter 90 mm, wall thickness 2.8-5.6 mm*	30 x 5.0 mm	
Diameter 110 mm, wall thickness 3.2-6.6 mm*	30 x 6.0 mm	

* Typical pipe diameters shown, see below graph for intermediate sizes

PVC Pipes 32-110 / 30 mm Collar - U/U

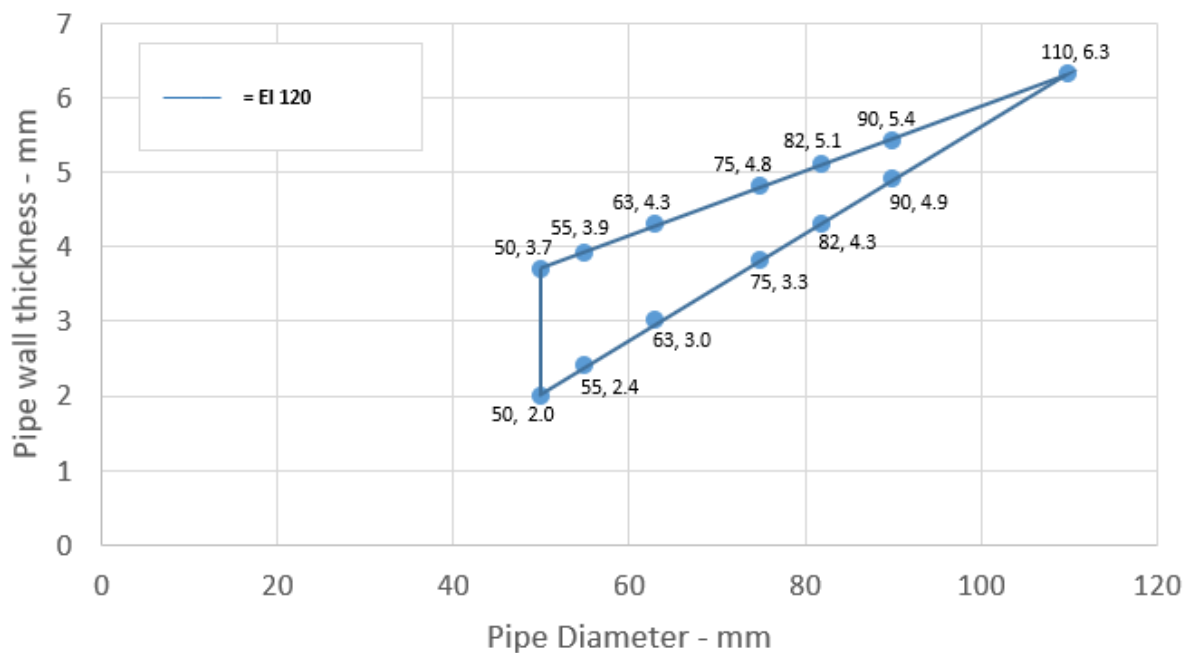


A.5.1.1.1

Services	Collar Inlay	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1 and PVC-C according to EN 1566-1		
Diameter 32 mm, wall thickness 2.0-3.7 mm	50 x 3.0 mm	EI 120 U/C, EI 120 C/C
Diameter 40 mm, wall thickness 2.0-3.7 mm		
Diameter 50 mm, wall thickness 2.0-3.7 mm*		
Diameter 55 mm, wall thickness 2.4-3.9 mm*	50 x 3.2 mm	
Diameter 63 mm, wall thickness 3.0-4.3 mm*	50 x 3.6 mm	
Diameter 75 mm, wall thickness 3.8-4.8 mm*	50 x 4.2 mm	
Diameter 82 mm, wall thickness 4.3-5.1 mm*	50 x 4.6 mm	
Diameter 90 mm, wall thickness 4.9-5.4 mm*	50 x 5.0 mm	
Diameter 110 mm, wall thickness 6.3 mm*	50 x 6.0 mm	

* Typical pipe diameters shown, see below graph for intermediate sizes

PVC Pipes 50-110 / 50 mm Collar - U/C

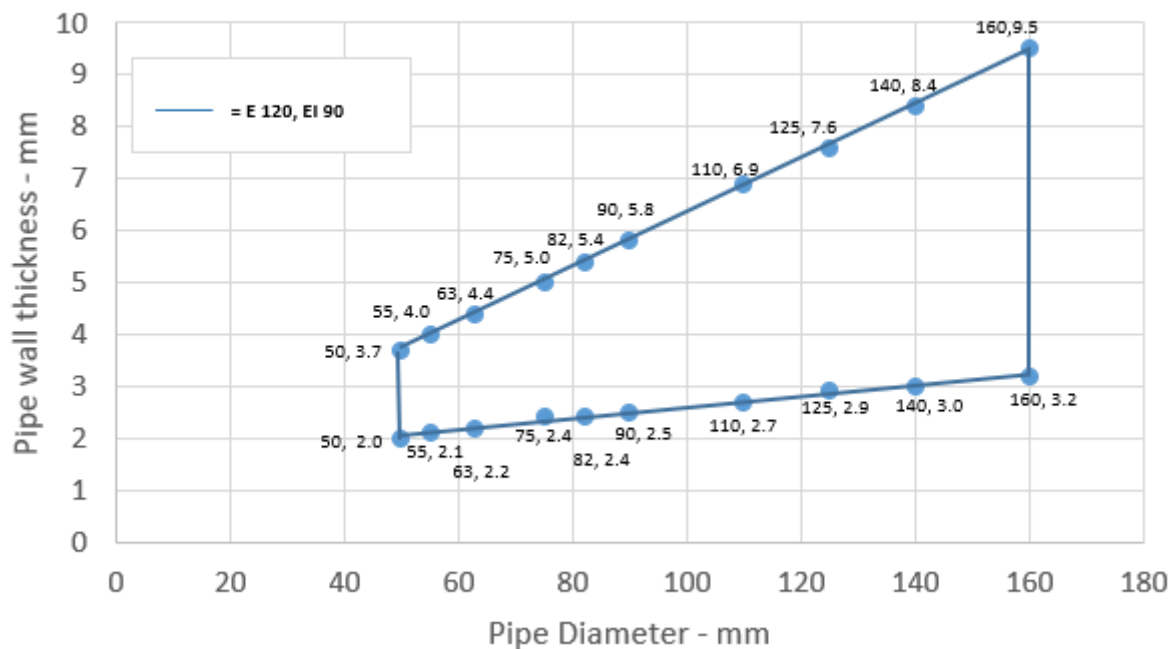


A.5.1.1.2

Services	Collar Inlay	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1 and PVC-C according to EN 1566-1		
Diameter 50 mm, wall thickness 2.0-3.7 mm*	50 x 3.0 mm	E 120 U/C, EI 90 U/C
Diameter 55 mm, wall thickness 2.1-4.0 mm*	50 x 3.2 mm	
Diameter 63 mm, wall thickness 2.2-4.4 mm*	50 x 3.6 mm	
Diameter 75 mm, wall thickness 2.4-5.0 mm*	50 x 4.2 mm	
Diameter 82 mm, wall thickness 2.4-5.4 mm*	50 x 4.6 mm	
Diameter 90 mm, wall thickness 2.5-5.8 mm*	50 x 5.0 mm	
Diameter 110 mm, wall thickness 2.7-6.9 mm*	50 x 6.0 mm	
Diameter 125 mm, wall thickness 2.9-7.6 mm*	50 x 8.8 mm	
Diameter 140 mm, wall thickness 3.0-8.4 mm*	50 x 11.5 mm	
Diameter 160 mm, wall thickness 3.2-9.5 mm*	50 x 15.0 mm	E 180 U/C, E 180 C/C EI 90 U/C, EI 90 C/C
Diameter 160 mm, wall thickness 3.2-9.5 mm	50 x 15.0 mm	

* Typical pipe diameters shown, see below graph for intermediate sizes

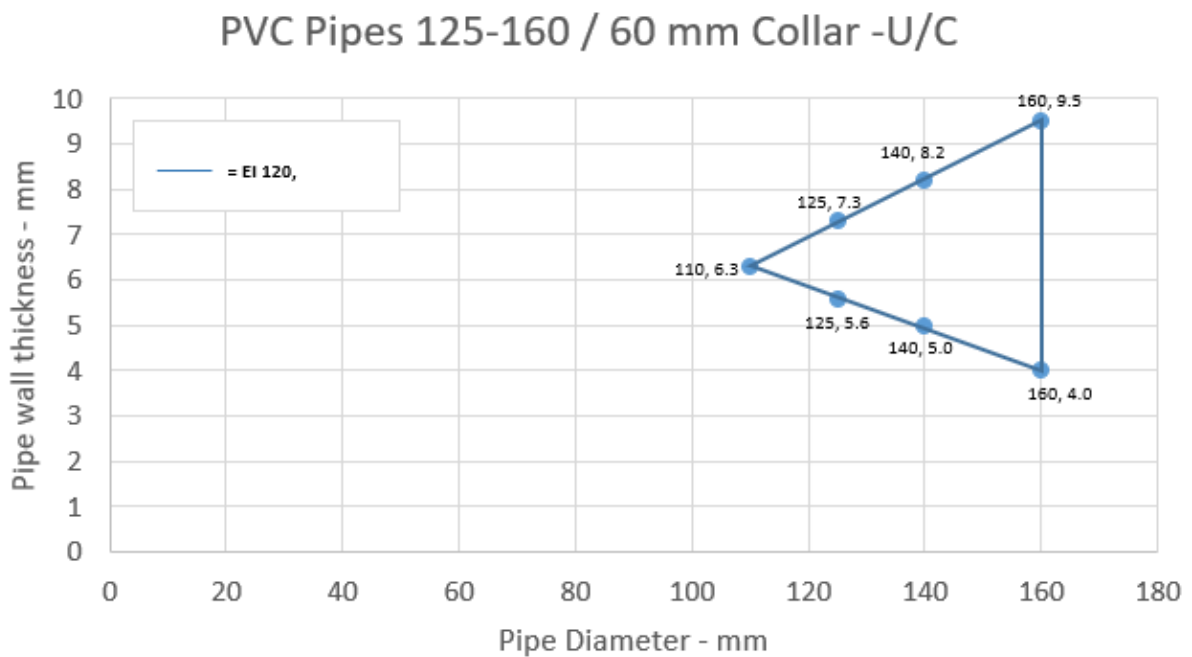
PVC Pipes 50-160 / 50 mm Collar - U/C



A.5.1.1.3

Services	Collar Inlay	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1 and PVC-C according to EN 1566-1		
Diameter 110 mm, wall thickness 6.3 mm*	60 x 6.0 mm	EI 120 U/C, EI 120 C/C
Diameter 125 mm, wall thickness 5.6-7.3 mm*	60 x 9.0 mm	
Diameter 140 mm, wall thickness 5.0-8.2 mm*	60 x 11.5 mm	
Diameter 160 mm, wall thickness 4.0-9.5 mm*	60 x 15.0 mm	

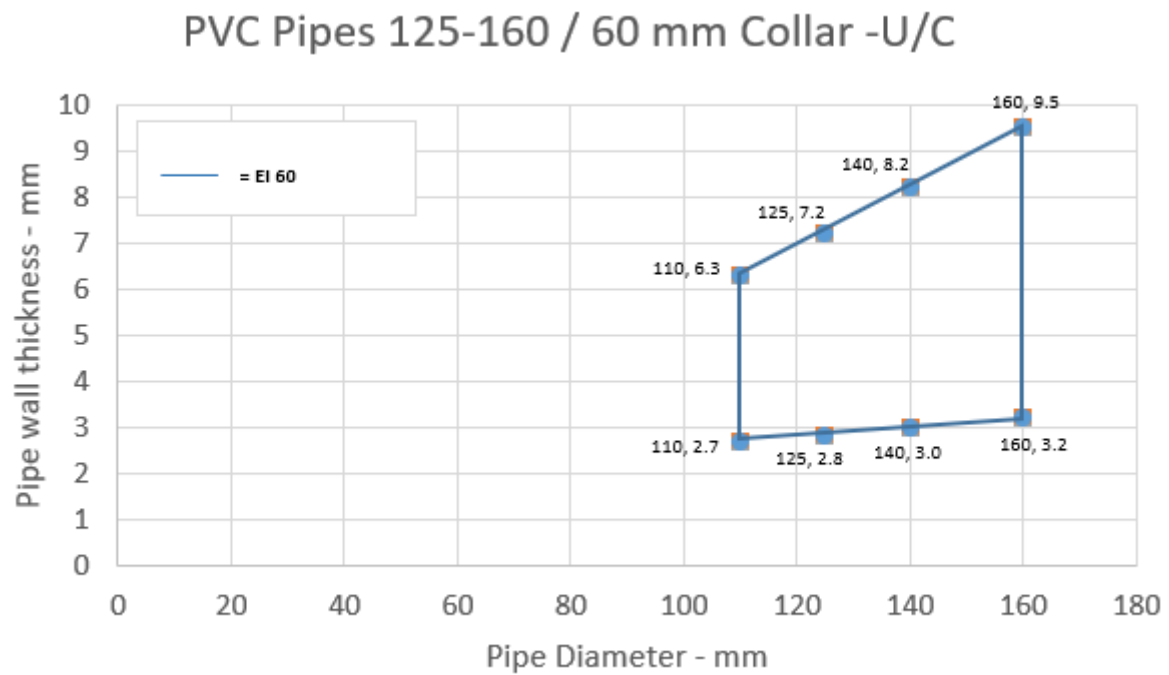
* Typical pipe diameters shown, see below graph for intermediate sizes



A.5.1.1.4

Services	Collar Inlay	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1 and PVC-C according to EN 1566-1		
Diameter 110 mm, wall thickness 2.7-6.3 mm*	60 x 6.0 mm	EI 60 U/C
Diameter 125 mm, wall thickness 2.8-7.2 mm*	60 x 8.7 mm	
Diameter 140 mm, wall thickness 3.0-8.2 mm*	60 x 11.4 mm	
Diameter 160 mm, wall thickness 3.2-9.5 mm*	60 x 15.0 mm	

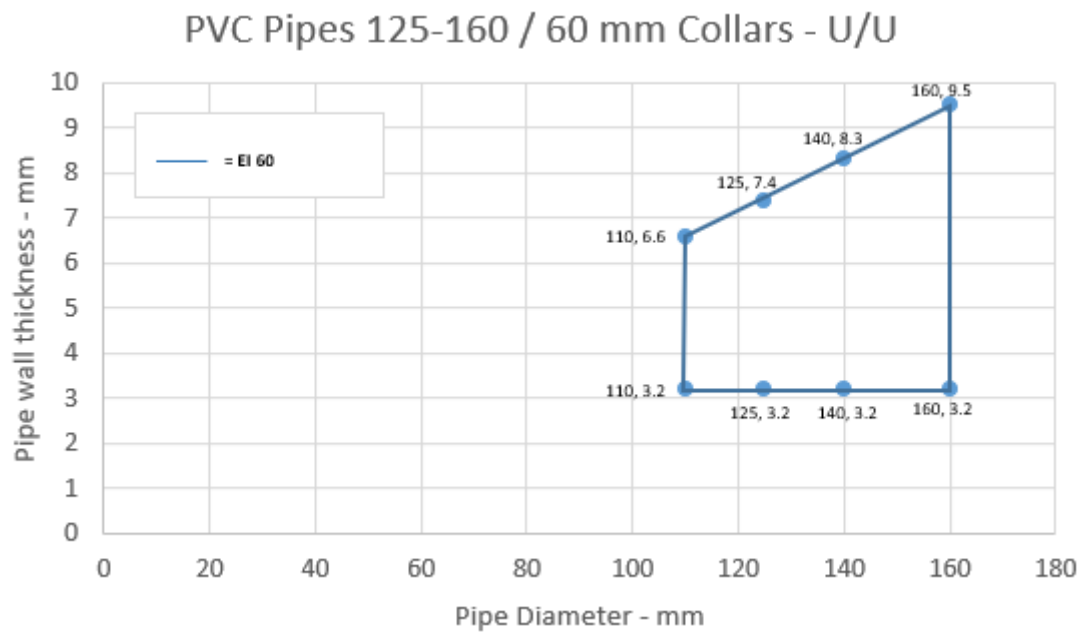
* Typical pipe diameters shown, see below graph for intermediate sizes



A.5.1.1.5

Services	Collar Inlay	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1 and PVC-C according to EN 1566-1		
Diameter 110 mm, wall thickness 3.2-6.6 mm*	60 x 6.0 mm	EI 60 U/U
Diameter 125 mm, wall thickness 3.2-7.4 mm*	60 x 8.7 mm	
Diameter 140 mm, wall thickness 3.2-8.3 mm*	60 x 11.4 mm	
Diameter 160 mm, wall thickness 3.2-9.5 mm*	60 x 15.0 mm	

* Typical pipe diameters shown, see below graph for intermediate sizes

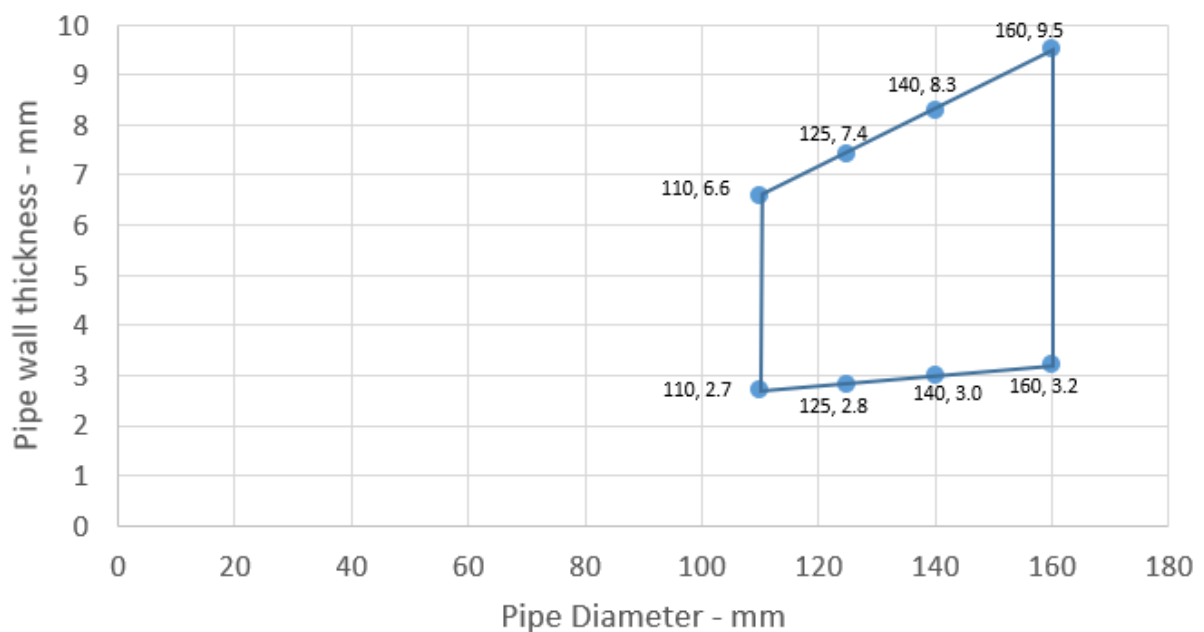


A.5.1.1.6

Services	Collar Inlay	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1 and PVC-C according to EN 1566-1		
Diameter 110 mm, wall thickness 2.7-6.6 mm*	50 x 6.0 mm	EI 60 C/U
Diameter 125 mm, wall thickness 2.8-7.4 mm*	60 x 8.7 mm	
Diameter 140 mm, wall thickness 3.0-8.3 mm*	60 x 11.4 mm	
Diameter 160 mm, wall thickness 3.2-9.5 mm*	60 x 15.0 mm	

* Typical pipe diameters shown, see below graph for intermediate sizes

PVC Pipes 125-160 / 60 mm Collar - C/U

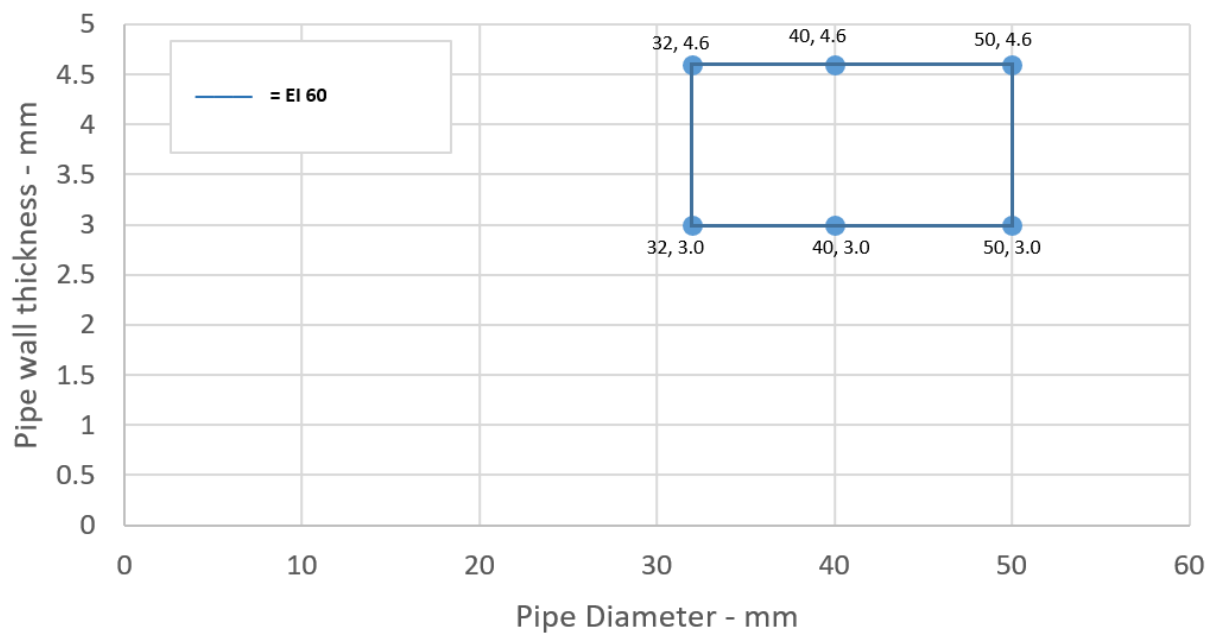


A.5.1.2

Services	Collar Inlay	Classification
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1		
Diameter 32 mm, wall thickness 3.0-4.6 mm*	30 x 3.0 mm	EI 60 U/U, EI 60 C/U, EI 60 U/C, EI 60 C/C
Diameter 40 mm, wall thickness 3.0-4.6 mm*		
Diameter 50 mm, wall thickness 3.0-4.6 mm*		
Diameter 110 mm, wall thickness 10.0 mm	30 x 6.0 mm	EI 180 U/C

* Typical pipe diameters shown, see below graph for intermediate sizes

PE Pipes 32-50 / 30 mm Collar - U/U

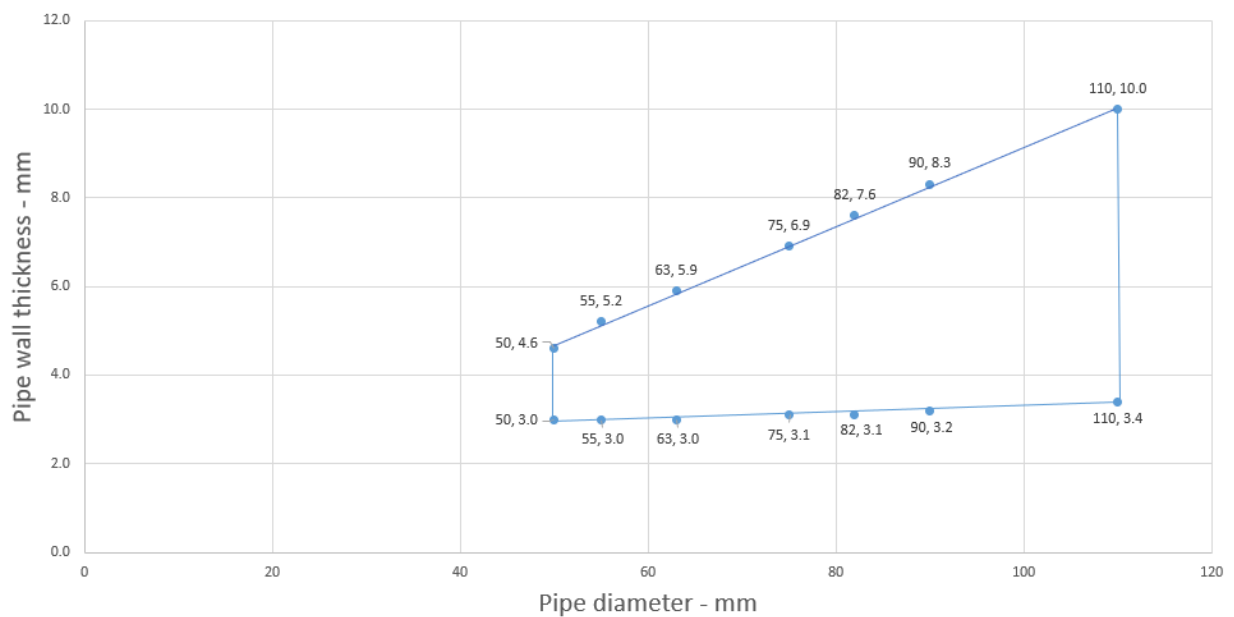


A.5.1.2.1

Services	Collar Inlay	Classification
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1		
Diameter 50 mm, wall thickness 3.0-4.6 mm*	30 x 3.0 mm	EI 60 U/U, EI 60 C/U, EI 60 U/C, EI 60 C/C
Diameter 55 mm, wall thickness 3.0-5.2 mm*	30 x 3.2 mm	
Diameter 63 mm, wall thickness 3.0-5.9 mm*	30 x 3.6 mm	EI 60 U/C, EI 60 C/C
Diameter 75 mm, wall thickness 3.1-6.9 mm*	30 x 4.2 mm	
Diameter 82 mm, wall thickness 3.1-7.6 mm*	30 x 4.6 mm	
Diameter 90 mm, wall thickness 3.2-8.3 mm*	30 x 5.0 mm	
Diameter 110 mm, wall thickness 3.4-10.0 mm*	30 x 6.0 mm	

* Typical pipe diameters shown, see below graph for intermediate sizes

PE pipes 50-110 / 30 mm Collar - U/C

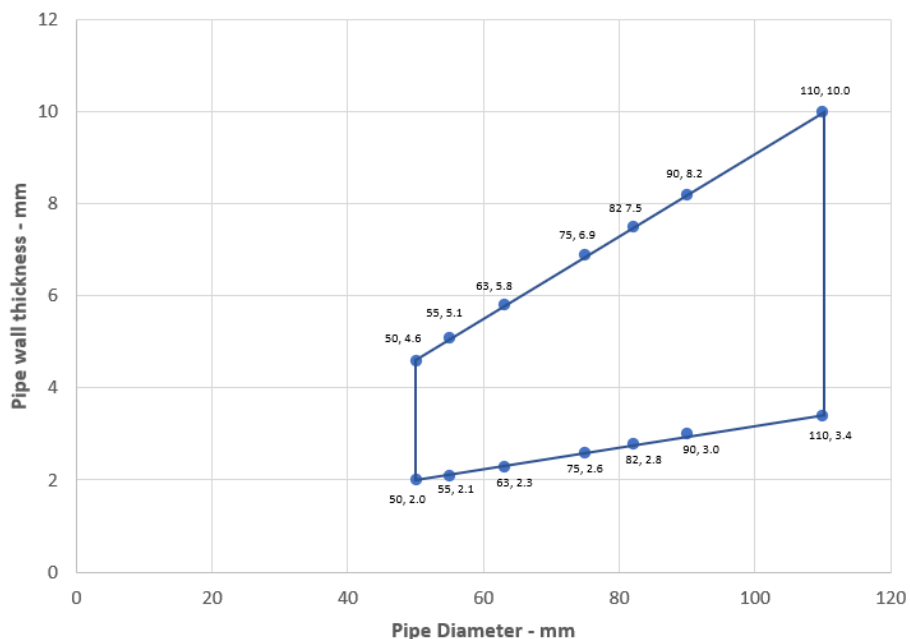


A.5.1.2.2

Services	Collar Inlay	Classification
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1		
Diameter 32-40 mm, wall thickness 3.0-4.6 mm	50 x 3.0 mm	EI 240 U/C
Diameter 50 mm, wall thickness 3.0-4.6 mm	50 x 3.2 mm	
Diameter 32-40 mm, wall thickness 2.0-3.0 mm	50 x 3.0 mm	EI 240 U/U
Diameter 50 mm, wall thickness 2.0-3.0 mm	50 x 3.2 mm	
Diameter 50 mm, wall thickness 2.0-4.6 mm*	50 x 3.0 mm	EI 60 U/U, EI 60 C/U
Diameter 55 mm, wall thickness 2.1-5.1 mm*	50 x 3.2 mm	
Diameter 63 mm, wall thickness 2.3-5.8 mm*	50 x 3.6 mm	
Diameter 75 mm, wall thickness 2.6-6.9 mm*	50 x 4.2 mm	
Diameter 82 mm, wall thickness 2.8-7.5 mm*	50 x 4.6 mm	
Diameter 90 mm, wall thickness 3.0-8.2 mm*	50 x 5.0 mm	
Diameter 110 mm, wall thickness 3.4-10.0 mm*	50 x 6.0 mm	

* Typical pipe diameters shown, see below graph for intermediate sizes

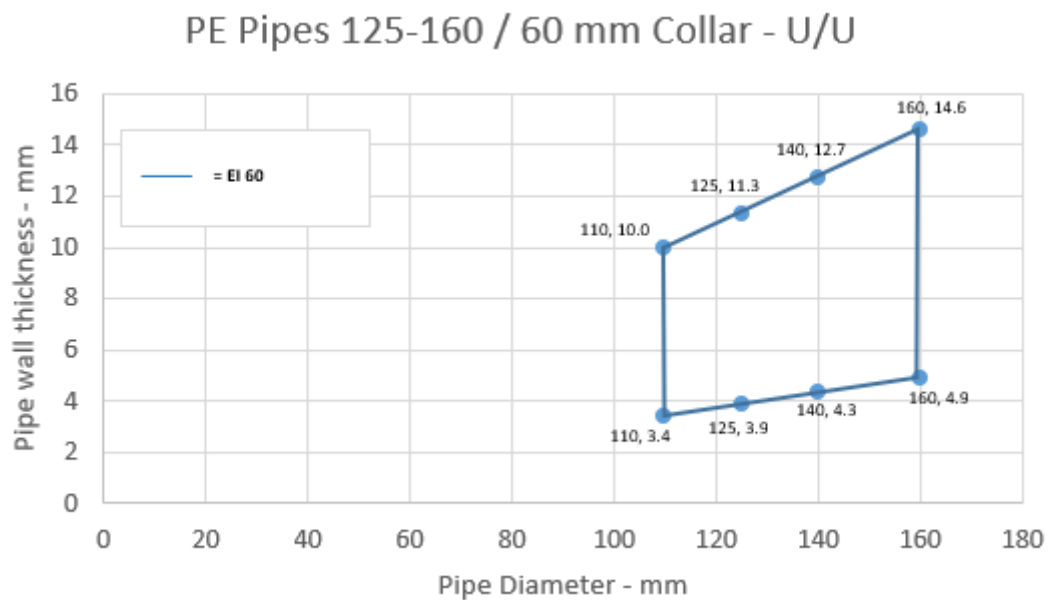
PE Pipes 50-110 / 50 mm Collar - EI 60 U/U



A.5.1.2.3

Services	Collar Inlay	Classification
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1		
Diameter 110 mm, wall thickness 3.4-10.0 mm*	60 x 6.0 mm	EI 60 U/U, EI 60 C/U
Diameter 125 mm, wall thickness 3.9-11.3 mm*	60 x 8.8 mm	
Diameter 140 mm, wall thickness 4.3-12.7 mm*	60 x 11.5 mm	
Diameter 160 mm, wall thickness 4.9-14.6 mm*	60 x 15.0 mm	

* Typical pipe diameters shown, see below graph for intermediate sizes

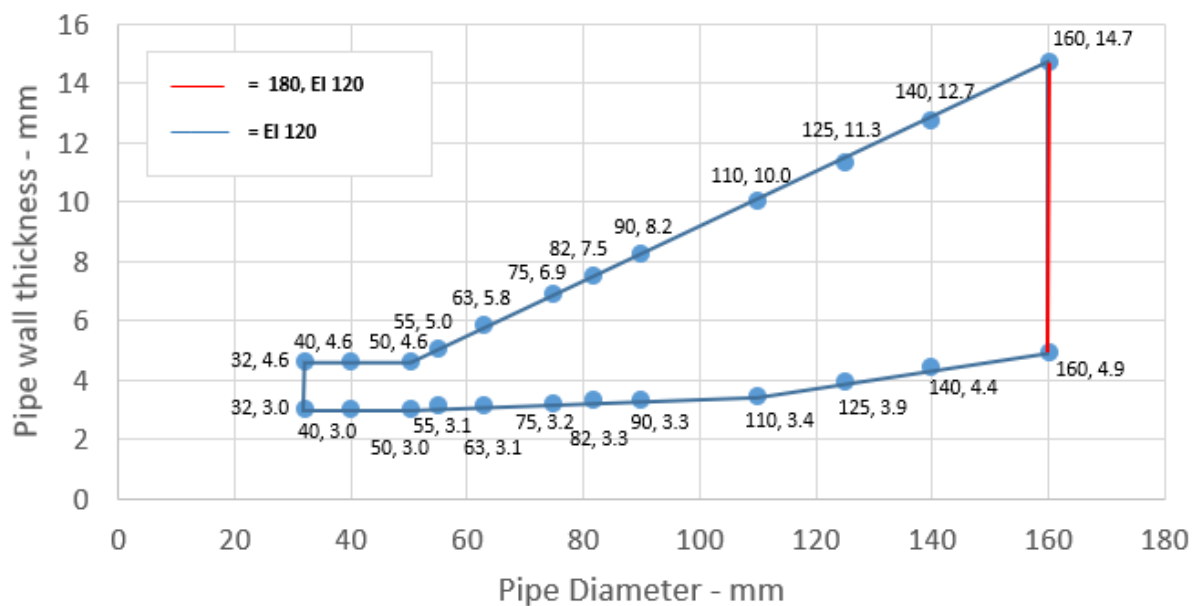


A.5.1.2.4

Services	Collar Inlay	Classification
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1		
Diameter 32 mm, wall thickness 3.0-4.6 mm	50 x 3.0 mm	EI 120 U/C, EI 120 C/C
Diameter 40 mm, wall thickness 3.0-4.6 mm		
Diameter 50 mm, wall thickness 3.0-4.6 mm		
Diameter 55 mm, wall thickness 3.1-5.0 mm	50 x 3.2 mm	
Diameter 63 mm, wall thickness 3.1-5.8 mm	50 x 3.6 mm	
Diameter 75 mm, wall thickness 3.2-6.9 mm	50 x 4.2 mm	
Diameter 82 mm, wall thickness 3.3-7.5 mm	50 x 4.6 mm	
Diameter 90 mm, wall thickness 3.3-8.2 mm	50 x 5.0 mm	
Diameter 110 mm, wall thickness 3.4-10.0 mm	50 x 6.0 mm	
Diameter 125 mm, wall thickness 3.9-11.3 mm	50 x 8.8 mm	
Diameter 140 mm, wall thickness 4.4-12.7 mm	50 x 11.5 mm	
Diameter 160 mm, wall thickness 4.9-14.7 mm	50 x 15.0 mm	E 180 U/C, E 180 C/C EI 120 U/C, EI 120 C/C

* Typical pipe diameters shown, see below graph for intermediate sizes

PE Pipes 32-16 / 50 mm Collar - U/C

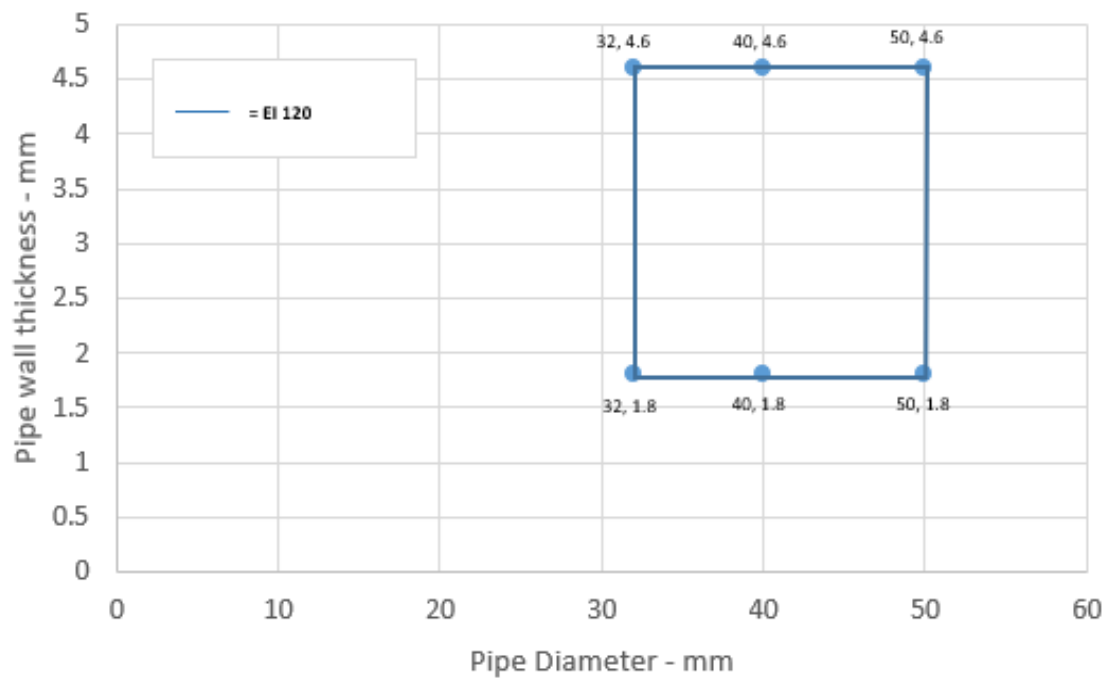


A.5.1.3

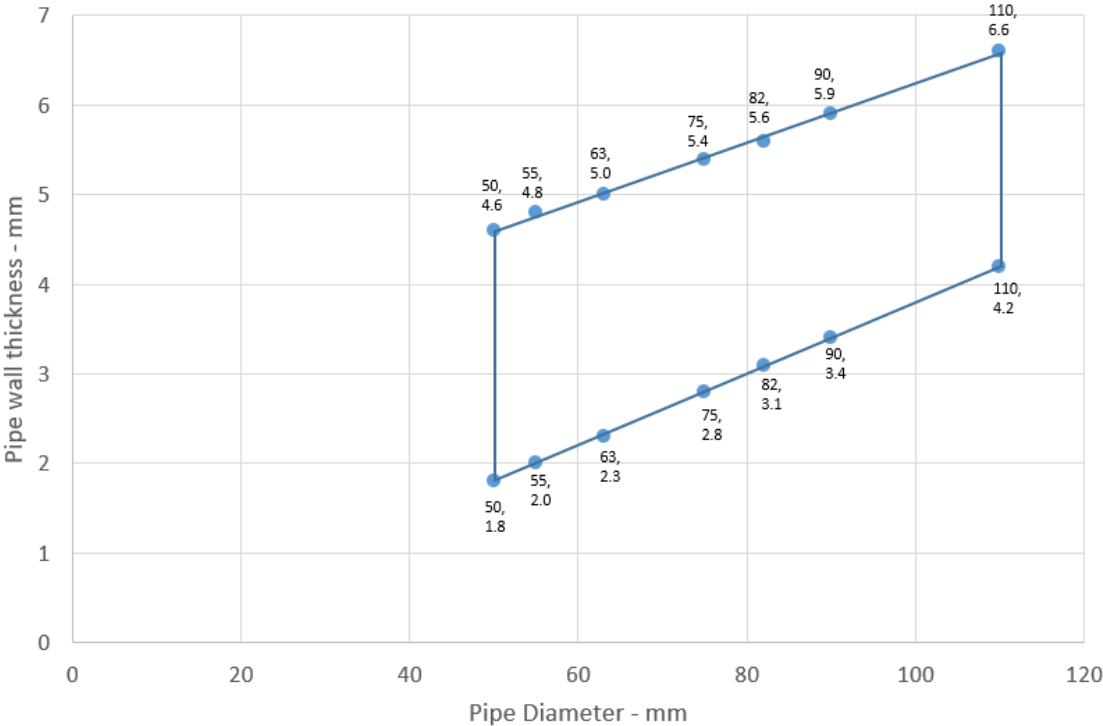
Services	Collar Inlay	Classification
PP pipe according to EN 1451-1		
Diameter 32 mm, wall thickness 1.8-4.6 mm*	30 x 3.0 mm	EI 120 U/U, EI 120 C/U, EI 120 U/C, EI 120 C/C
Diameter 40 mm, wall thickness 1.8-4.6 mm*		
Diameter 50 mm, wall thickness 1.8-4.6 mm*		
Diameter 55 mm, wall thickness 2.0-4.8 mm*	30 x 3.2 mm	EI 120 U/C, EI 120 C/C
Diameter 63 mm, wall thickness 2.3-5.5 mm*	30 x 3.6 mm	
Diameter 75 mm, wall thickness 2.8-5.4 mm*	30 x 4.2 mm	
Diameter 82 mm, wall thickness 3.1-5.6 mm*	30 x 4.6 mm	
Diameter 90 mm, wall thickness 3.4-5.9 mm*	30 x 5.0 mm	
Diameter 110 mm, wall thickness 4.2-6.6 mm*	30 x 6.0 mm	EI 180 U/C, EI 180 C/C

* Typical pipe diameters shown, see below graph for intermediate sizes

PP Pipes 32-50 / 30 mm Collar - U/U



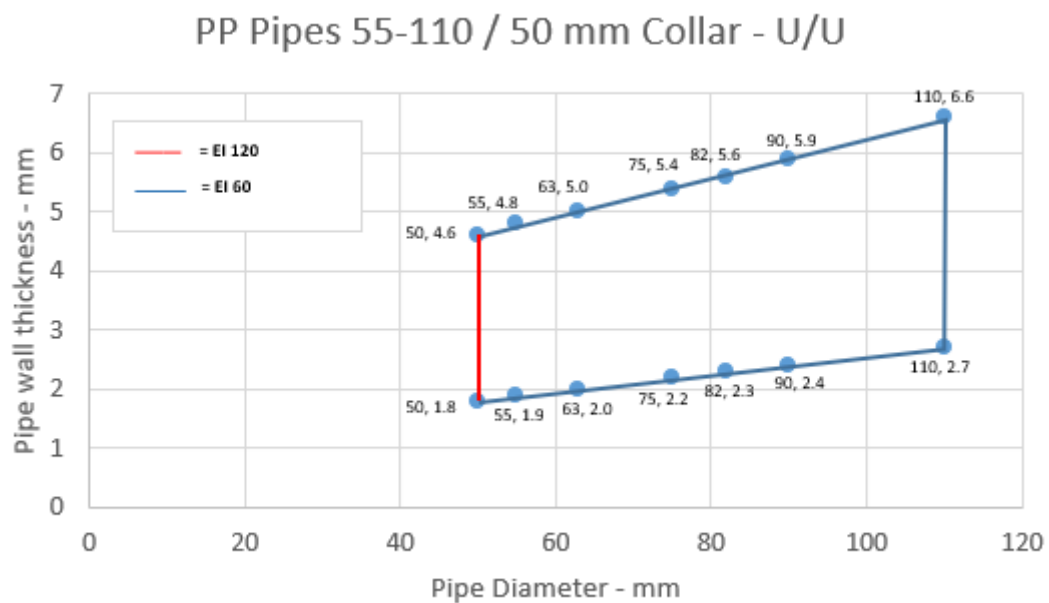
PP Pipes 50-110 / 30 mm Collar - U/C



A.5.1.3.1

Services	Collar Inlay	Classification
PP pipe according to EN 1451-1		
Diameter 50 mm, wall thickness 2.9 mm	50 x 3.2 mm	EI 240 U/U
Diameter 50 mm, wall thickness 2.9-4.6 mm	50 x 3.0 mm	E 240 U/C, EI 180 U/C
Diameter 50 mm, wall thickness 1.8-4.6 mm*	50 x 3.0 mm	EI 120 U/U, EI 120 C/U, EI 120 U/C, EI 120 C/C
Diameter 55 mm, wall thickness 1.9-4.8 mm*	50 x 3.2 mm	EI 60 U/U, EI 60 C/U
Diameter 63 mm, wall thickness 2.0-5.0 mm*	50 x 3.6 mm	
Diameter 75 mm, wall thickness 2.2-5.4 mm*	50 x 4.2 mm	
Diameter 82 mm, wall thickness 2.3-5.6 mm*	50 x 4.6 mm	
Diameter 90 mm, wall thickness 2.4-5.9 mm*	50 x 5.0 mm	
Diameter 110 mm, wall thickness 2.7-6.6 mm*	50 x 6.0 mm	

* Typical pipe diameters shown, see below graph for intermediate sizes

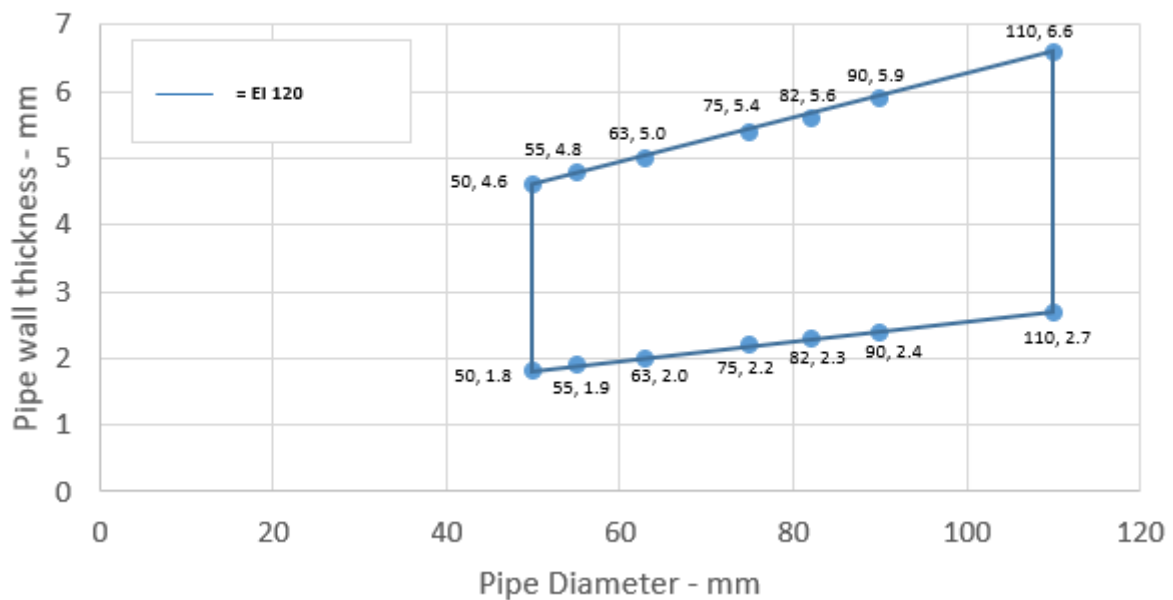


A.5.1.3.2

Services	Collar Inlay	Classification
PP pipe according to EN 1451-1		
Diameter 50 mm, wall thickness 1.8-4.6 mm*	50 x 3.0 mm	EI 120 U/U, EI 120 C/U, EI 120 U/C, EI 120 C/C
Diameter 55 mm, wall thickness 1.9-4.8 mm*	50 x 3.2 mm	EI 120 U/C, EI 120 C/C
Diameter 63 mm, wall thickness 2.0-5.0 mm*	50 x 3.6 mm	
Diameter 75 mm, wall thickness 2.2-5.4 mm*	50 x 4.2 mm	
Diameter 82 mm, wall thickness 2.3-5.6 mm*	50 x 4.6 mm	
Diameter 90 mm, wall thickness 2.4-5.9 mm*	50 x 5.0 mm	
Diameter 110 mm, wall thickness 2.7-6.6 mm*	50 x 6.0 mm	

* Typical pipe diameters shown, see below graph for intermediate sizes

PP Pipes 55-110 / 50 mm Collar - U/C

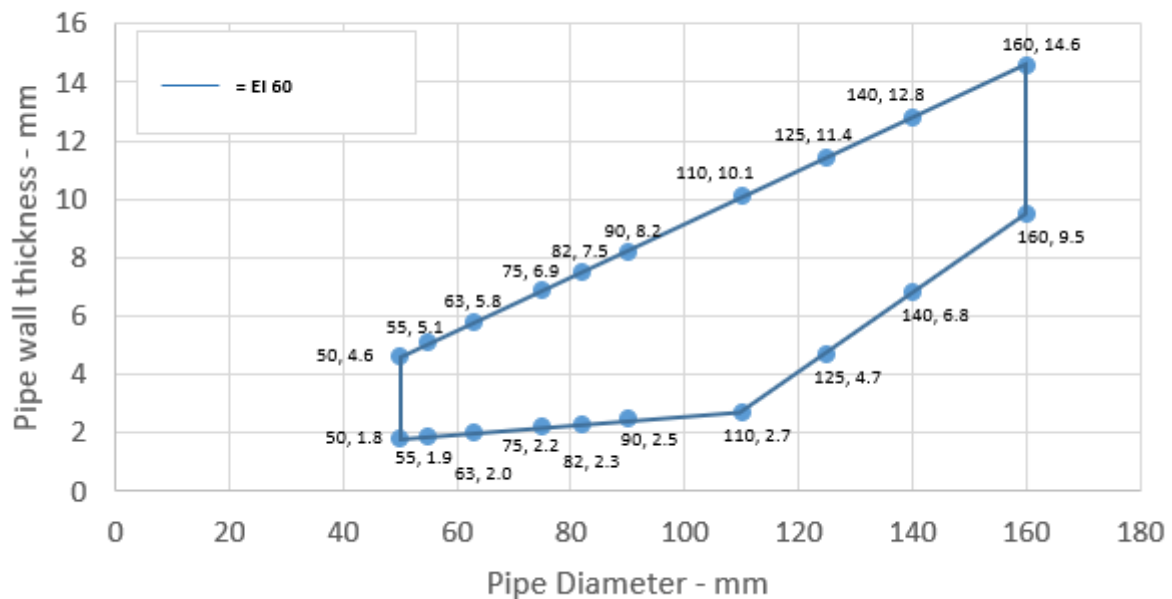


A.5.1.3.3

Services	Collar Inlay	Classification
PP pipe according to EN 1451-1		
Diameter 50 mm, wall thickness 1.8-4.6 mm*	30 x 3.0 mm	EI 60 U/C, EI 60 C/C
Diameter 55 mm, wall thickness 1.9-5.1 mm*	50 x 3.2 mm	
Diameter 63 mm, wall thickness 2.0-5.8 mm*	50 x 3.6 mm	
Diameter 75 mm, wall thickness 2.2-6.9 mm*	50 x 4.2 mm	
Diameter 82 mm, wall thickness 2.3-7.5 mm*	50 x 4.6 mm	
Diameter 90 mm, wall thickness 2.5-8.2 mm*	50 x 5.0 mm	
Diameter 110 mm, wall thickness 2.7-10.1 mm*	50 x 6.0 mm	
Diameter 125 mm, wall thickness 4.7-11.4 mm*	50 x 8.8 mm	
Diameter 140 mm, wall thickness 6.8-12.8 mm*	50 x 11.5 mm	
Diameter 160 mm, wall thickness 9.5-14.6 mm*	50 x 15.0 mm	

* Typical pipe diameters shown, see below graph for intermediate sizes

PP Pipes 55-160 / 50 mm Collar - U/C

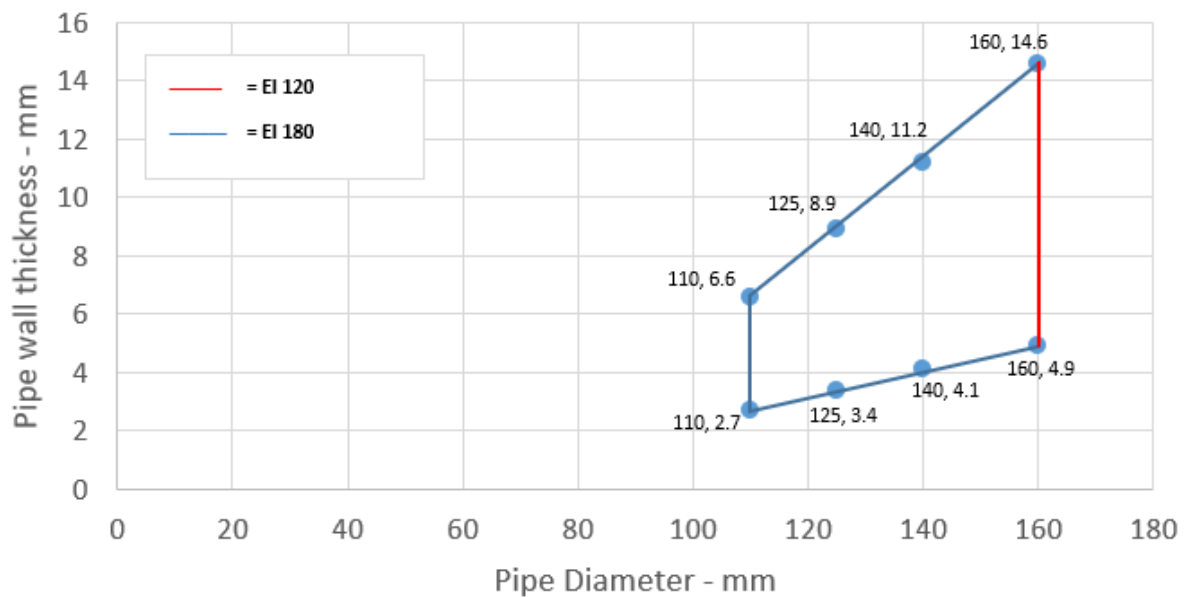


A.5.1.3.4

Services	Collar Inlay	Classification
PP pipe according to EN 1451-1		
Diameter 110 mm, wall thickness 2.7-6.6 mm*	60 x 6.0 mm	EI 120 U/C, EI 120 C/C
Diameter 125 mm, wall thickness 3.4-8.9 mm*	60 x 8.8 mm	
Diameter 140 mm, wall thickness 4.1-11.2 mm*	60 x 11.5 mm	
Diameter 160 mm, wall thickness 4.9-14.6 mm*	60 x 15.0 mm	EI 180 U/C, EI 180 C/C

* Typical pipe diameters shown, see below graph for intermediate sizes

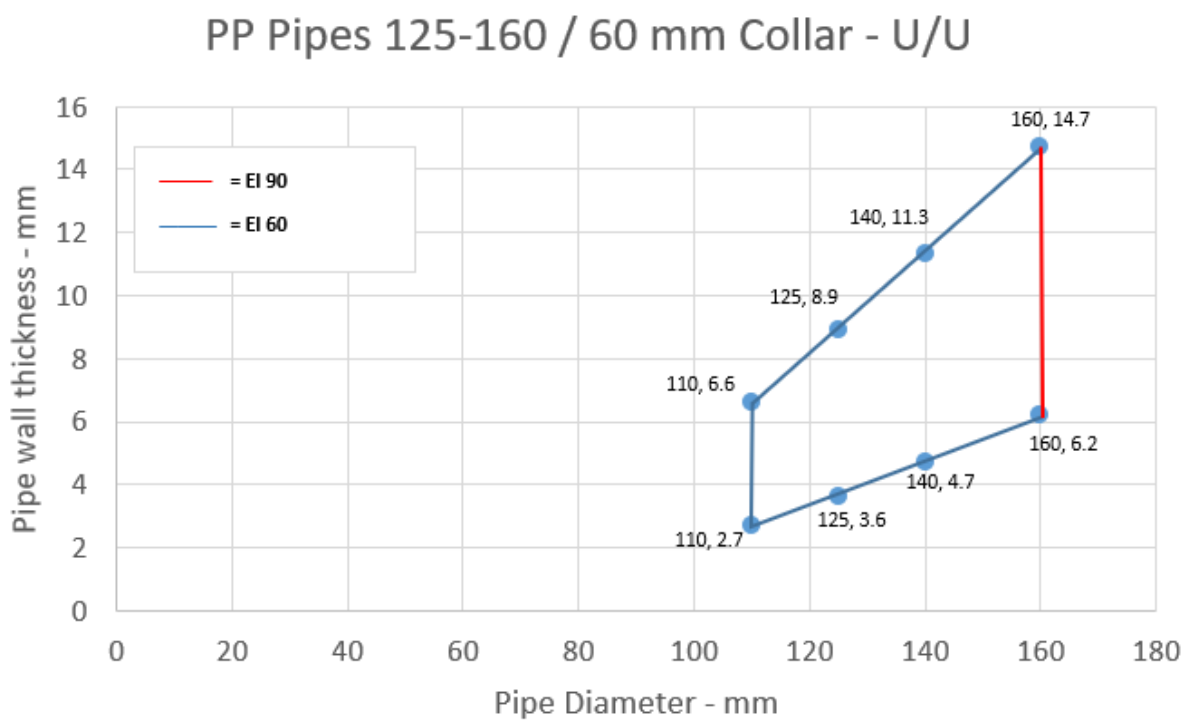
PP Pipes 125-160 / 60 mm Collar - U/C



A.5.1.3.5

Services	Collar Inlay	Classification
PP pipe according to EN 1451-1		
Diameter 110 mm, wall thickness 2.7-6.6 mm*	50 x 6.0 mm	EI 60 U/U
Diameter 125 mm, wall thickness 3.6-8.9 mm*	60 x 8.8 mm	
Diameter 140 mm, wall thickness 4.7-11.3 mm*	60 x 11.5 mm	
Diameter 160 mm, wall thickness 6.2-14.7 mm*	60 x 15.0 mm	
Diameter 160 mm, wall thickness 6.2 mm	60 x 15.0 mm	EI 90 U/U

* Typical pipe diameters shown, see below graph for intermediate sizes



A.5.1.4

Services	Collar Inlay	Classification
Wavin SiTech + PP-M B according to EN 13501-1		
32-40 mm diameter/ 1.8 mm wall thickness	50 x 3.0 mm	EI 240 U/U
50 mm diameter/ 1.8 mm wall thickness	50 x 3.2 mm	
75 mm diameter/ 1.8-2.5 mm wall thickness	50 x 4.2 mm	EI 180 C/U
90 mm diameter/ 1.8-2.9 mm wall thickness	50 x 5.0 mm	
110 mm diameter/ 1.8-3.4 mm wall thickness	50 x 6.0 mm	
Aquatherm Green SDR9 MF PP-RP according to ISO 21003		
32 mm diameter/3.6-5.6 mm wall thickness	30 x 3.0 mm	EI 240 C/C
40 mm diameter/3.6-5.6 mm wall thickness	50 x 3.0 mm	
50 mm diameter/3.6-5.6 mm wall thickness	50 x 3.2 mm	
63 diameter/5.6-12.3 mm wall thickness	50 x 3.6 mm	EI 120 C/C
75 diameter/4.4-8.4 mm wall thickness	50 x 4.2 mm	
90 diameter/4.9-10.0 mm wall thickness	50 x 5.0 mm	
110 diameter/5.6-12.3 mm wall thickness	50 x 6.0 mm	
Geberit Silent PP according to DIN 4102		
32-40 mm diameter/ 1.8 mm wall thickness	50 x 3.0 mm	EI 240 U/U
50 mm diameter/ 1.8 mm wall thickness	50 x 3.2 mm	
75 mm diameter/1.8-2.4 mm wall thickness	50 x 4.2 mm	EI 180 C/U
90 mm diameter/1.8-2.8 mm wall thickness	50 x 5.0 mm	
110 mm diameter/1.8-3.4 mm wall thickness	50 x 6.0 mm	
Polo-Kal NG Poloplast PP-MV according to DIN 4102		
32-40 mm diameter/1.8-2.0 mm wall thickness	50 x 3.0 mm	EI 240 U/U
50 mm diameter/1.8-2.0 mm wall thickness	50 x 3.2 mm	
75 mm diameter/1.9-2.6 wall thickness	50 x 4.2 mm	EI 240 C/U
90 mm diameter/2.0-2.9 wall thickness	50 x 5.0 mm	
110 mm diameter/2.0-3.4 wall thickness	50 x 6.0 mm	
Diameter 125 mm, wall thickness 3.9 mm	60 x 9.0 mm	EI 240 U/C
Diameter 160 mm, wall thickness 4.9 mm	60 x 15 mm	E 240 C/U, EI 240 U/C

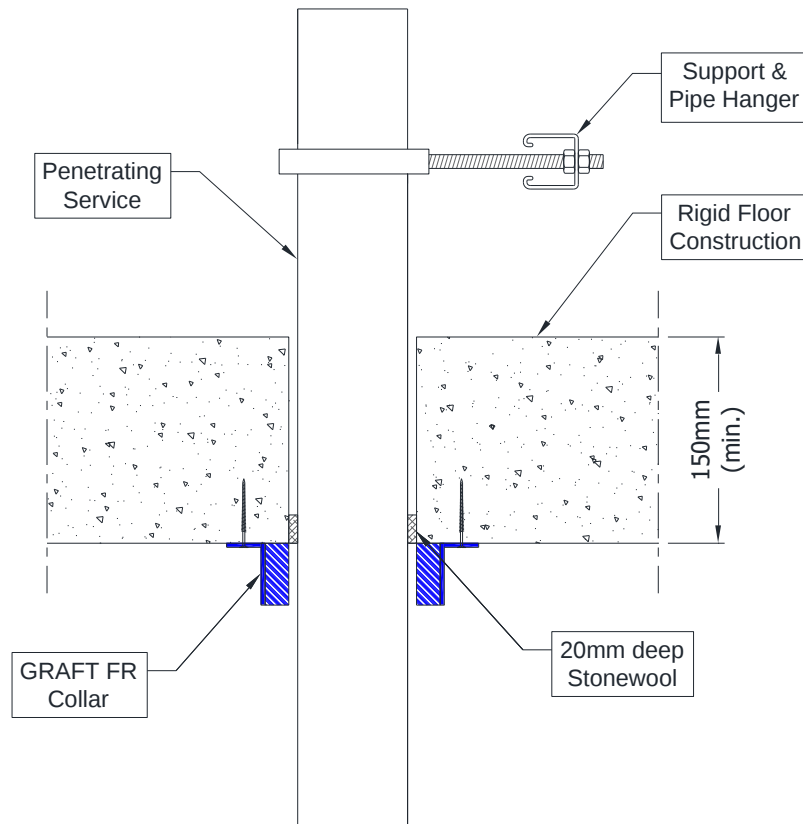
A.5.1.4.1

Services	Collar Inlay	Classification
Rehau Raupiano Plus PP-DD according to DIN 4102		
40 mm diameter/1.8 wall thickness	50 x 3.0 mm	EI 240 U/U
50 mm diameter/1.8 wall thickness	50 x 3.2 mm	
75 mm diameter/1.8-2.2 mm wall thickness	50 x 4.2 mm	EI 120 C/U
90 mm diameter/1.8-2.4 mm wall thickness	50 x 5.0 mm	
110 mm diameter/1.8-2.7mm wall thickness	50 x 6.0 mm	
Diameter 125 mm, wall thickness 3.1 mm	60 x 9.0 mm	EI 180 C/U
Diameter 160 mm, wall thickness 3.9 mm	60 x 15.0 mm	E 240 C/U, EI 240 U/C
BluePower Multilayer pipe – TR02-PP according to EN 1451-1		
32-40 mm diameter/1.8 mm wall thickness	50 x 3.0 mm	EI 180 U/U
50 mm diameter/1.8 mm wall thickness	50 x 3.2 mm	
75 mm diameter/1.8-3.4 mm wall thickness	50 x 4.2 mm	EI 180 C/U
90 mm diameter/1.8-3.4 mm wall thickness	50 x 5.0 mm	
110 mm diameter/1.8-3.4 mm wall thickness	50 x 6.0 mm	
125 mm diameter/3.4-4.9 mm wall thickness	60 x 9.0 mm	
160 mm diameter/3.4-4.9 mm wall thickness	60 x 15.0 mm	EI 240 C/U
Uponor Decibel according to EN 14366		
50 mm diameter/ 2.0 mm wall thickness	50 x 3.0 mm	EI 180 U/U
75 mm diameter/ 2.6 mm wall thickness	50 x 4.2 mm	EI 120 C/U
110 mm diameter/ 3.8 mm wall thickness	50 x 6.0 mm	
Wavin AS+ pipes according to EN 12056 and DIN 1986-100		
50 mm diameter / 3.0 mm wall thickness	50 x 3.0 mm	EI 240 U/U
75 mm diameter / 3.5 mm wall thickness	50 x 4.2 mm	EI 60 U/C
90 mm diameter / 4.6 mm wall thickness	50 x 5.0 mm	
110 mm diameter / 5.3 mm wall thickness	50 x 6.0 mm	
125 mm diameter / 5.3 mm wall thickness	60 x 9.0 mm	
160 mm diameter / 5.6 mm wall thickness	60 x 15.0 mm	
200 mm diameter / 6.0 mm wall thickness	60 x 18.0 mm	EI 240 U/C

A.5.2 Penetration seals, surface mounted in concrete floors

Penetration Seal: Combustible pipes fitted with GRAFT FR Collar, to the soffit of the floor.

Construction details:

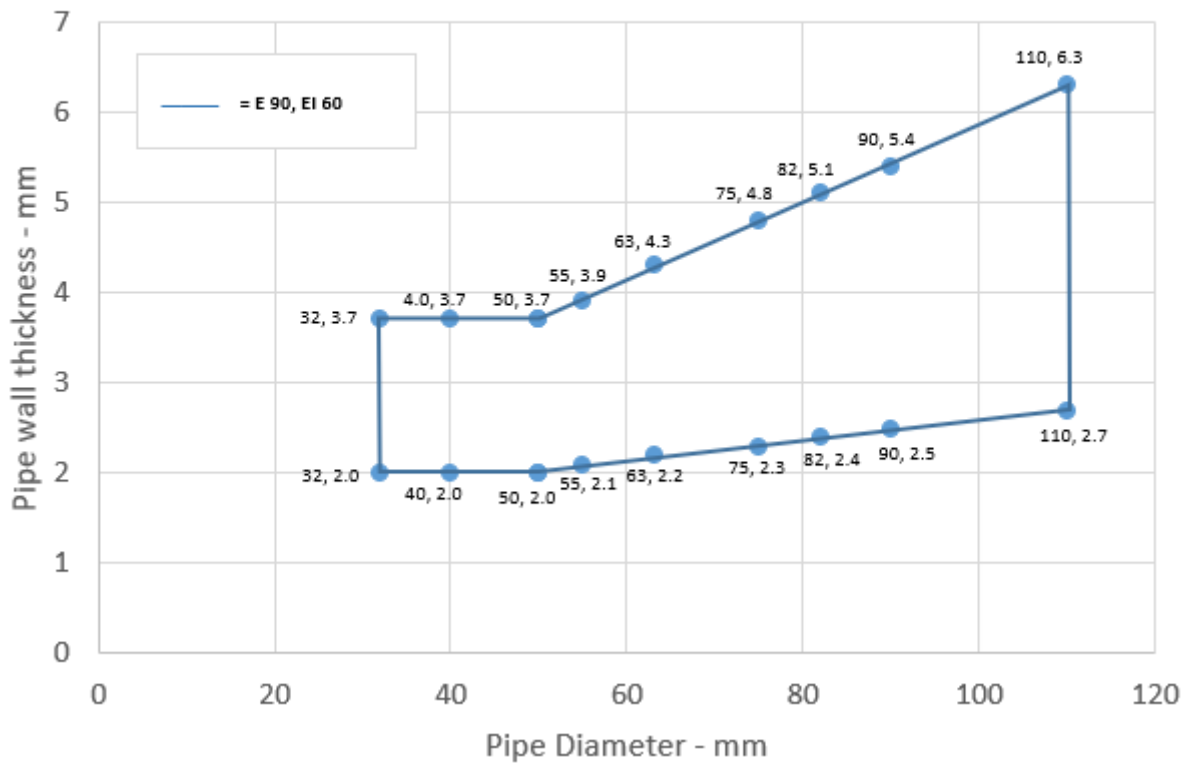


A.5.2.1

Services	Collar Inlay	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1 and PVC-C according to EN 1566-1		
Diameter 32 mm, wall thickness 2.0-3.7 mm*	50 x 3.0 mm	EI 120 C/C, EI 60 C/U
Diameter 40 mm, wall thickness 2.0-3.7 mm*		
Diameter 50 mm, wall thickness 2.0-3.7 mm*		
Diameter 55 mm, wall thickness 2.1-3.9 mm*	50 x 3.2 mm	
Diameter 63 mm, wall thickness 2.2-4.3 mm*	50 x 3.6 mm	
Diameter 75 mm, wall thickness 2.3-4.8 mm*	50 x 4.2 mm	
Diameter 82 mm, wall thickness 2.4-5.1 mm*	50 x 4.6 mm	
Diameter 90 mm, wall thickness 2.5-5.4 mm*	50 x 5.0 mm	
Diameter 110 mm, wall thickness 2.7-6.3 mm*	50 x 6.0 mm	

* Typical pipe diameters shown, see below graph for intermediate sizes

PVC Pipes 32-110 / 50 mm Collar - C/C

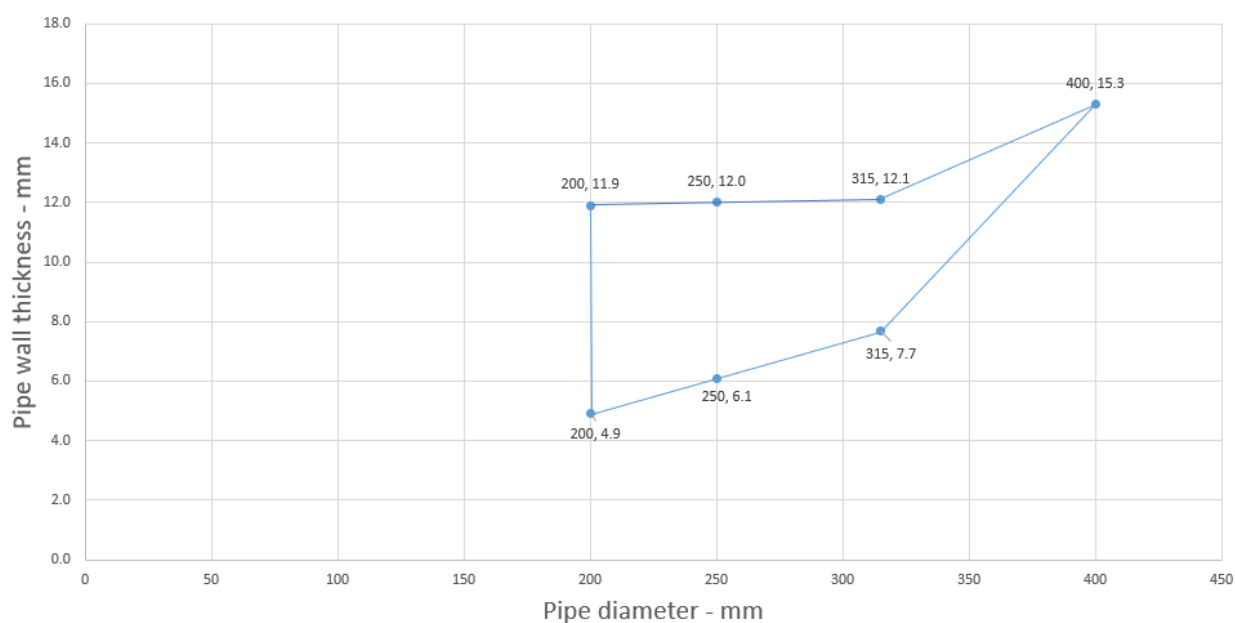


A.5.2.1.1

Services	Collar Inlay	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1 and PVC-C according to EN 1566-1		
Up to 200 mm diameter / 4.9-11.9 mm wall thickness*	60 x 18 mm	E 120 C/C, EI 60 C/C
Up to 250 mm diameter / 6.1-11.9 mm wall thickness*	75 x 24 mm	EI 60 C/C
Up to 315 mm diameter / 7.7-12.1 mm wall thickness*	75 x 30 mm	
Up to 400 mm diameter / 15.3 mm wall thickness*	100 x 39 mm	

* Typical pipe diameters shown, see below graph for intermediate sizes

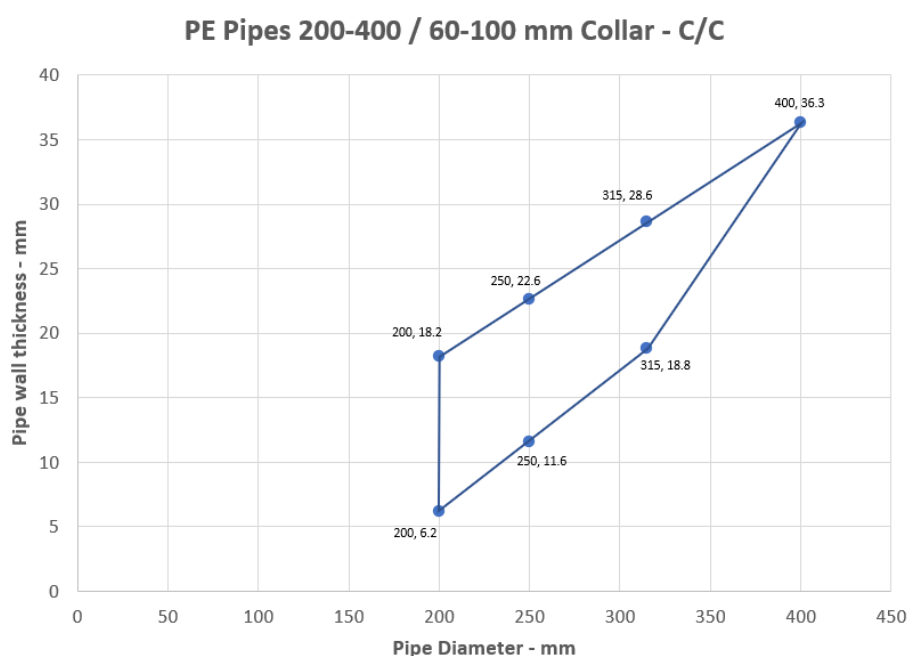
PVC pipes 200-400 / 60-100 mm Collar - C/C



A.5.2.2

Services	Collar Inlay	Classification
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1		
Up to 200 mm diameter / 6.2-18.2 mm wall thickness*	60 x 18 mm	E 240 C/C, EI 120 C/C
Up to 250 mm diameter / 11.5-18.4 mm wall thickness*	75 x 24 mm	EI 240 C/C
Up to 315 mm diameter / 18.7 mm wall thickness*	75 x 30 mm	
Up to 315 mm diameter / 18.8-28.6 mm wall thickness*	75 x 30 mm	EI 90 C/C
Up to 400 mm diameter / 36.3 mm wall thickness*	100 x 39 mm	EI 90 C/C

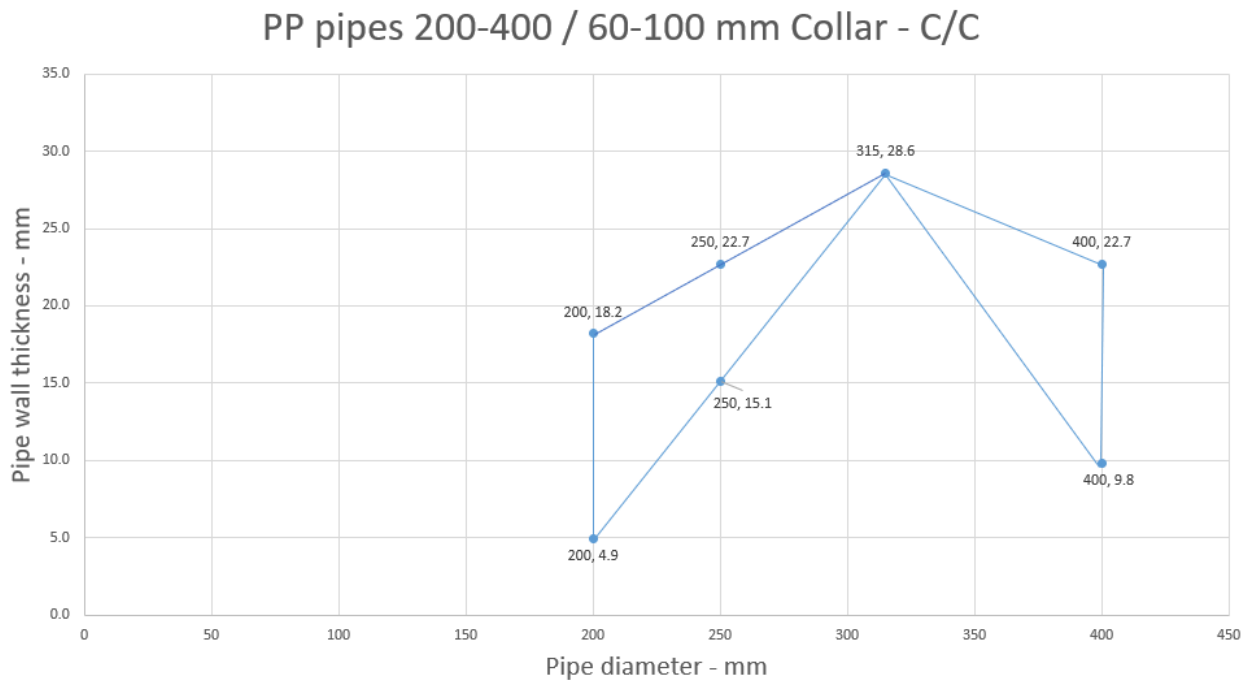
* Typical pipe diameters shown, see below graph for intermediate sizes



A.5.2.3

Services	Collar Inlay	Classification
PP pipe according to EN 1451-1		
Up to 200 mm diameter / 4.9-18.2 mm wall thickness*	60 x 18 mm	EI 120 C/C
Up to 250 mm diameter / 15.1-22.7 mm wall thickness*	75 x 24 mm	EI 60 C/C
Up to 315 mm diameter / 28.6 mm wall thickness*	75 x 30 mm	
Up to 400 mm diameter / 9.8-22.7 mm wall thickness*	100 x 39 mm	EI 30 C/C

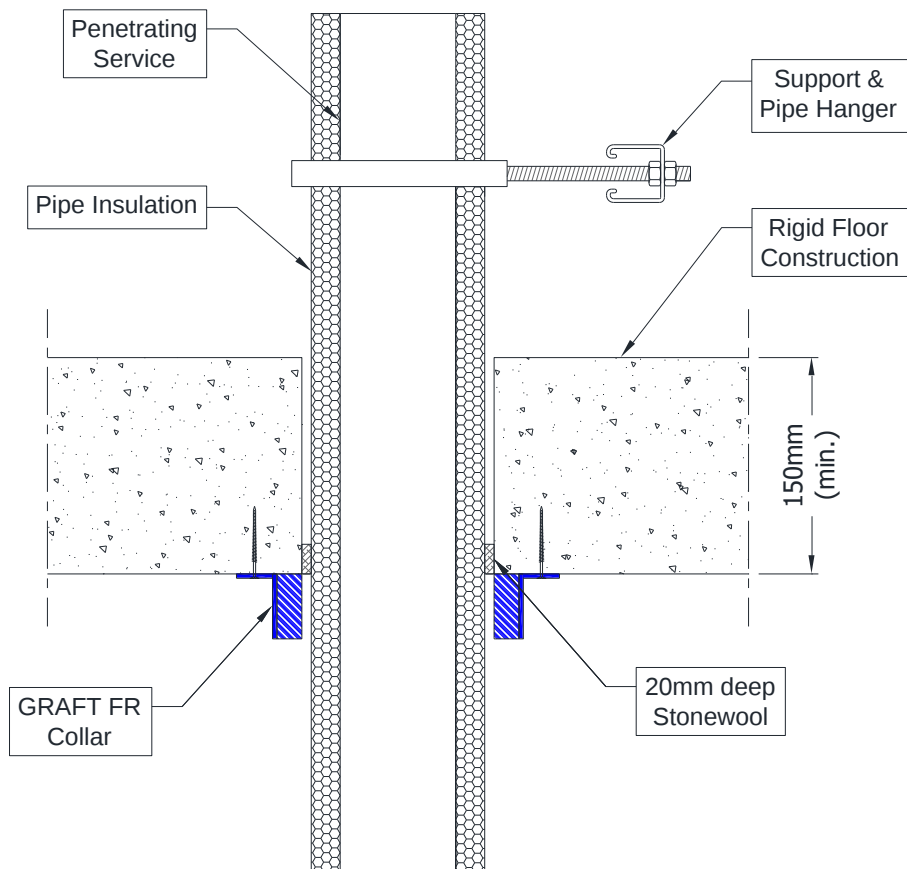
* Typical pipe diameters shown, see below graph for intermediate sizes



A.5.3 Penetration seals, surface mounted in concrete floors

Penetration Seal: Metallic pipes fitted with GRAFT FR Collar, to the soffit of the floor.

Construction details:

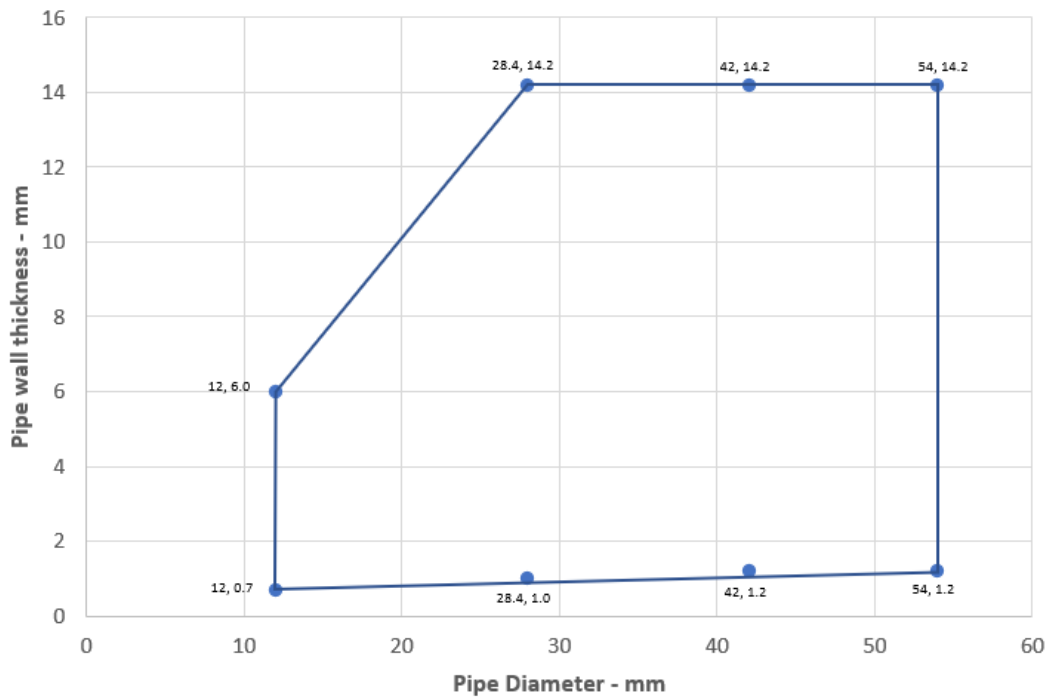


A.5.3.1

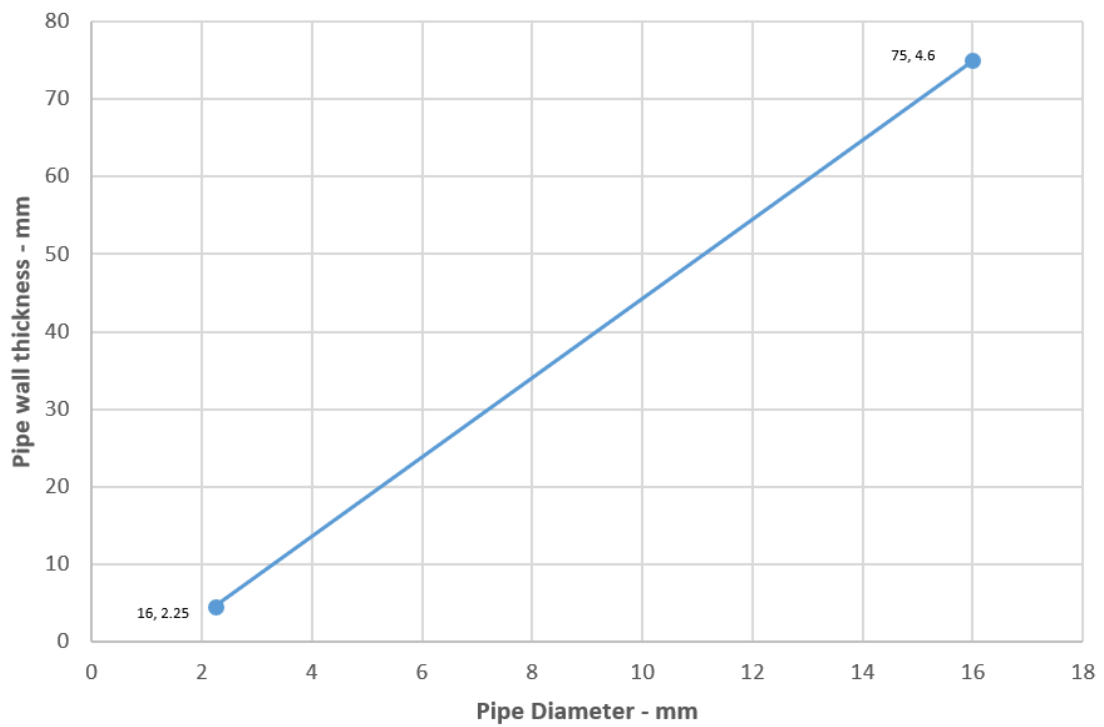
Services	Insulation	Collar	Classification
Copper pipe or mild steel			
Maximum diameter 42 mm, wall thickness 0.7-14.2 mm*	9 mm thick Elastomeric insulation minimum class D-s3, d0	Up to 63 mm collar at 50 mm height	EI 120 C/C
Maximum diameter 42 mm, wall thickness 0.7-14.2 mm*	10-50 mm thick Elastomeric insulation minimum class D-s3, d0	Up to 110 mm collar at 50 mm height, 125-160 mm at 60 mm height	EI 60 C/C
Maximum diameter 54 mm, wall thickness 0.7-14.2 mm*	19 mm thick Elastomeric insulation minimum class B-s3, d0	Up to 110 mm collar at 50 mm height	E 120 C/C, EI 60 C/C
Maximum diameter 54 mm, wall thickness 0.7-14.2 mm*	25 mm thick Phenolic insulation	Up to 110 mm collar at 50 mm height	E 120 C/C, EI 45 C/C
Maximum diameter 54 mm, wall thickness 0.7-14.2 mm*	20 mm thick PE foam insulation	Up to 110 mm collar at 50 mm height	E 120 C/C
Maximum diameter 54 mm, wall thickness 0.7-14.2 mm*	40 mm thick PU foam insulation	Up to 110 mm collar at 50 mm height, 125-160 mm at 60 mm height	EI 60 C/C
Alupex pipe			
Maximum diameter 75 mm, wall thickness 2.25-4.6 mm	9 mm thick Elastomeric insulation minimum class D-s3, d0	Up to 110 mm collar at 50 mm height	EI 120 C/C
	10-50 mm thick Elastomeric insulation minimum class B-s3, d0	Up to 110 mm collar at 50 mm height, 125-200 mm at 60 mm height	E 120 C/C, EI 90 C/C
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1			
Maximum diameter 160 mm, wall thickness 3.0-9.5 mm	9 mm thick Elastomeric insulation minimum class BL-s3, d0	Up to 110 mm collar at 50 mm height, 125-200 mm at 60 mm height	EI 180 C/C
	10-50 mm thick Elastomeric insulation minimum class B-s3, d0	Up to 110 mm collar at 50 mm height, 125-200 mm at 60 mm height, 250-315 mm at 75 mm height	EI 120 C/C
PP pipe according to EN 1451-1			
Maximum diameter 160 mm, wall thickness 1.8-9.1 mm	9-25 mm thick Elastomeric insulation minimum class BL-s3,d0	Up to 110 mm collar at 50 mm height, 125-200 mm at 60 mm height	E 180 C/C, EI 120 C/C
	26-50 mm thick Elastomeric insulation minimum class B-s3,d0	Up to 110 mm collar at 50 mm height, 125-200 mm at 60 mm height, 250-315 mm at 75 mm height	EI 60 C/C

* Typical pipe diameters shown, see below graph for intermediate sizes

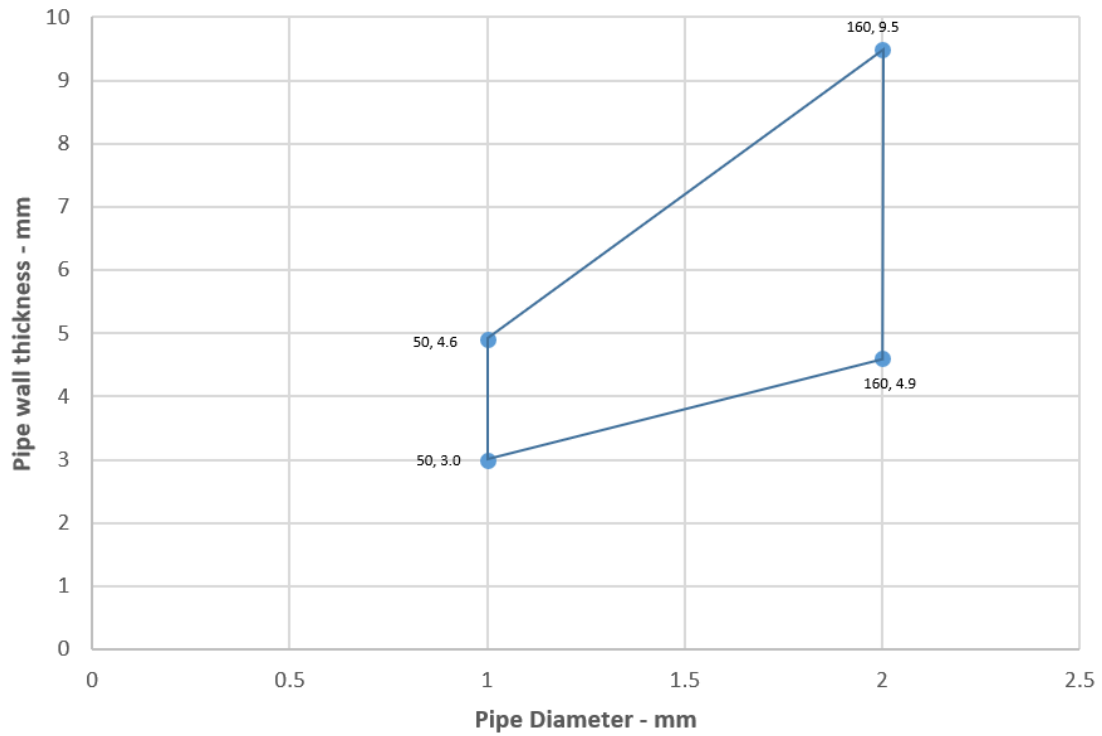
Copper or Steel Pipes 12-54 / Insulated - C/C



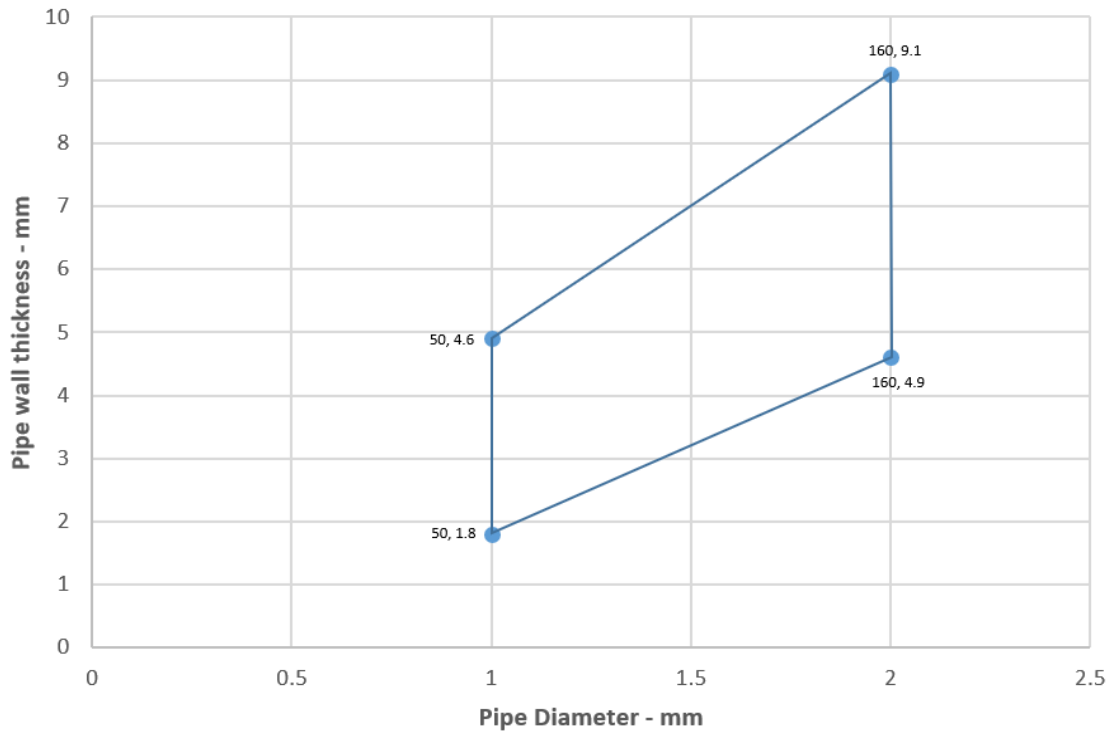
Alupex Pipes with Elastomeric Pipe Insulation - C/C



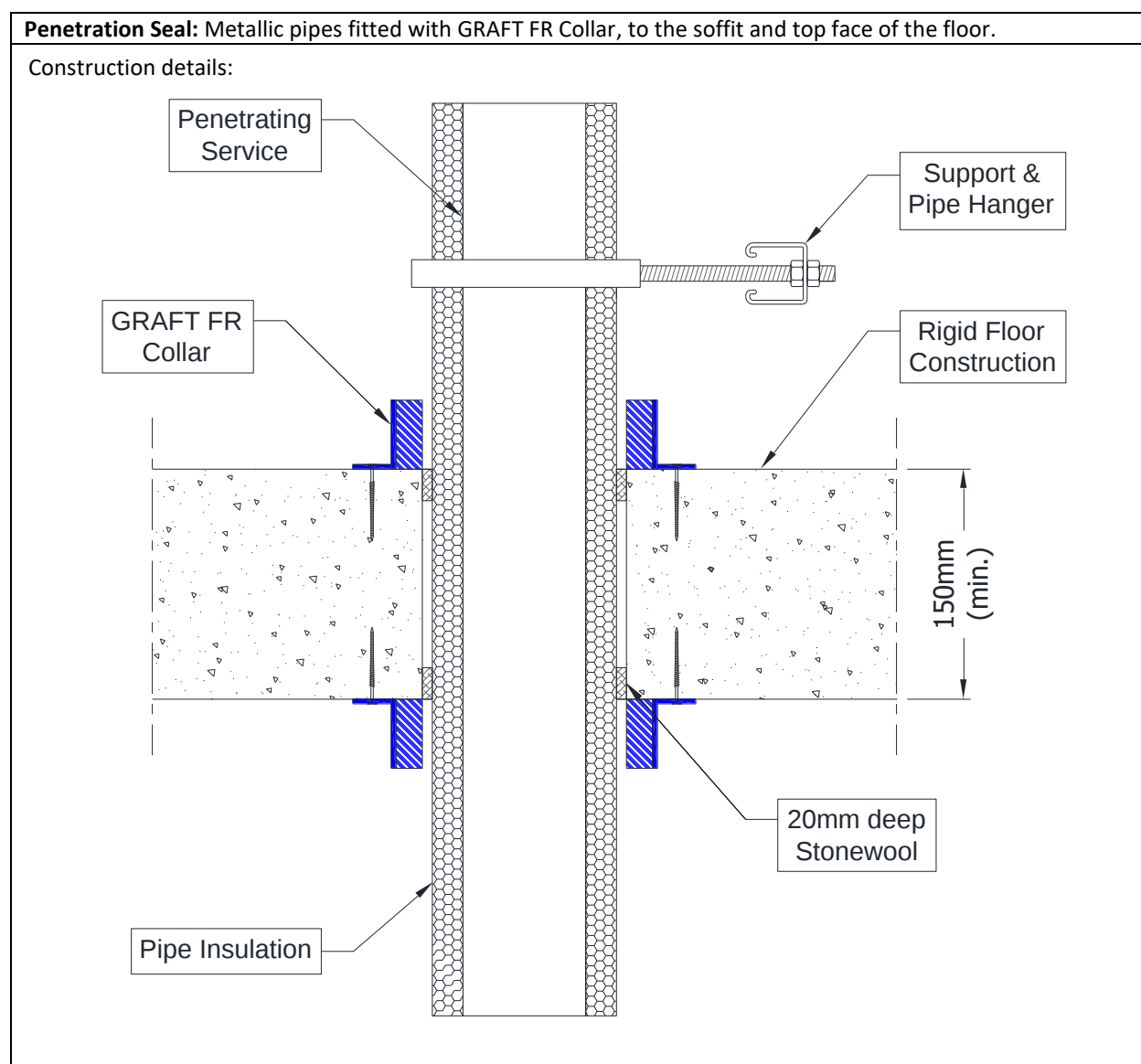
PE Pipes with Elastomeric Pipe Insulation - C/C



PP Pipes with Elastomeric Pipe Insulation - C/C



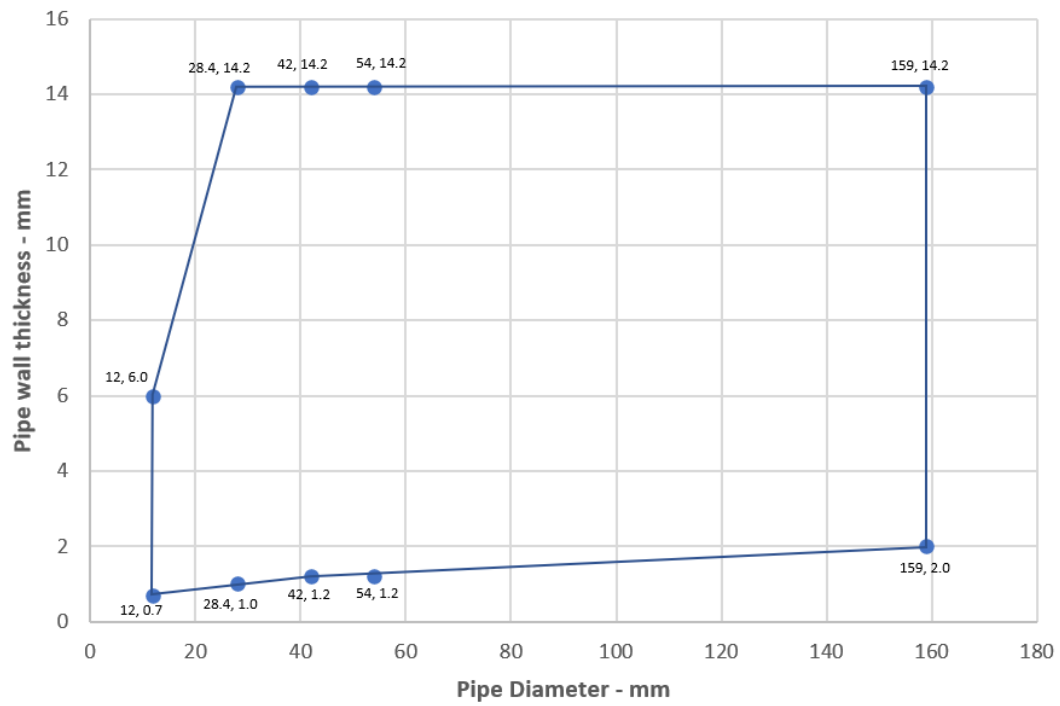
A.5.4 Penetration seals, surface mounted in concrete floors



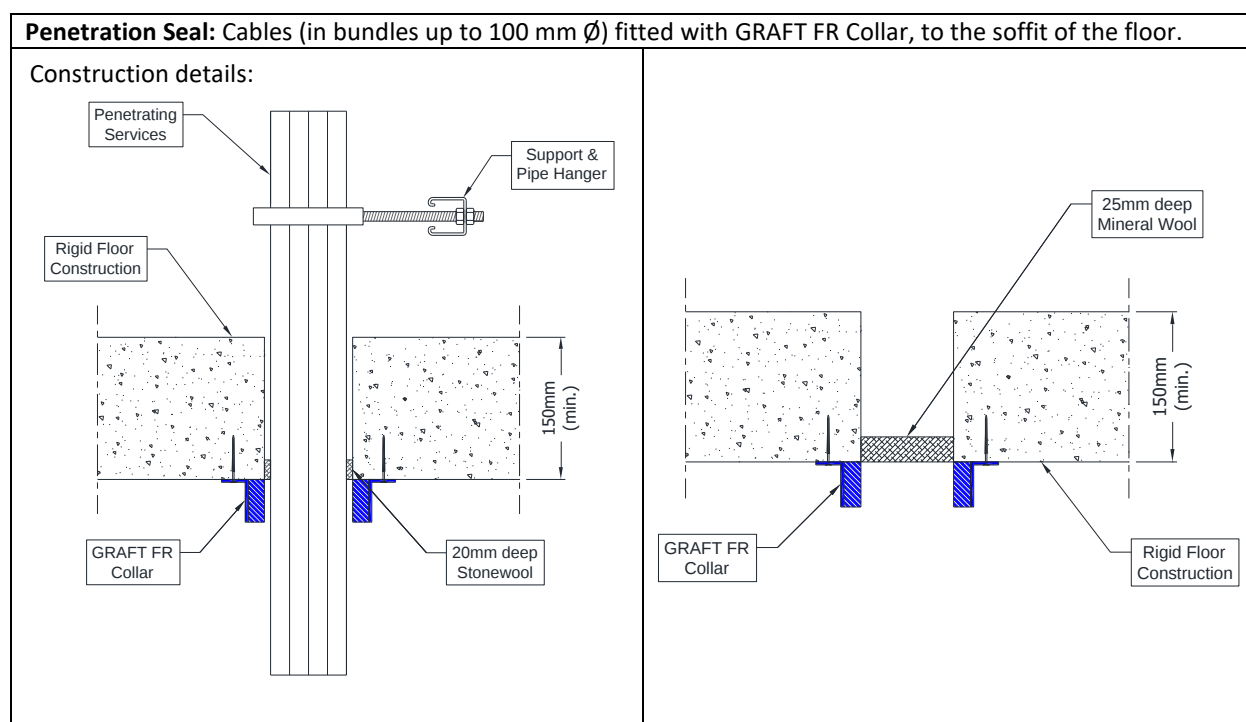
A.5.4.1

Services	Insulation	Collar	Classification
Copper pipe or mild steel			
Maximum diameter 158 mm, wall thickness 0.7-14.2 mm*	25 mm thick Phenolic insulation	Up to 110 mm collar at 50 mm height, 125-200 mm at 60 mm height, 250 mm at 75 mm height	E 120 C/C, EI 45 C/C
Diameter 159 mm, wall thickness 0.7-14.2 mm	25 mm thick Phenolic insulation	200 mm at 60 mm height, or 250 mm at 75 mm height	E 120 C/C, EI 60 C/C

Copper or Steel Pipes 12-159 / Insulated - C/C



A.5.5 Penetration seals, surface mounted in concrete floors



A.5.5.1

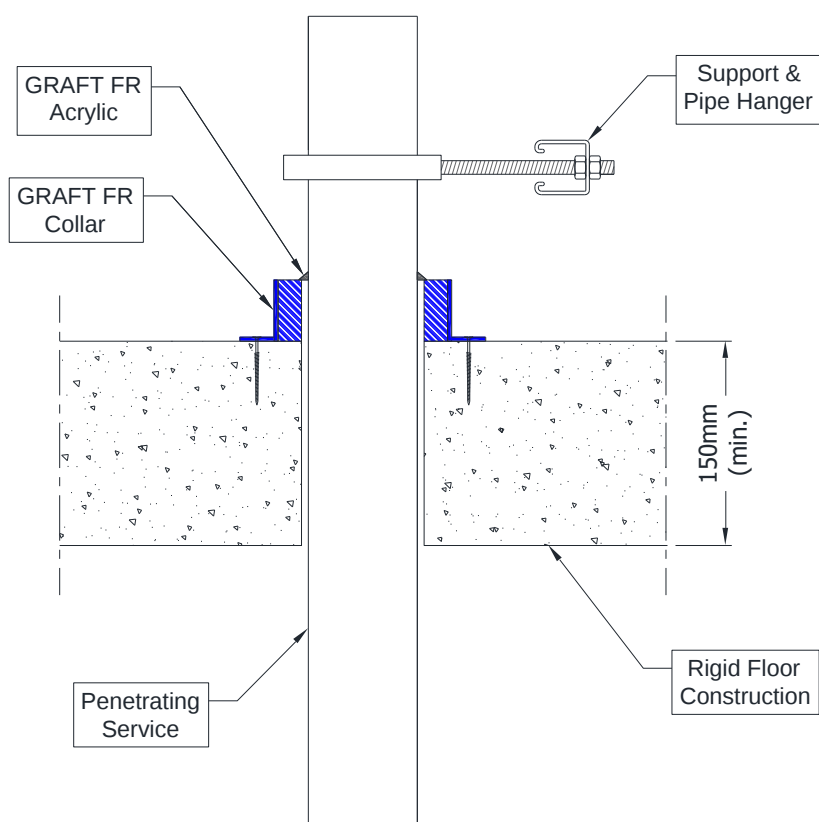
Services	Collar	Classification
None (blank)	Ø 55 x 30 x 3.2 mm	E 240, EI 60
None (blank)	Ø 160 x 60 x 15.0 mm	EI 120
Cables up to 21 mm Ø, in bundles up to 55 mm Ø	Ø 55 x 30 x 3.2 mm	EI 120
Cables up to 21 mm Ø, in bundles up to 100 mm Ø	Ø 110 x 50 x 6.0 mm	EI 90
Cables up to 21 mm Ø, in bundles up to 160 mm Ø	Ø 160 x 60 x 15.0 mm	EI 180
Cables up to 80 mm Ø, in bundles up to 125 mm Ø	Ø 125 x 60 x 9.0 mm	E 90, EI 60
PVC pipes up to 32 mm Ø, wall thickness 1.0-2.4 mm with or without cables up to 21 mm Ø, in partial or fully filled pipe bundles up to 160 mm Ø *	Up to 110 mm collar at 50 mm height, 125-160 mm at 60 mm height	EI 90 C/U
PE pipes up to 32 mm Ø, wall thickness 2.0-3.0 mm with or without cables up to 21 mm Ø, in partial or fully filled pipe bundles up to 160 mm Ø *		
PP pipes up to 32 mm Ø, wall thickness 1.8-4.4 mm with or without cables up to 21 mm Ø, in partial or fully filled pipe bundles up to 160 mm Ø *		
PEX pipe-in-pipe system		
Diameter up to 25 mm pipes, wall thicknesses 0.6 mm outer and 2.5 mm inner pipe, in bundle up to 50 mm	50 mm collar at 50 mm height	EI 90 C/C
Diameter up to 54 mm pipes, wall thicknesses 0.6-2.0 mm outer and 2.5-4.4 mm inner pipe, in bundle up to 160 mm	Up to 110 mm collar at 50 mm height, 125-160 mm at 60 mm height	EI 60 C/C

* PVC, PE and PP pipes can be mixed in the same bundle.

A.5.6 Penetration seals, surface mounted in concrete floors

Penetration Seal: Combustible pipes fitted with GRAFT FR Collar, to the top face of the floor.

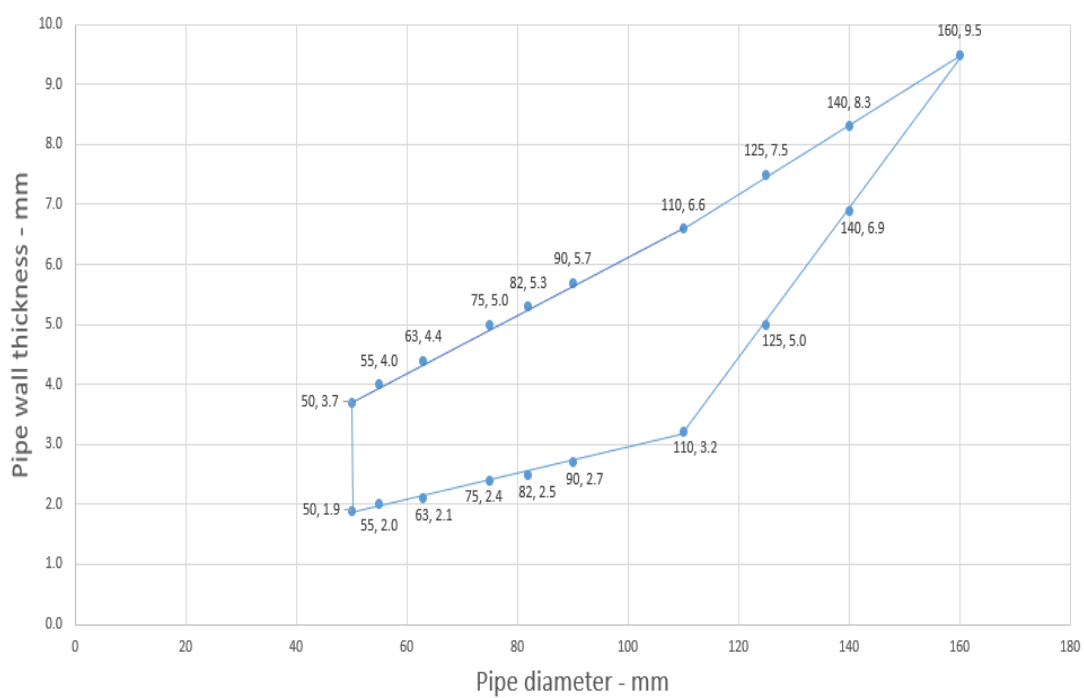
Construction details:



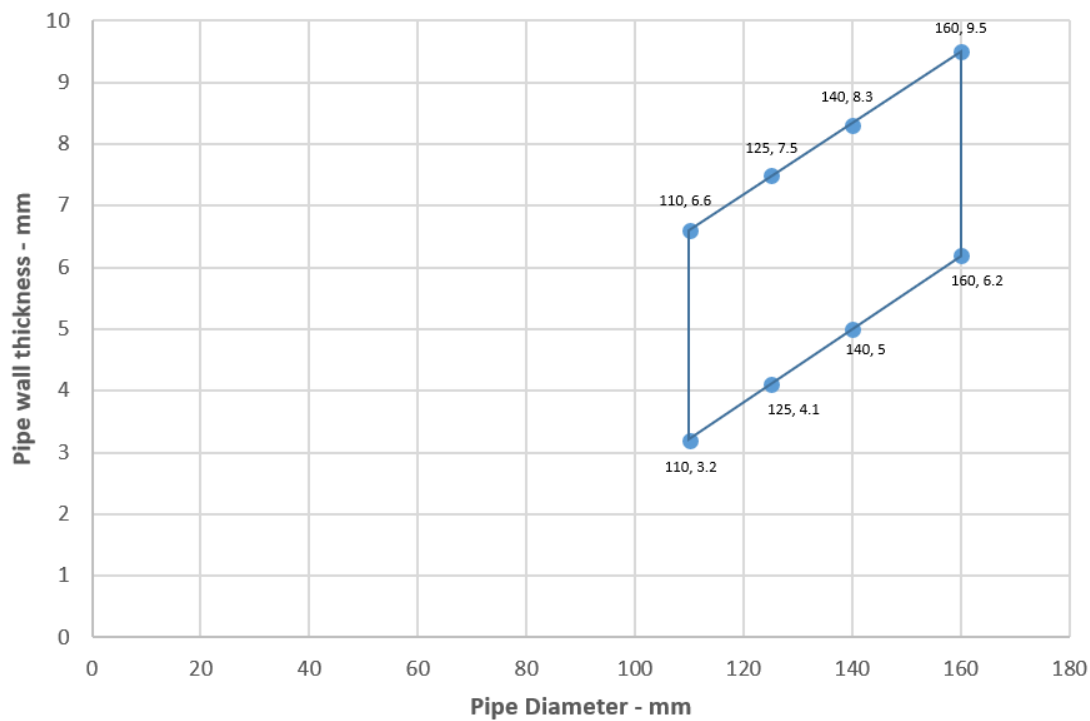
A.5.6.1

Services	Collar Inlay	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1 and PVC-C according to EN 1566-1		
Diameter 32 mm, wall thickness 1.9-3.7 mm	50 x 3.0 mm	EI 240 U/C
Diameter 40 mm, wall thickness 1.9-3.7 mm	50 x 3.0 mm	
Diameter 50 mm, wall thickness 1.9-3.7 mm	50 x 3.2 mm	
Diameter 55 mm, wall thickness 2.0-4.0 mm	50 x 3.2 mm	EI 120 U/C
Diameter 63 mm, wall thickness 2.1-4.4 mm	50 x 3.6 mm	
Diameter 75 mm, wall thickness 2.4-5.0 mm	50 x 4.2 mm	
Diameter 82 mm, wall thickness 2.5-5.3 mm	50 x 4.6 mm	
Diameter 90 mm, wall thickness 2.7-5.7 mm	50 x 5.0 mm	
Diameter 110 mm, wall thickness 3.2-6.6 mm	50 x 6.0 mm	E 240 U/C, EI 180 U/C
Diameter 125 mm, wall thickness 5.0-7.5 mm	60 x 8.8 mm	
Diameter 140 mm, wall thickness 6.9-8.3 mm	60 x 11.5 mm	
Diameter 160 mm, wall thickness 9.5 mm	60 x 15 mm	E 180 U/C, EI 90 U/C
Diameter 125 mm, wall thickness 4.1-7.5 mm	60 x 8.8 mm	
Diameter 140 mm, wall thickness 5.0-8.3 mm	60 x 11.5 mm	
Diameter 160 mm, wall thickness 6.2-9.5 mm	60 x 15 mm	

PVC pipes 50-160 / 50-60 mm Collar - U/C



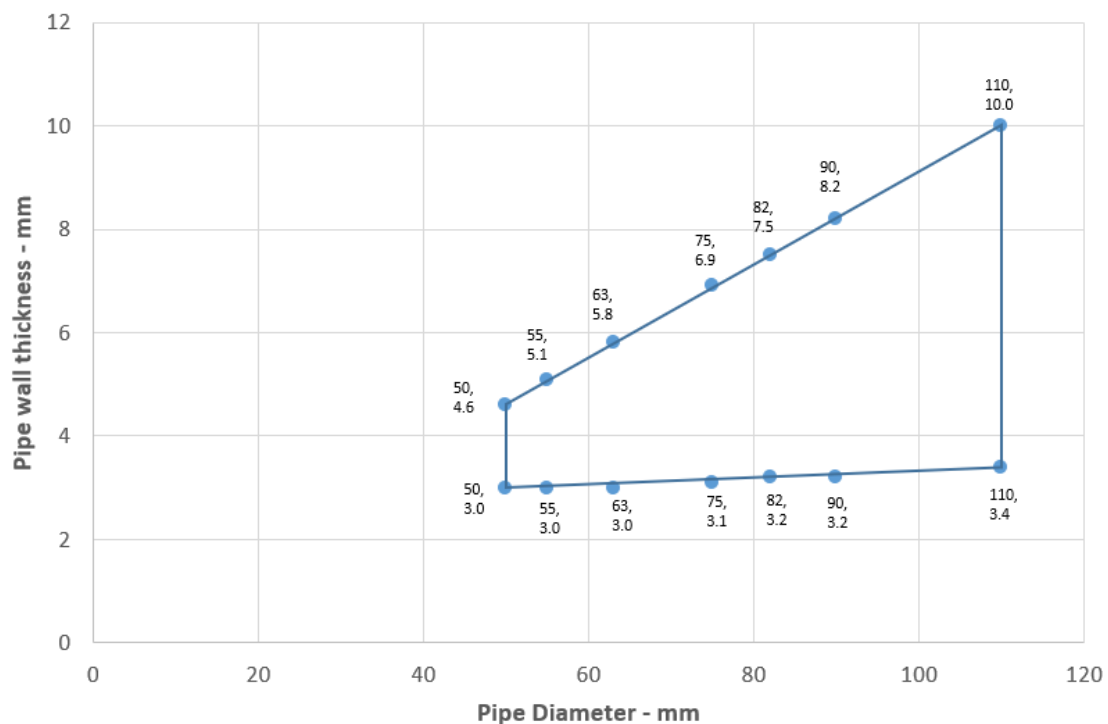
PVC Pipes 110-160 - U/C



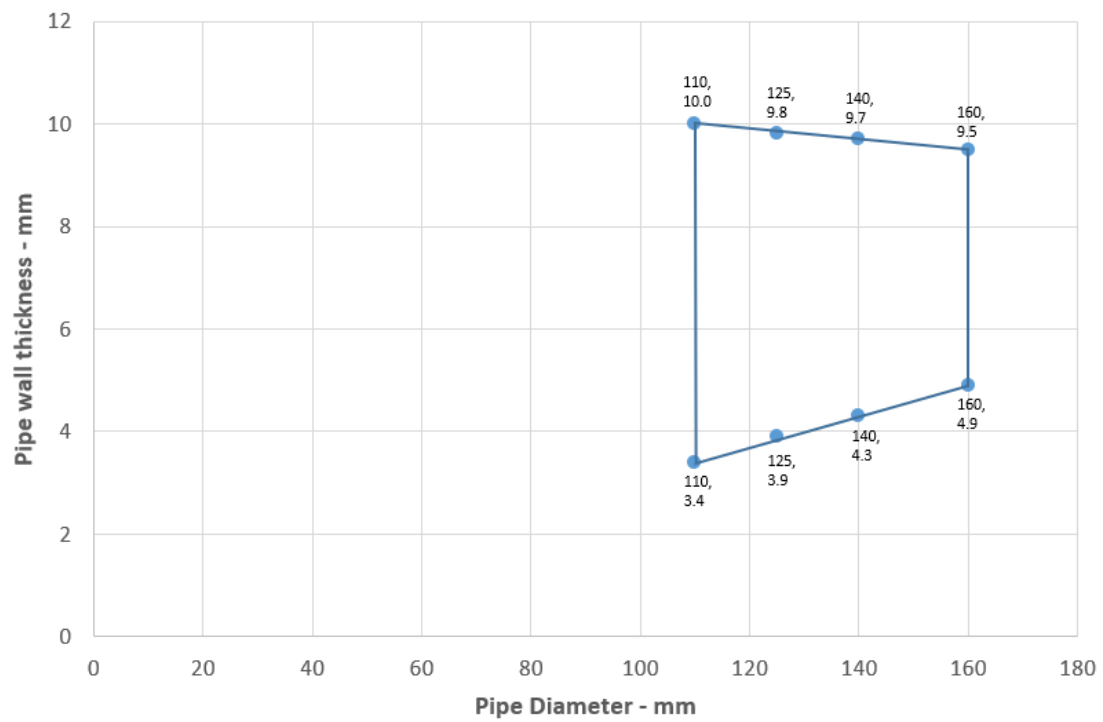
A.5.6.2

Services	Collar Inlay	Classification
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1		
Diameter 32 mm, wall thickness 3.0-4.6 mm	50 x 3.0 mm	EI 240 U/C
Diameter 40 mm, wall thickness 3.0-4.6 mm	50 x 3.0 mm	
Diameter 50 mm, wall thickness 3.0-4.6 mm	50 x 3.2 mm	
Diameter 55 mm, wall thickness 3.0-5.1 mm	50 x 3.2 mm	E 240 U/C, EI 60 U/C
Diameter 63 mm, wall thickness 3.0-5.8 mm	50 x 3.6 mm	
Diameter 75 mm, wall thickness 3.1-6.9 mm	50 x 4.2 mm	
Diameter 82 mm, wall thickness 3.2-7.5 mm	50 x 4.6 mm	
Diameter 90 mm, wall thickness 3.2-8.2 mm	50 x 5.0 mm	
Diameter 110 mm, wall thickness 3.4-10.0 mm	50 x 6.0 mm	
Diameter 125 mm, wall thickness 3.9-9.8 mm	60 x 8.8 mm	EI 60 U/C
Diameter 140 mm, wall thickness 4.3-9.7 mm	60 x 11.5 mm	
Diameter 160 mm, wall thickness 4.9-9.5 mm	60 x 15 mm	

PE Pipes 50-110 / 50 mm collar - U/C



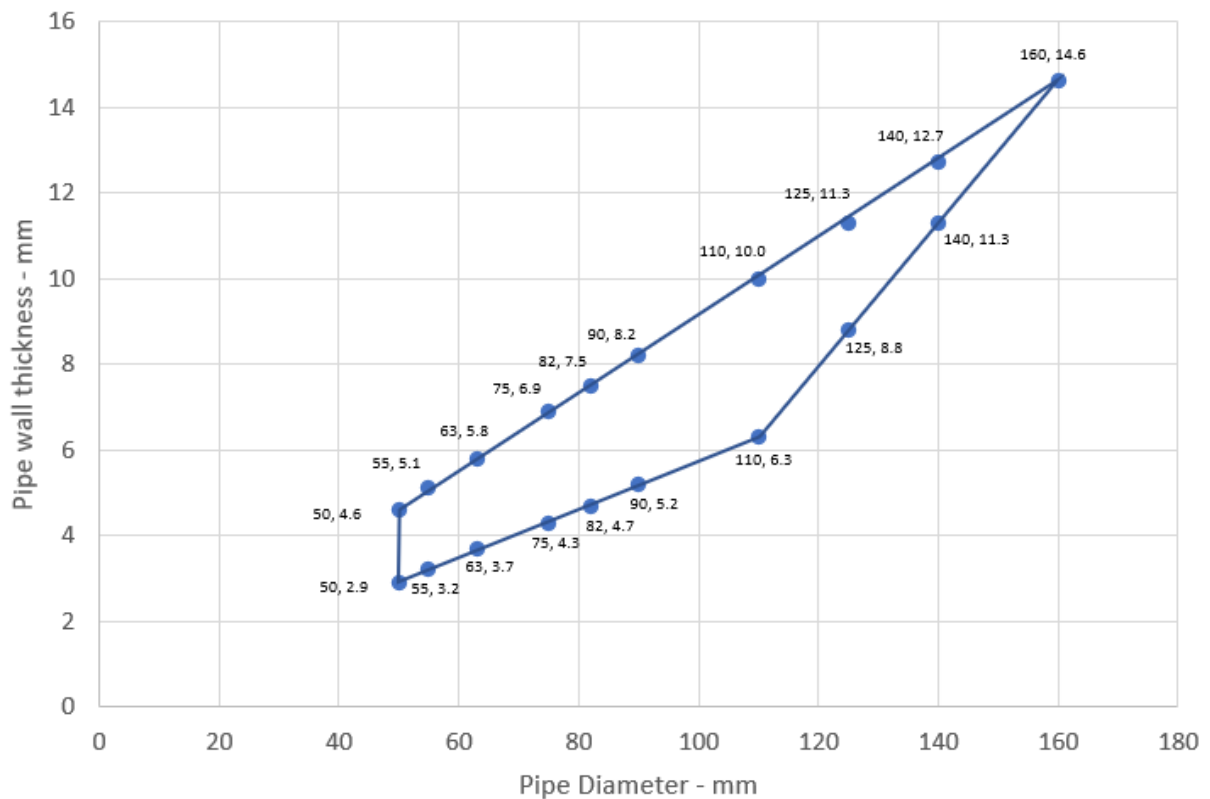
PE Pipes 110-160 - U/C



A.5.6.3

Services	Collar Inlay	Classification
PP pipe according to EN 1451-1		
Diameter 32 mm, wall thickness 2.9-4.6 mm	50 x 3.0 mm	E 240 U/C, EI 180 U/C
Diameter 40 mm, wall thickness 2.9-4.6 mm	50 x 3.0 mm	
Diameter 50 mm, wall thickness 2.9-4.6 mm	50 x 3.2 mm	
Diameter 55 mm, wall thickness 3.2-5.1 mm	50 x 3.2 mm	E 120 C/C, EI 90 C/C
Diameter 63 mm, wall thickness 3.7-5.8 mm	50 x 3.6 mm	
Diameter 75 mm, wall thickness 4.3-6.9 mm	50 x 4.2 mm	
Diameter 82 mm, wall thickness 4.7-7.5 mm	50 x 4.6 mm	
Diameter 90 mm, wall thickness 5.2-8.2 mm	50 x 5.0 mm	
Diameter 110 mm, wall thickness 6.3-10.0 mm	50 x 6.0 mm	
Diameter 125 mm, wall thickness 8.8-11.3 mm	60 x 8.8 mm	E 240 U/C, EI 60 U/C
Diameter 140 mm, wall thickness 11.3-12.7 mm	60 x 11.5 mm	
Diameter 160 mm, wall thickness 14.6 mm	60 x 15 mm	

PP Pipes 50-160 / 50-60 mm Collar



ANNEX B – Air Permeability – GRAFT FR Collar

Product tested	110mm GRAFT FR Collar each face fixed with plasterboard anchors		
Summary of testing procedure			Result
	Pressure (Pa)	Leakage (m ³ /h)	Leakage (m ³ /m ² /h)
Results under negative chamber pressure	25	0.23	N/A
	50	0.43	N/A
	100	0.72	N/A
	200	1.17	N/A
	300	1.63	N/A
	450	1.9	N/A
	600	2.34	N/A
Results under positive chamber pressure	25	0.2	N/A
	50	0.29	N/A
	100	0.49	N/A
	200	1.13	N/A
	300	1.75	N/A
	450	2.34	N/A
	600	3.01	N/A

