wavin

Wavin Overseas
01 | 04132 | 3000
February 2010

Wavin AS

Product and Technical Guide

THE LEADING LOW NOISE
SOIL & WASTE SYSTEM

Intelligent Solutions for Above Ground Projects

Contents

TELEPHONE: +31(0)523 624 911
FAX: +31(0)523 624 600
E-MAIL: wavin.overseas@wavin.com

1. Overall system norms, guidelines and advice

1.1. Sound insulation in building construction to DIN 4109

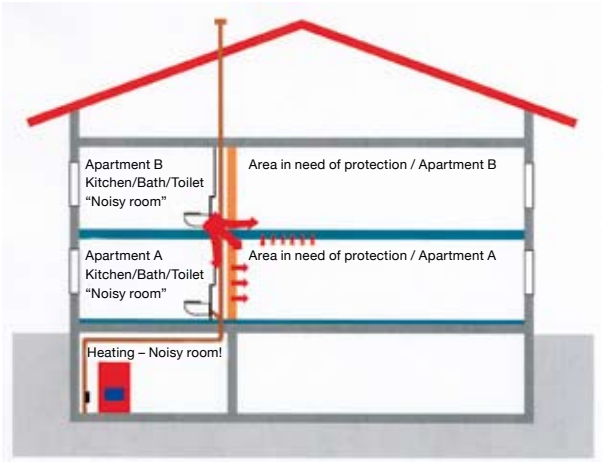
1.1.1. Basic concepts and minimum sound insulation requirements

People operating in so-called “areas in need of protection” must, in accordance with the provisions of DIN 4109, be protected from three effects: External noise generated in other areas (speech, music, footsteps, vacuum cleaning, etc.) Noise generated by the plant and equipment providing services to the building or by business activities in the same building, or in connected buildings.

Areas in need of protection are:

- Living areas, including lounge areas
- Sleeping areas, including areas set aside for sleeping in hostels and wards in hospitals or convalescent homes
- Study areas in schools, colleges and similar establishments
- Office premises (excluding large open-plan offices), consulting and treatment rooms, conference rooms and similar work areas.

The norm does not protect living areas against noise created by plant and equipment in the same living quarters.



Shared floor/ceiling in residential apartment building > 410 kg/sq.m
Single-skin installation wall within domestic living quarters > 220 kg/sq.m

Figure 1 Examples of areas requiring protection

The requirements and verifications relating to sound insulation in buildings are regulated by the following national norms:

- DIN 4109:1989-11 Sound insulation in building construction – requirements and verifications
- DIN 4109 Supplement A1: 1989-11 Sound insulation in building construction – examples of design and methods of calculation
- DIN 4109/A1 :2001-01: Sound insulation in building construction – requirements and verifications – Amendment A1
- DIN 4109 Supplement 2: 1989-11 Sound insulation in building construction – Advice for planning and implementation; Suggestions for increasing noise protection levels; Recommendations for noise protection in the home and in work areas.

These norms are the current technical regulations and must be taken into account in the planning, design and construction of the building. DN4109 is part of planning regulations and therefore binding. In addition, Issue 03/2002 of the ZVSHK Bulletin “Sound Insulation” is referred to, which summarises the regulations that must be complied with and contains additional advice on installing pipe systems.

The norms to be adhered to are usually also agreed through service contract law, as per DIN 18381:2002-12 VOB “Regulations for Awarding Public Works Contracts”, Part C; General Technical Specifications for Construction Works; gas, water and waste water installation works inside buildings, between employers and contractors. In order to provide protection against noise in buildings, in accordance with DIN 4109/A1, the specified sound pressure levels in areas requiring protection from noise generated by the equipment installed for the provision of water and the removal of waste water may not be greater than 30dB (A) for living and sleeping areas, and not greater than 35 dB (A) for teaching and work areas (see Table 1).

	1	2	3
	Source of noise	**Type of area requiring protection**	
		Living and sleeping areas	Teaching and work areas
		Allowable sound pressure level dB(A)	
1	Water installations (including water supply and waste water equipment)	≤ 30 a) b)	≤ 35 a) b)
2	Other plant and equipment providing services to the building	≤ 30 c)	≤ 35 c)
3	Daytime operation between 06.00 and 22.00 hours	≤ 35	≤ 35 c)
4	Night-time operation between 22.00 and 6.00 hours	≤ 25	≤ 35 c)

Table 1: Minimum requirements according to DIN 4109/A1: 2001 Allowable sound pressure level in areas requiring protection from noise generated by plant and equipment providing services to the building and business activities

a) discrete, temporary peaks, which occur when equipment is operated, as detailed in Table 6, DIN 4109/A1 (i.e. opening, closing, switching, cutting out, etc.) do not currently need to be considered.

b) contractual requirements for compliance with the allowable installation sound pressure levels: – design documentation must include noise protection requirements, for the designer, the contractor etc. this means that the components used must have the necessary sound insulation ratings. – in addition, the responsible construction site supervisors have to be identified and must be in attendance prior to the final commissioning of such installations.

c) the maximum allowable values for air-conditioning plant are 5 dB (A) higher, provided these are not continuous, monotonic noise emissions.

1.1.2. Increased noise protection

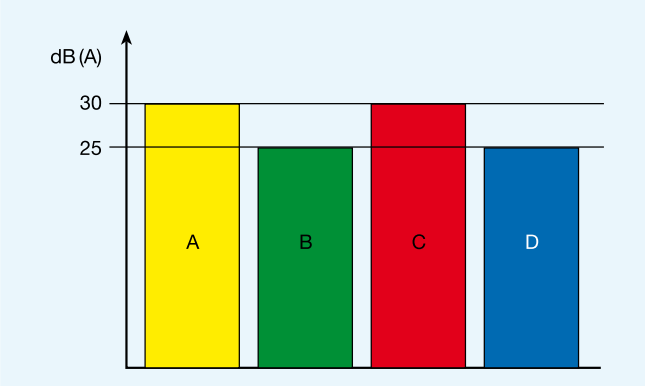
Where a level of sound insulation greater than the minimum values specified is desirable, this must be established in contracts between the contractor and the awarding authority. The following technical regulations, which are not included in planning legislation, contain relevant advice and suggestions, which require a contractual agreement to become binding.

DIN 4109 Supplement 2:

This contains instructions relating to noise levels that lie 5 dB (A) below the values given in DIN 4109/A1: 2001-01 Table 4. In accordance with Supplement 2, increased levels of sound insulation can be arranged, by agreement, to a maximum of 25 dB (A) in other areas requiring noise protection.

VDI 4100

In contrast to the requirements of DIN 4109, which was adopted as noise protection level I (NPL I), this guideline contains characteristic values for two additional noise protection levels – NPL II and NPL III. These two additional noise protection levels specify the arrangements for increased sound insulation



A: DIN 4109 (minimum legal requirements)

B: DIN 4109 Supplement 2

C: VDI 4100 Noise Protection Level II

D: VDI 4100 Noise Protection Level III

Fig. 2: Overview of Noise Protection Documentation

The design of residential buildings with high noise protection requirements requires the coordination of all participating contractors. The consultation of an acoustic engineer is recommended.

1.1.3. Noise control measures
1.1.3.1. Sources of noise in building equipment and appliances

The noise generated by plant and equipment providing services to buildings may be classified as follows:

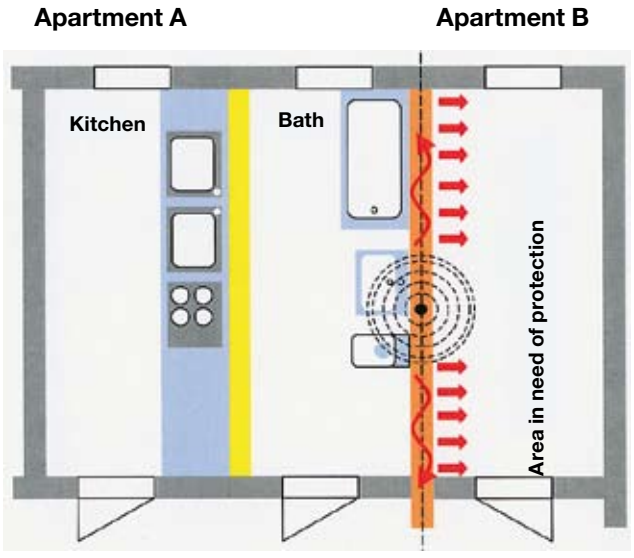
- Noise due to filling operations
- Noise generated by control equipment
- Intake noise
- Discharge noise
- Noise due to impact or shock

Noise is generated by moving parts or by flowing media. Waste water discharge pipes are prone to vibration, particularly where water flows through downpipes, or is forced to change direction in joints and elbows (noise due to impact or shock). Experience shows that the greatest problems are typically caused by the transmission of structural noise, particularly in the area of pipe clamps and brackets or where pipe-work is run through walls or ceilings.

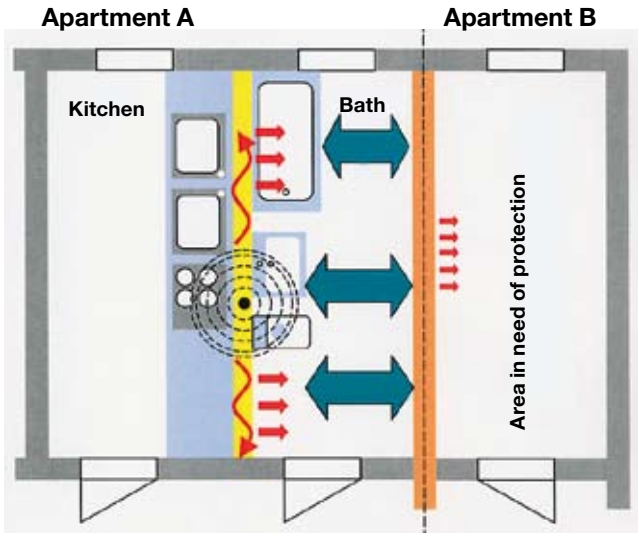
1.1.3.2. Building layout

An important step towards fulfilling noise protection requirements at the agreed levels is the design and production of an acoustically appropriate building layout. The following are a few – but not all – of the measures, which should be taken:

- Noise-sensitive areas should be kept as far as possible from sources of noise
- Non-sensitive areas should, wherever possible, be used as “buffer zones”
- Noise-sensitive areas should not be positioned in the direct vicinity of bathrooms, toilets or stairwells.
- Potential sources of noise should be “bundled together” in the same area



TELEPHONE:
+31(0)523 624 911
FAX:
+31(0)523 624 600
E-MAIL:
wavin.overseas@wavin.com



The comparison of the floor plans above demonstrates how good acoustic design in the lower building example can significantly reduce the noise levels to which areas requiring noise protection are exposed.

Fig. 3: Examples of good acoustic practice in building design

1.1.3.3. Planning pipe installation

The installation of Wavin waste water systems can significantly reduce noise levels when compared with other piping systems. When installing high-performance sound-insulating waste water piping systems such as Wavin, however, it is still necessary to consider how effectively the system can be sound-isolated. This applies to the waste water discharge system as a whole, including its points of contact with the building structure (pipe brackets and clamps, the running of pipework through walls and ceilings, mortar droppings between pipes and wall surfaces, etc.). When planning pipe installation, waste water discharge pipes should not be allowed to run inside the walls separating living areas. The attachment of waste water discharge pipes to partition walls in living areas should only be carried out under application of special noise protection measures. DIN 4109 requires that single-skin walls to which, or in which, water installations or equipment (i.e. waste water pipes) are to be attached must have an area-related mass of at least 220 kg/sq.m. Walls having an area-related mass of less than 220 kg/sq.m may only be used where prior testing has demonstrated that the walls exhibit acceptable properties with respect to the transmission of noise.

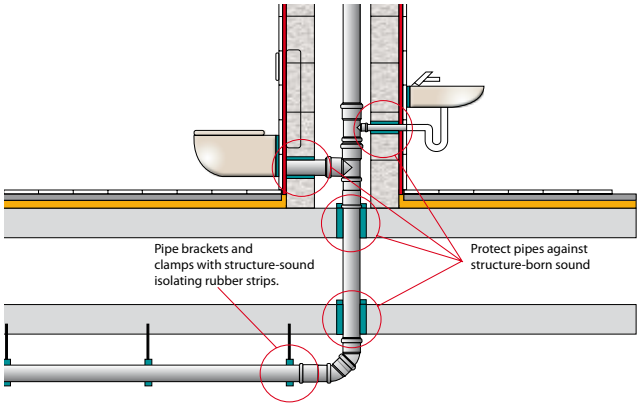


Fig. 4: Sound isolation of waste water systems

1.2. Waste water engineering to DIN 12056 and DIN 1986-100

1.2.1. Installation and rating of waste water removal systems

The following principles must be observed with respect to waste water removal systems:

- The system design should ensure that there are no significant pressure fluctuations which could cause the level of the trap water seal to be compromised.
- Reliable ventilation must be provided for the waste water removal system.
- A self-cleaning effect must be achieved.
- Nominal diameters should be kept to a minimum.
- Waste water must discharge at low noise levels.

1.2.2. Waste water removal systems

At European level, 4 different waste water removal systems have been established, which comply with DIN EN 12056-2, Section 4.2.

System I

Single downpipe with part-filled connecting pipe and a filling factor of 0.5 (mainly used in Germany where this is the only approved waste water system)

System II

Single downpipe with part-filled connecting pipe, reduced dimensions and a filling factor of 0.7 (mainly used in Scandinavia)

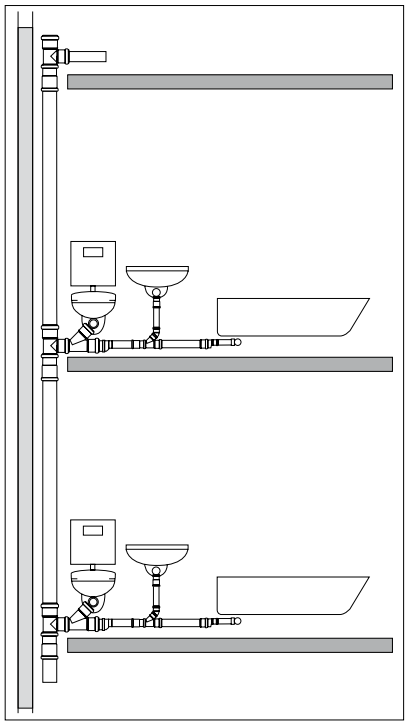


Fig. 5: System I (filling factor 0.5) and System II (filling factor 0.7)

System III

Single downpipe with fully-filled connecting pipe and a filling factor of 1.0 (mainly used in English-speaking countries)

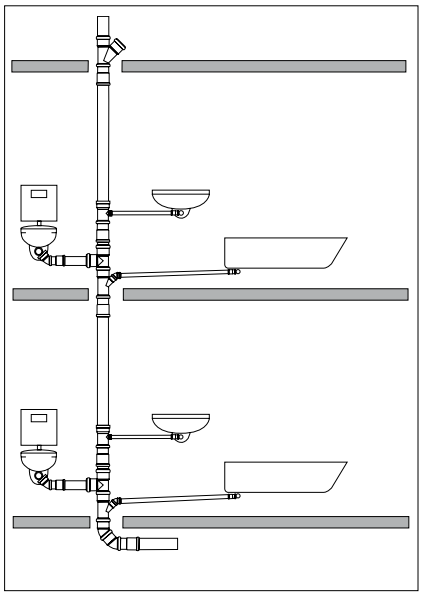


Fig. 6: System III

System IV

Consists of two separate pipe systems – sewage and grey-water – (mainly used in France)

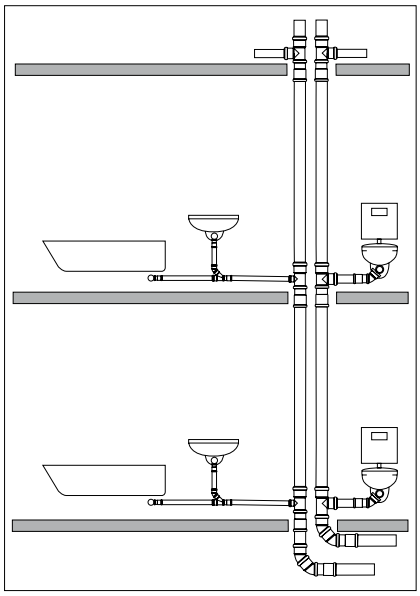


Fig. 7: System IV

1.2.3. Classification of nominal diameters

In accordance with DIN EN 12056, the nominal diameter (DN) is a suitable round number, more or less equal to the (external) diameter. Each nominal diameter (DN) is allocated a minimum internal diameter, $d_{i\ min}$ (see Table 2). For the purposes of calculation, the minimum internal diameter or actual internal diameter specified by the pipe manufacturer is normally used.

Problem: Product standards for pipes and fittings are generally specified using the external diameter parameter, even though the outer diameters do not always correspond to the values given in DIN EN 12056 (see DN 100 => DA 110).

Nominal diameter DN	**Minimum internal diameter $D_{i\ min}$**
30	26
40	34
50	44
56	49
60	56
70	68
80	75
90	79
100	96
125	113
150	146
200	184
225	207
250	230
300	290

Table 2: Nominal diameters (DN) and their corresponding minimum internal diameters $d_{i\ min}$ (corresponding to Table 1 in DIN EN 12056-2)

Nominal diameter to DIN EN 12056 (new) DN	**Wavin system designation DN**	**$D_{i\ min}$ mm**	**Previous Wavin designation mm**
56	**56**	**50**	**50**
70	70	69	70
90	**90**	**81**	**80**
100	100	99,4	100
125	125	124,4	125
150	150	149,4	150
200	200	187,6	200

Table 3: Wavin AS Pipes and Fittings

1.2.4. Downpipes

The term downpipe refers to piping, which is arranged vertically and generally leads down through the floors of a building and is ventilated at roof level.

DIN EN 12056 contains no specifications for downpipes but the necessary data can be found in DIN 1986-100. The specifications were in large part provided by the now withdrawn DIN 1986-1. These cover the joining of connecting pipework into downpipes, or the arrangement of branch pipes in downpipes, when connecting toilets - see Figures 5 and 6 of DIN 1986-100.

TELEPHONE: +31(0)523 624 911
FAX: +31(0)523 624 600
E-MAIL: wavin.overseas@wavin.com

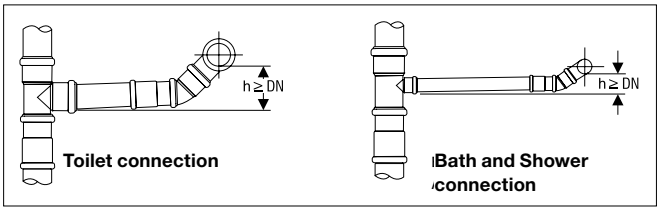


Fig. 8: Joining into a downpipe

Downpipes are rated according to the following criteria:

- Downpipes with primary ventilation (Table 4)
- Downpipes with secondary ventilation (Table 5)
- Branch pipe equipped with internal sharp-edging
- Branch pipe equipped with internal radius (higher loading under smaller bore), see Tables 4 and 5, column Q_{max} (l/s)

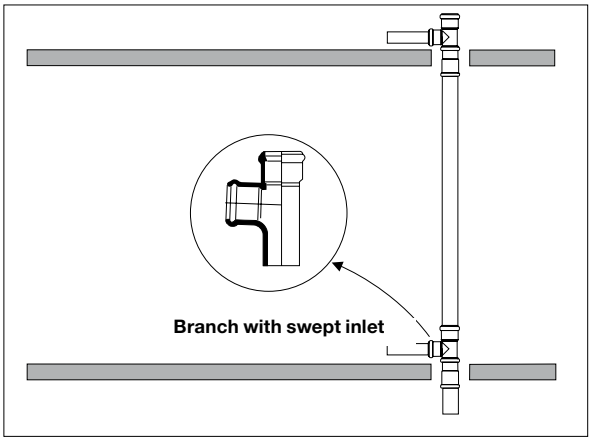


Fig. 9: Branch with swept inlet

Allowable waste water discharge in primary-ventilated downpipes DN	Q_{max} (l/s)	
	Branch	Branch with swept inlet
60	0,5	0,7
70	1,5	2,0
80*	**2,0**	**2,6**
90	**2,7**	**3,5**
100**	4,0	5,2
125	5,8	7,6
150	9,5	12,4
200	16,0	21,0

Table 4: Allowable waste water discharge in primary-ventilated downpipes (corresponding to Table 11 in DIN EN 112056-2)

* Minimum nominal diameter for toilets with flushing volumes of 4 to 6 litres
** Minimum nominal diameter for toilets with flushing volumes > 6 litres

Allowable waste water discharge in primary-ventilated downpipes DN	Secondary Ventilation DN	Q_{max} ($l/_S$)	
		Branch	Branch with swept inlet
60	50	0,7	0,9
70	50	2,0	2,6
80*	**50**	**2,6**	**3,4**
90	**50**	**3,5**	**4,6**
100**	50	5,6	7,3
125	70	12,4***	10,0
150	80	14,1	18,3
200	100	21,0	27,3

Table 5: Allowable waste water discharge in secondary-ventilated downpipes (corresponding to Table 12 in DIN EN 122056-2)

* Minimum nominal diameter for toilets with flushing volumes of 4 to 6 litres
** Minimum nominal diameter for toilets with flushing volumes > 6 litres
*** The corresponding value given in DIN EN 12056 is possibly incorrect. Recommended figure: 8.4

1.3. Installing pipes into concrete

Pipes, as with all hollow objects, are subject to buoyancy forces whilst concrete is setting. Piping must, therefore, be adequately secured against such forces, irrespective of the material of construction. It is recommended, that the pipe be filled with water and attached in an appropriate manner to any steel reinforcement available. Wavin domestic waste water discharge pipe systems (pipes and fittings) can be concreted into place without such precautions. Pipe thermal expansion must be taken into account when assembling, in accordance with pipe manufacturers' instructions. Individual sections should be fastened in such a way as to prevent changes in length occurring, particularly during concreting. In order to prevent concrete slurry getting into pipe collars and couplings, these should be protected with a proprietary sealing tape (e.g. Tesa-Krepp). Pipe ends should also be sealed off. During pouring, concrete should not be allowed run directly onto pipes – this can usually be avoided provided sufficient working space is available whilst concreting. It should also be ensured, that the pipe is not disturbed during compaction.

Where noise protection is required, the pipework must be insulated appropriately to prevent it from becoming a source of structural noise.

TELEPHONE: +31(0)523 624 911
FAX: +31(0)523 624 600
E-MAIL: wavin.overseas@wavin.com

2. Wavin AS

2.1. Professional building waste water discharge with the Wavin AS sound-insulating piping system

2.1.1. Description of system

Wavin AS is a sound-insulating piping system, which is suitable for use with hot-water and meets all the requirements for non-pressurised waste water piping contained in DIN 12056 and DIN 1986-100.

The pipes and fittings are manufactured from Astolan (a mineral-filled polypropylene), which ensures continuous noise protection right through the system from the waste removal facilities to the below-ground piping. Although the system is primarily designed as sound-insulating domestic waste water discharge piping, Wavin AS can also be used underground as far as the main sewer connecting point. Since the new DIN EN 12056 and DIN 1986-100 waste water norms, which further endorse DN 90 downpipe specifications, have come into force, it is possible to install a complete and secure waste water removal system using just two pipe dimensions – DN 56 and DN 90 – from the individual waste water sources (facilities) right up to the main drain cleaning access point or the mains sewage connecting point. Wavin AS is manufactured in all standard sizes from DN 56 right up to DN 200.

Like all plastics, Astolan is durable, corrosion-resistant and able to withstand the action of aggressive waste waters. Astolan's smooth surface characteristics prevent scaling and incrustation. Low mass and rapid, secure assembly make the system - by comparison to metallic piping - extremely installation-friendly.

2.1.2. Areas of application

Wavin AS is resistant to hot water and fulfils all the requirements of DIN EN 12056 and the associated norms given in DIN 1986, Part 100, i.e. short-term exposure to temperatures of 95 °C and long-term exposure to temperatures of 90 °C, in addition to those given in DIN 4109. Wavin AS is suitable for transporting waste waters in the range pH 2 - 12. It can be used for all domestic, roofing, land and bridge drainage applications.

The system is designed for professional waste water installations in (multiple storey) buildings and can be installed as:

- Single waste or drain pipes
- Collector pipes
- Stack pipes
- Ventilation pipes
- Rain stack pipes
- Below ground pipes up to inspection chamber / manhole

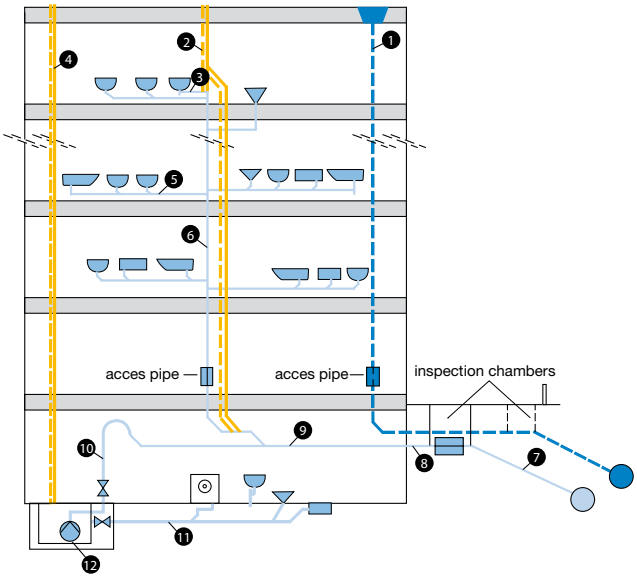


Fig. 10: Examples of waste and ventilation pipes

Examples

1. Rain stack pipe
2. Main ventilation
3. Single drain / waste pipe
4. Vents of collector pump cellars
5. Collector pipe
6. Stack pipe for wate water
7. Connecting sewer pipe (PVC-U)
8. Soil pipe
9. Collector pipe
10. Rising sewer pipe (PVC-U)
11. Underground collector pipeline
12. Faecal collection (cellar) pit

2.1.2.1. Residential property, hotels, hospitals, rest homes for the elderly, convalescent homes, office premises

Owing to its excellent sound-absorbing properties, Wavin AS is suitable for use wherever noise protection to DIN 4109 is specified, i.e. in hospitals, hotels, rest homes for the elderly, convalescent homes, office buildings and multi-occupancy residential properties. Single-occupancy residential properties are not covered by noise-protection legislation. However, even in this area, people are becoming ever more conscious of the value of peace and quiet. Thick external walls and sound-proofed windows are used to keep noise levels at a minimum. However, it is often forgotten that noise is not only generated by external, but also by internal sources. Wavin AS sound-insulating pipe systems are designed to ensure a comfortable environment. The maximum detectable flow noise is 12.3 dB (A) – less than the noise generated by the ticking of a wrist-watch.

2.1.2.2. Commercial kitchens and abattoirs

Wavin AS is suitable for the removal and draining to the mains of fat-containing waste waters from commercial kitchens and abattoirs. High durability and temperature-resistance (short-term exposure to 95°C; long-term exposure to 90°C) to DIN EN 12056 and the associated norms of DIN 1986, Part 100 are basic prerequisites. Scaling and incrustation are unable to form, due to the smoothness of the pipe surfaces. Where fat-containing waste waters are transported by means of collecting pipes and below-ground piping located far from grease-trap facilities, auxiliary heating is recommended to keep the fat liquid. The temperatures must not be permanently higher than 70 °C. Wavin AS is approved by the DIBt – the German Institute of Building Technology – for use in below-ground applications as far as the main sewage connection point (DIBt Z-42.1-228).

2.1.2.3. Photographic laboratories

Wavin AS pipes and fittings are manufactured from Astolan (a mineral-filled polypropylene) and the factory-made sealing rings are resistant to the developing and fixing media used in photographic laboratories over long-term exposures at 60°C. Wavin AS is also approved for short-term exposure to such media at 95°C (information on resistance to chemicals is given in the Wavin Chemical Resistance Tables). It is recommended that piping be installed with sufficient fall to reduce the contact time between fluid and guiding surface to a minimum.

2.1.2.4. Dental surgeries

Wavin AS can be used unreservedly in dental practices, provided the piping downstream of the dentist's chair is fitted with an integrated amalgam separator. Wavin AS (including the sealing ring) is amalgam resistant. In addition, there need be no concerns regarding cleaning agents and disinfectants normally used in dental practices if these are present in the usual concentrations.

2.1.2.5. Waste waters containing lactic acid produced by the food-processing and chemical industries

Wavin AS pipes and fittings are resistant to media containing lactic acid (at concentrations up to 90%) at liquid temperatures up to 60°C. This also applies to the factory-made SBR sealing ring of the connecting system, especially as contact is marginal. It is recommended, that piping be installed with sufficient fall to reduce contact time to a minimum.

2.1.3. Testing and approval

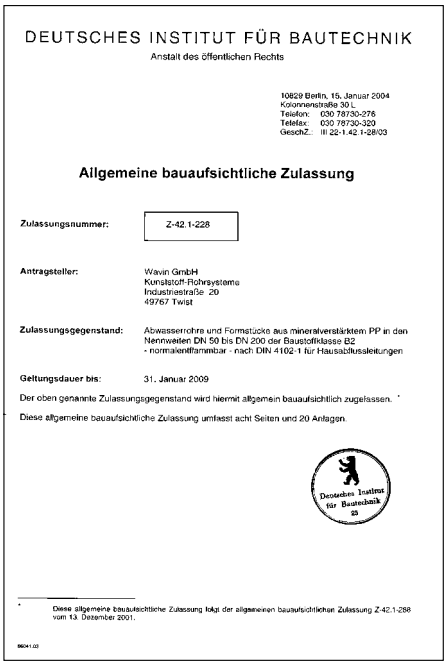
Wavin AS pipes and fittings are continually subject to strict quality controls according the DIN Certco in Berlin. They have been awarded DIBt buildings' inspection approval (DIBt Z-42.1-228) and are, therefore, deemed suitable for use as below-ground pipework.

2.1.3.1 Worldwide certificates and approvals

Denmark: ETA Denmark VA 2.14 DK 6858

Norway: Godkjenningsnmnda vor Sanitärmateriell Nr. 61-090

Sweden: Boverket DNR 83-4480/90



DEUTSCHES INSTITUT FÜR BAUTECHNIK
Anstalt des öffentlichen Rechts

10829 Berlin, 15. Januar 2004
Kolonnenstraße 30 L
Telefon: 030 78730-276
Telefax: 030 78730-320
GeschZ.: III 22-1.42.1-28/03

Allgemeine bauaufsichtliche Zulassung

Zulassungsnummer:	Z-42.1-228
Antragsteller:	Wavin GmbH Kunststoff-Rohrsysteme Industriestraße 20 49767 Twist
Zulassungsgegenstand:	Abwasserrohre und Formstücke aus mineralverstärkten PP in den Nennweiten DN 50 bis DN 200 der Baustoffklasse B2 - normalentflammbar - nach DIN 4102-1 für Hausabflussleitungen
Geltungsdauer bis:	31. Januar 2009

Der oben genannte Zulassungsgegenstand wird hiermit allgemein bauaufsichtlich zugelassen.

Diese allgemeine bauaufsichtliche Zulassung umfasst acht Seiten und 20 Anlagen.

Deutsches Institut für Bautechnik

Diese allgemeine bauaufsichtliche Zulassung folgt der allgemeinen bauaufsichtlichen Zulassung Z-42.1-288 vom 13. Dezember 2001.

Australia: Watermark Nr.: MP52 Spec 005

Germany: DiBt, Z.-42.1-228

Turkey: Turkish Standards Quality Appropriateness Certificate

Poland: Aprobata techniczna COBRTI INSTAL Nr AT-99-02-0670

2.1.4 Sound insulating properties

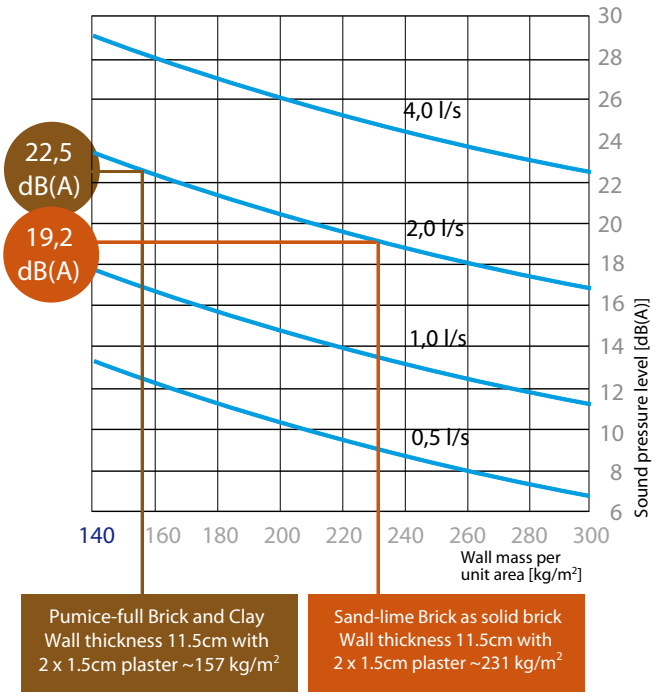
The excellent sound protection properties of Wavin AS can be attributed primarily to its thick-walled design as well as special molecular structure and the high density of 1.9 g/cm^3 of the Astolan pipe and moulded parts. This property enables Wavin AS to absorb airborne sound as well as mechanical vibrations. In studies conducted at the Fraunhofer Institut für Bauphysik (Fraunhofer Institute for Building Physics), Stuttgart, Wavin AS has proven its excellent sound absorption properties under near-real installation conditions (P-BA 130/1997).

A contribution to sound protection is also made by the compensator socket that functions as the control connector between Wavin pipes. Used at a maximum spacing interval of 3 metres, it isolates the sewage pipe from machanical vibration.

TELEPHONE: +31(0)523 624 911
FAX: +31(0)523 624 600
E-MAIL: wavin.overseas@wavin.com

2.1.5 The Wavin Noise Protection Diagram

The Wavin Noise Protection Diagram was developed by Wavin as an aid to planning and design. With it, the expected sound pressure level with respect to wall mass (kg/sq.m) and maximum waste water discharge rate (l/s) can be determined quickly. The following diagram contains two examples of wall materials, pumice-full brick and expanded clay and sand-lime brick/full brick. Other wall materials can be found in the following table.



Changes in the noise level of the installation in adjoining areas (basement level, rear), depending on the area-related mass of the installation wall at the same level of noise excitation. The sound pressure level $L_{AF,10}$ of the "Wavin AS" waste water system (for design see Report P-BA 210/2003) is shown as a function of the area-related mass of the wall supporting the installation. The calculated results shown correspond to the installation test conditions of the Fraunhofer Institute of Building Physics and do not necessarily apply to conditions in other buildings. When performing the calculations, for the purposes of simplification, the thickness, internal absorption and elastic modulus of the wall supporting the installation were assumed to remain constant. As a basis for the calculations, measurements taken on a wall with an area-related mass of 220 kg/sq.m were used. Source: Fraunhofer Institute of Building Physics

Wall material Description	Wall thickness in cm	Mass per unit area with mortar without plaster in kg/m²	Mass per unit area with plaster 2 x 1.5 cm in kg/m²
Sand-lime brick	11,5	201,0	231,0
Full brick	17,5	306,0	336,0
	24,0	420,0	450,0
Clay full brick	11,5	207,0	237,0
Gas concrete brick	12,5	100,0	130,0
	15,0	120,0	150,0
	25,0	200,0	230,0
	30,0	240,0	270,0
Pumice full brick & expanded clay	11,5	156,5	176,5
	17,5	222,0	192,0
	24,0	264,0	294,0
	30,0	330,0	360,0

Table 6: Wall mass
Source: DIN 1055/Manufacturer's data

2.1.6 Technical Data

Material:

Astolan®; polypropylene, mineral reinforced, resistant to hot water, DIN 4102, B2.

Physical characteristics:

Density	~ 1,9 g/cm^3 DIN 53479
Elongation at break	~ 29%
Tensile strength	~ 13 N/mm^2
E-modulus	~ 3800 N/mm^2
Coefficient of thermal linear expansion	~ 0,09 mm/mK
Fire resistancy	~ DIN 4102, B2
Colour	Light grey RAL 7035

Marking:

Wavin AS, nominal diameter, production year, quality mark, approval, material, control mark, fire classification.

Example:

Wavin AS, DN 100, 2002, Z.-42.1-228, ASTOLAN®, Ü DIN 4102, B2.

Pipe dimensions

DN	d[1)]	di[2)]	s[3)]
56	58	50.0	4.0
70	78	69.0	4.5
90	90	81.0	4.5
100	110	99.4	5.3
125	135	124.4	5.3
150	160	149.4	5.3
200	200	187.6	6.2

1) Outside diameter in mm.
2) Inside diameter in mm.
3) Wall thickness in mm.

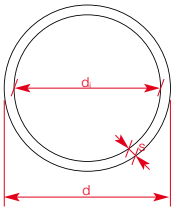


Table 7 Pipe dimensions

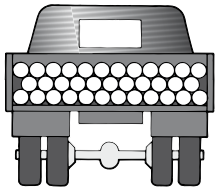
2.2 Packing, transport and storage

2.2.1 Packing

Wavin AS pipes and fittings are packed ready for transport in a customer friendly way. The packing guarantees optimal security, efficient storage and easy handling. Pipes are normally delivered on full pallets containing 14 to 38 pipes. Due to the standardized 3 metre length of all pipes there is only one pallet type for each dimension (DN 56, DN 70, DN 100, DN 125, DN 150 and DN 200). This saves space in the warehouse. Further, Wavin offers DN 90 (wall mounting) in 2 metre length. The pallets can be handled with a forklift truck. Wavin AS fittings are packed in practical carton box pallets.

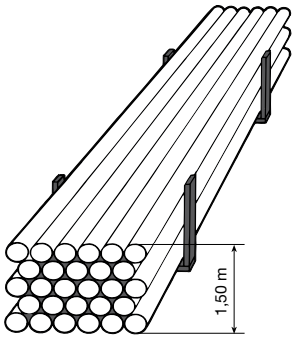
2.2.2 Transport

Wavin AS pipes – when no longer packed in original pallets – must lie fully supported over their total length during transport. Bending of the pipes should be avoided. Impact stress on pipes and fittings must be prevented.



2.2.3 Storage

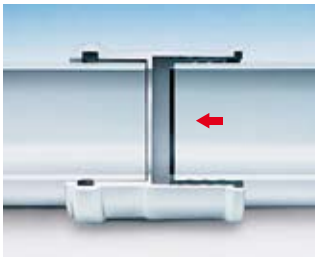
If stored correctly no lasting deformations or damage to pipes and fittings will occur. Factory bundled pipe pallets can be stacked. The stack of loose pipes should never be higher than 1,5 metre. The elastomeric sealing rings should peferably not be stored in the open air.

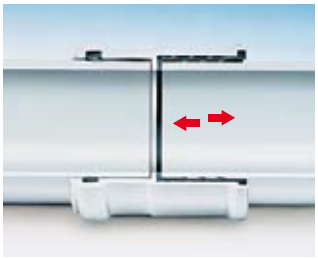


2.3 Jointing pipes and fittings

2.3.1 Joints with the compensator socket

The Wavin AS compensator socket is used to connect two pipes as well as a pipe and fitting where compensation for axial movements is required. For conventional plastic soil and waste pipe systems the expansion margin is created by marking and withdrawing the pipe to the expansion length. This is not required for Wavin AS, as the compensator socket adapts to temperature changes in the system. This not only saves working time, but also gives additional technical security to the system.





Mounting instructions

When making the connection with the compensator socket the following instruction rules should be adhered to:

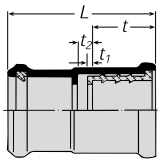
- *Clean pipe end.*
- *Check the position and condition of the elastomeric sealing ring in the groove. Further check the condition of the elastomeric expansion collar.*
  If necessary, clean fitting, sealing ring and collar.
- *Push the expansion collar over the pipe end (1).*
  ATTENTION: The expansion collar may only be pushed over the plain pipe ends, never over the spigot end of fittings.
- *Apply Wavin lubricant* sparsely inside compensator socket of fitting (2).*
- *Apply and distribute Wavin lubricant evenly on outside of elastomeric compensator collar (3).*

TELEPHONE: +31(0)523 624 911
FAX: +31(0)523 624 600
E-MAIL: wavin.overseas@wavin.com

- *Push fitting over compensator collar to full insertion depth. Check final position of compensator collar** (4-6).*
- *Apply Wavin lubricant on the next pipe end or spigot fitting and insert in the socket end to full depth.*

*) Never use oil or grease!

**) For insertion depth for pipe with collar into the compensator socket, see table 8



DN	L	t	t_1	t_2
(mm)	(mm)	(mm)	(mm)	(mm)
56	126	49	5	15
70	119	48	6	16
90	123	47	6	16
100	124	48	6	16
125	132	63	6	16
150	144	63	6	16

Table 8 Insertion depth for pipe with collar in compensator

2.3.2. Joints without the compensator socket

Push-fit joints between pipes of maximum 3 metre lengths and fittings must be capable of absorbing lateral thermal expansion of up to 10 mm. If the compensation socket is not used, the required lateral expansion tolerance can be created by inserting the pipe end to full depth and subsequently withdrawing the pipe end by 10 mm. (B). Socket connections between fittings only, need no consideration for lateral compensation due to temperature differences and can therefore be fully inserted.

The socket connection is to be installed as follows:

- *Check the position and condition of the elastomeric sealing ring in the groove. If necessary, clean fitting and sealing ring.*
- *Clean pipe end or spigot fitting.*
- *Apply Wavin lubricant* in a thin and equal layer on pipe end.*
- *Insert pipe end straight to the central register of the socket.*
- *Withdraw pipe by 10 mm. – never the fitting –*

*) Never use oil or grease!

In case of vertical installation of pipes, the individual pipe lengths must be fixed immediately after assembly with pipe brackets, in order to avoid the pipe from sliding downwards and eliminating the 10 mm expansion / contraction allowance (A).

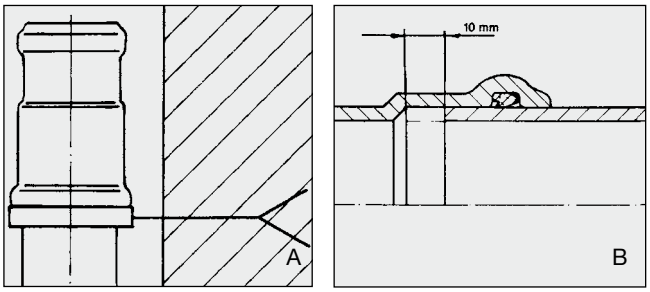


Figure 11 Joints with compensator socket (A) or alternatively with integrated socket (B)

2.3.3 Making a connection on an already installed pipe

This can easily be executed using standard Wavin AS fittings.

Installation instructions using double socketed sleeves:

1. *Cut out a sufficient length of pipe (length of fitting plus 2,5x OD of pipe)*
2. *Cut required pass length*
3. *Deburr and bevel cutting edges*
4. *Slide branch or access pipe on upper pipe end*
5. *Fit one double socketed sleeve, over its full length, on pass length*
6. *Fit one double socketed sleeve, over its full length, on lower pipe end*
7. *Fit in pass length and close the pipe by sliding the double socketed sleeves in position*
8. *Fix double socketed sleeves as pictured in figure*

Alternatively Wavin compression couplers or Wavin AS long socket (only DN 100) can also be used.

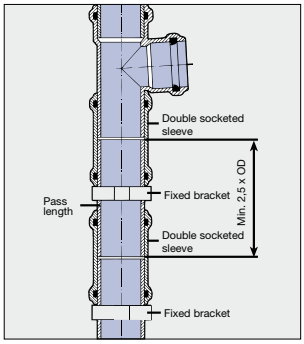


Figure 12 Connections on a ready installed pipe.

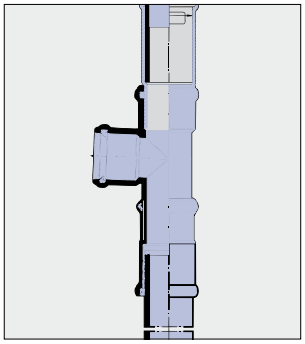


Figure 13 Alternative: Wavin AS long socket

2.4 Pipe cutting

Wavin AS can be cut simply with a commercial pipe cutter or saw. Always cut the pipe straight. Remove all swarf and burrs from the cut end and clean the pipe end. For connections to Wavin AS fittings or sockets bevel the pipe end - do not chamfer - see figure 14.

For connections to socketed pipe systems with roll-rings, the ends of the Wavin AS pipes must be chamfered. (Note: Does not apply for PVC-U fittings with elastomeric sealing ring as well as PP pipes and fittings).

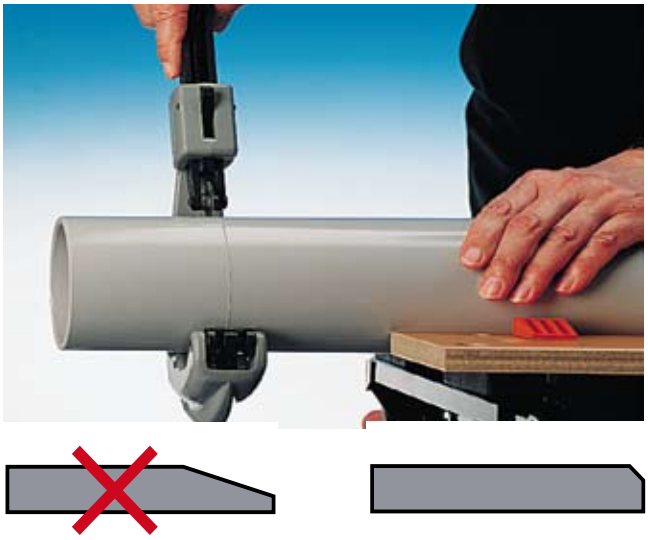


Figure 14 Cutting Wavin AS pipes

2.5 Fixing

2.5.1 General instructions

In principle Wavin AS soil and waste systems should be installed tension free and with free lateral allowance for temperature compensation. Use sound absorbing brackets, dimensionally compatible to the pipe diameter. The pipe brackets should have inserts of corrugated rubber and be fixed to the wall using screws and plastic plugs*. For pipe systems in which inner-pressures can arise, the joints have to be secured to prevent them from sliding apart and deviating from the centre axis.

The Wavin safety clips prevent the joints from sliding apart. Alternatively the fixing brackets can be arranged appropriately to achieve the same effect.

*) *Metal plugs can be used, but will lead to is disadvantageous sound emission.*

Figure 15

Figure 16

2.5.2 Fixing bracket

The fixed bracket creates a fixed point in the pipe system. With fixed brackets the pipe or fitting cannot be moved through the bracket after the screws are tightened (no longitudinal movement is possible). In order to prevent sliding down of the vertical stack, each individual pipe length must be secured on one point by a fixed bracket. Fittings or groups of fittings must always be secured as fixed points. Also every horizontally installed pipe should always be fixed with one fixed bracket. All remaining pipe brackets – in the vertical as well as in the horizontal installation – must be sliding brackets. The prescribed bracket distances should not be exceeded.

2.5.3 Sliding bracket

By using sliding brackets the pipe can still be moved through the bracket after the screws are tightened (longitudinal movement is possible once installed).

TELEPHONE: +31(0)523 624 911
FAX: +31(0)523 624 600
E-MAIL: wavin.overseas@wavin.com

2.5.4 Arrangements of the brackets

During installation of Wavin AS pipes, the following should be considered:

- In case of horizontal installation, the pipe bracket distances are 10 x the outside of the pipe (see figure 18). This becomes, in case of vertical pipe installation, depending on outside diameter, 1-2 metres (see figure 17).
- Generally pipe brackets should not be installed in impact areas. (eg diameter reductions and changes of directions in the system).
- Pipe brackets to be fixed to building materials with high specific area weight.
- For stack pipes in open mounting shafts and high rooms (storey height over 2,5 metres) it is advised to use one fixed bracket and one sliding bracket per pipe length.
- The fixed bracket must be installed directly above the fitting at the bottom of the pipe end. The sliding bracket must be installed at a distance of maximum of 2 metres above the fixed bracket (see figure 18).
- In multiple storey buildings (from 3 storeys and more) the stack pipes of DN 100 or bigger must be secured by additional fixing (stack pipe support) against sliding (see figure 18). In this case we advise using the Wavin AS socketed short length with a fixed bracket. Stack segments with fittings or short pipes are to be secured in such short distances with pipe brackets, so that they cannot slide apart.

In exceptional cases, where connecting elements other than the compensator socket are used (eg double socketed sleeve), per maximum allowable pipe length (3 metres), one fixed bracket and one sliding bracket should be installed in line with the illustrations (see figure 17) and (see figure 18) shown on this page. The double socketed sleeves are to be fixed.

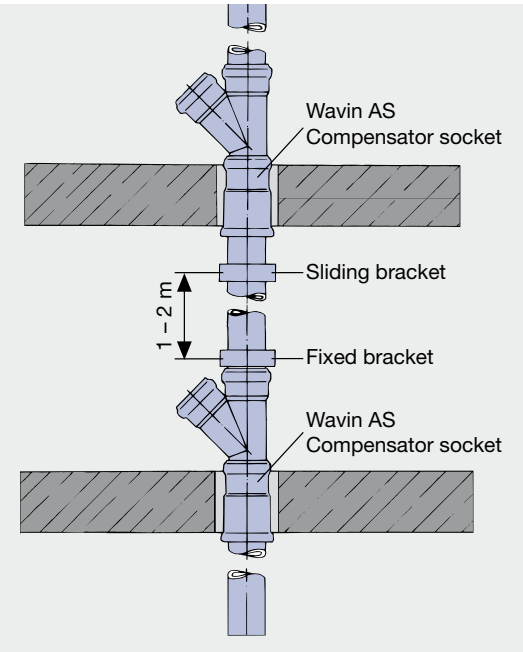


Figure 17 Fixing Wavin AS

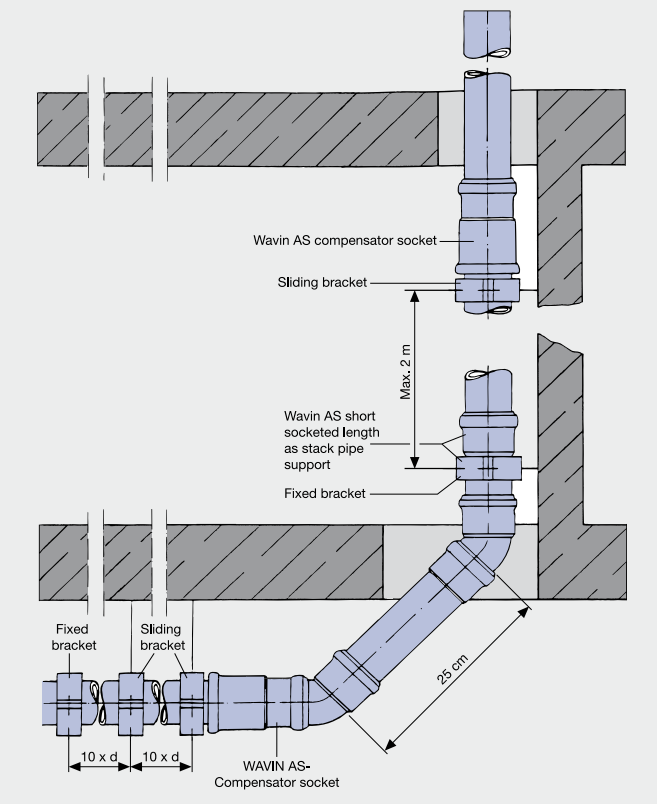


Figure 18 Fixing Wavin AS with stack pipe support

2.6 Installation in walls

In case Wavin AS is to be installed against a wall with a separate decorative top layer (e.g. plaster boards), the brackets must be fixed to the construction wall and not to the decorative layer. Passing holes in the decorative layer can be mended by using elastic filler. As long as stability and bearing capacity are not impaired, it is allowed to cut shafts and channels in brick work walls. External heating of Wavin AS pipes should be limited by heat insulating the source; eg central heating pipes as well as hot tap water pipes. Pipe and shaft dimensions are to be taken from table 2 below and figure 10.

DN	OD of pipe d_a	OD of socket d_m	Min. required spacing*, t_{erf}
(mm)	(mm)	(mm)	(mm)
56	58	79	125
70	78	96	142
90	90	110	156
100	110	132	179

* The stated depths are not including pipe crossings

Table 9 Space requirements for Wavin AS pipes DN 56 up to DN 100 mm

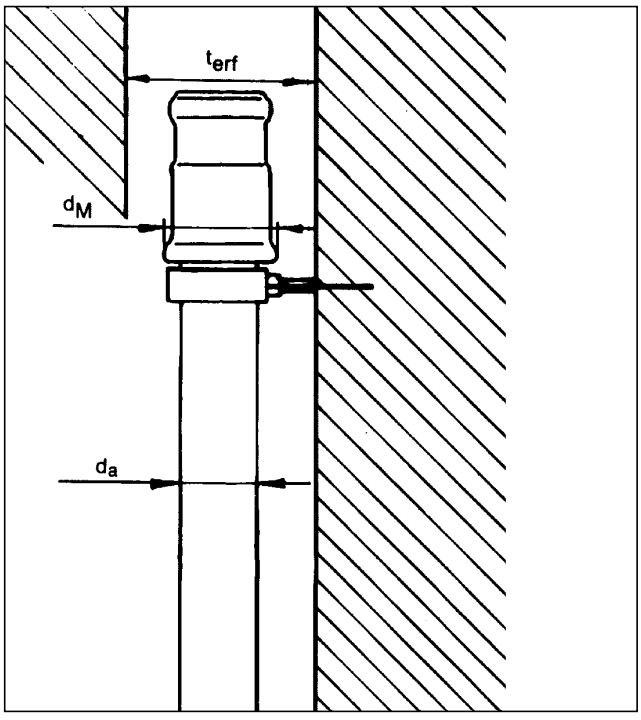


Figure 19 Space requirements Wavin AS

2.7 Installation in concrete

Wavin AS pipes and fittings can be casted in concrete. Thermal induced lateral movements to be dealt with, according to previous instructions. Pipes and fittings must be secured properly in order to prevent lateral movement during casting of the concrete. Close the annular gap between pipe and socket with sealing tape to prevent ingress of mortar in the sealing ring.

2.8 Floor crossings

Floor crossings should be made leak resistant and sound absorbent. In the case of the floor being concreted, Wavin AS pipes and fittings should be protected by using a protection sleeve or heat insulating wrapping material.

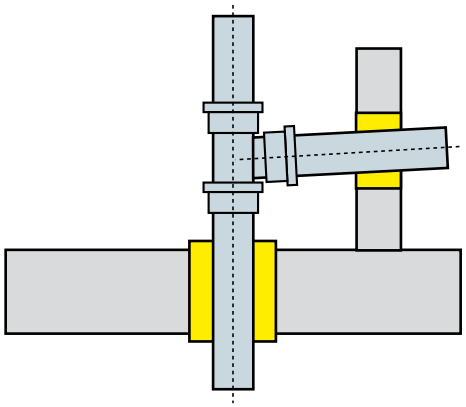


Figure 20 Floor- and wall crossings

2.9 Roof drainage pipes

Roof drainage pipes projected through living, sleeping and working rooms can be installed as pictured in figure *21*. The specific area weight of the casting should be at least equal to the wall and preferably for both at least 220 kg/m^2. Although the formation of condensation on the outside of Wavin AS pipes is less than on metallic pipes, it is recommended to insulate the pipes and fittings.

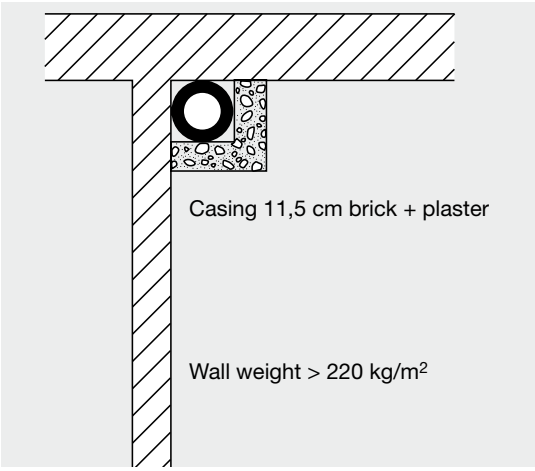


Figure 21 Internal roof drainage pipes

TELEPHONE: +31(0)523 624 911
FAX: +31(0)523 624 600
E-MAIL: wavin.overseas@wavin.com

2.10 Sound insulation recommendations

National / Local building regulations should be observed where applicable. In order to achieve optimal sound insulation it is highly recommended to implement the following instructions. These instructions are based on years of experience in compliance with strict and clear German Standards and Regulations (eg DIN 4109 and DIN 1053). Waste pipes should not be used in living, sleeping and working rooms. Should the waste pipe system be fixed on construction walls adjacent to living, sleeping and working rooms, the specific area weight of that wall should be at least 220 kg/m^2. The same requirement also applies when installed in a shaft and fixed on the intermediate wall. Shafts can be enclosed with a minimum 1,5 cm plaster layer on an appropriate support. The Wavin AS pipe system must be free from the plaster layer, avoiding sound bridges. It is recommended to wrap a layer of mineral wool around the pipe, where contact with the plaster layer cannot be avoided. *(see figure 22)*

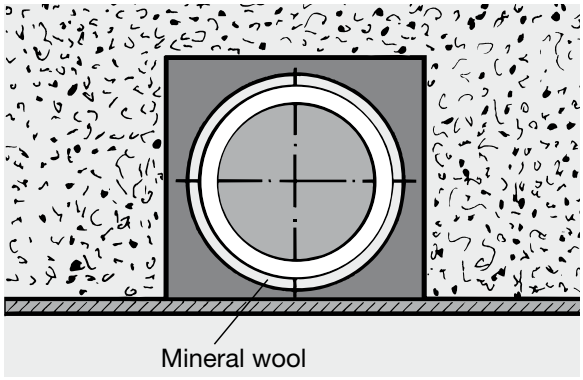


Figure 22 Pipe wrapping to avoid sound bridges between pipe and plaster

Emitted sounds depend highly on the course of the pipe. The prevention or reduction of impact zones leads to less sound emission. It is therefore recommended to prevent abrupt directional changes. Instead of installing a 90° elbow it is far better to change the direction from vertical to horizontal with two 45° elbows, interconnected by a short piece of straight pipe with a minimum length of 25 cm. *(see figure 23)* For this purpose the 45° long bend is included in the Wavin AS program. For optimal sound insulation, use full encircling brackets with inserts of corrugated rubber. *(see figure 24)*

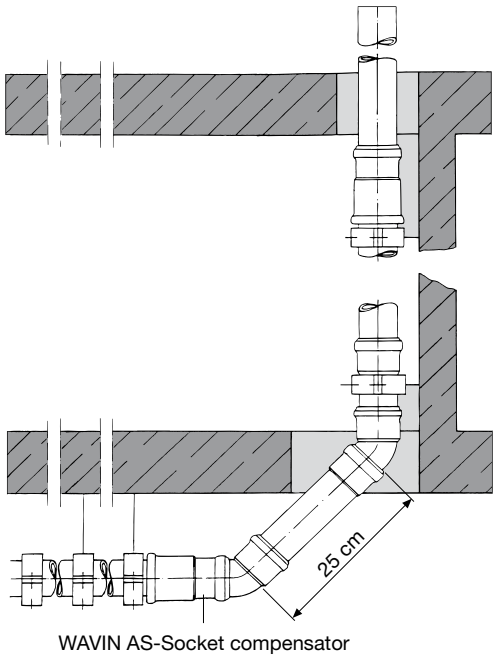


Figure 23 45° bends and short pipe lenght for less sound emission

Figure 24 Pipe bracket with inserts of corrugated rubber

2.11. Pipe installation in confined spaces involving changes in direction

The Wavin AS long bend is designed for making simple leg-length adjustments in confined spaces, where 45° bends or step-wise changes in direction are required.

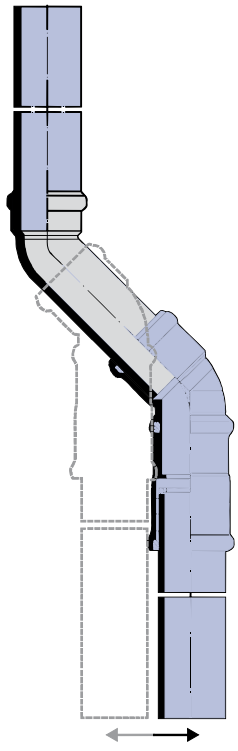


Figure 25 Wavin AS Long Bend

2.12 Air circulation pipework

The Wavin AS air circulation bend simplifies the installation of air circulation pipework.

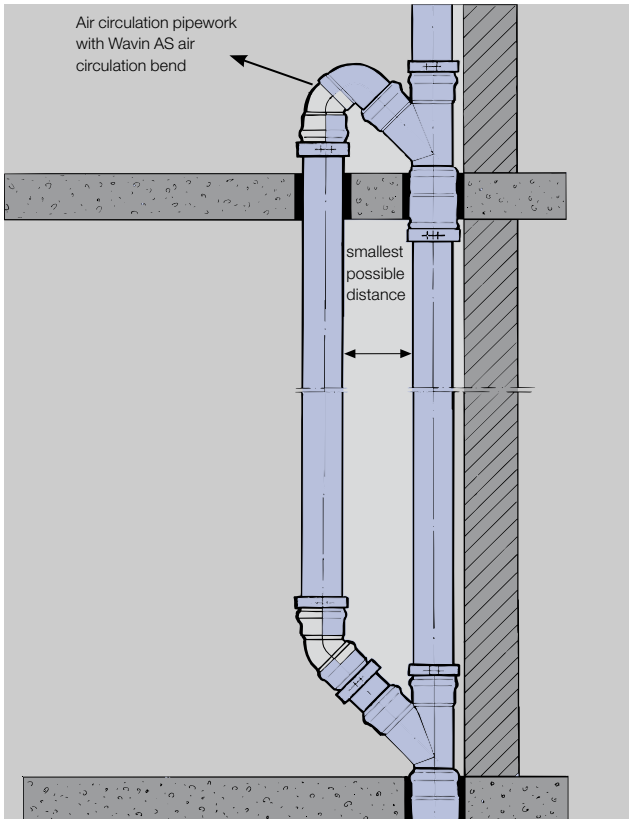


Figure 26 Wavin AS air circulation pipework with the air circulation bend.

2.13 Finished floor level assembly and pre-wall installations

When assembling onto finished floor levels in pre-wall installations, the use of the parallel branch matched to the pre-wall installation dimensions (WC element) is recommended.

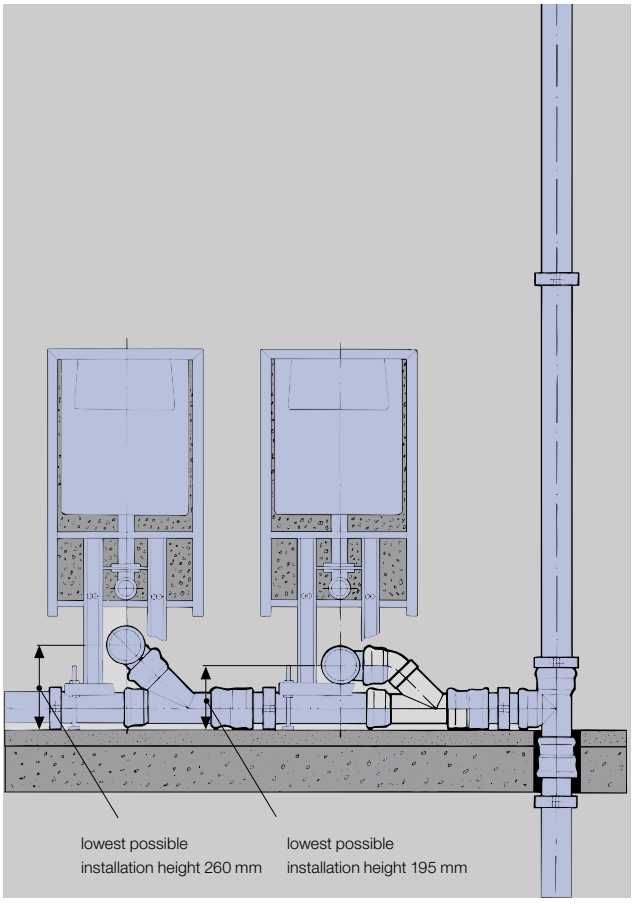


Figure 27 Wavin AS parallel branch for pre-wall installations

TELEPHONE:
+31(0)523 624 911
FAX:
+31(0)523 624 600
E-MAIL:
wavin.overseas@wavin.com

2.14 Below-ground piping and collecting pipes

Below-ground piping is normally connected to downpipes or directly into waste water facilities located at basement level. Such piping is normally to be found buried within the confines of the building or below the foundations.

Collecting pipes are installed above-ground and used to collect waste water from downpipes or other connecting pipework.

Recommendation: Avoid below-ground piping located within building confines and install collecting pipes (DIN 1986-100, Section 5.7) as an alternative. Below-ground piping with minimum DN 80 nominal diameter can be laid outside buildings and allowed to run as far as main sewer connection point, provided hydraulic calculations permit. The design of below-ground and collecting pipe circuits is based on figures calculated using the Prandtl-Colebrook equation.

Advice:
In order to guarantee self-cleaning capacity for every 4 -6 flushes, collecting pipes with nominal DN 90 diameters must be used wherever peak flow is greater than the design unit value of the given water-saving toilet facility.

Nominal DN 90 diameters can be installed without resorting to any calculations provided a minimum fall of at least 1 cm/m is available.

Gradient	DN 56 AS d_i=50		DN 70 AS d_i=69		DN 90 AS d_i=81		DN 100 AS d_i=99,4		DN 125 AS d_i=124,4		DN 150 AS d_i=149,4		DN 200 AS d_i=187,6	
J	Q	v	Q	v	Q	v	Q	v	Q	v	Q	v	Q	v
cm/m	l/s	m/s	l/s	m/s	l/s	m/s	l/s	m/s	l/s	m/s	l/s	m/s	l/s	m/s
0,20	0,19	0,19	0,45	0,24	0,70	0,27	1,21	0,31	2,20	0,36	3,60	0,41	6,60	0,48
0,30	0,23	0,24	0,56	0,30	0,86	0,33	1,49	0,38	2,71	0,45	4,42	0,50	8,12	0,59
0,40	0,27	0,27	0,64	0,34	0,99	0,39	1,72	0,44	3,14	0,52	5,12	0,58	9,39	0,68
0,50	0,30	0,31	0,72	0,39	1,11	0,43	1,93	0,50	3,52	0,58	5,73	0,65	10,52	0,76
0,60	0,33	0,34	0,79	0,42	1,22	0,47	2,12	0,55	3,86	0,63	6,29	0,72	11,54	0,83
0,70	0,36	0,37	0,86	0,46	1,32	0,51	2,29	0,59	4,17	0,69	6,80	0,78	12,47	0,90
0,80	0,38	0,39	0,92	0,49	1,41	0,55	2,45	0,63	4,46	0,73	7,28	0,83	13,34	0,97
0,90	0,41	0,42	0,98	0,52	1,50	0,58	2,60	0,67	4,74	0,78	7,72	0,88	14,16	1,02
1,00	0,43	0,44	1,03	0,55	1,58	0,61	2,74	0,71	5,00	0,82	8,15	0,93	14,93	1,08
1,10	0,45	0,46	1,08	0,58	1,66	0,65	2,88	0,74	5,24	0,86	8,55	0,98	15,67	1,13
1,20	0,47	0,48	1,13	0,60	1,74	0,67	3,01	0,78	5,48	0,90	8,93	1,02	16,37	1,18
1,30	0,49	0,50	1,18	0,63	1,81	0,70	3,13	0,81	5,71	0,94	9,30	1,06	17,04	1,23
1,40	0,51	0,52	1,22	0,65	1,88	0,73	3,25	0,84	5,92	0,97	9,65	1,10	17,69	1,28
1,50	0,53	0,54	1,26	0,68	1,95	0,75	3,37	0,87	6,13	1,01	10,00	1,14	18,32	1,33
2,00	0,61	0,63	1,46	0,78	2,25	0,87	3,89	1,00	7,09	1,17	11,56	1,32	21,18	1,53
2,50	0,69	0,70	1,64	0,88	2,52	0,98	4,36	1,12	7,94	1,31	12,93	1,48	23,69	1,71
3,00	0,75	0,77	1,80	0,96	2,76	1,07	4,78	1,23	870	1,43	14,17	1,62	25,97	1,88
3,50	0,82	0,83	1,94	1,04	2,98	1,16	5,16	1,33	9,40	1,55	15,31	1,75	28,06	2,03
4,00	0,87	0,89	2,08	1,11	3,19	1,24	5,52	1,42	10,05	1,65	16,38	1,87	30,00	2,17
4,50	0,93	0,94	2,20	1,18	3,39	1,31	5,86	1,51	10,67	1,76	17,38	1,98	31,83	2,30
5,00	0,98	0,99	2,32	1,24	3,57	1,39	6,18	1,59	11,25	1,85	18,32	2,09	33,56	2,43

Table 10 Allowable waste water discharge, filling factor 50% (h/d_i = 0.5)

Gradient	DN 56 AS d_i=50		DN 70 AS d_i=69		DN 90 AS d_i=81		DN 100 AS d_i=99,4		DN 125 AS d_i=124,4		DN 150 AS d_i=149,4		DN 200 AS d_i=187,6	
J	Q	v	Q	v	Q	v	Q	v	Q	v	Q	v	Q	v
cm/m	l/s	m/s	l/s	m/s	l/s	m/s	l/s	m/s	l/s	m/s	l/s	m/s	l/s	m/s
0,20	0,32	0,22	0,76	0,27	1,17	0,30	2,03	0,35	3,70	0,41	6,03	0,46	11,05	0,53
0,30	0,39	0,27	0,94	0,33	1,44	0,37	2,49	0,43	4,54	0,50	7,41	0,57	13,58	0,66
0,40	0,45	0,31	1,08	0,39	1,67	0,43	2,89	0,50	5,26	0,58	8,57	0,65	15,71	0,76
0,50	0,51	0,35	1,22	0,43	1,87	0,49	3,24	0,56	5,89	0,65	9,60	0,73	17,59	0,85
0,60	0,56	0,38	1,33	0,48	2,05	0,53	3,55	0,61	6,46	0,71	10,53	0,80	19,29	0,93
0,70	0,61	0,41	1,44	0,52	2,22	0,58	3,84	0,66	6,99	0,77	11,38	0,87	20,85	1,01
0,80	0,65	0,44	1,54	0,55	2,37	0,62	4,11	0,71	7,48	0,82	12,18	0,93	22,30	1,08
0,90	0,69	0,47	1,64	0,59	2,52	0,65	4,36	0,75	7,94	0,87	12,92	0,99	23,67	1,15
1,00	0,73	0,49	1,73	0,62	2,66	0,69	4,60	0,79	8,37	0,92	13,63	1,04	24,96	1,21
1,10	0,76	0,52	1,82	0,65	2,79	0,72	4,83	0,83	8,78	0,97	14,30	1,09	26,19	1,27
1,20	0,80	0,54	1,90	0,68	2,92	0,76	5,04	0,87	9,18	1,01	14,94	1,14	27,36	1,32
1,30	0,83	0,57	1,98	0,71	3,04	0,79	5,25	0,91	9,56	1,05	15,56	1,19	28,49	1,38
1,40	0,86	0,59	2,05	0,73	3,15	0,82	5,45	0,94	9,92	1,09	16,15	1,23	29,57	1,43
1,50	0,89	0,61	2,12	0,76	3,27	0,85	5,65	0,97	10,27	1,13	16,72	1,28	30,62	1,48
2,00	1,03	0,70	2,46	0,88	3,78	0,98	6,53	1,13	11,87	1,31	19,33	1,47	35,39	1,53
2,50	1,16	0,79	2,75	0,98	4,23	1,10	7,30	1,26	13,29	1,46	21,63	1,65	39,59	1,92
3,00	1,27	0,86	3,02	1,08	4,63	1,20	8,01	1,38	14,56	1,60	23,70	1,81	43,39	2,10
3,50	1,37	0,93	3,26	1,17	5,01	1,30	8,65	1,49	15,74	1,73	25,61	1,95	46,88	2,27
4,00	1,47	1,00	3,49	1,25	5,36	1,39	9,26	1,60	16,83	1,85	27,39	2,09	50,13	2,43
4,50	1,56	1,06	3,70	1,32	5,68	1,48	9,82	1,69	17,86	1,96	29,06	2,22	53,19	2,57
5,00	1,64	1,12	3,90	1,40	5,99	1,56	10,35	1,78	18,83	2,07	30,64	2,34	56,07	2,71

Table 11 Allowable waste water discharge, filling factor 70% (h/d_i = 0.7) Wavin AS

Gradient	DN 56 AS d_i=50		DN 70 AS d_i=69		DN 90 AS d_i=81		DN 100 AS d_i=99,4		DN 125 AS d_i=124,4		DN 150 AS d_i=149,4		DN 200 AS d_i=187,6	
J	Q	v	Q	v	Q	v	Q	v	Q	v	Q	v	Q	v
cm/m	l/s	m/s	l/s	m/s	l/s	m/s	l/s	m/s	l/s	m/s	l/s	m/s	l/s	m/s
0,20	0,38	0,19	0,90	0,24	1,39	0,27	2,41	0,31	4,41	0,36	7,19	0,41	13,21	0,48
0,30	0,46	0,24	1,11	0,30	1,71	0,33	2,97	0,38	5,42	0,45	8,85	0,50	16,24	0,59
0,40	0,54	0,27	1,29	0,34	1,99	0,39	3,44	0,44	6,28	0,52	10,24	0,58	18,79	0,68
0,50	0,60	0,31	1,44	0,39	2,23	0,43	3,86	0,50	7,03	0,58	11,47	0,65	21,04	0,76
0,60	0,66	0,34	1,59	0,42	2,44	0,47	4,23	0,55	7,71	0,63	12,58	0,72	23,07	0,83
0,70	0,72	0,37	1,72	0,46	2,64	0,51	4,58	0,59	8,34	0,69	13,60	0,78	24,94	0,90
0,80	0,77	0,39	1,84	0,49	2,83	0,55	4,90	0,63	8,93	0,73	14,55	0,83	26,68	0,97
0,90	0,82	0,42	1,95	0,52	3,00	0,58	5,20	0,67	9,47	0,78	15,45	0,88	28,32	1,02
1,00	0,86	0,44	2,06	0,55	3,17	0,61	5,48	0,71	9,99	0,82	16,29	0,93	29,86	1,08
1,10	0,91	0,46	2,16	0,58	3,32	0,65	5,76	0,74	10,49	0,86	17,09	0,98	31,34	1,13
1,20	0,95	0,48	2,26	0,60	3,47	0,67	6,01	0,78	10,96	0,90	17,86	1,02	32,74	1,18
1,30	0,99	0,50	2,35	0,63	3,62	0,70	6,26	0,81	11,41	0,94	18,60	1,06	34,09	1,23
1,40	1,02	0,52	2,44	0,65	3,76	0,73	6,50	0,84	11,85	0,97	19,31	1,10	35,39	1,28
1,50	1,06	0,54	2,53	0,68	3,89	0,75	6,73	0,87	12,27	1,01	19,99	1,14	36,64	1,33
2,00	1,23	0,63	2,93	0,78	4,50	0,87	7,79	1,00	14,18	1,17	23,11	1,32	42,35	1,53
2,50	1,37	0,70	3,27	0,88	5,04	0,98	8,72	1,12	15,87	1,31	25,86	1,48	47,38	1,71
3,00	1,51	0,77	3,59	0,96	5,52	1,07	9,56	1,23	17,40	1,43	28,34	1,62	51,93	1,88
3,50	1,63	0,83	3,88	1,04	5,97	1,16	10,33	1,33	18,80	1,55	30,63	1,75	56,11	2,03
4,00	1,74	0,89	4,15	1,11	6,39	1,24	11,05	1,42	20,11	1,65	32,76	1,87	60,01	2,17
4,50	1,85	0,94	4,41	1,18	6,78	1,31	11,72	1,51	21,34	1,76	34,75	1,98	63,67	2,30
5,00	1,95	0,99	4,65	1,24	7,15	1,39	12,36	1,59	22,50	1,85	36,64	2,09	67,13	2,43

Table 12 Allowable waste water discharge, filling factor 100% (h/d_i = 1.0) Wavin AS

TELEPHONE: +31(0)523 624 911
FAX: +31(0)523 624 600
E-MAIL: wavin.overseas@wavin.com

2.15 Installation of the Wavin BM-90 fire-protection sleeve

Wavin BM-90 is a new fire-protection sleeve designed for use with Wavin domestic waste water removal piping systems according to DIN 4102-11. It is suitable for use on piping with external diameters of up to 160mm and is able to provide a secure seal for use in all conceivable installation situations:

- Right-angled wall and ceiling penetration
- Lightly-constructed partition walls
- Angled wall and ceiling penetration to 45°
- For sealing over pipe collars (to 45°)
- For installation under ceilings and in front of walls
- Installation flush with ceiling surface

2.15.1 BM-90 Installation instructions

The BM-90 fire collar provides fire resistant sealing for wall and ceiling installation of the Wavin AS acoustic insulation systems and other selected Wavin soil and waste systems. The BM-90 fire collar is approved by the German Institute Building (DIBt), approval no. Z-19.17-1924.

General recommendations

(1) Positioning of the collars: on both sides of a wall; on one side under / in a ceiling (see Fig. 30).

(2) Wall & ceiling types: at least 10 cm thick solid concrete, aerated concrete and sand-lime brick walls as well as light dividing walls (stud walls: both sides clad with 12.5 mm plasterboard) and solid concrete and aerated concrete ceilings at least 15 cm thick

(3) Structural acoustic insulation: the acoustic insulation mat provided must be wrapped around the pipe where it passes through the wall or ceiling

(4) Joint sealing between pipe and wall / ceiling: to be packed to the full thickness of the wall or ceiling using mineral materials such as concrete, cement or plaster .

Figure 28 BM-90 fire collar

2.15.2. Components

The fire collars are made from powder coated sheet steel with a push-in fastening and tab fixings with an integrated intumescent material for reliable closure in the event of fire. Also included:

- insulation mat,
- fixing kit.
- identification label,
- declaration of conformity (Enclosure 1)

Permitted types of pipe

Type of pipe	External pipe diameter mm	Pipe wall thickness mm
Wavin AS	58 to 160	4.0 – 6.2

Table 13 Permitted types of pipe

Selection table

Wavin AS pipes DN	Straight installation mm	Installation with sleeve / Angled installation with sleeve/socket mm
56	63	90
70	75	110
90	90	125
100	110	140
125	140	180
150	160	200
200	200	-

Table 14 BM-90 selection table for various types of Wavin AS pipe installation

2.15.3 Types of installation

Straight ceiling installation

- Straight installation without sleeve / socket
- Straight installation with sleeve / socket

Wrap insulating mat around the pipe. Open the collar and position it around the pipe, whilst hooking in the push-in fastening. Fill the remaining gap with cement or concrete (see general recommendations (4)). Hold the collar firmly against the ceiling and mark the positions of the mounting holes.

Rotate the collar and drill the holes.

Insert plugs and fix the collar using screws and washers. (Mounting the collar using the washers, plugs and screws provided).

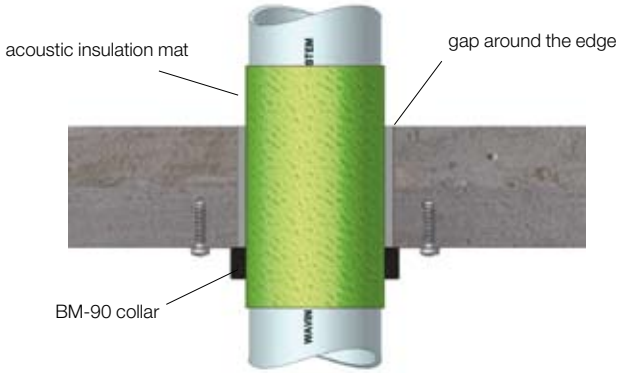
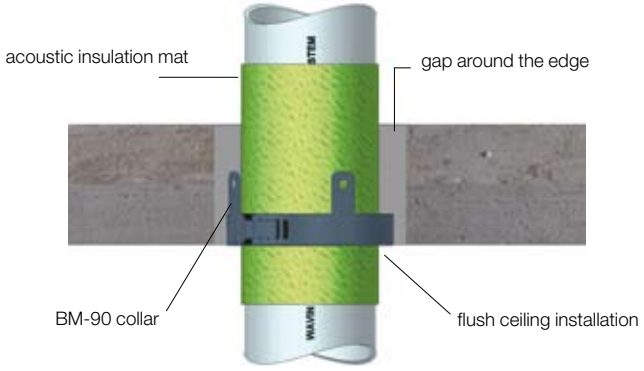


Figure 29 BM-90 fire collar: seal for straight ceiling installation

Flush ceiling installation

Wrap insulating mat around the pipe.

Open the collar and position it around the pipe, whilst hooking in the push-in fastening. Bend or angle the collar mounting tabs. Then install the collar flush with the ceiling. Fill the remaining ceiling gap with



cement or concrete (see general recommendations (4)).

Figure 30 BM-90 fire collar: flush ceiling installation

Angled ceiling installation

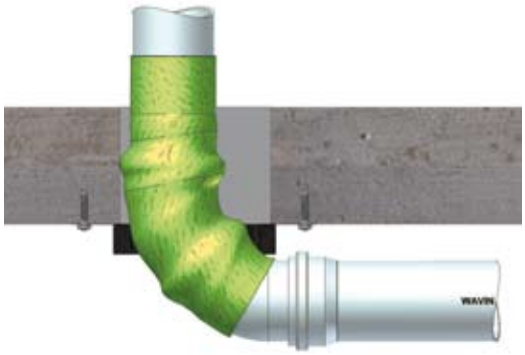
Wrap insulating mat around the pipe.

Open the collar and position it around the pipe, whilst hooking in the push-in fastening. Fill the remaining gap with cement or concrete (see general recommendations (4).

Hold the collar firmly against the ceiling and mark the positions of the mounting holes.

Rotate the collar and drill the holes.

Insert plugs and fix the collar using screws and washers. (Mounting the



collar using the washers, plugs and screws provided).

Figure 31 BM-90 fire collar: seal with ceiling installation of more than 45°

Wall installation

- in solid walls with sleeve
- in solid walls without sleeve
- in plasterboard walls with sleeve*
- in plasterboard walls without sleeve*
- Angled installation up to 45°

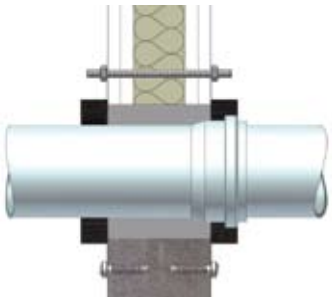
*Note: fittings for installation in plasterboard walls are not included.

Wrap insulating mat around the pipe. Open the collar and position it around the pipe, whilst hooking in the push-in fastening. Fill the remaining gap with cement or concrete (see general recommendations (4). Hold the collar firmly against the ceiling and mark the positions of the mounting holes.

Rotate the collar and drill holes.

Insert plugs and fix the collar using screws and washers. (Mounting the collar using the washers, plugs and screws provided).

Repeat the steps described for the second collar required on the



opposite side.

TELEPHONE: +31(0)523 624 911
FAX: +31(0)523 624 600
E-MAIL: wavin.overseas@wavin.com

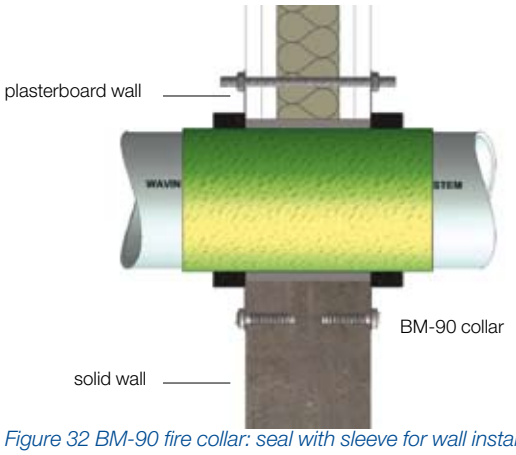


Figure 32 BM-90 fire collar: seal with sleeve for wall installation

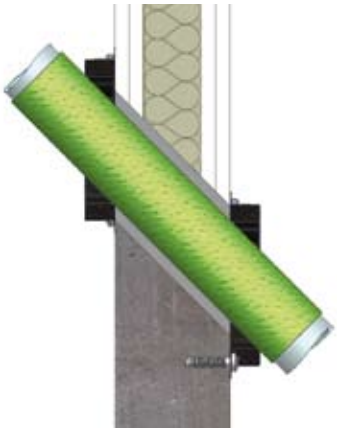
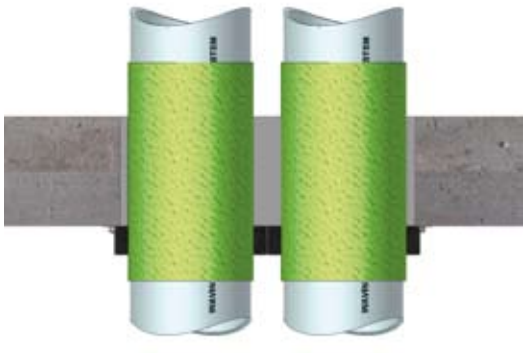


Figure 33 BM-90 fire collar: seal without sleeve for wall installation

Figure 34 BM-90 fire collar: 45° angled wall installation

Additional information



The collar has also been tested for adjacent installation and for sealing pneumatic (post) tube pipes including two control cables.

Figure 35 BM-90 fire collar: sealing of adjacently installed ceiling pipes

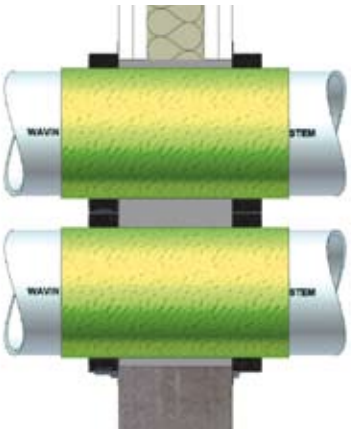


Figure 36 BM-90 fire collar: sealing of adjacently installed wall pipes

Note

The presented data, especially recommendations for the processing and use of our products are based on our knowledge and experience. Due to differences in material and working conditions that are outside the scope of our influence, we recommend that sufficient internal trials be conducted in each case to ensure the suitability of our product to the intended method and processing purposes. No liability will be accepted either on the basis of these instructions or from an oral advice, unless we are accused of gross negligence or deliberate malice.

Enclosure 1
Declaration of conformity
for the Wavin BM-90 fire collar

Name and address of the installing company:

Site / building:

Date of manufacture:

Required fire safety class for pipe seal: R90

Declaration:

We hereby state that:

all details of the manufacture and installation of R90 fire resistant pipe seals for installation in walls and ceilings of fire class F90 have been carried out properly and according to the requirements of the Deutsche Institut für Bautechnik (DIBt / German Institute of Building Technology) National Technical Approval No.: Z-19.17-1924 dated 21.10.2008.

The signatories confirm that the products used in the manufacture of the object being certified (e.g. the pipe collar or the fitting kit, fire protection insert etc.) have been accredited according to the National Technical Approval standards.

Place, Date

Company / Signature

This declaration is to be given to the builder to be forwarded to the relevant building authorities if required.

TELEPHONE: +31(0)523 624 911
FAX: +31(0)523 624 600
E-MAIL: wavin.overseas@wavin.com

2.16 Wavin AS Floor Trap

The highly functional Floor Trap completes the existing Wavin AS range. The Wavin AS Floor Trap has unique features such as an air tight baffle construction and the incorporation of proven Wavin AS seals. The Wavin AS Floor Trap can be directly applied within the Wavin AS soil and waste system design.

In the design of the Wavin AS Floor Trap, 50 years of Wavin knowledge has been integrated from both a functional installation as well as a hydraulic perspective.

Important aspects in the designing process were:

- Knock-out prevention
- SBR seals
- Absorbs/correct installation mistakes
- Durability
- Resistance to difficult installation circumstances.

2.16.1 Benefits

Seal construction

The already proven Wavin AS seal construction is included in not only the top inlet but on all inlets and even on the outlet. This seal construction gives the Floor Trap the same performances/reliability as the already established Wavin AS fittings and pipes and gives maximum freedom in installing this Floor Trap.

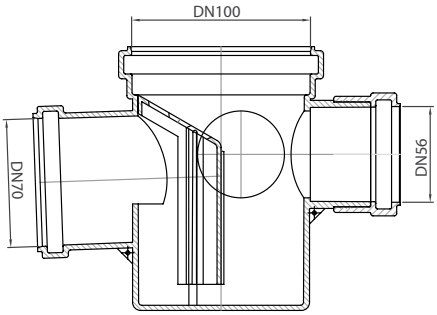
Baffle construction

The baffle construction is air tight under all circumstances. The high tolerances during production guarantee the functionality during the installed life time. A specially designed inspection plug enables to access the area under the baffle in order to inspect and clean this area. The Floor Trap volume is designed in such a way that a maximal discharge capacity is reached.

Blind plugs

In case not all the inlets are used two PP-blind plugs are added to the Floor Trap. These blind plugs are easy to mount to the inlets of the Floor Trap and secure a leakage free sealing of unused connections to the Floor Trap.

Connections and relation between DN and OD			
	Number	DN	OD [mm]
Inlets	3	56	58
Outlet	1	70	78
Top inlet	1	100	110



Quality requirements

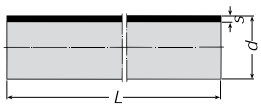
The Wavin AS Floor Trap complies with the respective standard EN1455 (EN1451 for the pipes). The seals comply with standard EN 681-1.

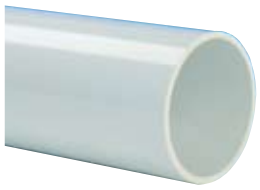
2.17 Complementary products

The Wavin AS system can well be used in combination with:

- HepvO - hygienic self-sealing waste valve
- Wavin EMU - soil & waste accessories (traps, siphons)
- Wavin Problem Solvers - soil & waste manifolds and flexible pan connectors

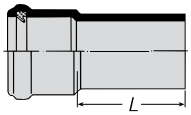
Delivery Program





Wavin AS - plain ended pipe

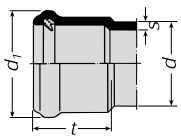
Dim. DN	Article No.	d mm	s mm	L mm	Weight kg/m	Standard Packing
56	91.1.0000	58	4,0	3000	1,40	30
70	91.1.0002	78	4,5	3000	2,10	38
90	91.1.0005	90	4,5	3000	2,30	35
100	91.1.0004	110	5,3	3000	3,55	29
125	91.1.0006	135	5,3	3000	4,40	23
150	91.1.0008	160	5,3	3000	5,15	20
200	91.1.0010	200	6,2	3000	7,50	14



Wavin AS - socketed short length

Dim. DN	Article No.	L mm	Weight kg/pc.	Standard Packing
56	91.1.0100	150	0,30	672
70	91.1.0102	150	0,45	360
90	91.1.0103	150	0,55	240
100	91.1.0104	150	0,78	196
125	91.1.0106	150	1,01	140
150	91.1.0108	150	1,20	100

Other short lengths (250, 500, 1000, 2000 mm) on request.



Socket dimension

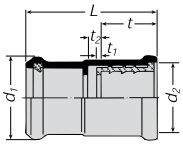
Dim. DN	d mm	d1 mm	s mm	t mm
56	58	75	4,0	54
70	78	96	4,5	56
90	90	110	4,5	55
100	110	132	5,3	61
125	135	161	5,3	64
150	160	181	5,3	66
200	200	227	6,2	85

All fittings with sockets are pre-assembled with sealing rings.

For spare sealing rings see page 33.

TELEPHONE: +31(0)523 624 911
FAX: +31(0)523 624 600
E-MAIL: wavin.overseas@wavin.com

Wavin AS - compensator socket

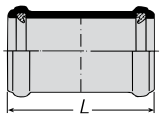


Dim. DN	Article No.	d1 mm	d2 mm	t mm	t1 mm	t2 mm	L mm	Weight kg/pc.	Standard Packing
56	91.1.2000	175	172	49	5	15	126	0,20	924
70	91.1.2002	196	184	48	6	16	119	0,30	576
90	91.1.2003	110	104	47	6	16	123	0,30	400
100	91.1.2004	132	116	48	6	16	124	0,49	308
125	91.1.2006	161	141	63	6	16	132	0,66	192
150	91.1.2008	181	166	63	6	16	144	0,75	120

All compensator sockets are pre-assembled with collars and sealing rings.

For spare collars and sealing rings see page 33.

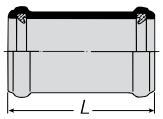
Wavin AS - double socketed sleeve, with central register



Dim. DN	Article No.	L mm	Weight kg/pc.	Standard Packing
200	91.1.2022	168	1,33	75

Connecting element between pipes as well as between pipes and fittings.

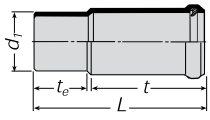
Wavin AS - double socketed sleeve

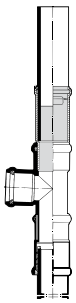


Dim. DN	Article No.	L mm	Weight kg/pc.	Standard Packing
56	91.1.2010	105	0,18	1000
70	91.1.2012	107	0,26	640
100	91.1.2014	117	0,43	336
125	91.1.2016	124	0,56	216
150	91.1.2018	143	0,62	140
200	91.1.2020	168	1,30	140

Only for subsequent installation or repair purposes.

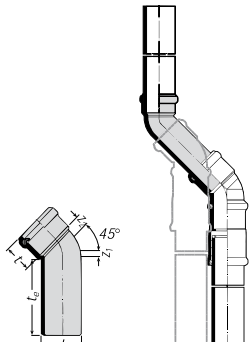
Wavin AS - long socket





Dim. DN	Article No.	d1 mm	t mm	te mm	L mm	Weight kg/pc.	Standard Packing
100	91.1.2400	110	127	74	210	0,80	196

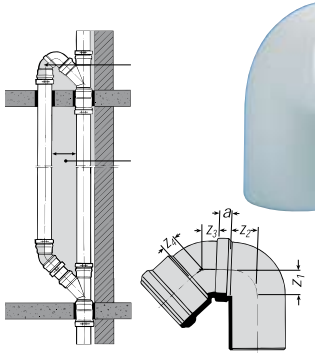
For constructing a branch or prefabrication at a later date.



Wavin AS - long bend 45°

Dim. DN	Article No.	d1 mm	t mm	te mm	Z1 mm	Z2 mm	Weight kg/pc.	Standard Packing
100	91.1.2390	110	57	250	24	28	1,42	112

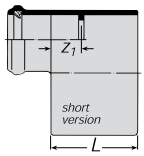
For a simple adjustment of long leg bend (or long leg elbow 45°) in narrow installation with 45° change of direction, or stepped 90° change of direction.

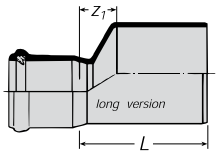


Wavin AS - air circulation bend 135°

Dim. DN	Article No.	Z1 mm	Z2 mm	Z3 mm	Z4 mm	a mm	Weight kg/pc.	Standard Packing
100	91.1.2290	78	58	44	28	19,5	1,24	110

For secondary venting systems

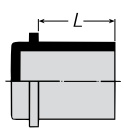




Wavin AS - reducer

Dim. DN	Article No.	z1 mm	L mm	Weight kg/pc.	Standard Packing
56/ 40	91.1.2300	-18	60	0,03	1000
70/ 56*	91.1.2302	-28	76	0,05	1000
70/ 56	91.1.2304	-28	76	0,20	1012
90/ 56	91.1.2303	-32	84	0,30	864
90/ 70	91.1.2305	-29	82	0,40	800
100/ 56	91.1.2306	-10	87	0,45	360
100/ 70	91.1.2308	-10	87	0,47	336
100/ 90	91.1.2309	-35	87	0,36	540
125/100	91.1.2310	-13	90	0,63	240
150/100**	91.1.2312	-44	115	0,98	112
150/125**	91.1.2314	-33	125	1,00	120
200/150**	91.1.2316	32	142	1,32	60

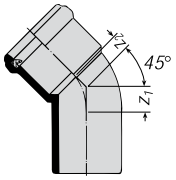
*Internal diameter of socket: 50 mm (PP) ** long version



Wavin AS - socket plug

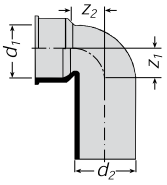
Dim. DN	Article No.	L mm	Weight kg/pc.	Standard Packing
56	91.1.2340	49	0,11	1000
70	91.1.2342	52	0,20	1000
90	91.1.2343	40	0,18	800
100	91.1.2344	57	0,37	500
125	91.1.2346	60	0,51	200
150	91.1.2348	49	0,54	300

TELEPHONE: +31(0)523 624 911
FAX: +31(0)523 624 600
E-MAIL: wavin.overseas@wavin.com



Wavin AS - bends 15°, 30°, 45°, 67° and 87°

Dim. DN	°	Article No.	z1 mm	z2 mm	Weight kg/pc.	Standard Packing
56	15°	91.1.2200	19	8	0,22	960
56	30°	91.1.2220	24	16	0,21	800
56	45°	91.1.2240	28	17	0,22	800
56	67°	91.1.2260	43	21	0,23	660
56	87°	91.1.2270	47	32	0,25	768
70	15°	91.1.2202	26	10	0,33	500
70	30°	91.1.2222	30	17	0,37	480
70	45°	91.1.2242	37	21	0,39	480
70	67°	91.1.2262	48	31	0,42	400
70	87°	91.1.2272	62	42	0,46	340
90	15°	91.1.2203	8	8	0,33	380
90	30°	91.1.2223	15	14	0,35	340
90	45°	91.1.2243	22	20	0,36	320
90	87°	91.1.2273	49	42	0,41	256
100	15°	91.1.2204	27	15	0,61	220
100	30°	91.1.2224	37	19	0,65	224
100	45°	91.1.2244	44	28	0,71	196
100	67°	91.1.2264	60	44	0,74	168
100	87°	91.1.2274	78	58	0,89	144
125	15°	91.1.2206	29	16	0,81	160
125	30°	91.1.2226	38	45	0,91	120
125	45°	91.1.2246	50	34	0,98	120
125	87°	91.1.2276	96	102	1,17	80
150	15°	91.1.2208	13	19	0,89	100
150	30°	91.1.2228	24	30	1,00	100
150	45°	91.1.2248	36	42	1,28	64
150	87°	91.1.2278	83	89	1,62	48
200	45°	91.1.2250	47	42	1,99	40
200	87°	91.1.2280	103	93	2,51	32



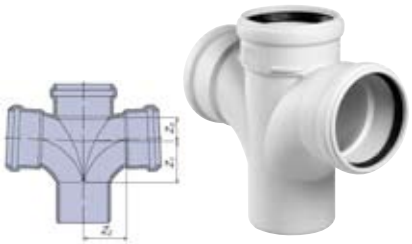
Wavin AS - trap conversion bend

Dim. DN	Article No.	d1 mm	d2 mm	Z1 mm	Z2 mm	Weight kg/pc.	Standard Packing
56/40	91.1.2380	50	58	30,5	25	0,08	800

Wavin AS - branches 45°, 67°, 87°

Dim. DN	°	Article No.	Z1 mm	Z2 mm	Z3 mm	Weight kg/pc.	Standard Packing
56/56	45°	91.1.2030	28	74	74	0,43	424
56/56	67°	91.1.2060	36	45	45	0,38	400
56/56	87°	91.1.2080	48	32	32	0,37	336
70/56	45°	91.1.2032	17	83	79	0,58	280
70/56	67°	91.1.2062	31	54	46	0,51	280
70/56	87°	91.1.2082	48	42	28	0,49	320
70/70	45°	91.1.2034	38	99	99	0,75	216
70/70	67°	91.1.2064	47	61	60	0,64	252
70/70	87°	91.1.2084	62	43	43	0,59	240
90/56	45°	91.1.2037	-3	97	84	0,70	224
90/56	87°	91.1.2041	32	48	31	0,58	224
90/70	87°	91.1.2043	43	49	40	0,69	186
90/90	45°	91.1.2035	19	113	106	0,70	168
90/90	87°	91.1.2039*	72	72	37	0,79	168
100/56	45°	91.1.2036	1	110	97	0,94	140
100/56	67°	91.1.2066	24	75	52	0,82	140
100/56	87°	91.1.2086	47	61	27	0,78	160
100/70	45°	91.1.2038	21	122	115	1,22	112
100/70	67°	91.1.2068	40	81	67	1,00	120
100/70	87°	91.1.2105*	72	90	47	1,00	140
100/70	87°	91.1.2088	60	61	43	0,94	140
100/100	45°	91.1.2040	44	136	136	1,50	88
100/100	67°	91.1.2070	58	84	84	1,32	96
100/100	87°	91.1.2090	78	58	58	1,10	112
100/100	87°	91.1.2103*	100	88	47	1,23	112
125/100	45°	91.1.2042	31	155	152	1,90	62
125/100	87°	91.1.2092	78	73	59	1,59	72
125/125	45°	91.1.2044	49	169	169	2,04	56
125/125	87°	91.1.2094	90	72	72	1,56	60
150/100	45°	91.1.2046	2	168	159	2,14	46
150/150	45°	91.1.2048	36	194	194	2,82	24
200/200	45°	91.1.2050	42	247	239	4,40	16

*Swept type

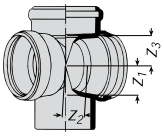


Wavin AS - double branch 87°

Dim. DN	Article No.	Z1 mm	Z2 mm	Z3 mm	Weight kg/pc.	Standard Packing
90/90/90	91.1.2102*	79	72	39	0,97	72
100/70/70	91.1.2101*	72	90	47	1,20	72
100/100/100	91.1.2100	78	58	58	1,58	72
100/100/100	91.1.2107*	100	88	47	1,50	72

*Swept type

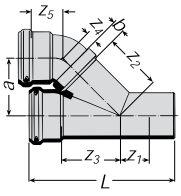
TELEPHONE: +31(0)523 624 911
FAX: +31(0)523 624 600
E-MAIL: wavin.overseas@wavin.com



Wavin AS - corner branch 87°

Dim. DN	Article No.	Z1 mm	Z2 mm	Z3 mm	Weight kg/pc.	Standard Packing
90/90/90	91.1.2122*	79	72	60	1,06	80
100/100/100	91.1.2110	78	58	58	1,58	80

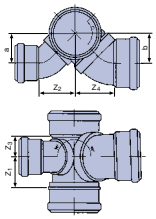
*Swept type



Wavin AS parallel branch

Dim. DN	Article No.	Z1 mm	Z2 mm	Z3 mm	Z4 mm	Z5 mm
100/100	91.1.2120	44	136	136	44	28

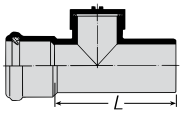
a mm	b mm	L mm	Weight kg/pc.	Standard Packing
129	19,5	320	1,93	70



Wavin AS - combination branch 87°

Dim DN	Article No.	Z1 mm	Z2 mm	Z3 mm	Z4 mm	Weight kg/pc.	Standard Packing
100/100/70	91.1.2108	80	80	58	104	1,92	80

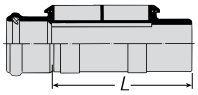
Double socket means a single fitting for both right-handed or left-handed installations



Wavin AS - access pipe type RU

Dim. DN	Article No.	L mm	Weight kg/pc.	Standard Packing
56	91.1.2320	151	0,30	480
70	91.1.2322	187	0,91	196
90	91.1.2331	148	1,93	80

With round access lid.



Wavin AS - access pipe type RE

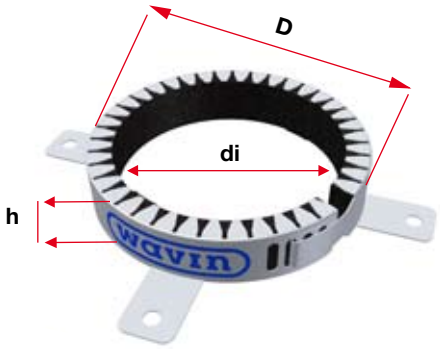
Dim. DN	Article No.	L mm	Weight kg/pc.	Standard Packing
100	91.1.2330	298	2,17	72
125	91.1.2332	316	3,26	60
150	91.1.2334	345	3,60	40

With rectangular access lid.

Safety clip for socket plug

Dim. DN	Article No.	Standard Packing
56	91.1.2491	1
70	91.1.2493	1
100	91.1.2496	1
125	91.1.2497	1
150	91.1.2498	1

Axially fixed.

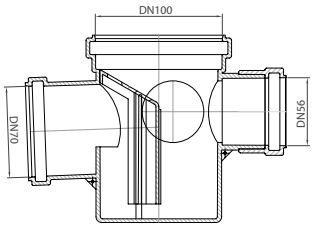


Fire protection collar type BM-90

Dim. mm	Article No.	h	D	di
40	91.1.2510	30	56	40
50	91.1.2512	30	70	50
63	91.1.2514	30	75	63
75	91.1.2516	30	99	75
90	91.1.2518	30	117	90
110	91.1.2520	30	141	110
125	91.1.2522	50	154	125
140	91.1.2524	50	178	140
160	91.1.2526	50	200	160
180	91.1.2528	50	228	180
200	on request	50	253	200

See page 21 for choice of correct collar size.

TELEPHONE: +31(0)523 624 911
FAX: +31(0)523 624 600
E-MAIL: wavin.overseas@wavin.com



Wavin AS - Floor Trap

Dim. DN	Article No.	OD mm
100/70/56 (3x)	91.1.5670	110/78/58 (3x)

Total height (without lid/ cover): 164mm

Spare collar and sealing ring

Dim. DN	Collar Art.-No.	Standard Packing	Sealing rings Art.-No.	Standard Packing
56 (58 mm)	91.1.2462	10	91.1.2442	20
70 (75 mm)	-	-	91.1.2443	20
70 (78 mm)	91.1.2464	10	91.1.2444	20
90	91.1.2465	10	91.1.2445	20
100	91.1.2466	10	91.1.2446	20
125	91.1.2467	10	91.1.2447	20
150	91.1.2468	10	91.1.2448	20
200	-	-	91.1.2450	20

Lubricant

Contents per bottle	Article No.	Standard Packing
500 ml	91.1.2480	648

Dimension DN	Consumption of lubricant per/500ml
56	approx. 40 connections
70	approx. 35 connections
90	approx. 32 connections
100	approx. 30 connections
125	approx. 25 connections
150	approx. 20 connections
200	approx. 10 connections

It is recommended to use the Wavin Lubricant.
When using a local lubricant, always use a clear lubricant.

Bracket with rubber insert
Fixed bracket

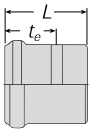
Brackets

Dim. DN	Article No.
56	11.5.1800
70	11.5.1802
90	11.5.1804
100	11.5.1806
125	11.5.1808
150	11.5.1810
200	11.5.1812

Bracket with rubber insert
Sliding bracket

Note: This bracket can be used both as a fixed bracket and as a sliding bracket. The only difference is the small plastic rings. When the bracket is used as a fixed bracket; the plastic rings should be removed. When using the bracket as a sliding bracket; the plastic rings should be put in place (see picture sliding bracket).

TELEPHONE: +31(0)523 624 911
FAX: +31(0)523 624 600
E-MAIL: wavin.overseas@wavin.com

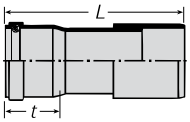


Connection to PP, PVC-U and PE spigot end

Dim. DN	Article No.	te mm	L mm	Weight kg/pc.	Standard Packing
56*	91.1.2360	-	50	0,04	2000
70	91.1.2361	77	130	0,07	2720

* Short version

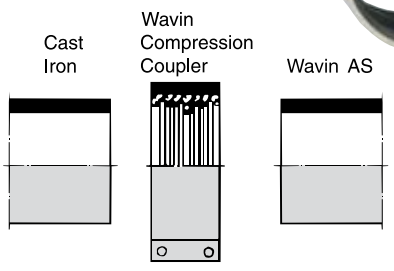
Wavin AS DN		Other Plastic Systems OD
56	X	50
70	X	75



Connection to PP, PVC-U and PE spigot end

Dim. DN	Article No.	t mm	L mm	Weight kg/pc.	Standard Packing
125	91.1.2370	82	245	0,70	120

Wavin AS DN		Other Plastic Systems OD
125	X	110



Connection from Cast Iron to Wavin AS

Dim. DN	Article No.	Standard Packing
56	91.1.2420	1320
70	91.1.2421	960
90	99.1.2425	720
100	91.1.2422	540
125	91.1.2423	360
150	91.1.2424	240

Can also be used for subsequent installation of pipes and fittings.

Wavin AS

Product and Technical Guide

Meeting your needs

The Wavin AS system forms part of a comprehensive range of plastic pipe systems to provide intelligent solutions for all building, civils and infrastructure projects.
These include:

Drinking Water Supply

- Wavin Hot & Cold systems
- Wavin PE and PVC Pressure Pipe systems

Waste Water Discharge

- Wavin Soil & Waste systems
- Wavin Sewer systems
- Wavin Inspection Chambers and Manholes

Storm Water Management

- Wavin Storm Water Infiltration systems
- Wavin Channel Drainage & Road Gullies
- Wavin Siphonic Roof Drainage systems
- Wavin Roof Gutters

Others

- Wavin Pipe Renovation systems
- Wavin Cable Duct systems
- Wavin Gas Transport systems
- Wavin Surface Heating & Cooling systems

Wavin Overseas B.V.
Rollepaal 19, 7701 BR,
P.O. Box 158, 7700 AD,
Dedemsvaart, The Netherlands

Phone: +31/523-624911
Fax: +31/523-624600

Email: wavin.overseas@wavin.com

www.wavinoverseas.com

02/2010