Waste water drainage
TECHNICAL MANUAL

wavin
CONNECT TO BETTER

Wavin SiTech Low-Noise Soil and Waste system

Contents

CONNECT TO BETTER

1. Wavin SiTech

1.1. System description

Wavin SiTech (PP) is a cost-effective low-noise soil and waste system. Noise, especially reducing noise, is an important aspect in the interior design of buildings. The Wavin SiTech system meets the latest construction requirements in line with the increasingly more demanding criteria for customers' comfort and well-being.

Next to EN 1451-1 Wavin SiTech meets DIN 4109 standards for noise reduction and fully satisfies the EN 13501-1 fire properties. Ideal for installation in multi-storey buildings and those that are particularly sensitive to noise: hospitals, hotels, social or healthcare buildings, offices, apartment buildings and libraries. It is also excellent for drainage of fluids at high temperature (kitchens, restaurants, launderettes, industrial waste etc.).

The system consists of a full product range in diameters 32, 40, 50, 75, 90, 110, 125 and 160 mm.

For discharge of hot water Wavin SiTech can be applied up to 90°C in continuous use with temperature peaks of up to 95°C for short periods.

The emitted noise level at 2.0 l/s, measured by the Stuttgart Fraunhofer Physical Constructions Institute according to DIN 4109, is 22 dB(A) and 14 dB(A) with soundproofed fixings (Bismat 1000 clamps).

1.2 Material description

The pipe is fitted with a slip-on coupling with prefabricated elastomer gasket, removable and inspectable (DIN EN 681 and DIN 4060), made from a 3-layer structured compound: the outer layer (pale blue RAL 5024) is made from copolymer polypropylene, the middle layer is in polypropylene with added minerals, the inner layer (white) is in copolymer polypropylene. The 3 coextruded layers form a single body.

The fittings are pale blue (RAL 5024) in color, stabilized and resistant to UV rays, made with a single layer of copolymer polypropylene, strengthened with mineral additives and fitted with couplers with single-lip installed elastomer gasket, removable and inspectable (DIN EN 681 and DIN 4060).

1.3. Key characteristics

Wavin SiTech is an innovative soil & waste system with proven low noise technology at a very reasonable price. The system incorporates the following key characteristics:

- Three layered pipe made from copolymer polypropylene, solid and durable
- Noise insulating three layer structure
- Proven acoustic insulation performance, accredited by the independent testing institute Fraunhofer (approval since 13 September 2006)
- Extensive product range of pipes and fittings available in sizes 32, 40, 50, 75, 90, 110, 125 and 160 mm
- Special fittings such as multiple angular socketed branches and double socketed branches
- Availability of double socketed pipe for minimum material wastage on site
- Safe & installation friendly fire protection solutions
- Easy installation by secure joint connection through slip-on coupling with prefabricated elastomer gasket
- Quick installation to the wall and ceiling by convenient and solid bracketing

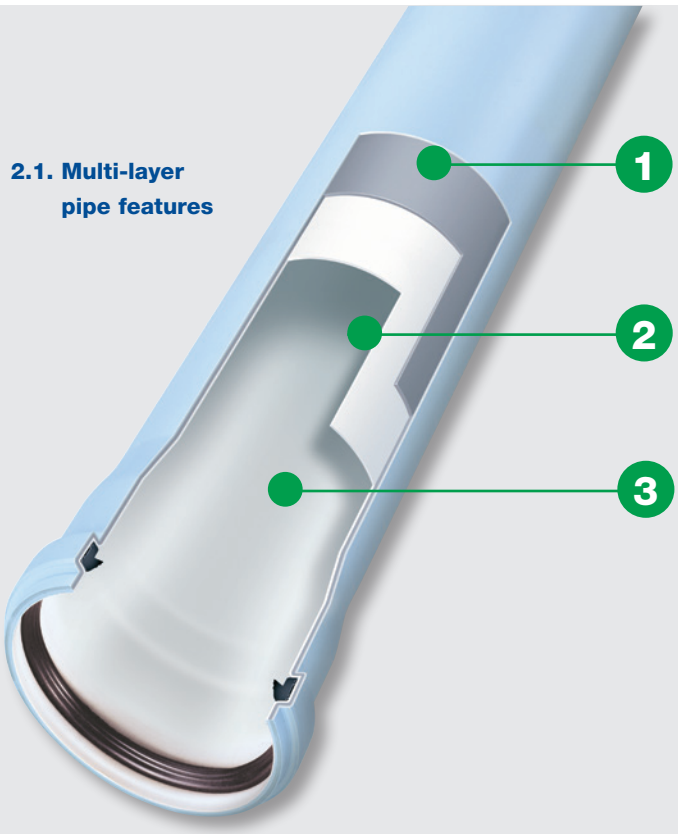
1.4 Fields of application

Similar to other plastics, Wavin SiTech has a long life span, shows resistance against corrosion and is not effected by aggressive waste water, as chemical resistance provides applicability from pH 2 – 12. Due to the smooth inner surface no encrustations build up inside the pipe system. Its low weight compared to metal pipe systems in combination with the secure push-fit connection ensures high installation convenience. With a short term resistance to high temperature fluids of 95°C and permanent exposure resistance to fluids at 90°C, the system is well suitable for residential & commercial applications.

Wavin SiTech applies to waste water drainage systems that operate under gravity. It is applicable for drainage inside dwellings, commercial, institutional and industrial buildings. Wavin SiTech is therefore commonly applied in private houses, apartment blocks, commercial buildings, kitchens, laboratories, hospitals and schools.

2. Technical data Wavin SiTech

2.1. Multi-layer pipe features



Outer layer

- Resistant to chemicals
- Highly resistant to impact stress and point loading

Middle layer

- Reinforced with mineral additives
- High impact resistance even at -20°C

Inner layer

- High chemical resistance
- Smooth inner surface with excellent flow characteristics
- White coloured to ensure good visibility during inspections

Materials

- **Outer layer** - pale blue in homopolymer polypropylene
- **Middle layer** - copolymer polypropylene with added minerals to increase noise absorption
- **Inner layer** - white in copolymer polypropylene

With its three coextruded layers and mineral core, Wavin SiTech prevents the propagation of sound.

2.2. Physical characteristics

Noise protection level	22 dB(A) with standard fixing
Noise protection level	10 dB(A) with Bismat 1000 brackets
Density	1.3 g/cm3 per pipe 1.2 g/cm3 per joint
Ring Stiffness	>= 5.5 kN/m2 ref. Diam 110
Working temperature	90°C permanent – 95°C temporarily
Resistance to chemicals	pH 2-12
Lifetime expectation	50 years
Fire resistance	DIN 4102 B2
Colour	Pale blue, RAL 5024, white inside

These physical characteristics guarantee a product with high performance in terms of noise insulation, impact resistance and strength.

2.3. Pipe fixation

Wavin recommends the use of fixation collars with rubber seal (standard) to guarantee low-noise performance. For superior acoustic performance by a further 10 dB(A) it is recommended to use special fixation collars. For more detailed information see chapter 6.7.

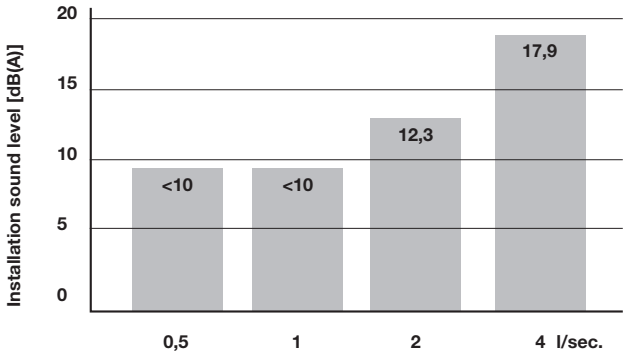


Figure 1: Acoustic performance SiTech as accredited by Fraunhofer Institut in accordance with DIN 4109 and EN 14366.

2.4. Marking

The marking on the pipe includes: trade name, nominal diameter, thickness, type of raw material, field of application, product certification (PIIP 152 RP 1.1 / CF DIN 4102 B2), date and time of production.

2.5. Pipe dimensions

Diam (mm)	Thickness (mm)
32	1.8-2.2
40	1.8-2.2
50	1.8-2.2
75	2.3-2.8
90	2.8-3.3
110	3.4-4.0
125	3.9-4.5
160	4.9-5.6

Table 1: Pipe geometry.

2.6. Conformity certificates

The SiTech range (polypropylene with added minerals) has two conformity certificates (Italian and German) with technical specifications agreed by the authorized certification institutes.

These certificates are in any case based on the requirements laid down in the European reference standards (UNI EN 1451) for Polypropylene piping applicable for drainage in buildings, specifically for application B (building), with the addition of specifications concerning the minimum requirements for mineral additives used as noise propagation levels.

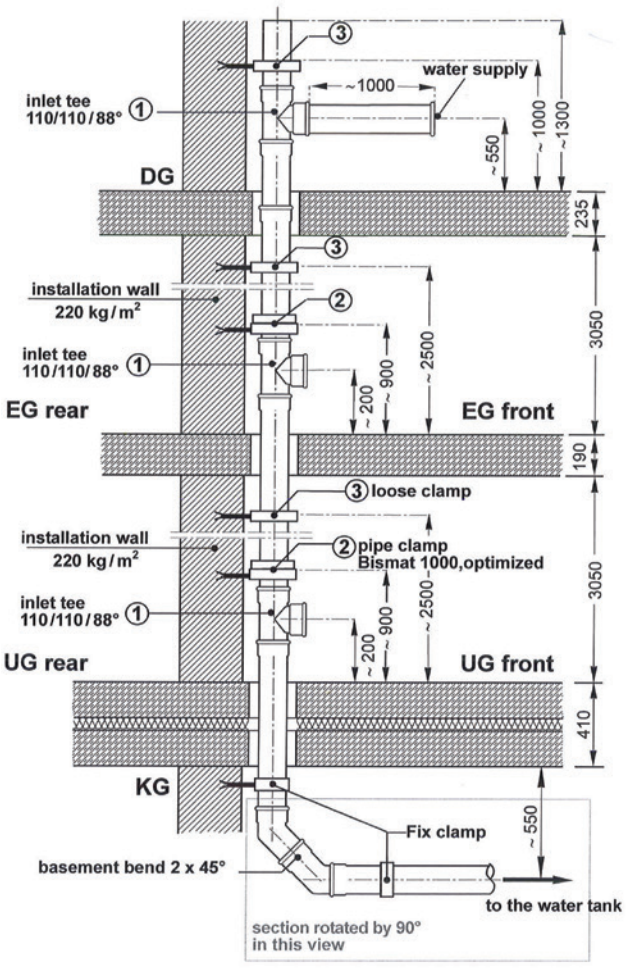


Figure 2: Test set up in accordance with EN 14366.

This drawing represents the diagram used to carry out the performance tests on our low-noise systems. These tests were carried out at the Fraunhofer Institut Für Bauphysik in Stuttgart, the most accredited European laboratory on studies on noise in buildings. The tests were carried out in compliance with the standard DIN EN 14366.

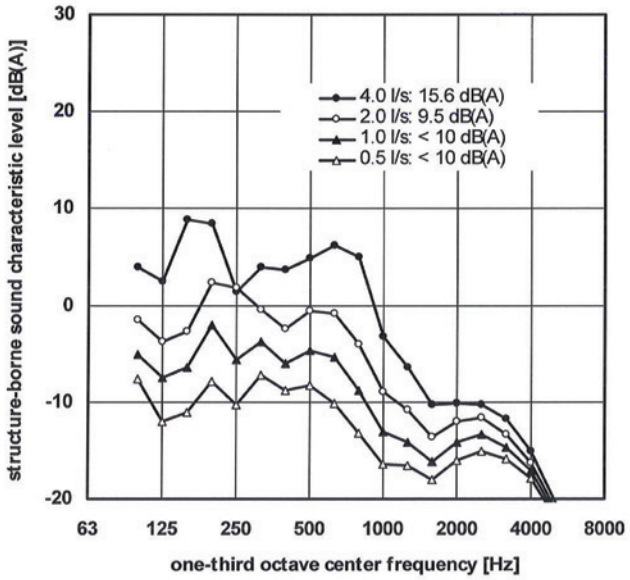


Figure 3: Structure-borne sound characteristics level in accordance with EN 14366.

2.8. Quality and certification

Rigorous quality tests and checks throughout the production process make sure that Wavin SiTech is robust, reliable and efficient in noise reduction.

SYSTEM STANDARDS

Discharge system:	EN 476 EN 1451-1
Noise protection:	DIN 4109 EN 14366
Fire properties:	EN 13501-1 EN 13823

APPLICATION STANDARDS

Internal gravity drainage:	EN 12056-01 DIN 1986 - 100 DIN-CERTCO-Richtlinien

APPROVALS

Italy:	IIP (Istituto Italiano dei Plastici – Italian institute of plastics)
Germany:	DIBT (Deutsches Institut für Bautechnik – German institute of building engineering)

3. About sound

Sound is a sensation felt, a perception of what takes place around us, caused by various compression waves which cross the eardrum and are captured and transformed by our brain; it is composed of different frequencies. The acuteness or intensity of our perception depends on the frequency and range.

Sound is a wave that is:

- Elastic (it needs a medium to be propagated)
- Longitudinal (perturbation takes place parallel to the direction of propagation)

To exist it requires:

- A source (vibrating body)
- An elastic propagation medium (air, water, etc.)

A sound is therefore a method of transmitting mechanical energy.

To propagate, a sound needs a medium to transport it: any means, whether solid, liquid or gassy, like air, is able to transport sound, influencing its speed according to density.

Sound is propagated through the exchange of air-solid-air or solid-air vibrations (in the second case the solid is the source of the sound). When soundproofing soil and waste systems, we need to think in two different directions: the noise created in the pipes and transmitted by them and that which is transmitted by the walls or surrounding media.

Sound is measured with a phonometer, an instrument which filters noise and measures intensity at its different frequencies. It is expressed in decibels. The decibel is the logarithm of the ratio between the measured sound pressure and a reference sound pressure, multiplied by ten.

$$dB = 10 \log x P / Pa$$

Sound is an energy (just think of when you stand in front of the stereo speakers and you can “feel” the basses), but what we perceive is a processed sensation. The human ear is sensitive to pressure in a NON LINEAR manner; therefore twice the pressure does not correspond to twice the sensation. This is very important for understanding a very simple yet fundamental rule: the doubling of acoustic power corresponds to an increase of 3 dB.

How noise is measured

The noise created inside waste systems obviously depends greatly on the vertical waste pipe. Here the falling water flows against the wall of the pipe or fitting at every sharp bend. The noise generated is transmitted directly to the pipes, where these come into direct contact with solid parts, and indirectly through the ducts and installation walls.

The thickness and mass of the walls are of great importance, just like the fixing brackets and other elements which connects the pipes to their supports.

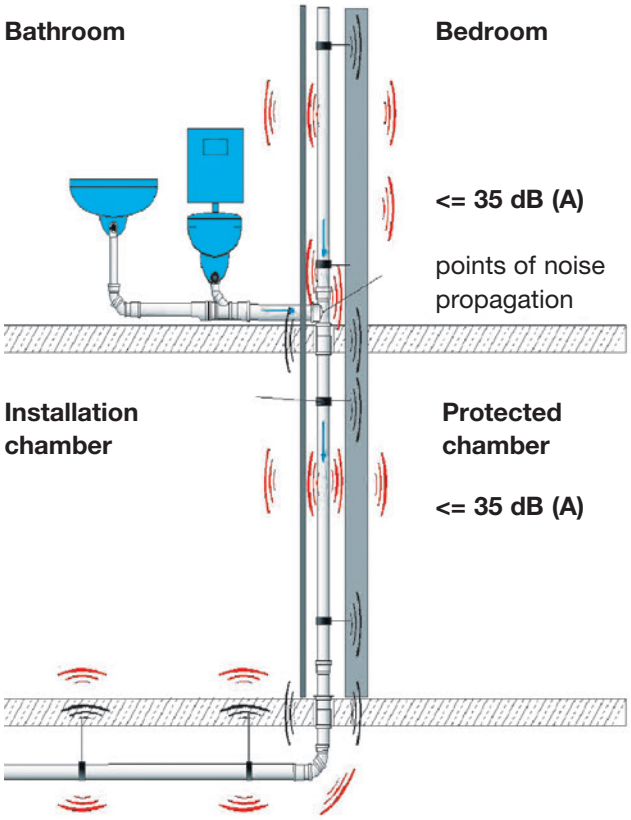


Figure 4: Example of noise propagation during drainage.

If we consider the “installation chamber” to be the room in which the pipes are installed (generally the bathroom), the room next door divided by the installation wall is called the “protected chamber”.

The noises emitted are measured in the protected chamber according to DIN EN 14366.

3.1. Sources of noise in building equipment and appliances

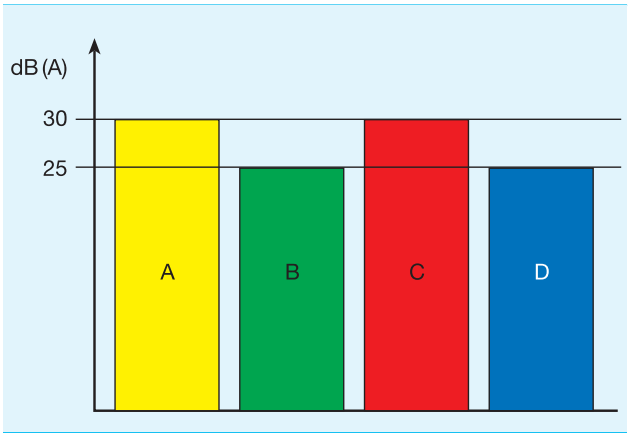
The noise generated by plant and equipment providing services to buildings may be classified as follows:

- 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.

3.2. Low noise requirements

Local ruling increasingly describe the maximum acceptable sound level inside the living area of a building. Subsequently such noise limitation will then have to be established in contracts between the contractor and the awarding authority. The following technical regulations, which are usually not included in planning legislation, contain relevant advice and suggestions, which require a contractual agreement to become binding.



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

Figure 5: Overview of noise protection levels.

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.

3.3. Sound insulation by Wavin SiTech

Soundproofing Wavin SiTech

The performance tests carried out by the Fraunhofer Institut Für Bauphysik were done using an installation with a surface mass of 220 kg/m^2.

The weight of the wall used expressed in kg/m^2 is key to define the dampening value of the wall. The graph (see fig. 6) represents the acoustic insulation of Wavin Sitech according to the surface mass of the installation wall.

Using this tool makes it is possible to calculate the estimated level of acoustic pressure, considering the mass of the wall (kg/m^2) and the maximum flow of the sewage (l/s).

Wall material	Wall thickness cm	Wall mass without plaster kg/m^2	Wall mass with plaster kg/m^2
Sandstone, solid brick	11.5 17.5 24.0	201.0 306.0 420.0	231 336.0 450.0
Porous concrete stone	10.0 12.5 15.0 20.0 25.0 30.0 36.5	80.0 100.0 120.0 160.0 200.0 240.0 292.0	110.0 130.0 150.0 190.0 230.0 270 322.0
Plasterboard	8.0 10.0	70.0 87.5	
Pumice and expanded clay	9.5 11.5 17.5 24.0 30.0	104.5 126.5 192.0 264.0 330.0	134.5 156.5 222.0 294.0 360.0
Breeze block / poroton	11.5 17.5 24.0 36.5	115.0 175.0 240.0 300.0 365.0	145.0 205.0 270.0 330.0 395.0
Solid stone	11.5	207.0	237.0

According to DIN 1055

Table 2: Wall mass.

4. Acoustic design

4.1. Advantageous layout

An important factor for the assurance of acoustic insulation is the design and implementation of an acoustically advantageous layout. The following measures have proven to be of significant influence on the level of noise generated from the soil system inside the building:

- 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

The comparison between the two examples of layout shown above demonstrates how the acoustically advantageous layout in the second example contributes to a clear reduction in the acoustic pressure of the systems in the room which demands acoustic insulation.

However, even using highly efficient low-noise waste systems like Wavin SiTech, one always has to seek for the best possible acoustic decoupling. This goes for the whole drainage system and its points of contact with the building (collars, passages through walls and floors, plaster residues between the pipe and the building, etc…). In designing piping, moreover, we need to avoid positioning waste pipes in the partition walls between apartments. Special noise-reduction measures also need to be adopted when fixing drain pipes to the partition walls between apartments.

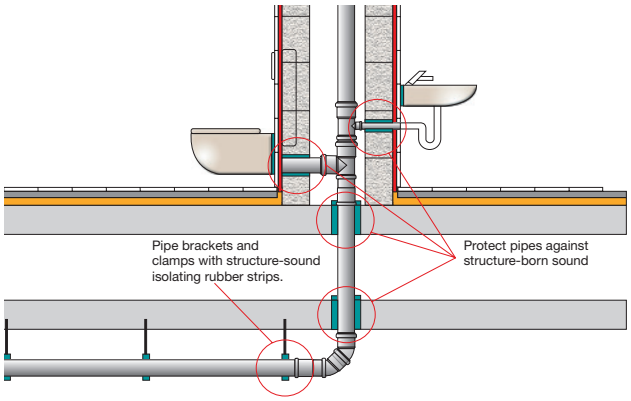
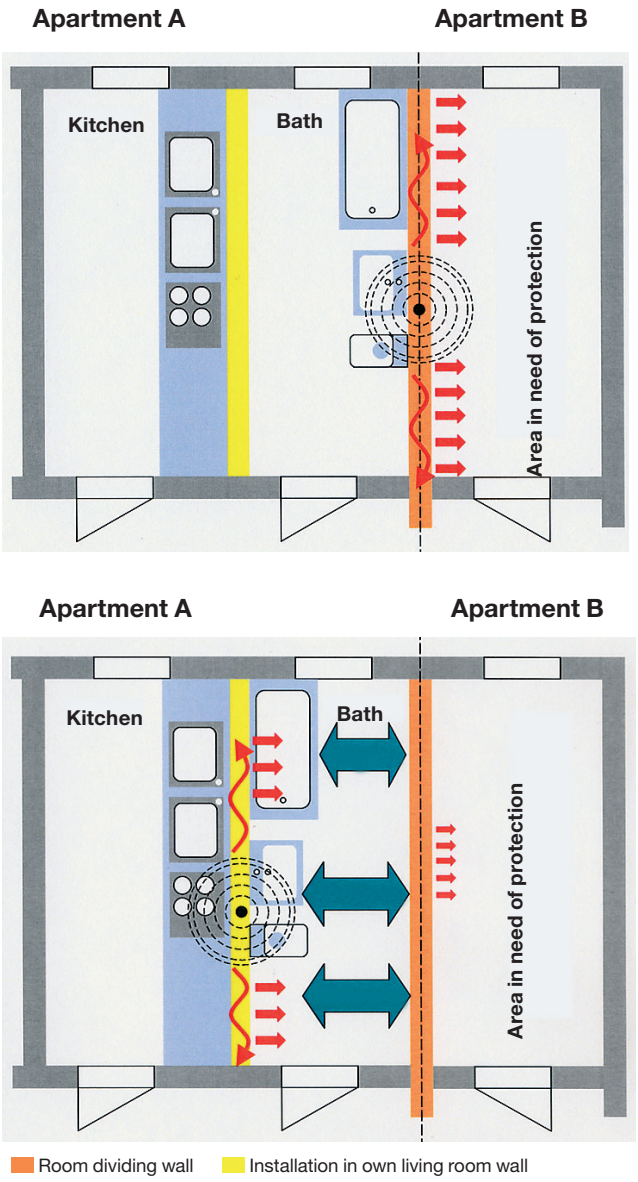


Figure 6: Sound isolation of waste water systems.



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.

Figure 7: Examples of good acoustic practice in building design.

4.2. Acoustic pipe design

The installation of Wavin SiTech can significantly reduce noise levels when compared with other piping systems. However when installing high-performance sound-insulating waste water piping systems, 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.

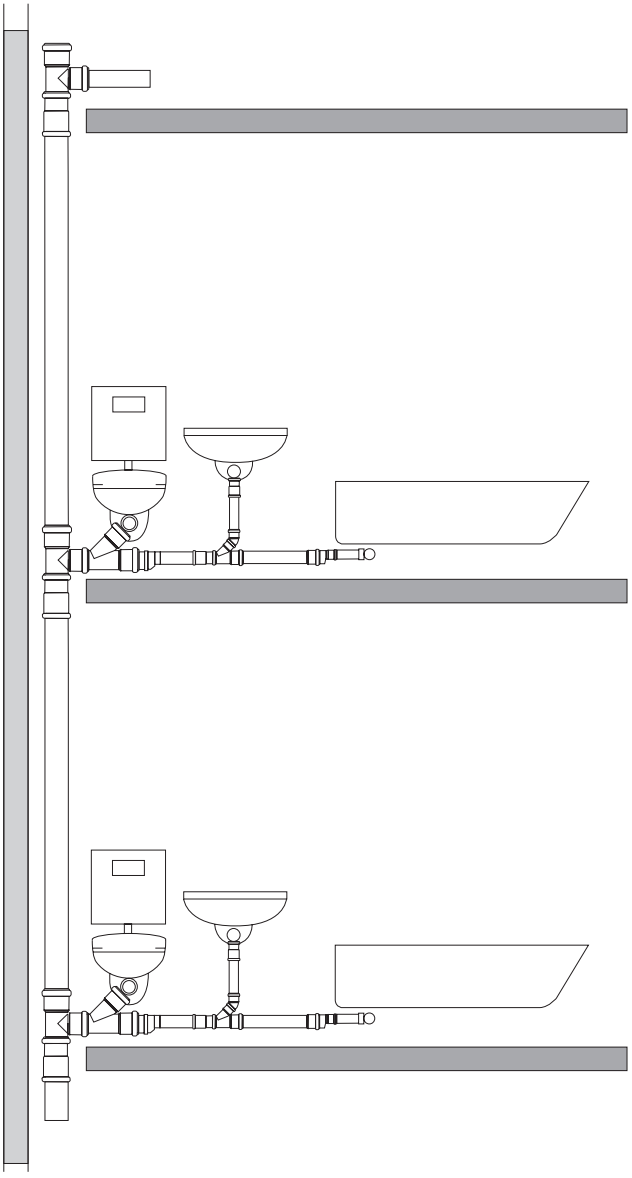


Figure 8: Example of a pipe design.

5. Design of the waste water system

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

The following principles must be observed with respect to waste water drainage 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

5.2. Waste water drainage systems

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

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

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

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

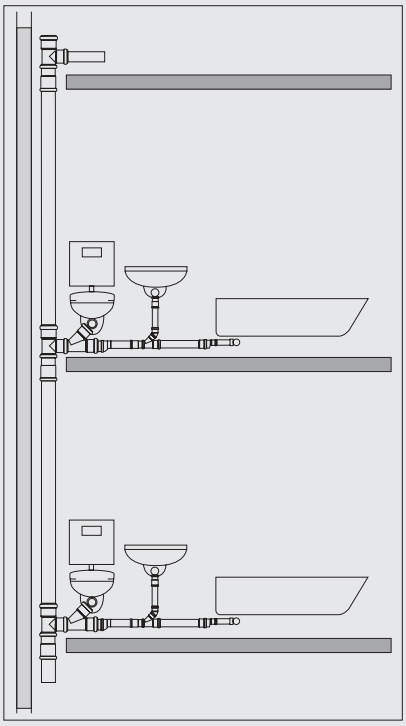


Figure 9: System I (filling factor 0.5) and System II (filling factor 0.7).

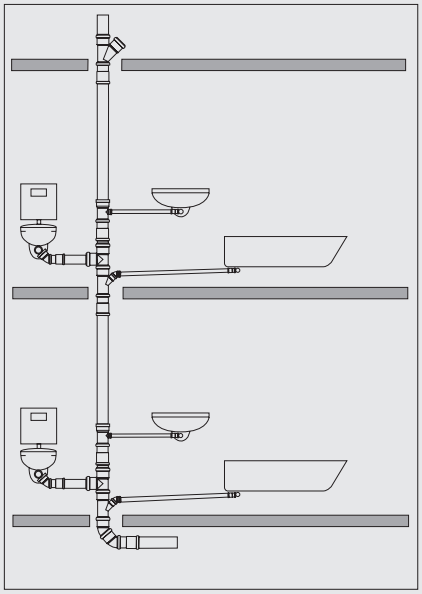


Figure 10: System III.

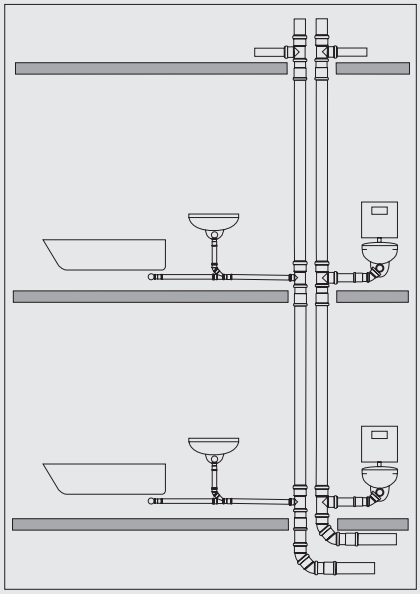


Figure 11: System IV.

5.3. 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 jointing of connecting pipework into downpipes, or the arrangement of branch pipes in downpipes, when connection toilets.

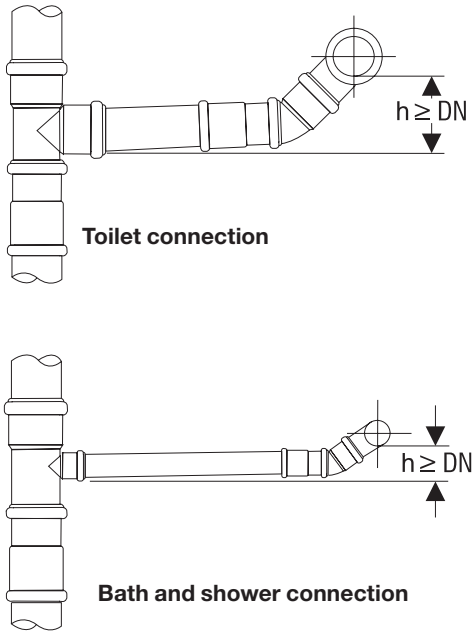


Figure 12: Joining into a downpipe.

Downpipes are rated to the following criteria:

- Downpipes with primary ventilation
- Downpipes with secondary ventilation
- Branch pipe equipped with internal sharp-edging
- Branch pipe equipped with internal radius (higher loading under smaller bore)

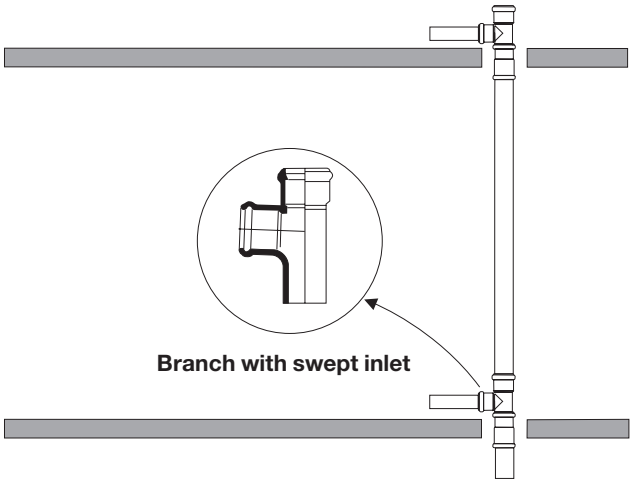


Figure 13: Branch with swept inlet.

6. Installation and jointing

6.1. Soundproofing

Wavin has designed its acoustic systems to reduce noise emissions in concealed and visible installations. However, to achieve a high level of soundproofing we strongly recommend to follow the instructions given below. These instructions are the results of extensive experience and consider the strict standards and regulations (e.g. DIN 4109 and EN 1451-1).

Further, if applicable, design and installation should comply with local regulation.

6.2. Wavin recommendations

Wall cavities must be carefully insulated to prevent noise diffusion. Contact must be avoided between the waste system and the framework to prevent the expansion of noise. Where contact with the cavity wall cannot be avoided, pipe can be wrapped in a layer of insulation material.

Noise intensity depends greatly on the pipe configuration; avoid sharp changes in direction. Use 45° elbow joints with a short pipe extension (min. length 25 cm) rather than a 90° elbow.

To ensure soundproofing use circular brackets with corrugated rubber inserts. Make sure that the brackets are fixed tightly and do not move.

6.3. Passages

Passages through floors, ceilings and walls must be insulated with anti-vibration materials, such as insulation blankets. In compliance with building provisions concerning acoustic insulation in buildings with more than one floor, waste pipes must not be laid visibly in living rooms and bedrooms. It is recommended to conceal the pipework in or install behind solid walls with a surface mass of at least 220 kg/m^2 (ref. DIN 4109).

The housing or wall spaces must be coated with a layer of plaster with a thickness of at least 1.5 cm. Acoustic bridges between the piping and the adjacent wall are not permitted. As a precaution it is recommended to use vibration-damping materials such as rock wool or glass wool or synthetic insulating materials.

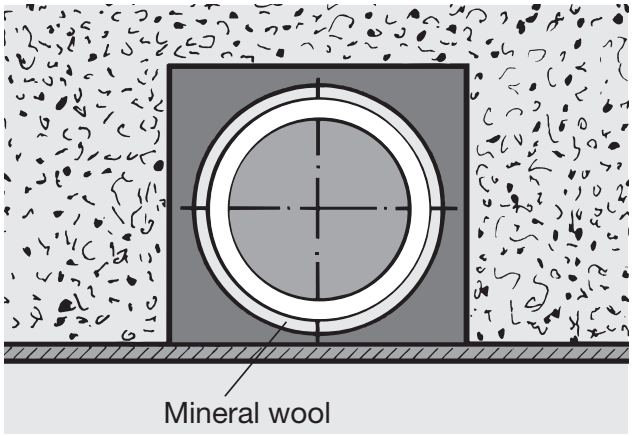


Figure 14: Pipe insulation to avoid acoustic bridges between the pipe and the adjacent wall with rock or glass wool or synthetic insulating materials.

6.4. Installation

The pipe network is a key source of noise. Measures need to be taken to reduce the noise caused by contact sound of flowing fluids. Consequently the waste pipes must where possible be deviated progressively, never sharply, as this would increase the noise.

In buildings with more than 3 storeys, (>10 m) it is necessary to use 250 mm slow-down stretches to pass the vertical waste pipe into the horizontal pipe. To do this it is possible to use, for example, two 45° bends and a coupler (see fig. 16). Alternatively it is possible to use a 45° long bend.

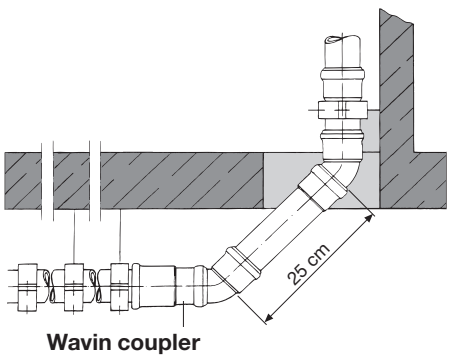


Figure 15: 45° bends and coupler to create a slow-down stretch.

Moreover, the waste pipe must be sized and laid to allow both the sewage water and the air to circulate freely. When faced with acoustic insulation requirements, we need to use pipe brackets with rubber inserts.

Figure 16: Pipe collar with rubber insert.

If a containment structure is built around the waste pipe, make sure that the pipes are fixed to the load bearing wall and not to the structure. Passages through walls and floors must be elastic.

6.5. Cutting pipes to size

Pipes can be cut to size using standard pipe cutters or saws. Make sure that the cut is at a 90° angle on the pipe axis. Remove any burrs, cutting residues are sharp edges.

6.6. Push-fit couplings

To cope with variations in length due to thermal factors in between connections of pipe and fitting, with maximum pipe length of 3 meters, a maximum 10 mm slid out of the sleeve has to be considered.

For push-fit connections between fittings no variations in length due to thermal factors have to be considered, and it is therefore possible to slot the fittings completely.

The push-fit coupling is done as follows:

- Check the position and the condition of the lip seal in the coupler channel. If necessary, clean the fitting and the gasket
- Clean the push-fit end of the pipe and the fitting
- Apply a thin uniform layer of Wavin lubricant on the end of the coupling. Do not use oil or grease!
- Place the end into the coupler and push in firmly
- Slide the pipe, not the fitting, 10 mm out of the coupling

When positioning pipes vertically, to avoid slipping and the elimination of the dilatation space of 10 mm, fix the individual pipes with collars immediately after assembly.

6.7. Fixation

General instructions

All components of Wavin SiTech must be installed free of tension and leave space for any variations in length. For pipe installation it is recommended to use collars with damping rubber inlets of a size that suits the external diameter of the pipe and which completely embrace the pipe. It is also recommended to use screw-on pipe brackets with rubber inserts.

Pipes in which internal pressure may build up must be fixed in such a way as to avoid any slippage or movement along their axis.

Fixed points

Fixed points in the pipe system are created by fixed brackets. Every downpipe should have a fixation point in order to prevent the vertical pipe from slipping. The fittings or groups of fittings must always be configured as fixed points.

Horizontal pipes must always have a one fixed point. Next to fixed points pipes should also be able to slide and therefore sliding points are required as well. For a good configuration of fixed and sliding points one has to comply with the prescribed distances between one collar and the next.

Sliding brackets

Once assembled, the sliding bracket guarantees longitudinal freedom of movement along the pipes. When assembling brackets for Wavin pipes, follow the instructions below:

Fixation instruction

- The distances between brackets for horizontal pipes must be approximately 10 times the external diameter of the pipe (see fig. 19). For vertical pipes, depending on the external diameter, the distance must be between 1 and 2 meters (see fig. 18)
- In general a pipe bracket should not be assembled in an area subject to contact sound
- Assemble the brackets to building components with a high surface mass
- For vertical drain pipes into open shafts or high rooms (more than 2.5 meters) use one fixed and one sliding bracket per pipe
- The fixed bracket must be placed at the lower end of the pipe immediately above the coupler. The sliding bracket must be placed at no more than two meters above the fixed bracket (see fig. 19)

In buildings with more than 3 storeys waste pipes must be fitted with additional fixings (supports for vertical pipes) to prevent them from dropping. It is advisable to use a short fitting together with a fixed bracket.

Socketed pipe sections or those with short pipes must be fixed with pipe brackets positioned at a sufficiently close distance to prevent the pipes from sliding out.

In special cases using coupling elements other than push-fit couplings (such as repair couplers) for each pipe of maximum permitted length 3 m a fixed and a sliding bracket must be installed, as shown in the figures (18 and 19).

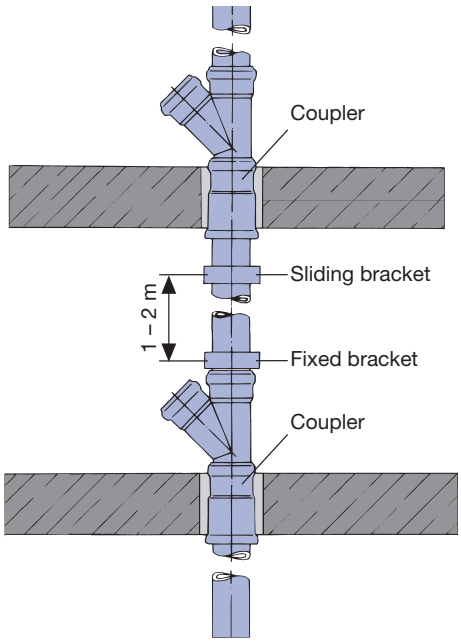
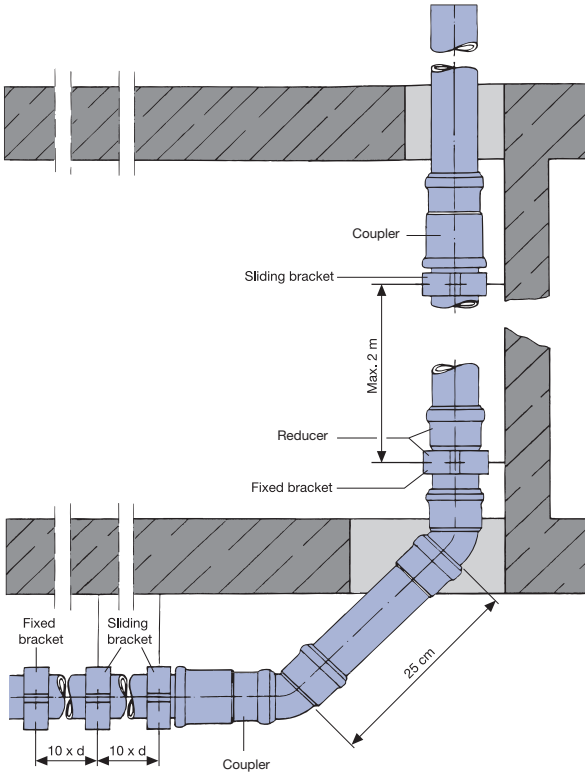


Figure 17: Wavin fixation.

Figure 18: Wavin fixation with support for waste pipe.



Errors to avoid

Avoid connection to different systems in order to prevent the propagation of vibrations from one system to another.

Always use brackets with vibration-damping rubber inserts to limit the transmission of vibrations to the wall.

Always check that there is no brickwork or concrete between the waste system and the wall; this could produce vibrations on the walls and limit the damping capacity of the brackets.

Avoid direct contact with concrete, and where this is not possible, conceal the pipework with noise-absorbent materials

Avoid mixing different systems in order to maintain low-noise performance. Many waste systems have compatible diameters but do not assure the same noise-absorbing features.

7. Fire protection

7.1. Product description

The Fire-Stop collar is a fire-prevention system comprising an opening stainless steel structure which facilitates assembly even after installation of the pipe. Inside the collar there is a graphite-based intumescent sheath which expands to a temperature of around 150°C, increasing its volume around 20 times. This develops great pressure which completely blocks the pipe, thus blocking flames and fumes. The Fire-Stop collar system guarantees fire resistance to REI 180 for both walls and floors.

Advantages:

- Quick installation thanks to the tab closure system
- Seals against passing fumes, gases, flames and heat
- Possibility to install the collar in the wall in the case of insufficient space
- No tools required.

Size and features of the pipes:

- The range of diameters for which Fire-Stop collars are available are from 40 to 250 Ø
- Pipes of different materials can be used including PVC, PP, ABS, and PE
- There are no special tolerances required on the pipe diameters

Note: The intumescent material in the inside of the Fire-Stop collar is made from mineral fibre mixed with graphite. In the event of handling this material some dust may be produced: this is not toxic or carcinogenic.

7.2. Applications

The Fire-Stop collar can be applied both internally and externally in walls or ceilings. With its easy-opening structure, the Fire-Stop collar is fitted around the pipe and closed with the fixing tab. It is then anchored to the wall using the expansion plugs supplied.

The intumescent material inside the metallic wrapper of the Fire-Stop collar reacts and expands at a temperature of around 150°C. This completely closes the passage of plastic pipes during a fire, before the pipe melts completely. During intumescence, a large amount of water vapour is emitted which cools the area affected.

7.3. Certification

When installing fire-prevention seals in a pipe opening using intumescent collars, follow the requirements laid down in the national certifications issued for the product. Please refer to these to check the limits set concerning the size of the opening, the type and thickness of the wall or floor, the maximum pipe diameter etc.

- Giordano Institute for Walls no. 203677/2790FR
- Giordano Institute for Floors no. 203745/2792FR

Fire reaction class REI 180	Suitable for pipe Ø	No. of fixing plugs	Collar height mm	Collar thickness mm
	40/63	3	40	10
	75	3	40	10
	78/90	3	40	10
	110	4	50	10
	125	4	50	10
	135/160	4	60	10

Table 3: EFM Fire-Stop collars.

7.4. Assembly instructions

When the system is applied to a fire resistant vertical (wall) or horizontal installation (floor) which separated a fire risk area, only one Fire-Stop collar is required.

If the system is applied to a fire resistant vertical (wall) or horizontal (floor) installation which separated two fire risk areas, use a Fire-Stop collar on both sides.

Hole
Drill a circular hole into the wall or floor with a diameter of 2 mm greater than the external diameter of the plastic pipe to be used.

Installing the pipe
Insert the PVC, PP, ABS, PE etc. pipe in the hole and clean the part the collar is to be applied to.

Closing and sealing against fumes and gas
If there are any gaps between the pipe and the wall, seal these using putty or intumescent strips according to the thickness, to prevent the passage of fumes in the event of a fire.

Cleaning the pipe
The expansion of the intumescent material in the collar completely closes the plastic pipes by a mechanical action. If the pipes are very dirty or have mortar residues, this may delay the action. Clean the surface of the plastic pipe in the point of installation of the Fire-Stop collars.

Installing the EFM collar
Wrap the Fire-Stop collar around the pipe, widening and then closing the steel structure using the tabs fitted on the ends. NB: the collar must be applied to the side exposed to the fire risk.

Fixing the Fire-Stop collar
Once in position, fixe the Fire-stop collar to the wall or floor using the plugs and screws supplied. Do not use plastic anchoring systems which are not fire-resistant. NB: the number of screws depends on the diameter of the collar.

Note: The Fire-Stop collar can only prevent the passage of fire if it is properly installed.

Precautions
In the case of contact of the intumescent material with the eyes, wash delicately with soap and water. Keep out of the reach of children.

8. Handling, transport and storage

8.1. Handling

Take great care when handling pipes and fittings. Excessive scratching or impact stress on the pipe may damage the external structure or affect the seal properties. Take extra care when handling the pipes and fittings during the winter. The low temperature reduces the resistance to impact stress of plastic. We recommend the use of nylon sheaths on the forks or plastic forks if the bundles of pipes are unloaded by mechanical means. Metal forks, hooks and chains must not come in contact with the pipes.

Load and unload loose pipes by hand. Do not use forks with an extension. When pipes are inserted one inside the other, always remove the inside pipe first.

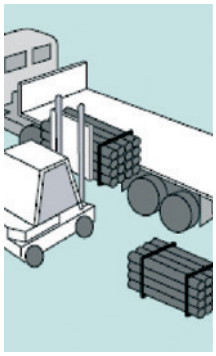


Figure 19: Unloading strapped pallets.

8.2. Transport

Wavin SiTech pipes – when no longer packed in original packaging – must be stored fully supported over their total length during transport. Bending of the pipes shoud be avoided. Impact stress on pipe and fittings must be prevented

8.3. Storage

Always store pipes on a flat surface. Pallets must be stored at a maximum height of 3 m without additional supports or side barriers.

Loose pipes must have side supports every 2 m. Wooden supports must be at least 75 mm wide. The ideal situation is to support the loose pipes along their whole length. If this is not possible, place wooden supports of at least 75 mm wide under the pipe at a distance of maximum 1 m. Stack the different sizes of pipe separately or, if this is not possible, stack them with the largest diameters on the bottom.

When unloading loose pipes on the ground the maximum number in the pile is 7 and the maximum permitted height is 2 m for Wavin SiTech. Socketed pipes should be stacked in such way that even support is maintained, socketed pipes should therefore be stacked in an alternating order.

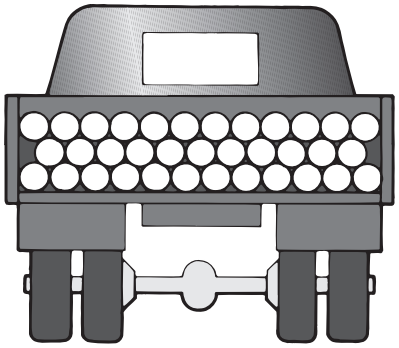


Figure 20: Transport of loose Wavin pipes.

Fittings supplied in plastic bags or cardboard boxes must be stored away from sunlight. If this is not possible, open the bags to prevent for overheating. Fittings in cardboard boxes must be stored indoors. Store the degreasing solvent and silicon lubricant in a cool place, away from heat sources or direct sunlight.

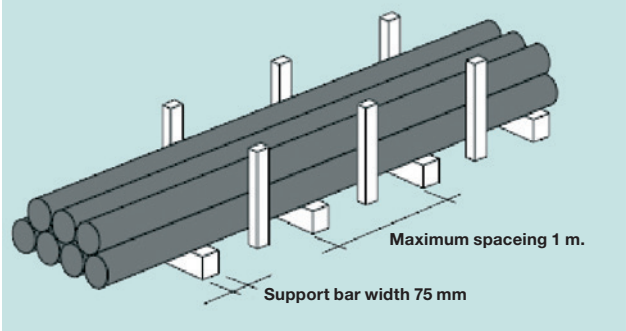
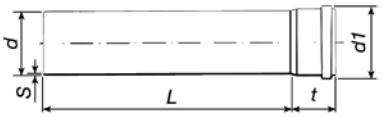


Figure 21: Stacking loose pipes on the ground.

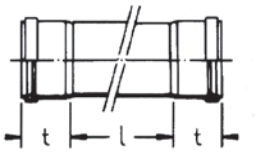
9. Product range



Socketed Pipe STEM

Article code	d1 mm	L mm
660 101	32	150
660 102	32	250
660 103	32	500
660 105	32	1.000
660 107	32	1.500
660 109	32	2.000
660 121	40	150
660 122	40	250
660 123	40	500
660 125	40	1.000
660 127	40	1.500
660 129	40	2.000
660 141	50	150
660 142	50	250
660 143	50	500
660 145	50	1.000
660 147	50	1.500
660 149	50	2.000
660 151	50	3.000
660 201	75	150
660 202	75	250
660 203	75	500
660 205	75	1.000
660 207	75	1.500
660 209	75	2.000
660 211	75	3.000
660 221	90	150
660 222	90	250
660 223	90	500
660 225	90	1.000
660 227	90	1.500
660 229	90	2.000
660 231	90	3.000
660 241	110	150
660 242	110	250
660 243	110	500
660 245	110	1.000
660 247	110	1.500
660 249	110	2.000
660 251	110	3.000
665 261	125	150
665 262	125	250
665 263	125	500
665 265	125	1.000

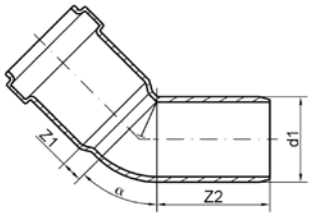
665 267	125	1.500
665 269	125	2.000
665 271	125	3.000
665 282	160	250
665 283	160	500
665 285	160	1.000
665 287	160	1.500
665 289	160	2.000
665 291	160	3.000



Double Socketed Pipe STDM

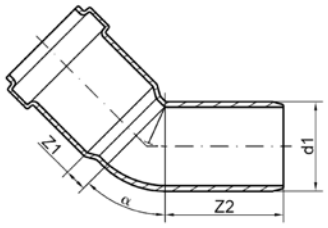
Article code	d1 mm	L mm
660 303	32	500
660 305	32	1.000
660 309	32	2.000
660 311	32	3.000
660 323	40	500
660 325	40	1.000
660 327	40	1.500
660 329	40	2.000
660 331	40	3.000
660 343	50	500
660 345	50	1.000
660 347	50	1.500
660 349	50	2.000
660 351	50	3.000
660 403	75	500
660 405	75	1.000
660 407	75	1.500
660 409	75	2.000
660 411	75	3.000
660 423	90	500
660 425	90	1.000
660 427	90	1.500
660 429	90	2.000
660 431	90	3.000
660 443	110	500
660 445	110	1.000
660 447	110	1.500
660 449	110	2.000
660 451	110	3.000
665 463	125	500
665 465	125	1.000
665 467	125	1.500
665 469	125	2.000

9. Product range



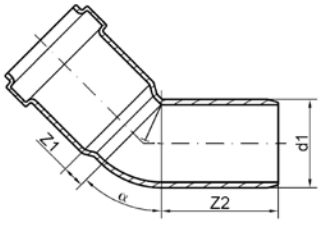
Bend 15° STB

Article code	d1 mm	z1 mm	z2 mm
661 221	32	6,8	42,0
661 231	40	7,4	48,8
661 251	50	7,2	52,8
661 281	75	7,7	59,5
661 291	90	5,5	66,8
661 301	110	9,3	73,2
661 311	125	8,4	77,0
661 321	160	10,2	88,0



Bend 30° STB

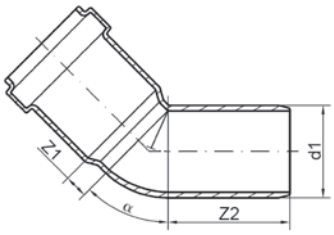
Article code	d1 mm	z1 mm	z2 mm
661 223	32	7,1	42,3
661 233	40	7,8	49,2
661 253	50	7,7	53,3
661 283	75	8,3	60,1
661 293	90	5,5	66,8
661 303	110	10,1	74,0
661 313	125	9,3	77,7
661 323	160	12,1	89,8



Bend 45° STB

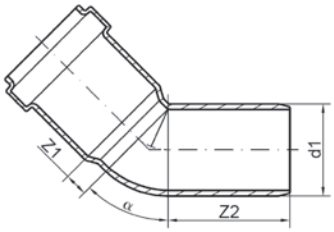
Article code	d1 mm	z1 mm	z2 mm
661 224	32	7,4	42,6
661 234	40	8,2	49,6
661 254	50	8,1	53,8
661 284	75	9,0	60,8
661 294	90	5,5	67,5
661 304	110	10,9	74,6
661 314	125	10,2	78,6
661 324	160	13,6	91,1

Bend 67°30' STB



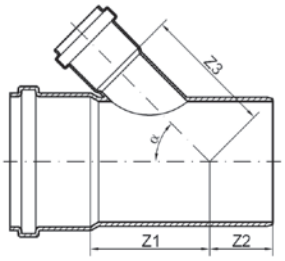
Article code	d1 mm	z1 mm	z2 mm
661 226	32	7,9	43,1
661 236	40	8,9	50,3
661 256	50	8,0	54,6
661 286	75	10,1	62,0
661 296	90	5,5	67,5
661 306	110	12,4	76,3
661 316	125	11,8	80,3

Bend 87°30' STB



Article code	d1 mm	z1 mm	z2 mm
661 228	32	8,5	43,7
661 238	40	9,7	51,1
661 258	50	9,9	55,6
661 288	75	11,5	63,3
661 298	90	5,5	68,5
661 308	110	14,1	78,1
661 318	125	13,7	82,1
661 328	160	18,7	96,5

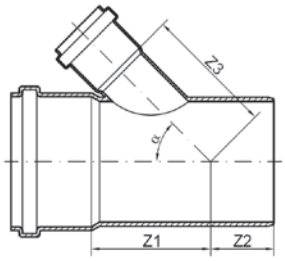
Branch 45° STEA



Article code	d1/d2 mm	z1 mm	z2 mm	z3 mm
662 005	32/32	46,4	48,4	46,4
662 008	40/32	50,4	51,4	52,0
662 009	40/40	55,6	57,2	55,6
662 015	50/32	55,4	50,4	59,2
662 016	50/40	60,6	56,4	62,7
662 018	50/50	67,7	63,5	67,7
662 031	75/50	82,5	57,7	86,0
662 034	75/75	100,1	75,4	100,1
662 036	90/50	87,4	57,5	94,5
662 038	90/75	117,0	72,0	119,0
662 040	90/90	114,5	84,5	114,5
662 043	110/50	102,1	53,9	111,3
662 046	110/75	120,3	71,6	126,0
662 047	110/90	143,0	97,0	173,0
662 048	110/110	147,3	96,1	147,3

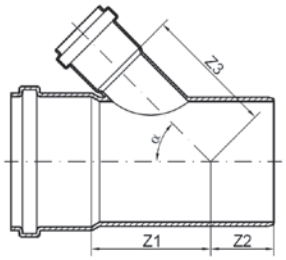
9. Product range

Branch 45° STEA continued



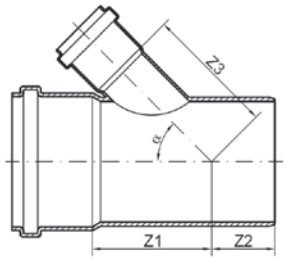
Article code	d1/d2 mm	z1 mm	z2 mm	z3 mm
662 053	125/75	159,0	79,0	153,0
662 054	125/90	148,0	101,0	190,0
662 055	125/110	164,0	102,0	157,0
662 056	125/125	164,0	102,0	164,0
662 070	160/90	167,0	101,0	237,0
662 071	160/110	178,0	87,5	187,0
662 074	160/160	213,0	120,0	213,0

Branch 67°30' STEA



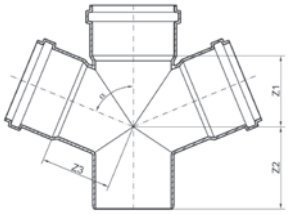
Article code	d1/d2 mm	z1 mm	z2 mm	z3 mm
662 109	40/40	36,6	62,6	36,3
662 116	50/40	38,4	64,8	41,7
662 118	50/50	43,8	70,2	43,8
662 131	75/50	51,3	71,9	57,9
662 140	90/90	79,0	94,0	79,0
662 143	110/50	60,6	78,5	77,4
662 146	110/75	74,7	92,0	84,9
662 148	110/110	95,7	110,0	95,7
662 155	125/110	95,0 1	22,0	97,0

Branch 87°30' STEA



Article code	d1/d2 mm	z1 mm	z2 mm	z3 mm
662 209	40/40	26,8	68,6	26,8
662 216	50/40	27,1	72,9	31,8
662 218	50/50	32,1	77,9	32,1
662 231	75/50	34,9	84,3	45,1
662 234	75/75	47,4	96,8	47,4
662 237	90/50	33,5	90,0	52,5
662 240	90/90	54,5	108,5	54,5
662 243	110/50	37,7	97,5	63,2
662 246	110/75	50,8	110,1	66,0
662 247	110/90	66,0	128,0	98,0
662 248	110/110	70,4	127,6	70,4
662 253	125/75	61,0	122,0	86,0
662 255	125/110	70,4	127,6	70,4
662 256	125/125	72,0	143,0	72,0
662 271	160/110	69,0	114,0	108,0
662 274	160/160	95,0	210,0	124,0

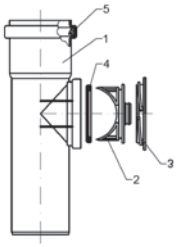
Double Branch 67°30' STDA



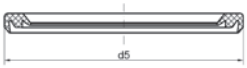
Article code	d1/d2 mm	z1 mm	z2 mm	z3 mm
662 636	90/50	71,0	89,0	78,0
662 640	90/90	79,5	95,0	79,5
662 643	110/50	60,6	78,5	77,4
662 648	110/110	95,7	111,0	95,7
662 655	125/110	113,0	118,0	115,0

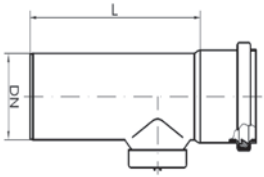
Access Pipe STRE

Sealing ring access joint

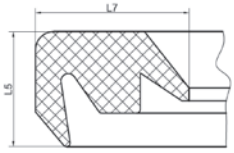


1. Socket
2. Insert access cover
3. Cap access cover
4. Sealing ring access cover
5. Sealing ring socket



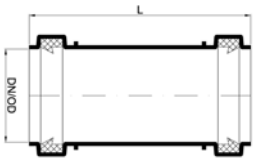


Article code	d1/d2 mm	d5 mm	L5 mm	L7 mm
660 865	50/50	47,4	3,95	5,35
660 868	75/75	70,7	6,10	8,00
660 869	90/90	84,6	7,50	9,40
660 870	110/110	105,4	8,50	11,90



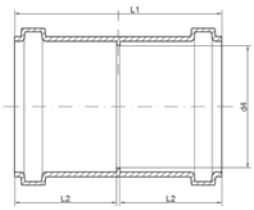
Article code	d1/d2 mm	L mm
660 871	125/110	280
660 873	160/110	315

Repair Coupler STU



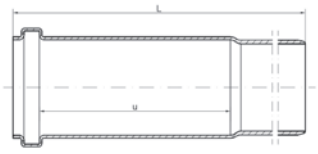
Article code	d1 mm	L mm
664 033	40	96
664 035	50	104
664 038	75	118
664 039	90	127
664 040	110	145
664 041	125	165
664 043	160	224

9. Product range



Double Socketed Sleeve with End Stop STMM

Article code	d1 mm	L1 mm	L2 mm	d4 mm
664 802	32	86,5	42,9	28,0
664 803	40	95,5	47,1	36,5
664 805	50	103,5	51,1	46,6
664 808	75	117,5	57,8	70,0
664 809	90	126,5	62,4	83,4
664 810	110	144,8	71,2	103,4
664 811	125	157,3	76,5	118,4
664 812	160	179,0	87,5	150,5

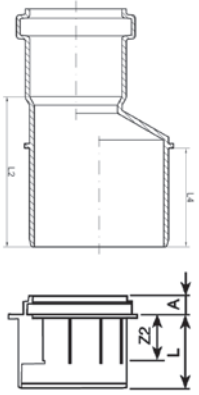


Extended Socket STLL

Article code	d1 mm	L mm	u mm
664 103	40	155	88,5
664 105	50	171	100,5
664 108	75	194	114,5
664 109	90	223	122,0
664 110	110	240	143,0
664 111	125	306	205,0
664 113	160	370	260,0

Type A

Type B

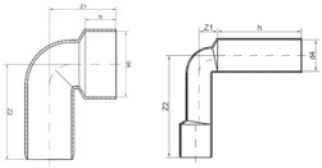


Reducer STR

Article code	d1/d2 mm	L2 mm	L4 mm
660 608	40/32 Type A	64,3	49,0
660 615	50/32 Type A	74,1	53,0
660 616	50/40 Type A	66,3	48,5
660 631	75/50 Type A	80,9	53,3
660 643	110/50 Type A	114,4	66,5
660 602	110/75 Type A	101,1	66,5
660 655	125/110 Type A	95,0 7	6,0
660 671	160/110 Type A	127,0	87,0
660 672	160/125 Type A	118,5	87,0

Article code	d1/d2 mm	L mm	Z2 mm	A mm
660 636	90/50 Type B	62	32	16
660 639	90/75 Type B	62	43	16
660 647	110/90 Type B	66	43	20

Trap Bend STSW

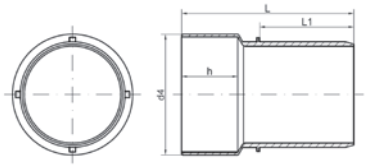


663 926

Article code	d1 mm	z1 mm	z2 mm	d4 mm	h mm
663 900	32	52,5	76,0	53,3	26,0
663 901	40	54,0	78,5	53,3	24,7
663 902	50	88,5	56,5	53,3	24,7
663 926	50/40	27,0	160,0	53,7	133,0

Clamp 1” ¼	Article code 308 046
Clamp 1” ½	Article code 308 048
Clamp 2”	Article code 800 004

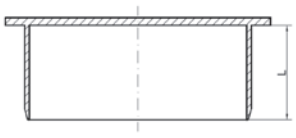
Trap Coupler STS



Article code	d1 mm	L mm	L1 mm	d4 mm	h mm
663 910	32	82,0	41,5	53,8	26,0
663 911	40	82,1	44,5	53,3	24,7
663 912	50	82,1	48,5	53,3	24,7

Clamp 1”¼	Article code 308 046
Clamp 1”½	Article code 308 048
Clamp 2”	Article code 800 004

End Cap STM



Article code	d1 mm	L mm
664 543	40	36
664 546	50	41
664 551	75	45
664 552	90	49
664 553	110	55
664 554	125	77
664 555	160	88

9. Product range

Bracket with rubber inlay

Article code	ø
305620	110x1/2”
305621	125x1/2”
305623	160x1/2”
305604	M10 40
305605	M10 50
305607	M10 75
305609	M10 90
305610	M10 110
305611	M10 125
305613	M10 160

Fire Collar EFM

Article code	ø
309180	40x63
309182	75
309183	78x90
309184	110
309185	125
309186	135x160
309187	200
309188	250

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Annex I
Overview quality certificates

Figure 22

Figure 23

Figure 24

Figure 25

Annex II
Wavin SiTech specification text

A multi-layer low-noise drainage system. The pipe is fitted with a slip-on coupling with installed elastomer gasket, removable and inspectable (DIN EN 681 and DIN 4060) made from a 3-layer structured compound: the outer layer (pale blue RAL 5024) is made of copolymer polypropylene, the middle layer is made of polypropylene with added minerals, the inner layer (white) is made of copolymer polypropylene. The 3 coextruded layers form a single body.

The fittings are pale blue (RAL 5024) in color, stabilized and resistant to UV rays, made with a single layer of copolymer polypropylene, strengthened with mineral additives and fitted with couplers with single-lip installed elastomer gasket, removable and inspectable (DIN EN 681 and DIN 4060).

The system is completed with pipes, branches, bends, couplers and special pieces in diameters 32, 40, 50, 75, 90, 110, 125, 160 mm compatible with the standard sizes of domestic polypropylene soil and waste systems.

The field of application for high temperature fluids reaches 90°C in continuous use with resistance to temperature peaks up to 95°C for short periods.

The emitted noise level at 2.0 l/s, measured by the Stuttgart Fraunhofer Physical Constructions Institute according to DIN 4109 was 22 dB(A) and 14 dB(A) with soundproofed fixings “Bismat 1000, optimized”.

The marking on the pipe includes: trade name, nominal diameter, thickness, type of raw material, field of application, product certification (PIIP 152 RP 1.1 / CF DIN 4102 B2), date and time of production.

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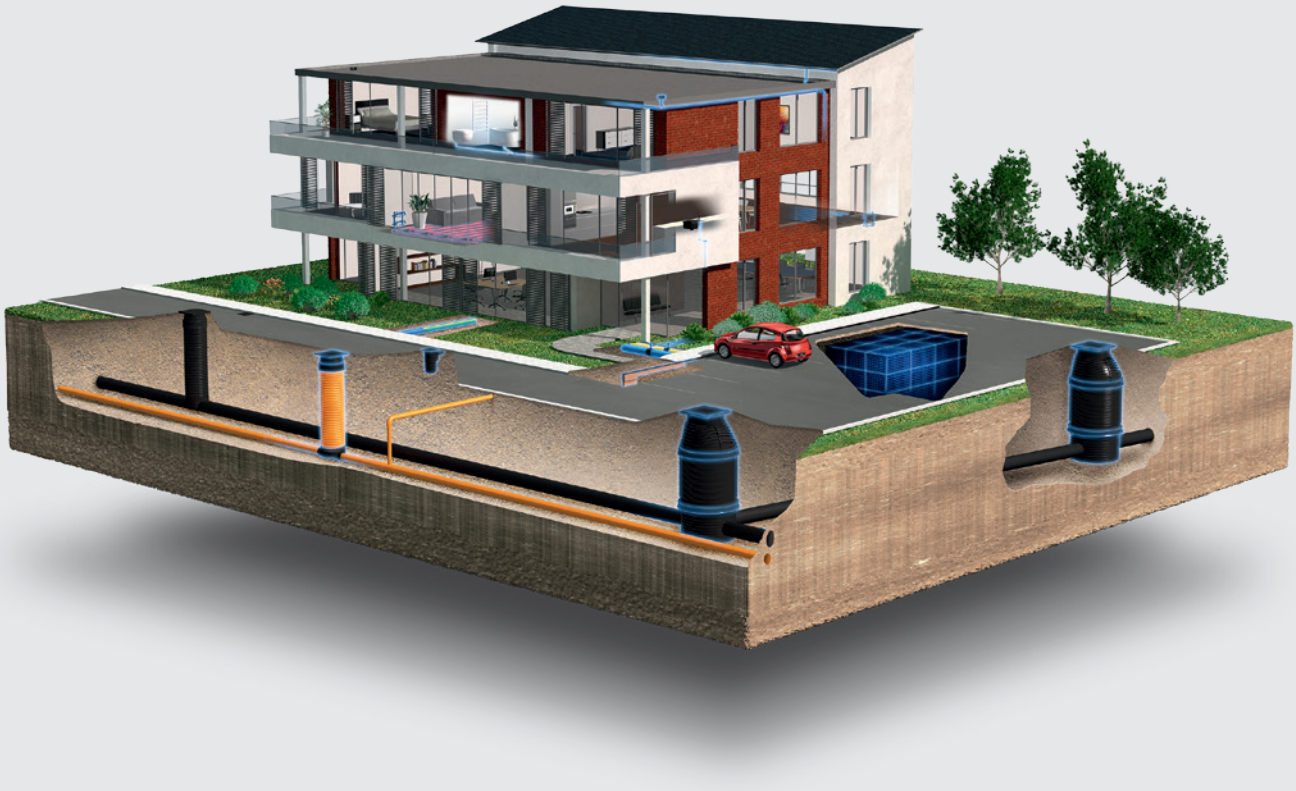

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