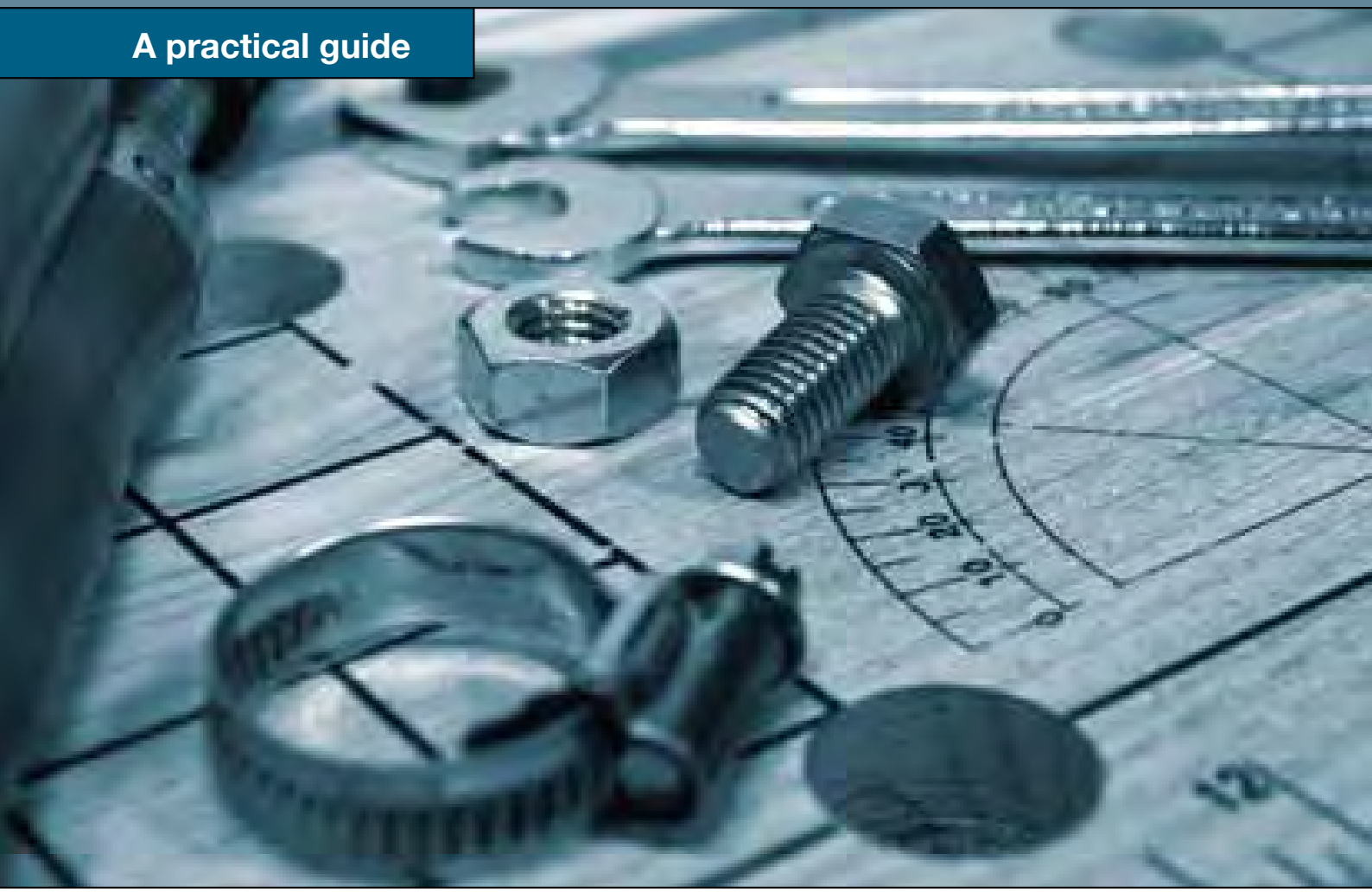
Technology and installation

What you need to know

A practical guide



RSP®

Standards
The essentials

First things first

For a cast iron waste water system to function reliably, it must be installed according to certain standards.

The easiest way to obtain these standards is to buy them online. The relevant series of standards fall into two categories: those for systems installed inside buildings, and those applicable to buried systems.

These standards for the drainage of waste water from buildings and sites are absolutely binding for the installation of RSP® systems!

This brochure contains technical data, material properties and areas of application for the RSP® product range, and helpful examples showing how to apply the relevant standards in practice.

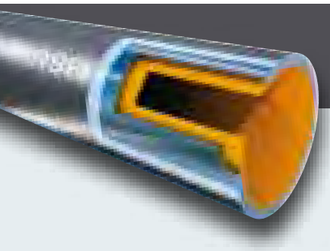
Installation in buildings
The main standard dealing with the installation of cast iron waste water systems in buildings is DIN EN 12056, which stipulates methods for fixing and sealing the systems and sets out requirements for pipes that are subjected to pressure.

Buried systems
DIN EN 1610, DIN EN 752 and DIN 4124 are the applicable standards for buried pipe systems and those installed outside buildings. Requirements include performing a visual inspection following installation, and verifying leaktightness before the pipe trench is backfilled.

RSP® waste water systems – an overview

SML
Socketless cast iron waste water system for building construction

- Internal epoxy resin coating with optimised properties (approx. 130 µm)
- Grey cast iron
  Grade: 150 (as per ISO 185)
- High-quality external epoxy coating, paintable (approx. 80 µm)

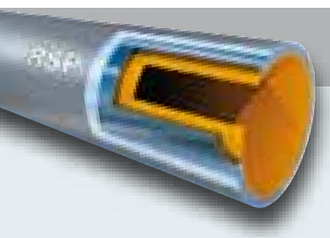


KML
Socketless cast iron system for aggressive waste water from kitchens and laboratories

- Specially formulated internal epoxy resin coating (approx. 250 µm)
- Grey cast iron
  Grade: 150 (as per EN 185)
- Zinc coating (130 g/m²)
- External epoxy coating (approx. 60 µm)

TML
Socketless cast iron waste water system for civil engineering applications

- Internal epoxy resin coating with special properties (approx. 130 µm)
- Grey cast iron
  Grade: 150 (as per EN 185)
- Zinc coating (130 g/m²)
- External epoxy coating (approx. 60-100 µm)



BML
Socketless cast iron waste water system for bridge construction

- Specially formulated internal epoxy resin coating (approx. 130 µm)
- Grey cast iron
  Grade: 150 (as per EN 185)
- Zinc coating (approx. 40 µm)
- 2-component epoxy finishing coat (approx. 80 µm)

Couplings
High tensile and standard joints for SML, KML, TML and BML systems

The RSP® range includes one and two-bolt couplings, Fix couplings, claws and pipe couplings for civil engineering, building and bridge construction, and for use with both pressurised and non-pressurised drainage pipes.

Quality assured!

The RSP® product range is designed according to the high quality standards of DIN EN 877, but also meets far more demanding requirements.

More details on page 26!

Areas of application:

Designation	Material	Area of application	Pressure (bar)	Gasket	High tensile (axial)
Rapid (one-bolt)	1.4510/11	Inside buildings	0.5	EPDM/NBR	No
CV coupling (two-bolt)	1.4510/11	Inside buildings	0.5	EPDM	No
Combination claw	St3K 40	Inside buildings	Up to 10		Yes
GA claw	Stab. ferr. chrome steel	Inside buildings	Up to 10		Yes
Flex pipe coupling	1.4301	Inside buildings, for joining metal and plastic pipes of different sizes	Up to 10	EPDM/NBR	Yes
Grip pipe coupling	1.4301	Inside buildings, for joining metal pipes of different sizes	Up to 10	EPDM/NBR	Yes
RSP-S1 (one-bolt)	1.4301	Inside and outside buildings	0.5	EPDM/NBR	No
Fix coupling	EPDM	Inside and outside buildings, for joining pipes of different materials	0.5		No
Flex INOX pipe coupling	1.4571	Inside and outside buildings, for joining metal and plastic pipes of different sizes	Up to 10	EPDM/NBR	Yes
Grip pipe coupling	1.4571	Inside and outside buildings, for joining metal pipes of different sizes	Up to 10	EPDM/NBR	Yes
RSP-S1⁺ (one-bolt)	1.4401	Buried systems	0.5	EPDM/NBR	No
Rapid INOX (one-bolt)	1.4571	Buried systems/bridge construction	0.5	EPDM/NBR	No
CE	1.4301	Buried systems	0.5	EPDM	No
SVE	PP-CO	Buried systems	0.5	EPDM	No

Material properties of RSP® cast iron waste water systems

In general all products are tested and controlled according to the latest version of EN 877 (previously DIN 19522) (see LGA Quality Certificates and control reports).

However, RSP® products also offer other important and useful benefits. Below you can find a detailed summary of these, relating to mechanical properties, surface condition, and the chemical resistance of the internal coating on the product.

1. Mechanical properties

Mechanical properties Grey cast iron components	Pipes	Fittings
Minimum tensile strength	200 a)	150 a)
Minimum ring crush strength	350 MPa a) 332 MPa b)	-
Max. Brinell hardness	260 a)	260 a)
Density	~ 7.2 kg/dm³	~ 7.2 kg/dm³
Compressive strength	3-4 x minimum tensile strength	3-4 x minimum tensile strength
Shear strength	1–1.6 x minimum tensile strength	1–1.6 x minimum tensile strength
Coefficient of linear expansion	0.0105 mm/mK	0.0105 mm/mK
Poisson's ratio	0.3	0.3

a) As required by EN 877 b) Diameters of DN 250 or more

2. Surface condition

Pipes and fittings of nominal size (DN):	Indentations depth/ height (mm)	Elevations surface area (cm²)	Offset, flash (mm)	Indentation, unevenness of front face (mm)
40–100	< 0.5	< 0.5	< 0.4	< 2.0
125–300	< 0.8	< 0.9	< 0.4	< 3.5
400	< 1.5	< 1.4	< 0.5	< 5.0

3. Chemical resistance of coating

Medium/solution	Concentration (N = normal solution)	pH	Test duration (d = days, h = hours)	Temperature in °C	Results (degree of blistering as per DIN ISO 4628-2)
Phosphoric acid	25%	1.0	72 d	40 °C	m0/g0 Max. size 3 and max. class 3
Acetic acid	10%	2.0	48 d	25 °C	
Hydrogen peroxide solution	10%	3.5	48 d	25 °C	
Sulphuric acid	0.1 N	1.0	30 d	50 °C	
Lactic acid	1%	2.0	48 d	25 °C	
Citric acid	5%	1.5	30 d	50 °C	
Waste water as per EN 877		7.0	30 d	50 °C	
Soda solution	0.1 N	11.4	30 d	50 °C	
Salt water		5.6	10 d	50 °C	
Water (deionised)		6.4	30 d	50 °C	
Salt spray			1500 h	35 °C	

Installation examples

1. In concrete and other materials

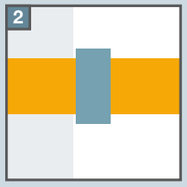
When installing waste water systems in concrete or other materials, attention should be given to the interplay between the materials in the components and the surrounding material. Clause 6.7 of DIN EN 12056-5 requires that the external surfaces of components do not come into contact with substances that can attack the material.

Because of their good mechanical properties such as high dead weight and bending strength, and the fact that they have the same coefficient of expansion as concrete, cast iron pipes are ideally suited to installation in concrete, where they have a clear advantage over alternative pipe systems.

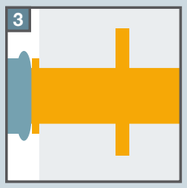
The pipe only needs to be secured against buoying upwards (particularly during concreting). This can be done by mounting the pipes on supports or affixing them to the reinforcements.

Special additional sealing is required for pipes installed below the maximum groundwater or flood level.

SVE couplings
Polypropylene, designed to adapt to earth movements



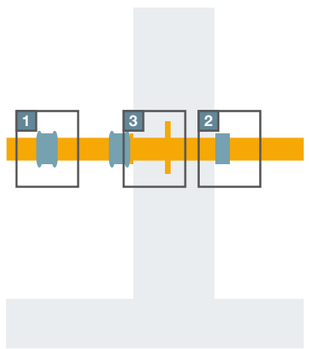
CV or one-bolt couplings
Polypropylene, designed to adapt to earth movements



SML adapter
With clamp and wall flange

2. Wall penetrations

Wall penetrations should be flexible to prevent separation or offset from the axis due to settling. Casing pipes or pipes with a wall flange can be used for this purpose.



3. Grease traps (KML)

KML pipes should be used as the inlet pipes to grease traps. However, deposits can form on the inside of these pipes particularly in the cold months of the year, where fats and oils can cool down very quickly. The distance between the drain and the grease trap should therefore be as short as possible with a minimum gradient of 2 cm/m.

Trace heating should be fitted to collecting pipes outside buildings or which pass through parts of the building that are susceptible to frost.

Grease traps must be sufficiently ventilated to remove any aggressive sewer gases. Here it is important to be aware that the greasy waste waters in the inlet pipe to a grease trap can be less aggressive than the pre-treated waste water leaving it, and hence special consideration should be given to the pipes installed downstream of the grease trap. Stench traps on the inlet and outlet pipes are not permissible because the system needs to be aerated via the inlet pipe.

Source: DIN 1986-100 9.2.1

4. Horizontal pipes

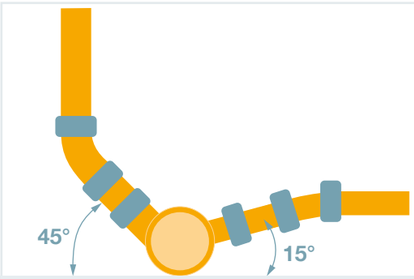
The following must be observed when installing horizontal pipes:

Discharge from third parties must be avoided to prevent the risk of blockage.

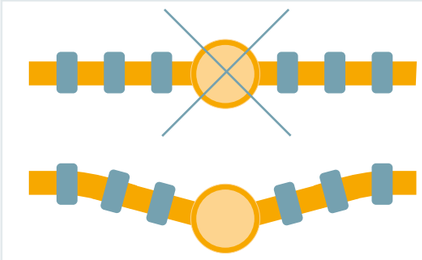
These pipes should also be accessible for cleaning equipment and sewer CCTV systems.

Suggested solution:
Connections to horizontal pipes should be made using bends and branches of ≥ 45°.

Source: DIN EN 12056-1 8.2.2



Connect to horizontal pipes using 45° branches.



Do not use double branches in horizontal pipes.

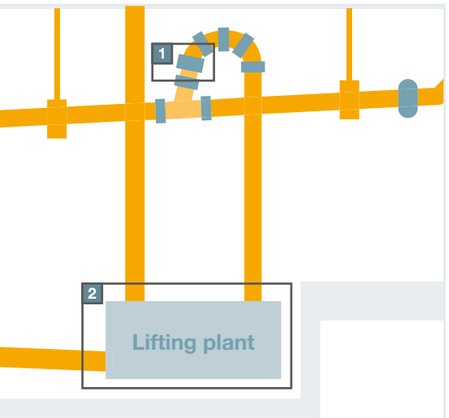
Level along crown

Level along bottom

At transitions from a smaller to a larger cross-sectional area, DIN EN 12056-1 recommends the following:

Level along crown
Area of application: Collecting pipes
Benefits: Prevents formation of air pockets which can impair the hydraulic properties of the pipe. Also prevents waste water from penetrating into the smaller pipe.

Level along bottom
Area of application: Buried systems
Benefit: Easier cleaning and maintenance (sewer CCTV).



Detailed diagram on page 19.

5. Non-positive locking connections

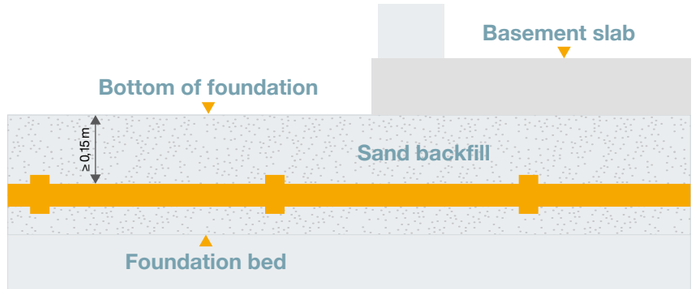
Pipes and fixings must be able to reliably absorb the longitudinal forces resulting from the flow within them. Non-positively locked joints must be additionally secured with positively-locking joints (e.g. claws[1]) to ensure reliable transfer of these longitudinal forces.

Otherwise, additional fixing points must be used to prevent the pipe system components from disengaging. Examples of pipes where considerable reaction forces can be expected include outlet pipes from pumps[2] for siphonic roof drainage systems, and waste water pipes subjected to excessive strain (e.g. rainwater and foul water pipes installed below the flood level).

Source: DIN 1986-100 6.1.3

6. Drains

Drains underneath buildings should be installed in a pipe trench in the foundation bed in such a way that there is still 0.15 m of sand between the crown of the pipe at its highest point and the bottom of the foundation. If this minimum depth of cover cannot be adhered to, it is recommended that steel or cast iron pipes are used (DIN EN 1610 8.5).



Before the trench is backfilled, a leaktightness test must be carried out as per DIN EN 1610. If the leaktightness test is performed with air, for safety reasons the pipe must be partially covered.

Source: DIN EN 1610

Frost protection

Requirements of DIN 4108

(Thermal insulation in buildings) – selected requirements:

Waste water pipes may only be installed in external walls if the residual wall thickness meets the requirements of DIN 4108 (Thermal insulation in buildings).

Thermal insulation of the external wall channel is mandatory.

Drains installed in areas where there is a risk of pipes freezing must not be fitted with a trap. The trap must be fitted at another (frost-proof) location, e.g. inside the building.

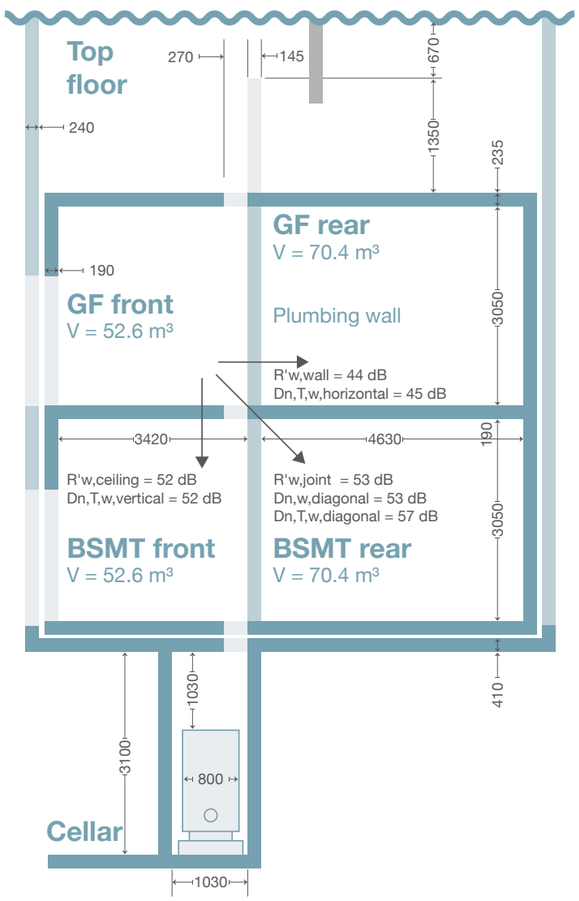
In Central Europe, an installation depth of 1.5 m is sufficient to ensure protection against frost. Depending on the local climatic conditions, local authorities may specify smaller depths of between e.g. 800 and 1200 mm. A differentiation is made between waste water pipes that are empty and those that are full under normal operating conditions.

Thermal insulation zones

- I Coastal areas (0.45) k = 2.2
- II Central Germany (0.55) k = 1.8
- III Mountainous areas and Eastern Germany (0.66) k = 1.57

Source: DIN EN 12056-1

Sound insulation as per DIN 4109



Sound insulation requirements

to prevent plumbing noises from water supply and waste water systems in areas where noise protection is required

Permissible sound pressure level of 30 dB(A)

- Living spaces including lounges
- Sleeping areas including bedrooms in hotels, guesthouses etc. and rooms with beds in hospitals, sanatoria and nursing homes

Permissible sound pressure level of 35 dB(A)

- Classrooms in schools, universities etc.
- Offices (not including open plan offices), consulting rooms, meeting rooms and other similar work premises

Thanks to the high mass per unit area of components in cast iron waste water systems, and the design of the joints for these systems, they have a considerable noise-damping effect.

EN 14366 is available for use in assessing the sound insulating properties of waste water systems. The test method in this standard uses typical test equipment to measure the airborne and structure-borne sound emitted by waste water systems.

According to Table 1 of DIN 1986-4, SML pipes are granted building supervisory approval for use in sound and fire protected areas. Used in conjunction with acoustic pipe clips, these pipes can achieve noise levels below 30 dB(A).

Source: DIN EN 12056-1 7.2.2.4

Test results:

Even when used with conventional fixing clamps, RSP® SML waste water systems gave the following results, according to the test report from the Fraunhofer Institute for Building Physics:

Flow rate (l/s)	0.5 l/s	1.0 l/s	2.0 l/s	4.0 l/s
dB(A) value as per DIN EN 14366	15 dB(A)	18 dB(A)	22 dB(A)	27 dB(A)
Plumbing noise level L In in BSMT rear; dB(A) value as per DIN 4109	17 dB(A)	19 dB(A)	24 dB(A)	29 dB(A)

It has been shown that in practice these values can be reduced to approximately 10 dB(A) if appropriate acoustic decoupling materials are used.

This characteristic sets cast iron apart from alternative waste water system materials, and ensures a high level of living comfort.

Structural fire safety

Fire testing of RSP® waste water systems at MFPA Leipzig

Requirements for construction works

Depending on the building regulations of the individual German Federal state (see German Model Building Regulation) and on the type of building, the number of residential units in it and the way in which it is used, the following criteria may need to be met (DIN EN 12056-1 5.4.1):

- Measures to prevent fires from starting and to prevent the spread of fire and smoke
- Measures to facilitate the rescue of people and animals, and firefighting operations
- Measures to protect people from falling pipework components
- No easily combustible building materials may be used
- Fire-resistant components must be composed primarily of non-combustible building materials (e.g. SML cast iron pipes)
- A recommended minimum distance of 50 mm between pipes of different materials must be adhered to in order to prevent combustible pipes from igniting due to heat radiated by non-combustible pipes
- Note also that fire protection sleeves become ineffective if material is permitted to drop down from burning pipes causing the fire to spread to the floors below
- Non-combustible and combustible pipes may therefore only be used together if fire protection sleeves are used

The solution

Cast iron waste water pipes meet all of these criteria, because:

- Cast iron pipes are non-combustible (DIN 4102 A1) and their external coating does not produce any substantial smoke
- Cast iron pipes do not require fire resistant sealing as needed for plastic pipes
- Fire-rated insulating material around the pipes is recommended at wall and ceiling penetrations to prevent the transfer of structure-borne noise

Cleaning pipework

Short pipe with rectangular access door

- For use in buried pipe systems and in shafts
- Can accommodate relatively large cleaning and inspection equipment such as sewer CCTV systems, high-pressure cleaning equipment, rotary cutters, etc.
- Maintenance and cleaning in both directions possible

Short pipe with round access door

- For installation in stacks shortly before transition to buried pipe
- For inspection of this transition zone only

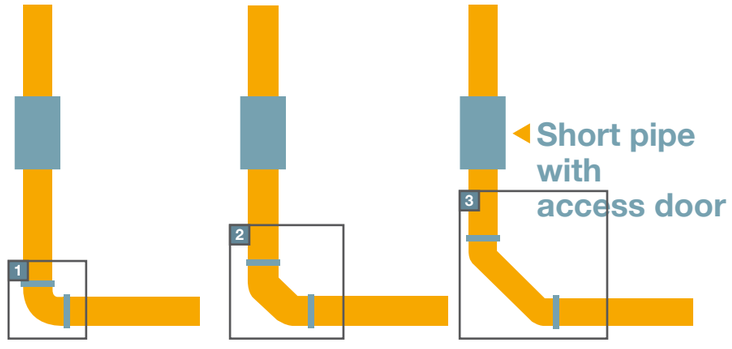
Source: DIN EN 12056-1 7.5.1

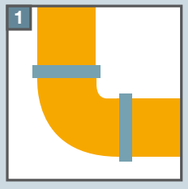
Buried and collecting pipes must have access doors every 20 m, or every 40 m if there is no change in direction between access doors.

Recommended fittings at corner with collecting pipe

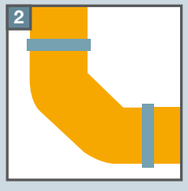
- 88° bend for max. 3 floors or 10 m height
- 2 x 45° bends for 4-8 floors or 10-22 m
- Bend with 250 mm oblong for more than 8 floors or 22 m

Source: DIN 1986-100 6.2.2

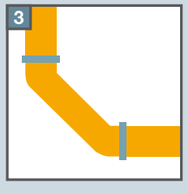




Bend 88°
For max. 10 m height



2 x 45° bends
For max. 22 m height



Bend with 250 mm oblong
For more than 22 m height

Questions? We can help.

For more technical information please speak directly to Technical Support on our free customer service number +49 (0) 8034 70 82-0

Installation

Use a pipecutter or electric pipe saw (e.g. Rothenberger PIPECUT)

Safety instructions

Cutting pipes

Clause 8.5.5 of DIN EN 1610 reads: “Pipes should always be cut to length using suitable tools as recommended by the manufacturer. They must be cut in such a way as to ensure the correct functioning of the joint.”

Electric pipe saws such as the Rothenberger PIPECUT are suitable for this purpose. The pipe must be securely anchored in order to ensure a clean, square cut. Angle grinders fitted with cutting wheels are not recommended. The pipe face must always be smooth and free from burr following cutting to prevent dirt from accumulating between the components. An edge seal coating should be applied to the cut edges before they are joined together.

An edge seal coating should be applied to the cut edges before they are joined together.
This can be sprayed on or applied with a brush (DIN EN 1610 8.5.5)

Pipe cutting notes:

- *Use electric pipe saws (e.g. Rothenberger PIPECUT)*
- *Fix pipe securely in place for a clean, square cut*
- *Only use angle grinders fitted with cutting wheels on pipes larger than DN 300*
- *Keep cut surfaces smooth and free from burr*
- *Use an edge seal coating on the cut edges (applies for TML, KML and BML)*

Joining pipes and fittings

According to Clause 5.4.2 of DIN EN 12056-1, 6.2 of DIN EN 12056-5, and DIN EN 752-2, sewers and waste water pipes must be watertight to ensure the proper functioning of a waste water system. DIN EN 12056 additionally demands that waste water pipes installed inside buildings are gas-tight to prevent the release of vapours and foul air from from the pipework system.

We offer an extensive range of couplings capable of meeting these requirements, including one and two-bolt screw couplings in various steel grades, various claws for fixing pressurised pipes, and SVE couplings for buried systems. Whatever your application, we recommend using RSP® couplings, as these have been tested to ensure that they provide the necessary functionality and meet the relevant requirements, including those of the EN 877 standard.

Joining notes:

- *Use couplings tested as per DIN EN 877 from the RSP® range*
- *Adhere to the specified tightening torques when fitting couplings*
- *Identify points in the pipe system that are exposed to pressure (of more than 0.5 bar) and consult with the planning office and/or manufacturer regarding the use of claws in these areas*

Fixing the pipe systems

“Fixing” notes:

- *Exposed pipes must not come into contact with walls*
- *Adhere to minimum gradient of 0.5%*
- *Do not exceed maximum distance between fixing points (2 m)*
- *Do not exceed maximum distance between fixing point and pipe end/ coupling (0.7 m)*
- *Use additional fixing points in case of changes of direction*

The relevant standards also contain requirements relating to the fixing of pipe systems.

For example:
“Pipes must be fixed securely. Distances between fixing points and measures taken to prevent disengagement and misalignment of components at joints in pipe systems must be defined according to manufacturers’ installation instructions for the respective raw material. Exposed pipes must not come into direct contact with walls.”
DIN EN 12056-2 stipulates a minimum gradient of 0.5%.

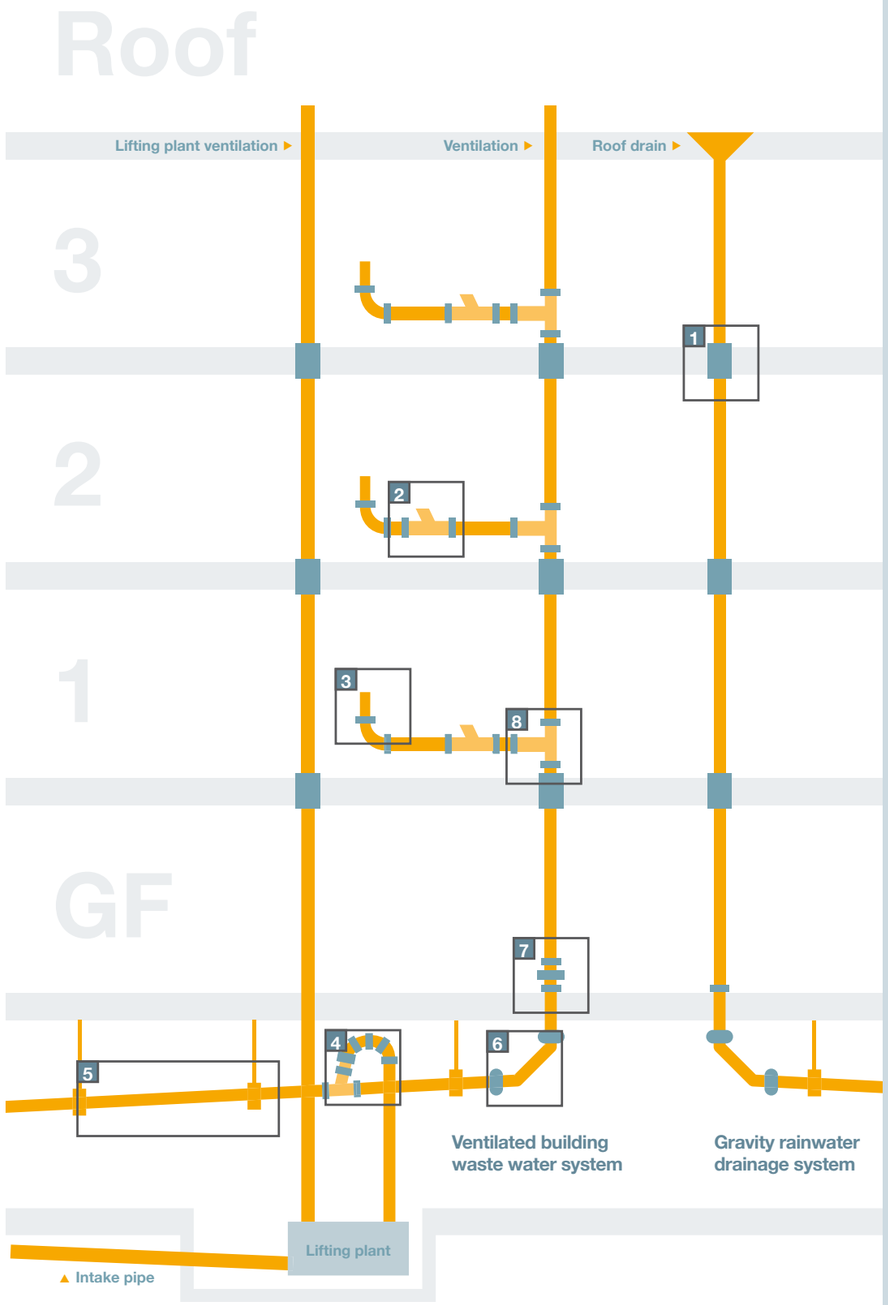
A sufficient number of fixings should be used to ensure accurate installation of pipe systems, particularly collecting pipes. RSP® SML pipe systems should have fixings at least every 2 m. This means that, for a pipe of length between 2 and 3 m, at least two fixings will be needed. At joints, the distance from the end of a section of pipe to a fixing point must not exceed 0.7 m.
Stacks, pressurised pipes and pipes incorporating changes of direction must additionally be fixed with stack support pipes, claws or fixing point brackets.

In buildings with five floors or less, stacks of DN 100 or more must be secured against sinking with a stack support pipe fixed above the basement ceiling. In taller buildings, a stack support pipe must additionally be installed on each subsequent fifth floor. To minimise plumbing noise, direct installation on walls should be avoided.

Generally, fixings should be applied at regular intervals and standard-compliant fixing systems should be used. It is also important to follow the installation instructions of the manufacturer of the fixings.

Suspending pipes with perforated tape is not admissible, as this does not guarantee sufficiently stable pipe routing. Connecting sleeves/ coupling gaskets must likewise not be used for fixing waste water pipework systems.

Source: DIN EN 12056-1



1 Fire resistance
Must also meet sound insulation requirements

2 DN 100/80
Waste water inlet from e.g. WC

3 DN 50
Discharge from washbasin or shower

4 Claw on pressurised pipe
Used with lifting plant; protection up to 10 bar

5 Minimum gradient
0.5% as per DIN EN 12056-2

6 Bend with 250 mm oblong
To reduce pressure in stack
Coupling secured with claw

7 Stack support pipe
For added stability in buildings with 5 or more floors (min. DN 100)

8 Branch
Waste water discharge into stack (min. DN 100)

Questions? We can help.

For more technical information please speak directly to Technical Support on our customer service number +49 (0) 8034 70 82-0

Joining pipes and fittings (SML, KML, BML, TML)

Sample RSP-S1+ coupling

Fitting one-bolt couplings

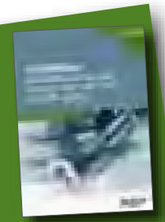
1. Open the coupling until it fits onto the pipe or fitting
2. Push the coupling on as far as the sealing lip
3. Push the other component flush into the coupling
4. Tighten the bolt to 15–20 Nm. Job done!

Step 1

Step 2

Step 3

Step 4



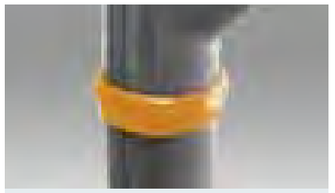
Fitting CV and CE couplings

1. Push the gasket onto the end of the pipe or fitting in such a way that the spacer inside lies evenly against its edge
2. Fold back the top half of the gasket
3. Place the other pipe or fitting flush against the spacer
4. Fold the top half of the gasket back into position
5. Now close the band clamp around the gasket
6. Tighten the bolts, alternating between the two in such a way that the locking components remain parallel always with the same distance between them. Job done!

Sample CV coupling

Step 1

Step 2



Step 3

Step 4

Step 5

Step 6

Sample combination claw

Fitting combination claws

1. Place the claw around the coupling in such a way that its teeth do not rest on the metal casing of the coupling
2. Tighten the bolts alternately (crosswise) in such a way that the locking components remain as parallel as possible and always with the same distance between them
3. The cast iron pipe is now evenly enclosed by the claw. Job done!

Step 1

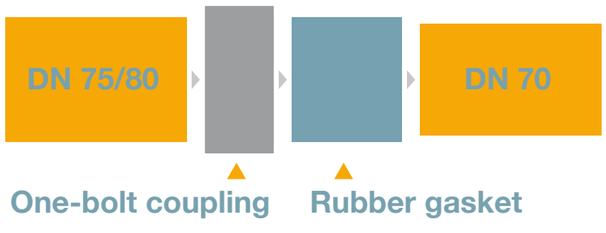
Step 2

Step 3

Sample EPDM rubber gasket

Fitting EPDM rubber gasket

1. Place one-bolt coupling on pipe or fitting (DN 75/80).
2. Push EPDM gasket flush onto other pipe or fitting (DN 70).
3. Insert pipe with EPDM rubber gasket into one-bolt coupling
4. Tighten one-bolt coupling (10 – 20 Nm). Job done!

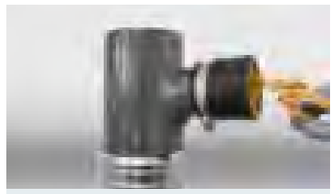


Fitting Fix couplings

1. Slacken the band clamp and push the Fix coupling onto the pipe up to the stop. Use the band clamp to fix it in place
2. Use pliers to detach (do not cut) the cover from the front end of the coupling around the channel
3. Mark the connecting pipe at the required insertion depth, apply lubricant to the pipe and push it into place. Job done!

Sample Fix coupling

Step 1



Step 2

Step 3

Fitting pipe couplings

1. Start with the clamp loosely screwed together
2. Tighten the screws alternately in such a way that the locking components remain as parallel as possible and always with the same distance between them
3. The cast iron pipe is now evenly enclosed by the coupling. Job done!

Sample Grip and Flex pipe couplings

Table of flow rates as per DIN EN 877 (DIN 19522)

Pipe 50% full (h/d = 0.5)

	DN 50		DN 70		DN 80		DN 100		DN 125		DN 150		DN 200		DN 250		DN 300	
	Di = 51		Di = 71		Di = 75		Di = 103		Di = 127		Di = 152		Di = 200		Di = 263		Di = 314	
J cm/m	Q l/s	v m/s	Q l/s	v m/s	Q l/s	v m/s	Q l/s	v m/s	Q l/s	v m/s	Q l/s	v m/s	Q l/s	v m/s	Q l/s	v m/s	Q l/s	v m/s
0.5	0.3	0.3	0.8	0.4	0.9	0.4	2.1	0.5	3.7	0.6	6.0	0.7	12.5	0.8	25.8	1.0	41.3	1.1
0.6	0.4	0.3	0.9	0.4	1.0	0.4	2.3	0.6	4.1	0.6	6.6	0.7	13.7	0.9	28.3	1.0	45.3	1.2
0.7	0.4	0.4	0.9	0.5	1.1	0.5	2.5	0.6	4.4	0.7	7.1	0.8	14.8	0.9	30.6	1.1	48.9	1.3
0.8	0.4	0.4	1.0	0.5	1.1	0.5	2.7	0.6	4.7	0.7	7.6	0.8	15.8	1.0	32.7	1.2	52.3	1.4
0.9	0.4	0.4	1.1	0.5	1.2	0.6	2.9	0.7	5.0	0.8	8.1	0.9	16.8	1.1	34.7	1.3	55.5	1.4
1.0	0.5	0.5	1.1	0.6	1.3	0.6	3.0	0.7	5.3	0.8	8.5	0.9	17.7	1.1	36.6	1.3	58.5	1.5
1.1	0.5	0.5	1.2	0.6	1.4	0.6	3.2	0.8	5.5	0.9	8.9	1.0	18.6	1.2	38.4	1.4	61.4	1.6
1.2	0.5	0.5	1.2	0.6	1.4	0.6	3.3	0.8	5.8	0.9	9.4	1.0	19.4	1.2	40.1	1.5	64.2	1.7
1.3	0.5	0.5	1.3	0.6	1.5	0.7	3.4	0.8	6.0	1.0	9.7	1.1	20.2	1.3	41.8	1.5	66.8	1.7
1.4	0.5	0.5	1.3	0.7	1.5	0.7	3.6	0.9	6.3	1.0	10.1	1.1	21.0	1.3	43.4	1.6	69.3	1.8
1.5	0.6	0.6	1.4	0.7	1.6	0.7	3.7	0.9	6.5	1.0	10.5	1.2	21.7	1.4	44.9	1.7	71.8	1.9
1.6	0.6	0.6	1.4	0.7	1.6	0.7	3.8	0.9	6.7	1.1	10.8	1.2	22.4	1.4	46.4	1.7	74.1	1.9
1.7	0.6	0.6	1.5	0.7	1.7	0.8	3.9	0.9	6.9	1.1	11.1	1.2	23.1	1.5	47.8	1.8	76.4	2.0
1.8	0.6	0.6	1.5	0.8	1.7	0.8	4.1	1.0	7.1	1.1	11.5	1.3	23.8	1.5	49.2	1.8	78.7	2.0
1.9	0.6	0.6	1.5	0.8	1.8	0.8	4.2	1.0	7.3	1.2	11.8	1.3	24.5	1.6	50.6	1.9	80.8	2.1
2.0	0.7	0.6	1.6	0.8	1.8	0.8	4.3	1.0	7.5	1.2	12.1	1.3	25.1	1.6	51.9	1.9	82.9	2.1
2.5	0.7	0.7	1.8	0.9	2.0	0.9	4.8	1.2	8.4	1.3	13.5	1.5	28.1	1.8	58.0	2.1	92.8	2.4
3.0	0.8	0.8	1.9	1.0	2.2	1.0	5.3	1.3	9.2	1.5	14.8	1.6	30.8	2.0	63.6	2.3	101.7	2.6

Pipe 70% full (h/d = 0.7)

	DN 50		DN 70		DN 80		DN 100		DN 125		DN 150		DN 200		DN 250		DN 300	
	Di = 51		Di = 71		Di = 75		Di = 103		Di = 127		Di = 152		Di = 200		Di = 263		Di = 314	
J cm/m	Q l/s	v m/s	Q l/s	v m/s	Q l/s	v m/s	Q l/s	v m/s	Q l/s	v m/s	Q l/s	v m/s	Q l/s	v m/s	Q l/s	v m/s	Q l/s	v m/s
0.5	0.5	0.4	1.3	0.4	1.5	0.5	3.6	0.6	6.2	0.7	10.1	0.7	20.8	0.9	43.1	1.1	68.9	1.2
0.6	0.6	0.4	1.4	0.5	1.7	0.5	3.9	0.6	6.8	0.7	11.0	0.8	22.9	1.0	47.2	1.2	75.5	1.3
0.7	0.6	0.4	1.6	0.5	1.8	0.5	4.2	0.7	7.4	0.8	11.9	0.9	24.7	1.1	51.1	1.3	81.6	1.4
0.8	0.7	0.5	1.7	0.6	1.9	0.6	4.5	0.7	7.9	0.8	12.7	0.9	26.4	1.1	54.6	1.3	87.3	1.5
0.9	0.7	0.5	1.8	0.6	2.1	0.6	4.8	0.8	8.4	0.9	13.5	1.0	28.1	1.2	58.0	1.4	92.6	1.6
1.0	0.8	0.5	1.9	0.6	2.2	0.7	5.1	0.8	8.8	0.9	14.3	1.1	29.6	1.3	61.1	1.5	97.6	1.7
1.1	0.8	0.5	2.0	0.7	2.3	0.7	5.3	0.9	9.3	1.0	15.0	1.1	31.0	1.3	64.1	1.6	102.4	1.8
1.2	0.8	0.6	2.0	0.7	2.4	0.7	5.5	0.9	9.7	1.0	15.6	1.2	32.4	1.4	67.0	1.6	107.0	1.8
1.3	0.8	0.6	2.1	0.7	2.5	0.7	5.8	0.9	10.1	1.1	16.3	1.2	33.8	1.4	69.7	1.7	111.4	1.9
1.4	0.9	0.6	2.2	0.7	2.6	0.8	6.0	1.0	10.5	1.1	16.9	1.2	35.0	1.5	72.4	1.8	115.6	2.0
1.5	0.9	0.6	2.3	0.8	2.7	0.8	6.2	1.0	10.9	1.1	17.5	1.3	36.3	1.5	74.9	1.8	119.7	2.1
1.6	1.0	0.6	2.4	0.8	2.7	0.8	6.4	1.0	11.2	1.2	18.1	1.3	37.5	1.6	77.4	1.9	123.7	2.1
1.7	1.0	0.7	2.4	0.8	2.8	0.9	6.6	1.1	11.6	1.2	18.6	1.4	38.6	1.6	79.8	2.0	127.5	2.2
1.8	1.0	0.7	2.5	0.8	2.9	0.9	6.8	1.1	11.9	1.3	19.2	1.4	39.8	1.7	82.1	2.0	131.2	2.3
1.9	1.1	0.7	2.6	0.9	3.0	0.9	7.0	1.1	12.2	1.3	19.7	1.5	40.9	1.7	84.4	2.1	134.8	2.3
2.0	1.1	0.7	2.7	0.9	3.1	0.9	7.2	1.2	12.5	1.3	20.2	1.5	41.9	1.8	86.6	2.1	138.3	2.4
2.5	1.2	0.8	3.0	1.0	3.4	1.0	8.0	1.3	14.0	1.5	22.6	1.7	46.9	2.0	96.9	2.4	154.7	2.7
3.0	1.3	0.9	3.3	1.1	3.8	1.1	8.8	1.4	15.4	1.6	24.8	1.8	51.4	2.2	106.1	2.6	169.6	2.9

Pipe 100% full (h/d = 1.0)

	DN 50		DN 70		DN 80		DN 100		DN 125		DN 150		DN 200		DN 250		DN 300	
	Di = 51		Di = 71		Di = 75		Di = 103		Di = 127		Di = 152		Di = 200		Di = 263		Di = 314	
J cm/m	Q l/s	v m/s	Q l/s	v m/s	Q l/s	v m/s	Q l/s	v m/s	Q l/s	v m/s	Q l/s	v m/s	Q l/s	v m/s	Q l/s	v m/s	Q l/s	v m/s
0.5	0.6	0.3	1.6	0.4	1.8	0.4	4.2	0.5	7.4	0.6	12.0	0.7	24.9	0.8	51.6	1.0	82.6	1.1
0.6	0.7	0.3	1.7	0.4	2.0	0.4	4.7	0.6	8.2	0.6	13.2	0.7	27.4	0.9	56.6	1.0	90.5	1.2
0.7	0.8	0.4	1.9	0.5	2.1	0.5	5.0	0.6	8.8	0.7	14.2	0.8	29.6	0.9	61.2	1.1	97.8	1.3
0.8	0.8	0.4	2.0	0.5	2.3	0.5	5.4	0.6	9.4	0.7	15.2	0.8	31.6	1.0	65.4	1.2	104.6	1.4
0.9	0.9	0.4	2.1	0.5	2.4	0.6	5.7	0.7	10.0	0.8	16.2	0.9	33.6	1.1	69.4	1.3	111.0	1.4
1.0	0.9	0.5	2.2	0.6	2.6	0.6	6.0	0.7	10.6	0.8	17.1	0.9	35.4	1.1	73.2	1.3	117.1	1.5
1.1	1.0	0.5	2.3	0.6	2.7	0.6	6.3	0.8	11.1	0.9	17.9	1.0	37.1	1.2	76.8	1.4	122.8	1.6
1.2	1.0	0.5	2.4	0.6	2.8	0.6	6.6	0.8	11.6	0.9	18.7	1.0	38.8	1.2	80.3	1.5	128.3	1.7
1.3	1.0	0.5	2.5	0.6	2.9	0.7	6.9	0.8	12.1	1.0	19.5	1.1	40.4	1.3	83.6	1.5	133.6	1.7
1.4	1.1	0.5	2.6	0.7	3.1	0.7	7.2	0.9	12.5	1.0	20.2	1.1	41.9	1.3	86.7	1.6	138.7	1.8
1.5	1.1	0.6	2.7	0.7	3.2	0.7	7.4	0.9	13.0	1.0	20.9	1.2	43.4	1.4	89.8	1.7	143.6	1.9
1.6	1.2	0.6	2.8	0.7	3.3	0.7	7.7	0.9	13.4	1.1	21.6	1.2	44.9	1.4	92.8	1.7	148.3	1.9
1.7	1.2	0.6	2.9	0.7	3.4	0.8	7.9	0.9	13.8	1.1	22.3	1.2	46.3	1.5	95.6	1.8	152.9	2.0
1.8	1.2	0.6	3.0	0.8	3.5	0.8	8.1	1.0	14.2	1.1	22.9	1.3	47.6	1.5	98.4	1.8	157.3	2.0
1.9	1.3	0.6	3.1	0.8	3.6	0.8	8.3	1.0	14.6	1.2	23.6	1.3	48.9	1.6	101.1	1.9	161.7	2.1
2.0	1.3	0.6	3.2	0.8	3.7	0.8	8.6	1.0	15.0	1.2	24.2	1.3	50.2	1.6	103.8	1.9	165.9	2.1
2.5	1.5	0.7	3.5	0.9	4.1	0.9	9.6	1.2	16.8	1.3	27.1	1.5	56.2	1.8	116.1	2.1	185.6	2.4
3.0	1.6	0.8	3.9	1.0	4.5	1.0	10.5	1.3	18.4	1.5	29.7	1.6	61.6	2.0	127.2	2.3	203.3	2.6

Key			
Di	Internal diameter (mm)	v	Flow velocity (metres per second)
Q	Waste water flow rate (litres per second)	J	Gradient (cm per metre)

Adhere to minimum gradients as per DIN EN 12056 and DIN 1986-100

Questions? We can help.

For more technical information please speak directly to Technical Support on our customer service number +49 (0) 8034 70 82-0

Quality marks for proven quality

RSP® is committed to fulfilling quality criteria that go far beyond what is required by the applicable European standard (EN 877). The following measures ensure that RSP® products reliably meet the ever-tougher requirements applicable to its various types of waste water systems:

- **Factory production control:**
  According to an optimised internal quality management system
- **Third-party control::**
  Performed at least twice annually in our production and warehouse facilities by an independent external test institute
- **Individual tests:**
  Individual tests, e.g. complete temperature cycling test as per DIN EN 877, performed once annually
- **Internal coating:**
  Subjected to enhanced requirements and regular testing, e.g. salt spray test at 35 °C for 1500 h (the applicable standard requires only 350 h) (see LGA 7311272-02 and 03 test reports)
- **Surface condition:**
  Tougher requirements are applied for surface condition than those in DIN EN 877

The full set of RSP® catalogues

Cast iron waste water systems, couplings,
and technology and installation

Request a catalogue now!
+49 (0) 8034 70 82-0

RSP®

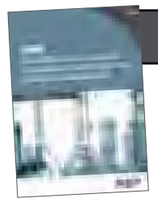
Well connected

SML

Socketless cast iron waste water system for building construction

BML

Socketless cast iron waste water system for bridge construction

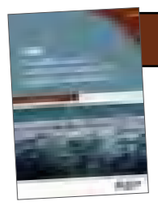


KML

Socketless cast iron system for aggressive waste water from kitchens and laboratories

Couplings

High tensile and standard joints for SML, KML, TML and BML systems



TML

Socketless cast iron waste water system for civil engineering applications

Technology and installation

What you need to know

Or download any catalogue from: www.rsp-pipes.com

XXII.de

Correct as at 02/2012, subject to alterations.

RSP® Ruck Sanitärprodukte GmbH | Kirchstraße 1 | 83126 Flintsbach am Inn | Tel.: +49 (0) 8034 70 82-0

www.rsp-pipes.com

RSP®