

**uponor**

# Uponor Decibel Waste Water Pipe System

Technical Information





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# Uponor Decibel Waste Water Pipe System



## Uponor Decibel – Waste water pipe system with excellent sound insulation

Uponor Decibel is a complete waste water pipe system consisting of pipes and fittings in dimensions of 50, 75, 110 and 160 mm. The system can be used both in new builds and in renovations. The specially mineral-reinforced polypropylene and the innovative, multi-layer wall structure ensure a significant reduction in flow noise. Uponor Decibel is thus also suitable for use in buildings with high sound absorption requirements.

Uponor Decibel is easy to work with, not least because of its lower weight in comparison to cast iron pipes. The pipes can be cut to length, deburred and externally chamfered with a conventional saw. No special tools are necessary.

Standardised dimensions in accordance with EN 1451 ensure a trouble-free transition from Uponor Decibel to other drainage systems that are also dimensioned to this Standard, without any special adapters.

### Uponor Decibel Waste Water Pipe System

- For all acoustically demanding buildings, both new builds and renovations
- Easy installation
- Available in dimensions of 50, 75, 110 and 160 mm
- Stable, multi-layer PP wall structure with high sound insulation effect
- Smooth, abrasion-resistant inner surface to reduce the risk of blockages
- High resistance to low temperatures and to UV
- Robust, white outer surface for attractive installation
- Fulfils the requirements of European Standard EN 1451

## Areas of Application

Uponor Decibel is a sound-absorbing waste water system for unpressurised domestic drainage, in accordance with EN 12056. It can be used both in single family homes and in large multi-storey buildings. In residential construction, for example in single and multiple-family dwellings and in housing estates, Decibel is suitable both as a standard system without sound-absorbing requirements and as a solution for increased sound insulation requirements as per the VDI 4100 guidelines. Its excellent sound-proofing properties mean that Uponor Decibel can especially score points in the area of commercial construction, for example in multi-storey residential or office buildings, hotels and clinics with increased sound absorbing requirements.



*Uponor Decibel contains the most important components for buildings drainage and is dimensionally compatible with common plastic waste water pipe systems*



*Uponor Decibel is equally suitable for use in new builds as well as in refurbishments*

# Planning and Installation Instructions

## Area of application for Uponor Decibel

The Uponor Decibel waste water pipe system is an unpressurised drainage system for domestic drainage. It is used for the discharge of waste water as per the definitions of EN 12056-1 in gravity drainage systems in buildings, in accordance with EN 12056. The pipes, moulded parts and sealing elements of the Decibel Systems are tested and approved in compliance with EN 1451-1, and are designed for temperatures up to 85°C (up to 100°C for brief periods). The connection is made through the sleeves of the pipes and the moulded parts, or with a double or sliding sleeve. Uponor Decibel must not be pressurised. However, when used as an internal rain water pipe, a maximum pressure of 0.5 bar is permitted.

### System I

#### Single downpipe system with partially filled connection pipes

Sanitary drainage fixtures are connected to partially filled connection pipes. The partially filled connection pipes are designed for a filling level of 0.5 (50%) and are connected to a single waste water downpipe.

### System II

#### Single downpipe system with connection pipes of a smaller dimension

Sanitary drainage fixtures are connected to smaller dimension connection pipes. The smaller dimension connection pipes have a filling level of up to 0.7 (70%) and are connected to a single waste water downpipe.

## General Requirements for Drainage Systems

Amongst other things, drainage systems must be planned and installed, so that: the maximum expected waste water flow is drained; sufficient ventilation is provided so as to ensure the function of the waste water pipe system; the materials used are resistant, both to the mechanical stresses during installation as well as to the fluids to be drained during operation; the health and safety of the users and the people in the building is not compromised; the permitted noise levels do not exceed the limits set out in the national and regional regulations; protection against leakage of sewer gases, mechanical stress, the effects of frost, backwaters, corrosion and the spread of fire is provided; condensation cannot cause damage either to the pipework or to the building; access to the drainage system is provided where necessary, for inspection, testing and maintenance purposes.

## Systems in accordance with EN 12056-2

Until now, there was no agreement on a single European drainage system. However, 4 types of system have been specified, which are described in EN 12056-2, Section 4.2. Within the types of system, there are different variations in detail, therefore national and regional regulations and technical rules are permitted, which are listed as Appendix A in the Standard (informative).

In Germany, System I is to be applied.

### System III

#### Single downpipe system with fully filled connection pipes

Sanitary fixtures that are connected via connection pipes which are operated fully filled. The fully filled connection pipes have a filling level of 1.0 (100%) and each connection pipe is separately connected to a single waste water downpipe.

### System IV

#### System with separate waste water downpipes

The system types of Systems I, II und III can also be split into one waste water downpipe, which drains the waste water from toilets and urinals, and another waste water downpipe, which drains waste water from all other drainage fixtures.

In accordance with DIN 1986-100, Section 6.1.1, for reasons of improved inspection and easier renovation, underground pipework in buildings (with basements) should be avoided and should instead be routed as header pipes.

# Fire Protection

## Requirements

Particularly in recent years, the focus on structural fire protection has increasingly become the focus of all the trades involved in the planning and construction of buildings. Requirements for fire protection, as well as the relevant implementation guidelines, can be found in the Model Building Ordinance (MBO), in the Regional Construction Ordinances (LBO). These guidelines insist that there must be no fear that, over a defined period of time, fire and smoke can spread through pipes that pass through fire-resistant partitions and ceilings. The type and extent of the fire protection measures must already be defined and approved through the local building authorities (community/city/town) during the planning phase.

## Fire protection by partitioning

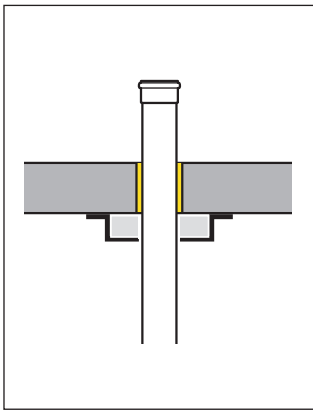
If pipes, cables or other domestic installations are going to be laid through fire-resistant, enclosing walls and ceilings, fire protection measures must be found which offer at least the same fire-resistance rating as the traversing building component. Thus the danger of an uncontrolled spread of fire across different fire zones will be minimised (fire stops).

This requirement applies both to flammable and non-flammable pipes. The choice of a non-flammable pipework material is not sufficient here as, for example, with metal pipework, the spread of fire could be caused by heat conduction.

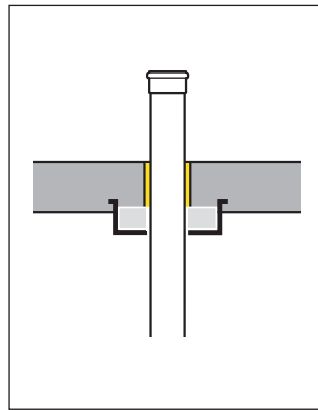
## Fire protection collars

Commercial fire stops such as, for example, fire protection collars can be used for partitioning the Uponor Decibel waste water pipe system. The intumescent built into the collar foams three-dimensionally in the event of a fire, when temperatures reach approx. 150°C. This creates an expansion pressure on the pipe, which is now sealed off in a very short space of time. This will inhibit heat conduction and the transmission of combustion gas for the fire-resistance period. The Uponor Decibel waste water pipe system has been successfully tested with fire protection collars. When planning and installing fire protection collars, the requirements of the general building inspectorate approval (federal and regional), the specifications of the local building authorities and the specifications of the respective installation instructions must be observed and implemented.

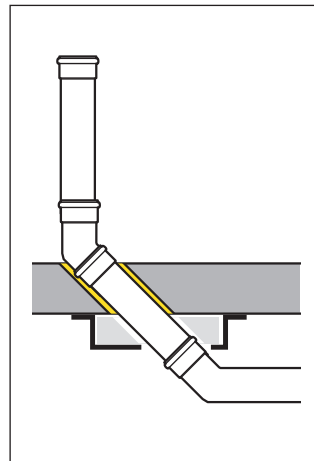
## Positioning of Fire Protection Collars (examples)



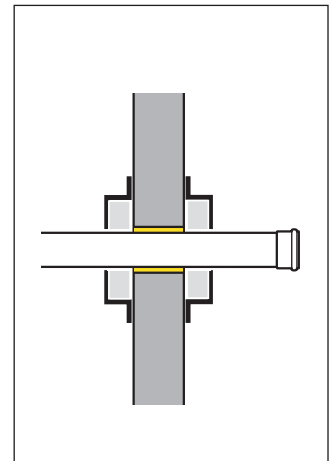
Surface Mounting



Ceiling Elements



Surface Mounting  
(Angled Fire Protection Collars)



Wall Mounting (fire protection collar  
required on both sides)

# Noise Protection

The value of a property is also determined, along with many other factors, for example, energetic properties, by its acoustic standard. The requirements for sound absorption within a building are defined in standards and guidelines.

## The minimum sound absorption requirements as per DIN 4109

DIN 4109 defines the requirements for noise sources from water installations, water supply and waste water installations to protect the user from unreasonable noise and is regarded as the building regulations basis for sound insulation. DIN 4109 must be applied, regardless of the type of building, if rooms requiring protection, e.g. in retirement homes, hospitals, office buildings, etc. are to be considered. DIN 4109 also applies between separate living areas and the living areas of third-party apartments which require protection

(e.g. living and sleeping quarters, children's bedrooms). Its defined minimum permitted requirement is a rated sound pressure level of  $L_{AFmax,n} \leq 30 \text{ dB(A)}$ .

## Increased Sound Insulation as per VDI 4100

The VDI 4100 (2012-10) contains regulations and recommendations for increased sound insulation. However, these are not legally binding under building law, but are regarded as state of the art and can be agreed under civil law. Defined in the guidelines are the sound absorbing features in sound insulations levels I, II and III and in additional sound insulation levels for sound insulation in their own area. The requirements, including the specification of the sound insulation level and the associated parameters, must be explicitly agreed in the contract.

## Overview of the Recommended Sound Insulation Values for Building Services Systems

Maximum rated noise level	Standard/ Guideline	Designation	Sound insulation level	Area of application	Legal basis
$\leq 35 \text{ dB(A)}$	VDI 4100 (2012-10)	$L_{AFmax,nT}$	SSt EB I	Increased requirements in apartments and single-family homes.	Civil law agreement
$\leq 30 \text{ dB(A)}$	VDI 4100 (2012-10)	$L_{AFmax,nT}$	SSt EB II		
$\leq 30 \text{ dB(A)}$	DIN 4109-1	$L_{AFmax,nT}$	-	Adjacent rooms requiring protection in third-party areas	Building regulations basis
$\leq 30 \text{ dB(A)}$	VDI 4100 (2012-10)	$L_{AFmax,nT}$	SSt I	Adjacent rooms in apartments with low levels of comfort in design and equipment in multi-family houses	Civil law agreement
$\leq 30 \text{ dB(A)}$	VDI 4100 (2012-10)	$L_{AFmax,nT}$	SSt I	Adjacent rooms in apartments with low levels of comfort in design and equipment in single-family homes, semi-detached and single-family terraced homes.	Civil law agreement
$\leq 27 \text{ dB(A)}$	VDI 4100 (2012-10)	$L_{AFmax,nT}$	SSt II	Adjacent rooms in apartments with average levels of comfort in design and equipment in multi-family homes	Civil law agreement
$\leq 25 \text{ dB(A)}$	VDI 4100 (2012-10)	$L_{AFmax,nT}$	SSt II	Adjacent rooms in apartments with average levels of comfort in design and equipment in single-family homes, semi-detached and single-family terraced homes	Civil law agreement
$\leq 24 \text{ dB(A)}$	VDI 4100 (2012-10)	$L_{AFmax,nT}$	SSt III	Adjacent rooms in apartments with special levels of comfort in design and equipment in multi-family homes	Civil law agreement
$\leq 22 \text{ dB(A)}$	VDI 4100 (2012-10)	$L_{AFmax,nT}$	SSt III	Adjacent rooms in apartments with special levels of comfort in design and equipment in single-family homes, semi-detached and single-family terraced homes	Civil law agreement



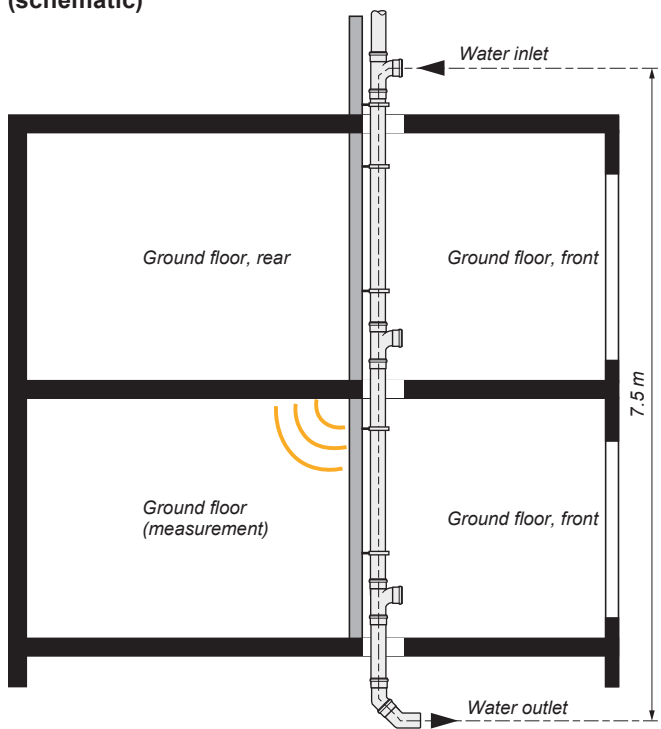
## Sound-tested by the Fraunhofer Institute

To determine its sound-proofing effects, Uponor Decibel was tested by the officially recognised Fraunhofer Institute for Building Physics, Stuttgart (IBP) to EN 14366 “Measurement of the noise from waste water installations in the test bench”. For the test, the waste water pipes were fixed to a massive installation wall (weight per unit area 220 kg/m<sup>2</sup>) with standard pipe clamps. During the tests, the pipes were subjected to constant water volume flows (0.5, 1, 2, and 4 l/s). The drop height between the water inlet and outlet was 7.5 metres. During the tests, the noise emissions in the

space located behind the installation wall (rear, ground floor) were measured. There is no direct air connection between the measuring room and the front ground floor room, so the noises in the measuring room were transmitted exclusively as structure-borne noise through the installation wall.

Although this simulation does not correspond to realistic installation and operating situations in practice, the standardised test set-up does, however, make it possible to directly compare the sound-proofing effects of different pipes. And Uponor Decibel performs excellently.

**Test bench for acoustic tests as per EN 14366 (schematic)**

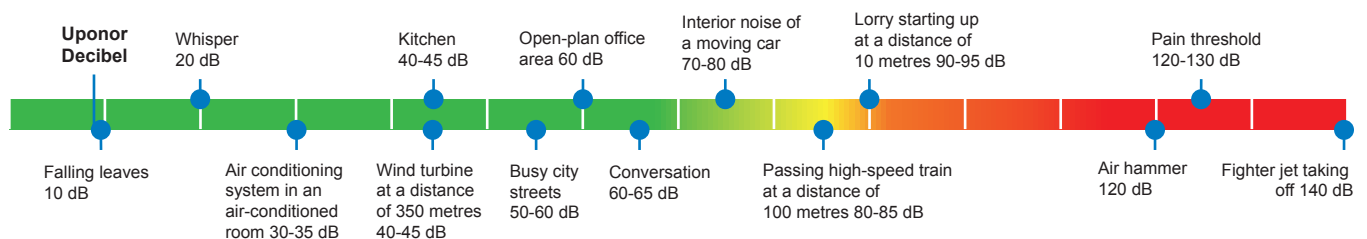


**Measured results for Uponor Decibel**

Flow rate [l/s]	Structure-borne noise L <sub>SC, A</sub> [dB (A)]
0.5	<10
1.0	<10
2.0	<10
4.0	14

*If the noise level is below 10 dB (A), this is recorded with <10 db (A) in the test report. Noise levels below 10 dB cannot be noticed in a normal living environment.*

## Uponor Decibel is so quiet



# Technical Properties

This chapter describes the technical features, dimensions and chemical resistance of the Uponor Decibel waste water pipe system. The system is developed, manufactured and identified in accordance with the current quality and environmental management systems such as EN ISO 9001 und EN ISO 14001.

## Standards and approvals

Uponor Decibel pipes and components hold SITAC type approval (SITAC SC0091-16). The dimensions and the material used for the rubber seals comply with European Standard EN 681-1.

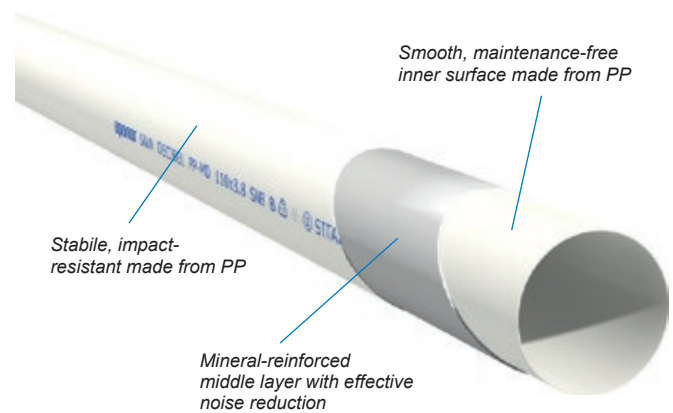
The noise levels of the Uponor Decibel System were determined in agreement with EN 14366. This Standard contains standardised methods for the measurement of noise from a waste water pipe system with different volume flows under test conditions.

## Pipe construction

The Decibel pipes are designed for practical use. All the properties required for minimal noise transmission and for long-term, trouble-free use are combined in the triple-layer wall construction.

The external PP layer is extremely robust, and protects the pipes from damage. The white colour of the pipes provides an aesthetically pleasing installation on the wall.

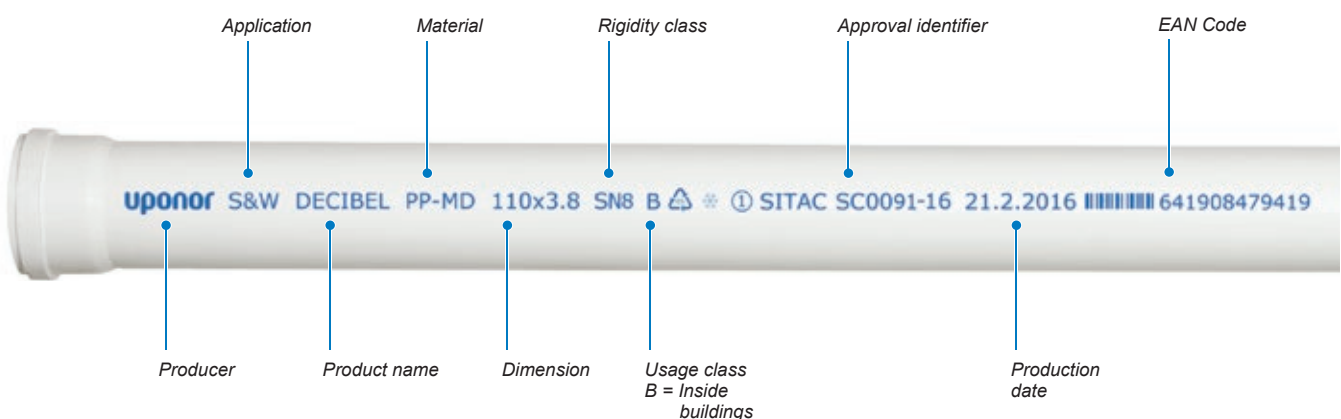
The middle layer, made from mineral-reinforced medium-density polypropylene ensures a significant reduction in flow noise and guarantees high stability. The PP inner layer is resistant to scratches and scoring, and thus offers protection against blocked pipes. In addition, the white inner surface facilitates visual checks of the drain.

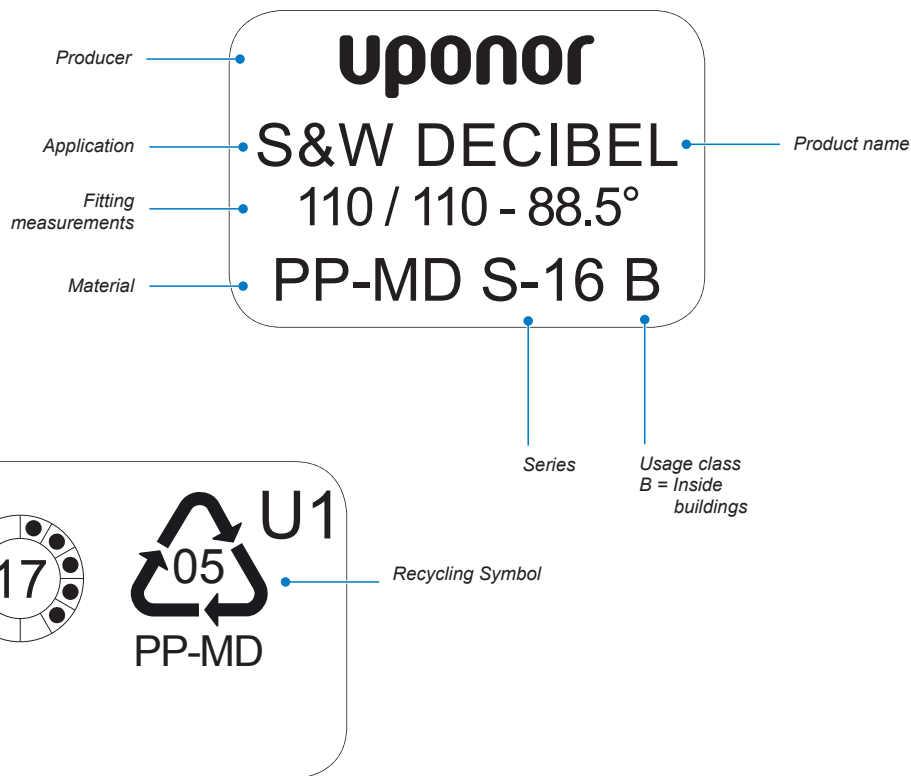


## Identification of the pipes and components

There is printed information (e.g. area of application, system name, dimensions, production facilities, production date, approvals, etc.) about the Decibel pipes and components.

The information is easily recognisable during storage, during installation and during operation.





## Technical properties and dimensions

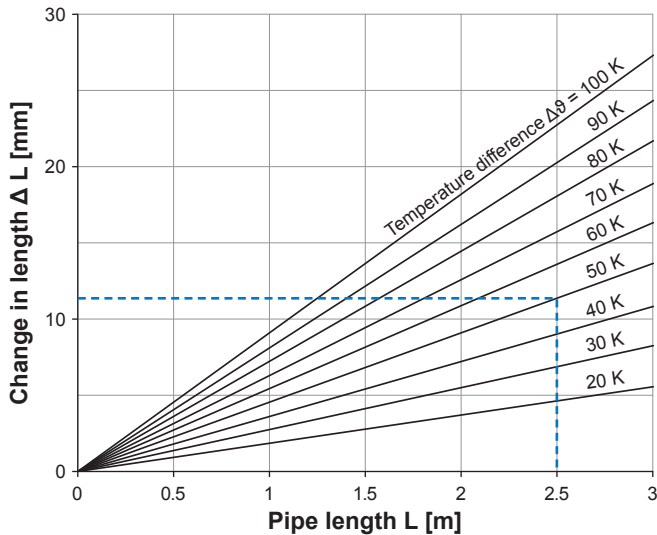
Uponor Decibel technical data	
Pipe and fitting material	Mineral-reinforced medium-density PP (PP copolymer)
Colour	White
Connection	Push-fit sleeve with factory-fitted sealing ring
Pipe and fitting density	1.6 kg/dm <sup>3</sup>
Tensile strength	>16 MPa
Elasticity module	Pipes: 2,100 MPa, Fittings: 1,700 MPa
Thermal coefficient of linear expansion	0.09 mm/m K
Max. operating temperature	+85°C (constant), +100°C (short-term)
Rigidity	≥4 kN/m <sup>2</sup>
Chemical resistance	Discharge of waste water in the range of pH-Value 2-12
Approval	German Institute for Building Technology
Application	All dimensions: B (tested for use as a waste water pipe system inside buildings)

# Processing guidelines

## Heat-induced change in length

The thermal expansion of Uponor Decibel waste water pipes is usually compensated by the expansion space in the sleeve joints. If the expansion space of the sleeve is insufficient (e.g. if the waste water pipe system is being used on the upper limits of the operating temperature range), an additional

expansion joint (long sleeve) can be used for the relevant section of pipe, to absorb the additional thermal expansion. The expected heat-induced change in length can be determined from the diagram below.



### Example:

Pipe length: 2.5 m  
 Installation temperature: 10°C  
 Max. operating temperature: 60°C  
 Temperature difference  $\Delta\theta$ : 50 K

**Change in length  $\Delta L$ :** 11.3 mm

$$\Delta L = \alpha \times L \times \Delta\theta$$

$$\alpha = 0.09 \text{ mm/mK}$$

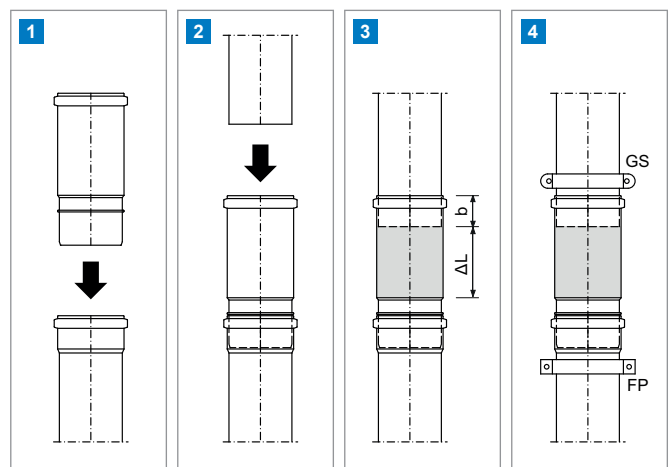
### Note:

$\Delta\theta$  is the temperature difference between the installation temperature and the maximum operating temperature. If the waste water pipes are installed during the winter, a correspondingly higher thermal expansion is to be expected.

## Installation of a long sleeve for compensating greater thermal expansion

If the expansion space in the pipe sleeves is insufficient (e.g. in the case of large lengths of pipework and large temperature differences), a Decibel long sleeve can be installed to compensate, as described below.

- 1 Insert the long sleeve into the sleeve of the lower pipe
- 2 Insert the upper pipe into the long sleeve
- 3 Insert the pipe ends far enough to allow sufficient expansion space ( $\Delta L$ ). The minimum insertion depth ( $b$ ) should not be below 43 mm.
- 4 Fix the pipe section with fixed point clamps (FP) and sliding clamps (GS)



## Fixing distances

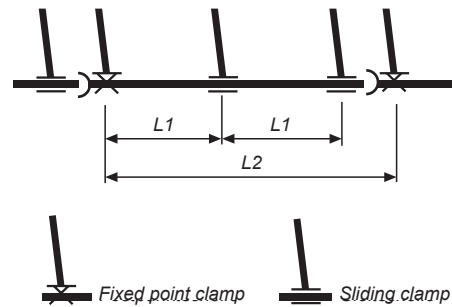
The fixing distances for the Uponor Decibel waste water pipe system are shown in the following table. Vertical waste water pipes have a minimum of two fixings on each floor. When the storey height is 3 m or more, fixings between the floors must also be provided, to avoid the pipes vibrating during operation and the vibrations spreading through the building.

Such vibrations can lead to the drainage noise being transmitted to rooms. The Decibel waste water pipes must only be fixed using commercial pipe clamps which are intended for use with plastic waste water pipes and which completely enclose the pipe.

### Maximum permitted horizontal and vertical fixing distances

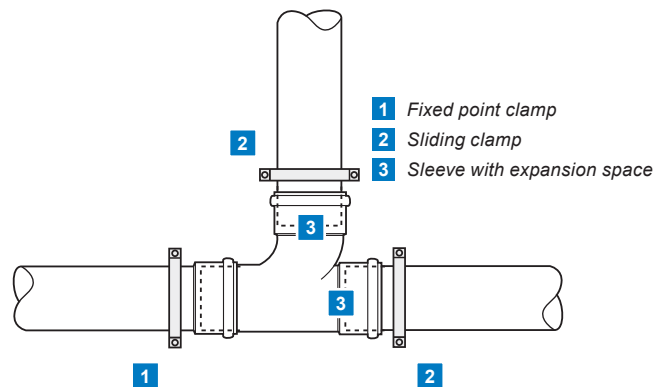
Pipe diameter ø [mm]	Maximum permitted fixing distance			
	Horizontal		Vertical	
	L1 [mm]	L2 [mm]	L1 [mm]	L2 [mm]
50	1000	2000	1500	2000
75	1000	3000	2000	3000
110	1500	3000	2000	3000
160	2000	3000	2000	3000

**Suggestion:** Vertical waste water pipes have a minimum of two fixings on each floor. If the storey height is 3 metres or more, fixings between the floors must also be provided. A downpipe support is required at the bottom of each vertical pipe section (and then on every 5 floors), to prevent the downpipe from dropping.



### Fixing example of a vertical Decibel junction on a horizontal waste water pipe

The sleeves of the pipes and fittings and any necessary additional long sleeves allow the absorption of thermal expansion. Fixing is done using a combination of fixed point and sliding clamps, where the sliding clamps guide the length expansion in the desired direction.



## Installation of the Uponor Decibel pipes and fittings



The pipe is cut at right angles with a fine-toothed (1-2 mm) saw or cutting device which is specially designed to cut plastic waste water pipes.



Then the end of the pipe is deburred on the inside and the outside. The ends of the pipes must not have any longitudinal scoring. The sealing groove and the sealing ring of the sleeve must be clean and free of any damage.

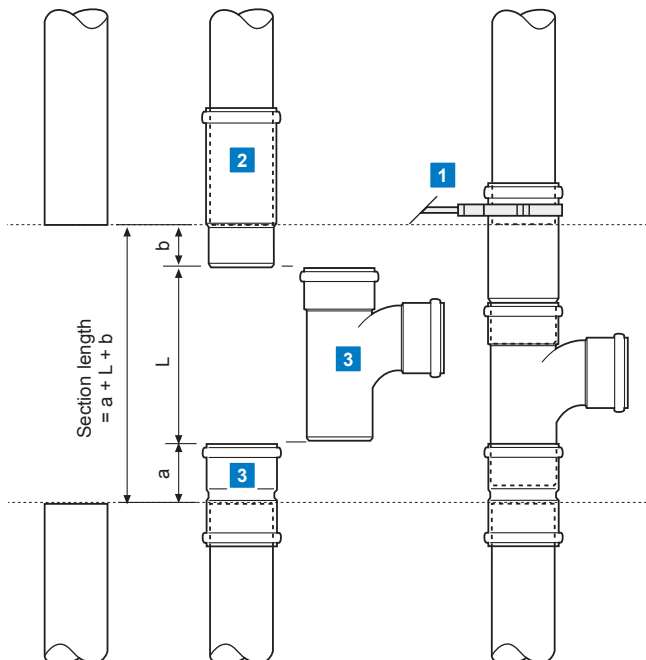


After that, the permitted insertion depth, minus the expected thermal expansion is marked on the end of the pipe, and a lubricant, designed for plastic waste water pipes with connectors and rubber seals made from EPDM, is applied to the end of the pipe.



The pipe is then inserted into the sleeve, up to the insertion mark. The thermal expansion of the pipe must be taken into consideration when making all the junctions and connections.

### Installation example: Retrofitting a horizontal Decibel junction of 88.5° using a long sleeve



- 1 Fixed point clamp
- 2 Long sleeve
- 3 Double sleeve
- 4 Junction

## Connection to on-site domestic drainage systems

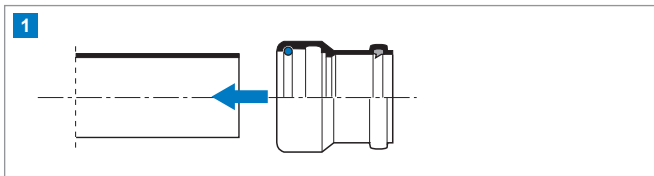
Uponor Decibel can be connected to commercial waste water pipe systems (plastic, cast iron, concrete, stainless steel, etc.), either by using a Decibel sleeve or with special preformed adapters.

The transition to cast iron waste water pipe systems is usually done by using sleeve connectors, O-rings and cup seals.

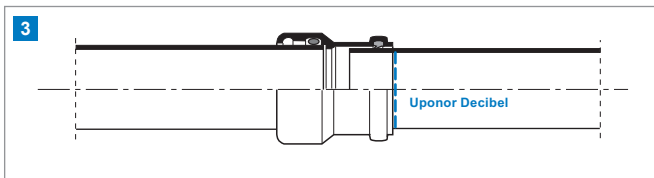
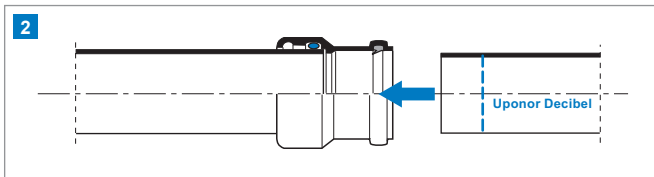
### Note:

When connecting different waste water materials, there are some important points to note:  
The connection must be tight, the components must be clean and the junction must not cause any restrictions that could limit the flow rate.

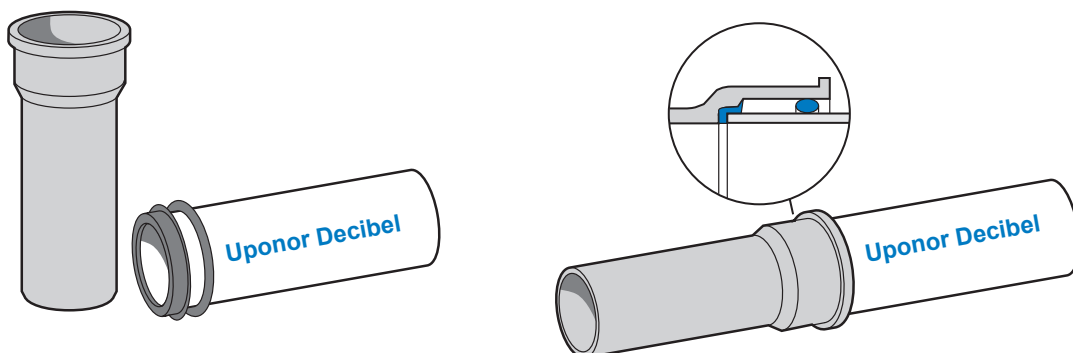
## Transition from Uponor Decibel waste water pipe system using transition sleeve (example)



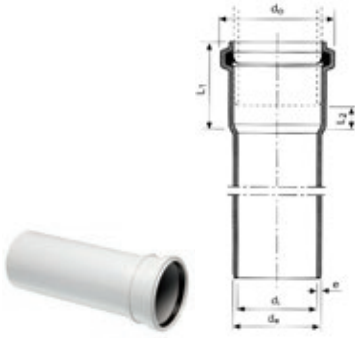
- 1 Insert the transition sleeves onto the cast iron waste water pipe. Do not grease the end of the pipe! When being attached, the O-ring moves into the rear groove of the transition sleeve
- 2 Mark the insertion depth on the Uponor Decibel waste water pipe system and insert the end of the pipe into the transition sleeve, up to the mark.
- 3 Finished system transition.




## Decibel transition to a cast iron waste water pipe system using O-rings and cup seals (example)





# Components and Dimensions

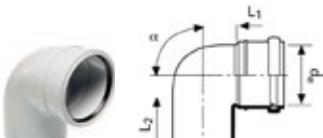
Decibel pipe with sleeve	$d_e$	e	$d_e$	$d_o$	L	L1	L2 <sup>1)</sup>	Item No.
	50	2.0	46.0	64	500	43	10	1088228
	50	2.0	46.0	64	1000	43	10	1000196
	50	2.0	46.0	64	3000	43	10	1000193
	75	2.6	69.8	90	500	51	15	1088229
	75	2.6	69.8	90	1000	51	15	1000197
	75	2.6	69.8	90	3000	51	15	1000194
	110	3.8	102.4	129	500	58	15	1088230
	110	3.8	102.4	129	1000	58	15	1000198
	110	3.8	102.4	129	3000	58	15	1000195
	160	5.4	148.8	185	1000	82	15	1087215
	160	5.4	148.8	185	3000	82	15	1087214

<sup>1)</sup> Expansion length with professional installation with maximum insertion length marked


Decibel 15° bow	$\alpha$	$d_e$	L1	L2	Item No.
	15°	50	5	50	1000199
	15°	75	8	60	1000203
	15°	110	11	70	1000207
	15°	160	36	118	1087216


Decibel 30° bow	$\alpha$	$d_e$	L1	L2	Item No.
	30°	50	10	55	1000200
	30°	75	14	66	1000204
	30°	110	18	77	1000208
	30°	160	37	138	1087217


Decibel 45° bow	$\alpha$	$d_e$	L1	L2	Item No.
	45°	50	14	58	1000201
	45°	75	20	72	1000205
	45°	110	27	86	1000209
	45°	160	40	153	1087218

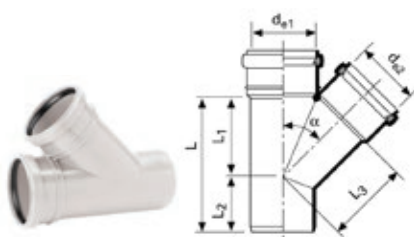
Decibel 88.5° bow	$\alpha$	$d_e$	L1	L2	Item No.
	88.5°	50	29	73	1000202
	88.5°	75	43	91	1000206
	88.5°	110	68	125	1000210

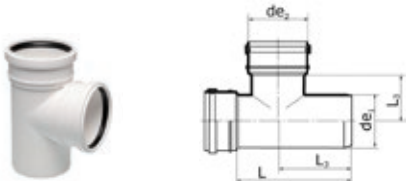


Decibel 88.5° long bow	$\alpha$	$d_e$	L1	L2	Item No.
	88.5°	75	85	138	1089592
	88.5°	110	105	167	1000211
	87.5°	160	158	235	1087219

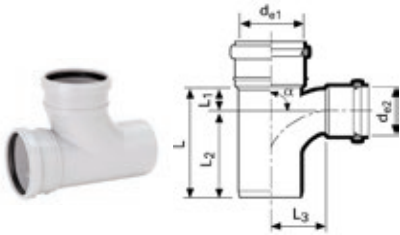
Decibel 45° bow sleeve	$\alpha$	$d_e$	L1	L2	Item No.
	45°	50			1089600
	45°	75			1089595
	45°	110			1089596

Decibel 88.5° bow sleeve	$\alpha$	$d_e$	L1	L2	Item No.
	88.5°	75			1089593
	88.5°	110			1089594

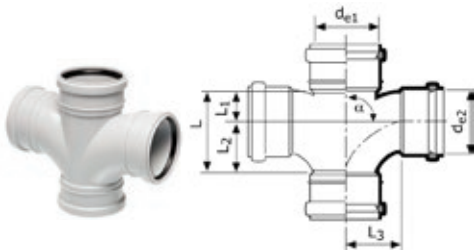
Decibel 45° junction	$\alpha$	$d_{e1}$	$d_{e2}$	L	L1	L2	L3	Item No.
	45°	50	50	118	61	57	61	1000212
	45°	75	50	129	73	56	78	1000213
	45°	75	75	161	91	70	91	1000214
	45°	110	50	176	95	81	113	1000215
	45°	110	75	173	109	64	116	1000216
	45°	110	110	207	133	74	133	1000217
	45°	160	110	322	196	126	174	1087220
	45°	160	160	317	196	121	196	1087221

Decibel 88.5° junction	$\alpha$	$d_{e1}$	$d_{e2}$	L	L2	L3	Item No.
	88.5°	50	50	100	73	27	1000218
	88.5°	75	50	119	80	27	1000219
	88.5°	75	75	141	93	48	1000220
	88.5°	110	50	119	92	55	1000221
	88.5°	110	75	164	99	47	1000222
	88.5°	110	110	177	118	58	1000223

Decibel 88.5° junction, rounded	$\alpha$	$d_{e1}$	$d_{e2}$	L	L1	L2	L3	Item No.
	88.5°	110	110	187	57	130	94	1000224



Decibel 88.5° double bow junction, rounded	$\alpha$	$d_{e1}$	$d_{e2}$	L	L1	L2	L3	Item No.
	88.5°	110	110	143	58	85	95	1000225

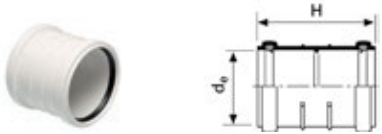


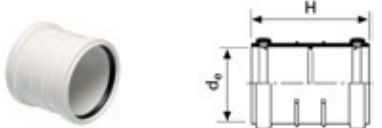
Decibel 45° sleeve junction	$\alpha$	$d_{e1}$	$d_{e2}$	L	L1	L2	L3	Item No.
	45°	75	75					1089597
	45°	110	75					1089598
	45°	110	110					1089599




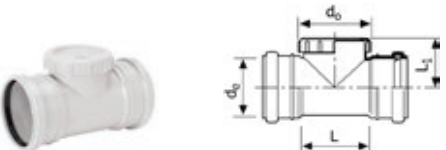
Decibel 88.5° sleeve junction	$\alpha$	$d_{e1}$	$d_{e2}$	L	L1	L2	L3	Item No.
	88.5°	110	110					1089601





Decibel double sleeve	$d_e$	H	Item No.
	50	89	1000226
	75	106	1000227
	110	120	1000228
	160	154	1087222


Decibel slide-on sleeve	$d_e$	H	Item No.
	50	89	1000229
	75	106	1000230
	110	120	1000231
	160	154	1087223

Decibel eccentric reduction	$d_e$	$d_{e1}$	H	L	Item No.
	50	75	13	18	1000232
	50	110	30	38	1000233
	75	110	18	26	1000234
	110	160	25	32	1087224

Decibel cleaning piece with double sleeve	$d_e$	$d_o$	L	L1	Item No.
	75	88	86	69	1000235
	110	124	122	90	1000236

Decibel cleaning piece with sleeve	$d_e$	L	L1	L2	L3	Item No.
	160	200	63	137	119	1087225

Decibel long sleeve	$d_e$	L	L1	Item No.
	110	83	265	1000237

Decibel cast iron system transition	DN	$d_e$	H	Item No.
	70	75	82	1051259
	100	110	94	1051260

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