Acoustic Soil & Waste

March 2011

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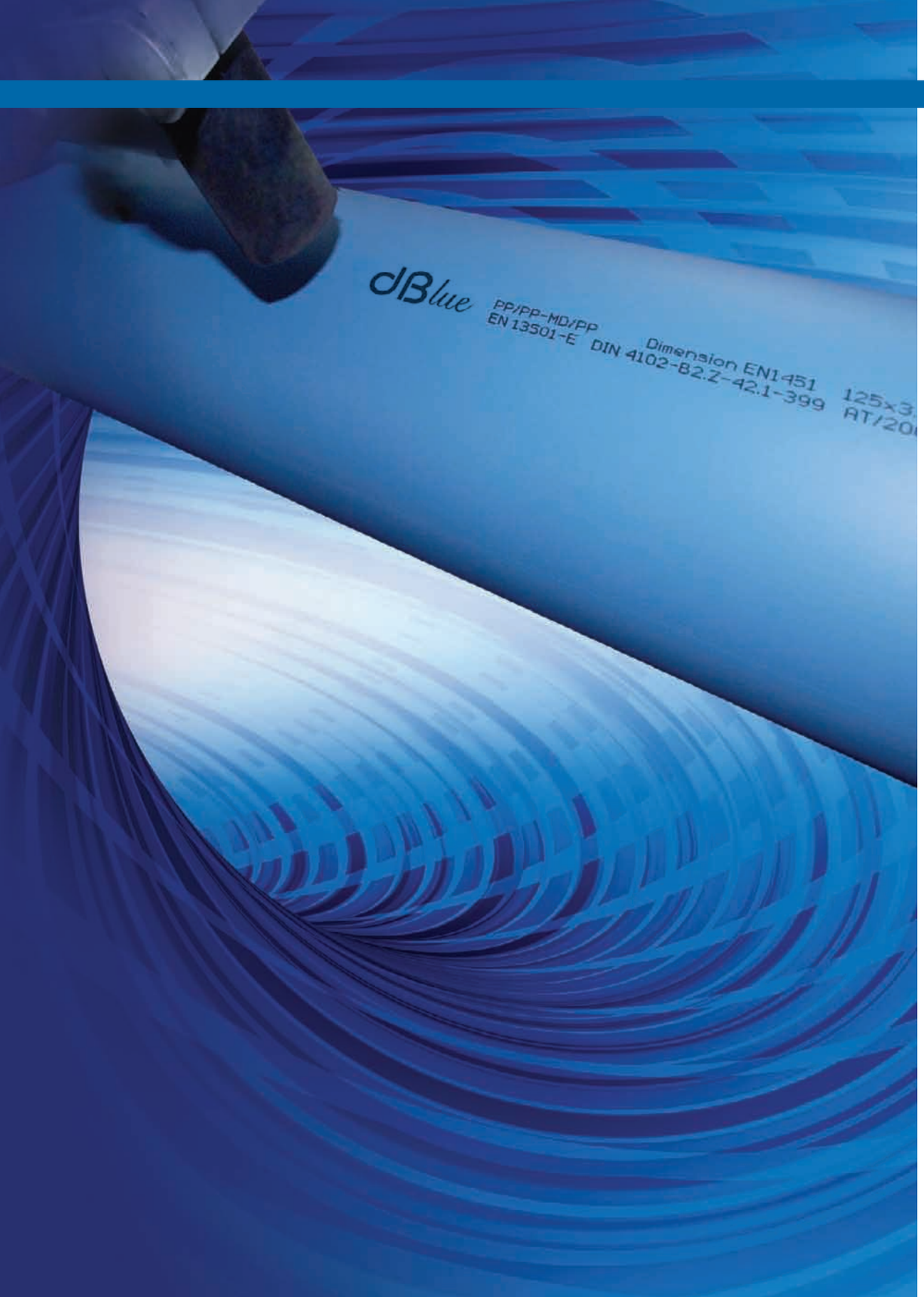

Acoustic Soil & Waste

The **Marley dBlue** acoustic soil & waste system is designed for use where improved levels of soundproofing are required. Used in conjunction with the acoustic pipe clips, the dBlue system is designed to reduce noise and acoustic vibrations to a level of 19dB*. Suitable for use in multi-occupancy applications as well as hospitals and hotels and other commercial applications, where reduced noise levels are preferred.

System properties

- High degree of noise reduction inside the pipe
- Impact resistant
- Resistance to temperature change
- Low coefficient of wall roughness
- Resistance to high temperature of flowing waste water
- Lightweight
- Totally recyclable
- Low degree of vibration transmission between elements

Contents

*Based on Fraunhofer test at 4 l/s

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The system

Aliaxis – Research & Development Institute

Research into the system

One of the first soundproof soil and waste systems, developed and designed as a European project at the Aliaxis Research & Development Institute. The main objective of this project was to develop a new generation soundproof soil & waste system that could be used not only in buildings with a high specification but also in multi-occupancy apartment buildings, hospitals, hotels and other commercial applications. At the same time, it also had to comply with all the acoustic standards and regulations of the European countries.

Material formulation

A special material formula was developed for the Marley dBlue system combining plastic and minerals (mineral fillers), which enabled enhanced acoustic and mechanical characteristics. Detailed chemical tests on a selection of raw materials making up the three-layer Marley dBlue system material formulation were conducted. Aside from the safe and fast discharge of sanitary waste water, Marley dBlue reduces noise generated by the flow of waste water in pipework. The Marley dBlue system is resistant to hot waste water flow and can also be installed at extremely low temperatures in winter. While developing the system, it was decided that all the layers should be distinguished by colour, depending on the material used for their production.


Laboratory tests – material formulation

Triple-layer pipe structure

The most modern method of three-layer, PP-MD (modified polypropylene) pipe co-extrusion was used in the production of the Marley dBlue system. This method means that the propagation of noise generated by waste water flowing inside pipework is severely limited by the nature of the pipe construction.

Marley dBlue pipe – during production

Each of the three layers that make up the Marley dBlue system has an individual function.

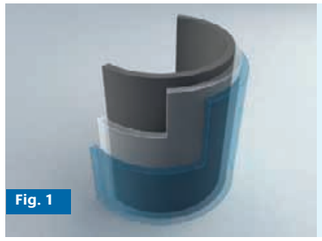
Fig. 1

Internal layer

- material PP
- colour [light-grey]
- resistance to high temperature +90°C [+95°C]
- low roughness co-efficient

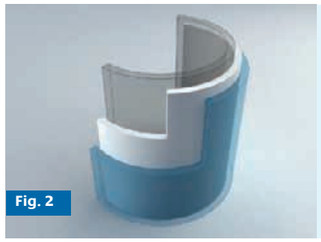
Fig. 2

Middle layer

- material PP-MD
- reinforcement with minerals
- colour [cream-white]
- noise reduction
- high stiffness

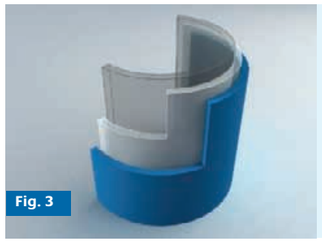
Fig. 3

External layer

- material PP
- colour [blue]
- impact resistant

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Noise reduction in soil and waste systems

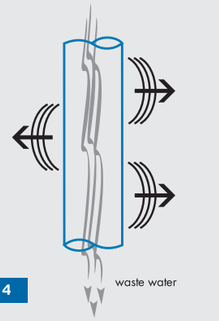


Fig. 4

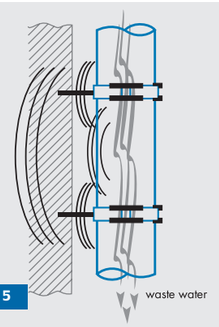


Fig. 5

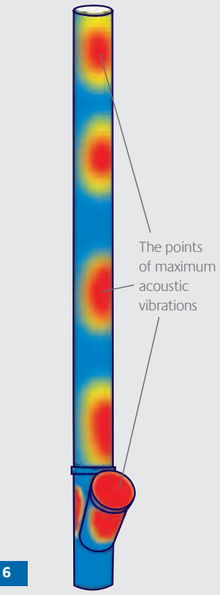


Fig. 6

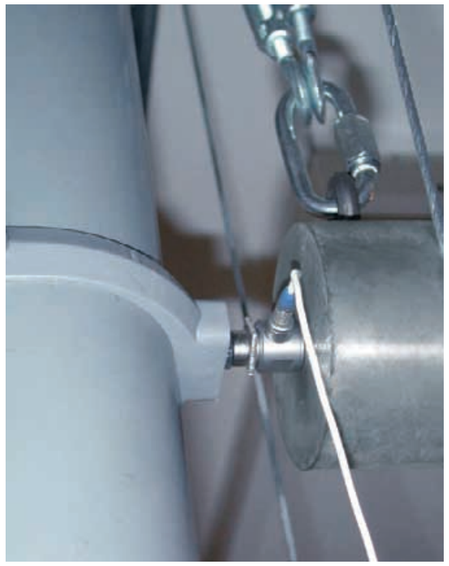
Every object in motion makes noise transmitting its vibrations – in the form of pressure or negative pressure waves – to the surrounding air. There are two types of noise in soil and waste systems:

Air borne noise – coming from pipelines, generated by waste water flowing inside. In this case, a soundproof soil and waste system should limit the propagation of air borne noise and keep it inside the pipes. This is achieved by using a special material formula (using minerals), a three-layer pipe structure, the quality of manufacturing and correct installation.

Structure-borne noise – coming from pipes and fittings as well as the system of fixing to the building's structure. This sound comes from the noise inside the system mentioned before, which being limited by pipes and fittings makes them vibrate (acoustic resonance). The resonance is transmitted through a system of pipe clamps to the building's structure and heard in the neighbouring rooms as an irritating acoustic wave. In this case it is important to design the system of fixing pipes and fittings to the building's structure in such a way that the transmission of the acoustic resonance to its walls is reduced to the minimum.

Vibrations and acoustic bridge

Numerous tests were conducted in Aliaxis R&D laboratories to confirm the above mentioned theories. The tests helped to determine the points where maximum acoustic vibrations are generated on the pipe (Fig. 6). As shown, the main area of their generation is the pipe and the branch which further transmits acoustic vibrations to the downpipe. The test confirmed that the type and location of pipe clips as well as the system's design and material formula are the most important factors in the soil and waste system noise reduction. Designing a stand (see image right) measuring vibrations transmitted by the pipe clip to the building's structure (acoustic bridge) was the next step. Parallel to work on the structure of the Marley dBlue system, pipe clips were designed especially for the soundproof soil and waste system. The main objective of the laboratory and prototype work was to develop a system of pipes, fittings and pipe clips with the weight and wall thickness lower than in the traditional soundproof systems but with the greatest possible reduction of noise inside the system and its transmission to its surroundings.



Reduction of noise inside the pipeline and its transmission to its surroundings

The triple soundproof layer system puts different material media in the way of the propagating noise, which causes partial absorption of sound waves and their partial reflection inwards and significantly reduces transmission to their surroundings. The absorbed and reflected waves cause acoustic resonance of pipes and fittings. The greater height inside the building, the more dynamically the resonance (Fig. 7) increases towards the flowing waste water and is transmitted through the fixing system onto the building's structure. Construction barriers subject to the acoustic resonance transmission cause its transmission to neighbouring rooms in the form of sound waves. The Marley dBlue system's structure along with fixing clips is responsible for the maximum reduction of this acoustic phenomenon (Fig. 8). The acceptable noise level in the above mentioned rooms (a living room, a hospital ward, bedroom or a hotel room) is set at the national acoustic safety standards for buildings. Hence these are the places that are particularly protected against noise at the design stage. In contrast, kitchens and bathrooms are the places where pipes are usually located. But here the noise coming from the soil and waste system is negligible compared with the equipment normally operating in these rooms so it is not subject to limitations to the same degree as the above mentioned rooms designed for frequent stay.

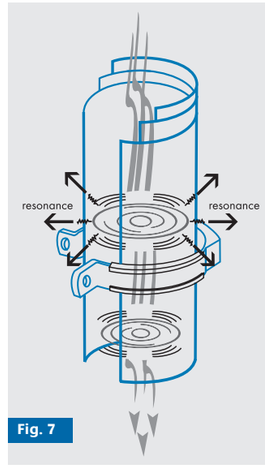


Fig. 7

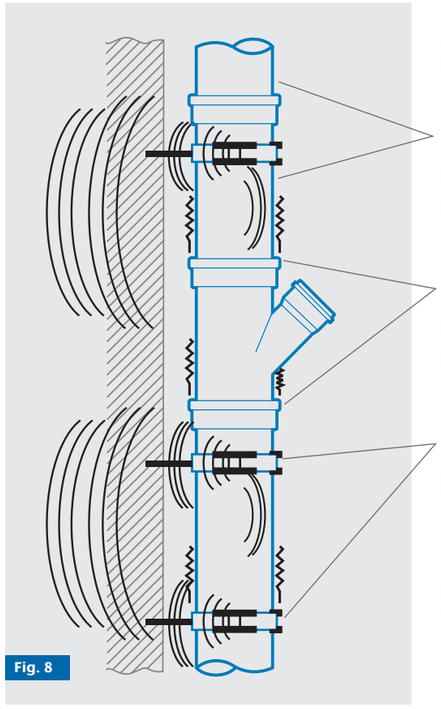


Fig. 8

19dB

Limiting noise propagation

- triple-layer wall structure
- special material layout

Preventing transmission of acoustic vibrations

- between pipes and fittings
- tight socket/gasket connection

Elimination of acoustic bridges

- special acoustic clip

Tests on the reduction of noise coming from soil and waste system carried out in the Institute for Building Physics Fraunhofer Germany, Marley dBlue showed noise transmission at the level of 19dB under the test conditions.

Structure of the acoustic pipe clip

In order to provide the described reduction of the acoustic bridge and transmission of vibrations coming from the Marley dBlue system, a system of acoustic pipe clips was designed. A special body section and the use of elastomer inlays provide a stable grip while maintaining acoustic properties. Cushioning inlays are placed inside the pipe clip at three points to ensure a secure fixing is achieved to the building's structure.

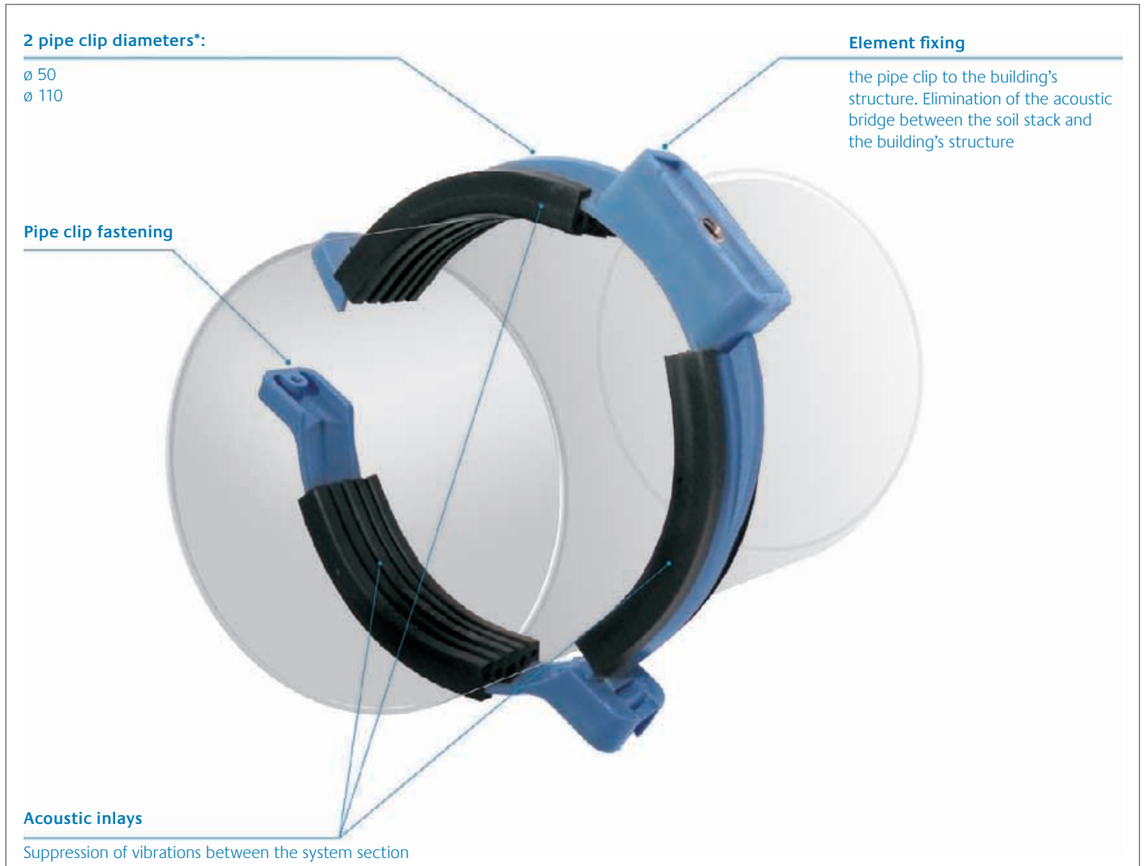


Fig. 9

NOTE: These acoustic pipe brackets were used together with Marley dBlue pipes and fittings during the test procedure of noise reduction inside the pipe line, conducted at the Fraunhofer Institute for Building Physics in Stuttgart, Germany. The use of a different type of pipe clip for the installation of the Marley dBlue system will result in change to the certified noise reduction values.

*ø 40 and ø 160 pipe clips also available.

Noise in our everyday surroundings

It is useful to compare the Marley dBlue system's noise reduction and acoustic vibration suppression properties to everyday noise around us. Subject to the test procedure on the level of noise reduction, conducted at Fraunhofer Institute in Germany, according to EN 14366 (the procedure and results are given on page 10), the Marley dBlue system showed the emitted noise level of only 19dB. The diagram below refers the value of 19dB to the noise present in our everyday surroundings.

The diagram also indicates individual noise levels and their effect on human health.

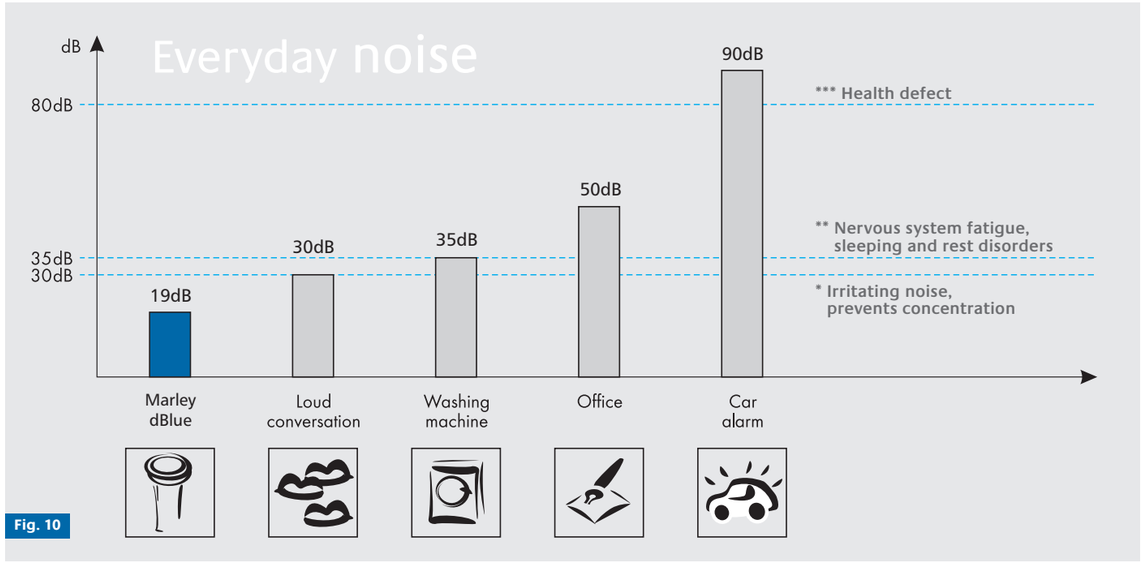


Fig. 10

An organ of hearing like the human ear is made to receive not only very quiet noise but also to withstand very loud sounds. As the diagram shows, the difference between the level of noise emitted by the Marley dBlue system and a loud conversation is 11dB. The minimum noise level detected by the human ear is 3dB. This means that an increase in the noise level by 11dB makes a significant and noticeable difference for the ear; the difference later turns into irritating noise. While determining acceptable indoor noise standards for the construction industry it is assumed that the minimum noise reduction that can improve room acoustics and human ear perception is 5dB.

Therefore, the acceptable noise standards for the construction industry described in the next section differ by 5dB in each room.

The Building Regulations Approved Document E (2010) stipulates acoustic requirements of 45dB or less. This Building Regulation applies to any kind of building used as a dwelling, including houses and apartments; and rooms for residential purposes, such as students and nurses accommodation, nursing homes and hotels. It also applies to dwellings that have been created as a result of a conversion or material change of use.

The Scottish Technical Handbook (2010), section 5.1.2 stipulates acoustic requirements of 53dB.

Acoustic safety of rooms

Acceptable noise levels

The acceptable noise level that a human being can be exposed to while performing everyday activities and relaxing is described as “the threshold noise level value”. According to the valid regulations, there are two categories of noise tests:

Category I: Noise measured outdoors, i.e. in the neighbouring area, surroundings and open space. According to European Directive No.2002/49/EC, generally speaking, the noise acceptable in a built-up area at daytime is 60dB and at night (between 10.00 pm and 6.00 am), 50dB.

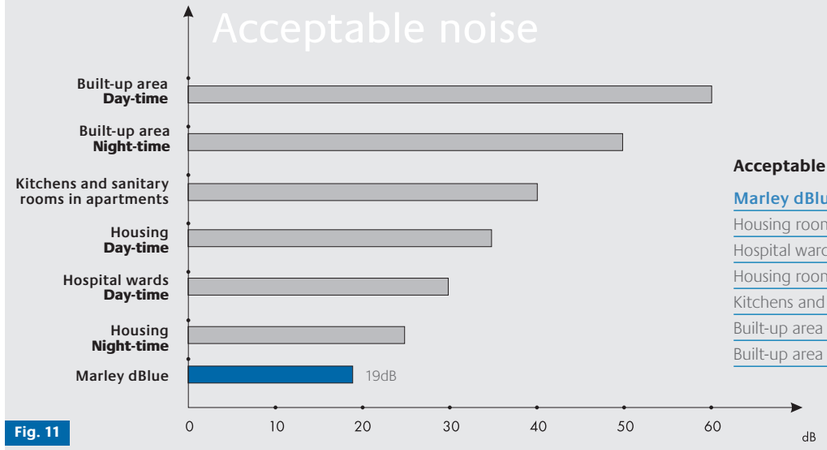
Category II: Noise measured indoors. “Building acoustics. Protection of rooms inside buildings against noise. Acceptable indoor sound level values”.

The table shown right presents several examples of the acceptable sound level in rooms designed for everyday stay.

Kind of room	Acceptable average level of sound-noise reaching the place from the building’s technical equipment and other equipment inside and outside of the building	
	day	night
Rooms designed for mental activities that require intense concentration	30dB	–
Rooms in 3-star or below 3-star hotels	40dB	30dB
Accommodation in residential buildings, boarding schools, children’s homes, old people’s homes, 4 and more star hotels	35dB	25dB
Rooms in Intensive Medical Care Units	25dB	25dB
Patient’s rooms in hospitals and sanatoriums except rooms in Intensive Care Units	30dB	25dB
Kitchens and sanitary rooms in flats	40dB	40dB

The values presented in the table are shown in the diagram below in reference to the Marley dBlue system acoustic properties.

Acoustic properties of the Marley dBlue system versus the regulations



Acceptable noise	dB
Marley dBlue	19
Housing rooms – **Night-time**	25
Hospital wards – **Day-time**	30
Housing rooms – **Day-time**	35
Kitchens and sanitary rooms in apartments	40
Built-up area – **Night-time**	50
Built-up area – **Day-time**	60

Fig. 11

Considering mandatory requirements and the fact that the European Commission is working on tightening the national standards, it is worth considering at the design stage a soundproof system with a high degree of noise reduction inside the pipework.

Noise level measurement

Marley dBlue soundproof system – Fraunhofer test

Test and measurements of noise emitted by the soundproof Marley dBlue system were conducted according to the European standard EN 14366 “Laboratory measurement of noise from waste water installations”.

The diagram below presents noise measurement and its methodology inside the Marley dBlue system. The test stand, diameters and types of components used are described in the standard. Water introduced into the system on the TF(f) floor and received on the C floor was the tested medium. Acoustic tests are conducted in rooms MR(b) and MR(f) and the least favourable boundary conditions are assumed in the comparative analysis with other soil and waste systems or other sources of noise. The boundary conditions are as follows:

- measured flow in the soil and waste system Q=4 l/s
- pipe diameter DN=110 mm (most frequent diameter)
- measurement taken on the lowest floor, in room MR(b) – room marked red in the diagram; safety standards determine and require the lowest noise levels at this point (room neighbouring the soil stack)
- partition wall – weight: 220 kg/m^2

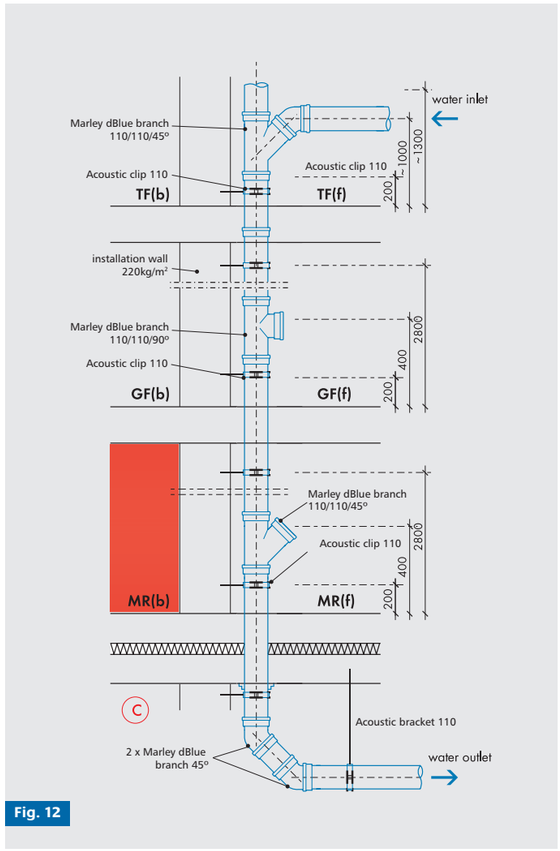


Fig. 12

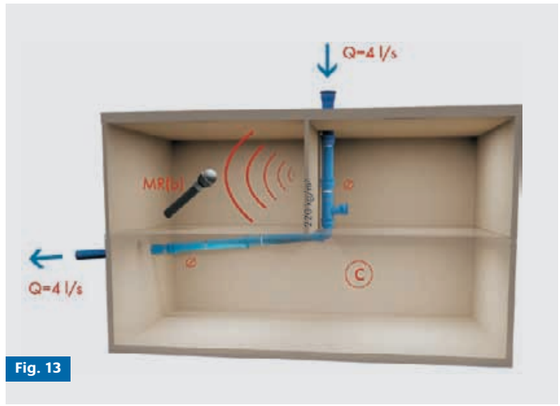
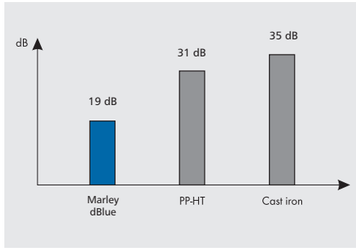


Fig. 13

The diagram below summarises and visualises noise measurement for the Marley dBlue system conducted under the least favourable boundary conditions.

The diagram compares the maximum noise level measured under identical measurement conditions on three different soil and waste systems, made of different material (but frequently used for the production of soil and waste systems)

Key:
TF – top floor
GF – ground floor
MR – measurement room
f – front
b – back



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Design

1. Barrier passage and pipe clip location

The location of pipe clips is an important factor that has to be taken into consideration while designing and installing the system. Additionally, detail “A” presents the recommended method of passing a soundproof duct through a construction barrier. Each passage should be secured with a sleeve made of material that prevents moisture and ensures acoustic insulation (preventing acoustic bridges with the building’s construction elements – ceilings, walls).

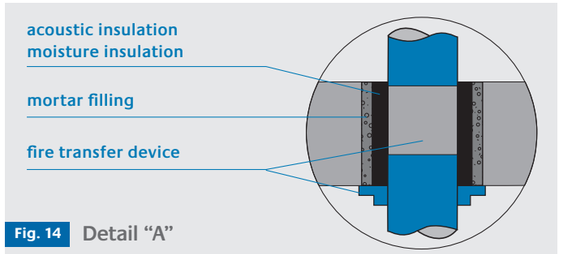


Fig. 14 Detail “A”

2. Vertical pipe support

In order to maintain good acoustic properties, the Marley dBlue system should be installed together with specially designed acoustic pipe clips. Acoustic pipe clamps for the Marley dBlue system are produced in two versions, depending on the pipe diameter.

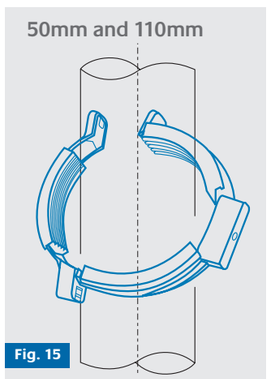


Fig. 15

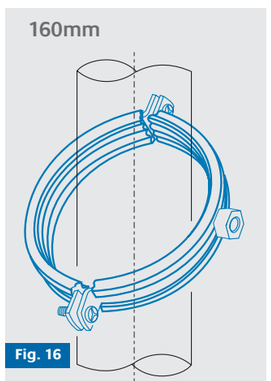
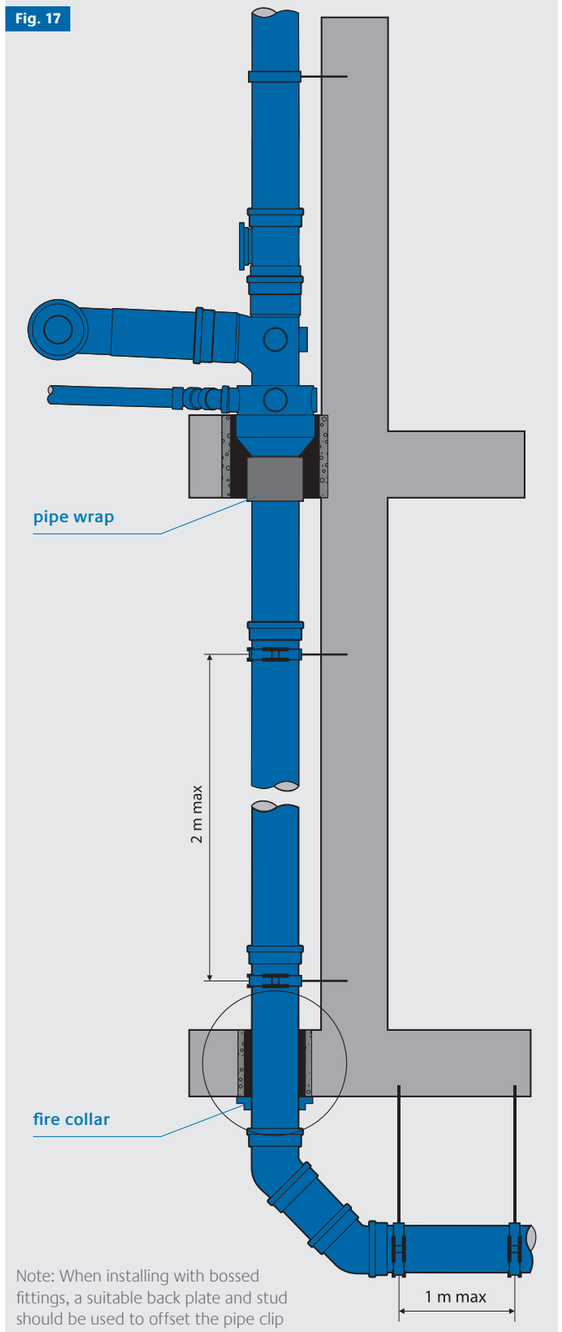


Fig. 16

Fig. 17



Note: When installing with bossed fittings, a suitable back plate and stud should be used to offset the pipe clip

3. Suspended pipe work

The Marley pipe support range was developed to meet the specific requirements of suspended sanitary pipework and drainage systems. Manufactured in zinc electro plated mild steel for internal use, the versatile range of components can be assembled to provide a robust, lightweight system suitable for most applications. The system also provides suitable control of expansion and contraction.

The arrangements of brackets and channel supports have been extensively tested and the assembly techniques used have been successfully employed on many domestic and commercial installations. Three different support methods are described and the recommended support centres are shown in the following table for each option.

Pipe Diameter (mm)	Horizontal Support (m)	Vertical Support (m)
32	0.50	1.20
40	0.50	1.20
50	0.60	1.20
82	1.00	2.00
110	1.00	2.00
160	1.20	2.00

Single support

Recommended for waste or larger diameter pipework fixed within 500mm of the floor soffit.

Continuous channel support

Suitable for use where pipework is fitted within 750mm of the floor soffit with structural fixings provided at a maximum of 1.2m centres.

Double support

Developed for use with larger diameter pipework fixed within 1.0m of the floor soffit.

Pipe brackets

The 110 and 160mm two piece pipe brackets are designed to fit round the ring seal socket of a pipe or fitting. Where intermediate support brackets are located, the SC621 PVC barrel clip collar is used as a spacer sleeve between the pipe and bracket.

Angle and side bracing

Angle braces should be provided at 6m centres to prevent lineal and thermal movement. Side bracing may also be necessary on long runs where there are no side connections to eliminate lateral movement.

Vertical pipes

The transition between vertical and horizontal pipework should be achieved using two 45° bends or a single 87.5° long radius bend with a support bracket positioned as close as possible.

Branch connections

All branch connections into horizontal pipework should be made at 45° to ensure the discharge is swept in the direction of flow.

Structural fixings

It is recommended that 6mm rawlbolt or similar proprietary fixings are used to secure base plate and angle cleats to the structure.

Fig. 17 Single support

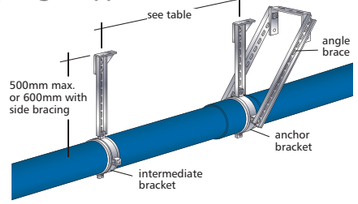


Fig. 18 Continuous support

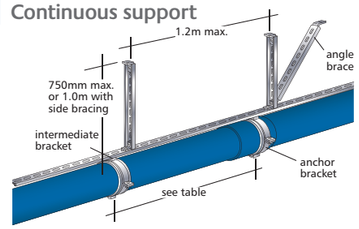
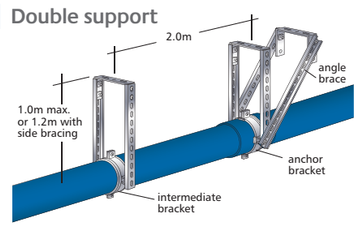
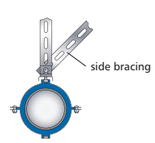


Fig. 19 Double support

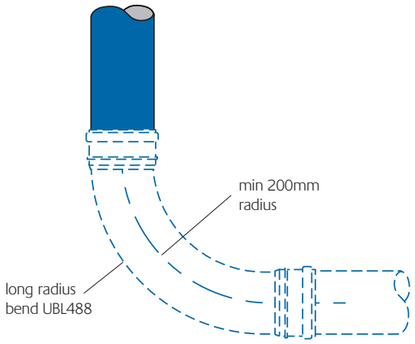




Design

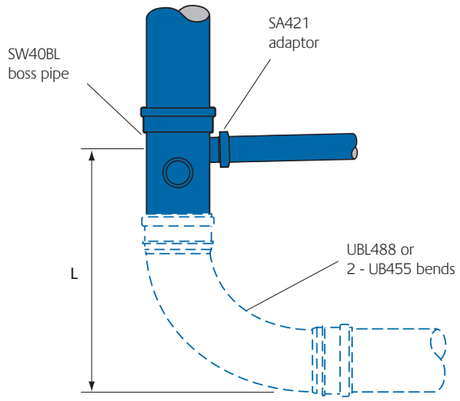
Bends at the base of stacks

Bends at the base of vertical stacks should be of long radius and have a minimum centre line radius of 200mm on a 110mm nominal size stack. Two 45° radius bends may also be used as an alternative to provide the change of direction and connection to the building drain. The same design principle should also be adopted where offsets occur in stacks of one or more storey height.



Branches at the base of stacks

For single dwellings up to three storeys high, the distance between the centre line of the lowest branch connection and the invert of the drain should be at least 450mm. For multi-storey systems up to five storeys high, the minimum distance should be 740mm and for systems higher than five floors no connections are permissible at ground floor level. Where this occurs a separate stub stack should be provided to serve the ground floor or individual appliances should have their own separate connection to the building drain.



L = 450mm up to three storeys high
L = 740mm up to five storeys high
L = one storey height, over five storeys

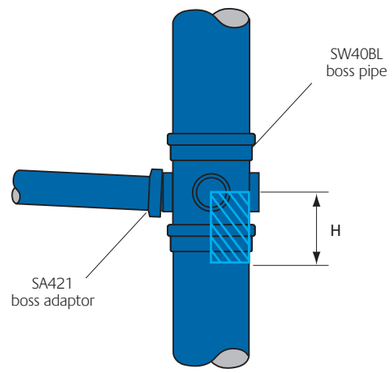
Offsets in stacks

Offsets in the wet portion of a discharge stack should be avoided wherever possible but where they have to be fitted a large radius or two 45° bends should be used to create each change of direction. Offsets in lightly loaded stacks up to three storeys high do not require offset venting but on multi-storey buildings this may be necessary depending on the loading of the stack and the numbers of floors above the offset. The principles previously described for bends and branches at the base of a stack should also be applied.

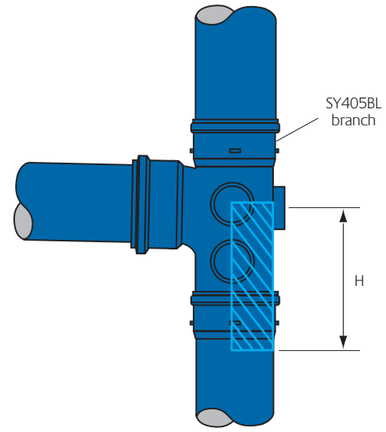
Prevention of cross-flow

Where small diameter branch waste pipes connect to a discharge stack they must be arranged to eliminate the risk of cross-flow from one branch to the other. A branch creates a no entry zone for opposing waste connections, which varies depending on the stack diameter. No connections should be made within the restricted zone although entry is permissible on the centre line of the boundary directly opposite or at right angles.

To prevent cross-flow from a large diameter branch to a smaller waste connection, the latter should be made to the stack at or above the centre line of the larger branch, at right angles or at least 200mm below the restricted zone. Entry is permissible on the boundary centre line directly opposite or at right angles.



Stack size	Height of zone 'H'
110mm	110mm
160mm	250mm



'H' = 200mm irrespective of stack diameter

7. Full dimensional standardisation

With a view to facilitating installation works and connecting the Marley dBlue system to other soil and waste systems as well as connecting those systems to the Marley dBlue soil and waste system, full dimensional standardisation of the system was maintained, according to EN 1451. This means that connections of all diameters can be made without any need to use adapting connectors for non-standard diameters. Basic examples of connections are presented opposite.

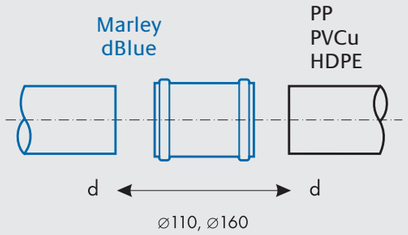


Fig. 20

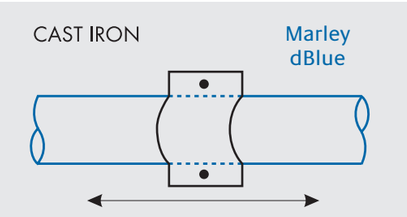


Fig. 21

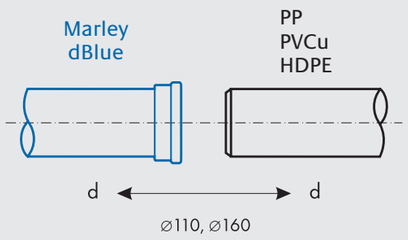


Fig. 22

Approvals

Reg. -No. 4300
Initial type tests on multilayer pipes made of PP/PP-mineral filled/PP and fittings made of PP-mineral filled for soil and waste discharge, applications are “B” and “BD” inside buildings and buried in ground within the building structure

P-BA 74/2010
Determination of the acoustic performance of a waste water installation system consisting of acoustic plastic pipes mounted with acoustic pipe clamps in the laboratory

Z-42. 1-399
Triple-layer pipes and fittings made of PP-mineral filled for diameters: from DN 40 to DN 160

AT / 2006-02-1604
Pipes and fittings made of polypropylene (PP) for soundproof soil and waste system

SCB 0973
Soundproof soil and waste system for diameters: from 40mm to 160mm

UA1.107.0030860-07
Soundproof soil and waste system for diameters: from 40mm to 160mm

C 07 0188 V/AO
Soundproof soil and waste system for diameters: from 40mm to 160mm

Standards

This system meets a number of quality and safety standards.

EN 1451 “Plastics piping systems for soil and waste discharge (low and high temperature) within the building structure. Polypropylene (PP). Specifications for pipes, fittings and the system”

EN 1411 “Plastics piping and ducting systems. Thermoplastics pipes. Determination of resistance to external blows by the staircase method”

EN 14366 “Laboratory measurement of noise from waste water installations”.

EN 13501 “Fire classification of construction products and building elements”.

DIN 4102 “Fire behaviour of building materials and building components”.

EN 1055 “Plastics piping systems. Thermoplastics piping systems for soil and waste discharge inside buildings. Test method for resistance to elevated temperature cycling”.

EN 1054 “Plastics piping systems. Thermoplastics piping systems for soil and waste discharge. Test method for airtightness of joints”.

EN 681 “Elastomeric seals. Material requirements for pipe joint seals used in water and drainage applications”.

Installation

Cutting pipes and jointing

Prior to cutting the pipe and jointing it to another pipe or fitting, measure the necessary pipe section allowing for the pipe socket depth.


Photo. 1

Photo. 2

Cut the pipe using a pipe cutter (Photo 1) or a fine-toothed saw (Photo 2), with particular attention to keeping the angle 90°C.


Photo. 3

Photo. 4

Another important factor prior to making the connections is to bevel the pipe end properly, using a chamfering tool or coarse file to provide a 15° bevel on the end of the pipe.


Photo. 5


Photo. 6

When connecting the pipe with a fitting or the socket of another pipe, push the connected pipe to the insertion depth (Photo 5) and mark a line on the edge of the socket and the connected pipe (Photo 6).


Photo. 7


Photo. 8

In order to allow for thermal movement, an expansion gap of between 5-10mm should be allowed within ring seal joints as each full length of pipe is installed and bracketed accordingly to ensure the gap is maintanied (Photo 7).

NOTE: Prior to making socket connections, lubricate the pipe end and the seal in the socket to facilitate inserting the spigot into the socket.

Installation

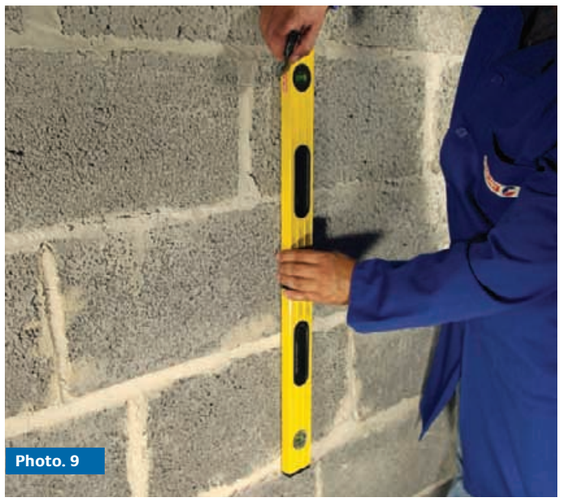


Photo. 9


Photo. 10

Using a level (Photo 9), determine the length of the Marley dBlue soil stack. On the run line, measure the points (Photo 10) where the pipe clips will be fixed and horizontal connections to the sanitary fittings made.


Photo. 11


Photo. 12

Next, drill holes applicable for the diameter of fixing (Photo 11) on the pipe line. Fix a rawlbolt into the wall and mount the pipe clip by screwing it clockwise inside the wall. Tightening the pipe clip makes the screw lock inside the rawlbolt and simultaneously the pipe clip is tightened until a stop on the screw (Photo 12).


Photo. 13


Photo. 14

In the final stage, put the pipe or fitting inside the pipe clamp under socket (Photo 14) and connect the two parts of the open pipe clip with a drill-driver (Photo 15).

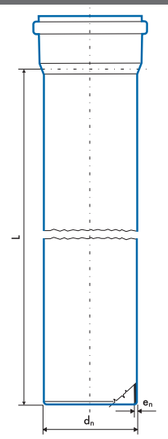

Photo. 15


Photo. 16

Product information

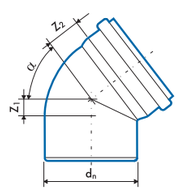
Pipe with socket

d_n (mm)	e_n (mm)	L (mm)	Code	Pack	Pack type
40	1,8	3000	dB-PEU300H	10	PLT
50	1,8	3000	dB-PEU300J	10	PLT
110	3,4	3000	dB-PEU300V	10	PLT
160	4,9	3000	dB-PEU300Z	28	PLT



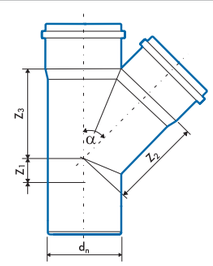
Bend

α°	d_n (mm)	Z_1 (mm)	Z_2 (mm)	Code	Pack	Pack type
15°	40	4	7	VKL-040-000-15D	20	PH7
	50	5	9	VKL-050-000-15D	20	PH5
	110	9	14	VKL-110-000-15D	8	PH4
30°	40	7	10	VKL-040-000-30D	20	PH7
	50	9	12	VKL-050-000-30D	20	PH5
	110	17	22	VKL-110-000-30D	8	PH4
45°	40	10	14	VKL-040-000-45D	20	PH7
	50	12	16	VKL-050-000-45D	20	PH5
	110	25	29	VKL-110-000-45D	14	PH3
	160	36	42	VKL-160-000-45D	6	PH3
67,5°	40	-	-	VKL-040-000-67D	20	PH7
	50	20	23	VKL-050-000-67D	20	PH5
	110	40	44	VKL-110-000-67D	14	PH3
90°	40	23	26	VKL-040-000-90D	20	PH7
	50	28	31	VKL-050-000-90D	20	PH5
	110	57	61	VKL-110-000-90D	14	PH3
	160	83	89	VKL-160-000-90D	4	PH3



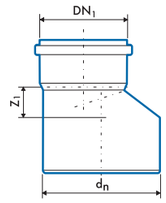
Branch

α°	d_n (mm)	Z_1 (mm)	Z_2 (mm)	Z_3 (mm)	Code	Pack	Pack type
45°	40/40	10	49	49	VTR-040-040-45D	20	PH5
	50/40	12	61	61	VTR-050-040-45D	20	PH5
	50/50	12	61	61	VTR-050-040-45D	20	PH4
	110/40	-	104	91	VTR-110-040-45D	6	PH4
	110/50	-	104	91	VTR-110-050-45D	6	PH4
	110/110	25	134	134	VTR-110-110-45D	7	PH3
	160/110	1	179	173	VTR-160-110-45D	3	PH3
	160/160	22	210	210	VTR-160-160-45D	2	PH3
90°	40/40	23	25	25	VTR-040-040-90D	20	PH5
	50/40	23	25	25	VTR-050-040-90D	20	PH5
	50/50	28	30	30	VTR-050-050-90D	20	PH4
	110/40	28	60	32	VTR-110-040-90D	6	PH4
	110/50	28	60	32	VTR-110-050-90D	6	PH4
	110/110	57	62	62	VTR-110-110-90D	7	PH3
	160/110	58	92	64	PTR-160-110-87D	5	PH3
	160/160	83	92	92	VTR-160-160-90D	3	PH3



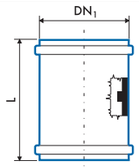
Reducer

d_n/DN_1 (mm)	Z_1 (mm)	Code	Pack	Pack type
50/40	12	VRD-050-040-00D	15	PH7
110/50	40	VRD-110-050-00D	17	PH4
160/110	14	VRD-160-110-00D	15	PH3



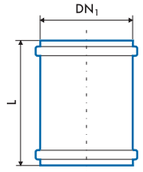
Double socket coupling

DN_1 (mm)	L (mm)	Code	Pack	Pack type
40	125	VMD-040-000-00D	20	PH5
50	105	VMD-050-000-00D	20	PH5
110	128	VMD-110-000-00D	6	PH5
160	179	VMD-160-000-00D	6	PH3



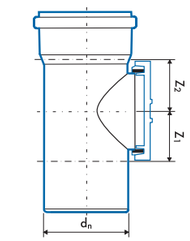
Slip coupling

DN_1 (mm)	L (mm)	Code	Pack	Pack type
40	137	VMP-040-000-00D	20	PH5
50	105	VMP-050-000-00D	20	PH5
110	128	VMP-110-000-00D	6	PH5
160	179	VMP-160-000-00D	6	PH3



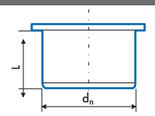
Access pipe

d_n (mm)	Z_1 (mm)	Z_2 (mm)	Code	Pack	Pack type
50	28	30	VCZ-050-000-00D	10	PH5
110	58	62	VCZ-110-000-00D	6	PH4
160	49	68	VCZ-160-000-00D	6	PH3



Socket plug

d_n (mm)	L (mm)	Code	Pack	Pack type
40	39	VKK-040-000-00D	20	PH7
50	39	VKK-050-000-00D	20	PH7
110	46	VKK-110-000-00D	20	PH4
160	48	VKK-160-000-00D	10	PH4



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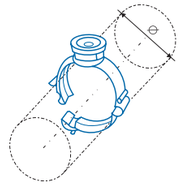
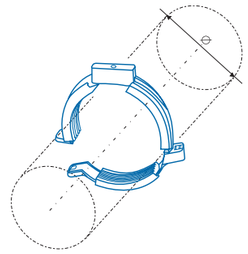
Pipe clip

Ø (mm)	Code	Pack	Pack type
40	POB-040-000-000	10	FOL



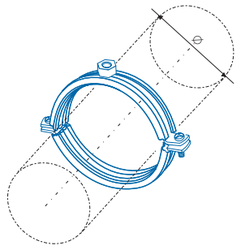
Acoustic pipe clip

Ø (mm)	Code	Pack	Pack type
50	POB-050-000-000	10	FOL
110	POB-110-0M8-000	5	FOL



Acoustic metal pipe clip

Ø (mm)	Code	Pack	Pack type
160	POB-160-000-000	1	-



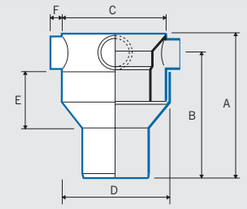
PH3 – cardboard box 600 x 400 x 300
PH4 – cardboard box 400 x 300 x 300
PH5 – cardboard box 400 x 300 x 150
PH7 – cardboard box 300 x 200 x 150
PLT – pallet
FOL – plastic bag

The following are PVCu products manufactured using a mineral filler and are identified by black snap caps

Collar boss

d_n (mm)	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	Angle	Code	Pack	Pack type
110	245	210	178	186	100	20	87.5°	SCB41BL	–	–

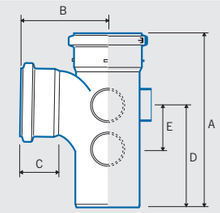
Solvent socket/spigot connection for PVCu/PVCu.
Spigot tail can be inserted into push-fit connection.



Five boss branch

d_n (mm)	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	Angle	Code	Pack	Pack type
110	300	150	60	175	76	87.5°	SY405BL	–	–

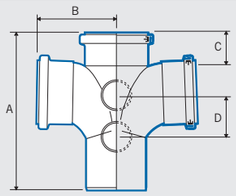
Push-fit sockets/spigot



Double branch

d_n (mm)	A (mm)	B (mm)	C (mm)	D (mm)	Angle	Code	Pack	Pack type
110	288	141	54	76	87.5°	SY404BL	–	–

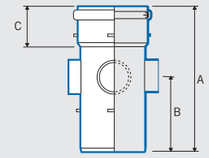
Push-fit sockets/spigot



Boss pipe

d_n (mm)	A (mm)	B (mm)	C (mm)	Angle	Code	Pack	Pack type
110	244	123	70	90°	SW40BL	–	–

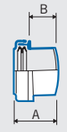
Push-fit sockets/spigot



Boss connector

d_n (mm)	A (mm)	B (mm)	Angle	Code	Pack	Pack type
40	43	21	87.5°	SA421BL	–	–
50	74	45	87.5°	SA420BL	–	–

For integrity, all boss adaptors must be solvent welded onto boss upstands.



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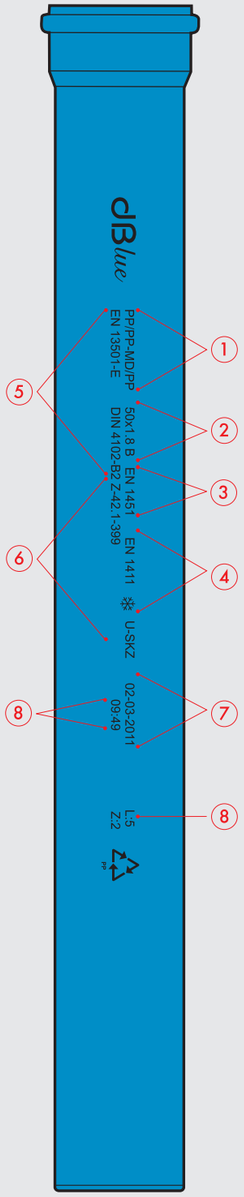
Identification

Marley dBlue system identification

Marley dBlue system marking contains data in order to provide complete traceability:

Marley dBlue pipe – in the course of marking



1. Technical identification

1. Material type
2. Diameter / wall thickness / area of application
3. Conformity of dimensions
4. Resistance to low temperatures
5. Fire resistance class
6. Information about the international technical approvals

2. Production identification

7. Day / month / year of production
8. Time / shift no. / production line no.

The identification presented above enables full control over the high quality of the Marley dBlue system, its storage, logistics and sales distribution.

Packing, storage and transportation

In order to facilitate transport and storage, all the fittings are packed in cardboard boxes.

Pipes are packed in bundles on pallets. Further details concerning the type and size of cardboard boxes used are given in the product information (pages 22-25).

Marley dBlue pipes and fittings must not be transported unpacked (in bulk) along with other construction materials to prevent damage during transportation. The pipes must be transported in a horizontal position.

During unloading they must be protected against damage, particularly at temperatures below freezing.

Never throw, drag or bend pipes and fittings when unloading them.

Pipes should be stored horizontally on even surfaces up to 1.5m high. All products should be protected against sunlight.

Their outdoor storage time should not exceed 12 months.

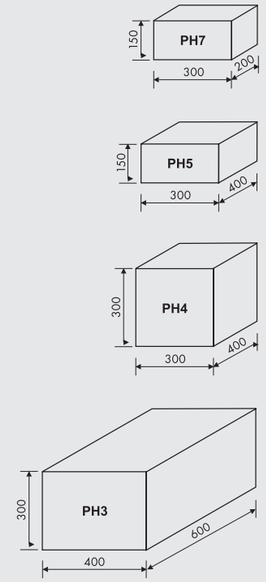


Fig. 24

Types of cardboard boxes used for packing elements of the Marley dBlue system.

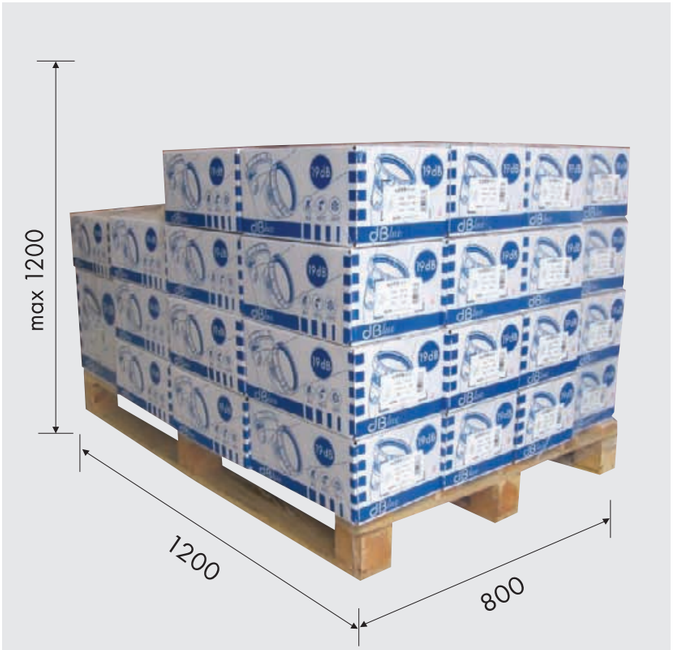


Fig. 23

Cardboard boxes are placed on a pallet up to 1200mm high. The pallet is 800mm wide and 1200mm long.

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