



TRIPLUS

**Triple layer soundproof
waste and drainage system
inside the buildings**

MADE IN ITALY



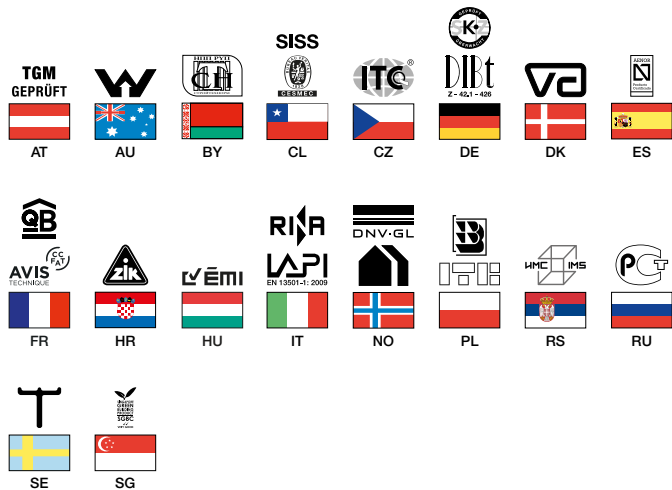
valsir[®]
QUALITY FOR PLUMBING



Media-tic - Barcelona (Spain)

TRIPLUS

Triplus[®], the evolution of push-fit waste and drainage systems



The market's increasing attention to waste and drainage systems, in particular to the correct design of systems and to their hydraulic performance, convinced Valsir to create a particularly innovative product line.

The Triplus[®] pipes are in fact made up of three layers of material, which, when joined, result in a system with extremely good mechanical characteristics, even at low temperatures, and an excellent soundproofing performance.

Triplus[®] is a push-fit system that includes triple layer pipes, fittings and accessories, industrialized, produced and patented by Valsir, that guarantees the levels of low noise emissions of waste systems required by the regulations, laws and standards in force.



Triplus[®] is manufactured in compliance with European Standard EN 1451 and can be used **for waste and drainage systems** at low and high temperatures, ventilation systems for waste and rainwater networks **inside buildings for residential and industrial use, hospitals and hotels.**

The wide range of pipes, fittings and accessories allows construction of the entire waste network, the branches of the sanitary fixtures, the stacks, waste manifolds, etc.

MADE IN ITALY

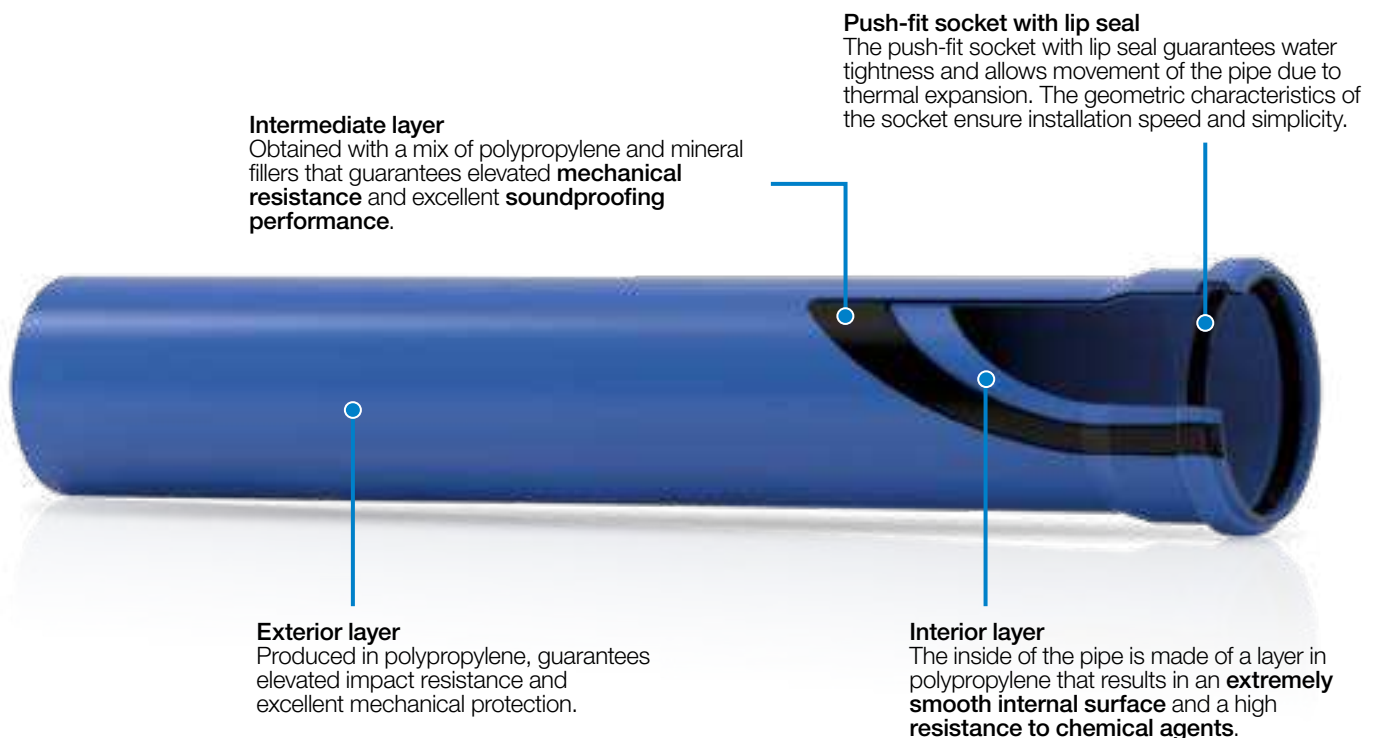


Viceroy Hotel Yas Island F1 Circuit (Abu Dhabi, United Arab Emirates)

CHARACTERISTICS OF EXCELLENCE

The advantages of using the Triplus® waste system

- **Speed and extreme ease of installation** on site without the use of special tools, thanks to the push-fit connection. The socket connection, moreover, does not require the use of glues or harmful solvents.
- Excellent soundproofing performance: measured in the Fraunhofer laboratories in Stuttgart, in compliance with European Standard EN 14366 equal to **12 dB(A) with a flow rate of 2 l/s** (certificate P-BA 227/2006).
- High impact resistance at extremely harsh temperatures (**as low as -25°C**).
- Resistance to intermittent discharges at **temperatures as high as 95°C**.
- The pipes are made up of three layers of material joined together to guarantee **elevated mechanical resistance**.
- **High chemical resistance** to substances dissolved in civil and industrial waste waters.
- Wide range of **transition fittings** for connection to other waste systems in cast iron, PE, PP, PVC.
- Wide range of **diameters from DN 32 mm to DN 250 mm**.
- The product, its recyclability and the production processes are based on **Green Building principles** which promote respect for the environment and the conservation of natural resources.



The intermediate layer is created with a **patented polypropylene-based (PP) mix with mineral fillers (MD)** such as to provide the Triplus® system with excellent mechanical characteristics at low (impact resistance at temperatures as low as -25°C) and high temperatures (continuous discharge with temperatures as high as 95°C).

The Triplus® waste system can transport waste waters with PH values between 2 and 12, it has a high resistance to the most common chemical compounds and is characterised by an extremely smooth internal surface that prevents the build-up of internal deposits inside the waste network.



Ø32

Ø40

Ø50

Ø75

Ø90

Ø110

Ø125

Ø160

Ø200

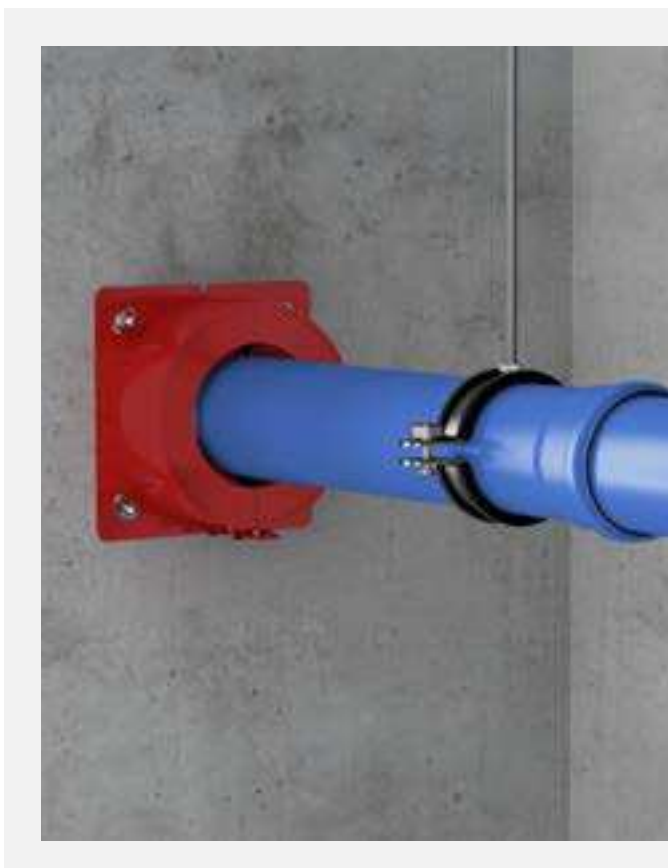
Ø250

AN EXTREMELY WIDE RANGE

The range is composed of pipe lengths between 150 mm and 3 m and is characterised by a wide choice of fittings and accessories that allows the construction of the most varied system configurations.

The smaller diameters such as 32, 40 and 50 mm are used for the branch pipe connections on each floor, while the larger diameters such as 250 mm are used for the waste manifolds.

The range is completed with accessories for the connection to other Valsir waste systems and pipe clips, which, when fitted with anti-vibration rubber, allow reduction of the vibrations that are transferred to the installation walls when the waste system is in use.



Fire stop collars

When standards and local regulations require the **fire compartmentation of rooms** such as, for example, boiler rooms, underground garages or industrial fire-hazard areas, then fire stop collars shall be used.

To cover all system necessities and to meet the most severe fire prevention requirements a **complete range** is available, that covers diameters **to 250 mm**.

It is important to remember that the Triplus waste system is made of a polypropylene based material and therefore, unlike other materials such as PVC, it does **not produce carcinogenic compounds** such as dioxins and vinyl chloride **in the event of fire**.

ADVANCED SOLUTIONS

Valsir was the **first company that supplied a triple layer waste system with a VBF (Ventilation Branch Fitting System)**. This is the ideal solution in high-rise buildings with a high simultaneous use factor of the sanitary appliances.

This innovative waste system guarantees excellent ventilation of the stack and branch connections on each floor thus limiting pressure fluctuations within the system.

This system allows great advantages and huge savings thanks to the possibility of creating single stacks (therefore without need for parallel ventilation) in the **diameters 110 mm and 160 mm** with more than double waste flow rate if compared to primary ventilation.

The ideal solution for high rise buildings

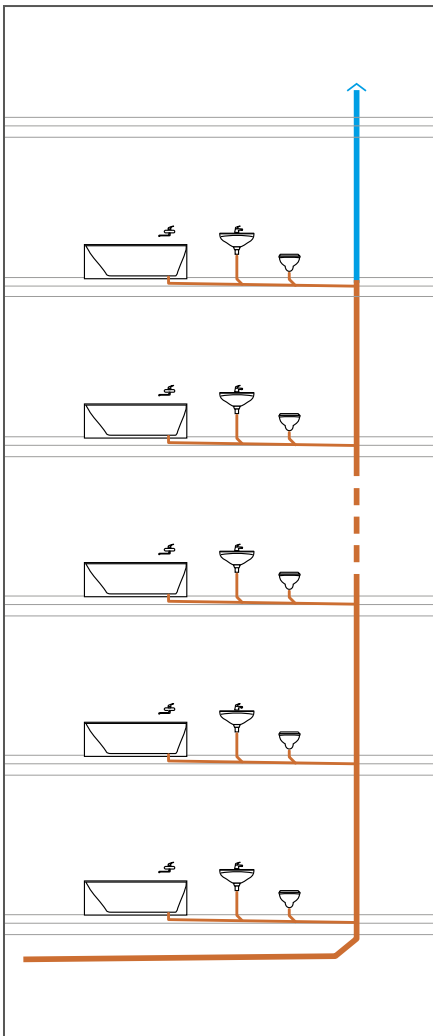
- **One soil stack**, no separate ventilation pipes required.
- **Increase in stack load** in comparison with conventional systems.
- **Reduction in speed** of effluents.
- **Excellent ventilation** of the stack and branches of each floor.
- **Up to 6 connections** on one branch fitting.
- **Up to 100* flats** with VBF 110 and **up to 448* flats** with VBF 160 connected to the same waste stack.

* An "average apartment" is composed of a kitchen with sink and dishwasher (max. capacity 6 kg) and a bathroom with basin, bathtub, washing machine, bidet and water closet (with 9 l flush cistern) for a total flow of 6.7 l/s. The calculation takes into account a simultaneity coefficient of K=0.5.

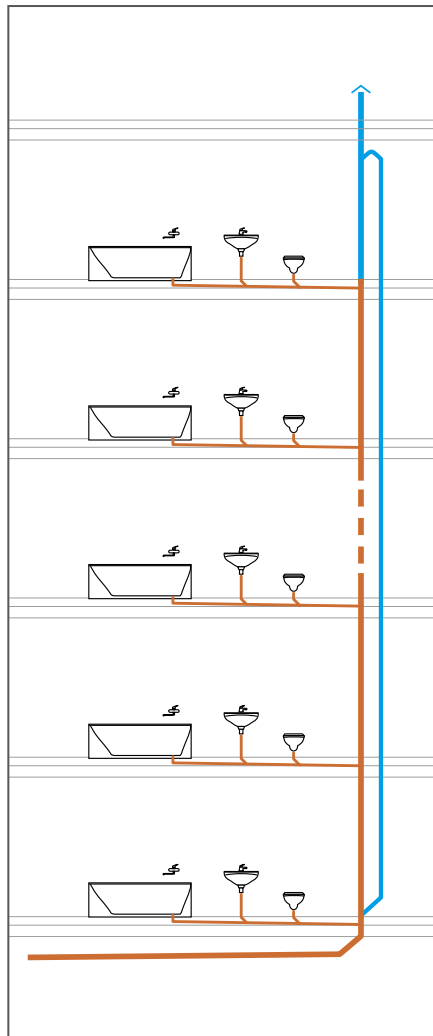


Waste systems with Triplus® VBF (Ventilation Branch Fitting System) allow greater stack loads than any other waste system (systems with primary ventilation, systems with direct or indirect parallel ventilation, systems with secondary ventilation).

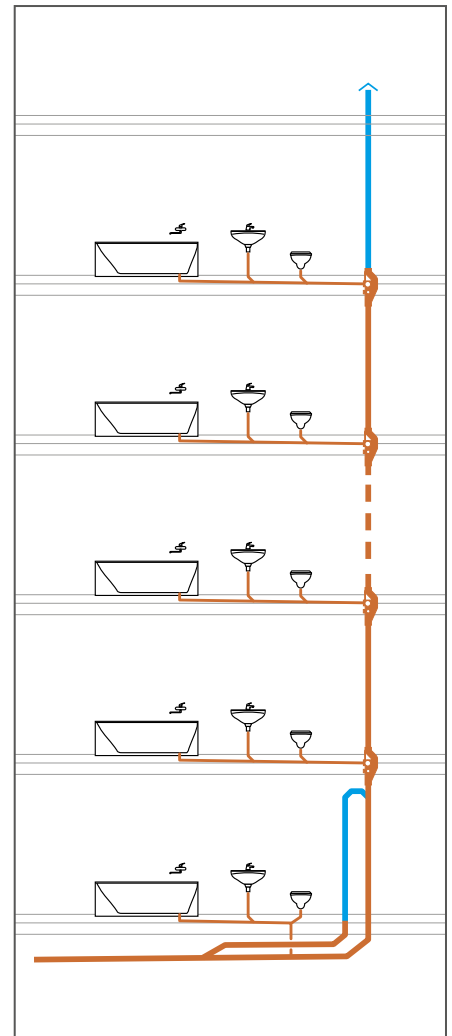
System with primary ventilation



System with parallel ventilation



System with VBF



Drainage capacity **40% greater** than systems with primary ventilation.

Drainage capacity **225% greater** than systems with primary ventilation.

SIGNIFICANT ACOUSTIC PERFORMANCE

When a waste system is in use, noises are generated inside the pipelines causing it to vibrate from the fall of the liquid being discharged.

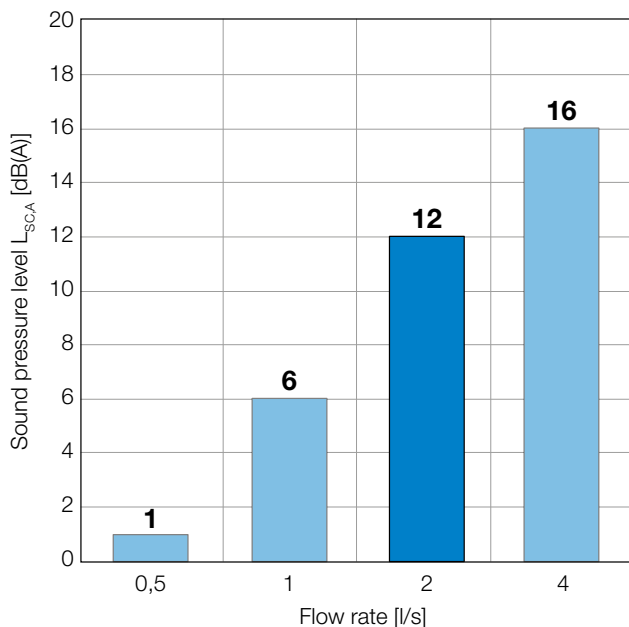
Most of the noise generated spreads inside the pipe but the vibrations that are generated are transmitted from the walls of the pipe to the surrounding area and to the bracketing systems and consequently to the building structure.

To minimize noise levels in waste and drainage systems, not only should the system be properly designed and the waste circuit be mounted correctly, but it is also important to choose a system with an elevated soundproofing performance.

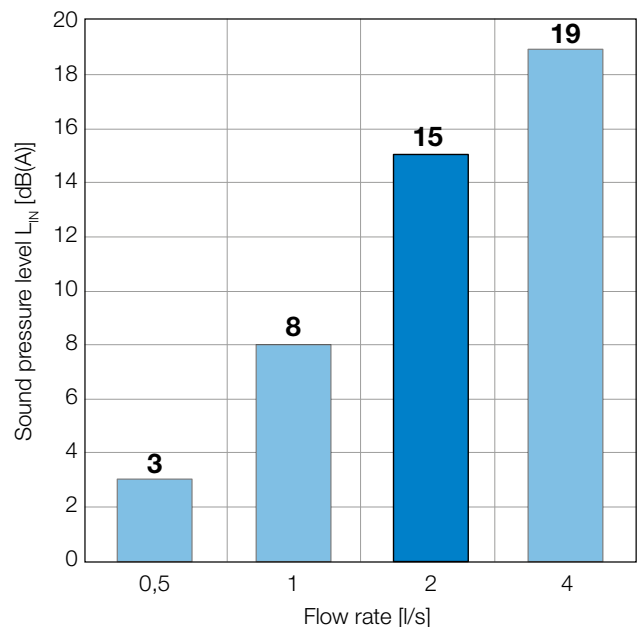
Triplus® allows waste systems to be installed that guarantee excellent soundproofing performance, **with 2 l/s (typical toilet flush) noise emissions of 12 dB(A) were measured.**

The extraordinary soundproofing performance of Triplus® have also been demonstrated by laboratory tests conducted at the CSIRO Australian complying with the requirements of the Building Code of Australia.

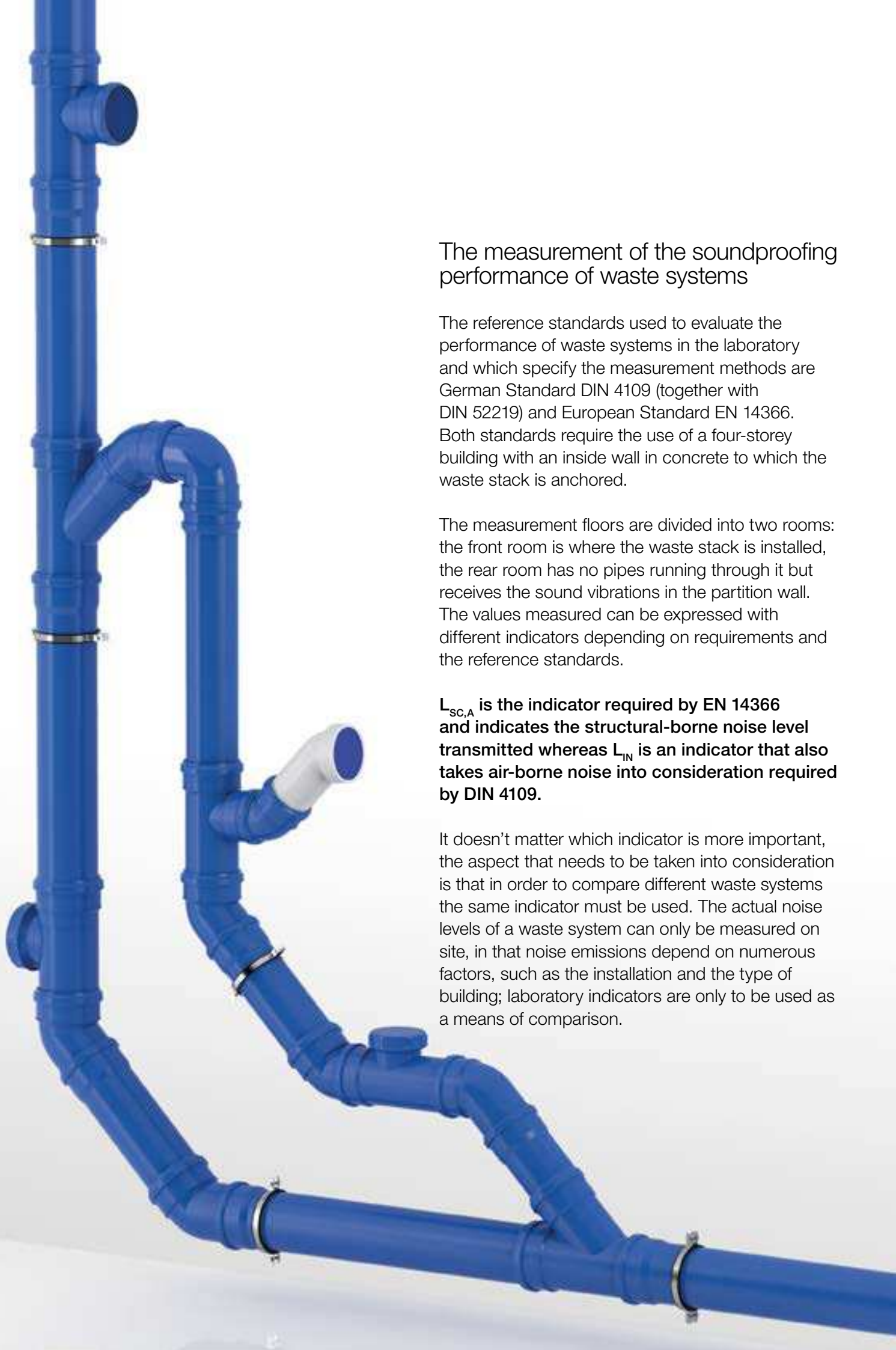
Sound pressure levels $L_{SC,A}$ of the Triplus® pipe in compliance with EN 14366



Sound pressure levels L_{IN} of the Triplus® pipe in compliance with DIN 4109



Certificate P-BA 225/2006 in accordance with EN 14366.
Certificate P-BA 226/2006 in accordance with DIN 4109.



The measurement of the soundproofing performance of waste systems

The reference standards used to evaluate the performance of waste systems in the laboratory and which specify the measurement methods are German Standard DIN 4109 (together with DIN 52219) and European Standard EN 14366. Both standards require the use of a four-storey building with an inside wall in concrete to which the waste stack is anchored.

The measurement floors are divided into two rooms: the front room is where the waste stack is installed, the rear room has no pipes running through it but receives the sound vibrations in the partition wall. The values measured can be expressed with different indicators depending on requirements and the reference standards.

$L_{SC,A}$ is the indicator required by EN 14366 and indicates the structural-borne noise level transmitted whereas L_{IN} is an indicator that also takes air-borne noise into consideration required by DIN 4109.

It doesn't matter which indicator is more important, the aspect that needs to be taken into consideration is that in order to compare different waste systems the same indicator must be used. The actual noise levels of a waste system can only be measured on site, in that noise emissions depend on numerous factors, such as the installation and the type of building; laboratory indicators are only to be used as a means of comparison.



The seal is completely inaccessible thanks to the particular structure of the housing.

The joint guarantees total bore passage thanks to the absence of reductions in the section.

PUSH-FIT JOINTS, INSTALLATION EASE AND RAPIDITY

Triplus® ensures practical and rapid installations without the use of glues, electrical appliances or special tools, thanks to the push-fit jointing system.

The special geometry of the seal and the push-fit socket guarantee total water tightness and allow the normal movements of the pipeline including those caused by thermal expansion.



A system suited to temperature fluctuations: **thermal expansion of Triplus® is extremely low in comparison with other more common plastic materials:** a 3 m pipe expands by just 9 mm when the flow of liquid is at a continuous temperature of 60°C.

It is thanks to its low coefficient of heat expansion that the push-fit joints are capable of absorbing the variations in pipe length, without the need to take any particular measures; simply follow the installation instructions indicated in the Valsir technical handbooks.



The bi-joint sleeve to minimise waste

In order to make use of pipe cut offs that would otherwise be discarded, Valsir supplies the bi-joint sleeve. This is a special fitting that allows plain ended pipes to be connected guaranteeing water tightness without penalising waste flow rates.



Altair
(Colombo, Sri Lanka)

REFERENCES



Golubacka Monument (Golubac, Serbia)



Alila Hotel (Solo, Indonesia)



Le Meridien (Limassol, Cipro)



Crown Plaza Hotel (Muscat, Oman)



Home Limassol (Limassol, Cipro)



CUSTOMER SERVICE

Technical support

Valsir provides complete support during design and on site, thanks to a high-level technical department that consists of a team of engineers with international experience that are capable of providing solutions to all installation needs.



Valsir Academy

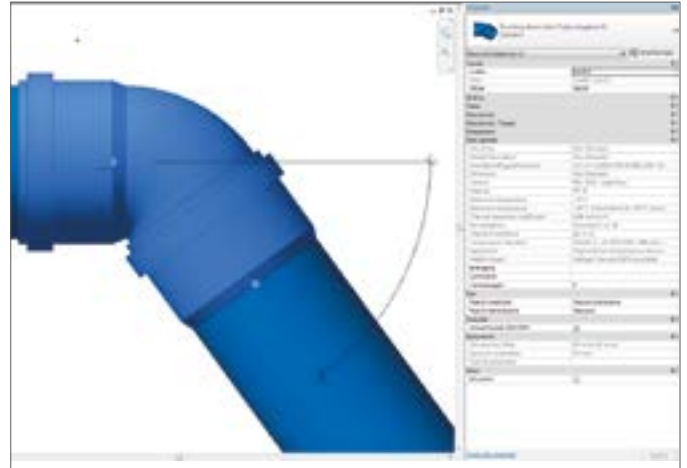
Valsir has an important training facility - **Valsir Academy** - dedicated to clients, distributors, plumbers and planners that provides perfectly equipped courses, both theoretical and practical on the use and the design of plumbing and heating systems. Courses are provided both inside the training facility and on customers' premises.

VALSIR IS BIM-READY

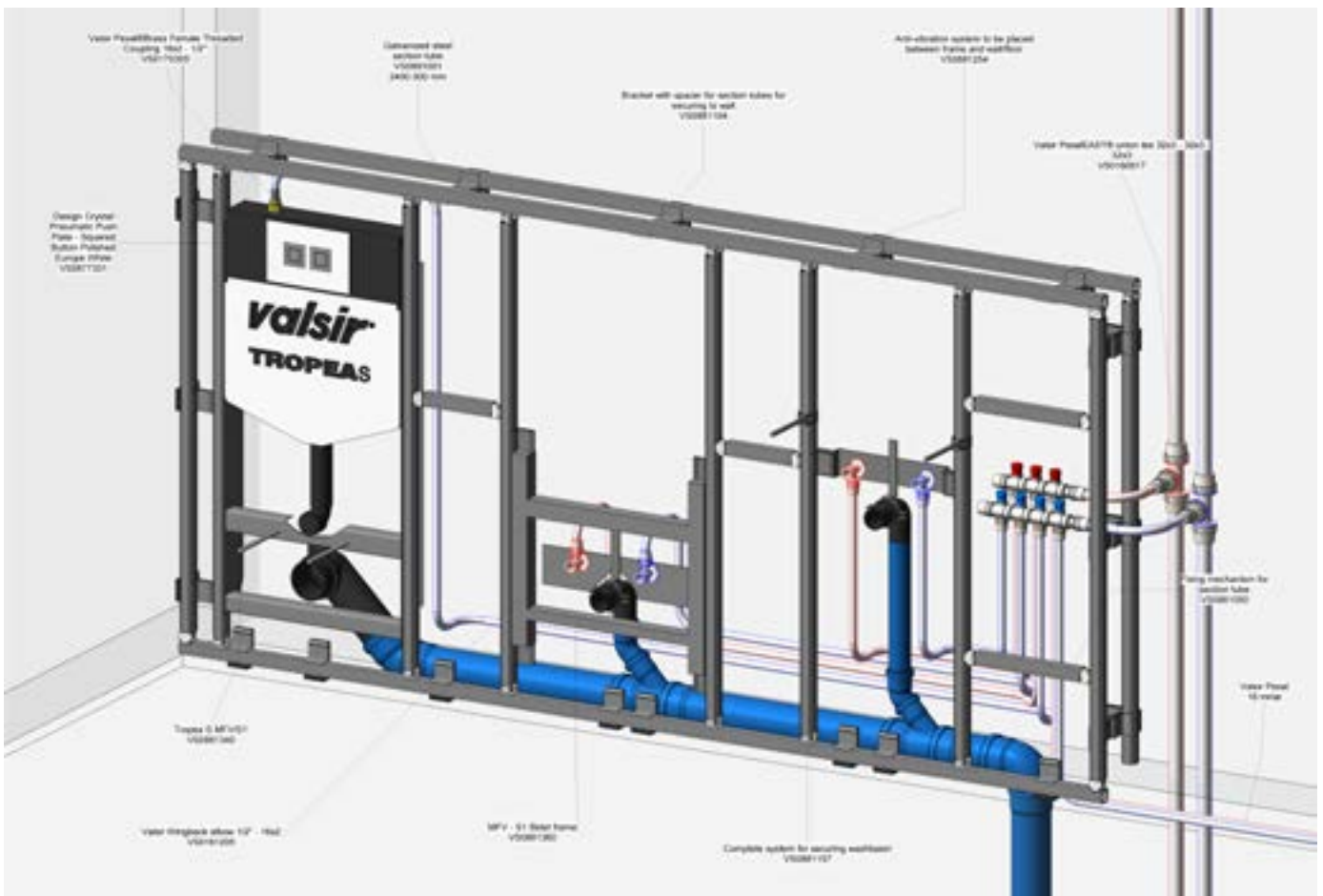
Valsir has adopted the BIM philosophy, the modelling process that allows to improve planning, design, construction and management of buildings, aligning with the industry transition to digital building modelling.

A “BIM-oriented” design offers outstanding competitive advantages: more efficiency and productivity, less errors, less downtime, less costs, greater interoperability, maximum information sharing, more timely and consistent project control.

Valsir captures the essence of this system with a set of Revit models and applications designed for quick and easy use.



www.valsir.it/u/revit



QUALITY AND ENVIRONMENT

Quality

The constant commitment of Valsir in the production of quality products is attested by over **200 product approvals** obtained throughout the world by the most stringent certification bodies (data updated to 01/03/2022), by a Management System of the Quality (QMS) certified in compliance with the **UNI EN ISO 9001:2015** standard and the Energy Management System (SGE) certified according to the international standard **UNI EN ISO 50001:2018**. Valsir S.p.A. has further demonstrated its commitment to the environment by obtaining certification **ISO 14001:2015** on the Vestone production site.

Since 2019 an innovative and modern plant has also been built that, integrated with the already installed photovoltaic park, will be able to produce over 30% of the electricity needed for all Valsir plants. This is a Trigenerator powered by methane gas capable of producing electricity, steam and cooling energy.



Sustainability

Efficient processes and reliable products are no longer the only parameters used to perform an assessment of the quality of a company's conduct: the capacity of the company and its management to design and implement production process that are sustainable from an environmental point of view is of equal importance.

Valsir has started a project of Corporate Social Responsibility and has published its 3th Sustainability Report that gathers facts and figures relating to the daily commitment of Valsir in terms of social, economic and environmental responsibility.



Download
valsir.it/u/sostenibilita-en



WASTE SYSTEMS



SUPPLY SYSTEMS



GAS SYSTEMS



FLUSHING SYSTEMS



BATHROOM SYSTEMS



TRAPS



RADIANT SYSTEMS



DRAINAGE SYSTEMS



HRV SYSTEM



ACADEMY



SEWER SYSTEMS



WATER TREATMENT



valsir[®]
QUALITY FOR PLUMBING

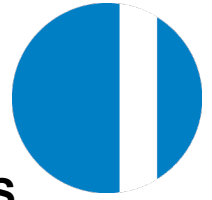


VALSIR S.p.A. - Società a Socio Unico
Località Merlaro, 2
25078 Vestone (BS) - Italy
Tel. +39 0365 877.011
Fax +39 0365 81.268
e-mail: valsir@valsir.it
www.valsir.it

Soggetta all'attività di direzione e coordinamento ex art. 2497 bis C.C. da parte di Silmar Group S.p.A. - Codice Fiscale 02075160172

L02-534/3 - Marzo 2022





SOUNDPROOFING TRIPLE-LAYER PUSH-FIT SYSTEM FOR INSTALLATION INSIDE BUILDINGS



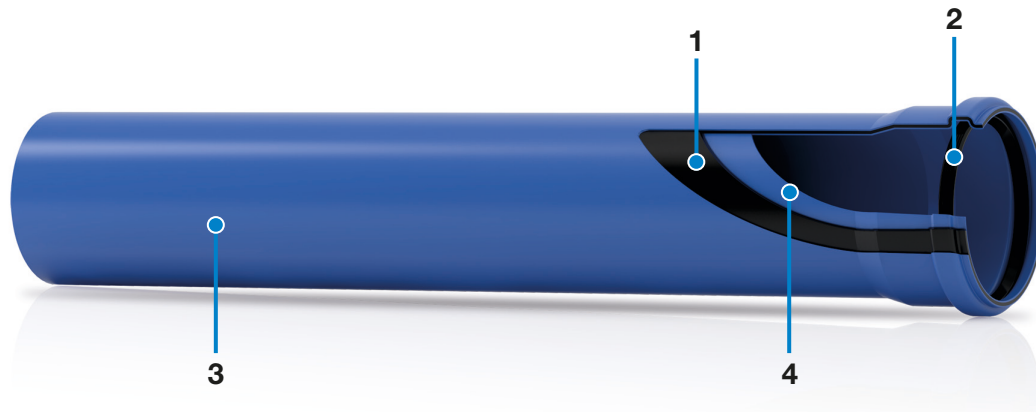
The product

The Valsir Triplus® system is suitable for the construction of high and low temperature waste systems, for the ventilation of waste systems and for rainwater drainage inside civil and industrial buildings, hospitals, hotels, etc.

Pipes are made of three layers of material, resulting in high mechanical properties at low temperatures and excellent soundproofing performance.

Characteristics

- Excellent soundproofing performance; the system reduces noise to just 12 dB(A) with a flow of 2 l/s.
- Absolute guarantee of seal tightness thanks to the (pre-assembled) elastomer seal which does not require the use of any special equipment, glue or solvents.
- Extremely fast and easy to install thanks to the light weight of the products.
- Wide range of diameters from Ø 32 mm to Ø 250 mm and availability of accessories for connection to existing waste systems in different materials such as cast iron, PE, PVC, etc.
- Excellent impact resistance even at low temperatures thanks to the triple-layer structure.
- High resistance to a wide range of chemical compounds also at high temperatures; not affected by stray currents.
- High resistance to abrasion.
- Extremely smooth internal surfaces ensure reduced pressure losses and prevent the formation of deposits.
- Pipes are available in different lengths (from 150 mm to 3 m) and by using the double socket pipe and the double socket fitting material wastage is avoided.



- 1. Intermediate layer**
Obtained with a mix of polypropylene and mineral fillers that guarantees elevated mechanical resistance and excellent soundproofing performance.
- 2. Push-fit socket with lip seal**
The push-fit socket is fitted with a lip seal that guarantees the hydraulic tightness and free movement of the pipe in the event of thermal expansion. The geometrical characteristics of the socket ensure a fast and easy installation.
- 3. Exterior layer**
Produced in polypropylene, it ensures high impact resistance and excellent mechanical protection.
- 4. Interior layer**
Realized in polypropylene, it's characterized by an extremely smooth internal surface and a high resistance to chemical agents.

Technical details

Typical technical details.

Property	Value	Test method
Pipe material	Polypropylene for the internal and external layers, mix of polypropylene and mineral fillers for the intermediate layer.	-
Fitting material	Polypropylene + mineral fillers	-
Seal material	SBR	-
Colour	Fittings: light blue RAL 5015. Pipes: light blue RAL 5015 for the internal and external layers, black for the intermediate layer.	-
Diameters	32÷250 mm	-
Application	High and low temperature waste and drainage systems inside buildings and outside buildings fixed onto the wall (application area B) or laid directly in the concrete casting; ventilation of waste systems; gravity rainwater drainage systems.	-
Connections	Push-fit socket connection with rubber seal.	-
Minimum temperature of use	-25°C	-
Maximum temperature of waste water	+95°C (intermittent) +80°C (continuous)	-
Minimum pressure	-800 mbar ⁽¹⁾	-
Maximum pressure	+1.5 bar ⁽²⁾	-
Composition of waste water	pH 2±12	-
Soundproofing performance	L _{SC,A} =12 dB(A) with flow of 2 l/s, measurement performed on basement test room floor, behind the installation wall with 2 clips per floor.	EN 14366
	L _{IN} =15 dB(A) with flow of 2 l/s, measurement performed on basement test room floor, behind the installation wall with 2 clips per floor.	DIN 4109
	R _w + C _{tr} 42 without pipe lagging and with 13 mm plasterboard wall and 75 mm R1.5 insulation, evaluation made with flow of 2 and 4 l/s.	Building Code of Australia (Part F5.6)
	ESA 4	NF EN 14366 DTA
Density at 23°C	pipes: > 1200 kg/m ³ (average on thickness) > 1800 kg/m ³ (intermediate layer) fittings: > 1400 kg/m ³	UNI EN ISO 1183-2
Elasticity modulus	1500 MPa	ISO 527-2
Tensile strength	≥ 18 MPa	ISO 527-2
Ultimate elongation	≥ 600%	ISO 6259-3
Crystalline melting temperature	≥ 160°C	ISO 11357-3
Linear heat expansion coefficient	0,08 mm/m·K	-
UV resistance	Suitable for outdoor use ⁽³⁾ . Suitable for outdoor storage (for periods not exceeding 18 months and in any case not in direct contact with sunlight).	-
Halogen content	Halogen-free	-
Fire resistance	D-s3,d0	EN 13501-1
Reference construction standard	EN 1451-1 - AS7671:2003 - DIBt z42.1-426	-
Packaging	Pipes in wooden frames with strapping for large diameters, in bundles tied with plastic elements for other diameters, in cardboard boxes for small diameters and reduced lengths. Fittings in cardboard boxes.	-

(1) The system is suitable for the creation of central vacuum systems. The values indicated refer to 20°C.

(2) The system is suitable for gravity waste and drainage systems therefore, the indicated value refers to the maximum pressure that can be applied during system testing at 20°C.

(3) Provided that it's protected from direct exposure to sun rays, for example, using a special protective paint.

Application field

The Triplus® pipes and fittings meet the requirements of the EN 1451 Standard and can be used inside buildings intended for residential and industrial use and, in particular, for the following purposes:

- Waste pipes for domestic waste waters (low and high temperature).
- Ventilation pipes connected to the waste pipes previously indicated.
- Rainwater systems within the building structure.

According to the European Standard EN 1451 the Valsir Triplus® pipes and fittings are suitable for applications marked with “B”, which are intended to be used inside buildings and outside buildings fixed onto the wall.

Dimensions

The diameters, the wall thickness and the relative tolerances of the Valsir Triplus® pipes are indicated in the following table.

[Pipe dimensional characteristics.](#)

Nominal diameter DN [mm]	External diameter OD [mm]	Thickness s [mm]	Series S	Application area
30	32 ^{+0.3}	1.8 ^{+0.4}	14/16/20	B
40	40 ^{+0.3}	1.8 ^{+0.4}	14/16/20	B
50	50 ^{+0.3}	1.8 ^{+0.4}	14/16/20	B
70	75 ^{+0.4}	2.6 ^{+0.5}	14	B
90	90 ^{+0.4}	3.1 ^{+0.6}	14	B
100	110 ^{+0.4}	3.4 ^{+0.6}	16	B
125	125 ^{+0.4}	3.9 ^{+0.6}	16	B
150	160 ^{+0.5}	4.9 ^{+0.7}	16	B
200	200 ^{+0.5}	6.2 ^{+0.6}	16	B
250	250 ^{+0.5}	7.7 ^{+0.8}	16	B

Note: The tolerances indicated are specified in the reference standard EN 1451.

Connection systems

Different methods can be used for connecting the pipes and/or fittings in polypropylene:

- Connection with push-fit socket.
- Connection with a sliding sleeve.
- Connection with double socket fitting.

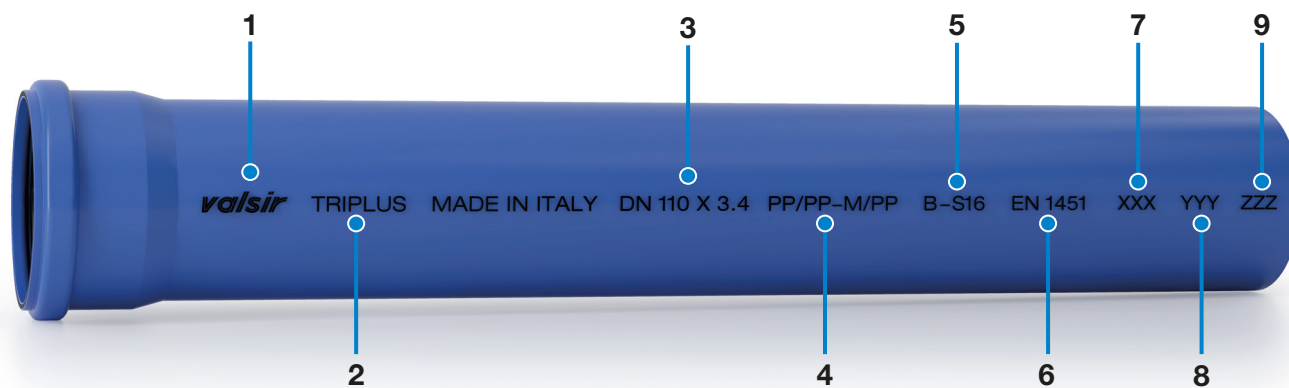
Approvals

The approvals of Valsir Triplus® pipes and fittings are available on the website www.valsir.it

The Triplus® system, is EPD (Environmental Product Declaration) certified. This document describes environmental impacts of a specific quantity of material or service during the life cycle. The EPD document can be downloaded from the website www.valsir.it in the EPD area.

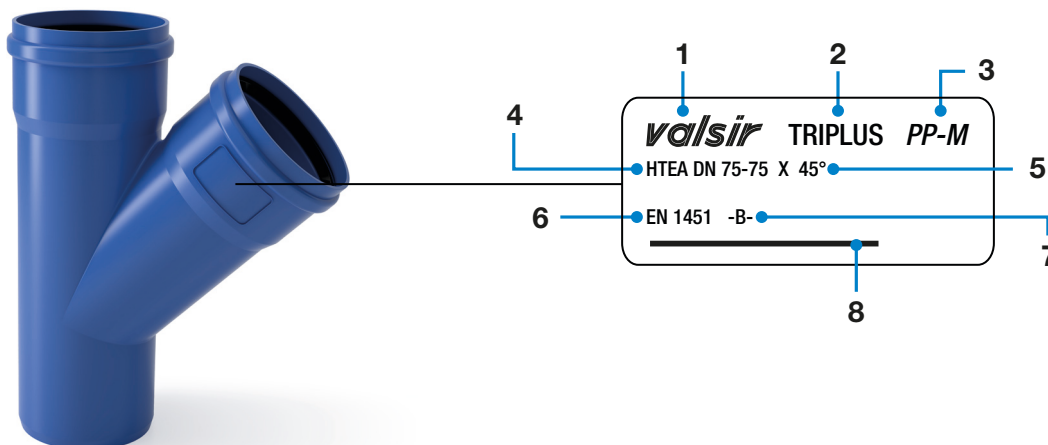
Marking

Pipe marking.



1. Name of manufacturer
2. Brand name (Triplus)
3. External diameter and thickness
4. Indication of material (PP/PP-M/PP)
5. Indication of application area (B) and series
6. Reference standard
7. Indication of production plant
8. Indication of production period
9. Product approvals

Fitting marking.



1. Name of manufacturer
2. Brand name (Triplus)
3. Indication of material (PP-H)
4. Connection diameters
5. Characteristic angle (for bends and branches)
6. Reference standard
7. Indication of application area (B)
8. Product approvals

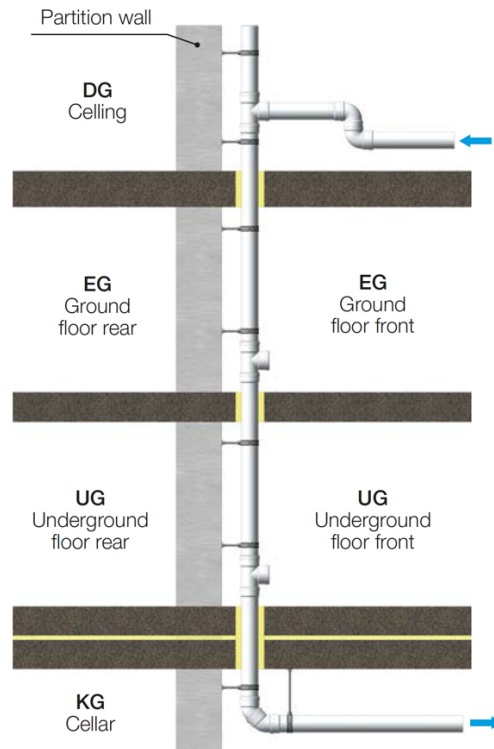
Acoustic performance of waste systems: test methods

The reference standards used for the tests are the UNI EN 14366:2004 and the DIN 4109:1989 (together with DIN 52219:1993) that specify the measurement methods and the results' evaluation.

The test building is located inside the Fraunhofer Institute and it is completely insulated through very thick walls made of the highest quality soundproofing materials. It is a real building of four floors (with internal height of 3050 mm), two of which, shown in the figure with EG and UG, are the reference floors for measurements divided by a wall made of concrete, with a weight of 220 kg/m² according to the Standard DIN 4109 (250 kg/m² for European standard EN 14366), to which the waste stack is anchored.

The measurement floors are each divided into two rooms: the front room is where the pipe is installed, the back room is free from any installation and it is affected by the noise vibrations transferred to the partition wall; the back rooms have a volume of 70.4 m³ (surface area of about 23 m²) while the front rooms are 52.6 m³ (surface area of about 17 m²).

[Layout of test system.](#)



A pumping station with a precision of 5% ensures a continuous waste flow and supplies different levels of flow in relation to the internal diameter of the pipe, as can be seen in Table.

The acoustic pressure levels are measured in third octaves with frequencies from 100 Hz to 5000 Hz.

[Measurement flow in relation to the dimensions of the waste pipe to be tested.](#)

Internal diameter of the pipe [mm]	70 ≤ ID < 100	100 ≤ ID < 125	125 ≤ ID < 150
Measurement flows [l/s]	0.5 - 1	0.5 - 1 - 2 - 4	0.5 - 1 - 2 - 4 - 8

The results

The tests were carried out both with 2 clips and with 1 clip per floor as they represent the typical installations in residential buildings. Consider that the values obtained were rounded up to whole numbers as requested by the reference standards.

Levels of sound pressure measured behind the installation wall for the Valsir Triplus® 110x3.4 pipe, measurements performed and formulated by the Fraunhofer Institute of Stuttgart (Germany).

Test pipes: Valsir Triplus®						
Test conditions	Measurement floor	Flow rate of water				Reference standard
		0.5 l/s	1 l/s	2 l/s	4 l/s	
		Sound level				
Index $L_{SC,A}$ measured behind the installation wall, with 2 clips per floor, pipe diameter OD 110 mm	UG	1 dB(A)	6 dB(A)	12 dB(A)	16 dB(A)	EN 14366
Index L_{IN} measured behind the installation wall, with 2 clips per floor, pipe diameter OD 110 mm	EG	3 dB(A)	8 dB(A)	12 dB(A)	19 dB(A)	DIN 4109
	UG	4 dB(A)	9 dB(A)	15 dB(A)	19 dB(A)	
Index L_{IN} measured behind the installation wall, with 1 clip per floor, pipe diameter OD 110 mm	EG	1 dB(A)	5 dB(A)	10 dB(A)	16 dB(A)	DIN 4109
	UG	2 dB(A)	6 dB(A)	11 dB(A)	15 dB(A)	