1

TECHNICAL MANUAL

WASTE SYSTEMS

Valsir waste and drainage systems

MADE IN ITALY

valsir®

QUALITY FOR PLUMBING

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VALSIR WASTE AND DRAINAGE SYSTEMS

1 VALSIR WASTE AND DRAINAGE SYSTEMS

1.1 Valsir HDPE. Waste and drainage system in high density polyethylene

1.1.1 The product

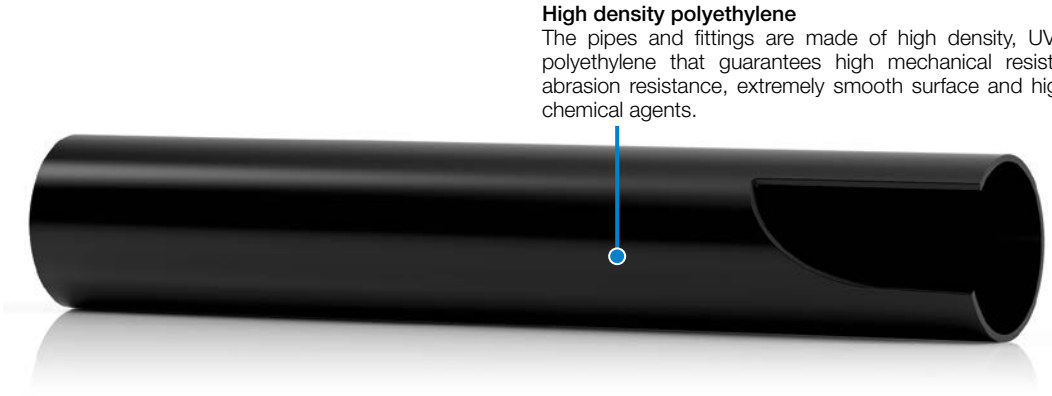
The Valsir HDPE product line is composed of pipes, fittings and accessories to create waste and ventilation systems as well as rainwater drainage systems that operate under negative pressures.

Valsir HDPE is suitable for above ground installations thanks to its resistance to UV rays, as well as underground and inside concrete installations.
It is widely used for waste systems inside buildings for civil and industrial use, in hotels, hospitals, laboratories and industrial plants.

1.1.2 Characteristics

- Wide range of diameters from OD 32 mm to OD 315 mm and two types of wall thickness SDR 26 and SDR 33.
- Extremely fast and easy to install thanks to the light weight of the products, the numerous connection methods available and the possibility of prefabrication.
- Wide range of special fittings that allow the construction of any type of system and transition fittings for the connection to waste systems in different materials such as cast iron, PP, PVC, etc.
- High chemical resistance and excellent compatibility with the majority of substances normally present in civil and industrial waste waters. HDPE is not attacked by micro-organisms and it is not affected by corrosion due to stray currents.
- High resistance to abrasion.
- Extremely smooth internal surfaces ensure reduced pressure losses and prevent the formation of deposits.
- Stabilised pipes to reduce dimensional variations.
- Pipes and fittings with Carbon Black additive to make the system UV-resistant.

Figure 1.1 Pipe structure.



1.1.3 Technical details

Table 1.1 Typical technical details.

Property	Value	Test method
Pipe material	High density polyethylene PE 80	-
Fitting material	High density polyethylene PE 80	-
Seal material(1)	SBR	-
Colour	Black	-
Diameters	32÷315 mm	-
Application	High and low temperature waste and drainage systems inside the building, externally anchored to the walls of the building (application area B) or buried in ground within the building structure (application area D) or for both installations (application area BD); ventilation for waste systems; both gravity and under negative pressure rainwater drainage systems.	-
Connections	Butt welding, welding using electrofusion coupling, push-fit method with rubber seal, mechanical joint with flange, mechanical joint with screw fitting.	-
Minimum operating temperature2)	-40°C	-
Maximum temperature of waste water	+95°C (intermittent) +80°C (continuous)	-
Minimum pressure3)	-800 mbar (SDR 26) -450 mbar (SDR 33)	-
Maximum pressure(4)	Without push-fit sockets or expansion sockets: +5 bar (SDR 26); +4 bar (SDR 33) With push-fit sockets or expansion sockets: +0.5 bar	-
Composition of waste water	pH 0÷14	-
Density at 23°C	> 945 kg/m^3	UNI EN ISO 1183-2
Elasticity modulus	1000 MPa	ISO 527-2
Tensile strength	22 MPa	ISO 527-2
Ultimate elongation	≥ 350 %	ISO 625-3
Carbon black content	2.0-2.5 %	S14476-1
Thermal stability (OIT) at 200°C	≥ 20 min	EN 728
Crystalline melting temperature	≥ 130°C	ISO 11357-3
Linear heat expansion coefficient	0.20 mm/m·k	-
UV resistance	Suitable for storage outdoors as well as applications with exposure to sunlight	-
Halogen content	Halogen-free	-
Fire resistance	Class M4 Class B2 Euroclass E	NF P 92-505 DIN 4102-1 EN 13501-1
Reference construction standard	EN 1519-1 - AS/NZS 5065 - AS/NZS 4401 - SN S92010 SN S92012 - DIN 19537-2 - DIN 19535-10 - NBK 8 SI 4479-1 - SANS 8770	-
Packaging	Pipes in wooden frames with strapping Fittings in cardboard boxes	-

(1) Seal present on some fittings only. For most fittings, jointing is made by welding.
(2) For joint realization with both butt-welding and electrofusion coupling, the minimum permitted temperature is -5°C.
(3) Operating conditions at 20°C valid only for rainwater drainage systems under negative pressure (Rainplus® siphonic drainage systems).
(4) Maximum pressures in relation to special applications not in compliance with EN 1519 considering a safety factor SF=1.25 and temperature of 20°C.

1.1.4 Application field

The Valsir pipes and fittings in polyethylene meet the requirements of the EN 1519 Standard and can be installed inside buildings intended for residential and industrial use and in particular for the following purposes:

a) Waste pipes for domestic waste waters (low and high temperature).
b) Ventilation pipes connected to the waste pipes previously indicated.
c) Rain water systems inside the structure of the building.

The EN 1519 Standard establishes different applications identified with a specific marking:

- The “B” marking identifies pipes and fittings used inside buildings and outside buildings fixed onto the wall. The use is limited to the S16 series, which cannot be used for underground applications of any type.
- The “D” marking identifies pipes and fittings buried in the ground within the building structure at a distance no greater than 1 m from the same and connected to the building’s waste system.
- The “BD” marking identifies pipes and fittings for both inside buildings and buried in the ground within the building structure. For this use, nominal diameters equal to or greater than 75 mm, belonging to the S 12.5 series, are allowed.

1.1.5 Dimensions

The diameters, the wall thickness and relative tolerances of the Valsir pipes in high density polyethylene are indicated in the following table. These values are in compliance with those set by the standards currently in force.

Table 1.2 Pipe dimensional characteristics.

Nominal diameter DN [mm]	External diameter OD [mm]	Thickness s [mm]	Series s	SDR	Application area
30	$32^{+0.3}_{0}$	$3.0^{+0.5}_{0}$	12.5/16	26/33	BD
40	$40^{+0.4}_{0}$	$3.0^{+0.5}_{0}$	12.5/16	26/33	BD
50	$50^{+0.5}_{0}$	$3.0^{+0.5}_{0}$	12.5/16	26/33	BD
56	$56^{+0.5}_{0}$	$3.0^{+0.5}_{0}$	12.5/16	26/33	BD
60	$63^{+0.6}_{0}$	$3.0^{+0.5}_{0}$	12.5/16	26/33	BD
70	$75^{+0.7}_{0}$	$3.0^{+0.5}_{0}$	12.5/16	26/33	BD
90	$90^{+0.9}_{0}$	$3.5^{+0.6}_{0}$	12.5	26	BD
100	$110^{+1.0}_{0}$	$4.2^{+0.7}_{0}$	12.5	26	BD
125	$125^{+1.2}_{0}$	$4.8^{+0.7}_{0}$	12.5	26	BD
150	$160^{+1.5}_{0}$	$6.2^{+0.9}_{0}$	12.5	26	BD
200	$200^{+1.8}_{0}$	$6.2^{+0.9}_{0}$	16	33	B
200	$200^{+1.8}_{0}$	$7.7^{+1.0}_{0}$	12.5	26	BD
250	$250^{+2.3}_{0}$	$7.7^{+1.0}_{0}$	16	33	B
250	$250^{+2.3}_{0}$	$9.6^{+1.2}_{0}$	12.5	26	BD
300	$315^{+2.9}_{0}$	$9.7^{+1.2}_{0}$	16	33	B
300	$315^{+2.9}_{0}$	$12.1^{+1.5}_{0}$	12.5	26	BD

Note: The tolerances indicated are specified in the reference standard EN 1519.

1.1.6 Connection systems

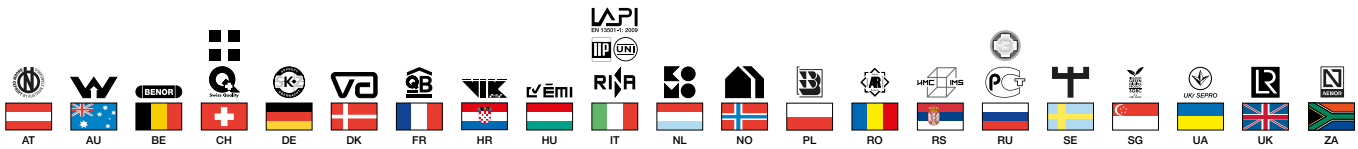
Different methods can be used for connecting the pipes and/or fittings in polyethylene:

- Connection by butt-welding.
- Connection by electrofusion welding.
- Connection by push-fit socket.
- Connection by expansion socket.
- Connection by threaded fitting.
- Connection by contraction sleeve.
- Connection by screw fitting.
- Connection by screw fitting with flange bushing.
- Connection by flanged fitting.

For more information on connection methods, see chapter 8 “Connections and testing”.

1.1.7 Quality marks

The quality marks pertaining to the construction of Valsir high density polyethylene pipes and fittings are the following:



1.1.8 Marking

Figure 1.2 Pipe marking.

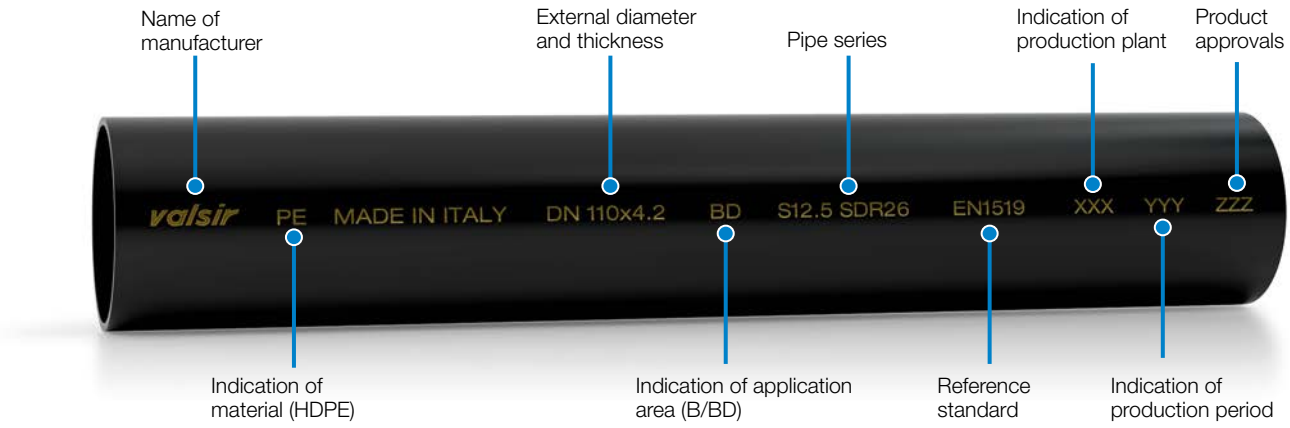
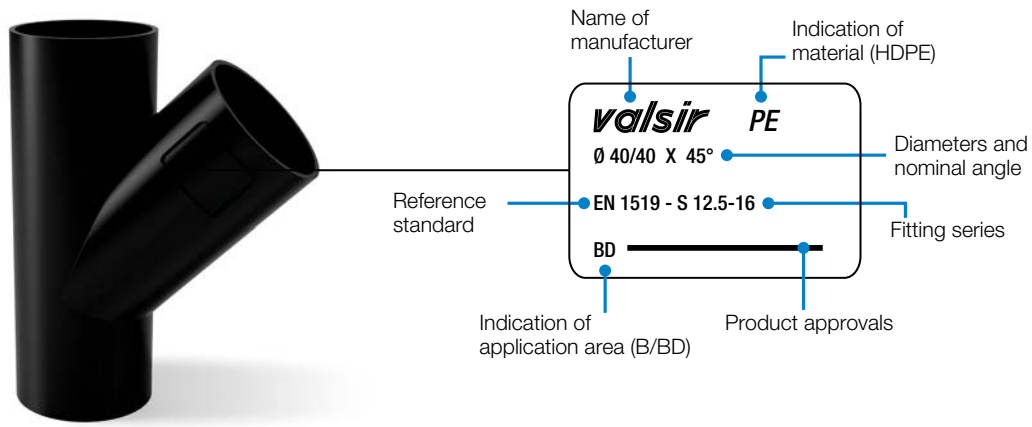


Figure 1.3 Fitting marking.



1.2 Valsir PP. Push-fit self-extinguishing system for installation inside buildings

1.2.1 The product

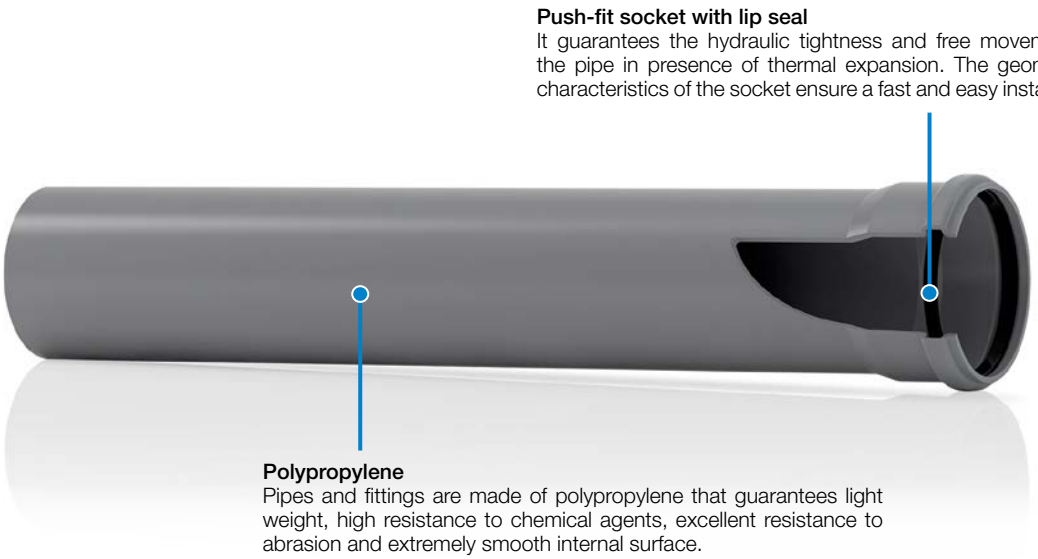
Valsir PP is composed of pipes, fittings and accessories for the construction of waste, ventilation and rainwater drainage systems.

The extremely light weight and simple connections, thanks to the push-fit sockets with rubber seals, make it the most practical and economical solution for the construction of waste systems inside buildings for civil and industrial use, hospitals and hotels.

1.2.2 Characteristics

- 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.
- Range of diameters from OD 32 mm to OD 160 mm and wide range of special pieces and accessories that allow the construction of any type of system and the connection to waste systems in different materials such as cast iron, PE, PVC, etc.
- Material not subject to stray currents and compatible with most chemicals normally present in wastewater.
- High resistance to abrasion.
- Extremely smooth internal surfaces ensure reduced pressure losses and prevent the formation of deposits.
- Pipes are available in various lengths (from 150 mm to 5 m) and by using the double socket pipe and the double socket fitting material wastage is avoided.
- Excellent behaviour in case of fire, that allows to achieve class B1 according to standard DIN 4102-1.

Figure 1.4 Pipe structure.



1.2.3 Technical details

Table 1.3 Typical technical details.

Property	Value	Test method
Pipe material	Homopolymer polypropylene	-
Fitting material	Homopolymer polypropylene	-
Seal material	SBR	-
Colour	Grey RAL 7037	-
Diameters	32÷160 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	Connection with push-fit sockets with rubber seal.	-
Minimum temperature of use	0°C	-
Maximum temperature of waste water	+95°C (intermittent) +80°C (continuous)	-
Minimum pressure	Not suitable for drainage systems under negative pressure.	-
Maximum pressure	+1.5 bar(1)	-
Composition of waste water	pH 2÷12	-
Density at 23°C	> 900 kg/m^3	UNI EN ISO 1183-2
Elasticity modulus	1650 MPa	ISO 527-2
Tensile strength	≥ 22 MPa	ISO 527-2
Ultimate elongation	≥ 200 %	ISO 6259-3
Crystalline melting temperature	≥ 160°C	ISO 11357-3
Linear heat expansion coefficient	0.11 mm/m·K	-
UV resistance	Suitable for outdoor use(2). 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	Class M1 Class B1 D-s3,d0	NF P 92-505, NF P 92-501 DIN 4102-1 EN 13501-1
Reference construction standard	EN 1451-1 - DIN 19560-10	-
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) This product line is suitable for gravity waste systems, therefore, the indicated value refers to the maximum pressure that can be applied during system testing at 20°C.
(2) Provided that it's protected from direct exposure to sun rays, for example, using a special protective paint.

1.2.4 Application field

The Valsir pipes and fittings in polypropylene meet the requirements of EN 1451 Standard and can be used inside buildings (destined) for residential and industrial use and in particular for the following purposes:

a) Waste pipes for domestic waste waters (low and high temperature).
b) Ventilation pipes connected to the waste pipes previously indicated.
c) Rain water systems inside the structure of the building.

According to the European Standard EN 1451 the Valsir PP 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.

1.2.5 Dimensions

The nominal diameters, the nominal wall thickness and relative tolerances of the Valsir polypropylene pipes are indicated in the following table. These values are in compliance with those set by the standards currently in force.

Table 1.4 Dimensional characteristics of the pipes.

Nominal diameter DN [mm]	External diameter OD [mm]	Thickness s [mm]	Series S	Application area
30	$32\ ^{+0.3}_{0}$	$1.8\ ^{+0.4}_{0}$	14/16/20	B
40	$40\ ^{+0.3}_{0}$	$1.8\ ^{+0.4}_{0}$	14/16/20	B
50	$50\ ^{+0.3}_{0}$	$1.8\ ^{+0.4}_{0}$	14/16/20	B
70	$75\ ^{+0.4}_{0}$	$1.9\ ^{+0.4}_{0}$	20	B
90	$90\ ^{+0.4}_{0}$	$2.2\ ^{+0.5}_{0}$	20	B
100	$110\ ^{+0.4}_{0}$	$2.7\ ^{+0.5}_{0}$	20	B
125	$125\ ^{+0.4}_{0}$	$3.1\ ^{+0.6}_{0}$	20	B
150	$160\ ^{+0.5}_{0}$	$3.9\ ^{+0.6}_{0}$	20	B

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

1.2.6 Connection systems

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

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

For more information on connection methods see chapter 8 “Connections and testing”.

1.2.7 Quality marks

The quality marks obtained for the construction of Valsir polypropylene pipes and fittings are the following:

1.2.8 Marking

Figure 1.5 Pipe marking.

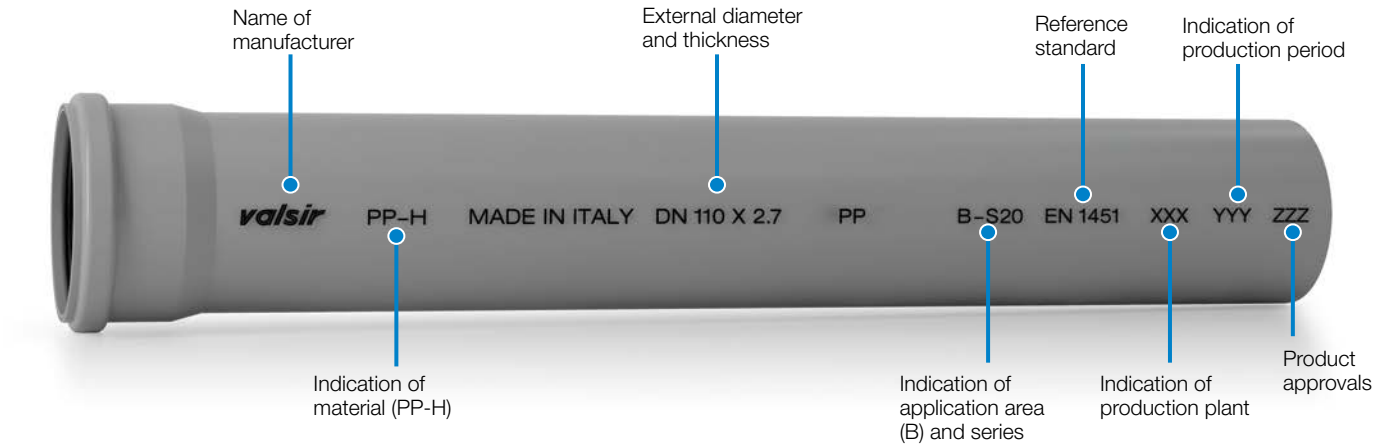
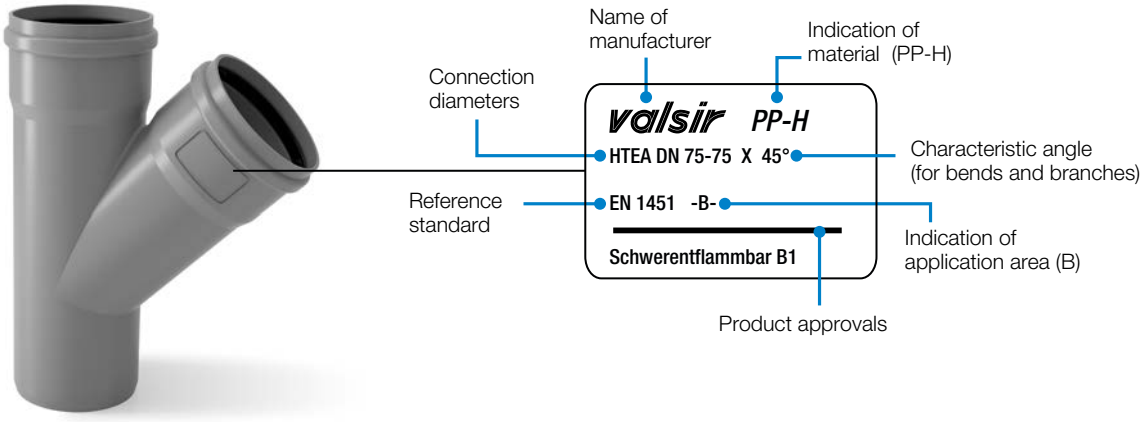


Figure 1.6 Fitting marking.



1.3 Valsir PP3®. Triple-layer push-fit system for installation inside buildings

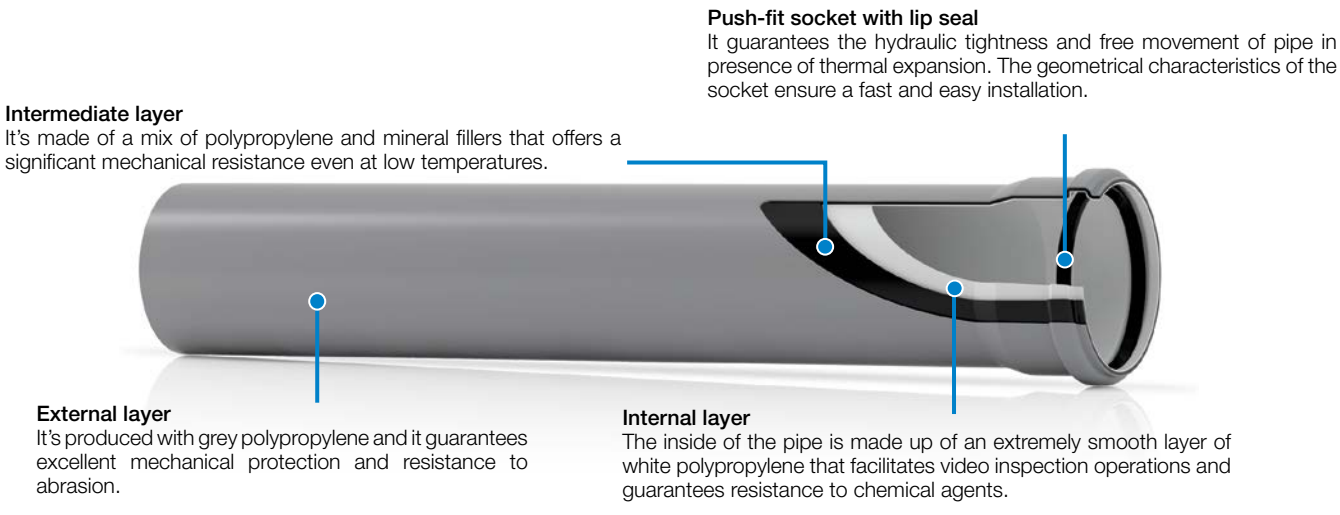
1.3.1 The product

Valsir PP3® is composed of triple layer pipes, fittings and accessories for the construction of waste, ventilation and rainwater drainage systems.
The extremely light weight and simple connections, thanks to the push-fit sockets with rubber seals, make it the most practical and economical solution for the construction of waste systems inside buildings for civil and industrial use, hospitals and hotels.
The pipes' white internal surface, simplify video camera inspections.

1.3.2 Characteristics

- Good soundproofing performance; thanks to its characteristics, the system has a noise level of 17 dB(A) (with a flow rate 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.
- The white inner surface facilitates video inspection operations inside the waste piping system.
- The special material mix that makes up the pipes' intermediate layer increases the crushing and the impact resistance of the pipes at low temperatures. The particular characteristics of the material provide a good soundproofing performance, one of the best when compared with products in the same category.
- Extremely fast and easy to install thanks to the light weight of the products.
- Range of diameters from OD 32 mm to OD 160 mm and wide choice of special pieces and accessories that allow the construction of any type of system and the connection to waste systems in different materials such as cast iron, PE, PVC, etc.
- Material not subject to stray currents and compatible with most chemicals normally present in wastewater.
- High resistance to abrasion.
- Extremely smooth internal surfaces ensure reduced pressure losses and prevent the formation of deposits.
- Pipes are available in various lengths (from 150 mm to 5 m) and by using the double socket pipe and the double socket fitting material wastage is avoided.

Figure 1.7 Pipe structure.



1.3.3 Technical details

Table 1.5 Typical technical details.

Property	Value	Test method
Pipe material	Polypropylene for internal and external layers, mix of polypropylene and mineral fillers for the intermediate layer	-
Fitting material	Polypropylene (1)	-
Seal material	SBR	
Colour	Fittings: grey RAL 7037. Pipes: grey RAL 7037 for the external layer, black for the intermediate layer, white for the internal layer.	-
Diameters	32÷160 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	Connection with push-fit socket with rubber seal.	-
Minimum temperature of use	-10°C	-
Maximum temperature of waste water	+95°C (intermittent) +80°C (continuous)	-
Minimum pressure	Not suitable for drainage systems under negative pressure	-
Maximum pressure	+1.5 bar(2)	-
Composition of waste water	pH 2÷12	-
Soundproofing performance(3)	$L_{SC,A}$=17 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}=20 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
Density at 23°C	pipes: > 940 kg/m^3 (average on thickness) > 1800 kg/m^3 (intermediate layer) fittings: > 900 kg/m^3	UNI EN ISO 1183-2
Elasticity modulus	1650 MPa	ISO 527-2
Tensile strength	≥ 22 MPa	ISO 527-2
Ultimate elongation	≥ 500%	ISO 6259-3
Crystalline melting temperature	≥ 160°C	ISO 11357-3
Linear heat expansion coefficient	0.11 mm/m·K	-
UV resistance	Suitable for use outdoors(4). Suitable to be stored outdoors (for periods not exceeding 18 months).	-
Halogen content	Halogen-free	-
Fire resistance	D-s3,d2	EN 13501-1
Reference construction standard	EN 1451-1	-
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) Fittings are the same of the PP product line.
(2) This product line is suitable for gravity waste systems, therefore, the indicated value refers to the maximum pressure that can be applied during system testing at 20°C.
(3) For more details, refer to chapter 2 “Noise in waste systems”.
(4) Provided that it’s protected from direct exposure to sun rays, for example, using a special protective paint.

1.3.4 Application field

The Valsir PP3® 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:

a) Waste pipes for domestic waste waters (low and high temperature).
b) Ventilation pipes connected to the waste pipes previously indicated.
c) Rain water systems within the building structure.

According to the European Standard EN 1451 the Valsir PP3® 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.

1.3.5 Dimensions

The nominal diameters, the nominal wall thickness and relative tolerances of the Valsir PP3® pipes are indicated in the following table. These values are in compliance with those set by the standards currently in force.

Table 1.6 Dimensional characteristics of the pipes.

Nominal diameter DN [mm]	External diameter OD [mm]	Thickness s [mm]	Series S	Application area
30	$32\ ^{+0.3}_{0}$	$1.8\ ^{+0.4}_{0}$	14/16/20	B
40	$40\ ^{+0.3}_{0}$	$1.8\ ^{+0.4}_{0}$	14/16/20	B
50	$50\ ^{+0.3}_{0}$	$1.8\ ^{+0.4}_{0}$	14/16/20	B
70	$75\ ^{+0.4}_{0}$	$1.9\ ^{+0.4}_{0}$	20	B
90	$90\ ^{+0.4}_{0}$	$2.2\ ^{+0.5}_{0}$	20	B
100	$110\ ^{+0.4}_{0}$	$2.7\ ^{+0.5}_{0}$	20	B
125	$125\ ^{+0.4}_{0}$	$3.1\ ^{+0.6}_{0}$	20	B
150	$160\ ^{+0.5}_{0}$	$3.9\ ^{+0.6}_{0}$	20	B

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

1.3.6 Connection systems

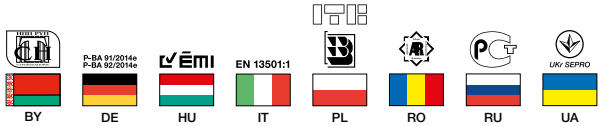
Different methods can be used for connecting the pipes and/or fittings in polypropylene:

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

For more information on connection methods see chapter 8 “Connections and testing”.

1.3.7 Quality marks

The quality marks obtained for the construction of Valsir polypropylene pipes and fittings are the following:



1.3.8 Marking

Figure 1.8 Pipe marking.

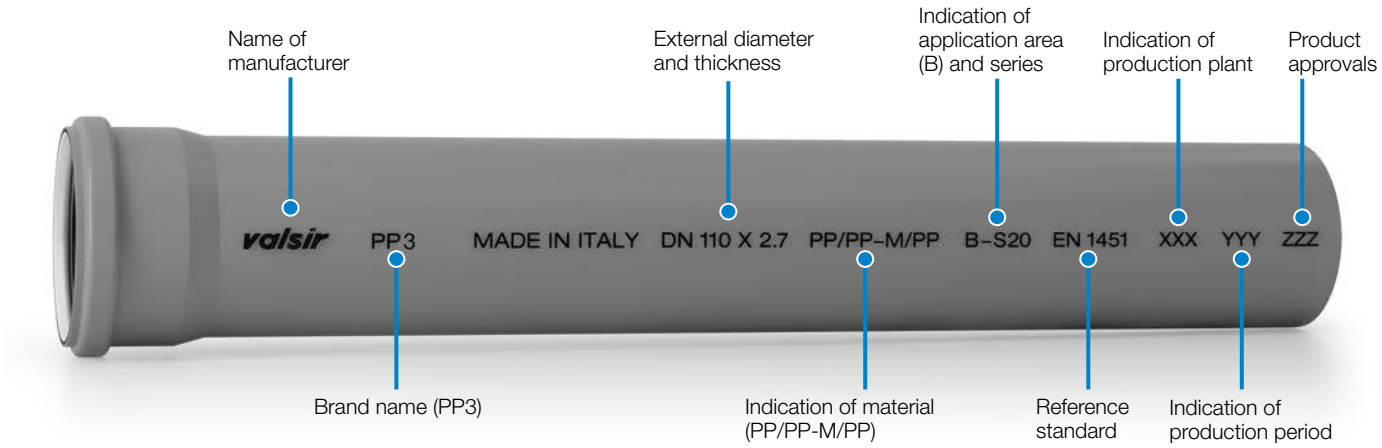
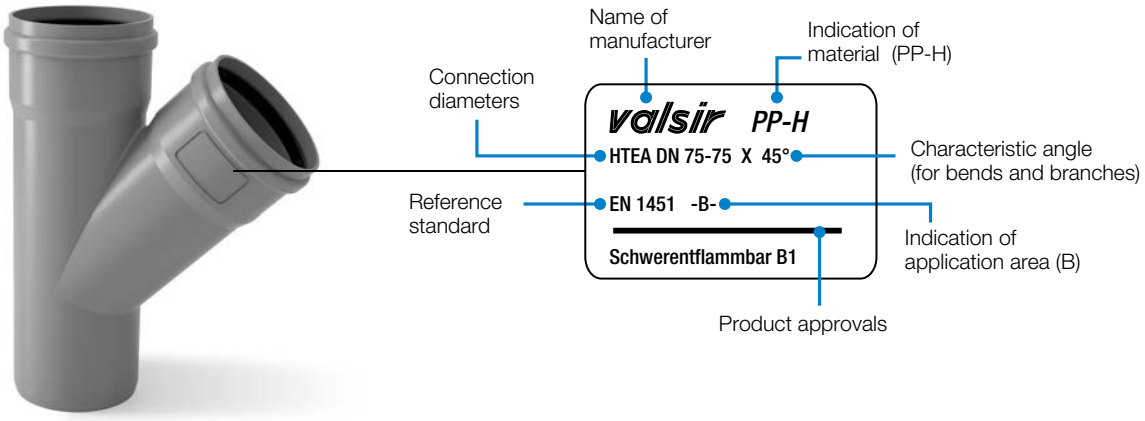


Figure 1.9 Fitting marking.



1.4 Valsir Blackfire®. Triple-layer, self-extinguishing, soundproofing and UV-resistant push-fit system for installation inside buildings

1.4.1 The product

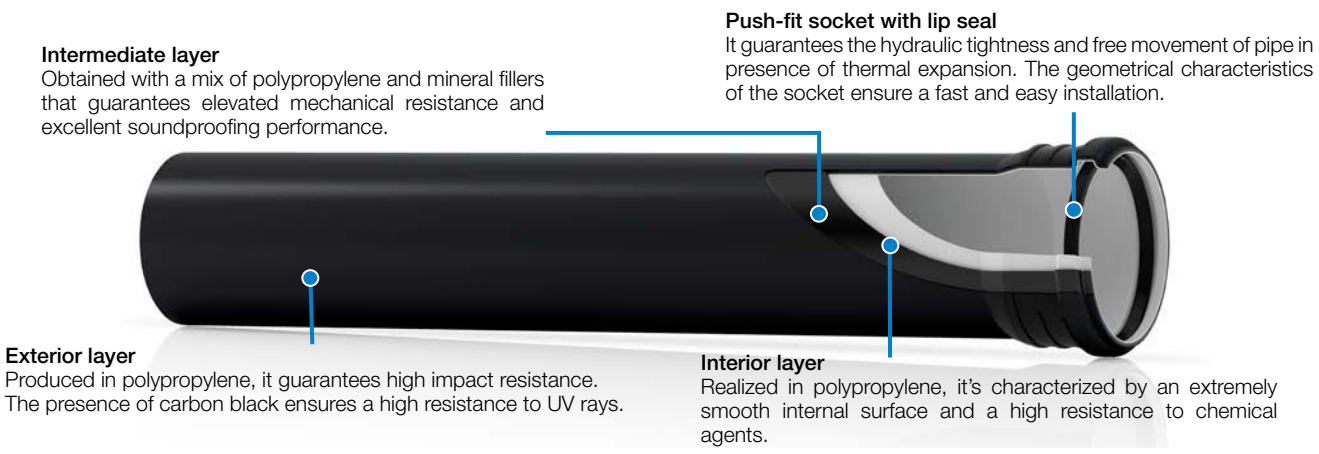
The Valsir Blackfire® system is suitable for the construction of high and low temperature waste systems, for the ventilation of waste systems and for rainwater drainage inside civil and industrial buildings, hospitals, hotels, etc.

The pipes are composed of three layers of material, that, when combined, give them exceptional mechanical properties at low temperatures as well as excellent soundproofing.

1.4.2 Characteristics

- Good soundproofing performance; thanks to its characteristics, the system has a noise level of 16 dB(A) (with a flow rate 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.
- Extreme versatility and ease of installation thanks to the light weight of the products.
- A wide range of diameters from OD 32 mm to OD 160 mm and accessories for connection to existing drainage networks, even if made with different materials.
- High impact resistance also at low temperatures thanks to the structure made up of three layers of material joined together.
- High chemical resistance also at high temperature, not subject to 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.
- Excellent firefighting performance, resulting in a class B1 rating according to standard DIN 4102-1.
- Pipes and fittings with Carbon Black and other additives to make the system UV-resistant.

Figure 1.10 Pipe structure.



1.4.3 Technical details

Table 1.7 Typical technical details.

Property	Value	Test method
Pipe material	Polypropylene for internal and external layers, mixture of polypropylene and mineral fillers for intermediate layer	-
Fitting material	Polypropylene + mineral fillers	-
Seal material	SBR	
Colour	Fittings: black. Pipes: black for the intermediate and external layers, white for the internal layer.	-
Diameters	32÷160 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	-10°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(3)	$L_{SC,A}$=16 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}=18 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
Density at 23°C	pipes: > 1100 kg/m^3 (average on thickness) >1200 kg/m^3 (intermediate layer) fittings: > 1100 kg/m^3	UNI EN ISO 1183-2
Elasticity modulus	1500 MPa	ISO 527-2
Tensile strength	≥ 20 MPa	ISO 527-2
Ultimate elongation	≥ 50%	ISO 6259-3
Crystalline melting temperature	≥ 160°C	ISO 11357-3
Linear heat expansion coefficient	0.08 mm/m·K	-
UV resistance	Suitable for use outdoors thanks to the presence of Carbon Black and others components	-
Halogen content	Halogen-free	-
Fire resistance	B1	DIN 4102-1
Reference construction standard	EN 1451-1 - AS7671	-
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) For more details, refer to chapter 2 “Noise in waste systems”.

1.4.4 Application field

The Valsir Blackfire® 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:

a) Waste pipes for domestic waste waters (low and high temperature).
b) Ventilation pipes connected to the waste pipes previously indicated.
c) Rain water systems within the building structure.

According to the European Standard EN 1451 the Valsir Blackfire® 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.

1.4.5 Dimensions

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

Table 1.8 Pipe dimensional characteristics.

Nominal diameter DN [mm]	External diameter OD [mm]	Thickness s [mm]	Series S	Application area
30	$32\ ^{+0.3}_{0}$	$1.8\ ^{+0.4}_{0}$	14/16/20	B
40	$40\ ^{+0.3}_{0}$	$1.8\ ^{+0.4}_{0}$	14/16/20	B
50	$50\ ^{+0.3}_{0}$	$1.8\ ^{+0.4}_{0}$	14/16/20	B
70	$75\ ^{+0.4}_{0}$	$2.3\ ^{+0.5}_{0}$	16	B
90	$90\ ^{+0.4}_{0}$	$2.8\ ^{+0.5}_{0}$	16	B
100	$110\ ^{+0.4}_{0}$	$3.4\ ^{+0.6}_{0}$	16	B
125	$125\ ^{+0.4}_{0}$	$3.9\ ^{+0.6}_{0}$	16	B
150	$160\ ^{+0.5}_{0}$	$4.9\ ^{+0.7}_{0}$	16	B

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

1.4.6 Connection systems

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

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

For more information on connection methods, see chapter 8 “Connections and testing”.

1.4.7 Quality marks

The quality marks obtained for the construction of Valsir Blackfire® pipes and fittings are the following:

DIBt Fraunhofer Hoch Fladungen DE — UKr SEPRO UA

1.4.8 Marking

Figure 1.11 Pipe marking.

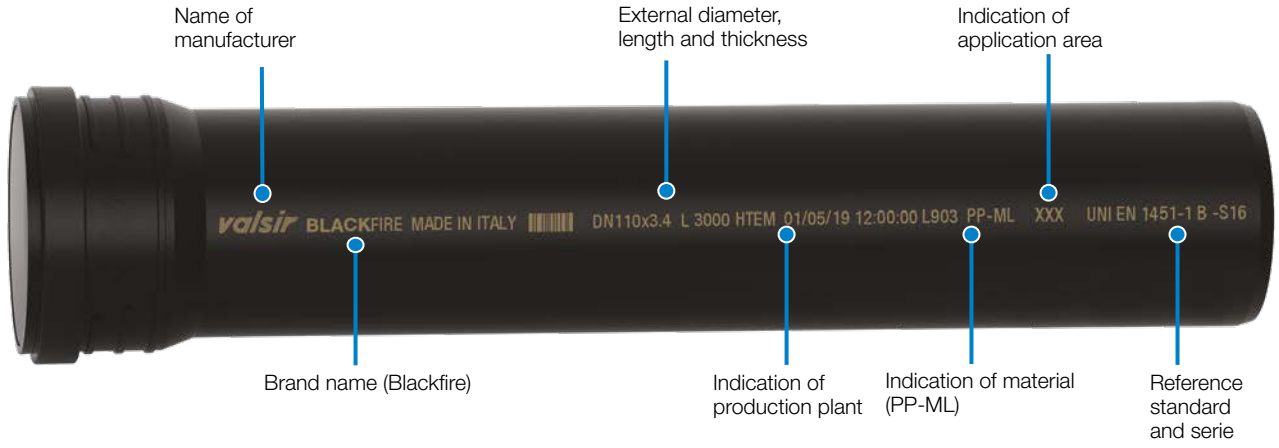
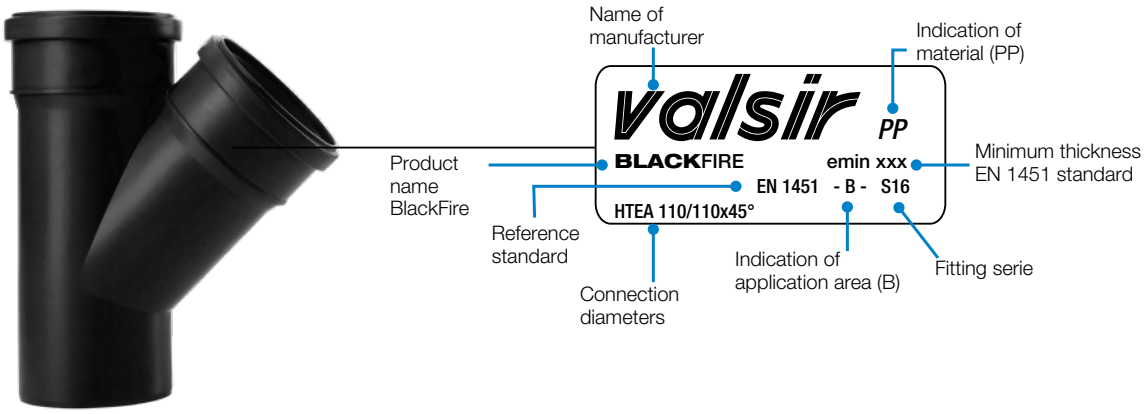


Figure 1.12 Fitting marking.



1.5 Valsir Triplus®. Soundproofing triple-layer push-fit system for installation inside buildings

1.5.1 The product

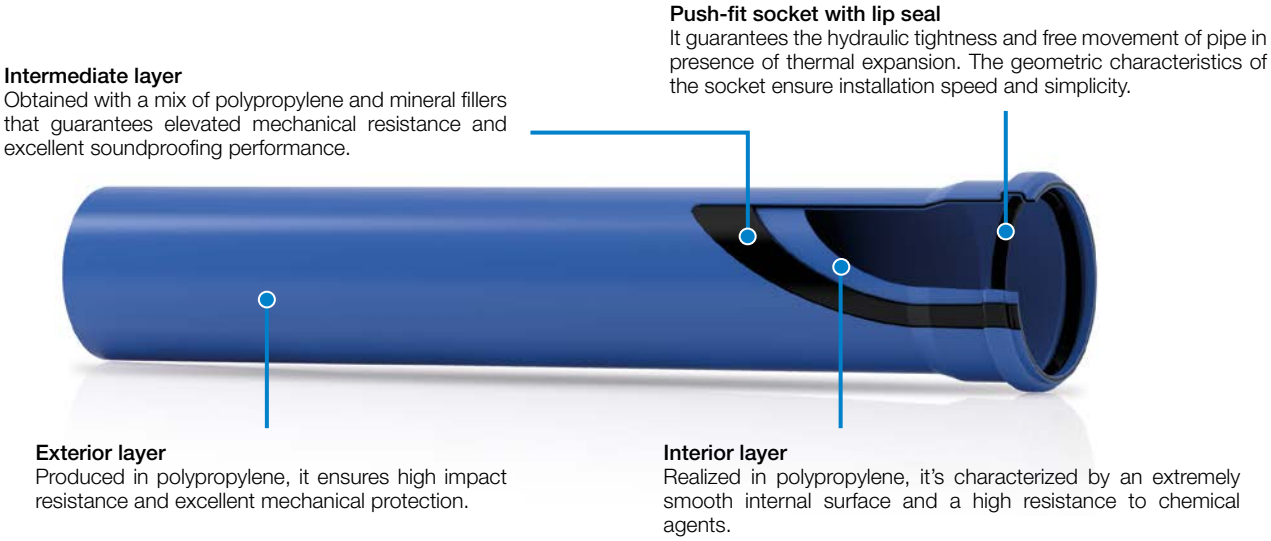
The Valsir Triplus® system is suitable for the construction of high and low temperature waste systems, for the ventilation of waste systems and for rainwater drainage inside civil and industrial buildings, hospitals, hotels, etc.

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

1.5.2 Characteristics

- Excellent soundproofing performance; the system reduces noise to just 12 dB(A) (with a flow rate 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 OD 32 mm to OD 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.

Figure 1.13 Pipe structure.



1.5.3 Technical details

Table 1.9 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(3)	$L_{SC,A}$=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(4). 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 - 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, the value indicated refers therefore to the maximum pressure that can applied during system testing at 20°C.
(3) For greater detail refer to chapter 2 “Noise in waste systems”.
(4) Provided protected from direct sunlight, for example, using a special protective paint.

1.5.4 Application field

The Valsir 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:

a) Waste pipes for domestic waste waters (low and high temperature).
b) Ventilation pipes connected to the waste pipes previously indicated.
c) Rain water 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.

1.5.5 Dimensions

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

Table 1.10 Pipe dimensional characteristics.

Nominal diameter DN [mm]	External diameter OD [mm]	Thickness s [mm]	Series S	Application area
30	$32\ ^{+0.3}_{0}$	$1.8\ ^{+0.4}_{0}$	14/16/20	B
40	$40\ ^{+0.3}_{0}$	$1.8\ ^{+0.4}_{0}$	14/16/20	B
50	$50\ ^{+0.3}_{0}$	$1.8\ ^{+0.4}_{0}$	14/16/20	B
70	$75\ ^{+0.4}_{0}$	$2.6\ ^{+0.5}_{0}$	14	B
90	$90\ ^{+0.4}_{0}$	$3.1\ ^{+0.6}_{0}$	14	B
100	$110\ ^{+0.4}_{0}$	$3.4\ ^{+0.6}_{0}$	16	B
125	$125\ ^{+0.4}_{0}$	$3.9\ ^{+0.6}_{0}$	16	B
150	$160\ ^{+0.5}_{0}$	$4.9\ ^{+0.7}_{0}$	16	B
200	$200\ ^{+0.5}_{0}$	$6.2\ ^{+0.6}_{0}$	16	B
250	$250\ ^{+0.5}_{0}$	$7.7\ ^{+0.8}_{0}$	16	B

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

1.5.6 Connection systems

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

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

For more information on connection methods see chapter 8 “Connections and testing”.

1.5.7 Quality marks

The quality marks obtained for the construction of Valsir Triplus® pipes and fittings are the following:

1.5.8 Marking

Figure 1.14 Pipe marking.

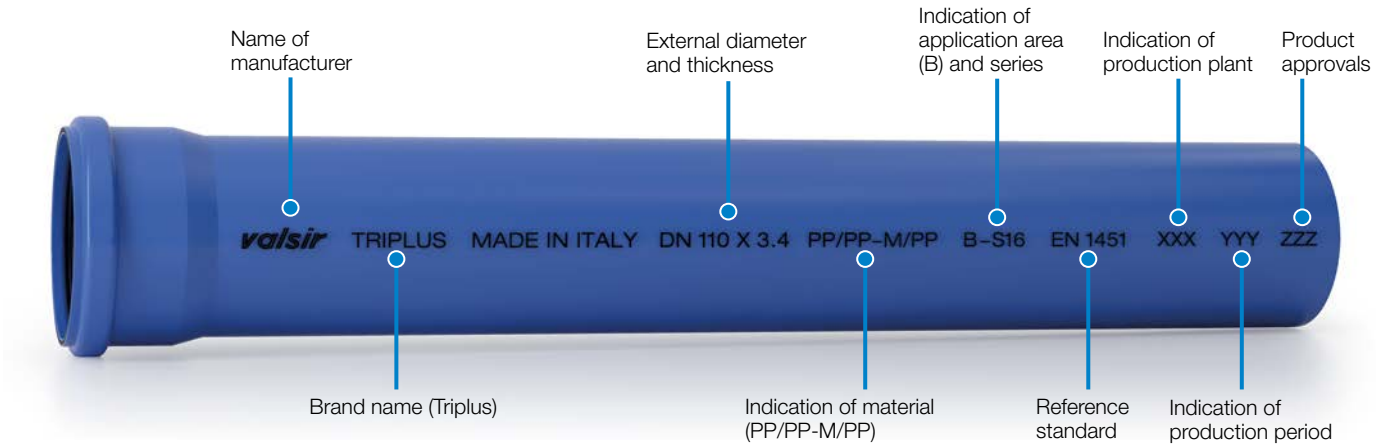
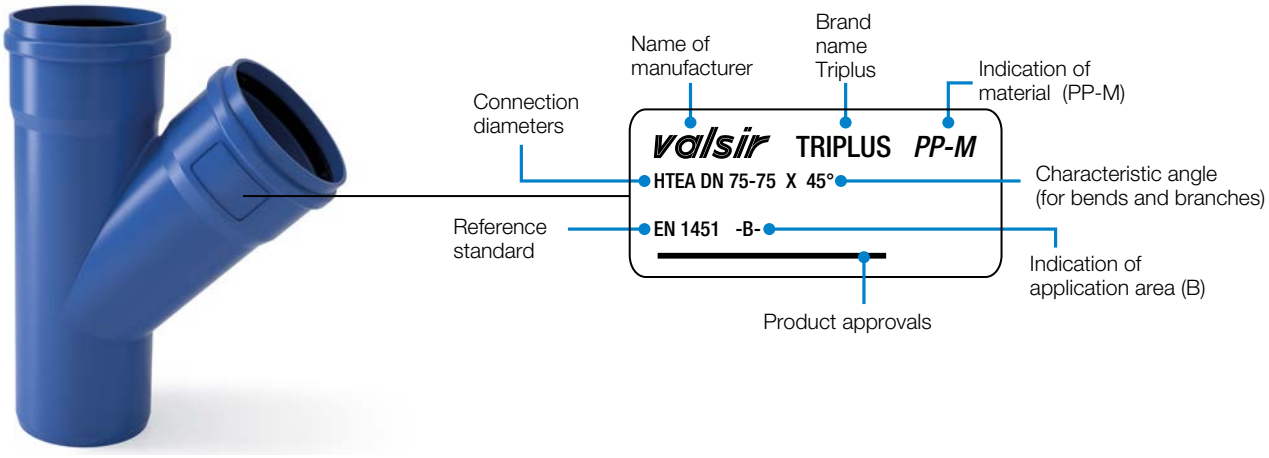


Figure 1.15 Fitting marking.



1.6 Valsir Silere®. Soundproofing push-fit system for installation inside buildings

1.6.1 The product

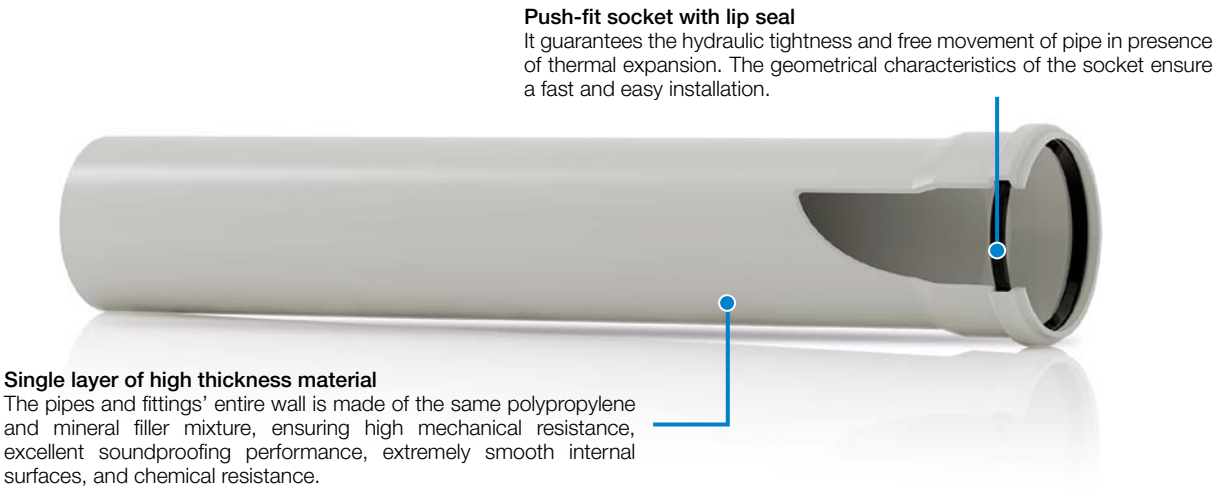
The Valsir Silere® product line is composed of push-fit pipes, fittings and accessories that enhance the sound-reducing properties of waste systems, in compliance with the standards and regulations in force. This product line is suitable for the construction of high and low temperature waste systems, for the ventilation of waste systems and for rainwater drainage inside civil and industrial buildings, hospitals, hotels, etc.

The system has a large wall thickness and a high specific weight, making it possible to achieve one of the best soundproofing performances currently available on the market.

1.6.2 Characteristics

- Excellent soundproofing performance; thanks to its characteristics, the system has a noise level of 6 dB(A) (with a flow rate 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.
- Wide range of diameters from OD 58 mm to OD 160 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.
- 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.

Figure 1.16 Pipe structure.



1.6.3 Technical details

Table 1.11 Typical technical details.

Property	Value	Test method
Pipe material	Mix of polypropylene and mineral fillers	-
Fitting material	Mix of polypropylene and mineral fillers	-
Seal material	SBR	
Colour	RAL 7035	-
Diameters	58÷160 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	-20°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(3)	$L_{SC,A}$=6 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}=9 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
	$R_w + C_{tr}$ 46 without pipe lagging and with 13 mm plasterboard wall and 75 mm R1.5 insulation, evaluation performed with flow of 2 and 4 l/s.	Building Code of Australia (Part F5.6)
Density at 23°C	1600 kg/m^3	UNI EN ISO 1183-2
Elasticity modulus	2800 MPa	ISO 527-2
Tensile strength	≥ 14 MPa	ISO 527-2
Ultimate elongation	≥ 80%	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(4). 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	C-s3,d0	EN 13501-1
Reference construction standard	EN 1451-1 - WMTS-508 - NBK 19	-
Packaging	Large diameter pipes are supplied in wooden frames with strapping, small diameters and short pipes are sealed in heat-shrinkable film. Fittings are sealed in heat-shrinkable film.	-

(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) For more details, refer to chapter 2 “Noise in waste systems”.
(4) Provided that it’s protected from direct exposure to sun rays, for example, using a special protective paint.

1.6.4 Application field

The Valsir Silere® 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:

a) Waste pipes for domestic waste waters (low and high temperature).
b) Ventilation pipes connected to the waste pipes previously indicated.
c) Rain water systems within the building structure.

According to the European Standard EN 1451 the Valsir Silere® 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.

1.6.5 Dimensions

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

Table 1.12 Pipe dimensional characteristics.

Nominal diameter DN [mm]	External diameter OD [mm]	Thickness s [mm]	Application area
50	$58\ ^{+0.3}_{0}$	$4.0\ ^{+0.5}_{0}$	B
70	$78\ ^{+0.3}_{0}$	$4.5\ ^{+0.5}_{0}$	B
90	$90\ ^{+0.4}_{0}$	$4.5\ ^{+0.6}_{0}$	B
100	$110\ ^{+0.4}_{0}$	$5.4\ ^{+0.7}_{0}$	B
125	$135\ ^{+0.4}_{0}$	$5.6\ ^{+0.7}_{0}$	B
150	$160\ ^{+0.5}_{0}$	$5.6\ ^{+0.7}_{0}$	B

1.6.6 Connection systems

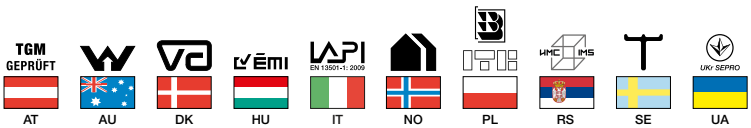
Silere pipes and/or fittings use a number of connection methods:

- Connection with push-fit socket.
- Connection with sliding sleeve.
- Connection with bi-joint sleeve.
- Connection with double socket fitting.

For more information on connection methods see chapter 8 “Connections and testing”.

1.6.7 Quality marks

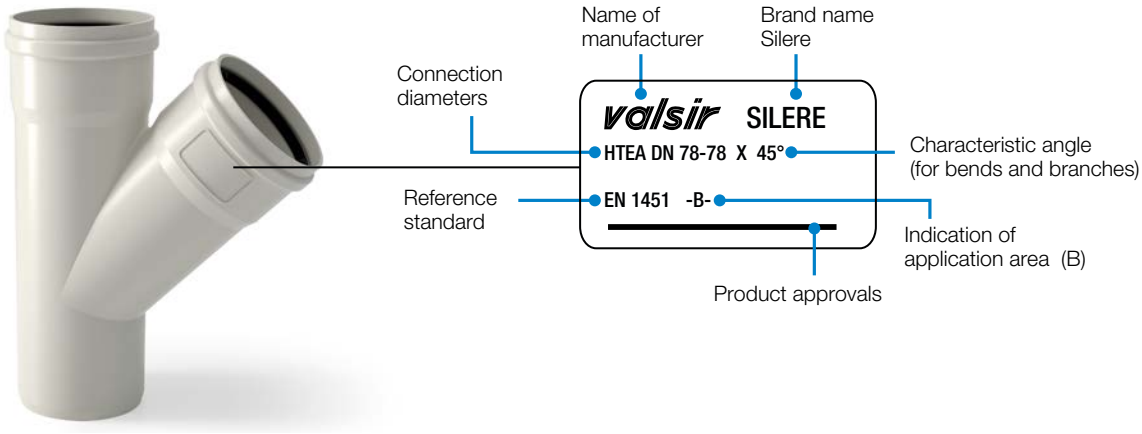
The quality marks obtained for the construction of Silere® pipes and fittings are the following:



1.6.8 Marking

Table 1.13 Pipe marking.

Table 1.14 Fitting marking.



WASTE SYSTEMS

SUPPLY SYSTEMS

GAS SYSTEMS

FLUSHING SYSTEMS

BATHROOM SYSTEMS

TRAPS

RADIANT SYSTEMS

DRAINAGE SYSTEMS

HRV SYSTEM

ACADEMY

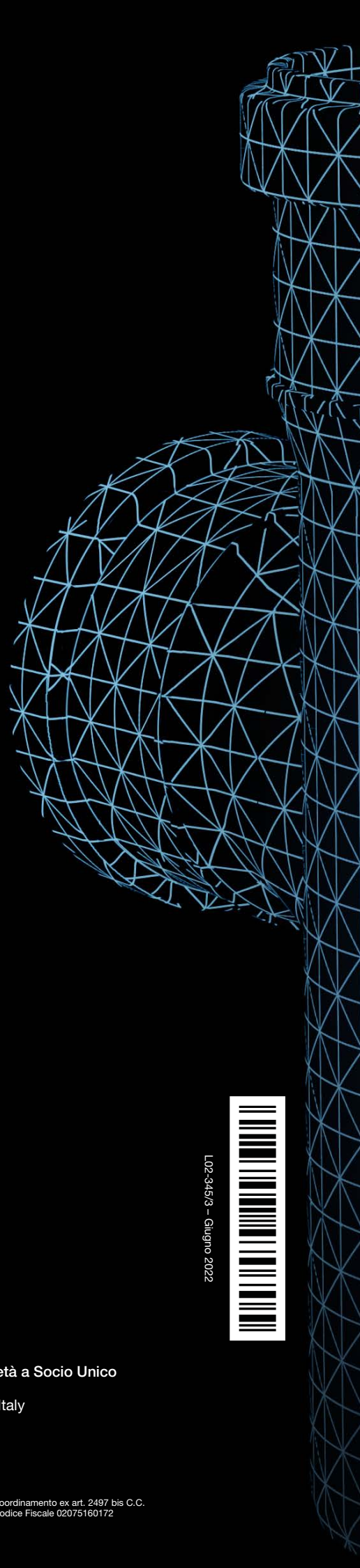
SEWER SYSTEMS

WATER TREATMENT

GROUP SILMAR

valsir®

QUALITY FOR PLUMBING



L02-345/3 – Giugno 2022

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