2

TECHNICAL MANUAL

SUPPLY SYSTEMS

Components

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2

COMPONENTS

2 COMPONENTS

Valsir offers a wide range of pipes and fittings for the construction of water supply, heating, air cooling and industrial systems. The entire range is widely described in the following chapters, the following tables are intended to give an immediate indication of the areas of application for each type of pipe and matching fitting.

Table 2.1 Application fields.

Application	Pexal® pipe	Mixal® pipe	Thermoline® pipe
Supply of hot and cold drinking water	•	•	
Centralized distribution	•	•	
Radiator heating	•	•	•
Convector air conditioning	•	•	•
Floor, wall and ceiling radiant heating and air conditioning	•	•	•
Compressed air distribution	•	•	
Industrial installations	•	•	
Fuel gas transportation(1)	•		

(1) This application is possible with specially approved Pexal® Gas pipes with an outer yellow layer, that are not dealt with in this manual.

Table 2.2 Correlation between pipes and fittings.

Pipe	Pexal® Brass Brass press-fittings	Bravopress® Multi-press PPSU fittings	Pexal® XL Technopolymer modular fittings	Pexal® Easy Full bore PPSU fittings	Pexal® Twist Brass compression fittings
Pexal® pipe	•	•	•	•	•
Mixal® pipe	•	•			•
Thermoline® pipe	•	•			•

2.1 Pexal® multilayer pipes

2.1.1 The product

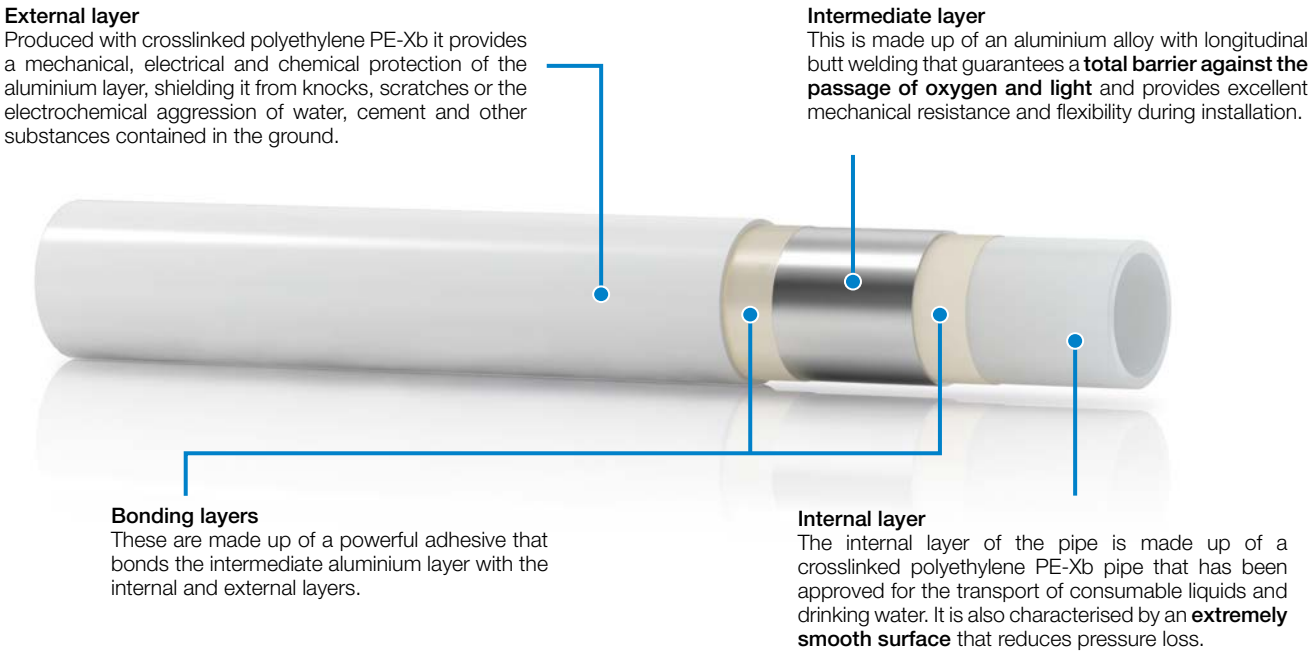
Pexal® is an innovative pipe capable of responding to different installation techniques and different applications, from hot and cold potable water distribution, to centralized distribution, from convector and radiator heating systems to floor, wall and ceiling heating and air cooling systems, from compressed air distribution systems to industrial installations.

The Pexal® Gas pipe with an outer yellow layer is suitable and is certified for transporting fuel gas inside buildings (for more details, please refer to the dedicated documentation).

The Pexal® multilayer pipes combine the advantages of synthetic materials and in particular of the crosslinked polyethylene such as resistance to abrasion and corrosion, chemical resistance and hygiene with those of aluminium such as resistance to high temperatures and pressures, dimensional stability, impermeability to oxygen and light, and low thermal expansion.

The result is a product consisting of different layers of materials that combined together allow excellent properties to be obtained which can not be reached by a pipe made of only one material.

Figure 2.1 Layering of the pipe.



2.1.2 Features

The characteristics of the Pexal® pipes make this product highly reliable and extremely easy to install.

Durability and mechanical strength

The system has a durability of at least 50 years guaranteed by the product standards at pressures of 10 bar and temperatures up to 95°C. For operating temperatures lower than 95°C, the pipes can withstand pressures above 10 bar while maintaining a high degree of reliability over time. The mechanical characteristics of the Pexal® pipes are such that the bursting pressure at room temperature (in relation to the pipe diameter) is more than 100 bar!

Resistance to corrosion

The total resistance to corrosion, to building materials and to the main chemical compounds allows them to be used for various applications, even industrial ones.

Smoothness and resistance to scale formation

The extreme smoothness of the inner surface (roughness of 0.007 mm) prevents the formation of deposits such as limescale and also ensures low pressure drops over time.

Resistance to abrasion

Crosslinked polyethylene is abrasion resistant, and this is a synonym of durability, since the pipes are not affected by the abrasive action of impurities that are carried by the water at high speed.

Flexibility and shape stability

The combination of crosslinked polyethylene and aluminium guarantees excellent flexibility features in bending (laso manual bending). The Pexal® pipe can be bent manually up to the 32 mm diameter and mechanically for the larger diameters, with curvature radii of up to 2.5 times the diameter.
The excellence of the Pexal® pipes resides also in its extraordinary shape stability: once bent and installed, it maintains the configuration over time allowing a reduction of the number of anchoring clips needed, which in surface mounting is reduced by 40% of the clips required for plastic pipes such as PE-X, PE-RT, PP-R, PB, PVC-C etc. Thanks to these features, the Pexal® pipes are also the ideal solution in areas subjected to earthquakes.

Thermal expansion

Thermal expansion is about 8 times lower than that of plastic pipes and is comparable to that of metal pipes. A 10 m Pexal® pipe subjected to a 50°C temperature difference will expand by 13 mm in contrast to a plastic pipe (crosslinked polyethylene) that expands by 90 mm.

Lightweight

The pipes are extremely lightweight compared to metal pipes: the weight is 1/3 compared to that of a corresponding copper pipe and 1/10 compared to that of a corresponding steel pipe.

Acoustic insulation

Crosslinked polyethylene is elastic and absorbs vibrations and therefore offers excellent acoustic insulation.

Oxygen and light barrier

The butt-welded aluminium layer represents a permanent oxygen and light barrier, avoiding in this way the two main causes of algae formation and corrosion in plastic pipes.

Thermal conductivity

The thermal conductivity of the pipe is 0.42 - 0.52 W/m·K (in relation to the diameter), approximately 900 times lower than that of copper, an aspect which is extremely important to ensure reduced temperature losses.

Hygiene

Non-toxic materials are used for the pipes and fittings and the system is certified for drinking water distribution.

Ecology
Pexal® is manufactured with fully recyclable materials, the production processes are energetically efficient in order to have a low impact on the environment. Valsir adopts Green Building principles, with an eye on environmental protection and conservation of resources.

2.1.3 Technical data

Table 2.3 Typical technical data.

Features	Values	Testing methods
Material	Crosslinked polyethylene internal layer PE-Xb, internal bonding layer, intermediate aluminium layer, external bonding layer, crosslinked polyethylene external layer PE-Xb	-
Colour	RAL White 9003	-
Dimensions	14÷110 mm	-
Application	Hot and cold potable water distribution, convector and radiator heating systems, radiant heating and cooling systems, compressed air distribution systems, industrial installations.	-
Fittings	Pexal® Brass, Bravopress®, Pexal® XL, Pexal® Easy and Pexal® Twist	-
Minimum operating temperature(1)	-60°C	-
Maximum temperature(2)	+95°C/+100°C	EN ISO 21003-1
Maximum pressure	+10 bar	EN ISO 21003-1
Density at 23°C	> 0.950 g/cm^3 (crosslinked polyethylene)	-
Softening temperature	135°C	-
Thermal expansion coefficient	0.026 mm/m·K	-
Thermal conductivity	0.42÷0.52 W/m·K	-
Internal roughness	0.007 mm	-
Oxygen permeability	0 mg/l	-
UV Resistance	Yes, if protected with UV-resistant paint	-
Halogen levels	Halogen-free	-
Reaction to fire	C-s2,d0	EN 13501-1

(1) At any rate above the freezing temperature of the transported fluid.
(2) For more details see the “Application fields” section.

2.1.4 Application fields

The conditions of use of the Pexal® pipes are shown in the technical data tables outlined above; however, according to the international standard EN ISO 21003-1 there are four classes of application or fields of use that need to be ascertained by performing laboratory tests in combination with the operating pressure p_D chosen by the producer which can be 4, 6, 8, 10 bar. These application fields are given in the table below.
The Pexal® pipes are certified for all four classes of application for pressures up to 10 bar.

Table 2.4 Application fields and operating conditions in compliance with EN ISO 21003-1.

Application fields	Operating temperature T_D	Duration of T_D	Maximum operating temperature T_{max}	Duration of T_{max}	Malfunctioning temperature	Duration of T_{mal}	Typical application
	[°C]	[years]	[°C]	[years]	[°C]	[hours]	
1[a]	60	49	80	1	95	100	Domestic hot water (60°C)
2[a]	70	49	80	1	95	100	Domestic hot water (70°C)
4[a]	20 + 40 + 60	2.5 + 20 + 25	70	2.5	100	100	Floor heating and low temperature systems
5[a]	20 + 60 + 80	14 + 25 + 10	90	1	100	100	High temperature heating systems

2.1.5 Range

The range of Pexal® pipes is extremely wide: they are produced in a 14 mm diameter to 110 mm diameter and are available in coils or straight lengths, without sheath, with 6 and 10 mm insulating sheath or with corrugated protective sheath.

Table 2.5

Pipe dimensions	Pexal® pipe in coils	Pexal® pipe in straight lengths	Pexal® pipe with 6 mm insulating sheath	Pexal® pipe with 10 mm insulating sheath	Pexal® pipe with corrugated protective sheath	Pexal® insulated double pipe with corrugated protection
14x2	100 m	5 m	50 m (grey)	-	-	-
16x2	100 m, 200 m	5 m	50 m (grey, red, blue)	50 m (blue)		50 m
16x2.25	100 m	5 m	50 m (grey)	50 m (blue)	-	-
18x2	100 m	5 m	50 m (grey)	-	-	-
20x2	100 m	5 m	50 m (grey, red, blue)	50 m (red, blue)	50 m (red, blue)	50 m
20x2.5	100 m	5 m	25 m (grey), 50 m (grey)	50 m (blue)	-	-
26x3	50 m	5 m	50 m (grey, red, blue)	50 m (red, blue)	50 m (red, blue)	-
32x3	50 m	5 m	-	25 m (grey, red)	25 m (red, blue)	-
40x3.5	-	5 m	-	-	-	-
50x4	-	5 m	-	-	-	-
63x4.5	-	5 m	-	-	-	-
75x5	-	5 m	-	-	-	-
90x7	-	5 m	-	-	-	-
110x10	-	5 m	-	-	-	-

2.1.5.1 Pexal® pipe features

Pexal® pipes without insulation are suitable for a multitude of applications and if necessary can be suitably insulated once the installation has been completed.

Table 2.6 Pexal® pipe features (diameters from 14 to 26 mm).

External diameter	**[mm]**	14	16	16	18	20	20	26
Thickness	**[mm]**	2	2	2.25	2	2	2.5	3
Internal diameter	**[mm]**	10	12	11.5	14	16	15	20
Water volume	**[l/m]**	0.078	0.113	0.104	0.154	0.201	0.176	0.314
Weight	**[g/m]**	97	113	120	130	156	177	286
Weight with water	**[g/m]**	175	226	224	284	357	353	599
Maximum operating temperature	**[°C]**	95	95	95	95	95	95	95
Maximum operating pressure	**[bar]**	10	10	10	10	10	10	10
Thermal expansion coefficient	**[mm/m·K]**	0.026	0.026	0.026	0.026	0.026	0.026	0.026
Thermal conductivity	**[W/m·K]**	0.44	0.44	0.43	0.44	0.47	0.45	0.47
Internal roughness	**[mm]**	0.007	0.007	0.007	0.007	0.007	0.007	0.007
Oxygen permeability	**[mg/l]**	0	0	0	0	0	0	0

Table 2.7 Pexal® pipe features (diameters from 32 to 110 mm).

External diameter	**[mm]**	32	40	50	63	75	90	110
Thickness	**[mm]**	3	3.5	4	4.5	5	7	10
Internal diameter	**[mm]**	26	33	42	54	65	76	90
Water volume	**[l/m]**	0.53	0.854	1.383	2.286	3.312	4.528	6.362
Weight	**[g/m]**	390	545	833	1232	1603	2403	3810
Weight with water	**[g/m]**	919	1397	2213	3513	4908	6922	10159
Maximum operating temperature	**[°C]**	95	95	95	95	95	95	95
Maximum operating pressure	**[bar]**	10	10	10	10	10	10	10
Thermal expansion coefficient	**[mm/m·K]**	0.026	0.026	0.026	0.026	0.026	0.026	0.026
Thermal conductivity	**[W/m·K]**	0.50	0.49	0.50	0.51	0.52	0.47	0.44
Internal roughness	**[mm]**	0.007	0.007	0.007	0.007	0.007	0.007	0.007
Oxygen permeability	**[mg/l]**	0	0	0	0	0	0	0

2.1.5.2 Multilayer Pexal® insulated pipe features

Pexal® pipes that are covered in the factory with thermal insulting sleeves are suitable in all applications that require a certain degree of insulation against condensation and against energy loss combined with an extremely practical and economic installation.

Table 2.8 Multilayer Pexal® insulated pipe features.

Pipe	Insulation thickness	External diameter of the insulated pipe	Weight	Thermal conductivity of the insulated pipe
	[mm]	[mm]	[g/m]	[W/m·K]
14x2	6	26	105	0.055
16x2	6	28	121	0.054
16x2	10	36	133	0.049
16x2.25	6	28	138	0.057
16x2.25	10	36	150	0.051
18x2	6	30	139	0.054
20x2	6	32	166	0.053
20x2	10	40	179	0.048
20x2.5	6	32	199	0.057
20x2.5	10	40	212	0.051
26x3	6	38	304	0.060
26x3	10	46	320	0.053
32x3	10	52	430	0.052

The features of the material used for the production of the insulating sheath are indicated in the table.

Table 2.9 Features of the material used for the production of the insulating sheath.

Features	Unit	Value
Material	-	High density closed cell polyethylene
Fire resistance class (EN 13501-1)	-	B_L-s1,d0
Density	[kg/m^3]	33
Thermal conductivity at 0°C	[W/m·K]	0.0343
Thermal conductivity at 10°C	[W/m·K]	0.0354
Thermal conductivity at 40°C	[W/m·K]	0.0374
Traction resistance	[N/mm^2]	>0.18
Ultimate elongation	[%]	>80
Vapour diffusion resistance factor μ	-	7400

2.1.5.3 Features of the multilayer Pexal® pipe with corrugated protective sheath

Pexal® pipes that are covered in the factory with a protective corrugated insulating sleeve are generally used in domestic water supply systems that require protection.

Table 2.10 Features of the multilayer Pexal® pipe with corrugated protective sheath.

Pipe	Sheath thickness	External diameter of the pipe including the sheath	Weight	Crushing
	[mm]	[mm]	[g/m]	[N/m]
16x2	0.8	26.5	170	320
16x2 double	0.85	25	334	320
20x2	0.9	30.5	237	320
20x2 double	0.95	30.5	466	320
26x3	0.9	37.5	392	320
32x3	0.9	44.8	532	320

The features of the material used for the production of the corrugated protective sheath are indicated in the table.

Table 2.11 Features of the material used for the production of the corrugated protective sheath.

Features	Unit	Value
Material	-	High density polyethylene
Flame-retardant	-	No
Density	[kg/m^3]	961
Thermal conductivity	[W/m·K]	0.38
Traction resistance	[N/mm^2]	> 22
Ultimate elongation	[%]	> 350

2.1.6 Connection systems

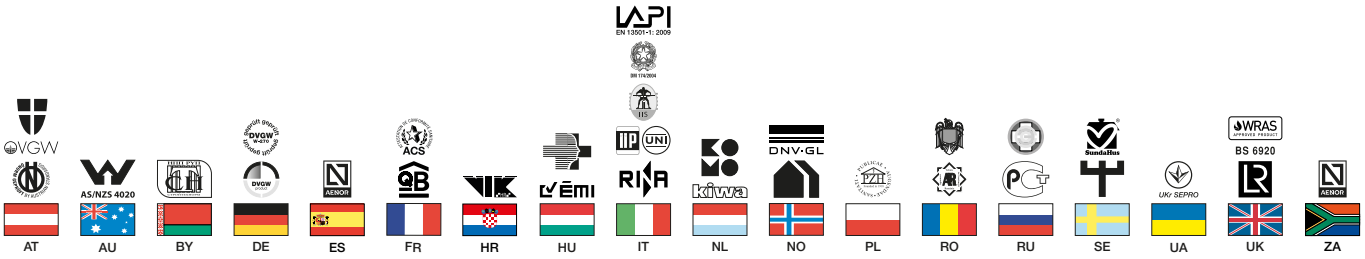
The Pexal® pipes can be matched with different types of Valsir fittings.

Table 2.12

Pexal® pipe	Pexal® Brass Multi-press brass fittings	Bravopress® PPSU press-fittings	Pexal® XL Technopolymer modular fittings	Pexal® Easy Full bore PPSU fittings	Pexal® Twist Brass compression fittings
14x2	•			•	•
16x2	•	•		•	•
16x2.25	•			•	•
18x2	•				•
20x2	•	•		•	•
20x2.5	•			•	•
26x3	•	•		•	•
32x3	•	•		•	•
40x3.5	•	•	•	•	
50x4	•	•	•	•	
63x4.5	•	•	•	•	
75x5	•		•	•	
90x7	•		•		
110x10			•		

2.1.7 Certifications

The Pexal® system is manufactured and certified according to EN ISO 21003 Standards by the strictest certification bodies that control and frequently verify its performance in our production plants in Italy.

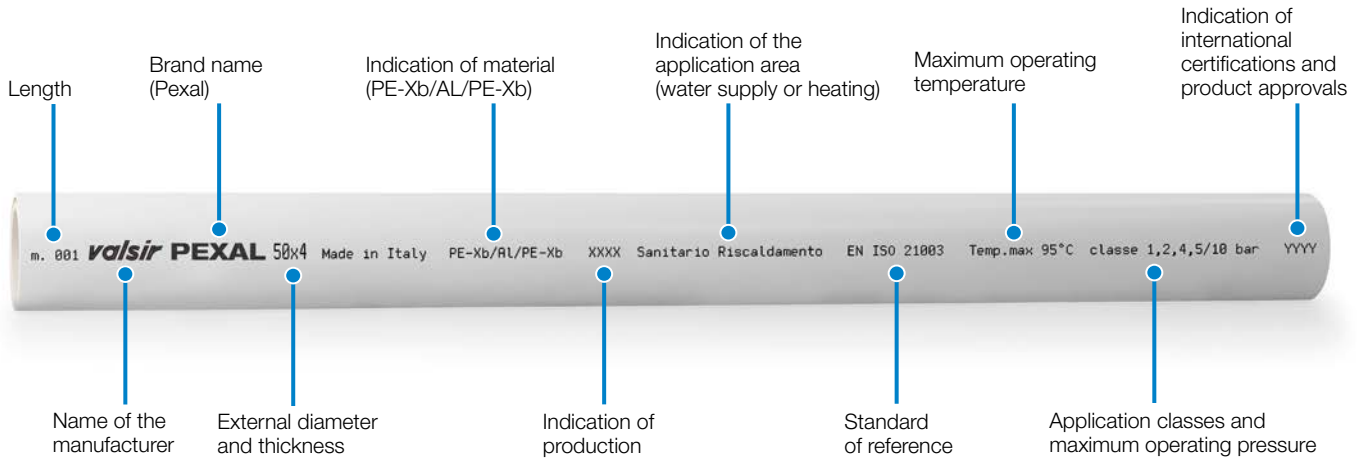


2.1.8 Potability

The Pexal® system is suitable for domestic water supply systems; it received a potability certification from international institutes that ran tests to verify the absence of foreign substances, the non-proliferation of biofilm and organoleptic tests. Performed both at low and high temperatures, such tests in fact, assess whether the water is contaminated with molecules migrating from the pipe and conferring odour and flavour.
The Pexal® pipes passed these tests successfully, thus obtaining certifications in the main countries of interest: Austria, Australia, Germany, France, Hungary, Italy, Holland, Poland, Romania, Russia, Ukraine, Great Britain, South Africa.

2.1.9 Marking

The marking of the Pexal® pipes contains all the information required by current regulations as well as all the data necessary to trace the product.



2.2 Mixal® multilayer pipes

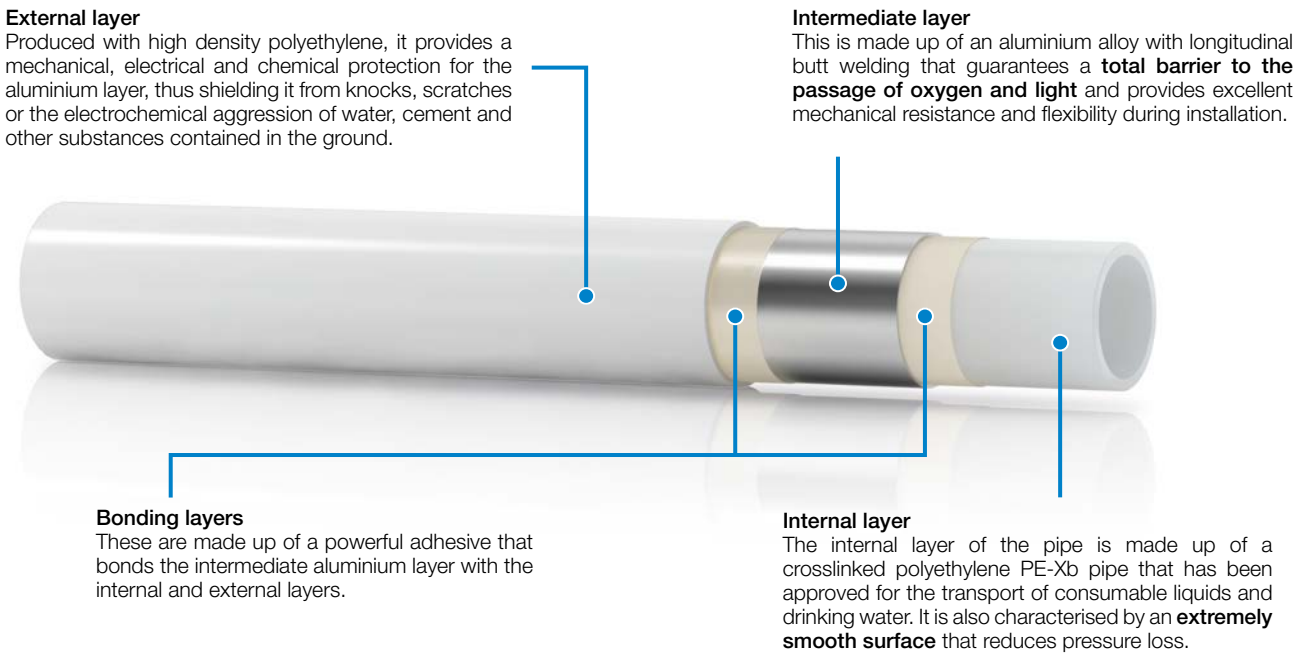
2.2.1 The product

Mixal® is an extremely flexible multilayer pipe and is therefore ideal for the creation of floor, wall and ceiling radiant heating and cooling systems. Thanks to its excellent performances it can also be used for hot and cold potable water supply, for convector and radiator heating systems, in industrial plants as well as for compressed air distribution systems.

Mixal® combines the advantages of synthetic materials (crosslinked polyethylene and high density polyethylene) such as resistance to abrasion and corrosion, chemical resistance and hygiene with those of the aluminium such as resistance to high temperatures and pressures, dimensional stability, impermeability to oxygen and light, and low thermal expansion.

The result is a product consisting of different layers of materials that combined together allow excellent properties to be obtained which can not be reached by a pipe made of only one material.

Figure 2.2 Layering of the pipe.



2.2.2 Features

The characteristics of Mixal® pipes are such as to make this a highly reliable product and extremely easy to install.

Durability and mechanical strength

The system has a durability of at least 50 years guaranteed by the product standards at pressures of 10 bar and temperatures up to 95°C. For operating temperatures lower than 95°C, the pipes can withstand pressures above 10 bar while maintaining a high degree of reliability over time. The mechanical characteristics of the Mixal® pipes are such that the bursting pressure at room temperature (in relation to the pipe diameter) is more than 100 bar!

Resistance to corrosion

The total resistance to corrosion, to building materials and to the main chemical compounds allows them to be used for various applications even industrial ones.

Smoothness and resistance to scales

The extreme smoothness of the inner surface (roughness of 0.007 mm) prevents the formation of deposits such as limescale and also ensures low pressure drops over time.

Resistance to abrasion

Crosslinked polyethylene is abrasion resistant, and this is a synonym of durability, since the pipes are not affected by the abrasive action of impurities that are carried by the water at high speed.

Flexibility and shape stability

The combination of crosslinked polyethylene, aluminium and high density polyethylene guarantees excellent flexibility during the bending phase (manual bending also). The Mixal® pipe can be bent manually or mechanically with bending radii of up to 2.5 times its diameter.
Once bent and installed, the Mixal® pipe maintains the configuration over time allowing to reduce the number of anchoring clips needed, which in surface mounting is reduced by 40% of the clips required for plastic pipes such as PE-X, PE-RT, PP-R, PB, PVC-C etc.
Thanks to these features, the Mixal® pipe is also the ideal solution in areas subject to earthquakes.

Thermal expansion

Thermal expansion is about 8 times lower than that of plastic pipes and is comparable to that of metal pipes. A 10 m long Mixal® pipe subjected to a 50°C temperature difference will expand by 13 mm in contrast to a plastic pipe (crosslinked polyethylene) that expands by 90 mm.

Lightweight

The pipes are extremely lightweight compared to metal pipes: the weight is 1/3 compared to that of a corresponding copper pipe and 1/10 compared to that of a corresponding steel pipe.

Acoustic insulation

Crosslinked polyethylene is elastic and absorbs vibrations and therefore offers excellent acoustic insulation.

Oxygen and light barrier

The butt-welded aluminium layer represents a permanent oxygen and light barrier, avoiding in this way the two main causes of algae formation and corrosion in plastic pipes.

Thermal conductivity

The thermal conductivity of the pipe is 0.42 - 0.52 W/m·K (in relation to the diameter), approximately 900 times lower than that of copper, an aspect which is extremely important to ensure reduced temperature losses.

Hygiene

Non-toxic materials are used for the pipes and fittings and the system is certified for drinkable water distribution.

Ecology
Mixal® is manufactured with fully recyclable materials, the production processes are energy efficient in order to have a low impact on the environment. Valsir adopts Green Building principles, with an eye on environmental protection and the conservation of resources.

2.2.3 Technical data

Table 2.13 Typical technical data.

Features	Values	Testing methods
Material	Crosslinked polyethylene PE-Xb internal layer, internal bonding layer, intermediate aluminium layer, external bonding layer, high density polyethylene HDPE external layer.	-
Colour	RAL white 9003	-
Dimensions	14÷32 mm	-
Application	Hot and cold potable water distribution, convector and radiator heating systems, radiant heating and air cooling systems, compressed air distribution systems, industrial installations.	-
Fittings	Pexal® Brass, Bravopress® and Pexal® Twist	-
Minimum operating temperature(1)	-60°C	-
Maximum temperature(2)	+95°C/+100°C	EN ISO 21003-1
Maximum pressure	+10 bar	EN ISO 21003-1
Density at 23°C	> 0.950 g/cm^3 (crosslinked polyethylene)	-
Softening temperature	135°C	-
Thermal expansion coefficient	0.026 mm/m·K	-
Thermal conductivity	0.42÷0.52 W/m·K	-
Internal roughness	0.007 mm	-
Oxygen permeability	0 mg/l	-
UV Resistance	Yes, if protected with UV-resistant paint	-
Halogen levels	Halogen-free	-
Fire resistance class	(16÷20) B-s2,d0 (25÷32) C-s2,d0	EN 13501-1

(1) At any rate above the freezing temperature of the transported fluid.
(2) For more details see the “Application fields” section.

2.2.4 Application fields

The conditions of use of Mixal® pipes are shown in the technical data tables outlined above, however, according to the international standard EN ISO 21003-1 there are four classes of application that need to be laboratory tested in combination with the operating pressure p_D chosen by the producer, which can be 4, 6, 8, 10 bar. These application classes are given in the table below. **The Mixal® pipes are certified for all four classes of application for pressures up to 10 bar.**

Table 2.14 Application fields and operating conditions in compliance with EN ISO 21003-1.

Application class	Operating temperature T_D	Duration of T_D	Maximum operating temperature T_{max}	Duration of T_{max}	Malfunctioning temperature T_{mal}	Duration of T_{mal}	Typical application
	[°C]	[years]	[°C]	[years]	[°C]	[hours]	
1[a]	60	49	80	1	95	100	Domestic hot water (60°C)
2[a]	70	49	80	1	95	100	Domestic hot water (70°C)
4[a]	20 + 40 + 60	2.5 + 20 + 25	70	2.5	100	100	Floor heating and low temperature systems
5[a]	20 + 60 + 80	14 + 25 + 10	90	1	100	100	High temperature heating systems

2.2.5 Range

The Mixal® pipes are available in coils or straight lengths from a 14 mm diameter to a 32 mm diameter, with a 6, 10 and 13 mm insulating sheath or with a corrugated protective sheath.

Table 2.15

Pipe dimensions	Mixal® pipe in coils	Mixal® pipe in straight lengths	Mixal® pipe with 6 mm insulating sheath	Mixal® pipe with 10 mm insulating sheath	Mixal® pipe with 13 mm insulating sheath	Mixal® pipe with corrugated protective sheath	Mixal® insulated double pipe with corrugated protection
14x2	100 m	5 m	50 m (grey)	-	-	-	-
16x2	100, 120, 200, 240, 500 m	5 m	50 m (grey, red, blue)	50 m (red, blue)	50 m (grey)	50 m (red, blue)	50 m (grey)
18x2	100 m	5 m	50 m (grey)	-	-	-	-
20x2	100, 240, 400 m	5 m	50 m (grey, red, blue)	50 m (blue, red)	50 m (grey)	50 m (red, blue)	50 m (grey)
20x2.25	100 m	5 m	50 m (grey)	-	-	-	-
25x2.5	50 m	5 m	50 m (grey)	-	-	-	-
26x3	50 m	5 m	25 m (grey) 50 m (grey, red, blue)	50 m (blue, red)	50 m (grey)	50 m (red, blue)	-
32x3	50 m	5 m	-	25 m (grey, red, blue)	25 m (grey)	50 m (red, blue)	-

2.2.5.1 Mixal® pipe features

Mixal® pipes without insulation are suitable for a multitude of applications and if necessary can be suitably insulated once installation has been completed.

Table 2.16 Mixal® pipe features.

External diameter	**[mm]**	14	16	18	20	20	25	26	32
Thickness	**[mm]**	2	2	2	2	2.25	2.5	3	3
Internal diameter	**[mm]**	10	12	14	16	15.5	20.5	20	26
Water volume	**[l/m]**	0.078	0.113	0.154	0.201	0.188	0.329	0.314	0.53
Weight	**[g/m]**	90	105	120	141	147	223	256	332
Weight with water	**[g/m]**	168	218	274	342	335	551	569	861
Maximum operating temperature	**[°C]**	95	95	95	95	95	95	95	95
Maximum operating pressure	**[bar]**	10	10	10	10	10	10	10	10
Thermal expansion coefficient	**[mm/m·K]**	0.026	0.026	0.026	0.026	0.026	0.026	0.026	0.026
Thermal conductivity	**[W/m·K]**	0.42	0.42	0.42	0.43	0.42	0.44	0.43	0.44
Internal roughness	**[mm]**	0.007	0.007	0.007	0.007	0.007	0.007	0.007	0.007
Oxygen permeability	**[mg/l]**	0	0	0	0	0	0	0	0

2.2.5.2 Multilayer Mixal® insulated pipe features

Mixal® pipes that are covered in the factory with thermal insulting sleeves are suitable in all applications that require a certain degree of insulation against condensation and against energy loss combined with an extremely practical and economic installation.

Table 2.17 Multilayer Mixal® insulated pipe features.

Pipe	Insulating layer thickness	External diameter of the insulated pipe	Weight	Thermal conductivity of the insulated pipe
	[mm]	[mm]	[g/m]	[W/m·K]
14x2	6	26	97	0.055
16x2	6	28	113	0.054
16x2	10	36	125	0.049
16x2	13	42	134	0.047
18x2	6	30	129	0.053
20x2	6	32	150	0.053
20x2	10	40	163	0.048
20x2	13	46	174	0.046
20x2.25	6	32	161	0.050
25x2.5	6	37	233	0.050
26x3	6	38	266	0.060
26x3	10	46	282	0.052
26x3	13	52	295	0.050
32x3	10	52	370	0.052
32x3	13	58	385	0.049

The features of the material used for the production of the insulating sheath are indicated in the table.

Table 2.18 Features of the material used for the production of the insulating sheath.

Features	Unit	Value
Material	-	High density closed cell polyethylene
Flame-retardant	-	B_L-s1,d0
Density	[kg/m^3]	33
Thermal conductivity at 0°C	[W/m·K]	0.0343
Thermal conductivity at 10°C	[W/m·K]	0.0354
Thermal conductivity at 40°C	[W/m·K]	0.0374
Traction resistance	[N/mm^2]	>0.18
Ultimate elongation	[%]	>80
Vapour diffusion resistance factor μ	-	7400

2.2.5.3 Features of the multilayer Mixal® pipe with corrugated protective sheath

Mixal® pipes that are covered in the factory with a protective corrugated insulating sleeve are generally used in domestic water supply systems that require protection.

Table 2.19 Features of the multilayer Mixal® pipe with corrugated protective sheath.

Pipe	Sheath thickness	External diameter sheathed pipe	Weight	Crushing
	[mm]	[mm]	[g/m]	[N/m]
16x2	0.8	26.5	162	320
16x2 double	0.85	25	318	320
20x2	0.9	30.5	221	320
20x2 double	0.95	30.5	434	320
26x3	0.9	37.5	364	320
32x3	0.9	44.8	484	320

The features of the material used for the production of the corrugated protective sheath are indicated in the table.

Table 2.20 Features of the corrugated protective sheath.

Features	Unit	Value
Material	-	High density polyethylene
Flame retardant	-	No
Density	[kg/m^3]	961
Thermal conductivity	[W/m·K]	0.38
Traction resistance	[N/mm^2]	> 22
Ultimate elongation	[%]	> 350

2.2.6 Connection systems

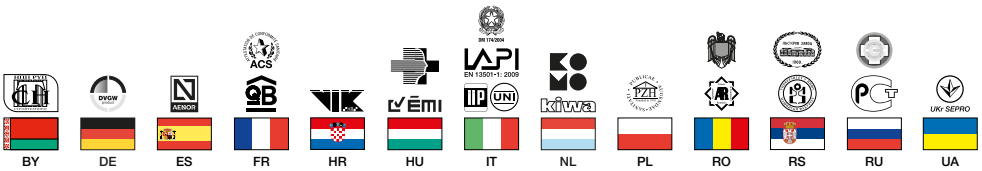
The Mixal® pipes can be combined with the different types of Valsir fittings.

Table 2.21

Mixal® pipe	Pexal® Brass Brass press fittings	Bravopress® Multi-press PPSU fittings	Pexal® XL Technopolymer modular fittings	Pexal® Easy Full bore PPSU fittings	Pexal® Twist Brass compression fittings
14x2	•				•
16x2	•	•			•
18x2	•				•
20x2	•	•			•
20x2.25	•				
25x2.5	•	•			
26x3	•	•			•
32x3	•	•			•

2.2.7 Certifications

The Mixal® system is produced and certified to standards EN ISO 21003 by international certification bodies that frequently control and verify performance inside the production plants located in Italy.

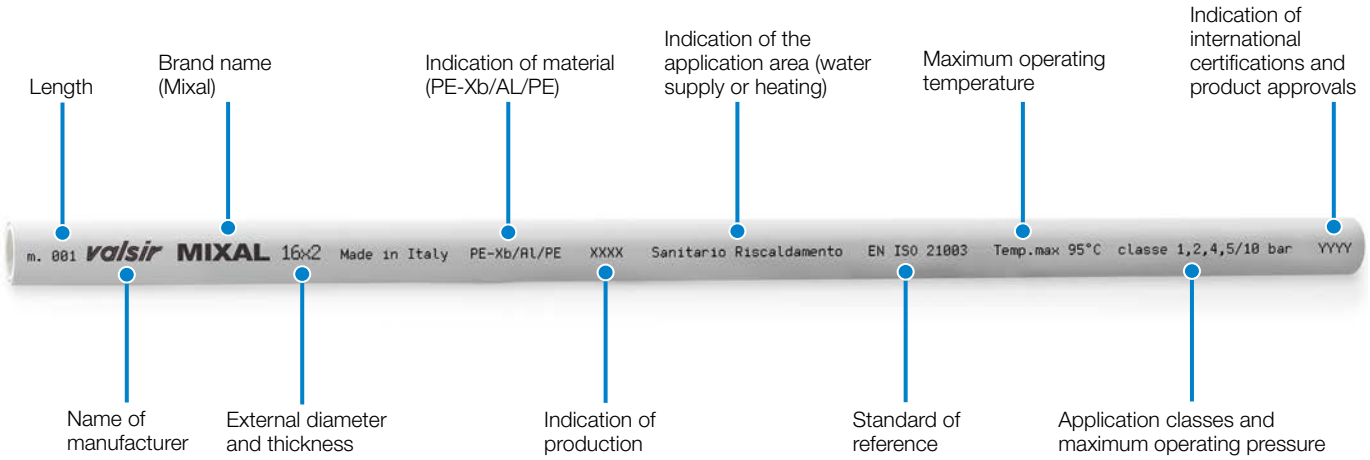


2.2.8 Potability

The Mixal® system is suitable and has been certified by international institutes for applications in water supply distribution systems: Belarus, France, Hungary, Italy, Poland, Romania, Serbia, Russia, and Ukraine.

2.2.9 Marking

The marking of the Mixal® pipes contains all the information required by current regulations as well as all the data necessary to trace the product.



2.3 Thermoline® plastic pipes

2.3.1 The product

Thermoline® is a plastic pipe produced with crosslinked polyethylene and is supplied with and without an oxygen barrier (EVOH). This product is widely used for the production of floor, wall and ceiling heating and cooling radiant systems but also for heating systems in general.

Thermoline® has an excellent resistance to abrasion, corrosion, and chemical agents and is characterized by excellent hygiene and exceptional elasticity.

Figure 2.3 Layering of the pipe with oxygen barrier (EVOH).

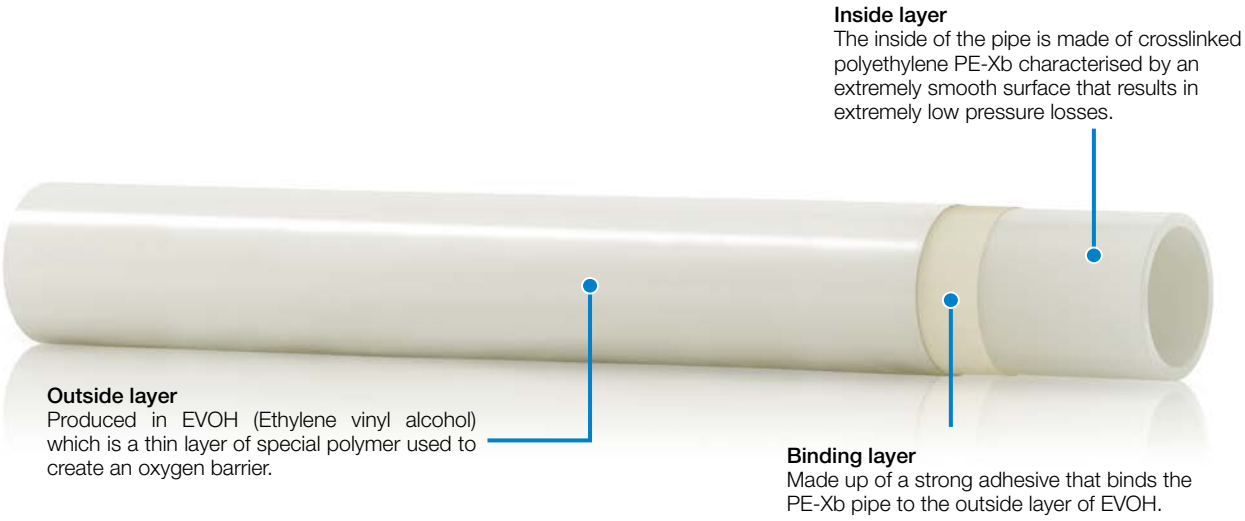


Figure 2.4 Layering of the pipe without oxygen barrier (EVOH).

2.3.2 Features

Advantages and features of the Thermoline® pipes.

Resistance to corrosion

This pipe is characterised by a total resistance to corrosion, to building materials and to the majority of chemical compounds.

Smoothness and resistance to scale formation

The extreme smoothness of the inner surface (roughness of 0.007 mm), as well as preventing the formation of limescale, also ensures low pressure drops over time.

Resistance to abrasion

Crosslinked polyethylene is abrasion resistant, and this is a synonym of durability, since the pipes are not affected by the abrasive action of impurities that are carried by the water at high speed.

Flexibility

Crosslinked polyethylene is extremely flexible and this facilitates installation of the pipe even in awkward positions. The pipes can be bent either cold or, for tighter bends, using a stream of hot air at about 130°C which causes the polyethylene to soften; in this phase, the crosslinked polyethylene becomes transparent and can be shaped according to necessity until it has completely cooled. This operation cannot be performed on pipes with an oxygen barrier as it would compromise the features of the pipe.

Lightweight

The pipes are extremely lightweight compared to metal pipes: the crosslinked polyethylene weighs 8 times less than steel and 10 times less than copper.

Thermal memory

If heated with a stream of air at 130°C crosslinked polyethylene becomes transparent and regains its original shape if lost due to crushing or excessive bending without compromising its mechanical strength. This operation cannot be performed on pipes with an oxygen barrier as it would compromise the pipe's features.

Resistance at low temperatures

It is possible to use crosslinked polyethylene at very low temperatures due to its high elasticity (as low as minus 100°C); even though at below 0°C temperatures crosslinked polyethylene does not become brittle, it is nevertheless important that the water doesn't freeze inside the pipe to avoid that, due to expansion of the water, stress is generated in very limited areas of the pipe wall that could lead to the ductile failure of the same.

Durability

The system has a durability of at least 50 years guaranteed by the product standards.

Acoustic insulation

Crosslinked polyethylene is elastic and absorbs vibrations and therefore offers excellent acoustic insulation.

Thermal Conductivity

Thermal conductivity of the pipe is 0.38 W/m·K, approximately 900 times lower than that of copper, an aspect which is extremely important to ensure reduced temperature losses.

Ecology

Thermoline® is manufactured with fully recyclable materials, the production processes are energy efficient in order to have a low impact on the environment. Valsir adopts Green Building principles, with an eye on environmental protection and the conservation of resources.

2.3.3 Technical data

Table 2.22 Typical technical data.

Features	Value	Testing methods
Material	Crosslinked polyethylene PE-Xb. The pipe with an oxygen barrier also has an adhesive layer and an EVOH outer layer.	-
Colour	Translucent white	-
Dimensions	12÷25 mm	-
Application	Radiator heating systems, convector heating systems, radiant heating and cooling systems.	-
Fittings	Pexal® Brass, Bravopress® and Pexal® Twist fittings	-
Minimum operating temperature(1)	-100°C	-
Maximum temperature(2)	+100°C	EN ISO 15875
Maximum pressure	Differs according to the pipe diameter, see section “Application fields”	-
Density at 23°C	> 0.950 g/cm^3 (crosslinked polyethylene)	-
Softening temperature	135°C	-
Ultimate strength at 23°C	20 MPa	-
Thermal expansion coefficient	0.14÷0.20 mm/m·K	-
Thermal conductivity	0.38 W/m·K	-
Internal roughness	0.007 mm	-
Oxygen permeability	In relation to the diameter, see the “Range” chapter.	DIN 4726
UV Resistance	No	-
Halogen levels	Halogen-free	-

(1) At any rate above the freezing temperature of the transported fluid.
(2) For more details see the “Application fields” section.

2.3.4 Application fields

The Thermoline® pipes are manufactured and certified according to EN ISO 15875 and therefore can be used, in relation to the application class and the working pressure indicated in the technical data table outlined above, at the temperature and duration conditions specified in the following table.

Table 2.23 Application fields and operating conditions in accordance with ISO 15875-1.

Application class	Operating temperature T_D	Duration of T_D	Maximum operating temperature T_{max}	Duration of T_{max}	Malfunctioning temperature T_{mal}	Duration of T_{mal}	Typical application
	[°C]	[years]	[°C]	[years]	[°C]	[hours]	
4[a]	20 + 40 + 60	2.5 + 20 + 25	70	2.5	100	100	Floor heating and low temperature systems
5[a]	20 + 60 + 80	14 + 25 + 10	90	1	100	100	High temperature heating system

DIN 16893 suggests another method to evaluate the operating conditions of crosslinked polyethylene pipes; with this standard it is possible to calculate the maximum operating pressure of the pipes at different temperatures as indicated in the following table.

Table 2.24 Maximum operating pressures calculated in accordance with DIN 16893 (paragraph 6.1).

External diameter	**[mm]**	12	14	15	16	17	18	20	20	25
Thickness	**[mm]**	2	2	2.5	2	2	2	2	2.8	2.3
Maximum pressure at 20°C	**[bar]**	25.2	21.0	25.2	18.0	16.8	15.8	14.0	20.5	12.5
Maximum pressure at 50°C	**[bar]**	17.6	14.7	17.6	12.6	11.8	11.0	9.8	14.4	8.8
Maximum pressure at 70°C	**[bar]**	14.1	11.8	14.1	10.1	9.4	8.8	7.8	11.5	7.0

Note. The maximum mechanical stress of crosslinked polyethylene at 50 years and a safety factor SF of 1.5 were taken into consideration.

2.3.5 Range

The Thermoline® pipes are available in coils from diameter 12 mm to diameter 25 mm, with or without an oxygen barrier (EVOH).

Table 2.25

Pipe dimensions	Thermoline® EVOH pipe (with oxygen barrier)	Thermoline® pipe (without oxygen barrier)
12x2	200 m	-
14x2	200, 600 m	-
16x2	120, 200, 240, 480, 600 m	100 m
17x2	200, 240, 480, 600 m	-
20x2	200, 600 m	100 m

2.3.5.1 Thermoline® pipe features

Thermoline® pipes without insulation are used mainly for the construction of floor heating and cooling systems. If necessary, they can be insulated after the installation.

Table 2.26 Thermoline® pipe features.

External diameter	**[mm]**	12	14	16	17	20
Thickness	**[mm]**	2	2	2	2	2
Internal diameter	**[mm]**	8	10	12	13	16
Water volume	**[l/m]**	0.050	0.079	0.113	0.133	0.201
Weight	**[g/m]**	65	78	91	97	116
Weight with water	**[g/m]**	115	156	203	229	317
Calculated series S_{calc}	**-**	2.5	3.0	3.5	3.8	4.5
Application class and operating pressure(1)	**[bar]**	Class 5/10	Class 5/10	Class 4/10 Class 5/8	Class 4/10 Class 5/8	Class 4/8
Thermal expansion coefficient at 20°C	**[mm/m·K]**	0.14	0.14	0.14	0.14	0.14
Thermal expansion coefficient at 100°C	**[mm/m·K]**	0.20	0.20	0.20	0.20	0.20
Thermal conductivity	**[W/m·K]**	0.38	0.38	0.38	0.38	0.38
Internal roughness	**[mm]**	0.007	0.007	0.007	0.007	0.007
Oxygen permeability(2)	**[mg /m²·day]**	≤3.6 at 80°C	≤3.6 at 80°C	≤3.6 at 80°C	≤3.6 at 80°C	≤0.32 at 40°C

(1) In accordance with EN ISO 15875, for details, see the “Application fields” section.
(2) Requirements contained in DIN 4726.

2.3.6 Connection systems

The Thermoline® pipes can be combined with different types of Valsir fittings.

Table 2.27

Thermoline® pipe	Pexal® Brass Brass press fittings	Bravopress® PPSU multi-press fittings	Pexal® XL Technopolymer modular fittings	Pexal® Easy Full bore PPSU fittings	Pexal® Twist Brass compression fittings
12x2					
14x2	•				•
16x2	•	•			•
17x2					
20x2	•	•			•

2.3.7 Certifications

The Thermoline® system is manufactured and certified according to the ISO 15875 standards by the strictest certification bodies that often control and verify its performance with frequent visits to our production plants in Italy.

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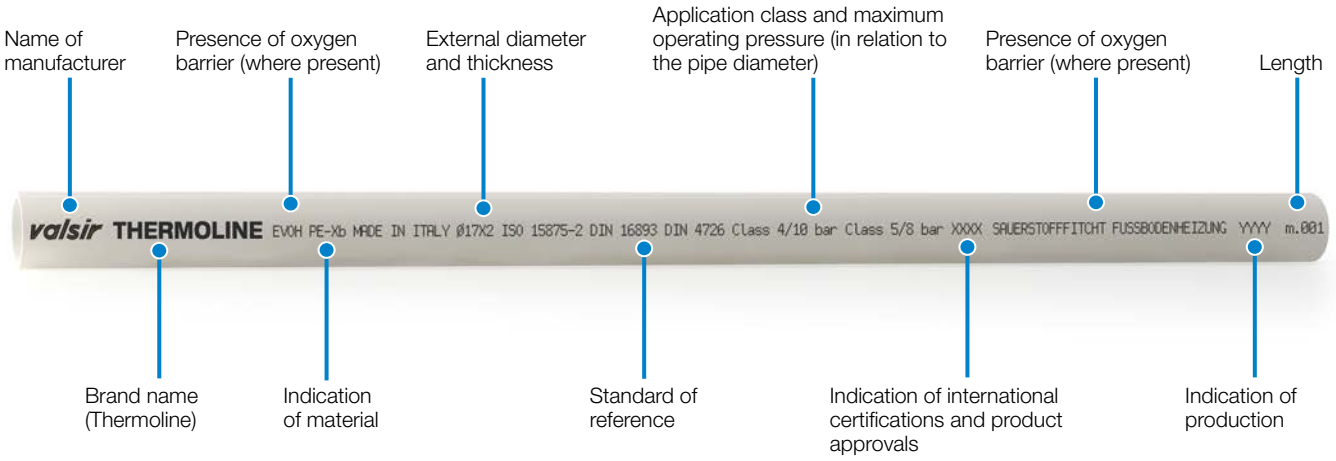
2.3.8 Marking

The marking of the Thermoline® pipes contains all the information required by current regulations as well as all the data necessary to trace the product.



2.4 Pexal® Brass press fittings

2.4.1 The product

Pexal® Brass is a system of press fittings suitable for a variety of applications, from hot and cold drinking water supply systems, to heating systems and industrial installations.

By using a portable pressing machine equipped with a suitable jaw, the pipe is shaped around the fitting insert. Even in the presence of temperature fluctuations, the joint remains perfectly watertight and cannot be loosened thanks to the stainless steel sleeve that covers the portion of pipe in contact with the insert. The sleeve has inspection holes to verify the correct insertion of the pipe on the fitting.

2.4.2 Features

Simplicity

The Pexal® Brass jointing technique was born in order to simplify and speed up connection operations with a consequent reduction of installation costs.

Multipress

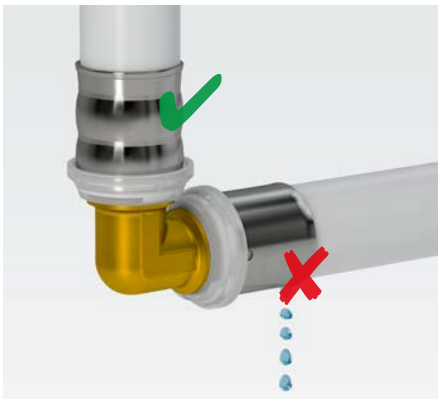
The Pexal® Brass fittings are multipress and therefore compatible with a wide range of pressing profiles available on the market (H, TH, U, C, VAL) and this allows the plumber to use the pressing jaws already in his possession without having to buy new ones.

Pressing profile TH

Pressing profile H, U, C, VAL

Safety

The fittings are designed so that to indicate any incomplete pressing during system testing, which according to international standards is necessary once the system has been completed (please refer to the chapter “Commissioning”). Thanks to the particular profile of the insert, the fittings indicate incomplete pressing by dripping, thus immediately identifying the point to be repaired.



Furthermore, the fittings are created with a special insert having a profile that prevents the pipe from becoming disconnected and two ring seals to guarantee maximum safety and reliability over time. Leak detection during system test in case of non pressed fittings on diameters from 16 mm to 32 mm (for pressures between 0.5 and 2 bar).

The physical and chemical integrity of the coupling is guaranteed by the anti-loosening profile, the double seal ring and a plastic ring that insulates the aluminium layer of the multilayer pipe from the brass alloy of the fitting body.

Versatility

The range of brass press fittings Pexal® Brass is among the widest on the market, from a 16 mm diameter to a 90 mm diameter. The range is also characterized by numerous types of fittings and accessories for all applications.

Hygiene

Brass press fittings are certified to transport potable water, and can therefore be used for the construction of domestic hot and cold water distribution systems.

Compatibility

Pexal® Brass ensures full compatibility with other piping systems.
The special transition fittings and accessories allow already existing copper and crosslinked polyethylene pipes to be easily connected to Valsir multilayer pipes.

2.4.3 Technical data

Table 2.28 Pexal® Brass fittings features.

Body	Brass alloy
Sleeve	AISI 304 stainless steel with inspection holes to check the correct insertion of the pipe
Seals	2 made of EPDM
Chemical/physical detachment	Through the bottom ring made of PE which prevents contact between the aluminium layer and the brass fitting
Dimensional range	14-90 mm
Suitable pipes	Pexal®, Mixal®, Thermoline®
Equipment required	Pipe cutter, calibrator, lubricant, pressing machine

Table 2.29 Pressing profiles for Pexal® Brass.

Diameter	Pressing profiles
14x2	H
16x2	H, TH, U
16x2.25	H, TH, U
18x2	H, TH, U
20x2	H, TH, U
20x2.25	H, TH, U
20x2.5	H, TH, U
25x2.5	TH, U
26x3	H, TH, C
32x3	VAL, H, TH, U
40x3.5	VAL, TH, U
50x4	VAL, TH, U
63x4.5	VAL, TH, U
75x5	VAL, U
90x7	U

Note: During installation, always check the suitable pressing profiles for the fitting in question.

2.4.4 Range

Table 2.30 Pexal® Brass fittings and accessories.

Description	Design	Description	Design
Intermediate coupling		Reducing coupling	
Threaded coupling (female)		Threaded coupling (male)	
45° elbow		Elbow	
Threaded elbow (male)		Threaded elbow (female)	
Union tee		Reducing union tee	
Threaded union tee (female)		Wingback elbow	
Low wingback elbow		Swivel adaptor for manifolds with conic end	
Swivel adaptor for manifolds with flat end		Repair fitting	
Press transition fitting copper		Compression transition fitting copper	

Description	Design	Description	Design
Elbow fitting for connection to copper		Elbow fitting with extension in chrome copper	
Fitting with bend in chrome copper		Straight fitting with extension in chrome copper	
Transition fitting for Pex pipe		Stop valve	
U fitting		Terminal fitting	
Elbow fitting 15° female		Fastec connection fitting	
2-way manifold		3-way manifold	
2-way nickel-plated manifold with stop valves		3-way nickel-plated manifold with stop valves	
4-way nickel-plated manifold with stop valves			

2.4.5 Certifications

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2.5 Bravopress® technopolymer (PPSU) press fittings

2.5.1 The product

Bravopress® is a press fittings system made of a technopolymer (PPSU), a plastic material characterized by exceptional mechanical strength and corrosion resistance, employed for the construction of water supply, heating, cooling and industrial systems.

By using a portable pressing machine equipped with a suitable jaw, the pipe is shaped around the fitting insert. Even in the presence of temperature fluctuations, the joint is perfectly watertight and cannot be loosened thanks to the stainless steel sleeve that covers the portion of pipe in contact with the insert. The sleeve has inspection holes to verify the correct insertion of the pipe on the fitting.

2.5.2 Features

Hygiene

Bravopress® press fittings are certified to transport potable water, and can therefore be used for the construction of domestic hot and cold water distribution systems. The material used to make these fittings provides an exceptional level of hygiene as well as offering an excellent resistance to treatments against Legionella.

Chemical resistance

The material used to make these fittings, polyphenylsulfone (PPSU), is a polymer characterized by an exceptional resistance to oxidation and corrosion, to the main chemical compounds dissolved in water, and to cement and lime.
The mechanical properties of this material such as the tensile strength, modulus of elasticity and aging resistance far exceeds those of normal polymers.

Multipress

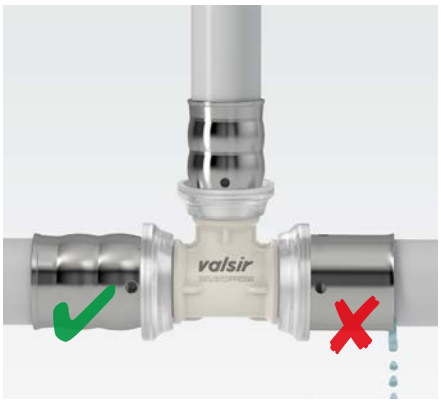
The Bravopress® fittings are multipress and therefore compatible with a wide range of pressing profiles available on the market (H, TH, U, C, VAL) and this allows the plumber to use the pressing jaws already in his possession without having to buy new ones.

Pressing profile H, U, C, VAL

Pressing profile TH

Safety

The Bravopress® fittings are designed so that to indicate any incomplete pressing during system testing, which according to international standards is necessary once the system has been completed (please refer to the chapter “Commissioning”). Thanks to the particular profile of the insert, the fittings indicate incomplete pressing by dripping, thus immediately identifying the point to be repaired.



Furthermore, the fittings are created with a special insert having a profile that prevents the pipe from becoming disconnected and two ring seals to guarantee maximum safety and reliability over time. Leak detection during system test in case of non pressed fittings on diameters from 16 mm to 32 mm (for pressures between 0.5 and 2 bar).

The physical and chemical integrity of the coupling is guaranteed by the anti-loosening profile, the double seal ring and a plastic ring that insulates the aluminium layer of the multilayer pipe from the brass alloy of the fitting body.

Ease of use

Bravopress® is extremely easy to use and can be installed using a special portable pressing machine in a very fast way, thus reducing the overall installation costs. In addition, the product is characterised by an extreme lightness.

2.5.3 Technical data

Table 2.31 Bravopress® fittings features.

Body	Polyphenylsulfone (PPSU), characterized by extreme hygiene, chemical resistance and high mechanical characteristics
Sleeve	AISI 304 stainless steel with inspection holes to check the correct insertion of the pipe
Seals	2 made of EPDM
Chemical/physical detachment	Polyphenylensulphone is a plastic material not subject to corrosion and oxidation and eliminates the problem of stray currents
Dimensional range	16÷63 mm
Suitable pipes	Pexal®, Mixal®, Thermoline®
Equipment required	Pipe cutter, calibrator, lubricant, pressing machine

Table 2.32 Pressing profiles for Bravopress® fittings.

Diameter	Pressing profile
16x2	H, TH, U
20x2	H, TH, U
25x2.5	TH, U
26x3	H, TH, C
32x3	H, TH, U
40x3.5	VAL, TH, U
50x4	VAL, TH, U
63x4.5	VAL, TH, U

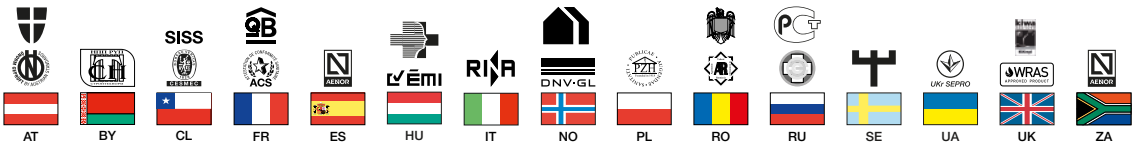
Note: During installation, always check the suitable pressing profiles for the fitting in question.

2.5.4 Range

Table 2.33 Bravopress® fittings and accessories.

Description	Design	Description	Design
Intermediate coupling		Reducing coupling	
Threaded coupling (male)		Threaded coupling (female)	
Elbow		Threaded elbow (male)	
Threaded elbow (female)		Union tee	
Reducung union tee		Threaded union tee (female)	
Wingback elbow		45° elbow	

2.5.5 Certifications



2.6 Pexal® XL technopolymer modular fittings

2.6.1 The product

Pexal® XL is the modular fitting system made of technopolymer (PPSU), a plastic material featuring outstanding mechanical strength and resistance to corrosion, ideal for construction of water supply, heating and cooling systems and industrial plants.
The fitting modules are connected to each other with PPS collars for pullout prevention, while the hydraulic seal is ensured by a double EPDM O-ring.
Using a portable pressing machine, equipped with suitable jaw, the pipe is shaped around the hose barb.

The joint, even in the presence of thermal variations, is perfectly watertight and prevents loosening thanks to the stainless steel sleeve that covers the portion of the pipe in contact with the insert.
Moreover, the sleeve has inspection holes to check that the pipe is inserted correctly into the fitting.

2.6.2 Features

Hygienic properties

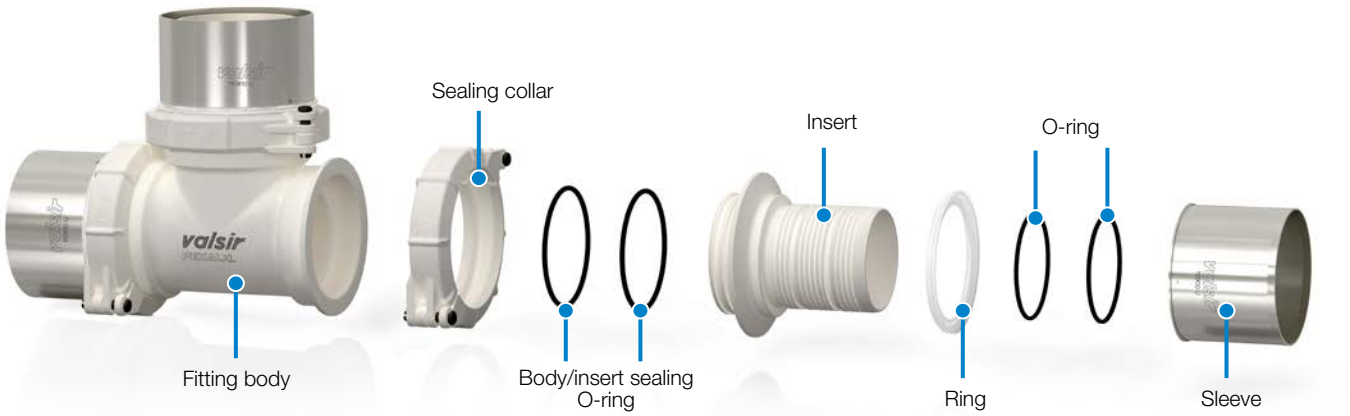
Pexal® XL press fittings are certified for drinking water transport, therefore they can be used for domestic hot and cold water distribution systems. The material of these fittings ensures an outstanding level of hygiene, as well as an excellent resistance to the treatments against legionella.

Chemical resistance

The polyphenylsulfone (PPSU), is a technopolymer featuring excellent resistance to oxidation, corrosion, and to the action of main chemical components dissolved in water, cement and lime.
The mechanical properties of this material, such as tensile strength, modulus of elasticity and resistance to ageing, are far superior to those of normal polymers.

Modularity

The modular philosophy that characterises the Pexal® XL range ensures extreme installation flexibility while using just a few items. The assembly versatility allows wide system design freedom, and easily remedying the unforeseen events at the site.
The closure with collar allows the prefabrication of fittings: this means, in case of installation at height, a considerable simplification of the installation procedures, with a significant reduction in the risk of accidents.
The modularity of Pexal® XL is a benefit also for logistics: the reduced number of items to manage allows maximum efficiency even with a small warehouse.



Safety

The Pexal® XL fittings are made with a special insert using a profile with two seals to ensure maximum safety and reliability over time.
The system is completed by PPS collars, ensuring mechanical strength and system uniformity.
To further ensure proper installation, the collars are locked with a pin that prevents unintentional openings of the system.

Ease of use

Pexal® XL is a simple and intuitive system that can be quickly installed using a portable pressing machine, helping to reduce overall installation costs.
In addition, the assembly of modules requires no special equipments, as sealing collars are closed manually.
Finally, the modular assembly allows for easy installation despite the large size of the pipes to be connected: in these terms, the lightweight of the technopolymer is a further benefit.

2.6.3 Technical data

Table 2.34 Pexal® XL fittings features.

Body	The polyphenylsulfone (PPSU) features extreme hygienic properties, chemical resistance and high mechanical properties.
Sleeve	AISI 304 stainless steel with inspection holes to check the correct insertion of the pipe.
Seals	2 in EPDM
Sealing collar	PPS with pin lock
Chemical/physical detachment	The Polyphenylsulfone is a plastic material not subject to corrosion and oxidation and eliminates the problem of stray currents.
Dimensional range	40÷110 mm
Suitable pipes	Pexal®
Equipment required	Pipe cutter, calibrator, pressing machine, lubricant

Table 2.35 Pressing profiles for Pexal® XL fittings.

Diameter	Pressing profile
40x3.5	VAL, TH, U
50x4	VAL, TH, U
63x4.5	VAL, TH, U
75x5	VAL, U
90x7	U
110x10	U

Note: During installation, always check the suitable pressing profiles for the fitting in question.

2.6.4 Range

Table 2.36 Pexal® XL fittings and accessories.

Description	Design	Description	Design
Pexal® XL straight coupling		Pexal® XL 45° elbow	
Pexal® XL 90° elbow		Pexal® XL union tee	
Pexal® XL reducing		Insert Pexal® XL	
Threaded male Pexal® XL		Threaded female Pexal® XL	
Sealing collar for Pexal® XL modular system			

2.7 Pexal® Easy technopolymer (PPSU) full bore fittings

2.7.1 The product

Pexal® Easy is an advanced fittings system made of technopolymer (PPSU) for water supply in heating, cooling and refrigerating systems. It is used with Pexal® pipes and guarantees an increase of 30% in bore as compared with normal compression or press fittings. By using a special portable tool, either electric or mechanical that is operated manually, a socket is created on the pipe end; the process involves the widening of the internal diameter of the pipe that can then be fitted over the fitting insert. A threaded sleeve is then tightened by hand, thus ensuring the hydraulic and mechanical seal of the joint between the pipe and the fitting. This type of joint guarantees a full bore and the possibility of re-using the fittings ensures that installation times are reduced to a minimum.

2.7.2 Features

Full bore

Unlike other conventional systems, with Pexal® Easy there is no reduction in the internal cross-section. Jointing by creating a socket on the pipe in fact results in a reduction in pressure loss which is, on average, 30%, allowing significant advantages during the dimensioning phase of the water supply system.

Chemical resistance

The material used to produce this range of fittings, polyphenylsulfone (PPSU), is a polymer characterized by an exceptional resistance to oxidation and corrosion, to the main chemical compounds dissolved in water, and to cement and lime. The mechanical properties of this material such as the tensile strength, modulus of elasticity and aging resistance far exceeds those of normal polymers.
Thanks to these properties, Pexal® Easy can be used for installations in direct contact with sea water and water with high concentrations of salt and is therefore the ideal product for the creation of water supply systems in the nautical industry.

Versatility

The range of the Pexal® Easy fittings is very wide, from 14 mm diameter, to 75 mm diameter and is characterized by numerous types of fittings and accessories for all applications.
The Pexal® Easy fittings are also removable and reusable, thus allowing to minimize waste during installation.

Hygiene

Pexal® Easy fittings are certified to transport potable water, and can therefore be used for the construction of domestic hot and cold water distribution systems. The material used to make these fittings provides an exceptional level of hygiene as well as offering an excellent resistance to treatments against Legionella.

Ease of use

Pexal® Easy is an extremely easy system to use, the fittings can be installed in a very fast way, thus reducing overall installation costs. In addition, the product is characterised by an extremely light weight.

2.7.3 Technical data

Table 2.37 Pexal® Easy fittings features.

Body	Polyphenylsulfone (PPSU) is characterized by extreme hygiene, chemical resistance and high mechanical characteristics
End nut	Reinforced Polyamide (PA12) with high mechanical characteristics
Seals	2 made of EPDM
Chemical/physical detachment	Polyphenylensulphone is a plastic material not subject to corrosion and oxidation and eliminates the problem of stray currents
Dimensional range	14-75 mm
Suitable pipes	Pexal®
Equipment required	Pipes cutter, socketing machine, wrench, lubricant

2.7.4 Range

Table 2.38 Pexal® Easy fittings and accessories.

Description	Design	Description	Design
Intermediate coupling		Threaded coupling (male)	
Threaded coupling (female)		Reducing coupling	
Elbow		Reducing fitting with nut	
45° elbow		Threaded elbow (male)	
Threaded elbow (female)		Threaded elbow (female-male/female)	
90° elbow (male/female)		90° elbow (female/female)	
Intermediate coupling (female/female)		Threaded union tee (female)	
Union tee		Reducing union tee	
Offset threaded union tee (female)		Wingback elbow	

Description	Design	Description	Design
90° elbow with extended male/female threading		90° female threaded tee	
Stop valve		Modular manifold	
Modular manifold with closing switch		Modular manifold, outlet with stop valves	
Modular manifold body		Modular dual distribution manifold	
Double branch tee fitting		Modular manifold for domestic water distribution	
Cross modular manifold		Stop ball valve	

2.7.5 Certifications

AU BY DE FR HU IT NL NO PL RO RU UA UK ZA

2.8 Pexal® Twist brass compression fittings

2.8.1 The product

Pexal® Twist is a classical compression system made of brass that can be used with Pexal® and Mixal® multilayer pipes. Pexal® Twist provides reliability and an extremely simple installation.
The permanent coupling of the pipe is created by compression by tightening the nut over the pre-cut olive; the profiles of the two pieces result in the progressive tightening of the olive and the distribution of the compression over the entire contact surface.

To guarantee a perfect seal, an insert was created with a particular anti-loosening profile with radial knurling, two O-rings directly in contact with the pipe and an O-ring for the insert assembly on the fitting body.

The integrity of the system is ensured by the bottom gasket, which isolates the aluminium from the fitting, preventing galvanic corrosion, and by the quality of the fitting made with special brass alloys.

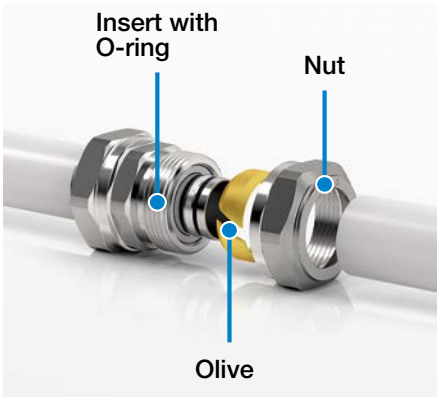
2.8.2 Features

Ease of use
Pexal® Twist is extremely easy to use, the fittings can be easily installed using a simple wrench for hex nuts. The fitting is removable and therefore reusable in the event of errors during installation.

Hygiene
Pexal® Twist fittings are certified to transport potable water, and can therefore be used for the construction of domestic hot and cold water distribution systems.

Hydraulic and mechanical capacity

By tightening the nut, the pre-cut olive is also progressively tightened and, thanks to the distribution of the compression over the entire surface of the pipe in contact with the fitting, a long-lasting mechanical coupling is guaranteed. The insert is fitted with two O-ring seals therefore guaranteeing an excellent resistance to hydraulic pressure.



2.8.3 Technical data

Table 2.39 Pexal® Twist fittings features.

Body	Nickel-plated brass for 16x2,18x2, 20x2 (insert incorporated) and brass without nickel-plating for the remaining diameters (with removable insert)
Sleeve	Nickel-plated brass for 16x2, 18x2, 20x2 and brass without nickel-plating for the remaining diameters
Seals	EPDM
Chemical/physical detachment	Through the bottom ring made of PTFE which prevents the contact between the aluminium layer and the brass fitting
Dimensional range	14-32 mm
Suitable pipes	Pexal®, Mixal®, Thermoline®
Equipment required	Pipes cutter, calibrator, hex wrench, lubricant

2.8.4 Range

Table 2.40 Pexal® Twist fittings and accessories range.

Description	Design	Description	Design
Intermediate coupling		Reducing coupling	
Threaded coupling (male)		Threaded coupling (female)	
Elbow		Threaded elbow (male)	
Threaded elbow (female)		Union tee	

Description	Design	Description	Design
Reducing union tee		Threaded union tee (male)	
Threaded union tee (female)		Union tee body	
Female lateral thread union tee		Wingback elbow	
Double sliding offset tee		2-way manifold with connections	
3-way manifold with connections		2-way nickel-plated manifold with stop valves and connections	
3-way nickel-plated manifold with stop valves and connections		4-way nickel-plated manifold with stop valves and connections	
Kit with nut, olive and tail			

2.8.5 Certifications

BY HU IT PL RO RU UA UK

2.9 Derivation clamp for Pexal® Connex-T multilayer systems

2.9.1 The product

Pexal® Connex-T is a real revolution in the installation of multilayer systems. Developed by Valsir to create derivations on new or existing large diameter multilayer pipes, it significantly reduces laying time and costs and facilitates maintenance work.

The solutions adopted have been studied to minimise the margin of error and to make installation as easy as possible: it is not always easy to work on already existing pipes, both because of the working position and of the spaces, very often limited.

The special push-fit profile on the pipe has been designed and engineered to minimise pressure drops. Tested in accordance with the most stringent international standards for multilayer systems and subjected to the most stringent quality tests at Valsir, Pexal® Connex-T has a guaranteed durability of at least 50 years in full compliance with the regulations; during this period, its use is permitted with pressure of 10 bar and temperatures of up to 95°C.

2.9.2 Features

Cost-effectiveness

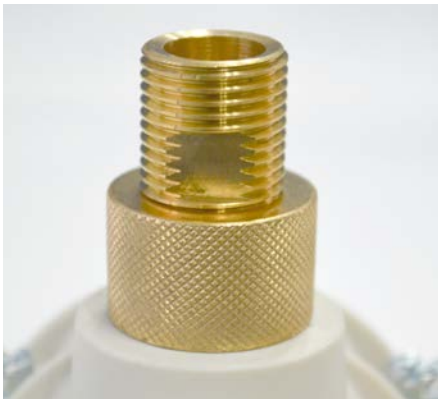
On already installed Valsir multilayer pipes, Pexal® Connex-T allows creating a derivation with a significant reduction in costs related to both the material used and the labour. With traditional systems, it is necessary to cut a fairly long piece of pipe and insert two fittings in order to create a derivation. Pexal® Connex-T can be installed without cutting the pipe or installing additional fittings.

Mechanical strength

The new derivation clamp for Pexal® Connex-T multilayer system is made of PA-M, a polymeric material with excellent temperature and pressure resistance that provides great resistance to chemicals and corrosion.

Safety

The threaded insert locking ring nut is designed for easy and safe installation. It is equipped with an end-of-stroke system preventing excessive tightening forces that may damage the multilayer pipe.



Easy installation

Special hooks located on the half-shells allow locking the two parts of Pexal® Connex-T before the final locking with the closing screws, preventing the two parts from falling off.

In addition, locking nuts are inside the rear half-shell to ensure better tightening of the closing screws.
Their seat is designed to prevent them from slipping out during installation and to ensure a higher tightening torque.

Special profiles have been made in the passage holes of the closing screws to prevent slipping out during installation. The screw head allows using both a socket wrench and an electric screwdriver/screwdriver for tightening.

Performance

Tested according to the most stringent international standards for multilayer systems (DVGW W542, DVGW W534, EN ISO 21003 -2 -3 and -5). Pexal® Connex-T has a guaranteed durability of at least 50 years in full compliance with the regulations; during this period, its use is permitted with pressure of 10 bar and temperatures of up to 95°C.

Chemical resistance

The total resistance to corrosion, to building materials and to the main chemical compounds allows its use for a number of applications, including industrial applications.

Hygienic properties and recyclability

The system consists of completely non-toxic materials that are certified for transport of food fluids and drinking water. The Pexal® Connex-T system is manufactured from fully recyclable materials that can be recycled at the end of their life. The production processes used are energy efficient and have low impact. Valsir embraces Green Building principles, with a view to respecting the environment and preserving resources.

2.9.3 Technical data

Table 2.41 Features of Pexal® Connex-T derivation clamps.

Body	PA-M
Insert	Brass alloy
Ring nut	Brass alloy
Seal	EPDM
Screws and locking nuts	4 (for diameters 50÷63 mm) and 6 (for diameters 75÷90 mm); galvanised steel
Chemical/physical decoupling	By means of EPDM seal which prevents contact of the aluminium layer of the pipe with the metal body of the fitting and the transported fluid.
Dimensional range	50÷90 mm (pipe) 1/2”, 3/4”, 1” (derivation connection)
Suitable pipes	Pexal®
Required equipment	Electric screwdriver with end-of-stroke stop, 6 mm bit for metal, Pexal® Connex-T milling kit complete with fine sandpaper, lubricant, slotted screwdriver, slip joint pliers (or similar)

2.9.4 Range

Table 2.42 Range of Pexal® Connex-T derivation clamps.

Pipe diameter	Derivation diameter	Mill type
50	G 1/2”	1/2”
63	G 3/4”	3/4”
75	G 3/4”	3/4”
75	G 1”	1”
90	G 1”	1”

2.9.5 Certifications

ACS
FR

WASTE SYSTEMS

SUPPLY SYSTEMS

GAS SYSTEMS

FLUSHING SYSTEMS

BATHROOM SYSTEMS

TRAPS

RADIANT SYSTEMS

DRAINAGE SYSTEMS

HRV SYSTEM

ACADEMY

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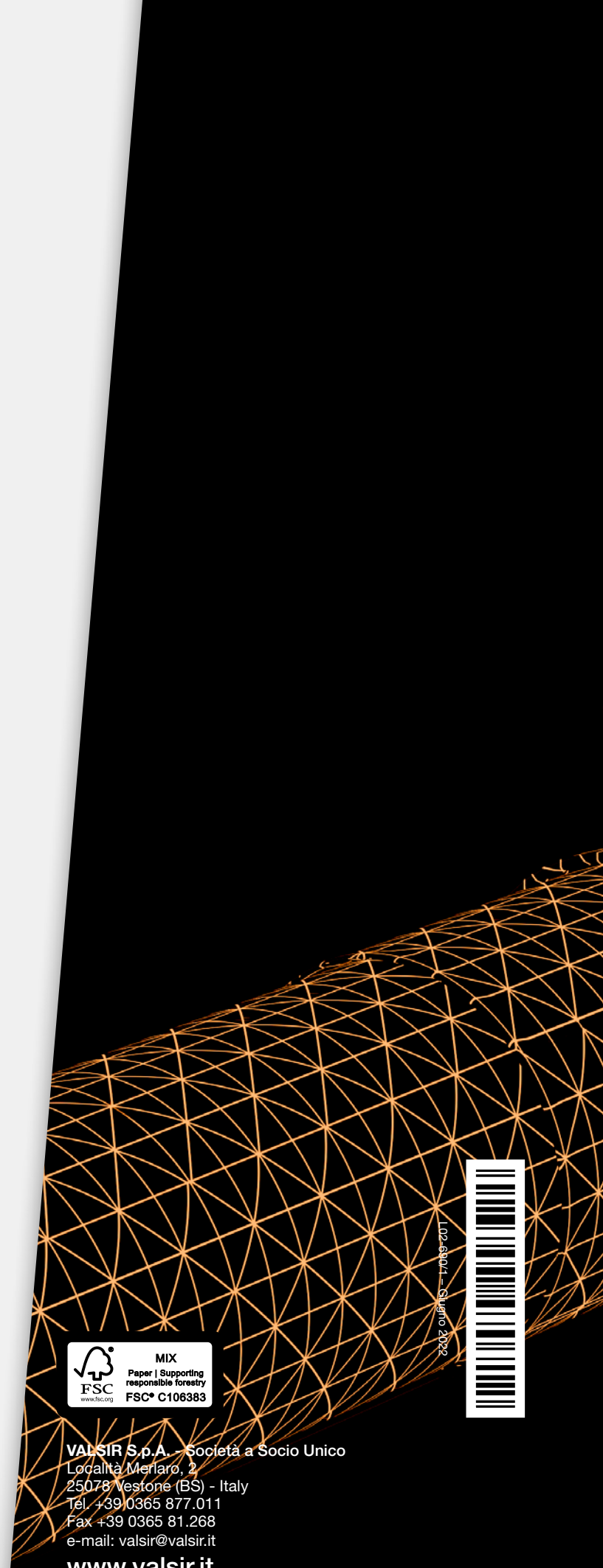
QUALITY FOR PLUMBING



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