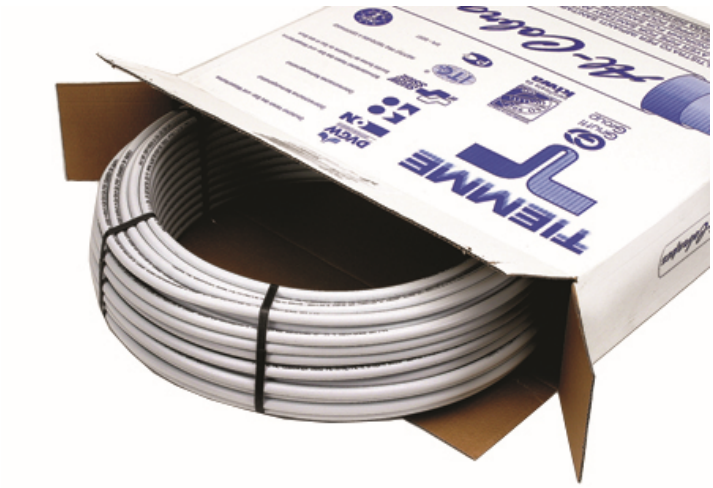
EN

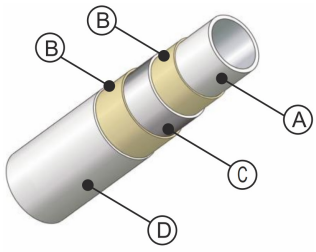
0600 / 0660 / 0600B / 0660B / 0660S
0640B / 0640R / 0641
0630B / 0630R / 0670B / 0670R / 0615B / 0635 / 0636
“AL-COBRAPEX” MULTILAYER PIPE



DESCRIPTION

AL-COBRAPEX pipes adapt to any type of heating/cooling and plumbing and compressed air distribution systems, with application in residential, commercial, industrial and agricultural sectors and, in general, with any kind of non-corrosive fluid *.

AL-COBRAPEX are multilayer type pipes, with an aluminium core and are a valid alternative to metal pipes and also to some of the plastic pipes normally used in common plant engineering systems.
The technology of these pipes consists of inserting a metal layer (aluminium) between two layers of plastic material (polyethylene) that are glued together as shown in the picture:



A: Layer in PE-Xb polyethylene cross-linked using silanes.
B: Adhesive layer.
C: Intermediate layer in aluminuim welded with a laser head technique.
D: Layer in PE-Xb polyethylene cross-linked using silanes (art. 0600 - 0660 - 0600B - 0660B), or HDPE high density polyethylene (art. 0660S).

AL-COBRAPEX pipes have the characteristic of combining the advantages of plastic materials (resistance to abrasion, to corrosion and to chemicals, lightness and ease of installation), with those of aluminium (high pressures resistance, dimensional stability and reduced thermal expansion).

There is a wide range of AL-COBRAPEX pipes:
they are produced in diameters from 14 to 90 mm and supplied in rolls or bars. They are available in white pipe versions, with 6/10/13 mm thick thermal insulation or with corrugated protective sheath.

ADVANTAGES / STRENGTHS

- Quick and easy installation system: flexible, light and stable (thanks to the aluminium core).
- Impermeable to oxygen and UV rays. **
- Resistant to corrosion and chemicals.
- Low pressure drops.
- Suitable for multiple applications:
  - Distribution of hot and cold drinking water
  - Radiant heating and cooling systems (low temperature)
  - Radiator heating systems (high temperature)
  - Compressed air distribution systems
- Reduced thermal expansion generated when the temperature of the fluid in transit changes.
- Durability guaranteed by product standards for at least 50 years!
- Resistant to high pressures (10 bar in all the categories of application foreseen by the UNI EN ISO 21003-1 standard).
- Resistant to high temperatures (+ 95 °C).

** To check compatibility with fluids or other substances not listed, contact the Tiemme Technical Dept.*
*** The pipe is supplied duly packed for storage to guarantee complete protection from UV rays. The material should not be exposed to direct sunlight.*

UNCOVERD MULTILAYER PIPE (art. 0600 / 0660 / 0600B / 0660B / 0660S)

TECHNICAL SPECIFICATIONS

Art. 0600 – 0600B (composition PE-Xb / Al / PE-Xb)

External diameter	(mm)	14	16	18	20	26	32	40	50	63	75	90
Thickness	(mm)	2.0	2.0	2.0	2.0	3.0	3.0	3.5	4.0	4.5	5.0	7.0
Aluminium thickness	(mm)	**0.30**	**0.30**	**0.30**	**0.40**	**0.60**	**0.75**	**0.80**	**1.00**	**1.20**	**1.35**	**1.35**
Weight	(kg/m)	0.090	0.110	0.130	0.150	0.300	0.410	0.606	0.909	1.350	1.600	2.400
Volume of water contained	(l/m)	0.078	0.113	0.154	0.201	0.314	0.531	0.855	1.385	2.290	3.310	4.530
Maximum working temperature	(°C)	95										
Peak temperature	(°C)	110										
Maximum working pressure	(Bar)	10 *										
Thermal expansion coefficient	(mm/m °C)	0.026										
Internal roughness	(mm)	0.007										
Oxygen diffusion	(mg/l)	0										
Thermal conductivity	(W/mk)	0.47										
Fire reaction class	-	C-s2, d0										

Art. 0660 – 0660B (composition PE-Xb / Al / PE-Xb)

External diameter	(mm)	14	16	18	20	25	26	32
Thickness	(mm)	2.0	2.0	2.0	2.0	2.5	3.0	3.0
Aluminium thickness	(mm)	**0.20**	**0.20**	**0.20**	**0.25**	**0.35**	**0.35**	**0.40**
Weight	(kg/m)	0.090	0.110	0.130	0.150	0.215	0.300	0.410
Volume of water contained	(l/m)	0.078	0.113	0.154	0.201	0.314	0.314	0.531
Maximum working temperature	(°C)	95						
Peak temperature	(°C)	110						
Maximum working pressure	(Bar)	10 *						
Thermal expansion coefficient	(mm/m °C)	0.026						
Internal roughness	(mm)	0.007						
Oxygen diffusion	(mg/l)	0						
Thermal conductivity	(W/mk)	0.47						
Fire reaction class	-	C-s2, d0						

Art. 0660S (composition PE-Xb / Al / HDPE)

External diameter	(mm)	16	20	26
Thickness	(mm)	2.0	2.0	3.0
Aluminium thickness	(mm)	**0.20**	**0.25**	**0.35**
Weight	(kg/m)	0.105	0.141	0.256
Volume of water contained	(l/m)	0.113	0.201	0.314
Maximum working temperature	(°C)	95		
Peak temperature	(°C)	110		
Maximum working pressure	(Bar)	10 *		
Thermal expansion coefficient	(mm/m °C)	0.026		
Internal roughness	(mm)	0.007		
Oxygen diffusion	(mg/l)	0		
Thermal conductivity	(W/mk)	0.47		
Fire reaction class	-	B-s2, d0		

** For further details please see the "FIELD OF APPLICATION (UNI EN ISO 21003-1)" section of this technical sheet.*

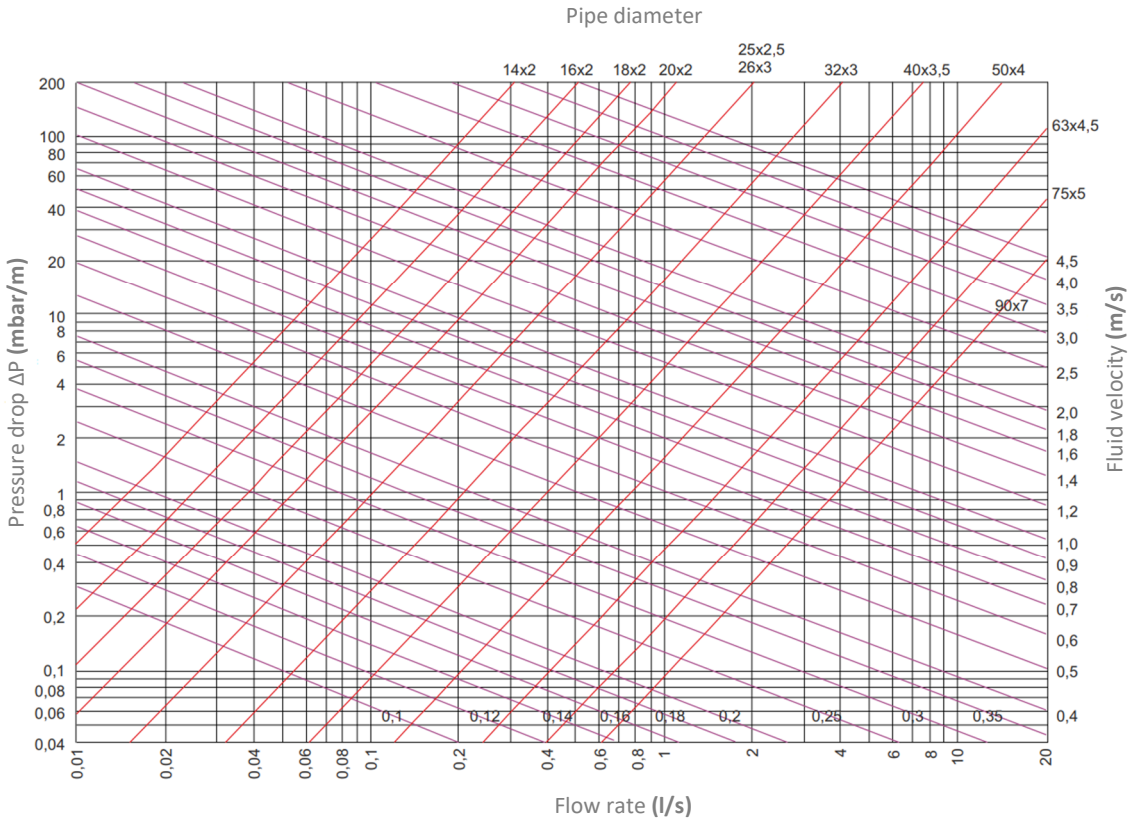
FIELD OF APPLICATION (UNI EN ISO 21003-1)

The performance characteristics of multilayer piping are regulated by **UNI EN ISO 21003-1** which defines four classes of application over a period of 50 years of continuous operation.
Tiemme AL-COBRAPEX pipes are certified for all four classes of application for working pressures up to **10 bar**.

Table of application classes and working conditions according to UNI EN ISO 21003-1

Application class	Working Pressure P_D	Working temperature T_D	Durati-on of T_D	Maximum working temperature T_{max}	Durati-on of T_{max}	Malfunction temperature T_{mal}	Durati on of the T_{mal}	Typical application
	[bar]	[°C]	[yrs]	[°C]	[yrs]	[°C]	[hrs]	
1	10	60	49	80	1	95	100	Domestic hot water (60°C)
2	10	70	49	80	1	95	100	Domestic hot water (70°C)
4	10	20 + 40 + 60	2.5 + 20 + 25	70	2.5	100	100	Underfloor heating and low temperature systems
5	10	20 + 60 + 80	14 + 25 + 10	90	1	100	100	High temperature heating systems

FLUID DYNAMIC CHARACTERISTICS



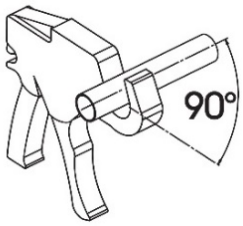
The pressure drops shown in the graph refer to heat transfer fluid at 10°C.

For different fluid temperatures, the pressure drop values obtained from the graph should be multiplied by the correction factors indicated in the table below.

Correction factors	
Fluid Temp. (°C)	Correction factor
15	0.971
20	0.939
30	0.882
40	0.834
50	0.793
60	0.762
70	0.740
80	0.718
90	0.695

INSTRUCTIONS FOR CORRECT ASSEMBLY

To obtain a perfect join between fitting/pipe, regardless of the type of fitting that will be used, some simple but important operations must be carried out to prepare the pipe:

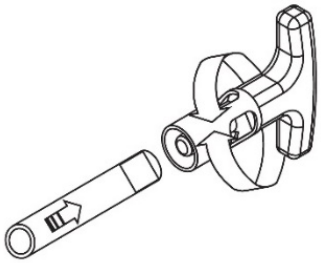


Cutting the pipe:

The pipe must be cut perpendicular to its axis.

The use of hacksaws or angle grinders must be avoided as they could deform the pipe.

Recommended tools: Up to Ø 32 mm **Art. 1495** - over Ø 32 mm **Art. 1683**



Pipe calibration and flaring

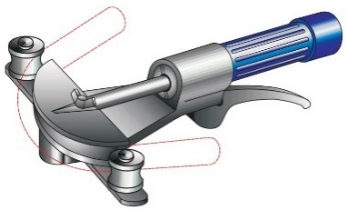
Restore the shape of the pipe using the appropriate calibrator.

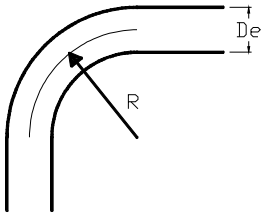
Pay particular attention when carrying out pipe calibration and deburring, always use the appropriate tools.

Any burr residue could damage the O-rings.

The calibrating/deburring tool should be inserted into the pipe and then turned clockwise.

Recommended tools: Complete case **Art. 1498SET**





Bending:

The pipe can be bent by hand or using the appropriate tools, depending on the radius required.

The table below provides an indication of the minimum bending radii permitted:

external pipe Ø (mm)	Bending radius **R** (mm)			
	Manual	Manual with internal spring	Manual with external spring	Mechanical
14	70	56	56	41
16	80	64	64	49
18	90	72	72	65
20	100	80	80	80
25	130	100	-	90
26	130	100	100	90
32	160	-	-	120
40	-	-	-	150
50	-	-	-	190
63	-	-	-	240
75	-	-	-	320
90	-	-	-	530

Recommended tools: Pipe bending spring **Art. 1497 – Art. 1497EST /** Pipe-bender **Art. 1684**

IMPORTANT: Carrying out the following operations incorrectly, may compromise the tightness of the joint.

TIEMME RACCORDERIE S.p.A. will accept no responsibility for breakages and/or accidents resulting from failure to comply with these indications and from improper use of the system. The information shown does not exempt the user from scrupulously following current regulations and good technical standards.

THERMAL EXPANSIONS

Metal and plastic multilayer piping is characterised by a linear thermal expansion coefficient that is lower than that of plastic piping.
The linear thermal expansion coefficient (α) of AL-COBRAPEX multilayer pipe is **0.026 [mm/mK],** therefore**, for every linear metre of piping, subjected to a temperature increase of 1K, there will be a corresponding lengthening of 0.026 mm.**

The following formula can be used to determine the overall lengthening of a stretch of network:

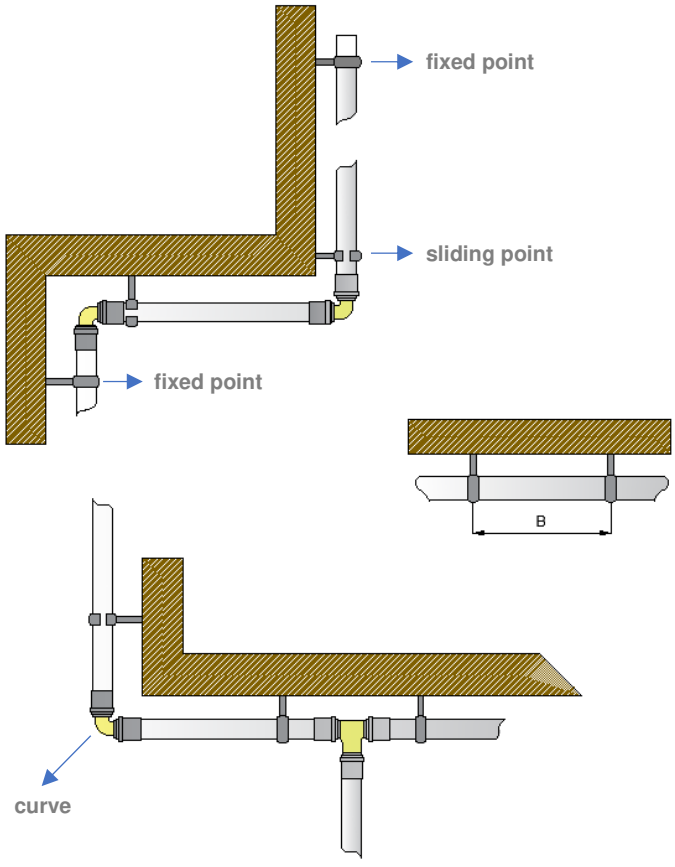
$$\Delta L = \alpha \times L \times \Delta T$$

Where:

ΔL variation in pipe length in mm
α linear thermal expansion coefficient of the pipe (0.026 mm/mK)
L length of laid pipe
ΔT temperature difference to which the tube is subjected

PRACTICAL INSTALLATION TIPS:

Multilayer pipes cannot be rigidly constrained between two fixed points, but the variation in the length of the pipes must always be absorbed or deviated.
Linear expansions of piping can be absorbed by frequent changes in the path of the pipe itself, but during installation it may be difficult to artificially insert changes in the path for the sole purpose of "shock absorbing" linear thermal expansions, so metal or plastic dilators, which are readily available on the market, should be used.
The rigid fittings placed on the network and the taps will be considered fixed points. Sliding supports will be installed between two fixed points, depending on the length of the section, for the purpose of supporting the piping but allowing it to slide without being within a rigid constraint.
The construction of fixed points must be completed using support collars near T-joints, intermediate curves, or intermediate joint connections.
The supports used to create fixed points must be suitable for plastic pipes and adequately coated so that the external coating cannot be damaged.
When chase laying, it is important to know that laying with insulation sheaths (mandatory for pipes that convey hot water and recommended to avoid the formation of condensation on pipes conveying cooled water), is already enough to compensate, with lateral deformations, the lengthening caused by thermal expansion.



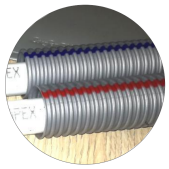
Pipe diameter (mm)	Maximum distance of the supports "**B**" (m)
14	1.0
16	1.0
18	1.0
20	1.0
25	1.5
26	1.5
32	2.0
40	2.0
50	2.5
63	2.5
75	2.5
90	2.5

MULTILAYER PIPE WITH PROTECTIVE CORRUGATED SHEATH (art. 0640B / 0640R / 0641)

AL-COBRAPEX multilayer pipe with corrugated sheath adds the presence of an external corrugated protective sheath to the properties of the white multilayer pipe.

FIELD OF APPLICATION:
Plumbing systems where protection is required or where removing and replacing the pipe must be possible.

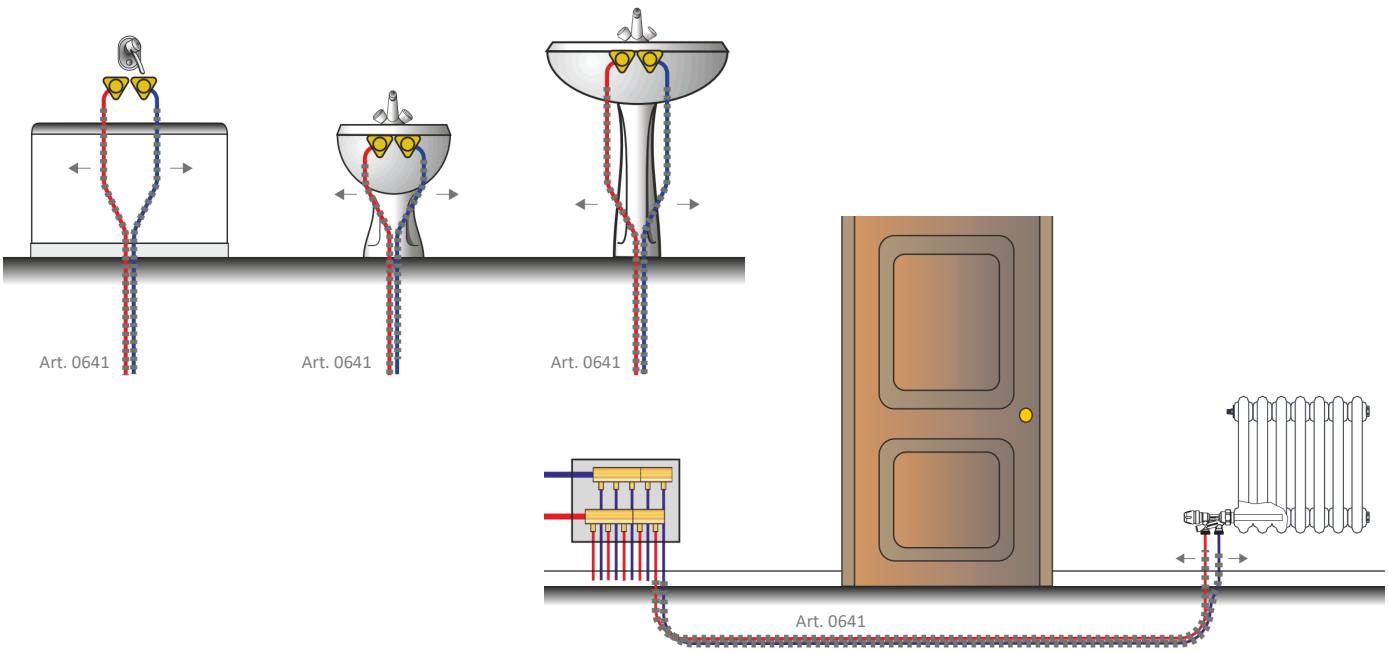
PRODUCTION RANGE:

	Article	Description	Production range	Pipe specifications (reference uncoverd pipe)
	**0640B**	Multilayer pipe with blue corrugated sheath.	Ø 14 x 2.0 Ø 16 x 2.0 Ø 18 x 2.0 Ø 20 x 2.0	**Art. 0660**
	**0640R**	Multilayer pipe with red corrugated sheath.	Ø 14 x 2.0 Ø 16 x 2.0 Ø 18 x 2.0 Ø 20 x 2.0	**Art. 0660**
	**0641**	"AL-COBRAPEX TWIN" double multilayer pipe with grey corrugated sheaths. A continuous red line is highlighted on one sheath and a continuous blue line on the other to allow for immediate identification. The two pipes can be easily separated if necessary (close to outlets from the collector - utilities/terminals)	Ø 16 x 2.0 Ø 20 x 2.0 	**Art. 0660**

TECHNICAL SPECIFICATIONS (PROTECTIVE CORRUGATED SHEATH):

Pipe diameter	(mm)	14 x 2.0	16 x 2.0	18 x 2.0	20 x 2.0
Sheath outer diameter	(mm)	24	24 (25 art. 0641)	28	28 (30.5 art. 0641)
Sheath inner diameter	(mm)	19	19 (20 art. 0641)	23	23 (25.5 art. 0641)
Material	-	Polyethylene			
Density	(g/cm^3)	0.955			
Yield strength	(Mpa)	27			
Breaking length	(%)	600			
Bending strength	(Mpa)	1370			
Embrittlement temperature	(°C)	< - 75			

INSTALLATION EXAMPLE (AL-COBRAPEX TWIN pipe Art. 0641):



MULTILAYER PIPE WITH THERMAL INSULATION
(art. 0630B / 0630R / 0670B / 0670R / 0615B / 0635 / 0636)

AL-COBRAPEX multilayer pipe with thermal insulation adds the presence of an external insulating sheath to the properties of the white multilayer pipe.

FIELD OF APPLICATION:

heating and plumbing systems, where a certain degree of insulation is required against the formation of condensation and against energy losses. Tiemme insulated pipes are suitable for conveying fluids for use in heating/cooling systems in accordance with the UNI EN ISO 12241 standard "THERMAL INSULATION FOR SYSTEMS IN BUILDINGS AND FOR INDUSTRIAL INSTALLATIONS - CALCULATION METHODS".

PRODUCTION RANGE:

	Article	Insulating sheath specifications			Production range	Pipe specs. (reference uncovered pipe)
		Sheath thickness	Sheath colour	Fire reaction class		
	0630B	6 mm 10 mm	Blue	CL-s1, d0	Ø 14 x 2.0 (th. 6 mm) Ø 16 x 2.0 (th. 6 / 10 mm) Ø 18 x 2.0 (th. 6 mm) Ø 20 x 2.0 (th. 6 / 10 mm) Ø 25 x 2.5 (th. 6 / 10 mm) Ø 26 x 3.0 (th. 6 / 10 mm) Ø 32 x 3.0 (th. 6 / 10 mm)	Art. 0660
	0630R	6 mm 10 mm	Red	CL-s1, d0	Ø 14 x 2.0 (th. 6 mm) Ø 16 x 2.0 (th. 6 / 10 mm) Ø 18 x 2.0 (th. 6 mm) Ø 20 x 2.0 (th. 6 / 10 mm) Ø 25 x 2.5 (th. 6 / 10 mm) Ø 26 x 3.0 (th. 6 / 10 mm) Ø 32 x 3.0 (th. 6 / 10 mm)	Art. 0660
	0670B	6 mm	Blue	CL-s1, d0	Ø 16 x 2.0 (th. 6 mm) Ø 20 x 2.0 (th. 6 mm)	Art. 0600
	0670R	6 mm	Red	CL-s1, d0	Ø 16 x 2.0 (th. 6 mm) Ø 20 x 2.0 (th. 6 mm)	Art. 0600
	0615B	6 mm	White	CL-s1, d0	Ø 16 x 2.0 (th. 6 mm)	Art. 0660
	0635	10 mm	Green	CL-s1, d0	Ø 16 x 2.0 (th. 10 mm) Ø 18 x 2.0 (th. 10 mm) Ø 20 x 2.0 (th. 10 mm) Ø 26 x 3.0 (th. 10 mm) Ø 32 x 3.0 (th. 10 mm)	Art. 0660
	0636	10 mm 13 mm	Grey	BL-s2, d0	Ø 16 x 2.0 (th. 10 mm) Ø 20 x 2.0 (th. 13 mm) Ø 26 x 3.0 (th. 13 mm) Ø 32 x 3.0 (th. 13 mm)	Art. 0660

TECHNICAL SPECIFICATIONS (THERMAL INSULATION SHEATH):

Material	-	Closed cell polyethylene foam
Fire reaction class (EN 13501-1)	(Euroclass)	CL-s1, d0 (art. 0630B - 0630R - 0670B - 0670R - 0615B – 0635) BL-s2, d0 (art. 0636)
Density	(Kg/m^3)	33
Thermal conductivity	(W/mk)	0.0397
Tensile strength	(N/mm^2)	> 0.18
Breaking length	(%)	> 80
Water vapour permeability μ	(mg/Pa.s.m)	< 0.15
Working temperature range	(°C)	-30 (as long as the fluid remains in the liquid phase) ÷ +95

TABLE FOR RAPID CALCULATION OF HEAT LOSSES

The table shows the heat losses in W per linear meter of sheathed AL-COBRAPEX piping, based on the temperature of the vector fluid passing through it (three different temperature levels). Losses are calculated with an ambient temperature of 20 °C.

HEATING OPERATION

Pipe diameter - insulation thickness	Heat loss and surface temperature					
	40°C		60°C		80°C	
	W/m	°C	W/m	°C	W/m	°C
14x2 - 6 mm	4.90	27.41	8.30	34.83	12.58	42.25
16x2 - 6 mm	4.60	27.36	9.25	34.73	13.88	42.09
16x2 - 10 mm	3.83	26.10	7.66	32.20	11.50	38.30
18x2 - 6 mm	4.16	26.02	8.33	32.05	12.50	38.08
20x2 - 6 mm	5.51	27.31	11.02	34.62	16.54	41.94
20x2 - 10 mm	4.51	25.98	9.02	31.97	13.54	37.95
20x2 - 13 mm	4.20	25.57	8.40	31.14	12.60	36.72
25x2,5 - 6 mm	6.44	26.84	10.52	31.17	19.35	40.53
25x2,5 - 10 mm	5.26	25.58	13.15	33.09	15.79	36.75
26x3 - 6 mm	6.57	26.54	12.89	33.68	19.73	39.03
26x3 - 10 mm	5.39	25.36	10.78	30.72	16.17	36.09
26x3 - 13 mm	5.26	25.23	10.53	30.47	15.79	35.70
32x3 - 6 mm	7.81	26.54	15.62	33.09	23.44	39.63
32x3 - 10 mm	6.34	25.31	12.68	30.62	19.02	35.93
32x3 - 13 mm	6.07	25.09	12.15	30.18	18.23	35.27

COOLING OPERATION

Pipe diameter - insulation thickness	Heat loss and surface temperature					
	10°C		14°C		18°C	
	W/m	°C	W/m	°C	W/m	°C
14x2 - 6 mm	-3.35	20.06	-2.51	21.54	-1.67	23.03
16x2 - 6 mm	-3.70	20.10	-2.77	21.58	-1.85	23.05
16x2 - 10 mm	-3.06	21.11	-2.30	22.34	-1.53	23.55
18x2 - 6 mm	-4.04	20.14	-3.03	21.60	-2.02	23.07
20x2 - 6 mm	-4.39	20.17	-3.28	21.63	-2.19	23.08
20x2 - 10 mm	-3.59	21.22	-2.69	22.42	-1.79	23.61
20x2 - 13 mm	-2.13	17.17	-1.27	18.30	-0.42	19.43
25x2,5 - 6 mm	-5.15	20.52	-3.86	21.89	-2.57	23.26
25x2,5 - 10 mm	-4.21	21.53	-3.15	22.64	-2.10	23.76
26x3 - 6 mm	-5.35	20.79	-3.92	22.09	-2.61	23.39
26x3 - 10 mm	-4.29	21.73	-3.21	22.79	-2.14	23.86
26x3 - 13 mm	-2.67	17.34	-1.60	18.40	-0.53	19.46
32x3 - 6 mm	-6.18	20.82	-4.63	22.11	-3.08	23.41
32x3 - 10 mm	-5.02	21.79	-3.76	22.84	-2.51	23.89
32x3 - 13 mm	-3.08	17.41	-1.84	18.45	0.61	19.48

In the table on cooling operation with water at 10°C (given by the average between 7°C and 12.5°C), for example, it is possible to see that a 20x2 mm diameter pipe with 10 mm thick insulation will have a loss per linear metre of -3.59 W with a surface temperature of 21.22°C. This temperature must be higher than the ambient dew point temperature, which in the case of an environment at 26°C with 50% relative humidity is 14.84°C (below is a table with indications of the dew point of the ambient air according to the ambient temperature and the degree of relative humidity).

Ambient temperature	Air dew point as a function of relative humidity										
	45% Ur	50% Ur	55% Ur	60% Ur	65% Ur	70% Ur	75% Ur	80% Ur	85% Ur	90% Ur	95% Ur
14 °C	2.20	3.76	5.10	6.40	7.58	8.67	9.70	10.71	11.62	12.55	13.36
15 °C	3.12	4.65	6.07	7.36	8.52	9.63	10.70	11.69	12.62	13.52	14.42
16 °C	4.07	5.59	6.98	8.29	9.47	10.61	11.68	12.66	13.63	14.58	15.54
17 °C	5.00	6.48	7.92	9.18	10.39	11.48	12.54	13.57	14.50	15.36	16.19
18 °C	5.90	7.43	8.83	10.12	11.33	12.44	13.48	14.56	15.41	16.31	17.25
19 °C	5.80	8.33	9.75	11.09	12.26	13.37	14.49	15.47	16.40	17.37	18.22
20 °C	7.73	9.30	10.72	12.00	13.22	14.40	15.48	16.46	17.44	18.36	19.18
21 °C	8.60	12.22	11.59	12.92	14.21	15.36	16.40	17.44	18.41	19.27	20.19
22 °C	9.54	11.16	12.54	13.89	15.19	16.27	17.41	18.42	19.39	20.28	21.22
23 °C	10.44	12.02	13.47	14.87	16.04	17.29	18.37	19.37	20.37	21.34	22.23
24 °C	11.32	12.93	14.44	15.73	17.06	18.21	19.22	20.33	21.37	22.32	23.18
25 °C	12.20	13.83	15.37	16.69	17.99	19.11	20.24	21.35	22.27	23.30	24.22
26 °C	13.15	14.84	16.26	17.67	18.90	20.09	21.29	22.32	23.32	24.31	25.16
27 °C	14.08	15.68	17.24	18.57	19.83	21.11	22.23	23.31	24.32	25.22	26.10

The tables are for the sole purpose of providing the technician with a general reference to quickly evaluate the performance of the chosen pipe.

INFORMATION FROM TIEMME

ANALYSING THE STANDARD: PIPE INSULATION

Law 10/91 – UNI EN 14114

Within the context of the National Energy Plan (specific to the issues of saving and more rational use of traditional energy sources), Law 10/91, integrated by Presidential Decree 412/93 and implemented in the National Regulations through the UNI EN 14114 Standard defines the thickness of the insulators to be used in compliance with the regulations, for the insulation of heating and air conditioning systems.
The legislation states that the reference thermal conductivity λ of the insulation to be used, must be derived from the value shown on the manufacturer's certificate taken at the average test temperature of 40 °C.
The correct insulating thickness is obtained considering the value of the thermal conductivity λ (certified as described) and the external diameter of the pipe to be insulated.

3 application categories are foreseen: **A** with insulation thicknesses defined in the table below, **B** and **C** with thicknesses defined on the basis of the location of the pipes to be insulated (summarised in the illustration below) and calculated with **specific reduction coefficients**, shown under TABLE 1.

CATEGORY A: insulation of external pipes, cellars, garages, external cavities, unheated rooms, technical rooms.

CATEGORY B: insulation of pipes running along perimeter walls towards the inside of the buildings.

CATEGORY C: insulation of pipes running inside structures and not facing the outside or unheated rooms.

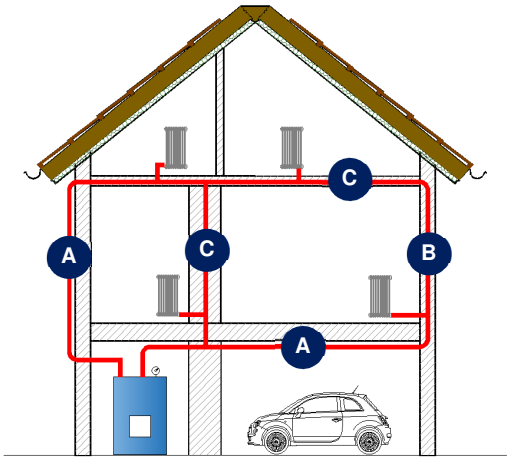


TABLE 1: Thickness of the insulation as a function of the conductivity of the insulation λ and of the diameter of the pipe according to Law 10/91.

The values as per the table refer to **CATEGORY A.** For laying categories B and C, these values will be multiplied by the corresponding corrective factor. For insulation thermal conductivity values other than those shown, the corresponding insulation thicknesses can be determined by linear interpolation of the data.

Useful thermal conductivity of the insulation λ (W/mk)	External diameter of the pipe (mm)					
	< 20	from 20 to 39	from 40 to 59	from 60 to 79	from 80 to 99	>100
0.030	**13**	**19**	**26**	**33**	**37**	**40**
0.032	**14**	**21**	**29**	**36**	**40**	**44**
0.034	**15**	**23**	**31**	**39**	**44**	**48**
0.036	**17**	**25**	**34**	**43**	**47**	**52**
0.038	**18**	**28**	**37**	**46**	**51**	**56**
0.040 **(TIEMME 0.0397)**	**20**	**30**	**40**	**50**	**55**	**60**
0.042	**22**	**32**	**43**	**54**	**59**	**64**
0.044	**24**	**35**	**46**	**58**	**63**	**69**
0.046	**26**	**38**	**50**	**62**	**68**	**74**
0.048	**28**	**41**	**54**	**66**	**72**	**79**
0.050	**30**	**44**	**58**	**71**	**77**	**84**

REDUCTION COEFFICIENTS: **CATEGORY B**: multiply the insulation thicknesses indicated in the table x **0.5**
CATEGORY C: multiply the insulation thicknesses indicated in the table x **0.3**

CHART 1: Table for choosing the insulation thicknesses of AL-COBRAPEX pipes according to Law 10/91 - UNI EN 14114

Piping diameter (mm)		14x2	16x2	18x2	20x2	25x2.5	26x3	32x3
Insulation thickness (mm)	CATEGORY A	**20**	**20**	**20**	**30**	**30**	**30**	**30**
	CATEGORY B	**10**	**10**	**10**	**15**	**15**	**15**	**15**
	CATEGORY C	**6**	**6**	**6**	**9**	**9**	**9**	**9**

ANALYSING THE STANDARD: THERMAL INSULATORS AND FIRE CLASSIFICATION

UNI EN 14304: Thermal insulation products for building systems and industrial installations - Factory made flexible elastomeric foam (FEF) products - Specification

Elastomeric-based insulators fall within the field of application of the UNI EN 14304 standard which defines the requirements of these materials for pipe insulation in both civil and industrial environments, with a working temperature of between approximately -200 °C and + 175 °C. The standard describes the characteristics of the product and includes test procedures, conformity assessment, marking and labeling. The standard does not deal with products with a declared thermal conductivity greater than 0.050 W/(mx K) at 10 °C.
The standard does not deal with products used for the insulation of building structures.

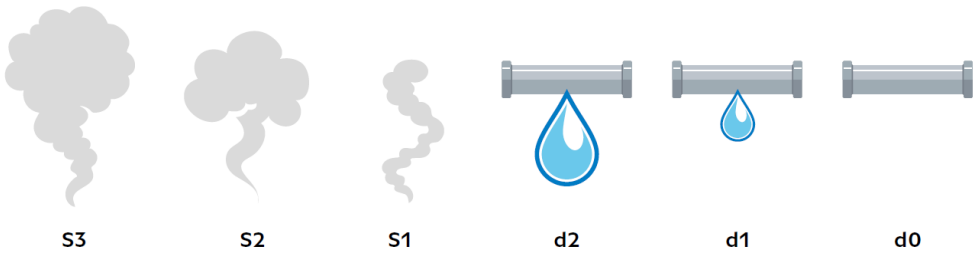
UNI EN 13501-1: Fire classification of products and construction elements - Part 1: Classification based on the results of reaction to fire tests.

The standard describes the reaction to the fire classification process for all construction products including products contained in construction elements (with the exception of power, control and communication cables which are dealt with in UNI EN 13501-6).

MAIN CLASSIFICATION		
A1	+++++	Non-combustible materials (glass, fiberglass, metals, porcelain etc ...)
A2		
B	++++	Non-flammable combustible materials
C	+++	Combustible materials that are not highly flammable
D	++	
E	+	
F	-	Easily flammable materials

L Suffix - Reaction to fire characteristics, suffix added to the class symbol that qualifies the material to be used in mainly linear contexts: for example, thermal insulation of technical installations.

ACCESSORY CLASSIFICATION				
s	1	++	more severe limits and restrictions than classification s2	**s = smoke:** production of smoke during combustion
	2	+	total production of fumes and their development must be limited	
	3	-	no restrictions on smoke development	
d	0	++	no dripping	**d = dripping:** dripping during combustion
	1	+	dripping for a defined maximum time	
	2	-	no restrictions	



The choice of insulation must be made during the planning stage after having checked the position of the system in the building and the type of protection (false ceilings, cladding, etc.), to determine the minimum Euroclass required.
The most restrictive situation occurs when the system crosses escape routes with exposed insulation or without EI30 protection.

DM 15.03.2005 ART. 8: Reaction to fire requirements for construction products to be used in works where the fire safety requirement is foreseen.

1. Lobbies, corridors, hallways, stairs, ramps, passageways in general. Insulation of technical installations with predominantly linear development: (A2L-s1, d0), (A2L-s2, d0), (BL-s1, d0), (BL-s2, d0)
2. Product to be used in all other environments that are not part of escape routes. The isolation of technical installations with predominantly linear development with products classified in the following fire reaction classes is allowed: (A2L-s1, d0), (A2L-s2, d0), (A2L-s3, d0), (A2L-s1, d1), (A2L-s2, d1), (A2L-s3, d1), (BL-s1, d0), (BL-s2, d0)
3. Technical installation located inside a horizontal and/or vertical cavity delimited by products and/or construction elements with a fire resistance class of at least EI 30.
- along escape routes: The use of products included in one of the following fire reaction classes is permitted:
(A2L-s1, d0), (A2L-s2, d0), (A2L-s3, d0), (A2L-s1, d1), (A2L-s2, d1), (A2L-s3, d1), (A2L-s3, d2), (A2L-s2, d2), (A2L-s3, d2), (BL-s1, d0), (BL-s2, d0), (BL-s3, d0), (BL-s1, d1), (BL-s2, d1),(BL-s3, d1), (BL-s1, d2), (BL-s2, d2), (BL-s3, d2)(CL-s1, d0), (CL-s2, d0), (CL-s3, d0), (CL-s1, d1), (CL-s2, d1), (CL-s3, d1), (CL-s1, d2), (CL-s2, d2), (CL-s3, d2), (DL-s1, d0), (DL-s2, d0), (DL-s1, d1), (DL-s2, d1).
- in all other areas not part of escape routes. The use of products classified at least in the fire reaction class (EL) is allowed.

MAIN SYSTEM ACCESSORIES

Art. 4530
Pipe decoiler.

Art. 1689
Pipe straightener.

Art. 0900B / 0900R
Blue and red corrugated sheath for pipe protection.

Art. 0625
Transparent PVC cup with CL1 sealing.

Art. 1497 / 1497EST
Pipe bending spring.

Art. 1684
Pipe bender.

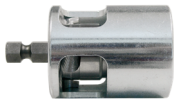
Art. 1495
Pipe cutting shears.

Art. 1683
Pipe cutting shears + deburrer.

Art. 1498SET
Case with calibrating/deburring set.

Art. 1498UM
Calibrators/deburrers with fixed handle.

Art. 1498MT
Interchangeable T-handle.



Art. 1498US
Interchangeable calibrating/deburring tools.

Art. 1600
Compression fittings.

Art. 1650
Press Fittings.

See the product catalogue for order codes/further details.

ITEM SPECIFICATIONS

0600/0660 Series

Tiemme AL-COBRAPEX multilayer pipe. Composition PE-Xb-Al-PE-Xb. Application classes (UNI EN ISO 21003-1) 1, 2, 4, 5 (suitable for plumbing and heating systems). Maximum working pressure 10 Bar. Maximum working temperature +95 °C. Compliant with **UNI EN ISO 21003-1.** Supplied in rolls. Available in sizes 14x2 - 16x2 - 18x2 - 20x2 - 25x2.5 - 26x3 - 32x3.

0600B / 0660B Series

Tiemme AL-COBRAPEX multilayer pipe. Composition PE-Xb-Al-PE-Xb. Application classes (UNI EN ISO 21003-1) 1, 2, 4, 5 (suitable for plumbing and heating systems). Maximum working pressure 10 Bar. Maximum working temperature +95 °C. Compliant with **UNI EN ISO 21003-1.** Supplied in bars. Available in sizes 16x2 - 18x2 - 20x2 - 25x2.5 - 26x3 - 32x3 - 40x3.5 - 50x4 - 63x4.5 - 75x5 - 90x7.

0660S Series

Tiemme AL-COBRAPEX multilayer pipe. Composition PE-Xb-Al-HDPE. Application classes (UNI EN ISO 21003-1) 1, 2, 4, 5 (suitable for plumbing and heating systems). Maximum working pressure 10 Bar. Maximum working temperature +95 °C. Compliant with **UNI EN ISO 21003-1.** Supplied in rolls. Available in sizes 16x2 - 20x2 - 26x3.

0630B / 0630R / 0670B / 0670R / 0615B / 0635 Series
Tiemme AL-COBRAPEX multilayer pipe, externally insulated with closed cell expanded polyethylene sheath with scratch-resistant finish. Available with red, blue, green and white sheath. Composition PE-Xb-Al-PE-Xb. Application classes (UNI EN ISO 21003-1) 1, 2, 4, 5 (suitable for plumbing and heating systems). Maximum working pressure 10 Bar. Maximum working temperature +95 °C. Compliant with **UNI EN ISO 21003-1.** Thermal conductivity of thermal insulation sheath 0.0397 W/mk. Fire reaction class of thermal insulation sheath CL-s1, d0 (UNI EN 13501-1). Supplied in rolls. Available in sizes 14x2 - 16x2 - 18x2 - 20x2 - 25x2.5 - 26x3 - 32x3 with insulation thickness 6/10 mm.

0636 Series
Tiemme AL-COBRAPEX multilayer pipe, externally insulated with closed cell expanded polyethylene sheath with scratch-resistant finish. Grey sheath available. Composition PE-Xb-Al-PE-Xb. Application classes (UNI EN ISO 21003-1) 1, 2, 4, 5 (suitable for plumbing and heating systems). Maximum working pressure 10 Bar. Maximum working temperature +95 °C. Compliant with **UNI EN ISO 21003-1.** Thermal conductivity of thermal insulation sheath 0.0397 W/mk. Fire reaction class of thermal insulation sheath BL-s2, d0 (UNI EN 13501-1). Supplied in rolls. Available in sizes 16x2 - 20x2 - 26x3 - 32x3 with insulation thicknesses 10/13 mm.

0640B / 0640R Series
Tiemme AL-COBRAPEX multilayer pipe, with external corrugated protective sheath. Available with red and blue sheath. Composition PE-Xb-Al-PE-Xb. Application classes (UNI EN ISO 21003-1) 1, 2, 4, 5 (suitable for plumbing and heating systems). Maximum working pressure 10 Bar. Maximum working temperature +95 °C. Compliant with **UNI EN ISO 21003-1.** Supplied in rolls. Available in sizes 14x2 - 16x2 - 18x2 - 20x2.

0641 Series
Tiemme AL-COBRAPEX TWIN double multilayer pipe, with gray corrugated external protective sheaths. Composition PE-Xb-Al-PE-Xb. Application classes (UNI EN ISO 21003-1) 1, 2, 4, 5 (suitable for plumbing and heating systems). Maximum working pressure 10 Bar. Maximum working temperature +95 °C. Compliant with **UNI EN ISO 21003-1.** Supplied in rolls. Available in sizes 16x2 - 20x2.

CERTIFICATIONS

0600 / 0660 / 0600B / 0660B Series

0660S Series