1. SANIFIL. Origins, composition and applications.

The Polypropylene (PP) is a thermoplastic synthetic resin with the characteristic of varying its state reversibly in function of the raw material.

Despite having a smaller density when compared with the Polyethylene (PE), the Polypropylene presents a higher mechanical resistance, higher coalition point (175ºC) and excellent dimensional stability.

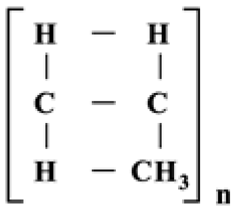


Fig. 1 - Polypropylene Monomer

SANIFIL is a polypropylene compound, presenting as main characteristic high rigidity, high resistance to heat, high resistance to impact and excellent chemical resistance.

Non-toxicity is another one of the excellent characteristics of Polypropylene which, in the event of combustion, does not transmit to the atmosphere noxious and incompatible gases for human inhalation.

Being the polypropylene a combustible material, it is not considered as inflammable as its self-ignition point is at 380º, quite above the temperature of coalition of the raw material. However, once initiated the combustion, it spreads throughout the material in contact with it.

This fact justifies the inclusion of additives nominated “flame retardant” (FR-Flame Retardant) that stop the propagation of the flame after having withdrawn it from the contact of the source of ignition of the combustion with the pipe. Being the flame one of the three present components in the combustion together with the combustible, in this case the raw material, and the comburent, the oxygen existing in the atmospheric air, this situation is easily observed (image 2) when comparing the necessary oxygen (O2) to keep the flame.

Fig. 2–percentage of necessary oxygen to maintain the flame lit in a combustion

The properties of SANIFIL pipe (PP-FR) are listed below:

Property	A. measure	Method	Rehearsal value
Fluidity index (230ºC;2.16Kg)	g/10 min	ISO 1133	0.350
Density	g/cm3	ISO 1183	0.903
Resistance to the impact IZOD(23ºC)	J/m	ISO 180/1A	150
Elasticity module in flexion	MPa	ISO 178	1200
Rockwell hardness	R	ASTM-D-785	84
Coefficient of linear thermal expansion	mm/mºK	pr EN 1451-1	0.14
Coefficient of thermal conductivity	W/mºK	pr EN 1451-1	0.2
Time of self extinction	s	DIN 4102-B1	<12

Chart 1 – SANIFIL's PP characteristics

The resistance in time of a polypropylene pipe depends, obviously, on the mechanical (working pressure) and thermal (working temperature) requirements of the system. In the drainage systems these requirements are minimum, specially the mechanical ones, so it is possible to affirm that the duration of the pipe SANIFIL is timeless.

Another important characteristic of SANIFIL is the capacity to resist to high temperatures (95ºC for drainages without pressure) which allows to carry out all the usually necessary drainage in a house, even the hot water drainage, without decreasing the time of useful life of the pipe.

When associating all this with a high chemical resistance when in contact with highly aggressive fluids, it means that there are several industrial and laboratorial applications for technical fluids drainage nets.

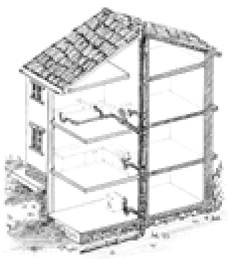


Fig.3–outlines of a domestic application.

In short, SANIFIL is advised for the following drainage nets:

· Domestic

· Industrial

· Laboratorial

2. Dimensions.

SANIFIL is supplied in the dimensions presented below (chart 2), flared in one of its ends.

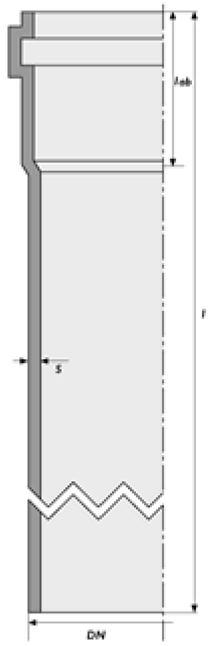


Fig.4–Dimensions of SANIFIL

Diâmetro Nominal	Espessura de parede	Comprimento abocardamento
DN	s	l ob
32	1.8	46
40	1.8	48
50	1.8	50
75	1.9	55
110	2.7	70
125	3.1	75

Chart 2–Dimensional chart SANIFIL's range (dimensions in millimetres)

SANIFIL pipe is produced in lengths of 3 m in RAL 7037 colour.

As already mentioned, SANIFIL will be used in systems that are considered "non pressurised". For this reason, and as long as the remaining working conditions are respected, it can be stated that its duration is timeless.

3. Production standards.

SANIFIL is produced according to the existent standards:

· DIN /9560 – Polypropylene pipes and fittings with a reinforced rubber sealing gasket, for hot water drainage inside buildings. Dimensions and technical specifications for installation.

· DIN 4102 – Behaviour to fire of the materials for the construction of buildings. Classified as belonging to class B1.

· pr EN1451/1 – Systems of plastic pipes for drainage of hot and cold waters, installed inside the buildings. Part 1: Specification of pipes, fittings and systems.

· NP IN 1053 – Plastic pipe systems. Thermoplastic pipes for applications without pressure. Rehearsal method for the determination of water stanching.

· UNI 8319 – Polypropylene pipes for drainage of water in buildings.

· UNI 8320 – Polypropylene fittings for drainage of water in buildings.

· UNI ISO/TR 7471 – Chemical resistance of PP pipes and fittings.

4. General characteristics.

The advantages of SANIFIL have already been described, following up a group of properties that characterize this pipe system:

· Advised for discharges of domestic hot waters without loss of its characteristics throughout the years.

· Resistance to low temperatures in case of ice formation in the interior.

· Resistance to abrasion eventually caused by some solid particles which sometimes come with the discharge fluids.

· High resistance to impact , even with low temperatures.

· Installation without any glues, which allows an increase of chemical resistance to aggressive fluids.

· Excellent resistance to fire due to the additives which allow its self-extinction.

· High chemical resistance, a polypropylene characteristic. The possibility of industrial discharge of water containing associated chemical elements is high and can take place, from sour solutions (PH2) to alkaline solutions (PH 12).

· Reduced inner rugosity, which increases the discharge capacity and the inhibition to the creation of deposits of solid materials in the pipes with a reduced angle of horizontal inclination what could create obstructions to the continuous fluids discharge.

5. Chemical Resistance.

As it was already indicated, the excellent characteristics for discharge of aggressive chemical fluids are a reality. In the following chart (Tab. 3) can be proven the compatibility of this pipe with a wide range of chemical fluids.

Reagent or Product	Concentration %	Temperature			Reagent or Product	Concentration %	Temperature		
		20° C	60° C	100° C			20° C	60° C	100° C
Ammonium acetate	sol. sat.	S	S	-	Lactic acid	fino a 90%	S	S	-
Sodium acetate	sol. sat.	S	S	S	Nitric acid	10%	S	NS	NS
Acetone	100%	S	S	-	Nitric acid	30%	S	-	-
Bromine acid	fino a 48%	S	L	NS	Nitric acid	40 a 50%	L	NS	NS
Citric acid	10%	S	S	S	Perchloric acid	2n	S	-	-
Clorhydric acid (gas)	100%(seco)	S	S	-	Sulphurous acid	sol.	S	-	-
Clorhydric acid	2 a 7%	S	S	S	Sulphuric acid	fino a 10%	S	S	S
Clorhydric acid	10 a 20%	S	S	-	Sulphuric acid	10 a 30%	S	S	-
Clorhydric acid	30%	S	L	L	Sulphuric acid	50%	S	L	L
Clorhydric acid	35% a 36%	S	-	-	Sulphuric acid	96%	S	L	NS
Dichloroacetic acid	100%	L	-	-	Sulphuric acid	98%	L	NS	NS
Fluoridric acid	sol. dil.	S	-	-	Trichloroacetic acid	fino a 50%	S	S	-
Fluoridric acid	40%	S	-	-	Chlorinc water	sol.sat.	S	L	-
Formic acid	10%	S	S	L	Distillate water	100%	S	S	S
Formic acid	85%	S	NS	NS	Sea water	-	S	S	S
Phosphoric acid	fino a 85%	S	S	S	Mineral water	-	S	S	S
Glycollic acid	30%	S	-	-	Oxygen water	fina a 10%	S	-	-

Chart 3 - Chemical resistance of SANIFIL (Extract from Standard UNI ISO/TR 7471)

Reagent or Product	Concentration %	Temperature 20° C	60° C	100° C
Oxygen water	fina a 30%	S	L	-
Amino alcohol	100%	S	S	S
Benzyl Alcohol	100%	S	L	-
Ethylic alcohol	fino a 95%	S	S	S
Isopropalyling Alcohol	100%	S	S	S
Methylic alcohol	5%	S	L	L
Ammonia(water)	fino a 30%	S	-	-
Ammonia	100%	S	-	-
Air	-	S	S	S
Benzene	100%	L	NS	NS
Ammonium bicarbonate	sol.sat.	S	S	-
Potassium Bicarbonate	sol. sat.	S	S	-
Sodium Bicarbonate	sol. sat.	S	S	S
Sodium bichromate	sol. sat.	S	S	S
Sodium bisulfate	sol. sat.	S	S	-
Sodium bi- sulfite	sol.	S	-	-
Bromate of potassium	fino a 10%	S	S	-
Bromate of potassium	sol. sat.	S	S	-
Bromine (dry vapour)	-	L	NS	NS
Butane	100%	S	-	-
Butanol	100%	S	L	L
Butyphenol	sol. sat. fria	S	-	-
Butyglycol	100%	S	-	-
Barium carbonate	sol. sat.	S	S	S
Carbonate of calcium	sol. sat.	S	S	S
Carbonate of magnesium	sol. sat.	S	S	S
Carbonate of potassium	sol. sat.	S	-	-
Carbonate of sodium	fino a 50%	S	S	L
Mercury cianete	sol sat.	S	S	-
Cianete of potassium	sol. sat.	S	-	-
Chlorate of sodium	sol. sat.	S	-	-
Chlorate of potassium	sol. sat.	S	S	-
Ammonium chlorate	sol. sat.	S	-	-
Barium chlorate	sol. sat.	S	S	S
Chlorate of calcium	sol. sat.	S	S	S
Copper chlorate	sol. sat.	S	S	-
Ethylene chlorate	100%	L	L	-
Chlorate of magnesium	sol. sat.	S	S	-
Chlorate of mercury	sol sat.	S	S	-
Nickel chlorate	sol. sat.	S	S	-
Chlorate of potassium	sol. sat.	S	S	-
Chlorate of sodium	10%	S	S	S
Zin chlorate	sol. sat.	S	S	-
Clorox(gaseous)	100%	NS	NS	NS
Chlorine (l liquidate)	100%	NS	NS	NS
Chlorine -ethanol	100%	S	-	-
Chlorine formic	100%	L	NS	NS
Emption	100%	L	NS	NS
Etanolamine	100%	S	-	-
Ether of petroleum	-	L	L	-
Ether isopropylic	100%	L	-	-
Phenol	5%	S	S	-
Phenol	90%	S	-	-
Fluorite of potassium	sol. sat.	S	S	-
Ammonium phosphate	sol. sat.	S	-	-
Gello	-	S	S	-
Glycerine	100%	S	S	S
Glucose	20%	S	S	S
Hydrogen	100%	S	-	-
Ammonium hydroxide	sol.	S	-	-
Barium hydroxide	sol. sat.	S	S	S
Hydroxide of calcium	sol. sat.	S	S	-
Hydroxide of potassium	fino a 50%	S	S	S
Hydroxide of sodium	1%	S	S	S
Hydroxide of sodium	10 a 60%	S	S	S
Iodated of potassium	sol. sat.	S	-	-
Iodine	-	S	-	-
Isooctane	100%	L	NS	NS
Milk	-	S	S	S
Mercury	100%	S	S	-
Naphtha	-	S	NS	NS
Nitrate of harmony	sol. sat.	S	S	S
Nitrate of calcium	sol. sat.	S	S	-
Nitrate of potassium	30%	S	S	S
Copper nitrate	sol.	S	S	-
Nitrate of mercury	sol. sat.	S	S	-
Nickel nitrate	sol. sat.	S	S	-
Nitrate of sodium	sol. sat.	S	S	-
Peanut oil	-	S	S	-
Almond oil	-	S	-	-
Oil vegetable	-	S	S	L
Coconut oil	-	S	-	-
Oil of paraffin	-	S	L	NS
Oil of cotton seed	-	S	S	-
Oil of linen seed	-	S	S	S
Oil of soy	-	S	L	-
Oxygen	100%	S	-	-
Percolator of potassium	10%	S	S	-
Permanganate of potassium	2n	S	-	-
Persulfate of potassium	sol. sat.	S	-	-
Propane	100%	S	-	-
Silicate of sodium	sol.	S	S	-
Flat caustic (to see hydroxide of sodium)				
Ammonium sulphate	sol. sat.	S	S	S
Barium sulphate	sol. sat.	S	S	S
Copper sulphate	sol. sat.	S	S	-
Sulphate of magnesium	sol.sat	S	S	-
Nickel sulphate	sol. sat.	S	S	-
Sulphate of potassium	sol. sat.	S	-	-
Sulphate of sodium	sol. sat.	S	S	-
Sulphate of Zing	sol. sat.	S	S	-
Sulphite of sodium	40%	S	-	-
Sulphured of sodium	sol. sat.	S	S	S
Fruit juice	-	S	S	S
Juice of honey	-	S	-	-
Tetrachloride of carbon	100%	NS	NS	NS
Wine	-	S	-	-
Whisky	-	S	-	-
Ilene	100%	NS	NS	NS

Chart 3 - Chemical Resistance of SANIFIL (Extract from Standard UNI ISO/TR 7471)

Where,

S - satisfactory chemical resistance.

L - limited chemical resistance.

NS - non satisfactory chemical resistance.

Sun. Sat - saturated solution, prepared at 20ºC.

Sun. - watery solution with a concentration superior to 10%, but not saturated.

Sol.dil. –watery solution diluted with concentration inferior to 10%.

6. Thermal expansions and contractions.

As it is known, any solid material expands with the temperature increase and contracts with its decrease.

Being SANIFIL's coefficient of thermal linear expansion of about 0.14 mm/m ºK, the increase of the temperature of the discharge fluid will most likely originate an increase in the real length of the pipe.

In the event of contraction, reduction of the discharge temperature and consequent decrease of the temperature of the material that composes the tube, there is no problem at all, as long as the o'ring area (which seals the system) is not affected.

Carrying out some quick operations and taking as example a temperature of 0ºC for the discharge fluid circulation inside a SANIFIL pipe with 3 m long that was installed with an ambient temperature of 20ºC, it can be verified that there is a contraction of about 8.4 mm. For values of this order of greatness the sealing area is never attained (positioning of o'ring).

Returning to the discharge of hot fluids, the expansion will have to be absorbed in the pipe flare area. We would like to call your attention to the fact that the fitting and the pipe are not rigidly linked. Therefore, it should always be verified which is the value of the maximum temperature within the pipe and proceed to its installation in such a way that the expansion will not cause any damage in the system.

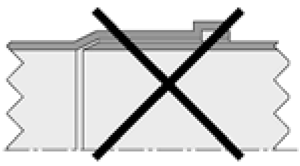


Fig. 5 - installation of SANIFIL not allowing the absorption of thermal expansions.

The above drawing alerts to the way how SANIFIL should not be installed, i.e., the pipe should not be installed fully in contact with the flare area. This way, there will not be any absorptions of thermal expansions.

Please consider the following example:

A SANIFIL pipe will be installed at the ambient temperature (20ºC) and it will allow domestic water drainages at limit temperatures of 5ºC and 60ºC, respectively for cold and hot waters.

To carry out the installation in an appropriate way, the expansions and contractions should be foreseen, being these absorbed in the flare area.

For a ratio of thermal expansion presented and considering a length of 3 m for each SANIFIL pipe, the expansions will be as follows:

Cold water	Discharge minimum t =5ºC	$\Delta L = 6.3\ mm$
Hot water	Discharge maximum t = 60ºC	$\Delta L = 16.8\ mm$

As it can be verified in drawing 6, it will be in the flare that this length variation will be absorbed.

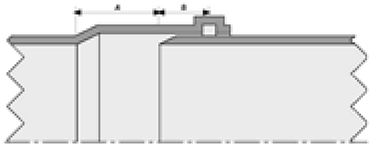


Fig. 6 - Installation of SANIFIL for absorption of thermal contractions and expansions.

Dimension A allows to absorb the pipe’s thermal expansions, which, in the considered example, should never be inferior to 16.8 mm. On the other hand, dimension B allows us to see, in case of contractions, if the sealing area will not be over passed. Therefore, for the considered example, dimension B should never be inferior to 6.3 mm.

Finally, in order to absorb expansions, the pipes and the fittings should be hold in an appropriate way, as described in the following chapter.

7. Support.

As it has been seen in the previous chapter, the supports should allow the thermal expansions and contractions. This way, all the rigid supports should be placed in the flare areas. It is possible to install slide supports (supports which will allow the pipe's longitudinal movement) in order to stop the pipe deformation and guarantee flexion reduced values.

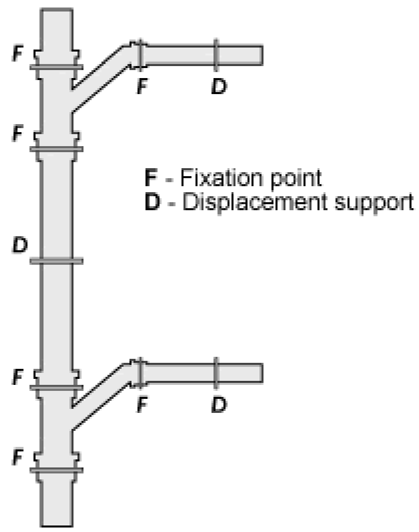


Fig. 7 -Supports of SANIFIL

	Nominal diameter (mm)					
Installation	32	40	50	75	110	125
Vertical	0.8	1.0	1.0	1.5	2.0	2.0
Horizontal	0.4	0.5	0.5	1.0	1.0	1.0

Table 4–Distances between supports (values in meters)

The maximum distances between supports are defined so that there will not be any danger of rupture. Chart 4 presents these values for the vertical and horizontal installation.

8. Installation. Installation way and special cares during assembly.

SANIFIL also presents the particularity of not needing any glue so that the carried out installation is perfectly sealed. Fig. 8 presents the sequence of SANIFIL's assembly.

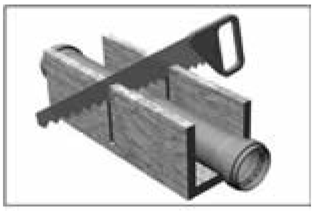


Fig. 8.1

Fig. 8.2

Fig. 8.3

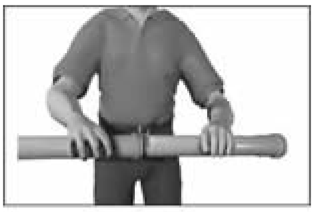


Fig. 8.4

Fig.8 – SANIFIL's assembly sequence

Fig. 8.1 presents a simple way of cutting SANIFIL's pipe with the desired measure. This cut should always be made perpendicularly to the longitudinal axis of the pipe.

After the cut, a chamfering will be carried out in the cut end so that it will have the same geometry of the pipe's flare area (Fig.8.2). Immediately before the installation, a cleaning of the external and internal surface of the pipe should be carried out in order to remove any eventual particles.

In order to ease up the installation of the pipe inside the fitting (or another pipe) flare area, the use of a lubricant is advised (Fig. 8.3), placing it in the contact area with the o'ring. This way, it will decrease the risk of damage of the o'ring during the installation of the pipe.

Finally, place the pipe inside the fitting or another pipe (Fig.8.4) for a later conclusion of the drainage system to be executed.

9. Drain Systems. Dimensions

As it can be verified, SANIFIL pipes can be use on domestic or industrial applications.

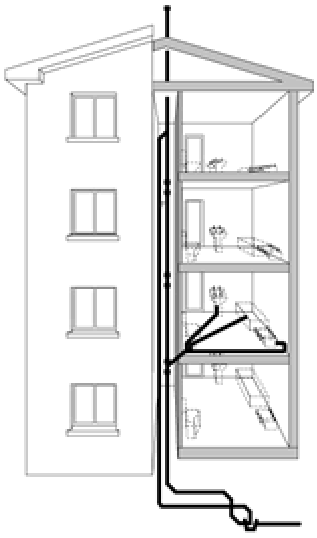


Fig. 9– SANIFIL drainage system with secondary ventilation.

At industrial level, it is the installed equipment to which the discharge of the fluids will be made at (let us take as an example the water discharge from installed cooling systems) that will decide the draining system to install, i.e., each case needs a tube dimension that is usually defined by the equipment manufacturer, for limit working conditions, or by the responsible who defines the system drain conditions when specific systems have to be considered.

Therefore, the industrial project adapts the system to install.

At domestic level, the system is usually defined by previously established standard conditions which can be found in Public Systems and Construction General Regulation for Water distribution and Residual water, specially in Title V concerning Residual Water Construction Draining Systems. Please note that also here were considered the equipment manufacturers standard values.

Despite usually deciding for the separation of soap water from toilet discharge water, this solution is not the only one correct. Since the necessary secondary are guaranteed, a drainage system is able to work with only a discharge column, eliminating the two discharge columns (drainage falling pipes) usually used by the separation of the waters above mentioned. As it is indicated in the mentioned regulation article 217.º point 5 “the branches of soap water or urinol water discharge can only be linked to latrine drainages as long as the secondary ventilation of the first is assured....” This secondary ventilation can be achieved by the ventilation branches (when necessary) and to ventilation columns.

Figure 9 shows a system with secondary ventilation with only a discharge column (there is no separation of fluids).

9.1. Discharge branches

The minimum dimension values of the discharge branches are defined in the mentioned standard regulation according to chart 5.

The simultaneity ratio should be taken into consideration, in a similar way to the water distribution construction systems.

For the presented values, the dimensioning this made for half section drainage, without the existence of ventilation branches.

Please note that urinol discharge should always be independent, being able to be linked to the soap water discharge by means of a union box.

The inclinations of installation of the discharge branches (almost horizontal) should be between 1% and 4%.

Never, under any circumstances, it is allowed to install a vertical discharge with a height superior to 2m.

Equipment	Discharge flow (l/min)	Discharge branch (mm)
WC	90	90
Bathtub	60	40
Bidet	30	40
Shower	30	40
Washbasin	30	40
Dishwasher machine	60	50
Washing machine	60	50
Backrest Urinol	90	75
Suspended Urinol	60	50
Sink	30	50
Tank	60	50
The industrial machines present dimensions regarding the indications of the equipment manufacturer		

Table 5-Extract of the chart of the General Regulation of Public Systems and Constructions of Distribution of Water of Drainage of Residual Waters, indicating minimum values of section of pipes for discharge branches.

9.2. Fall Drainage Pipes

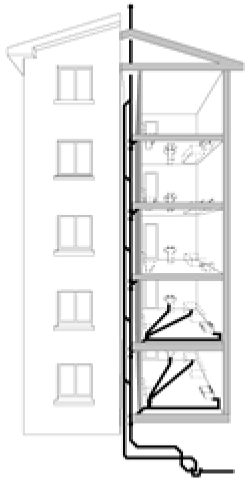


Fig. 10– SANIFIL's drainage system with secondary ventilation in all floors.

As easily understood, the drainage fall pipes should be dimensioned according to the flows and existent discharge branches. This drainage fall pipe should maintain a constant section throughout all its extension, being obligatory the primary ventilation of the system.

The installation of a ventilation column is considered obligatory for evacuation systems whose drainage fall pipes exceed the 35 m of height and whose flow is superior to 700 l/min., according to what is indicated by figure 10.

The rate of occupation of a drainage fall pipe, which by definition is the reason between the area occupied by the liquid mass and the area of the interior section of the pipe, should not exceed the value of 1/3 for systems with secondary ventilation. This ratio may reach very reduced values (1/7) for systems without secondary ventilation, usually systems without separation of fluids.

This occupation rate may dictate an increase of the fall pipe sections in cases of systems with soap waters and WC residual waters separation and, in contrast, to provide a reduced section column but enough for the drainage of all fluids, for system with secondary ventilation. Please note that the minimum diameter for a drainage fall pipe is of 50 mm.

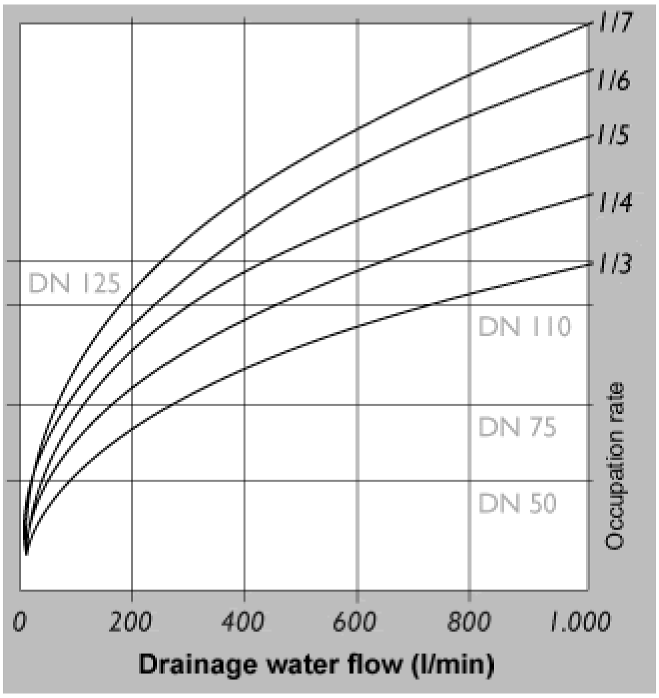
It is obligatory the installation of inspection and cleaning boxes (type HTRE) at least from three to three floors, being advisable their installation in all floors. The installation of this accessory is also considered obligatory whenever there is any change in the verticality of the drainage fall pipe.

If the distance between the evacuation collector and the drainage fall pipe is superior to 10 m, the secondary ventilation should exist.

Graphic 1 allows, in a quick way, to define which is the dimension of the fall pipe to be installed taking into consideration the occupation rate and the water flow.

The areas defined by horizontal lines locate the dimensional needs for SANIFIL pipes.

The occupation rates are defined according to the diameter to install, making the calculation process iterative.



Graph 1 - Dimension of drainage tubes according to the Regulation of the Public Systems and of Nets of Distribution of Water and of Drainage of Residual Waters

Nominal diameter of the drainage pipe (mm)	Occupation rate
50	.1/3
75	.1/4
110	.1/6
125	.1/6

Chart 6–occupation Rates according to the General Regulation of the Public Systems and of water Distribution nets and of Drainage of Residual Waters

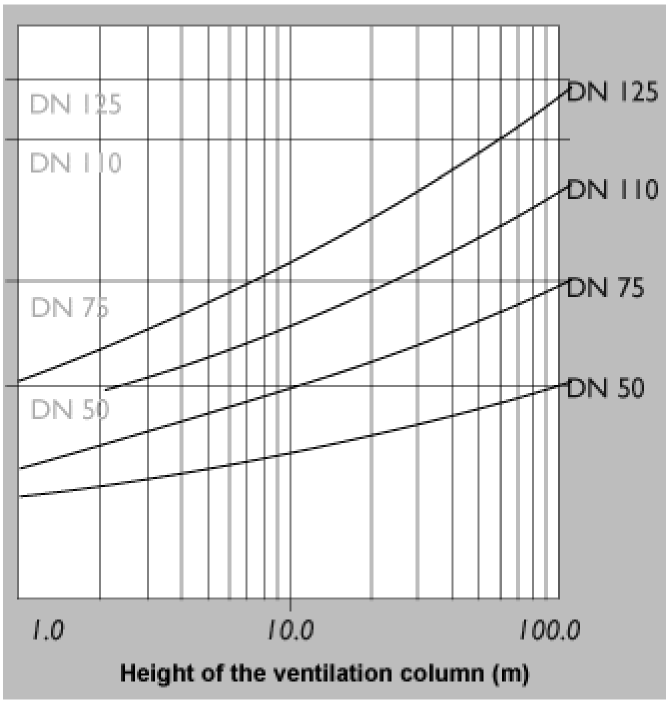
After defining a diameter, it is verified if "the pipe area" is equal with the arbitrated diameter, for the rate of foreseen occupation.

9.3. Ventilation columns

The secondary ventilation column is calculated in function of the foreseen height and of the diameter of the existing fall pipe, where the ventilation column will be placed.

Graphic 2 allows to determine in a quick way the diameter of that column. The presented areas defined by the horizontal lines define the diameter of the SANIFIL pipe to install in order to carry out the secondary ventilation of the system.

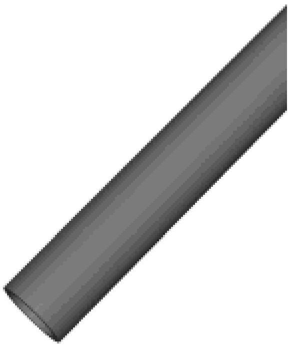
Please note that the ventilation column will have its origin in the main collector, at a distance from the drainage fall pipe of approximately 10 times its diameter and finish near 1 m above the last discharge union made to the drainage fall pipe. Their section should be maintained constant in all its extension, as well as its uprightness.



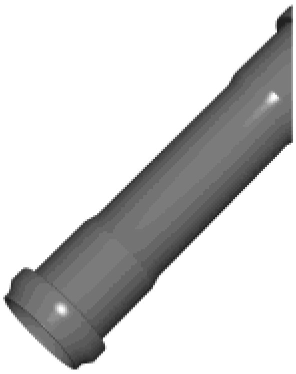
Graph 2–Dimensioning of the ventilation columns according to the General Regulation you the Public Systems and of Nets of Distribution of Water and of Drainage of Residual Waters.

10. SANIFIL System

SANIFIL pipe with simple flare (Length=3m)	
Reference	Dimensions
SF 001 032000 1800	Ø 32
SF 001 040000 1800	Ø 40
SF 001 050000 1800	Ø 50
SF 001 075000 1900	Ø 75
SF 001 110000 2700	Ø 110
SF 001 125000 3100	Ø 125



SANIFIL pipe without flare (Length=5m)	
Reference	Dimensions
SF 000 032000 1800	Ø 32
SF 000 040000 1800	Ø 40
SF 000 050000 1800	Ø 50
SF 000 075000 1900	Ø 75
SF 000 110000 2700	Ø 110
SF 000 125000 3100	Ø 125

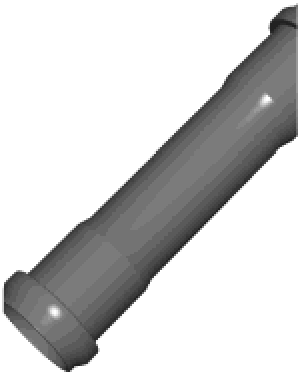


SANIFIL pipe with double flare (Length=3m)	
Reference	Dimensions
SF 002 032000 1800	Ø 32
SF 002 040000 1800	Ø 40
SF 002 050000 1800	Ø 50
SF 002 075000 1900	Ø 75
SF 002 110000 2700	Ø 110
SF 002 125000 3100	Ø 125

SANIFIL pipe with simple flare (Length=0.15m)	
Reference	Dimensions
SF 003 032000 1800	Ø 32
SF 003 040000 1800	Ø 40
SF 003 050000 1800	Ø 50
SF 003 075000 1900	Ø 75
SF 003 110000 2700	Ø 110
SF 003 125000 3100	Ø 125

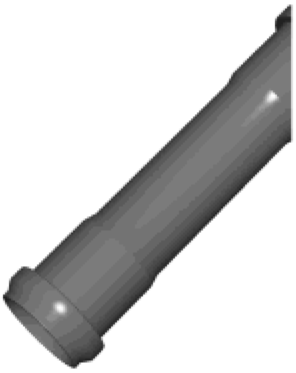
SANIFIL pipe with simple flare (Length=0.25m)	
Reference	Dimensions
SF 005 032000 1800	Ø 32
SF 005 040000 1800	Ø 40
SF 005 050000 1800	Ø 50
SF 005 075000 1900	Ø 75
SF 005 110000 2700	Ø 110
SF 005 125000 3100	Ø 125

SANIFIL pipe with simple flare (Length=0.5m)	
Reference	Dimensions
SF 007 032000 1800	Ø 32
SF 007 040000 1800	Ø 40
SF 007 050000 1800	Ø 50
SF 007 075000 1900	Ø 75
SF 007 110000 2700	Ø 110
SF 007 125000 3100	Ø 125



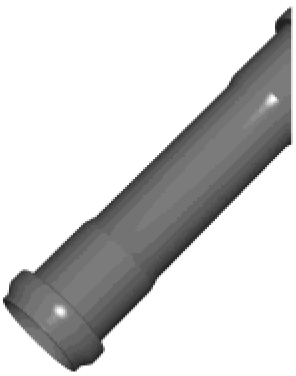
SANIFIL pipe with double flare (Length=0.5m)	
Reference	Dimensions
SF 008 032000 1800	Ø 32
SF 008 040000 1800	Ø 40
SF 008 050000 1800	Ø 50
SF 008 075000 1900	Ø 75
SF 008 110000 2700	Ø 110
SF 008 125000 3100	Ø 125

SANIFIL pipe with simple flare (Length=0.75m)	
Reference	Dimensions
SF 009 032000 1800	Ø 32
SF 009 040000 1800	Ø 40
SF 009 050000 1800	Ø 50
SF 009 075000 1900	Ø 75
SF 009 110000 2700	Ø 110
SF 009 125000 3100	Ø 125



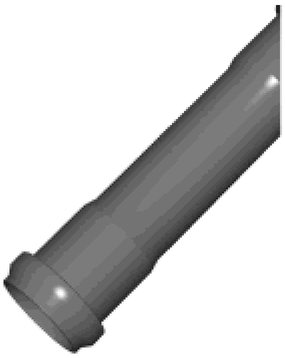
SANIFIL pipe with double flare (Length=0.75m)	
Reference	Dimensions
SF 010 032000 1800	Ø 32
SF 010 040000 1800	Ø 40
SF 010 050000 1800	Ø 50
SF 010 075000 1900	Ø 75
SF 010 110000 2700	Ø 110
SF 010 125000 3100	Ø 125

SANIFIL pipe with simple flare (Length=1m)	
Reference	Dimensions
SF 011 032000 1800	Ø 32
SF 011 040000 1800	Ø 40
SF 011 050000 1800	Ø 50
SF 011 075000 1900	Ø 75
SF 011 110000 2700	Ø 110
SF 011 125000 3100	Ø 125



SANIFIL pipe with double flare (Length=1m)	
Reference	Dimensions
SF 012 032000 1800	Ø 32
SF 012 040000 1800	Ø 40
SF 012 050000 1800	Ø 50
SF 012 075000 1900	Ø 75
SF 012 110000 2700	Ø 110
SF 012 125000 3100	Ø 125

SANIFIL pipe with simple flare (Length=1.5m)	
Reference	Dimensions
SF 013 032000 1800	*Ø 32*
SF 013 040000 1800	*Ø 40*
SF 013 050000 1800	*Ø 50*
SF 013 075000 1900	*Ø 75*
SF 013 110000 2700	*Ø 110*
SF 013 125000 3100	*Ø 125*



SANIFIL pipe with double flare (Length=1.5m)	
Reference	Dimensions
SF 014 032000 1800	*Ø 32*
SF 014 040000 1800	*Ø 40*
SF 014 050000 1800	*Ø 50*
SF 014 075000 1900	*Ø 75*
SF 014 110000 2700	*Ø 110*
SF 014 125000 3100	*Ø 125*

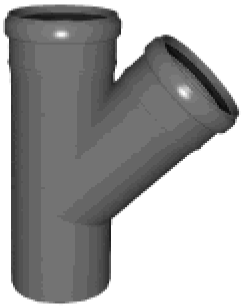
30º THB bend	
Reference	Dimensions
AS 001 032000 1800	Ø 32
AS 001 040000 1800	Ø 40
AS 001 050000 1800	Ø 50
AS 001 075000 1900	Ø 75
AS 001 110000 2700	Ø 110
AS 001 125000 3100	Ø 125

45º THB bend	
Reference	Dimensions
AS 002 032000 1800	Ø 32
AS 002 040000 1800	Ø 40
AS 002 050000 1800	Ø 50
AS 002 075000 1900	Ø 75
AS 002 110000 2700	Ø 110
AS 002 125000 3100	Ø 125

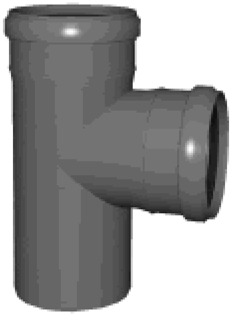
67º 30´HTB bend	
Reference	Dimensions
AS 003 032000 1800	Ø 32
AS 003 040000 1800	Ø 40
AS 003 050000 1800	Ø 50
AS 003 075000 1900	Ø 75
AS 003 110000 2700	Ø 110
AS 003 125000 3100	Ø 125

HTBR reduction bend	
Reference	Dimensions
AS 012 050040 1818	*Ø50 / Ø40*

87º 30´THB bend	
Reference	Dimensions
AS 004 032000 1800	*Ø 32*
AS 004 040000 1800	*Ø 40*
AS 004 050000 1800	*Ø 50*
AS 004 075000 1900	*Ø 75*
AS 004 110000 2700	*Ø 110*
AS 004 125000 3100	*Ø 125*



45º HTEA fork	
Reference	Dimensions
AS 005 032000 1800	*Ø 32*
AS 005 040000 1800	*Ø 40*
AS 005 050000 1800	*Ø 50*
AS 005 075000 1900	*Ø 75*
AS 005 110000 2700	*Ø 110*
AS 005 125000 3100	*Ø 125*



87º 30´HTEA fork	
Reference	Dimensions
AS 006 032000 1800	Ø 32
AS 006 040000 1800	Ø 40
AS 006 050000 1800	Ø 50
AS 006 075000 1900	Ø 75
AS 006 110000 2700	Ø 110
AS 006 125000 3100	Ø 125

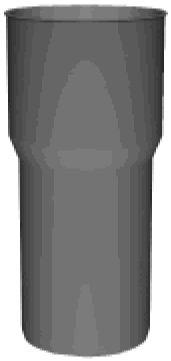
HTEA reduction fork 45º	
Reference	Dimensions
AS 007 050040 1818	Ø 50 / Ø 40
AS 007 075040 1918	Ø 75 / Ø 40
AS 007 075050 1918	Ø 75 / Ø 50
AS 007 110040 2718	Ø 110 / Ø 40
AS 007 110050 2718	Ø 110 / Ø 50
AS 007 110075 2719	Ø 110 / Ø 75
AS 007 125110 3127	Ø 125 / Ø 110

87º 30´HTEA reduction fork	
Reference	Dimensions
AS 008 050040 1818	Ø 50 / Ø 40
AS 008 075040 1918	Ø 75 / Ø 40
AS 008 075050 1918	Ø 75 / Ø 50
AS 008 110040 2718	Ø 110 / Ø 40
AS 008 110050 2718	Ø 110 / Ø 50
AS 008 110075 2719	Ø 110 / Ø 75
AS 008 125110 3127	Ø 125 / Ø 110

67º 30´HTDA double fork	
Reference	Dimensions
AS 009 110050 2718	Ø110 / Ø50 / Ø50
AS 009 110075 2719	Ø110 / Ø75 / Ø75
AS 009 110110 2727	Ø110 / Ø110 / Ø110

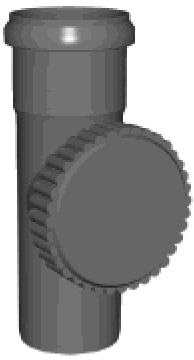
67º 30´HTED corner fork	
Reference	Dimensions
AS 010 110110 2727	Ø110 / Ø110 / Ø110

87º 30´ HTED corner fork	
Reference	Dimensions
AS 011 110110 2727	Ø110 / Ø110 / Ø110

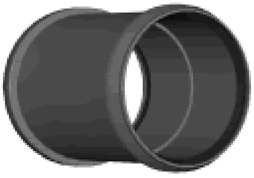


HTLL Flared pipe tip, triple depth	
Reference	Dimensions
AS 013 040000 1800	Ø 40
AS 013 050000 1800	Ø 50
AS 013 075000 1900	Ø 75
AS 013 110000 2700	Ø 110
AS 013 125000 3100	Ø 125

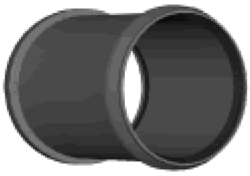
HTSB wc bend with double attack	
Reference	Dimensions
AS 022 110040 2718	Ø110 / Ø40



HTRE inspection fitting with screwing cap	
Reference	Dimensions
AS 014 050000 1800	Ø 50
AS 014 075000 1900	Ø 75
AS 014 110000 2700	Ø 110
AS 014 125000 3100	Ø 125



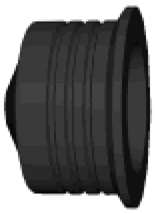
HTMM latch union	
Reference	Dimensions
AS 015 032000 1800	Ø 32
AS 015 040000 1800	Ø 40
AS 015 050000 1800	Ø 50
AS 015 075000 1900	Ø 75
AS 015 110000 2700	Ø 110
AS 015 125000 3100	Ø 125



HTU union without latch	
Reference	Dimensions
AS 016 032000 1800	Ø 32
AS 016 040000 1800	Ø 40
AS 016 050000 1800	Ø 50
AS 016 075000 1900	Ø 75
AS 016 110000 2700	Ø 110
AS 016 125000 3100	Ø 125

HTR eccentric reduction	
Reference	Dimensions
AS 017 032050 1818	Ø 32 / Ø 50
AS 017 040050 1818	Ø 40 / Ø 50
AS 017 040075 1819	Ø 40 / Ø 75
AS 017 050075 1819	Ø 50 / Ø 75
AS 017 050110 1827	Ø 50 / Ø 110
AS 017 075110 1927	Ø 75 / Ø 110
AS 017 110125 2731	Ø 110 / Ø 125

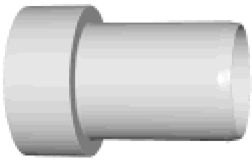
HTV eccentric reduction	
Reference	Dimensions
AS 018 040110 1827	Ø 40 / Ø 110
AS 018 050110 1827	Ø 50 / Ø 110
AS 018 075110 1927	Ø 75 / Ø 110



HTGM adapter	
Reference	Dimensions
AS 019 040046 1800	Ø50 / Ø40

HTSW technical bend	
Reference	Dimensions
AS 020 040046 1800	Ø40 / Ø46

HTSB Simple WC bend	
Reference	Dimensions
AS 021 110000 2700	Ø110



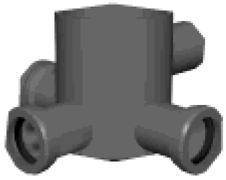
HTSK wc canyon	
Reference	Dimensions
AS 023 110000 2700	*Ø110*

Lubricant (150 gr.)	
Reference	Dimensions
EQ 203 150000 0000	-

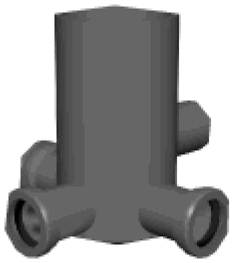
Chamfer cone (external up to ∅50)	
Reference	Dimensions
EQ 201 050000 0000	*Ø20 a Ø50*

Chamfer fitting (external and internal up to ∅50)	
Reference	Dimensions
EQ 202 050000 0000	*Ø20 a Ø50*

HTSK mirror	
Reference	Dimensions
AS 024 110000 2700	*Ø110*



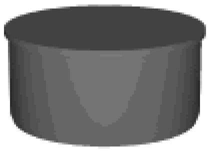
Pavement box with siphon height (h total = 125 mm and ∅ inspection = 100 mm)	
Reference	Dimensions
AS 025 040050 1818	Ø50 / 3 x Ø40



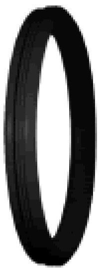
High pavement box with siphon height (h total = 205 mm and ∅ inspection = 100 mm)	
Reference	Dimensions
AS 026 040050 1818	Ø50 / 3 x Ø40

Pavement cover (stainless steel)	
Reference	Dimensions
AS 027 100000 0000	Ø100

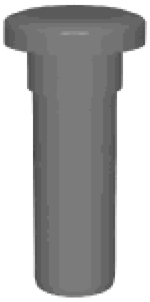
Pavement grill (stainless steel)	
Reference	Dimensions
AS 028 100000 0000	Ø100



HTM terminal end cap	
Reference	Dimensions
AS 029 040000 1800	Ø 40
AS 029 050000 1800	Ø 50
AS 029 075000 1900	Ø 75
AS 029 110000 2700	Ø 110
AS 029 125000 3100	Ø 125



HTRL sealing o'ring	
Reference	Dimensions
AS 030 032000 1800	Ø 32
AS 030 040000 1800	Ø 40
AS 030 050000 1800	Ø 50
AS 030 075000 1900	Ø 75
AS 030 110000 2700	Ø 110
AS 030 125000 3100	Ø 125



PVC terminal ventilation	
Reference	Dimensions
AS 031 075000 1900	Ø75
AS 031 110000 2700	Ø110