uponor

Snow and ice melting system

"Easily predictable snow removal costs with Uponor Snow and Ice melting system"

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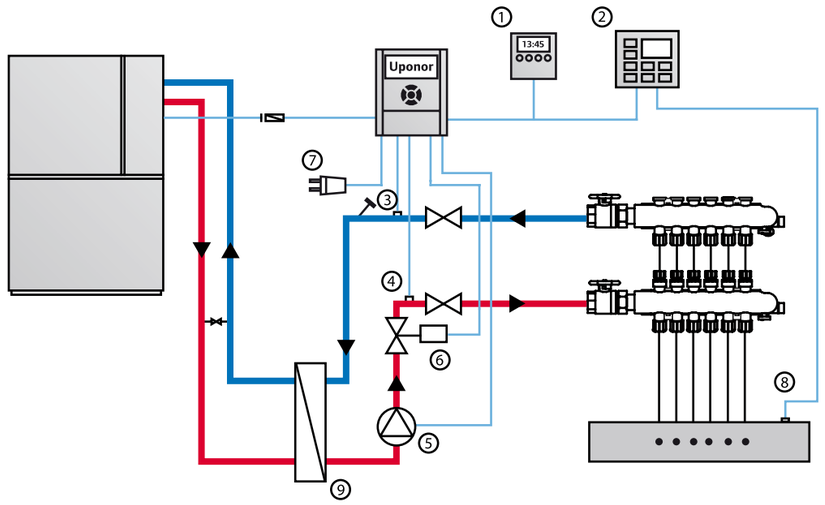
Uponor Snow and ice melting design principles

Uponor Ice & Snow melting system needs a minimum of +35°C degree temperature of water to function which means that a wide variety of heat sources can be used, including district heating return water, waste heat from various processes, heat pumps, etc. The heat from any suitable source can be transferred through a heat exchanger to the Uponor Ice & Snow melting system. The basic and easy design consist Uponor PEX piping with pipe c/c of 250mm and Uponor Industrial Manifold. Where Uponor Ice & Snow melting system differ from Industrial underfloor heating system is that when it functions it´s almost always at max operating flows and temperatures. That is why we only recommend only maximum of 9 loop manifolds to be used with maximum pressure loss of 30 kPa. This must be checked case by case and if done with shorter loops and lower pressure losses the amount of manifold blocks can be increased.

Basic principle

A fundamental principle for Uponor Ice & Snow melting system is that all loops from a given manifold should be of equal lengths. The heat will then be distributed evenly, without the use of throttling valves. Distribution pipes should be designed with Uponor pre insulated pipe system for industrial buildings. They have an advantage of having a ready insulation and flexibility to install them either into the ground or to the walls. Uponor Ice & Snow melting system can be rated for heat outputs ranging up to 350 W per m2. The output required is dependent on the geographical location and the requirement of the system. Due to our research work and long experience, we can always recommend an optimum output. The depth of installation and the loop centre-to-centre distance are also matched to the relevant system.



1. Simplified Snowmaelting timer and pushbutton (alternative solution
2. Snowmelting controller with snow and ice sensor (alternative solution)
3. Supply sensor
4. Return sensor
5. Circulation pump
6. Mixing valve
7. 230 V AC
8. Ground sensor
9. Heat exchanger

Simplified snow and ice melting scheme

Picture above shows a typical connection for Snow & Ice melting system. It is recommended to use a snow and ice detector to achieve better functionality and energy efficiency when using Snow and Ice melting system.

"Heat from any suitable source can be transferred through a heat exchanger to the Uponor Ice & Snow melting system."

The design

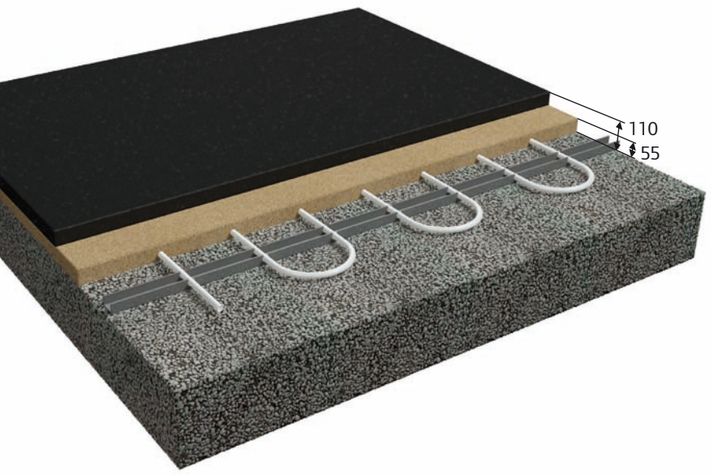
This illustration shows an example of an truck loading area with Uponor Snow and Ice melting system design. There are four same sized (155m2) melting areas done with two separate manifolds.

The table on the right shows the design data and estimated energy consumption data from one of the four same sized melting areas.

Snow and ice melting calculations example	
Size of the area to be melted	155 m2
Designed effect of the system	38,75 kWh (250 W/m2)
Pipe c/c	250 mm
Flow on the manifold	0,67 l/s
Pressure loss from the pipes	30,1 kPa
Max operating pressure	0,3 Mpa
Supply Water / Return Water	40/25 °C
Liquid used Water / Propylene glycol mix:	~65/~35 %
Heat conductivity of the liquid	3,8 kJ/kg °C
Amount of snowfall	25 mm/h
Temperature of the environment	-5 °C
Designed surface temperature during snowfall	3 °C
Speed of the Wind	6 m/s
The length of the snowfall	5 h
Total amount of yearly snowing in h	600 h
Total yearly energy used in estimated area for snow & ice melting	39654 kWh

Adjustable system solution for different structures.

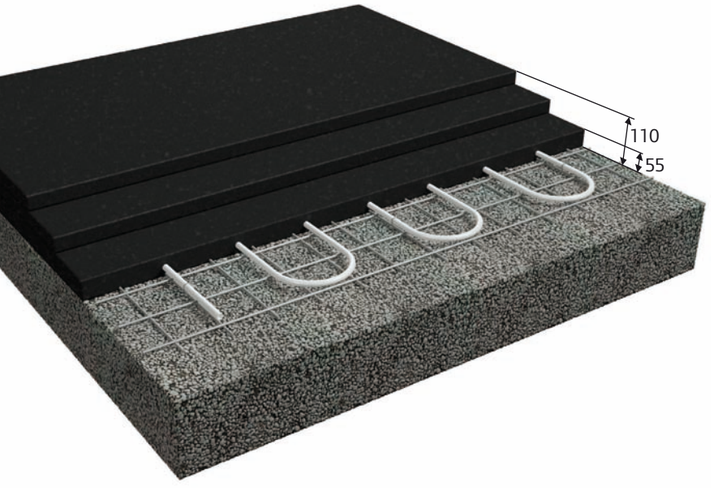
The pipe can be covered with asphalt, gravel, sand and slab or can be cast into concrete. For surface heating, the pipe should be laid about 100 mm below the finished surface level and at a centre-to-centre distance of 250 mm in order to ensure a uniform temperature on the surface. Mark the U-bends on site before laying the pipes. Fill the pipes with water and pressurize them before the surfacing work is started (internal pressure of 0.2 MPa).



Asphalted surfaces:

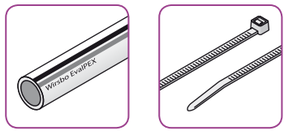
Picture on the left shows the basic installation of asphalted structure with low wear. Mainly used for employment parking areas and low trafficked truck loading areas.

Components:
- Uponor PE-Xa pipe
- Uponor PE-Xa Clamp track
- Uponor Clamp track nail



Asphalted surfaces:

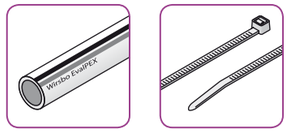
Picture on the left shows the installation of asphalted structure with high wear. Main usage areas are for parking area ramps, high trafficked areas like roads and high truck traffic areas like the roads around logistic centers and such.



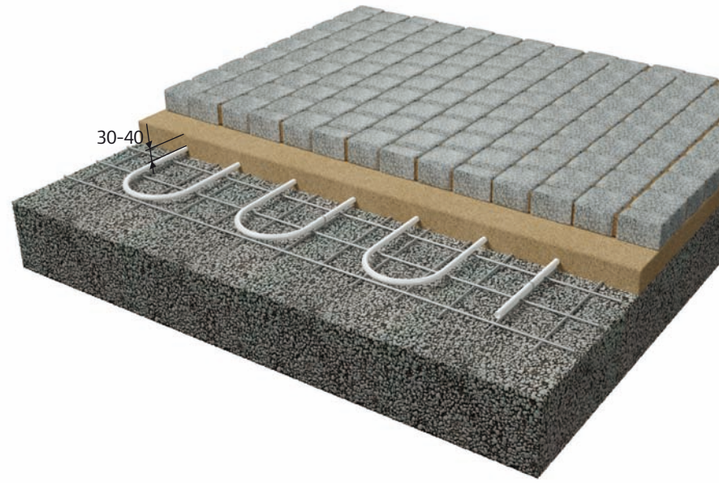
Components:
- Uponor PE-Xa pipe
- Uponor Pipe tie

Paving stones:

Picture on the right shows the installation of snow and ice melting system under paving stones. Installation is done by using Uponor industrial clamp tracks. Main usage places for paving stone areas include walking areas as well as roads.

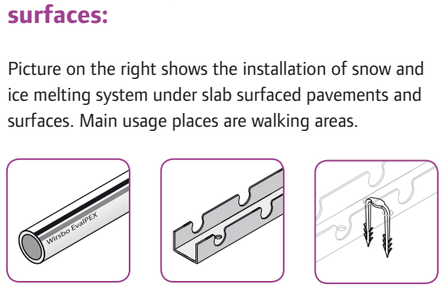


Components:
- Uponor PE-Xa pipe
- Uponor Pipe tie

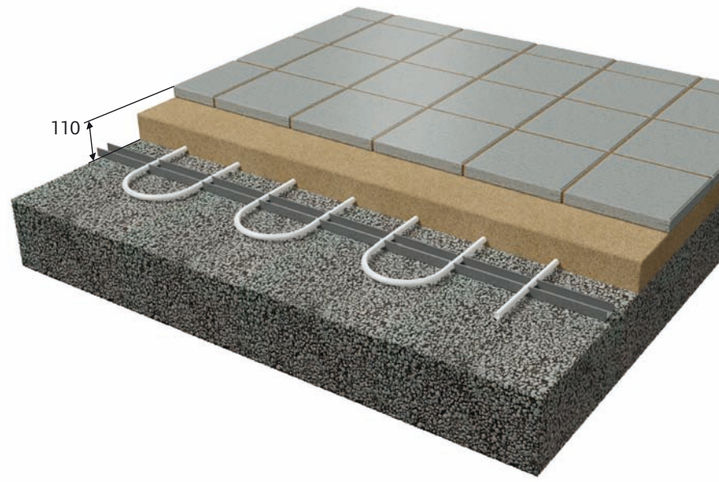


Slab-surfaced pavements and surfaces:

Picture on the right shows the installation of snow and ice melting system under slab surfaced pavements and surfaces. Main usage places are walking areas.

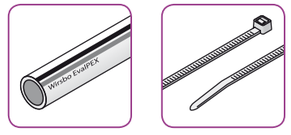


Components:
- Uponor PE-Xa pipe
- Uponor PE-Xa Clamp track
- Uponor Clamp track nail



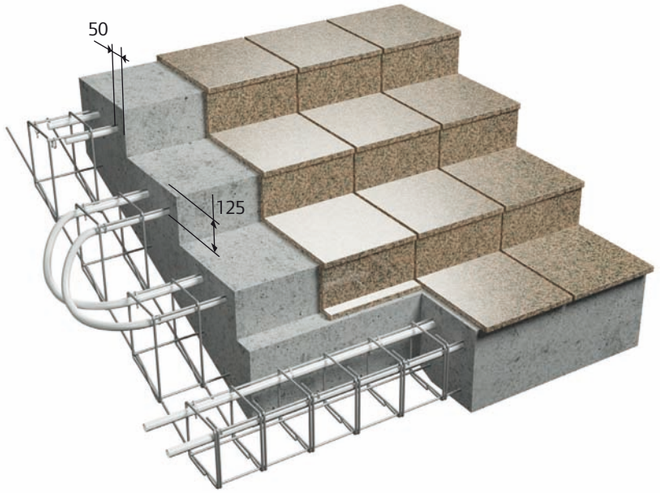
Concrete surfaces:

Picture on the right shows the installation of snow and ice melting system into concrete cast. The actual concrete solution and its height is calculated through its structural needs. Concrete structures might be used because of high loads for example aeroplane hangars. Another reason for using concrete slab can be for walking areas that are tiled instead of using paving stones.



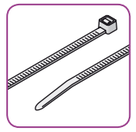
Components:
- Uponor PE-Xa pipe
- Uponor Pipe tie

Adjustable system solution for different structures.



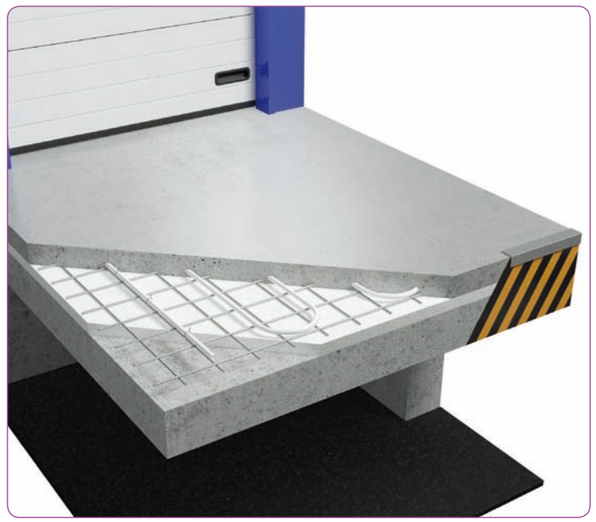
Stairs:

Picture on the left shows an example of Uponor Snow and Ice melting system and the way how the Uponor PE-Xa pipes can be installed to an ironing in concrete staircase.



Components:

- Uponor PE-Xa pipe
- Uponor Pipe tie



Deck structures:

The need for insulation is normally low because of the high temperature deference between the heated surface outdoors and the ground. But when designing deck structures like loading areas or bridges the structure will cool also from underneath. In these cases it is recommendable to use insulation in the construct to prevent heat loss downwards.

Components:

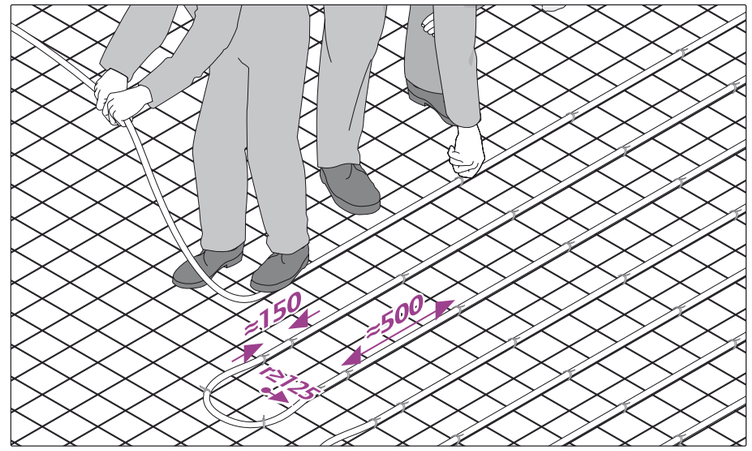
- Uponor PE-Xa pipe
- Uponor Pipe tie

Installing Uponor heating pipes

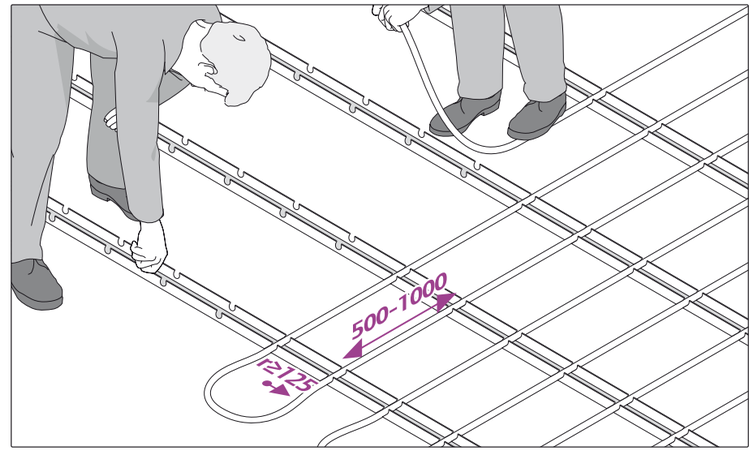
Snow & Ice melting system is normally installed just underneath the surface layers of the construct. The structural needs and load bearing calculated on these areas must be designed in a way that the piping will not break from these loads. It must also be taken into account that the structural demands will not be diminished because of these installations and the actual heating.

The brief guides describe only some aspects of the process of installing Uponor Snow and Ice melting system.

Installation with cable tie

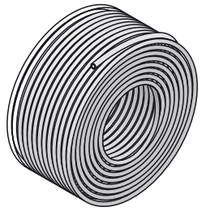


Installation with clamp track

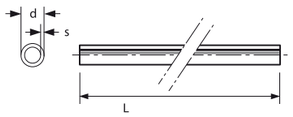


Uponor industrial snow and ice melting system components

Uponor PE-Xa pipe

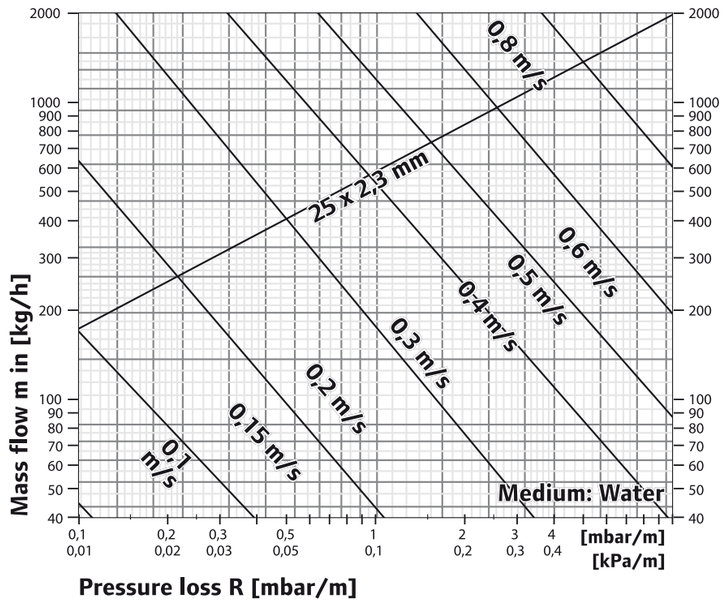


Uponor PE-Xa pipe, 25 x 2.3 mm	
Pipe dimensions	25 x 2.3 mm
Material	PE-Xa
Manufacture	As per EN ISO 15875
Oxygen impermeability	As per DIN 4726
Density	0.938 g/cm3
Thermal conductivity	0.35 W/mK
Lin. expansion coefficient	At 20 °C, 1.4 x 10-4 1/K
	At 100 °C, 2.05 x 10-4 1/K
Crystalline melting temperature	133 °C
Materials class	E
Min. bending radius	125 mm
Surface roughness of pipe	0.007 mm
Water content	0.33 l/m
Range of heating application	70 °C/7.2 bar
Max. cont. operating pressure (water at 20 °C)	15.4 bar (safety factor ≥ 1.25)
Max. cont. operating pressure (water at 70 °C)	7.2 bar (safety factor ≥ 1.5)
DIN-CERTCO registration no.	3V209 PE-X
Pipe connections	Connector couplings and clamp ring screw connections, Q&E joints, type Uponor 25 x 2.3
Preferred installation temperature	≥ 0 °C
Approved water additive	Uponor GNF antifreeze
UV protection	Optically opaque cardboard (unused portion must be stored in the box)

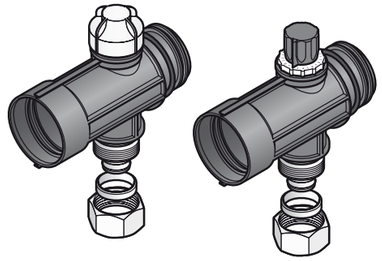


Uponor - Nr.	d [mm]	s [mm]	L [m]
1005278	25	2,3	220
1005282	25	2,3	240
1005277	25	2,3	270
1005281	25	2,3	300
1006746	25	2,3	220
1006750	25	2,3	340
1033321	25	2,3	240
1045072	25	2,3	340
1023448	25	2,3	205
1047615	25	2,3	303
1047617	25	2,3	240
1047618	25	2,3	640

Uponor PE-Xa pipe, 25 x 2,3 mm pressure loss diagram



Uponor industrial manifold 25-G 11/2



Uponor Industrial Manifold 25-G 11/2 as supply and return for Industrial heating.

Consists of:

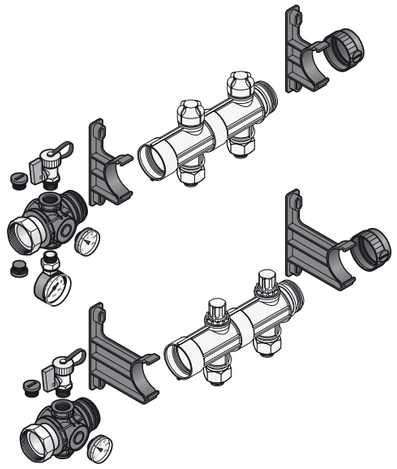
- **supply-segment with control valves for pre-adjustment, heating loop connection for PE-Xa Pipe 25x2,3 with compression adapter.**

- **return-segment with thermostat upper section incl. cap for locking. Uponor actuator can be mounted directly on the return manifold, heating loop connection for PE-Xa Pipe 25x2,3 with compression adapter.**

Spacing of outlet: 100 mm

Uponor - Nr.
1045813

Uponor industrial manifold basic kit

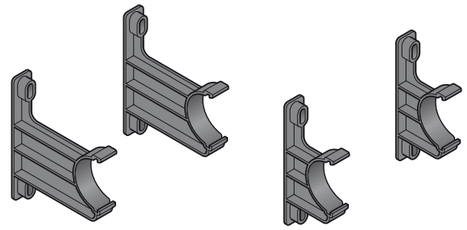


Uponor Industrial Manifold Basic Kit for assembly and mounting the Industrial manifold, consists of:

- **2 brackets short**
- **2 brackets long**
- **2 filling valves brass**
- **2 thermometers 0 - 60°C**
- **1 manometer**
- **2 endcaps**
- **2 flat sealing screw connection pieces with swivel nut**
- **1 mounting material:**
  - **8x screws 6x60mm**
  - **8x plastic anchors 8x40mm**
  - **2x flat sealings 44x32x2**

Uponor - Nr.
1045815

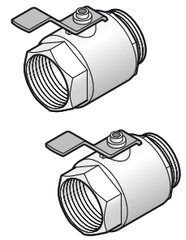
Uponor industrial manifold bracket kit



Uponor Industrial Manifold Bracket Kit for mounting the Industrial manifold. Includes mounting materials.

Uponor - Nr.
1045816

Uponor industrial ball valve G11/2

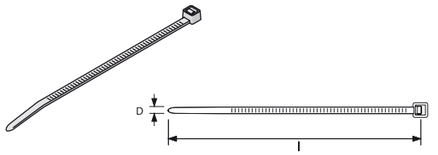


Uponor Industrial Ball Valve G 11/2 for use with the Uponor Industrial manifold G 11/2 connection:

- G 11/2 FT
- G 11/2 MT

Uponor - Nr.
1030135

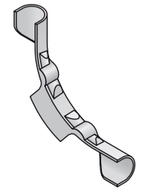
Uponor Cable Tie



For fastening Uponor pipes on reinforcement steel meshes. Made of polyamide.

Uponor - Nr.	b [mm]	h [mm]
1005287	5	200
1005372	7	300

Uponor Pipe Bend Support

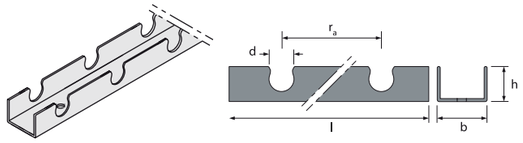


Made of impact resistant plastic to provide 90° bend.

Uponor - Nr.	d [mm]
1001230	25

Uponor Industrial Clamp track for 25mm pipe

Uponor clamp track for 25 mm pipes.



Uponor - Nr.	b [mm]	h [mm]	d [mm]	ra [mm]	l [mm]
1005290	50	34	25	50	3000

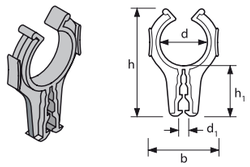
Uponor Fastening Nails for Clamp Track

For fastening the Uponor clamp track 25.

Uponor - Nr.	b [mm]	h [mm]
1005291	36	50

Uponor Pipe Clip

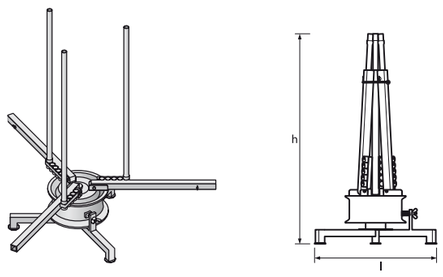
For fastening Uponor pipes on reinforcement steel meshes.



Uponor - Nr.	h [mm]	h1 [mm]	b [mm]	d [mm]	d1 [mm]
1005289	57	27	38	25	3-8

Uponor Industrial Pipe Uncoiler

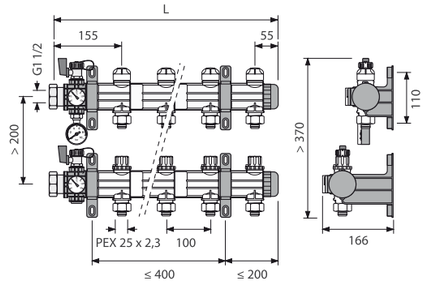
For pipe dimension of 25 and coil length of 300 m.



Uponor - Nr.	l [mm]	h [mm]
1006256	740	1300

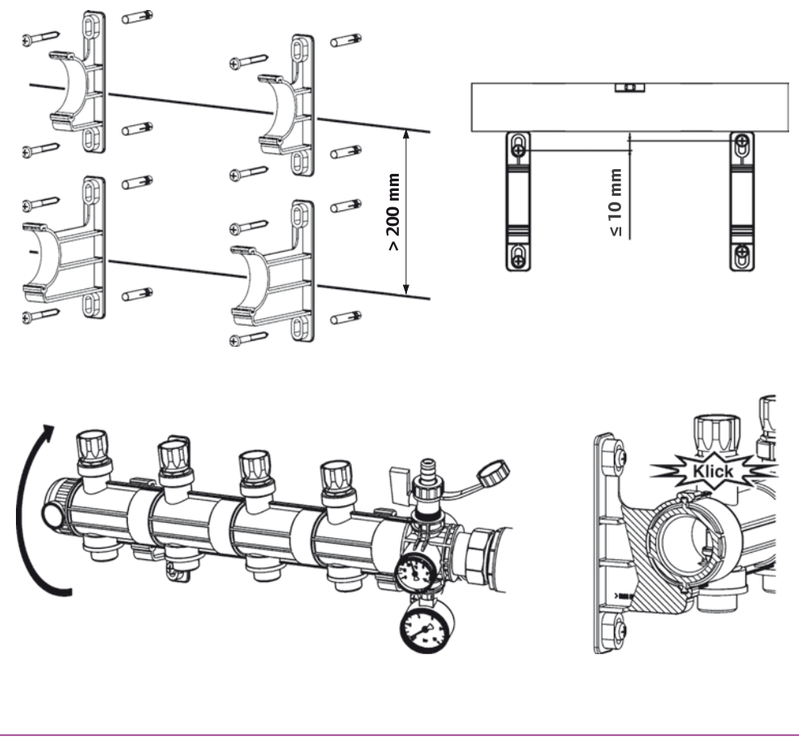
Installation of Uponor industrial manifold

Mounting



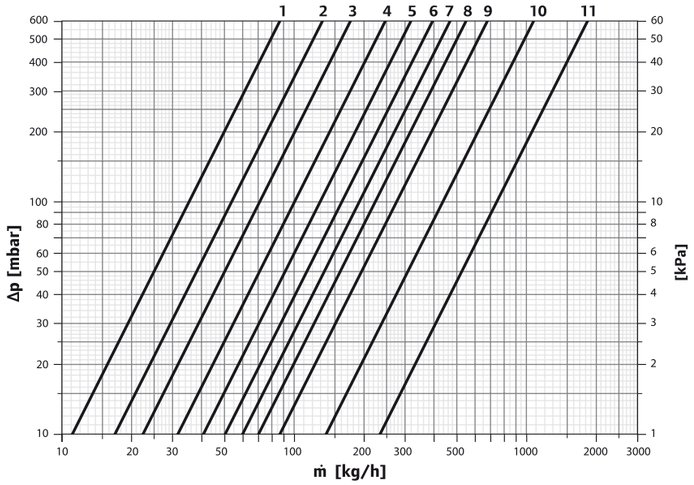
Technical data:	
Connection dimensions	G 1½
Max. operating temperature	70°C
Max. operating pressure	6 bar
Max. test pressure (24 h, ≤ 30°C)	10 bar
kvs value inlet/outlet valves	2,35 m3/h
Maximum amount of loops	9

Circuits	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
L [mm]	310	410	510	610	710	810	910	1010
Required clamps	2	2	2	2	3	3	3	3



Hydraulic balancing

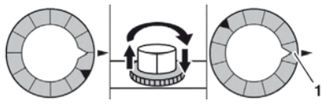
A



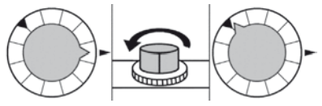
1. Connect the hose to the boiler fill and drain valve and open the boiler fill and drain valve.

2. Open the return valve of the first heating circuit a. Open the supply valve of the first heating circuit b. Close all other valves c.

3. Fill the system with max. 5 bar and rinse it



4. Close the supply and return valves of the filled heating circuit.

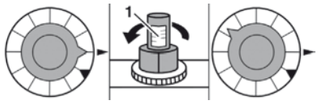


5. Repeat the filling and rinsing procedure (steps 1 and 2) for all further heating circuits

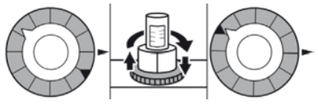
6. Bleed the system at the boiler fill and drain valve.

B

1. Open the supply valve until the calculated water quantity (1) is displayed on the flow meter



2. Turn the ring to the stop of the supply valve



Startup and testing

Fill pipes

1. **Connect the hose to the boiler fill and drain valve and open the boiler fill and drain valve.**

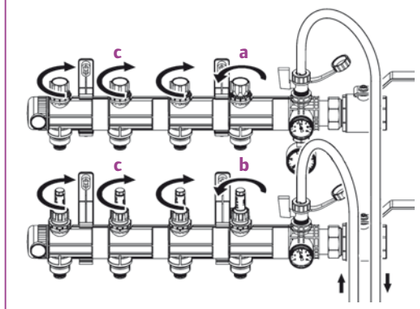
2. **Open the return valve of the first heating circuit a. Open the supply valve of the first heating circuit b. Close all other valves c.**

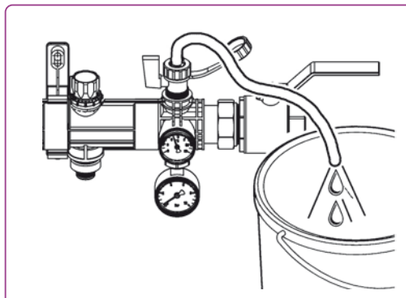
3. **Fill the system with max. 5 bar and rinse it.**

4. **Close the supply and return valves of the filled heating circuit**

5. **Repeat the filling and rinsing procedure (steps 1 and 2) for all further heating circuits**

6. **Bleed the system at the boiler fill and drain valve.**





Pressure test

1. **Pressurise the system to 6 bar for 2 hours.**

2. **After 2 hours perform a leak test (the decrease in pressure may not exceed 0.2 bar)**

3. **Fill the system with water until the operating pressure is reached**

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Uponor's Simply More philosophy includes services for all stages of the construction process – from the fi rst concept of a project to a building in use.

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Uponor Industrial Snow and Ice melting System 12/2010