MAKING MODERN LIVING POSSIBLE

Handbook

Danfoss Pipes for Hydronic Floor Heating

The English language is used for the original instructions.
Other languages are a translation of the original instructions.
(Directive 2006/42/EC)

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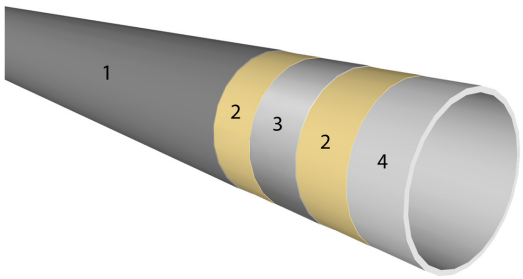
Danfoss FH Pipes

The Danfoss FH pipes are high quality pipes for under floor heating applications.
All Danfoss FH pipes are manufactured from the highest quality PE-RT (Polyethylene Raised Temperature resistance) which is a recyclable material with similar characteristics to those of PE-Xa pipes.
The PE-RT material gains it's strength from the octen side chain molecules which makes additional cross linking redundant. Even without cross linking the Danfoss FH pipes hava a lifespan of more than 50 years. All the layers are permanently bonded together with a high quality bonding adhesive.



1. PE-HD outer layer
2. Adhesive
3. Butt-welded aluminium
4. PE-RT inner pipe

FH Composite Pipes

The Danfoss Composite pipe consists of 5 layers, the outer layer is made from PE-HD, the core from aluminium and the inner pipe from PE-RT. This combination gives the pipe a strong and protective outer layer making the pipe resistant for use on building site conditions. The Aluminium core makes installation easier by helping the pipe stay in the bent shape without springing back. The PE-RT inner pipe has a smooth surface which minimizes pressure loss allowing for long circuit lengths, and at the same time minimize the murmur in the installation.

No Corrosion
The FH Composite pipe is a 100% oxygen tight thanks to the continuously butt-welded aluminium core. Oxygen tightness is a must to keep the installation free from corrosion which ensures a long life time for the system.
The FH composite pipe exceeds the demand for oxygen barrier according to DIN 4726

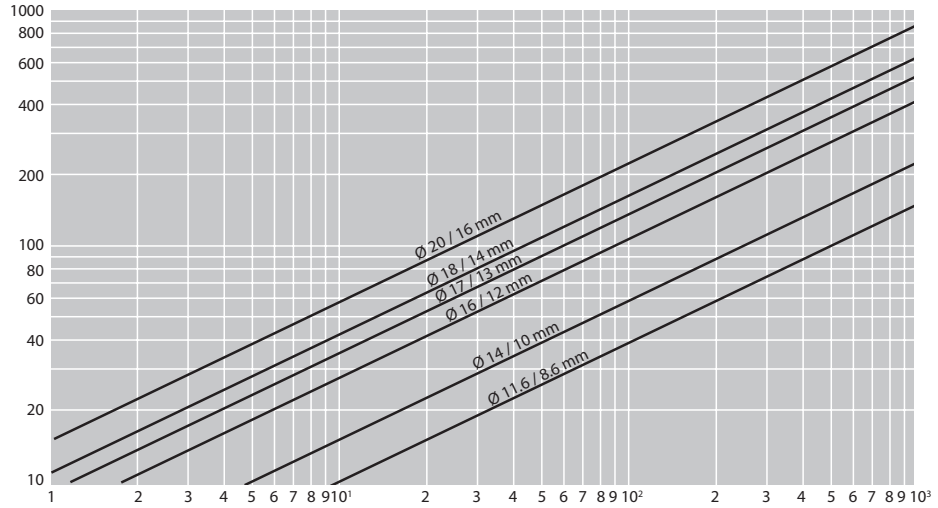
No noise
The aluminium core ensure that the thermal expansion of the pipe is only 1/7 to that of a full plastic pipe, this helps to prevent noise problems in the floor construction.

In shape
The Danfoss composite pipe is manufactured in such a way that the aluminium layer prevents the pipe from going back to its original form. This makes it easy to install.

Quality inside
The PE-RT resin is typically available in different qualities and to ensure that the quality of the pipe we only use the highest quality of materials.

Pressure Loss for FH Composite Pipes

Volume flow - water quantity m (kg/h)



Water temperature: 40°C

Pressure loss, [Pa/m] (1 mbar = 100 Pa)

Materials	PE-RT / Aluminium / PE-HD
Max. working pressure	10 bar
Test pressure	16 bar
Max. flow temperature (short term)	110 °C
Max. working temperature	95 °C (not for continous operation)
Recommended max. working temperature	65 °C

FH PE-RT Pipes

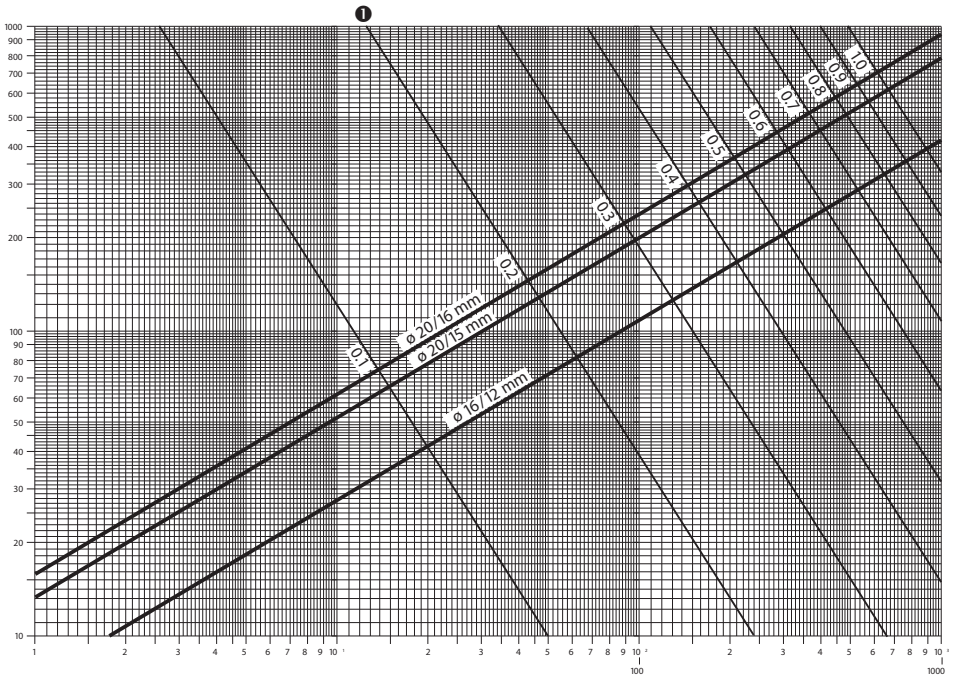
The Danfoss PE-RT pipe is a multilayer pipe with 5 layers, the outer layer is made from PE-RT which serves as a protective layer for the EVOH oxygen barrier. The smooth inner pipe is made from PE-RT to prevent pressure loss and pipe murmur. Installation is eased by the flexibility that the PE-RT material provides.

Long life time
The EVOH (Ethylene Vinyl Alcohol) oxygen barrier in the pipe helps to keep the installation free from corrosion. The oxygen barrier is accordance with DIN 4726.

Construction site conditions
The outer layer of the pipe serves as a protection barrier which keeps the oxygen barrier free from scratches and makes the pipe well suited for the conditions on construction sites.

Flexible
The PE-RT material is very flexible which makes it easy to work with, the flexibility of the material makes it possible to install the pipe even at low temperatures.

Pressure Loss for FH PE-RT Pipes



❶ *Flow velocity (m/s)*

Water temperature: 40 °C.

Materials	PE-RT / EVOH / PE-RT
Max. working pressure	6 bar
Test pressure	10 bar
Max. flow temperature	95 °C
Max. working temperature	60 °C
Oxygen barrier	EVOH

Pipe Bending

The flexible nature of the pipe material makes it easy and quick for one person to install the Danfoss FH pipes. To achieve a proper bend hold the pipe at a distance approx. 40 cm and then bend it to the required radius. To avoid damage to the pipe kinks should be avoided, this could be made easier by using a bending spring.

Bending with internal bending spring
The pipe is first bevelled to remove inner plastic edges and make the pipe end nice and circular. The internal spring is then inserted to leave just a small bit showing. It is important not to bend so hard that the spirals of the bending spring begin to show on the outside of the PE-sleeve.

Bending with external bending spring
The external bending spring is ushed over the pipe to the bending point. After carrying out bending the spring is removed.

Minimum Bending Radius with Bending Springs

Pipe dimension[mm]	Manual pipe bender radius [mm]	Internal pipe bending spring radius [mm]	External bending spring radius [mm]
16	80 (5 x Od)	64 (4 x Od)	64 (4 x Od)
20	100 (5 x Od)	80 (4 x Od)	80 (4 x Od)

Od = Outside diameter.

Precautions

UV-protection

Inside buildings there is no need to take extra precaution against UV radiation. The grey outer synthetic layer of the composite pipe is not sensitive to indirect UV radiation inside buildings. However the Danfoss Composite pipe has to be protected from direct sunlight and UV radiation. Completed installations must be covered or protected in another way from UV radiation (e.g. enclosed in a protective pipe).

Frost

The following combinations of Anti-freeze and anticorrosion with water can be used for the Danfoss FH pipes:

- Antifrogen N by Clariant
- Antifrogen L by Clariant
- Tyfocor by Tyforop Chemie GmbH
- Tyfocor L by Tyforop Chemie GmbH
- Tyfocor LS Tyforop Chemie GmbH

It is important that the proportion of water to Anti-freeze and anti-corrosion should be a minimum of 25% Vol and a maximum of 80% Vol since otherwise there is a danger of corrosion in some metallic areas. Installations that have been temporarily filled with anti-freeze and anti-corrosion must be emptied and cleaned several times with water in order to remove any residual product. Any residual product can lead to corrosion. Anti-freeze and anti-corrosion additives must not be allowed to attack Polyethylene, EPDM, PPSU, and brass.

Connections

Danfoss connection fittings are available as compression and press fittings, both variants comes in the dimension 16 x 2.0mm and 20 x 2.25mm as the FH pipes.

Compression fitting

The Danfoss compression fitting uses the well know compression ring technology where the ring is firmly fixed to the pipe by screwing the coupling tight. The fitting connection can be disconnected from the manifold but the ring still remains fixed to the pipe.

Press fitting

The press fitting is used for fast and economical connections in the floor. The press fitting technology is a well known and proven technique.

The connection is easily made with help of the Danfoss hand-press tool which makes installation possible under all conditions. The pipe is bevelled and simply pressed into the sleeve of the press fitting. The plastic ring has holes so the pipe is visible when it is pressed enough into the sleeve. The ring also serves as guidance as where to place the press tool before pressing to ensure a tight connection. After pressing the sleeve the plastic rings can be removed.

Product Range

FH Composite pipes

16 x 2 mm, 200 m, Code no. 088X0001

16 x 2 mm, 500 m, Code no. 088X0003

FH PE-RT pipes

16 x 2 mm, 200 m, Code no. 088X0004

20 x 2.25 mm, 150 m, Code no. 088X0005

16 x 2 mm, 500 m, Code no. 088X0006

Fittings

Press coupling, 16 x 2 mm, Code no. 088X0020

Press coupling, 20 x 2.25 mm, Code no. 088X0021

Screw coupling, 16 x 2 mm, Code no. 088X0025

Screw coupling, 20 x 2.25 mm, Code no. 088X0026

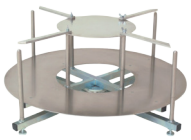
Compression fitting, ¾" x 16 x 2 mm, Code no. 013G4186

Compression fitting, ¾" x 20 x 2.25 mm, Code no. 013G4093

Tools

FH dispensing wheel:

- for 200 m pipes, Code no. 088X0600
- for 500 m pipes, Code no. 088X0615



Pipe cutter:

- for 16-20 mm pipes, Code no. 088X0601

Pipe bevelling tool:

- for 16 mm pipes, Code no. 088X0603
- for 20 mm pipes, Code no. 088X0604

Hand press tool: Code no. 088X0609

Inserts:

- for 16 mm pipes, Code no. 088X0610
- for 20 mm pipes, Code no. 088X0611