SINTEF

Technical Approval

SINTEF Certification

No. 2464

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SINTEF confirms that

JRG Sanipex pipe in tube system

has been found to be fit for use in Norway and to meet the provisions regarding product documentation given in the regulation relating to the marketing of products for construction works (DOK) and regulations on technical requirements for building works (TEK), with the properties, fields of application and conditions for use as stated in this document

1. Holder of the approval

Georg Fischer JRG AG
Hauptstrasse 130,
4450 Sissach,
Switzerland

2. Product description

JRG Sanipex pipe in tube system is a system for distribution of cold and hot water inside buildings; see Fig. 1-3. Table 1 shows JRG Sanipex pipe in tube system's main components.

3. Fields of application

The approval concerns cold and hot water distribution inside buildings.

4. Properties

PEX-pipes

The use of PEX-pipes has the following limitations:

- Maximum allowed pressure is 1,0 MPa (10 bar)
- Maximum allowed temperature for a short period of time is 95 °C
- Maximum continuous operating temperature is 70 °C

Watertightness

The pipe in tube system has passed type testing for watertightness in accordance with NT VVS 129 *Pipe in tube systems* for PEX-pipes with dimensions 12 x 1.7 mm and 16 x 2.2 mm. PEX-pipes and fittings are certified in accordance with current product standards.

Exchangeability

PEX-pipe dimensions 12 x 1.7 mm (18 mm protection tube) and 16 x 2.2 mm (25 mm protection tube) are documented to be exchangeable for up to 10 meters length, included three bends plus wall box. See Chapter 6 regarding dimensioning. PEX-pipe dimension 20 x 2.8 mm (29 mm protection tube) is not documented with regard to exchangeability.

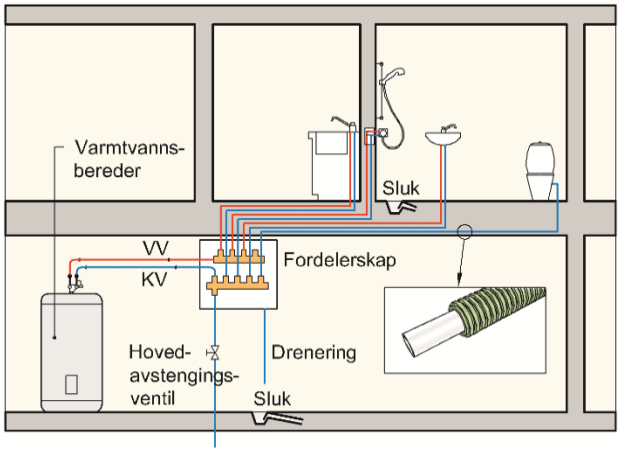

Fig.1
Principle sketch of a pipe in tube system

Acoustic characteristics

The pipe in tube systems acoustic characteristics depends on how it is installed, noise levels of taps, water hammer levels etc. The noise levels from technical installations shall be in accordance with limit values given in TEK and NS 8175, Class C.

Table 1
Product specifications for JRG Sanipex pipe in tube system

Component	Description
PEX- pipe and protection tube	Dimension 12 x 1.7 mm (18 mm protection tube), 16 x 2.2 mm (25 mm protection tube) and 20 x 2.8 mm (29 mm protection tube). External diameter of the belonging corrugated PE protection tubes is given in parenthesis. SINTEF Product Certificate no. 0017, 0049 and 1814.
Fittings for PEX- pipe	Fitting system for PEX- pipe. SINTEF Product Certificate no. 0049 and 1814.
Wall box	Wall box for 12 x 1.7 mm and 16 x 2.2 mm PEX-pipe with 18 mm and 25 mm protection tube respectively. The wall box is delivered in two versions; with and without threads on the extension part.
Locking clip for wall box	The locking clip secures grip and tightening between wall box and protection tube.
Bracket for wall box	Bracket to fix the wall box to the studding.
Manifold	Manifold made of bronze for distribution of water.
Manifold cabinet - steel	Galvanized steel manifold cabinet for installation in ceiling or in wall in both wet and dry zones. The cabinet is delivered with splash protection, front door with frame, manifold bracket, bushings, drainage clip and drainage components. Drainage capacity 0.25 l/s. Manifold cabinet 4 can be installed in wet zones.
Manifold cabinet - aluminium	Galvanized salt water resistant aluminium manifold cabinet for installation in ceiling or in wall in both wet and dry zones. The cabinet is delivered with splash protection, front door with frame, manifold bracket, bushings, drainage clip and drainage components. Drainage capacity ≥0.25 l/s. Manifold cabinet 4 can be installed in wet zones.
Manifold cabinet - plastic	Cabinet for installation in ceiling or in wall in both wet and dry zones. The cabinet is delivered with splash protection, front door with frame, manifold bracket, bushings, drainage clip and drainage components. Drainage capacity ≥ 0.25 l/s.
Mini manifold cabinet	Galvanized steel manifold cabinet. The cabinet is delivered with JRG Sanipex box 3-way 90°. Drainage capacity 0.25 l/s.
Ball valves	Ball valves in brass for taps/mixers and manifolds. SINTEF Product Certificate no. 1454 and 1455.
Fixing clamps	For use inside the manifold cabinet when replacing PEX-pipes through protection tubes.
Clamps for protection tube	Clamps for fixing/support of protection tubes with external diameters 18 mm and 25 mm.
Pipe protection unit for nails and screws	Pipe protection unit is used for protection of 18 mm, 25 mm and 29 mm protection tubes from penetration of nails and screws.
End sleeve	End sleeves are used to make a watertight connection between PEX-pipes and protection tubes with dimension 12 x 1.7 mm (18 mm protection tube) and 16 x 2.2 mm (25 mm protection tube).
Fitting connector	Fitting connector is used for fixing/support of protection tube, for instance in kitchen units. The fitting must be secured against possible leakages with leakage detector.
Pipe support	Pipe support made of plastic ensuring correct pipe bending radius between transition floor/wall and ceiling/wall.
Installation suitcase with special tools	Installation suitcase with special tools for installation of the pipe in tube system.

Fig.2
JRG Sanipex – Wall box with locking clip
Source: Georg Fischer JRG AG

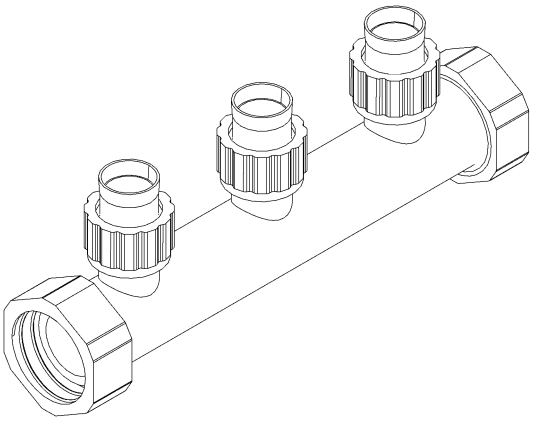

Fig.3
JRG Sanipex – Manifold
Source: Georg Fischer JRG AG

5. Environmental aspects

Chemicals hazardous to health and environment

The product contains no hazardous substances with priority in quantities that pose any increased risk for human health and environment. Chemicals with priority include CMR, PBT or vPvB substances.

Effect on indoor environment

The product is evaluated according to SINTEF Technical Approval – Health and Environmental Requirements version 09.05.2022. The product is not regarded as emitting any particles, gases or radiation that have a perceptible impact on the indoor climate, or to have any significant impact on health. The product meets the requirements in BREEAM-NOR v6.0, Emissions from building products according to Hea 02 Indoor air quality.

Effect on soil, surface water and ground water

The product is evaluated to emit no substances to drinking water in amounts that can cause taste, smell or is dangerous to the health.

Waste treatment/recycling

The product shall be sorted as metal and residual waste. The product shall be delivered to an authorized waste treatment plant for material and energy recovery.

Environmental declaration

No environmental declaration (EPD) has been worked out for the product.

6. Special conditions for use and installation

Design considerations

The PEX-pipes shall be easily accessible for replacement after installation. The protection tubes shall be installed so that damaged PEX-pipes can be replaced without damaging any building construction. Leakages shall be easily discovered and shall not damage other installations or building parts. The main goal for the protection tube is to drain potential leakages to the floor gully in a wet room. Water leakages shall be directed through the manifold cabinet's draining tube to a visible spot, not into the floor gully directly.

Installation

JRG Sanipex pipe in tube system shall be installed as described in Building Research Design Guide 553.117 *Rør-i-rør-systemer for vannforsyning* and in accordance with the manufacturer's installation instructions. Components, as described in Table 1, shall be used when installing JRG Sanipex pipe in tube system only. The internal control form, accompanying the manifold cabinet, shall be completed before commissioning.

Dimensioning

Chosen pipe dimensions shall give enough water to the sanitary equipment. The PEX-pipes shall be easily accessible for replacement after installation also. The following factors are controlling the exchangeability; pipe dimension, pipe length, fixation and number of bends. The exchangeability of the inner PEX-pipe must be controlled before finishing the building construction if the pipe lengths are more than 10 meters.

Table 2 shows suggested water flow capacity for different sanitary equipment with recommended pipe dimensions with respect to exchangeability. The water pressure must be at least 5 bars in front of the manifold for Table 2 to be valid.

Table 2
PEX-pipe dimensioning

Sanitary equipment	Water flow l/s	Recommended external diameter for PEX-pipe[1] mm		
		12 x 1,7	16 x 2,2	20 x 2,8
Water closet	0,10	X	X	-
Basin mixer	0,20	X[2]	X	-
Kitchen mixer	0,20	X[2]	X	-
Shower mixer	0,20	X[2]	X	-
Washing and dishwashing machines	0,20	X[2]	X	-
Bath mixers	0,30	-	X	X[3]

[1] X is recommended pipe dimension
[2] Pipe lengths > 5 meter should be controlled regarding capacity
[3] Exchangeability is not documented

Manifold cabinet

When manifold cabinets are installed in a wet room, then the cabinets can be placed in both wet and dry zones. The installation instruction from Armaturjonsson for mounting in wet zones must be followed.

Protection tubes must be fastened to the cabinet by using bushings. The protection tubes must be cut above the sill height in the bottom of the cabinet. The drain tube must be cut as close as possible to the cabinet's bottom as described in Fig. 4. A pipe cutter from Armaturjonsson shall be used for this operation.

Manifold cabinets for wall installation shall be mounted at a height that ensures the protection tubes come straight into the cabinet.

The required drainage capacity from manifold cabinets is ≥ 0.25 l/s.

A protection tube with an external diameter of 25 mm and the cabinet's drainage components has a documented capacity of ≥ 0.25 l/s. The drain tube cannot be more than 1.5 meters in length.

PP pipe with an external diameter of 40 mm and the cabinet's drainage components has a documented capacity of 0.40 l/s.

When the manifold cabinet is installed in the ceiling, then it must be mounted in a wet room with draining ability to a watertight floor with gully. The front door must be installed level with the ceiling and the water splash protector must be removed. Water shut-off valves should not be located inside cabinets in ceilings. If the valve has to be located inside, then it must be easily accessible.

Bushings in the cabinet shall be controlled for water tightness before completion of the building construction. The water capacity of the drainage tube shall also be controlled before finishing the wall.

The water splash protector shall always be placed inside the manifold cabinet with exception of when the cabinet is mounted in a ceiling.

It is important that the manifolds are clamped inside the cabinet to avoid bothersome noise from water hammers when closing of taps.

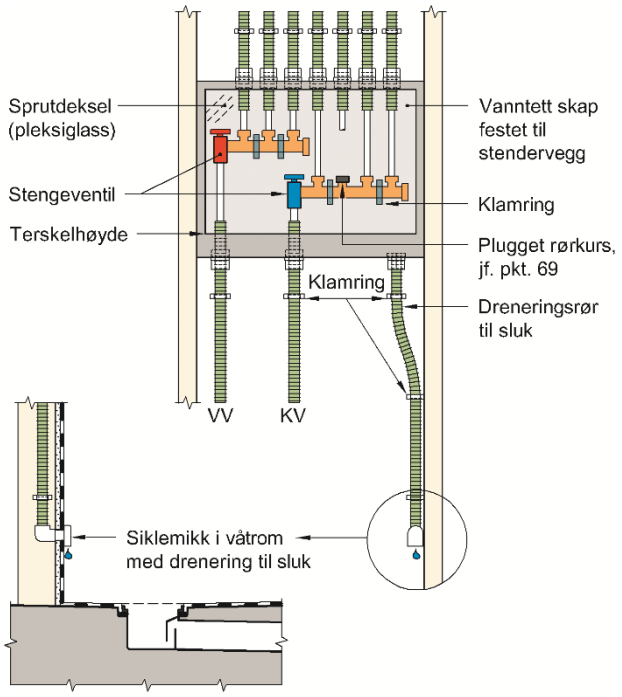

Fig. 4
Correct installation of manifold cabinet in wet rooms

Manifold cabinets without any chance of draining water leakages to a floor gully must be installed with a leakage detector as described in Fig. 5. This solution can be relevant if the cabinet must be installed in rooms like offices, toilet room or kitchens without floor gullies.

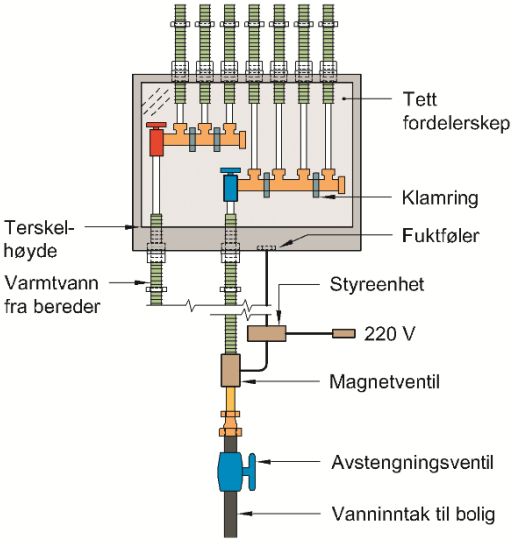

Fig. 5
Manifold cabinet without draining must be installed with a leakage detector that shuts off the water supply immediately if leakages occur

Manifolds

Manifolds should preferably be installed inside a manifold cabinet, but manifolds can be installed visibly in a wet room with a watertight floor membrane and gully. It is important to fix the manifolds well to the building construction. Manifold brackets for fixing/supporting of the manifolds shall be used.

Clamping of protection tubes

Clamps that fixes the protection tubes well to the building construction shall be used.

Clamping of protection tubes is especially important before and after a bend, in the middle of a bend, and also where tubes pass through a building part and in conjunction with wall boxes and manifold cabinets.

Protection tubes should be clamped in conjunction with wall boxes and manifold cabinets with a distance of 150-300 mm. The clamp space on straight pipes should not exceed 0.6 m.

Fixing clamps for use inside the manifold cabinet shall be used when replacing PEX-pipes through protection tubes.

Installation of wall boxes

Wall boxes shall be installed as described in the installation instruction from Georg Fischer JRG AG and/or Armaturjonsson.

Installation of wall boxes in wet zones

Wall boxes and belonging sleeve/collar/fixation ring shall always be used in wet zones made of liquid membrane, bathroom panels or watertight boards to ensure a watertight connection to the construction. The sleeve/collar/fixation ring must be installed as described in the installation instruction from Georg Fischer JRG AG and/or Armaturjonsson.

Water leakages protection in kitchen and toilet room

Kitchen unit and toilet rooms are considered dry zones, i.e. rooms without gully and water tight floor. It is not required to use wall boxes in dry zones, but it is highly recommended. The wall box ensures a watertight connection between box and protection tube, and a good fixation to avoid trouble with expansion forces.

Floors in toilet rooms or the bottom floor inside the kitchen sink unit should have a watertight covering and a leakage detector to avoid damages from potential water leakages, see Fig. 6.

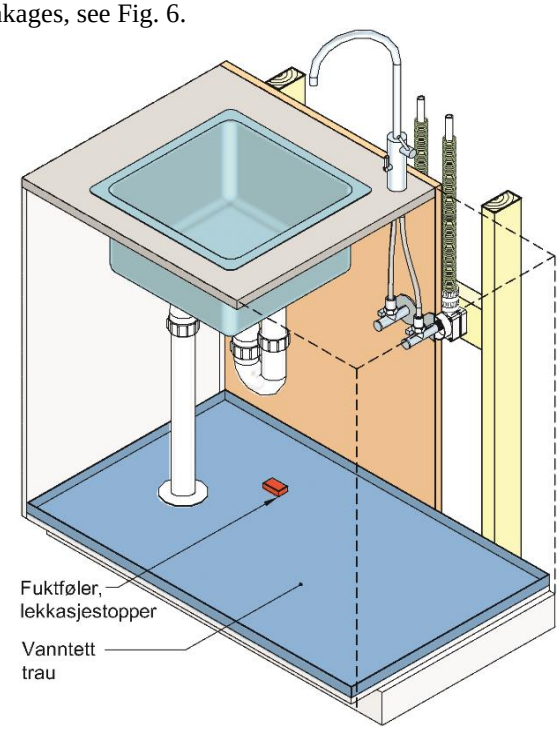

Fig. 6
Main principles for water leakage protection in dry zones

Tools

Special tools delivered by Armaturjonsson AS for installation of the system shall always be used when required.

Expansion forces

Expansion forces shall not cause damage to the pipe in tube system, taps or building constructions it is fastened to. The pipe expansion with regard to temperature must be considered when installing the system. PEX- pipes have 0.18 mm/(m°C) length expansion, i.e. 90 mm per 10 m and 50° C temperature difference. If the pipes are installed with small curves, much of the expansion will be picked up between the space of the PEX- pipe and the protection tube.

Water hammer

Water hammer can cause noise from the pipe in tube system due to movement (strokes) between PEX-pipes and protection tubes. This movement can be avoided if the pipes are installed with small curves with clamp spacing 0.6 meter as described in Building Research Design Guide 553.117 and 553.185. It is also recommended to use special taps that have a water hammer-reducing closing mechanism installed.

Pipe protection

Pipe protection unit should be installed in stud partitions where there is a risk of penetrating the pipes with nails, screws etc. Expansion forces and water hammers can destroy protection tubes when they go through steel partitions, but this can be avoided by protecting the tubes.

PEX-pipes must not be exposed to solvents, and tape cannot be used on the outside of the pipes. PEX-pipes must not be exposed to sunlight (UV- radiation) for a long period.

Cold and hot water insulation

Insulation of pipes must be considered if it is necessary in systems where it is needed for cold and hot water or for instance, when the pipes are cast in concrete.

Protection against frost

When pipes are installed in an external wall/floor/roof, then the pipes must be placed on the warmest side of the construction to avoid pipe freezing.

Penetration of fire walls

Penetrating fire classified building walls or floors must not weaken the building construction's fire resistance. If plastic pipes with external diameter less than 32 mm penetrates:

- bricked or casted building constructions with fire resistance up to class EI 90 A"-s,d0, or
- isolated non-loadbearing wall with fire resistance up to class EI 60 A2-s1,d0,

then it must be used a sealant which is classified for the purpose. The sealant must have the same fire resistance as the construction. Penetration of fire walls shall be carried out as described in Building Research Design Guide 520.342.

Pressure testing of the system

The pipe in tube system shall be pressure tested in accordance with the installation instructions before handing it over to the owner of the building.

Marking of water circuits

The water circuit should be marked somewhere inside the manifold cabinet with exact length and where it delivers water. A circuit form, accompanying the cabinet, should be used.

Protection against Legionellosis

Cold and hot water pipes should not be in contact with each other to avoid heat transmission when installed. Cold water pipes should not be laid in areas with high temperature, f. ex. in timberwork with floor heating.

Unused pipe circuits should be emptied of water and plugged or closed at the manifold.

7. Factory production control

The product is produced by Georg Fischer JRG AG, Hauptstrasse 130, 4450 Sissach, Switzerland.

The holder of the approval is responsible for the factory production control in order to ensure that the product is produced in accordance with the preconditions applying to this approval.

The manufacturing of the product is subject to continuous surveillance of the factory production control in accordance with the contract regarding SINTEF Technical Approval.

8. Basis for the approval

The approval is based on a system assessment, documentation of the properties of the subcomponents and type testing of a complete system as documented in the following reports:

- SINTEF report B0999805 dated 19.6.2008
- SINTEF report 3B040902 dated 10.11.2012
- SINTEF report 3B040939 dated 6.8.2012
- SINTEF report 102003700 dated 18.3.2013
- SINTEF report 102003701 dated 16.4.2013
- SINTEF report 102004276-9 dated 30.10.2013
- SINTEF report 102004276-17 dated 5.11.2014
- SINTEF report SBF2016F0153 dated 6.4.2016
- SINTEF report SBF2017F0120 dated 28.3.2017
- SINTEF report 2017:00018 dated 7.6.2017
- SINTEF report 2018:00915 dated 19.9.2018
- SINTEF report 2019:00657 dated 18.06.2019
- SINTEF Product Certificate no. 0017
- SINTEF Product Certificate no. 0049
- SINTEF Product Certificate no. 1454
- SINTEF Product Certificate no. 1455
- SINTEF Product Certificate no. 1814

9. Marking

All packaging should be marked with the manufacturer's name, product name and production date. The approval mark for SINTEF Technical Approval No. 2464 may also be used.

Approval mark

10. Liability

The holder/manufacturer has sole product responsibility according to existing law. Claims resulting from the use of the product cannot be brought against SINTEF beyond the provisions of Norwegian Standard NS 8402

for SINTEF

Hans Boye Skogstad
Approval Manager