floorflex®

"Sıcaklık Ayağınızın Altında"

FLOORFLEX™ CORRUGATED STAINLESS STEEL UNDERFLOOR HEATING PIPE INSTALLATION MANUAL & APPLICATION PRINCIPLES

January 2024

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1.Introduction & Product Description

FloorFlex is a corrugated stainless steel underfloor heating pipe manufactured by BES Yapı. Compared to traditional plastic pipe systems, it provides:

-Higher heat transfer
-Longer service life
-Lower screed thickness
-Oxygen barrier without additional layer

Country of Manufacture: BES Yapı, Türkiye
Brand: FloorFlex

2.Technical Specifications & Standards

2.1 General Technical Data

Feature	Value
Material	Stainless Steel
Rated Diameter	DN 15
Inner Diameter	15.5 mm
Outer Diameter	19.6 mm
Heat Conduction Coefficient	13.45 W/m·K
Maximum Comfort Operating Temperature	50°C (continuous) 55°C (short-term peak)
Maximum Working Pressure	3 bar
Test Pressure	3 bar (hydraulic) 6 bar (pneumatic / vacuum test)
Maximum Bending Radius	75 mm (~4× pipe outer diameter)
Oxygen Barrier	Self-contained (stainless steel material)
Surface Coating	Nano Technological Polymer Coating
Fluid Volume	1 m FloorFlex ≈ 0.242 L/m

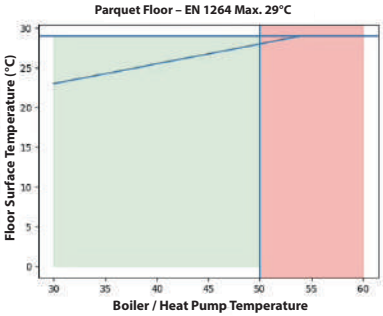
2.2 Standards

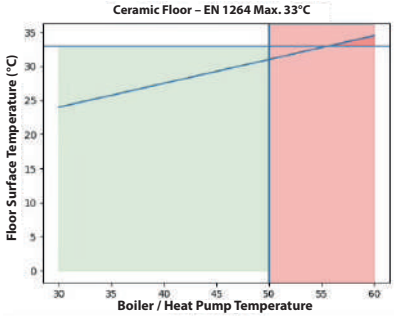
Manufactured in accordance with the following standards:

TSE K 534 - Manifold
TS266 - Drinking Water Characteristics
TS EN 10088 - Stainless Steel
ISO 16137 - Industrial Valve & Connection Elements
Patent No: 2015/03708 - GFS Connection Technology
Patent No: 2015/05940 - Manifold Connection System

3.Stainless Steel Material 304L & 316L

3.1 Temperature Performance & Risk Limits





Critical Temperature Thresholds

Temperature Range	Material Behavior	Security Assessment
Below 50°C	Stable mechanical properties	Safe
50–55°C	Up to 12% loss in yield strength, onset of carbide precipitation	Short-term Temporary
Above 55°C	Rapid material degradation, unacceptable risk	Forbidden

FloorFlex is a corrugated underfloor heating pipe made of stainless steel, developed by BES Yapı. The FloorFlex Stainless Steel System, designed to overcome the problems of classic systems, offers advantages such as a high heat transfer coefficient, low installation thickness, and long service life.

To review
our catalog.

3.2 Corrosion Resistance

304L or 316L stainless steel is used depending on project requirements.

-Chloride content in water must be below 30 ppm according to TS 266.

-High chloride and high temperature increase the risk of pitting corrosion.

-Nano polymer coating maximizes corrosion resistance, provides resistance in the formation of electric arcs, minimizes the chemical effects of concrete.

To review
our website.

4. System Components

4.1 FloorFlex Stainless Steel Pipe

-Produced from 304L / 316L stainless steel,

-Corrugated structure (improves resistance),

-Heat treated (annealing) at 1050°C (improves ss material structure),

-Nano polymer coated (improves corrosion resistance and prevents electrical arc),

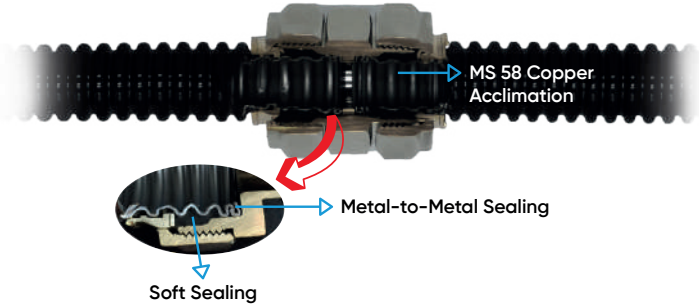
-Shipped under vacuum (-750 ppm).

To watch our vacuum video.

To watch our Temperature Test video.

4.2 FloorFlex Stainless Steel Pipe

Manufactured with patented GFS connection technology.



Type	Model Code	Feature
Flow Controlled Stainless	FLR-KPD-12 - FLR-KPD-16	2s - 6s
Thermostatically Controlled Stainless	FLR-KPT-12 - FLR-KPT-16	2s - 6s
Termostatik Kontrollü Paslanmaz	FLR-KST-12 - FLR-KST-16	2s - 6s

4.3 Connection Fittings

-Patented GFS Connection Technology
-Soft Sealing Elements

-Brass Alloy Components

To watch our Pressure Test video.

4.4 Insulation Materials

-Compliant with TS EN 14313
-Thermal conductivity: λ = 0.029 W/mK
-TS EN 16069 + A1 Polyethylene Foam (PEF)

5. Pre-Installation Preparation

5.1 Storage & Handling

-Store in original packaging,

-Avoid sharp edges,

-Do not twist or overlap pipes during unrolling.

5.2 Floor Preparation

-The floor must be cleaned of any remaining floor material, plaster, and concrete debris.
-Surface must be clean and smooth, uneven surfaces should be filled with mortar.
-The floor should be swept and dusted. Remove construction debris.
-The drainage system must be completed before underfloor heating is installed. Complete drainage installation beforehand.

5.3 Metallized Mat Placement

-TS EN 14313 compliant metallized mat is used.
-Metalized mats must completely cover the floor without leaving any gaps.
-Especially in north-facing areas and areas with glass balconies, metallized insulation mats with a minimum thickness of 5mm should be preferred.
-Depending on the thickness of the screed, the perimeter band should be at least 5-7cm above the ground.
-Depending on the thickness of the screed, the underlayment should be at least 5-7 cm above the ground.
-For heat efficiency and a homogeneous surface, screed additive is recommended.

6.Installation Steps

6.1 Manifold Placement

-Must be positioned higher than heating circuits.
-Minimum 70 cm above finished floor level.
-Separate manifold pair for each floor.
-A separate manifold pair (feed-and-return) must be used for each floor.

6.2 Pipe Layout Planning

Before installation, a pipe layout plan should be prepared to determine the route the pipe will take:

-Even distribution required. The circuit lines should be distributed evenly and regularly into the rooms.

-The leftmost unit circuit is connected to the leftmost port on the collector.

-The distance between pipes is determined according to heat loss calculations (typical modulation range; 300-400mm, but varies depending on the project location).

6.3 Pipe Laying Techniques

The building should be constructed according to its heating requirements as per TS 825. The values below are average values.

Resistance Type Flooring (This is an example; please share your project for accurate information. Quantities vary depending on the location of the collector and your project.)

Version	Floor Area	Pipe Length	Distance Between Pipes	m² / Hose
Version 1	10 m²	30–33 m	300 mm	3–3.3
Version 2	10 m²	25–28 m	400 mm	2.5–2.8

Snail-Type Flooring (This is an example; please share your project for accurate information. Quantities vary depending on the location of the collector and your project.)

Version	Floor Area	Pipe Length	Distance Between Pipes	m² / Hose
Version 3	10 m²	33–35 m	300 mm	3.3–3.5
Version 4	10 m²	28–33 m	400 mm	2.8–3.3

6.4 Pipe Laying Rules

1.Unroll from outer side of the coil.
2.Two-person installation recommended: one person places the pipe, and the other unwinds the reel.
3.Connect pipe end to manifold adapter.
4.Minimum bending radius: 75 mm
5.Fix pipes to metallic insulation mat by fixing elements.
6.For transitions between rooms near the manifold, it is recommended to drill through the wall.

6.5 Special Cases

-If the area to be heated is an outdoor balcony or a place with high heat loss, it should be designed as a separate line.

-Heat loss calculation software should be used in apartments without external insulation.

-Crushed or damaged pipes should absolutely not be used.

7.Pressure Testing & Leak Control

7.1 Vacuum Control (Factory Test)

Tested at 6 bar and vacuum sealed:

-**Vacuum Value:** -750ppm

-If vacuum sound is heard when cap is removed → Pipe is sealed.

7.2 Site Pressure Test (Before Screed)

A leak test must be carried out before the screed is poured. Parquet and ceramic flooring should not be installed without a leak test. The company responsible for any problems arising from projects where a leak test has not been conducted is liable.

Parameter	Value
Test Pressure	3–6 bar (hydraulic)
Test Duration	Minimum 4 hours
Acceptance Criteria	No pressure drop

Test Procedure:

1.Boilers, circulation pumps, expansion tanks, etc., are excluded from the test.

2. The water connection is made to the collector filling valve.

3.All circuits must be filled simultaneously. Only one heating circuit is switched on; the others remain switched off.

4.The automatic air vent must be in the open position.

5.Water is pumped in and the escape of air is observed.

6.Continue filling until bubble-free water comes out of the drain line.

7.Circuit is closed and the next circuit begins.

8.After all circuits are completed, the system pressure is increased to 3-6 bar.
9.Pressure is monitored for a minimum of 4 hours.
10. If there is a pressure drop, a leak check is performed.

7.3 Cold Weather Conditions

After testing in cold weather conditions, on construction sites and in unoccupied apartments:

-Drain system to prevent freezing**.**

-Keep manifold valves open.

8.Screed Application

8.1 Screed Thickness

The FloorFlex system requires a lower screed thickness compared to traditional plastic pipe systems;

System	Total Thickness (including screed)
Plastic Pipe System	10–12 cm
FloorFlex System	4–5 cm

In a 100m² house, approximately 7m³ of screed material can be saved.**(This is an example; please share your project for accurate information.)**

8.2 Screed Rules

-Minimum 2 cm screed above pipe.
-It is recommended to use a screed additive (plasticizer): 1 kg for every 5 m².
-The ambient temperature must not fall below 5°C for a minimum of 5 days from the time of screed pouring.
-Avoid overheating during drying process.
-The exterior wall should be insulated with screed.

9.Commissioning & Operation

9.1 Initial Start-Up

1.Flush pipes.
2.Fill system to 1.5–2 bar. (It is recommended that the chlorine quality in the heating system (TS 266 (<30 ppm)) be met.)
3.The circulation pump is activated, and the circuits are cleaned via dirt traps.
4.Maintain 25°C water temperature for first 3 days.
5.Increase temperature gradually.

9.2 Operating Temperatures

Condition	Temperature	Duration
Normal operation	40–45°C	Continuous
Maximum continuous	50°C	Limited
Peak temperature (emergency)	55°C	< 1 hour
PROHIBITED	>75°C	-

9.3 Balancing (Hydraulic)

Hydraulic equalization is critical for ensuring all circuits heat up evenly:

-The pressure losses in the circuits must be equalized.
-Flow rate should be reduced in short circuits and increased in long circuits.
-The flow rate is adjusted using the flow indicators on the collector.

9.4 Venting

The system should be vented when it is commissioned and at regular intervals:

1. Manifold outlet pipes are checked.

2.The automatic air vent on the collector, which is mandatory in the system, must be loosened.

3.Excessive water output can reduce system pressure (should be maintained between 1.5-2 bar).

4.Automatic air-vent manifolds are mandatory for apartment installations. Systems without automatic air vents are the sole responsibility of the installer. Manufacturer-supplied manifolds include automatic air vents and flow control.

5.When the installing company does not use an automatic air vent system, all risks arising from the system's inability to release air that may accumulate over time are the responsibility of the installer, both for the installations already completed and those to be completed.

6.Please contact our Customer Representative for details.

7.In central heating systems, the mechanical company must commission the system in accordance with the project specifications.alması gerekmektedir.

10.Maintenance

10.1 Periodic Maintenance

When installed according to manufacturer instructions, the system does not require annual maintenance.

-It has its own oxygen barrier,
-It is resistant to corrosion,
-It saves on annual maintenance costs.

10.2 Troubleshooting Symptoms & Solutions

Issue	Possible Cause	Solution
Cold spots	Air in the system	Bleed the air
Insufficient heating	Low flow rate	Adjust flow, check pump
Vibration noise	Air bubble	Bleed air with vent
Boiler room	High temperature	Three-way valve, proper design
Pressure drop	Leak	Leak detection

10.3 Leak Detection

In case of leakage in vacuum tubes:

-The seals at the pipe ends are checked,
-If there is no vacuum sound (if no sound of air filling is heard), there may be a leak,
-The leak point is identified through a pressure test,
-Please contact a customer representative.

11.Safety Warnings

11.1 Leak Detection

1.Maximum continuous temperature: 50°C
2.Minimum bending radius: 75 mm
3.Damaged pipes must not be used.
4.Air Venting Valve mandatory: Collectors that are not present should not be used.
5.Pressure test is mandatory before screed application.
6.Chloride level must be below 30 ppm.
7.Central Heating System Implementation: It must be designed by a mechanical project firm in a way that is suitable for the system (3-way valve, automatic air vent, safety valve, etc.).

11.2 Water Quality Alerts

-Water with a chloride content <30 ppm should be used.
-High chloride water (>200 ppm) accelerates corrosion.
-Water chemistry should be checked regularly.

11.3 Certified Practitioner

Installation must be carried out by certified professionals holding a FloorFlex Master Certificate.

12.Technical Data Tables

12.1 Heat Transfer Performance (This is representative; the exact information is specific for project.)

Parameter	PEX Pipe	FloorFlex
Outer Diameter	16 mm	19.6 mm
Inner Diameter	12 mm	15.5 mm
Thermal Conductivity	0.35 W/m·K	13.45 W/m·K
Outer Surface Area (1 m)	0.050265 m²	0.091630 m²
Inner Surface Area (1 m)	0.037699 m²	0.089562 m²
Fluid Volume	~ 0.113 L/m	~ 0.242 L/m

12.2 Pipe Length According to Installation Type (This is a representative image; please share your project for accurate information.)

Version	Floor Area	Pipe Length	Distance Between Pipes	m² / Hose
Version 1	10 m²	30–33 m	300 mm	3–3.3
Version 2	10 m²	25–28 m	400 mm	2.5–2.8

Version	Floor Area	Pipe Length	Distance Between Pipes	m² / Hose
Version 3	10 m²	33–35 m	300 mm	3.3–3.5
Version 4	10 m²	28–33 m	400 mm	2.8–3.3

The quantities vary depending on the location of the collector and your project.

12.3 Layer Thicknesses (This is representative; it does not contain accurate information.)

Layer	Material	Thickness
Base (structural)	Concrete	-
Insulation	Metalized insulation sheet	5 mm
Pipe	304L & 316L stainless steel	19.6 mm (outer diameter)
Screed (above pipe)	Mortar	20 mm
Adhesive	-	-
Final floor layer	Ceramic / marble / parquet	10 mm
TOTAL FINISHED THICKNESS	-	~55 mm

12.4 Recommended Floor Coverings

(Representative image only)(Please share your project so that it includes information)

Floor Covering Type	Heat Conductivity	Recommendation
Ceramic	High	Very good
Marble / Granite	High	Very good
Laminate flooring	Medium	Suitable with perforated insulation sheet
Wood flooring	Low	Special precautions required
Carpet	Low	Not recommended

Appendix A: Vacuum Control Procedure

1.Remove pipe caps.
2.Listen for vacuum sound.
3.If sound is present → System is safe.
4.If not → Contact authorized representative.
5.Contact the Customer Representative.

Appendix B: Frequently Asked Questions

Q: Why is the pipe vacuum sealed?
A: To verify leak-tightness and long-term safety.

Q: What is the advantage compared to plastic pipes?
A: Approximately 40 times higher heat transfer, shorter pipe length requirement, lower screed thickness, and natural oxygen barrier.

Q: Compatible boiler types?
A: Condensing boilers and heat pumps are recommended.

Q: Is there freeze risk?
A: Drain unused systems after testing.

Revision History

Date: January 2024

FloorFlex is a
BES Yapı Brand.
www.besyapi.com/en