



# TYPE APPROVAL CERTIFICATE

Certificate No:  
**TAK00001B2**  
Revision No:  
**6**

## This is to certify:

That the **Plastic Piping System, Thermoplastic**

with type designation(s)  
**ecoFIT - PE 80, PE 100 PN16/PN10 Pipes and Fittings, HEAT-FIT**

Issued to

**Georg Fischer Piping Systems Ltd.**  
**Schaffhausen, SH, Switzerland**

is found to comply with

**DNV rules for classification – Ships Pt.4 Ch.6 Piping systems**  
**DNV class programme DNV-CP-0072 – Type approval – Thermoplastic piping systems**

## Application :

**Essential and non-essential piping system, fire endurance level "0" and "L3" (see certificate),**  
**External pressure resistance: 1.33bar**  
**Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV.**

Issued at **Hamburg** on **2024-02-27**

This Certificate is valid until **2029-01-25**.

DNV local station: **Augsburg**

Approval Engineer: **Hagen Markus**

for **DNV**

.....  
**Sven Klinger**  
**Head of Section**

This Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid.  
The validity date relates to the Type Approval Certificate and not to the approval of equipment/systems installed.

LEGAL DISCLAIMER: Unless otherwise stated in the applicable contract with the holder of this document, or following from mandatory law, the liability of DNV AS, its parent companies and their subsidiaries as well as their officers, directors and employees ("DNV") arising from or in connection with the services rendered for the purpose of the issuance of this document or reliance thereon, whether in contract or in tort (including negligence), shall be limited to direct losses and under any circumstance be limited to 300,000 USD.



## Product descriptions

### ecoFIT Polyethylene piping system

The ecoFIT Polyethylene piping system is made of PE100 and PE80. Pressure classes PN10 (S8.3/SDR17.6) and PN16 (S5/SDR11).

Nominal pressure values PN for pipe joints are based on Internal Pressure Short Term Tests on pipe spools with safety factor of 4.

### References to GF Piping Systems documents:

- "Planning Fundamentals for Industrial piping systems"
- "System Specification for ecoFIT Piping Systems in Polyethylene (PE)"

## ecoFIT Polyethylene piping system

### Pipes PN10 (ISO S8.3/SDR17.6)

#### Outside diameters and minimum wall thickness of ecoFIT Polyethylene pipes

OD [mm]	50	63	75	90	110	125	140	160	180	200	225	250
t [mm]	2.9	3.6	4.3	5.1	6.3	7.1	8.0	9.1	10.2	11.4	12.8	14.2

OD [mm]	280	315	355	400	450	500	560	630
t [mm]	15.9	17.9	20.1	22.7	25.5	28.4	33.2	35.7

### Pipes PN16 (ISO S5/SDR11)

#### Outside diameters and minimum wall thickness ecoFIT Polyethylene pipes

OD [mm]	20	25	32	40	50	63	75	90	110	125	140	160
t [mm]	1.9	2.3	3.0	3.7	4.6	5.8	6.9	8.2	10.0	11.4	12.8	14.6

OD [mm]	180	200	225	250	280	315	355	400	450	500	560	630
t [mm]	16.4	18.2	20.5	22.8	25.4	28.6	32.2	36.3	40.9	45.4	50.8	57.2

## External pressure resistance

External pressure rating is the sum of vacuum pressure inside the pipe and pressure outside the pipe.

For application in suction lines the vacuum pressure inside the pipe reduces the external pressure rating.

External pressure resistance: 1.33bar, safety factor: 3.

## Fittings

Size range, pressure classes				Fitting types	
PE80		PE100		Bend 90°, Elbow 90°, 45°, 30°, 15°	
SDR17.6, PN10	d20 up to d110	SDR11, PN16	d20 up to d630	Seamless bends 90°, 60°, 45°, 30°, 22°, 11°	
		SDR17.6, PN10		Tee 90°, 45° (equal and reduced)	
Joining technique: Electrofusion, Butt fusion, Socket fusion				Coupler, Reducer, End cap	
				Flange adaptor, Backing flanges PP-Steel	
				Transition adaptor PE/brass, PE/stainless steel	
				Flanges, PP-V, Fixpoint fitting	

**Long-term permissible service pressure at lower and elevated temperatures <sup>1</sup>**  
**Non-essential systems<sup>2</sup>**

Temperature	Pressure class	-40°C up to +20°C	30°C	40°C	50°C	60°C
Maximum allowable working pressure (bar)	PN10 (SDR17.6)	7.65	6.50	5.58	3.97	2.55
	PN16 (SDR11)	12.69	10.79	9.26	6.59	4.23

**Notes**

<sup>1</sup> Refer to +GF+ Piping Systems "System Specification for ecoFIT Piping Systems in Polyethylene (PE)", "Planning Fundamentals for Industrial piping systems"  
<sup>2</sup> Reference ISO15494:2003, SF 1.6/25 years. In case of chemical presence, please contact authorised +GF+ Piping Systems representative.

**Essential systems<sup>3</sup>**

Temperature	Pressure class	-40°C up to +20°C	30°C	40°C	50°C	60°C
Maximum allowable working pressure (bar)	PN10 (SDR17.6)	4.99	4.24	3.64	3.02	1.94
	PN16 (SDR11)	8.29	7.04	6.05	5.02	3.22

**Notes**

<sup>3</sup> References CP-072 and ISO15494:2003, SF 2.5 (25years)

**HEAT-FIT™ – Fire retardant pipe and fitting encapsulation fire protection system**

The "HEAT-FIT™" fire protection systems consist of:

**Pipes with L3 fire tested coating type "HEAT-FIT- PE™"**

Pipe dimensions: d110, d160, d225 and d315

Pressure class: SDR11 (PN16)

**Pipes sleeves and jackets** for pipes and fittings without L3 fire tested coating

Jackets and pipe sleeves are made of five layers composite cloth.

The transitions, pipe sleeve to fitting jacket, are to be fastened and closed by HEAT-FIT – Jacket Metal Strap, article no. 756 170 302.

**Accessories HEAT-FIT**

– Jacket Sealing Tape, Metal Closure, Fixpoint for ecoFIT PE piping system

**References**

- +GF+ document „Product range HEAT-FIT™"

- +GF+ document "Ultimate fire protection HEAT-FIT™ Fire Retardant System"

**Fitting types**

Elbows (90°, 45°, 30°, 15°), T 90° equal/reduced, Reducer, Branch saddle, Flange connection, Electric coupler, Weld bead covering, Fix point fitting, Inserts pipe clamps

**Production places**

**Pipes**

+GF+ DEKA GmbH, Kreuzstrasse 22, 35232 Dautphetal-Mornshausen, Germany
+GF+ Hakan Plastic, Organize sanayi Bölgesi, 3. Cadde No:11-13, 59500 Cerkezköy, Turkey
Georg Fischer Piping Systems Ltd., No. 266, Qianwan Road, Economic Development Zone, Yangzhou, China.

**Fittings**

Georg Fischer Piping Systems Ltd., Ebnatstrasse 111, 8201 Schaffhausen, Switzerland
Georg Fischer Wavin AG, Niederlassung Subingen, Industriestrasse 24, 4553 Subingen, Switzerland

**Responsibility**

The Georg Fischer Piping Systems Ltd., Schaffhausen, Switzerland takes the responsibility that both design and production follow the Rules, Standards and/or Regulations listed on page 1 of this certificate.

## Application/Limitation

The ecoFIT piping system is type approved for application in piping systems as listed in the “Application table” below. Reference DNV Rules Pt.4, Ch.6, Section 2 – 1.7 Plastic pipes “Table 1- Fire endurance requirements matrix”. Approved installation locations where “0” or “L3” is specified in the matrix. Appropriate footnotes are to be observed.

The ecoFIT piping system is not approved for installation locations where “NA” or “X” is indicated and not approved for installation in gas hazardous area.

For installation locations where “L3” is specified in Table 1 Fire endurance requirements matrix, pipes of type “+GF+ HEAT-FIT -PE” in combination with fittings protected by “+GF+ HEAT-FIT – Fire retardant pipe and fitting encapsulation fire protection system” are to be used.

Alternatively, ecoFIT pipes and fittings covered protected by “+GF+ HEAT-FIT – Fire retardant pipe and fitting encapsulation fire protection system”.

### Application table ecoFIT piping system for installation in locations with fire endurance level “0”

Piping system	Item	Scope
<b>Freshwater</b>		
Non-essential systems	22	Potable hot and cold water and bunkerlines Potable water treatment systems (Osmosis and Evaporation) Chilled water and cooling water of air condition systems
Essential system	20	Cooling water
Condensate return	21	Condensate piping system
<b>Sanitary and drains and scuppers</b>		
Sanitary drains internal	24	Black and grey water including wastewater treatment and discharge lines to shore
<b>Sea water<sup>1</sup></b>		
Tank cleaning services, fixed machines	18	Seawater piping system
Non-essential systems	19	Piping systems of Ballast Water Management Systems (BWMS). <sup>1</sup>
Essential system	16	Ballast water systems, Cooling water
<b>Miscellaneous</b>		
Brine	30	Refrigerating piping systems

#### Notes

<sup>1</sup> For installation location where “L3 and higher levels” is required, metallic isolation valves are to be fitted at the ship site. boundary to the ballast piping system of the ship. The isolation valves shall be remotely controlled valves from outside the space, e.g., fire control station and the valve shall be a fail-safe-closing type valve.

## Application table for installation in locations with fire endurance level “L3”

**+GF+ HEAT-FIT -PE**” in combination with fittings protected by “+GF+ HEAT-FIT – Fire retardant pipe and fitting encapsulation fire protection system”

**+GF+ ecoFIT** pipes and fittings covered protected by “+GF+ HEAT-FIT – Fire retardant pipe and fitting encapsulation fire protection system”.

Piping system	Item	Scope
<b>Freshwater</b>		
Essential system	20	Cooling water
Condensate return	21	Condensate piping system
<b>Sea water<sup>1</sup></b>		
Tank cleaning services, fixed machines	18	Seawater piping system <sup>2</sup>
Essential system	16	Ballast water systems, Cooling water
Non-essential system	19	Piping systems of Ballast Water Management Systems (BWMS).
<b>Miscellaneous</b>		
Exhaust gas cleaning system effluent line	33	Effluent piping system from the scrubber to ship side <sup>1, 3</sup>

### Notes

<sup>1</sup> For installation location where “L3 and higher levels” is required, metallic isolation valves are to be fitted at the ship site.

<sup>2</sup> For installation on open deck remote closing valve to be provided at the cargo tanks.

<sup>3</sup> L3 in service spaces, NA in accommodation- and control spaces.

## Extent of Type Tests applicable to piping system dependent on application

### Fire endurance level

The ecoFIT piping system without “HEAT-FIT” fire protection system is not tested with respect to Fire Endurance characteristics.

### Flame spread

Surface flame spread characteristics is confirmed for blanket ecoFIT piping system acc. to ADTMD635, Classification HB. For HEAT-FIT fire protection system confirmed acc. to FTP Code 2010, Annex 1, Part 5.

### Smoke and toxicity

The ecoFIT piping system protected by HEAT-FIT fire protection system is tested with respect to capability of producing excessive quantities of smoke and toxic products as defined in IMO FTP Code, Annex 1, Part 2.

### Electrical conductivity

Not applicable.

### Passenger vessels

For application on passenger vessels additional requirements specified in the Rules and Regulations of the appropriate flag state authority may have to be observed.

## Installation

ecoFIT piping system

For designing, installation and maintenance of the piping system the instructions specified in the Georg Fischer (+GF+) “Planning Fundamentals for Industrial Piping Systems” are to be observed.

“HEAT-FIT” fire protection system”, refer to the actual version of the “+GF+ HEAT-FIT Mounting Instructions”, article no. 700278168.

In addition the installation requirements specific to the ship as specified by the shipyard as well as DNV Rules Pt.4 Ch. 6, Section 10 – 4 Joining of Plastic Pipes are to be observed.

## Bulkhead penetration

### General

When plastic pipes pass through watertight bulkheads or decks, the watertight integrity of the bulkhead or deck is to be maintained by installation of external pressure resistant pipe types specified in tables on page 2.  
External pressure resistance level required by water head or/and vacuum in the pipe is to be observed.

In general pipe penetration through watertight bulkheads or decks as well as through fire divisions shall be type approved unless the penetration pipe is welded into the bulkhead/deck.

Type approval certificates published in the DNV Approval Finder shall include the pipe types "+GF+ **HEAT-FIT -PE**" or "ecoFIT pipes protected by "**HEAT-FIT – Fire retardant pipe and fitting encapsulation fire protection system**".

Plastic pipes passing watertight bulkheads or decks which are also a fire division, and a fire may cause flooding of watertight compartments, the watertight integrity of the bulkhead or deck is to be maintained by a metallic shut-off valve fitted at the bulkhead or deck.

The operation of this valve shall be provided from above the freeboard deck.  
Refer to DNV Rules Pt.4 Ch.6 Section 3 – [1.4 Fittings on watertight bulkheads].

### Special cases

Passenger vessels – SOLAS Ch. II-1 – Reg. 13.2.3

On passenger vessels, where the watertight bulkhead is also a fire division, pipe penetration design shall comply to MSC.429(98), Section Reg. 13.2.3 are to be observed.

As an alternative to a type approved penetration system the following penetration design may be accepted:

A steel spool piece of 900 mm in length, preferable 450 mm on each side, with thickness according to Pt.4 Ch. 6 Sec.9 [1.2.1] is arranged at the watertight penetration.

The pipe shall be flanged or similar to each side of the steel spool piece. No valve(s) are required at the penetration, unless required by the assumptions made in the damage stability calculations.

Reference Pt 4 Ch.6 – Sec. 2 - Materials (1.7.6)

## Type Approval documentation

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### Tests carried out

ecoFIT Polyethylene piping system type testing according to DNV CP-072.

### HEAT-FIT – Fire retardant pipe and fitting encapsulation fire protection system

- Fire endurance test Level 3
- Flame spread test acc. to FTP Code 2010, Annex 1, Part 5,
- Smoke and toxicity acc. to FTP code 2010, Annex 1, Part 2.
- Vibration test
- Impact resistance test
- Environmental tests: salt spray, dry heat test @ 50°C, immersion tests

### Production Testing

Each batch of pipes and fittings shall be subjected to product tests as specified in +GF+ "Quality Plans".

### Marking of product

The marking is to be carried out in such a way that it is visible, legible and indelible. The marking of the products product is to enable traceability to this Type Approval Certificate.

Product	Scope	Example
Pipes and fittings	Brand name	+GF+, ecoFIT
	Material grade	PE 100
	Design standard	EN ISO 15494
	Dimension OD	d 63, PN16 (ISO/DIN)
	Traceability code	Bar code
	Country of Origin	Switzerland

HEAT-FIT Protection system	Brand name	+GF+ - HEAT-FIT Jacket System
	Article number	XXX YYY ZZZ FR- Jacket "Product"
	Outer diameter pipe	"d110"
	Production date	"MM / YYYY"
HEAT FIT pipe with coating	Brand name, dimensions inner and outer pipes, pressure class, manufacturing code	+GF+ HEAT-FIT PE100 d110/D118 SDR11 PN16 756xxx yyy 20231019

### Periodical assessment

For retention of the Type Approval, a DNV Surveyor shall perform periodical assessment to verify that the conditions for the Type Approval are complied with. Refer to the Class Programme DNV-CP-0338, Sec.4.

To check the validity of this certificate, please look it up in <https://approvalfinder.dnv.com>

### End of certificate