



DET NORSKE VERITAS

TYPE APPROVAL CERTIFICATE

CERTIFICATE NO. K-2259
This Certificate consists of 3 pages

This is to certify that the
Plastic Pipes, Thermoplastic

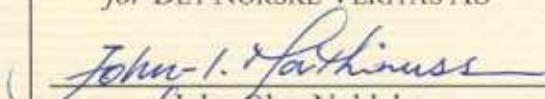
with type designation(s)
INSTAFLEX®; PB PN10 Pipes

Manufactured by
Georg Fischer Rohrleitungssysteme AG
(at HAKA Gerodur AG, Gossau, Switzerland)
Schaffhausen, Switzerland

is found to comply with
Det Norske Veritas' Rules for Classification of Ships
Det Norske Veritas' Type Approval Program for Thermoplastic Piping, preliminary

Application
For non-essential systems, for heating systems, hot and cold water and chilled water. For inst. acc. to DNV Rules and Manufacturer's Spec. The piping system is not tested w.r.t. Fire Endurance performance. Flame Spread tested acc. to ASTM D635.

Place and date
Høvik, 2003-04-22
for DET NORSKE VERITAS AS


John Olav Nøkleby
Head of Section



Local Office
DNV Essen

This Certificate is valid until
2007-06-30


Gisle Hersvik
Surveyor

Notice: 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.

If any person suffers loss or damage which is proved to have been caused by any negligent act or omission of Det Norske Veritas, then Det Norske Veritas shall pay compensation to such person for his proved direct loss or damage. However, the compensation shall not exceed an amount equal to ten times the fee charged for the service in question, provided that the maximum compensation shall never exceed USD 2 million. In this provision "Det Norske Veritas" shall mean the Foundation Det Norske Veritas as well as all its subsidiaries, directors, officers, employees, agents and any other acting on behalf of Det Norske Veritas.



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Product description

Polybutylene (PB) PN10 Pipes (Coils).

Dimensions: D16 to D25 (as per +GF+ PB Product Catalogue)

Pipes:

| | Outside diameters and minimum wall thickness | | |
|---------|--|-----|-----|
| OD [mm] | 16 | 20 | 25 |
| t [mm] | 2,2 | 2,8 | 2,3 |

Fittings:

To be fitted with Type Approved fittings intended used with the INSTAFLEX® pipes.

Joining techniques:

Socket and Electrofusion

Application/Limitation

For installation according to DNV Rules and Manufacturer's Specification.

For non-essential systems, for heating systems, hot and cold water and chilled water (fresh and seawater) up to 10 bar. Service temperature 0°C to 70°C (short periods up to 95°C).

The piping system is not tested with respect to Fire Endurance performance.

Flame Spread tested according to ASTM D635 with maximum average burning rate 32.2 mm/min.

Type Approval documentation

1. Letter from DNV Essen of 2002-04-18, including letter from +GF+ of 2002-04-11, Application for Type Approval dated 2002-04-11, Georg Fischer +GF+ PB Product Catalogue and Georg Fischer +GF+ INSTAFLEX® Technical Manual, and test results.
2. Letter from DNV Essen of 2002-09-28, including various test results.
3. Letter from DNV Essen dated 2001-12-09, including Survey Report ESN-02-3625 of 2002-12-06.
4. Letters from +GF+ of 2003-02-13 and 2002-02-21, including test results and Application for Type Approvals dated 2003-01-14.
5. Various correspondences in the period April 2002 – March 2003.



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Tests carried out

Type Testing carried out according to **Type Approval documentation**.

Marking of product

Product shall be marked with *manufacturer's name*; **Georg Fischer Rohrleitungssysteme AG (at HAKA Gerodur AG, Gossau, Switzerland), Schaffhausen, Switzerland** and *type designation*.

Certificate Retention/Renewal Survey

Surveys to be carried out at both *Georg Fischer Rohrleitungssysteme AG* and *HAKA Gerodur AG*.

The scope of the Retention/Renewal Survey is to verify that the conditions stipulated for the Type Approval is complied with and that no alterations are made to the product design or choice of materials.

Survey to be performed after two (2) years (Certificate Retention Survey) and at renewal after four (4) years (Certificate Renewal Survey).

The main elements of the survey are:

- Ensure that **Type Approval documentation** is available.
- Review design, materials, production process, and performance with respect to possible changes, in order to ensure compliance with **Type Approval documentation** and/or referenced material specifications.
- Ensure traceability between manufacturer's product marking and the DNV Type Approval Certificate.

END OF CERTIFICATE

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