



TYPE APPROVAL CERTIFICATE

Certificate No:
TAK000023K
Revision No:
1

This is to certify:

That the **Plastic Piping System, Thermoplastic**

with type designation(s)
+GF+ Aquasystem PP-R

Issued to

Georg Fischer Hakan Plastik Boru ve Profil San. Tic. A.S.
Cerkezkoy / Tekirdag, Turkey

is found to comply with

DNV class programme DNV-CP-0072 – Type approval – Thermoplastic piping systems

Application :

For use in non-essential and essential piping systems and in piping systems serving the main functions. For water and seawater up to 10, 16 and 20 bar. Service temperature range 0°C to 70°C (95°C for shorter periods). For installation in accordance to DNV Rules and Manufacturer's recommendations. The piping system is tested to Low Flame Spread characteristics according to ASTM D635. The piping system is not tested w.r.t. Fire Endurance characteristics.

Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV.

Issued at **Høvik** on **2022-03-30**

for **DNV**

This Certificate is valid until **2027-01-23**.

DNV local station: **Istanbul**

Approval Engineer: **Stefan Marion**

Gustav Heiberg
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 description

+GF+ Hakan Plastik AQUASYSTEM® Pipes and Fittings

- Material: PP-R (Random Polypropylene)
- Nominal Internal Pressure rating:
 - o SDR11 / PN10
 - o SDR7.4 / PN16
 - o SDR6 / PN20
- Nominal External Pressure rating: 1.66 bar (Collapse resistant)

Dimensions: DN20 to DN200 (as per +GF+ Hakan Plastik AQUASYSTEM® Product Catalogue).

Covered by this certificate are the following dimensions:

Pipes – SDR11 (PN10):

Outside diameters and minimum wall thickness						
OD [mm]	20	25	32	40	50	63
t [mm]	1.9	2.3	2.9	3.7	4.6	5.8

Outside diameters and minimum wall thickness						
OD [mm]	75	90	110	125	160	200
t [mm]	6.8	8.2	10.0	11.4	14.6	18.2

Pipes – SDR7.4 (PN16):

Outside diameters and minimum wall thickness						
OD [mm]	20	25	32	40	50	63
t [mm]	2.8	3.5	4.4	5.5	6.9	8.6

Outside diameters and minimum wall thickness						
OD [mm]	75	90	110	125	160	200
t [mm]	10.3	12.3	15.1	17.1	21.9	27.4

Pipes – SDR6 (PN20):

Outside diameters and minimum wall thickness						
OD [mm]	20	25	32	40	50	63
t [mm]	3.4	4.2	5.4	6.7	8.3	10.5

Outside diameters and minimum wall thickness						
OD [mm]	75	90	110	125	160	200
t [mm]	12.5	15.0	18.3	20.8	26.6	33.2

Fittings:

PP-R Fittings: DN20 to DN200.

Pipes to be joined with +GF+ Hakan Plastik's PP-R Fittings.

Joining techniques:

Socket fusion welding, butt-welding, electrofusion welding, mechanical connection, flange connection.

Application/Limitation

The plastic piping system is type approved for application in piping systems as listed in "Table 1 - Fire endurance requirements matrix" of DNV Rules Pt.4, Ch.6, Section 2, where "0" is specified. Appropriate footnotes are to be observed.

The approval covers applications such as systems for hot and cold fresh and seawater.

Maximum service pressure: 10 bar /16 bar /20 bar.
Service temperature range: 0°C to 70°C (95°C for shorter periods).

Maximum allowable pressure to be reduced as a function of operating temperature when service temperature is above 20°C. Please refer to DNV-CP-0072, Table 2.

Fire Endurance Level

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

Low Flame Spread

The piping system is tested for low flame spread characteristics in accordance with ASTM D635.

Smoke Generation & Toxicity

The piping system is not tested with respect to Smoke Generation & Toxicity characteristics.

Electrical conductivity

The piping system is non-conductive, not for installation in gas hazardous area.

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

For installation in accordance with DNV Rules/Standards and Manufacturer's recommendations.

Bulkhead and Deck Penetration

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.

When plastic pipes pass through watertight bulkheads or decks, 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, Sec.3 – 1.4 Fittings on watertight bulkheads.

Penetration of pipes without external pressure capability through watertight bulkheads is not approved.

On passenger vessels, where the watertight bulkhead is also a fire division, the requirements of the SOLAS Chapter II - 1, Regulation 13.2.3. are to be observed.

Type Approval documentation

1. Application for Type Approval of 2020-07-13
2. Type Approval Assessment Report from DNV Turkey of 2021-12-06
3. +GF+ Hakan Plastik PP-R Aquasystem Technical Catalogue
4. Materials Datasheet from polypropylene raw material supplier
5. Exova report regarding long term properties of polypropylene raw material
6. Letter from raw material supplier regarding Vicat Softening Temperature, letter dated 2021-04-11
7. Test results from tests done at Hakan Plastik and witnessed by DNV, report dated 2021-12-06
8. Letter from Georg Fischer Piping Systems Ltd., Switzerland regarding compliance with ASTM D635
9. RINA flame spread test report nos. 98 DG 713 TO dated 1998-12-10

Tests carried out

Type Testing carried out in accordance with **Type Approval documentation**.

Marking of product

Product shall be marked with *manufacturer's name*; **(+GF+)**, *production site (reference/code)*, *pressure rating* and *type designation* **AQUASYSTEM®**.

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



Job Id: **262.1-034820-1**
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Periodical assessment

The scope of the Periodical assessment 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.

Periodical assessments (for Certificate Retention and Certificate Renewal) shall be performed according to DNV-CP-0338.

This certificate is only valid if required Periodical assessments are carried out with satisfactory results. To check the validity of this certificate, please look it up in <https://approvalfinder.dnv.com>.

END OF CERTIFICATE