Certificate No:
TAK000026A

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Plastic Piping System, Thermoplastic

with type designation(s)
PE 100 PN16/PN10 pipes and fittings

Issued to
Firat Plastik Kaucuk San. ve Tic. A.S.
Büyükçekmece, İstanbul, Türkiye

is found to comply with
DNV class programme DNV-CP-0072 – Type approval – Thermoplastic piping systems
DNV rules for classification – Ships

Application :

For use in non-essential and essential systems up to 10/16 bar. Service Temperature 40°C. for installation in accordance to DNV Rules and Manufacturer's recommendations. The piping system is not tested w.r.t. Fire Endurance. The piping system has been tested w.r.t. Low Flame Spread characteristics according to ASTM D635.

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

Issued at **Høvik** on **2023-01-10**
This Certificate is valid until **2028-01-09**.
DNV local unit: **Istanbul**

Approval Engineer: **Stefan Marion**

for **DNV**

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

PE 100 Pipes and Fittings

Material: High Density Polyethylene (HDPE)

Nominal Internal Pressure Rating:
- SDR11 / PN16
- SDR17 / PN10

Nominal External Pressure Rating:
- 1 bar (collapse resistant)

Dimensions:

Covered by this certificate are the following dimensions:

	Outside diameters OD and minimum wall thickness t								
OD [mm]	32	40	50	63	75	90	110	125	140
PN 10 t [mm]	2.0	2.4	3.0	3.8	4.5	5.4	6.6	7.4	8.3
PN 16 t [mm]	3.0	3.7	4.6	5.8	6.8	8.2	10.0	11.4	12.7

	Outside diameters OD and minimum wall thickness t								
OD [mm]	160	180	200	225	250	280	315	355	400
PN 10 t [mm]	9.5	10.7	11.9	13.4	14.8	16.6	18.7	21.1	23.7
PN 16 t [mm]	14.6	16.4	18.2	20.5	22.7	25.4	28.6	32.2	36.3

	Outside diameters OD and minimum wall thickness t								
OD [mm]	450	500	560	630	710				
PN 10 t [mm]	26.7	29.7	33.2	37.4	42.1				
PN 16 t [mm]	40.9	45.4	50.8	57.2	64.5				

Fittings:
Elbow, Tee, Reducing Tee, Reduction fitting, Adapter

Joining techniques:
Fusion Welding, Butt Welding, Flange Joining, Coupling Adapter

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, Sec.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.

Not approved for installation locations where “NA” or “X” is indicated and not approved for installation in gas hazardous area.

Reference to Table 1	**Item**	**Piping system**
Freshwater		
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
Sanitary and drains and scuppers		
Sanitary drains internal	24	Black and grey water including wastewater treatment and discharge lines to shore
Sea water		
Non-essential systems	19	Piping systems of Ballast Water Management Systems (BWMS).[1]
Essential system	16	Ballast water systems
Miscellaneous	30	Brine

Notes
[1] For installation location where “L3 and higher levels” is required, metallic isolation valves are to be fitted at the 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.

Maximum service pressure: see tables below
External pressure rating: 1 bar
Service temperature range: -40°C to 40°C (for shorter periods up to 70°C)

Maximum allowable pressure to be reduced as a function of operating temperature when service temperature is above 20°C.

Long-term permissible service pressure at lower and elevated temperatures [1]

Non-essential systems[2]

Temperature	Pressure class	-40°C up to +20°C	30°C	40°C	50°C	60°C
Maximum allowable working pressure (bar)	PN10 (SDR17)	10	8.7	7.4	6.1	4.8
	PN16 (SDR11)	16	13.92	11.84	9.76	7.68

Notes
[1] Refer to FIRAT product catalogue:
[2] Reference ISO15494:2003, Safety Factor SF 1.25/25 years.

Essential systems[3]

Temperature	Pressure class	-40°C up to +20°C	30°C	40°C	50°C	60°C
Maximum allowable working pressure (bar)	PN10 (SDR17)	5	4.35	3.7	3.05	2.4
	PN16 (SDR11)	8	6.96	5.92	4.88	3.84

Notes
[3] References DNV CP-0072, ISO15494:2003, SF 2.5 (100 000 hours)

Fire Endurance
The piping system is not tested w.r.t. Fire Endurance characteristics.

Low Flame Spread
The piping system is tested w.r.t. Low Flame Spread characteristics in accordance with ASTM D635.

Smoke Generation & Toxicity
The piping system is not tested w.r.t. Smoke Generation & Toxicity characteristics.

Electrical conductivity
The piping system is non-conductive, not for installation in gas hazardous area, or used with non-conductive fluids.

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.

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

Tests carried out

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

Marking of product

The product is to be marked with:

- manufacturer's name; **Firat Plastik**
- type designation; *PE 100*
- pressure rating
- nominal pressure
- dimensions
- production date/Batch no.

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

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 / 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