

TYPE APPROVAL CERTIFICATE**This is to certify:****That the Plastic Piping System, Thermoplastic**with type designation(s)
**PVC-U Piping System (Pipes, Fittings, Valves),
Phonoblack Piping System (Pipes, Fittings)**

Issued to

**F.I.P. FORMATURA INIEZIONE POLIMERI - S.P.A.
Casella, GE, Italy**

is found to comply with

**DNV GL rules for classification – Ships
DNV GL class programme DNVGL-CP-0072 – Type approval – Thermoplastic piping systems
IMO Resolution A.753(18). Guidelines for the Application of Plastic Pipes on Ships****Application :****Non-essential systems for water and sea water up to 16 bar. Service temperature 0°C to 60°C.
For installation according to DNV GL Rules and Manufacturer's Recommendations. The piping
system is not tested w.r.t. Fire Endurance. The piping system is tested to Low Flame Spread in
accordance with ASTM D635-06 (accepted as an alternative to IMO Resolution A.653(16)).****Product(s) approved by this certificate is/are accepted for installation on all vessels classed
by DNV GL.**Issued at **Høvik** on **2021-02-23**for **DNV GL**This Certificate is valid until **2026-02-22**.DNV GL local station: **Italy FIS**Approval Engineer: **Gisle Hersvik****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 GL AS, its parent companies and subsidiaries as well as their officers, directors and employees ("DNV GL") 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.



Job Id: **262.1-017434-2**
 Certificate No: **TAK000006V**
 Revision No: **1**

Product description

PVC-U PN10 and PN16 Pipes & Fittings and Valves

- PVC-U Pipes in accordance with EN ISO 15493, EN ISO 1452
- PVC-U Fittings in accordance with EN ISO 15493, EN ISO 1452
- PVC-U Valves in accordance with EN ISO 16135, EN ISO 16136, EN ISO 16137, EN ISO 16138
- Pipe dimensions: DN10/d16 to DN150/d160 for PN16
DN200/d200 to DN300/d315 for PN10

PVC-U Phonoblack Pipes & Fittings

- PVC-U Pipes in accordance with EN 1329-1
- PVC-U Fittings in accordance with EN 1329-1
- Pipe dimensions: DN40 to DN160 (non-pressure applications)
- Nominal external pressure (EP): None

Pipes PN16 - Series S6.3 SDR13.6 for OD≤90 and Series S8 SDR 17 for OD>90:

| Outside diameters and minimum wall thickness | | | | | | | |
|--|--|-----|-----|-----|-----|-----|-----|
| OD [mm] | | 16 | 20 | 25 | 32 | 40 | 50 |
| t [mm] | | 1,5 | 1,5 | 1,9 | 2,4 | 3,0 | 3,7 |

| Outside diameters and minimum wall thickness | | | | | | | |
|--|-----|-----|-----|-----|-----|-----|-----|
| OD [mm] | 63 | 75 | 90 | 110 | 125 | 140 | 160 |
| t [mm] | 4,7 | 5,6 | 6,7 | 6,6 | 7,4 | 8,3 | 9,5 |

Pipes PN10 - Series S12.5 SDR26:

| Outside diameters and minimum wall thickness | | | | | |
|--|-----|-----|-----|------|------|
| OD [mm] | 200 | 225 | 250 | 280 | 315 |
| t [mm] | 7,7 | 8,6 | 9,6 | 10,7 | 12,1 |

Pipes - Phonoblack:

| Outside diameters and minimum wall thickness | | | | | | | | |
|--|-----|-----|-----|-----|-----|-----|-----|-----|
| OD [mm] | 40 | 50 | 75 | 90 | 100 | 110 | 125 | 160 |
| t [mm] | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.2 | 3.2 | 4.0 |

Fittings:

Bends, 45° and 90° elbows, 45° and 90° tees, crosses, reducers, flanges, couplers, end caps, unions, stubs, nipples, adaptor sockets, transition fittings, tank connectors.

Valves:

| Type | Designation | Nominal internal diameter [mm] | Maximum working pressure [bar] |
|-----------|-----------------------------|--------------------------------|--------------------------------|
| VXE PVC-U | Easyfit 2-way ball valve | 10-100 | 16 |
| VEE PVC-U | Easyfit 2-way ball valve | 10-100 | 16 |
| VKD PVC-U | Dual block 2-way ball valve | 10-100 | 16 |
| VKR PVC-U | Dual block 2-way ball valve | 10-50 | 16 |
| TKD PVC-U | Dual block 3-way ball valve | 10-50 | 16 |
| FE PVC-U | Butterfly valve | 40-300 | 16-4 |
| FK PVC-U | Butterfly valve | 40-400 | 16-6 |
| SSE PVC-U | Easyfit check valve | 10-100 | 16 |
| SXE PVC-U | Easyfit check valve | 10-100 | 16 |

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| Type | Designation | Nominal internal diameter [mm] | Maximum working pressure [bar] |
|----------|-------------------------|-----------------------------------|-----------------------------------|
| VM PVC-U | Diaphragm valve | 15-100 | 10 |
| DK PVC-U | Diaphragm valve | 15-65 | 10 |
| CM PVC-U | Compact diaphragm valve | 12-15 | 6 |
| RV PVC-U | Sediment strainer | 10-100 | 16-6 |
| VR PVC-U | Check valve | 10-100 | 16-6 |
| VV PVC-U | Angle seat valve | 10-50 | 16-10 |
| VA PVC-U | Air release valve | 10-50 | 16 |
| VZ PVC-U | Foot valve | 10-50 | 16 |
| CR PVC-U | Clapet check valve | 40-300 | 5 |

Note: Nominal internal diameter and maximum working pressure shall be in accordance with Manufacturer's recommendations.

Joining technique:

Solvent jointed, threads, flanges, rubber ring joint

Manufactured by

F.I.P. Formatura Iniezione Polimeri S.p.A., Localita' Pian di Parata, Casella (GE), Italy

DNV GL local station: Genoa

DYKA B.V., Produktieweg 7, Postbus 33, 8330 AA, Steenwijk, The Netherlands (PVC-U pipes)

DNV GL local station: Rotterdam

LA.RE.TER. SPA, Via Occhiobello 732 – 45024 Fiesso Umbertiano (RO), Italy (PVC-U pipes)

DNV GL local station: Genoa

REDI SPA, Via Madonna dei Prati 5/A – 40069 Zola Predosa (BO), Italy (Phonoblack pipes, fittings)

DNV GL local station: Genoa

Responsibility

The Company (stated on the front page of this Certificate) takes the responsibility that both design and production are in compliance with Rules, Standards and/or Regulations listed on page 1 of this certificate.

Application/Limitation

Approved only for installation of piping systems onboard ships which will not be exposed to vacuum inside the pipes and not exposed to external pressure outside the pipes.

The plastic piping system is type approved for application in piping systems as listed in "Table 1 - Fire endurance requirements matrix" of DNV GL Rules Pt.4, Ch.6, Sec.2 as follows:

| Item | Piping system ¹⁾ | |
|-------------------|-----------------------------|---|
| Seawater | | |
| 19 | Non-essential systems | - Ballast water management systems ²⁾ |
| Freshwater | | |
| 22 | Non-essential systems | - Potable hot and cold water and bunkerlines - Potable water treatment systems (Osmosis and Evaporation) - Chilled water and cooling water of air condition systems |

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| Item | Piping system ¹⁾ | |
|-------------------------------------|-----------------------------|---|
| Sanitary drains and scuppers | | |
| 24 | Sanitary drains (internal) | - Black and grey water including waste water treatment and discharge lines to shore |
| Miscellaneous | | |
| 29 | Service air (non-essential) | |
| 30 | Brine | |

Notes

- ¹⁾ Approved installation locations where "0" is specified in "Table 1 - Fire endurance requirements matrix".
Appropriate footnotes are to be observed.
- ²⁾ 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.

For installation according to DNV GL Rules and Manufacturer's recommendations.

Maximum service pressure: 16 bar.

Service temperature range: 0°C to 45 °C, short term up to 60°C.

Low Flame Spread

The piping system is tested with respect to Low Flame Spread performance in accordance with IMO Resolution A.653(16).

Smoke Generation & Toxicity

The piping system is not tested with respect to capability of producing excessive quantities of smoke and toxic products as defined in IMO FTP Code, Annex 1: Part 2.

Fire Endurance

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

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 GL 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

1. Assessment Report from DNV GL Genoa of 2020-12-10.
2. Survey Report from DNV GL Genoa of 2020-12-10, including testing witnessed by DNV GL surveyor.
3. Survey Report from DNV GL Venice of 2020-10-05. (LA.RE.TER S.p.A.)

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4. Survey Report from DNV GL Venice of 2020-10-05. (REDI S.p.A.)
5. Statement re. Asbestos from FIP/Aliaxis of 2020-12-14.
6. Statement re. REDI SPA/Phonoblack range from FIP/Aliaxis of 2020-06-19.
7. FIP test report, 2020-12-10 (pipes) (witnessed DNV GL).
8. FIP test report, January 2019 (valves) (report no. BV3/2019).
9. FIP calibration report.
10. SPECIFICATIONS FOR PVC FIP PIPES PRODUCED BY LARETER (SM-28 04/20).
11. Phonoblack catalogue: "Soundproof piping system Black PVC-U system"
12. Application for Type Approval of 2020-07-20.
13. Assessment Report from DNV GL Genoa of 2015-10-29.
14. Survey Report from DNV GL Genoa of 2015-10-29.
15. Application for Type Approval of 2014-03-07.
16. Statement from DYKA B.V. of 2013-06-17.
17. GL Type Approval Certificate for DYKA B.V. PVC-U Pipes.
18. RINA Test Report No. 2014CS011270/2, Test for the Determination of Rate, Extent and Time of Burning of Self-Supporting Plastics in a Horizontal Position, of 2014-06-26 (ASTM D635-06).
19. FIP's QAOP008, Annex I, II and III (Drawings of test spools for burst tests, Valves to be tested (leak, burst) and External Pressure Test).
20. PVC-U Regression Curves.
21. DNV GL Genoa witnessed test results; PVC-U Valves & Burst Tests & External Pressure Tests.

Tests carried out

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

Marking of product

The product is to be marked with the *manufacturer's name, place of manufacture, material/type designation, nominal pressure, dimensions and production date* (as relevant).

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 GL 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 and Certificate Renewal) shall be performed according to DNVGL-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.dnvgl.com>

END OF CERTIFICATE