DET NORSKE VERITAS

TYPE APPROVAL CERTIFICATE

CERTIFICATE NO. **K-5764**

This is to certify that the
Plastic Pipes, Thermoplastic

with type designation(s)
PVC-C Piping System (Pipes, Fittings, Valves)

Issued to
F.I.P. FORMATURA INIEZIONE POLIMERI SPA
CASELLA, **Italy**

is found to comply with
Det Norske Veritas' Rules for Classification of Ships
Det Norske Veritas' Type Approval Programme 1-501.2, 2011, Thermoplastic Pipes
IMO Resolution A.753(18). Guidelines for the Application of Plastic Pipes on Ships

Application
For use in non-essential and essential systems for water up to 16 bar. Service temperature 0ºC to 80ºC. For installation according to DNV Rules and Manufacturer's Specifications. The piping system is not tested w.r.t. Fire Endurance. The piping system is tested to Low Flame Spread in accordance with IMO Resolution A.653(16).

This Certificate is valid until **2017-12-31**.

Issued at **Høvik** on **2013-12-19**

DNV local station: **Genoa**

Approval Engineer: **Helene Bjerke**

for **Det Norske Veritas AS**
Digitally Signed By: Strande, Martin
Location: DNV Høvik, Norway
Signing Date: 2013-12-19

Martin Strande
Head of Section

Product description

PVC-C PN10 and PN16 Pipes & Fittings and Valves..
- PVC-C Pipes in accordance with DIN 8079/8080 and ISO 15493.
- Pipe dimensions: DN10/d16 to DN150/d160 for PN16
  DN100/d110 to DN150/d160 for PN10

Pipes PN16 - Series S6.3 SDR13.6:

	Outside diameters and minimum wall thickness										
OD [mm]	16	20	25	32	40	50	63	75	90	110	160
t [mm]	1,4	1,5	1,9	2,4	3,0	3,7	4,7	5,6	6,7	8,2	11,8

Pipes PN10 - Series S10 SDR21:

	Outside diameters and minimum wall thickness	
OD [mm]	110	160
t [mm]	5,3	7,7

Fittings:
Bends, tees, crosses, reducers, flanges, couplers, end caps, unions, stubs, nipples, adaptor sockets, transition fittings.

Valves:

Type	**Designation**	**Nominal internal diameter [mm]**	**Maximum working pressure [bar]**
VXE PVC-C	Easyfit 2-way ball valve	10-100	16
VKD PVC-C	Dual block 2-way ball valve	10-100	16
TKD PVC-C	Dual block 3-way ball valve	10-50	16
FK PVC-C	Butterfly valve	40-300	16-8
SXE PVC-C	Easyfit check valve	10-100	16
VM PVC-C	Diaphragm valve	15-100	10
CM PVC-C	Compact diaphragm valve	12-15	6
RV PVC-C	Sediment strainer	10-100	16-6

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

Joining technique:
Solvent jointed, threads, flanges

Manufactured by

FIP Formatura Iniezione Polimeri S.p.A., Localita' Pian di Parata, Casella, GE, Italy

DNV local office: Genoa

FRIATEC AG, Steinzeugstraße 50, 68229 Mannheim, Germany

DNV local office: Essen

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

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

The approval covers application such as non-essential and essential systems, hot and cold water systems chilled and brine water systems, cooling systems (air condition), black and grey water systems, watertreatment fresh and waste water, osmosis systems and evaporation, fresh water bunker lines, etc.

Maximum service pressure 16 bar. Service temperature range 0ºC to 80ºC.

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

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

Type Approval documentation

1. Application for Type Approval of 2012-12-05.
2. ESN-13-31924-1_ Survey Report (Messrs. FRIATEC AG) of 2013-10-29.
3. ESN-13-31924-2_Certificate - Retention Survey Report of 2013-09-19
4. GEN-13-0105-1_Survey Report of 2013-08-20 (survey date 2013-07-10)
5. Assessment Report from DNV Milan of 2013-10-29 (survey 2013-07-10)
6. Declaration from FRIATEC AG, Mannheim to FIP SpA, Casella (Genoa) of 2013-06-30
7. Asbestos Free Declaration from FIP SpA of 2013-07-10.
8. Letter from FIP of 2013-02-15 with info on docs to be submitted, dimensions etc. [TechDoc No. 4
9. Various correspondences between DNV and FIP, April 2012-December 2013.

Tests carried out

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

Marking of product

The product is to be marked with the *manufacturer's name*: **F.I.P. Formatura Iniezione Polimeri SPA, Casella, Italy**, *material/type designation*, *nominal pressure*, *dimensions* and *production date*.

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

The main elements of the Periodical Assessment are to:

- 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