Certificate no.:
TAK00002JG

TYPE APPROVAL CERTIFICATE

This is to certify:

that the Plastic Piping System, Thermoplastic

with type designation(s)
PVC-U PN10 and PN16 Pipes and Fittings

issued to
Cosco (NanTong) Clavon Ship Engineering Co., Ltd.
Nantong, Jiangsu Province, China

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

Application:

Nominal External Pressure rating (EP): None. For use in systems for water up to 16 bar. Service temperature 0ºC to 60ºC. For installation according to DNV Rules and Manufacturer's recommendations. The piping system is not tested w.r.t. Fire Endurance and Smoke Generation & Toxicity characteristics. The piping system is tested to Low Flame Spread characteristics according to IMO resolution A.653(16).

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

Issued at **Hamburg** on **2025-08-15**
This Certificate is valid until **2030-08-14**.
DNV local unit: **Nantong**

Approval Engineer: **Gisle Hersvik**

for **DNV**

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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 USD 300 000.

Product description

PVC-U PN10 and PN16 Pipes and Fittings.

PVC-U: Unplasticized Polyvinyl Chloride

Nominal external pressure ratings (PN): PN10 (Series S10 SDR21) and PN16 (Series S6.3 SDR13.6)
Nominal external pressure ratings (EP): None

Pipes PN10 - Series S10 SDR21 - DN15/dn20 to DN200/dn200:

	Outside diameters and minimum wall thickness						
OD [mm]	20	25	32	40	50	63	75
t [mm]	2.0	2.0	2.0	2.0	2.0	3.0	3.6

	Outside diameters and minimum wall thickness						
OD [mm]	90	110	125	140	160	180	200
t [mm]	4.3	5.3	6.0	6.7	7.7	8.6	9.6

Pipes PN16 - Series S6.3 SDR13.6 - DN15/dn20 to DN200/dn200:

	Outside diameters and minimum wall thickness						
OD [mm]	20	25	32	40	50	63	75
t [mm]	2.2	2.2	2.4	3.0	3.7	4.7	5.6

	Outside diameters and minimum wall thickness						
OD [mm]	90	110	125	140	160	180	200
t [mm]	6.7	8.1	9.2	10.3	11.8	13.3	14.7

Fittings:
Elbows, tees, reducers, flanges, flange adaptors

Joining technique:
Adhesive bonding

Manufactured by

Kaiyuan Plastics Technology (Nantong) Co., Ltd., No.826, YanjiangRoad, RugaoPort HiTech Industrial Park, Rugao, Nantong 226500 Jiangsu Province, P.R. China

DNV local station: Nantong

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 2 - Fire endurance requirements matrix” of DNV-RU-SHIP Pt.4 Ch.6 Sec.2 where “0” is specified. Appropriate footnotes are to be observed.

The approval covers application such hot and cold-water systems chilled and brine water systems, cooling systems (air condition), black and grey water systems, water-treatment fresh and wastewater, osmosis systems and evaporation, freshwater bunker lines, etc.

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

Maximum service pressure: see tables below.
Service temperature range: 0ºC to 60ºC.

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

Non-essential systems [ii]

Temperature	Pressure class	0°C up to +20°C	30°C	40°C	50°C	60°C
Maximum allowable working pressure (bar)	PN10 (SDR21 / S10)	10.0	7.96	5.97	4.10	2.51
	PN16 (SDR13.6 / S6.3)	16.0	12.73	9.55	6.56	4.01

Notes
[i] Refer to Manufacturer's product catalogue:
[ii] Reference: 'design standard' ISO 15493:2003 + A1:2017, Safety Factor SF 2.5 / 50 years.

Essential systems [iii]

Temperature	Pressure class	0°C up to +20°C	30°C	40°C	50°C	60°C
Maximum allowable working pressure (bar)	PN10 (SDR21 / S10)	10.0	7.96	5.97	4.10	2.51
	PN16 (SDR13.6 / S6.3)	16.0	12.73	9.55	6.56	4.01

Notes
[iii] References: DNV-CP-0072, 'design standard' ISO 15493:2003 + A1:2017, SF 2.5 (100 000 hours)

Low Flame Spread
The piping system is tested with respect to Low Flame Spread in accordance with IMO FTP Code, Annex 1, Part 5.

Smoke Generation & Toxicity
The piping system is not tested in accordance with 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
General
In general, pipe penetrations through watertight bulkheads or decks as well as through fire divisions shall be Type Approved unless the pipe is welded into the bulkhead/deck.

When plastic pipes pass through watertight bulkheads or decks which are also a fire division, and a fire may cause flooding of watertight compartments, 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-RU-SHIP Pt.4 Ch.6 Sec.3 – 1.4 Fittings on watertight bulkheads.

Pipes with no external pressure capacity
The **PVC-U PN10 and PN16 Pipes and Fittings** is not approved for penetrating watertight subdivisions, unless:

a) a steel spool piece of 900 mm in length, preferable 450 mm on each side, with thickness according to DNV-RU-SHIP Pt.4 Ch.6 Sec.9 [1.2.1] is arranged at the watertight penetration. A remote operated emergency shut off valve shall be arranged between the steel spool piece and the pipe on one side. This valve shall be of safe to close type, or else the control including hydraulic piping and electric cables shall be routed inboard of B/5, and preferably to center line, before being routed longitudinally.

On the opposite side should the pipe be flanged or similar to the steel spool piece, or

b) two manual valves, one on each side of the steel spool piece in a) are arranged, under the provision that these valves are easily accessible.

Refer to DNV-RU-SHIP Pt.4 Ch.6 Sec.2 – [1.7.6].

Passenger vessels – SOLAS Ch. II-1 – Reg. 13.2.3
On passenger vessels, where the watertight bulkhead is also a fire division, pipe penetration design shall comply to MSC.429(98), Section 'Regulation 13.2.3'.
Refer to DNV-CP-0165, Section 2 - 5 Watertightness and gas tightness - particular cases.

Type Approval documentation

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*: **Cosco (NanTong) Clavon Ship Engineering Co., Ltd., China**, *place of manufacture*, *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 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