



Certificate no.:
TAK00002E8

TYPE APPROVAL CERTIFICATE

This is to certify:

that the **Plastic Piping System, Thermoplastic**

with type designation(s)

PVC-U Pipes and Fittings: PN10 and PN16

issued to

ERA CO., LTD.

Taizhou, China

is found to comply with

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

DNV rules for classification – Ships

Application:

External Pressure (EP): 3.0 bar. For use in piping systems for water and sea water up to 16 bar. Service temperature 0°C to 60°C. The piping system is not tested w.r.t. Fire Endurance. The piping system is tested to Low Flame Spread characteristics in accordance with ASTM D635-22.

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

Issued at **Hamburg** on **2024-11-01**

This Certificate is valid until **2029-10-31**.

DNV local unit: **Ningbo CMC**

for **DNV**

Approval Engineer: **Gisle Hersvik**

.....

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-C Pipes and Fittings

- Unplasticized Polyvinylchloride (PVC-U).
- Nominal Internal Pressure rating (PN): 10 and 16 bar.
- Nominal External pressure rating (EP): 3 bar.

Pipes:

Nominal diameter, DN [mm]	Wall thickness, min. [mm]	
	<i>Pipe series, S / Standard Size Ratio, SDR</i>	
	S10 / SDR21	S6.3 / SDR13.6
	<i>Nominal Pressure, PN [bar]</i>	
	10	16
20	2.0	2.0
25	2.0	2.0
32	2.0	2-4
40	2.0	3.0
50	2.4	3.7
63	3.0	4.7
75	3.6	5.6
90	4.3	6.7
	S12.5 / SDR26	S8 / SDR17
110	4.2	6.6
125	4.8	7.4
140	5.4	8.3
160	6.2	9.5
180	6.9	10.7
200	7.7	11.9

Fittings:

Elbows, equal tees, reducing tees, plugs, flanges.

Joining techniques

Socket glue bonding: DN20-DN50

Elastic rubber seal ring flexible connection: DN63-DN200

Notes: Flanged connections should be used when connecting metal pipes with nominal diameter $dn \geq 100$ mm and pipe fittings such as flanged valves. For the connection with sanitary fittings, threaded valves and other pipe fittings, it is advisable to use injection molded pipe fittings with embedded copper wire joints or injection molded pipe fittings with stainless steel reinforced at the pipe mouth.

Place of manufacture

ERA CO., LTD., No.2 Daixi Road, Huangyan Economic Development Zone, Taizhou, Zhejiang, P.R. China

Application/Limitation

The plastic piping system is approved for application in systems as listed in "Table 1 – 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 in accordance with DNV Rules and Manufacturer's recommendations.
The DNV-RU-SHIP, Pt.4 Ch.6 Sec.10 Para. 4 *Joining of plastic pipes* is to be observed.

Maximum service pressure: 16 bar. See below tables.
Service temperature range: 0°C to 60°C.

Long-term permissible service pressure at lower and elevated temperatures

Non-essential services

Temperature		0°C	20°C	40°C	60°C
Maximum allowable working pressure [bar]	PN10 / S10	10.0	10.0	6.3	2.5
	PN10 / S12.5				
	PN16 / S6.3	16.0	16.0	10.0	4.1
	PN16 / S68				

Notes:

Reference ISO 15493, SF1.6/25years

ISO 15493: 2003: Plastics piping systems for industrial applications — Acrylonitrile-butadiene-styrene (ABS), unplasticized poly(vinyl chloride) (PVC-U) and chlorinated poly(vinyl chloride) (PVC-C) — Specifications for components and the system — Metric series

Essential services

Temperature		0°C	20°C	40°C	60°C
Maximum allowable working pressure [bar]	PN10 / S10	6.4	6.4	4.0	1.6
	PN10 / S12.5				
	PN16 / S6.3	10.2	10.2	6.4	2.6
	PN16 / S68				

Notes:

Reference ISO 15493 and DNV-CP-0072, SF2.5/25years

ISO 15493: 2003: Plastics piping systems for industrial applications — Acrylonitrile-butadiene-styrene (ABS), unplasticized poly(vinyl chloride) (PVC-U) and chlorinated poly(vinyl chloride) (PVC-C) — Specifications for components and the system — Metric series

Fire Endurance

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

Low Flame Spread

The piping system is tested to Low Flame Spread characteristics in accordance with ASTM D635-22, Classification: HB.

Smoke Generation & Toxicity

The piping system is not tested with respect to capability of producing excessive quantities of smoke and toxic products in fire as defined in IMO FTP Code, Annex 2 - 2.2.

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.

Bulkhead and Deck Penetration

Pipe penetration 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.

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



Job ID: **262.1-041250-1**
Certificate no.: **TAK00002E8**

The product is to be marked with the *manufacturer's name and address*: **ERA Co., Ltd., China**, *brand name*: **PVC-U** / *type designation, diameter, pressure rating, temperature rating, serial number, production date and product standard*.

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