



Marine & Offshore

Certificate number: SMS.W.II./143619/A.0

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RECOGNITION FOR BV MODE II SCHEME

ERA CO.,LTD.
TAIZHOU - CHINA

Summary of the range of the recognition which is detailed in the subsequent page(s):

Marine Plastic Pipes and Fittings
PERT, DN20~160, PN10 bar, PN16 bar
PE100, DN20~630, PN10 bar, PN16 bar
PPR, DN20~160, PN10 bar, PN16 bar
PVC-U, DN20~200, PN10 bar, PN16 bar

Products are to be manufactured, examined and tested by ERA CO.,LTD. in accordance with the type listed in this certificate and BV rules

This certificate is issued to attest that Bureau Veritas Marine & Offshore has performed, at the above company's request and in compliance with the requirements of NR320, a satisfactory assessment of the manufacturing facilities and associated quality procedures related to the range of the recognition.

This certificate will expire on: 21 Jun 2028

For BUREAU VERITAS,
At BV SHANGHAI, on 21 Oct 2024,
Hong Zhang

This certificate was created electronically and is valid without signature



This certificate remains valid until the date stated above, unless cancelled or revoked, provided the conditions indicated in the subsequent page(s) are complied with. This certificate is issued within the scope of the General Conditions of Bureau Veritas Marine & Offshore available on the internet site www.veristar.com. Any Person not a party to the contract pursuant to which this document is delivered may not assert a claim against Bureau Veritas Marine & Offshore for any liability arising out of errors or omissions which may be contained in said document, or for errors of judgement, fault or negligence committed by personnel of the Society or of its Agents in establishment or issuance of this document, and in connection with any activities for which it may provide.

THE SCHEDULE OF RECOGNITION

1. RANGE OF THE RECOGNITION

The products listed in the table below are not required to be certified individually or per batch by Bureau Veritas Marine & Offshore. Their compliance with the approved type is solely certified by the manufacturer using its own format of document and marking to allow traceability to the approved type (HBV products as defined in NR320).

App. number	Validity date	Item designation	Trade name
75857/A0 BV	18 Oct 2029	THERMOSETTING MATERIAL PIPES AND FITTINGS - 2090H	PE100 Marine Plastic Pipes and Fittings
75858/A0 BV	18 Oct 2029	THERMOPLASTIC MATERIAL PIPES AND FITTINGS - 2080H	PVC-U Plastic pipe & fittings
75859/A0 BV	18 Oct 2029	THERMOPLASTIC MATERIAL PIPES AND FITTINGS - 2080H	PPR Pipes and Fittings
77043/A0 BV	18 Oct 2029	THERMOSETTING MATERIAL PIPES AND FITTINGS - 2090H	PE-RT Pipes and Fittings

2. LIMITATIONS

The certificates listed in the range of recognition are to be valid, as applicable.

Bureau Veritas Marine & Offshore is to be informed immediately of any modification to manufacturing facilities and associated quality procedures in order to agree on appropriate actions.

ERA CO.,LTD. has to apply for the periodical audits as agreed with Bureau Veritas Marine & Offshore.

3. PERIMETER OF CERTIFICATION

Quality system of following site(s) has been assessed:

ERA CO.,LTD. - TAIZHOU - CHINA

4. REMARKS

- Address: No.2 Daixi Road & No.555, Huangjiao Road, Dongcheng St.(as brunch factory)
Huangyan Economic Development Zone , Taizhou, Zhejiang,P.R.China
- Annual Audit: 1 time/every year

*** END OF CERTIFICATE ***



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**

Approval Engineer: **Gisle Hersvik**

for DNV



Digitally Signed By:
Martin Wenning
Location: DNV Hamburg,
Germany

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]	
	Pipe series, S / Standard Size Ratio, SDR	
	S10 / SDR21	S6.3 / SDR13.6
	Nominal Pressure, PN [bar]	
	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

1. Assessment Report from DNV Ningbo of 2024-08-24.
2. Assessment documents, incl. ISO 9001 Certificate.
3. PVC long-term hydrostatic pressure calculation [Calculated MRS = 25.0 MPa according to ISO 1452:2009 and ISO 15493:2003]
4. PVC-U dn20 PN16 1000h Report No. GYPG2024080131.
5. "The Test Reports for Marine Plastic Pipes and Fittings (Type: PVC-U)". File No.: ERA-DNV-2404, Aug., 2024, incl.:

- ERA's Test Reports for Short-term Internal Pressure, Long-term Internal Pressure, External Pressure, External Load, Temperature Limits, Impact Resistance, Fatigue, Aging and Fluid Absorption.
 - SGS Test Report No. AJFS2211009002FF of 2023-08-28 [ASTM D635-18: HB, - mm/min]
 - SGS Test Report No. AJFS2408009204FF of 2024-08-16 [ASTM D635-22: HB, - mm/min]
6. "Application documents for Marine Plastic Pipes and Fittings". File No.: ERA-DNV-2301, Rev No.: 0, Dec., 2023.
 7. "The test program for Marine Plastic Pipes and Fittings". File No.: ERA/TP-DNV-01, Rev No.: A3, June, 2024.
 8. Application for Type Approval of 2023-12-26.

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 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



Type Approval Certificate

This is to certify that the undernoted product(s) has/have been tested with satisfactory results in accordance with the relevant requirements of the Lloyd's Register Type Approval System.

Manufacturer	ERA CO., LTD.
Address	No.2 Daixi Road, Huangyan Economic Development Zone, Taizhou, 318020, China
Place of Production	ERA CO., LTD. No.2 Daixi Road, Huangyan Economic Development Zone, Taizhou, 318020, China
Place of Production	ERA CO., LTD. No.555, Huangjiao Road, Dongcheng Street, Huangyan District, Taizhou, China
Type	Plastic Pipes
Description	Thermoplastics Pipes and Fittings, include 45°&90° Elbow, Equal coupling, Equal tee, Reducing tee, Flange and Plug
Trade Name	ERA
Application	Marine and offshore piping systems for sea water, fresh water, sanitary/drains/scuppers and non-essential services in locations listed in Part 5, Chapter 12, Table 12.5.1 of Lloyd's Register's Rules and Regulations for the Classification of Ships where a "0" is indicated.
Specified Standard	LR Rules and Regulations for the Classification of Ships, July 2024 IMO Resolution A.753(18), as amended by IMO Resolution MSC.313(88)

Jun Hua Rong

Engineering Piping - Senior Specialist to
Lloyd's Register Classification Society (China)
Co., Ltd.

12th Floor, Chong Hing Finance Centre, No. 288
Nanjing West Road, Shanghai, 200003, China

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Type Approval Certificate

ISO 1167-2:2006
ISO 9969:2007
ISO 75-1/2:2004
ISO 62:2008
ASTM D635

Ratings

PE-RT	
Nominal Diameter (mm):	DN20~DN160
Nominal Pipe Thickness (mm):	2.8~17.9
Nominal Pressure Rating (bar):	10/16
External Pressure Rating (bar):	3
Working Temperature Range (°C):	-40~95
PE100	
Nominal Diameter (mm):	DN20~DN630
Nominal Pipe Thickness (mm):	2.3~57.2
Nominal Pressure Rating (bar):	10/16
External Pressure Rating (bar):	3
Working Temperature Range (°C):	-40~60
PPR	
Nominal Diameter (mm):	DN20~DN160
Nominal Pipe Thickness (mm):	2.3~17.9
Nominal Pressure Rating (bar):	10/16
External Pressure Rating (bar):	3
Working Temperature Range (°C):	0~90
PVC-U	
Nominal Diameter (mm):	DN20~DN200
Nominal Pipe Thickness (mm):	2.0~11.9
Nominal Pressure Rating (bar):	10/16
External Pressure Rating (bar):	3

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Type Approval Certificate

Working Temperature Range(°C): 0~60

Additional Tests

Low-Flame spread test conducted according to ASTM D635.

Other Conditions

1. Plastic pipes and fittings intended for application in Class I, Class II and Class III systems for which there are Rule requirements, are to be manufactured in accordance with Chapter 14 of LR Rules for Materials and to be manufactured and tested in accordance with Part 5, Chapter 12, Section 5 of the Rules and Regulations for the Classification of Ships.
2. Suitable pipes and fittings are to be selected and installed in accordance with the manufacture's instructions. The temperature-pressure reduction is to the manufacture's recommendation.
3. The use of plastics pipes may be restricted by statutory requirements of the National Authority of the country in which the ship is to be registered.
4. No fire endurance test, smoke generation test, toxicity test and electrical conductivity test are conducted.

This certificate is not valid for equipment, the design, ratings or operating parameters of which have been varied from the specimen tested. The manufacturer should notify Lloyd's Register Classification Society (China) Co., Ltd. of any modification or changes to the equipment in order to obtain a valid Certificate.

The Design Appraisal Document with reference number STS/TA/JRZ/PRJ11100424852/O-002645D and its supplementary Type Approval Terms and Conditions form part of this Certificate.

12th Floor, Chong Hing Finance Centre, No. 288
Nanjing West Road, Shanghai, 200003, China

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NIPPON KAIJI KYOKAI

Certificate

OF

APPROVAL

Certificate No.
TA241277E(N)

Item : Plastic Pipe and Fittings
Product name : PVC-U
Applicant : ERA CO.,LTD.
No. 2, Daixi Road, Huangyan Economic Development
Zone, Taizhou City, Zhejiang, China
Manufacturers : See Annex.
Specifications : See Annex.
Testing standard : Chap.6, Part 6 of "Guidance for The Approval and Type
Approval of Materials and Equipment for Marine Use"
Condition for use : See Annex.

THIS IS TO CERTIFY that the above type of products has been approved by
Nippon Kaiji Kyokai with type approval No. NKPP077 as complying with the relevant
requirements of the Society's *Rules for the Survey and Construction of Steel Ships*.

This certificate is valid until 5 November 2029.

Issued at Tokyo on 6 November 2024.

NIPPON KAIJI KYOKAI


M. Irisawa
General Manager
Material and Equipment Department





1. Manufacturers

ERA CO.,LTD.

No. 2, Daixi Road, Huangyan Economic Development Zone,
Taizhou City, Zhejiang, China

ERA CO.,LTD.

No.555, Huangjiao Road, Dongcheng Street, Huangyan District,
Taizhou City, Zhejiang, China

2. Specifications

Type		PVC-U
Nominal Diameter (mm)		20 – 200
Material		PVC-U
Working Temperature (°C)		0 ~ 60
Nominal Pressure	Internal (MPa)	1.0 / 1.6
	External (MPa)	0.3
Category		N/A
Fire Endurance		N/A

3. Condition for use

3.1. On Plastic Pipes, the followings are to be marked.

- (1) Trade name and/or product name
- (2) NK's approval, such as "NK-Approved"
- (3) Nominal pressure
- (4) The design standards to be applied
- (5) Material of which pipe or fitting is made

3.2. Particulars, manufacturing method and material of Plastic Pipes are to be same as those in the original approval tests. Any alternation to the above items is to be informed to the Society for approval. Our surveyor reserves the right to access to the manufacturing facilities and may require further test and/or examination where deemed.

3.3. Plastic Pipes are to be tested after manufacture in accordance with the requirement of "1.7.1 Shop Tests, Annex 12.1.6 PLASTIC PIPES of Part D, Rules for the Survey and Construction of Steel Ships".



3.4. The installation of the piping system is to be carried out in accordance with “Annex 12.1.6 PLASTIC PIPES of Part D, Rules for the Survey and Construction of Steel Ships”.

3.5. Plastic Pipes are to be subject to the periodical examination at interval of five years after the date of approval.

4. Bonding procedure quality testing

The adequacy of the method for connecting pipes has been confirmed by the bonding procedure qualification testing.



TYPE APPROVAL CERTIFICATE
No. MAC009124WS

This is to certify that the product identified below satisfies the requirements of the standard quoted under "Reference standard"

<i>Description</i>	Plastic pipes and fittings
<i>Type</i>	PE-RT, PE100, PPR, PVC-U
<i>Applicant</i>	ERA CO., LTD.
	No.2 Daixi Road, Huangyan Economic Develoment Zone, Taizhou, Zhejiang, P.R.China
<i>Manufacturer</i>	ERA CO., LTD.
<i>Place of manufacture</i>	No.2 Daixi Road, Huangyan Economic Develoment Zone, Taizhou, Zhejiang, P.R.China, No.555, Huangjiao Rode,Dongcheng Street, Huangyan District Taizhou, Zhejiang, P.R.China
<i>Reference standards</i>	Rules for the Type Approval of Plastic Pipes
<i>Reference documents</i>	RINA TYPE APPROVAL SYSTEM

Issued in **SHANGHAI** on **May 20, 2024.** *This Certificate is valid until* **May 19, 2029**

Qiang Sun

RINA Services S.p.A.

This certificate consists of this page and 1 enclosure



TYPE APPROVAL CERTIFICATE

No. MAC009124WS

Enclosure - Page 1 of 2

PE-RT, PE100, PPR, PVC-U

Manufacturer's Documents

Documentations of product drawings(pipe and fittings)--RINA drawing SHMC27798, SHMC27800, SHMC29731/32, test program--RINA drawing SHMC29670, and water supply pipe connection procedure--RINA drawing SHMC27806 have been reviewed.

Asbestos free declaration has been reviewed on RINA drawing SHMC-28122.

Test Reports

Internal pressure test, External pressure test, Deformation test of external loading characteristics by parallel-plate loading, Axial tensile strength test, Minimum/Maximum operating temperature report, Impact resistance test, Aging test, Fatigue test, Fluid absorption test and Surface flame spread characteristics test has been reviewed with RINA drawing SHMC29344-29346, SHMC29662-29669, SHMC29671.

Fire endurance test and electrical conductivity test have not been carried out.

The product 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.

Product Description

Product Name	Marine Plastic Pipe and Fittings			
Product model	PE-RT	PE100	PPR	PVC-U
Specifications (mm)	DN20-160	DN20-1000	DN16-160	DN20-200
Nominal Pressure (MPa)	PN1.0, PN1.6	PN1.0, PN1.6	PN1.0, PN1.6	PN1.0, PN1.6
Operating Temperature (°C)	-40~95	-40~60	0~90	0~60

Application/Limitation

This plastic pipe can be used in piping systems including ballast system, cooling water system, bilge water system and other secondary systems, where fire endurance are not required according to the RINA Rules and IMO Resolution A.753(18) Guidelines for the Application of Plastic Pipes on Ships, as Amended by Resolution MSC.313(88) and MSC.399(95).

This plastic pipe is not used in the spaces which have a fire endurance level(L1/L2/L1W/L2W/L3).

The product is not intended for use in areas that require electrical conductivity.



RINA Services S.p.A.
Via Corsica, 12 - 16128 Genova
Tel +39 010 53851
Fax +39 010 5351000

TYPE APPROVAL CERTIFICATE

No. MAC009124WS

Enclosure - Page 2 of 2

PE-RT, PE100, PPR, PVC-U

Acceptance conditions

Pipes and fittings, installation, jointing and bonding procedures are to in accordance with manufacture's instruction/ recommendations and Pt C, Ch 1, App 3, Para 3 of RINA Rules.

When the piping pierces watertight or fire bulkhead or decks, suitable means shall be provided to maintain the integrity of the bulkhead or deck in case of failure of the pipes.

The workshop tests and testing after installation on board are to be carried out in accordance with Pt C, Ch 1, App 3, Para 4.2 & 4.3 of RINA Rules.

Marking of product

The pipes and fittings marking shall at least include the following information:

- Pressure rating
- Temperature rating
- The design standards that the pipe or fitting is manufactured in accordance with
- The material of which the pipe or fitting is made
- Product and manufacturer name
- Conductive or non-conductive

SHANGHAI May 20, 2024

