TYPE APPROVAL CERTIFICATE

Certificate no.:
TAK00000U5
Revision No:
3

This is to certify:

that the Plastic Piping System, Thermoplastic

with type designation(s)
PE100 Pipes and Fittings: PN6, PN8, PN10 and PN12.5

issued to

Zhejiang Weixing New Building Materials Co.,Ltd

Linhai, Zhejiang, 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 rating: EP=1.33 bar and EP=1.66 bar. For use in piping systems for water and sea water up to 12.5 bar. Service temperature -40ºC to 60ºC. For installation in accordance to DNV 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 characteristics, as per ASTM D635-14.

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

Issued at **Hamburg** on **2024-04-16**

This Certificate is valid until **2029-04-13**.
DNV local unit: **Ningbo CMC**

Approval Engineer: **Gisle Hersvik**

for **DNV**

Digitally Signed By:
Stefan Röhr
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.

Product description

PE100 Pipes and Fittings

- Material: Polyethylene (PE100)
- Nominal Internal Pressure rating (PN): 6 bar / SDR21
  - Nominal External pressure rating (EP): 1.33 bar (collapse resistant).
- Nominal Internal Pressure rating (PN): 8 bar / SDR17, 10 bar / SDR13.6 and 12.5 bar / SDR11
  - Nominal External pressure rating (EP): 1.66 bar (collapse resistant)

Pipes:

Nominal diameter, DN [mm]	Wall thickness, min. [mm]			
	Standard Size Ratio, SDR			
	SDR21	**SDR17**	**SDR13.6**	**SDR11**
	Nominal Pressure, PN [bar]			
	6	**8**	**10**	**12.5**
20	--	--	--	1.9
25	--	--	--	2.3
32	--	--	--	3.0
40	3.5	--	--	3.7
50	3.5	--	--	4.6
63	3.5	--	4.7	5.8
75	3.6	4.5	5.6	6.8
90	4.3	5.4	6.7	8.2
110	5.3	6.6	8.1	10.0
125	--	7.4	9.2	11.4
140	6.7	8.3	10.3	12.7
160	7.7	9.5	11.8	14.6
180	--	10.7	13.3	16.4
200	9.6	11.9	14.7	18.2
225	--	13.4	16.6	20.5
250	--	14.8	18.4	22.7
280	--	16.6	20.6	25.4
315	--	18.7	23.2	28.6
355	--	21.1	26.1	32.2
400	--	23.7	29.4	36.3
450	--	26.7	33.1	40.9
500	--	29.7	36.8	45.4
560	--	33.2	41.2	50.8
630	--	37.4	46.3	57.2
710	--	42.1	52.2	64.5
800	--	47.4	58.8	72.6

Fittings:
Elbows, tees, sockets, caps and male thread connectors.

Joining techniques:
Butt fusion, socket fusion, electrofusion and flanged.

Application/Limitation

The plastic piping system is type approved for application in piping systems as listed in “Table 1- Fire endurance requirements matrix” of DNV-RU-SHIP Pt.4 Ch.6 Sec.2 where “0” is specified, as follows:

Item	Piping system [1]	
Seawater		
19	Non-essential systems	- Ballast and bilge water management systems [2]
Freshwater		
22	Non-essential systems	- Potable hot and cold water and bunker lines - Potable water treatment systems (Osmosis and Evaporation) - Chilled water and cooling water of air condition systems
Sanitary drains and scuppers		
24	Sanitary drains (internal)	- Black and grey water including wastewater 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 in accordance with DNV Rules and Manufacturer's recommendations.

Maximum service pressure: 12.5 bar. See below tables.
Service temperature range: -40ºC to 60ºC

Long-term permissible service pressure at lower and elevated temperatures

Non-essential services

Temperature		-40°C to 0°C	20°C	40°C	60°C
Maximum allowable working pressure [bar]	PN6 / SDR21	6.0	6.0	4.6	3.4
	PN8 / SDR17	8.0	8.0	5.8	4.2
	PN10 / SDR13.6	10.0	10.0	7.3	5.4
	PN12.5 / SDR11	12.5	12.5	9.2	6.8

Notes:
Reference ISO 15494, SF1.6/25years
ISO 15494: 2015: Plastics piping systems for industrial applications, Polybutene (PB), polyethylene (PE), polyethylene of raised temperature resistance (PE-RT), crosslinked polyethylene (PE-X), polypropylene (PP), Metric series for specifications for components and the system.

Essential services

Temperature		-40°C to 0°C	20°C	40°C	60°C
Maximum allowable working pressure [bar]	PN6 / SDR21	4.8	3.8	2.9	2.1
	PN8 / SDR17	6.0	5.1	3.7	2.6
	PN10 / SDR13.6	7.6	6.4	4.6	3.4
	PN12.5 / SDR11	9.6	8.0	5.8	4.3

Notes:
Reference ISO 15494 and DNV-CP-0072, SF2.5/25years
ISO 15494: 2015: Plastics piping systems for industrial applications, Polybutene (PB), polyethylene (PE), polyethylene of raised temperature resistance (PE-RT), crosslinked polyethylene (PE-X), polypropylene (PP), Metric series for specifications for components and the system.

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, as per ASTM D635-14 (Classification: HB. Average horizontal burning rate: 22.8 mm/min).

Smoke Generation & Toxicity
The piping system is not tested with respect to generating 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 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-RU-SHIP Pt.4 Ch.6 Sec.3 – 1.4 Fittings on watertight bulkheads.

Penetration of pipes without external pressure capability through watertight bulkheads is not approved.

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 2024-04-08.
2. 'Hydrostatic pressure of different temperature of PE 100 and PE-RT', 2024-04-15.
3. Internal "Test Report of Marine plastic pipes and fittings", ref. No 20240202C0011 of 2024-02-02.
4. Application for Type Approval of 2024-01-04.
5. Assessment Report from DNV Ningbo of 2021-09-02.
6. DNV GL Witness of Tests (Internal Pressure Short-Term, dn40, dn110, dn200 / SDR21, External Pressure, dn40, dn110, dn200, SDR21, Impact Resistance, dn40, dn110, dn200, SDR21, External Loading, dn110, SDR21, Internal Pressure Long-Term, dn40, dn110, dn200, SDR21).
7. Marine plastic pipe and fittings expanding certificate test program (PE100), WXJC/MS/W-21-15.
8. Information Note of 2021-08-05.
9. Application for Type Approval of 2021-03-09.
10. Assessment Report from DNV GL Ningbo of 2018-11-27.
11. SGS Test Report No. SHIN1608040475MR-03 of 2016-09-09.
12. Internal test report of 2018-12-05.
13. Assessment Report from DNV GL Ningbo 2017-01-19.
14. Test Reports (DNV Witness of Tests); Internal Pressure (Dn630, SDR11/SDR17), External Pressure (Dn630, SDR17), Impact Resistance (Dn630, SDR17).
15. Calculation Report, Dn630, SDR17.
16. Application for Type Approval of 2016-11-21.
17. Material Declaration – Asbestos of 2016-11-21.
18. Size and Tolerance of PE100 Pipes
19. Application for Type Approval of 2014-02-12.
20. Application Material from Zhejiang Weixing New Building Materials Co., Ltd., incl. various type approval documentation (e.g. Product specification, product list, pipes/fittings sizes/tolerances, installation guide, Production Processes, QA Arrangement, Packaging and Marking of Product and Approval Test Program).
21. Test Reports from Weixing NBM (covering internal pressure short-term, external pressure, impact resistance, external load) of 2014-01-03 and 2014-04-17.
22. Test Report Nos. NLSH1207171478601 and NLSH1207171478602 "Test Report of Asbestos in Marine Products" from Center Testing International (Shenzhen) Corporation Shanghai Branch of 2012-07-19.
23. Test Reports from Weixing NBM (covering internal pressure short-term, external pressure, impact resistance, external load) of 2014-01-03, 2014-04-16 and 2014-04-17.
24. Test Report Nos. 1401311106659, 1401311106669 and 1401311106679 from State Center of Supervision and Test for Chemical Building Materials.
25. Test Report Nos. BETC-HJ-2012-G-54(B), BETC-HJ-2012-G-54(C), BETC-HJ-2012-G-55(B), BETC-HJ-2012-G-56(B) and BETC-HJ-2012-G-57(B) from China National Center for Test of Chemical Building Materials.
26. Regression Curves (internal pressure long-term).
27. Type Approval Assessment Report from DNV GL Ningbo of 2014-05-14.

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*: **Zhejiang Weixing New Building Materials Co., Ltd., China**, *brand name*: **VASEN**, *pressure rating*, *temperature rating* and *type designation*.

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