

TYPE APPROVAL CERTIFICATE

This is to certify:

That the **Plastic Piping System, Fibre Reinforced Thermosetting**

with type designation(s)

SDWM-1.0/1.6, SDWM-1.0C/1.6C, SDWM-1.0CF/1.6CF

Issued to

Shandong Weima New Material Technology Co., Ltd.
Dongying, China

is found to comply with

DNV rules for classification – Ships Pt.4 Ch.6 Piping systems

DNV-OS-D101 – Marine and machinery systems and equipment, Edition July 2021

DNV class programme DNV-CP-0070 – Type approval – Fibre reinforced thermosetting plastic piping systems

Application :

Fire endurance leve L3, Flame spread capability tested acc. to FTP Code Annex 1, Part 5 – Surface flammability, External pressure rating 0.3 to 0.4MPa refer to certificate.

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

Issued at **Hamburg** on **2023-12-06**

This Certificate is valid until **2028-12-05**.

DNV local station: **Qingdao NB & CMC**

for **DNV**

Approval Engineer: **Hagen Markus**

.....
Sven Klinger
Head of Section

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 300,000 USD.



Product description

Filament Wound Fibre Reinforced Thermosetting Epoxy Resin Pipe and Fittings

Conductive and Non – Conductive.

Resin bisphenol A-type epoxy resin with reinforced fiber untwisted roving and aromatic amine curing agent.

Reference: "Product Catalogue – Doc. Number:SDWM/C JZ-02, issue date 2022-124

Type designation	Design properties	Size range	Nominal internal pressure PN	Nominal external pressure	Fire endurance level
SDWM-1.0/1.6	Non-conductive	DN25 – DN1300	1.0MPa	0.3MPa	None
SDWM-1.0C/1.6C	Conductive				
SDWM-1.0CF/1.6CF	Conductive and fire endurance		1.6MPa	0.4MPa	L3

Size range and wall thickness of pipes¹

SDWM-1.0/1.0C, SDWM-1.0CF

Nominal Diameter DN	Minimum structural wall thickness ² mm	OD mm	Nominal Diameter DN	Minimum structural wall thickness ² mm	OD mm
25	5.0	36.0	500	13.1	527.2
40	5.0	51.0	550	14.2	579.4
50	5.0	61.0	600	15.5	632.0
65	5.0	76.0	650	16.8	684.60
80	5.0	91.0	700	18.1	737.2
100	5.0	111.0	750	20.1	791.2
125	6.2	138.4	800	21.3	843.6
150	6.8	164.6	850	23.	897.0
200	7.2	215.4	900	24.	949.0
250	8.8	268.6	1000	26.5	1054.0
300	9.8	320.6	1100	29.0	1159.0
350	10.5	372.0	1200	31.6	1264.2
400	11.4	423.8	1300	34.2	1369.4
450	12.2	475.4			

Note

¹ Reference GRE "List of marine engineering and marine pipeline products", 2022-01

² Allowed tolerance in production "plus x mm" (excl. internal epoxy resin liner of 0.5mm, no top layer)

Size range and wall thickness of pipes¹

SDWM-1.6/1.6C, SDWM-1.6CF¹

Nominal Diameter DN	Minimum structural wall thickness ² mm	Minimum OD mm	Nominal Diameter DN	Minimum structural wall thickness ² mm	Minimum OD mm
25	5.0	36.0	500	17.5	536.0
40	5.0	51.0	550	17.8	586.6
50	5.0	61.0	600	18.8	638.6
65	5.0	76.0	650	20.4	691.8
80	5.0	91.0	700	22.5	746.0
100	5.0	111.0	750	24.0	799.0
125	6.2	138.4	800	25.4	851.8
150	7.2	165.4	850	27.1	905.2
200	9.2	219.4	900	28.4	957.8
250	11.5	274.0	1000	31.0	1063.0
300	13.5	328.0	1100	35.0	1171.0
350	14.5	380.0	1200	37.3	1275.6
400	15.5	432.0	1300	41.0	1383.0
450	16.6	484.2			

Notes

¹ Reference GRE "List of marine engineering and marine pipeline products", 2022-01

² Allowed tolerance in production "plus x mm" (excl. internal epoxy resin liner of 0.5mm, no top layer)

Standard fittings

Elbows (90°, 45°), Equal Tee, Concentric Reducer

Joining methods

Taper adhesive (coupling), Double O-ring expansion joint, GRE Flange connections.

Application/Limitation

The GRE piping system is type approved for application in piping systems as listed in "Table 1- Fire endurance requirements matrix" of the DNV Rules Pt.4, Ch.6, Section 2.

Approved installation locations are where "0" or "L3" is specified in the matrix. Appropriate footnotes are to be observed. Not approved for installation locations where "NA" or "X" is indicated.

For installation on Offshore units the requirements specified in the applicable DNV rules for classification of Offshore units (RU-OU) are to be observed.

Permissible working pressure and temperature range¹

Piping System	Permissible working pressure [bar] and media temperatures						
	up to 30°C	40°C	50°C	60°C	70°C	80°C	93°C
SDWM-1.0/1.0C, SDWM-1.0CF	10	10	10	10	10.5	9.5	8
SDWM-1.6/1.6C, SDWM-1.6CF	16	16	16	16	14	12.5	10

Note

¹ Reference DNV-CP-0070 Table 2

Fire endurance Level

Fire Endurance tests according to IMO Resolution A.753 (18), Appendix 2 has been successfully tested on the following joining methods.

Test level	Type of connection	Flame protection	Approved size range O.D. mm
L3	Tapered adhesive coupling	Not applicable	25 up to 1300
	Double O-ring expansion joint		> 152

Flame spread

Surface flame spread characteristics has been tested acc. to FTP Code Annex 1, Part 5 – Surface flammability

Smoke and toxicity

The GRE piping system has been tested acc. to FTP Code Annex 1, Part 2 – Smoke generation and toxicity.

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.

Electrical conductivity

Piping system	Electrically conductive	
	outside	inside
SDWM-1.0/1.6	no	no
SDWM-1.0C/1.6C	yes	yes
SDWM-1.0CF/1.6CF	yes	yes

The GRE piping system of type SDWM-1.0/1.6 is not approved for installation in gas hazardous areas or conveying non-conductive fluids, e.g. refined oil products and distillates.

For installation in gas hazardous areas or conveying non-conductive fluids, the piping systems of type SDWM-1.0C/1.6C is to be installed.

Where conductive piping is required, the resistance per unit length of the pipe, bends, elbows, fabricated branch pieces etc., should not exceed $10^5 \Omega/m$.

Manufacturer installation instruction with regard to jumper wire to be observed.

After installation, the conductivity of the piping system shall be measured, and the resistance to earth from any point in the piping system shall not exceed $10^6 \Omega$ to earth.

Reference DNV Rules Pt.4 Ch.6 – Sec. 9 and 10.

Design and installation specification for the piping systems

For the design and installation of the piping systems the instructions in the "WEIMA glass fibre reinforced plastic pipe system Installation Manual (Ship and Ocean Engineering)" and "Product catalogue Doc.No.: SDWM/C JZ-02" are to be observed.

In addition, the DNV Rules Pt.4 Ch.6 – Section 10 – Para. 4 Installation of Plastic Piping Systems are to be observed.

Bulkhead 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 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 Rules Pt.4, Ch.6 Section 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 Tests carried out

- Internal pressure test short time, ASTM D 1599, A
- Internal pressure long-term test >100.000h, ASTM D 2992:2018-B, API Spec 15LR 7th Edition, B
- Axial tensile strength ASTM D 2105-01:2019
- External pressure ASTM D 2924, Fig 2 and calculation acc.to ISO14692:3
- Parallel plate loading test ASTM D 2412 and GB/T 5352-2005
- External load test DNV CP-070
- HDT Test ISO 75-2:2004, Method A
- Water absorption ISO 8361-1:1991
- Chemical resistance ASTM C581-20
- Ageing ISO 9142-2003, ISO 4892-3:2016 Method A, Cycl1
- Electrical conductivity DNV CP-070, scope of tests: 3.3.4 a) Electrical conductivity – outside,
b) Electrical conductivity inside and outside
- Fire endurance test IMO Res.753(18) Appendix 2 - L3
- Smoke generation and toxicity - FTP Code Annex 1, Part 2
- Surface flammability (flame spread) - FTP Code, Annex 1, Part 5

Type Approval documentation

Production Testing

Each batch shall be subjected to product tests according to quality control plan "SDWM/JL ZL-20 Rev. A/0".
Appropriate works certificate to be issued.

Marking of product

To ensure traceability from the final product to this type approval certificate each pipe or pipe spool is to be marked at least with:

Scope pipes		Example
Manufacturer's name and / or logo		Shandong Weima New Material Technology Co.,Ltd
DN, Outside diameter/ wall thickness		DN250, 274x11mm
Type designation / material of which the pipe or fitting is made		SDWM-1.0CF/1.6CF
Nominal design pressure PN	internal	1.6MPa
	external	0.4MPa
Working pressure at max. service temperature	internal	0.95MPa@95°C
Conductive / non-conductive		conductive
Fire endurance level		L3
Date of fabrication		2022-02-16

Scope fittings		Example
Manufacturer's name and / or logo		Shandong Weima New Material Technology Co.,Ltd
DN		DN250
Type designation / material of which the pipe or fitting is made		SDWM-1.0CF/1.6CF
Working pressure at max. service temperature	internal	0.95MPa@95°C
Conductive / non-conductive		conductive
Fire endurance level		L3
Date of fabrication		2022-02-16

Note

In addition, labels with the following text shall be attached to flanges which shall be joined by bolting:
"APPLY BOLTING TORQUE ACCORDING TO MANUFACTURER'S RECOMMENDATION."

Periodical assessment

For retention of the Type Approval, a DNV Surveyor shall perform periodical assessments.
Refer to the Class Programme DNV-CP-0338, Sec.4.

To check the validity of this certificate, please look it up in <https://approvalfinder.dnv.com>

END OF CERTIFICATE