Certificate no.:
TAK00002BX

TYPE APPROVAL CERTIFICATE

This is to certify:

that the Plastic Piping System, Fibre Reinforced Thermosetting

with type designation(s)
Bondstrand™ 1000M Series: 1001M, 1003M,
Bondstrand™ 1000MC Series: 1001MC, 1003MC

issued to
NOV FGS Malaysia Sdn. Bhd.
Senai, Johor, **Malaysia**

is found to comply with
DNV class programme DNV-CP-0070 – Type approval – Fibre reinforced thermosetting plastic piping systems
DNV rules for classification – Ships
IMO Resolution A.753(18). Guidelines for the Application of Plastic Pipes on Ships

Application:

External Pressure (EP): 1.0 / 3.0 bar. For use in essential piping systems and in piping systems serving the main functions, with installation according to DNV Rules and Manufacturer's recommendations. The piping system is non-conductive/conductive. The piping system is approved to Fire Endurance L3 according to IMO Resolution A.753(18) and Low Flame Spread according to ASTM D635. Further, an IMO Fire Endurance L1 Modified test has been performed,

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

Issued at **Hamburg** on **2024-03-04**
This Certificate is valid until **2029-03-03**.
DNV local unit: **Kuala Lumpur**

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 300,000 USD.

Product description

Bondstrand™ 1000M Series Fiberglass Pipes and Fittings:

Bondstrand™ 1000M Series: 1001M, 1003M
Bondstrand™ 1000MC Series: 1001MC, 1003MC

Nominal Internal Pressure rating (PN): 10 bar
Nominal External pressure rating (EP): 1.0 bar (1001M/1001MC)
3.0 bar (1003M/1003MC)

Pipe Series 1000M/1000MC – PN10:

		Min. structural wall thickness in mm, excl. liner													
Ø [inch/mm]	**EP [bar]**	**1/ 25**	**1.5/ 40**	**2/ 50**	**2.5/ 60**	**3/ 80**	**4/ 100**	**5/ 125**	**6/ 150**	**8/ 200**	**10/ 250**	**12/ 300**	**14/ 350**	**16/ 400**	**18/ 450**
1001	**1.0**	3.5	3.5	3.6	3.6	3.6	4.6	4.6	4.6	4.6	4.8	5.8	6.3	7.2	8.0
1003	**3.0**	3.5	3.5	3.6	3.6	3.6	4.6	4.6	4.6	5.5	7.0	8.3	9.2	10.5	11.5

		Min. structural wall thickness in mm, excl. liner								
Ø [inch/mm]	**EP [bar]**	**20/ 500**	**22/ 550**	**24/ 600**	**26/ 650**	**28/ 700**	**30/ 750**	**32/ 800**	**36/ 900**	**40/ 1000**
1001	**1.0**	8.8	9.7	10.6	11.9	12.8	13.7	14.6	16.4	18.3
1003	**3.0**	12.8	14.1	15.4	17.3	18.7	20.0	21.4	24.1	16.9

NOTE: The total pipe wall thickness will include 0.5 mm liner when required by the application.

Fittings:
Approved fittings as per Bondstrand Product Dimension for Series 1001M/1001MC/1003M/1003MC, such as:
Elbows, Tees, Laterals, Crosses, Reducers, Flanges, Couplers and Adaptors.

Jointing Methods:
Adhesive Bonded Joint
1" - 6" : Quick Lock
8" - 40" : Taper

Butt & Wrap Joint
1" - 40" : Plain End

Manufactured by

NOV FGS Malaysia Sdn. Bhd., PLO 202 Senai Industrial Park, Phase IV, 81400 Senai, Johor, Malaysia

NOV FGS Malaysia Sdn. Bhd., PLO 79, Jalan Rumbia 2, Kompleks Perindustrian Tanjung Langsat, Johor, Malaysia

DNV local station: Kuala Lumpur

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

The piping systems are approved for use in essential piping systems and in piping systems serving the main functions as defined in DNV Rules for Classification of Ships, Pt.1 Ch.1 Sec.1 [Table 2].

The installation of the piping system shall be according to DNV Rules and Manufacturer's recommendations.

Maximum working temperature is +93ºC. For permissible pressure to be reduced according to DNV-CP-0070, Table 2, it is not applicable based on manufacturer’s data.

Fire Endurance – L3

The piping system **Bondstrand™ 1000M/1000MC** is approved to Fire Endurance L3 according to IMO Resolution A.753(18).

Fire Endurance – L1 Modified
The below listed piping series are tested to Fire Endurance L1 Modified (as per NOV FGS specification) with basis in IMO Resolution A.753(18), Appendix 1, Section 2.2.1.2.1, where testing is modified to be performed with stagnant (10 mins), then flowing (50 mins) fluid instead of testing in dry condition.

DN25-125: Bondstrand™ 1000M/1000MC
- 2 mm passive fire protection coating (referred as FP PC2) over the pipe and taper joint.

DN150- DN1000: Bondstrand™ 1000M/1000MC
- 2 mm passive fire protection coating (referred as FP PC2) over the taper joint only.

For details, on application of the passive fire protection and actual passive fire protection used, please consult NOV FGS.

Low Flame Spread
The piping system **Bondstrand™ 1000M/1000MC** is approved to Low Flame Spread, according to ASTM D635 (accepted as an alternative to Part 5 of Annex-1 of IMO FTP Code 2010).

Smoke Generation & Toxicity
The piping system **Bondstrand™ 1000M/1000MC** has not been tested to Smoke Generation & Toxicity characteristics.

Electrical Conductivity
The piping system **Bondstrand™ 1000M/1000MC** is approved as:
- Unlined and Conductive (for installation in gas hazardous areas)
- Unlined and Non-conductive (not for installation in gas hazardous areas)
- Lined and Conductive (for installation in gas hazardous areas)
- Lined and Non-conductive (not for installation in gas hazardous areas)

dependent on client's needs.

Conductivity test is to be carried out after installation of piping system on board ship.

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 Rules 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.

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.

Type Approval documentation

Tests carried out

Type Testing carried out according to **Type Approval documentation**.

Marking of product

The pipes and fittings are to be marked. The marking shall at least include the following information:
- *manufacturer's name*
- *manufacturing plant*
- *type designation*
- *pressure rating*
- *temperature rating*
- *nominal pressure*

- *dimensions*
- *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