Certificate No:
TAK00001S1

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Plastic Pipes, Fibre Reinforced Thermosetting

with type designation(s)
Bondstrand™ 5000 and Bondstrand™ 5000C Series Pipes and Fittings

Issued to
NOV FGS Malaysia Sdn. Bhd.
Johor, Malaysia

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

Application :

For use in non-essential piping systems, with installation in accordance with DNV GL Rules and Manufacturer's recommendations. The piping system is conductive or non-conductive. The piping system has been tested to Low Flame Spread in accordance with ASTM D635. The piping system has not been tested to Fire Endurance characteristics.

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

Issued at **Høvik** on **2019-08-01**
This Certificate is valid until **2024-07-31**.
DNV GL local station: **Singapore**

Approval Engineer: **Gisle Hersvik**

for **DNV GL**

Rikard Törnqvist
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.

Job Id: **262.1-030512-1**
Certificate No: **TAK00001S1**

Product description

Bondstrand™ S5000 (Non-Conductive) and Bondstrand™ S5000C (Conductive) Series Glassfibre Reinforced Vinylester (GRV) Pipes and Fittings.
- Filament wound fiberglass-reinforced vinyl ester pipe with1.3 mm resin-rich reinforced liner.
- With or without conductive filaments (carbon fibre) in pipe wall

Maximum Internal Working Pressure: 16 bar
External Pressure: None.

Pipes:

		Nominal wall thickness in inch/mm								
	Ø [inch]:	**2**	**3**	**4**	**6**	**8**	**10**	**12**	**14**	**16**
	Ø [mm]:	**50**	**80**	**100**	**150**	**200**	**250**	**300**	**350**	**400**
Int. PN	**16**	0.15	0.16	0.20	0.20	0.226	0.226	0.226	0.250	0.250
[bar]		3.9	4.0	5.1	5.1	5.7	5.7	5.7	6.4	7.3

(Ref. Bondstrand™ 5000/5000C Product Data (CI5000 – April 2013))

Fittings:
Filament wound and molded fittings and flanges.
Elbows, crosses, tees, flanges, reducers, nipples and couplings, laterals.

Joining methods:
Quick-Lock® straight/taper adhesive bonding, Flanges, Flanged fittings.

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 GL local station: Singapore

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

Approved only for installation of piping systems onboard ships which will not be exposed to vacuum inside the pipes and not exposed to external pressure outside the pipes.

For installation in accordance with DNV GL Rules/Standards and Manufacturer's recommendations.

Maximum working temperature: 93ºC. For applications with working temperature above +30ºC, the permissible pressure is to be reduced in accordance with DNV GL Rules for Classification of Ships, Pt.4 Ch.6 Sec.9, Table A8.

The piping system is approved as:
- conductive, for installations in gas hazardous areas.
- non-conductive, not for installations in gas hazardous areas.

Test of conductivity is to be carried out after installation of piping system.

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

Low Flame Spread
The piping system is approved to Low Flame Spread, in accordance with ASTM D635-06 (accepted as an alternative to IMO Resolution A.653(16)).

Smoke Generation & Toxicity
The piping system is not tested to Smoke Generation & Toxicity characteristics.

For application on passenger vessels additional requirements specified in the Rules and Regulations of the appropriate Flag State authority may have to be observed.

When plastic pipes pass through watertight bulkheads or decks, the watertight integrity of the bulkhead or deck is to be maintained.

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

The pipes and fittings are to be marked. The marking shall at least include the following information:
- *Product name*
- *Manufacturers name;* ***NOV FGS***
- *Place of manufacture*
- *Pressure rating*
- *Temperature rating*
- *Conductive/Non-Conductive*

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 GL 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 Assessment to be performed after 2 and 3.5 years (Certificate Retention) and at renewal after 5 years (Certificate Renewal).

The main elements of the Periodical Assessment are to:
- Ensure that **Type Approval documentation** is available.
- Review design, materials, production process, and performance with respect to possible changes, in order to ensure compliance with **Type Approval documentation** and/or referenced material specifications.
- Ensure traceability between manufacturer’s product marking and the DNV GL Type Approval Certificate.

END OF CERTIFICATE