

TYPE APPROVAL CERTIFICATE

This is to certify:**That the Plastic Pipes, Fibre Reinforced Thermosetting**

with type designation(s)

Bondstrand™ 2020 Series Marine Pipes & Fittings, Bondstrand™ 2020C Series Marine Conductive Pipes & Fittings

Issued to

**NOV FGS Malaysia Sdn. Bhd.
Senai 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****IMO Resolution A.753(18). Guidelines for the Application of Plastic Pipes on Ships****Application :****For installation according to DNV GL Rules and Manufacturer's Specification, 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 D635-97.****Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.**This Certificate is valid until **2021-08-31**.Issued at **Høvik** on **2016-09-01**DNV GL local station: **Singapore**Approval Engineer: **Gisle Hersvik**for **DNV GL**

**Martin Strande
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: **262.1-013187-3**
Certificate No: **TAK00000F1**

Product description

Bondstrand™ 2020 Series and Bondstrand™ 2020C Series, Marine Pipes and Fittings, Non-conductive / Conductive.

Pipes:

		Bondstrand™ 2020, Minimum wall thickness in mm								
Non-conductive	Ø:	27	42	53	82	105	132	159	209	263
Int. PN	20	3.5	3.5	3.6	3.6	4.6	4.6	4.6	5.8	7.2
[bar]										
Conductive	Ø:	27	42	53	82	105	132	159	209	263
Int. PN	20	3.5	3.5	3.6	3.6	4.6	4.6	4.1	5.3	6.7
[bar]										

Internal pressure:

PN 16 bar.

External pressure:

Maximum external pressure is to be stipulated in accordance with the Bondstrand Engineering Guide.

Fittings:

Elbows, Equal Tees, Reducers, Reducing Tees, Couplings, Flanges.

Other fittings to be tested prior to installation in classified objects.

Joining Methods:

1" - 4" diameter pipe

Quick-Lock Adhesive Joint

6" - 10" diameter pipe

Taper-Taper Joint

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

For installation according to DNV GL Rules/Standards and Manufacturer's Specification.

The piping system is approved as:

- Non-conductive, not for conveying conductive fluids in gas hazardous areas
- Conductive, for conveying conductive liquid fluids in gas hazardous areas dependent on clients' needs.

Piping system is approved to Fire Endurance L3 according to IMO Resolution A.753(18).

Piping system is approved to Low Flame Spread, according to ASTM D635-97 (accepted as an alternative to IMO Resolution A.653(16)).

Maximum material temperature: 100°C. The maximum internal pressure at 100°C is 75 % of that at ambient temperature. Maximum pressure between ambient temperature and 100°C is to be determined by linear interpolation.

Conductivity testing to be carried out on installed system.

Approved mounting/joining specification to be followed.

Type Approval documentation

- 1.
- 2.
- 3.
- 4.

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 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 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