

## TYPE APPROVAL CERTIFICATE

### This is to certify:

**That the Plastic Pipes, Fibre Reinforced Thermosetting**

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

Issued to  
**NOV FGS Malaysia Sdn Bhd**  
**Senai Johor, Malaysia**

is found to comply with  
**Det Norske Veritas' Type Approval Programme 1-501.1, 2011, Fibre Reinforced Thermosetting Plastic Pipes**  
**Det Norske Veritas' Rules for Classification of Ships**  
**Det Norske Veritas' Offshore Standards**  
**IMO Resolution A.753(18). Guidelines for the Application of Plastic Pipes on Ships**

### Application :

**For installation in accordance with DNV Rules and Manufacturer's Specification. 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.**

This Certificate is valid until **2018-12-31**.

Issued at **Høvik** on **2014-08-24**

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. If any person suffers loss or damage which is proven to have been caused by any negligent act or omission of the Society, then the Society shall pay compensation to such person for his proven direct loss or damage. However, the compensation shall not exceed an amount equal to ten times the fee charged for the service in question. The maximum compensation shall never exceed USD 2 million. In this provision the "Society" shall mean DNV GL AS as well as all its direct and indirect owners, affiliates, subsidiaries, directors, officers, employees, agents and any other person or entity acting on behalf of DNV GL AS.

Certificate No: **K-6065**  
File No: **332.30**  
Job Id: **262.1-016954-1**

## Product description

### **Bondstrand™ S5000 (Non-Conductive) and S5000C (Conductive) Series Glassfibre Reinforced Vinylester (GRV) Pipes and Fittings.**

- Filament wound fiberglass-reinforced vinyl ester pipe with 1.3 mm resin-rich reinforced liner.
- With or without conductive filaments (carbon fibre) in pipe wall

Maximum Internal Working Pressure: 16 bar

External Pressure: N/A

#### 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 [bar]	16	0.15	0.16	0.20	0.20	0.226	0.226	0.226	0.250	0.250
		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.

## Application/Limitation

For installation in accordance with DNV Rules and Manufacturer's Specification.

The piping system is approved as:

- conductive, for installations in gas hazardous areas.
- non-conductive, not for installations in gas hazardous areas.

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)).

The piping system is not tested to Fire Endurance characteristics.

Maximum working temperature: 93°C. For applications with working temperature above +30°C, the permissible pressure is to be reduced in accordance with DNV Rules for Classification of Ships, Pt.4 Ch.6 Sec.7, Table A8.

Conductivity testing to be carried out on installed systems.

Manufacturer's mounting/joining specification to be followed.

## Type Approval documentation

1. Emails from DNV GL Singapore of 2013-09-05, 2013-10-24, 2014-02-26 and 2014-05-16, including:
  - Application for Type Approval of 2013-10-09,
  - Qualification Plan of DNV Type Approval for Bondstrand 5000 and 5000C,
  - Bondstrand™ 5000/5000C Product Data (CI5000 – April 2013),
  - NOV FGS Conductivity Test Report of 2013-08-28, Test Procedure and Calibration Reports,
  - NOV FGS Impact Test Report of 2013-08-28,
  - NOV FGS Test Report (Short Term Burst, 2" and 16") of 2013-08-28,
  - NOV FGS Pipe Axial Tensile Strength Test Report of 2013-08-28,

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- TÜV Test Report No. 7191070982-MEC13-KSY "Flammability Test of Polyester Fibre Glass Pipe" of 2013-10-14,
  - TÜV Test Report No. 7191070983-MEC13-KSY "Heat Deflection Temperature of Polyester Fibre Glass Pipe" of 2013-10-14,
2. Email from NOV FGS of 2014-05-16, including:
- Ameron Test Report (Hydro & Short Term Burst, 3") of 2001-06-19,
  - DNV Inspection Report of 2004-03-14 (rev. 2004-05-19) (ISO 14692-2:2001-Hydrostatic Design Basis).

## 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 Malaysia Sdn Bhd***
- *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 two (2) years (Certificate Retention) and at renewal after four (4) 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