



DET NORSKE VERITAS

TYPE APPROVAL CERTIFICATE

CERTIFICATE NO. **K-4902**

This is to certify that the
Plastic Pipes, Fibre Reinforced Thermosetting

with type designation(s)
Bondstrand S2000M and S2000M FP Pipes and Fittings and QL16NC Fittings


Manufactured by
NOV FGS Singapore (Pte) Ltd
SINGAPORE, Singapore

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
IMO Resolution A.753(18). Guidelines for the Application of Plastic Pipes on Ships

Application

For installation according to DNV Rules and Manufacturer's Specification. The piping system is non-conductive, not for installations in gas hazardous areas. 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.

Høvik, 2012-03-21
for Det Norske Veritas AS

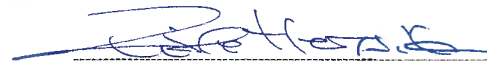


Rikard Törnqvist
Head of Section



DNV local office:
Singapore

This Certificate is valid until
2016-06-30



Gisle Hersvik
Surveyor

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 proved to have been caused by any negligent act or omission of Det Norske Veritas, then Det Norske Veritas shall pay compensation to such person for his proved direct loss or damage. However, the compensation shall not exceed an amount equal to ten times the fee charged for the service in question, provided that the maximum compensation shall never exceed USD 2 million. In this provision "Det Norske Veritas" shall mean the Foundation Det Norske Veritas as well as all its subsidiaries, directors, officers, employees, agents and any other acting on behalf of Det Norske Veritas.



Certificate No.: K-4902
 File No.: 332.30
 Job Id.: 262.1-013186-1

Product description

Bondstrand S2000M and S2000M FP Fibreglass Pipes and Fittings and QL16NC Fittings, for marine and offshore service.

Maximum internal pressure at ambient temperature dependent on diameter is to be as follows:

Bondstrand S2000M:			
Nom. diameter	1" - 6"	8" - 16"	18" - 40"
Max. pressure, bar	16	16	16
Fitting name	QL16NC	QL16NC	S2000M-4.3

		S2000M-4.3 Minimum wall thickness in mm, incl. liner.																	
		Ø:	25	40	50	80	100	150	200	250	300	350	400	450	500	600	750	900	1000
Int. PN	16	4.3	5.5	4.1	4.1	5.2	5.4	7.0	8.6	10.2	11.0	12.5	13.9	15.4	18.3	22.6	27.3	27.4	*
[bar]		-	-	-	-	-	-	-	-	-	11.6	13.1	14.5	16.0	19.2	23.5	28.2		**

* IPS = Iron Pipe Size

** MCI = Marine Cast Iron

Outside diameters of pipe in 250 and 300 mm sizes exceed IPS dimensions of ISO 559-1977 (273.0 and 323.9 mm, respectively) and MCI dimensions of ISO 13-1978 (274.0 and 326.0 mm, respectively).

Approved Fittings:

Typically elbows, tees, flanges, reducers.

Fittings to be tested prior to installation in classified objects.

Application/Limitation

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

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.

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

Piping system is approved as non-conductive, not for installation in gas hazardous areas.

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)).

The piping system Bondstrand S2000M FP is successfully tested for jet fire resistance, using fire protection barrier as per NOV FGS Specification PF-12 "FIRE PROTECTION OF GLASSFIBER REINFORCED EPOXY PIPE AND FITTINGS IN JET FIRE APPLICATIONS".

Conductivity testing to be carried out on installed system.

Approved mounting/joining specification to be followed.

Type Approval documentation

1. Previous Type Approval Certificate No. K-4567.
2. Email from DNV Singapore of 2012-03-15, incl. Survey Report of 2012-03-01.
3. Email from DNV Singapore of 2012-02-13, incl. Test Report (40") of 2012-12-03.
4. Jet-Fire Resistance Test Report, SwRI, March 2004, ref. email from DNV Singapore of 2008-01-16.



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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:

- *Product name*
- *Manufacturers name*
- *Pressure rating*
- *Temperature rating*

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.

Certificate Retention/Renewal Survey

The scope of the Retention/Renewal Survey 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.

Survey to be performed after two (2) years (Certificate Retention Survey) and at renewal after four (4) years (Certificate Renewal Survey).

The main elements of the survey are:

- 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 Type Approval Certificate.

END OF CERTIFICATE