



**TYPE APPROVAL CERTIFICATE**  
No. MAC032913WS/001

**This is to certify that the product identified below satisfies the requirements of the standard quoted under "Reference standard"**

<i>Description</i>	<b>GRE Bulkhead Penetration Pieces</b>
<i>Type</i>	<b>Bondstrand GRE Bulk Head Penetration with Nominal Pipe size 1" to 40"</b>
<i>Applicant</i>	<b>NOV FGS SINGAPORE (PTE) LTD NO 7A TUAS AVE 3 639407 SINGAPORE SINGAPORE</b>
<i>Manufacturer</i>	<b>NOV FGS SINGAPORE (PTE) LTD</b>
<i>Place of manufacture</i>	<b>NO 7A TUAS AVE 3 639407 SINGAPORE SINGAPORE</b>
<i>Reference standards</i>	<b>Part C, Chapter 1, Section 10 of RINA Rules 2013</b>
<i>Reference documents</i>	<b>RINA TYPE APPROVAL SYSTEM</b>

Issued in **SHANGHAI** on **May 10, 2013**. This Certificate is valid until **May 9, 2018**



RINA  
**Giuseppe Zagaria**

This certificate consists of this page and 1 enclosure.  
This certificate annuls and replaces the previously issued certificate No. MAC032913WS.

**TYPE APPROVAL CERTIFICATE**

No. **MAC032913WS/001**

Enclosure - Page 1 of 2

**Bondstrand GRE Bulk Head Penetration with Nominal Pipe size 1" to 40"**

**Reference documents**

NOV FGS SINGAPORE (PTE) LTD product specification documentation and test reports with RINA No.SHMC-5812 to SHMC-5836 on 22/04/2013.

**Technical characteristics**

The GRE bulkhead penetration pieces consists of a steel pipe sleeve with double plate, Bondstrand GRE pipe, two rubber o-rings, epoxy sealant and four saddles. Epoxy sealant is poured into the annulus between the steel sleeve and GRE pipe providing a watertight penetration with excellent mechanical properties. The penetration is strengthened with two saddles bonded on the GRE pipe, on each side of the steel sleeve.

- Product range and rating

Nominal Diameter of GRE pipe in inch/ mm	1" to 40"/ 25 to 1000
Gap between GRE pipe and steel sleeve in mm	15
Min. sleeve length in mm(+/-2)	187 to 523
Min. wall thickness of sleeve pipe in mm	15 to 25
OD steel sleeve in mm(+/-2)	96 to 1134
OD of penetration plate in mm	Refer to the "GRE Bulkhead penetrations dimension table"
Thickness of penetration plate in mm	
Design Internal Pressure in bar	17.2
Design External Pressure in bar	4.0
Maximum operating temperature in °C	93

- Material of the product component

O-ring	Buna N, shore A70
Resin filler	Epoxy resin
Saddle blank	GRE
Pipe and flanges	GRE
Penetration sleeve and plate	Mild steel



**TYPE APPROVAL CERTIFICATE**

**No. MAC032913WS/001**

**Enclosure - Page 2 of 2**

**Bondstrand GRE Bulk Head Penetration with Nominal Pipe size 1" to 40"**

***Application and Limitation***

Where the bulkhead is required to have specific fire integrity characteristics, arrangements are to be made to ensure that fire endurance is not impaired. These arrangements are to be tested in accordance with IMO Resolution A.754(18) as amended with the RINA Surveyor's attendance.

The arrangement and installation on board is to be carried out in accordance with Manufacturer's guidelines and RINA Rules requirements.

The manufacture is to have quality system that meets ISO 9000 series standards or equivalent.

The resistance of the bulkhead is not to be impaired by the bulkhead penetration.

The applicant has declared to RINA that the products detailed in this certificate are manufactured at the following manufacturer sites:

- **NOV FGS Singapore Pte Ltd**  
**No. 7A Tuas Avenue 3, Singapore 639407.**
- **NOV FGS Malaysia SDN. BHD**  
**PLO 202, Senai Industrial Park Phase IV, 81400 Senai, Johor, Malaysia.**

***Remarks***

The GRE bulkhead penetration product is to be permanently marked with identification, at least:

1. Manufacturer name or trade mark
2. The material of which the penetration is made
4. Pressure rating
5. Temperature rating

**SHANGHAI May 10, 2013**

