

# Bondstrand GRE Watertight Bulkhead Penetration

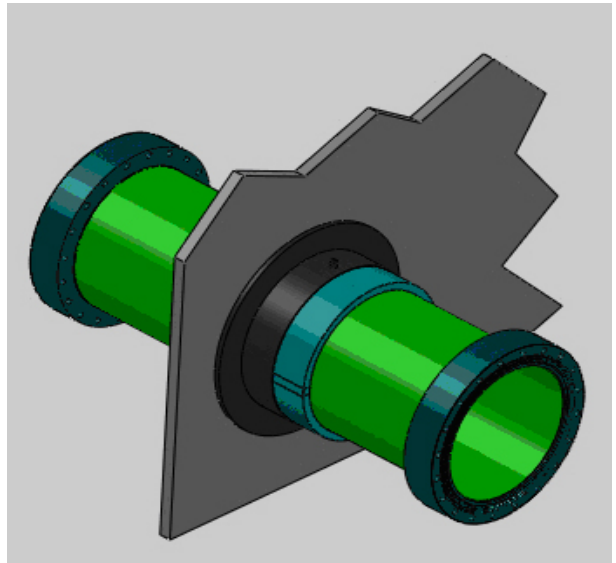
## Uses and applications

The Bondstrand Glassfiber Reinforced Epoxy (GRE) bulkhead penetration is developed for use in piping systems passing through watertight steel bulkheads, decks and tank-tops on board vessels and mobile offshore drilling units. Applicable piping systems where used: Ballast water, ballast stripping, service pump room and various other applications. The GRE bulkhead penetration is designed to replace conventional steel penetrations. It eliminates the costly and disruptive periodic maintenance and inspection required for steel penetrations.

## Approvals

At the time of this printing, Type Approval for the Bondstrand GRE Watertight Bulkhead Penetration has been issued by Bureau Veritas (B.V.) and by the Russian Maritime Register of Shipping (R.M.R.S.).

Requests for Type Approval of Bondstrand GRE Bulkhead Penetrations have been submitted to major classification societies. In the interim, as the need arises, Case Approval applications can be submitted to the respective classification societies. Bondstrand GRE Bulkhead Penetrations have received Case Approvals for vessels Classed under American Bureau of Shipping (ABS) and The Lloyds Register Group.



*Bulkhead Penetration*

## Description

The GRE bulkhead penetration assembly consists of Bondstrand GRE pipe, two rubber o-rings, epoxy sealant, four saddles and a steel pipe sleeve with doubler plate. Epoxy sealant is welded to the annulus between steel sleeve and GRE pipe providing a watertight penetration with excellent mechanical properties. End connection options to the balance of the Bondstrand piping system can be included. The penetration is reinforced and stabilized by two saddles bonded on the GRE pipe, on each side of steel sleeve.

## Size and performance

Available in sizes: from 1 to 40 inch (25 to 1000 mm)

Maximum operating temperature: 93°C (200°F)

Internal pressure rating: up to 17.2 bar (250 psig)

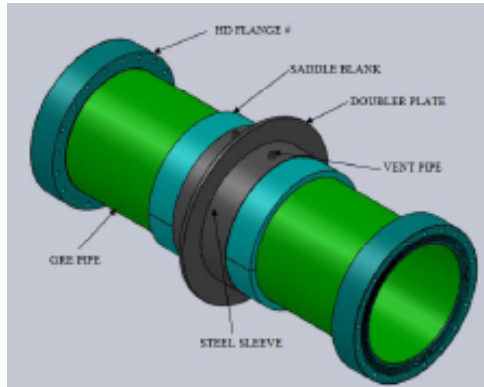
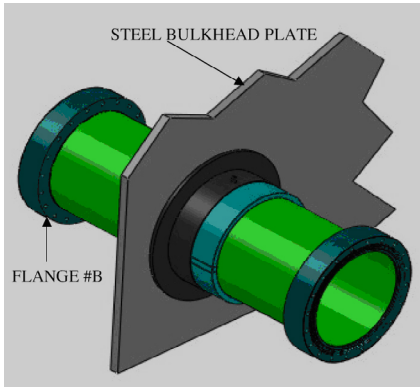
External pressure rating: Please refer to rating of respective Bondstrand GRE Pipe Series used for the Bulkhead Penetration.

---

## Features

The Bondstrand GRE bulkhead penetration shown in Figure 1 has Heavy-Duty flange end configurations. Other end configurations available are:

- A. Double O-ring male;
- B. Adhesive Quick-Lock;
- C. Adhesive Taper.



Consult NOV Fiber Glass Systems for other type of end configurations.

Figure 1: Bulkhead Penetration Assembly

Two 180° GRE saddle blanks are bonded on each side of the steel sleeve. The saddles are bonded against the edge of the steel sleeve and serve to anchor the GRE pipe at the bulkhead.

Inlet and outlet vent pipe are located on the sleeve to ensure air is vented out when sealant is poured into the annulus between the steel sleeve and GRE pipe.

Protective coating is applied on the external surface of the steel sleeve and doubler plate in accordance with coating specified by the Yard (or its equivalent).

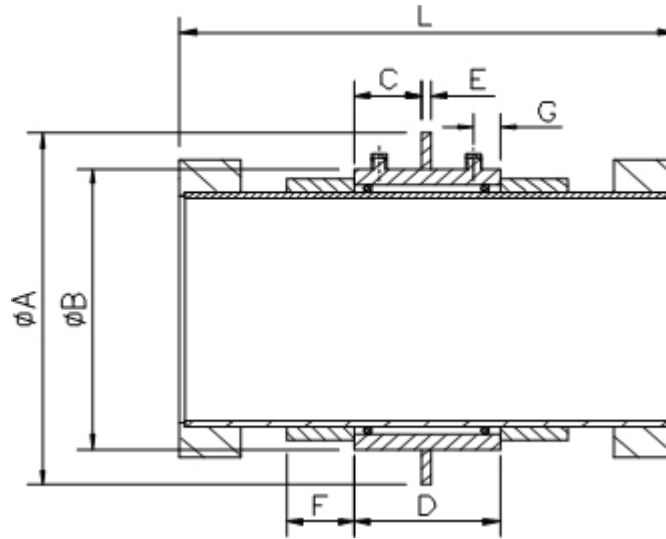
### Note:

The hole opening on bulkhead should be large enough for installation of the GRE bulkhead penetration (e.g. for Heavy Duty flange end to fit through). The hole opening must be larger than the outside diameter of the heavy duty flange). If opening cannot be larger than the outside diameter of the connector, connector #B will have to be bonded at site after the GRE bulkhead penetration piece is installed.

Customer (Yard) to provide material specification for steel pipe sleeve and doubler plate.

## Product Dimensions

The table below shows the overall dimensions of the Bondstrand GRE to replace Glassfiber Reinforced Epoxy bulkhead assembly with flanged end connections.



## GRE Bulkhead Penetration Dimensions

Diameter - Inches	1	1½	2	3	4	5	6	8	10	12
Diameter - Millimeters	25	40	50	80	100	125	150	200	250	300
Pipe Outside Diameter	36	51	62	91	116	143	170	221	278	332
Pipe Inside Diameter	27	42	53	82	105	132	159	209	263	314
OD Steel Sleeve - B	96	111	122	151	176	203	230	291	348	402
Saddle Length - F	102	102	102	102	102	102	102	102	102	102
OL Penetration Assembly (Fig-Fig) L	511	521	553	553	562	592	607	637	667	715
Minimum Sleeve Length - D	187	187	187	187	187	191	191	191	191	211
Position of Vent (Nozzle) - G	60	60	60	60	60	60	60	60	60	60
Position of Doubler Plate - C	Dimensions to be provided and confirmed by customer (Yard).									
OD of Doubler Plate - A										
Thickness of Doubler Plate - E										

Diameter - Inches	14	16	18	20	24	28	30	32	36	40
Diameter - Millimeters	350	400	450	500	600	700	750	800	900	1000
Pipe Outside Diameter	357	408	459	510	611	739	792	845	947	1055
Pipe Inside Diameter	338	386	434	482	579	700	750	800	897	1000
OD Steel Sleeve - B	427	478	529	580	681	819	872	925	1027	1134
Saddle Length - F	102	102	152	152	152	152	152	152	152	152
OL Penetration Assembly (Fig-Fig) L	741	783	1013	1061	1207	1242	1285	1307	1404	1679
Minimum Sleeve Length - D	221	243	265	287	331	386	409	431	478	523
Position of Vent (Nozzle) - G	60	60	60	60	60	60	60	60	60	80
Position of Doubler Plate - C	Dimensions to be provided and confirmed by customer (Yard).									
OD of Doubler Plate - A										
Thickness of Doubler Plate - E										

---

## Field Testing

The GRE Bulkhead Penetration assembly can be hydrotested to the full test pressure allowed for the piping system to which it is connected, typically 150% of the rated pressure.

## Conversions

1 psi	= 6895 Pa	= 0.07031 kg/cm <sup>2</sup>	
1 bar	= 10 <sup>5</sup> Pa	= 14.5 psi	= 1.02 kg/cm <sup>2</sup>
1 MPa	= 1 N/mm <sup>2</sup>	= 145 psi	= 10.2 kg/cm <sup>2</sup>
1 inch	= 25.4 mm		
1 Btu.in/ft <sup>2</sup> h°F	= 0.1442 W/mK		
°C	= 5/9 (°F-32)		

## Important notice

This literature should only be used by personnel having specialized training in accordance with currently acceptable industry practice. Variations in environment, changes in operating procedures, or extrapolation of data may cause unsatisfactory results. Your engineers must verify the suitability of Bondstrand™ or Centron™ products for your intended application.

National Oilwell Varco has produced this brochure for general information only, and it is not intended for design purposes. Although every effort has been made to maintain the accuracy and reliability of its contents, National Oilwell Varco in no way assumes responsibility for liability for any loss, damage or injury resulting from the use of information and data herein nor is any warranty expressed or implied. Always cross-reference the bulletin date with the most current version listed at the web site noted in this literature.

### North America

17115 San Pedro Ave. Suite 200  
San Antonio, Texas 78232 USA  
Phone: 210 477 7500

### South America

Estrada de Acesso à Zona  
Industrial Portuária de Suape, s/no.  
Recife, PE, Brazil 55.590-000  
Phone: +55 81 3501 0023

### Europe

P.O. Box 6, 4190 CA  
Geldermalsen, The Netherlands  
Phone: 31 345 587 587

### Asia Pacific

No. 7A, Tuas Avenue 3  
Jurong, Singapore 639407  
Phone: 65 6861 6118

### Middle East

P.O. Box 17324  
Dubai, UAE  
Phone: 971 4881 3566

**www.fgspipe.com • fgspipe@nov.com**

**NOV Fiber Glass Systems**

©2014 National Oilwell Varco. All rights reserved.  
MOS2080ENG September 2014