

# Bondstrand GRE Watertight Bulkhead Penetration

## Uses and applications

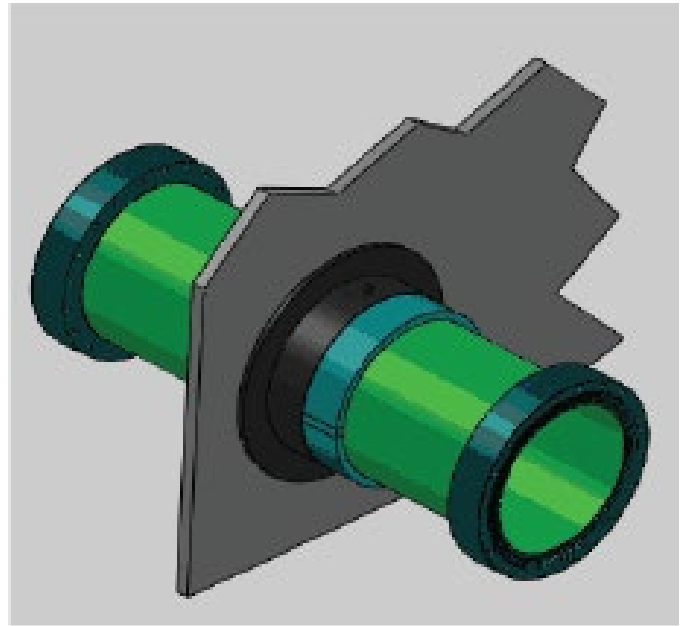
The Bondstrand Glassfiber Reinforced Epoxy (GRE) bulkhead penetration is developed for use in piping systems passing through watertight steel bulkheads, decks and tank-tops on board vessels and mobile offshore drilling units. Applicable piping systems where used: Ballast water, ballast stripping, service 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

Bondstrand GRE Watertight Bulkhead Penetration has been reviewed and approved by major classification societies for use on board vessels. The Bondstrand GRE Watertight Bulkhead Penetration holds type approval certificates from American Bureau of Shipping (ABS), Bureau Veritas (BV), Det Norske Veritas (DNV) and Lloyd's Register (LR). It is also hold valid type approval from Nippon Kaiji Kyotai (NKK), Registro Italiano Navale (RINA) and Russian Maritime Register of Shipping (RMRS).

## 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.

A30 and A60 fire rated BHP are available. Please check with NOV Fiber Glass Systems.

## Bondstrand GRE Watertight Bulkhead Penetration - Product Data

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### 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;
- B. Adhesive Quick-Lock;
- C. Adhesive Taper.

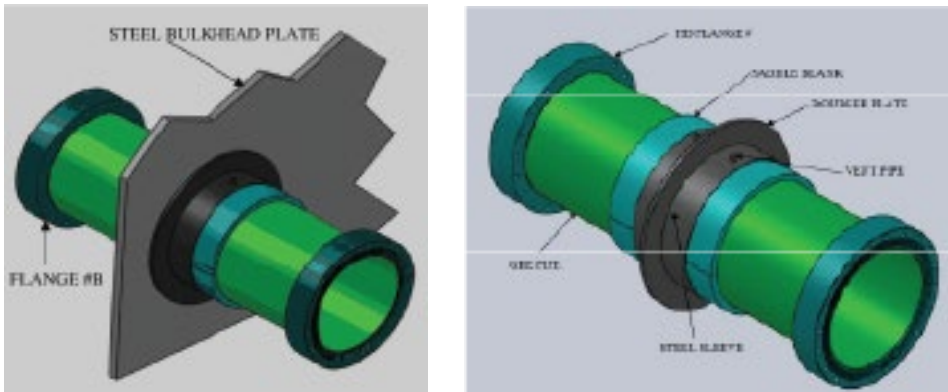


Figure 1: Bulkhead Penetration Assembly

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

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

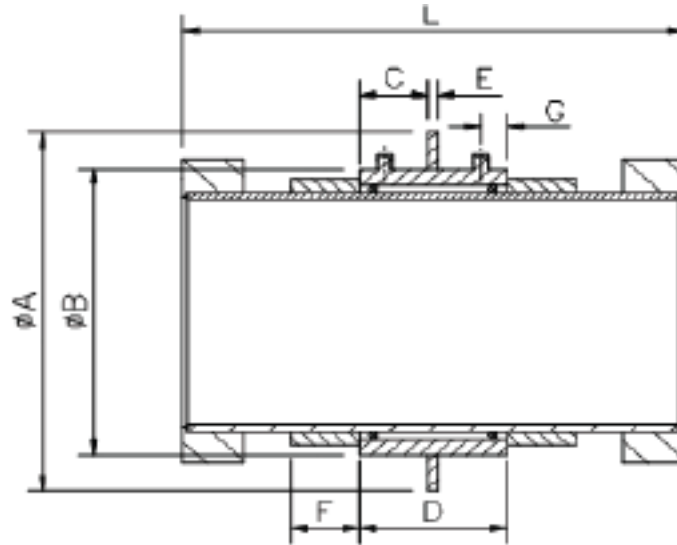
Note:

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.

## Production Dimensions

The table below shows the overall dimensions of the Bondstrand GRE 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 (Flg-Flg) L	511	521	551	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	950	1055
Pipe Inside Diameter	338	386	434	482	579	700	750	800	900	1000
OD Steel Sleeve - B	427	478	529	580	681	819	872	925	1030	1134
Saddle Length - F	102	102	152	152	152	152	152	152	152	152
OL Penetration Assembly (Flg-Flg) L	741	783	1013	1061	1207	1242	1285	1307	1404	1679
Minimum Sleeve Length - D	221	243	265	287	331	386	409	431	477	523
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										

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## 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	= 105Pa	= 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™ products for your intended application.

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