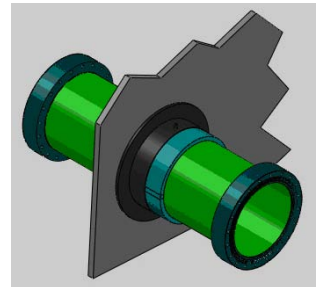


Bondstrand® GRE Watertight Bulkhead Penetration

Uses and applications

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. Piping system: Ballast water, ballast stripping, service pump room and various other applications. GRE bulkhead penetration is designed to replace conventional steel penetration. It eliminates the need for corrosion protection and periodical maintenance of pipe passing through bulkheads, decks and tank-tops.



Bulkhead penetration

Approvals

Type Approval of Bondstrand GRE bulkhead penetration submitted to major classification societies. In the interim if there is a need, case approval application can be submitted to the respective classification societies. It is case approved for vessels classed under American Bureau of Shipping (ABS) and The Lloyds Register Group.

Description

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

Size and performance

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

Maximum operating temperature: 93°C

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

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.

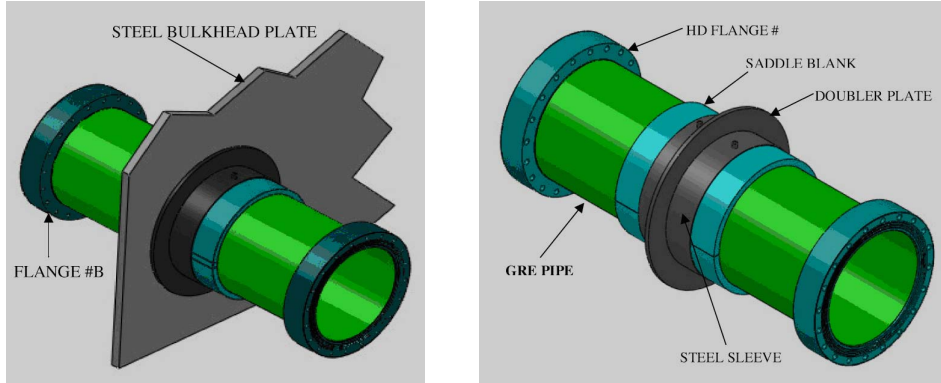


Figure 1: Bulkhead penetration assembly

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 serves to anchor the GRE pipe at the bulkhead.

Inlet and outlet vent pipes 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).

For information on end configuration joints / connections, please refer to the following NOV Fiber Glass Systems literature:

FP 170 Quick-Lock® Assembly Instructions;

FP 1043 Taper Assembly Instructions;

FP 196 Assembly Instructions for Bondstrand fiberglass flanges;

FP 212 Series 2000M & 7000M fitted with Double O-Ring expansion couplings.

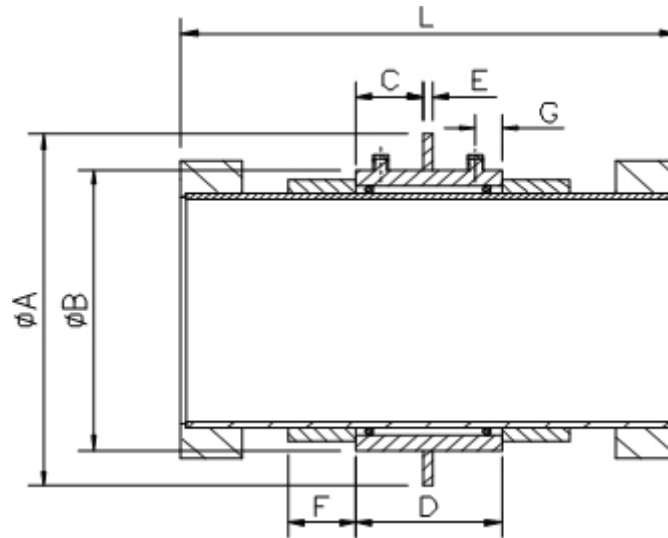
Note:

Hole opening on bulkhead should be large enough for installation of GRE bulkhead penetration (e.g. for heavy duty flange end configuration, 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 flange, flange #B will have to bonded at site after GRE bulkhead penetration piece is installed.

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

Product dimension

The below table shows the overview dimension of the Glassfiber Reinforced Epoxy (GRE) bulkhead penetration assembly.



GRE Bulkhead Penetration Dimensions

Diameter of GRE pipe (inches)	1	2	3	4	5	6	8	10	12	14
Diameter of GRE pipe (mm)	25	50	75	100	125	150	200	250	300	350
GRE Pipe Outside diameter (ref)	36	62	91	116	143	170	221	278	332	357
GRE pipe Inside diameter (ref)	27	53	82	105	132	159	209	263	314	338
OD steel sleeve B	96	122	151	176	203	230	291	348	402	427
Saddle Length F	102	102	102	102	102	102	102	102	102	102
OL penetration assembly (Flg - Flg) L	471	511	513	522	556	571	609	664	715	741
Minimum sleeve length hD	147	147	147	147	155	155	163	188	211	221
Position of vent (Nozzle) G	50	50	50	50	50	50	50	50	50	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 of GRE pipe (inches)	16	18	20	24	28	30	32	36	40	14
Diameter of GRE pipe (mm)	400	450	500	600	700	750	800	900	1000	350
GRE Pipe outside diameter (ref)	408	459	510	611	739	792	845	947	1055	357
GRE pipe inside diameter (ref)	386	434	482	579	700	750	800	897	1000	338
OD steel sleeve B	478	529	580	681	819	872	925	1027	1134	427
Saddle length F	102	152	152	152	152	152	152	152	152	102
OL, penetration assembly (Flg - Flg)	783	1013	1061	1207	1242	1285	1307	1404	1679	741
Minimum sleeve length	243	265	287	331	386	409	431	478	523	221
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										

* All dimensions in mm unless otherwise specified.

Field testing

Pipe system is designed for field testing with water at ambient temperature at 150% of GRE pipe rated pressure.

Conversions

1psi	= 6895 Pa	= 0.07031 kg/cm ²	
1 bar	= 105Pa	= 14.5 psi	= 1.02 kg/cm ²
1 MPa	= 1 N/mm ²	= 145 psi	= 10.2 kg/cm ²
1 inch	= 25.4 mm		
1 Btu.in/ft ² 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.

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MOS2080 supersedes FP1050 - November 2012