

# FIBERBOND<sup>®</sup> Fiberglass Piping Systems

## Series 20FR16-C

### Description:

The FIBERBOND<sup>®</sup> 20FR16-C Fiberglass Piping Series is an ABS and USCG approved fiberglass reinforced pipe product manufactured by filament winding utilizing a premium grade fire retardant epoxy vinyl ester resin and a 20-mil (0.50mm) liner, suitable for design pressures up to 232 psig (16.0 barg) and temperatures up to 185F (85c). The 20FR16 standard product is available in 1" to 24" (25mm - 610mm) nominal inside diameters, with custom products up to 60" (1524mm) diameter. The 20FR16-C product is identical to 20FR16 except that it has an electrically conductive exterior that may be grounded to earth. Series 20FR16, without the electrically conductive exterior, is also available.

### Applications:

Design Range:	232 psig (16.0 barg) up to 24in. and 185F (85c) (with standard fittings) 150psig (10.3 barg) up to 36in. and 185F (85c) (with standard fittings) 100psig (6.9 barg) up to 48in. and 185F (85c) (with standard fittings) 50psig (3.4 barg) up to 60in. and 185F (85c) (with standard fittings)
Applications:	Seawater, freshwater, & sanitary/drain systems for marine and offshore installations per IMO A.753(18) Level 0 and Level 3. Fire mains for offshore installations per USCG PFM1-98; applications requiring an electrically conductive exterior

### Piping Specifications:

Manufacture:	Contact molded and filament wound 1" - 2" (25mm - 51mm) Filament wound 3" - 60" (76mm - 1524mm)
Construction:	Fire retardant epoxy vinyl ester resin 20 mil (0.02in./0.50mm) C-Veil reinforced resin rich liner 55degree wind pattern
Delivery:	Random lengths or part of a shop-fabricated system

### Fittings Specifications:

Manufacture:	Contact molded 1" - 60" (25mm - 1524mm)
Dimensions:	Per FIBERBOND <sup>®</sup> Fittings Guide
Delivery:	Loose or part of a shop pre-fabricated system

### Joining System Specifications:

Fabrication:	Plain End Butt and Strap 1" - 60" (25mm - 1524mm)
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### Applicable Standards:

Testing:	ASTM D635, D638/D2105, D1599, D2412, IMO A.753(18) L3 Fire Endurance
QA:	ASTM D2563, D3567 EU Pressure Equipment Directive for Group 2 Liquids (Category 1, Module A - Internal Production Control); SEP may also be used for sizes up to 12" at 16barg and all sizes up to 10barg
Approvals:	ABS Certificate No. 00-NO32171-X USCG Certificate of Approval 164.141/0023/0, Sizes 2" - 20"

## Typical Dimensions

Nominal Size (in. / mm)	I.D. (in. / mm)	O.D. (in. / mm)	Min. Wall (in. / mm)	Span (ft / m)	Press. Rating (psig / bar)	Weight (lbs/ft - kg/m)
2" (50)	2.00 (51)	2.50 (64)	0.25 (6)	12.8 (3.9)	232 (16.0)	1.5 (2.2)
3" (80)	3.00 (76)	3.50 (89)	0.25 (6)	14.5 (4.4)	232 (16.0)	2.2 (3.3)
4" (100)	4.00 (102)	4.50 (114)	0.25 (6)	15.7 (4.8)	232 (16.0)	2.9 (4.3)
6" (150)	6.00 (152)	6.50 (165)	0.25 (6)	16.6 (5.0)	232 (16.0)	4.3 (6.4)
8" (200)	8.00 (203)	8.64 (219)	0.32 (8)	19.1 (5.8)	232 (16.0)	7.8(11.6)
10" (250)	10.00 (254)	10.78 (274)	0.39 (10)	21.3 (6.5)	232 (16.0)	11.0 (16.4)
12" (300)	12.00 (305)	12.92 (329)	0.46 (12)	23.3 (7.1)	232 (16.0)	16.3 (24.3)
14" (350)	14.25 (362)	15.33 (389)	0.54 (14)	25.4 (7.7)	232 (16.0)	20.8 (31.0)
16" (400)	16.25 (413)	17.49 (444)	0.62 (16)	27.2 (8.2)	232 (16.0)	27.9 (41.6)
18" (450)	18.25 (463)	19.63 (499)	0.69 (18)	28.8 (8.7)	232 (16.0)	33.7 (50.2)
20" (500)	20.25 (514)	21.77 (553)	0.76 (19)	30.0 (9.0)	232 (16.0)	40.0 (59.6)
24" (600)	24.25 (616)	26.07 (662)	0.91 (23)	30.0 (9.0)	232 (16.0)	57.3 (85.4)

All spans rated for SG=1.0 (water) and is limited by 1) a bending stress of 1,000psi (6.9MPa) for dead weight only, 2) a temperature of 150F (65c), and 3) a deflection of 0.50in. (12mm) over three spans. Maximum spacing is 30ft (9.1m). Actual spacing in the field may be shorter due to other design conditions such as wind loads. Information on larger pipe sizes is available from Specialty Plastics.

## Typical Properties

Property	Value (U.S.)	Value (S.I.)
Pipe Axial Tensile Strength	8,400 psi	57.9 MPa
Pipe Axial Tensile Modulus	1,400,000 psi	9.7 GPa
Pipe Hoop Tensile Strength	26,400 psi	182.0 MPa
Pipe Hoop Tensile Modulus	2,200,000 psi	15.2 GPa
Pipe Bending Strength	16,800 psi	115.8 MPa
Pipe Bending Modulus	1,400,000 psi	9.7 GPa

Property	Value (U.S.)	Value (S.I.)
Density	0.06 lb/cu in.	1.7 g/cu cm
Thermal Expansion Coeff.	0.00001 in./in./deg F	0.000018 mm/mm/deg C
Minor Poisson's Ratio	0.55	0.55
Major Poisson's Ratio	0.35	0.35
Hazen Williams Coeff.	150	150
Specific Roughness	0.0002 in.	0.0005 cm



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