

Applications

- Service Station
- Vent/Vapor Recovery
- Bulk Plant Terminals
- Fueling Terminals
- Central Fuel Oil Systems
- Marinas Terminals
- Ethanol Fuel Blends
- Biodiesel Fuel
- Diesel Exhaust Fluid
- UL/ULC Systems that require MV, HB, CT, A&M Fuels

Materials and Construction

All pipe is manufactured by filament winding process using amine-cured epoxy thermosetting resin to impregnate strands of continuous glass filaments with a resin-rich interior surface. The operating pressure of the pipe is up to 250 psig (17.2 bar) with continuous operating temperature to 150°F (66°C).

Red Thread IIA is Listed with Underwriters Laboratories Standard 971-2004 for non-metallic underground piping for motor vehicle (MV), high blend (HB), concentrated (CT) and aviation and marine (A&M) fuels. The pipe and fittings are also Listed with Underwriters Laboratories of Canada with both Listings under File MH9162.

Fittings

Fittings are manufactured with the same chemical and temperature capabilities as the pipe. Depending on the configurations and size, the fittings construction method will be compression molded, contact molded, fabricated or filament wound and are described in FH1250.

Testing

Installed pipe systems should be tested prior to use to assure soundness of all joints and connections. Locate pressure gauge in close proximity to the pressurizing equipment, not directly on the piping system. A pressure gauge with the test pressure at mid-scale is recommended.

Joining System

- **T.A.B.™** - The primary joining method for pipe joints promoting fast, positive make-up and prevents “backout” during curing.
- **Bell & Spigot** - The primary joining method for fitting joints.

These joints assist the installer and assures a fast trouble-free installation. Adhesive for this system is Series 8000. T.A.B. spigots can be bonded into tapered bells and tapered spigots can be Bonded into T.A.B. bells using standard bonding procedures for tapered joints.

ASTM D2996 Designation Code - RTRP-11AW13110

Nominal Dimensional Data

Pipe Size		Inside Diameter		Outside Diameter		Wall Thickness		Weight		Pressure/ Temperature Max. Rating at 150°F (66°C)		Mill Test Pressure		Minimum Bending Radius	
in	mm	in	mm	in	mm	in	mm	lbs/ft	kg/m	psig	MPa	psig	MPa	ft	m
2	50	2.238	57	2.372	60	0.067	1.70	0.42	0.63	250	1.72	375	2.59	102	31.0
3	80	3.363	85	3.559	90	0.098	2.49	0.92	1.37	175	1.21	300	2.07	153	46.5
4	100	4.364	111	4.554	116	0.095	2.41	1.15	1.71	125	0.86	265	1.83	195	59.5
6	150	6.408	163	6.686	170	0.139	3.53	2.47	3.68	20	0.14	265	1.83	287	87.4

View of Joint Illustrations



T.A.B.



Bell & Spigot

Typical Mechanical Properties

Pipe Property	75°F	24°C	200°F	93°C	Method
	psi	MPa	psi	MPa	
Axial Tensile					
Ultimate Stress	9,530	65.7	6,585	45.4	ASTM D2105
Modulus of Elasticity	1.68 x 10 ⁶	11,584	1.42 x 10 ⁶	9,791	ASTM D2105
Poisson's Ratio, $v_{ah} (v_{ha})^{(1)}$	0.35 (0.61)				
Axial Compression					
Ultimate Stress	12,510	86.3	8,560	59.0	ASTM D695
Modulus of Elasticity	0.677 x 10 ⁶	4,668	0.379 x 10 ⁶	2,613	ASTM D695
Beam Bending					
Modulus of Elasticity (Long Term)	2.6 x 10 ⁶	17,927	0.718 x 10 ⁶	4,951	ASTM D2925
Hydrostatic Burst					
Ultimate Hoop Tensile Stress	40,150	277	36,480	252	ASTM D1599
Hydrostatic Hoop Design Stress					
Static 20 Year Life	LTHS - 95% LCL	-	18,203 - 14,689	125.5 - 101.3	ASTM D2992 - Procedure B
Static 50 Year Life	LTHS - 95% LCL	-	16,788 - 13,142	115.7 - 90.6	ASTM D2992 - Procedure B
Parallel Plate					
Hoop Modulus of Elasticity	3.02 x 10 ⁶	20,822	-	-	ASTM D2412
Shear Modulus	1.76 x 10 ⁶	12,135	1.63 x 10 ⁶	11,250	-

Typical Physical Properties

Pipe Property	Value	Value	Method
Thermal Conductivity	0.23 BTU/hr•ft•°F	0.4 W/m°C	ASTM D177
Thermal Expansion	10.7 x 10 ⁻⁶ in/in °F	19.3 x 10 ⁻⁶ mm/mm °C	ASTM D696
Absolute Roughness	0.00021 in	0.00053 mm	
Specific Gravity	1.8		ASTM D792

Ultimate Collapse Pressure

Size		Collapse Pressure ⁽²⁾⁽³⁾⁽⁴⁾			
		psig		MPa	
in	mm	75°F	150°F	24°C	66°C
2	50	177	133	1.22	0.92
3	80	171	129	1.18	0.89
4	100	69	51	0.48	0.35
6	150	69	51	0.48	0.35

Pipe Length

Size		Standard		Random	
in	mm	ft	m	ft	m
2-6	50-150	15	4.57	22-25	6.7-7.62

⁽¹⁾ v_{ha} = The ratio of axial strain to hoop strain resulting from stress in the hoop direction.
 v_{ah} = The ratio of hoop strain to axial strain resulting from stress in the axial direction.
⁽²⁾ The differential pressure between internal and external pressure which causes collapse.
⁽³⁾ A 0.67 design factor is recommended for short duration vacuum service. A full vacuum is equal to 14.7 psig (0.101 MPa) differential pressure at sea level.
⁽⁴⁾ A 0.33 design factor is recommended for sustained (long-term) differential collapse pressure design and operation.

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.

Fiber Glass Systems
 17115 San Pedro Avenue, Ste 200
 San Antonio, Texas 78232 USA
 Phone: 210 477 7500
 Fax: 210 477 7560



© 2017 National Oilwell Varco All rights reserved
 FH1200ENG February 2017

Red Thread™ IIA Primary Fittings

(Product Data)



90° and 45° Elbow, Flange and Tee

Pipe Size		A		B		C		D		E		F		O		X ₁ ⁽¹⁾		X ₂ ⁽¹⁾	
in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
2	50	3 3/8	86	2 1/4	57	3/4	19	4 3/4	121	3/4 D-4 Holes	19 D-4 Holes	2 5/8	67	6	152	1 3/8	35	1 1/2	38
3	80	4 5/8	117	2 5/8	67	1 3/8	35	6	152	3/4 D-4 Holes	19 D-4 Holes	3 3/4	95	7 1/2	191	1 5/8	41	1 7/8	48
4	100	5 1/8	130	2 5/8	67	1 3/8	35	7 1/2	191	3/4 D-4 Holes	19 D-4 Holes	3 7/8	98	9	229	1 1/2	38	1 7/8	48

⁽¹⁾X dimension is a nominal makeup dimension for layout only. Do not use for assembly dimensions.

90° Elbow

(Belled Ends)

Part	Part Number
2" 90° Elbow	012020-360-4
3" 90° Elbow	012030-360-4
4" 90° Elbow	012040-360-4

45° Elbow

(Belled Ends)

Part	Part Number
2" 45° Elbow	012020-310-4
3" 45° Elbow	012030-310-4
4" 45° Elbow	012040-310-4

Flange

(Belled Ends)

Part	Part Number
2" Flange	012020-170-4
3" Flange	012030-170-4
4" Flange	012040-170-4

Tee

(Belled Ends)

Part	Part Number
2" Tee	012020-410-4
3" Tee	012030-410-4
4" Tee	012040-410-4

Sleeve Coupling, End Cap and Nipple

Pipe Size		Sleeve Coupling				End Cap				Nipple (Overall Length "A")				
		A		X ₁ ⁽¹⁾		A		X ₁ ⁽¹⁾		4"	6"	8"	10"	12"
in	mm	in	mm	in	mm	in	mm	in	mm	102 mm	152 mm	203 mm	254 mm	305 mm
2	50	6	152	2 1/8	54	2 3/4	70	1 3/8	35	†	†	†	†	†
3	80	6	152	2 3/8	60	3 1/4	83	1 3/4	44	-	†	†	†	†
4	100	7	178	2 7/8	73	3 3/4	95	1 5/8	41	-	†	†	†	†

⁽¹⁾X dimension is a nominal makeup dimension for layout only. Do not use for assembly dimensions.

† Available from stock.

Sleeve Coupling

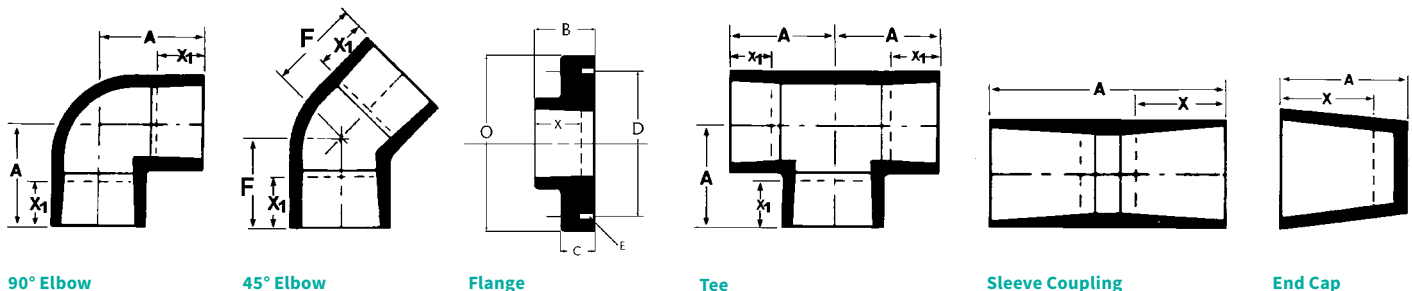
(Belled Ends)

Part	Part Number
2" Sleeve Coupling	012020-101-8
3" Sleeve Coupling	012030-101-8
4" Sleeve Coupling	012040-101-4

End Cap

Part	Part Number
2" End Cap	012020-180-4
3" End Cap	012030-180-4
4" End Cap	012040-180-4

View of Fitting Illustrations



Threaded Adapter⁽²⁾ - NPT Thread

Pipe Size		Bell x Male						Spigot x Male				Bell x Female				Spigot x Female			
		A		B		X ₁ ⁽¹⁾		A		B		A		X ₁ ⁽¹⁾		A		B	
in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
2	50	4 ¼	108	2	51	1 ¾	35	3 ⅝	92	2	51	3 ½	89	1 ¾	35	3 ⅞	98	2 ⅛	54
3	80	5 ½	140	3	76	1 ⅝	41	4 ⅝	117	3	76	4 ½	114	1 ⅝	41	4 ¾	121	3 ⅛	79
4	100	5 ½	140	4	102	1 ½	38	4 ⅞	124	4	102	4 ½	114	1 ½	38	4 ⅞	124	4 ⅛	105

⁽¹⁾X dimension is a nominal makeup dimension for layout only. Do not use for assembly dimensions.

Bell x Male (BxM)

Part	Part Number
2" BxM	012020-191-4
3" BxM	012030-191-4
4" BxM	012040-191-4

Bell x Female (BxF)

Part	Part Number
2" BxF	012020-194-4
3" BxF	012030-194-4
4" BxF	012040-194-4

Spigot x Male (SxM)

Part	Part Number
2" SxM	012020-192-4
3" SxM	012030-192-4
4" SxM	012040-192-4

Spigot x Female (SxF)

Part	Part Number
2" SxF	012020-195-4
3" SxF	012030-195-4
4" SxF	012040-195-4

Reducer Bushing

Pipe Size		A		X ⁽¹⁾	
in	mm	in	mm	in	mm
2 x 1	50 x 25	1 ¾	44	*	*
2 x 1 ¼	50 x 32	2	51	*	*
2 x 1 ½	50 x 40	1 ¾	44	*	*
3 x 2	80 x 50	2 ¼	57	1 ½	38
4 x 3	100 x 80	2 ¾	60	1 ⅞	48

⁽¹⁾X dimension is a nominal makeup dimension for layout only. Do not use for assembly dimensions.

* Also available with British Standard Threads. Specify when ordering.

Part	Part Number
2" x 1" Female NPT	012020-233-4
2" x 1 ¼" Female NPT	012020-232-4
2" x 1 ½" Female NPT	012020-231-4
3" x 2" Red. Bushing	012030-231-4
4" x 3" Red. Bushing	012040-231-4

Saddle

Pipe Size		A		B		X ⁽¹⁾	
in	mm	in	mm	in	mm	in	mm
2 x 1 ½	50 x 40	2 ⅞	73	4	102	1	25

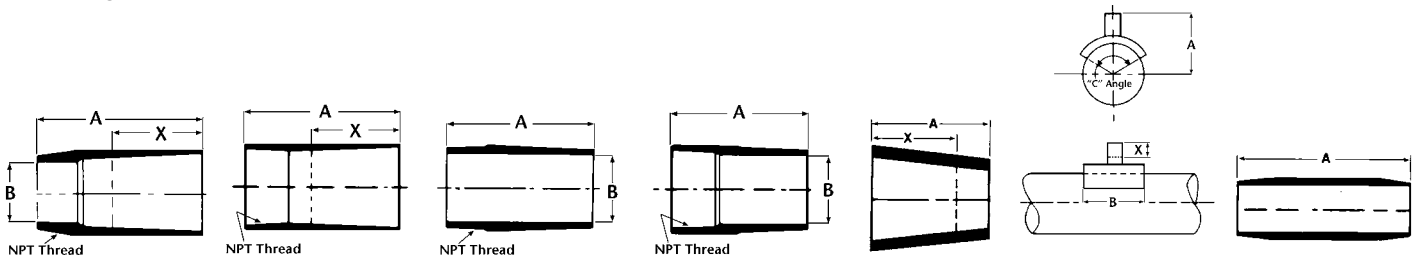
Part	Part Number
2" x 1 ½" Female NPT	012020-516-4

Nipple

Part	Part Number
2" x 4"	012020-004-5
2" x 6"	012020-006-5
2" x 8"	012020-008-5
2" x 10"	012020-010-5
2" x 12"	012020-012-5
3" x 6"	012030-006-5
3" x 8"	012030-008-5
3" x 10"	012030-010-5
3" x 12"	012030-012-5

Part	Part Number
4" x 6"	012040-006-4
4" x 8"	012040-008-4
4" x 10"	012040-010-4
4" x 12"	012040-012-4

View of Fitting Illustrations



Threaded Adapter - BxM

Threaded Adapter - BxF

Threaded Adapter - SxM

Threaded Adapter - SxF

Reducer Bushing

Saddles

Nipple

Secondary Containment Fittings

90°, 45° Elbow, Tee, Sleeve Coupling, Termination Fitting

Pipe Size		A		B		C		D		E		F		G	
in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
3	80	6	152	7	178	14	356	3	76	2 1/2	64	2 1/2	64	8	203
4	100	7 1/2	191	8	203	14	356	3	76	3	76	2 1/2	64	8 1/2	216
6	150	8	203	9	229	16	406	4	102	4	102	3	76	11	279

90° Elbow

Part	Part Number
3" 90° SC Elbow	012030-360-3
4" 90° SC Elbow	012040-360-3
6" 90° SC Elbow	012060-360-9

45° Elbow

Part	Part Number
3" 45° SC Elbow	012030-310-3
4" 45° SC Elbow	012040-310-3
6" 45° SC Elbow	012060-310-9

Tee

Part	Part Number
3" SC Tee	012030-410-3
4" SC Tee	012040-410-3
6" SC Tee	012060-410-9

Sleeve Coupling

Part	Part Number
3" SC Sleeve Coupling	012030-101-3
4" SC Sleeve Coupling	012040-101-3
6" SC Sleeve Coupling	012060-101-9

Termination Fitting

(with NPT TAP)

Part	Part Number
3" x 2" WITH 3/4 NPT Tap	012030-236-3
4" x 3" WITH 3/4 NPT Tap	012040-236-3
6" x 4" WITH 3/4 NPT Tap	012060-234-7

Termination Fitting

(without TAP)

Part	Part Number
3" x 2" Without Tap	012030-235-3
4" x 3" Without Tap	012040-235-3
6" x 4" Without Tap	012060-235-9

Sleeve Coupling

(One-piece, scarfed O.D.)

Pipe Size		A		X ⁽¹⁾	
in	mm	in	mm	in	mm
2	50	5	127	2 1/8	54
3	80	6	152	2 3/8	60
4	100	6	152	2 7/8	73

Part	Part Number
2" SC Sleeve Coupling	012020-101-9
3" SC Sleeve Coupling	012030-101-9
4" SC Sleeve Coupling	012040-101-9

Threaded Adapter

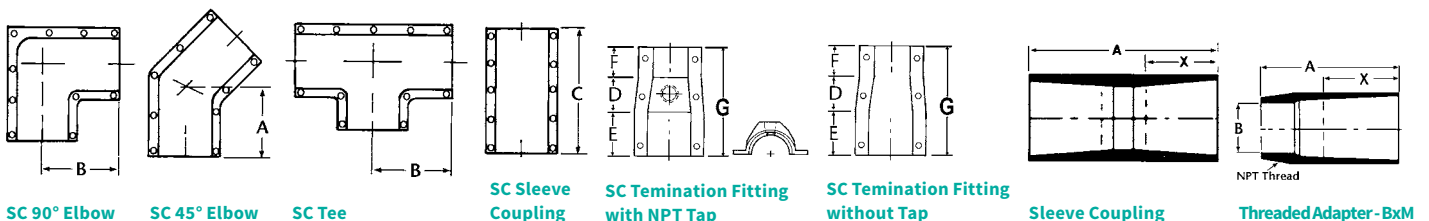
(Bell x Male, scarfed O.D.)

Pipe Size		A		B		X ⁽¹⁾	
in	mm	in	mm	in	mm	in	mm
2	50	4 1/4	108	2	51	1 3/8	35
3	80	5 1/2	140	3	76	1 5/8	41
4	100	5 1/2	140	4	102	1 1/2	38

Part	Part Number
2" B x M Threaded Adapter	002020-191-7
3" B x M Threaded Adapter	002030-191-7
4" B x M Threaded Adapter	002040-191-7

⁽¹⁾X dimension is a nominal makeup dimension for layout only. Do not use for assembly dimensions.

View of Fitting Illustrations



SC 90° Elbow

SC 45° Elbow

SC Tee

SC Sleeve Coupling

SC Termination Fitting with NPT Tap

SC Termination Fitting without Tap

Sleeve Coupling

Threaded Adapter-BxM

Crossover 45° Elbow, Crossover Tee, Crossover Nipple

Pipe Size		Crossover 45				Crossover Tee				Crossover Nipple (Overall Length "C")	
		A1		A2		B1		B2		6"	8"
in	mm	in	mm	in	mm	in	mm	in	mm	152 mm	203 mm
3	80	6	152	4 ¾	121	7	178	5 ½	140	†	-
4	100	7 ½	191	5 ½	140	8	203	6 ¾	162	†	-
6	150	-	-	-	-	-	-	-	-	-	†

†Available from stock.

Crossover 45° Elbow

Part	Part Number
3" 45° SC Crossover	012030-311-3
4" 45° SC Crossover	012040-311-3

Crossover Tee

Part	Part Number
3" SC Crossover Tee	012030-411-3
4" SC Crossover Tee	012040-411-3

Crossover Nipple

(Scarf both ends)

Part	Part Number
3" x 6" Crossover Nipple	012030-006-7
4" x 6" Crossover Nipple	012040-006-7
6" x 8" Crossover Nipple	012060-008-7

Reducer Bushing

(Scarfed O.D.)

Pipe Size		A		X ⁽¹⁾	
in	mm	in	mm	in	mm
3 x 2	80 x 50	2 ¼	57	1 ½	38
4 x 3	100 x 80	2 ¾	60	1 ⅞	48

⁽¹⁾X dimension is a nominal makeup dimension for layout only. Do not use for assembly dimensions.

Part	Part Number
3" x 2" Reducer Bushing	012030-231-7
4" x 3" Reducer Bushing	012040-231-7

Saddle

Pipe Size		A		B		X ⁽¹⁾	
in	mm	in	mm	in	mm	in	mm
3 x 2	80 x 50	4	102	6	152	1 ¾	35
4 x 2	100 x 50	4 ½	114	6	152	1 ¾	35
4 x 3	100 x 80	5 ¼	133	6	152	1 ⅝	41
3 x 1	80 x 25	3 ½	89	6	152	*	*
3 x 1 ¼	80 x 32	3 ½	89	6	152	*	*
3 x 1 ½	80 x 38	3 ½	89	6	152	*	*
4 x 1	100 x 25	4	102	6	152	*	*
4 x 1 ¼	100 x 30	4	102	6	152	*	*
4 x 1 ½	100 x 40	4	102	6	152	*	*

* NPT threads.

Centralizer

Part	Part Number
2" x 3" Centralizer	013020-650-3
3" x 4" Centralizer	013030-651-4
4" x 6" Centralizer	013040-650-6

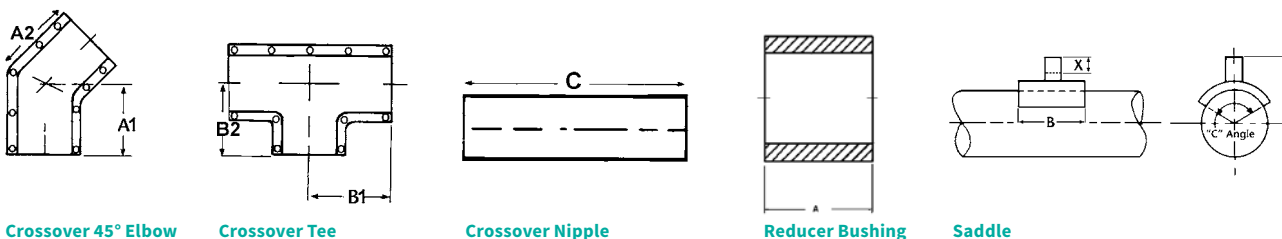
Belled Outlet

Part	Part Number
3" x 2" Saddle	012030-521-4
4" x 2" Saddle	012040-521-4
4" x 3" Saddle	012040-531-4

Female NPT Outlet

Part	Part Number
3" x 1" Saddle	012030-511-4
3" x 1 ¼" Saddle	012030-512-4
3" x 1 ½" Saddle	012030-516-4
4" x 1" Saddle	012040-511-4
4" x 1 ¼" Saddle	012040-512-4
4" x 1 ½" Saddle	012040-516-4

View of Fitting Illustrations



Sump Fittings

Double Wall Bonded Sump Entry/ Termination Fitting

Pipe Size		A		B		C	
in	mm	in	mm	in	mm	in	mm
3 (3 x 2)	80 (80 x 50)	6 7/8	175	4	102	4	102
4 (4 x 3)	100 (100 x 80)	6 7/8	175	4	102	5	127

Part	Part Number
3" Bonded Fitting	012030-626-0
4" Bonded Fitting	012040-626-0

Double Wall Gasketed Sump Entry/ Termination Fitting

Pipe Size		A		B		C	
in	mm	in	mm	in	mm	in	mm
3 (3 x 2)	80 (80 x 50)	6 7/8	175	4	102	4	102
4 (4 x 3)	100 (100 x 80)	6 7/8	175	4	102	5	127

Part	Part Number
3" Gasketed Fitting	012030-620-0
4" Gasketed Fitting	012040-620-0

Bonded Sump Entry Fitting

Pipe Size		A		C	
in	mm	in	mm	in	mm
2	50	6	152	2 9/16	65
3	18	6	152	3 3/4	95
4	100	6	152	4 3/4	121
6	150	6	152	6 7/8	175

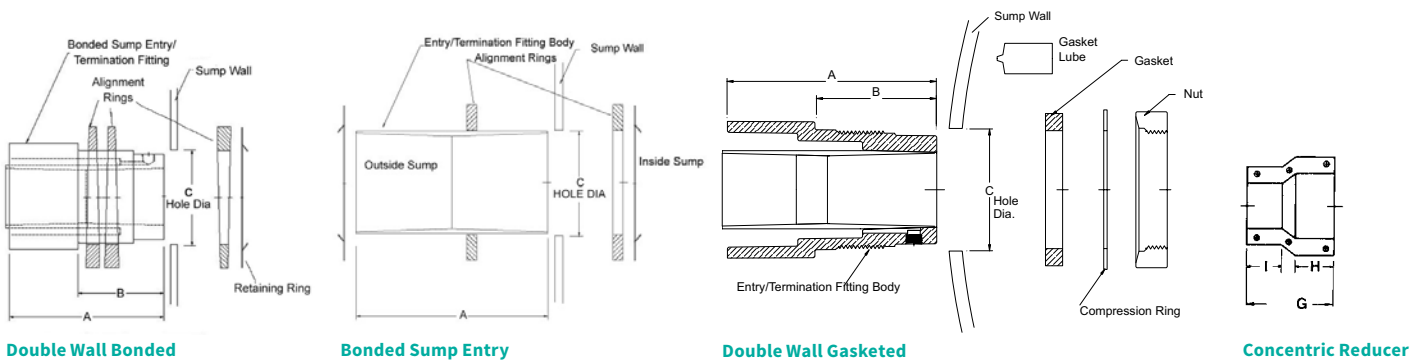
Part	Part Number
2" Bonded Fitting	012020-622-0
3" Bonded Fitting	012030-622-0
4" Bonded Fitting	012040-622-0
6" Bonded Fitting	012060-622-0

Concentric Reducer

Pipe Size		G ± 1/8		H ± 1/8		I ± 1/8	
in	mm	in	mm	in	mm	in	mm
4 x 3	100 x 80	6	152	2 1/2	64	2 1/2	64
5 x 4	125 x 100	7	178	2 1/2	64	2 1/2	64
6 x 4	150 x 100	7	178	3 1/4	83	2 3/4	70

Part	Part Number
4" x 3" Concentric Reducer	012040-238-3
5" x 4" Concentric Reducer	012050-238-3
6" x 4" Concentric Reducer	012060-238-3

View of Fitting Illustrations



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.

Fiber Glass Systems

17115 San Pedro Avenue, Ste 200
San Antonio, Texas 78232 USA
Phone: 210 477 7500
Fax: 210 477 7560

© 2016 National Oilwell Varco All Rights Reserved
FH1250ENG September 2016

**NSF International
(National Sanitation Foundation)**

ANSI/NSF Standard No. 61 (Drinking Water System Components—Health Effects) Listing: Note: Standard No. 61 was developed by a consortium and with support from the U.S. Environmental Protection Agency under cooperative agreement No. CR-812144:

- 2"-24" Red Thread II Pipe and Fittings
- 1"-36" Green Thread Pipe and Fittings
- 3033 and 8000 Series (Epoxy Adhesive)
- F-Chem Pipe ⁽¹⁾
- F-Chem Fittings ⁽¹⁾

(1) Piping greater than 14" diameter using NSF Listed resin system.

Underwriters Laboratories Inc. (UL) and Underwriters' Laboratories of Canada (ULC)

Red Thread II pipe and compatible primary fittings, along with secondary containment pipe and fittings, and adhesives are listed for use in conveying petroleum products, alcohols, and alcohol-gasoline mixtures including ethanol, methanol and MTBE underground (UL). The primary pipe sizes are 2", 3" and 4"; the secondary containment pipe and fittings sizes are 3", 4", and 6".

These products are listed for use in conveying petroleum products, gasoline mixtures and up to 100% ethanol underground (ULC).

TABLE 6.1 Table for Use in Classifying Fiberglass Flanges to ASTM D4024

	Type	Grade	Class	Pressure Rating Designation*	Property Designation				
Filament Wound (FW)	1								
Compression Molded.....	2								
Resin-Transfer Molded.....	3								
Centrifugally Cast	4								
Epoxy Resin		1							
Polyester Resin		2							
Furan Resin.....		3							
Integrally-Molded (mfg. on pipe/fitting)			1						
Taper to Taper Adhesive Joint			2						
Straight to Taper Adhesive Joint			3						
Straight Adhesive Joint.....			4						
*Gauge Pressure (psig)	50			A					
(Flanges must withstand a pressure of 4 times the rating without damage to the flange)	100			B					
	150			C					
	200			D					
	250			E					
	300			F					
	400			G					
	500			H					
PROPERTY	0	1	2	3	4	5	6	7	8
Burst Pressure (psig)	(unspecified)	200	400	600	800	1000	1200	1600	2000
Sealing Test Pressure (psig)		75	150	225	300	375	450	600	750
Bolt Torque Limit (ft. •lbs.)		20	30	50	75	100	125	150	200