

SPECIFICATIONS

COMPOSITES USA *Pure Guard SS*

**FACTORY MUTUAL APPROVED 4922 (#J.I.3011760) SPRINKLER FREE
FACTORY MUTUAL APPROVED 4910 (#J.I.3011760) CLEAN ROOM
ECTFE LINED STAINLESS STEEL DUCT AND FITTINGS**

REQUIREMENTS

GENERAL REQUIREMENTS

ECTFE fluoropolymer coated stainless steel duct for corrosive fume and smoke exhaust shall bear the Factory Mutual #J.I.3011760 signifying Approval by Factory Mutual to their protocol **FM 4922** as a non-sprinkled smoke removal duct and to Factory Mutual protocol **FM 4910** for installation and use in Clean Room environments. The duct shall be approved for use without height (vertical riser) restrictions.

The duct must have been tested using ASTM E-84 test methods in a certified test laboratory resulting in a Flame Spread less than 25 and a Smoke Development of less than 50 on both the inside and outside of the duct.

To ensure maximum levels of corrosion resistance, the fluoropolymer liner must be of 0.016" (0.4mm) thick.

MATERIALS

Liner – The internal liner shall be seamless ECTFE applied at a thickness of 0.016" (0.4mm) by electrostatic deposition followed by high temperature cure.

Stainless Steel Substrate – A series 300 stainless steel shall be used to fabricate all duct, fittings and accessories.

Flange Back Up Rings – Standard flange back up rings shall be manufactured using A-36 steel unless otherwise agreed with customer. Series 300 stainless steel is available as an option.

Quick Clamps – Standard quick disconnect clamps (QC Clamps), for sizes available, shall be manufactured from series 300 stainless steel.

Gasket Materials – A fully expanded PTFE gasket material shall be used to join sections.

Bolts, Nuts, and Washers - Bolts, nuts, and washers shall be (ASTM A449) grade 5 plated steel unless otherwise specified. Series 300 series stainless steel is available as an option.

CONSTRUCTION

Stainless Steel Structure - The duct will be designed and manufactured in accordance with the latest S.M.A.C.N.A. Industrial Duct Construction Standards requirements for Class 5 (corrosive vapors) thickness and reinforcement, for -6/+50 inches water column (-1.5 /+12.4 kPa) unless otherwise

specified. Duct and fittings shall be formed of continuously welded stainless steel, with internal welds ground smooth to allow for internal lining.

The inner liner shall be ECTFE fluoropolymer using the same formulation on file with Factory Mutual. The liner will be applied by electrostatic deposition with elevated temperature cure to achieve final liner thickness. Liner thickness shall be 0.016" (0.4mm).

Liner Integrity – All duct and fittings shall be visually inspected for defects and dielectric spark tested to check against pinholes.

DUCT SIZES AND TOLERANCES

Size - The standard duct size shall be the outside diameter in inches or millimeters. Standard sizes begin at 2" and are generally available in any size through 132" diameter..

Length - Standard lengths on duct sections are 5 ft nominal and 10 ft nominal. On diameters 6" and under, duct is supplied in maximum 5 ft lengths. Custom lengths shorter than nominal standards are available as required.

Actual lengths will vary slightly from nominal as follows: On diameters up to and including 48" diameter with rolled flanged ends, actual duct will be 0.75" less than nominal lengths (ie., 5 ft nominal = 59.25" actual and 10 ft nominal = 9'-11.25" actual). On duct over 48" diameter with fixed welded flanges duct will be 0.25" longer than the nominal length. See the fittings style sheets for additional clarification.

Wall Thickness - The minimum wall thickness, stiffeners and support spacing shall be in accordance with S.M.A.C.N.A. for the appropriate pressure/ vacuum class. Standard product is designed for ±6 inches water column unless otherwise specified.

Rectangular Duct - The nominal size of rectangular duct shall be determined by the inside dimensions. There are no standard sizes for rectangular duct.

Fittings - All fittings such as elbows, laterals, tees, and reducers shall be equal or superior in strength to the adjacent pipe section and shall have the same diameter as the adjacent pipe. The dimensions of fittings shall be as shown in fitting detail sheets located on the Composites USA web site (www.compositesusa.com).

Elbow - Standard elbows shall have a centerline radius of one and one half times the diameter of the fitting. Standard elbows are mitered construction. Elbows above 45° through 90° shall have a minimum of three gores. Verify exact construction by referencing the appropriate Composites USA fitting figure number (available on the web site). Incorporation of straight pipe extensions on elbows is permissible.

Reducers - Reducers of either concentric or eccentric style will have a length as determined by the difference of the diameters of the reducer (either 2.5 or 5X the difference is standard). Alternate reducer lengths are acceptable in order to accommodate end user layout requirements.

Flanges – Standard flange design is a floating Van Stone style ring flange up to a maximum of 30-inch diameter, with fixed, welded flanges on larger sizes. Flanges up to and including 48" diameter are generally rolled rings butted up against flared end duct and fittings. These flanges may be supplied loose or fixed.

Standard flanges on duct larger than 48" diameter are rolled stainless steel rings welded to duct without

flaring the duct. All welds are continuous and ground smooth for coating, and the flange face is coated the in the same manner as the duct.

All flange dimensions are shown on the appropriate fitting style sheet (available on the web site).

RECOMMENDED INSTALLATION PRACTICE

Duct Hangers and Spacing – Hangers and supports shall be as recommended by S.M.A.C.N.A., Round Industrial Duct Construction Standard, Chapter 13. Hanger spacing shall be within 2 diameters on each side of duct joint for loose Van Stone style flanges. Generally, for Class 5 duct (corrosive vapors) it is not required to analyze the local deformation at support points in the absence of external loads such as wind, snow, etc.

Underground Installation – Special consideration must be given to installing duct underground. It is recommended that Composites USA, Inc. be consulted for design and installation procedures.

Thermal Expansion – The thermal expansion of 300 series stainless steel is approximately 6.25×10^{-6} in/in/F⁰. Proper consideration of this should be given in the support and hanger system as well as the location and quantity of expansion joints (if any).

Pressure and Vacuum Service - Standard duct is mechanically designed for –6/+50 inches water column (-1.5 /+12.4 kPa) at up to 300°F (150°C). Typical duct thickness per size is as shown in Table 1 below for standard and elevated vacuum conditions, with standard flange arrangements (loose rings for up to 30” diameter, fixed welded flanges on larger than 30” diameter). For other pressure and vacuum services and elevated temperatures, please consult Composites USA, Inc. engineering for specific recommendations.

Bolts, Nuts, and Washers - Bolts, nuts, and washers shall be grade 5 plated steel and supplied by Composites USA, Inc. unless otherwise specified. Recommended torques are as shown below or can be provided by Composites USA upon request. See the Composites USA Pure Guard SS Installation Instructions or www.compositesusa.com for additional detail.

<u>Bolt Diameter</u>	<u>Torque</u>	<u>Material</u>
5/16 inch	22	Plated Grade 5 Steel
3/8 inch	36	Plated Grade 5 Steel

Note: Torque values shown are maximum values, based upon non-lubricated bolts.

Gaskets – Gaskets shall be form in place fully expanded PTFE material and a minimum of 1/8” thick as shown below. Gaskets shall be supplied by Composites USA, Inc. unless otherwise specified.

<u>Joint Diameter</u>	<u>Width</u>	<u>Thickness</u>
< 12 inch	0.18 inch	0.12 inch
< 24 inch	0.25 inch	0.12 inch
< 42 inch	0.25 inch	0.18 inch
≥ 42 inch	0.25 inch	0.25 inch

Gaskets are to be applied as wrinkle free as possible to the duct flange ends, with cut ends of the gasket overlapping by at least 1” on each side (2” overall). Check duct ends to ensure proper alignment between sections prior to tightening bolts or clamps.

Duct Diameter inches	Duct Diameter mm	Thickness (Gage) at -6" w.c.	Thickness (Gage) at -8" w.c.	Thickness (Gage) at -10" w.c.	Thickness (Gage) at -12" w.c.	Thickness (Gage) at -20" w.c.	Thickness (Gage) at -30" w.c.
2	51						
3	76						
4	102	22	22	22	22	22	22
6	152						
8	203					20	20
10	254			20	20		18
12	305	20	20			18	16
14	356			18	18	16	
16	406	18	18				14
18	457			16	16	14	
20	508		16				
22	559	16		14	14		12
24	610		14			12	
26	660	14					
28	711			12	12		10
30	762	12	12			10	
32	813						
34	864		18				
36	914				16	14	
38	965	18		16			
40	1016		16				
42	1067						12
44	1118	16					
46	1168						
48	1219				14		
50	1270	14	14	14			
52	1321					12	
54	1372						
56	1422						
58	1473						
60	1524						11
66	1676	12	12	12	12		
72	1829						
78	1981					11	10
84	2134						
90	2286	11	11	11	11		
96	2438						
102	2591	10	10	10	10	10	
108	2743						7
114	2896						
120	3048	7	7	7	7	7	
126	3200						
132	3353						

Table 1 - Pure Guard SS Thickness –

Note: Basis SMACNA Industrial Duct requirements for 10-0" non-stiffened lengths. Composites USA reserves the right to modify stiffeners/ thickness to suit design requirements

SPECIAL REQUIREMENTS -

Butterfly Style Dampers - are to be supplied to the same materials of construction and quality assurance parameters as the duct system. Each damper is to ship complete with all the components listed below:

Lined Stainless Steel Damper Body
Lined Stainless Disc or Blade Assembly
Lined Stainless Shaft with Viton® O-ring seals
SS Locking Quadrant Hand Mechanism
Van Stone Style Flanges or Quick Clamps to Match Mating Pure Guard SS Duct
Actuator - Optional

Certified dimensional drawings shall be provided for approval showing all damper assembly components weights, flange drilling patterns and critical dimensions.

Butterfly Damper Design -

Damper Body - Flange thickness and bolthole layout shall be the same as for the duct dimensions. Face to face dimensions shall be specified at the time of the system layout. Standard dimensions are shown on the web site (www.compositesusa.com) fitting style sheets.

If automated, the damper body shall be clearly marked to show flow direction. Markings shall be permanent and clearly visible from greater than 10 ft. The damper body shall be designed with a mounting bracket suitable to properly mount the actuator or lock the manual shaft in proper operating position.

Damper Blade - Shall be manufactured from the same material as the duct. The blade should be designed to withstand the design conditions without failure with a safety factor of 5:1 or deflect in excess of 1.0% of the diameter.

Shaft Seals – Viton® O-ring seals are supplied as standard. Optional outboard bearings shall be mounted in a packing gland outside of the damper body and shall be readily accessible for lubrication and/ or removal.

Deformation or Creep - The equipment shall be suitable for all operating conditions. Deformation or creep shall not interfere with the damper operation under the most severe combined operating conditions.

Options:

Shaft Seals – Viton® O-ring seals are provided as standard construction. Teflon® or other packed shaft gland seals are available as an option.

Blade Seals – Blade seals where provided shall be EPDM unless otherwise specified - Not provided with base bid.

Actuator/ Coupling - All electrical components are to be NEMA 4. The design shall insure that thermal growth will not interfere with the damper or actuator operation over the full temperature range - Not provided with base bid.