

## PART SW

# SPIRAL-WOUND GASKETS

### SW-1 SIZE AND CLASS

Spiral-wound gaskets, including centering ring and inner ring (paras. SW-2.4 and SW-2.5), are identified by flange size (NPS), pressure class, and the appropriate flange standard (ASME B16.5 or ASME B16.47).

### SW-2 DIMENSIONS AND TOLERANCES

#### SW-2.1 General

Dimensions and tolerances for spiral-wound gaskets, centering rings, and inner rings shall be in accordance with Figure SW-2.1-1 and Tables SW-2.1-1 through SW-2.1-6, and as specified in this Part.

#### SW-2.2 Construction

Spiral-wound gaskets shall be constructed as alternate plies (circular layers counted as revolutions) of preformed metal windings and pliant fillers that are spirally wound. Pliant fillers shall not extend below the metal winding on both contact faces of the gasket. Metal winding thickness shall be 0.190 mm  $\pm$  0.040 mm (0.0075 in.  $\pm$  0.0015 in.). For all filler materials, filler thickness and density shall be determined by the manufacturer such that the performance testing criteria in para. SW-2.6 will be met. In addition, for gaskets with flexible graphite filler material, filler thickness and density shall be determined by the manufacturer such that each finished gasket will compress to a thickness no less than 3.43 mm (0.135 in.) when subjected to the following uniform gasket stress, and where the gasket contact area is calculated using the inside and outside diameters as shown in Tables SW-2.1-1 through SW-2.1-3:

- (a) 52 MPa (7,500 psi) for Class 150 flanges
- (b) 70 MPa (10,000 psi) for Class 300 through Class 600 flanges
- (c) 140 MPa (20,000 psi) for Class 900 and above flanges

#### SW-2.3 Metal Joining

The inner windings shall have a minimum of three plies of preformed metal strip without filler. The initial two plies shall have spot welds spaced around the inner circumference. The minimum number of welds shall be three. The maximum distance between welds shall be

76 mm (3.0 in.). The outer windings, which shall have a minimum of three plies of preformed metal without filler, shall be spot-welded circumferentially with a minimum of three welds, the last of which shall be the terminal weld.

The distance of the first weld from the terminal weld shall be no greater than 38 mm (1.5 in.). Up to four additional loose preformed metal windings beyond the terminal weld may be used to retain the gasket into the centering ring.

#### SW-2.4 Centering Ring

All spiral-wound gaskets shall be furnished assembled into a centering ring. The centering-ring thickness shall be from 2.97 mm to 3.33 mm (0.117 in. to 0.131 in.) and suitably grooved on the inside diameter so as to retain

the gasket.

#### SW-2.5 Inner Ring

Inward buckling of spiral-wound gaskets has been identified as a potential problem. Inner rings shall be furnished with all spiral-wound gaskets having polytetrafluoroethylene (PTFE) filler material. Inner rings for flexible graphite-filled, spiral-wound gaskets shall be furnished unless the purchaser specifies otherwise.

For all filler materials, inner rings shall be furnished in spiral-wound gaskets for

- (a) NPS 24 and larger in Class 900
- (b) NPS 12 and larger in Class 1500
- (c) NPS 4 and larger in Class 2500

Inner rings are required for these gaskets due to high available bolt loads, which may result in ~~outer~~ centering ring damage.

The inner-ring thickness shall be from 2.97 mm to 3.33 mm (0.117 in. to 0.131 in.).

Tables SW-2.1-4 through SW-2.1-6 show inner-ring inside diameters that may extend a maximum of 1.5 mm (0.06 in.) into the flange bore under the worst combination of flange bore, eccentric installation, and tolerance. Gaskets with inner rings should be used only with socket welding, lapped, welding neck, and integral flanges.

Reference Table SW-2.5-1 for minimum pipewall thickness for use with gaskets with inner rings. Reference Tables SW-2.5-2 through SW-2.5-4 for maximum allowable bore for use with gaskets without inner rings.

## SW-2.6 Performance Testing

For all corresponding sizes and pressure classes, finished gaskets (including windings as well as inner and ~~outer~~ centering rings) shall be capable of meeting a maximum permissible leakage rate of 0.0137 mg/s·m (7.67E-10 lb/sec·in.). The circumferential length [meter (inch)] shall be calculated using the gasket outside diameter as shown in Tables SW-2.1-1 through SW-2.1-3. Testing shall be conducted at ambient temperature using an external calibration gas with a known methane concentration and a test gas flow rate of 1 L/min.

(a) The test fixture shall have a surface finish per ASME B16.5, be capable of shielding the gasket so as to direct any leakage to the monitoring probe, and be capable of applying a uniform load on the test gasket sealing element while internally pressurizing the gasket with methane (minimum 97% purity).

(b) Gasket stress due to the uniformly applied load shall be 35 MPa (5,000 psi) for Class 150, 56 MPa (8,000 psi) for Class 300 and Class 400, and 70 MPa (10,000 psi) for Class 600 and above.

(c) Test pressure shall be 20 bar (290 psi) for Class 150 and 40 bar (580 psi) for Class 300 and above.

(d) Test pressure shall be maintained for a minimum of 4 h, after which time three readings shall be taken at approximately 5-min intervals; the average of these three readings shall be compared to the maximum permissible leakage rate.

## SW-3 MATERIALS

Metal windings and filler materials shall be in accordance with Table SW-3-1. The inner-ring material should match the winding material unless the purchaser specifies otherwise. The centering ring may be carbon steel that is painted, metal plated, or otherwise coated to inhibit atmospheric corrosion.

## SW-4 MARKING

### SW-4.1 General

The centering ring of each spiral-wound gasket shall be permanently marked. The lettering height shall be a minimum of 2.5 mm (0.1 in.). The following information shall be included with the centering-ring markings:

- (a) manufacturer's name or trademark.
- (b) flange size (NPS).
- (c) pressure class.
- (d) winding metal abbreviation (see Table SW-3-1), except that the abbreviation may be omitted when Type 304 stainless steel is used.
- (e) filler material abbreviation (see Table SW-3-1).
- (f) centering- and inner-ring metal abbreviation (see Table SW-3-1), except that the abbreviation may be omitted when carbon steel is used for the ~~outer~~ centering ring and Type 304 stainless steel is used for the inner ring.
- (g) flange identification. Gaskets intended for ASME B16.47 flanges shall be marked B16.47 A or B16.47 B, as applicable. Gaskets intended for ASME B16.5 flanges need not be so marked. Illustrative marking examples are shown in Table SW-4.1-1.
- (h) ASME B16.20 designation.

### SW-4.2 Pressure Class

Gaskets suitable for more than one pressure class shall be marked with all applicable classes, as shown in Table SW-4.1-1.

### SW-4.3 Color Coding

Spiral-wound gaskets shall be marked with a color code that identifies the windings and filler materials. A continuous color around the outer edge of the centering ring shall identify the winding metal. The color identifying the filler material for NPS 1½ and larger shall have four intermittent stripes spaced approximately 90 deg apart on the outer edge of the centering ring. Smaller size gaskets shall have a minimum of two stripes 180 deg apart. The colors shall conform to those listed in Table SW-3-1.