

# Chlorine Institute Pamphlet 95

## Gaskets for Chlorine Service

Users of chlorine gaskets are strongly encouraged to become familiar with Chlorine Institute Pamphlet 95 *Gaskets for Chlorine Service*. Pamphlet 95 provides chlorine manufacturers, packagers, and consumers with practical information that can be used to prevent failures and minimize fugitive emissions from gasketed connections in dry and wet chlorine service. The pamphlet provides guidance for gasket material selection and gasket installation procedures.

Pamphlet 95 lists gaskets that have found user acceptance in chlorine service. Gaskets are added to the pamphlet by virtue of gasket testing by member companies. Members of the Chlorine Institute are encouraged to test new gaskets and gasket materials following the procedures in Pamphlet 95. Subsequent to the successful completion of a one year test, the member company reports the results to the Institute so that the results can be added to the Chlorine Institute gasket tables found in Pamphlet 95. Conducting field tests of gaskets and sharing the test results will enable members to become aware of gaskets that may provide improved service, reliability and/or cost benefits. This is consistent with the Institute's goal of continuous improvement.

The following is a re-print of the gasket tables found in Pamphlet 95 with the exception that the tables may contain gaskets and gasket materials that have been added since the most recent publication of Pamphlet 95.

Table 3-1: The gaskets listed in Table 3-1 have found user acceptance in dry chlorine service for the service class indicated. Testing results are available from the Institute or the gasket manufacturer.

Service Classes	
<b>I</b>	Gas only vacuum to 150 psig (1034 kPa) and -20°F to 300°F (-29°C to 149°C)
<b>II</b>	Gas only vacuum to 150 psig (1034 kPa) and -50°F to 300°F (-46°C to 149°C)
<b>III</b>	Gas only vacuum to 150 psig (1034 kPa) and -150°F to 300°F (-101°C to 149°C)
<b>IV</b>	Gas or liquid vacuum to 300 psig (2068 kPa) and -20°F to 300°F (-29°C to 149°C)
<b>V</b>	Gas or liquid vacuum to 300 psig (2068 kPa) and -50°F to 300°F (-46°C to 149°C)
<b>VI</b>	Gas or liquid vacuum to 300 psig (2068 kPa) and -150°F to 300°F (-101°C to 149°C)

**Table 3-1. Gasket Materials That Have Found User Acceptance  
in Dry Chlorine Service**

		Service Class						Comments
		I	II	III	IV	V	VI	
								(Refer to the test results for more complete information on gaskets that have been field tested. Test results can be obtained from the gasket manufacturer or The Chlorine Institute.)
1	Asbestos, compressed (Fed. Spec. HH-P 46E)	U	U	U*	U	U	U*	May be restricted in some jurisdictions. Used successfully for service conditions down to -100°F (-73°C)
2	Chemical lead (2-4% antimony)	U	U	UK	U	U	X	Tongue & Groove Joints (confined on all four sides)
3	Spiral wound Monel/PTFE	U	UK	UK	U	UK	UK	
4	Virgin PTFE (unfilled & unexpanded)	U	U	UK	U	U	UK	Tongue & Groove Joints (confined on all four sides)
5	Lead	U	UK	UK	U	UK	X	Tongue & Groove Joints (confined on all four sides)
6	Garlock Gylon 3510	U	U	U*	U	U	U*	Barium sulfate filled PTFE; "Off-White Color" *Tested for service conditions between 100°F (38°C) and -90°F (-68°C). Gasket Mfr: Garlock Sealing Technologies, Inc.
7	Durlon 9000	U	U*	UK	U	U*	UK	Silicate Filled PTFE; "Blue Color" *Tested for service conditions between 250°F (121°C) and -40°F (-40°C). Gasket Mfr: GRI/Durabla Canada Ltd.
8	Gore-Tex GR	U	UK	UK	U	UK	UK	Expanded PTFE tested for service conditions between 100°F (38°C) and 0°F (-18°C). Gasket Mfr: W.L. Gore and Associates, Inc.
9	Inertex SQ-S	U	U	UK	U	U	UK	Expanded PTFE. Tested for service conditions between 60°F (16°C) and -50°F (-46°C). Gasket Mfr: Inertech, Inc./YMT.
10	Garlock Graphonic	U	UK	UK	U	UK	UK	Graphite with Hastelloy C276 insert. Tested for service conditions between 300°F (149°C) and 0°F (-18°C). Gasket Mfr: Garlock Sealing Technologies, Inc.

**Table 3-1. Gasket Materials That Have Found User Acceptance  
in Dry Chlorine Service (continued)**

		Service Class						Comments
		I	II	III	IV	V	VI	
								(Refer to the test results for more complete information on gaskets that have been field tested. Test results can be obtained from the gasket manufacturer or The Chlorine Institute.)
11	Tex-O-Lon	U	UK	UK	U	UK	UK	PTFE with 304 stainless steel insert. Tested for service conditions between 270°F (132°C) and 20°F (-7°C). Gasket Mfr: Plastomer Products, Inc.
12	Flexitallic Sigma 500	U	UK	UK	U	UK	UK	Glass-Filled PTFE; "Blue color". Tested for service conditions between 45°F (7°C) and 20°F (-7°C). Gasket Mfr: Flexitallic L.P.
13	Gore-Tex TriGuard	U	U*	UK	U	U*	UK	Expanded PTFE. Tested for service conditions between 40°F (4°C) and -45°F (-43°C). Gasket Mfr: W.L. Gore and Associates, Inc.
14	Task-Line	U	UK	UK	U	UK	UK	PTFE with 304 stainless steel insert. Tested for service conditions between 222°F (106°C) and 0°F (-18°C). Gasket Mfr: PureFlex.
15	Flexitallic Sigma 533	U	U	UK	U	U	UK	Barium sulfate filled PTFE; "Off-White color". Tested for service conditions between 20°F (-7°C) and 72°F (22°C). Gasket Mfr: Flexitallic L.P.
16	Gore™ Universal Pipe Gasket (Style 800)	U	UK	UK	U	UK	UK	Tested for service conditions between -20°F (-29°C) and 284°F (140°C). Gasket Mfr: W.L. Gore and Associates, Inc.
17	Teadit 1590	U	UK	UK	U	UK	UK	Tested for service conditions between 10°F (-12°C) and 90°F (32°C). Gasket Mfr: Teadit.
18	Teadit 1580	U	UK	UK	UK	UK	UK	Tested for service conditions between 10°F (-12°C) and 90°F (32°C). Gasket Mfr: Teadit.

**U** = Gaskets used or tested within this service class

**U\*** = See comments for additional restrictions

**UK** = It is unknown if gasket is used in this service

**X** = Gasket should not be used in this service class

NOTE: Gasket test results are available from the Secretary of the Chlorine Institute

Table 3-2: Table 3-2, “Chlorine Cylinder and Ton Container Valve Connection Gaskets”, is a listing of gaskets materials and gaskets that have either been widely used for many years with chlorine cylinder and ton containers or subjected to a trial test as outlined in Pamphlet 95 Appendix C. The use of gaskets on packaging equipment (i.e. outlet cap and yoke adapter) is considered a unique application by the packaging industry. These gaskets are typically in service for a much shorter time and at less severe temperature and pressure conditions than gaskets used elsewhere in the chlorine industry. The application of this gasket evaluation procedure for chlorine cylinder and ton container valve connections is administered by the Chlorine Institute’s Packaging Committee.

Table 3-2. Chlorine Cylinder and Ton Container Valve Connection Gaskets		
Gasket Materials with an Historical Record of Use with Chlorine Cylinder and Ton Containers		
Gasket Name		Comments
1	Asbestos, compressed (Fed. Spec. HH-P 46E)	
2	Lead with 0 - 4% antimony	
Gaskets Tested in Chlorine Service Following Chlorine Institute Evaluation Procedures for Cylinder and Ton Container Valves (Performance results available from the Chlorine Institute)		
1	GORE-TEX TriGuard	Expanded PTFE

Table 3-3: Table 3-3 is a listing of gasket materials that have found user acceptance in wet chlorine service. Wet service gaskets are usually used at lower pressure than dry service gaskets and the gaskets are less prone to variations between manufacturers provided the descriptions in Table 3-3 are completely followed. Therefore, generic gasket descriptions are given in lieu of specific manufacturers' brand names. New gasket materials can be added to Table 3-3 following the procedures in Pamphlet 95.

Table 3-3. Gasket Materials That Have Found User Acceptance in Wet Chlorine Service (1,2)

1	<b>Expanded PTFE gasket</b> , sheet made from 100% Virgin PTFE without fillers and without pigmentation. A lowered density product (range of 0.6 s.g. to 1.2 s.g) than skived or filled PTFE Sheet (approx. 2.1 s.g. or higher), has a multi-directional fibrillated structure that resists cold-flow and creep relaxation.
2	<b>Microcellular PTFE gasket</b> , sheet made from 100% Virgin PTFE without fillers and without pigmentation. A lowered density product than skived or filled PTFE Sheet made with a manufacturing process that creates resistance to cold-flow and creep relaxation.
3	<b>Filled PTFE gasket</b> , sheet reinforced with glass beads or barium sulfate fillers to reduce creep and cold-flow characteristics. Displays good sealing ability in higher pressure applications yet does not require very high torque loads. Generally used on hard surface flanging as opposed to plastic flange faces.
4	<b>Ethylene propylene high polymer content (EPDM) elastomer</b> , peroxide cured, soft (approx. 62 Durometer) for use at lower pressured applications (Up to approximately 100 psig for 1/16 inch and 75 psig for 1/8 inch thick gaskets). Generally used in wet chlorine service on thermoplastic or fiberglass reinforced plastic flanges as well as on flat faced metal flanges.
5	<b>EPDM gasket (as above), fully or partially encapsulated, with PTFE for added chemical resistance</b> . Generally used in wet chlorine service on thermoplastic or fiberglass reinforced plastic flanges as well as on flat faced metal flanges.
6	<b>Viton A Fluoroelastomer</b> , soft (approximately 60 Durometer) gasket sheet for use at lower pressure applications (up to approximately 100 psig for 1/16 inch and 75 psig for 1/8 inch thick gaskets). Generally used in wet chlorine service on thermoplastic or fiberglass reinforced plastic flanges as well as on flat faced metal flanges.
7	<b>SBR (Styrene butadiene rubber)</b> , is a low cost elastomeric gasket that has been successfully used in wet chlorine service. In recent years it has been largely replaced by more resistant EPDM or Viton gaskets. Generally used in wet chlorine service on thermoplastic or fiberglass reinforced plastic flanges as well as on flat faced metal flanges.
8	<b>Virgin PTFE</b> , (unfilled and unexpanded), a high resistance to wet and dry chlorine but is susceptible to cold flow and creep. Chlorine permeability through the gasket is relatively high. Filled or expanded PTFE is generally a better gasket material choice.

(1) When using elastomeric gaskets in flat faced plastic flanges, it is recommended that a 1/8 inch thick full face gasket be used.

(2) Grade 2 titanium can be attacked at stagnant flow areas around gaskets, especially at low pH conditions (<2.5). Porous materials, such as virgin PTFE can also cause titanium flange failures.

The Chlorine Institute does not approve, rate, certify, or endorse any gasket used in chlorine service. The information on gaskets and gasket materials contained in the gasket tables reflects information obtained from member companies in their use and/or evaluation of the gasket or gasket material. Gasket users should refer to the test results for more complete information on gaskets that have been field tested. Test results can be obtained from the gasket manufacturer or the Chlorine Institute. Review of test results should be part of the process used in making gasket use decisions.