

### CR-CHLOROPRENE (NEOPRENE)

Chloroprene is a synthetic rubber that is suitable for use against moderate acids, alkalies and salt solutions. It has good resistance to commercial oils and fuels. It is very poor against strong oxidizing acids, aromatic and chlorinated hydrocarbons. Its temperature range would be from approximately -60°F to 250°F (-51°C to 121°C).

### BUNA-N/RUBBER (NITRILE, NBR)

Buna-N is a synthetic rubber that has good resistance to oils and solvents, aromatic and aliphatic hydrocarbons, petroleum oils and gasoline over a wide range of temperature. It also has good resistance to caustics and salts but only fair acid resistance. It is poor in strong oxidizing agents, chlorinated hydrocarbons, ketones and esters. It is suitable over a temperature range of approximately -60°F to 250°F (-51°C to 121°C).

### EPDM (ETHYLENE PROPYLENE)

This synthetic material has good resistance to strong acids, alkalies, salts and chlorine solutions. It is not suitable for use in oils, solvents or aromatic hydrocarbons. Its temperature range would be between -70°F to 350°F (-57°C to 177°C).

### FLUOROCARBON (VITON®)

Fluorocarbon elastomer has good resistance to oils, fuel, chlorinated solvents, aliphatic and aromatic hydrocarbons and strong acids. It is not suitable for use against amines, esters, ketones or steam. Its normal temperature range would be between -15°F to 450°F (-26°C to 232°C).

### CHLOROSULFONATED POLYETHYLENE (HYPALON®)

Hypalon® has good acid, alkali and salt resistance. It resists weathering, sunlight, ozone, oils and commercial fuels such as diesel and kerosene. It is not good in aromatics or chlorinated hydrocarbons and has poor resistance against chromic acid and nitric acid. Its normal temperature range would be between -50°F and 275°F (-46°C and 135°C).

### NATURAL RUBBER

Natural rubber has good resistance to mild acids and alkalis, salts and chlorine solutions. It has poor resistance to oils and solvents and is not recommended for use with ozone. Its temperature range is very limited and is suitable only for use from -70°F to 200°F (-57°C to 93°C).

### SILICONES

Silicone rubbers have good resistance to hot air. They are unaffected by sunlight and ozone. They are not, however, suitable for use against steam, aliphatic and aromatic hydrocarbons. The temperature range would be between -65°F to 500°F (-54°C to 260°C).

### VEGETABLE FIBER SHEET

Vegetable fiber sheet is a tough pliable gasket material manufactured by paper making techniques utilizing plant fibers and a glue-glycerine impregnation. It is widely used for sealing petroleum products, gases and a wide variety of solvents. Its maximum temperature limit is 250°F (121°C). If a more compressible material is required, a combination cork-fiber sheet is available. The cork-fiber sheet has the same maximum temperature limitation as the vegetable fiber sheet.

**NOTE:** Viton® and Hypalon® are registered trademarks of DuPont.

## COMPRESSED NON-ASBESTOS

Early efforts to replace asbestos resulted in the introduction and testing of compressed non-asbestos products in the 1970's. Many of these products have seen extensive use since that period, however there have been enough problems to warrant careful consideration in choosing a replacement material for compressed asbestos. Most manufacturers of non-asbestos sheet materials use synthetic fibers, like aramid or Kevlar®, in conjunction with an elastomeric binder. The elastomeric binder makes up a larger percentage of this sheet and thereby becomes a more important consideration when determining applications.

### L-441

A general service sheet gasket material with a wide range of application potential. Manufactured with a formulation of high quality fillers, premium aramid fibers and nitrile binder, L-441 is the workhorse of the Lamons gasket line.

#### Applications and Characteristics

- Excellent sealing ability
- Excellent chemical resistance
- Good creep relaxation minimization
- Great recovery

Creep Relaxation	ASTM F-38B (1/32")	20%
Sealability	ASTM F-37A (1/32")	0.25 ml/hr.
Compressibility	ASTM F-36J	7-17%
Recovery	ASTM F-36J	50% min.
Tensile Strength	ASTM F-152 (cross-grain) psi (MPa)	Typical 2000 (14)
Change in Tensile	ASTM F-152 after immersion in ASTM Oil #3 @ 5 hrs./300°F (149°C)	25% max. decrease
Weight Increase	ASTM F-146 after immersion in Fuel B @ 5 hrs./73°F (23°C)	15% Maximum
Thickness Increase	ASTM F-146 after immersion in fluid:	
	ASTM Oil I, 5 hrs./300°F (149°C)	0-5%
	ASTM Oil 3, 5 hrs./300°F (149°C)	0-5%
	ASTM Fuel A, 5 hrs./73°F (23°C)	0-5%
	ASTM Fuel B, 5 hrs./73°F (23°C)	0-7%
Standard Line Callout	ASTM F-104	F712121B3E22M5
Leachable Chlorides	FSA Method (Typical)	100 ppm
Density	112 lbs/ft <sup>3</sup> (1.8 g/cc)	
Color	Blue	
Temperature Range	-40°F to 400°F (-40°C to 204°C)	

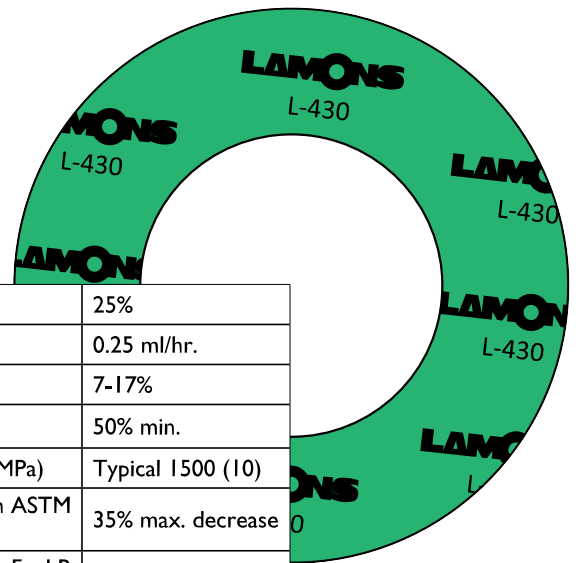
**NOTE:** Kelvar® is a registered trademark of DuPont.

## L-430

A general purpose sheet gasket material with superior mechanical properties. Constructed with premium aramid fiber and nitrile binder, L-430 is a general service sheet material with compatibility to many services.

### Applications and Characteristics:

- Used successfully in mild organic and inorganic acids
- Diluted alkalis
- General chemicals
- Synthetic oils
- Petroleum and petroleum derivatives



Creep Relaxation	ASTM F-38B (1/32")	25%
Sealability	ASTM F-37A (1/32")	0.25 ml/hr.
Compressibility	ASTM F-36j	7-17%
Recovery	ASTM F-36j	50% min.
Tensile Strength	ASTM F-152 (cross-grain) psi (MPa)	Typical 1500 (10)
Change in Tensile	ASTM F-152 after immersion in ASTM Oil #3 @ 5 hrs./300°F (149°C)	35% max. decrease
Weight Increase	ASTM F-146 after immersion in Fuel B @ 5 hrs./73°F (23°C)	15% Maximum
Thickness Increase	ASTM F-146 after immersion in fluid:	
	ASTM Oil 1, 5 hrs./300°F (149°C)	0-5%
	ASTM Oil 3, 5 hrs./300°F (149°C)	0-5%
	ASTM Fuel A, 5 hrs./73°F (23°C)	0-5%
	ASTM Fuel B, 5 hrs./73°F (23°C)	0-7%
Standard Line Callout	ASTM F-104	F712111E12M4
Leachable Chlorides	FSA Method (Typical)	200 ppm
Density	112 lbs/ft <sup>3</sup> (1.8 g/cc)	
Color	White/Green	
Temperature Range	-40°F to 400°F (-40°C to 204°C)	

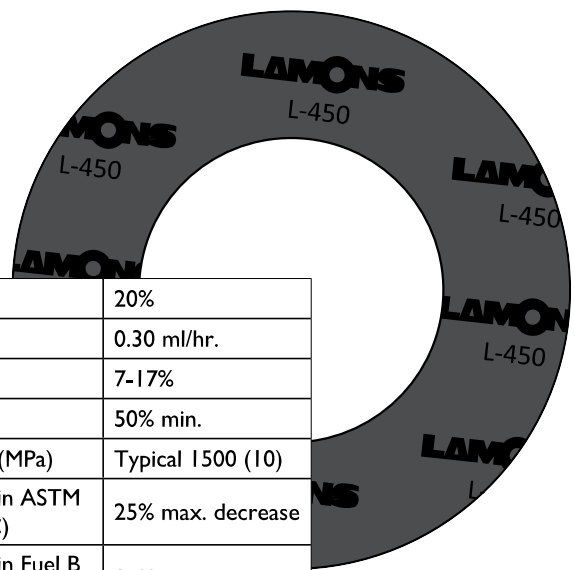
## L-450

A premium sheet material utilizing carbon fiber and graphite as reinforcing agents. L-450 is designed to perform in extreme temperatures and pressures. Standardization and consolidation of many other gasket materials can be achieved by the use of L-450.

### Applications and Characteristics:

- Good anti-stick properties
- Good steam resistance, water, stronger acids and alkalis, inert gases, general chemicals, oils and fuels, petroleum and petroleum derivatives.

Creep Relaxation	ASTM F-38B (1/32")	20%
Sealability	ASTM F-37A (1/32")	0.30 ml/hr.
Compressibility	ASTM F-36J	7-17%
Recovery	ASTM F-36J	50% min.
Tensile Strength	ASTM F-152 (cross-grain) psi (MPa)	Typical 1500 (10)
Change in Tensile	ASTM F-152 after immersion in ASTM Oil #3 @ 5 hrs./300°F (149°C)	25% max. decrease
Weight Increase	ASTM F-146 after immersion in Fuel B @ 5 hrs./73°F (23°C)	15% Maximum
Thickness Increase	ASTM F-146 after immersion in fluid:	
	ASTM Oil 1, 5 hrs./300°F (149°C)	0-5%
	ASTM Oil 3, 5 hrs./300°F (149°C)	0-5%
	ASTM Fuel A, 5 hrs./73°F (23°C)	0-5%
	ASTM Fuel B, 5 hrs./73°F (23°C)	0-7%
Standard Line Callout	ASTM F-104	F712122B3E22M5
Leachable Chlorides	FSA Method (Typical)	200 ppm
Density	87 lbs/ft <sup>3</sup> (1.4 g/cc)	
Color	Black	
Temperature Range	-40°F to 650°F (-40°C to 343°C)	



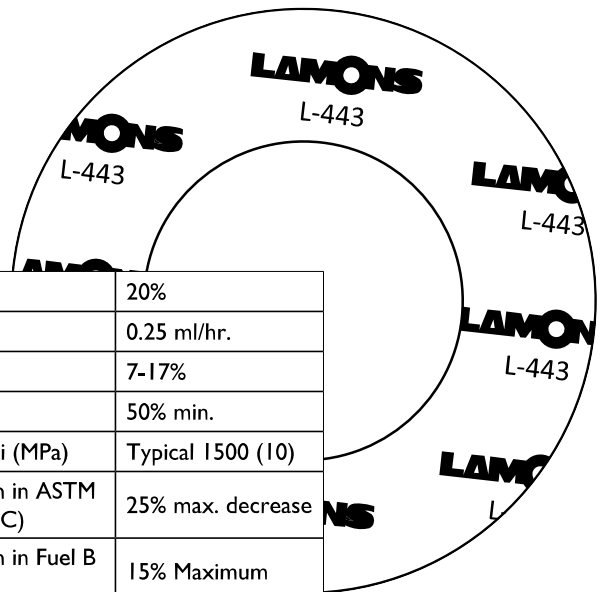
## L-443

A compressed gasket material with a reinforcement structure consisting of glass and aramid fibers. Excellent resistance to steam can be realized due to the addition of glass fiber. A premium nitrile binder is utilized to achieve resilience and additional chemical resistance.

### Applications and Characteristics:

- It can be applied to a variety of process media including steam, general chemicals, petroleum and petroleum derivatives.
- It possesses excellent creep relaxation minimization and good mechanical properties.

Creep Relaxation	ASTM F-38B (1/32")	20%
Sealability	ASTM F-37A (1/32")	0.25 ml/hr.
Compressibility	ASTM F-36J	7-17%
Recovery	ASTM F-36J	50% min.
Tensile Strength	ASTM F-152 (cross-grain) psi (MPa)	Typical 1500 (10)
Change in Tensile	ASTM F-152 after immersion in ASTM Oil #3 @ 5 hrs./300°F (149°C)	25% max. decrease
Weight Increase	ASTM F-146 after immersion in Fuel B @ 5 hrs./73°F (23°C)	15% Maximum
Thickness Increase	ASTM F-146 after immersion in fluid:	
	ASTM Oil 1, 5 hrs./300°F (149°C)	0-5%
	ASTM Oil 3, 5 hrs./300°F (149°C)	0-5%
	ASTM Fuel A, 5 hrs./73°F (23°C)	0-5%
	ASTM Fuel B, 5 hrs./73°F (23°C)	0-7%
Standard Line Callout	ASTM F-104	F712132B3E21M5
Leachable Chlorides	FSA Method (Typical)	200 ppm
Density	100 lbs/ft <sup>3</sup> (1.6 g/cc)	
Color	White/Green	
Temperature Range	-40°F to 500°F (-40°C to 260°C)	



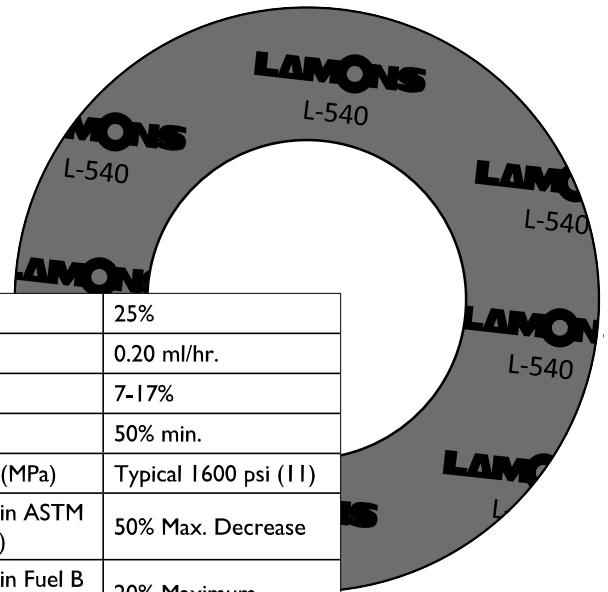
## L-540

A compressed sheet gasket material utilizing a neoprene binder. This material has an inherent resistance to oil and petroleum based solvents.

### Applications and Characteristics:

- It is chemically stable and possesses good mechanical properties.
- It is an excellent choice for water, saturated steam refrigerants, oils and fuels.

Creep Relaxation	ASTM F-38B (1/32")	25%
Sealability	ASTM F-37A (1/32")	0.20 ml/hr.
Compressibility	ASTM F-36J	7-17%
Recovery	ASTM F-36J	50% min.
Tensile Strength	ASTM F-152 (cross-grain) psi (MPa)	Typical 1600 psi (11)
Change in Tensile	ASTM F-152 after immersion in ASTM oil #3 @ 5 hrs./300°F (149°C)	50% Max. Decrease
Weight Increase	ASTM F-146 after immersion in Fuel B @ 5 hrs./73°F (23°C)	20% Maximum
Thickness Increase	ASTM F-146 after immersion in fluid:	
	ASTM Oil I, 5 hrs./300°F (149°C)	0-10%
	ASTM Oil 3, 5 hrs./300°F (149°C)	15-25%
	ASTM Fuel A, 5 hrs./73°F (23°C)	0-10%
	ASTM Fuel B, 5 hrs./73°F (23°C)	10-20%
Standard Line Callout	ASTM F-104	F712332BE4E45M5
Leachable Chlorides	FSA Method (Typical)	500 ppm
Density	106 lbs/ft <sup>3</sup> (1.7 g/cc)	
Color	Dark Gray	
Temperature Range	-40°F to 400°F (-40°C to 204°C)	

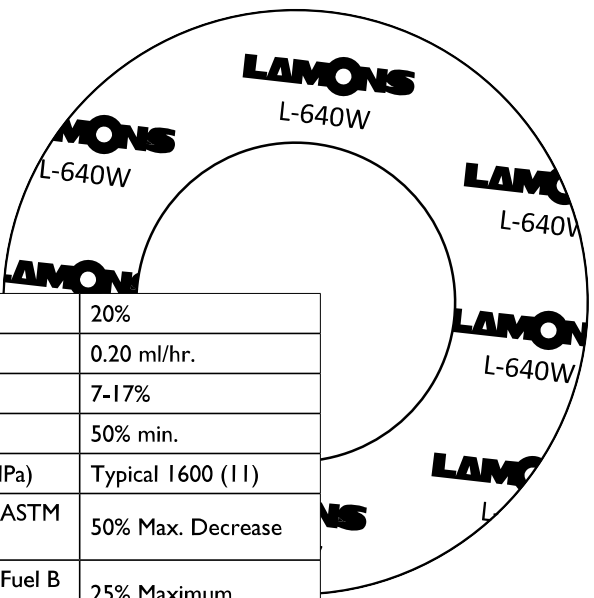


## L-640W

A premium compressed sheet gasket material comprised of an engineered blend of aramid fiber, high quality fillers and SBR binder.

### Applications and Characteristics:

- Good anti-stick properties
- Good steam resistance, water, mild, acids and alkalis, inert gases.



Creep Relaxation	ASTM F-38B (1/32")	20%
Sealability	ASTM F-37A (1/32")	0.20 ml/hr.
Compressibility	ASTM F-36J	7-17%
Recovery	ASTM F-36J	50% min.
Tensile Strength	ASTM F-152 (cross-grain) psi (MPa)	Typical 1600 (11)
Change in Tensile	ASTM F-152 after immersion in ASTM oil #3 @ 5 hrs./300°F (149°C)	50% Max. Decrease
Weight Increase	ASTM F-146 after immersion in Fuel B @ 5 hrs./73°F (23°C)	25% Maximum
Thickness Increase	ASTM F-146 after immersion in fluid:	
	ASTM Oil I, 5 hrs./300°F (149°C)	0-15%
	ASTM Oil 3, 5 hrs./300°F (149°C)	20-35%
	ASTM Fuel A, 5 hrs./73°F (23°C)	0-15%
	ASTM Fuel B, 5 hrs./73°F (23°C)	15-25%
Standard Line Callout	ASTM F-104	F712541B3E45M5
Leachable Chlorides	FSA Method (Typical)	200 ppm
Density	112 lbs/ft <sup>3</sup> (1.8g/cc)	
Color	White	
Temperature Range	-40°F to 400°F (-40°C to 204°C)	

## FLEXIBLE GRAPHITE

This is an all graphite material containing no resins or inorganic fillers. It is available with or without a metal insertion, and in adhesive-back tape form. Flexible Graphite has outstanding resistance to corrosion against a wide variety of acids, alkalis and salt solutions, organic compounds, and heat transfer fluids, even at high temperatures. There are two proven metal reinforced flexible graphite laminate materials ideal for 95% of all sheet gasket applications. Lamons flexible graphite laminates (LG-SS and LG-TC) are surface branded for easy identification. These gasket materials meet refinery, petrochemical and industrial service requirements.

### LAMONS LG-SS

LG-SS is a flat metal 316/316L stainless steel reinforced flexible graphite sheet material made with minimum 98% typical carbon content.



Nominal Thickness	0.030"-0.120" (0.8 mm - 3 mm)
316/316L insert thickness	0.002" (0.05 mm)
Density	70 lb/ft <sup>3</sup> (1.12 g/cc)
Ash content (Max)	2.0%
Total chlorine (Max)	50 ppm
Number of inserts	One
Compressibility	30%-40%
Recovery	15%-20%
Creep relaxation	<4%
Stability under stress (DIN 52913)	48 N/m <sup>2</sup>
ASME code factor "M value"	2
ASME code factor "Y value"	900 psi
Gas permeability according DIN 3535 (0.60")	<1.0 ml/min
Tp max at 15,000 psi gasket stress	3227 psi (22 MPa)
PVRC design constants*:	G <sub>b</sub> = 816 psi a = 0.377 psi G <sub>s</sub> = 0.066 psi
Typical thicknesses	1/16" (1.5 mm) 1/8" (3 mm)

\*The values are taken from BFG-6.I and ROTT. Test results are subject to interpretation and can lead to differing design constants.

## LAMONS LG-TC

LG-TC is a reinforced flexible graphite sheet material laminated with tanged 316/316L stainless steel insert and made with minimum 98% typical carbon content.



Nominal Thickness	0.030" - 0.120" (0.8 mm - 3 mm)
316/316L insert thickness	0.004"/0.005" (0.1/0.127 mm)
Density	70 lb/ft <sup>3</sup> (1.12 g/cc)
Ash content (Max)	1.0%
Total chlorine (Max)	50 ppm
Number of inserts	One
Compressibility	30%-40%
Recovery	15%-20%
Creep relaxation	<4%
Stability under stress (DIN 52913)	48 N/m <sup>2</sup>
ASME code factor "M value"	2
ASME code factor "Y value"	2500 psi
Gas permeability according DIN 3535 (0.60")	<1.0 ml/min
Tp max at 15,000 PSI gasket stress	2287 psi (16 MPa)
PVRC design constants*:	G <sub>b</sub> = 1400 psi a = 0.324 psi G <sub>s</sub> = 0.010 psi
Typical thicknesses	1/16" (1.5 mm) 1/8" (3 mm)

\*The values are taken from BFG-6.I and ROTT. Test results are subject to interpretation and can lead to differing design constants.

## LAMONS LG-L

LG-L homogeneous graphite sheets are manufactured from high carbon content of minimum 98% natural graphite.



Nominal Thickness	0.030"-0.120" (0.8 mm - 3 mm)
Density	70 lb/ft <sup>3</sup> (1.12 g/cc)
Ash content (Max)	1.0%
Total chlorine (Max)	50 ppm
Number of inserts	One
Compressibility	30%-40%
Recovery	15%-20%
Creep relaxation	<4%
Stability under stress (DIN 52913)	48 N/m <sup>2</sup>
ASME code factor "M value"	2
ASME code factor "Y value"	2500 psi
Gas permeability according DIN 3535 (0.60")	<1.0 ml/min
Tp max at 15,000 PSI gasket stress	2287 psi (16 MPa)
PVRC design constants*:	G <sub>b</sub> = 1400 psi a = 0.324 psi G <sub>s</sub> = 0.010 psi
Typical thicknesses	1/16" (1.5 mm) 1/8" (3 mm)

\*The values are taken from BFG-6.I and ROTT. Test results are subject to interpretation and can lead to differing design constants.

## GRAPHITE TAPE

Rolls of graphite tape can be furnished with a strong self-adhesive backing strip, to facilitate repair of pre-laminated surfaces, enhancement of existing design or installation as a form-in-place gasket.



## PTFE PRODUCTS



PTFE (Polytetrafluoroethylene) has emerged as the most common thermoplastic gasket material. PTFE's outstanding properties include resistance to temperature extremes from cryogenic to 450°F (232°C) (for virgin material). PTFE is highly resistant to chemicals, solvents, caustics and acids except free fluorine and alkali metals. It has a very low surface energy and does not adhere to the flanges. PTFE gaskets can be supplied in a variety of forms; either as virgin or reprocessed material, and also with a variety of filler material. The principal advantage in adding fillers to PTFE is to inhibit cold flow or creep relaxation.

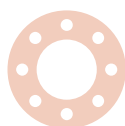
### VIRGIN / GLASS-FILLED / REPROCESSED PTFE SHEET

Typical Physical Properties					
Property	Units	ASTM Method	Typical Values (Virgin)	Typical Values (G-F)	Typical Values (Repro)
Specific Gravity	g/cc	D-792	2.14 - 2.20	2.15 - 2.24	2.13 - 2.20
Hardness	Shore D	D-2240	52 - 65	55 - 58	52 - 65
Tensile Strength	psi (MPa)	D-638 D-1708	2800 min (19.3 MPa)	1000 - 2000 (7-14 MPa)	1500 - 2400 (10 MPa - 17 MPa)
Elongation	%	D638 D-1708	270 min	50 - 150	75 - 200
Deformation Under Load (73°F, 2000 psi, 24 hrs.)	%	D-621	15 - 16	3 - 9	N/A
Coefficient of Linear Thermal Expansion (78°F - 400°F)	in/in/°F	D-696	$4 - 9 \times 10^{-5}$	$3 - 8 \times 10^{-5}$	N/A
Thermal Conductivity	BTU/hr/ft²/F-in	C-177	1.7	2.5 - 3.5	
Dielectric Strength	volts/mil	D-149a	300 min	N/A	500 - 1000
Temperature Range	°F (°C)		Cryogenic to 450°F (232°C)	Cryogenic to 450°F (232°C)	Cryogenic to 450°F (232°C)

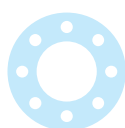
## BIAXIALLY ORIENTATED PTFE SHEET

Lamons offers biaxially orientated PTFE sheet gasket material that is specifically designed for the chemical industry. The sheet size available is normally 60" x 60" (1524 mm x 1524 mm) in 1/32" (0.8 mm), 1/16" (1.5 mm) & 1/8" (3 mm) thickness, but it is also available in 70" x 70" (1778 mm x 1778 mm), plus other variations of thickness. The material is manufactured to ensure the properties are the same in all directions, therefore reducing creep, which is often found in other types of PTFE gasket materials.

This material is available in various grades:



A biaxially orientated silica-filled PTFE sheet for use in sealing most chemicals except molten alkali metals, fluorine gas, and hydrogen fluoride. This material is approved for potable water service, complies with requirements of FDA regulations and can be used at all concentrations of sulfuric acid.



A biaxially orientated sheet material containing PTFE and hollow glass microspheres for use in sealing most chemicals except molten alkali metals, fluorine gas and hydrogen fluoride. This material is approved for potable water service, complies with requirements of FDA regulations and has exceptional compression characteristics making it good for use in glass lined flanges or where loading problems exist.



A pigment-free biaxially orientated, barium sulfate-filled PTFE sheet for use in sealing food, pharmaceuticals, and other general chemical media. This material complies with requirements of FDA regulations and is acceptable for use in aqueous hydrofluoric acid below 49%, but is not suitable for sealing molten alkali metals or fluorine gas.

Typical Physical Properties							
Style	Units	Silica Filler		Hollow Glass Microspheres		Barium Sulfate	
Color		Pink		Blue		Off White	
Thickness	in (mm)	1/16" (1.6)	1/8" (3.175)	1/16" (1.6)	1/8" (3.175)	1/16" (1.6)	1/8" (3.175)
Density	lbs/ft <sup>3</sup> (g/cc)	13.7 (2.2)	13.7 (2.2)	87 (1.4)	87 (1.4)	18 (2.9)	18 (2.9)
ASTM Compressibility	%	7	7	35	30	8	7
ASTM Recovery	%	44	45	44	43	43	45
ASTM Tensile Strength	psi (MPa)	2320 (16)	2175 (15)	2030 (14)	1450 (10)	2175 (15)	2465 (17)
DIN Residual Stress @ 175°C	psi (MPa)	4351 (30)	2900 (20)	4351 (30)	3770 (26)	4061 (28)	2755 (19)
DIN Gas Permeability	mL/min	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
ASTM Liquid Leakage; Fuel A 50psi	mL/hr	4	3	0.65	0.75	3	3
ASTM Creep Relaxation	%	35	53	31	47	33	51
MAX Temp	°F (°C)	500 (260)		500 (260)		500 (260)	
MAX Pressure	psi/MPa	1235/ 8.5		1235/ 8.5		1235/ 8.5	

## EXPANDED PTFE SHEET

Expanded PTFE effectively fills flange imperfections for a tight, leak-free seal. It is easily compressed under lower loads, beneficial for applications such as FRP or glass-lined flanges. Unlike conventional PTFE, which is prone to creep and cold flow, expanded PTFE has good creep resistance and bolt torque retention properties even under higher compressive force. With expanded PTFE, it is much more possible to bolt up once and not have to retorquer later. Most commonly FDA/USDA suitable.

Typical Physical Properties		
Property	ASTM Method	Typical Values
Compressibility	F-36	68%
Recovery	F-36	12%
Sealability	F-37-B	0.00 ml (Fuel A) / 0.02 hr (Nitrogen)
Creep Relaxation	F-38	32% @ 212°F (100°C)/ 16% @ 73°F (23°C)
Temperature Limit		Cryogenic to 450°F (232°C)
Pressure Limit		Full vacuum to 3000 psi (20 MPa)



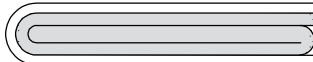
## PTFE JOINT SEALANT

100% pure, specially processed PTFE sealant provides soft, highly compressible gasketing on a roll for long-life, trouble-free sealing that cuts maintenance and storing costs. Under pressure, PTFE sealant provides a very thin and wide ribbon-like joint sealant so that the smallest possible gasket surface area is exposed to the harmful effects of corrosive media.

## PTFE ENVELOPE GASKETS

Envelope gaskets utilizing PTFE jackets have become popular for use in severely corrosive services because of their low minimum seating stresses, excellent creep resistance, high deformability and choice of a variety of filler materials to assure optimum performance on any specific application. Fillers such as corrugated metal and rubber sheets are available.

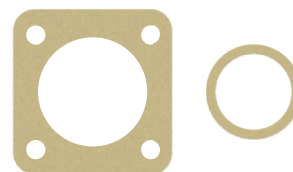
There are three basic designs of envelopes:

- 1. Slit Type / V Type / Style 800:** sliced from cylinders and split from the outside diameter to within approximately 1/16" (1.5 mm) of the inside diameter. The bearing surface is determined by the filler dimensions. Clearance is required between the ID of the filler and the envelope ID. The gasket OD normally rests within the bolt hole circle and the ID is approximately equal to the nominal ID of pipe. Available in sizes to a maximum OD of 24.

- 2. Milled Type / Square Cut / Style 820:** machined from cylinder stock. The jacket is machined from the OD to within approximately 1/32" (0.8 mm) of its ID. The jacket's ID fits flush with pipe bore and its OD nests within the bolts. Available in sizes up to a maximum OD of 24" (609 mm). Milled envelopes are more expensive than slit type since considerably more material is lost in machining.

- 3. Formed Tape Type:** large diameter (over 12 NPS) and irregularly shaped envelopes are formed from tape and heat sealed to produce a continuous jacket construction.


## HIGH TEMPERATURE SHEET PRODUCTS

### MICA

Mica sheet is a readily-processible form comprised of a high percentage of mineral held together with small amount of silicon binder. Its lamellar and non-fibrous structure, together with the low ratio of binder allows for a significant reduction of weight loss at elevated temperatures, and especially when compared to other high temperature compositions. It resists a wide array of chemicals and is unaffected by water, acids, bases, solvents and mineral oils.



Typical Physical Properties		
Property	Method	Typical Values
Density	IEC 371-2	118 lbs/ft <sup>3</sup> (1.9 g/cc)
Tensile Strength	DIN 52910	2,900 psi (20 MPa)
Compressibility	ASTM F36-J	25%
Recovery	ASTM F36-J	35%
Ignition Loss @ 800°C	DIN 52911	<5%
Dielectric Strength	IEC 243 - 23°C	Approx. 20 kV/mm (508 V/mil)
Creep Strength 50MPa, 300°C	DIN 52913	Approx. 5801 psi (40 MPa)
Creep Strength 7252psi, 572°F	DIN 52913	5800 (40 MPa)
MAX Temperature	N/A	1832 (1000)
MAX Pressure	N/A	72.5 psi (5 bar)

Mica sheet is used in automobile exhaust manifolds, gas turbines, gas and oil burners, heat exchangers and other bolted flanged connections.

**NOTE ON HIGH TEMPERATURE GASKETS:** Lamons also utilizes mica in conjunction with oxidation resistant grade flexible graphite as a filler material for spiral wound gaskets, and as a facing material for kammprofiled and corrugated gaskets in the semi-metallic section. While the HTG configuration is not quite as high in temperature rating as mica sheet, it offers the sealing ability for pressure rating found in a semi-metallic gasket design

### CERAMIC FIBER

Ceramic fiber is available in sheet or blanket form and makes an excellent gasket material for hot air duct work with low pressures and light flanges. It is satisfactory for service up to approximately 2000°F (1093°C). Ceramic material is also used as a filler material in spiral-wound gaskets.

## NON-METALLIC GASKET DIMENSIONS FOR PIPE FLANGES

Soft material gaskets are dimensionally sized per ASME B16.21 for use with ASME B16.5 flanges. Non-metallic gaskets are used in Raised Face (RF), Flat Face (FF), Welding Neck (WN), and Slip On (SO) flanges. Typically, the outside diameter dimension is the bolt circle diameter minus one bolt diameter unless a full face gasket is requested.

### ASME B16.21 GASKET TOLERANCES:

Nominal Pipe Size (NPS) 12 and smaller Outside Diameter (OD): +0.0", -1/16" (+0.0, -1.5 mm)

Nominal Pipe Size (NPS) 14 and Larger Outside Diameter (OD): +0.0", -1/8" (+0.0, -3.0 mm)

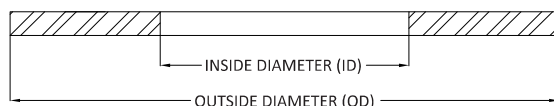
Nominal Pipe Size (NPS) 12 and smaller Inside Diameter (ID):  $\pm 1/16"$  ( $\pm 1.5$  mm)

Nominal Pipe Size (NPS) 14 and Larger Inside Diameter (ID):  $\pm 1/8"$  ( $\pm 3.0$  mm)

Bolt Circle Diameter:  $\pm 1/16"$  ( $\pm 1.5$  mm)

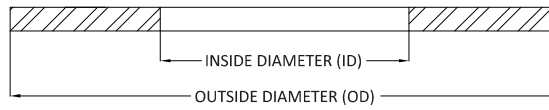
Center to center of adjacent bolt holes:  $\pm 1/32"$  ( $\pm 1.0$  mm)

## DIMENSIONS FOR RING GASKETS PER ASME B16.21 TO SUIT ASME B16.5 FLANGES



Nominal Pipe Size (NPS)	Class 150			
	Inside Diameter (ID)		Outside Diameter (OD)	
	Inches	mm	Inches	mm
1/2	0.84	21	1.88	48
3/4	1.06	27	2.25	57
1	1.31	33	2.62	67
1 1/4	1.66	42	3.00	76
1 1/2	1.91	49	3.38	86
2	2.38	60	4.12	105
2 1/2	2.88	73	4.88	124
3	3.50	89	5.38	137
3 1/2	4.00	102	6.38	162
4	4.50	114	6.88	175
5	5.56	141	7.75	197
6	6.62	168	8.75	222
8	8.62	219	11.00	279
10	10.75	273	13.38	340
12	12.75	324	16.13	410
14	14.00	356	17.75	451
16	16.00	406	20.25	514
18	18.00	457	21.62	549
20	20.00	508	23.88	607
24	24.00	610	28.25	718

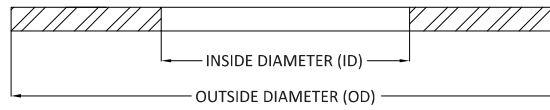
## DIMENSIONS FOR RING GASKETS PER ASME B16.21 TO SUIT ASME B16.5 FLANGES



Class 300				
Nominal Pipe Size (NPS)	Inside Diameter (ID)		Outside Diameter (OD)	
	Inches	mm	Inches	mm
1/2	0.84	21	2.12	54
3/4	1.06	27	2.62	67
1	1.31	33	2.88	73
1 1/4	1.66	42	3.25	83
1 1/2	1.91	49	3.75	95
2	2.38	60	4.38	111
2 1/2	2.88	73	5.12	130
3	3.50	89	5.88	149
3 1/2	4.00	102	6.50	165
4	4.50	114	7.12	181
5	5.56	141	8.50	216
6	6.62	168	9.88	251
8	8.62	219	12.12	308
10	10.75	273	14.25	362
12	12.75	324	16.62	422
14	14.00	356	19.12	486
16	16.00	406	21.25	540
18	18.00	457	23.50	597
20	20.00	508	25.75	654
24	24.00	610	30.50	775

Class 400				
Nominal Pipe Size (NPS)	Inside Diameter (ID)		Outside Diameter (OD)	
	Inches	mm	Inches	mm
1/2	0.84	21	2.12	54
3/4	1.06	27	2.62	67
1	1.31	33	2.88	73
1 1/4	1.66	42	3.25	83
1 1/2	1.91	49	3.75	95
2	2.38	60	4.38	111
2 1/2	2.88	73	5.12	130
3	3.50	89	5.88	149
3 1/2	4.00	102	6.38	162
4	4.50	114	7.00	178
5	5.56	141	8.38	213
6	6.62	168	9.75	248
8	8.62	219	12.00	305
10	10.75	273	14.12	359
12	12.75	324	16.50	419
14	14.00	356	19.00	483
16	16.00	406	21.12	536
18	18.00	457	23.38	594
20	20.00	508	25.50	648
24	24.00	610	30.25	768

## DIMENSIONS FOR RING GASKETS PER ASME B16.21 TO SUIT ASME B16.5 FLANGES



Class 600				
Nominal Pipe Size (NPS)	Inside Diameter (ID)		Outside Diameter (OD)	
	Inches	mm	Inches	mm
1/2	0.84	21	2.12	54
3/4	1.06	27	2.62	67
1	1.31	33	2.88	73
1 1/4	1.66	42	3.25	83
1 1/2	1.91	49	3.75	95
2	2.38	60	4.38	111
2 1/2	2.88	73	5.12	130
3	3.50	89	5.88	149
3 1/2	4.00	102	6.38	162
4	4.50	114	7.62	194
5	5.56	141	9.50	241
6	6.62	168	10.50	267
8	8.62	219	12.62	321
10	10.75	273	15.75	400
12	12.75	324	18.00	457
14	14.00	356	19.38	492
16	16.00	406	22.25	565
18	18.00	457	24.12	613
20	20.00	508	26.88	683
24	24.00	610	31.12	791

Class 900				
Nominal Pipe Size (NPS)	Inside Diameter (ID)		Outside Diameter (OD)	
	Inches	mm	Inches	mm
1/2	0.84	21	2.50	64
3/4	1.06	27	2.75	70
1	1.31	33	3.12	79
1 1/4	1.66	42	3.50	89
1 1/2	1.91	49	3.88	99
2	2.38	60	5.62	143
2 1/2	2.88	73	6.50	165
3	3.50	89	6.62	168
3 1/2	-	-	-	-
4	4.50	114	8.12	206
5	5.56	141	9.75	248
6	6.62	168	11.38	289
8	8.62	219	14.12	359
10	10.75	273	17.12	435
12	12.75	324	19.62	498
14	14.00	356	20.50	521
16	16.00	406	22.62	575
18	18.00	457	25.12	638
20	20.00	508	27.50	699
24	24.00	610	33.00	838

# **DIMENSIONS FOR FULL FACE GASKETS TO SUIT ASME B16.5 FLANGES**

Nominal Pipe Size (NPS)	Class 150							
	Inside Diameter (ID)		Outside Diameter (OD)		# of Bolt Holes	Bolt Hole Diameter (Inches)	Bolt Circle Diameter (BCD)	
	Inches	mm	Inches	mm			Inches	mm
1/2	0.84	21	3.50	89	4	0.62	2.38	60.3
3/4	1.06	27	3.88	99	4	0.62	2.75	69.9
1	1.31	33	4.25	108	4	0.62	3.12	79.4
1 1/4	1.66	42	4.63	118	4	0.62	3.50	88.9
1 1/2	1.91	49	5.00	127	4	0.62	3.88	98.4
2	2.38	60	6.00	152	4	0.75	4.75	120.7
2 1/2	2.88	73	7.00	178	4	0.75	5.50	139.7
3	3.50	89	7.50	191	4	0.75	6.00	152.4
3 1/2	4.00	102	8.50	216	8	0.75	7.00	177.8
4	4.50	114	9.00	229	8	0.75	7.50	190.5
5	5.56	141	10.00	254	8	0.88	8.50	215.9
6	6.62	168	11.00	279	8	0.88	9.50	241.3
8	8.62	219	13.50	343	8	0.88	11.75	298.5
10	10.75	273	16.00	406	12	1.00	14.25	362.0
12	12.75	324	19.00	483	12	1.00	17.00	431.8
14	14.00	356	21.00	533	12	1.12	18.75	476.3
16	16.00	406	23.50	597	16	1.12	21.25	539.8
18	18.00	457	25.00	635	16	1.25	22.75	577.9
20	20.00	508	27.50	699	20	1.25	25.00	635.0
24	24.00	610	32.00	813	20	1.38	29.50	749.3

Nominal Pipe Size (NPS)	Class 300							
	Inside Diameter (ID)		Outside Diameter (OD)		# of Bolt Holes	Bolt Hole Diameter (Inches)	Bolt Circle Diameter (BCD)	
	Inches	mm	Inches	mm			Inches	mm
1/2	0.84	21	3.75	95	4	0.63	2.63	66.8
3/4	1.06	27	4.62	117	4	0.75	3.25	82.6
1	1.31	33	4.88	124	4	0.75	3.50	88.9
1 1/4	1.66	42	5.25	133	4	0.75	3.88	98.4
1 1/2	1.91	49	6.12	155	4	0.88	4.50	114.3
2	2.38	60	6.50	165	8	0.75	5.00	127.0
2 1/2	2.88	73	7.50	191	8	0.88	5.88	149.2
3	3.50	89	8.25	210	8	0.88	6.63	168.3
3 1/2	4.00	102	9.00	229	8	0.88	7.25	184.2
4	4.50	114	10.00	254	8	0.88	7.88	200.0
5	5.56	141	11.00	279	8	0.88	9.25	235.0
6	6.62	168	12.50	318	12	0.88	10.63	269.9
8	8.62	219	15.00	381	12	1.00	13.00	330.2
10	10.75	273	17.50	445	16	1.13	15.25	387.4
12	12.75	324	20.50	521	16	1.25	17.75	450.9
14	14.00	356	23.00	584	20	1.25	20.25	514.4
16	16.00	406	25.50	648	20	1.38	22.50	571.5
18	18.00	457	28.00	711	24	1.38	24.75	628.7
20	20.00	508	30.50	775	24	1.38	27.00	685.8
24	24.00	610	36.00	914	24	1.63	32.00	812.8

**DIMENSIONS FOR FULL FACE GASKETS  
TO SUIT ASME B16.5 FLANGES**

Nominal Pipe Size (NPS)	Class 400							
	Inside Diameter (ID)		Outside Diameter (OD)		# of Bolt Holes	Bolt Hole Diameter (Inches)	Bolt Circle Diameter (BCD)	
	Inches	mm	Inches	mm			Inches	mm
1/2	0.84	21	3.75	95	4	0.63	2.62	66.5
3/4	1.06	27	4.63	117	4	0.75	3.25	82.6
1	1.31	33	4.88	124	4	0.75	3.50	88.9
1 1/4	1.66	42	5.25	133	4	0.75	3.88	98.4
1 1/2	1.91	49	6.13	156	4	0.88	4.50	114.3
2	2.38	60	6.50	165	8	0.75	5.00	127.0
2 1/2	2.88	73	7.50	191	8	0.88	5.88	149.2
3	3.50	89	8.25	210	8	0.88	6.63	168.3
3 1/2	4.00	102	9.00	229	8	1.00	7.25	184.2
4	4.50	114	10.00	254	8	1.00	7.88	200.0
5	5.56	141	11.00	279	8	1.00	9.25	235.0
6	6.62	168	12.50	318	12	1.00	10.63	269.9
8	8.62	219	15.00	381	12	1.13	13.00	330.2
10	10.75	273	17.50	445	16	1.25	15.25	387.4
12	12.75	324	20.50	521	16	1.38	17.75	450.9
14	14.00	356	23.00	584	20	1.38	20.25	514.4
16	16.00	406	25.50	648	20	1.50	22.50	571.5
18	18.00	457	28.00	711	24	1.50	24.75	628.7
20	20.00	508	30.50	775	24	1.63	27.00	685.8
24	24.00	610	36.00	914	24	1.88	32.00	812.8

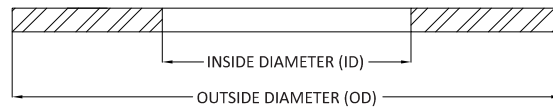
Nominal Pipe Size (NPS)	Class 600							
	Inside Diameter (ID)		Outside Diameter (OD)		# of Bolt Holes	Bolt Hole Diameter (Inches)	Bolt Circle Diameter (BCD)	
	Inches	mm	Inches	mm			Inches	mm
1/2	0.84	21	3.75	95	4	0.63	2.63	66.8
3/4	1.06	27	4.63	117	4	0.75	3.25	82.6
1	1.31	33	4.88	124	4	0.75	3.50	88.9
1 1/4	1.66	42	5.25	133	4	0.75	3.88	98.4
1 1/2	1.91	49	6.13	156	4	0.88	4.50	114.3
2	2.38	60	6.50	165	8	0.75	5.00	127.0
2 1/2	2.88	73	7.50	191	8	0.88	5.88	149.2
3	3.50	89	8.25	210	8	0.88	6.63	168.3
3 1/2	4.00	102	9.00	229	8	1.00	7.25	184.2
4	4.50	114	10.75	273	8	1.00	8.50	215.9
5	5.56	141	13.00	330	8	1.13	10.50	266.7
6	6.62	168	14.00	356	12	1.13	11.50	292.1
8	8.62	219	16.50	419	12	1.25	13.75	349.3
10	10.75	273	20.00	508	16	1.38	17.00	431.8
12	12.75	324	22.00	559	20	1.38	19.25	489.0
14	14.00	356	23.75	603	20	1.50	20.75	527.1
16	16.00	406	27.00	686	20	1.63	23.75	603.3
18	18.00	457	29.25	743	20	1.75	25.75	654.1
20	20.00	508	32.00	813	24	1.75	28.50	723.9
24	24.00	610	37.00	940	24	2.00	33.00	838.2

## DIMENSIONS FOR FULL FACE GASKETS TO SUIT ASME B16.5 FLANGES

Nominal Pipe Size (NPS)	Class 900							
	Inside Diameter (ID)		Outside Diameter (OD)		# of Bolt Holes	Bolt Hole Diameter (Inches)	Bolt Circle Diameter (BCD)	
	Inches	mm	Inches	mm			Inches	mm
1/2	0.84	21	4.75	121	4	0.88	3.25	82.6
3/4	1.06	27	5.13	130	4	0.88	3.50	88.9
1	1.31	33	5.88	149	4	1.00	4.00	101.6
1 1/4	1.66	42	6.25	159	4	1.00	4.38	111.3
1 1/2	1.91	49	7.00	178	4	1.13	4.88	124.0
2	2.38	60	8.50	216	8	1.00	6.50	165.1
2 1/2	2.88	73	9.63	245	8	1.13	7.50	190.5
3	3.50	89	9.50	241	8	1.00	7.50	190.5
3 1/2	4.00	102	11.50	292				0.0
4	4.50	114	11.50	292	8	1.25	9.25	235.0
5	5.56	141	13.75	349	8	1.38	11.00	279.4
6	6.62	168	15.00	381	12	1.25	12.50	317.5
8	8.62	219	18.50	470	12	1.50	15.50	393.7
10	10.75	273	21.50	546	16	1.50	18.50	469.9
12	12.75	324	24.00	610	20	1.50	21.00	533.4
14	14.00	356	25.25	641	20	1.63	22.00	558.8
16	16.00	406	27.75	705	20	1.75	24.25	616.0
18	18.00	457	31.00	787	20	2.00	27.00	685.8
20	20.00	508	33.75	857	20	2.13	29.50	749.3
24	24.00	610	41.00	1041	20	2.63	35.50	901.7



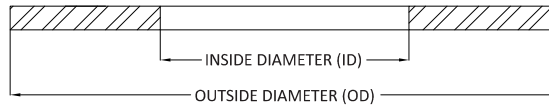
# **DIMENSIONS FOR RING GASKETS PER ASME B16.21 TO SUIT ASME B16.47 SERIES A FLANGES**



Nominal Pipe Size (NPS)	Class 150			
	Inside Diameter (ID)		Outside Diameter (OD)	
	Inches	mm	Inches	mm
26	26.00	660	30.50	775
28	28.00	711	32.75	832
30	30.00	762	34.75	883
32	32.00	813	37.00	940
34	34.00	864	39.00	991
36	36.00	914	41.25	1048
38	38.00	965	43.75	1111
40	40.00	1016	45.75	1162
42	42.00	1067	48.00	1219
44	44.00	1118	50.25	1276
46	46.00	1168	52.25	1327
48	48.00	1219	54.50	1384
50	50.00	1270	56.50	1435
52	52.00	1321	58.75	1492
54	54.00	1372	61.00	1549
56	56.00	1422	63.25	1607
58	58.00	1473	65.50	1664
60	60.00	1524	67.50	1715

Nominal Pipe Size (NPS)	Class 300			
	Inside Diameter (ID)		Outside Diameter (OD)	
	Inches	mm	Inches	mm
26	26.00	660	32.88	835
28	28.00	711	35.38	899
30	30.00	762	37.50	953
32	32.00	813	39.62	1006
34	34.00	864	41.62	1057
36	36.00	914	44.00	1118
38	38.00	965	41.50	1054
40	40.00	1016	43.88	1115
42	42.00	1067	45.88	1165
44	44.00	1118	48.00	1219
46	46.00	1168	50.12	1273
48	48.00	1219	52.12	1324
50	50.00	1270	54.25	1378
52	52.00	1321	56.25	1429
54	54.00	1372	58.75	1492
56	56.00	1422	60.75	1543
58	58.00	1473	62.75	1594
60	60.00	1524	64.75	1645

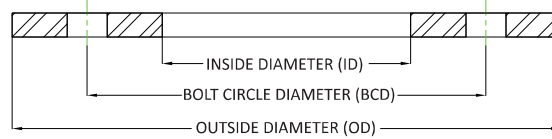
# **DIMENSIONS FOR RING GASKETS PER ASME B16.21 TO SUIT ASME B16.47 SERIES A FLANGES**



Class 400				
Nominal Pipe Size (NPS)	Inside Diameter (ID)		Outside Diameter (OD)	
	Inches	mm	Inches	mm
26	26.00	660	32.75	832
28	28.00	711	35.12	892
30	30.00	762	37.25	946
32	32.00	813	39.50	1003
34	34.00	864	41.50	1054
36	36.00	914	44.00	1118
38	38.00	965	42.25	1073
40	40.00	1016	44.38	1127
42	42.00	1067	46.38	1178
44	44.00	1118	48.50	1232
46	46.00	1168	50.75	1289
48	48.00	1219	53.00	1346
50	50.00	1270	55.25	1403
52	52.00	1321	57.26	1454
54	54.00	1372	59.75	1518
56	56.00	1422	61.75	1568
58	58.00	1473	63.75	1619
60	60.00	1524	66.25	1683

Class 600				
Nominal Pipe Size (NPS)	Inside Diameter (ID)		Outside Diameter (OD)	
	Inches	mm	Inches	mm
26	26.00	660	34.12	867
28	28.00	711	36.00	914
30	30.00	762	38.25	972
32	32.00	813	40.25	1022
34	34.00	864	42.25	1073
36	36.00	914	44.50	1130
38	38.00	965	43.50	1105
40	40.00	1016	45.50	1156
42	42.00	1067	48.00	1219
44	44.00	1118	50.00	1270
46	46.00	1168	52.26	1327
48	48.00	1219	54.75	1391
50	50.00	1270	57.00	1448
52	52.00	1321	59.00	1499
54	54.00	1372	61.25	1556
56	56.00	1422	63.50	1613
58	58.00	1473	65.50	1664
60	60.00	1524	67.75	1721

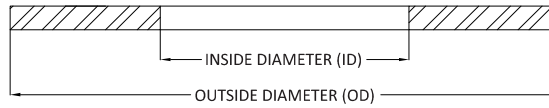
## DIMENSIONS FOR FULL FACE GASKETS TO SUIT ASME B16.47 SERIES A FLANGES



Nominal Pipe Size (NPS)	Class 150							
	Inside Diameter (ID)		Outside Diameter (OD)		# of Bolt Holes	Bolt Hole Diameter	Bolt Circle Diameter (BCD)	
	Inches	mm	Inches	mm			Inches	mm
26	26.00	660	34.25	870	24	1.38	31.75	806.5
28	28.00	711	36.50	927	28	1.38	34.00	863.6
30	30.00	762	38.75	984	28	1.38	36.00	914.4
32	32.00	813	41.75	1060	28	1.63	38.50	977.9
34	34.00	864	43.75	1111	32	1.63	40.50	1028.7
36	36.00	914	46.00	1168	32	1.63	42.75	1085.9
38	38.00	965	48.75	1238	32	1.63	45.25	1149.4
40	40.00	1016	50.75	1289	36	1.63	47.25	1200.2
42	42.00	1067	53.00	1346	36	1.63	49.50	1257.3
44	44.00	1118	55.25	1403	40	1.63	51.75	1314.5
46	46.00	1168	57.25	1454	40	1.63	53.75	1365.3
48	48.00	1219	59.50	1511	44	1.63	56.00	1422.4
50	50.00	1270	61.75	1568	44	1.88	58.25	1479.6
52	52.00	1321	64.00	1626	44	1.88	60.50	1536.7
54	54.00	1372	66.25	1683	44	1.88	62.75	1593.9
56	56.00	1422	68.75	1746	48	1.88	65.00	1651.0
58	58.00	1473	71.00	1803	48	1.88	67.25	1708.2
60	60.00	1524	73.00	1854	52	1.88	69.25	1759.0

Nominal Pipe Size (NPS)	Class 300							
	Inside Diameter (ID)		Outside Diameter (OD)		# of Bolt Holes	Bolt Hole Diameter	Bolt Circle Diameter (BCD)	
	Inches	mm	Inches	mm			Inches	mm
26	26.00	662	38.25	972	28	1.75	34.50	876.3
28	28.00	713	40.75	1035	28	1.75	37.00	939.8
30	30.00	764	43.00	1092	28	1.88	39.25	997.0
32	32.00	815	45.25	1149	28	2.00	41.50	1054.1
34	34.00	866	47.50	1207	28	2.00	43.50	1104.9
36	36.00	917	50.00	1270	32	2.13	46.00	1168.4
38	38.00	968	46.00	1168	32	1.63	43.00	1092.2
40	40.00	1019	48.75	1238	32	1.75	45.50	1155.7
42	42.00	1070	50.75	1289	32	1.75	47.50	1206.5
44	44.00	1121	53.25	1353	32	1.88	49.75	1263.7
46	46.00	1172	55.75	1416	28	2.00	52.00	1320.8
48	48.00	1223	57.75	1467	32	2.00	54.00	1371.6
50	50.00	1274	60.25	1530	32	2.13	56.25	1428.8
52	52.00	1324	62.25	1581	32	2.13	58.25	1479.6
54	54.00	1375	65.25	1657	28	2.38	61.00	1549.4
56	56.00	1426	67.25	1708	28	2.38	63.00	1600.2
58	58.00	1477	69.25	1759	32	2.38	65.00	1651.0
60	60.00	1528	71.25	1810	32	2.38	67.00	1701.8

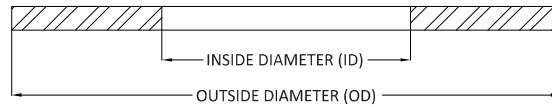
# **DIMENSIONS FOR RING GASKETS PER ASME B16.21 TO SUIT ASME B16.47 SERIES B FLANGES**



Nominal Pipe Size (NPS)	Class 150			
	Inside Diameter (ID)		Outside Diameter (OD)	
	Inches	mm	Inches	mm
26	26.00	660	28.56	725
28	28.00	711	30.56	776
30	30.00	762	32.56	827
32	32.00	813	34.69	881
34	34.00	864	36.81	935
36	36.00	914	38.88	988
38	38.00	965	41.12	1044
40	40.00	1016	43.12	1095
42	42.00	1067	45.12	1146
44	44.00	1118	47.12	1197
46	46.00	1168	49.44	1256
48	48.00	1219	51.44	1307
50	50.00	1270	53.44	1357
52	52.00	1321	55.44	1408
54	54.00	1372	57.62	1464
56	56.00	1422	59.62	1514
58	58.00	1473	62.19	1580
60	60.00	1524	64.19	1630

Nominal Pipe Size (NPS)	Class 300			
	Inside Diameter (ID)		Outside Diameter (OD)	
	Inches	mm	Inches	mm
26	26.00	660	30.38	772
28	28.00	711	32.50	826
30	30.00	762	34.88	886
32	32.00	813	37.00	940
34	34.00	864	39.12	994
36	36.00	914	41.25	1048
38	38.00	965	43.25	1099
40	40.00	1016	45.25	1149
42	42.00	1067	47.25	1200
44	44.00	1118	49.25	1251
46	46.00	1168	51.88	1318
48	48.00	1219	53.88	1369
50	50.00	1270	55.88	1419
52	52.00	1321	57.88	1470
54	54.00	1372	60.25	1530
56	56.00	1422	62.75	1594
58	58.00	1473	65.19	1656
60	60.00	1524	67.12	1705

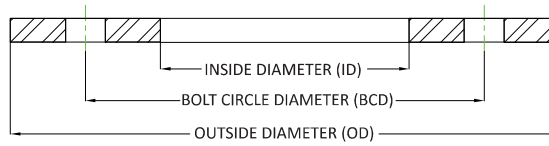
**DIMENSIONS FOR FLAT RING GASKETS PER ASME B16.21  
TO SUIT ASME B16.47 SERIES B FLANGES**



Class 400				
Nominal Pipe Size (NPS)	Inside Diameter (ID)		Outside Diameter (OD)	
	Inches	mm	Inches	mm
26	26.00	660	29.38	746
28	28.00	711	31.50	800
30	30.00	762	33.75	857
32	32.00	813	35.88	911
34	34.00	864	37.88	962
36	36.00	914	40.25	1022

Class 600				
Nominal Pipe Size (NPS)	Inside Diameter (ID)		Outside Diameter (OD)	
	Inches	mm	Inches	mm
26	26.00	660	30.12	765
28	28.00	711	32.25	819
30	30.00	762	34.62	879
32	32.00	813	36.75	933
34	34.00	864	39.25	997
36	36.00	914	41.25	1048

## DIMENSIONS FOR FULL FACE GASKETS TO SUIT ASME B16.47 SERIES B FLANGES



Class 150								
Nominal Pipe Size (NPS)	Inside Diameter (ID)		Outside Diameter (OD)		# of Bolt Holes	Bolt Hole Diameter	Bolt Circle Diameter (BCD)	
	Inches	mm	Inches	mm			Inches	mm
26	26.00	660	30.94	786	36	0.88	29.31	744.5
28	28.00	711	32.94	837	40	0.88	31.31	795.3
30	30.00	762	34.94	887	44	0.88	33.31	846.1
32	32.00	813	37.06	941	48	0.88	35.44	900.2
34	34.00	864	39.56	1005	40	1.00	37.69	957.3
36	36.00	914	41.63	1057	44	1.00	39.75	1009.7
38	38.00	965	44.25	1124	40	1.13	42.13	1070.1
40	40.00	1016	46.25	1175	44	1.13	44.13	1120.9
42	42.00	1067	48.25	1226	48	1.13	46.13	1171.7
44	44.00	1118	50.25	1276	52	1.13	48.13	1222.5
46	46.00	1168	52.81	1341	40	1.25	50.56	1284.2
48	48.00	1219	54.81	1392	44	1.25	52.56	1335.0
50	50.00	1270	56.81	1443	48	1.25	54.56	1385.8
52	52.00	1321	58.81	1494	52	1.25	56.56	1436.6
54	54.00	1372	61.00	1549	56	1.25	58.75	1492.3
56	56.00	1422	63.00	1600	60	1.25	60.75	1543.1
58	58.00	1473	65.94	1675	48	1.38	63.44	1611.4
60	60.00	1524	67.94	1726	52	1.38	65.44	1662.2

Class 300								
Nominal Pipe Size (NPS)	Inside Diameter (ID)		Outside Diameter (OD)		# of Bolt Holes	Bolt Hole Diameter	Bolt Circle Diameter (BCD)	
	Inches	mm	Inches	mm			Inches	mm
26	26.00	660	34.13	867	32	1.38	31.63	803.4
28	28.00	711	36.25	921	36	1.38	33.75	857.3
30	30.00	762	39.00	991	36	1.50	36.25	920.8
32	32.00	813	41.50	1054	32	1.63	38.50	977.9
34	34.00	864	43.63	1108	36	1.63	40.63	1032.0
36	36.00	914	46.13	1172	32	1.75	42.88	1089.2
38	38.00	965	48.13	1223	36	1.75	44.88	1140.0
40	40.00	1016	50.13	1273	40	1.75	46.88	1190.8
42	42.00	1067	52.50	1334	36	1.88	49.00	1244.6
44	44.00	1118	54.50	1384	40	1.88	51.00	1295.4
46	46.00	1168	57.50	1461	36	2.00	53.75	1365.3
48	48.00	1219	59.50	1511	40	2.00	55.75	1416.1
50	50.00	1270	61.50	1562	44	2.00	57.75	1466.9
52	52.00	1321	63.50	1613	48	2.00	59.75	1517.7
54	54.00	1372	65.88	1673	48	2.00	62.13	1578.1
56	56.00	1422	69.50	1765	36	2.38	65.00	1651.0
58	58.00	1473	71.94	1827	40	2.38	67.44	1713.0
60	60.00	1524	73.94	1878	40	2.38	69.44	1763.8

## SECTION TWO: SEMI-METALLIC GASKETS

Semi-Metallic gaskets are designed to feature soft, pliable sealing materials - which enhance the tightness of the assembly with lower overall load requirements when compared to full metallic gaskets. They are most popular due to this configuration, and are available in a wide variety of styles and sizes. They can typically be fabricated of any metal which is available in thin strip or sheet, and which can be welded. Therefore, they can be used against virtually any corrosive medium dependent upon the choice of the metal and filler/facing material. Additionally, they can be used over the complete temperature range from cryogenic to approximately 2000°F (1093°C). Semi-metallic gaskets can generally be used in pressures ranging from vacuum to those seen in ASME B16.5 standard 2500 pressure class flange ratings. They are resilient and, as a consequence, can compensate somewhat for flange movement that may occur due to temperature gradients, variations of pressure and vibration.

Lamons offers the following filler / facing materials for semi-metallic gaskets:

Temperature Range	
PTFE	Cryogenic to 450°F (232°C)
Flexible Graphite	Cryogenic to 850°F (454°C)
Oxidation Resistant Grade Flexible Graphite	Cryogenic to 975°F (524°C)
HTG (High Temperature Gasket)	Cryogenic to 1500°F (816°C)
Mica	Cryogenic to 1832°F (1000°C)
Ceramic	Cryogenic to 2000°F (1093°C)

## LAMONS SPIRASEAL®

### PRODUCT FAMILY

Spiral wound gaskets have become extremely popular due to the wide variety of available styles and sizes. Spiral wound gaskets can be fabricated of any metal which is available in thin strip and which can be welded; therefore, they can be used against virtually any corrosive medium dependent upon the choice of the metal and filler. They can be used over the complete temperature range from cryogenic to approximately 2000°F (1093°C). This type of gasket can be used in all pressures from vacuum to the standard 2500 pressure class flange ratings. Spiral wound gaskets can also be manufactured with variable densities, i.e. relatively low density gaskets for vacuum service up to extremely high density gaskets having a seating stress of approximately 30,000 psi (207 MPa). The softer gaskets would require a seating stress in the range of 5,000 psi (34 MPa).



#### VARIABLE DENSITY

Spiral wound gaskets are manufactured by alternately winding strips of metal and soft fillers on the outer edge of winding mandrels that determine the inside dimensions of the wound component. In the winding process, the alternating plies are maintained under pressure. Varying the pressure during the winding operation and/or the thickness of the soft filler, the density of the gasket can be controlled over a wide range. As a general rule, low winding pressure and thick soft fillers are used for low pressure applications. Thin fillers and high pressure loads are used for high pressure applications. This, of course, would account for the higher bolt loads that have to be applied to the gasket in high pressure applications. In addition to all these advantages of the spiral wound gasket, they are relatively low cost.

#### AVAILABLE SIZES AND THICKNESSES

Lamons spiral wound gaskets are available in thicknesses of 0.0625" (1.5 mm), 0.100" (2.5 mm), 0.125" (3 mm), 0.175" (4 mm), 0.250" (6.4 mm), and 0.285" (7 mm). The chart on page 47 indicates the size range that can normally be fabricated in the various thicknesses along with the recommended compressed thickness of each and the maximum flange width.

#### FLANGE SURFACE FINISH

Use of spiral wound gaskets gives the designer and the user a wider tolerance for flange surface finishes than other metallic gaskets. While they can be used against most commercially available flange surface finishes, experience has indicated that the appropriate flange surface finishes used with spiral wound gaskets are as follows:

- 125 to 250 AARH optimum
- 500 AARH maximum

## AVAILABLE SPIRASeal® STYLES

Lamons spiral wound gaskets are available in a variety of styles to suit the particular flange facing being utilized on the flanges.

### LAMONS STYLE W

Style W gaskets are SpiraSeal® windings only. No inner or outer ring is utilized. Used in a variety of different applications, they may be furnished in many different sizes and thicknesses.

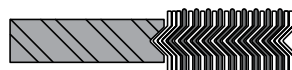


Style W gaskets are made in standard sizes to fit:

- A. Large tongue and groove joints, 1/2 to 24 NPS, standard pressures;
- B. Small tongue and groove joints, 1/2 to 24 NPS, standard pressures; and,
- C. Large male and female joints 1/4 to 24 NPS, standard pressures,

### LAMONS STYLE WR

Style WR gaskets consist of a spiral wound sealing component with a solid metal outer guide ring. The outer guide ring serves to center the gasket properly in the flange joint, acts as an anti-blowout device, provides radial support for the spiral wound component, and acts as a compression gauge to prevent the spiral wound component from being over crushed. Normally the outer guide rings are furnished in mild steel, but can be supplied in other metals when required by operating conditions.



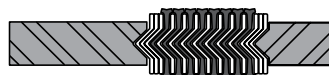
### LAMONS STYLE WRI

Style WRI is identical to style WR, with the addition of an inner ring. The inner ring also serves several functions. Primarily, it provides radial support for the gasket on the ID to help prevent the occurrences of buckling or imploding. The inner ring also serves as an additional compression limiter. Its ID is normally sized slightly larger than the ID of the flange bore, minimizing turbulence in process flow. The inner rings are normally supplied in the same material as the spiral wound component. Lamons normally manufactures standard Style WR and WRI spiral wound gaskets to ASME B16.20, designed to suit ASME B16.5 and ASME B16.47 flanges.



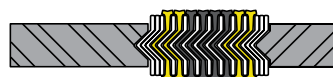
### LAMONS STYLE WRI-LC

Style WRI-LC gaskets provide a seal at relatively lower seating stress. This means that our design requires less bolt load to seat, yet still has the recovery like a standard spiral wound. The WRI-LC gasket is typical to Class 150 and 300 flanges, where users have a concern with insufficient potential of pre-load. But, the density of the WRI-LC gasket can be varied to meet virtually any requirement. Electronic controls on Lamons' SpiraSeal machines assure high quality precision welding with equal spacing, the correct number of metal plies on the gasket inside periphery, proper ratio of metal to filler, proper number of metal plies on the outside and spot welds on the OD.



### LAMONS STYLE WRI-HTG

Style WRI-HTG gaskets combine the corrosion and oxidation resistance of mica with the “sealability” of flexible graphite. The mica material, in conjunction with the metal spirals serves as a barrier between oxidizing process conditions and/or external air and the graphite. While Inconel® X-750 is commonly selected as the winding metal, any alloy can be selected. The overall effective rating of the HTG configuration can be utilized in temperatures of up to 1500°F (815°C). Higher temperatures can be realized given further consultation with Lamons Engineering Department.



### LAMONS STYLE WRI-LP

Designed for highly corrosive environments, Style WRI-LP is a Spiral wound gasket with a conventional outer guide ring and a “Kammpro” style LPI inner ring. This dual sealing design engages the raised face completely from the OD to the bore. The winding can be constructed with the required metal and soft filler specified by the user. The “Kammpro” inner ring metal can be ordered in any alloy, such as Monel®, or in carbon steel. A carbon steel inner ring can be given a protective PTFE coating for increased chemical resistance. The Kammpro inner ring is faced typically with either 0.020” (0.5 mm) thick EPTFE or graphite. The WRI-LP has seen wide-spread approvals for Hydrofluoric Acid (HF) service, although this design has much further potential. Its main advantages are: no metal contact with the media; chemical resistance; fire safe design; sizing to meet ASME B16.5; available in large diameter and for special flanges.



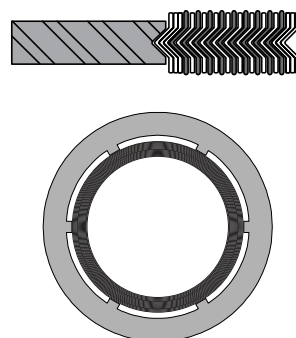
### LAMONS INHIBITOR

Lamons Inhibitor gasket provides corrosion resistance in the most extreme conditions. It combines a HTG filler configuration with highest purity graphite, and a Kammpro inner ring laminated with soft PTFE material. The design of the Inhibitor gasket utilizes the Kammpro inner ring to provide the primary sealing interface. The inner ring material and its covering layer are inert in terms of corrosion through contact with dissimilar materials. This fire safe design incorporates the sealing integrity of highest purity graphite in conjunction with mica on the ID and OD, preventing the entrance of further corrosive conditions to the media.



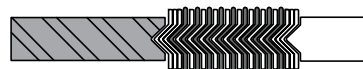
### LAMONS STYLE WR-AB

Inward buckling of spiral wound gaskets is sometimes a concern in industry today. Work is ongoing through various industry committees to improve the standard in this regard. Some end users do not want to use inner rings due to cost or bore intrusion - to address this stance, Lamons offers Style WR-AB. By creating a space for expansion between the OD of the winding and the outer ring, the buckling along the inside could be reduced. This feature, combined with a reinforced inside circumference, help to further reduce the likelihood of inward buckling after installation.



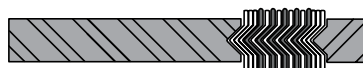
### LAMONS STYLE WRI-HF

This gasket was developed for Hydrofluoric (HF) acid applications. It consists of a Monel® and PTFE winding with a carbon steel centering ring and a PTFE inner ring. The carbon steel outer ring can be coated with special HF acid detecting paint if desired. The PTFE inner ring reduces corrosion to the flanges between the bore of the pipe and the ID of the spiral wound sealing element.



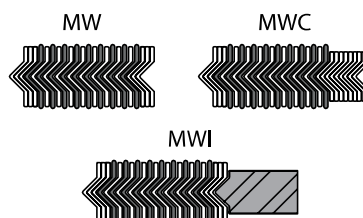
### LAMONS STYLE WRI-RJ

The style WRI-RJ gasket is identical to a Style WRI in construction features but is specially sized to be used as a replacement gasket for flanges machined to accept oval or octagonal ring joint gaskets. The sealing component is located between the ID of the groove machined in the flange and the flange bore. These are intended to be used as replacement parts and are considered a maintenance item. In new construction, where spiral wound gaskets are intended to be used, raised face flanges should be utilized.



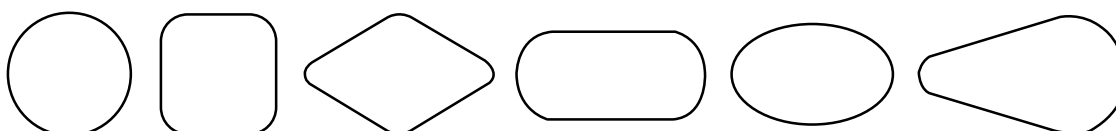
### LAMONS STYLE MW, MWC & MWI

These gaskets are available in round, obround, and oval shapes and are used for standard manhole cover plates. When spiral wound manhole gaskets with a straight side are required, it is necessary that some curvature be allowable, given to the fact that spiral wound gaskets are wrapped under tension and therefore tend to buckle inward when the gaskets are removed from the winding mandrel. As a rule of thumb, the ratio of the long ID to the short ID should not exceed three to one.



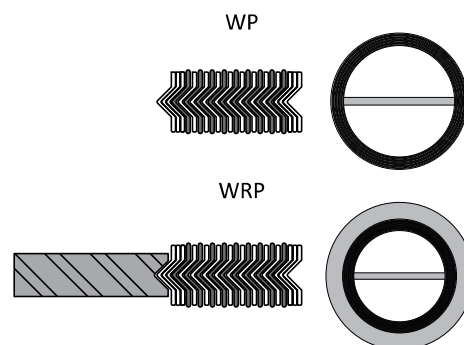
### LAMONS STYLE H

Style H gaskets are for use on boiler hand hole and tubecap assemblies. They are available in round, square, rectangular, diamond, obround, oval and pear shapes. Lamons has tooling available for manufacturing most of the standard handhold and tubecap sizes of the various boiler manufacturers. However, these are also available in special sizes and shapes. (To order special gaskets, dimensional drawings or sample cover plates should be provided in order to assure proper fit.)



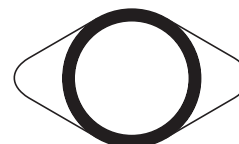
## LAMONS STYLE WP & WRP

These gaskets are similar to Style W and Style WR, with the addition of pass partitions for use with shell and tube heat exchangers. Partitions are normally supplied as double-jacketed construction, made of the same material as the spiral wound component. The partition strips can be soft soldered, tack welded or silver soldered to the spiral wound component. The double-jacketed partition strips are normally slightly thinner than the spiral wound component in order to minimize the bolt loading required to properly seat the gasket.



## LAMONS STYLE L

The spiral wound components of Style L are identical to those of Style W and in addition have a wire loop welded to the outer periphery of the gasket, sized so as to fit over diametrically opposite bolts, for proper centering of the spiral wound component on the gasket seating surface. Whenever possible, it is recommended that a Style WR gasket be used in lieu of a Style L gasket because of the obvious advantages of the outer solid metal guide ring. The Style L is considerably more difficult to produce than the Style WR and therefore more expensive.



## SPIRAL WOUND GASKET DIMENSIONS FOR PIPE FLANGES

Spiral wound gaskets must be sized to ensure the winding component is seated properly between flat surfaces. If it protrudes beyond a raised face or into a flange bore, mechanical damage and leakage may occur.

Style W typically is applied in confined groove type flanges, and it is sized by the following formulas:

**Gasket is confined on the Inside Diameter (ID) and Outside Diameter (OD):**

Gasket Inside Diameter (ID) = Groove Inside Diameter (ID) + 1/16" (1.5 mm)

Gasket Outside Diameter (OD) = Groove Outside Diameter (OD) - 1/16" (1.5 mm)

**Gasket is confined on the Outside Diameter (OD):**

Gasket Inside Diameter (ID) = Bore + Minimum 1/4" (6.4 mm)

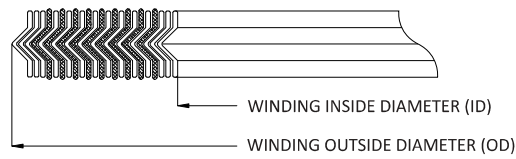
Gasket Outside Diameter (OD) = Recess Outside Diameter (OD) - 1/16" (1.5 mm)

## LIMITATIONS OF SIZE & THICKNESS

Gasket Thickness		Maximum Inside Diameter (ID)*		Maximum Flange Width*		Recommended Compressed Thickness	
Inches	mm	Inches	mm	Inches	mm	Inches	mm
0.063	1.59	9	229	0.375	9.53	0.050/0.055	1.27/1.39
0.100	2.54	12	305	0.500	12.70	0.075/0.080	1.91/2.03
0.125	3.18	40	1016	0.750	19.05	0.090/0.100	2.29/2.54
0.175	4.45	75	1905	1.000	25.40	0.125/0.135	3.18/3.43
0.250	6.35	160	4064	1.250	31.75	0.180/0.200	4.57/5.08
0.285	7.24	160	4064	1.250	31.75	0.200/0.220	5.08/5.59

\*These limitations are intended as a general guide only. Materials of construction and flange width of gasket can affect the limitations listed.

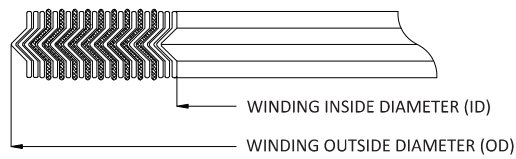
## DIMENSIONS FOR STYLE W TO SUIT LARGE MALE AND FEMALE JOINTS



Nominal Pipe Size (NPS)	Pressure Class							
	150, 300, 400, 600				900, 1500			
	Inside Diameter (ID)		Outside Diameter (OD)		Inside Diameter (ID)		Outside Diameter (OD)	
	Inches	mm	Inches	mm	Inches	mm	Inches	mm
1/4	0.50	12.7	1.00	25.4	-	-	-	-
1/2	1.00	25.4	1.38	34.9	1.00	25.4	1.38	34.9
3/4	1.31	33.3	1.69	42.9	1.31	33.3	1.69	42.9
1	1.50	38.1	2.00	50.8	1.50	38.1	2.00	50.8
1 1/4	1.88	47.6	2.50	63.5	1.88	47.6	2.50	63.5
1 1/2	2.13	54.0	2.88	73.0	2.13	54.0	2.88	73.0
2	2.88	73.0	3.63	92.1	2.88	73.0	3.63	92.1
2 1/2	3.38	85.7	4.13	104.8	3.38	85.7	4.13	104.8
3	4.25	108.0	5.00	127.0	4.25	108.0	5.00	127.0
3 1/2	4.75	120.7	5.50	139.7	4.75	120.7	5.50	139.7
4	5.19	131.8	6.19	157.2	5.19	131.8	6.19	157.2
4 1/2	5.69	144.5	6.75	171.5	-	-	-	-
5	6.31	160.3	7.31	185.7	6.31	160.3	7.31	185.7
6	7.50	190.5	8.50	215.9	7.50	190.5	8.50	215.9
8	9.38	238.1	10.63	269.9	9.38	238.1	10.63	269.9
10	11.25	285.8	12.75	323.9	11.25	285.8	12.75	323.9
12	13.50	342.9	15.00	381.0	13.50	342.9	15.00	381.0
14	14.75	374.7	16.25	412.8	14.75	374.7	16.25	412.8
16	17.00	431.8	18.50	469.9	17.00	431.8	18.50	469.9
18	19.25	489.0	21.00	533.4	19.25	489.0	21.00	533.4
20	21.00	533.4	23.00	584.2	21.00	533.4	23.00	584.2
24	25.25	641.4	27.25	692.2	25.25	641.4	27.25	692.2

Nominal Pipe Size (NPS)	Pressure Class			
	2500			
	Inside Diameter (ID)		Outside Diameter (OD)	
	Inches	mm	Inches	mm
1/4	-	-	-	-
1/2	0.81	20.6	1.38	34.9
3/4	1.06	27.0	1.69	42.9
1	1.25	31.8	2.00	50.8
1 1/4	1.63	41.3	2.50	63.5
1 1/2	1.88	47.6	2.88	73.0
2	2.38	60.3	3.63	92.1
2 1/2	3.00	76.2	4.13	104.8
3	3.75	95.3	5.00	127.0
3 1/2	-	-	-	-
4	4.75	120.7	6.19	157.2
4 1/2	-	-	-	-
5	5.75	146.1	7.31	185.7
6	6.75	171.5	8.50	215.9
8	8.75	222.3	10.63	269.9
10	10.75	273.1	12.75	323.9
12	13.00	330.2	15.00	381.0

## DIMENSIONS FOR STYLE W



### FOR LARGE TONGUE AND GROOVE JOINTS

Nominal Pipe Size (NPS)	Pressure Class			
	150-2500*			
	Inside Diameter (ID)		Outside Diameter (OD)	
	Inches	mm	Inches	mm
1/2	1.00	25.4	1.38	34.9
3/4	1.31	33.3	1.69	42.9
1	1.50	38.1	2.00	50.8
1 1/4	1.88	47.6	2.50	63.5
1 1/2	2.13	54.0	2.88	73.0
2	2.88	73.0	3.63	92.1
2 1/2	3.38	85.7	4.13	104.8
3	4.25	108.0	5.00	127.0
3 1/2	4.75	120.7	5.50	139.7
4	5.19	131.8	6.19	157.2
5	6.31	160.3	7.31	185.7
6	7.50	190.5	8.50	215.9
8	9.38	238.1	10.63	269.9
10	11.25	285.8	12.75	323.9
12	13.50	342.9	15.00	381.0
14	14.75	374.7	16.25	412.8
16	16.75	425.5	18.50	469.9
18	19.25	489.0	21.00	533.4
20	21.00	533.4	23.00	584.2
24	25.25	641.4	27.25	692.2

\* 2500# only thru 12" NPS

### FOR SMALL TONGUE AND GROOVE JOINTS

Nominal Pipe Size (NPS)	Pressure Class			
	150-2500*			
	Inside Diameter (ID)		Outside Diameter (OD)	
	Inches	mm	Inches	mm
1/2	1.00	25.4	1.38	34.9
3/4	1.31	33.3	1.69	42.9
1	1.50	38.1	1.88	47.6
1 1/4	1.88	47.6	2.25	57.2
1 1/2	2.13	54.0	2.50	63.5
2	2.88	73.0	3.25	82.6
2 1/2	3.38	85.7	3.75	95.3
3	4.25	108.0	4.63	117.5
3 1/2	4.75	120.7	5.13	130.2
4	5.19	131.8	5.69	144.5
5	6.31	160.3	6.81	173.0
6	7.50	190.5	8.00	203.2
8	9.38	238.1	10.00	254.0
10	11.25	285.8	12.00	304.8
12	13.50	342.9	14.25	362.0
14	14.75	374.7	15.50	393.7
16	16.75	425.5	17.63	447.7
18	19.25	489.0	20.13	511.2
20	21.00	533.4	22.00	558.8
24	25.25	641.4	26.25	666.8

\* 2500# only thru 12" NPS

#### STYLE W GASKET TOLERANCES:

Gasket Diameter (Inches)	Inside Diameter (ID)	Outside Diameter (OD)
Up to 1"	(+3/64", -0.00")	(+0.00", -1/32")
1" to 24"	(+1/32", -0.00")	(+0.00", -1/32")
24" to 36"	(+3/64", -0.00")	(+0.00", -1/16")
36" to 60"	(+1/16", -0.00")	(+0.00", -1/16")
60" and above	(+3/32", -0.00")	(+0.00", -3/32")

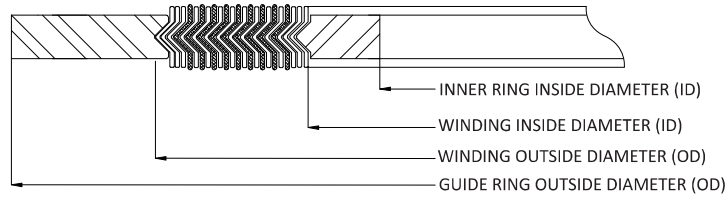
Gasket Diameter (mm)	Inside Diameter (ID)	Outside Diameter (OD)
Up to 25.4 mm	(+1.2 mm, -0.00 mm)	(+0.00 mm, -0.8 mm)
25.4 mm to 610 mm	(+0.8 mm, -0.00 mm)	(+0.00 mm, -0.8 mm)
610 mm to 914 mm	(+1.2 mm, -0.00 mm)	(+0.00 mm, -1.6 mm)
914 mm to 1524 mm	(+1.6 mm, -0.00 mm)	(+0.00 mm, -1.6 mm)
1524 mm and above	(+2.4 mm, -0.00 mm)	(+0.00 mm, -2.4 mm)

Thickness +0.015" - 0.00" (+0.381 mm, -0.00 mm) on special gaskets with:

- Less than 1" (25.4 mm) ID greater than 26" (660.4 mm) ID.
- PTFE fillers
- 1" (25.4 mm) or larger flange width.

Thickness +0.010 - 0.000" (+0.254 mm, -0.00 mm) for most other sizes and materials.

## DIMENSIONS FOR STYLE WRI PER ASME B16.20 TO SUIT ASME B16.5 FLANGES



Nominal Pipe Size (NPS)	Class 150							
	Inner Ring Inside Diameter (ID)		Winding Inside Diameter (ID)		Winding Outside Diameter (OD)		Guide Ring Outside Diameter (OD)	
	Inches	mm	Inches	mm	Inches	mm	Inches	mm
1/4*	-	-	0.50	12.7	0.88	22.2	1.75	44.5
1/2	0.56	14.2	0.75	19.1	1.25	31.8	1.88	47.6
3/4	0.81	20.6	1.00	25.4	1.56	39.7	2.25	57.2
1	1.06	26.9	1.25	31.8	1.88	47.6	2.63	66.7
1 1/4	1.50	38.1	1.88	47.6	2.38	60.3	3.00	76.2
1 1/2	1.75	44.5	2.13	54.0	2.75	69.9	3.38	85.7
2	2.19	55.6	2.75	69.9	3.38	85.7	4.13	104.8
2 1/2	2.62	66.5	3.25	82.6	3.88	98.4	4.88	123.8
3	3.19	81.0	4.00	101.6	4.75	120.7	5.38	136.5
3 1/2*	3.50	88.9	4.50	114.3	5.25	133.4	6.38	161.9
4	4.19	106.4	5.00	127.0	5.88	149.2	6.88	174.6
5	5.19	131.8	6.13	155.6	7.00	177.8	7.75	196.9
6	6.19	157.2	7.19	182.6	8.25	209.6	8.75	222.3
8	8.50	215.9	9.19	233.4	10.38	263.5	11.00	279.4
10	10.56	268.2	11.31	287.3	12.50	317.5	13.38	339.7
12	12.50	317.5	13.38	339.7	14.75	374.7	16.13	409.6
14	13.75	349.3	14.63	371.5	16.00	406.4	17.75	450.9
16	15.75	400.1	16.63	422.3	18.25	463.6	20.25	514.4
18	17.69	449.3	18.69	474.7	20.75	527.1	21.63	549.3
20	19.69	500.1	20.69	525.5	22.75	577.9	23.88	606.4
24	23.75	603.3	24.75	628.7	27.00	685.8	28.25	717.6

\*Not Listed in ASME B16.20

## DOUBLE COLOR CODING FOR SPIRASeal® GASKETS PER ASME B16.20

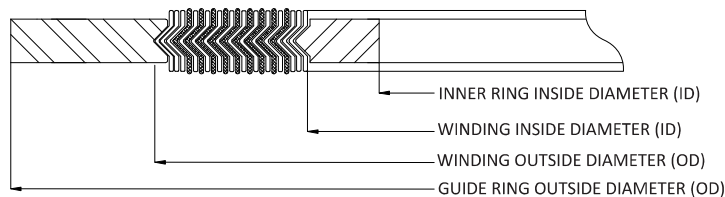
### METALLIC WINDINGS

304 SS	Yellow	Incoloy	White
316L SS	Green	Titanium	Purple
317L SS	Maroon	Alloy 20	Black
347 SS	Blue	Carbon Steel	Silver
321 SS	Turquoise	Hastelloy "B"	Brown
Monel	Orange	Hastelloy "C"	Beige
Inconel	Gold	Phos. Bronze	Copper
Nickel	Red		

### NON-METALLIC FILLERS

PTFE	White Stripe
Ceramic	Light Green Stripe
Flexible Graphite	Gray Stripe
Phyllosilicate (HTG)	Light Blue Stripe

# **DIMENSIONS FOR STYLE WRI PER ASME B16.20 TO SUIT ASME B16.5 FLANGES**

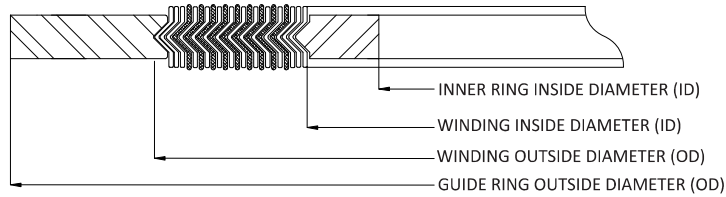


Nominal Pipe Size (NPS)	Class 300							
	Inner Ring Inside Diameter (ID)		Winding Inside Diameter (ID)		Winding Outside Diameter (OD)		Guide Ring Outside Diameter (OD)	
	Inches	mm	Inches	mm	Inches	mm	Inches	mm
1/4*	-	-	0.50	12.7	0.88	22.2	1.75	44.5
1/2	0.56	14.2	0.75	19.1	1.25	31.8	2.13	54.0
3/4	0.81	20.6	1.00	25.4	1.56	39.7	2.63	66.7
1	1.06	26.9	1.25	31.8	1.88	47.6	2.88	73.0
1 1/4	1.50	38.1	1.88	47.6	2.38	60.3	3.25	82.6
1 1/2	1.75	44.5	2.13	54.0	2.75	69.9	3.75	95.3
2	2.19	55.6	2.75	69.9	3.38	85.7	4.38	111.1
2 1/2	2.62	66.5	3.25	82.6	3.88	98.4	5.13	130.2
3	3.19	81.0	4.00	101.6	4.75	120.7	5.88	149.2
3 1/2*	3.50	88.9	4.50	114.3	5.25	133.4	6.50	165.1
4	4.19	106.4	5.00	127.0	5.88	149.2	7.13	181.0
5	5.19	131.8	6.13	155.6	7.00	177.8	8.50	215.9
6	6.19	157.2	7.19	182.6	8.25	209.6	9.88	250.8
8	8.50	215.9	9.19	233.4	10.38	263.5	12.13	308.0
10	10.56	268.2	11.31	287.3	12.50	317.5	14.25	362.0
12	12.50	317.5	13.38	339.7	14.75	374.7	16.63	422.3
14	13.75	349.3	14.63	371.5	16.00	406.4	19.13	485.8
16	15.75	400.1	16.63	422.3	18.25	463.6	21.25	539.8
18	17.69	449.3	18.69	474.7	20.75	527.1	23.50	596.9
20	19.69	500.1	20.69	525.5	22.75	577.9	25.75	654.1
24	23.75	603.3	24.75	628.7	27.00	685.8	30.50	774.7

Nominal Pipe Size (NPS)	Class 400							
	Inner Ring Inside Diameter (ID)		Winding Inside Diameter (ID)		Winding Outside Diameter (OD)		Guide Ring Outside Diameter (OD)	
	Inches	mm	Inches	mm	Inches	mm	Inches	mm
1/4*	-	-	0.50	12.7	0.88	22.2	1.75	44.5
1/2	0.56	14.2	0.75	19.1	1.25	31.8	2.13	54.0
3/4	0.81	20.6	1.00	25.4	1.56	39.7	2.63	66.7
1	1.06	26.9	1.25	31.8	1.88	47.6	2.88	73.0
1 1/4	1.50	38.1	1.88	47.6	2.38	60.3	3.25	82.6
1 1/2	1.75	44.5	2.13	54.0	2.75	69.9	3.75	95.3
2	2.19	55.6	2.75	69.9	3.38	85.7	4.38	111.1
2 1/2	2.62	66.5	3.25	82.6	3.88	98.4	5.13	130.2
3	3.19	81.0	4.00	101.6	4.75	120.7	5.88	149.2
3 1/2*	3.50	88.9	4.13	104.8	5.25	133.4	6.38	161.9
4	4.04	102.6	4.75	120.7	5.88	149.2	7.00	177.8
5	5.05	128.3	5.81	147.6	7.00	177.8	8.38	212.7
6	6.10	154.9	6.88	174.6	8.25	209.6	9.75	247.7
8	8.10	205.7	8.88	225.4	10.38	263.5	12.00	304.8
10	10.05	255.3	10.81	274.6	12.50	317.5	14.13	358.8
12	12.10	307.3	12.88	327.0	14.75	374.7	16.50	419.1
14	13.50	342.9	14.25	362.0	16.00	406.4	19.00	482.6
16	15.35	389.9	16.25	412.8	18.25	463.6	21.13	536.6
18	17.25	438.2	18.50	469.9	20.75	527.1	23.38	593.7
20	19.25	489.0	20.50	520.7	22.75	577.9	25.50	647.7
24	23.25	590.6	24.75	628.7	27.00	685.8	30.25	768.4

\*Not Listed in ASME B16.20

**DIMENSIONS FOR STYLE WRI PER ASME B16.20  
TO SUIT ASME B16.5 FLANGES**

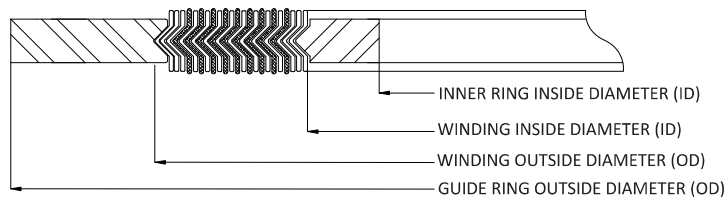


Nominal Pipe Size (NPS)	Class 600							
	Inner Ring Inside Diameter (ID)		Winding Inside Diameter (ID)		Winding Outside Diameter (OD)		Guide Ring Outside Diameter (OD)	
	Inches	mm	Inches	mm	Inches	mm	Inches	mm
1/4*	-	-	0.50	12.7	0.88	22.2	1.75	44.5
1/2	0.56	14.2	0.75	19.1	1.25	31.8	2.13	54.0
3/4	0.81	20.6	1.00	25.4	1.56	39.7	2.63	66.7
1	1.06	26.9	1.25	31.8	1.88	47.6	2.88	73.0
1 1/4	1.50	38.1	1.88	47.6	2.38	60.3	3.25	82.6
1 1/2	1.75	44.5	2.13	54.0	2.75	69.9	3.75	95.3
2	2.19	55.6	2.75	69.9	3.38	85.7	4.38	111.1
2 1/2	2.62	66.5	3.25	82.6	3.88	98.4	5.13	130.2
3	3.19	81.0	4.00	101.6	4.75	120.7	5.88	149.2
3 1/2	3.50	88.9	4.13	104.8	5.25	133.4	6.38	161.9
4	4.04	102.6	4.75	120.7	5.88	149.2	7.63	193.7
5	5.05	128.3	5.81	147.6	7.00	177.8	9.50	241.3
6	6.10	154.9	6.88	174.6	8.25	209.6	10.50	266.7
8	8.10	205.7	8.88	225.4	10.38	263.5	12.63	320.7
10	10.05	255.3	10.81	274.6	12.50	317.5	15.75	400.1
12	12.10	307.3	12.88	327.0	14.75	374.7	18.00	457.2
14	13.50	342.9	14.25	362.0	16.00	406.4	19.38	492.1
16	15.35	389.9	16.25	412.8	18.25	463.6	22.25	565.2
18	17.25	438.2	18.50	469.9	20.75	527.1	24.13	612.8
20	19.25	489.0	20.50	520.7	22.75	577.9	26.88	682.6
24	23.25	590.6	24.75	628.7	27.00	685.8	31.13	790.6

Nominal Pipe Size (NPS)	Class 900							
	Inner Ring Inside Diameter (ID)		Winding Inside Diameter (ID)		Winding Outside Diameter (OD)		Guide Ring Outside Diameter (OD)	
	Inches	mm	Inches	mm	Inches	mm	Inches	mm
1/4*	-	-	-	-	-	-	-	-
1/2	0.56	14.2	0.75	19.1	1.25	31.8	2.50	63.5
3/4	0.81	20.6	1.00	25.4	1.56	39.7	2.75	69.9
1	1.06	26.9	1.25	31.8	1.88	47.6	3.13	79.4
1 1/4	1.31	33.3	1.56	39.7	2.38	60.3	3.50	88.9
1 1/2	1.63	41.4	1.88	47.6	2.75	69.9	3.88	98.4
2	2.06	52.3	2.31	58.7	3.38	85.7	5.63	142.9
2 1/2	2.50	63.5	2.75	69.9	3.88	98.4	6.50	165.1
3	3.10	78.7	3.75	95.3	4.75	120.7	6.63	168.3
3 1/2*	3.50	88.9	4.13	104.8	5.25	133.4	7.50	190.5
4	4.04	102.6	4.75	120.7	5.88	149.2	8.13	206.4
5	5.05	128.3	5.81	147.6	7.00	177.8	9.75	247.7
6	6.10	154.9	6.88	174.6	8.25	209.6	11.38	288.9
8	7.75	196.9	8.75	222.3	10.13	257.2	14.13	358.8
10	9.69	246.1	10.88	276.2	12.25	311.2	17.13	435.0
12	11.50	292.1	12.75	323.9	14.50	368.3	19.63	498.5
14	12.63	320.8	14.00	355.6	15.75	400.1	20.50	520.7
16	14.75	374.7	16.25	412.8	18.00	457.2	22.63	574.7
18	16.75	425.5	18.25	463.6	20.50	520.7	25.13	638.2
20	19.00	482.6	20.50	520.7	22.50	571.5	27.50	698.5
24	23.25**	590.6	24.75	628.7	26.75	679.5	33.00	838.2

\*Not Listed in ASME B16.20    \*\* Inner rings are required

## DIMENSIONS FOR STYLE WRI PER ASME B16.20 TO SUIT ASME B16.5 FLANGES



Nominal Pipe Size (NPS)	Class 1500							
	Inner Ring Inside Diameter (ID)		Winding Inside Diameter (ID)		Winding Outside Diameter (OD)		Guide Ring Outside Diameter (OD)	
	Inches	mm	Inches	mm	Inches	mm	Inches	mm
1/4*	-	-	-	-	-	-	-	-
1/2	0.56	14.2	0.75	19.1	1.25	31.8	2.50	63.5
3/4	0.81	20.6	1.00	25.4	1.56	39.7	2.75	69.9
1	1.06	26.9	1.25	31.8	1.88	47.6	3.13	79.4
1 1/4	1.31	33.3	1.56	39.7	2.38	60.3	3.50	88.9
1 1/2	1.63	41.4	1.88	47.6	2.75	69.9	3.88	98.4
2	2.06	52.3	2.31	58.7	3.38	85.7	5.63	142.9
2 1/2	2.50	63.5	2.75	69.9	3.88	98.4	6.50	165.1
3	3.10	78.7	3.63	92.1	4.75	120.7	6.88	174.6
3 1/2*	3.50	88.9	4.13	104.8	5.25	133.4	7.38	187.3
4	3.85	97.8	4.63	117.5	5.88	149.2	8.25	209.6
5	4.90	124.5	5.63	142.9	7.00	177.8	10.00	254.0
6	5.80	147.3	6.75	171.5	8.25	209.6	11.13	282.6
8	7.75	196.9	8.50	215.9	10.13	257.2	13.88	352.4
10	9.69	246.1	10.50	266.7	12.25	311.2	17.13	435.0
12	11.50**	292.1**	12.75	323.9	14.50	368.3	20.50	520.7
14	12.63**	320.8**	14.25	362.0	15.75	400.1	22.75	577.9
16	14.50**	368.3**	16.00	406.4	18.00	457.2	25.25	641.4
18	16.75**	425.5**	18.25	463.6	20.50	520.7	27.75	704.9
20	18.75**	476.3**	20.25	514.4	22.50	571.5	29.75	755.7
24	22.75**	577.9**	24.25	616.0	26.75	679.5	35.50	901.7

Nominal Pipe Size (NPS)	Class 2500							
	Inner Ring Inside Diameter (ID)		Winding Inside Diameter (ID)		Winding Outside Diameter (OD)		Guide Ring Outside Diameter (OD)	
	Inches	mm	Inches	mm	Inches	mm	Inches	mm
1/4*	-	-	-	-	-	-	-	-
1/2	0.56	14.2	0.75	19.1	1.25	31.8	2.75	69.9
3/4	0.81	20.6	1.00	25.4	1.56	39.7	3.00	76.2
1	1.06	26.9	1.25	31.8	1.88	47.6	3.38	85.7
1 1/4	1.31	33.3	1.56	39.7	2.38	60.3	4.13	104.8
1 1/2	1.63	41.4	1.88	47.6	2.75	69.9	4.63	117.5
2	2.06	52.3	2.31	58.7	3.38	85.7	5.75	146.1
2 1/2	2.50	63.5	2.75	69.9	3.88	98.4	6.63	168.3
3	3.10	78.7	3.63	92.1	4.75	120.7	7.75	196.9
3 1/2*	3.50	88.9	-	-	-	-	-	-
4	3.85**	97.8**	4.63	117.5	5.88	149.2	9.25	235.0
5	4.90**	124.5**	5.63	142.9	7.00	177.8	11.00	279.4
6	5.80**	147.3**	6.75	171.5	8.25	209.6	12.50	317.5
8	7.75**	196.9**	8.50	215.9	10.13	257.2	15.25	387.4
10	9.69**	246.1**	10.63	269.9	12.25	311.2	18.75	476.3
12	11.50**	292.1**	12.50	317.5	14.50	368.3	21.63	549.3

\*Not Listed in ASME B16.20 \*\* Inner rings are required

**SPIRAL-WOUND WR/WRI TOLERANCES  
PER ASME B16.20 SPECIFICATIONS**

- The winding thickness:  $\pm 0.005''$  (0.13 mm) measured across the metallic portion of the winding not including the filler.
- The winding outside diameter
  - o NPS  $\frac{1}{2}$  through NPS 8 is  $\pm 1/32''$  ( $\pm 0.8$  mm)
  - o NPS 10 through NPS 24 is  $+1/16''$ ,  $- 1/32''$  (+1.5 mm, -0.8 mm)
- The winding inside diameter
  - o NPS  $\frac{1}{2}$  through NPS 8 is  $\pm 1/64''$  ( $\pm 0.4$  mm )
  - o NPS 10 through NPS 24 is  $\pm 1/32''$  ( $\pm 0.8$  mm)
- The guide ring outside diameter:  $\pm 1/32''$  ( $\pm 0.8$  mm)
- The guide ring and inner thickness shall be from 0.117" (2.97 mm) to 0.131" (3.33 mm)
- The inner ring inside diameter:
  - o NPS  $\frac{1}{2}$  through 3 is  $\pm 1/32''$  ( $\pm 0.8$  mm)
  - o NPS 4 through 24 is  $\pm 1/16''$  ( $\pm 1.5$  mm)

**TABLE FOR MINIMUM PIPE WALL THICKNESS THAT IS SUITABLE  
FOR USE WITH STANDARD INNER RINGS PER THE ASME B16.20**

Nominal Pipe Size (NPS)	Pressure Class						
	150	300	400	600	900	1500	2500
1/2	Schedule 80						
3/4							
1							
1 1/4	Schedule 40					Schedule 80	
1 1/2							
2							
2 1/2							
3							
3 1/2*							
4							
5							
6						Schedule 80	
8							
10							
12							
14	Schedule 10S	Schedule 30	Schedule 80	Schedule 80	Schedule 80	Schedule 80	Schedule 80
16							
18							
20							
24							
24							

General Notes per ASME B16.20:

- The pipe wall schedules identified represent the minimum pipe wall thickness suitable for use with inner rings for ASME B16.5 flanges (reference ASME B 36.10M and B36.19M).
- Gasket with inner rings should be used only with socket welding, lapped, welding neck, and integral flanges.

\* Not Listed in ASME B16.20

**TABLE FOR LIMITATIONS ON THE MAXIMUM ASME B16.5 FLANGE BORE  
FOR USE WITH STANDARD ASME B16.20 SPIRAL WOUND GASKETS**

Nominal Pipe Size (NPS)	Pressure Class							
	150	300	400	600	900 (1)	1500 (1)	2500 (1)	
1/2	WN Flange only (2)		No Flanges Use 600	WN Flange only	No Flanges Use 1500	WN flange only (2)		
3/4				SO Flange (3) WN Flange (2)				
1				SO and WN Flange any bore				
1 1/4	SO Flange (3)	SO and WN Flange any bore		WN Flange with Schedule 80 bore (excludes nozzle (4) and SO flange) (5)	No Flanges			
1 1/2	WN Flange, any bore							
2								
2 1/2								
3	SO and WN Flange any bore		WN Flange with Schedule OS bore described in ASME B36.19M (Includes nozzle (4) but excludes SO Flanges)		WN flange with SW bore (include nozzle (4) but excludes SO flange)			
4								
5								
6								
8			WN Flange with Schedule 10S bore described in ASME B36.19M (Excludes nozzle (4) and SO Flanges) (5)		WN flange with schedule 80 bore (excludes nozzle (4) and SO flange) (5)			
10								
12								
14								
16								
18								
20								
24								

**Abbreviations:**

**SO** = slip on and threaded

**WN** = welding neck

**SW** = standard wall

**Notes per the ASME B16.20 specification:**

1. Inner rings are required for class 900 NPS 24, class 1500 NPS 12 through 24, and class 2500 NPS 4 through NPS 12 per the ASME B16.20. These inner rings may extend into the pipe bore a maximum of 1/16" (1.5 mm) under the worst combination of maximum bore, eccentric installation, and additive tolerances.
2. In these sizes, the gasket is suitable for a welding neck flange with a standard wall bore, if the gasket and the flanges are assembled concentrically. This also applies to a nozzle. It is the user's responsibility to determine if the gasket is satisfactory for a flange or any larger bore.
3. Gaskets in these sizes are suitable for slip on flanges only if the gaskets and flanges are assembled concentrically
4. A nozzle is a long welding neck; the bore equals the flange NPS
5. A NPS 24 gasket is suitable for nozzles.