

Though "elastomer" is synonymous with "rubber", it is more formally a polymer that can be modified to a state exhibiting little plastic flow and quick or nearly complete recovery from an extending force, and upon immediate release of the stress, will return to approximately its own shape. According to the definition of the American Society for Testing and Materials (ASTM) for the term "elastomer" it is essential that: An elastomer part must not break when stretched approximately 100%. After being stretched 100%, held for 5 minutes and then released, it must retract to within 10% of its original length within 5 minutes after release.

Resistance to the media

As used throughout this manual, the term "media" denotes the substance retained by the seal like liquids, gasses, or a mixture of both, powders or solids. The chemical effect of the media on the seal is of prime importance. It must not alter the operational characteristics or reduce the life expectancy of the seal. Excessive deterioration of the seal must be avoided. It is easy, however, to be misled on this point. A significant amount of volume shrinkage usually results in premature leakage of any seal, whether static or dynamic. On the other hand, a compound that swells excessively, or develops a large increase or decrease in hardness, tensile strength, or elongation, will often continue to serve well for a long time as a static seal, in spite of undesirable test results on elastomer compounds. The first step in selecting the correct material is to select an elastomer that is compatible with the chemical environment.

Compound

A compound is a mixture of base polymer(s) and other chemicals which form a finished rubber material. More precisely, the term 'compound' refers to a specific blend of ingredients tailored for particular characteristics required to optimize performance in some specific service. The basis of compound design is selection of the polymer type. To the elastomer, the compounder may add reinforcing agents, such as carbon black, coloured pigments, curing or vulcanizing agents, activators, plasticizers, accelerators, anti-oxidants or anti-radiation additives. There may be hundreds of such combinations.

The physics of rubber

Rubber is composed of long chains of randomly oriented molecules. These long chains are subject to entanglement and cross-linking. The entanglement has a significant impact on the viscoelastic properties such as stress relaxation. When a rubber is exposed to stress or strain energy, internal rearrangements such as rotation and extension of the polymer chains occur. These changes occur as a function of the energy applied or the duration and rate of application, as well as the temperature at which the energy is applied. ISO 1629 identifies approximately 25 elastomeric types.



SEAL MATERIALS



NBR / Acrylonitrile butadiene

Nitrile, chemically, is a copolymer of butadiene and acrylonitrile. Acrylonitrile content varies in commercial products from 18% to 50%. As the nitrile content increases, resistance to petroleum base oils and hydrocarbon fuels increases, but low temperature flexibility decreases. Due to its excellent resistance to petroleum products, and its ability to be compounded for service over a temperature range of $-30^{\circ}\text{C} / -22^{\circ}\text{F}$ to $120^{\circ}\text{C} / 248^{\circ}\text{F}$ nitrile is the most widely used elastomer in the seal industry today. Also many military rubber specifications for fuel and oil resistant seals require nitrile based compounds. It should be mentioned that to obtain good resistance to low temperature, it is often necessary to sacrifice some high temperature resistance. Nitrile compounds are superior to most elastomers with regard to compression set, tear, and abrasion resistance. Nitrile compounds do not possess good resistance to ozone, sunlight, or weather. They should not be stored near electric motors or other ozone generating equipment. They should be kept from direct sunlight. However, this can be improved through compounding. NBR is the standard material for hydraulics and pneumatics. NBR resists oil-based hydraulic fluids, fats, animal and vegetable oils, flame retardant liquids (HFA, HFB, HFC), grease, water and air.

EPDM - EPM / Ethylene Propylene, and Ethylene Propylene Diene rubber

Ethylene propylene rubber is an elastomer prepared from ethylene and propylene monomers (ethylene propylene copolymer) and at times with an amount of a third monomer (ethylene propylene terpolymers). Ethylene propylene rubber has a temperature range of $-40^{\circ}\text{C} / -40^{\circ}\text{F}$ to $145^{\circ}\text{C} / 293^{\circ}\text{F}$, depending on the curing system.

It has a great acceptance in the sealing world because of its excellent resistance to heat, water and steam, alkali, mild acidic and oxygenated solvents, ozone, and sunlight. These compounds also withstand the affect of brake fluids and other phosphate ester-based hydraulic fluids. EPDM compounds are not recommended for gasoline, petroleum oil and grease, and hydrocarbon environments. Special EPDM compounds have good resistance to steam.

FPM - FKM / Fluorocarbon rubber

Fluorocarbon elastomers have grown to major importance in the seal industry. Due to its wide range of chemical compatibility, temperature range, low compression set, and excellent aging characteristics, fluorocarbon rubber is the most significant single elastomer developed in recent history.

Fluorocarbon elastomers are highly fluorinated carbon-based polymers used in applications to resist harsh chemical and ozone attack. The working temperature range is considered to be $-30^{\circ}\text{C} / -22^{\circ}\text{F}$ to $+200^{\circ}\text{C} / 392^{\circ}\text{F}$. But for short working periods it will take even higher temperatures. Special compounds having improved chemical resistance are also available with new types always being developed. Generally speaking, with increasing fluorine content, resistance to chemical attack is improved while low temperature characteristics are diminished. There are, however, specialty grade fluorocarbons that can provide high fluorine content with low temperature properties.

FPM resists mineral oils and greases, aliphatic, aromatic and also special chlorinated hydrocarbons, petrol, diesel fuels, silicone oils and greases. It is suitable for high vacuum applications. Many fluorocarbon compounds have a higher than normal mould shrinkage rate, molds for fluorocarbon products are often different from molds for Nitrile.

AU - EU / Polyurethane rubber (PU)

Polyurethanes (Polyester-urethane AU and Polyether-urethane EU) exhibit outstanding mechanical and physical properties in comparison with other elastomers. Urethanes provide outstanding resistance to abrasion and tear and have the highest available tensile strength among all elastomers while providing good elongation characteristics. Ether based urethanes (EU) are directed toward low temperature flexibility applications. The ester based urethanes (AU) provide improved abrasion, heat, and oil swell resistance.

Over a temperature range of $-40^{\circ}\text{C} / -40^{\circ}\text{F}$ up to $82^{\circ}\text{C} / 180^{\circ}\text{F}$, resistance to petroleum based oils, hydrocarbon fuels, oxygen, ozone and weathering is good. However, polyurethanes quickly deteriorate when exposed to acids, ketones and chlorinated hydrocarbons. Certain types of polyester-urethanes (AU) are also sensitive to water and humidity. Polyether-urethanes (EU) offer better resistance to water and humidity.

The inherent toughness and abrasion resistance of polyurethane (EU) seals is particularly desirable in hydraulic systems where high pressures, shock loads, wide metal tolerances, or abrasive contamination is anticipated.



SEAL MATERIALS



CSM / Chlorosulfonated polyethylene

CSM show excellent resistance to weathering and give good service in many media. It is inherent ozone resistant and shows a very low erosion rate in rain and hail, regardless of colour. CSM provides good oil, acid, and flame resistance. The temperature range is -40°C / -40°F to 140°C / 284°F

FEP / Fluorinated ethylene propylene

FEP is a copolymer of tetrafluorethylene and hexafluorpropylene. FEP has a lower melting point than PTFE making it suitable for injection moulding. FEP is used for encapsulation with for example Silicone square seals. FEP has a wide spectrum of chemical compatibility and temperature range and excellent aging characteristics. The temperature range for Silicone - FEP encapsulated seals is -60°C / -76°F to 205°C / 401°F.

PTFE / Poly tetrafluorethylene

Poly TetraFluoroEthylene is a fluorocarbon-based polymer and is commonly abbreviated PTFE. PTFE's mechanical properties are low compared to other plastics, but its properties remain at a useful level over a wide temperature range of -30°C / -22°F to 300°C / 572°F. Mechanical properties are often enhanced by adding fillers. It has excellent thermal and electrical insulation properties and a low coefficient of friction. PTFE is very dense and cannot be melt processed - it must be compressed and sintered to form useful shapes.

PTFE + 15% graphite / Poly tetrafluorethylene + 15% graphite

PTFE seals filled with 15% graphite have a low coefficient of friction compared to other filled PTFE materials. Compared to unmodified PTFE they show a higher flexural modulus and surface hardness up to 97 Shore A, a lower notched impact strength, tensile strength, elongation at break and electrical characteristics compared with unmodified **PTFE**.

VMQ / MVQ / Silicone rubber

Silicones are a group of elastomeric materials made from silicone, oxygen, hydrogen, and carbon. Extreme temperature range and low temperature flexibility are characteristics of silicone compounds. As a group, silicones have poor tensile strength, tear resistance, and abrasion resistance. Special compounds have been developed with exceptional heat and compression set resistance. High strength compounds have also been made, but their strength does not compare to conventional rubber. Silicones possess excellent resistance to extreme temperatures -55°C / -67°F to 230°C / 446°F. Some special compounds resist even higher temperatures. Retention of properties of silicone at high temperature is superior to most other elastic materials. Silicone compounds are very clean and are used in many food and medical applications because they do not impart odour or taste. Silicone compounds are not recommended for dynamic sealing applications due to relatively low tear strength and high coefficient of friction.

Silicone is resistant to hot air, ozone, UV radiation, engine and transmission oils, animal and vegetable fats and oils, and brake fluids. VMQ also has low resistance to mineral oils. Silicone can be compounded to be electrically resistant, conductive, or flame retardant. Silicones are also fungous resistant, odorless, tasteless and non-toxic but are not resistant to petrol oils.

SBR / Styrene Butadiene Rubber

This material is similar to natural rubber. SBR still finds service in brake fluid applications, although the high temperature range is inferior to that of ethylene propylene compounds. Service range for this material is -50°C / -58°F to +110°C / +230°F.



SEAL MATERIALS

novatec® PREMIUM II

novatec® PREMIUM II offers flange seals for raised face and flat face applications. Raised face flange seals are used in circumstances where the seal is directly placed on the contact face of the flange, between the flange holes. Flat face flange seals are placed over the full flange surface, including the flange holes.

novatec® PREMIUM II is a flange seal used in a wide range of industries. Due to the combination of graphite and aramide fibres (KEVLAR®) and a low percentage of binder the flange seal is very good temperature resistance and therefore resistant to 80% of all common media in the chemical industry. novatec® PREMIUM II seals show good stress relaxation, high temperature resistant, good ductility, anti stick coating, excellent torque retention, high tensile strength and a temperature range of +320°C / +608°F.

novatec® PREMIUM II is a registered trademark of Frenzelit

KEVLAR® is a registered trademark of Dupont Dow Elastomers

GORE™ Universal Pipe Seal (UPG) Style 800

GORE™ Universal Pipe Seal (UPG) Style 800 is composed out of 100% expanded PTFE. They are offered for flat face and raised face applications. Due to his multidirectional fibre structure and his unique profile (envelope type) GORE™ UPG Style 800 seals are used for a wide range of applications in the chemical industry. Following features are to be mentioned: chemically inert and temperature resistant (-210°C / -346°F up to +260 °C / 500°F), seals at low bolt load, high dimensional stability, high resistance against creep and cold flow, resistant to all media in the 0-14 pH range with exception for alkali metals and element fluorine.

GORE™ is a registered trademark of W.L. Gore & Associates, Inc.

BIO-PRO®

As the process conditions in pharmaceutical installations are getting more and more severe (temperature - CIP - SIP -aseptic), the need of a universal applicable product is relevant. GYLON BIO-PRO is a perfect combination between virgin PTFE and glass based microspheres. Due to its inorganic microspheres, GYLON BIO-PRO is highly compressible and can be used in a wide range of applications. The mix of PTFE with microspheres permits GYLON BIO-PRO to resist to a universal range of liquids, and combines a high temperature resistance (from -210°C / -346°F to 260°C / 500°F) with an exceptional good mechanical stability. Indeed, cold-flow, usually recognised as one of the major problems with virgin PTFE-seals, is completely eliminated when using a modified PTFE-seal such as GYLON BIO-PRO.

GYLON BIO-PRO can be used in low- stress-applications, which means that this material can be used in plastic, glass as well as in stainless steel couplings like triclamp couplings.

GYLON BIO-PRO is a registered trademark of Garlock Sealing Technologies



CHEMICAL TERMS



Chemical term	ASTM 1418	ISO 1629	Polymer trade name	Registered trade mark of
Acrylonitrile Butadiene	NBR	NBR	Perbunan N®, Buna N®	Bayer Corporation
Highly Saturated Nitrile	HNBR	HNR	Therban®	Bayer Corporation
Carboxylated Nitrile	XNBR	XNBR	Nipol®	Zeon Chemicals Inc.
Fluorocarbon	FKM	FPM	Viton®	DuPont Dow Elastomers
Ethylene Propylene	EPDM	EPDM	Nordel®	DuPont Dow Elastomers
Styrene Butadiene	SBR	SBR	Stereon®	Dow Corning Corp.
Poly Tetrafluorethylene	PTFE	PTFE	Teflon®	DuPont Dow Elastomers
Polychloroprene	CR	CR	Neoprene®	DuPont Dow Elastomers
Isobutylene Isoprene	IIR	IIR	Butyl®	ExxonMobil Chemical
Silicone	VMQ	MVQ	Silastic®	Dow Corning Corp.
Fluorosilicone	FVMQ	MFQ	FSE®	General Electric Co.
Chlorosulfonated Polyethylene	CSM	CSM	Hypalon®	DuPont Dow Elastomers
Polyisoprene * Natural * Synthetic	NR / IR	NR / IR	SMR® Natsyn®	Goodyear Rubber Products Copr.
Polyurethane (Polyester or Polyether)	AU or EU	AU or EU	Vulkollan®	Bayer Corporation
Perfluoroelastomer	FFPM	FFPM	Kalrez®	DuPont Dow Elastomers
Fluorinated ethylene propylene	FEP	FEP	-	-



CAM & GROOVE COUPLINGS



Cam & groove couplings in compliance with FEDERAL Mil A-A-59326A / EN 14420-7 / DIN 2828

Coupler seal

- Square seal



Form:	Square
Seal place:	Coupling side coupler part
Material:	NBR, EPDM, FPM, CSM,
Reference:	NBR: VLXB ... EPDM: VLXE ... FPM: VLXV ... CSM: VLXH ...
Temperature range:	NBR: -30°C / -22°F to 120°C / 248°F EPDM: -40°C / -40°F to 145°C / 293°F FPM: -30°C / -22°F to 200°C / 392°F CSM: -40°C / -40°F to 140°C / 284°F
Colour:	NBR: black EPDM: black yellow striped FPM: green CSM: black green striped
Hardness:	NBR: 60 +/- 5 Shore A EPDM: 70 +/- 5 Shore A FPM: 70 +/- 5 Shore A CSM: 70 +/- 5 Shore A

Dimensions

ND	Inch	OD \varnothing +/- 0.3 mm	ID \varnothing +/- 0.2 mm	Height +/- 0.2 mm
15	1/2"	26.5	17.5	4.0
20	3/4"	35.0	22.0	5.5
25	1"	40.0	27.0	6.4
32	1.1/4"	50.0	35.0	6.4
40	1.1/2"	56.0	41.0	6.4
50	2"	67.0	51.0	6.4
65	2.1/2"	80.0	60.0	6.4
80	3"	95.0	76.0	6.4
100	4"	124.0	102.0	6.4
125	5"	150.5	124.0	6.4
150	6"	180.0	153.0	6.4
200	8"	232.5	203.5	7.9



CAM & GROOVE COUPLINGS



- Closed seal



Form:	Square + closed
Seal place:	Coupling side coupler part
Material:	FEP outside, Silicone inside
Reference:	VLXPSG ...
Temperature range:	-60°C / -76°F to 204°C / 399°F
Colour:	Transparent outside, red inside
Hardness:	60 +/- 5 Shore D

Dimensions



ND	Inch	OD \varnothing +/- 0.3 mm	ID \varnothing +/- 0.2 mm	Height +/- 0.2 mm
15	1/2"	26.6	17.5	4.0
20	3/4"	35.0	22.2	5.5
25	1"	39.7	27.0	6.5
32	1 1/4"	49.2	34.5	6.5
40	1 1/2"	55.5	41.3	6.5
50	2"	66.7	50.8	6.5
65	2 1/2"	79.4	60.3	6.5
80	3"	95.5	76.2	6.5

- Open envelope seal



Form:	Open envelope
Seal place:	Coupler side
Material:	PTFE outside, EPDM or FPM inside
Reference:	PTFE - EPDM : VLXP ... PTFE - FPM : VLXP ... V
Temperature range:	PTFE - EPDM : -25°C / -13°F to 100°C / 212°F PTFE - FPM : -10°C / 14°F to 200°C / 392°F
Colour:	PTFE: white outside EPDM: black inside FPM: black grey striped inside
Hardness:	PTFE - EPDM: 85 +/- 5 Shore D FPM - FPM: 85 +/- 5 Shore D

Dimensions

ND	Inch	OD \varnothing +/- 0.3 mm	ID \varnothing +/- 0.2 mm	Height +/- 0.2 mm
15	1/2"	26.2	17.5	4.0
20	3/4"	35.3	21.2	5.5
25	1"	39.0	23.0	6.4
32	1 1/4"	49.5	32.4	6.4
40	1 1/2"	55.2	35.2	6.4
50	2"	66.0	47.0	6.4
65	2 1/2"	79.0	58.5	6.4
80	3"	94.5	76.3	6.4
100	4"	124.0	102.0	6.4

CAM & GROOVE COUPLINGS



- Closed envelope seal



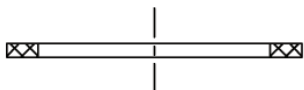
Form:	Closed envelope
Seal place:	Coupler side
Material:	PTFE outside, FPM core inside
Reference:	VLXPG ...
Temperature range:	-15°C / -26°F to 200°C / 392°F
Colour:	PTFE: white outside FPM: black inside
Hardness:	PTFE - FPM: 74 +/- 5 Shore D

Dimensions



ND	Inch	OD \pm 0.3 mm	ID \pm 0.2 mm	Height \pm 0.2 mm
15	1/2"	26.5	13.5	4.5
20	3/4"	35.0	18.0	5.7
25	1"	41.8	23.5	6.5
32	1 1/4"	48.0	30.0	6.5
40	1 1/2"	56.0	35.5	6.5
50	2"	67.0	46.5	6.5
65	2 1/2"	81.5	60.0	6.6
80	3"	94.0	76.0	6.6
100	4"	122.5	100.5	6.6

Thread seal



Form:	Square + flat
Seal place:	Female thread side for adaptor / coupler part
Material:	PTFE or PU
Reference:	PTFE: X2RP ... PU: X2RV ...
Temperature range:	PTFE: -30°C / -22°F to 300°C / 572°F PU: -40°C / -40°F to 82°C / 180°F
Colour:	PTFE: white PU: brown
Hardness:	PTFE: 90 +/- 5 Shore A PU: 65 +/- 5 Shore A

Dimensions

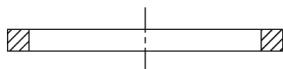
ND	Inch	OD \pm 0.3 mm	ID \pm 0.2 mm	Height \pm 0.2 mm
20	3/4"	26.0	19.0	1.5
25	1"	33.0	24.0	2.0
32	1.1/4"	42.0	33.0	2.0
40	1.1/2"	48.0	39.0	2.0
50	2"	60.0	49.0	2.0
65	2.1/2"	76.0	63.0	2.5
80	3"	88.0	77.0	3.0
100	4"	114.0	100.0	3.0

GUILLEMIN COUPLINGS



Guillemin couplings in compliance with EN 14420-8 / NF E 29.572

Square seal for coupling part



Form:	Square
Seal place:	Coupling side
Material:	NBR, FPM, EPDM, PTFE
Reference:	NBR: GXB ... FPM: GXV ... EPDM: GXE ... PTFE: GXP ...
Temperature range:	NBR: -30°C / -22°F to 120°C / 248°F FPM: -30°C / -22°F to 200°C / 392°F EPDM: -40°C / -40°F to 145°C / 293°F PTFE: -30°C / -22°F to 300°C / 572°F
Colour:	NBR: black FPM: green EPDM: white PTFE: white
Hardness:	NBR: 60 +/- 5 Shore A FPM: 75 +/- 5 Shore A EPDM: 60 +/- 5 Shore A PTFE: 95 +/- 5 Shore A

Dimensions

ND	Inch	ØOD mm	ØID mm	Height mm
25	1"	34.3	27.3	4.0
40	1 1/2"	51.0	43.0	5.0
50	2"	64.0	54.0	5.0
65	2 1/2"	79.0	69.0	6.0
80	3"	96.0	85.0	6.0
100	4"	117.5	103.5	7.0

Flat seal for plug



Form:	Flat
Seal place:	Male plug without locking ring
Material:	NBR, EPDM
Reference:	GXB ... GP GXE ... GP
Temperature range:	NBR: -30°C / -22°F to 120°C / 248°F EPDM: -40°C / -40°F to 145°C / 293°F
Colour:	NBR: beige
Hardness:	NBR: 60 +/- 5 Shore A EPDM: 60 +/- 5 Shore A

Dimensions

ND	Inch	ØOD mm	ØID mm	Height mm
50	2"	67.9	37.5	2.8
65	2.1/2"	83.5	48.0	2.8
80	3"	100.5	62.0	3.5



Crimping seal for helical coupling and composite hoses



Form:	Profiled
Seal place:	Composite swage ferrule
Material:	NBR
Reference:	CX ...
Temperature range:	NBR: -30°C / -22°F to 120°C / 248°F
Colour:	Black
Hardness:	65 +/- 5 Shore A

Dimensions

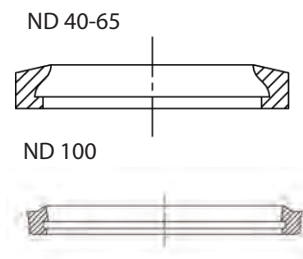
ND	Inch	OD \pm 2 mm	ID mm
50	2"	65.5	50.0
65	2 1/2"	84.0	65.0
80	3"	100.0	80.0
100	4"	112.5	100.0

DSP COUPLINGS



DSP-couplings in compliance with NF S61-704 / NF S61-705

Profiled seal for coupling part



Form:	Profiled
Seal place:	Coupling side
Material:	NBR
Reference:	DXB ...
Temperature range:	-30°C / -22°F to 120°C / 248°F
Colour:	Black

Dimensions

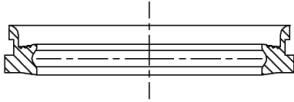
ND	Inch	ØOD mm	ØID mm	Height mm
DSP 40	2"	50.0	37.0	8.0
DSP 65	2 1/2"	79.0	63.0	10.0
AR 100	4"	117.0	100.0	12.0

TW COUPLINGS



TW couplings in compliance with EN 14420-6 / DIN 28450

Profiled crown seal



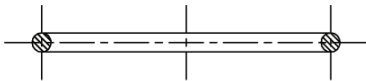
Form:	Profiled
Seal place:	Coupling side crown part ND 50-80
Material:	NBR, FPM, CSM
Reference:	NBR: GSDB ... FPM: GSDV ... CSM: GSDH ...
Temperature range:	NBR: -30°C / -22°F to 120°C / 248°F FPM: -30°C / -22°F to 200°C / 392°F CSM: -40°C / -40°F to 140°C / 293°F
Colour:	NBR: black FPM: black CSM: green

Dimensions

ND	Inch	ØOD mm	ØID mm	Height mm
50	2"	62.5	49.0	10.0
80	3"	92.0	76.0	11.6

Dimension ND 100 is only available in o-ring version.

O-ring



Form:	O-ring
Seal place:	Coupling side crown part ND 100, Female dust cap ND 100
Material:	NBR, FPM, CSM
Reference:	NBR: TWFB100 FPM: TWFB100 CSM: TWFB100
Temperature range:	NBR: -30°C / -22°F to 120°C / 248°F FPM: -30°C / -22°F to 200°C / 392°F CSM: -40°C / -40°F to 145°C / 293°F
Colour:	NBR: black FPM: black CSM: green
Hardness:	70 / 80 +/- 5 Shore A

Dimensions

ND	Inch	ØOD +/- 0.8 mm	ØID +/- 0.8 mm	Height +/- 0.3 mm
100	4"	113.0	99.0	7.0



Square seal



Form:	Square
Seal place:	Female cap ND 50 and ND 80
Material:	NBR, FPM, CSM
Reference:	NBR: TWFB ... FPM: TWFB ... CSM: TWFB ... PTFE: TWFB ...
Temperature range:	NBR: -30°C / -22°F to 120°C / 248°F FPM: -30°C / -22°F to 200°C / 392°F CSM: -40°C / -40°F to 140°C / 293°F PTFE: -30°C / -22°F to 300°C / 572°F
Colour:	NBR: black FPM: black CSM: green PTFE: white
Hardness:	70 / 80 +/- 5 Shore A PTFE: 90 +/- 5 Shore A

Dimensions

ND	Inch	ØOD mm	ØID mm	Height mm
50	2"	61.5	49.0	5.0
80	3"	92.0	77.0	6.0

Dimension ND 100 is only available in o-ring version.

Thread seal in compliance with EN 14420-5 / DIN 2817

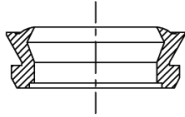


Form:	Square + flat
Seal place:	Female thread side for EN 14420-7 / DIN 2828
Material:	PTFE or PU
Reference:	PTFE: X2RP ... PU: X2RV ...
Temperature range:	PTFE: -30°C / -22°F to 300°C / 572°F PU: -40°C / -40°F to 82°C / 180°F
Colour:	PTFE: white PU: brown
Hardness:	PTFE: 90 +/- 5 Shore A PU: 65 +/- 5 Shore A

ND	Inch	ØOD mm	ØID +/- 1 mm	Height mm
50	2"	60.0	49.0	2.0
80	3"	88.0	77.0	3.0
100	4"	114.0	100.0	3.0



Profiled seal



Form:	Profiled
Seal place:	Coupling side
Material:	NBR, FPM
Reference:	NBR: GKX FPM: GKXV
Temperature range:	NBR: -30°C / -22°F to 120°C / 248°F FPM: -30°C / -22°F to 200°C / 392°F
Colour:	NBR: black FPM: green

Dimensions

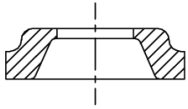
ØOD mm	ØID mm	Height mm
35.0	24.0	12.0





Express couplings in compliance with NF E 29.573

Profiled seal



Form:	Profiled
Seal place:	Coupling side
Material:	NBR
Reference:	EXX
Temperature range:	-30°C / -22°F to 120°C / 248°F
Colour:	Black

Dimensions

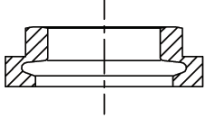
ØOD mm	ØID mm	Height +0.5mm 0
35.0	15.0	10.0

EUROPEAN AIR COUPLING



European air coupling in compliance with DIN 3489

Profiled seal



Form:	Profiled
Seal place:	Coupling side
Material:	NBR
Reference:	EAX
Temperature range:	-30°C / -22°F to 120°C / 248°F
Colour:	Black

Dimensions

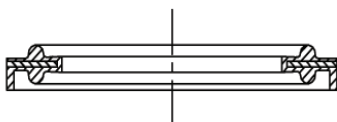
ØOD mm +0.1 / -0.2	ØID mm	Height mm +0.2 / -0.1
34.0	20.0	11.0

TRICLAMP COUPLINGS



Triclamp couplings in compliance with DIN 32676

Profiled seal



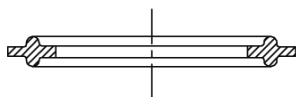
Form:	Profiled
Seal place:	Flange side
Material:	NBR, FPM, EPDM, PTFE, Silicone
Reference:	TRIX ... P
Temperature range:	NBR: -30°C / -22°F to 120°C / 248°F FPM: -30°C / -22°F to 200°C / 392°F EPDM: -40°C / -40°F to 145°C / 293°F PTFE: -30°C / -22°F to 300°C / 572°F Silicone: -55°C / -67°F to 230°C / 440°F
Colour:	NBR: black FPM: green EPDM: black PTFE: white Silicone: red

Dimensions

ND	For flange mm	Ø ID mm
10	34.0	10.2
15	34.0	16.2
20	34.0	20.2
25	50.5	26.2
32	50.5	32.2
40	50.5	38.2
50	64.0	50.2
65	91.0	66.2
80	106.0	81.2
100	119.0	100.2

Triclamp couplings in compliance with INCH

Non-profiled seal



Form:	Non-profiled
Seal place:	Flange side
Material:	NBR, FPM, EPDM, PTFE
Reference:	TRIX ...
Temperature range:	NBR: -35°C / -30°F to 120°C / 248°F FPM: -30°C / -22°F to 200°C / 392°F EPDM: -40°C / -40°F to 145°C / 293°F PTFE: -30°C / -22°F to 300°C / 572°F
Colour:	NBR: black red dotted FPM: green EPDM: black green dotted PTFE: white

Dimensions

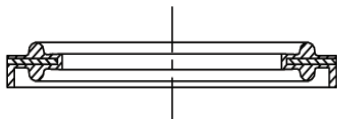
ND	For flange mm	Ø ID mm
1"	50.5	22.9
1 1/2"	50.5	35.1
2"	64.0	47.8
2 1/2"	77.5	60.5
3"	91.0	72.1
4"	119.0	97.6

TRICLAMP COUPLINGS



Triclamp couplings in compliance with ISO 1127

Profiled seal



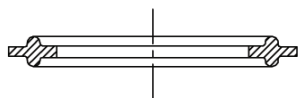
Form:	Profiled
Seal place:	Flange side
Material:	Silicone, EPDM, FPM, BIO-PRO®
Reference:	TRIX ... P
Temperature range:	Silicone: -55°C / -67°F to 230°C / 440°F EPDM: -40°C / -40°F to 140°C / 284°F FPM: -30°C / -22°F to 200°C / 392°F BIO-PRO: -210°C / +346°F to 260°C / 500°F
Colour:	Silicone: translucent EPDM: black FPM: white or black BIO-PRO®: blue

Dimensions

ND	For flange mm	Ø ID mm
8	34.0	10.2
10	34.0	14.2
15	34.0	18.3
20	50.5	23.9
25	50.5	29.9
32	50.5	33.6
40	64.0	44.5
50	77.5	56.5
65	91.0	72.3
80	106.0	85.1
100	130.0	110.5

Triclamp couplings in compliance with IMPERIAL

Non-profiled seal

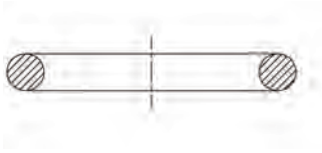


Form:	Non-profiled
Seal place:	Flange side
Material:	NBR, FPM, EPDM, PTFE
Reference:	TRIX ...
Temperature range:	NBR: -35°C / -30°F to 120°C / 250°F FPM: -30°C / -22°F to 200°C / 392°F EPDM: -40°C / -40°F to 145°C / 293°F PTFE: -30°C / -22°F to 300°C / 572°F
Colour:	NBR: black FPM: green EPDM: black PTFE: white

ND	For flange mm	Ø ID mm
1"	50.5	22.9
1 1/2"	50.5	35.6
2"	64.0	48.0
2 1/2"	77.5	60.2
3"	91.0	73.3
4"	119.0	97.8



O-ring seal



Form:	O-ring
Seal place:	Coupling side female part
Material:	SBR
Reference:	KX ...
Temperature range:	-50°C / -58°F to 110°C / 230°F
Colour:	Black
Hardness:	50 +/- 5 Shore A

Dimensions

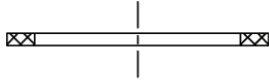
ND	ØOD mm	ØID mm	Height mm
50	86.0	64.0	11.0
70	110.0	87.0	11.5
89	140.0	112.0	14.0
108	160.0	124.0	18.0
133	190.0	146.0	22.0
159	220.0	180.0	20.0

SCREW HOSE COUPLINGS



Screw hose couplings in compliance with EN 14420-5 / DIN 2817

Thread seal



Form:	Square + flat
Seal place:	Coupling side female part
Material:	PU PTFE
Reference:	X2RV... X2RP...
Temperature range:	PTFE: -30°C / -22°F to 300°C / 572°F PU: -40°C / -40°F to 82°C / 180°F
Colour:	PTFE: white PU: brown

Dimensions

ND	Inch	Ø OD mm	Ø ID mm +/-1	Height mm
15	1/2"	20.0	13.0	1.5
20	3/4"	26.0	19.0	1.5
25	1"	33.0	24.0	2.0
32	1.1/4"	42.0	33.0	2.0
40	1.1/2"	48.0	39.0	2.0
50	2"	60.0	49.0	2.0
65	2.1/2"	76.0	63.0	2.5
80	3"	88.0	77.0	3.0
100	4"	114.0	100.0	3.0

NIPPLES



Thread seal



Form:	Square + flat
Seal place:	Female thread
Material:	PU
Reference:	PU: X2RV ... for brass coupling
Temperature range:	PU: -40°C / -40°F to 82°C / 180°F
Colour:	PU: brown
Hardness:	PU: 65 +/- 5 Shore A

Dimensions

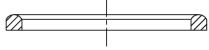
ND	Inch	ØOD mm	ØID mm +/-1	Height mm
15	1/2"	20.0	13.0	1.5
20	3/4"	26.0	19.0	1.5
25	1"	33.0	24.0	2.0
32	1.1/4"	42.0	33.0	2.0
40	1.1/2"	48.0	39.0	2.0
50	2"	60.0	49.0	2.0
65	2.1/2"	76.0	63.0	2.0
80	3"	88.0	77.0	3.0
100	4"	114.0	100.0	3.0

FOOD COUPLINGS - DIN 11851



Food couplings in compliance with DIN 11851

U-shape seal



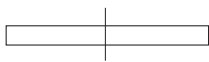
Form:	Semi-rounded
Seal place:	Coupling side male threaded part
Material:	NBR
Reference:	DIN211 ...
Temperature range:	-30°C / -22°F to 120°C / 248°F
Colour:	Blue
Hardness:	75-85 Shore A



Dimensions

ND	Inch	ØOD mm	ØID mm	Height mm
15	1/2"	26.0	18.0	4.5
20	3/4"	33.0	23.0	4.5
25	1"	40.0	30.0	5.0
32	1 1/4"	46.0	36.0	5.0
40	1 1/2"	52.0	42.0	5.0
50	2"	64.0	54.0	5.0
65	2 1/2"	81.0	71.0	5.0
75	3"	88.0	78.0	5.0
80	3"	95.0	85.0	5.0
100	4"	114.0	104.0	6.0

Seal disk



Form:	Squared + flat
Seal place:	Blind nut
Material:	NBR
Reference:	DIN222 ...
Temperature range:	-30°C / -22°F to 120°C / 248°F
Colour:	Beige
Hardness:	60 +/- 5 Shore A



Dimensions

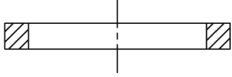
ND	ØOD mm	ØID mm	Height mm
15	1/2"	34.0	3.0
20	3/4"	44.0	3.0
25	1"	52.0	3.0
32	1 1/4"	58.0	3.0
40	1 1/2"	65.0	3.0
50	2"	78.0	3.0
65	2 1/2"	95.0	3.0
75	3"	104.0	3.0
80	3"	110.0	3.0
100	4"	130.0	3.0

FOOD COUPLINGS - SMS



Food couplings in compliance with SMS

Square seal



Form:	Square
Seal place:	Couplings side male threaded part
Material:	EPDM
Reference:	DIN273 ...
Temperature range:	-40°C / -40°F to 145°C / 293°F
Colour:	Black
Hardness:	60-80 Shore A

Dimensions

ND	Inch	ØOD mm	ØID mm	Height mm
25	1"	32.0	25.0	5.50
32	1 1/4"	40.0	32.0	5.50
38	1 1/2"	48.0	38.0	5.50
51	2"	61.0	51.0	5.50
63.5	2 1/2"	73.5	63.5	5.50
76	3"	86.0	76.0	5.50
101.6	4"	113.50	101.60	5.50

STEAM COUPLINGS



Steam couplings in compliance with EN 14423 / DIN 2826

Thread seal



Form:	Flat
Seal place:	Female thread side for EN 14423 / DIN 2826 version
Material:	PTFE or novatec® PREMIUM II with KEVLAR®
Reference:	PTFE: X2RP ... novatec®: XRVSN ...
Temperature range:	PTFE: -30°C / -22°F to 300°C / 572 °F novatec® PREMIUM II with KEVLAR®: 320°C / 608°F
Colour:	PTFE: White novatec® PREMIUM II with KEVLAR®: blue
Hardness:	PTFE: 90 +/- 5 Shore A novatec® PREMIUM II with KEVLAR®: 95 +/- 5 Shore A

novatec® PREMIUM II is a registered trademark of Frenzelit
KEVLAR® is a registered trademark of Dupont Dow Elastomers

Dimensions for PTFE thread seal

ND	Inch	ØOD mm +0 / -0.5 mm	ØID mm +/- 1	Height mm
15	1/2"	20.0	13.0	1.5
20	3/4"	26.0	19.0	1.5
25	1"	33.0	24.0	2.0
32	1 1/4"	42.0	33.0	2.0
40	1 1/2"	48.0	39.0	2.0
50	2"	60.0	49.0	2.0

Dimensions for PTFE thread seal novatec® PREMIUM II

ND	Inch	ØOD mm +0 / -0.5 mm	ØID mm +/- 1	Height mm
15	1/2"	20.0	13.0	2.0
20	3/4"	26.0	18.0	2.0
25	1"	33.0	23.0	2.0
32	1 1/4"	42.0	33.0	2.0
40	1 1/2"	48.0	38.0	2.0
50	2"	60.0	49.0	2.0

DINBO STEAM COUPLINGS



Profiled seal



Form:	Profiled
Seal place:	DINBO female spud male thread side
Material:	PTFE + 15% graphite
Reference:	BOFXP ...
Temperature range:	180°C / 356°F
Colour:	Carbon black
Hardness:	97 +/- 2 Shore A

Dimensions

ND	Inch	ØOD mm	ØID mm	Height mm
15	1/2"	27.2	16.0	5.0
20	3/4"	38.2	24.5	6.0
25	1"	38.2	24.5	6.0

PETROL HOSE COUPLINGS



Petrol hose couplings in compliance with EN 14424

Thread seal



Form:	Square + flat
Seal place:	Coupling side swivel nut
Material:	PU
Reference:	X2RV ...
Temperature range:	-40°C / -40°F to 82°C / 180°F
Colour:	Brown
Hardness:	65+/- 5 Shore A

Dimensions

ND	Inch	ØOD mm +/- 1	ØID mm +/- 1	Height mm
15	1/2"	20.0	13.0	1.5
20	3/4"	26.0	19.0	1.5
25	1"	33.0	24.0	2.0
32	1.1/4"	42.0	33.0	2.0
40	1.1/2"	48.0	39.0	2.0

FLANGE COUPLINGS



Flange couplings in compliance with EN / DIN and ASTM

Raised face flange gasket



Form:	Flat
Seal place:	Raised face
Working pressure:	DIN: PN 10-16-40 ASTM: ASA 150 lbs
Material:	GORE™ UPG Style 800 novatec® PREMIUM II
Reference:	EN / DIN: FXG ... DIN ASTM: FXN ... A1
Temperature range:	GORE™ UPG Style 800: -210°C / -346°F to 260°C / 500°F novatec® PREMIUM II: 320°C / 608°F
Colour:	GORE™ UPG Style 800: white novatec® PREMIUM II: blue

Dimensions for DIN flanges

ND	EN / DIN	ØOD mm	ØID mm	Height mm
15	PN10/40	51.0	22.0	3.0
20	PN10/40	61.0	27.0	3.0
25	PN10/40	71.0	34.0	3.0
32	PN10/40	82.0	43.0	3.0
40	PN10/40	92.0	49.0	3.0
50	PN10/40	107.0	61.0	3.0
65	PN10/40	127.0	77.0	3.0
80	PN10/40	142.0	89.0	3.0
100	PN10/16	162.0	115.0	3.0
125	PN10/16	192.0	141.0	3.0
150	PN10/16	218.0	169.0	3.0
200	PN10/16	273.0	220.0	3.0

Dimensions for ANSI flanges

INCH	ANSI	ØOD mm	ØID mm	Height mm
1/2"	ASA 150lbs	47.5	22.0	3.0
3/4"	ASA 150lbs	57.0	27.0	3.0
1"	ASA 150lbs	66.5	34.0	3.0
1 1/4"	ASA 150lbs	76.0	43.0	3.0
1 1/2"	ASA 150lbs	85.5	49.0	3.0
2"	ASA 150lbs	104.5	61.0	3.0
2 1/2"	ASA 150lbs	124.0	73.0	3.0
3"	ASA 150lbs	136.5	89.0	3.0
4"	ASA 150lbs	174.5	115.0	3.0
5"	ASA 150lbs	196.5	141.0	3.0
6"	ASA 150lbs	222.0	169.0	3.0
8"	ASA 150lbs	279.0	220.0	3.0