TERMINAL GROUP

Catalogue

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TERMINAL

บริษัท เทอร์มินอลซีล แอนด์ เซอร์วิส จำกัด
บริษัท เทอร์มินอล แมชชีนเวิร์ค จำกัด
บริษัท ที.เอ็ม.จี. รับเบอร์พาร์ท จำกัด

บริษัท เทอร์มินอลซีล แอนด์ เซอร์วิส จำกัด ได้ก่อตั้งขึ้นเมื่อปี พ.ศ.2541 โดยผลิตซีลดวนสั่งทำ ซีลสเปเชียล รวมถึงนำเข้าและจัดจำหน่าย ซีลและโอริง ชนิดต่างๆ หลากหลายแบรนด์ชั้นนำ จากทั่วโลก

ต่อมาในปี พ.ศ. 2546 ได้ขยายธุรกิจออกมาเป็น บริษัท เทอร์มินอล แมชชีนเวิรคู จำกัด ที่ให้บริการในด้านการสราง-ซอมเครื่องจักรอุตสาหกรรม ชุดดนกำลัง ชุดคอนโทรล กระบอกไฮดรอลิก - นิวแมติก ตามความตองการของลูกคา

เพื่อเพิ่มความพรอมให้กับ สินค้า และ บริการให้ครบครันมากยิ่งขึ้น กลุมบริษัท เทอรมินอล กรุป จึงไดกอตั้ง บริษัท ที เอ็ม จี รับเบอร พารท จำกัด ขึ้นใน ปี พ.ศ. 2554 ซึ่งให้บริการ และ รับผลิต ชิ้นงานสั่งทำ งาน โมลด งานพลาสติก งานยางรูปแบบตางๆ ตามความตองการของลูกคา อยางครบวงจร

ปัจจุบัน Terminal group ได้แบ่งสายงานการผลิตและบริการ ออกเป็น 5 Divisions คือ

Specials Seal Division เรามีเครื่อง CNC ผลิตซีล ซึ่งเป็นเทคโนโลยีใหมลาสุด พรอมนำเขา วัตถุดิบกึงสำเร็จรูปคุณภาพสูงที่ใชในการผลิตจากยุโรป

เราใส่ใจในทุกรายละเอียด ขั้นตอนในการผลิตชิ้นงาน รวมถึงมีการติดตามและตรวจสอบชิ้นงานที่ไดอยางละเอียด เพื่อให้ไดชิ้นงานที่ตรงตามความตองการของลูกคา

Made to Order & Moulding Parts Division ผู้ผลิต และ ให้บริการชิ้นงานสั่งทำ งานโมลด งานพลาสติก งานยาง รูปแบบตาง ๆ ตามความตองการของลูกคา โดยใช กรรมวิธีการผลิตแบบ Press และ Injection

Seals & O-rings Distribution Division ผู้นำเข้าและจัดจำหน่ายซีล โอริง อุปกรณเกี่ยวกับ ซีล และ โอริง ทุกชนิด แบรนดชั้นนำจากทั่วโลก มาตรฐานญี่ปุน ยุโรป อเมริกา เพื่อรองรับความตองการของโรงงานอุตสาหกรรม

Made - to - Order Machines Division เรามีความเชี่ยวชาญในการผลิตเครื่องจักรอุตสาหกรรม ชุดดนกำลัง (เพาเวอรยูนิต) ชุดคอนโทรล กระบอกไฮดรอลิก-นิวแมติกตามความตองการของลูกคา ดวยเทคโนโลยีชั้นนำและทีมวิศวกรชั้นแนวหนาที่จะคอยดูแลอยางใกลชิดทุกขั้นตอน

Repair & Maintenance Division ด้วยประสบการณ์และความเชี่ยวชาญมากกวา15 ปี เรามีบริการให้คำปรึกษาระบบและซอมบำรุงเครื่องจักร รวมถึง ดูแลเครื่องจักรกลโรงงาน แมวาเครื่องจักรนั้นจะไม่ไดผลิตโดย Terminal group ก็ตาม

ผลิตภัณฑ์

ซีล,ซีลสเปเชียล ซีลดวนสั่งทำ โอริง อุปกรณ์เกี่ยวกับโอริง ชิ้นงานสั่งทำ งานโมลด เครื่องจักรสั่งทำ ชุดดนกำลัง (เพาเวอรยูนิต) ชุดคอนโทรล กระบอกสูบสั่งทำ อุปกรณไฮดรอลิกอุปกรณนิวแมติก

เรามีคลังเก็บสินค้า ที่ได้มาตรฐาน โดยมีการควบคุมอุณหภูมิ เพื่อรักษาคุณภาพของวัตถุดิบและสินค้าให้เป็นไปตามที่กำหนด

ด้วยทำเลที่ตั้งที่ใกล้เส้นทางการขนส่ง และ ศูนย์กระจายสินค้า จึงมั่นใจได้ว่าสินค้าจะสามารถจัดส่งได้ถึงมือคุณได้ตรงตามเวลาที่กำหนด

TERMINALSEAL AND SERVICE CO.,LTD.
TERMINAL MACHINEWORK CO.,LTD.
T.M.G. RUBBERPART CO.,LTD.

นอกเหนือจากนั้น เพื่อเพิ่มศักยภาพในการทำงานของพนักงาน เราจึงได้มีการจัดการฝึกอบรมเสริมความรู้ให้กับพนักงานของเราเป็นประจำทุกเดือนเพราะเราใส่ใจในลูกคา เราจึงคัดสรร แต่สินคาคุณภาพระดับโลก พัฒนาความรู้และเทคโนโลยีในการผลิตอยางต่อเนื่อง

เราได้หลอมรวมทุกศักยภาพเพื่อเป็นพลังในการขับเคลื่อนองค์กรให้เจริญรุดหน้าเคียงคู่กับความสำเร็จของลูกค้าด้วยสินค้าและบริการที่ดีที่สุดตลอดไป

Terminal Group consists of three companies;

TERMINALSEAL AND SERVICE CO.,LTD.
TERMINAL MACHINEWORK CO.,LTD.
T.M.G. RUBBERPART CO.,LTD.

TERMINALSEAL AND SERVICE CO.,LTD. was founded in 1998 producing customized and specialized seals including importing and distributing seals and O-rings from several world-leading brands.

In 2003, Terminal Group expanded its business to **TERMINAL MACHINEWORK CO.,LTD.** to include the production and repair of custom industrial machines, power units, control systems, hydraulic - pneumatic cylinders according to customers' requirement.

To sufficiently and adequately meet customers' needs, Terminal Group established **T.M.G. RUBBERPART CO.,LTD.** in 2011 which provides complete services and produces a variety of made - to - order products, moulding parts,plastic and rubber materials according to customers'requirement.

Currently,Terminal Group's production lines and services are divided into 5 divisions:

Special Seals Division – We have modern CNC lathing machines with the latest technology and high - quality semi - finished imported materials for seal production from Europe.

We thoroughly inspect every detail of the production process devoting special attention to it throughout thereby guaranteeing our customers' complete satisfaction.

Made-to-Order & Moulding Parts Division - We service and manufacture varied forms of made - to - order products, moulding parts, plastic and rubber materials according to customers' requirements with press and Injection production processes.

Seals & O-rings Distribution Division–We import and distribute leading brands of seals, O-rings, and equipments worldwide with Japanese, European, and American standards to support requirements from industrial factories.

Made - To - Order Machines Division – We are specialized in producing custom industrial machines, power units, control units, and hydraulic-pneumatic cylinders according to customers' requirements with leading technology and excellent engineers to take care of every process of the production.

Repair & Maintenance Division – With more than 15 years of experience and expertise, we have consulting and overhaul services for systems and machinery maintenance,including maintenance for several machines made by other than Terminal Group.

PRODUCT

SEALS, SPECIAL SEALS, MADE-TO-ORDER SEALS, O-RINGS, O-RINGS EQUIPMENTS, MADE-TO-ORDER PARTS, MOULDING PARTS, CUSTOM MACHINES-POWER UNIT-CONTROL UNIT, MADE-TO-ORDER CYLINDERS, HYDRAULIC & PNEUMATIC EQUIPMENTS

We have standard, temperature-controlled warehouses that ensure the quality of both raw materials and products as per specifications.

Located near the transportation route and distribution center, it is guaranteed that all the orders will be delivered to you on time.

In order to increase working capability of our staff, we provide technical and product training each month. In order to provide leading services to our customers, we select only world-class products, maintain up-to-date information, and provide the latest production technology.

We have embraced the role of a locomotive power as a continually progressive organization growing together with our customers by offering our best products and services.

ターミナルグループ

ターミナルグループは、ターミナルシールアンドサービス株式会社、ターミナルマシンワールド株式会社、そしてＴＭＧラバーパート株式会社と３つの会社から成り立っています。
ターミナルシールアンドサービス株式会社は １９９８ 年に設立され、注文製作のシールや特殊シールの製作に加えて、世界の一流ブランドのシール、Ｏリングの輸入から流通までも手がけています。
2003年、ターミナルグループはターミナルマシンワーク株式会社へと事業を拡大しました。
開発、機械修理、パワーユニット、コントロールシステム、油圧・エアシリンダーなどお客様の御要望に応じたサービス業務を行っています。
迅速な対応とサービス、そしてより完璧な製品を提供するため、２０１１年、ターミナルグループはTMGラバーパート株式会社を設立しました。
満足ゆくサービスとオーダーメード製品　モールディング、プラスティックやゴム素材など、お客様の御要望に沿えるよう対応しております・
現在、ターミナルグループ株式会社では、生産ライン・サービスは５つの部門に分かれています。
特殊シール部門　最新技術に基づくＣＮＣ旋盤機を使用し、さらにヨーロッパのシール工場より最高品質の半製品素材をも輸入しています。
我々は全生産工程において厳重に注意を払い、お客様の御要望に沿えるよう、完成まで徹底的に検査します。
オーダーメード部門とモールディング部門
様々な形態におけるオーダーメード製品の業務サービスと製造元でもあります。
モールディング、プラスティック、ゴム素材などお客様の御要望に合わせ、生産工程に投入、推進していきます。
シール及びＯリング流通部門
各工場からの需要を満たすため、主に日本、ヨーロッパ、アメリカなど世界を代表するブランドからシール、Ｏリングと各対応製品の輸入、販売を行っています。
オーダーメード機械部門　工業機械の製造を専門とし、パワーユニットをはじめ、コントロールユニット、油圧式　空気圧式シリンダーなど、お客様の御要望に応じて、優秀な技術者が最先端技術で全生産工程に対応します。
修理・メンテナンス部門
15年以上の経験と専門的知識を兼ね備え、システムの検査や相談、機械設備のメンテナンスなど、たとえターミナルグループ以外の工業機械であっても全力で対応します。

製品

シール、特殊シール、オーダーメードシール、Ｏリング、Ｏリング対応製品、オーダーメード部品、モールディング部品、オーダーメード機械、オーダーメードエアシリンダー、油圧装置、空圧装置

わが社では、基本的に原材料や製品の品質を維持するため、定温倉庫を使用しています。

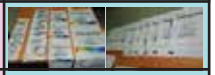
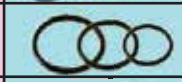
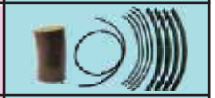
配送センターは輸送道路に隣接して立地しており、お客様に納得していただけるよう、製品をオンタイムでお手元にお届けします。

さらに従業員一人一人の作業能力を伸ばすため、わが社では毎月、技術育成トレーニングを行っています。

お客様を第一に考え、世界基準の製品のみを厳選、常に知識のグレードアップを求めて、更なる生産技術の向上を目指します。

秘められた全ての潜在能力を駆使し、優れた製品とサービスをもって、我々はお客様とともに歩んでゆきます。

O-rings, Quad Ring (X-Ring), Back-up Ring, Static Seals

TYPE	PRODUCT NAME (CODE)	MATERIAL	TEMPERATURE	PICTURE
	ENCAPSULATED -O-RING -METRIC -AS-568	FEP PFA	-267°C UP TO + 205°C -267°C UP TO + 260°C	
	Kalrez® O-ring METRIC -AS-568	FFKM (Perfluoroelastomer)	-17°C UP TO + 327°C	
	Chemaraz® O-ring -METRIC -AS-568	FFKM (Perfluoroelastomer)	-30°C UP TO + 316°C	
	SUNFLON CAP O-RING -P	NBR + PTFE	-40°C UP TO + 80°C	
	METAL O-RING	METAL	-270°C UP TO + 700°C	
	PU O-RING -METRIC -AS -568	POLYURETHANE(PU)	-54°C UP TO + 107°C	
	O-RING PTFE -P,G,V,S -AS -568 -METRIC	PTFE	-200°C UP TO + 260°C	
	O-RING KITS -METRIC -AS-568 -JIS	-NBR-70 -FKM-75	-40°C UP TO + 120°C -40°C UP TO + 230°C	
	O-RING ACCESSARIES			
	-AS-568 -METRIC O-RING (CORD)	-NBR-70 -FKM-75 -EPDM-65 -MVQ-70	-40°C UP TO + 120°C -40°C UP TO + 230°C -55°C UP TO + 150°C -60°C UP TO + 230°C	
	O-RING -P,G,V,S -AS -568 -METRIC	-NBR -70 -NBR -90 -FKM -75 -MVQ -70 -EPDM -70 -HNBR -70 -PTFE -TFE/P (AFLAS)	-40°C UP TO + 120°C -40°C UP TO + 120°C -40°C UP TO + 230°C -60°C UP TO + 230°C -55°C UP TO + 150°C -40°C UP TO + 150°C -200°C UP TO + 260°C -15°C UP TO + 280°C	
	X-RING -AS-568	-NBR-70 -FKM-75	-40°C UP TO + 120°C -40°C UP TO + 230°C	
	BACK-UP RING -P,G -METRIC (BRT)	-PTFE -PTFE+CARBON	-200°C UP TO + 260°C -200°C UP TO + 260°C (HI-PRESSURE)	
	BACK-UP -AS-568 -METRIC	-NBR-90 -PTFE	-40°C UP TO + 120°C -200°C UP TO + 260°C	
	BONDED SEAL	-NBR + METAL -FKM + METAL -EPDM + METAL	-30°C UP TO + 100°C -18°C UP TO + 200°C -50°C UP TO + 120°C	
	Bonded Seals (Centralising Lip)	-NBR + METAL -FKM + METAL -EPDM + METAL	-30°C UP TO + 100°C -18°C UP TO + 200°C -50°C UP TO + 120°C	

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PRODUCT GUIDE
แนะนำผลิตภัณฑ์

I **Customized & specialized Seal ID 4-2000mm.**
ซีลด่วนสั่งทำ ซีลสเปเชียล ID 4–2000mm.

II **Seals, O-rings, O-ring Kits,O-ring Cord, Seals & O-Rings Equipments**
ซีล โอริง โอริงคิดส์ โอริงคอร์ด อุปกรณ์เกี่ยวกับซีล–โอริง

III **Mechanical Seals, Excavator Seal Kits, Cylinder seal kits, Rotary Shaft Oilseals, All kinds of Sealing Products, etc.**
เมคคานิคอลซีล,ซีลสำหรับรถขุด–ตัก ซีลชุดสำหรับ
กระบอกไฮดรอลิค–ลม ออยซีล ซีลทุกชนิด–ทุกประเภท ฯลฯ

IV **Made-to-Order Products, Molding parts**
ชิ้นงานสั่งทำ งานโมลด์ งานพลาสติก งานยาง รูปแบบต่างๆ
ตามที่ลูกค้าต้องการ

V **Custom-Made Industrial Machines,Power Units, Control Units, Hydraulic & Pneumatic Cylinders, X-lift, etc.**
ผู้สร้างเครื่องจักรอุตสาหกรรม ชุดต้นกำลัง (เพาเวอร์ยูนิต)
ชุดคอลโทรล กระบอกไฮดรอลิค–นิวแมติก เอ็กลิฟส์ ฯลฯ ตามที่
ลูกค้าต้องการ

VI **Consulting & Overhaul Services, Repair & Maintenance for Several Machines & Cylinders**
บริการให้คำปรึกษา เปลี่ยนอุปกรณ์ ซ่อมบำรุงเครื่องจักร
ซ่อมกระบอกไฮดรอลิค–ลม

VII **Hydraulic and Pneumatic Equipments, Mobile Hydraulics, Hoses, Fittings, Coupling,Bearings, Chains, Belts, Measuring Tools, etc.**
ผู้นำเข้าและจำหน่ายอุปกรณ์ ไฮดรอลิค–นิวแมติก โมบายไฮดรอลิค
สายไฮดรอลิค–ลม ฟิตติ้งส์ ข้อต่อสวมเร็ว แบริ่ง โซ่ สายพาน เครื่องมือวัด ฯลฯ

O-RING MATERAIL GUIDE

1. Acrylonitrile-Butadiene (NBR)

Copolymers of butadiene and acrylonitrile are known by several generic names, Buna N, Nitrile Rubber and NBR. The acrylonitrile content of NBR compounds varies considerably (18% to 50%) and influences the physical properties of the finished material. The higher acrylonitrile content, the better resistance to oil and fuel, At the same time, elasticitv, compression set resistance to low temperature is adversely affected. The lower acrylonitrile content obtain, the better low temperature resistance, but sacrifice some resistance to oil and fuel. In view of these opposing realities, a compromise selection is the medium acrylonitrile content rubber. NBR has good mechanical properties when compared with other elastomers and high wear resistance.

NBR is unable to resist the weathering and ozone. Some special compound can improve this defect, such as NBR/PVC blending compound which has excellent weathering and ozone resistance and good resistence to fuel but compression set is not so good.

SERVICE TEMPERATURE

For NBR the service temperature can be designed from –55°C to 100°C or up to 125°C depending on different acrylonitrile content and formula. Generally higher than 100°C, life time will be shortened.

HARDNESS

40 to 90 Shore A are available.

COLOR

Black, Brown, green, white, rust, yellow, blue, red, orange, and gray are available, or any assigned color from customers.

APPLICATION

NBR compounds have excellent resistance to abrasion, non-polar oils and solvent, water and permeation (higher acrylonitrile content) will be better. NBR also can be used in conditions of dilute acids, alkalis and salt solution at low temperatures. Applying in aromatic hydrocarbons, chlorinated hydrocarbons and polar solvents are not suitable.

2. Fluorocarbon(FKM,FPM)

Trade name : Viton® DuPont

Fluorocarbon is a well-known high performance rubber, especially it has excellent resistance to high temperature, ozone, weather, oxygen, mineral oil, fuels, hydraulic fluids, aromatics and many organic solvents and chemicals. Now we can supply parts made by Viton® system gum like general type (A-TYPE, 66% fluorine) middle fluorine content type (B-, GBL-TYPE, 67-68.5% fluorine), high fluorine content type (F-, GF-TYPE, 70% fluorine), improving low temperature flexibility type (GLT-, GFLT) and excellent resistant to more chemicals and solvents—Viton® ETP Extreme. We also can supply excellent acid and alkali resistance parts by AFLAS® Asahi Glass Co./Japan

SERVICE TEMPERATURE

For general type the service temperature is better limited to approximately from -26°C (-15°F) to 232°C (450°F) in static application, though the service temperature can arrive to 275°C at short time but up to 232°C the parts life will be shortened. In dynamic application it is suitable between -15°C and 200°C.
For GLT-type the low temperature can be down below -40°C.

HARDNESS

For general type the hardness from 50 to 90 Shore A are available.
For others type 60 to 90 Shore A are appropriate.

COLOR

Now black, brown, green, white, rust, yellow, blue are available, or any assigned color from customers.

APPLICATION

Because FKM has excellent resistance of high temperature, oil, solvent, flame, chemical and weather, it is usually applied in automotive, chemical processing, aerospace and many industries.
Viton GLT has more broad usable thermal range of -45°C to + 275°C and outstanding aggressive HTS-type oils, applied in aerospace is a good choice.Viton ETP usually applies in chemical industrial field. Some fuels add several methanol, Viton F – and B-type are more usable than A-type especially F-type some lubtricants add a few organic amide or amine, choosing peroxide curing system Viton® will be better than bisphenol curing system.

O-RING STANDARD SIZE (METRIC)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References			
Type	(ID)		(CS)		F	JIS	AS-BS	JASO F404
mm	235.00	+/-1.79	6.00	+/-0.15		DIN		
	236.00		6.00					
	237.00		6.00					
	237.50		6.00					
	238.00		6.00					
	240.00		6.00					
	242.00		6.00					
	244.00	+/-1.83	6.00					
	247.00		6.00					
	249.00		6.00					
	250.00		6.00					
	258.00	+/-1.93	6.00					
	259.00		6.00					
	260.00		6.00					
	262.00		6.00					
	265.00	+/-1.98	6.00					
	266.00		6.00					
	270.00		6.00					
	278.00		6.00					
	280.00	+/-2.08	6.00					
	284.00		6.00					
	285.00		6.00					
	288.00		6.00					
	290.00		6.00					
	294.00	+/-2.14	6.00					
	295.00		6.00					
	300.00		6.00					
	305.00	+/-2.25	6.00					
	310.00		6.00					
	315.00	+/-2.25	6.00					
	320.00	+/-2.30	6.00					
	325.00		6.00					
	330.00	+/-2.37	6.00					
	335.00		6.00					
	338.00	+/-2.43	6.00					
	340.00		6.00					
	345.00		6.00					
	348.00	+/-2.49	6.00					
	350.00		6.00					
	355.00		6.00					
	358.00	+/-2.56	6.00					
	360.00		6.00					
	365.00		6.00					
	368.00	+/-2.62	6.00					
	370.00		6.00					
	375.00		6.00					
	376.00	+/-2.68	6.00					
	380.00		6.00					
	385.00		6.00					

O-RING STANDARD SIZE (METRIC)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References			
Type	(ID)		(CS)		F	JIS	AS-BS	JASO F404
mm	386.00	+/-2.68	6.00	+/-0.15		DIN		
	388.00		6.00					
	389.00	+/-2.76	6.00					
	390.00		6.00					
	392.00		6.00					
	394.00		6.00					
	395.00		6.00					
	398.00		6.00					
	400.00		6.00					
	415.00	+/-2.84	6.00					
	422.00		6.00					
	429.00		6.00					
	446.00	+/-3.07	6.00					
	448.00		6.00					
	450.00	+/-3.30	6.00					
	470.00		6.00					
	478.00		6.00					
	480.00		6.00					
	486.00	+/-3.37	6.00					
	489.00		6.00					
	500.00	+/-3.37	6.00					
	504.00	+/-3.40	6.00					
	505.00		6.00					
	508.00		6.00					
	510.00		6.00					
	516.00		6.00					
	530.00		6.00					
	540.00	+/-3.60	6.00					
	544.00		6.00					
	549.00		6.00					
	555.00		6.00					
	560.00		6.00					
	569.00	+/-3.81	6.00					
	575.00		6.00					
	579.00		6.00					

APPLICATION

HNBR has wide applications in auto and oil industries. For environment requirement HCFC will be replaced by ozone-safe refrigerants-HFCs. In old air conditioning and refrigeration equipment Chloroprene (CR) and Fluoroelastomer (FKM) are popular material with coolant system of HCFC (or CFC) and mineral oil. But CR and FKM is not adequate in the newer coolant system HCF134a (R134a) and PAG lube, because CR will degrade PAG lube and FKM will swell more in R134a, the available rubber is HNBR.

7. Carboxylated Nitrile (XNBR)

Carboxylated Nitrile is similar to Nitrile rubber, but the polymer backbone has been chemically modified with Carboxylic Acid containing group. This result is XNBR with more excellent abrasion and tear resistance than traditional NBR. For this reason, XNBR based parts are usually applied in dynamic assembly such as seals and rod wipers.

SERVICE TEMPERATURE

For XNBR the service temperature is from -20°C to 100°C or up to 125°C. Generally higher than 100°C, life time will be shortened.

HARDNESS

50 to 90 Shore A are available.

COLOR

Black, white and gray are available, or any assigned color from customers.

8. Butyl Rubber (IIR)

Butyl rubber is composed by copolymerizing isobutylene, which with small amounts of isoprene. It is like EPDM possessing excellent resistant to chemical and polar fluid, outstanding electrical insulation and good ozone resistance. The special properties of butyl rubber are low gas, moisture permeability and high shock absorption. These properties have made butyl rubber the polymer choice in a variety of applications.

SERVICE TEMPERATURE

For IIR the service temperature can be designed from -55°C to 100°C.

HARDNESS

50 to 70 Shore A are available.

9. Natural Rubber (NR)

Natural rubber is produced from the latex of the Hevea brasiliensis, the chemical name of polymer is polyisoprene. Polyisoprene also can be synthesized by polymerization from its monomer isoprene. Natural rubber possesses many excellent physical properties including high resilience and strength, good abrasion resistance. The defects are like SBR, having poor resistant to hydrocarbon oil and not suitable in UV, oxygen, ozone because the double bond in the polymer backbone. But its poor weathering resistance can be modified by special additive.

SERVICE TEMPERATURE

For NR the service temperature can be designed from -50°C to 70°C, and up to 100°C at short time.

HARDNESS

40 to 90 Shore A are available.

10. Polyacrylate (ACM)

Polyacrylates or simply acrylate rubbers are copolymers having two major components: the backbone (monomeric acid ester of alkyl or alkoxy) are the reactive cure-site. ACMs are high heat and oil resistant, specialty elastomers. It also well resists to mineral oil,oxygen and ozone even at nigh temperature. The low temperature flexibility and chemical resistant of ACM is not good.

SERVICE TEMPERATURE

For standard ACM the service temperature is -15°C to 150°C, shortened lifetime up to 175°C. The low service temperature of some special compound can be down to -25°C.

HARDNESS

45 to 85 Shore A are available.

COLOR

Black, white, orange are available, or any assigned color from customers.

APPLICATION

Polyacrylates usually are applied in automatic indrustry, especially in automatic transmission fluid system.

11. Urethane, Polyurethane (AU, EU, PU)

Trade Names: Adiprene®, Millathane®, Vibrathane®

Polyurethane is an organic polymer. Polyurethanes are formed by reacting a polyol (an alcohol with more than two reactive hydroxyl groups per molecule) with a diisocyanate or a polymeric isocyanate in the presence of suitable catalysts and additives. Polyurethane is a widely used compound due to its superior strength, tear and abrasion resistance. Polyurethane also provides excellent permeation resistance. Good hydraulic oil and gasoline resistance. Resistant to pure aliphatic hydrocarbons (propane, butane, fuel), mineral, siliconeoils, greases, water, oxygen, ozone and aging .Not compatible with acids, ketones, esters, ethers, alcohols, glycols, hot water, steam, alkalis and amines.

SERVICE TEMPERATURE

The service temperature of PU is -54°C to 107°C, shortened lifetime up to 107°C.

HARDNESS

60 to 93 Shore A are available.

COLOR

Black, transparent, green, orange are available, or any assigned color from customers.

APPLICATION

Polyurthane usually are applied in mechanical industry, especially in the place requires material must have higher wear resistance and higher strength and abrasion resistance. Some applying environment will happen moisture condensing on the surface of rubber seal, which will cause hydrolysis of AU, so choosing EU is better. But EU doesn't resist well to oil, the lubricant must use higher aniline point oil.

12. Chloroprene or Polychloroprene Rubber(CR)

Trade name : Neoprene® Dupont

Chloroprene or polychloroprene (Trade name : Neoprene) was one of the first successful synthetic elastomers in 1931 by DuPont. It is prepared by emulsion polymerization of chloroprene, or 2-chlorobutadiene. CR is a multi-purpose elastomer which yields a balanced combination of properties. It has good resistence to sun, ozone weather and perform well in contact with oils and many chemicals. It also display outstanding physical toughness and good resistence to fire.

SERVICE TEMPERATURE

The service temperature of Chloroprene can be designed from -40°C to 100 or up to 125°C depending on different grades. Generally higher than 100°C, life time will be shortened.

HARDNESS

30 to 90 Shore A are available.

COLOR Black, white, rust, yellow and blue are available, or any assigned color from customers.

APPLICATION

Chloroprene has been used thousands of diverse of environments, including automotive, wire and cable industries.

13. Epicholorohydrin (CO,ECO,GECO)

Hydrin®is the trade name of epichlorophydrin elastomers made by Zeon Chemicals. Epichlorohydrin elastomers are available as a homopolymer (CO), copolymer (ECO,GCO), And terpolmer (GECO). All epichlorohydrin rubbers offer low temperature flexible; resistance to oils, fuel and common solvents; good weatherability and good dynamic properties.

SERVICE TEMPERATURE

The service temperature of epichlorodrin can be designed from -40°C to 125°C or up to 135°C.

HARDNESS

50 to 80 Shore A are available.

COLOR

Black is available, or any assigned color from customers.

APPLICATION

The typical application of epichlorohydrin are for automotive and industrial fields.

14. Styrene-Butadiene Rubber (SBR)

The most widely synthetic rubber in the entire world is SBR, a copolymer of styrene and butadiene. The most part of SBR rubber is used in tire by blending with natural rubber and butadiene rubber. SBR is weal and unusable without reinforcement by carbon black, but with carbon black it is strong and abrasion-resistant. The defects of SBR are poor resistant to oil and not suitable in weathering, UV, oxygen, ozone because the double bond in the polymer backbone.

SERVICE TEMPERATURE

The service temperature of SBR can be designed from -55°C to 100°C

HARDNESS

50 to 70 Shore A are available.

15. Ethylene/Acrylic elastomer (AEM)

Ethylene/acrylic elastomer is a copolymer of ethylene and methyl acrylate, plus a small amount of a cure site monomer containing carboxylic acid groups. AEM is a tough, low-compression-set rubber with excellent resistance to high temperature, hot mineral oil, fluids and weathering. The low temperature flexibility and mechanic properties are better that ACM, but it is not well resistant to low aniline oil (like ASTM No.3 oil) and polar solvents.

SERVICE TEMPERATURE

For standard ACM the service temperature is -30°C to 150°C, shortened lifetime up to 175°C.

HARDNESS

40 to 85 Shore A are available.

COLOR

Black and orange colors are available.

APPLICATION

AEM is typically chosen for applications requiring improved performance versus nitrile rubber, Neoprene or reduced cost versus higher-end elastomers such as HNBR, FKM. It also usually is applied in automatic industry.

16. Perfluoroelastomer (FFKM)

Trade names: Parofluor® Parker
Kalrez® Du Pont
Chemraz® Greene, Tweed & Co.

Kalrez has the chemical properties of PTFE (Teflon®) and the elastic properties of FKM-rubber. The processing of Perfluor Rubber is exceptionally difficult.Perfluor Rubber is only used in seldom cases because the raw material price is many times more expensive than Fluorocarbon (FKM). Normally alternative elastomers can be selected, FFKM only being taken in exceptional cases.

SERVICE TEMPERATURE

-30°C up to 327°C.

Chemical resistance:

- to nearly all chemicals
- oxygen, ozone, weather and aging
- exceptionally low weight loss in high vacuums at high temperatures.

17. Polytetrafluoroethylene (PTFE)

Virgin PTFE (Polytetrafluoroethylene) commonly referred to as Teflon or TFE in white color. The material has outstanding chemical properties and the lowest coefficient of friction of any solid material. The wide range of temperature (-200°C to +260°C) and the mechanical properties make PTFE a universal material for a wide range of applications. PTFE should not be used for dynamic applications in water.

SERVICE TEMPERATURE

PTFE has the wide range of temperature between -200°C to +260°C.

HARDNESS

ASTM D2240 Shore D 51-65.

APPLICATION

Piston Rod seals with spring or elastomer energizer, rotary seals, back-up rings, special seals and O-rings, high and low temperature applications, chemical resistance required, low-friction applications.

18. Tetrafluoroethylene /Propylene (TFE/P, FEPM)

Trade Name : AFLAS® Asahi Glass Co./Japan

Tetrafluoroethylene/Propylene copolymere (TFE/P), commonly referred to as FEPM or AFLAS®, has a very high resistance to hydraulic fluids (incl. Alkyl-Acryl-Phosphate Esters), All break fluids (on glycol, mineral and silicone base), acids, steam and hot water, sour oils/gases (H2S) and heavy formulated oils with amine additives.

HARDNESS

At 20°C : DIN 53505 Shore A 85(+/-5)

APPLICATION

Static and dynamic seals (standard and special), wipers, O-rings, flange seals, rotary seals, rubber energizers (preload elements). Applications where high temp. and/or chemical resistance is required, oil and gas industry.

19. Polyetheretherketone (PEEK)

Polyetheretherketone is a brown-beige (natural) high-performance thermoplastic commonly referred to as PEEK. The material has excellent physical and chemical properties to serve a wide range of applications at high temperatures where outstanding mechanical stability and rigidity are necessary. PEEK has good tribological characteristics and is recommended for precision parts, where close tolerances are required. PEEK is approved for the use of applications in contact with foodstuff.

SERVICE TEMPERATURE

-50°C to +250°C.

HARDNESS

Shore D 90.

APPLICATION

Guide rings, bushings, back-up rings, scrapers. Housings, high precision parts and O-Rings.

FDA, USDA, NSF 51, USP Approved Compounds

The food and Drug Administration (FDA) has established a list of rubber compounding ingredients which tests have indicated are neither toxic nor carcinogenic. Rubber compounds produced entirely from those ingredients and which also pass the FDA extraction tests are said to “meet the FDA requirements”. The FDA does not approve rubber compounds. It is the responsibility of the manufacturer to compound food grade materials from the FDA list of ingredients and establish whether they pass the necessary extraction requirements. Similar standards are established by the United States Department of Agriculture (USDA)

Additional requirements have been imposed upon seal manufacturers regarding food and beverage service. Parker has developed several materials that are certified to NSF 51, Food and Beverage Standard. In critical medical applications, seals often must be made from an even “cleaner” list of ingredients. The U.S. Pharmacopoeia (USP) Class VI outline requirements for system toxicity and intracutaneous toxicity for these “cleaner” compounds. The USP Class VI compounds must be made from ingredients with clear histories of biocompatibility that meet tighter requirements for leachates.

Typical applications for our FDA, NSF 51, USDA materials are disposable medical devices, surgical instruments and medical fluid dispensing components, as well as a wide variety of food and beverage handling equipment. The type of approval/certification required generally rests with the end customer’s regulatory expectations for the specific application.

Parker Compound	Polymer	Hardness	Color	Service
E3609-70	EPDM	70	Black	NSF 51, FDA, USP Class VI
FF350-75	FFKM	75	White	FDA, USP Class VI
V0680-70	FKM	70	Black	NSF 51, FDA, USDA
N1219-60	NBR	60	Black	NSF 51, FDA
N1220-70	NBR	70	Black	NSF 51, FDA

Parker Compound	Polymer	Hardness	Color	Service
N0508-75	NBR	75	Black	FDA, USDA
S0802-40	VMQ	40	White	FDA
S1538-55	VMQ	55	Trans-Lucent	FDA-USP Class VI
S0317-60	VMQ	60	Rust	FDA, USDA, USP Class VI
S1380-70	VMQ	70	Rust	FDA
S0355-75	VMQ	75	Rust	FDA, USDA
V1274-80	FKM	80	Black	USP Class VI

NSF 61 Approved Compounds

NSF 61 Drinking Water System Components – is the nationally recognized health effects standard for all devices, components and materials which contact drinking water. Parker’s O-Ring Division has developed several materials that are certified to NSF 61. Many of these materials are approved for use in the United Kingdom (WRAS) and Germany (KTW) as well as North America. NSF International is an industry regulating agency that was established in 1944. Recognized by ANSI (American National Standards Institute), NSF maintains qualification standards and criteria for a wide range of products, including potable water components and delivery systems.

Parker Compound	Polymer	Hardness	Color	Service
E1561-60 (63446)	EPDM	60	Commercial Hot**	NSF 61, WRAS, KTW, Ideal for High Volume Applications
E1549-70 (63447)	EPDM	70	Commercial Hot**	NSF 61, WRAS, KTW, Excellent Compression Set Resistance, Ideal for High Volume Applications
E3609-70	EPDM	70	Commercial Hot**	NSF 61, WRAS, KTW, Excellent Compression Set Resistance
N0757-70	NBR	70	Cold Water***	NSF 61
N1510-70 (67997)	NBR	70	Commercial Hot**	NSF 61

* NSF 61 listed materials given a commercial hot water rating are also certifed for cold water

** Commercial Hot = Tested at 82°C (180°F)

*** Cold Water = Tested at 23°C (73.4°F)

Encapsulated O-ring

Encapsulated O Rings are generally manufactured with a Viton® or Silicone energizing core and have an exterior DuPont™ FEP or PFA jacket.

Encapsulated O-ring Jacket

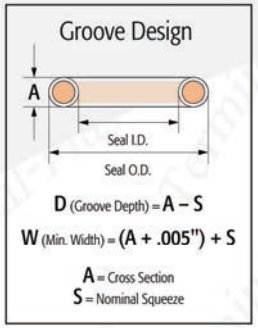
FEP Teflon® combines superb corrosion resistance, sealing reliability and operating temperature range: -450 to +400 ° F (-267 to + 205°C).

PFA Teflon®, which 's similar to FEP, but it provides higher mechanical properties at higher operating temperatures : -450 to +500°F (-267 to + 260°C).

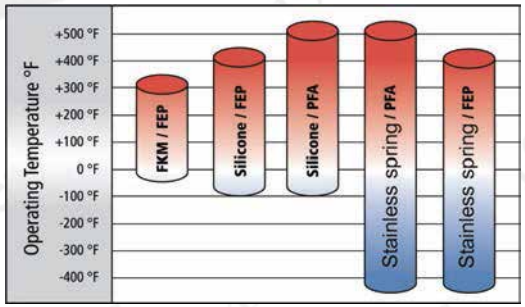
Encapsulated O-ring Core

FKM, Silicone, Silicone Hollow, Stainless Spring Type 301/302, EPDM

Core Available by Special Order: Viton® Extreme GF-S, Perfluoroelastomer, Fluorosilicone, Nitrile (Buna N)



Encapsulated O-Ring Temperature Range

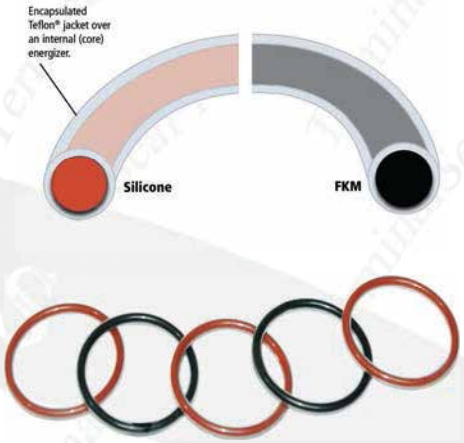


Advantages of Encapsulated O-rings

Abrasion Resistance	Chemically Inert	Enclosed Energizer Core
Excellent Resilience	High Chemical Resistance	Good Impact Strength
Low Absorption	Low Coefficient of Friction	Low Compression Set
Low Ovality	Lubricity	No Swelling
Non Flammable	Relatively Low Permeability	Reusable
Sanitary	Smooth Surface	Wide Temperature Range

Encapsulated O-Rings Applications

Chemical Processing	Petrochemical Refineries, Oil & Gas
Paints and Dies	Refrigeration, Semi-Conductor
Food & Drink	Pharmaceutical & Cosmetic
Power Generation	Aerospace, Defense, Space
Shipping/Marine, Transportation	Construction, Paper Industry



Kalrez® O-rings

Physical Properties and Product Comparisons

Kalzer® perfluoroelastomer (FFKM) parts are available in a number of different compounds that are formulated to optimize properties to give the best possible performance in various applications. Modification of the finished properties is achieved by use of fillers and others additives.

Table 1 summarizes the basic physical properties of the most commonly used Kalez® products for the chemical and hydrocarbon processing industries. Descriptions of the key attributes for each product and their general areas of application follow.

Kalrez® O-rings

Table 1

Typical Physical Properties

Kalrez®Products	Standard Compound			Special Compound				
	6375	7075	4079	6380	7090	0090	0040	1050LF
Maximum Application Temperature[2], °C °F	275 527	327 620	316 600	225 437	325 617	250 482	220 428	288 550
Durometer Hardness, Shore A[3], points ±5	75	75	75	80	90	95	70	82
100% Modulus[4], MPa psi	7.24 1,050	7.58 1,100	7.24 1,050	6.89 1,00	15.50 2,2248	(50% Modulus) 14.20 2,057	6.60 959	12.40 1,800
Tensile Strength at Break[4], MPa psi	15.16 2,200	17.91 2,600	16.88 2,450	15.86 2,300	22.75 3,300	19.50 2,827	13.70 1,885	18.60 2,700
Elongation at Break[4],%	160	160	150	160	75	80	180	125
Compression Set[5],% 70 hr at 204°C (400°F) Tr10[6], °C °F	30 -3 26.6	12 -4 24.8	25 -2 28.4	38 -5 23.0	12 -5 23.0	40 -7 19.4	38 -17 1.4	35 -4 24.8

[1] Not to be used for specifications

[2] DuPont Performance Elastomers proprietary method; performance will vary with seal design and application specifics

[3] ASTM D2240

[4] ASTM D412, 500 mm/min (20 in/min)

[5] ASTM D395 - Method B, pellets

[6] ASTM 1329

Standard Compound

1. Kalrez® Spectrum™ 6375 is a carbon black-filled product for general use in O-rings, seals, diaphragms and other parts specifically for the chemical process industry. This product has excellent broad chemical resistance, good mechanical properties, and outstanding hot-air aging properties. Kalez® SpectrumTM 6375 is well suited for use in mixed process streams because of its excellent resistance to acids, bases, and amines. It is also recommended for use in hot water, steam, pure ethylene oxide and propylene oxide.

2. Kalrez® Spectrum™ 7075 has enhanced physical properties including very low compression set and improved seal force retention. It is a carbon black-filled product utilizing proprietary cure chemistry cure chemistry. Its mechanical properties are designed for improved sealing performance in both high temperature environments and temperature cycling situations. Kalrez®Spectrum™ 7075 O-rings have a glossy finish. This product was specifically developed for the chemical and hydrocarbon industries to provide improved chemical and thermal resistance better than the industry standard set by Kalrez® 4079.

3. Kalrez® 4079 is a low compression set product for general-purpose use in O-rings, diaphragms, seals, and other parts used in the process and aircraff industries. It is a carbon black-filled product with excellent chemical resistance, good mechanical properties, and outstanding hot air aging properties. It exhibits low swell in organic and inorganic acids and has good response to temperature cycling effects. This product is not recommended for use in hot water/steam applications or in contact with certain hot aliphatic amines, ethylene oxide, or propylene oxide.

Special Compound

Note: Before ordering Kalrez® parts in specialty products, please consult with us or DuPont Performance polymers to determine properties needed for the application. Special products are generally not held in inventory.

4. Kalrez® Spectrum™ 6380 is a non-black product specifically developed for chemical processes involving hot, aggressive amines. It has also been successfully used in applications involving highly oxidizing chemicals. In addition, It has excellent overall chemical resistance. This cream colored product is easily identifiable when selecting an O-ring material for harsh chemical plant services.

5. Kalrez® Spectrum™ 7090 is a product for uses requiring higher hardness/higher modulus than more typical applications. Kalrez® Spectrum™ 7090 perfluoroelastomer parts are well suited for both static and dynamic applications as well as specific sealing applications requiring extrusion resistance at high temperatures. These special black parts have excellent thermal and mechanical properties, including excellent compression set and seal force retention, resistance to temperature cycling effects, and rapid gas decompression(RGD). Short excursions to higher temperatures may also be possible.

6. Kalrez® 0090 is a black product with broad chemical resistance combined with high modulus and high hardness. Kalrez® 0090 parts have outstanding resistance to extrusion and rapid gas decompression (RGD). This product has been independently tested and certified by the Materials Engineering Research Laboratory (MERL – UK) to meet NORSOK-M-710 Rev 1 requirements.

7. Kalrez® Spectrum™ 0040 is a black product specifically designed for low temperature environments where significant chemical resistance is required. Kalrez® Spectrum™ 0040 parts maintain elasticity and seal force at temperatures unattainable by other perfluoroelastomers.

8. Kalrez® 1050LF is a carbon black-filled product for O-rings, seals, and other parts used in chemical process industries. It has good hot water/steam, and excellent amine resistance. Kalrez® 1050LF is not recommended for use in organic acids, or inorganic aicds at high temperatures.

Note: Other specialty or custom compounds may be available or developed to applications that require different properties than the above compounds offer: 8375, 8385, 8101, 4001……

Kalrez is a registered trademark of Dupont.

Kalrez® Compound

Kallrez Compound	Industry Segment	Hardness Shore A	Description / Application	100% Modulus Mpa(Psi)	Colour	Max. Service Temp
Spectrum™ 7075	Chemical and Mineral Processing	75	Highest temperature resistance,lowest compression set, temperature cycling	7.6 (1,100)	Black	327 ˚C
Spectrum™ 6375	Chemical and Mineral Processing	75	Outstanding performance in the widest possible range of chemicals snd temperatures	7.2 (1,050)	Black	275 ˚C
Spectrum™ 6380	Chemical and Mineral Processing	80	Developed specifically for hot aggressive amine environments	6.89 (1,000)	Cream	225 ˚C
4079	Chemical and Mineral Processing	75	High temperature, low compression set	7.2 (1,050)	Black	316 ˚C
1050LF	Chemical and Mineral Processing	82	General purpose,hot water/steam, amines	12.4 (1,800)	Black	288 ˚C
1058	Chemical Processing	65	Softest compound for low sealing force applications	4.7 (675)	Black	260 ˚C
2037	Chemical Processing/ Semiconductor	79	White filled, high purity, general chemical resistance	6.2 (900)	White	218 ˚C
2035	Chemical Processing/ Semiconductor	85	Suitable for Ethylene Oxide	8.61 (1,250)	Black	220 ˚C
Spectrum™ 7090	Chemical and Mineral Processing / Oil & Gas Exploration	90	Excellent explosive decompression resistance, low compression set and high temperature resistance	15.5 (2,248)	Black	325 ˚C
3018	Chemical and Mineral Processing / Oil & Gas Exploration	91	High hardness, high modulus, extrusion resistance	16.9 (2,450)	Black	288 ˚C
3065	Oil & Gas industry	90	High hardness, high modulus, extrusion resistance, custom parts	N/A	Black	288 ˚C
6885	Spray paint Application only	75	Spray Systems	6.89 (1,000)	Black	270 ˚C
6880	Spray paint Application only	70	Spray Systems	2.48 (360)	White	250 ˚C
6230	Pharmaceutical & Food Grade	75	Superior chemical resistance and low contanmination from extractables;FDA, USP Class VI, FCN 000101	7.1 (1,020)	Black	260 ˚C
6221	Pharmaceutical & Food Grade	70	Superior chemical resistance and low contanmination from extractables;FDA, USP Class VI, FCN 000102	7.2 (1,050)	White	260 ˚C
6230A	Pharmaceutical & Food Grade	75	Sanitary Seals	7.1 (1,020)	Black	260 ˚C
7075UP	Semiconductor	75	Recommended compound for thermal applications	7.6 (1,100)	Black	327 ˚C
6375UP	Semiconductor	75	Wet process application, low elemental extractables, static and dynamic applications	7.2 (1,050)	Black	275 ˚C
4079UP	Semiconductor	75	Thermal applications	7.2 (1,050)	Black	316 ˚C
2037UP	Semiconductor	79	High Purity for clean room environment	6.2 (900)	White	218 ˚C

Kalrez® Compound

Kallrez Compound	Industry Segment	Hardness Shore A	Description / Application	100% Modulus Mpa(Psi)	Colour	Max. Service Temp
8002	Semiconductor	69	Select semiconductor plasma and gas deposition applications, low particle generation	2.9 (420)	Clear	250 ˚C
Sahara™ 8085	Semiconductor	80	Plasma and depostion HDPCVD, PECVD, SACVD, Etch, Ash, low particle generation o-ring and bonded doors	7.5 (1,085)	Beige	240 ˚C
Sahara™ 8475	Semiconductor	60	Thermal applications	2.2 (320)	White	300 ˚C
Sahara™ 8575	Semiconductor	62	Etch-low weight loss in oxygen and fluorine based plasmas	2.5 (360)	White	300 ˚C
9100	Semiconductor	74	High hardness, high modulus, excellent resistance	4.3 (620)	Amber translucent	300 ˚C

Chemraz® O-rings

HIGH-PERFORMANCE MATERIALS AT A GLANCE

Chemraz® Perfluoroelastomer (FFKM) ensures customers the best compound available for each unique application.

Chemraz 555, 605 and 600-broad chemical resistance

Chemraz 555 offers broad chemical resistance in an extremely wide temperature range, outstanding physical properties and superior compression set resistance. Chemraz 605 and 600 provide the same chemical resistance as chemraz 505 but with a higher temperature range.

Compound	555	605	600
Shore A Hardness	80	80	90
Temperature range	10°F to 600°F (-12°C to 316°C)	-4°F to 500°F (-20°C to 260°C)	
Color	Black		

Chemraz 505, 504 and 510 – standard compounds

Chemraz 505 offer broad Chemical resistance for a wide range of applications. Chemraz 504 and 510 are softer and harder versions of Chemraz 505. Chemraz 504 is an ideal for applications experiencing low forces,while Chemraz 510 is perfect for high-pressure applications.

Compound	505	504	510
Shore A Hardness	75	65	90
Temperature Range	-22°F to 446°F (-30°C to 230°C)		
Color	Black		

Chermraz 615 – for high temperature

Ideal for continuous high temperatures up to 615°F (324°C) because of its low compression set and outstanding mechanical properties.

Compound	615
Shore A Hardness	80
Temperature Range	0°F to 615°F (-18°C to 324°C)
Color	Black

Chemraz 514 and 517 – white compounds

White compounds used whatever carbon black contamination must be avoided.

Compound	514	517
Shore A Hardness	70	80
Temperature Range	-20°F to 425°F (-29°C to 218°C)	
Color	white	

Chemraz 584 and 858 – specific media

Ideal for use in strong oxidizing media and hot aqueous solutions.

Compound	584	585
Shore A Hardness	70	80
Temperature Range	-22°F to 428°F (-30°C to 220°C)	
Color	Cream	

Chemraz SD625, SD517 and SD585–compliant compounds

These specialty compounds are USP class VI and FDA compliant. Additionally, SD625 and SD517 meet 3-A® Sanitary Standards.

Compound	SD625	SD517	SD585
Shore A Hardness	80	80	80
Temperature Range	-4°F to 500°F (-20°C to 260°C)	-22°F to 428°F (-30°C to 220°C)	
Color	Black	White	Cream

Chemraz 526 – rapid gas decompression resistant(RGD)

Rapid gas decompression resistant Chemraz with the same chemical resistance as Chemraz 505.

Compound	526
Shore A Hardness	95
Temperature Range	-4°F to 482°F (-20°C to 250°C)
Color	Black

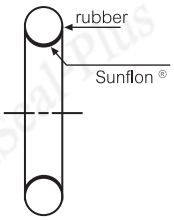
Cap O-rings (Sunflon® Cap O-rings)

Cap O-ring is a seal; a crescent shaped SUNFLON® ring is molded on the inner periphery of rubber O-ring integrally, and have both of low frictional properties of SUNFLON® and elasticity of rubber.

Example of use

For hydraulic equipment (Cylinder, Actuator, Valve etc.), rotating shaft, oscillating shaft

Cap O-ring



What is cap O-rings?

Cap O-ring is fromed with a crescent shaped Sunflon®(PTFE) ring on the inside diameter surface of rubber as shown in the figure on the left. Cap O-ring has good characteristics for low friction due to their PTFE ring and elasticity of rubber.

Cap O-ring can be easily installed to one-piece housing. If it is used with retainer, it can endure long service life compared to usage of Cap O-ring alone. Retainer is necessary for long service life when used under condition of pressure 2.9MPa and above.

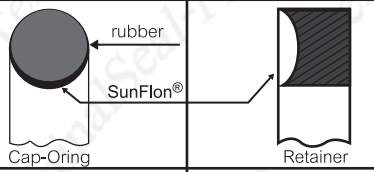
Features of Cap O-ring

1. Low friction like rotary Capseal which can avoid stick –slip.
2. Like rubber O-ring, fitting can be done without dividing the groove.
3. Almost no increase in break-out resistance after long pause.
4. Longer seal service life
5. Used for higher speed than Capseal
6. Used for JIS B 2406 dynamic O-ring grooves.
7. Available for high pressure (9.8 MPa) condition with retaining ring.

Usage and characteristics of Cap O-ring

Cap O-ring dimensions and housign dimensions

Table 1

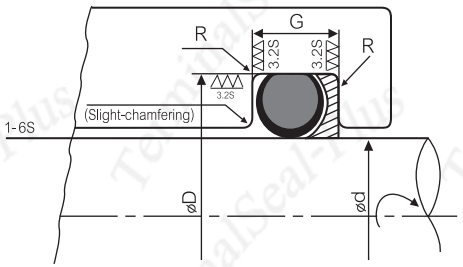
Usage	Rotary, Swing, Spiral and reciprocating	
Part No.	SOP-xx	SUN-SOP-xx
Cross-section		
Standard material, Compound No. (Note 1)	NBR (hardness 70) 1115-70	Sunflon® S4151
Temperature range °C	-40~+80	
Max. pressure MPa (Note 2)	2.9, 9.8 (together with retainer)	
Max. rotation speed m/s (Note 3)	10 (for rotary)	
Sealing liquid	Petroleum oil Cutting oil Gear oil Lubricant oil Grease	

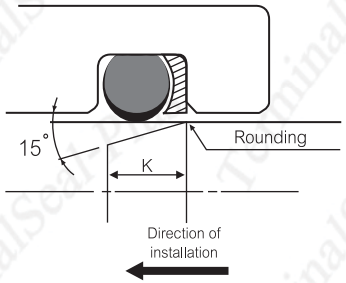
Note 1.For special usage, we have combinations with fluorine rubber 1320-75, NBR 1129-70, Sunflon® S4161 and others. Please consult our sales engineer.

Note 2.Retainers are necessary for pressure over 2.9MPa.

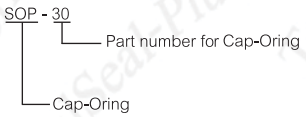
Note 3.Refer to figure 3. PV line diagram for high pressure.

Cap O-ring dimensions and housing dimensions.

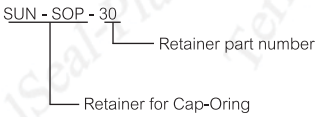




Cap O-ring indentification Code



Retainer identification code



Cap O-ring test data

And application examples

Cap O-ring test data

1. PV diagram

Figure 3 shows available PV line drawing.

(Retainers are used for P=2.9MPa and over.)

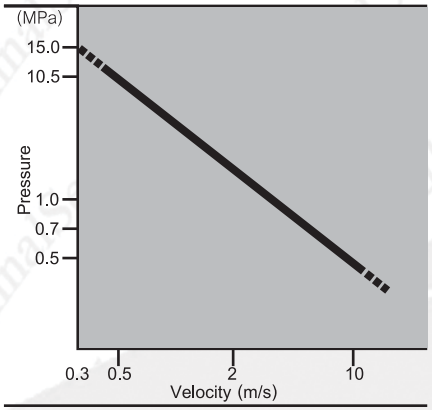


Fig. 3

2. Rotary torque

Figure 4 shows rotary torque of pressure 0~ 20.6MPa. (for SOP-50A, rod diameter Ø50, Turbine oil 32)

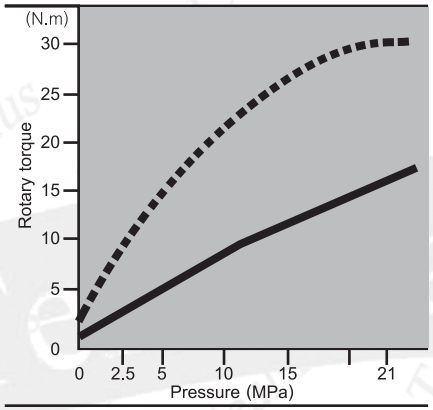


Fig. 4

Cap O-ring application examples

1. Rotary joint for machine tool index table

Rotation speed	16.6 rpm
Fluid	petroleum oil
Pressure	4~5 MPa
Size	SOP50, SOP75, SOP80, SOP90, SOP105
Retainer	contained

2. For manipulator of seabed vessel,

Rotation speed, slow speed	
Fluid	petroleum oil for aircraft
Pressure	13.7MPa
Size	SOP15, SOP35, SOP45, SOP70, SOP90, SOP100
Retainer	contained

3. Dust seal for machine tool rotation table

Rotation speed slow speed	
Fluid	water-soluble cutting oil
Pressure	almost none
Size	SOP190
Retainer	none

4. Rotary joint for wind power generator

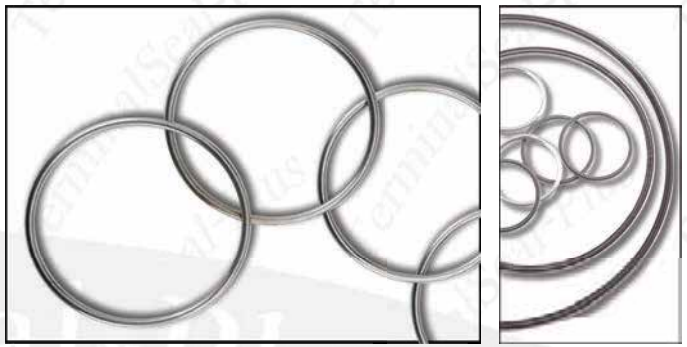
Rotation speed 48 rpm	
Fluid	petroleum oil ISO VG 32
Pressure	11.8 MPa
Size	SOP48A, SOP52, SOP55
Retainer	contained

5. Tooling for machine tool

Rotary speed	3000 rpm
Fluid	water-soluble cutting oil
Pressure	0.98 MPa
Size	SOP14, SOP18, SOP25, SOP35
Retainer	none

Metal O-ring

Metal O-rings perform high level sealing characteristics under severe conditions such as high temperature, high pressure, etc. Our metal O-rings maintains high sealing seal characteristics under more severe ultrahigh vacuum and cryogenic temperature. From industries such as H-II A rocket and atomic energy related and semiconductor, we have got favorable reputations.



Feature

- Usable under -270 °C to + 700 °C
- Steady sealing performance under ultrahigh vacuum (1.3x10-10PA) and ultra high pressure: 300MPa (approx. 3000kgf/cm^2)
- Compact designing can be applied as smaller sealing area achieved
- Lowering clamping force on flanges compared to other metallic gaskets
- Small Flange loading per unit (9.8x10^2~2.0x10^{3}N/$_{CM}$ {100~200kgf/cm})
- Allows compact designing.
- High-level vacumm of 1.33x10^{-7} Pa {1x10^{-9} Torr} canbe obtained.
- Baking up to +400 °C is possible.

Application

Vacuum machinery, Vacuum apparatus, Vacuum vales, Mass flow controllers, Various flanges, CVD devices, Thermal diffusion furnace devices, Quartz flanges, Rocket engines, Withstand pressure departments of nuclear reactor pressure vessels, Turbochargers, Injector for vehicle engines.

Sealing mechanism of metal O-ring

Specifications and groove shape of metal O-ring

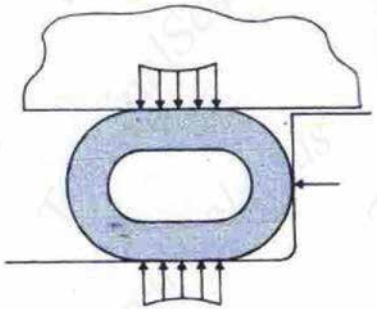


Fig.1

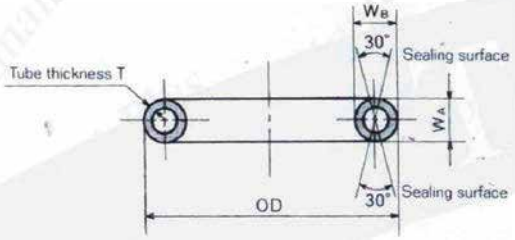
Sealing mechanism of metal O-ring

Sealing operation of metal O-ring is to use repulsive force of metal when metal O-ring is mechanically squeezed by groove as shown in Fig 1

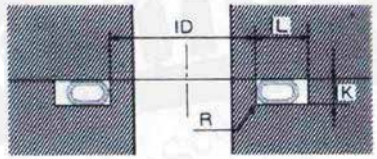
Metal O-ring is not reusable.

Specifications and groove shape of metal O-ring

Shape of metal O-ring



Groove dimensions



- Surface finish of metal O-ring is 1.6 S.
- Metal tube materal:SUS321
- Plating:silver

- Required surface finish of groove is 3.2S

Table 1 Dimensions in millimeters

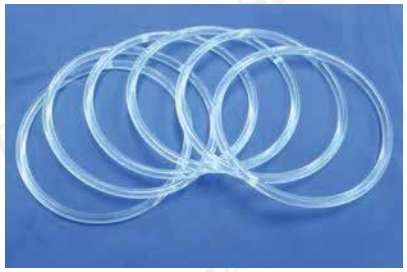
Corresponding AS568 Rubber O-rings	Metal O-ring dimensions			
	Tube diameter (nominal)	Tube thickness (T)	O-rind outside Diameter (OD)	Available Outside Diameter size rangs
AS568-011-037	1.57	0.25		10-65
AS568-136-170	2.39	0.35		55-200
AS568-240-284	3.18	0.60		100-460
AS568-370-395	4.77	0.80		215-660

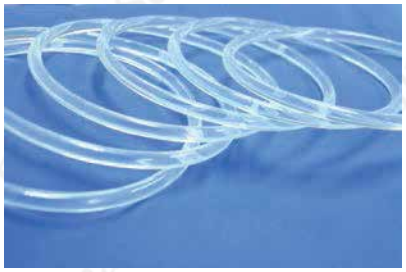
Identification code of metal O-ring

AS568-XXX (metal)

code N0. of AS 568

PU O-ring (Polyurethane O-ring)





Common Names: Urethane, AU, EU, PU

Trade Names: Adiprene®, Millathane®, Vibrathane®

General Description: Polyurethane is an organic polymer. Polyurethanes are formed by reacting a polyol (an alcohol with more than two reactive hydroxyl groups per molecule) with a diisocyanate or a polymeric isocyanate in the presence of suitable catalysts and additives. Polyurethane is a widely used compound due to its superior strength, tear and abrasion resistance. Polyurethane also provides excellent permeation resistance.

Features:

- Good hydraulic oil and gasoline resistance
- Resistant to pure aliphatic hydrocarbons (propane, butane, fuel)
- Resistance to mineral and silicone oils and greases
- Resistant to water, oxygen, ozone and aging
- Excellent tear and abrasion resistance
- Available in multiple types and compounds to meet performance and cost requirements

Limitations:

- Not compatible with acids, ketones, esters, ethers, alcohols, glycols
- Hot water, steam, alkalis and amines

Service Temperature:

-65°F to 225 °F(-54 °C to 107 °C). Depending on compound and application

Popular Polyurethane O-Ring Materials

Don't see what you need?

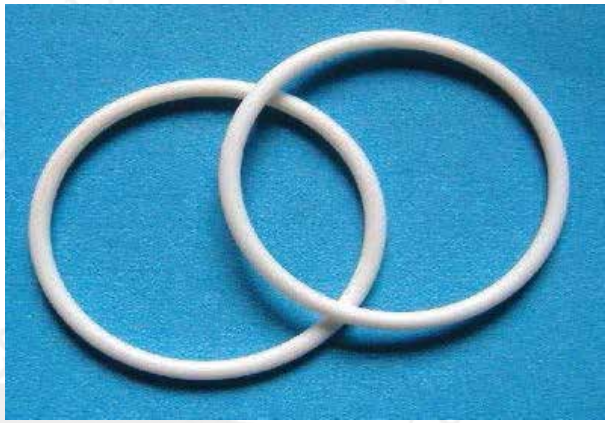
Please contact an application engineer for assistance in selecting the compound that provides the best combination of performance and price for your specific application.

COMPOUND	P1000	P1001	P1004	P1006
Base Material	PolyUrethane	PolyUrethane	PolyUrethane	PolyUrethane
Color	Translucent	Translucent	Translucent	Translucent
Duro (Shore A)	70	90	90	70
Typical Inventory Level	Med	Med	Med	Med
High Temp (F)	250	250	180	180
Low Temp (F)	-65	-65	-30	-30
Steam < 300 F	4	4	4	4
Steam < 400 F	4	4	4	4
Compression Set	2	2	3	3
Chemical & Solvents	3	3	4	4
Sunliight, Ozone, UV	1	1	1	1
Wear Abrasion	1	1	2	2
Permeation Vacuum	1	1	1	1
Petroleum & Hydraulics Oil	3	3	4	4
Fuels & Gas	3	3	4	4
Brake Fluids	4	4	4	4

*1 = Great 2 = Good 3 = Fair 4 = Poor

High performance 70 durometer Polyurethane
High performance 90 durometer Polyurethane
High performance 90 durometer Polyurethane
High performance 70 durometer Polyurethane

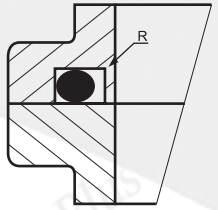
PTFE(Teflon®) O-rings



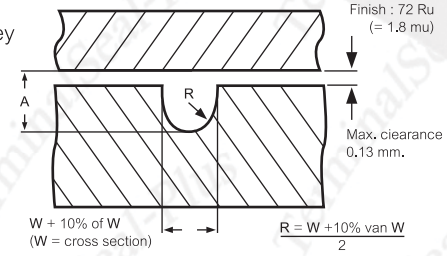
Groove dimensions for PTFE O-Rings

Owing to the less elastic properties of the material, PTFE(Teflon®) O-Rings can be used for static sealing in axial groove constructions only.

When using PTFE O-Ring in axial groove or flange constructions, normal groove depths are suitable. Considering the occurrence of cold flow of PTFE, the best results are achieved if the groove construction stated below is used.



PTFE O-Rings used in the groove construction as per figures are more effective than when they are installed in the usual O-Ring grooves.



A=W-10 to 20% of W
(for cross sections 1.78 to 5.33 mm)

A=W-10 to 15% of W
(for cross sections 5.33 to 7 mm)

Compressing PTFE O-Rings requires higher loads than compressing elastomer O-Rings. Consequently PTFE O-Rings can be used for pressure sealing in axial groove, not in radial grooves.

In radial grooves, PTFE O-Rings can serve as a pressureless separating seal, fot instance.

Because PTFE O-Rings are difficult to expand and difficult to compress, it is advisble to choose groove dimentions that creat a silding fit.

If PTFE O-Rings are heated to 80 or 100°C, they are easier to install.

Note : Because Kalrez® is much more elastic than PTFE, it is recommendable to consider the application of Kalrez instead of PTFE if chemical and thermal conditions do not permit the use of polymer.

Application of O-Rings against vacuum

When constructing O-Ring groove for vacuum sealing, it is important that the groove is filled by the O-Ring as much as possible, because when rubber is being exposed to vacuum, it will shrink to a certain extent. Besides it must be prevented that the O-Ring can slide or roll. The surfaces to be sealed must be machined as smooth as possible.

The figures in the next column represent the cross section according to AS 568A for vacuum sealing.

Dimensions in millimetres

Cross Section	Groove depth E	Groove width F
1.78	1.27 - 1.32	2.11 - 2.24
2.62	1.88 - 1.98	3.00 - 3.12
3.53	2.57 - 2.62	3.99 - 4.14
5.33	3.86 - 3.94	5.99 - 6.12
7.00	5.11 - 5.19	7.75 - 7.87

In the case of high-vacuum sealing, the gas permeability and degassing properties of the O-Rings play an important part. These properties vary widely among the various elastomers and are also highly dependent on temperature and medium handled.

In the majority of cases butyl and, particularly, Viton are the compounds to be preferred for sealing against vacuum.

Note : If in regard of vacuum and elevated temperatures maximum requirements are made, Kalrez® will give the best results.

O-ring Kits, O-rings Accessaries

O-RING KITS

The great O-ring hint draws to an end with an O-ring kit from of a wide range of standard metric or imperial sizes in selected Parker. Ideal for repair, fitting and assembly workshops. Compounds Optimum use of O-rings is assured because the kit Available in various versions: customized repair kits consisting is made to your immediate requirements.

O-Ring Kit nr. 2

492 O-rings in 37 different imperial sizes

O-Ring Kit no. 4

382 O-rings in 30 different imperial sizes

Compounds proven in parker Quality

Nitrile-Butadiene Rubber NBR 70 Shore A

Nitrile Butadiene Rubber NBR 90 Shore A

Fluorocarbon (Viton) FKM 75 Ahore A

O-Ring Kit no. 2			
462 O-rings in 37 different imperial sizes.			
No.	Parker size	Dimensions	Quantity
1	2-006	2.90 x 1.78	32
2	2-007	3.68 x 1.78	32
3	2-008	4.47 x 1.78	32
4	2-009	5.28 x 1.78	32
5	2-010	6.07 x 1.78	32
6	2-011	7.65 x 1.78	32
7	2-012	9.25 x 1.78	32
8	2-110	9.19 x 2.62	13
9	2-111	10.77 x 2.62	13
10	2-112	12.37 x 2.62	13
11	2-113	13.94 x 2.62	13
12	2-114	15.54 x 2.62	13
13	2-115	17.12 x 2.62	13
14	2-116	18.72 x 2.62	13
15	2-210	18.64 x 3.53	9
16	2-211	20.22 x 3.53	9
17	2-212	21.82 x 3.53	9
18	2-213	23.39 x 3.53	9
19	2-214	24.99 x 3.53	9
20	2-215	26.57 x 3.53	9
21	2-216	28.17 x 3.53	9

To be continued

O-Ring Kit no. 4			
382 O-rings in 30 different imperial sizes.			
No.	Parker size	Dimensions	Quantity
1	2-006	2.90 x 1.78	20
2	2-007	3.68 x 1.78	20
3	2-008	4.47 x 1.78	20
4	2-009	5.28 x 1.78	20
5	2-010	6.07 x 1.78	20
6	2-011	7.65 x 1.78	20
7	2-012	9.25 x 1.78	20
8	2-010	9.19 x 2.62	13
9	2-111	10.77 x 2.62	13
10	2-112	12.37 x 2.62	13
11	2-113	13.94 x 2.62	13
12	2-114	15.54 x 2.62	13
13	2-115	17.12 x 2.62	13
14	2-116	18.76 x 2.62	13
15	2-210	18.64 x 3.53	10
16	2-211	20.22 x 3.53	10
17	2-212	21.82 x 3.53	10
18	2-213	23.39 x 3.53	10
19	2-214	24.99 x 3.53	10
20	2-215	26.57 x 3.53	10
21	2-216	28.17 x 3.53	10

To be continued

O-Ring Kit no. 2			
462 O-rings in 37 different imperial sizes.			
No.	Parker size	Dimensions	Quantity
22	2-217	29.74 x 3.53	9
23	2-218	31.34 x 3.53	9
24	2-219	32.94 x 5.33	9
25	2-220	34.52 x 5.33	9
26	2-221	36.09 x 3.53	9
27	2-222	37.69 x 3.53	9
28	2-325	37.47 x 5.33	6
29	2-326	40.64 x 5.33	6
30	2-327	43.82 x 5.33	6
31	2-328	46.99 x 5.33	6
32	2-329	50.17 x 5.33	6
33	2-330	53.34 x 5.33	6
34	2-331	56.52 x 5.33	6
35	2-332	59.69 x 5.33	6
36	2-333	62.87 x 5.33	6
37	2-334	66.04 x 5.33	6

37 Item = 492 O-rings

O-Ring Kit no. 4			
382 O-rings in 30 different imperial sizes.			
No.	Parker size	Dimensions	Quantity
22	2-217	29.74 x 3.53	10
23	2-218	31.34 x 3.53	10
24	2-219	32.92 x 3.53	10
25	2-220	34.52 x 3.53	10
26	2-221	36.09 x 3.53	10
27	2-222	37.69 x 3.53	10
28	2-325	37.47 x 5.33	7
29	2-326	40.64 x 5.33	7
30	2-327	43.82 x 5.33	7

30 Items = 382 O-rings

All O-rings in proven Parker quality NBR 70 (N 674-70)

O-Ring Kit

Part. No. **PLSTC STD KIT E0515** - Compound E05215-80 EPR 80 durometer o-rings per NAS 1613 rev. 2 in 37 popular AS568 size/513 o-rings

Part. No. **PLSTC STD KIT N0552** - Compound N0552-90 NBR 90 durometer o-rings in 37 popular AS568 sizes / 513 o-rings

Part. No. **PLSTC STD KIT N0674** - Compound N0674-70 NBR 70 durometer o-rings in 37 popular AS568 sizes / 513 o-rings

Part. No. **PLSTC STD KIT V0747** - Compound V0747-75 FKM 75 durometer o-rings in 37 popular AS568 sizes / 513 o-rings

Part. No. **PLSTC STD KIT V0884** - Compound V0884-75 FKM (brown) 75 durometer o-rings in 37 popular AS568 sizes / 513 o-rings

Note: Boxes and plugs are available as separate items.

PARKER O-RING KITS

Content of PLSTC STD KIT

No.	Parker size	Dimensions mm	Quantity
1	2-006	2.90 x 1.78	36
2	2-007	3.68 x 1.78	36
3	2-008	4.47 x 1.78	36
4	2-009	5.28 x 1.78	36
5	2-010	6.07 x 1.78	36
6	2-011	7.65 x 1.78	36
7	2-012	9.25 x 1.78	36
8	2-110	9.19 x 2.62	12
9	2-111	10.77 x 2.62	12
10	2-112	12.37 x 2.62	12
11	2-113	13.94 x 2.62	12
12	2-114	15.54 x 2.62	12
13	2-115	17.12 x 2.62	12
14	2-116	18.72 x 2.62	12
15	2-210	18.64 x 3.53	9
16	2-211	20.22 x 3.53	9
17	2-212	21.82 x 3.53	9
18	2-213	23.39 x 3.53	9
19	2-214	24.99 x 3.53	9
20	2-215	26.57 x 3.53	9
21	2-216	28.17 x 3.53	9
22	2-217	29.74 x 3.53	9
23	2-218	31.34 x 3.53	9
24	2-219	32.92 x 3.53	9
25	2-220	34.52 x 3.53	9
26	2-221	36.09 x 3.53	9
27	2-222	37.69 x 3.53	9
28	2-325	37.47 x 5.33	6
29	2-326	40.64 x 5.33	6
30	2-327	43.82 x 5.33	6
31	2-328	46.99 x 5.33	6
32	2-329	50.17 x 5.33	6
33	2-330	53.34 x 5.33	6
34	2-331	56.52 x 5.33	6
35	2-332	59.69 x 5.33	6
36	2-333	62.87 x 5.33	6
37	2-334	66.04 x 5.33	6

37 Item = 513 O-Ring

O-Ring Kit no. 6

407 O-rings in 32 different imperial sizes

O-Ring Kit no. 6			
407 O-rings in 37 different imperial sizes.			
No.	Parker size	Dimensions	Quantity
1	2-006	2.90 x 1.78	20
2	2-008	4.47 x 1.78	20
3	2-010	6.07 x 1.78	20
4	2-011	7.65 x 1.78	20
5	2-012	9.25 x 1.78	20
6	2-013	12.42 x 1.78	20
7	2-110	9.19 x 2.62	13
8	2-111	10.77 x 2.62	13
9	2-112	12.37 x 2.62	13
10	2-113	13.94 x 2.62	13
11	2-114	15.54 x 2.62	13
12	2-115	17.12 x 2.62	13
13	2-116	18.76 x 2.62	13
14	2-117	20.29 x 2.62	13
15	2-118	21.89 x 3.53	10
16	2-210	18.64 x 3.53	10
17	2-211	20.22 x 3.53	10
18	2-212	21.82 x 3.53	10
19	2-213	23.39 x 3.53	10
20	2-214	24.99 x 3.53	10
21	2-215	26.57 x 3.53	10
22	2-216	28.17 x 3.53	10
23	2-217	29.74 x 3.53	10
24	2-218	31.34 x 3.53	10

To be continued

O-Ring Kit no. 7

408 O-rings in 32 different metric sizes

O-Ring Kit no. 4					
382 O-rings in 30 different imperial sizes.					
No.	Dimensions	Quantity	No.	Dimensions	Quantity
1	3.00 x 2.00	20	17	20.00 x 3.50	10
2	5.00 x 2.00	20	18	22.00 x 3.50	10
3	6.00 x 2.00	18	19	23.00 x 3.50	10
4	8.00 x 2.00	18	20	25.00 x 3.50	10
5	10.00 x 2.00	18	21	27.00 x 3.50	10
6	13.00 x 2.00	18	22	28.00 x 3.50	10
7	10.00 x 2.50	14	23	30.00 x 3.50	10
8	12.00 x 2.50	14	24	31.00 x 3.50	10
9	14.00 x 2.50	14	25	32.00 x 3.50	10
10	15.00 x 2.50	14	26	34.00 x 3.50	10
11	16.00 x 2.50	14	27	36.00 x 3.50	10
12	18.00 x 2.50	14	28	38.00 x 3.50	10
13	20.00 x 2.50	14	29	41.00 x 3.50	10
14	21.00 x 2.50	14	30	44.00 x 3.50	10
15	22.00 x 2.50	14	31	46.00 x 3.50	10
16	18.00 x 3.50	10	32	50.00 x 3.50	10

32 Item = 408 O-ring

All O-rings in proven Parker quality NBR 70 (N 674-70)

O-Ring Kit no. 6

407 O-rings in 32 different imperial sizes

O-Ring Kit no. 6			
407 O-rings in 37 different imperial sizes.			
No.	Parker size	Dimensions	Quantity
25	2-219	32.92 x 3.53	10
26	2-220	34.52 x 3.53	10
27	2-221	36.09 x 3.53	10
28	2-222	37.69 x 3.53	10
29	2-223	40.87 x 3.53	10
30	2-224	44.04 x 3.53	10
31	2-225	47.22 x 3.53	10
32	2-226	50.39 x 3.53	10

32 items = 407 O-rings

All O-rings in proven Parker-Qualitat NBR 70 (N 674-70)

Part. No. N1490 BOSS KIT - Compound N1490-90
NBR 90 durometer in 20 standard tube fitting sizes

Further Kits for MS 33656 (Tube Fitting Boss Seals) are available in the compound N552-90 (Kit no. 8), as well as according to the Japanese metric standard JIS B 2401 in compound N674-70

Imperial Sizes O-Ring Kit

485 O-Ring in 37 different imperial size

Compounds in proven PARKER-PRADIFA qualities

• Nitrile Butadiene Rubber	NBR	70°Shore A
• Nitrile Butadiene Rubber	NBR	90°Shore A
• Ethylene-Propylene	EPDM	80°Shore A
• Fluorocarbon (Viton)	FPM	75°Shore A
• Fluorocarbon (Viton)	FPM	90°Shore A
• Neoprene	Cr	70°Shore A
• Silicone	MVQ	70°Shore A

Kit 8

O AS 568A Standard Series

O NBR, 70 Shore A

O ASTM D2000

SAE J200....

O DIN 3771/ISO 3601

O 20 sizes, 212 pcs

O-ring Division Europe

Kit no.8

No	Abm./Size	ID X W	No	Abm./Size	ID X W
901	3/32	0.185 x 0.056	911	11/16	0.863 x 0.116
902	1/8	0.239 x 0.064	912	3/4	0.924 x 0.116
903	3/16	0.301 x 0.064	213	13/16	0.986 x 0.116
904	1/4	0.351 x 0.072	914	7/8	1.047 x 0.116
905	5/16	0.414 x 0.072	916	1	1.171 x 0.116
906	3/8	0.468 x 0.078	918	1 1/8	1.355 x 0.116
907	7/16	0.530 x 0.082	920	1 1/4	1.475 x 0.118
908	1/2	0.644 x 0.087	924	1 1/2	1.720 x 0.118
909	9/16	0.706 x 0.097	928	1 3/4	2.090 x 0.118
910	5/8	0.755 x 0.097	932	2	2.337 x 0.118

Nitrile Butadiene Rubber NBR 70° Shore A

• JIS Standard Series (mm)

• NBR, 70 Shore A (Parker N674-70)

•ASTM D2000

SEA J200...

• DIN 3771/ISO 3601

• 30 sizes, 396 pcs.

O-Ring Kit 5

No	Size	ID x W
006	P3	2,80 x 1,90
007	P4	3,80 x 1,90
008	P5	4,80 x 1,90
009	P6	5,80 x 1,90
010	P7	6,80 x 1,90
011	P8	7,80 x 1,90
012	P9	8,80 x 1,90
110	P10A	9,80 x 2,40
111	P11	10,80 x 2,40
112	P12	11,80 x 2,40
113	P14	13,80 x 2,40
114	P16	15,80 x 2,40
115	P18	17,80 x 2,40
116	P20	19,80 x 2,40
210	G20	20,00 x 3,00

No	Size	ID x W
211	G22	22,00 x 3,00
212	P22,4	22,10 x 3,50
213	G25	24,40 x 3,10
214	P25	24,70 x 3,50
215	P26	25,70 x 3,50
216	G30	29,40 x 3,10
217	P30	29,70 x 3,50
218	P32	31,70 x 3,50
219	P34	33,70 x 3,50
220	G35	34,40 x 3,10
221	P36	35,70 x 3,50
222	G40	39,40 x 3,10
325	P40	39,70 x 3,50
326	G45	44,70 x 3,10
327	P48	47,70 x 3,50

O-rings Accessaries

O-Ring Hook

Avoid Metal Part Damage When Picking Seals & O-Ring

Removing 'O' Ring from the seat. with O' Ring Hooks the removal of 'O' Rings is simple and safe. The 'O' Ring hooks come in set of 4, with different Profiles. The design of the hooks is such that it does not damage the seat knurled handle provides firm grip.

O-Ring Extraction Tools

Parker

Part. No. BRASS EXTRACTION KIT

Brass extraction pick and spat in plastic pouch

Installation Tool

Tools for proper installation and disassembling of O-rings.

Parker O-Ring measuring cone and measuring tape

O-rings Accessaries

The measuring cone can be used for quick and accurate definition of 2-xxx O-ring sizes up to 75 mm diameter. The reference diameter. of the cross section is easily noted using the caliberted slot in the cone base.

Checking the cross-section

Cone, e.g. cross-section 2.62 mm is the 2-1xx series.

The 2-1xx series read from the cone directly above the calibration slot for the 2.62 mm section. The respective inner diameter in millimeters then can be taken from the size list.

Identification of the 2-xxx size number with the measuring cone

The measuring tape suits O-ring diameters up to 200 mm and is used in a similar way like the cone. The different scales on the tape apply to diverse cross-sections.

Identification of the O-ring size using the measuring band

SICOMET 8300

is the standard adhesive for bonding 0-rings and rubber materials. It features a low viscosity and fast setting time, joining hard to bond elastomers. It is highly resistant to aging, weathering and plasticizer migration.

Lubrication of O-rings during assembly-O-Lube and Super-O-Lube

Lubricant or grease is used with all types of O-ring seal to

- ease assembly
- lower friction
- extend working lifetime

Without dout the greatest advantage of O-ring lubrication is the ease of assembly.

A) Parker O-Lube is a mineral oil based lubricant containing barium soap. It eases assembly problems and contributes to a longer seal working life.

B) Parker Super-O-Lube is a silicone based lubricant and completes the rage compatible with all elastomers (silicone compounds have to be handled carefully; apply only a minimum quantity of Super-O-Lube). This lubricant is noted for its adhesive properties, adhering well to both metal and rubber parts. It exhibits an unusually wide temperature range.

A) Parker O-Lube

Technical data

Content : appr 80 % mineral oil

appr. 20 barium stearate

max 0.2 % water

Stock point: -4 °C

Flame point: +224 °C

Recommended temperature range: -30 °C to +120°C

B) Parker Super-O-Lube

Technical data

Content: Silicone grease

Stock point: -33 °C

Flame point: +321 °C

Recommended temperature range: -55 °C to +200°C

TERMINAL GROUP

O-rings Accessaries

Depth Caliper

It is generally difficult to measure the groove depth. With inside calipers the measurement is not precise. We has introduced depth calipers a specially designed instrument that can measure groove depth easily and accurately.

5 Easy steps to groove measurement:

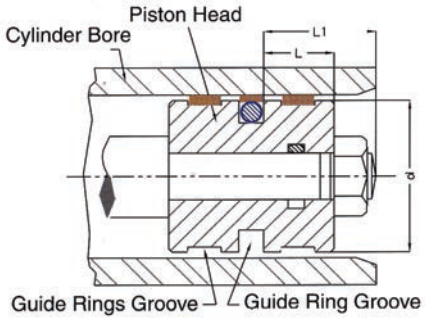
1. Chooes the suitable pin to put in the upper of the lower hole.
2. Push the pin to reset the graduation to zero.
3. Down to gland hold to measure the depth of groove.
4. Measure the other side of the pin
5. Depth = Length of pin-measurement.

Piston Seal installation

Dimensional Requirement:-

1) Piston Head Dia = d
2) Piston Head Lenght = L
3) Piston Head Total Lenght = L1
   (In case of Nut fitted)

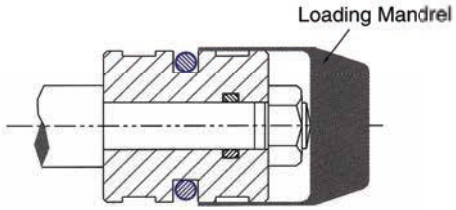
Following is the methods to install Teflon Seal Rings



Step1

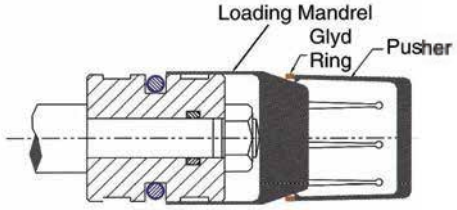
Stretch O-Ring and install in the groove.

Place loading mandrel onto piston head.



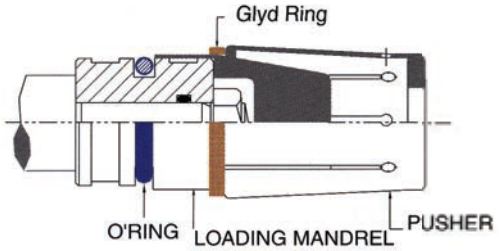
Step2

Place Teflon ring on the leading mandrel.



Step3

Place Pusher & push the Teflon ring upto the groove. Teflon ring will evenly expand and side on the loading mandrel & fit into the groove without damage.



Rod Seal installation

Seal Twistor

Most failures of quality seals are caused by bad installations. Complicated groove design adds to the problem, invariably damaging either the seals or the seat. It is therefore necessary to use the right installation technique with the right set of tools.

We have introduced SEAL TWSTOR a special tool that helps you to install rod seals easily and efficiently. SEAL TWSTOR turns seal to an omega shape without an acute angle (not suitable for fragile materials). It makes the size of the seal smaller than the gland hole diameter. Seal can cross over the chamfers safely and then rebounds in the groove.

Rod Seal installation

Size Range

SPECIFICATION	S		M		L		XL	
Ø GLAND HOLE	22 to 30mm	0.7" to 1.187"	30 to 50mm	1.187" to 2"	50 to 70mm	2" to 2.75"	70 to 165mm	2.75" to 65"
Cross Section Max.	5mm	0.187"	6mm	0.234"	10mm	0.375"	17.5mm	0.187"

4 Easy steps to install Rod Seal with Seal Twistor:

1. Fix the handle in the stand hole.
   Then put two arms inside the seal.

2. Twist the seal with guiding hand
   to prevent it from propping out.

3. Hold the handles,then put the seal
   into the gland hold carefully.

4. Turn handles back,then pull
   TWISTOR our to rebound the
   seal in the groove

TERMINAL GROUP

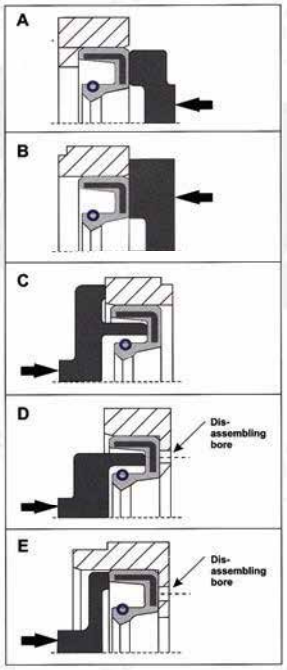
O-rings Accessaries

Rotary Seal Installation

Various force fit situations of the rotary seal with suitable installation tools or devices.

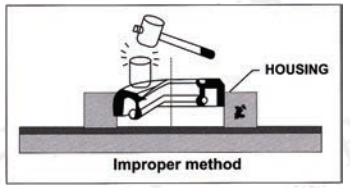
Installation Instructions

The following points must be observed when installing rotary shaft lip seals.

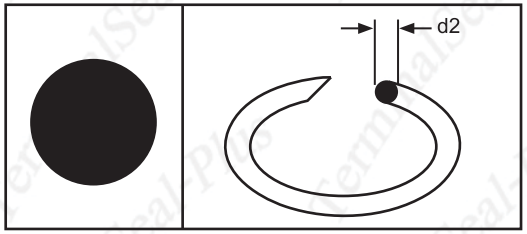


- Before installing clean the installation grooves. Shaft and seal must be greased of oiled for rubber seals.
- Sharp-edged transitions must either be chamfered or rounded or else covered.
- When pressing in the seal take care that the ring is not twisted.
- The pressing force must be applied at close as possible to the outer circumstance of the seal.
- After installation the seal must be concentric and at right angles to the shaft.
- The end face of the mounting bore is generally used as the contact surface the seal can also be fixed with a shoulder or a spacer washer.

Installation aids for fitting rotary shaft seals



O-Ring Cord



Type: O-ring Profile, Extruded in Running Length.

Max Operation Conditions

Temperature: NBR (-40C to +120C), FKM (-40C to 230C)

Pressure: 40 Bars (Depending on the Joint)

Compatibility: Mineral Oil, Bio Oil, Soluble Water &Water Glycol Fluids

Application

Medium Precision Seal Requirement, Large Diameter Axial Sealing, Low Pressure Equipment, Static Application is recommended.

DETAIL:

Ring Cord is an O-Ring Profile available in running lengths & in various cord diametres. The cord can be profile cut to required angle & both ends joint with the help of an adhesive to from a circular ring. O-Ring Cords form a very useful substitute to sudden break down jobs & helps in saving time to get expensive assemblies executed, instead of waiting for an endless O-Ring ordered or to be procured. It is must to have an O-Ring Cord with adhesive in your premises.

O-Ring Cord

Cross Section (cs)	(CS) Tolerance
1.00	+/-0.08
1.20	
1.50	
1.60	
1.78	
1.90	
2.00	
2.40	
2.50	
2.62	
3.00	+/-0.10
3.17	
3.50	
3.53	
4.00	
4.50	+/-0.13
5.00	
5.33	
5.50	+/-0.15
5.70	
6.00	
6.35	
6.50	
6.70	
6.99	
7.00	

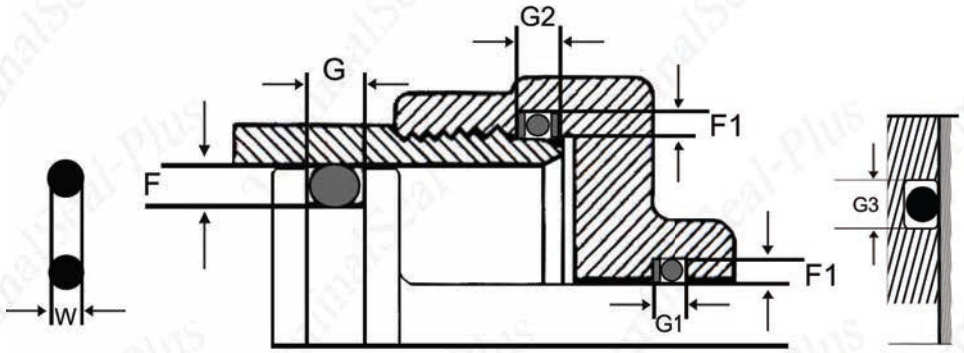
Cross Section (cs)	(CS) Tolerance
7.50	+/-0.18
8.00	
8.40	
8.50	+/-0.20
9.00	
9.50	
10.00	
10.50	+/-0.30
11.00	
11.50	
12.00	
12.50	
12.70	
13.00	
13.50	
14.00	
14.50	
15.00	
15.50	
16.00	
16.50	+/-0.40
17.00	
17.50	
18.00	
18.50	
19.50	

Cross Section (cs)	(CS) Tolerance
20.00	+/-0.40
20.50	
21.00	
22.00	
22.50	
23.00	
23.50	
24.00	
24.50	
25.00	
25.40	
25.50	
26.00	
26.50	
27.00	
27.50	
28.00	
28.50	
29.00	
29.50	
30.00	

Material : Nitrile Rubber (NBR), Fluorocarbon (FKM,FPM) viton

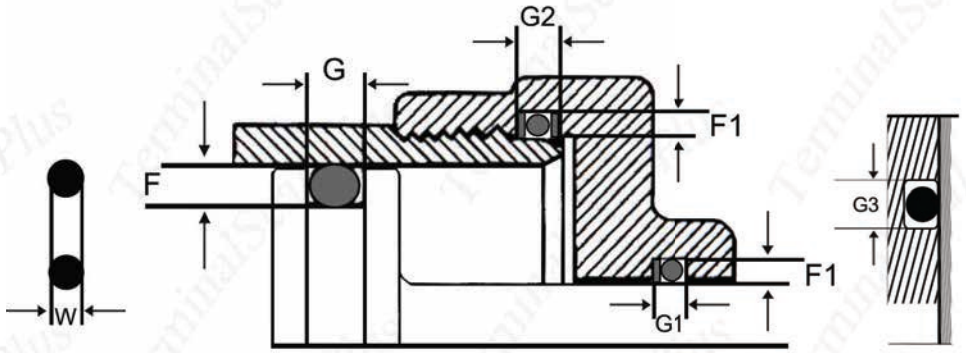
* Non-standard materials will be available upon request

ENGINEERING AND GLAND DESIGN



Cross Sectlon W	STATIC GLAND			DYNAMIC GLAND		ROTARY GLAND		Radius
	Groove Depth	Groove Width		Groove Depth	Groove Width	Groove Depth	Groove Width	
	F1 +0.05	G1 +0.2	G2 +0.2	F +0.05	G +0.2	H +0.05	G3 +0.2	r1
1.42	1.05	-	-	-	1.90	1.05	2.00	0.30
1.50	1.10	3.00	4.00	1.25	2.00	1.10	2.10	0.30
1.63	1.20	3.10	4.10	1.30	2.10	1.20	2.20	0.30
1.78 1.80	1.30	3.80	5.20	1.45	2.30	1.30	2.60	0.40
1.90	1.40	4.00	5.40	1.55	2.60	1.40	2.70	0.40
2.00	1.50	4.10	5.50	1.65	2.70	1.50	2.80	0.40
2.08	1.55	4.20	5.60	1.75	2.80	1.55	2.90	0.40
2.20	1.60	4.40	5.80	1.85	3.00	1.60	3.00	0.40
2.26	1.70	4.40	5.80	1.90	3.00	1.70	3.10	0.40
2.34	1.75	4.50	5.90	1.95	3.10	1.75	3.10	0.40
2.40	1.80	4.60	6.00	2.05	3.20	1.80	3.30	0.50
2.46	1.85	4.70	6.14	2.10	3.30	1.85	3.40	0.50
2.50	1.85	4.70	6.10	2.16	3.30	1.85	3.40	0.50

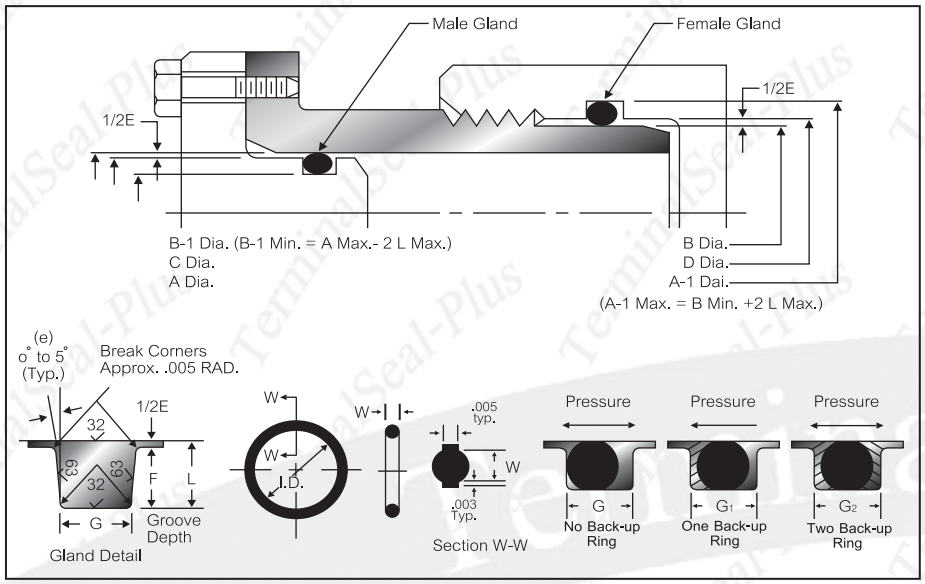
ENGINEERING AND GLAND DESIGN



Cross Sectlon W	STATIC GLAND			DYNAMIC GLAND		ROTARY GLAND		Radius
	Groove Depth	Groove Width		Groove Depth	Groove Width	Groove Depth	Groove Width	
	F1 +0.05	G1 +0.2	G2 +0.2	F +0.05	G +0.2	H +0.05	G3 +0.2	r1
2.62 2.65	2.00	5.00	6.40	2.25	3.60	2.00	3.80	0.60
2.70	2.05	5.00	6.40	2.30	3.60	2.05	3.80	0.60
2.95	2.20	5.30	6.70	2.50	3.90	2.20	4.00	0.60
3.00	2.30	5.40	6.80	2.60	4.00	2.30	4.00	0.60
3.50	2.65	6	7.4	3.05	4.6	2.65	4.7	0.6
3.53 3.55	2.7	6.2	7.6	3.1	4.8	2.7	5	0.8
3.6	2.8	6.2	7.6	3.15	4.8	2.8	5.1	0.8
4	3.1	6.9	8.6	3.5	5.2	3.1	5.3	0.8
4.5	3.5	7.5	9.2	4	5.8	3.5	5.9	0.8
5	4	8.3	10	4.4	6.6	4	6.7	0.8
5.33	4.3	8.8	10.5	4.7	7.1	4.3	7.3	1.2
5.5	4.5	8.8	10.5	4.8	7.1	4.5	7.3	1.2
5.7	4.6	8.9	10.6	5	7.2	4.6	7.4	1.2
6	4.9	9.1	10.8	5.3	7.4	4.9	7.6	1.2
6.5	5.4	9.7	11.4	5.7	8	5.4	8.2	1.2
6.99 7	5.8	12	14.5	6.1	9.5	5.5	9.7	1.5
7.5	6.3	12.2	14.7	6.6	9.7	6.3	9.9	1.5
8	6.7	12.3	14.8	7.1	9.8	6.7	10	1.5
8.4	7.1	12.5	15	7.5	10	7.1	10.3	1.5
9	7.7	13.1	15.6	8.1	10.6	7.7	10.9	2
9.5	8.2	13.5	16	8.6	11	8.2	11.4	2
10	8.6	14.1	16.6	9.1	11.6	8.6	12	2.5
12	10.6	16	18.5	11	13.5	10.6	14	2.5

ENGINEERING AND GLAND DESIGN

STATIC O-RING SEALING-INDUSRIAL STATIC SEAL GLANDS



Design-For Industrial O-Ring Static Seal Glands

O-Ring Size AS568A-	W Cross-Section		L Gland Depth	Spueeze		E(a) Diametral Clearance	G-Groove Width			R Groove Radius	Max. Eccen-tricitu (b)
	Nominal	Actual		Actual	%		No Back-up Ring(G)	One Back-up Ring(G_1)	Two Back-up Ring(G_2)		
006 through 012	1/16	.070 ±.003	.050 to .052	.015 to .023	22 to 32	.002 to .005	.093 to .098	.138 to .143	.205 to .210	.005 to .015	.002
014 through 116	3/32	.103 ±.003	.081 to .083	.017 to .025	17 to 24	.002 to .005	.140 to .145	.171 to .176	.238 to .243	.005 to .015	.002
201 through 222	1/8	.139 ±.004	.111 to .113	.022 to .032	16 to 23	.003 to .006	.187 to .192	.208 to .213	.275 to .280	.010 to .025	.003
309 through 349	3/16	.210 ±.005	.170 to .173	.032 to .045	15 to 21	.003 to .006	.281 to .286	.311 to .316	.410 to .415	.020 to .035	.004
425 through 460	1/4	.275 ±.006	.226 to .229	.040 to .055	15 to 20	.004 to .007	.375 to .380	.408 to .413	.538 to .543	.020 to .035	.005

(a) Clearance (extrusion gap) must be held to a minimum consistent with design requirements for temperature range variation.

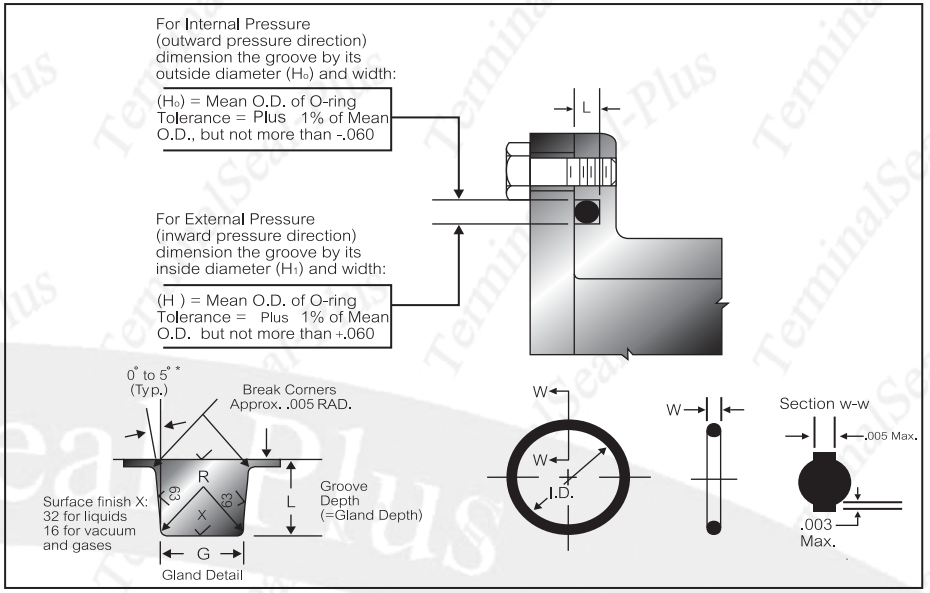
(b) Total indicator reading between groove and adjacent bearing surface.

(c) Reduce maximum diametral clearance 50% when using Silicone or fluorosilicone O-rings.

(d) For ease of assembly, when Back-up Ring are used, gland depth may be increased up to 5%.

ENGINEERING AND GLAND DESIGN

STATIC O-RING SEALING-FACE SEAL GLANDS

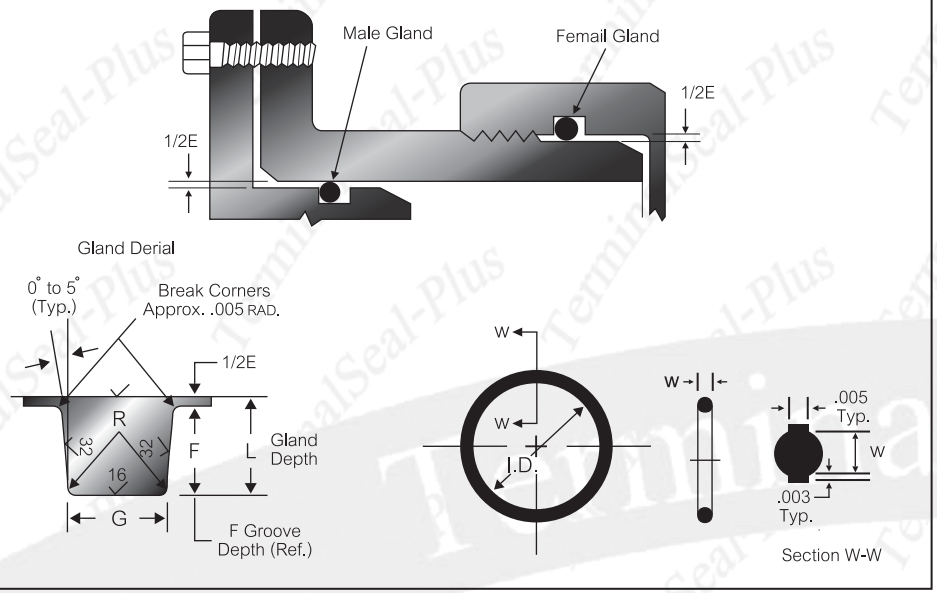


Design-For O-Ring Face Seal Glands

These dimension are intended primarity for face type O-ring seals and low temperature applications.

O-Ring Size AS568A	W Cross-Section		L Gland Depth	Squeeze		G-Groove Wigth		R Groove Radius
	Nominal	Actual		Actual	%	Liquids	Vacuum and Gases	
004 through 050	1/16	.070 ±.003	.050 to .054	.013 to .023	19 to 32	.101 to .107	.084 to .089	.005 to .015
102 through 178	3/32	.103 ±.003	.074 to .080	.020 to .032	20 to 30	.136 to .142	.120 to .125	.005 to .015
201 through 284	1/8	.139 ±.004	.101 to .107	.028 to .042	20 to 30	.177 to .187	.158 to .164	.010 to .025
309 through 395	3/16	.210 ±.005	.152 to .162	.043 to .063	21 to 30	.270 to .290	.239 to .244	.020 to .035
425 through 475	1/4	.275 ±.006	.210 to .211	.058 to .080	21 to 29	.342 to .362	.309 to .314	.020 to .035
special	3/8	.375 ±.007	.276 to .286	.082 to .108	22 to 28	.475 to .485	.419 to .424	.030 to .045
special	1/2	.500 ±.008	.370 to .380	.112 to .138	22 to 27	.638 to .645	.560 to .565	.030 to .04

STATIC O-RING SEALING-STATIC VACUUM SEAL GLANDS

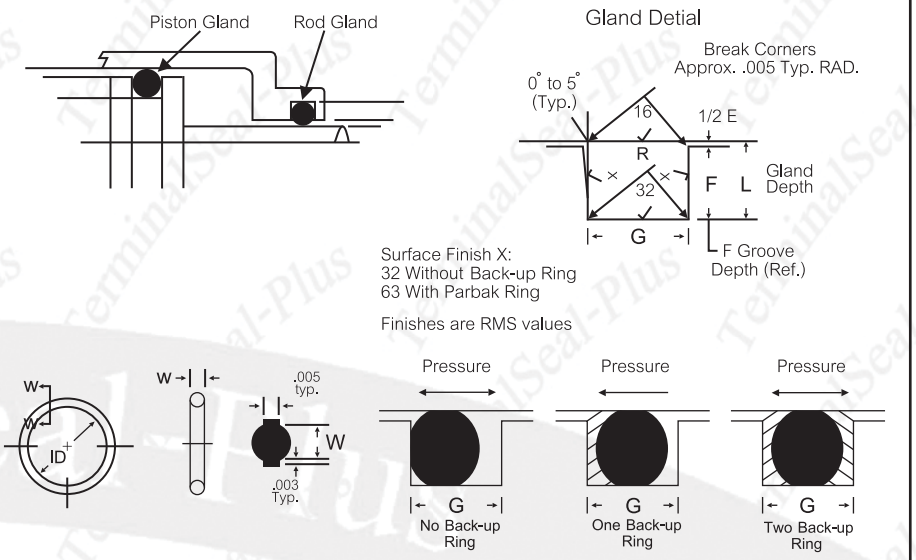


Design - For Static Vacuum Seal Glands

O-Ring Size AS568A-	W Cross-Section		L Gland Depth	E Squeeze		Diametral Clearance	G Groove Width	R Groove Radius	max.* Eccen-tricity
	Nominal	Actual		Actual	%				
004 through 050	1/16	.070 ±.003	.050 to .052	.015 to .023	22 to 32	.002 to .005	.093 to .098	.005 to .015	.002
102 through 178	3/32	.103 ±.003	.081 to .083	.017 to .025	17 to 24	.002 to .005	.140 to .145	.005 to .015	.002
201 through 284	1/8	.139 ±.004	.111 to .113	.022 to .032	16 to 23	.003 to .006	.187 to .192	.010 to .025	.003
309 through 395	3/16	.210 ±.005	.170 to .173	0.32 to .045	15 to 21	.003 to .006	.281 to .286	.020 to .035	.004
425 through 475	1/4	.275 ±.006	.226 to .229	.040 to .055	15 to 20	.004 to .007	.375 to .380	.020 to .035	.005

* Total indicator reading between groove and adjacent bearing surface.

INDUSTRIAL RECIPROCATING O-RING PACKING GLANDS



Industrial Reciprocating O-Ring Packing Glands

AS568 B Uniform Dash No.	W Cross-Section		L Gland Depth	Squeeze		E(a) Diametral Clearance	G-Groove Width			R Groove Radius	Max. Eccen-tricity (b)
							No Back-up	1 Back-up	2 Back-up		
	Nominal	Actual		Actual	%		Ring(G)	Ring(G1)	Ring(G2)		
006 to 012	1/16	.070 ±.003	.055 to .057	.010 to .018	15-25	.002 to .005	.093 to .098	.138 to .143	.205 to .210	.005 to .015	.002
104 to 116	3/32	.103 ±.003	.088 to .090	.010 to .018	10-17	.002 to .005	.140 to .145	.171 to .176	.238 to .243	.005 to .015	.002
201 to 222	1/8	.139 ±.004	.121 to .123	.012 to .022	9-16	.003 to .006	.187 to .192	.208 to .213	.275 to .280	.010 to .025	.003
309 to 349	3/16	.210 ±.005	.185 to .188	.017 to .030	8-14	.003 to .006	.281 to .286	.311 to .316	.410 to .415	.020 to .035	.004
425 to 460	1/4	.275 ±.006	.237 to .240	.029 to .044	11-16	.004 to .007	.375 to .380	.408 to .413	.538 to .543	.020 to .035	.005

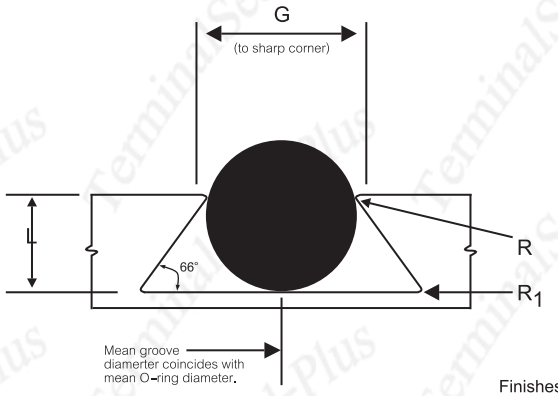
(a) Clearance (extrusion gap) must be held to a minimum consistent with design requirements for temperature range variation.

(b) Total indicator reading between groove and adjacent bearing surface.

(c) O-rings not listed are not recommended for reciprocating application.

ENGINEERING AND GLAND DESIGN

O-Ring Dovetail Grooves



Finishes are RMS values

It is often necessary to provide some mechanical means for holding an o-ring in a face seal groove during assembly and maintenance of equipment. An undercut or dovetail groove has proven beneficial in many applications to keep the o-ring in place. This is an expensive groove to machine, however, and thus should be used only when absolutely necessary.

It should be noted that although this method has been used successfully,It is not generally recommended. The inherent characteristics of the groove design limit the amount of void area. Normally acceptable tolerance extremes, wide service temperature ranges and fluid media the cause high swell of the elastomer are conditions that cannot be tolerated in this type of groove design.

NOTE: If needed, Applications Engineering can recommend where to purchase dovetail cutter.

O-Ring Dovetail Grooves

Radius “R” is CRITICAL. Insufficient radius will potentially cause damage to the O-ring during installation, while excessive radius may contribute to extrusion.

AS568 B Uniform Dash No.	W Cross-section		L Gland Depth	Squeeze %	G Gland Width (to sharp Corner)	R	R1
	Nominal	Actual					
004-050	1/16	.070 ± .003	.050 to .052	27	.055 to .059	.005	1/64
102-178	3/32	.103 ± .003	.081 to .083	21	.083 to .087	.010	1/64
201-284	1/8	.139 ± .004	.111 to .113	20	.113 to .117	.010	1/32
309-395	3/16	.210 ± .005	.171 to .173	18	.171 to .175	.015	1/32
425-475	1/4	.275 ± .006	.231 to .234	16	.231 to .235	.015	1/16
Special	3/8	.375 ± .007	.315 to .319	16	.315 to .319	.020	3/32

Note : These design recommendations assume metal-to-metal contact. In some hard vacuum applications, it may be necessary to increase compression on the seal to achieve sealing Contact a Parker Applications Engineer for more information.

ENGINEERING DESIGN & APPLICATION INFORMATION

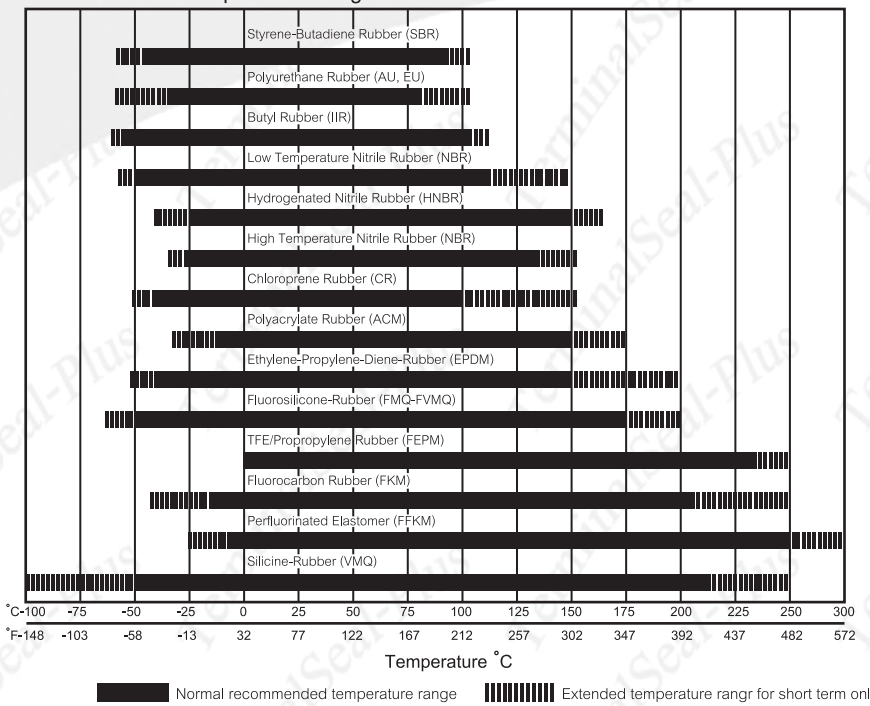
Elastomer Base	Durometer (Shore A)	General Recommendations
Fluorocarbon (FPM, VITON, FKM)	75	General ASTM D2000 M2HK810 A1-10 B38 EF31 EO78 Z1=75+/-5 SHORE A.
	90	General ASTM D2000 M2HK910 A1-10 B38 EF31 EO78 E088
	75	FDA 21 CFR 177.2600
	75	Internal Lubricant (PTFE, MOS2)
	75	AMS 7276, MIL-R-83248 Low Compression Set
	75	Viton GFLT for Chrysler MS-BZ832 grade F.
	75	Viton F-type for Ford WSA-M2D401-A8
	75	Viton GLT-type for Chrysler MS-BZ832 grade G
	75	Viton GF-type for Chrysler MS-BZ832 grade C
	75	Viton B-type for Chrysler MS-BZ832 grade B
	75	General meet F15 Low Temperature
ETP	75	Viton ETP-type excellent oil, Heat, Chemical, solvent resistance.
Aflas (TFE/P, FEPM)	75	Aflas good for strong bases and acids
Fluorosilicone (FVMQ)	60	M25988/3 Type 1, Class 1, Grade 60
	70	M25988/1 Type 1, Class 1, Grade 70
	75	M25988/2 Type 1, Class 3, Grade 75
	80	M25988/4 Type 1, Class 1, Grade 80
Silicone (MQ, VMQ, PVMQ)	70	General ASTM D2000 M2GE705 A19 B37 C12 EA14 EO16 EO36 F19
	70	FDA 21 CFR 177.2600 Class II spec.
	70	ZZ-RP765E/GEN
	70	High heat resistance, service temperature -55c~ +250c
	70	Improve oil resistance
	70	NSF61 approval.
	60	UL 94-vo approval
Nitrile (NBR, BUNA-N)	70	General ASTM D2000 M2BG714 A14 B34 EA14 EF11 EF21 EO14 EO34
	70	FDA 21 CFR177.2600 Class I
	70	40% Acn. Good fuel resistance.
	70	Internal lubricant (PTFE, Molysulfide, Wax)
	70	NBR/PVC blending, excellent ozone resistance, good fuel resistance.
	70	Higher heat resistance (M2CH714 A25 EO15 EO35)
	70	18% Acn. Excellent low temperature resistance (-55C)
	70	NSF61 approval.
	60	Insulation, resist to 2kv
	90	Non-nitosamine
Highly Saturated Nitrile (HNBR, HSN)	70	General ASTM D2000 M2DH710 A26 B16 EO16 EO36 F17 Z1=Green color
	70	Ford WSH-M2D463-A
	70	FDA 21 CRF177.2600 Class II spec.
	70	Good fuel resistance and for adhesion metal seal.
Polyurethane (AU, EU, PU)	70	Ether type-excellent water resistance, Ester type-excellent oil resistance.
	90	Ether type-excellent water resistance, Ester type-excellent oil resistance.
Polyacrylate (ACM, PA, POM)	70	General ASTM D2000 M2DH710 A26 B16 EO16 EO36 F13
	70	Improve low temperature flexibility
Ethylene/Acrylic elastomer (AEM)	70	General ASTM D2000 M3EE710 A47 B46 EO16 EO36 F16
Ethylene Propylene Rubber (EPM, EPR, EPDM)	70	General ASTM D2000 M3CA710 A25 B35 EA14 G11
	70	General ASTM D2000 M3DA710 A26 B36 C32 EA14 F19 G21 Z1=Peroxide

ENGINEERING DESIGN & APPLICATION INFORMATION

Elastomer Base	Durometer (Shore A)	General Recommendations
	70	Internal Lubricant
	70	FDA 21 CRF177.2600 Class II spec.
	70	NSF61 approval.
	70	Peroxide Cured, Electric insulation
	70	General, ANTI-MICROBE
Epichlorohydrin (CO, ECO, GECO)	70	General M3CH710
Chloroprene (CR) (Neoprene)	70	General ASTM M3BC710 A14 B14 EO14 EO34 F17
	57	Electrical insulation 500v, 100m
	60	For UL94-V1 application
Carboxylated Nitrile (XNBR)	70	General ASTM D2000 M2BG714 A14 B14 EO14 EO34 EF11 EF21
	70	Internal lubrication (PTFE, Molysulfide, Erucamide)
Butyle (IIR)	70	General ASTM D2000 M2BA710 B13 C12
Natural Rubber (NR)	70	General ASTM D2000 M2AA710
	40	General ASTM D2000 M2AA410
Styrene-butadiene Rubber (SBR)	70	General ASTM D2000 M2AA708
Polytetrafluorthene (PTFE)	51-65 Shore D	FDA approval
Polyetheretherketone (PEEK)	90	FDA approval

Elastomeric sealing compounds

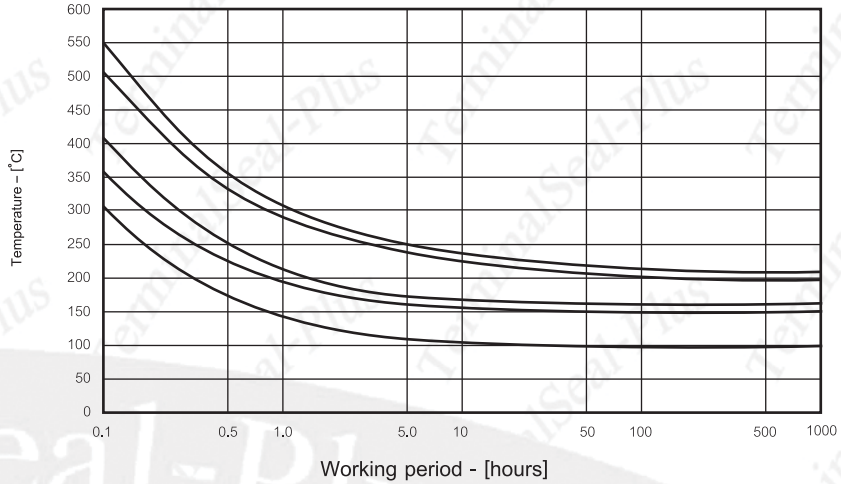
Temperature Range for Common Elastomeric Materials



ENGINEERING DESIGN & APPLICATION INFORMATION

Temperature Range for Common Elastomeric Materials

Table: Temperature range for various elastomeric materials



The table can only be used as a guide line. The actual life-span of a seal at a high temperature is dependent upon the application and the medium to be sealed.

Remark: High temperature limitations for various Elastomeric Meterials

ENGINEERING DESIGN & APPLICATION INFORMATION

GENERAL PROPERTIES OF MOST USED ELASTOMERS

	NITRILE (HIGH NITRILE)	NEOPRENE	ETHYLENE PROPYLENE TERPOLYMER	POLYACRY-LATE	SILICONE	FLUORO-SILICONE	FLUORO-CARBON
ASTM D1418 DESIGNATION	NBR	CR	EPDM	ACM	MQ. PMQ	FVMQ	FKM
ASTM D2000 /SAE J200 TYPE CLASS	BF.BG BK.CH	BC.BE	AA.BA.CA	DF.DH	VMQ.PVMQ FC.FE.GE	FK	HK
HARDNESS, SHORE A	40-90	30-90	30-90	40-85	30-85	60-80	60-95
TENSILE STRENGTH MAX, REINF(PSI)	4000	4000	3000	2500	1200	1200	2500
ELONGATION MAX, REINF (%)	600	600	600	400	700	400	300
SPECIFIC GRAVITY	0.0	1.24	0.86	1.09	0.98	0.98	1.85
BRITTLE POINT (F)	-40	-80	-90	-40	-90TO-180	-85	-40
COMPRESSION SET	G-E	G-E	G-E	G	F-E	G	G-E
RESILIENCE AT 73°F	G	G-E	G	F	P-E	F	F
ELECTRICAL-PROPERTIES	P-F	E	E	F	G-E	E	G
ADHESION TO METAL	G-E	G-E	F-G	G	G	F	F
RESISTANCE TO							
ABRASION	E	E	G	F	P-F	P	G
TEARING	G	F-G	F	P-F	P-F	P	F-G
FLAME	P	G-E	P	P	F-E	F	E
OZONE	P-F	E	E	E	E	E	E
WEATHER	P	E	E	E	E	E	E
OXIDATION	G	E	E	G	E	E	E
WATER	E	G	E	P	G-E	E	E
STEAM	F-G	F	G-E	VP	F-G	F-G	G
ACID (DILUTED)	G	E	E	P-F	G	E	E
ACID (CONCENTRATED)	G	E	E	P-F	F	G	E
ALKALIES(DILUTED)	G	E	E	P-F	E	E	E
ALKALIES(CONCENTRATED)	G	E	E	P-F	E	G	E
SYNTHETIC LUBRICANTS	G-E	P	VP	P	VP	E	E
LUBRICATING OILS (HIGH ANILINE)	E	E	VP	E	G	E	E
LUBRICATING OILS (LOW ANILINE)	E	G	VP	E	F	E	E
ANIMAL,VEGETABLE OILS	G	G	G-E	G	E	E	E
GAS PERMEABILITY	G-E	G	F	G	P	P	E

E=EXCELLENT; G=GOOD; F=FAIR; P=POOR; VP=VERY POOR

ENGINEERING DESIGN & APPLICATION INFORMATION

BASIC REQUIREMENT FOR CLASSIFICATION OF BASIC ELASTOMERS

KIND OF MATERIAL / TEST ITEM	ASTM D2000 SYMBOL	BG	BC	DH	FK	GE	HK
	POLYMER	NITRILE	NEOPRENE	POLY-ACRYLIC	FLUORO-SILICONE	SILICONE	FLUORO-CARBON
	APPLICATION	FOR NORMAL OIL-RESISTANCE APPLICATION	FOR HEAT & WEATHER RESISTANCE APPLICATION	FOR GOOD HEAT & OIL RESISTANCE APPLICATION	FOR EXCELLENT HEAT & FUEL RESISTANCE APPLICATION	FOR HEAT RESISTANCE APPLICATION	FOR EXCELLENT HEAT & FUEL RESISTANCE APPLICATION
NORMAL CONDITION	HARDNESS SHORE A	70±5	70±5	70±5	60±5	70±5	70±5
	TENSILE STRENGRH MIN, (PSI)	2000	2000	1000	870	870	1450
	ELONGATION MIN, (%)	250	250	200	150	150	1750
AGING TEST	TEMP(°F)TIME(HRS)	212°F,70 (100°C)	212°F,70 (100°C)	302°F,70 (150°C)	437°F,70 (225°C)	437°F,70 (225°C)	482°F,70 (250°C)
	CHANGE IN HARDNESS, MAX,	±15	+15	+10	+15	+10	+10
	CHANGE IN TENSILE STRENGHT MAX, (%)	±30	-15	-25	-45	-25	-25
	CHANGE IN ELONGATION, MAX,(%)	-50	-40	-30	-45	-30	- 25
COMPRESSION SET TEST	TEMP(°F)/TIME(HRS)	212 °F,22 (100°C)	212°F,22 (100°C)	302°F,22 (150°C)	347°F,70 (175°C)	347°F,70 (175°C)	347°F,70 (175°C)
	COMPRESSIONE SET MAX, (%)	25	35	30	45	30	30
OIL RESISTANCE TEST	TEMP(°F)/TIME(HRS)	212 °F,70 (100°C)	212°F,70 (100°C)	302°F,70 (150°C)	73°F,70 (23°C)	302°F,70 (150°C)	73°F,70 (23°C)
	OIL USED	LUBRICANT#1	LUBRICANT#1	LUBRICANT#1	FUEL C	LUBRICANT#1	FUEL C
	CHANGE IN HARDNESS	-5 ~ +10	±10	-5 ~ +10	0 ~ -15	0 ~ -15	±5
	CHANGE IN TENSILE STRENGHT MAX, (%)	-25	-30	-20	-60	-20	-25
	CHANGE IN ELONGATION, MAX,(%)	-45	-30	-30	-50	-20	-20
	CHANGE IN VOLUME(%)	-10 ~ +50	-10 ~ +15	±5	0 ~ +25	0 ~ +15	0 ~ +10
	TEMP(°F)/TIME(HRS)	212°F,70 (100°C)	212°F,70 (100°C)	302°F,70 (150°C)	302°F,70 (150°C)	302°F,70 (150°C)	
	OIL USED	LUBRICANT#3	LUBRICANT#3	LUBRICANT#3	LUBRICANT#3	LUBRICANT#3	
	CHANGE IN HARDNESS	-10 ~ +5	-20	-15	0 ~ -10	-40	
	CHANGE IN TENSILE STRENGHT MAX, (%)	-45	-45	-40	-35		
	CHANGE IN ELONGATION, MAX,(%)	-45	-30	-40	-30		
	CHANGE IN VOLUME(%)	0 ~ +25	+80	+25	0 ~ +10	+60	
LOW TEMPERATURE BENDING TEST	TEMP(°F)/TIME(MIN)	-40°F,3 (-40°C)	-40°F,3 (-40°C)	-14°F,3 (-10°C)	-67°F,3 (-55°C)	-67°F,3 (-55°C)	0°F,3 (-18°C)
	APPEARANCE	PASS	PASS	PASS	PASS	PASS	PASS

ENGINEERING DESIGN & APPLICATION INFORMATION

DESIGN DATA : EXTRUSION LIMIT OF O-RING & CLEARANCE GAP

The O-ring is contained in the gland and forced to flow into the surface imperfections of the gland and any clearance gap available to it. So, O-ring can perform sealing by means of squeeze under low-pressure conditions. However, as the pressure mounts, it becomes distorted. The distortion increases the strain, and the increased strain results in more tight sealing. Under high pressure, O-ring would extrude out of the clearance gap. The extrusion will cause seal failure in a standard gland configuration. An antiextrusion back-up ring. Made of a tough, cut-resistant material such as leather. Teflon or hard rubber, is suggested. In static applications it may be possible to modify the gland to withstand the higher pressures without the addition of a back-up ring. Anyway, care must be taken to make the extrusion as small as possible. The extent of this extrusion depends upon the hardness of O-ring, pressure, and clearance gap. Please refer to FIG 1, FIG 2 and TABLE 1.

FIG. 1

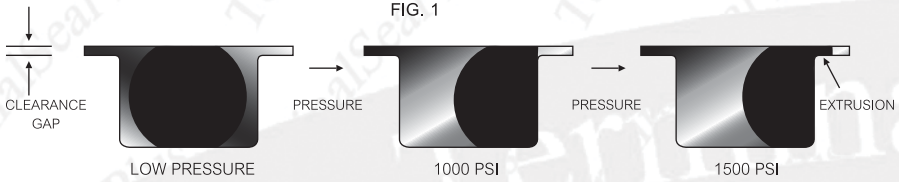
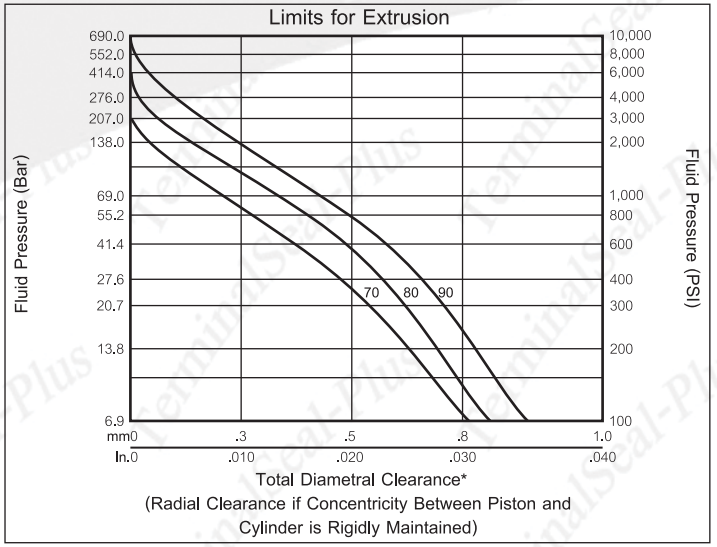


FIG. 2: EXTRUSION LIMIT OF O-RING



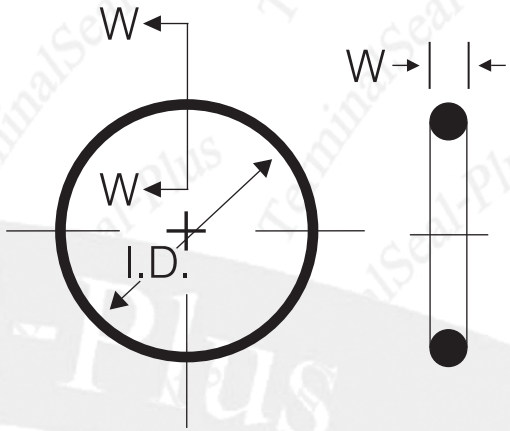
*Reduce the clearance shown by 60% when using silicone or fluorosilicone elastomers.

Basis for Curves

1. 100,000 pressure cycles at the rate of 60 per minute from zero to the indicated pressure.
2. Maximum temperature (i.e., test temperature) 71°C (160°F).
3. No back-up rings.
4. Total diametral clearance must include cylinder expansion due to pressure.
5. Apply a reasonable safety factor in practical applications to allow for excessively sharp edges and orther imperfections and for higher temperatures.

STANDARD O-RINGS SIZE

P, G, S, SS, V, AS, ISO, METRIC



MATERIAL	TEMPERATURE
-NBR -70	-40 °C UP TO + 120 °C
-NBR -90	-40 °C UP TO + 120 °C
-FKM -75	-40 °C UP TO + 230 °C
-MVQ -70	-60 °C UP TO + 230 °C
-EPDM -70	-55 °C UP TO + 150 °C
-HNBR -70	-40 °C UP TO + 150 °C
-PTFE	-200 °C UP TO + 260 °C
-TFE/P (AFLAS)	-15 °C UP TO + 280 °C

O-RING STANDARDS SIZE (P)

Cross section (CS)=1.90 mm (P3-P10)

Dimensions		(ID) Tolerance	Cross Section (CS)	(CS) Tolerance	Spec.References				
Type	(ID)				F	JIS	AS-BS	NOK	JASO F404
P3	2.80	+/-0.14	1.90	+/-0.07		P3		CO 0000	1003
P4	3.80					P4		CO 0001	1004
P5	4.80	+/-0.15				P5		CO 0002	1005
P6	5.80					P6		CO 0003	1006
P7	6.80	+/-0.16				P7		CO 0004	1007
P8	7.80	+/-0.16				P8		CO 0005	1008
P9	8.80	+/-0.17				P9		CO 0006	1009
P10	9.80					P10		CO 0007	1010
	11.0	+/-0.12							1011
	12.3								1012
	13.0								1013
	13.8								1014
	14.8								1015
	15.8								1016
	16.8								1017
	17.8								1018
	18.8	+/-0.15							1019
	19.8								1020
	21.0								1021
	22.1								1022
	23.3								1023
	24.7								1025
	26.2								1026
	27.7								1028
	29.7								1030
	31.2								1031
	33.2								1033
	35.2								1035

O-RING STANDARDS SIZE (P)

Cross section (CS)=2.40 mm (P10A-P22)

Dimensions		(ID) Tolerance	Cross Section (CS)	(CS) Tolerance	Spec.References				
Type	(ID)				F	JIS	AS-BS	NOK	JASO F404
P10A	9.80	+/-0.17	2.40	+/-0.07		P10A		CO 0008	2010
P11	10.80	+/-0.18				P11		CO 0009	
P11.2	11.00					P11.2		CO 0010	2011
P12	11.80	+/-0.19				P12		CO 0011	
P12.5	12.30					P12.5		CO 0012	2012
P14	13.80					P14		CO 0013	2014
P15	14.80	+/-0.20				P15		CO 0014	2015
P16	15.80					P16		CO 0015	2016
P18	17.80	+/-0.21				P18		CO 0016	2018
P20	19.80	+/-0.22				P20		CO 0017	2020
P21	20.80	+/-0.23				P21		CO 0018	2021
P22	21.80	+/-0.24				P22		CO 0020	
	22.1								2022
	23.3								2023
	24.7								2025
	26.2								2026
	27.7								2028
	29.7								2030
	31.2								2031
	33.2								2033
	35.2								2035
	37.2								2037
	39.7								2040
	42.2								2042
	44.7								2045
	47.2								2047
	49.7								2050
	52.6								2053
	55.5								2056
	59.6								2060
	62.6								2063
	66.6								2067
	70.6								2071

O-RING STANDARDS SIZE (P)

Cross section (CS)=3.50 mm (P22A-P50)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References				
Type	(ID)		(CS)		F	JIS	AS-BS	NOK	JASO F404
P22A	21.70	+/-0.24	3.50	+/-0.1		P22A		CO 0019	
P22.4	22.10	+/-0.24				P22.4		CO 0021	3022
P24	23.70	+/-0.24				P24		CO 0022	3024
P25	24.70	+/-0.25				P25		CO 0023	3025
P25.5	25.20	+/-0.25				P25.5		CO 0024	
P26	25.70	+/-0.26				P26		CO 0025	3026
P28	27.70	+/-0.8				P28		CO 0026	3028
P29	28.70	+/-0.29				P29		CO 0027	
P29.5	29.20	+/-0.29				P29.5		CO 0028	
P30	29.70	+/-0.29				P30		CO 0029	3030
P31	30.70	+/-0.30				P31		CO 0030	
P31.5	31.20	+/-0.31				P31.5		CO 0031	3031
P32	31.70	+/-0.31				P32		CO 0032	
P34	33.70	+/-0.33				P34		CO 0033	3034
P35	34.70	+/-0.34				P35		CO 0034	3035
P35.5	35.20	+/-0.34				P35.5		CO 0035	
P36	35.70	+/-0.34				P36		CO 0036	
P38	37.70	+/-0.37				P38		CO 0037	3038
P39	38.70	+/-0.37				P39		CO 0038	3039
P40	39.70	+/-0.37				P40		CO 0039	3040
P41	40.70	+/-0.38				P41		CO 0040	
P42	41.70	+/-0.39				P42		CO 0041	3042
P44	43.70	+/-0.41				P44		CO 0042	3044
P45	44.70	+/-0.41				P45		CO 0043	3045
P46	45.70	+/-0.42				P46		CO 0044	
P48	47.70	+/-0.44				P48		CO 0046	3048

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O-RING STANDARDS SIZE (P)

Cross section (CS)=3.50 mm (P22A-P50)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References				
Type	(ID)		(CS)		F	JIS	AS-BS	NOK	JASO F404
P49	48.70	+/-0.45	3.50	+/-0.1		P49		CO 0047	
P50	49.70					P50		CO 0049	3050
	52.6	+/-0.25							3053
	55.6								3056
	59.6								3060
	62.6								3063
	66.6								3067
	70.6	+/-0.40							3071
	74.6								3075
	79.6								3080
	84.6								3085
	89.6								3090
	94.6								3095
	99.6								3100
	105.6								3106
	111.6								3112
	117.60								3118
	124.60								3125
	131.60	+/-0.60							3132
	139.60								3140
	149.60								3150

O-RING STANDARDS SIZE (P)

Cross section (CS)=5.70 mm (P48A-P150)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References				
Type	(ID)		(CS)		F	JIS	AS-BS	NOK	JASO F404
P48A	47.60	+/-0.44				P48A		CO 0045	
P50A	49.60	+/-0.45				P50A		CO 0048	
P52	51.60	+/-0.47				P52		CO 0050	
P53	52.60	+/-0.48				P53		CO 0051	
P55	54.60	+/-0.49				P55		CO 0052	
P56	55.60	+/-0.50				P56		CO 0053	
P58	57.60	+/-0.52				P58		CO 0054	
P60	59.60	+/-0.53				P60		CO 0055	
P62	61.60	+/-0.55				P62		CO 0056	
P63	62.60	+/-0.56				P63		CO 0057	
P65	64.60	+/-0.57				P65		CO 0058	
P67	66.60	+/-0.59				P67		CO 0059	
P70	69.60	+/-0.61				P70		CO 0060	
P71	70.60	+/-0.62				P71		CO 0061	
P75	74.60	+/-0.65				P75		CO 0062	
P80	79.60	+/-0.69				P80		CO 0063	
P85	84.60	+/-0.73	5.70	+/-0.15		P85		CO 0064	
P90	89.60	+/-0.77				P90		CO 0065	
P95	94.60	+/-0.81				P95		CO 0066	
P100	99.60	+/-0.84				P100		CO 0067	
P102	101.60	+/-0.85				P102		CO 0068	
P105	104.60	+/-0.87				P105		CO 0069	
P110	109.60	+/-0.91				P110		CO 0070	
P112	111.60	+/-0.92				P112		CO 0071	
P115	114.60	+/-0.94				P115		CO 0072	
P120	119.60	+/-0.98				P120		CO 0073	
P125	124.60	+/-1.01				P125		CO 0074	
P130	129.60	+/-1.05				P130		CO 0075	
P132	131.60	+/-1.06				P132		CO 0076	
P135	134.60	+/-1.09				P135		CO 0077	
P140	139.60	+/-1.12				P140		CO 0078	
P145	144.60	+/-1.16				P145		CO 0079	
P150	149.60	+/-1.19				P150		CO 0081	

O-RING STANDARDS SIZE (P)

Cross section (CS)=8.40 mm (P150A-P500)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References				
Type	(ID)		(CS)		F	JIS	AS-BS	NOK	JASO F404
P150A	149.50	+/-1.19				P150A		CO 0080	
P155	154.50	+/-1.23				P155		CO 0082	
P160	159.50	+/-1.26				P160		CO 0083	
P165	164.50	+/-1.30				P165		CO 0084	
P170	169.50	+/-1.33				P170		CO 0085	
P175	174.50	+/-1.37				P175		CO 0086	
P180	179.50	+/-1.40				P180		CO 0087	
P185	184.50	+/-1.44				P185		CO 0088	
P190	189.50	+/-1.48				P190		CO 0089	
P195	194.50	+/-1.51				P195		CO 0090	
P200	199.50	+/-1.55				P200		CO 0091	
P205	204.50	+/-1.58	8.40	+/-0.15		P205		CO 0092	
P209	208.50	+/-1.61				P209		CO 0093	
P210	209.50	+/-1.62				P210		CO 0094	
P215	214.50	+/-1.65				P215		CO 0095	
P220	219.50	+/-1.68				P220		CO 0096	
P225	224.50	+/-1.71				P225		CO 0097	
P230	229.50	+/-1.75				P230		CO 0098	
P235	234.50	+/-1.78				P235		CO 0099	
P240	239.50	+/-1.81				P240		CO 0100	
P245	244.50	+/-1.84				P245		CO 0101	
P250	249.50	+/-1.88				P250		CO 0102	
P255	254.50	+/-1.91				P255		CO 0103	
P260	259.50	+/-1.94				P260		CO 0104	
P265	264.50	+/-1.97				P265		CO 0105	
P270	269.50	+/-2.01				P270		CO 0106	
P275	274.50	+/-2.04				P275		CO 0107	
P280	279.50	+/-2.07				P280		CO 0108	

O-RING STANDARDS SIZE (P)

Cross section (CS)=8.40 mm (P150A-P500)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References				
Type	(ID)		(CS)		F	JIS	AS-BS	NOK	JASO F404
P285	284.50	+/-2.10	8.40	+/-0.15		P285		CO 0109	
P290	289.50	+/-2.14				P290		CO 0110	
P295	294.50	+/-2.17				P295		CO 0111	
P300	299.50	+/-2.20				P300		CO 0112	
P305*	304.50					P305*		CO 2147	
P310*	309.50					P310*		CO 8835	
P315	314.50	+/-2.30				P315		CO 0113	
P320	319.50	+/-2.33				P320		CO 0114	
P325*	324.50					P325*		CO 8836	
P330*	329.50					P330*		CO 7645	
P335	334.50	+/-2.42				P335		CO 0115	
P340	339.50	+/-2.45				P340		CO 0116	
P345*	344.50					P345*		CO 8837	
P350*	349.50					P350*		CO 6615	
P355	354.50	+/-2.54				P355		CO 0117	
P360	359.50	+/-2.57				P360		CO 0118	
P365*	364.50					P365*		CO 6630	
P370*	369.50					P370*		CO 8838	
P375	374.50	+/-2.67				P375		CO 0119	
P380*	379.50					P380*		CO 2274	
P385	384.50	+/-2.73				P385		CO 0120	
P390*	389.50					P390*		CO 6650	
P395*	394.50					P395*		CO 8839	
P400	399.50	+/-2.82				P400		CO 0121	
P405*	404.50					P405*		CO 2311	
P410*	409.50					P410*		CO 6663	
P415*	414.50					P415*		CO 2337	
P420*	419.50					P420*		CO 8840	

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O-RING STANDARDS SIZE (P)

Cross section (CS)=8.40 mm (P150A-P500)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References				
Type	(ID)		(CS)		F	JIS	AS-BS	NOK	JASO F404
P425*	424.50	+/-2.82	8.40	+/-0.15		P425*		CO 2359	
P430*	429.50					P430*		CO 2371	
P435*	434.50					P435*		CO 2383	
P440*	439.50					P440*		CO 8841	
P445*	444.50					P445*		CO6681	
P450*	449.50					P450*		CO 8842	
P455*	454.50					P455*		CO 2433	
P460*	459.50					P460*		CO 8843	
P465*	464.50					P465*		CO 2433	
P470*	469.50					P470*		CO 8844	
P475*	474.50					P475*		CO8845	
P480*	479.50					P480*		CO 6734	
P485*	484.50					P485*		CO 9165	
P490*	489.50					P490*		DO 9015	
P495*	494.50					P495*		DO 9016	
P500*	499.50					P500*		CO 9057	

O-RING STANDARDS SIZE (G)

Cross section (CS)=3.10 mm (G25-G145)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References				
Type	(ID)		(CS)		F	JIS	AS-BS	NOK	JASO F404
G25	24.40	+/-0.25					G25	CO 0200	3025 S
G30	29.40	+/-0.29					G30	CO 0201	3030 S
G35	34.40	+/-0.33					G35	CO 0202	3035 S
G40	39.40	+/-0.37					G40	CO 0203	3040 S
G45	44.40	+/-0.41					G45	CO 0204	3045 S
G50	49.40	+/-0.45					G50	CO 0205	3050 S
G55	54.40	+/-0.49					G55	CO 0206	3055 S
G60	59.40	+/-0.53					G60	CO 0207	3060 S
G65	64.40	+/-0.57					G65	CO 0208	3065 S
G70	69.40	+/-0.61					G70	CO 0209	3070 S
G75	74.40	+/-0.65					G75	CO 0210	3075 S
G80	79.40	+/-0.69					G80	CO 0211	3080 S
G85	84.40	+/-0.73	3.10	+/-0.1			G85	CO 0212	3085 S
G90	89.40	+/-0.77					G90	CO 0213	3090 S
G95	94.40	+/-0.81					G95	CO 0214	3095 S
G100	99.40	+/-0.85					G100	CO 0215	3100 S
G105	104.40	+/-0.87					G105	CO 0216	3105 S
G110	109.40	+/-0.91					G110	CO 0217	3110 S
G115	114.40	+/-0.94					G115	CO 0218	3115 S
G120	119.40	+/-0.98					G120	CO 0219	3120 S
G125	124.40	+/-1.01					G125	CO 0220	3125 S
G130	129.40	+/-1.05					G130	CO 0221	3130 S
G135	134.40	+/-1.08					G135	CO 0222	3135 S
G140	139.40	+/-1.12					G140	CO 0223	3140 S
G145	144.40	+/-1.16					G145	CO 0224	3145 S

O-RING STANDARDS SIZE (G)

Cross section (CS)=5.70 mm (G150-G500)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References				
Type	(ID)		(CS)		F	JIS	AS-BS	NOK	JASO F404
G150	149.30	+/-1.19					G150	CO 0224	
G155	154.30	+/-1.23					G155	CO 0225	
G160	159.30	+/-1.26					G160	CO 0226	
G165	164.30	+/-1.30					G165	CO 0227	
G170	169.30	+/-1.33					G170	CO 0228	
G175	174.30	+/-1.37					G175	CO 0229	
G180	179.30	+/-1.40					G180	CO 0230	
G185	184.30	+/-1.44					G185	CO 0231	
G190	189.30	+/-1.47					G190	CO 0232	
G195	194.30	+/-1.51					G195	CO 0233	
G200	199.30	+/-1.55					G200	CO 0234	
G205*	204.30	+/-1.58					G205*	CO 1968	
G210	209.30	+/-1.61					G210	CO 0236	
G215*	214.30	+/-1.65	5.70	+/-0.15			G215*	CO 3303	
G220	219.30	+/-1.68					G220	CO 0237	
G225*	224.30	+/-1.71					G225*	CO 2011	
G230	229.30	+/-1.73					G230	CO 0238	
G235*	234.30	+/-1.78					G235*	CO 0231	
G240	239.30	+/-1.81					G240	CO 0239	
G245*	244.30	+/-1.85					G245*	CO 0260	
G250	249.30	+/-1.88					G250	CO 0240	
G255*	254.30	+/-1.91					G255*	CO 0279	
G260	259.30	+/-1.94					G260	CO 0241	
G265*	264.30	+/-1.98					G265*	CO 2643	
G270	269.30	+/-2.01					G270	CO 0242	
G275*	274.30	+/-2.04					G275*	CO 2100	

O-RING STANDARDS SIZE (G)

Cross section (CS)=5.70 mm (G150-G500)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References				
Type	(ID)		(CS)		F	JIS	AS-BS	NOK	JASO F404
G280	279.30	+/-2.07					G280	CO 0243	
G285*	284.30	+/-2.11					G285*	CO 3210	
G290	289.30	+/-2.14					G290	CO 0244	
G295*	294.30	+/-2.17					G295*	CO 6566	
G300	299.30	+/-2.20					G300	CO 0245	
G305*	304.30	+/-2.24					G305*	DO 1137	
G310*	309.30	+/-2.27					G310*	CO 2158	
G315*	314.30	+/-2.30					G315*	CO 8811	
G320*	319.30	+/-2.33					G320*	CO 2176	
G325*	324.30	+/-2.36					G325*	CO 8812	
G330*	329.30	+/-2.39					G330*	CO 8813	
G335*	334.30	+/-2.42					G335*	CO 8814	
G340*	339.30	+/-2.45	5.70	+/-0.15			G340*	CO 2206	
G345*	344.30	+/-2.48					G345*	CO 2216	
G350*	349.30	+/-2.51					G350*	CO 2233	
G355*	354.30	+/-2.54					G355*	CO 8815	
G360*	359.30	+/-2.57					G360*	CO 2244	
G365*	364.30	+/-2.60					G365*	CO 8816	
G370*	369.30	+/-2.63					G370*	CO 8817	
G375*	374.30	+/-2.67					G375*	CO 8818	
G380*	379.30	+/-2.70					G380*	CO 2272	
G385*	384.30	+/-2.73					G385*	CO8819	
G390*	389.30	+/-2.77					G390*	CO 2287	
G395*	394.30	+/-2.79					G395*	CO 8820	
G400*	399.30	+/-2.82					G400*	CO 2301	
G405*	404.30	+/-3.00					G405*	CO 8821	

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O-RING STANDARDS SIZE (G)

Cross section (CS)=5.70 mm (G150-G500)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References				
Type	(ID)		(CS)		F	JIS	AS-BS	NOK	JASO F404
G410*	409.30						G410*	CO 8822	
G415*	414.30						G415*	CO 2336	
G420*	419.30						G420*	CO 8823	
G425*	424.30						G425*	CO 2358	
G430*	429.30	+/-3.00					G430*	CO 8824	
G435*	434.30						G435*	CO 8825	
G440*	439.30						G440*	CO 8826	
G445*	444.30						G445*	CO 8827	
G450*	449.30						G450*	CO 2417	
G455*	454.30		5.70	+/-0.15			G455*	CO 8828	
G460*	459.30						G460*	CO 2441	
G465*	464.30						G465*	CO 6715	
G470*	469.30						G470*	CO 2460	
G475*	474.30	+/-3.30					G475*	CO 8829	
G480*	479.30						G480*	CO 8830	
G485*	484.30						G485*	CO 8831	
G490*	489.30						G490*	CO 8832	
G495*	494.30						G495*	CO 8833	
G500*	499.30						G500*	CO 8834	

O-RING STANDARDS SIZE (S)

Cross section (CS)=1.50 mm (S3-S22)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References				
Type	(ID)		(CS)		F	JIS	AS-BS	NOK	JASO F404
S3	2.50					S3		CO 0500	
S4	3.50					S4		CO 0501	
S5	4.50					S5		CO 0502	
S6	5.50					S6		CO 0503	
S7	6.50					S7		CO 0504	
S8	7.50					S8		CO 0505	
S9	8.50					S9		CO 0506	
S10	9.50					S10		CO 0507	
S11.2	10.70	+/-0.15	1.50	+/-0.10		S11.2		CO 0508	
S12	11.50					S12		CO 0509	
S12.5	12.00					S12.5		CO 0510	
S14	13.50					S14		CO 0511	
S15	14.50					S15		CO 0512	
S16	15.50					S16		CO 0513	
S18	17.50					S18		CO 0514	
S20	19.50					S20		CO 0515	
S22	21.50					S22		CO 0516	

O-RING STANDARDS SIZE (S)

Cross section (CS)=2.00 mm (S22.4-S150)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References				
Type	(ID)		(CS)		F	JIS	AS-BS	NOK	JASO F404
S22.4	21.90					S22.4		CO 0517	
S24	23.50					S24		CO 0518	
S25	24.50					S25		CO 0519	
S26	25.50					S26		CO 0520	
S28	27.50					S28		CO 0521	
S29	28.50					S29		CO 0522	
S30	29.50					S30		CO 0523	
S31.5	31.00	+/-0.15				S31.5		CO 0524	
S32	31.50					S32		CO 0525	
S34	33.50					S34		CO 0526	
S35	34.50					S35		CO 0527	
S35.5	35.00					S35.5		CO 0528	
S36	35.50		2.00	+/-0.10		S36		CO 0529	
S38	37.50					S38		CO 0530	
S39	38.50					S39		CO 0531	
S40	39.50					S40		CO 0532	
S42	41.50					S42		CO 0533	
S44	43.50					S44		CO 0534	
S45	44.50					S45		CO 0535	
S46	45.50					S46		CO 0536	
S48	47.50	+/-0.25				S48		CO 0537	
S50	49.50					S50		CO 0538	
S53	52.50					S53		CO 0539	
S55	54.50					S55		CO 0540	
S56	55.50					S56		CO 0541	

O-RING STANDARDS SIZE (S)

Cross section (CS)=2.00 mm (S22.4-S150)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References				
Type	(ID)		(CS)		F	JIS	AS-BS	NOK	JASO F404
S60	59.50	+/-0.25	2.00	+/-0.10		S60		CO 0542	
S63	62.50					S63		CO 0543	
S65	64.50					S65		CO 0544	
S67	66.50					S67		CO 0545	
S70	69.50					S70		CO 0546	
S71	70.50	+/-0.40				S71		CO 0547	
S75	74.50					S75		CO 0548	
S80	79.50					S80		CO 0549	
S85	84.50					S85		CO 0550	
S90	89.50					S90		CO 0551	
S95	94.50					S95		CO 0552	
S100	99.50					S100		CO 0553	
S105	104.50					S105		CO 0554	
S110	109.50					S110		CO 0555	
S112	111.50					S112		CO 0556	
S115	114.50					S115		CO 0557	
S120	119.50					S120		CO 0558	
S125	124.50					S125		CO 0559	
S130	129.50	+/-0.60				S130		CO 0560	
S132	131.50					S132		CO 0561	
S135	134.50					S135		CO 0562	
S140	139.50					S140		CO 0563	
S145	144.50					S145		CO 0564	
S150	149.50					S150		CO 0565	

O-RING STANDARDS SIZE (SS)

Cross section (CS)=1.00 mm (SS2-SS12)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References				
Type	(ID)		(CS)		F	JIS	AS-BS	NOK	JASO F404
SS2	1.80	+/-0.15	1.00	+/-0.07		SS2		CO 3325	
SS2.5	2.00					SS2.5		CO 2956	
SS3	2.50					SS3		CO 3700	
SS3.5	3.00					SS3.5		CO 3835	
SS4	3.50					SS4		DO 1172	
SS4.5	4.00					SS4.5		CO 7820	
SS5	4.50					SS5		CO 3729	
SS5.5	5.00					SS5.5		CO 3370	
SS6	5.50					SS6		CO 3765	
SS6.5	6.00					SS6.5		CO 3126	
SS7	6.50					SS7		CO 8846	
SS7.5	7.00					SS7.5		CO 5497	
SS8	7.50					SS8		CO 4275	
SS8.5	8.00					SS8.5		CO 7044	
SS9	8.50					SS9		CO 4945	
SS9.5	9.00					SS9.5		CO 7949	
SS10	9.50					SS10		CO 8847	
SS10.5	10.00					SS10.5		CO 8848	
SS11	10.50					SS11		CO 8849	
SS11.5	11.00					SS11.5		CO 5952	
SS12	11.50					SS12		CO 8850	

O-RING STANDARDS SIZE (V)

Cross section (CS)=4.00 mm

Dimensions		(ID)	Cross Section	(CS)	Spec.References				
Type	(ID)	Tolerance	(CS)	Tolerance	F	JIS	AS-BS	NOK	JASO F404
V 15	14.50	+/-0.15	4.00	+/-0.10				CO 0300	
V 24	23.5							CO 0301	
V 34	33.5							CO 0302	
V 40	39.5							CO 0303	
V 55	54.5	+/-0.25						CO 0304	
V 70	69.0							CO 0305	
V 85	84.0	+/-0.40						CO 0306	
V 100	99.0							CO 0307	
V 120	119.0							CO 0308	
V 150	148.5	+/-0.60						CO 0309	
V 175	173.0							CO 0310	

O-RING STANDARD SIZE (V)

Cross section (CS)=6.00 mm

Dimensions		(ID)	Cross Section	(CS)	Spec.References				
Type	(ID)	Tolerance	(CS)	Tolerance	F	JIS	AS-BS	NOK	JASO F404
V 225	222.5	+/-0.8	6.00	+/-0.15				CO 0311	
V 275	272.0							CO 0312	
V 325	321.5	+/-1.0						CO 0313	
V 380	376.0							CO 0314	
V 430	425.5	+/-1.2						CO 0315	

O-RING STANDARD SIZE (V)

Cross section (CS)=10.00 mm

Dimensions		(ID)	Cross Section	(CS)	Spec.References				
Type	(ID)	Tolerance	(CS)	Tolerance	F	JIS	AS-BS	NOK	JASO F404
V 480	475.0	+/-1.2	10.00	+/-0.3				CO 0316	
V 530	524.5	+/-1.6						CO 0317	
V 585	579.0							CO 0318	
V 640	633.5							CO 0319	
V 690	683.0							CO 0320	
V 740	732.5	+/-2.0						CO 0321	
V 790	782.0							CO 0322	
V 845	836.5							CO 0323	
V 950	940.5	+/-2.5						CO 0324	
V 1055	1044.0	+/-3.0						CO 0325	

O-RING STANDARDS SIZE (AS)

Cross section (CS)=1.78 mm (AS001-AS050)

Dimensions		(ID)	Cross Section	(CS)	Spec.References				
Type	(ID)	Tolerance	(CS)	Tolerance	F	JIS	AS-BS	NOK	JASO F404
AS-001	0.74	+/-0.10	1.02	+/-0.07			AS-001	CO 8424	
AS-002	1.07		1.27				AS-002	CO 3387	
AS-003	1.42		1.52				AS-003	CO 3388	
AS-004	1.78	+/-0.13	1.78	+/-0.08			AS-004	CO 5146	
AS-005	2.57						AS-005	CO 3052	
AS-006	2.90						AS-006	CO 0400	
AS-007	3.68						AS-007	CO 0401	
AS-008	4.47						AS-008	CO 0402	
AS-009	5.28						AS-009	CO 0403	
AS-010	6.07						AS-010	CO 0404	
AS-011	7.65						AS-011	CO 0405	
AS-012	9.25						AS-012	CO 0407	
AS-013	10.82						AS-013	CO 3174	
AS-014	12.42						AS-014	CO 1119	
AS-015	14.00	+/-0.18					AS-015	CO 1140	
AS-016	15.60	+/-0.23					AS-016	CO 3035	
AS-017	17.17						AS-017	CO 1179	
AS-018	18.77						AS-018	CO 1203	
AS-019	20.35						AS-019	CO 1225	
AS-020	21.95						AS-020	CO 1241	
AS-021	23.52						AS-021	CO 3037	
AS-022	25.12	+/-0.25					AS-022	CO 4386	
AS-023	26.70						AS-023	CO 3173	
AS-024	28.30						AS-024	CO 1302	
AS-025	29.87	+/-0.28					AS-025	CO 3636	
AS-026	31.47						AS-026	CO 3093	
AS-027	33.05						AS-027	CO 7771	

O-RING STANDARDS SIZE (AS)

Cross section (CS)=1.78 mm (AS001-AS050)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References				
Type	(ID)		(CS)		F	JIS	AS-BS	NOK	JASO F404
AS-028	34.65	+/-0.33	1.78	+/-0.08			AS-028	CO 3092	
AS-029	37.82						AS-029	CO 6134	
AS-030	41.00						AS-030	CO 3191	
AS-031	44.17	+/-0.38					AS-031	CO 5191	
AS-032	47.35						AS-032	CO 3235	
AS-033	50.52	+/-0.46					AS-033	CO 5346	
AS-034	53.70						AS-034	CO 1464	
AS-035	56.87						AS-035	CO 7772	
AS-036	60.05						AS-036	CO 4714	
AS-037	63.22						AS-037	CO 8462	
AS-038	66.40	+/-0.51					AS-038	CO 8231	
AS-039	69.57						AS-039	CO 4699	
AS-040	72.75						AS-040	CO 4457	
AS-041	75.92	+/-0.61					AS-041	CO 7129	
AS-042	82.27						AS-042	CO 4335	
AS-043	88.62						AS-043	CO 3010	
AS-044	94.97	+/-0.69					AS-044	CO 8205	
AS-045	101.32						AS-045	CO 4251	
AS-046	107.67	+/-0.76					AS-046	CO 4873	
AS-047	114.02						AS-047	CO 4947	
AS-048	120.37						AS-048	CO 4252	
AS-049	126.72	+/-0.94					AS-049	CO 8463	
AS-050	133.07						AS-050	CO 4948	

O-RING STANDARDS SIZE (AS)

Cross section (CS)=2.62 mm (AS102-AS178)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References				
Type	(ID)		(CS)		F	JIS	AS-BS	NOK	JASO F404
AS-102	1.24	+/-0.13	2.62	+/-0.08			AS-102	CO 8485	
AS-103	2.06						AS-103	CO 8464	
AS-104	2.84						AS-104	CO 8465	
AS-105	3.63						AS-105	CO 8466	
AS-106	4.42						AS-106	CO 8467	
AS-107	5.23						AS-107	CO 6006	
AS-108	6.02						AS-108	CO 8468	
AS-109	7.59						AS-109	CO 3084	
AS-110	9.19						AS-110	CO 0406	
AS-111	10.77						AS-111	CO 0408	
AS-112	12.37						AS-112	CO 0409	
AS-113	13.94	+/-0.18					AS-113	CO 0410	
AS-114	15.54	+/-0.23					AS-114	CO 0411	
AS-115	17.12						AS-115	CO 0412	
AS-116	18.72						AS-116	CO 0414	
AS-117	20.29	+/-0.25					AS-117	CO 4370	
AS-118	21.89						AS-118	CO 1240	
AS-119	23.46						AS-119	CO 6065	
AS-120	25.07						AS-120	CO 3805	
AS-121	26.64						AS-121	CO 3601	
AS-122	28.24						AS-122	CO 4128	
AS-123	29.82	+/-0.30					AS-123	CO 3105	
AS-124	31.42						AS-124	CO 3112	
AS-125	32.99						AS-125	CO 3230	
AS-126	34.59						AS-126	CO 3449	
AS-127	36.17						AS-127	CO 1367	

O-RING STANDARDS SIZE (AS)

Cross section (CS)=2.62 mm (AS102-AS178)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References				
Type	(ID)		(CS)		F	JIS	AS-BS	NOK	JASO F404
AS-128	37.77	+/-0.30	2.62	+/-0.08			AS-128	CO 1380	
AS-129	39.34	+/-0.38					AS-129	CO 3851	
AS-130	40.94						AS-130	CO 4408	
AS-131	42.52						AS-131	CO 6451	
AS-132	44.12						AS-132	CO 6155	
AS-133	45.69						AS-133	CO 3152	
AS-134	47.29	+/-0.34					AS-134	CO 1433	
AS-135	48.90	+/-0.43					AS-135	CO 8469	
AS-136	50.47						AS-136	CO 4330	
AS-137	52.07						AS-137	CO 1416	
AS-138	53.64						AS-138	CO 3707	
AS-139	55.24						AS-139	CO 6189	
AS-140	56.82						AS-140	CO 3107	
AS-141	58.42	+/-0.51					AS-141	CO 6202	
AS-142	59.99						AS-142	CO 6210	
AS-143	61.59						AS-143	CO 7872	
AS-144	63.17						AS-144	CO 4253	
AS-145	64.77						AS-145	CO 1518	
AS-146	66.34						AS-146	CO 3148	
AS-147	67.94	+/-0.56					AS-147	CO 3103	
AS-148	69.52						AS-148	CO 4718	
AS-149	71.12						AS-149	CO 6254	
AS-150	72.69						AS-150	CO 6261	
AS-151	75.87	+/-0.61					AS-151	CO 6268	
AS-152	82.22						AS-152	CO 6276	
AS-153	88.57						AS-153	CO 3568	
AS-154	94.92	+/-0.71					AS-154	CO 4837	
AS-155	101.27						AS-155	CO 7031	

TERMINAL GROUP

O-RING STANDARDS SIZE (AS)

Cross section (CS)=2.62 mm (AS102-AS178)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References				
Type	(ID)		(CS)		F	JIS	AS-BS	NOK	JASO F404
AS-156	107.62	+/-0.76	2.62	+/-0.08			AS-156	CO 1460	
AS-157	113.97						AS-157	CO 5357	
AS-158	120.32						AS-158	CO 6356	
AS-159	126.67	+/-0.89					AS-159	CO 7811	
AS-160	133.02						AS-160	CO 1720	
AS-161	139.37						AS-161	CO 4812	
AS-162	145.72						AS-162	CO 7130	
AS-163	152.07						AS-163	CO 1808	
AS-164	158.42	+/-1.02					AS-164	CO 1830	
AS-165	164.77						AS-165	CO 5411	
AS-166	171.12						AS-166	CO 6432	
AS-167	177.47						AS-167	CO 6437	
AS-168	183.82	+/-1.14					AS-168	CO 6445	
AS-169	190.17						AS-169	CO 8470	
AS-170	196.52						AS-170	CO 5303	
AS-171	202.87						AS-171	CO 7775	
AS-172	209.22	+/-1.27					AS-172	CO 5270	
AS-173	215.57						AS-173	CO 7776	
AS-174	221.92						AS-174	CO 8187	
AS-175	228.27						AS-175	CO 8534	
AS-176	234.62	+/-1.40					AS-176	CO 1122	
AS-177	240.97						AS-177	CO 1123	
AS-178	247.32						AS-178	CO 1124	

O-RING STANDARDS SIZE (AS)

Cross section (CS)=3.53 mm (AS201-AS284)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References				
Type	(ID)		(CS)		F	JIS	AS-BS	NOK	JASO F404
AS-201	4.34	+/-0.13	3.53	+/-0.10			AS-201	CO 8471	
AS-202	5.94						AS-202	CO 8472	
AS-203	7.52						AS-203	CO 4527	
AS-204	9.12						AS-204	CO 7048	
AS-205	10.69						AS-205	CO 7049	
AS-206	12.29						AS-206	CO 8460	
AS-207	13.87	+/-0.18					AS-207	CO 7059	
AS-208	15.47	+/-0.23					AS-208	CO 5250	
AS-209	17.04						AS-209	CO 8451	
AS-210	18.64	+/-0.25					AS-210	CO 0413	
AS-211	20.22						AS-211	CO 0415	
AS-212	21.82						AS-212	CO 0416	
AS-213	23.39						AS-213	CO 0417	
AS-214	24.99						AS-214	CO 0418	
AS-215	26.57						AS-215	CO 0419	
AS-216	28.17	+/-0.30					AS-216	CO 0420	
AS-217	29.74						AS-217	CO 0421	
AS-218	31.34						AS-218	CO 0422	
AS-219	32.92						AS-219	CO 0423	
AS-220	34.52						AS-220	CO 0424	
AS-221	36.09						AS-221	CO 0425	
AS-222	37.69	+/-0.38					AS-222	CO 0426	
AS-223	40.87						AS-223	CO 0350	
AS-224	44.04						AS-224	CO 0351	

TERMINAL GROUP

O-RING STANDARDS SIZE (AS)

Cross section (CS)=3.53 mm (AS201-AS284)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References				
Type	(ID)		(CS)		F	JIS	AS-BS	NOK	JASO F404
AS-225	47.22	+/-0.46	3.53	+/-0.10			AS-225	CO 0352	
AS-226	50.39						AS-226	CO 0353	
AS-227	53.57						AS-227	CO 0354	
AS-228	56.74	+/-0.51					AS-228	CO 0355	
AS-229	59.92						AS-229	CO 0356	
AS-230	63.09						AS-230	CO 0357	
AS-231	66.27						AS-231	CO 0358	
AS-232	69.44	+/-0.61					AS-232	CO 0359	
AS-233	72.62						AS-233	CO 0360	
AS-234	75.79						AS-234	CO 0361	
AS-235	78.97						AS-235	CO 0362	
AS-236	82.14						AS-236	CO 0363	
AS-237	85.32						AS-237	CO 0364	
AS-238	88.49						AS-238	CO 0365	
AS-239	91.67	+/-0.71					AS-239	CO 0366	
AS-240	94.84						AS-240	CO 0367	
AS-241	98.02						AS-241	CO 0368	
AS-242	101.19						AS-242	CO 0369	
AS-243	104.37						AS-243	CO 0370	
AS-244	107.54	+/-0.76					AS-244	CO 0371	
AS-245	110.72						AS-245	CO 0372	
AS-246	113.89						AS-246	CO 0373	
AS-247	117.07						AS-247	CO 0374	
AS-248	120.24						AS-248	CO 1672	
AS-249	123.42	+/-0.89					AS-249	CO 1680	
AS-250	126.59						AS-250	CO 1691	

O-RING STANDARDS SIZE (AS)

Cross section (CS)=3.53 mm (AS201-AS284)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References				
Type	(ID)		(CS)		F	JIS	AS-BS	NOK	JASO F404
AS-251	129.77	+/-0.89	3.53	+/-0.10			AS-251	CO 1705	
AS-252	132.94						AS-252	CO 1717	
AS-253	136.12						AS-253	CO 4047	
AS-254	139.29						AS-254	CO 1744	
AS-255	142.47						AS-255	CO 1762	
AS-256	145.64						AS-256	CO 1774	
AS-257	148.82						AS-257	CO 1788	
AS-258	151.99						AS-258	CO 1805	
AS-259	158.34	+/-1.02					AS-259	CO 1829	
AS-260	164.69						AS-260	CO 1856	
AS-261	171.04						AS-261	CO 1880	
AS-262	177.39						AS-262	CO 1983	
AS-263	183.74	+/-1.14					AS-263	CO 1915	
AS-264	190.09						AS-264	CO 1931	
AS-265	196.44						AS-265	CO 1946	
AS-266	202.79						AS-266	CO 1959	
AS-267	209.14	+/-1.27					AS-267	CO 1979	
AS-268	215.49						AS-268	CO 1990	
AS-269	221.84						AS-269	CO 2001	
AS-270	228.19						AS-270	CO 2018	
AS-271	234.54	+/-1.40					AS-271	CO 2032	
AS-272	240.89						AS-272	CO 2050	
AS-273	247.24						AS-273	CO 2064	
AS-274	253.59						AS-274	CO 3415	
AS-275	266.29						AS-275	CO 5748	
AS-276	278.99	+/-1.65					AS-276	CO 5393	

O-RING STANDARDS SIZE (AS)

Cross section (CS)=3.53 mm (AS201-AS284)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References				
Type	(ID)		(CS)		F	JIS	AS-BS	NOK	JASO F404
AS-277	291.69	+/-1.65	3.53	+/-0.10			AS-277	CO 2132	
AS-278	304.39						AS-278	CO 4602	
AS-279	329.79						AS-279	CO 2192	
AS-280	355.19						AS-280	CO 4549	
AS-281	380.59						AS-281	CO 2277	
AS-282	405.26	+/-1.91					AS-282	CO 4609	
AS-283	430.66	+/-2.03					AS-283	CO 6675	
AS-284	456.06	+/-2.16					AS-284	CO 5011	

O-RING STANDARDS SIZE (AS)

Cross section (CS)=5.33 mm (AS309-AS395)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References				
Type	(ID)		(CS)		F	JIS	AS-BS	NOK	JASO F404
AS-309	10.46	+/-0.13	5.33	+/-0.13			AS-309	CO 8486	
AS-310	12.06						AS-310	CO 8487	
AS-311	13.64	+/-0.18					AS-311	CO 8488	
AS-312	15.24	+/-0.23					AS-312	CO 4082	
AS-313	16.81						AS-313	CO 8480	
AS-314	18.42	+/-0.25					AS-314	CO 8481	
AS-315	19.99						AS-315	CO 7777	
AS-316	21.59						AS-316	CO 8482	
AS-317	23.16						AS-317	CO 6064	
AS-318	24.76						AS-318	CO 3025	
AS-319	26.34						AS-319	CO 8483	
AS-320	27.94	+/-0.30					AS-320	CO 4337	
AS-321	29.51						AS-321	CO 7778	
AS-322	31.12						AS-322	CO 4081	
AS-323	32.69						AS-323	CO 8484	
AS-324	34.29						AS-324	CO 4070	
AS-325	37.47	+/-0.38					AS-325	CO 0427	
AS-326	40.64						AS-326	CO 0428	
AS-327	43.82						AS-327	CO 0429	
AS-328	46.99						AS-328	CO 0430	
AS-329	50.16	+/-0.46					AS-329	CO 0431	
AS-330	53.34						AS-330	CO 0432	
AS-331	56.52						AS-331	CO 0433	
AS-332	59.69						AS-332	CO 0434	

O-RING STANDARDS SIZE (AS)

Cross section (CS)=5.33 mm (AS309-AS395)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References				
Type	(ID)		(CS)		F	JIS	AS-BS	NOK	JASO F404
AS-333	62.86	+/-0.51	5.33	+/-0.13			AS-333	CO 0435	
AS-334	66.04						AS-334	CO 0436	
AS-335	69.22						AS-335	CO 0437	
AS-336	72.39						AS-336	CO 0438	
AS-337	75.56	+/-0.61					AS-337	CO 0439	
AS-338	78.74						AS-338	CO 0440	
AS-339	81.92						AS-339	CO 0441	
AS-340	85.09						AS-340	CO 0442	
AS-341	88.26						AS-341	CO 0443	
AS-342	91.44	+/-0.71					AS-342	CO 0444	
AS-343	94.62						AS-343	CO 0445	
AS-344	97.79						AS-344	CO 0446	
AS-345	100.96						AS-345	CO 0447	
AS-346	104.14						AS-346	CO 0448	
AS-347	107.32	+/-0.76					AS-347	CO 0449	
AS-348	110.49						AS-348	CO 0450	
AS-349	113.66						AS-349	CO 0451	
AS-350	116.84						AS-350	CO 6340	
AS-351	120.02						AS-351	CO 7779	
AS-352	123.19						AS-352	CO 4133	
AS-353	126.36	+/-0.94					AS-353	CO 6366	
AS-354	129.54						AS-354	CO 4205	
AS-355	132.72						AS-355	CO 5131	
AS-356	135.89						AS-356	CO 6385	
AS-357	139.07						AS-357	CO 5317	
AS-358	142.24						AS-358	CO 7782	

O-RING STANDARDS SIZE (AS)

Cross section (CS)=5.33 mm (AS309-AS395)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References				
Type	(ID)		(CS)		F	JIS	AS-BS	NOK	JASO F404
AS-359	145.42	+/-0.94	5.33	+/-0.13			AS-359	CO 4111	
AS-360	148.59						AS-360	CO 8429	
AS-361	151.77						AS-361	CO 7783	
AS-362	158.12	+/-1.02					AS-362	CO 7784	
AS-363	164.47						AS-363	CO 7785	
AS-364	170.82						AS-364	CO 7786	
AS-365	177.17						AS-365	CO 7787	
AS-366	183.52	+/-1.14					AS-366	CO 7819	
AS-367	189.86						AS-367	CO 3417	
AS-368	196.22						AS-368	CO 1945	
AS-369	202.57						AS-369	CO 7789	
AS-370	208.92	+/-1.27					AS-370	CO 7790	
AS-371	215.27						AS-371	CO 6492	
AS-372	221.62						AS-372	CO 7791	
AS-373	227.97						AS-373	CO 7792	
AS-374	234.32	+/-1.40					AS-374	CO 7793	
AS-375	240.67						AS-375	CO 8801	
AS-376	247.02						AS-376	CO 8803	
AS-377	253.37						AS-377	CO 7794	
AS-378	266.07	+/-1.52					AS-378	CO 4905	
AS-379	278.77						AS-379	CO 7795	
AS-380	291.47	+/-1.65					AS-380	CO 8851	
AS-381	304.17						AS-381	CO 4906	
AS-382	329.57						AS-382	CO 7797	
AS-383	354.97	+/-1.78					AS-383	CO 7798	
AS-384	380.37						AS-384	CO 6643	

TERMINAL GROUP

O-RING STANDARDS SIZE (AS)

Cross section (CS)=5.33 mm (AS309-AS395)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References				
Type	(ID)		(CS)		F	I-JIS	AS-BS	NOK	JASO F404
AS-385	405.26	+/-1.91	5.33	+/-0.13			AS-385	CO 7799	
AS-386	430.66	+/-2.03					AS-386	CO 8802	
AS-387	456.06	+/-2.16					AS-387	CO 7826	
AS-388	481.46	+/-2.29					AS-388	CO 7800	
AS-389	506.81	+/-2.41					AS-389		
AS-390	532.21						AS-390		
AS-391	557.61	+/-2.54					AS-391		
AS-392	582.68	+/-2.67					AS-392		
AS-393	608.08	+/-2.79					AS-393		
AS-394	633.48	+/-2.92					AS-394		
AS-395	658.88	+/-3.05					AS-395		

O-RING STANDARDS SIZE (AS)

Cross section (CS)=6.99 mm (AS425-AS475)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References				
Type	(ID)		(CS)		F	I-JIS	AS-BS	NOK	JASO F404
AS-425	113.66	+/-0.84	6.99	+/-0.15			AS-425	CO 0487	
AS-426	116.84						AS-426	CO 0452	
AS-427	120.02						AS-427	CO 0453	
AS-428	123.19						AS-428	CO 0454	
AS-429	126.36	+/-0.94					AS-429	CO 0455	
AS-430	129.54						AS-430	CO 0456	
AS-431	132.72						AS-431	CO 0457	
AS-432	135.89						AS-432	CO 0458	
AS-433	139.06						AS-433	CO 0459	
AS-434	142.24	'+/-0.94					AS-434	CO 0460	
AS-435	145.42						AS-435	CO 0461	
AS-436	148.59						AS-436	CO 0462	
AS-437	151.76						AS-437	CO 0463	
AS-438	158.12	+/-1.02					AS-438	CO 0464	
AS-439	164.46						AS-439	CO 0465	
AS-440	170.82						AS-440	CO 0466	
AS-441	177.16						AS-441	CO 0467	
AS-442	183.52	+/-1.14					AS-442	CO 0468	
AS-443	189.86						AS-443	CO 0469	
AS-444	196.22						AS-444	CO 0487	
AS-445	202.56						AS-445	CO 0471	
AS-445A	209.55						AS-445A		
AS-446	215.26	+/-1.40					AS-446	CO 0472	
AS-446A	222.25						AS-446A		
AS-447	227.96						AS-447	CO 0473	
AS-447A	234.90						AS-447A		
AS-448	240.67	+/-1.40					AS-448	CO 0474	
AS-448A	247.65						AS-448A		
AS-449	253.36						AS-449	CO 0475	
AS-449A	260.35						AS-449A		

TERMINAL GROUP

O-RING STANDARDS SIZE (AS)

Cross section (CS)=6.99 mm (AS425-AS475)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References				
Type	(ID)		(CS)		F	I-JIS	AS-BS	NOK	JASO F404
AS-450	266.06	+/-1.52	6.99	+/-0.15			AS-450	CO 0476	
AS-450A	273.05						AS-450A		
AS-451	278.76						AS-451	CO 0477	
AS-451A	285.75						AS-451A		
AS-452	291.47						AS-452	CO 0478	
AS-452A	298.45						AS-452A		
AS-453	304.17						AS-453	CO 0479	
AS-454	316.87						AS-454	CO 0480	
AS-455	329.56						AS-455	CO 0481	
AS-456	342.26	+/-1.78					AS-456	CO 0482	
AS-457	354.96						AS-457	CO 0483	
AS-458	367.66						AS-458	CO 0484	
AS-459	380.36						AS-459	CO 0485	
AS-460	393.07						AS-460	CO 0486	
AS-461	405.26	+/-1.91					AS-461	CO 4397	
AS-462	417.96						AS-462	CO 7806	
AS-463	430.66	+/-2.03					AS-463	CO 7807	
AS-464	443.36	+/-2.16					AS-464	CO 2401	
AS-465	456.06						AS-465	CO 7808	
AS-466	468.76						AS-466	CO 5107	
AS-467	481.46	+/-2.29					AS-467	CO 4270	
AS-468	494.16						AS-468	CO 8810	
AS-469	506.86	+/-2.41					AS-469		
AS-470	532.26						AS-470		
AS-471	557.66	+/-2.54					AS-471		
AS-472	582.68	+/-2.67					AS-472		
AS-473	608.08	+/-2.79					AS-473		
AS-474	633.48	+/-2.92					AS-474		
AS-475	658.88	+/-3.05					AS-475		

O-RING STANDARDS SIZE (AS)

Cross section (CS)=1.42 mm,1.63 mm,1.83 mm,1.98 mm

Cross section (CS)=2.08 mm,2.21 mm,2.46 mm,2.95 mm,3.00 mm

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References				
Type	(ID)		(CS)		F	JIS	AS-BS	NOK	JASO F404
AS-901	4.70	+/-0.12	1.42	+/-0.07			AS-901	CO 5480	
AS-902	6.07		1.63	+/-0.07			AS-902	CO 3091	
AS-903	7.64						AS-903	CO 7600	
AS-904	8.92		1.83	+/-0.07			AS-904	CO 3597	
AS-905	10.52						AS-905	CO 1087	
AS-906	11.89		1.98	+/-0.07			AS-906	CO 3604	
AS-907	13.46		2.08	+/-0.07			AS-907	CO 8804	
AS-908	16.36		2.21	+/-0.07			AS-908	CO 1165	
AS-909	17.93		2.46	+/-0.07			AS-909	CO 8805	
AS-910	19.18						AS-910	CO 1206	
AS-911	21.92		2.95	+/-0.10			AS-911	CO 8243	
AS-912	23.47	+/-0.15					AS-912	CO 1253	
AS-913	25.04						AS-913	CO 8806	
AS-914	26.59						AS-914	CO 2998	
AS-916	29.74						AS-916	CO 1315	
AS-918	34.42						AS-918	CO 8807	
AS-920	37.46	+/-0.25	3.00	+/-0.10			AS-920	CO 3640	
AS-924	43.69						AS-924	CO 3706	
AS-928	53.09						AS-928	CO 8808	
AS-932	59.36						AS-932	CO 8809	

ISO O-RINGS

Cross section (CS)=1.80 mm

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References				
Type	(ID)		(CS)		F	JIS	AS-BS	NOK	JASO F404
A 0018G	1.80	+/-0.13	1.80	+/-0.08				CO 7200A	
A 0020G	2.00							CO 7201A	
A 0022G	2.40							CO 7202A	
A 0025G	2.50							CO 7203A	
A 0028G	2.80	+/-0.14						CO 7204A	
A 0031G	3.15							CO 7205A	
A 0035G	3.55							CO 7206A	
A 0037G	3.75							CO 7207A	
A 0040G	4.00							CO 7208A	
A 0045G	4.50							CO 1021A	
A 0048G	4.87	+/-0.15						CO 7209A	
A 0050G	5.00							CO 7210A	
A 0051G	5.15							CO 7200A	
A 0053G	5.30							CO 7212A	
A 0056G	5.60							CO 6868A	
A 0060G	6.00							CO 3026A	
A 0063G	6.30							CO 7213A	
A 0067G	6.70	+/-0.16						CO 7038A	
A 0069G	6.90							CO 7214A	
A 0071G	7.10							CO 7215A	
A 0075G	7.50							CO 7216A	
A 0080G	8.00							CO 7217A	
A 0085G	8.50							CO 7218A	

ISO O-RINGS

Cross section (CS)=1.80 mm

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References				
Type	(ID)		(CS)		F	JIS	AS-BS	NOK	JASO F404
A 0087G	8.75	+/-0.17	1.80	+/-0.08				CO 7219A	
A 0090G	9.00							CO 1061A	
A 0095G	9.50							CO 7221A	
A 0100G	10.00							CO 7222A	
A 0106G	10.60	+/-0.18						CO 7223A	
A 0112G	11.20							CO 7224A	
A 0118G	11.80	+/-0.19						CO 1109A	
A 0125G	12.50							CO 7225A	
A 0132G	13.20							CO 7226A	
A 0140G	14.00							CO 3441A	
A 0150G	15.00	+/-0.20						CO 6822A	
A 0160G	16.00							CO 6861A	
A 0170G	17.00	+/-0.21						CO 7227A	

ISO O-RINGS

Cross section (CS)=2.65 mm

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References				
Type	(ID)		(CS)		F	JIS	AS-BS	NOK	JASO F404
B 0140G	14.00	+/-0.19	2.65	+/-0.09				CO 7228A	
B 0150G	15.00	+/-0.20						CO 7229A	
B 0160G	16.00							CO 7230A	
B 0170G	17.00	+/-0.21						CO 7231A	
B 0180G	18.00							CO 7232A	
B 0190G	19.00	+/-0.22						CO 7233A	
B 0200G	20.00							CO 7234A	
B 0212G	21.20	+/-0.23						CO 7235A	
B 0224G	22.40	+/-0.24						CO 7236A	
B 0236G	23.60							CO 7237A	
B 0250G	25.00	+/-0.25						CO 7238A	
B 0258G	25.80	+/-0.26						CO 7239A	
B 0265G	26.50							CO 7240A	
B 0280G	28.00	+/-0.28						CO 7241A	
B 0300G	30.00	+/-0.29						CO 7242A	
B 0315G	31.50	+/-0.31						CO 7243A	
B 0325G	32.50	+/-0.32						CO 7244A	
B 0335G	33.50							CO 7245A	
B 0345G	34.50	+/-0.33						CO 7246A	
B 0355G	35.50	+/-0.34						CO 7247A	
B 0365G	36.50	+/-0.35						CO 7248A	
B 0375G	37.50	+/-0.36						CO 7249A	
B 0387G	38.70	+/-0.37						CO 7250A	

ISO O-RINGS

Cross section (CS)=3.55 mm

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References				
Type	(ID)		(CS)		F	JIS	AS-BS	NOK	JASO F404
C 0180G	18.00	+/-0.21	3.55	+/-0.10				CO 7251A	
C 0190G	19.00	+/-0.22						CO 7252A	
C 0200G	20.00							CO 7253A	
C 0212G	21.20	+/-0.23						CO 7254A	
C 0224G	22.40	+/-0.24						CO 7255A	
C 0236G	23.60							CO 7256A	
C 0250G	25.00	+/-0.25						CO 7257A	
C 0258G	25.80	+/-0.26						CO 7258A	
C 0265G	26.50							CO 7259A	
C 0280G	28.00	+/-0.28						CO 7260A	
C 0300G	30.00	+/-0.29						CO 7261A	
C 0315G	31.50	+/-0.31						CO 7262A	
C 0325G	32.50	+/-0.32						CO 7263A	
C 0335G	33.50							CO 7264A	
C 0345G	34.50	+/-0.33						CO 7265A	
C 0355G	35.50	+/-0.34						CO 7266A	
C 0365G	36.50	+/-0.35						CO 7267A	
C 0375G	37.50	+/-0.36						CO 7268A	
C 0387G	38.70	+/-0.37						CO 7269A	
C 0400G	40.00	+/-0.38						CO 7370A	
C 0412G	41.20	+/-0.39						CO 7271A	
C 0425G	42.50	+/-0.40						CO 7272A	
C 0437G	43.70	+/-0.41						CO 7273A	
C 0450G	45.00	+/-0.42						CO 7274A	
C 0462G	46.20	+/-0.43						CO 7275A	
C 0475G	47.50	+/-0.44						CO 7276A	
C 0487G	48.70	+/-0.45						CO 7277A	
C 0500G	50.00	+/-0.46						CO 7278A	

ISO O-RINGS

Cross section (CS)=3.55 mm

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References				
Type	(ID)		(CS)		F	JIS	AS-BS	NOK	JASO F404
C 0515G	51.50	+/-0.47	3.55	+/-0.10				CO 7279A	
C 0530G	53.00	+/-0.48						CO 7280A	
C 0545G	54.50	+/-0.50						CO 7281A	
C 0560G	56.00	+/-0.51						CO 7282A	
C 0580G	58.00	+/-0.52						CO 7283A	
C 0600G	60.00	+/-0.54						CO 7284A	
C 0615G	61.50	+/-0.55						CO 7285A	
C 0630G	63.00	+/-0.56						CO 7286A	
C 0650G	65.00	+/-0.58						CO 7287A	
C 0670G	67.00	+/-0.59						CO 7388A	
C 0690G	69.00	+/-0.61						CO 7289A	
C 0710G	71.00	+/-0.63						CO 7290A	
C 0730G	73.00	+/-0.64						CO 7291A	
C 0750G	75.00	+/-0.66						CO 7292A	
C 0775G	77.50	+/-0.67						CO 7293A	
C 0800G	80.00	+/-0.69						CO 7294A	
C 0825G	82.50	+/-0.71						CO 7295A	
C 0850G	85.00	+/-0.73						CO 7296A	
C 0875G	87.50	+/-0.75						CO 7297A	
C 0900G	90.00	+/-0.77						CO 7298A	
C 0925G	92.50	+/-0.79						CO 7299A	
C 0950G	95.00	+/-0.81						CO 7300A	
C 0975G	97.50	+/-0.83						CO 7301A	
C 1000G	100.00	+/-0.84						CO 7302A	
C 1030G	103.00	+/-0.87						CO 7303A	
C 1060G	106.00	+/-0.89						CO 7304A	
C 1090G	109.00	+/-0.91						CO 7305A	
C 1120G	112.00	+/-0.93						CO 7306A	

ISO O-RINGS

Cross section (CS)=3.55 mm

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References				
Type	(ID)		(CS)		F	JIS	AS-BS	NOK	JASO F404
C 1150G	115.00	+/-0.95						CO 7307A	
C 1180G	118.00	+/-0.97						CO 7308A	
C 1220G	122.00	+/-1.00						CO 7309A	
C 1250G	125.00	+/-1.03						CO 7310A	
C 1280G	128.00	+/-1.05						CO 7311A	
C 1320G	132.00	+/-1.08						CO 7312A	
C 1360G	136.00	+/-1.10						CO 7313A	
C 1400G	140.00	+/-1.13						CO 7314A	
C 1450G	145.00	+/-1.17						CO 7315A	
C 1500G	150.00	+/-1.20						CO 7316A	
C 1550G	155.00	+/-1.24	3.55	+/-0.10				CO 7317A	
C 1600G	160.00	+/-1.27						CO 7318A	
C 1650G	165.00	+/-1.31						CO 7319A	
C 1700G	170.00	+/-1.34						CO 7320A	
C 1750G	175.00	+/-1.38						CO 7321A	
C 1800G	180.00	+/-1.41						CO 7322A	
C 1850G	185.00	+/-1.44						CO 7323A	
C 1900G	190.00	+/-1.48						CO 7324A	
C 1950G	195.00	+/-1.51						CO 7325A	
C 2000G	200.00	+/-1.55						CO 7326A	

ISO O-RINGS

Cross section (CS)=5.30 mm

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References				
Type	(ID)		(CS)		F	JIS	AS-BS	NOK	JASO F404
D 0400G	40.00	+/-0.38						CO 7327A	
D 0412G	41.20	+/-0.39						CO 7328A	
D 0425G	42.50	+/-0.40						CO 7329A	
D 0437G	43.70	+/-0.41						CO 7330A	
D 0450G	45.00	+/-0.42						CO 4643A	
D 0462G	46.20	+/-0.43						CO 7331A	
D 0475G	47.50	+/-0.44						CO 7332A	
D 0487G	48.70	+/-0.45						CO 7333A	
D 0500G	50.00	+/-0.46						CO 7334A	
D 0515G	51.50	+/-0.47						CO 7335A	
D 0530G	53.00	+/-0.48						CO 7336A	
D 0545G	54.50	+/-0.50						CO 7337A	
D 0560G	56.00	+/-0.51						CO 7338A	
D 0580G	58.00	+/-0.52	5.30	+/-0.13				CO 7339A	
D 0600G	60.00	+/-0.54						CO 7340A	
D 0615G	61.50	+/-0.55						CO 7341A	
D 0630G	63.00	+/-0.56						CO 7342A	
D 0650G	65.00	+/-0.58						CO 7343A	
D 0670G	67.00	+/-0.59						CO 7344A	
D 0690G	69.00	+/-0.61						CO 7345A	
D 0710G	71.00	+/-0.63						CO 7346A	
D 0730G	73.00	+/-0.64						CO 7347A	
D 0750G	75.00	+/-0.66						CO 7348A	
D 0775G	77.50	+/-0.67						CO 7349A	
D 0800G	80.00	+/-0.69						CO 7350A	
D 0825G	82.50	+/-0.71						CO 7351A	

ISO O-RINGS

Cross section (CS)=5.30 mm

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References				
Type	(ID)		(CS)		F	JIS	AS-BS	NOK	JASO F404
D 0850G	85.00	+/-0.73						CO 7352A	
D 0875G	87.50	+/-0.75						CO 7353A	
D 0900G	90.00	+/-0.77						CO 7354A	
D 0925G	92.50	+/-0.79						CO 7355A	
D 0950G	95.00	+/-0.81						CO 7356A	
D 0975G	97.50	+/-0.83						CO 7357A	
D 1000G	100.00	+/-0.84						CO 7358A	
D 1030G	103.00	+/-0.87						CO 7359A	
D 1060G	106.00	+/-0.89						CO 7360A	
D 1090G	109.00	+/-0.91						CO 7361A	
D 1120G	112.00	+/-0.93						CO 7362A	
D 1150G	115.00	+/-0.95						CO 7363A	
D 1180G	118.00	+/-0.97						CO 7364A	
D 1220G	122.00	+/-1.00	5.30	+/-0.13				CO 7365A	
D 1250G	125.00	+/-1.03						CO 7366A	
D 1280G	128.00	+/-1.05						CO 7367A	
D 1320G	132.00	+/-1.08						CO 7368A	
D 1360G	136.00	+/-1.10						CO 7369A	
D 1400G	140.00	+/-1.13						CO 7370A	
D 1450G	145.00	+/-1.17						CO 7371A	
D 1500G	150.00	+/-1.20						CO 7372A	
D 1550G	155.00	+/-1.24						CO 7373A	
D 1600G	160.00	+/-1.27						CO 7374A	
D 1650G	165.00	+/-1.31						CO 7375A	
D 1700G	170.00	+/-1.34						CO 7376A	
D 1750G	175.00	+/-1.38						CO 7377A	

ISO O-RINGS

Cross section (CS)=5.30 mm

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References				
Type	(ID)		(CS)		F	JIS	AS-BS	NOK	JASO F404
D 1800G	180.00	+/-1.41						CO 7378A	
D 1850G	185.00	+/-1.44						CO 7379A	
D 1900G	190.00	+/-1.48						CO 7380A	
D 1950G	195.00	+/-1.51						CO 7381A	
D 2000G	200.00	+/-1.55						CO 7382A	
D 2060G	206.00	+/-1.59						CO 7383A	
D 2120G	212.00	+/-1.63						CO 7384A	
D 2180G	218.00	+/-1.67						CO 7385A	
D 2240G	224.00	+/-1.71						CO 7386A	
D 2300G	230.00	+/-1.75						CO 7387A	
D 2360G	236.00	+/-1.79						CO 7388A	
D 2430G	243.00	+/-1.83						CO 7389A	
D 2500G	250.00	+/-1.88						CO 7390A	
D 2580G	258.00	+/-1.93						CO 7391A	
D 2650G	265.00	+/-1.98	5.30	+/-0.13				CO 7392A	
D 2720G	272.00	+/-2.02						CO 7393A	
D 2800G	280.00	+/-2.08						CO 7394A	
D 2900G	290.00	+/-2.14						CO 7395A	
D 3000G	300.00	+/-2.21						CO 7396A	
D 3070G	307.00	+/-2.25						CO 7397A	
D 3150G	315.00	+/-2.30						CO 7398A	
D 3250G	325.00	+/-2.37						CO 7399A	
D 3350G	335.00	+/-2.43						CO 7400A	
D 3450G	345.00	+/-2.49						CO 7401A	
D 3550G	355.00	+/-2.56						CO 7402A	
D 3650G	365.00	+/-2.62						CO 7403A	
D 3750G	375.00	+/-2.68						CO 7404A	
D 3870G	387.00	+/-2.76						CO 7405A	
D 4000G	400.00	+/-2.84						CO 7406A	

ISO O-RINGS

Cross section (CS)=7.00 mm

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References				
Type	(ID)		(CS)		F	JIS	AS-BS	NOK	JASO F404
E 1090G	109.00	+/-0.91	7.00	+/-0.15				CO 7407A	
E 1120G	112.00	+/-0.93						CO 7408A	
E 1150G	115.00	+/-0.95						CO 7409A	
E 1180G	118.00	+/-0.97						CO 7410A	
E 1220G	122.00	+/-1.00				DIN		CO 7411A	
E 1250G	125.00	+/-1.03						CO 7412A	
E 1280G	128.00	+/-1.05						CO 7413A	
E 1320G	132.00	+/-1.08						CO 7414A	
E 1360G	136.00	+/-1.10				DIN		CO 7415A	
E 1400G	140.00	+/-1.13						CO 7416A	
E 1450G	145.00	+/-1.17						CO 7417A	
E 1500G	150.00	+/-1.21						CO 7418A	
E 1550G	155.00	+/-1.24						CO 7419A	
E 1600G	160.00	+/-1.27				DIN		CO 7420A	
E 1650G	165.00	+/-1.31						CO 7421A	
E 1700G	170.00	+/-1.34						CO 7422A	
E 1750G	175.00	+/-1.38				DIN		CO 7423A	
E 1800G	180.00	+/-1.41						CO 7424A	
E 1850G	185.00	+/-1.44						CO 7425A	
E 1900G	190.00	+/-1.48						CO 7426A	
E 1950G	195.00	+/-1.51				DIN		CO 7427A	
E 2000G	200.00	+/-1.55						CO 7428A	
E 2060G	206.00	+/-1.59						CO 7429A	
E 2120G	212.00	+/-1.63						CO 7430A	
E 2180G	218.00	+/-1.67						CO 7431A	
E 2240G	224.00	+/-1.71						CO 7432A	

ISO O-RINGS

Cross section (CS)=7.00 mm

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References				
Type	(ID)		(CS)		F	JIS	AS-BS	NOK	JASO F404
E 2300G	230.00	+/-1.75	7.00	+/-0.15				CO 7433A	
E 2360G	236.00	+/-1.79						CO 7434A	
E 2430G	243.00	+/-1.83						CO 7435A	
E 2500G	250.00	+/-1.88						CO 7436A	
E 2580G	258.00	+/-1.93						CO 7437A	
E 2650G	265.00	+/-1.98						CO 7438A	
E 2720G	272.00	+/-2.02						CO 7439A	
E 2800G	280.00	+/-2.08						CO 7440A	
E 2900G	290.00	+/-2.14						CO 7441A	
E 3000G	300.00	+/-2.21						CO 7442A	
E 3070G	307.00	+/-2.25						CO 7443A	
E 3150G	315.00	+/-2.30						CO 7444A	
E 3250G	325.00	+/-2.37						CO 7445A	
E 3350G	335.00	+/-2.43						CO 7446A	
E 3450G	345.00	+/-2.49						CO 7447A	
E 3550G	355.00	+/-2.56						CO 7448A	
E 3650G	365.00	+/-2.62						CO 7449A	
E 3750G	375.00	+/-2.68						CO 7450A	
E 3870G	387.00	+/-2.76						CO 7451A	
E 4000G	400.00	+/-2.84						CO 7452A	
E 4120G	412.00	+/-2.91						CO 7453A	
E 4250G	425.00	+/-2.99						CO 7454A	
E 4370G	437.00	+/-3.07						CO 7455A	
E 4500G	450.00	+/-3.15						CO 7456A	
E 4620G	462.00	+/-3.22						CO 6711A	
E 4750G	475.00	+/-3.30						CO 7457A	

ISO O-RINGS

Cross section (CS)=7.00 mm

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References				
Type	(ID)		(CS)		F	JIS	AS-BS	NOK	JASO F404
E 1090G	109.00	+/-0.91	7.00	+/-0.15				CO 7407A	
E 1120G	112.00	+/-0.93						CO 7408A	
E 1150G	115.00	+/-0.95						CO 7409A	
E 1180G	118.00	+/-0.97						CO 7410A	
E 1220G	122.00	+/-1.00				DIN		CO 7411A	
E 1250G	125.00	+/-1.03						CO 7412A	
E 1280G	128.00	+/-1.05						CO 7413A	
E 1320G	132.00	+/-1.08						CO 7414A	
E 1360G	136.00	+/-1.10				DIN		CO 7415A	
E 1400G	140.00	+/-1.13						CO 7416A	
E 1450G	145.00	+/-1.17						CO 7417A	
E 1500G	150.00	+/-1.21						CO 7418A	
E 1550G	155.00	+/-1.24						CO 7419A	
E 1600G	160.00	+/-1.27				DIN		CO 7420A	
E 1650G	165.00	+/-1.31						CO 7421A	
E 1700G	170.00	+/-1.34						CO 7422A	
E 1750G	175.00	+/-1.38				DIN		CO 7423A	
E 1800G	180.00	+/-1.41						CO 7424A	
E 1850G	185.00	+/-1.44						CO 7425A	
E 1900G	190.00	+/-1.48						CO 7426A	
E 1950G	195.00	+/-1.51				DIN		CO 7427A	
E 2000G	200.00	+/-1.55						CO 7428A	
E 2060G	206.00	+/-1.59						CO 7429A	
E 2120G	212.00	+/-1.63						CO 7430A	
E 2180G	218.00	+/-1.67						CO 7431A	
E 2240G	224.00	+/-1.71						CO 7432A	

ISO O-RINGS

Cross section (CS)=7.00 mm

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References				
Type	(ID)		(CS)		F	JIS	AS-BS	NOK	JASO F404
E 2300G	230.00	+/-1.75	7.00	+/-0.15				CO 7433A	
E 2360G	236.00	+/-1.79						CO 7434A	
E 2430G	243.00	+/-1.83						CO 7435A	
E 2500G	250.00	+/-1.88						CO 7436A	
E 2580G	258.00	+/-1.93						CO 7437A	
E 2650G	265.00	+/-1.98						CO 7438A	
E 2720G	272.00	+/-2.02						CO 7439A	
E 2800G	280.00	+/-2.08						CO 7440A	
E 2900G	290.00	+/-2.14						CO 7441A	
E 3000G	300.00	+/-2.21						CO 7442A	
E 3070G	307.00	+/-2.25						CO 7443A	
E 3150G	315.00	+/-2.30						CO 7444A	
E 3250G	325.00	+/-2.37						CO 7445A	
E 3350G	335.00	+/-2.43						CO 7446A	
E 3450G	345.00	+/-2.49						CO 7447A	
E 3550G	355.00	+/-2.56						CO 7448A	
E 3650G	365.00	+/-2.62						CO 7449A	
E 3750G	375.00	+/-2.68						CO 7450A	
E 3870G	387.00	+/-2.76						CO 7451A	
E 4000G	400.00	+/-2.84						CO 7452A	
E 4120G	412.00	+/-2.91						CO 7453A	
E 4250G	425.00	+/-2.99						CO 7454A	
E 4370G	437.00	+/-3.07						CO 7455A	
E 4500G	450.00	+/-3.15						CO 7456A	
E 4620G	462.00	+/-3.22						CO 6711A	
E 4750G	475.00	+/-3.30						CO 7457A	
E 4870G	487.00	+/-3.37						CO 7458A	
E 5000G	500.00	+/-3.45						CO 7459A	
E 5150G	515.00	+/-3.54						CO 7460A	
E 5300G	530.00	+/-3.63						CO 7461A	
E 5450G	545.00	+/-3.72						CO 7462A	
E 5600G	560.00	+/-3.81						CO 7463A	
E 5800G	580.00	+/-3.93						CO 7464A	
E 6000G	600.00	+/-4.05						CO 7465A	
E 6150G	615.00	+/-4.13						CO 7466A	
E 6300G	630.00	+/-4.22						CO 7467A	
E 6500G	650.00	+/-4.34						CO 7668A	
E 6700G	670.00	+/-4.46						CO 7469A	

O-RING STANDARD SIZE (METRIC)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References			
Type	(ID)		(CS)		F	JIS	AS-BS	JASO F404
mm	2.54	+/-0.15	0.97	+/-0.07	R000			
	1.15		1.00					
	1.50		1.00					
	1.80		1.00			SS 2	607	
	2.00		1.00			SS 2.5		
	2.50		1.00			SS 3		
	3.00		1.00			SS 3.5		
	3.50		1.00			SS 4		
	4.00		1.00			SS 4.5		
	4.50		1.00			SS 5		
	5.00		1.00			SS 5.5		
	5.50		1.00			SS 6		
	6.00		1.00			SS 6.5		
	6.50		1.00			SS 7		
	7.00		1.00			SS 7.5		
	7.50		1.00			SS 8		
	8.00		1.00			SS 8.5		
	8.50		1.00			SS 9		
	9.00		1.00			SS 9.5		
	9.50		1.00			SS 10		
	10.00		1.00			SS 10.5		
	10.50		1.00			SS 11		
	11.00		1.00			SS 11.5		
	11.50		1.00			SS 12		
	12.00		1.00					
	12.50		1.00					
	13.00		1.00					
	13.50		1.00					
	14.00		1.00					
	14.50		1.00					
	15.00		1.00					
	15.50		1.00					
	16.00		1.00					
	16.50		1.00					
	17.00		1.00					
	17.50		1.00					
	18.00		1.00					
	18.50		1.00					
	19.00		1.00					
	19.50		1.00					
	20.00		1.00					
	20.50		1.00					
	21.00		1.00					
	21.50		1.00					

TERMINAL GROUP

O-RING STANDARD SIZE (METRIC)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References			
Type	(ID)		(CS)		F	JIS	AS-BS	JASO F404
mm	22.00	+/-0.15	1.00	+/-0.07		DIN		
	22.50		1.00					
	23.00		1.00					
	23.50		1.00					
	24.00		1.00					
	24.50		1.00					
	25.00		1.00					
	26.00		1.00					
	27.00		1.00					
	28.00		1.00					
	29.00		1.00					
	30.00		1.00					
	31.00		1.00					
	32.00		1.00					
	33.00		1.00					
	34.00		1.00					
	35.00		1.00					
	36.00		1.00					
	37.00		1.00					
	38.00		1.00					
	39.00		1.00					
	40.00		1.00					
	41.00		1.00					
	42.00		1.00					
	43.00		1.00					
	44.00		1.00					
	45.00		1.00					
	46.00		1.00					
	47.00		1.00					
	48.00		1.00					
	49.00		1.00					
	50.00		1.00					
	51.00		1.00					
	52.00		1.00					
	0.74	+/-0.10	1.02	+/-0.07			AS-001	
	1.07						AS-002	
	4.70	+/-0.12	1.42				AS-901	
	1.50	+/-0.12	1.50	+/-0.08				
	1.85	+/-0.13				DIN		
	2.00					S-3		
	2.50							
	2.80							

O-RING STANDARD SIZE (METRIC)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References			
Type	(ID)		(CS)		F	JIS	AS-BS	JASO F404
mm	3.00	+/-0.14	1.50	+/-0.08		DIN		
	3.50		1.50			S-4		
	4.00		1.50					
	4.50		1.50			S-5		
	5.00	+/-0.15	1.50					
	5.50		1.50			S-6		
	6.00		1.50					
	6.50	+/-0.16	1.50			S-7		
	7.00		1.50					
	7.50		1.50			S-8		
	8.00		1.50					
	8.50		1.50			S-9		
	9.00	+/-0.17	1.50					
	9.50		1.50			S-10		
	10.00		1.50					
	10.50	+/-0.18	1.50					
	11.00		1.50					
	11.50	+/-0.19	1.50			S-12		
	12.00		1.50					
	12.50		1.50					
	13.00		1.50					
	13.50		1.50			S-14		
	14.00		1.50					
	14.50	+/-0.20	1.50			S-15		
	15.00		1.50					
	15.50		1.50					
	16.00		1.50			S-16		
	16.50		1.50					
	17.00	+/-0.21	1.50					
	17.50		1.50			S-18		
	18.00		1.50					
	18.50		1.50					
	19.00	+/-0.22	1.50					
	19.50		1.50			S-20		
	20.00		1.50					
	20.50		1.50					
	21.00	+/-0.23	1.50					
	21.50		1.50			S-22		
	22.00	+/-0.24	1.50					
	22.50		1.50					
	23.00		1.50					
	23.50		1.50					
	24.00		1.50					
	24.50	'+/-0.24	1.50					

O-RING STANDARD SIZE (METRIC)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References			
Type	(ID)		(CS)		F	JIS	AS-BS	JASO F404
mm	25.00	+/-0.25	1.50	+/-0.08		DIN		
	25.50		1.50					
	26.00	+/-0.26	1.50					
	26.50		1.50					
	27.00		1.50					
	27.50		1.50					
	28.00	+/-0.28	1.50					
	28.50		1.50					
	29.00	+/-0.29	1.50					
	29.50		1.50					
	30.00		1.50					
	30.50		1.50					
	31.00		1.50					
	31.50	+/-0.31	1.50					
	32.00	+/-0.32	1.50					
	32.50		1.50					
	33.00		1.50					
	33.50		1.50					
	34.00	+/-0.33	1.50					
	34.50		1.50					
	35.00	+/-0.34	1.50					
	35.50		1.50					
	36.00	+/-0.35	1.50					
	36.50		1.50					
	37.00	+/-0.36	1.50					
	37.50	'+/-0.36	1.50					
	38.00		1.50					
	38.50		1.50					
	39.00	+/-0.37	1.50					
	39.50		1.50					
	40.00	+/-0.38	1.50					
	41.00	+/-0.39	1.50					
	42.00	+/-0.40	1.50					
	43.00		1.50					
	44.00	+/-0.41	1.50					
	45.00	+/-0.42	1.50					
	46.00	+/-0.43	1.50					
	47.00	+/-0.44	1.50					
	48.00		1.50					
	49.00	+/-0.45	1.50					
	50.00	+/-0.46	1.50					
	51.00	+/-0.47	1.50					
	52.00		1.50					
	53.00	+/-0.48	1.50					

O-RING STANDARD SIZE (METRIC)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References			
Type	(ID)		(CS)		F	JIS	AS-BS	JASO F404
mm	54.00	+/-0.50	1.50	+/-0.08		DIN		
	55.00		1.50					
	56.00	+/-0.51	1.50					
	57.00	+/-0.52	1.50					
	58.00		1.50					
	59.00	+/-0.54	1.50					
	60.00		1.50					
	61.00	+/-0.55	1.50					
	62.00		1.50					
	63.00	+/-0.56	1.50					
	64.00	+/-0.58	1.50					
	65.00		1.50					
	66.00	+/-0.59	1.50					
	67.00		1.50					
	68.00	+/-0.61	1.50					
	69.00		1.50					
	70.00	+/-0.63	1.50					
	71.00		1.50					
	72.00	+/-0.64	1.50					
	73.00		1.50					
	74.00	+/-0.66	1.50					
	75.00		1.50					
	76.00		1.50					
	77.00	+/-0.67	1.50					
	78.00		1.50					
	79.00	+/-0.69	1.50					
	80.00		1.50					
	81.00		1.50					
	82.00	+/-0.71	1.50					
	83.00		1.50					
	84.00	+/-0.73	1.50					
	85.00		1.50					
	86.00		1.50					
	87.00	+/-0.75	1.50					
	88.00		1.50					
	89.00	+/-0.77	1.50					
	90.00		1.50					
	91.00		1.50					
	92.00	+/-0.79	1.50					
	93.00		1.50					
	94.00	+/-0.81	1.50					
	95.00		1.50					
	96.00		1.50					

O-RING STANDARD SIZE (METRIC)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References			
Type	(ID)		(CS)		F	JIS	AS-BS	JASO F404
mm	97.00	+/-0.83	1.50	+/-0.08		DIN		
	98.00							
	99.00	+/-0.84						
	100.00							
	1.42		1.52	+/-0.07			AS-003	
	2.20		1.60		R00			
	2.75		1.60		R1B			
	3.10	+/-0.10	1.60			DIN		
	4.10		1.60					
	4.70		1.60			DIN		
	5.00		1.60					
	5.10		1.60					
	6.10		1.60					
	7.10		1.60					
	8.10		1.60					
	9.10		1.60					
	10.10		1.60					
	11.10		1.60					
	12.10	+/-0.15	1.60					
	13.10		1.60					
	14.10		1.60					
	15.10		1.60					
	16.10		1.60					
	17.10		1.60					
	18.10		1.60					
	19.10		1.60					
	22.10		1.60					
	25.10		1.60					
	27.10		1.60					
	29.10	+/-0.20	1.60					
	32.10		1.60					
	35.10		1.60					
	37.10		1.60					
	6.07		1.63	+/-0.07			AS-902	
	7.64						AS-903	
	8.92	+/-0.12	1.83				AS-904	
	10.52						AS-905	
	11.89		1.98				AS-906	
	2.00	+/-0.13	2.00	+/-0.08		DIN		
	3.00	+/-0.14	2.00					
	3.50		2.00					
	4.00		2.00					
	4.50		2.00					

O-RING STANDARD SIZE (METRIC)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References			
Type	(ID)		(CS)		F	JIS	AS-BS	JASO F404
mm	5.00	+/-0.15	2.00	+/-0.08				
	5.50		2.00					
	6.00		2.00					
	6.50	+/-0.16	2.00					
	7.00	+/-0.16	2.00					
	7.50		2.00					
	8.00		2.00					
	8.50		2.00					
	9.00	+/-0.17	2.00					
	9.50		2.00					
	10.00		2.00					
	10.50		2.00					
	11.00	+/-0.18	2.00					
	11.50	+/-0.19	2.00					
	12.00		2.00					
	12.50		2.00					
	13.00		2.00					
	13.50		2.00					
	14.00		2.00					
	14.50		2.00					
	15.00	+/-0.20	2.00					
	15.50		2.00					
	16.00		2.00					
	16.50		2.00					
	17.00	+/-0.21	2.00					
	17.50		2.00					
	18.00		2.00					
	18.50		2.00					
	19.00	+/-0.22	2.00					
	19.50		2.00					
	20.00		2.00					
	20.50		2.00					
	21.00	+/-0.23	2.00					
	21.50		2.00					
	22.00	+/-0.24	2.00					
	22.50		2.00					
	23.00		2.00					
	23.50		2.00			S-24		
	24.00		2.00					
	24.50	+/-0.25	2.00			S-25		
	25.00		2.00					
	25.50		2.00			S-26		
	26.00	+/-0.26	2.00					
	26.50		2.00					
	27.00		2.00					
	27.50		2.00			S-28		

TERMINAL GROUP

O-RING STANDARD SIZE (METRIC)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References			
Type	(ID)		(CS)		F	JIS	AS-BS	JASO F404
mm	28.00	+/-0.28	2.00	+/-0.08		DIN		
	28.50		2.00			S-29		
	29.00	+/-0.29	2.00					
	29.50		2.00			S-30		
	30.00		2.00					
	30.50		2.00					
	31.00	+/-0.31	2.00			S-31		
	31.50		2.00			S-32		
	32.00	+/-0.32	2.00					
	32.50		2.00					
	33.00		2.00					
	33.50		2.00			S-34		
	34.00	+/-0.33	2.00					
	34.50		2.00			S-35		
	35.00	+/-0.34	2.00			S-35.5		
	35.50		2.00					
	36.00	+/-0.35	2.00			S-36		
	36.50		2.00					
	37.00	+/-0.36	2.00					
	37.50		2.00			S-38		
	38.00		2.00					
	38.50	+/-0.37	2.00			S-39		
	39.00		2.00					
	39.50		2.00			S-40		
	40.00	+/-0.38	2.00					
	41.00	+/-0.39	2.00			S-42		
	42.00	+/-0.40	2.00					
	43.00		2.00					
	44.00	+/-0.41	2.00					
	45.00	+/-0.42	2.00					
	46.00	+/-0.43	2.00					
	47.00	+/-0.44	2.00					
	48.00		2.00					
	49.00	+/-0.45	2.00					
	50.00	+/-0.46	2.00					
	51.00	+/-0.47	2.00					
	52.00		2.00					
	53.00	+/-0.48	2.00					
	54.00	+/-0.50	2.00					
	55.00		2.00					
	55.50	+/-0.51	2.00			S-56		
	56.00		2.00					
	57.00	+/-0.52	2.00					
	58.00		2.00					

O-RING STANDARD SIZE (METRIC)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References			
Type	(ID)		(CS)		F	JIS	AS-BS	JASO F404
mm	59.00	+/-0.54	2.00	+/-0.08		DIN		
	60.00		2.00					
	61.00	+/-0.55	2.00					
	62.00		2.00					
	63.00	+/-0.56	2.00					
	64.00	+/-0.58	2.00					
	64.50		2.00			S-65		
	65.00		2.00			DIN		
	66.00	+/-0.59	2.00					
	67.00		2.00					
	68.00	+/-0.61	2.00					
	69.00		2.00					
	69.50		2.00					
	70.00	+/-0.63	2.00					
	71.00		2.00					
	72.00	+/-0.64	2.00					
	73.00		2.00					
	74.00	+/-0.66	2.00					
	75.00		2.00					
	76.00		2.00					
	77.00	+/-0.67	2.00					
	78.00		2.00					
	79.00	+/-0.69	2.00					
	80.00		2.00					
	81.00		2.00					
	82.00	+/-0.71	2.00					
	83.00		2.00					
	84.00	+/-0.73	2.00					
	85.00		2.00					
	86.00		2.00					
	87.00	+/-0.75	2.00					
	88.00		2.00					
	89.00	+/-0.77	2.00					
	90.00		2.00					
	91.00		2.00					
	92.00	+/-0.79	2.00					
	93.00		2.00					
	94.00	+/-0.81	2.00					
	95.00		2.00					
	96.00		2.00					
	97.00	+/-0.83	2.00					
	98.00		2.00					
	99.00	+/-0.84	2.00					
	100.00		2.00					
	105.00	+/-0.89	2.00					
	109.00	+/-0.91	2.00					

O-RING STANDARD SIZE (METRIC)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References			
Type	(ID)		(CS)		F	JIS	AS-BS	JASO F404
mm	13.46	+/-0.12	2.08	+/-0.07	R6B		907	
	6.00		2.20					
	16.36		2.21				908	
	17.93		2.46				909	
	19.18		2.46				910	
	3.00	+/-0.14	2.50	+/-0.09		DIN		
	4.00		2.50					
	4.60		2.50					
	5.00	+/-0.15	2.50					
	5.50		2.50					
	6.00		2.50					
	6.50		2.50					
	7.00	+/-0.16	2.50					
	7.50		2.50					
	8.00		2.50					
	8.50		2.50					
	9.00	+/-0.17	2.50					
	9.50		2.50					
	10.00		2.50					
	10.50		2.50					
	11.00	+/-0.18	2.50					
	11.50		2.50					
	12.00	+/-0.19	2.50					
	12.50		2.50					
	13.00		2.50					
	13.50		2.50					
	14.00		2.50					
	14.50		2.50					
	15.00	+/-0.20	2.50					
	15.50		2.50					
	16.00		2.50					
	16.50		2.50					
	17.00	+/-0.21	2.50					
	17.50		2.50					
	18.00		2.50					
	18.50		2.50					
	19.00	+/-0.22	2.50					
	19.50		2.50					
	20.00		2.50					
	20.50		2.50					
	21.00	+/-0.23	2.50					
	21.50		2.50					
	22.00	+/-0.24	2.50					
	22.50		2.50					

O-RING STANDARD SIZE (METRIC)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References			
Type	(ID)		(CS)		F	JIS	AS-BS	JASO F404
mm	23.00	+/-0.24	2.50	+/-0.09		DIN		
	23.50		2.50					
	24.00		2.50					
	24.50		2.50					
	25.00	+/-0.25	2.50					
	25.50		2.50					
	26.00	+/-0.26	2.50					
	26.50		2.50					
	27.00		2.50					
	27.50		2.50					
	28.00	+/-0.28	2.50					
	28.50		2.50					
	29.00	+/-0.29	2.50					
	29.50		2.50					
	30.00		2.50					
	30.50		2.50					
	31.00	+/-0.31	2.50					
	31.50		2.50					
	32.00	+/-0.32	2.50					
	32.50		2.50					
	33.00		2.50					
	33.50		2.50					
	34.00	+/-0.33	2.50					
	34.50		2.50					
	35.00	+/-0.34	2.50					
	35.50		2.50					
	36.00	+/-0.35	2.50					
	36.50		2.50					
	37.00	+/-0.36	2.50					
	37.50		2.50					
	38.00		2.50					
	38.50		2.50					
	39.00	+/-0.37	2.50					
	39.50		2.50					
	40.00	+/-0.38	2.50					
	41.00	+/-0.39	2.50					
	42.00	+/-0.40	2.50					
	43.00		2.50					
	44.00	+/-0.41	2.50					
	45.00	+/-0.42	2.50					
	46.00	+/-0.43	2.50					
	47.00	+/-0.44	2.50					
	48.00		2.50					
	49.00	+/-0.45	2.50					

O-RING STANDARD SIZE (METRIC)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References			
Type	(ID)		(CS)		F	JIS	AS-BS	JASO F404
mm	50.00	+/-0.46	2.50	+/-0.09		DIN		
	51.00	+/-0.47	2.50					
	52.00		2.50					
	53.00	+/-0.48	2.50					
	54.00	+/-0.50	2.50					
	55.00		2.50					
	56.00	+/-0.51	2.50					
	57.00	+/-0.52	2.50					
	58.00		2.50					
	59.00	+/-0.54	2.50					
	60.00		2.50					
	61.00	+/-0.55	2.50					
	62.00		2.50					
	63.00	+/-0.56	2.50					
	64.00	+/-0.58	2.50					
	65.00		2.50					
	66.00	+/-0.59	2.50					
	67.00		2.50					
	68.00	+/-0.61	2.50					
	69.00		2.50					
	70.00	+/-0.63	2.50					
	71.00		2.50					
	72.00	+/-0.64	2.50					
	73.00		2.50					
	74.00	+/-0.66	2.50					
	75.00		2.50					
	76.00		2.50					
	77.00	+/-0.67	2.50					
	78.00		2.50					
	79.00	+/-0.69	2.50					
	80.00		2.50					
	81.00		2.50					
	82.00	+/-0.71	2.50					
	83.00		2.50					
	84.00	+/-0.73	2.50					
	85.00		2.50					
	86.00		2.50					
	87.00	+/-0.75	2.50					
	88.00		2.50					
	89.00	+/-0.77	2.50					
	90.00		2.50					
	91.00		2.50					
	92.00	+/-0.79	2.50					
	93.00		2.50					

O-RING STANDARD SIZE (METRIC)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References			
Type	(ID)		(CS)		F	JIS	AS-BS	JASO F404
mm	94.00	+/-0.81	2.50	+/-0.09		DIN		
	95.00		2.50					
	96.00		2.50					
	97.00	+/-0.83	2.50					
	98.00		2.50					
	99.00	+/-0.84	2.50					
	100.00		2.50					
	101.00		2.50					
	102.00	+/-0.87	2.50					
	103.00		2.50					
	104.00		2.50					
	105.00	+/-0.89	2.50					
	106.00		2.50					
	107.00		2.50					
	108.00	+/-0.91	2.50					
	109.00		2.50					
	110.00		2.50					
	111.00	+/-0.93	2.50					
	112.00		2.50					
	113.00		2.50					
	114.00	+/-0.95	2.50					
	115.00		2.50					
	116.00		2.50					
	117.00	+/-0.97	2.50					
	118.00		2.50					
	119.00		2.50					
	120.00	+/-1.00	2.50					
	121.00		2.50					
	122.00		2.50					
	123.00		2.50					
	124.00	+/-1.03	2.50					
	125.00		2.50					
	126.00		2.50					
	127.00	+/-1.05	2.50					
	128.00		2.50					
	129.00		2.50					
	130.00	+/-1.08	2.50					
	131.00		2.50					
	132.00		2.50					
	133.00		2.50					
	134.00	+/-1.10	2.50					
	135.00		2.50					
	136.00		2.50					
	137.00		2.50					

O-RING STANDARD SIZE (METRIC)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References			
Type	(ID)		(CS)		F	JIS	AS-BS	JASO F404
mm	138.00	+/-1.17	2.50	+/-0.09		DIN		
	139.00		2.50					
	140.00		2.50					
	141.00		2.50					
	142.00		2.50					
	143.00	+/-1.20	2.50					
	144.00		2.50					
	145.00		2.50					
	146.00		2.50					
	147.00		2.50					
	148.00	+/-1.24	2.50					
	149.00		2.50					
	150.00		2.50					
	162.00	+/-1.31	2.50					
	29.10		2.55		R20B			
	8.90		2.70		R8			
	10.50		2.70		R9			
	12.10		2.70		R10			
	13.60		2.70		R11			
	15.10		2.70		R12			
	16.90		2.70		R13			
	18.40		2.70		R14			
	27.30		2.70		R20T			
	21.92	+/-1.15	2.95	+/-0.10			AS-911	
	23.47		2.95				AS-912	
	25.04		2.95				AS-913	
	26.59		2.95				AS-914	
	29.74		2.95				AS-916	
	34.42		2.95				AS-918	
	3.00	+/-1.14	3.00	+/-0.09		DIN		
	3.50		3.00					
	4.00		3.00					
	4.50		3.00					
	5.00	+/-1.15	3.00					
	5.50		3.00					
	6.00		3.00					
	6.50		3.00					
	7.00	+/-1.16	3.00					
	7.50		3.00					
	8.00		3.00					
	8.50		3.00					
	9.00	+/-1.17	3.00					
	9.50		3.00					
	10.00		3.00					

O-RING STANDARD SIZE (METRIC)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References			
Type	(ID)		(CS)		F	JIS	AS-BS	JASO F404
mm	10.50	+/-0.17	3.00	+/-0.09		DIN		
	11.00	+/-0.18	3.00					
	11.50		3.00					
	12.00	+/-0.19	3.00					
	12.50		3.00					
	13.00		3.00					
	13.50		3.00					
	14.00		3.00					
	14.50		3.00					
	15.00	+/-0.20	3.00					
	15.50		3.00					
	16.00		3.00					
	16.50		3.00					
	17.00	+/-0.21	3.00					
	17.50		3.00					
	18.00		3.00					
	18.50		3.00					
	19.00	+/-0.22	3.00					
	19.20		3.00					
	19.50		3.00					
	20.00		3.00					
	20.50		3.00					
	21.00		3.00					
	21.50		3.00					
	22.00	+/-0.24	3.00					
	22.20		3.00					
	22.50		3.00					
	23.00		3.00					
	23.50		3.00					
	24.00		3.00					
	24.20		3.00					
	24.50		3.00					
	24.60		3.00					
	25.00	+/-0.25	3.00					
	25.50		3.00					
	26.00	+/-0.26	3.00					
	26.20		3.00					
	26.50		3.00					
	27.00		3.00					
	27.50		3.00					
	28.00	+/-0.28	3.00					
	28.50	+/-0.29	3.00					
	29.00		3.00					
	29.20		3.00					

O-RING STANDARD SIZE (METRIC)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References			
Type	(ID)		(CS)		F	JIS	AS-BS	JASO F404
mm	29.50	+/-0.29	3.00	+/-0.09		DIN		
	30.00		3.00					
	30.50		3.00					
	31.00	+/-0.31	3.00					
	31.50		3.00					
	32.00	+/-0.32	3.00					
	32.20		3.00					
	32.50		3.00					
	33.00		3.00					
	33.50		3.00					
	34.00	+/-0.33	3.00					
	34.20		3.00					
	34.50		3.00					
	35.00	+/-0.34	3.00					
	35.50		3.00					
	36.00	+/-0.35	3.00					
	36.20		3.00					
	36.50		3.00					
	37.00	+/-0.36	3.00					
	37.47		3.00				AS-920	
	37.50		3.00			DIN		
	38.00		3.00					
	38.50		3.00					
	39.00	+/-0.37	3.00					
	39.20		3.00					
	39.50		3.00					
	40.00	+/-0.39	3.00					
	41.00		3.00					
	41.50		3.00					
	42.00	+/-0.40	3.00					
	42.20		3.00					
	42.50		3.00					
	43.00		3.00					
	43.69		3.00				AS-924	
	44.00	+/-0.41	3.00			DIN		
	44.20		3.00					
	44.50		3.00					
	45.00	+/-0.42	3.00					
	46.00	+/-0.43	3.00					
	47.00	+/-0.44	3.00					
	48.00		3.00					
	49.00	+/-0.45	3.00					
	49.50		3.00					
	50.00	+/-0.46	3.00					

O-RING STANDARD SIZE (METRIC)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References			
Type	(ID)		(CS)		F	JIS	AS-BS	JASO F404
mm	50.50	+/-0.46	3.00	+/-0.09		DIN		
	51.00	+/-0.47	3.00					
	52.00		3.00					
	53.00	+/-0.48	3.00					
	53.09		3.00				AS-928	
	54.00	+/-0.50	3.00			DIN		
	54.50		3.00					
	55.00		3.00					
	56.00	+/-0.51	3.00					
	57.00	+/-0.52	3.00					
	58.00		3.00					
	59.00	+/-0.54	3.00					
	59.36		3.00				AS-932	
	59.50		3.00			DIN		
	60.00		3.00					
	61.00	+/-0.55	3.00					
	62.00		3.00					
	63.00	+/-0.56	3.00					
	64.00	+/-0.58	3.00					
	64.50		3.00					
	65.00		3.00					
	66.00	+/-0.59	3.00					
	67.00		3.00					
	68.00	+/-0.61	3.00					
	69.00		3.00					
	69.50		3.00					
	70.00	+/-0.63	3.00					
	71.00		3.00					
	72.00	+/-0.64	3.00					
	73.00		3.00					
	74.00	+/-0.66	3.00					
	74.50		3.00					
	75.00		3.00					
	76.00	+/-0.67	3.00					
	77.00		3.00					
	78.00		3.00					
	79.00	+/-0.69	3.00					
	79.50		3.00					
	80.00		3.00					
	81.00		3.00					
	82.00	+/-0.71	3.00					
	83.00		3.00					
	84.00	+/-0.73	3.00					
	84.50		3.00					

O-RING STANDARD SIZE (METRIC)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References			
Type	(ID)		(CS)		F	JIS	AS-BS	JASO F404
mm	85.00	+/-0.73	3.00	+/-0.09		DIN		
	86.00		3.00					
	87.00	+/-0.75	3.00					
	88.00		3.00					
	89.00	+/-0.77	3.00					
	89.50		3.00					
	90.00		3.00					
	91.00		3.00					
	92.00	+/-0.79	3.00					
	93.00		3.00					
	94.00	+/-0.81	3.00					
	94.50		3.00					
	95.00		3.00					
	96.00		3.00					
	97.00	+/-0.83	3.00					
	98.00		3.00					
	98.50		3.00					
	99.00	+/-0.84	3.00					
	99.50		3.00					
	100.00		3.00					
	101.00		3.00					
	102.00	+/-0.87	3.00					
	103.00		3.00					
	104.00		3.00					
	104.50		3.00					
	105.00	+/-0.89	3.00					
	106.00		3.00					
	107.00		3.00					
	108.00	+/-0.91	3.00					
	109.00		3.00					
	109.50		3.00					
	110.00		3.00					
	111.00	+/-0.93	3.00					
	112.00		3.00					
	113.00		3.00					
	114.00	+/-0.95	3.00					
	114.50		3.00					
	115.00		3.00					
	116.00		3.00					
	117.00	+/-0.97	3.00					
	118.00		3.00					
	119.00		3.00					
	119.50		3.00					
	120.00	+/-1.00	3.00					

O-RING STANDARD SIZE (METRIC)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References			
Type	(ID)		(CS)		F	JIS	AS-BS	JASO F404
mm	121.00	+/-1.00	3.00	+/-0.09		DIN		
	122.00		3.00					
	123.00		3.00					
	124.00	+/-1.03	3.00					
	124.50		3.00					
	125.00		3.00					
	126.00		3.00					
	127.00	+/-1.05	3.00					
	128.00		3.00					
	129.00		3.00					
	129.50		3.00					
	130.00	+/-1.08	3.00					
	131.00		3.00					
	132.00		3.00					
	133.00		3.00					
	134.00	+/-1.10	3.00					
	134.50		3.00					
	135.00		3.00					
	136.00		3.00					
	137.00		3.00					
	138.00	+/-1.17	3.00					
	139.00		3.00					
	139.50		3.00					
	140.00		3.00					
	141.00		3.00					
	142.00		3.00					
	143.00	+/-1.20	3.00					
	144.00		3.00					
	144.50		3.00					
	145.00		3.00					
	146.00		3.00					
	147.00		3.00					
	148.00	+/-1.24	3.00					
	149.00		3.00					
	149.50		3.00					
	150.00		3.00					
	151.00		3.00					
	152.00		3.00					
	153.00	+/-1.27	3.00					
	154.00		3.00					
	154.50		3.00					
	155.00		3.00					
	156.00		3.00					
	157.00		3.00					

TERMINAL GROUP

O-RING STANDARD SIZE (METRIC)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References			
Type	(ID)		(CS)		F	JIS	AS-BS	JASO F404
mm	158.00	+/-1.31	3.00	+/-0.09		DIN		
	159.00		3.00					
	159.50		3.00					
	160.00		3.00					
	161.00		3.00					
	162.00		3.00					
	163.00	+/-1.34	3.00					
	164.00		3.00					
	164.50		3.00					
	165.00		3.00					
	166.00		3.00					
	167.00		3.00					
	168.00	+/-1.38	3.00					
	169.00		3.00					
	169.50		3.00					
	170.00		3.00					
	171.00		3.00					
	172.00		3.00					
	173.00	+/-1.41	3.00					
	174.00		3.00					
	174.50		3.00					
	175.00		3.00					
	176.00		3.00					
	177.00		3.00					
	178.00	+/-1.44	3.00					
	179.00		3.00					
	179.50		3.00					
	180.00		3.00					
	181.00		3.00					
	182.00		3.00					
	183.00		3.00					
	184.00		3.00					
	184.50		3.00					
	185.00		3.00					
	186.00		3.00					
	187.00		3.00					
	188.00	+/-1.48	3.00					
	189.00		3.00					
	189.50		3.00					
	190.00		3.00					
	191.00		3.00					
	192.00		3.00					
	193.00	+/-1.51	3.00					
	194.00		3.00					

O-RING STANDARD SIZE (METRIC)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References			
Type	(ID)		(CS)		F	JIS	AS-BS	JASO F404
mm	194.50	+/-1.51	3.00	+/-0.09		DIN		
	195.00		3.00					
	196.00		3.00					
	197.00		3.00					
	198.00	+/-1.55	3.00					
	199.00		3.00					
	199.50		3.00					
	200.00		3.00					
	201.00		3.00					
	202.00		3.00					
	203.00	+/-1.59	3.00					
	204.00		3.00					
	204.50		3.00					
	205.00		3.00					
	206.00		3.00					
	207.00		3.00					
	208.00		3.00					
	209.00	+/-1.63	3.00					
	209.50		3.00					
	210.00		3.00					
	211.00		3.00					
	212.00		3.00					
	213.00		3.00					
	214.00		3.00					
	215.00	+/-1.67	3.00					
	216.00		3.00					
	217.00		3.00					
	218.00		3.00					
	219.00		3.00					
	219.50		3.00					
	220.00		3.00					
	221.00	+/-1.71	3.00					
	222.00		3.00					
	223.00		3.00					
	224.00		3.00					
	225.00		3.00					
	226.00		3.00					
	227.00	+/-1.75	3.00					
	228.00		3.00					
	229.00		3.00					
	229.50		3.00					
	230.00		3.00					
	231.00		3.00					
	232.00		3.00					

O-RING STANDARD SIZE (METRIC)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References			
Type	(ID)		(CS)		F	JIS	AS-BS	JASO F404
mm	233.00	+/-1.79	3.00	+/-0.09		DIN		
	234.00		3.00					
	325.00		3.00					
	236.00		3.00					
	237.00		3.00					
	238.00		3.00					
	239.00		3.00					
	239.00		3.00					
	240.00	+/-1.83	3.00					
	241.00		3.00					
	242.00		3.00					
	243.00		3.00					
	244.00		3.00					
	245.00		3.00					
	246.00		3.00					
	247.00	+/-1.88	3.00					
	248.00		3.00					
	249.00		3.00					
	249.50		3.00					
	250.00		3.00					
	260.00	+/-1.93	3.00					
	270.00	+/-2.02	3.00					
	280.00	+/-2.08	3.00					
	285.00	+/-2.14	3.00					
	290.00		3.00					
	310.00	+/-2.25	3.00					
	8.00	+/-0.15	3.50	+/-0.10		P22A		
	9.00		3.50					
	10.00		3.50					
	11.00		3.50					
	12.00		3.50					
	13.00		3.50					
	14.00		3.50					
	15.00		3.50					
	16.00		3.50			DIN		
	17.00		3.50					
	18.00		3.50					
	19.00		3.50					
	20.00		3.50					
	21.00		3.50					
	21.70		3.50			P22A		
	22.00		3.50			DIN		
	22.10		3.50			P22.4		
	23.00		3.50			DIN		

O-RING STANDARD SIZE (METRIC)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References			
Type	(ID)		(CS)		F	JIS	AS-BS	JASO F404
mm	23.70	+/-0.15	3.50	+/-0.10		P24		
	24.00		3.50			DIN		
	24.70		3.50			P25		
	25.00		3.50			DIN		
	25.20		3.50			P25.5		
	25.70		3.50			P26		
	26.00		3.50			DIN		
	27.00		3.50					
	27.70		3.50			P28		
	28.00		3.50			DIN		
	28.70		3.50			P29		
	29.00		3.50			DIN		
	29.20		3.50			P29.5		
	29.70		3.50			P30		
	30.00		3.50			DIN		
	30.70		3.50			P31		
	31.00		3.50			DIN		
	31.20		3.50			P31.5		
	31.70		3.50			P32		
	32.00		3.50			DIN		
	33.00		3.50					
	33.70		3.50			P34		
	34.00		3.50			DIN		
	34.70		3.50			P35		
	35.00		3.50			DIN		
	35.20		3.50			P35.5		
	35.70		3.50			P36		
	36.00		3.50			DIN		
	37.00		3.50					
	37.70		3.50			P38		
	38.00		3.50			DIN		
	38.70		3.50			P39		
	39.00		3.50			DIN		
	39.70		3.50			P40		
	40.00	+/-0.20	3.50			DIN		
	40.70		3.50			P41		
	41.00		3.50			DIN		
	41.70		3.50			P42		
	42.00		3.50			DIN		
	43.00		3.50					
	43.70		3.50			P44		
	44.00		3.50			DIN		
	44.70		3.50			P45		
	45.00		3.50			DIN		

TERMINAL GROUP

O-RING STANDARD SIZE (METRIC)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References			
Type	(ID)		(CS)		F	JIS	AS-BS	JASO F404
mm	45.70	+/-0.25	3.50	+/-0.10		P46		
	46.00		3.50			DIN		
	47.00		3.50			DIN		
	47.70		3.50			P48		
	48.00		3.50			DIN		
	48.70		3.50			P49		
	49.00		3.50			DIN		
	49.70		3.50			P50		
	50.00		3.50					
	51.00		3.50					
	52.00		3.50					
	53.00		3.50					
	54.00		3.50					
	55.00		3.50					
	56.00		3.50					
	57.00		3.50					
	58.00		3.50					
	59.00		3.50					
	60.00		3.50					
	61.00		3.50					
	62.00		3.50					
	63.00		3.50					
	64.00		3.50					
	65.00		3.50					
	66.00		3.50					
	67.00	+/-0.30	3.50			DIN		
	68.00		3.50					
	69.00		3.50					
	70.00		3.50					
	71.00		3.50					
	72.00		3.50					
	73.00		3.50					
	74.00		3.50					
	75.00		3.50					
	76.00		3.50					
	77.00		3.50					
	78.00		3.50					
	79.00		3.50					
	80.00		3.50					
	81.00		3.50					
	82.00		3.50					
	83.00		3.50					
	84.00		3.50					
	85.00		3.50					

O-RING STANDARD SIZE (METRIC)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References			
Type	(ID)		(CS)		F	JIS	AS-BS	JASO F404
mm	86.00	+/-0.35	3.50	+/-0.10		DIN		
	87.00		3.50					
	88.00		3.50					
	89.00		3.50					
	90.00		3.50					
	91.00		3.50					
	92.00		3.50					
	93.00		3.50					
	94.00		3.50					
	95.00		3.50					
	96.00		3.50					
	97.00		3.50					
	98.00		3.50					
	99.00		3.50					
	100.00		3.50					
	101.00		3.50					
	102.00		3.50					
	103.00		3.50					
	104.00		3.50					
	105.00		3.50					
	106.00		3.50					
	107.00		3.50					
	108.00		3.50					
	109.00		3.50					
	110.00	+/-0.40	3.50					
	111.00		3.50					
	112.00		3.50					
	113.00		3.50					
	114.00		3.50					
	115.00		3.50					
	116.00		3.50					
	117.00		3.50					
	118.00		3.50					
	119.00		3.50					
	120.00		3.50					
	121.00		3.50					
	122.00		3.50					
	123.00		3.50					
	124.00		3.50					
	125.00		3.50					
	126.00		3.50					
	127.00		3.50					
	128.00		3.50					
	129.00		3.50					

O-RING STANDARD SIZE (METRIC)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References			
Type	(ID)		(CS)		F	JIS	AS-BS	JASO F404
mm	130.00	+/-0.45	3.50	+/-0.10		DIN		
	131.00		3.50					
	132.00		3.50					
	133.00		3.50					
	134.00		3.50					
	135.00		3.50					
	136.00		3.50					
	137.00		3.50					
	138.00		3.50					
	139.00		3.50					
	140.00		3.50					
	141.00		3.50					
	142.00		3.50					
	143.00		3.50					
	144.00		3.50					
	145.00		3.50					
	146.00		3.50					
	147.00		3.50					
	148.00		3.50					
	149.00		3.50					
	150.00		3.50					
	151.00		3.50					
	152.00		3.50					
	153.00		3.50					
	154.00		3.50					
	155.00		3.50					
	156.00		3.50					
	157.00		3.50					
	158.00		3.50					
	159.00		3.50					
	160.00		3.50					
	161.00		3.50					
	162.00		3.50					
	163.00		3.50					
	164.00		3.50					
	165.00		3.50					
	166.00		3.50					
	167.00		3.50					
	168.00		3.50					
	169.00		3.50					
	170.00		3.50					
	171.00		3.50					
	172.00		3.50					
	173.00		3.50					

O-RING STANDARD SIZE (METRIC)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References			
Type	(ID)		(CS)		F	JIS	AS-BS	JASO F404
mm	174.00	+/-0.45	3.50	+/-0.10		DIN		
	175.00		3.50					
	176.00		3.50					
	177.00		3.50					
	178.00		3.50					
	179.00		3.50					
	180.00		3.50					
	181.00	+/-0.60	3.50					
	182.00		3.50					
	183.00		3.50					
	184.00		3.50					
	185.00		3.50					
	186.00		3.50					
	187.00		3.50					
	188.00		3.50					
	189.00		3.50					
	190.00		3.50					
	191.00		3.50					
	192.00		3.50					
	193.00		3.50					
	194.00		3.50					
	195.00		3.50					
	196.00		3.50					
	197.00		3.50					
	198.00		3.50					
	199.00		3.50					
	200.00		3.50					
	201.00	+/-0.70	3.50					
	202.00		3.50					
	203.00		3.50					
	204.00		3.50					
	205.00		3.50					
	206.00		3.50					
	207.00		3.50					
	208.00		3.50					
	209.00		3.50					
	210.00		3.50					
	215.00		3.50					
	220.00		3.50					
	225.00		3.50					
	230.00		3.50					
	235.00		3.50					
	240.00		3.50					
	245.00		3.50					

O-RING STANDARD SIZE (METRIC)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References			
Type	(ID)		(CS)		F	JIS	AS-BS	JASO F404
mm	250.00	+/-0.80	3.50	+/-0.10		DIN		
	255.00		3.50					
	260.00		3.50					
	265.00		3.50					
	270.00		3.50					
	275.00		3.50					
	280.00		3.50					
	285.00		3.50					
	290.00		3.50					
	295.00		3.50					
	300.00		3.50					
	305.00		3.50					
	310.00		3.50					
	315.00		3.50					
	320.00		3.50					
	325.00		3.50					
	330.00		3.50					
	335.00		3.50					
	340.00		3.50					
	345.00		3.50					
	350.00		3.50					
	355.00		3.50					
	360.00		3.50					
	365.00		3.50					
	370.00		3.50					
	380.00		3.50					
	390.00		3.50					
	400.00		3.50					
	410.00		3.50					
	420.00		3.50					
	430.00		3.50					
	440.00		3.50					
	18.30	+/-0.15	3.60	+/-0.80	R15			
	19.80		3.60		R16			
	21.30		3.60		R17			
	23.00		3.60		R18			
	24.60		3.60		R19			
	26.20		3.60		R20			
	27.80		3.60		R21			
	29.30		3.60		R22			
	30.80	+/-0.20	3.60		R23			
	32.50		3.60		R24			
	34.10		3.60		R25			
	35.60		3.60		R26			

O-RING STANDARD SIZE (METRIC)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References			
Type	(ID)		(CS)		F	JIS	AS-BS	JASO F404
	37.30		3.60		R27			
	43.40		3.60		R29T			
	4.00	+/-0.14	4.00					
	5.00	+/-0.15	4.00					
	6.00		4.00					
	7.00	+/-0.16	4.00					
	8.00		4.00					
	9.00	+/-0.17	4.00					
	10.00		4.00					
	11.00	+/-0.18	4.00					
	12.00	+/-0.19	4.00					
	13.00		4.00					
	14.00		4.00					
	15.00	+/-0.20	4.00					
	16.00		4.00					
	17.00	+/-0.21	4.00					
	18.00		4.00					
	19.00	+/-0.22	4.00					
	20.00		4.00					
	21.00	+/-0.23	4.00					
	22.00	+/-0.24	4.00					
	23.00		4.00					
mm	24.00		4.00	+/-0.10		DIN		
	25.00	+/-0.25	4.00					
	26.00	+/-0.26	4.00					
	27.00		4.00					
	28.00	+/-0.28	4.00					
	29.00	+/-0.29	4.00					
	30.00		4.00					
	31.00	+/-0.31	4.00					
	32.00	+/-0.32	4.00					
	33.00		4.00					
	34.00	+/-0.33	4.00					
	35.00	+/-0.34	4.00					
	36.00	+/-0.35	4.00					
	37.00	+/-0.36	4.00					
	38.00		4.00					
	39.00	+/-0.37	4.00					
	40.00	+/-0.38	4.00					
	41.00	+/-0.39	4.00					
	42.00	+/-0.40	4.00					
	43.00		4.00					
	44.00	+/-0.41	4.00					
	45.00	+/-0.42	4.00					

O-RING STANDARD SIZE (METRIC)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References			
Type	(ID)		(CS)		F	JIS	AS-BS	JASO F404
	46.00	+/-0.43	4.00					
	47.00	+/-0.44	4.00					
	48.00		4.00					
	49.00	+/-0.45	4.00					
	50.00	+/-0.46	4.00					
	51.00	+/-0.47	4.00					
	52.00		4.00					
	53.00	+/-0.48	4.00					
	54.00	+/-0.50	4.00					
	55.00		4.00					
	56.00	+/-0.51	4.00					
	57.00	+/-0.52	4.00					
	58.00		4.00					
	59.00	+/-0.54	4.00					
	60.00		4.00					
	61.00	+/-0.55	4.00					
	62.00		4.00					
	63.00	+/-0.56	4.00					
	64.00	+/-0.58	4.00					
	65.00		4.00					
	66.00	+/-0.59	4.00					
mm	67.00		4.00	+/-0.10		DIN		
	68.00	+/-0.61	4.00					
	69.00		4.00					
	70.00	+/-0.63	4.00					
	71.00		4.00					
	72.00	+/-0.64	4.00					
	73.00		4.00					
	74.00	+/-0.66	4.00					
	75.00		4.00					
	76.00		4.00					
	77.00	+/-0.67	4.00					
	78.00		4.00					
	79.00	+/-0.69	4.00					
	80.00		4.00					
	81.00		4.00					
	82.00	+/-0.71	4.00					
	83.00		4.00					
	84.00	+/-0.73	4.00					
	85.00		4.00					
	86.00		4.00					
	87.00	+/-0.75	4.00					
	88.00		4.00					

O-RING STANDARD SIZE (METRIC)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References			
Type	(ID)		(CS)		F	JIS	AS-BS	JASO F404
mm	89.00	+/-0.77	4.00	+/-0.10		DIN		
	90.00		4.00					
	91.00		4.00					
	92.00	+/-0.79	4.00					
	93.00		4.00					
	94.00	+/-0.81	4.00					
	95.00		4.00					
	96.00		4.00					
	97.00	+/-0.83	4.00					
	98.00		4.00					
	99.00	+/-0.84	4.00					
	100.00		4.00					
	101.00		4.00					
	102.00	+/-0.87	4.00					
	103.00		4.00					
	104.00		4.00					
	105.00	+/-0.89	4.00					
	106.00		4.00					
	107.00		4.00					
	108.00	+/-0.91	4.00					
	109.00		4.00					
	110.00		4.00					
	111.00	+/-0.93	4.00					
	112.00		4.00					
	113.00		4.00					
	114.00	+/-0.95	4.00					
	115.00		4.00					
	116.00		4.00					
	117.00	+/-0.97	4.00					
	118.00		4.00					
	119.00		4.00					
	120.00	+/-1.00	4.00					
	121.00		4.00					
	122.00		4.00					
	123.00		4.00					
	124.00	+/-1.03	4.00					
	125.00		4.00					
	126.00		4.00					
	127.00	+/-1.05	4.00					
	128.00		4.00					
	129.00		4.00					
	130.00	+/-1.08	4.00					
	131.00		4.00					
	132.00		4.00					

TERMINAL GROUP

O-RING STANDARD SIZE (METRIC)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References			
Type	(ID)		(CS)		F	JIS	AS-BS	JASO F404
mm	133.00	+/-1.08	4.00	+/-0.10		DIN		
	134.00	+/-1.10	4.00					
	135.00		4.00					
	136.00		4.00					
	137.00		4.00					
	138.00	+/-1.17	4.00					
	139.00		4.00					
	140.00		4.00					
	140.50		4.00					
	141.00		4.00					
	142.00		4.00					
	143.00	+/-1.20	4.00					
	144.00		4.00					
	145.00		4.00					
	146.00		4.00					
	147.00		4.00					
	148.00	+/-1.24	4.00					
	149.00		4.00					
	150.00		4.00					
	151.00		4.00					
	152.00		4.00					
	153.00	+/-1.27	4.00					
	154.00		4.00					
	155.00		4.00					
	156.00		4.00					
	157.00		4.00					
	158.00	+/-1.31	4.00					
	159.00		4.00					
	160.00		4.00					
	161.00		4.00					
	162.00		4.00					
	163.00	+/-1.34	4.00					
	164.00		4.00					
	165.00		4.00					
	166.00		4.00					
	167.00		4.00					
	168.00	+/-1.38	4.00					
	169.00		4.00					
	170.00		4.00					
	171.00		4.00					
	172.00		4.00					
	173.00	+/-1.41	4.00					
	174.00		4.00					
	175.00		4.00					

O-RING STANDARD SIZE (METRIC)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References			
Type	(ID)		(CS)		F	JIS	AS-BS	JASO F404
mm	176.00	+/-1.41	4.00	+/-0.10		DIN		
	177.00		4.00					
	178.00	+/-1.44	4.00					
	179.00		4.00					
	180.00		4.00					
	181.00		4.00					
	182.00		4.00					
	183.00		4.00					
	184.00		4.00					
	185.00		4.00					
	186.00		4.00					
	187.00		4.00					
	188.00	+/-1.48	4.00					
	189.00		4.00					
	190.00		4.00					
	191.00		4.00					
	192.00		4.00					
	193.00	+/-1.51	4.00					
	194.00		4.00					
	195.00		4.00					
	196.00		4.00					
	197.00		4.00					
	198.00	+/-1.55	4.00					
	199.00		4.00					
	200.00		4.00					
	201.00		4.00					
	202.00		4.00					
	203.00	+/-1.59	4.00					
	204.00		4.00					
	205.00		4.00					
	206.00		4.00					
	207.00		4.00					
	208.00		4.00					
	209.00	+/-1.63	4.00					
	210.00		4.00					
	211.00		4.00					
	212.00		4.00					
	213.00		4.00					
	214.00		4.00					
	215.00	+/-1.67	4.00					
	216.00		4.00					
	217.00		4.00					
	218.00		4.00					
	219.00		4.00					

TERMINAL GROUP

O-RING STANDARD SIZE (METRIC)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References			
Type	(ID)		(CS)		F	JIS	AS-BS	JASO F404
mm	220.00	+/-1.67	4.00	+/-0.10		DIN		
	221.00	+/-1.71	4.00					
	222.00		4.00					
	223.00		4.00					
	224.00		4.00					
	225.00		4.00					
	226.00		4.00					
	227.00	+/-1.75	4.00					
	228.00		4.00					
	229.00		4.00					
	230.00		4.00					
	231.00		4.00					
	232.00		4.00					
	233.00	+/-1.79	4.00					
	234.00		4.00					
	235.00		4.00					
	236.00		4.00					
	237.00		4.00					
	238.00		4.00					
	239.00		4.00					
	240.00	+/-1.83	4.00					
	241.00		4.00					
	242.00		4.00					
	243.00		4.00					
	244.00		4.00					
	245.00		4.00					
	246.00		4.00					
	247.00	+/-1.88	4.00					
	248.00		4.00					
	249.00		4.00					
	250.00		4.00					
	251.00		4.00					
	252.00		4.00					
	253.00		4.00					
	254.00	+/-1.93	4.00					
	255.00		4.00					
	256.00		4.00					
	257.00		4.00					
	258.00		4.00					
	259.00		4.00					
	260.00		4.00					
	261.00		4.00					
	262.00	+/-1.98	4.00					
	263.00		4.00					

O-RING STANDARD SIZE (METRIC)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References			
Type	(ID)		(CS)		F	JIS	AS-BS	JASO F404
mm	264.00	+/-1.98	4.00	+/-0.10		DIN		
	265.00		4.00					
	266.00		4.00					
	267.00		4.00					
	268.00		4.00					
	269.00	+/-2.02	4.00					
	270.00		4.00					
	271.00		4.00					
	272.00		4.00					
	273.00		4.00					
	274.00		4.00					
	275.00		4.00					
	276.00	+/-2.08	4.00					
	277.00		4.00					
	278.00		4.00					
	279.00		4.00					
	280.00		4.00					
	281.00		4.00					
	282.00		4.00					
	284.00		4.00					
	285.00	+/-2.14	4.00					
	286.00		4.00					
	287.00		4.00					
	288.00		4.00					
	289.00		4.00					
	290.00		4.00					
	291.00		4.00					
	292.00		4.00					
	293.00		4.00					
	294.00		4.00					
	295.00	+/-2.21	4.00					
	296.00		4.00					
	297.00		4.00					
	298.00		4.00					
	300.00		4.00					
	302.00		4.00					
	303.00		4.00					
	304.00	+/-2.25	4.00			DIN		
	305.00		4.00					
	306.00		4.00					
	307.00		4.00					
	308.00		4.00					
	309.00		4.00					
	310.00		4.00					

O-RING STANDARD SIZE (METRIC)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References			
Type	(ID)		(CS)		F	JIS	AS-BS	JASO F404
mm	311.00	+/-2.30	4.00	+/-0.10		DIN		
	312.00		4.00					
	313.00		4.00					
	314.00		4.00					
	315.00		4.00					
	316.00		4.00					
	317.00		4.00					
	318.00		4.00					
	319.00		4.00					
	320.00	+/-2.37	4.00			DIN		
	321.00		4.00					
	322.00		4.00					
	323.00		4.00					
	324.00		4.00					
	325.00		4.00					
	326.00		4.00					
	327.00		4.00					
	328.00		4.00					
	329.00		4.00					
	325.00	+/-2.43	4.00			DIN		
	330.00		4.00					
	331.00		4.00					
	332.00		4.00					
	333.00		4.00					
	334.00		4.00					
	335.00		4.00					
	336.00		4.00					
	337.00		4.00					
	338.00		4.00					
	339.00		4.00					
	340.00	+/-2.49	4.00			DIN		
	341.00		4.00					
	342.00		4.00					
	343.00		4.00					
	344.00		4.00					
	345.00		4.00					
	346.00		4.00					
	347.00		4.00					
	348.00		4.00					
	349.00		4.00					
	350.00	+/-2.56	4.00			DIN		
	351.00		4.00					
	352.00		4.00					
	353.00		4.00					

O-RING STANDARD SIZE (METRIC)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References			
Type	(ID)		(CS)		F	JIS	AS-BS	JASO F404
mm	354.00	+/-2.56	4.00	+/-0.10		DIN		
	355.00		4.00					
	356.00		4.00					
	357.00		4.00					
	358.00		4.00					
	359.00		4.00					
	360.00	+/-2.62	4.00			DIN		
	361.00		4.00					
	362.00		4.00					
	363.00		4.00					
	364.00		4.00					
	365.00		4.00			DIN		
	366.00		4.00					
	367.00		4.00					
	368.00		4.00					
	369.00		4.00					
	370.00	+/-2.68	4.00			DIN		
	371.00		4.00					
	372.00		4.00					
	373.00		4.00					
	374.00		4.00					
	375.00		4.00			DIN		
	376.00		4.00					
	377.00		4.00					
	378.00		4.00					
	379.00		4.00					
	380.00		4.00			DIN		
	381.00	+/-2.76	4.00					
	382.00		4.00					
	383.00		4.00					
	384.00		4.00					
	385.00		4.00			DIN		
	386.00		4.00					
	387.00		4.00					
	388.00		4.00					
	389.00		4.00					
	390.00		4.00			DIN		
	391.00		4.00					
	392.00		4.00					
	393.00	+/-2.84	4.00					
	394.00		4.00					
	395.00		4.00			DIN		
	396.00		4.00					
	397.00		4.00					

O-RING STANDARD SIZE (METRIC)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References			
Type	(ID)		(CS)		F	JIS	AS-BS	JASO F404
mm	398.00	+/-2.84	4.00	+/-0.10				
	399.00		4.00					
	400.00		4.00			DIN		
	401.00		4.00					
	402.00		4.00					
	403.00		4.00					
	404.00		4.00					
	405.00		4.00			DIN		
	406.00	+/-2.91	4.00					
	407.00		4.00					
	408.00		4.00					
	409.00		4.00					
	410.00		4.00			DIN		
	411.00		4.00					
	412.00		4.00					
	413.00		4.00					
	414.00		4.00					
	415.00		4.00			DIN		
	416.00		4.00					
	417.00		4.00					
	418.00		4.00					
	419.00	+/-2.99	4.00					
	420.00		4.00			DIN		
	421.00		4.00					
	422.00		4.00					
	423.00		4.00					
	424.00		4.00					
	425.00		4.00			DIN		
	426.00		4.00					
	427.00		4.00					
	428.00		4.00					
	429.00		4.00					
	430.00		4.00			DIN		
	431.00	+/-3.07	4.00					
	432.00		4.00					
	433.00		4.00					
	434.00		4.00					
	435.00		4.00			DIN		
	436.00		4.00					
	437.00		4.00					
	438.00		4.00					
	439.00		4.00					
	440.00		4.00			DIN		
	441.00		4.00					

O-RING STANDARD SIZE (METRIC)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References			
Type	(ID)		(CS)		F	JIS	AS-BS	JASO F404
mm	442.00	+/-3.07	4.00	+/-0.10				
	443.00		4.00					
	444.00	+/-3.15	4.00			DIN		
	445.00		4.00					
	446.00		4.00					
	447.00		4.00					
	448.00		4.00					
	449.00		4.00					
	450.00		4.00			DIN		
	451.00		4.00					
	452.00		4.00					
	453.00		4.00					
	454.00		4.00					
	455.00		4.00					
	456.00	+/-3.22	4.00					
	457.00		4.00					
	458.00		4.00					
	459.00		4.00					
	460.00		4.00			DIN		
	461.00		4.00					
	462.00		4.00					
	463.00		4.00					
	464.00		4.00					
	465.00		4.00					
	466.00		4.00					
	467.00		4.00					
	468.00		4.00					
	469.00	+/-3.30	4.00					
	470.00		4.00			DIN		
	471.00		4.00					
	472.00		4.00					
	473.00		4.00					
	474.00		4.00					
	475.00		4.00					
	476.00		4.00					
	477.00		4.00					
	478.00		4.00					
	479.00		4.00					
	480.00		4.00			DIN		
	481.00	+/-3.37	4.00					
	482.00		4.00					
	483.00		4.00					
	484.00		4.00					
	485.00		4.00					

O-RING STANDARD SIZE (METRIC)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References			
Type	(ID)		(CS)		F	JIS	AS-BS	JASO F404
mm	486.00	+/-3.37	4.00	+/-0.10		DIN		
	487.00		4.00					
	488.00		4.00					
	489.00		4.00					
	490.00		4.00					
	491.00		4.00					
	492.00		4.00					
	493.00		4.00					
	494.00	+/-3.45	4.00					
	495.00		4.00					
	496.00		4.00					
	497.00		4.00					
	498.00		4.00					
	499.00		4.00					
	500.00		4.00			DIN		
	525.00	+/-3.63	4.00					
	530.00		4.00					
	540.00	+/-3.72	4.00					
	550.00		4.00					
	560.00	+/-3.81	4.00					
	6.00	+/-0.15	4.50					
	8.00	+/-0.16	4.50					
	9.00	+/-0.14	4.50					
	9.50	+/-0.17	4.50			DIN		
	10.00		4.50					
	10.50		4.50					
	11.00	+/-0.18	4.50					
	12.00	+/-0.19	4.50					
	13.00		4.50					
	15.00	+/-0.20	4.50					
	15.50		4.50					
	16.00		4.50					
	17.00	+/-0.21	4.50					
	18.00		4.50					
	19.00	+/-0.22	4.50					
	20.00		4.50					
	21.00	+/-0.23	4.50					
	21.50		4.50					
	22.00	+/-0.24	4.50					
	22.50		4.50					
	23.00		4.50					
	24.00		4.50					
	24.50		4.50					
	25.00	+/-0.25	4.50					

O-RING STANDARD SIZE (METRIC)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References			
Type	(ID)		(CS)		F	JIS	AS-BS	JASO F404
mm	26.00	+/-0.26	4.50	+/-0.10		DIN		
	27.00		4.50					
	27.50		4.50					
	28.00	+/-0.28	4.50					
	28.50		4.50					
	29.00	+/-0.29	4.50					
	29.50		4.50					
	30.00		4.50					
	31.00	+/-0.31	4.50					
	31.50	+/-0.32	4.50					
	32.00		4.50					
	33.00	+/-0.33	4.50					
	34.00	+/-0.34	4.50					
	34.50		4.50					
	35.00		4.50					
	35.50		4.50					
	36.00	+/-0.35	4.50					
	37.00	+/-0.36	4.50					
	37.50		4.50					
	38.00		4.50					
	39.00	+/-0.37	4.50					
	40.00	+/-0.38	4.50					
	40.50		4.50					
	41.00	+/-0.39	4.50					
	42.00	+/-0.40	4.50					
	43.00		4.50					
	44.00	+/-0.41	4.50					
	45.00	+/-0.42	4.50					
	46.00	+/-0.43	4.50					
	47.00	+/-0.44	4.50					
	48.00		4.50					
	49.00	+/-0.45	4.50					
	50.00	+/-0.46	4.50					
	51.00	+/-0.47	4.50					
	53.00		4.50					
	56.00	+/-0.51	4.50					
	57.00	+/-0.52	4.50					
	60.00	+/-0.54	4.50					
	61.00	+/-0.55	4.50					
	63.00	+/-0.56	4.50					
	64.00	+/-0.48	4.50					
	65.00		4.50					
	66.00	+/-0.59	4.50					
	68.00	+/-0.61	4.00					

O-RING STANDARD SIZE (METRIC)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References			
Type	(ID)		(CS)		F	JIS	AS-BS	JASO F404
mm	69.00	+/-0.61	4.50	+/-0.10		DIN		
	70.00	+/-0.63	4.50					
	71.00		4.50					
	73.00	+/-0.64	4.50					
	74.00	+/-0.66	4.50					
	75.00		4.50					
	76.00		4.50					
	80.00	+/-0.69	4.50					
	81.00		4.50					
	83.00	+/-0.71	4.50					
	85.00	+/-0.73	4.50					
	86.00		4.50					
	89.00	+/-0.77	4.50					
	90.00		4.50					
	92.00	+/-0.79	4.50					
	93.50		4.50					
	95.00	+/-0.81	4.50					
	97.50	+/-0.75	4.50					
	98.00	+/-0.83	4.50					
	99.50	+/-0.84	4.50					
	100.00		4.50					
	100.50		4.50					
	101.00		4.50					
	103.50	+/-0.87	4.50					
	105.00	+/-0.89	4.50					
	106.00		4.50					
	110.00	+/-0.91	4.50					
	115.00	+/-0.95	4.50					
	118.00	+/-0.97	4.50					
	120.00	+/-1.00	4.50					
	122.00	+/-1.03	4.50					
	124.00		4.50					
	126.00		4.50					
	128.00	+/-1.05	4.50					
	130.00		4.50					
	131.50	+/-1.08	4.50					
	134.50		4.50					
	137.50		4.50					
	140.00	+/-1.10	4.50					
	140.50	+/-1.17	4.50					
	150.00		4.50					
	153.00	+/-1.24	4.50					
	155.00	+/-1.27	4.50					
	157.00		4.50					

O-RING STANDARD SIZE (METRIC)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References			
Type	(ID)		(CS)		F	JIS	AS-BS	JASO F404
mm	160.00	+/-1.27	4.50	+/-0.10		DIN		
	165.00	+/-1.31	4.50					
	172.00	+/-1.34	4.50					
	178.00	+/-1.38	4.50					
	180.00	+/-1.44	4.50					
	185.00		4.50					
	186.00		4.50					
	189.50		4.50					
	192.00	+/-1.48	4.50					
	208.00		4.50					
	215.00	+/-1.59	4.50					
	128.50	+/-1.67	4.50					
	225.00	+/-1.71	4.50					
	227.00	+/-1.75	4.50					
	250.00	+/-1.88	4.50					
	267.00	+/-1.98	4.50					
	280.00	+/-2.08	4.50					
	315.00	+/-2.30	4.50					
	4.00	+/-0.14	5.00	+/-0.13				
	5.00	+/-0.15	5.00					
	6.00		5.00					
	7.00	+/-0.16	5.00					
	8.00		5.00					
	9.00	+/-0.17	5.00					
	10.00		5.00					
	11.00	+/-0.18	5.00					
	12.00	+/-0.19	5.00					
	13.00		5.00					
	14.00		5.00					
	15.00	+/-0.20	5.00					
	16.00		5.00					
	17.00	+/-0.21	5.00					
	18.00		5.00					
	19.00	+/-0.22	5.00					
	20.00		5.00					
	21.00	+/-0.23	5.00					
	22.00	+/-0.24	5.00					
	23.00		5.00					
	24.00	+/-0.24	5.00					
	25.00	+/-0.25	5.00					
	26.00	+/-0.26	5.00					
	27.00		5.00					
	28.00	+/-0.28	5.00					
	29.00	+/-0.29	5.00					

O-RING STANDARD SIZE (METRIC)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References			
Type	(ID)		(CS)		F	JIS	AS-BS	JASO F404
mm	30.00	+/-0.29	5.00	+/-0.13		DIN		
	31.00	+/-0.31	5.00					
	32.00	+/-0.32	5.00					
	33.00		5.00					
	34.00	+/-0.33	5.00					
	35.00	+/-0.34	5.00					
	36.00	+/-0.35	5.00					
	37.00	+/-0.36	5.00					
	38.00		5.00					
	39.00	+/-0.37	5.00					
	40.00	+/-0.38	5.00					
	41.00	+/-0.39	5.00					
	42.00	+/-0.40	5.00					
	43.00		5.00					
	44.00	+/-0.41	5.00					
	45.00	+/-0.42	5.00					
	46.00	+/-0.43	5.00					
	47.00	+/-0.44	5.00					
	48.00		5.00					
	49.00	+/-0.45	5.00					
	50.00	+/-0.46	5.00					
	51.00	+/-0.47	5.00					
	52.00		5.00					
	53.00	+/-0.48	5.00					
	54.00	+/-0.50	5.00					
	55.00		5.00					
	56.00	+/-0.51	5.00					
	57.00	+/-0.52	5.00					
	58.00		5.00					
	59.00	+/-0.54	5.00					
	60.00		5.00					
	61.00	+/-0.55	5.00					
	62.00		5.00					
	63.00	+/-0.56	5.00					
	64.00	+/-0.58	5.00					
	65.00		5.00					
	66.00	+/-0.59	5.00					
	67.00		5.00					
	68.00	+/-0.61	5.00					
	69.00		5.00					
	70.00	+/-0.63	5.00					
	71.00		5.00					
	72.00	+/-0.64	5.00					
	73.00		5.00					

O-RING STANDARD SIZE (METRIC)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References			
Type	(ID)		(CS)		F	JIS	AS-BS	JASO F404
mm	74.00	+/-0.66	5.00	+/-0.13		DIN		
	75.00		5.00					
	76.00		5.00					
	77.00	+/-0.67	5.00					
	78.00		5.00					
	79.00	+/-0.69	5.00					
	80.00		5.00					
	81.00		5.00					
	82.00	+/-0.71	5.00					
	83.00		5.00					
	84.00	+/-0.73	5.00					
	85.00		5.00					
	86.00		5.00					
	87.00	+/-0.75	5.00					
	88.00		5.00					
	89.00	+/-0.77	5.00					
	90.00		5.00					
	91.00		5.00					
	92.00	+/-0.79	5.00					
	93.00		5.00					
	94.00	+/-0.81	5.00					
	95.00		5.00					
	96.00		5.00					
	97.00	+/-0.83	5.00					
	98.00		5.00					
	99.00	+/-0.84	5.00					
	100.00		5.00					
	101.00		5.00					
	102.00	+/-0.87	5.00					
	103.00		5.00					
	104.00		5.00					
	105.00	+/-0.89	5.00					
	106.00		5.00					
	107.00		5.00					
	108.00	+/-0.91	5.00					
	109.00		5.00					
	110.00		5.00					
	111.00	+/-0.93	5.00					
	112.00	+/-0.93	5.00					
	113.00		5.00					
	114.00	+/-0.95	5.00					
	115.00		5.00					
	116.00		5.00					
	117.00	+/-0.97	5.00					

O-RING STANDARD SIZE (METRIC)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References			
Type	(ID)		(CS)		F	JIS	AS-BS	JASO F404
mm	118.00	' +/-0.97	5.00	+/-0.13		DIN		
	119.00		5.00					
	120.00	+/-1.00	5.00					
	121.00		5.00					
	122.00		5.00					
	123.00		5.00					
	124.00	+/-1.03	5.00					
	125.00		5.00					
	126.00		5.00					
	127.00	+/-1.05	5.00					
	128.00		5.00					
	129.00		5.00					
	130.00	+/-1.08	5.00					
	131.00		5.00					
	132.00		5.00					
	133.00		5.00					
	134.00	+/-1.10	5.00					
	135.00		5.00					
	136.00		5.00					
	137.00		5.00					
	138.00	+/-1.17	5.00					
	139.00		5.00					
	140.00		5.00					
	141.00		5.00					
	142.00		5.00					
	143.00	+/-1.20	5.00					
	144.00		5.00					
	145.00		5.00					
	146.00		5.00					
	147.00		5.00					
	148.00	+/-1.24	5.00					
	149.00		5.00					
	150.00		5.00					
	151.00		5.00					
	152.00		5.00					
	153.00	+/-1.27	5.00					
	154.00		5.00					
	155.00		5.00					
	156.00	+/-1.27	5.00					
	157.00		5.00					
	158.00	+/-1.31	5.00					
	159.00		5.00					
	160.00		5.00					
	161.00		5.00					

O-RING STANDARD SIZE (METRIC)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References			
Type	(ID)		(CS)		F	JIS	AS-BS	JASO F404
mm	250.00	'+/-1.88	5.00	+/-0.13		DIN		
	251.00		5.00			DIN		
	252.00		5.00					
	253.00		5.00					
	254.00	+/-1.93	5.00					
	255.00		5.00					
	256.00		5.00					
	257.00		5.00					
	258.00		5.00					
	259.00		5.00					
	260.00		5.00			DIN		
	261.00		5.00					
	262.00	+/-1.98	5.00					
	263.00		5.00					
	264.00		5.00					
	265.00		5.00			DIN		
	266.00		5.00					
	267.00		5.00					
	268.00		5.00					
	269.00	+/-2.02	5.00					
	270.00		5.00			DIN		
	271.00		5.00					
	272.00		5.00					
	273.00		5.00					
	274.00		5.00					
	275.00		5.00			DIN		
	276.00	+/-2.08	5.00					
	277.00		5.00					
	278.00		5.00					
	279.00		5.00					
	280.00		5.00			DIN		
	281.00		5.00					
	282.00		5.00					
	283.00		5.00					
	284.00		5.00					
	285.00	+/-2.14	5.00			DIN		
	286.00		5.00					
	287.00		5.00					
	288.00		5.00					
	289.00		5.00					
	290.00		5.00			DIN		
	291.00		5.00					
	292.00		5.00					
	293.00		5.00					

O-RING STANDARD SIZE (METRIC)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References			
Type	(ID)		(CS)		F	JIS	AS-BS	JASO F404
mm	294.00	+/-2.14	5.00	+/-0.13				
	295.00	+/-2.21	5.00			DIN		
	296.00		5.00					
	297.00		5.00					
	298.00		5.00					
	299.00		5.00					
	300.00		5.00			DIN		
	301.00		5.00					
	302.00		5.00					
	303.00		5.00					
	304.00	+/-2.25	5.00					
	305.00		5.00			DIN		
	306.00		5.00					
	307.00		5.00					
	308.00		5.00					
	309.00		5.00					
	310.00		5.00			DIN		
	311.00	+/-2.30	5.00					
	312.00		5.00					
	313.00		5.00					
	314.00		5.00					
	315.00		5.00			DIN		
	316.00		5.00					
	317.00		5.00					
	318.00		5.00					
	319.00		5.00					
	320.00	+/-2.37	5.00			DIN		
	321.00		5.00					
	322.00		5.00					
	323.00		5.00					
	324.00		5.00					
	325.00		5.00			DIN		
	326.00		5.00					
	327.00		5.00					
	328.00		5.00					
	329.00		5.00					
	330.00	+/-2.43	5.00			DIN		
	331.00		5.00					
	332.00		5.00					
	333.00		5.00					
	334.00		5.00					
	335.00		5.00			DIN		
	336.00		5.00					
	337.00		5.00					

O-RING STANDARD SIZE (METRIC)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References			
Type	(ID)		(CS)		F	JIS	AS-BS	JASO F404
mm	338.00	+/-2.43	5.00	+/-0.13				
	339.00		5.00					
	340.00	+/-2.49	5.00			DIN		
	341.00		5.00					
	342.00		5.00					
	343.00		5.00					
	344.00		5.00					
	345.00		5.00			DIN		
	346.00		5.00					
	347.00		5.00					
	348.00		5.00					
	349.00		5.00					
	350.00	+/-2.56	5.00			DIN		
	351.00		5.00					
	352.00		5.00					
	353.00		5.00					
	354.00		5.00					
	355.00		5.00			DIN		
	356.00		5.00					
	357.00		5.00					
	358.00		5.00					
	359.00		5.00					
	360.00	+/-2.62	5.00			DIN		
	361.00		5.00					
	362.00		5.00					
	363.00		5.00					
	364.00		5.00					
	365.00		5.00			DIN		
	366.00		5.00					
	367.00		5.00					
	368.00		5.00					
	369.00		5.00					
	370.00	+/-2.68	5.00			DIN		
	371.00		5.00					
	372.00		5.00					
	373.00		5.00					
	374.00		5.00					
	375.00		5.00			DIN		
	376.00		5.00					
	377.00		5.00					
	378.00		5.00					
	379.00		5.00					
	380.00		5.00			DIN		
	381.00	+/-2.76	5.00					

O-RING STANDARD SIZE (METRIC)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References			
Type	(ID)		(CS)		F	JIS	AS-BS	JASO F404
mm	382.00	+/-2.76	5.00	+/-0.13				
	383.00		5.00					
	384.00		5.00					
	385.00		5.00			DIN		
	386.00		5.00					
	387.00		5.00					
	388.00		5.00					
	389.00		5.00					
	390.00		5.00			DIN		
	391.00		5.00					
	392.00		5.00					
	393.00	+/-2.84	5.00					
	394.00		5.00					
	395.00		5.00			DIN		
	396.00		5.00					
	397.00		5.00					
	398.00		5.00					
	399.00		5.00					
	400.00		5.00					
	405.00		5.00			DIN		
	410.00	+/-2.91	5.00					
	415.00		5.00					
	420.00	+/-2.99	5.00					
	425.00		5.00					
	430.00		5.00					
	435.00	+/-3.07	5.00					
	440.00		5.00					
	445.00	+/-3.15	5.00					
	450.00		5.00					
	455.00		5.00					
	460.00	+/-3.22	5.00					
	465.00		5.00					
	470.00	+/-3.30	5.00					
	475.00		5.00					
	480.00		5.00					
	485.00	+/-3.37	5.00					
	490.00		5.00					
	495.00	+/-3.45	5.00					
	500.00		5.00					
	505.00		5.00					
	510.00	+/-3.54	5.00					
	515.00		5.00					
	520.00		5.00					

O-RING STANDARD SIZE (METRIC)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References			
Type	(ID)		(CS)		F	JIS	AS-BS	JASO F404
mm	525.00	+/-3.63	5.00	+/-0.13				
	530.00	+/-3.63	5.00					
	535.00		5.00					
	540.00	+/-3.72	5.00					
	545.00		5.00					
	550.00		5.00					
	555.00	+/-3.81	5.00					
	560.00		5.00					
	565.00		5.00					
	570.00	+/-3.93	5.00					
	575.00		5.00					
	580.00		5.00					
	585.00		5.00					
	590.00	+/-4.05	5.00					
	595.00		5.00					
	600.00		5.00					
	6.00	+/-0.15	6.00	+/-0.15		DIN		
	7.00		6.00					
	9.00		6.00					
	10.00	+/-0.17	6.00					
	11.00		6.00					
	12.00	+/-0.18	6.00					
	13.00		6.00					
	14.00		6.00					
	15.00		6.00					
	16.00		6.00					
	18.00	+/-0.21	6.00					
	19.00		6.00					
	19.50	+/-0.22	6.00					
	20.00		6.00					
	21.00		6.00					
	22.00		6.00					
	23.00	+/-0.24	6.00					
	23.50		6.00					
	24.00		6.00					
	25.00		6.00					
	26.00	+/-0.26	6.00					
	27.00		6.00					
	28.00		6.00					
	29.00	+/-0.29	6.00					
	30.00		6.00					
	31.00		6.00					
	32.00		6.00					

O-RING STANDARD SIZE (METRIC)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References			
Type	(ID)		(CS)		F	JIS	AS-BS	JASO F404
mm	33.00	+/-0.32	6.00	+/-0.15		DIN		
	34.00		6.00					
	35.00		6.00					
	36.00	+/-0.33	6.00					
	37.00		6.00					
	38.00		6.00					
	39.00	+/-0.37	6.00					
	39.50		6.00					
	40.00		6.00					
	41.00		6.00					
	41.50	+/-0.39	6.00					
	42.00		6.00					
	43.00		6.00					
	44.00	+/-0.41	6.00					
	44.50		6.00					
	45.00		6.00					
	46.00	+/-0.44	6.00					
	47.00		6.00					
	48.00		6.00					
	49.00	+/-0.45	6.00					
	50.00		6.00					
	51.00	+/-0.46	6.00					
	52.00		6.00					
	53.00	+/-0.49	6.00					
	54.00		6.00					
	55.00		6.00					
	56.00	+/-0.51	6.00					
	57.00		6.00					
	58.00		6.00					
	59.50	+/-0.52	6.00					
	60.00		6.00					
	61.00	+/-0.54	6.00					
	62.00		6.00					
	63.00	+/-0.56	6.00					
	64.00		6.00					
	65.00		6.00					
	66.00	+/-0.58	6.00					
	67.00		6.00					
	68.00	+/-0.59	6.00					
	69.00		6.00					
	70.00	+/-0.63	6.00					
	72.00		6.00					
	73.00		6.00					
	74.00	+/-0.64	6.00					
	75.00		6.00					
	76.00	+/-0.66	6.00					
	78.00		6.00					

O-RING STANDARD SIZE (METRIC)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References			
Type	(ID)		(CS)		F	JIS	AS-BS	JASO F404
mm	78.50	+/-0.67	6.00	+/-0.15		DIN		
	79.00		6.00					
	80.00		6.00					
	81.00	+/-0.71	6.00					
	81.50		6.00					
	84.00		6.00					
	85.00	+/-0.71	6.00					
	86.00	+/-0.73	6.00					
	88.00		6.00					
	90.00	+/-0.77	6.00					
	92.00		6.00					
	93.00		6.00					
	95.00	+/-0.81	6.00					
	96.00		6.00					
	98.00		6.00					
	99.00	+/-0.83	6.00					
	100.00		6.00					
	101.00	+/-0.84	6.00					
	103.00		6.00					
	104.00	+/-0.87	6.00					
	104.50		6.00					
	105.00		6.00					
	106.00		6.00					
	108.00	+/-0.91	6.00					
	110.00		6.00					
	111.00		6.00					
	112.00		6.00					
	114.00	+/-0.93	6.00					
	115.00		6.00					
	118.00	+/-0.97	6.00					
	120.00		6.00					
	122.00		6.00					
	123.00		6.00					
	124.00	+/-1.00	6.00					
	125.00		6.00					
	128.00		6.00					
	130.00	+/-1.05	6.00					
	132.00		6.00					
	134.00	+/-1.08	6.00					
	135.00		6.00					
	136.00		6.00					
	138.00	+/-1.10	6.00					
	139.20		6.00					
	140.00		6.00					
	142.00	+/-1.17	6.00					
	145.00		6.00					
	146.00	+/-1.17	6.00					
	148.00		6.00					
	150.00		6.00					

O-RING STANDARD SIZE (METRIC)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References			
Type	(ID)		(CS)		F	JIS	AS-BS	JASO F404
mm	153.00	+/-1.20	6.00	+/-0.15		DIN		
	154.00		6.00					
	155.00		6.00					
	155.50	+/-1.24	6.00					
	156.00		6.00					
	157.00		6.00					
	158.00		6.00					
	159.00		6.00					
	160.00		6.00					
	162.00	+/-1.31	6.00					
	165.00		6.00					
	166.00		6.00					
	169.00		6.00					
	170.00		6.00					
	172.00	+/-1.38	6.00					
	175.00		6.00					
	176.00		6.00					
	180.00		6.00					
	182.00	+/-1.41	6.00					
	184.00		6.00					
	185.00		6.00					
	188.00	+/-1.44	6.00					
	190.00		6.00					
	191.20	+/-1.48	6.00					
	193.00		6.00					
	195.00		6.00					
	196.00	+/-1.51	6.00					
	198.00		6.00					
	200.00		6.00					
	201.00	+/-1.55	6.00					
	202.00		6.00					
	203.00		6.00					
	203.50		6.00					
	204.00		6.00					
	205.00		6.00					
	208.00	+/-1.59	6.00					
	210.00		6.00					
	212.00	+/-1.59	6.00					
	215.00	+/-1.63	6.00					
	216.00		6.00					
	217.00		6.00					
	218.00		6.00					
	220.00	+/-1.67	6.00					
	221.00		6.00					
	225.00	+/-1.71	6.00					
	226.00		6.00					
	229.00		6.00					
	230.00		6.00					

O-RING STANDARD SIZE (METRIC)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References			
Type	(ID)		(CS)		F	JIS	AS-BS	JASO F404
mm	235.00	+/-1.79	6.00	+/-0.15		DIN		
	236.00		6.00					
	237.00		6.00					
	237.50		6.00					
	238.00		6.00					
	240.00		6.00					
	242.00		6.00					
	244.00	+/-1.83	6.00					
	247.00		6.00					
	249.00		6.00					
	250.00		6.00					
	258.00	+/-1.93	6.00					
	259.00		6.00					
	260.00		6.00					
	262.00		6.00					
	265.00	+/-1.98	6.00					
	266.00		6.00					
	270.00		6.00					
	278.00		6.00					
	280.00	+/-2.08	6.00					
	284.00		6.00					
	285.00		6.00					
	288.00		6.00					
	290.00		6.00					
	294.00	+/-2.14	6.00					
	295.00		6.00					
	300.00		6.00					
	305.00	+/-2.25	6.00					
	310.00		6.00					
	315.00	+/-2.25	6.00					
	320.00	+/-2.30	6.00					
	325.00		6.00					
	330.00	+/-2.37	6.00					
	335.00		6.00					
	338.00	+/-2.43	6.00					
	340.00		6.00					
	345.00		6.00					
	348.00	+/-2.49	6.00					
	350.00		6.00					
	355.00		6.00					
	358.00	+/-2.56	6.00					
	360.00		6.00					
	365.00		6.00					
	368.00	+/-2.62	6.00					
	370.00		6.00					
	375.00		6.00					
	376.00	+/-2.68	6.00					
	380.00		6.00					
	385.00		6.00					

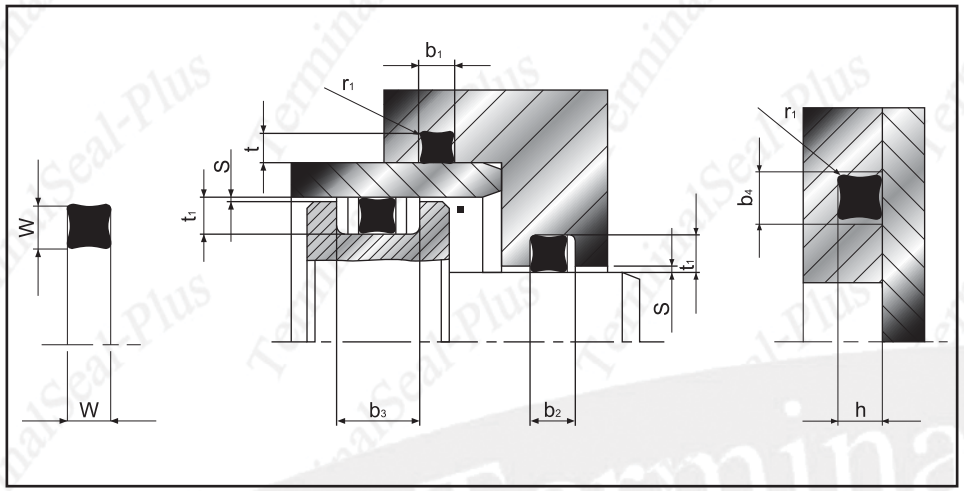
TERMINAL GROUP

O-RING STANDARD SIZE (METRIC)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References			
Type	(ID)		(CS)		F	JIS	AS-BS	JASO F404
mm	386.00	+/-2.68	6.00	+/-0.15		DIN		
	388.00		6.00					
	389.00	+/-2.76	6.00					
	390.00		6.00					
	392.00		6.00					
	394.00		6.00					
	395.00		6.00					
	398.00		6.00					
	400.00		6.00					
	415.00	+/-2.84	6.00					
	422.00		6.00					
	429.00		6.00					
	446.00	+/-3.07	6.00					
	448.00		6.00					
	450.00	+/-3.30	6.00					
	470.00		6.00					
	478.00		6.00					
	480.00		6.00					
	486.00	+/-3.37	6.00					
	489.00		6.00					
	500.00	+/-3.37	6.00					
	504.00	+/-3.40	6.00					
	505.00		6.00					
	508.00		6.00					
	510.00		6.00					
	516.00		6.00					
	530.00		6.00					
	540.00	+/-3.60	6.00					
	544.00		6.00					
	549.00		6.00					
	555.00		6.00					
	560.00		6.00					
	569.00	+/-3.81	6.00					
	575.00		6.00					
	579.00		6.00					

X-ring Standard Size (Quad Ring)

Installation Recommendations



Installation Drawing

thickness	Redial Squeezing		Groove Dimensions					Radius	rad. Gap
			Groove depth		Groove width				
W	Dynamically max. min.	Statically max. min.	Dynamically t_1 +0.05	Statically t/h +0.05	b_1, b_4+0.2	b_2 +0.2	b_3 +0.2	r^1	$S^{max.}$
1.02	0.300 0.115	0.350 0.165	0.08	0.75	1.20	-	-	0.10	0.03
1.27	0.330 0.145	0.430 0.245	1.00	0.90	1.40	-	-	0.10	0.03
1.52	0.350 0.165	0.450 0.265	1.25	1.15	1.70	-	-	0.22	0.04
1.78	0.360 0.175	0.460 0.275	1.50	1.40	2.00	3.40	4.80	0.22	0.05
2.62	0.400 0.215	0.450 0.265	2.30	2.25	3.00	4.40	5.80	0.30	0.08
3.53	0.430 0.205	0.530 0.305	3.20	3.10	4.00	5.40	6.80	0.40	0.08
5.33	0.560 0.250	0.710 0.400	4.90	4.75	6.00	7.70	9.40	0.40	0.10
7.00	0.700 0.350	0.950 0.600	6.40	6.20	8.00	10.50	13.00	0.60	0.10

X-ring Standard Size (Quad Ring)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References				
Type	(ID)		(CS)		F	JIS	AS-BS	NOK	JASO F404
X-002	1.07	+/-0.100	1.27				X-002		
X-003	1.42		1.52				X-003		
X-004	1.78		1.78				X-004		
X-005	2.57		1.78				X-005		
X-006	2.90		1.78				X-006		
X-007	3.68		1.78				X-007		
X-008	4.47		1.78				X-008		
X-009	5.28	+/-0.130	1.78				X-009		
X-010	6.07		1.78				X-010		
X-011	7.65		1.78				X-011		
X-012	9.25		1.78				X-012		
X-013	10.82		1.78				X-013		
X-014	12.42		1.78				X-014		
X-015	14.00	+/-0.180	1.78	+/-0.08			X-015		
X-016	15.60		1.78				X-016		
X-017	17.17		1.78				X-017		
X-018	18.77	+/-0.230	1.78				X-018		
X-019	20.35		1.78				X-019		
X-020	21.95		1.78				X-020		
X-021	23.52		1.78				X-021		
X-022	25.12		1.78				X-022		
X-023	26.70	+/-0.250	1.78				X-023		
X-024	28.30		1.78				X-024		
X-025	29.87		1.78				X-025		
X-026	31.47	+/-0.280	1.78				X-026		
X-027	33.05		1.78				X-027		
X-028	34.65	+/-0.330	1.78				X-028		

X-ring Standard Size (Quad Ring)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References				
Type	(ID)		(CS)		F	JIS	AS-BS	NOK	JASO F404
X-029	37.82	+/-0.330	1.78				X-029		
X-030	41.00		1.78				X-030		
X-031	44.17	+/-0.380	1.78				X-031		
X-032	47.35		1.78				X-032		
X-033	50.52	+/-0.460	1.78				X-033		
X-034	53.70		1.78				X-034		
X-035	56.87		1.78				X-035		
X-036	60.05		1.78				X-036		
X-037	63.22		1.78				X-037		
X-038	66.40	+/-0.510	1.78				X-038		
X-039	69.57		1.78				X-039		
X-040	72.75		1.78				X-040		
X-041	75.92	+/-0.610	1.78				X-041		
X-042	82.27		1.78	+/-0.08			X-042		
X-043	88.62		1.78				X-043		
X-044	94.97	+/-0.690	1.78				X-044		
X-045	101.32		1.78				X-045		
X-046	107.67	+/-0.760	1.78				X-046		
X-047	114.02		1.78				X-047		
X048	120.37		1.78				X048		
X-049	126.72	+/-0.940	1.78				X-049		
X-050	133.07		1.78				X-050		
X-102	1.24	+/-0.130	2.62				X-102		
X-103	2.06		2.62				X-103		
X-104	2.84		2.62				X-104		
X-105	3.63		2.62				X-105		
X-106	4.42		2.62				X-106		

X-ring Standard Size (Quad Ring)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References				
Type	(ID)		(CS)		F	JIS	AS-BS	NOK	JASO F404
X-107	5.23	+/-0.130	2.62				X-107		
X-108	6.02		2.62				X-108		
X-109	7.59		2.62				X-109		
X-110	9.19		2.62				X-110		
X-111	10.77		2.62				X-111		
X-112	12.37		2.62				X-112		
X-113	13.94	+/-0.180	2.62				X-113		
X-114	15.54	+/-0.230	2.62				X-114		
X-115	17.12		2.62				X-115		
X-116	18.72		2.62				X-116		
X-117	20.29	+/-0.250	2.62				X-117		
X-118	21.89		2.62				X-118		
X-119	23.46		2.62				X-119		
X-120	25.07		2.62	+/-0.08			X-120		
X-121	26.64		2.62				X-121		
X-122	28.24		2.62				X-122		
X-123	29.82	+/-0.300	2.62				X-123		
X-124	31.42		2.62				X-124		
X-125	32.99		2.62				X-125		
X-126	34.59		2.62				X-126		
X-127	36.17		2.62				X-127		
X-128	37.77		2.62				X-128		
X-129	39.34	+/-0.380	2.62				X-129		
X-130	40.94		2.62				X-130		
X-131	42.52		2.62				X-131		
X-132	44.12		2.62				X-132		
X-133	45.69		2.62				X-133		

X-ring Standard Size (Quad Ring)

Dimensions		(ID)	Cross Section	(CS)	Spec.References				
Type	(ID)	Tolerance	(CS)	Tolerance	F	JIS	AS-BS	NOK	JASO F404
X-134	47.29	+/-0.380	2.62				X-134		
X-135	48.90		2.62				X-135		
X-136	50.47		2.62				X-136		
X-137	52.07	+/-0.430	2.62				X-137		
X-138	53.64		2.62				X-138		
X-139	55.24		2.62				X-139		
X-140	56.82		2.62				X-140		
X-141	58.42	+/-0.510	2.62				X-141		
X-142	59.99		2.62				X-142		
X-143	61.59		2.62				X-143		
X-144	63.17	+/-0.510	2.62				X-144		
X-145	64.77		2.62				X-145		
X-146	66.34		2.62				X-146		
X-147	67.94		2.62	+/-0.08			X-147		
X-148	69.52	+/-0.560	2.62				X-148		
X-149	71.12		2.62				X-149		
X-150	72.69		2.62				X-150		
X-151	75.87		2.62				X-151		
X-152	82.22	+/-0.610	2.62				X-152		
X-153	88.57		2.62				X-153		
X-154	94.92	+/-0.710	2.62				X-154		
X-155	101.27		2.62				X-155		
X-156	107.62		2.62				X-156		
X-157	113.97	+/-0.760	2.62				X-157		
X-158	120.32		2.62				X-158		
X-159	126.67	+/-0.890	2.62				X-159		
X-160	133.02		2.62				X-160		

X-ring Standard Size (Quad Ring)

Dimensions		(ID)	Cross Section	(CS)	Spec.References				
Type	(ID)	Tolerance	(CS)	Tolerance	F	JIS	AS-BS	NOK	JASO F404
X-161	139.37		2.62				X-161		
X-162	145.72	+/-0.890	2.62				X-162		
X-163	152.07		2.62				X-163		
X-164	158.42		2.62				X-164		
X-165	164.77	+/-1.020	2.62				X-165		
X-166	171.12		2.62				X-166		
X-167	177.47		2.62				X-167		
X-168	183.82		2.62				X-168		
X-169	190.17	+/-1.140	2.62	+/-0.08			X-169		
X-170	196.52		2.62				X-170		
X-171	202.87		2.62				X-171		
X-172	209.22	+/-1.270	2.62				X-172		
X-173	215.57		2.62				X-173		
X-174	221.92	+/-1.270	2.62				X-174		
X-175	228.27		2.62				X-175		
X-176	234.62		2.62				X-176		
X-177	240.97	+/-1.400	2.62				X-177		
X-178	247.32		2.62				X-178		
X-201	4.34		3.53				X-202		
X-202	5.94		3.53				X-202		
X-203	7.52	+/-0.130	3.53				X-203		
X-204	9.12		3.53				X-204		
X-205	10.69		3.53	+/-0.10			X-205		
X-206	12.29		3.53				X-206		
X-207	13.87	+/-0.180	3.53				X-207		
X-208	15.47	+/-0.230	3.53				X-208		
X-209	17.04		3.53				X-209		

X-ring Standard Size (Quad Ring)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References				
Type	(ID)		(CS)		F	JIS	AS-BS	NOK	JASO F404
X-210	18.64	+/-0.250	3.53	+/-0.10			X-210		
X-211	20.22		3.53				X-211		
X-212	21.82		3.53				X-212		
X-213	23.39		3.53				X-213		
X-214	24.99		3.53				X-214		
X-215	26.57		3.53				X-215		
X-216	28.17	+/-0.300	3.53				X-216		
X-217	29.74		3.53				X-217		
X-218	31.34		3.53				X-218		
X-219	32.92		3.53				X-219		
X-220	34.52		3.53				X-220		
X-221	36.09		3.53				X-221		
X-222	37.69	+/-0.380	3.53				X-222		
X-223	40.87		3.53				X-223		
X-224	44.04		3.53				X-224		
X-225	47.22	+/-0.460	3.53				X-225		
X-226	50.39	+/-0.460	3.53				X-226		
X-227	53.57		3.53				X-227		
X-228	56.74	+/-0.510	3.53				X-228		
X-229	59.92		3.53				X-229		
X-230	63.09		3.53				X-230		
X-231	66.27		3.53				X-231		
X-232	69.44	+/-0.610	3.53				X-232		
X-233	72.62		3.53				X-233		
X-234	75.79		3.53				X-234		
X-235	78.97		3.53				X-235		
X-236	82.14		3.53				X-236		

X-ring Standard Size (Quad Ring)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References				
Type	(ID)		(CS)		F	JIS	AS-BS	NOK	JASO F404
X-237	85.32	+/-0.610	3.53				X-237		
X-238	88.49		3.53				X-238		
X-239	91.67	+/-0.710	3.53				X-239		
X-240	94.84		3.53				X-240		
X-241	98.02		3.53				X-241		
X-242	101.19		3.53				X-242		
X-243	104.37		3.53				X-243		
X-244	107.54	+/-0.760	3.53				X-244		
X-245	110.72		3.53				X-245		
X-246	113.89		3.53				X-246		
X-247	117.07		3.53				X-247		
X-248	120.24		3.53				X-248		
X-249	123.42	+/-0.890	3.53				X-249		
X-250	126.59		3.53	+/-0.10			X-250		
X-251	129.77		3.53				X-251		
X-252	132.94		3.53				X-252		
X-253	136.12		3.53				X-253		
X-254	139.29		3.53				X-254		
X-255	142.47		3.53				X-255		
X-256	145.64		3.53				X-256		
X-257	148.82	+/-0.890	3.53				X-257		
X-258	151.99		3.53				X-258		
X-259	158.34	+/-1.020	3.53				X-259		
X-260	164.69		3.53				X-260		
X-261	171.04		3.53				X-261		
X-262	177.39		3.53				X-262		
X-263	183.74	+/-1.140	3.53				X-263		

X-ring Standard Size (Quad Ring)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References				
Type	(ID)		(CS)		F	JIS	AS-BS	NOK	JASO F404
X-264	190.09	+/-1.140	3.53	+/-0.10			X-264		
X-265	196.44		3.53				X-265		
X-266	202.79		3.53				X-266		
X-267	209.14	+/-1.270	3.53				X-267		
X-268	215.49		3.53				X-268		
X-269	221.84		3.53				X-269		
X-270	228.19		3.53				X-270		
X-271	234.54	+/-1.400	3.53				X-271		
X-272	240.89		3.53				X-272		
X-273	247.24		3.53				X-273		
X-274	253.59		3.53				X-274		
X-275	266.29		3.53				X-275		
X-276	278.99	+/-1.650	3.53				X-276		
X-277	291.69		3.53				X-277		
X-278	304.39		3.53				X-278		
X-279	329.79		3.53				X-279		
X-280	355.19		3.53				X-280		
X-281	380.59		3.53				X-281		
X-282	405.26	+/-1.910	3.53				X-282		
X-283	430.66	+/-2.030	3.53				X-283		
X-284	456.06	+/-2.160	3.53				X-284		
X-309	10.46	+/-0.130	5.33	+/-0.13			X-309		
X-310	12.06		5.33				X-310		
X-311	13.64	+/-0.180	5.33				X-311		
X-312	15.24	+/-0.230	5.33				X-312		
X-313	16.81		5.33				X-313		
X-314	18.42	+/-0.250	5.33				X-314		

X-ring Standard Size (Quad Ring)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References				
Type	(ID)		(CS)		F	JIS	AS-BS	NOK	JASO F404
X-315	19.99	+/-0.250	5.33	+/-0.13			X-315		
X-316	21.59		5.33				X-316		
X-317	23.16		5.33				X-317		
X-318	24.76		5.33				X-318		
X-319	26.34		5.33				X-319		
X-320	27.94	+/-0.300	5.33				X-320		
X-321	29.51		5.33				X-321		
X-322	31.12		5.33				X-322		
X-323	32.69		5.33				X-323		
X-324	34.29		5.33				X-324		
X-325	37.46	+/-0.380	5.33				X-325		
X-326	40.64		5.33				X-326		
X-327	43.82		5.33				X-327		
X-328	46.99		5.33				X-328		
X-329	50.16	+/-0.460	5.33				X-329		
X-330	53.34		5.33				X-330		
X-331	56.52		5.33				X-331		
X-332	59.69		5.33				X-332		
X-333	62.86	+/-0.510	5.33				X-333		
X-334	66.04		5.33				X-334		
X-335	69.22		5.33				X-335		
X-336	72.39		5.33				X-336		
X-337	75.56	+/-0.610	5.33				X-337		
X-338	78.74		5.33				X-338		
X-339	81.92		5.33				X-339		
X-340	85.09		5.33				X-340		
X-341	88.26		5.33				X-341		

X-ring Standard Size (Quad Ring)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References				
Type	(ID)		(CS)		F	JIS	AS-BS	NOK	JASO F404
X-342	91.44	+/-0.710	5.33				X-342		
X-343	94.62		5.33				X-343		
X-344	97.79	+/-0.710	5.33				X-344		
X-345	100.96		5.33				X-345		
X-346	104.14		5.33				X-346		
X-347	107.32		5.33				X-347		
X-348	110.49	+/-0.760	5.33				X-348		
X-349	113.66		5.33				X-349		
X-350	116.84		5.33				X-350		
X-351	120.02	+/-0.760	5.33				X-351		
X-352	123.19		5.33				X-352		
X-353	126.36		5.33				X-353		
X-354	129.54		5.33				X-354		
X-355	132.72		5.33	+/-0.13			X-355		
X-356	135.89		5.33				X-356		
X-357	139.07	+/-0.940	5.33				X-357		
X-358	142.24		5.33				X-358		
X-359	145.42		5.33				X-359		
X-360	148.59		5.33				X-360		
X-361	151.77		5.33				X-361		
X-362	158.12		5.33				X-362		
X-363	164.47	+/-1.020	5.33				X-363		
X-364	170.82		5.33				X-364		
X-365	177.17		5.33				X-365		
X-366	183.52		5.33				X-366		
X-367	189.86	+/-1.140	5.33				X-367		
X-368	196.22		5.33				X-368		

X-ring Standard Size (Quad Ring)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References				
Type	(ID)		(CS)		F	JIS	AS-BS	NOK	JASO F404
X-369	202.57	+/-1.140	5.33				X-369		
X-370	208.92		5.33				X-370		
X-371	215.27	+/-1.270	5.33				X-371		
X-372	221.62		5.33				X-372		
X-373	227.97		5.33				X-373		
X-374	234.32		5.33				X-374		
X-375	240.67	+/-1.400	5.33				X-375		
X-376	247.02		5.33				X-376		
X-377	253.37		5.33				X-377		
X-378	266.07	+/-1.520	5.33				X-378		
X-379	278.77		5.33				X-379		
X-380	291.47		5.33				X-380		
X-381	304.17	+/-1.650	5.33				X-381		
X-382	329.57		5.33	+/-0.13			X-382		
X-383	354.97	+/-1.780	5.33				X-383		
X-384	380.37		5.33				X-384		
X-385	405.26	+/-1.910	5.33				X-385		
X-386	430.66	+/-2.030	5.33				X-386		
X-387	456.06	+/-2.160	5.33				X-387		
X-388	481.46	+/-2.290	5.33				X-388		
X-389	506.81	+/-2.410	5.33				X-389		
X-390	532.21		5.33				X-390		
X-391	557.61	+/-2.540	5.33				X-391		
X-392	582.68	+/-2.670	5.33				X-392		
X-393	608.08	+/-2.790	5.33				X-393		
X-394	633.48	+/-2.920	5.33				X-394		
X-395	658.88	+/-3.050	5.33				X-395		

X-ring Standard Size (Quad Ring)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References				
Type	(ID)		(CS)		F	JIS	AS-BS	NOK	JASO F404
X-425	113.66	+/-0.840	6.99	+/-0.15			X-425		
X-426	116.84		6.99				X-426		
X-427	120.02		6.99				X-427		
X-428	123.19		6.99				X-428		
X-429	126.36	+/-0.940	6.99				X-429		
X-430	129.54		6.99				X-430		
X-431	132.72		6.99				X-431		
X-432	135.89		6.99				X-432		
X-433	139.06		6.99				X-433		
X-434	142.24		6.99				X-434		
X-435	145.42		6.99				X-435		
X-436	148.59		6.99				X-436		
X-437	151.76		6.99				X-437		
X-438	158.12	+/-1.020	6.99				X-438		
X-439	164.46		6.99				X-439		
X-440	170.82	+/-1.020	6.99				X-440		
X-441	177.16		6.99				X-441		
X-442	183.52	+/-1.140	6.99				X-442		
X-443	189.86		6.99				X-443		
X-444	196.22		6.99				X-444		
X-445	202.56		6.99				X-445		
X-446	215.26	+/-1.400	6.99				X-446		
X-447	227.96		6.99				X-447		
X-448	240.67		6.99				X-448		
X-449	253.36		6.99				X-449		
X-450	266.06	+/-1.520	6.99				X-450		
X-451	278.76		6.99				X-451		

X-ring Standard Size (Quad Ring)

Dimensions		(ID) Tolerance	Cross Section	(CS) Tolerance	Spec.References				
Type	(ID)		(CS)		F	JIS	AS-BS	NOK	JASO F404
X-452	291.47	+/-1.520	6.99	+/-0.15			X-452		
X-453	304.17		6.99				X-453		
X-454	316.87	+/-1.520	6.99				X-454		
X-455	329.56		6.99				X-455		
X-456	342.26	+/-1.780	6.99				X-456		
X-457	354.96		6.99				X-457		
X-458	367.66		6.99				X-458		
X-459	380.36		6.99				X-459		
X-460	393.07		6.99				X-460		
X-461	405.26	+/-1.910	6.99				X-461		
X-462	417.96		6.99				X-462		
X-463	430.66	+/-2.030	6.99				X-463		
X-464	443.36	+/-2.160	6.99				X-464		
X-465	456.06		6.99				X-465		
X-466	468.76		6.99				X-466		
X-467	481.46	+/-2.290	6.99				X-467		
X-468	494.16		6.99				X-468		
X-469	506.86	+/-2.410	6.99				X-469		
X-470	532.26		6.99				X-470		
X-471	557.66	+/-2.540	6.99				X-471		
X-472	582.68	+/-2.670	6.99				X-472		
X-473	608.08	+/-2.790	6.99				X-473		
X-474	633.48	+/-2.920	6.99				X-474		
X-475	658.88	+/-3.050	6.99				X-475		

BACK-UP RINGS

There are four type of standard back-up rings as follows.

spiral cut uncut concave

Materials

Back-up rings are available in virtually all synthetic materials for example. PTFE, PA, POM, PU, NBR, FPM, and EPDM etc.

Operating Condition

The back-up rings are essential if one of the following conditions is applied.

- Pressures above 80 bar.
- Wide tolerances for the dimensions of the gap between the parts to be sealed.
- High speed.
- High temperature.
- Fluctuating pressure.

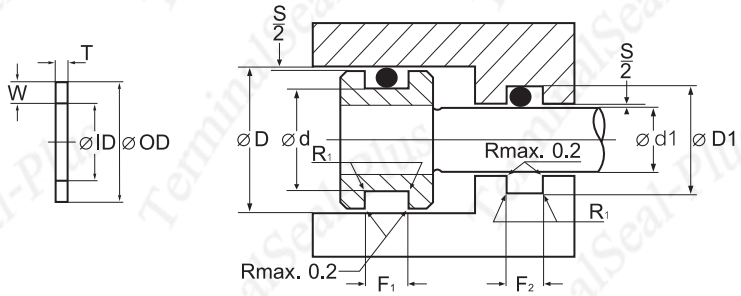
Installations

Normally back-up rings are installed in the lower pressure side. The back-up rings dimensions normally have to be adapted to the housing of the standard O-ring. To find out the size of the back-up rings, the following parameters are required.

- Housing dimensions with tolerances.
- Type of application (static, dynamic sealing)
- O-ring dimensions including medium, pressure and temperature.

Please contact us for more information and assistance.

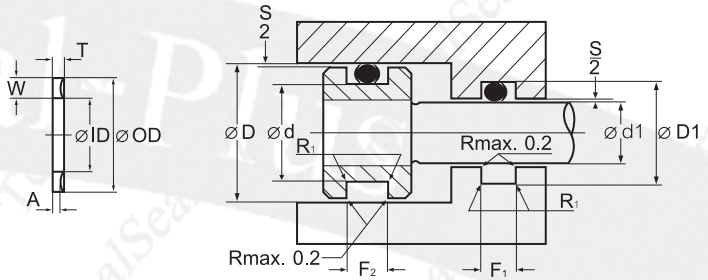
INSTALLATION RECOMMENDATION (CUT & UNCUT BACK-UP RINGS)



Installation Dimensions

Cross section	Back-up ring dimensions		Groove dimensions					Metrical Clearance s max.
			Groove dia.		Groove width**		Radius R_1	
AS 568 A	Width (W)	Thickness (T)	d-0.1	D1+0.1	1 back-up ring F_1+0.2	2 back-up Rings F2+0.2		
1.78	1.45	1.4	D- 2.9	d1+2.9	3.8	5.2	0.2	0.12
2.62	2.25	1.4	D- 4.5	d1+4.5	5.0	6.4	0.3	0.12
3.53	3.1	1.4	D- 6.2	d1+6.2	6.2	7.6	0.4	0.15
5.33	4.7	1.7	D- 9.4	d1+9.4	8.8	10.5	0.6	0.15
7.0	6.1	2.5	D-12.2	d1+12.2	12.0	14.5	0.6	0.20

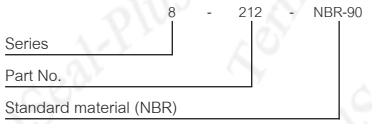
INSTALLATION RECOMMENDATION (CONCAVE BACK-UP RING)



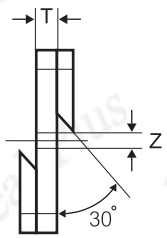
Installation Dimensions

Series	Back-up ring Groove dimensions							Radius R_1	O-Ring		Clearance
	Dimensions			Groove dia.		Groove width**			Cross section	series	
	Width (W)	Thickness (A)	Thickness (T)	d-0.1	D1+0.1	1 back-up ring F_1+0.2	2 back-up ring F_2+0.2				
8-004 to 8-050	1.35	1.14	1.24	D-2.9	d1+2.9	3.6	5.0	0.2	1.78	000	0.12
8-102 to 8-178	2.18	1.14	1.35	D-4.5	d1+4.5	4.5	5.9	0.3	2.62	100	0.12
8-201 to 8-284	3.00	1.02	1.27	D-6.2	d1+6.2	5.6	7.0	0.4	3.53	200	0.15
8-309 to 8-395	4.65	1.52	1.93	D-9.4	d1+9.7	7.9	9.6	0.6	5.33	300	0.15
8-425 to 8-475	5.99	2.44	2.97	D-12.2	d1+12.2	10.7	13.2	0.6	7.00	400	0.20

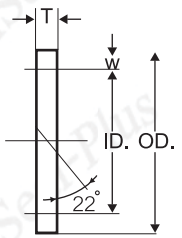
Order example



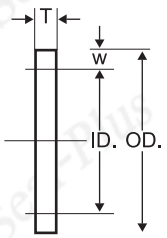
BACK-UP RING STANDARD SIZE (P)



Spiral (T1)



cut (T2)



endless (T3)

Type	Spiral				biascut and endless					JIS B 2401
	ID.	Width (W)	Thickness (T)	Clearance (Z)	ID.		OD.		Thickness (T)	
P 3	3				3		6			P 3
P 4	4				4		7			P 4
P 5	5				5		8			P 5
P 6	6	$1.50^{+0.03}_{-0.05}$	$0.7_{\pm 0.05}$	$1.2_{\pm 0.4}$	6	+0.15	9	0	$1.25_{\pm 0.1}$	P 6
P 7	7				7	0	10	-0.15		P 7
P 8	8				8		11			P 8
P 9	9				9		12			P 9
P 10	10				10		13			P 10
P 10A	10				10		14			P 10A
P 11	11				11		15			P 11
P 11.2	11.2				11.2		15.2			P 11.2
P 12	12				12		16			P 12
P 12.5	12.5				12.5		16.5			P 12.5
P 14	14				14	+0.15	18	0		P 14
P 15	15	$2.0^{+0.03}_{-0.05}$	$0.7_{\pm 0.05}$	$1.4_{\pm 0.8}$	15	0	19	-0.15	$1.25_{\pm 0.1}$	P 15
P 16	16				16		20			P 16
P 18	18				18		22			P 18
P 20	20				20		24			P 20
P 21	21				21		25			P 21
P 22	22				22		26			P 22
P 22A	22				22		28			P 22A
P 22.4	22.4				22.4		28.4			P 22.4
P 24	24				24		30			P 24
P 25	25				25		31			P 25
P 25.5	25.5				25.5		31.5			P 25.5
P 26	26				26		32			P 26
P 28	28				28		34			P 28
P 29	29				29		35			P 29
P 29.5	29.5				29.5		35.5			P 29.5
P 30	30				30		36			P 30
P 31	31				31		37			P 31
P 31.5	31.5	$3.0^{+0.03}_{-0.05}$	$0.7_{\pm 0.05}$	$2.25_{\pm 1.5}$	31.5	+0.20	37.5	0	$1.25_{\pm 0.1}$	P 31.5
P 32	32				32	0	38	-0.02		P 32
P 34	34				34		40			P 34
P 35	35				35		41			P 35
P 35.5	35.5				35.5		41.5			P 35.5
P 36	36				36		42			P 36
P 38	38				38		44			P 38

	Spiral				biascut and endless					
	ID.	Width (W)	Thickness (T)	Clearance (Z)	ID.		OD.		Thickness (T)	
P 39	39				39		45			P 39
P 40	40				40		46			P 40
P 41	41				41		47			P 41
P 42	42				42		48			P 42
P 44	44				44		50			P 44
P 45	45				45		51			P 45
P 46	46				46		52			P 46
P 48	48	$5.0^{+0.03}_{-0.05}$	$0.9_{\pm 0.06}$	$4.5_{\pm 1.5}$	48	+0.20	54	0	$1.25_{\pm 0.1}$	P 48
P 49	49				49		55			P 49
P 50	50				50		56			P 50
P 48A	48				48		58			P 48A
P 50A	50				50		60			P 50A
P 52	52				52		62			P 52
P 53	53				53		63			P 53
P 55	55				55		65			P 55
P 56	56				56		66			P 56
P 58	58				58		68			P 58
P 60	60				60		70			P 60
P 62	62				62		72			P 62
P 63	63				63		73			P 63
P 65	65				65		75			P 65
P 67	67				67		77			P 67
P 70	70				70		80			P 70
P 71	71				71		81			P 71
P 75	70				75		85			P 75
P 80	80				80		90			P 80
P 85	85	$5.0^{+0.03}_{-0.05}$	$0.9^{\pm 0.06}$	$4.5_{\pm 1.5}$	85	+0.25	95	0	$1.9^{\pm 0.13}$	P 85
P 90	90				90	0	100	-0.25		P 90
P 95	95				95		105			P 95
P 100	100				100		110			P 100
P 102	102				102		112			P 102
P 105	105				105		115			P 105
P 110	110				110		120			P 110
P 112	112				112		122			P 112
P 115	115				115		125			P 115
P 120	120				120		130			P 120
P 125	125				125		135			P 125
P 130	130				130		140			P 130
P 132	132				132		142			P 132
P 135	135				135		145			P 135
P 140	140				140		150			P 140
P 145	145				145		155			P 145
P 150	150				150		160			P 150
P 150A	150				150		165			P 150A
P 155	155				155		170			P 155
P 160	160				160		175			P 160
P 165	165				165		180			P 165
P 170	170				170		185			P 170
P 175	175	$7.5^{+0.03}_{-0.05}$	$1.4_{\pm 0.08}$	$6.0_{\pm 2.0}$	175	+0.30	190	0	$2.75_{\pm 0.15}$	P 175
P 180	180				180	0	195	-0.30		P 180
P 185	185				185		200			P 185
P 190	190				190		205			P 190
P 195	195				195		210			P 195
P 200	200				200		215			P 200
P 205	205				205		220			P 205

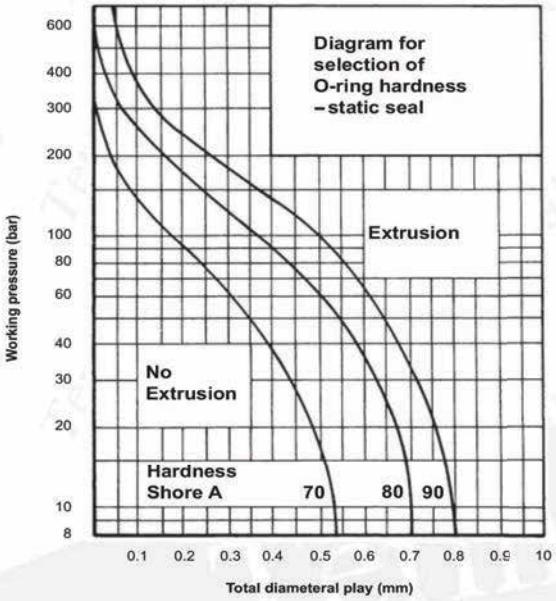
BACK-UP RING STANDRD SIZE (P)

Type	Spiral				biascut and endless					JIS B 2401
	ID.	Width (W)	Thickness (T)	Clearance (Z)	ID.		OD.		Thickness (T)	
P 209	209	$7.5^{+0.03}_{-0.05}$	$1.4_{\pm 0.08}$	$6.0_{\pm 2.0}$	209	+0.30 0	224	0 -0.30	$2.75_{\pm 0.15}$	P 209
P 210	210				210		225			P 210
P 215	215				215		230			P 215
P 220	220				220		235			P 220
P 225	225				225		240			P 225
P 230	230				230		245			P 230
P 235	235				235		250			P 235
P 240	240				240		255			P 240
P 245	245				245		260			P 245
P 250	250				250		265			P 250
P 255	255				255		270			P 255
P 260	260				260		275			P 260
P 265	265				265		280			P 265
P 270	270				270		285			P 270
P 275	275				275		290			P 275
P 280	280				280		295			P 280
P 285	285				285		300			P 285
P 290	290				290		305			P 290
P 295	295				295		310			P 295
P 300	300				300		315			P 300
P 315	315				315		330			P 315
P 320	320				320		335			P 320
P 335	335				335		350			P 335
P 340	340				340		355			P 340
P 355	355				355		370			P 355
P 360	360				360		375			P 360
P 375	375				375		390			P 375
P 385	385				385		400			P 385
P 400	400				400		415			P 400

BACK-UP RING STANDRD SIZE (G)

Type	Spiral				biascut and endless					JIS B 2401
	ID.	Width (W)	Thickness (T)	Clearance (Z)	ID.		OD.		Thickness (T)	
G 25	25	$2.5^{+0.03}$	$0.7_{\pm 0.05}$	$4.5_{\pm 1.5}$	25	+0.25 0	30	0 -0.25	$1.25_{\pm 0.10}$	G 25
G 30	30				30		35			G 30
G 35	35				35		40			G 35
G 40	40				40		45			G 40
G 45	45				45		50			G 45
G 50	50				50		55			G 50
G 55	55				55		60			G 55
G 60	60				60		65			G 60
G 65	65				65		70			G 65
G 70	70				70		75			G 70
G 75	75				75		80			G 75
G 80	80				80		85			G 80
G 85	85				85		90			G 85
G 90	90				90		95			G 90
G 95	95				95		100			G 95
G 100	100				100		105			G 100
G 105	105				105		110			G 105
G 110	110				110		115			G 110
G 115	115				115		120			G 115
G 120	120				120		125			G 120
G 125	125				125		130			G 125
G 130	130				130		135			G 130
G 135	135				135		140			G 135
G 140	140				140		145			G 140
G 145	145				145		150			G 145
G 150	150	$5.0^{+0.03}_{-0.05}$	$0.9_{\pm 0.06}$	$6.0_{\pm 2.0}$	150	+0.30 0	160	0 -0.30	$1.9_{\pm 0.13}$	G 150
G 155	155				155		165			G 155
G 160	160				160		170			G 160
G 165	165				165		175			G 165
G 170	170				170		180			G 170
G 175	175				175		185			G 175
G 180	180				180		190			G 180
G 185	185				185		195			G 185
G 190	190				190		200			G 190
G 195	195				195		205			G 195
G 200	200				200		210			G 200
G 210	210				210		220			G 210
G 220	220				220		230			G 220
G 230	230				230		240			G 230
G 240	240				240		250			G 240
G 250	250				250		260			G 250
G 260	260				260		270			G 260
G 270	270				270		280			G 270
G 280	280				280		290			G 280
G 290	290				290		300			G 290
G 300	300				300		310			G 300

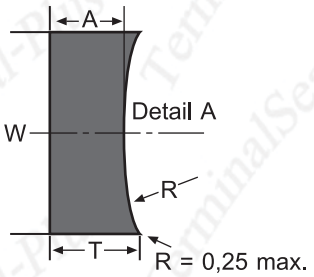
BACK-UP RING STANDRD SIZE (AS)

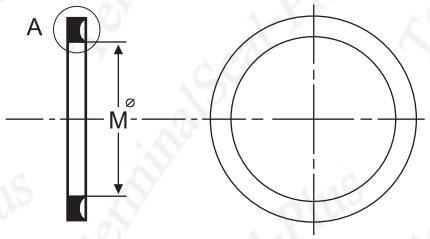


The extrusion diagram shows the maximum pressure allowed when back-up rings are not fitted

Please note :

1. The diagram is based on 100 000 pressure cycles at 60 cycle/min.
2. The allowable gap for Sillicone and Fluorosilicone is a half of the normal recommended gap.
3. The diagram is valid to a temperature of 70 ˚C.
4. The barreling of cylinders under pressure is not considered.



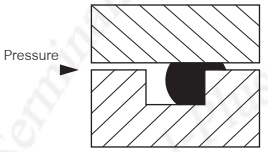


Parker® Back-up Rings

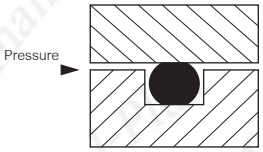
General

Back-up rings are always used with O-rings and used to prevent O-rings from gap extrusion. In case of high pressure O-rings can be forced into the sealed gap and finally get destroyed.

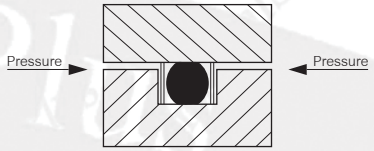
Back-up rings do not provide any sealing function. The use of a back-up ring produces a reliable O-ring seal effective over a wide pressure and temperature rage. This also applies to X-rings which can also be fitted together with back-up rings.



O-Ring installed without back-up ring



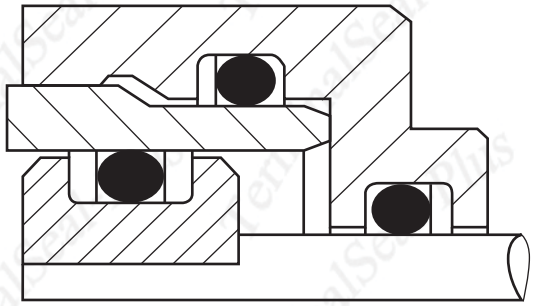
O-Ring installed with 1 back-up ring



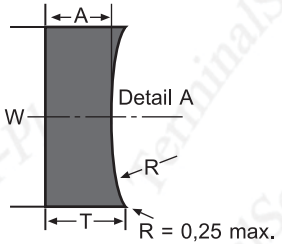
O-Ring installed with 2 back-up rings

Designs

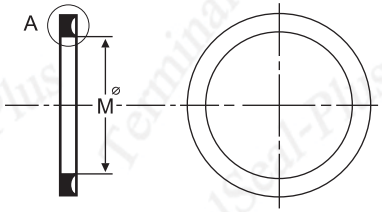
Back-up rings are used for external and internal sealing. They are used for radial dynamic and radial static installation.



BACK-UP RING STANDRD SIZE (AS)



Parker® -back-up ring



W 1.35 mm

Dimensions		(M) Tolerance	W
Type	M		
8-004	2.44	+/-0.15	1.35
8-005	3.23		
8-006	3.56		
8-007	4.34		
8-008	5.13		
8-009	5.94	+/-0.18	
8-010	6.73		
8-011	8.31		
8-012	9.91		
8-013	11.56	+/-0.23	
8-014	13.16		
8-015	14.73		
8-016	16.33		
8-017	17.91		
8-018	19.51		
8-019	21.08		
8-020	22.68	+/-1.00%	
8-021	24.26		
8-022	25.66		
8-023	27.43		
8-024	29.03		
8-025	30.61		
8-026	32.21		
8-027	33.78		
8-028	35.38		
8-029	38.56		
8-030	41.73	+/-0.86%	
8-031	44.91		
8-032	48.08		
8-033	51.26		
8-034	54.43		
8-035	57.61		
8-036	60.78		
8-037	63.96		
8-038	67.13		
8-039	70.31		
8-040	73.48		
8-041	76.66		
8-042	83.01	+/-0.78%	
8-043	89.36		
8-044	95.71		
8-045	102.06		
8-046	108,41		
8-047	114.76		
8-048	121.11		
8-049	127.46		
8-050	133.81		

W 2.18 mm

Dimensions		(M) Tolerance	W
Type	M		
8-102	1.96	+/-0.15	2.18
8-103	2.77		
8-104	3.56		
8-105	4.34		
8-106	5.13		
8-107	5.94		
8-108	6.73	+/-0.18	
8-109	8.31		
8-110	9.91		
8-111	11.48	+/-0.25	
8-112	13.08		
8-113	14.66		
8-114	16.26		
8-115	17.83		
8-116	19.43		
8-117	21.11		
8-118	22.68	+/-1.10%	
8-119	24.28		
8-120	25.86		
8-121	27.46		
8-122	29.03		
8-123	30.63		
8-124	32.21		
8-125	33.81		
8-126	35.38		
8-127	36.98		
8-128	38.56		
8-129	40.16	+/-0.95%	
8-130	41.73		
8-131	43.33		
8-132	44.91		
8-133	46.51		
8-134	48.08		
8-135	49.68		
8-136	51.26		
8-137	52.86		
8-138	54.43		
8-139	56.03		
8-140	57.61		
8-141	59.21		
8-142	60.78		
8-143	62.38		
8-144	63.96		
8-145	65.56		
8-146	67.13		
8-147	68.73		
8-148	70.31		
8-149	71.91		

W 2.18 mm

Dimensions		(M) Tolerance	W
Type	M		
8-150	73.48	+/-0.95%	2.18
8-151	76.66		
8-152	83.01	+/-0.78%	
8-153	89.36		
8-154	95.71		
8-155	102.06		
8-156	108.41		
8-157	114.76		
8-158	121.11		
8-159	127.46		
8-160	133.81		
8-161	140.16		
8-162	146.51		
8-163	152.86		
8-164	159.21		
8-165	165.56	+/-0.74%	
8-166	171.91		
8-167	178.26		
8-168	184.61		
8-169	190.96		
8-170	197.31		
8-171	203.66		
8-172	210.01		
8-173	216.36		
8-174	222.71		
8-175	229.06		
8-176	235.41		
8-177	241.76		
8-178	248.11		

BACK-UP RING STANDRD SIZE (AS)

W 3.00 mm

Dimensions		(M) Tolerance	W
Type	M		
8-201	5.13	+/-0.18	3.00
8-202	6.73		
8-203	8.30		
8-204	9.90		
8-205	11.56	+/-0.25	
8-206	13.16		
8-207	14.73		
8-208	16.33		
8-209	17.90		
8-210	19.46		
8-211	21.03		
8-212	22.63	+/-1.10%	
8-213	24.21		
8-214	25.81		
8-215	27.38		
8-216	28.98		
8-217	30.56		
8-218	32.16		
8-219	33.88		
8-220	35.48		
8-221	37.06		
8-222	38.66		
8-223	41.83		
8-224	45.01		
8-225	48.18		
8-226	51.36		
8-227	54.53		
8-228	57.71	+/-0.90%	
8-229	60.88		
8-230	64.06		
8-231	66.83		
8-232	70.00		
8-233	73.18		
8-234	76.35		
8-235	79.53		
8-236	82.70	+/-0.78%	
8-237	85.88		
8-238	89.05		
8-239	92.23		
8-240	95.40		
8-241	98.58		
8-242	101.75		
8-243	104.93		
8-244	108.10		
8-245	111.28		
8-246	114.45		
8-247	117.63		
8-248	121.11		
8-249	124.28		
8-250	127.46		

W 3.00 mm

Dimensions		(M) Tolerance	W
Type	M		
8-251	130.63	+/-0.78%	3.00
8-252	133.81		
8-253	136.98		
8-254	140.16		
8-255	143.33		
8-256	146.51	+/-0.74%	
8-257	149.68		
8-258	152.86		
8-259	159.21		
8-260	165.56		
8-261	171.91		
8-262	178.26		
8-263	184.61		
8-264	190.96		
8-265	197.31		
8-266	203.66		
8-267	210.01		
8-268	216.36		
8-269	222.71		
8-270	229.06		
8-271	235.41		
8-272	241.76		
8-273	248.11		
8-274	254.46		
8-275	267.16		
8-276	279.86		
8-277	292.56		
8-278	3.5.26	+/-0.67%	
8-279	330.66		
8-280	356.05		
8-281	381.46		
8-282	406.12		
8-283	431.52		
8-284	456.92		

W 4.65 mm

Dimensions		(M) Tolerance	W
Type	M		
8-309	11.43	+/-0.25	4.6
8-310	13.03		
8-311	14.60		
8-312	16.20		
8-313	17.78		
8-314	19.38		
8-315	20.96		
8-316	22.56	+/-1.10%	
8-317	24.13		
8-318	25.73		
8-319	27.31		
8-320	28.91		
8-321	30.42		
8-322	32.08		
8-323	33.43		
8-324	35.26		
8-325	38.43		
8-326	41.61	+/-0.95%	
8-327	44.78		
8-328	47.96		
8-329	51.13		
8-330	54.31		
8-331	57.61		
8-332	60.78		
8-333	63.96		
8-334	67.13		
8-335	70.31		
8-336	73.48		
8-337	76.66		
8-338	79.83		
8-339	83.13	+/-0.78%	
8-340	86.31		
8-341	89.48		
8-342	92.66		
8-343	95.83		
8-344	99.01		
8-345	102.31		
8-346	105.49		
8-347	108.66		
8-348	111.84		
8-349	115.01		
8-350	118.19		
8-351	121.36		
8-352	124.54		
8-353	127.71		
8-354	130.89		
8-355	134.09		
8-356	137.24		
8-357	140.41		
8-358	143.59		

BACK-UP RING STANDRD SIZE (AS)

4.65 mm

Dimensions		(M) Tolerance	W
Type	M		
8-359	146.76	+/-0.78%	4.65
8-360	149.68		
8-361	152.86		
8-362	159.21		
8-363	165.56	+/-0.74%	
8-364	171.91		
8-365	178.26		
8-366	184.86		
8-367	191.21		
8-368	197.56		
8-369	203.91		
8-370	210.26		
8-371	216.61		
8-372	222.96		
8-373	229.31		
8-374	235.66		
8-375	242.01		
8-376	248.36		
8-377	254.71		
8-378	267.41		
8-379	280.11		
8-380	292.81		
8-381	305.51	+/-0.67%	
8-382	330.91		
8-383	356.31		
8-384	381.71		
8-385	406.60		
8-386	432.00		
8-387	457.4		
8-388	482.75		
8-389	508.15		
8-390	533.55		
8-391	558.95		
8-392	584.02		
8-393	609.42		
8-394	634.82		
8-395	660.22		

5.99 mm

Dimensions		(M) Tolerance	W
Type	M		
8-425	115.60	+/-0.78%	5.99
8-426	118.77		
8-427	121.95		
8-428	125.20		
8-429	128.30		
8-430	131.47		
8-431	134.65		
8-432	137.82		
8-433	141.00		
8-434	144.17		
8-435	147.35		
8-436	150.52		
8-437	153.70		
8-438	159.36		
8-439	165.71	+/-0.74%	
8-440	172.06		
8-441	178.41		
8-442	184.76		
8-443	191.11		
8-444	197.46		
8-445	203.81		
8-446	216.51		
8-447	229.21		
8-448	241.91		
8-449	254.61		
8-450	267.31		
8-451	280.01		
8-452	292.71		
8-453	305.41	+/-0.67%	
8-454	318.11		
8-455	330.81		
8-456	343.51		
8-457	356.21		
8-458	368.91		
8-459	381.61		
8-460	394.31		
8-461	406.50		
8-462	419.20		
8-463	431.90		
8-464	444.60		
8-465	457.30		
8-466	470.00		
8-467	482.70		
8-468	495.40		
8-469	508.10		
8-470	533.50		
8-471	558.90		
8-472	584.30		
8-473	609.70		
8-474	635.10		
8-475	660.50		

Other dimensions (mm)

No.	R(mm)
004-050	2.21
102-178	3.28
201-284	4.42
309-395	6.65
425-475	8.74

No.	T(mm)
004-050	1.24
102-178	1.35
201-284	1.27
309-395	1.93
425-475	2.97

No.	A(mm)
004-050	1.14
102-178	1.14
201-284	1.27
309-395	1.93
425-475	2.97

W mm	+/-(mm)
004-050	1.14
102-178	1.14
201-284	1.27
309-395	1.93
425-475	2.97

Bonded Seals

The Bonded Seal was originally designed to replace copper type washers in high-pressure systems. Often used as bolt seals in hydraulic equipments, today bonded seals are finding usage in many and varied application throughout industries.The Bonded Seal comprises a metal washer and an elastomeric ring bonded inside the diameter. The metal washer prevents over-compression and limits deformation of the elastomeric ring.

Bonded Seals

Bonded Seals (Centralising Lip)

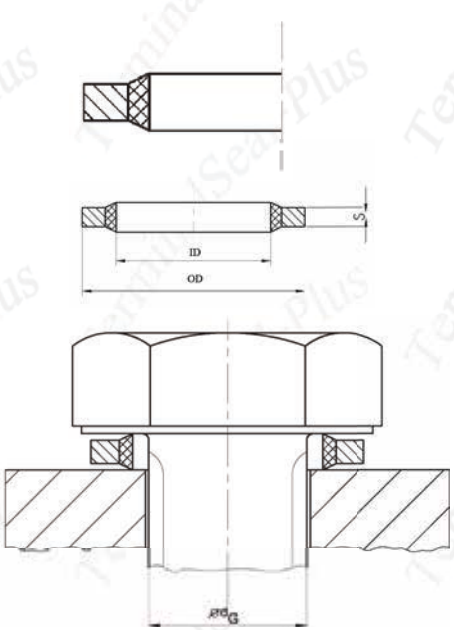
Advantages

- Reliable low and high pressure sealing
- High and low temperature capabilities
- Bolt torque is reduced with no loss of tightening load

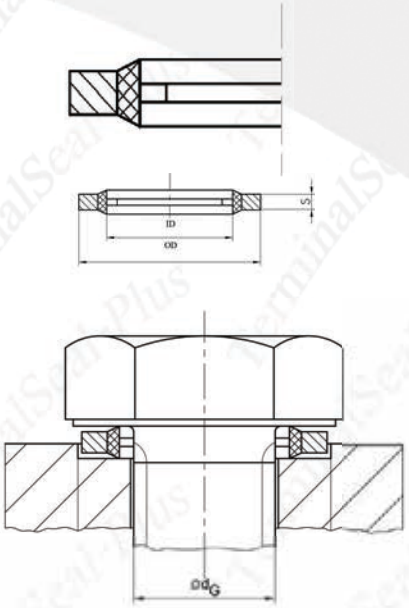
Materials

1. Elastomer component : available in NBR 70 (standard) and (special order materials) NBR 90, FKM (viton ®) 70 & 75 Shore A, EPDM 75 Shore A , HNBR and FVMQ
2. Washer component : standard carbon steel, and (special on request) stainless steel AISI 304, AISI 316 and AISI 316Ti
3. Surface Protection : Zinc Plated

Bonded Seals



Bonded Seals (Centralising Lip)

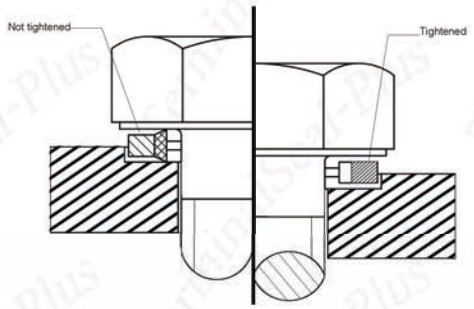


Bonded Seals

Height Tolerance (S)

1 ± 0.1
1.2 ± 0.1
1.5 ± 0.1
2 ± 0.1
2.3 ± 0.15
2.5 ± 0.15
3 ± 0.15
3.2 ± 0.15
3.5 ± 0.15

Bonded Seals (Not Tightened vs Tightened)



Metric Thread Size	Inside Diameter	Outside Diameter	Metal thickness	Spot face diameter	Clearance hole diameter
	ID	OD	t	d3 H13	d4
M2.5	3,10	6,40	1,00	6,70	2,70
M2.5	3,10	6,40	1,30	6,70	2,70
M3	3,60	7,50	1,00	7,63	3,20
M3	4,10	7,00	1,00	7,30	3,20
M3 (M3.5)	4,10	7,20	1,00	7,50 (7,35)	3,20 (3,70)
M4	4,50	7,00	1,00	7,35 (7,15)	4,20
M4	4,60	9,00	1,00	9,30 (9,13)	4,30 (4,20)
M4	4,90	8,60	1,00	8,90	4,30
M5	5,60	10,00	1,00	10,13	5,20
M5	5,70	9,00	1,00	9,30 (9,15)	5,30 (5,20)
M5	5,70	9,20	1,00	9,50	5,30
M5	5,70	10,00	1,00	10,30 (10,15)	5,30 (5,20)
M5 (M5.5)	6,20	9,20	1,00	9,50 (9,35)	5,30 (5,70)
M6	6,60	11,00	1,00	11,13	6,20
M6	6,70	10,00	1,00	10,30 (10,15)	6,40 (6,20)
M6	6,70	11,00	1,00	11,30 (11,15)	6,40 (6,20)
M6	6,70	11,00	2,50	11,35 (11,15)	6,40 (6,20)
M6	6,85	13,27	1,30	13,40	6,20
M6	6,90	13,20	1,30	13,50	6,40
M6	7,00	11,40	1,00	11,53	6,20
M6	7,00	13,40	1,30	13,70	6,40
M6 (M6.5)	7,10	12,00	1,00	12,30 (12,15)	6,40 (6,70)
M6 (M6.7)	7,30	10,20	1,00	10,50 (10,35)	6,40 (6,90)
M6 (M8)	8,50	13,40	1,00	13,70 (13,55)	6,40 (8,20)

TERMINAL GROUP

Metric Thread Size	Inside Diameter	Outside Diameter	Metal thickness	Spot face diameter	Clearance hole diameter
M8	8,60	13,00	1,00	13,13	8,20
M8	8,70	13,00	1,00	13,30 (13,15)	8,40 (8,20)
M8	8,70	14,00	1,00	14,30 (14,15)	8,40 (8,20)
M8	8,70	14,20	1,30	14,50	8,40
M8	8,70	16,00	1,00	16,30 (16,15)	8,40 (8,20)
M8 (M8.5)	9,30	13,30	1,00	13,60 (13,45)	8,40 (8,70)
M10	10,35	16,00	2,00	16,17	9,95
M8 (M10)	10,70	16,00	1,50	16,30 (16,15)	8,40 (10,20)
M10	10,70	17,00	1,50	17,13	10,20
M8 (M10)	10,70	18,00	1,50	18,30 (18,15)	8,40 (10,20)
M10 (M11)	11,40	16,30	1,50	16,60 (16,45)	10,50 (11,20)
M11	11,80	18,10	1,50	18,23	11,20
M10 (M11)	11,80	18,50	1,50	18,80 (18,65)	10,50 (11,20)
M10 (M11)	11,80	19,10	1,50	19,40 (19,25)	10,50 (11,20)
M10 (M12)	12,70	18,00	1,50	18,30 (18,15)	10,50 (12,20)
M12	12,70	19,00	1,50	19,13	12,20
M10 (M12)	12,70	20,00	1,50	20,30 (20,15)	10,50 (12,20)
M12 (M13)	13,70	20,00	1,50	20,30 (20,15)	13,00 (13,20)
M12	13,70	20,60	2,10	20,90	13,00
M12 (M13)	13,70	22,00	1,50	22,30 (22,15)	13,00 (13,20)
M12	13,70	22,20	1,59	22,50	13,00
M13	13,80	20,10	1,50	20,23	13,20
M12 (M13.5)	14,00	18,70	1,50	19,00 (18,85)	13,00 (13,70)
M14	14,70	21,00	1,50	21,13	14,20
M12 (M14)	14,70	22,00	1,50	22,30 (22,15)	13,00 (14,20)
M12	14,90	22,30	2,10	22,60	13,00
M14 (M15)	16,00	22,70	1,50	23,00 (22,85)	15,00 (15,20)
M14	16,50	25,50	2,10	25,80	15,00
M16	16,70	23,00	1,50	23,13	16,20
M14 (M16)	16,70	24,00	1,50	24,30 (24,15)	15,00 (16,20)

Metric Thread Size	Inside Diameter	Outside Diameter	Metal thickness	Spot face diameter	Clearance hole diameter
M16.5	17,20	23,90	2,10	24,03	16,70
M17	17,40	23,70	1,50	23,83	17,20
M14 (M17)	17,40	24,00	1,50	24,30 (24,15)	15,00 (17,20)
M14	17,40	24,00	2,00	24,30	15,00
M16 (M17.5)	18,00	24,70	1,50	25,00 (24,85)	17,00 (17,70)
M16	18,20	25,40	2,50	25,70	17,00
M16 (M18)	18,70	26,00	1,50	26,30 (26,15)	17,00 (18,20)
M18	18,70	27,00	2,00	27,13	18,20
M18 (M20)	20,70	28,00	1,50	28,30 (28,15)	19,00 (20,20)
M20	20,70	29,00	2,00	29,13	20,20
M18 (M21)	21,50	28,70	2,50	29,00 (28,85)	19,00 (21,20)
M21	21,70	30,00	2,00	30,13	21,20
M20 (M22)	22,50	28,00	1,50	28,30 (28,15)	21,00 (22,20)
M20 (M22)	22,70	30,00	2,00	30,30 (30,15)	21,00 (22,20)
M20 (M22)	22,70	30,00	3,00	30,30 (30,15)	21,00 (22,20)
M20 (M22)	22,70	31,00	2,00	31,13	22,20
M23	23,70	32,00	2,00	32,13	23,20
M20 (M24)	24,70	32,00	2,00	32,30 (32,15)	21,00 (24,20)
M24	24,70	33,00	2,00	33,13	24,20
M22	26,70	35,00	2,00	35,30	23,00
M24	27,00	35,00	2,50	35,30	25,00
M26	27,00	35,30	2,00	35,43	26,20
M24 (M27)	27,20	36,00	2,00	36,30 (36,15)	25,00 (27,20)
M27	27,70	36,00	2,00	36,13	27,20
M28	28,60	36,00	2,00	36,13	28,20
M24	28,70	37,00	2,00	37,30	25,00
M28.5	29,20	37,50	2,00	37,63	28,70
M30	30,70	39,00	2,00	39,13	30,20
M27 (M30)	31,00	39,00	2,00	39,30 (39,15)	28,00 (30,20)
M27 (M33)	33,70	42,00	2,00	42,30 (42,15; 42,13)	28,00 (33,20)
M27 (M33)	33,70	42,00	2,00	42,30 (42,15; 42,13)	28,00 (33,20)
M27	33,90	42,80	3,25	43,10	28,00
M27	33,90	42,90	3,40	43,20	28,00
M30 (M33)	34,30	43,00	2,00	43,30 (43,15)	31,00 (33,20)
M30 (M36)	36,70	46,00	2,00	46,30 (46,15)	31,00 (36,20)
M36	37,00	48,00	2,50	48,13	36,20
M36 (M39)	40,00	51,00	2,50	51,30 (51,15)	37,00 (39,20)
M39	40,00	51,00	2,50	51,13	39,20
M36 (M42)	42,70	53,00	3,00	53,30 (53,15)	37,00 (42,20)
M42	43,00	54,00	2,50	54,13	42,20
M45	46,00	57,00	2,50	57,13	45,20
M36 (M48)	48,70	59,00	3,00	59,30 (59,15)	37,00 (48,20)
M48	49,00	60,00	2,50	60,13	48,20
M42	51,70	63,50	3,25	63,80	43,00
M42 (M51)	52,00	60,00	3,00	60,30 (60,15)	43,00 (51,20)
M48 (M52)	53,30	64,50	3,00	64,80 (64,65)	50,00 (52,20)
M48 (M60)	60,70	73,00	3,00	73,30 (73,15)	50,00 (60,20)
M68	68,60	79,50	3,50	79,65	68,20
M75	76,10	90,30	3,38	90,45	75,20
M64	76,10	90,30	3,40	90,60	66,00
M88	89,09	101,48	3,25	101,63	88,20
M125	127,00	143,67	5,00	143,82	125,20

for BA/BS../UN.. Inch thread size	BSP thread	Inside Diameter	Outside Diameter	Metal thick-ness	Spot face diameter	Clearance hole diameter
		ID	OD	t	d3 H13	d4
6BA		3,05	6,35	1,22	6,48	2,79
1/8		3,70	8,05	1,04	8,30	3,50
9/64		4,00	8,38	1,04	8,70	3,90
4BA		4,12	7,26	1,22	7,39	3,60
5/32		4,70	9,29	1,04	9,60	4,50
2BA		5,21	8,38	1,22	8,51	4,69
3/16		5,60	10,79	1,37	11,10	5,40
7/32		6,20	11,55	1,37	11,90	6,00
1/4		6,86	13,21	1,22	13,34	6,34
1/4		6,99	13,34	1,22	13,47	6,35
1/4		7,10	13,18	1,37	13,50	7,00
5/16		8,31	13,34	1,22	13,47	7,93
5/16		8,64	14,22	1,22	14,35	7,94
5/16		8,70	15,16	1,37	15,50	8,50
3/8		10,30	17,52	1,37	17,80	10,20
3/8	1/8	10,37	15,88	2,00	16,01	9,53
40		11,26	18,36	2,00	18,49	10,16
7/16		11,69	19,05	2,00	19,18	11,11
7/16		11,90	19,53	1,90	19,80	11,70
1/2		13,70	22,30	1,90	22,50	13,50
1/2	1/4	13,74	20,57	2,00	20,70	12,70
9/16		14,86	22,23	2,00	22,36	14,28
9/16		15,30	24,68	1,90	25,00	15,00
60		15,83	22,23	2,00	22,36	15,23
5/8		16,52	25,40	2,00	25,53	15,88
5/8		16,90	27,05	1,90	27,30	16,80
	3/8	17,28	23,80	2,00	23,93	16,64
11/16		18,16	25,40	2,34	25,53	17,46
11/16		18,50	29,43	2,28	29,70	18,20
3/4		19,69	26,92	2,34	27,05	19,05
3/4		20,30	32,23	2,28	32,50	20,00
13/16	1/2	21,54	28,58	2,34	28,71	20,64
13/16		21,90	34,59	2,28	34,90	21,50
7/8	5/8	23,49	31,75	2,34	31,88	22,23
7/8		23,50	36,98	2,28	37,30	23,20
15/16		24,26	33,27	2,34	33,40	23,80
15/16		25,10	38,96	2,28	39,30	24,80
1		26,70	42,13	2,28	42,40	26,50
1	3/4	27,05	34,93	2,34	35,06	25,41
1 1/16		27,82	38,61	2,34	38,74	27,00
1 1/8		29,33	36,58	2,34	36,71	28,57
1 1/8		29,80	46,91	2,28	47,30	29,50
1 3/16	7/8	30,81	38,10	2,34	38,23	30,15
1 1/4		32,64	41,40	3,25	41,53	31,74
1 1/4		33,00	51,28	3,40	51,40	32,80
15/16	1	33,89	42,80	2,34	42,93	33,33
15/16	1	33,89	42,80	3,25	42,93	33,33
1 3/8		35,94	44,45	3,25	44,58	34,92
1 1/2		38,96	47,75	3,25	47,88	38,10
1 1/2		39,50	58,93	3,40	58,30	39,00
1 5/8	1 1/4	42,93	52,38	3,25	52,51	41,29

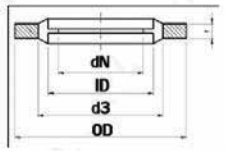
Bonded Seals (Not Tightened vs Tightened)

for BA/BS../UN.. Inch thread size	BSP thread	Inside Diameter	Outside Diameter	Metal thick-ness	Spot face diameter	Clearance hole diameter
1 3/4		45,34	57,15	3,25	57,28	44,44
1 7/8	1 1/2	48,44	58,60	3,25	58,73	47,64
2		51,69	63,50	3,25	63,63	50,79
2 1/8	1 3/4	54,89	69,85	3,25	69,98	53,99
2 1/4		58,04	70,36	3,25	70,49	57,14
	2	60,58	73,03	3,25	73,16	59,62
2 1/2		64,39	77,72	3,25	77,85	63,49
	2 1/4	66,68	79,50	3,25	79,63	65,50
	2 1/2	76,08	90,17	3,25	90,30	75,18

GM500 Deliverable Dimensions for pipe joints and couplings to ISO 1179 (CETOP RP.CH)

for BSP thread size	Inside Diameter	Outside Diameter	Metal thick-ness	Spot face diameter
	ID +0,2	OD -0,2	t ±0,15	d3 +0,4
1/16	8,30	12,70	1,25	13
1/8	10,40	14,70	1,25	15
1/4	13,85	18,70	1,25	19
3/8	17,35	22,70	1,25	23
1/2	21,65	26,70	1,25	27
3/4	27,30	32,50	1,25	33
1	34,20	39,50	2,00	40
1 1/4	42,80	49,50	2,00	50
1 1/2	48,70	55,50	2,00	56
2	60,50	68,50	2,00	69

Bonded Seals (Self Centralising Lip)



GM 500 Dimensional series: metric series, self Centralizing Lip					
for Metric Thread size	Inside Diameter	Outside Diameter	Metal thickness	Metal washer ID	ID between self centering seal
	ID	OD	t	d3	dN
M4	4,50	7,00	1,00	5,40	3,30
M5	5,70	10,00	1,00	7,40	4,45
M6	6,70	10,00	1,00	8,00	5,60
M8	8,70	14,00	1,00	10,40	6,40
M10	10,70	16,00	1,50	12,40	8,05
M12	12,70	19,00	1,50	14,10	9,73
M14	14,70	22,00	1,50	16,40	11,38
M16	16,70	24,00	1,50	18,40	13,41
M18	18,70	26,00	1,50	20,40	14,76
M20	20,70	28,00	1,50	22,50	16,76
M22	22,70	30,00	2,00	24,40	18,74
M24	24,70	32,00	2,00	26,40	20,11

Dimensional series: BSP, self Centralizing Lip

for BSP thread size	Inside Diameter	Outside Diameter	Metal thickness	Metal washer ID	ID between self centering seal
	ID	OD	t	d3	dN
BSP 1/8	10,37	15,88	2,00	11,84	8,26
BSP 1/4	13,74	20,57	2,00	15,21	11,18
BSP 5/8	16,51	25,40	2,00	18,75	12,90
BSP 3/8	17,28	23,80	2,00	18,75	14,76
BSP 11/16	18,16	25,40	2,40	19,69	14,50
BSP 1/2	21,54	28,58	2,47	23,01	18,24
BSP 5/8	27,05	34,93	2,47	28,53	23,83
BSP 3/4	27,05	34,93	2,47	28,53	23,83
BSP 7/8	30,81	38,10	2,47	32,29	27,51
BSP 1	33,89	42,80	3,40	36,88	29,92
BSP 1 1/4	42,93	52,38	3,40	45,93	38,45
BSP 1 1/2	48,44	58,60	3,40	51,39	44,45
BSP 1 3/4	54,89	69,85	3,40	58,30	50,42
BSP 2	60,58	73,03	3,40	63,63	56,26
BSP 2 1/4	66,68	79,50	3,40	69,98	62,36
BSP 2 1/2	76,08	90,17	3,40	79,38	71,50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ROD SEALS

Profile	Type
	RS01
	RS01A
	RS01B
NEW	RS01C
	RS02
	RS02A
	RS02B
NEW	RS02C
	RS03
	RS04
	RS05
	RS08
	RS09
	RS09A
	RS09B
	RS91

Profile	Type
	RS91B
	RS16
	RS17
	RS17A
	RS17B
	RS17C
	RS17D
	RS17E
	RS19
	RS19A
	RS20
	RS31 33
	RS35

PISTON SEALS

Profile	Type
	PS01
	PS01A
	PS01B
NEW	PS01C
	PS02
	PS02A
	PS03
	PS04
	PS05
	PS08
	PS08A
	PS08B
	PS08C
	PS08D
	PS08E

Profile	Type
	PS08F
	PS81
	PS09
	PS09A
	PS16
	PS16A
	PS17
	PS17A
	PS17B
	PS19
	PS19A
	PS20
	PS23
	PS35

SPECIAL SEALS AND MACHINED PARTS(STANDARD PROFILES)

Profile

ผลิตซีลตามรูปแบบที่ลูกค้ากำหนด นอกเหนือจากโพรไฟล์ซีลสแตนดาร์ดแล้ว เรายังรับผลิตซีลและชิ้นงานตามแบบ รวมทั้งออกแบบและปรับแบบให้เหมาะกับการใช้งานของลูกค้า

Customer specific seals

In additional of these standardized profiles, we also provide the machined parts according to a customer design, as well as the individual profile geometries which are designed by us for your special requirements

STATIC SEAL&O-RINGS

Profile	Type
	FL01A
	FL02B
	FL03
	FL06
NEW	FL07
	OR
	ORH
	ORV
	QR01
NEW	QR02
	SS01

BACK UP RINGS

Profile	Type
	BUR08
	BUR09
	BUR10
	BUR11
	BUR12
	BUR13

SYMMETRICAL SEALS (PISTON-/ROD SEALS)

Profile	Type
	PRS06
	PRS06A
	PRS06B
	PRS06C
	PRS06D
	PRS06E
	PRS07
	PRS10SP
	PRS11
	PRS13
	PRS14
	PRS15
	PRS18
	PRS19B
	PRS19C
	PRS19D
	PRS22
	PRS99
	PRS10-12
	PRS13-15
NEW	PRS25-27

MINING SEALS

Profile	Type
	P50
	P50A
	P51
	P51A
	P51G
	P52
	P53
	P54
	P54A
	P55
	R50
	R50A
	R51
	R52
	R53
	W50
	W51
	W53
	W54
	BWR01-P-PS
	BWR01-P-RS
	P58

WIPERS

Profile	Type
	WR01
	WR01A
	WR02
	WR02A
	WR02B
	WR02C
	WR02D
	WR03
	WR04
	WR07
	WR08
	WR11
	WR12
	WR13
	WR13_E2
	WR14
	WR15
	WR17
	WR18

OIL SEALS
ROTARY SEALS

Profile	Type
	OS01
	OS02
	OS03
	OS08
	OS08A
	R03
	R04
	R04A
	R05
	R05A
	VR06
	VR07
	R08
	R08D
	R09
	R09A
	R10
	R10A
	R11
	RS19A
	PS19A

BUSHINGS & WEAR
RING/GUIDE RINGS

Profile	Type
	BWR01
	BWR01A
	BWR02
	BWR03
	BWR04
	BWR05
	BWR06
	BWR07
	BWR08
	BWR09

ทุกโปรไฟล์เราสามารถผลิตให้ท่านได้ไม่จำกัดขนาดและจำนวนขั้นต่ำ
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อีเมล : terminalseal@terminalseal.com

All these profiles are able produced in various dimensions, without minimum order quantity

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MATERIAL SPECIFICATION

Description		Application temp.	Hardn. at 20°C	Main Application
NEW PU turquoise U230-T95		-30 to + 105°C	Shore A 95 +/-2	Wiper rings, U-Rings and other seals Compressed air, Hydraulic oil, Water, Hydrolysis resistance
NEW PU red U500-R95		-30 to + 125°C	Shore A 95 +/-2	U-seal, Wipers, Packing up to 400 bar. resistant with Water, Sea Water, Mineral & sillicone Oil, Fuel, Acids, Bases, Ozone, Air up to 120c, Used in Mining Idustry
PU red U203-R95		-30 to + 105°C	Shore A 95 +/-2	Wiper rings, U-Rings and other seals Compressed air, Hydraulic oil, Water, Hydrolysis resistance
PU blue U203-B95		-30 to + 105°C	Shore A 95 +/-2	Wiper rings, U-Rings and other seals Compressed air, Hydraulic oil, Water, Hydrolysis resistance
PU green U203-G95		-30 to + 105°C	Shore A 95 +/-2	Wiper rings, U-Rings and other seals Compressed air, Hydraulic oil, Water, Hydrolysis resistance
PU FDA light blue U203-B95		-30 to + 105°C	Shore A 95 +/-2	Wiper rings, U-Rings and other seals Compressed air, Mineral oil, Water, Resistant against hydrolysis
PU FDA natural U203-95FDA		-30 to + 100°C	Shore A 95 +/-2	Wiper rings, U-Rings and other seals Food industry, Contact with food, Hydrolysis resistance
PU MoS_2 grey U203-GM95		-30 to + 105°C	Shore A 95 +/-2	Wiper rings, U-Rings and other seals Compressed air, Hydraulic oil, Water, Hydrolysis resistance, for heavy duty applications
PU Low Temp. (FDA) NEW Dark Blue U203-B95-LT		-50 to + 105°C	Shore A 95 +/-2	Wiper rings, U-rings and other Seals.Food industry, Hydrolysis resistance.Maintain chemical resistances and Mechanical Properties at very low temp.(-50C) For both static & dynamic applications.
PU 57 Shore D dark blue U203-D57		-30 to + 90°C	Shore D 57 +/-2	Backup-rings or composite seals with preload elements, Compressed air, Oil, Water, resistant against hydrolysis
PU 57 Shore D + MoS_2 grey U203-D57G		-30 to + 90°C	Shore D 57 +/-2	Backup-rings or composite seals with preload elements, Compressed air, Oil, Water, resistant against hydrolysis
NBR black N107-B85		-25 to + 100°C	Shore A 85 +/-5	Wiper rings, U-Rings and other seals, Compressed air, Hydraulic oil, Water
NBR 95 black N109-B95		-25 to + 100°C	Shore A 95 +/-5	Wiper rings, U-Rings and other seals, Compressed air, Hydraulic oil, Water
NBR FDA white N111-W85		-22 to + 100°C	Shore A 85 +/-3	Wiper rings, U-Rings and other seals, Compressed air, Mineral oil, Water, Food Indurstry
H-NBR black HN112-B85		-25 to + 150°C	Shore A 85 +/-5	Wiper rings, U-Rings and other seals Compressed air, Hydraulic oil, Water
NEW H-NBR RGD black HN900-B85-RGD		-20 to + 150°C	Shore A 85 +/-5	Static & dynamic seals, O-Rings, flange seals, for oill and gas industry, high gas pressure, excellent chemical resistance : acids,hydrocarbons, aqueous media
NEW H-NBR RGD LT black HN901-B85-RGD		-35 to + 150°C	Shore A 85 +/-5	**Static & dynamic seals, O-Rings flange seals, for oill and gas industry, high gas pressure excellent chemical resistance : oil,fuel, hydrocarbons,Hydrogen sulphide, steam up to 140C, ozone,compound passed (RGD)at MERL UK**
FPM brown F109-BR85		-20 to + 210°C	Shore A 85 +/-5	Wiper rings, U-Rings and other seals high temperatures and aggressive media applications

MATERIAL SPECIFICATION

Description		Application temp.	Hardn. at 20°C	Main Application
FPM FDA brown F110-BR85		-20 to + 210°C	Shore A 85 +/-5	Wiper rings, U-Rings and other seals, high temperatures and aggressive media applications
FPM black F111-B85		-25 to + 210°C	Shore A 85 +/-5	Wiper rings, U-Rings and other seals high temperatures and aggressive media applications
NEW FPM-RGD black F800-RGD		-35 to + 200°C	Shore A 85 +/-5	**Static & dynamic seals, O_Rings, flange seals, for oil and gas industry, high gas pressure. excellent chemical resistance : oil, fuel, hydrocarbons, hydrogen sulphide, ozone, compound passed (RGD) at MERL UK**
EPDM black E131-B85		-50 to + 130°C	Shore A 85 +/-5	Wiper rings, U-Rings and other seals, diluted acids and alkaline, hot water & steam, EPDM is not resistant against mineral oil
EPDM FDA white E132-W85		-50 to + 100°C	Shore A 85 +/-3	Food industry Wiper rings, U-Rings and other seals diluted acids and alkaline, hot water & steam, EPDM is not resistant against mineral oil
EPDM-KTW black E133-W270		-45 to+ 120 C	Shore A 85 +/-5	Wiper rings, U-rings and other seals deluted acids and alkaline, hot water & steam, not resistant against mineral-vegetable-animal oil
Silicone FDA red S102-R85		-55 to +210°C	Shore A 85 +/-5	Food Industry, Flange seals, gaskets and other static seals, Not recommended for dynamic applications
Silicone FDA blue S103-BL85		-55 to +180°C	Shore A 85 +/- 3	Food Industry, Flange seals, gaskets and other static seals, Not recommended for dynamic applications
AFLAS black AF101-B85		-15 to +180°C	Shore A 85+/- 5	Wiper rings, U-Rings and other seals brake fluids, sour oil and gas, amines hot water & steam, high electrical insulation
PTFE-F grey T105-G		-200 to +260°C	Shore D 55 – 64	Backup & Guide rings, Spring loaded seals, Composite seals, Glass fiber / MoS_2 reinforced
PTFE-P FDA white T101-W		-200 to +260°C	Shore D 51 – 60	Backup & Guide rings, Spring loaded seals Composite seals, low friction, food industry, excellent chemical resistance
PTFE - 40%Bronze brown T110-BR40		-200 to +260°C	Shore D 62 – 67	Backup & Guide rings, Spring loaded seals, Composite seals with elastomer preload elements, low friction
PTFE - 40%Bronze blue T115-BR40		-200 to +260°C	Shore D 62 – 67	Backup & Guide rings, Spring loaded seals, Composite seals with elastomer preload elements, low friction
PTFE - 60%Bronze brown T120-BR60		-200 to +260°C	Shore D 65 – 70	Backup & Guide rings, Spring loaded seals, Composite seals, low friction
PTFE - 25%Carbon grey T125-C25		-200 to +260°C	Shore D 62 - 67	Backup & Guide rings, Spring loaded seals, Composite seals, low friction
POM FDA white P101-WE		-60 to +100°C	-	Backup and Guide rings, machined parts
PA FDA natural A112-WC		-30 to +105°C	-	Backup and Guide rings, machined parts
PEEK PK100-CN(FDA) brown-beige (natural)		- 50 to + 310°C	Shore D90	Guide rings, bushings, back-up rings, scrapers, housings, high precision parts
NEW **UHMW-PE (FDA) Translucent white UHMW - PE 1000**		-200 to + 80°C	Shore D**60 to 65 +/-5**	Piston/rod seals with spring, back-up rings, special seals in water hydraulics, low temp. & low friction, excellent chemical & sliding, food industry (contact with food)

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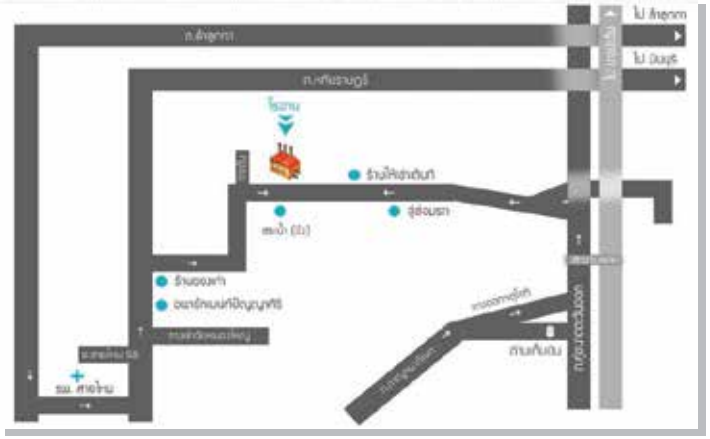

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