

AS-568* Standard O-Rings Quick Reference Chart



General Applications

Apple O-Rings are available in a choice of six basic materials, each in a range of optional Durometer (Shore A) Hardnesses. Other materials available upon request.

Buna-N/Nitrile: Buna N/Nitrile rubber is a copolymer of butadiene and acrylonitrile. You will find compounds that are ideally suited for oil and fuel resistant applications of all types

Ethylene-Propylene: In the Ethylene-Propylene family, you will find compounds that are used extensively for outdoor, weather resistant uses, water appliances. The first choice for low torque drive belts.

Silicone: In the Silicone family, you will find compounds that are excellent as static seals in extreme temperature conditions.

Neoprene®: In the Neoprene family, you will find compounds which are the superior sealing materials for the refrigeration industry featuring resistance to ammonia and Freon.®

Fluorocarbon: In the Fluorocarbon family, you will find compounds that make up the preferred seals for aircraft engines, automotive fuel handling systems, and hard vacuum service.

Fluorosilicone: In the Fluorosilicone family, you will find compounds that make up seals that are unparalleled for aerospace fuel systems and auto fuel emission control systems.

All materials are compounded under stringent quality control for uniformity of physical properties, and to meet or exceed Government, Military, Space Program, Automotive, F.D.A., Industrial and Commercial specifications.

To Determine Material:

1. Determine end use: static (stationary) or dynamic (moving).
2. List the substance that the seal will be exposed to and check O-Ring material resistances in Chemical Compatibility Table(s) listed in the Apple Seal Design Guide.

3. List ALL factors of seal application and check material performance.
 - A. Pressure: determines material hardness and selection.
 - B. Heat/Cold: check material temperature range(s).
 - C. Friction: determines material hardness and selection.
 - D. Permeability: important for pneumatic and vacuum applications.
4. Economy: see General Properties chart located in the Apple Seal Design Guide for most economical choice when several materials will do.

The most commonly used durometer is 70. Although other durometers are offered, availability may be limited due to processing or shrinkage factors.

Materials	Apple Material Designation	Durometers (Shore A)	Temperature Range Dry Heat Only	Description
Buna-N/Nitrile (NBR)	BN	40 thru 90	-40 to +257° F -40 to +125° C	Presently the seal industry's most widely used elastomer. Nitrile combines excellent resistance to petroleum-based oils and fuels, silicone greases, hydraulic fluids, water and alcohols, with a good balance of such desirable working properties as low compression set, high tensile strength, and high abrasion resistance.
Ethylene-Propylene (EPM/EPDM)	EP	40 thru 90	-40 to +275° F -40 to +135° C	Featuring good resistance to such polar solvents as ketones (MEK & Acetone). EPM/EPDM is also highly recommended for effective resistance to steam (to 400° F), hot water, silicone oils and greases, dilute acids and alkalis, alcohols and automotive brake fluids. Properly compounded, Ethylene Propylene can provide extended temperature range of -76°F to +350°F.
Silicone (MQ; PMQ; VMQ; PVMQ)	SL	25 thru 80	-85 to +400° F -65 to +230° C	Especially resistant to high, dry heat, in primarily static applications. Silicones are fungus resistant, odorless, tasteless, non-toxic elastomers, possessing high resistance to the aging effects of both sunlight and ozone attack.
Neoprene® (Chloroprene) (CR)	CR	40 thru 90	-40 to +250° F -40 to +121° C	An early developed, oil-resistant substitute for Natural Rubber, Neoprene features moderate resistance to petroleum oils; good resistance to ozone, sunlight and oxygen aging; relatively low compression set; good resilience; reasonable cost; and high resistance to attack by Freon® and Ammonia.
Fluorocarbon (Viton®) (Fluorel®) (FKM)	VT	55 thru 95	-13 to +446° F -25 to +230° C	Combining high temperature toughness with wide chemical agent compatibility, Fluorocarbon compounds feature excellent resistance to petroleum products and solvents, with good high temperature compression set characteristics.
Fluorosilicone (FVMQ)	FS	40 thru 80	-75 to +400° F -60 to +200° C	Combining the good high and low temperature stability of Silicones with the fuel, oil, and solvent resistance of fluorocarbons. FS compounds feature good compression set and resilience properties. FS compounds are suitable for exposure to air, sunlight, ozone, chlorinated and aromatic hydrocarbons.

*Note: Please check the latest standard for current version.

Standard O-Rings

Every Standard AS-568* Size in Stock:

Listed in inches. Includes all standard I.D.'s from 1/32" to 26," O.D.'s from 3/32" to 26 1/2" and Cross Sections (widths) from 1/32" to 1/4". Constantly restocked to assure immediate delivery of any size in small or large quantities.

Simplified Reference Easy to Order: All the information you need at a glance. All sizes listed by ascending inside diameter (I.D.) in fractional AND decimal sizes. Standard AS-568* Uniform Numbering System (Order by a single number).

Choice of Six Materials as Standard:

Rubber compounds and options of Durometer hardness to satisfy practically any service condition. Check with our sales staff for other material needs.

Fastest Delivery on O-Rings: Most likely the size and compound you require is in our stock of over 300,000,000 O-rings. Immediate shipments with no intermediate delays. (Remember – with Apple you can buy direct.)

O-Ring size is defined by inside diameter and width (cross-section) and is listed in both fractional and decimal dimensions with tolerances.

How to Order: The temperatures listed are general operating ranges for the entire family of each compound.

These will vary with specific compounds and/or length of exposure to temperature extremes. For example, silicone may still be serviceable with limited exposure to 700°F.

We highly recommend that in all cases, samples of a specific size and compound should be tested in the application before use in production.

Apple Catalog Numbers are identical to the AS-568* Numbering System, indicating precise I.D. and Width dimensions of O-Rings in one ordering number.

*Note: Please check the latest standard for current version.

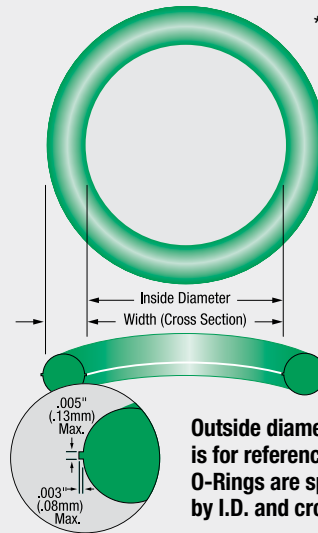
How to Determine O-Ring Size**

For sequence in ordering:

1. Size (catalog number)
2. Durometer and Material
3. Quantity

Example:

110 – 70SLR – 10,000
(size) (durometer, material and color) (quantity)



**** Shrinkage Size Adjustment:** Various O-ring compounds exhibit different shrinkage rates during molding. The normal O-ring sizes herein shown are based upon a 70 Durometer Nitrile standard. For other O-ring materials, be sure to consult your Apple representative.

Outside diameter (O.D.) is for reference only. O-Rings are specified by I.D. and cross section.

Seal Types & Gland Design

Table A

O-Ring Gland Design For Dynamic Seals

O-Ring Cross Section	Gland Depth	Squeeze		Diametrical Clearance Max.	Groove Width. ±.005			Groove Radius	Eccentricity Max.
		Inches	%		No Backup Rings	One Backup Ring	Two Backup Rings		
.040	.031/.033	.004/.012	11-28	.004	.063	–	–	.005-.008	.002
.050	.039/.041	.006/.014	13-26	.004	.073	–	–	.005-.008	.002
.060	.047/.049	.008/.016	14-25	.004	.084	–	–	.005-.008	.002
.070	.055/.057	.010/.018	15-25	.004	.095	.150	.208	.005-.015	.002
.103	.087/.090	.010/.019	10-18	.005	.145	.187	.249	.005-.020	.003
.139	.119/.123	.012/.024	9-17	.006	.185	.222	.301	.005-.030	.004
.210	.183/.188	.017/.032	8.5-15	.006	.285	.338	.428	.005-.050	.006
.275	.234/.240	.029/.047	10.5-17	.007	.375	.440	.579	.005-.060	.008

O-Ring Gland Design For Static Seals

O-Ring Cross Section	Gland Depth		Squeeze				Dia-metrical Clearance Max.	Groove Width. ±.005			Groove Radius	Eccentricity Max
	Radial	Axial	Radial →○←		Axial ↓○↑			No Backup Rings	One Backup Ring	Two Backup Rings		
			Inches	%	Inches	%						
.040	.027-.030	.027-.030	.007-.016	19-37	.007-.016	19-37	.003	.060	–	–	.005-.008	.002
.050	.035-.039	.034-.038	.008-.018	17-34	.009-.019	19-36	.004	.075	–	–	.005-.008	.002
.060	.042-.047	.042-.046	.010-.021	18-33	.011-.021	19-33	.004	.090	–	–	.005-.008	.002
.070	.050-.055	.049-.054	.012-.023	18-32	.013-.024	19-33	.004	.105	.150	.208	.005-.015	.002
.103	.080-.086	.075-.081	.014-.026	14-25	.019-.031	19-29	.005	.146	.182	.244	.005-.020	.003
.139	.110-.116	.100-.108	.019-.033	14-23	.027-.043	20-30	.006	.195	.217	.296	.005-.030	.004
.210	.170-.176	.155-.165	.029-.045	14-21	.040-.060	20-28	.006	.280	.333	.423	.005-.050	.006
.275	.225-.235	.205-.215	.034-.056	13-20	.054-.076	20-27	.007	.350	.435	.574	.005-.060	.008



Apple is the One Source for All Your Sealing Needs.

Apple Rubber Products stocks every AS-568* and most common metric sizes, plus a wide variety of non-standard, mil spec and government standard O-rings. Standard sizes include I.D.'s from 1/32" to 26", O.D.'s from 3/32" to 26 1/2", and cross sections from 1/32" to 1/4".

Apple offers the widest range of sizes in the industry, from our exclusive MicrOrings™, available as small as .008" I.D. We also have a large tooling inventory to eliminate production delays and save you tooling costs. In addition, Apple can custom-engineer O-rings and seals for prototypes or full production runs.

To top it off, 93% of our orders are shipped within 24 hours. When you call Apple, you deal direct with the manufacturer. Our experienced staff provides complete and comprehensive service to help you get the correct O-ring for your application.

The Full Line of Quality Apple Rubber Products

Products:

- O-Rings – Standards, Metrics, MicrOrings,™ MacrOrings™
- LSR (Liquid Silicone Rubber)
- Composite Seals (Rubber Bonded to Plastic or Metal)
- Custom Molded Seals
- Custom Molded Shapes
- Medical Seals
- Thermobonded Seals
- FilterSealSM
- Military Specs
- Standard and Exotic Materials

Services:

- Design Capabilities
- Prototyping and Production Runs
- Full Quality Control Laboratory
- Class 10,000 (7) Clean Room
- ISO 9001-2008 AS9100 B Certifications

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