16. Vulc-O-rings and O-ring Cords

Vulc-O-rings

One of our oldest and most popular products is the Hot Vulcanised Cord ring ('Vulc-O-ring').
Eriks has developed a very successful method of producing O-rings from extruded cord to a very high technical standard. The most important factors affecting the

quality of this product are the mechanical characteristics and dimensional accuracy of the extruded cord stock.Over recent years Eriks has formulated special compounds which give very low compression set figures which are critical for high quality vulcanising.

In addition to this the in-house extrusion lines are all laser controlled for dimensional accuracy and the standard extruded finish cord tolerances are often tighter than ISO 330 2 E1.
Eriks offers the optional 'close-tol' cord

which can have the incredible tolerance of just +/- 0.05mm (0.002") and a super smooth surface finish.

Joint Tensile Strengths

As the opposite picture shows, Eriks produces all joints by scarfing at 45°. This is very important in achieving high tensile strengths as the area of the vulcanising surface is greatly increased.

Eriks routinely conducts tensile strength tests on a regular basis to satisfy internal quality control requirements. In addition to this (by prior arrangement) production batch testing can also be provided.
The testing is carried out on a custom built tensometer.

A typical joint sample is 140mm long and is held in specially designed clamps.

16. Vulc-O-rings and O-ring Cords

Joint Tensile Strengths
The joint sample is stretched until breakage occurs and, depending on material, can result in a very high elongation.

When the sample breaks it is often at the joint area. This does not infer weakness but at such high elongation, a surface imperfection around the joint area will be the point of breakage.

The break as you can see is at the joint area but at 90 degrees to the cord stock.

This detail shows that the vulcanised area has not failed and indicates a good quality vulcanisation.

After breakage the load cell transfers to computer software the data which is then analysed and expressed in graph form and as industry standard MPa tensile strength.

It is then possible to include this testing with general certification (by prior agreement).

By conducting joint tests and inserting them into the actual production schedule, Eriks can obtain a true representation of the integrity and consistency of the vulcanising process, particularly useful on higher volume orders.

16. Vulc-O-rings and O-ring Cords

Size Range

ERIKS can produce Vulc-O-rings with cross sections ranging from 1.78 mm to 25,4 mm. These will have a surface finish as extruded unless otherwise requested.

Unlike moulded O-rings, Vulc-O-rings have a limit as to how small an inside diameter that can be produced, which is regulated by the cross section. The following table shows the smallest sizes that can be produced.

1.78 mm - 8.40 mm	30 mm
9.00 mm - 12.70 mm	45 mm
13.00 mm- 15.90 mm	60 mm
18.00 mm - 19.05 mm	150 mm
20.63 mm - 25.40 mm	250 mm

Please note the price list for these small size Vulc-O-rings are more expensive because they are more difficult to manufacture.

There is however no upper limit to diameter.
The largest Vulc-O-ring Eriks has ever produced so far has been an amazing 22 meters in diameter! The only difficulty is checking the inside diameter at quality control!

Dimensional Tolerances

As previously mentioned, Eriks' extruded cord is unrivalled for tolerance control. Standard extruded cord betters E1 in many sections and a summary of the standard sections with their tolerance follows:

1.78	± 0.10	6.50	± 0.25
2.00	± 0.10	6.99	± 0.25
2.40	± 0.12	7.50	± 0.25
2.62	± 0.12	8.00	± 0.25
3.00	± 0.12	8.40	± 0.25
3.18	± 0.15	9.00	± 0.25
3.53	± 0.15	9.52	± 0.25
4.00	± 0.15	10.00	± 0.33
4.50	± 0.20	11.10	± 0.38
4.80	± 0.20	12.00	± 0.45
5.00	± 0.20	12.70	± 0.45
5.34	± 0.20	13.00	± 0.45
5.50	± 0.25	14.00	± 0.50
5.70	± 0.25	14.30	± 0.50
6.00	± 0.25	15.00	± 0.50
6.35	± 0.25	15.90	± 0.50

Every inch of the extruded products are checked for compliance to the above tolerances by state of the art 'laser micrometers'. This is the only way to guarantee 100% cross section diameter inspection.

Each batch of extrusion is passed through one of these laser micrometers and the laser measures the cord 250 times per second and then produces a report after each batch showing details of high, low, and average diameters.

16. Vulc-O-rings and O-ring Cords

Inside diameters are controlled according to ISO 3302-1 M2F as Vulc-O-rings frequently fall outside the range of diameters controlled by BS or AS standard sizes.

25mm thru 40mm	+/- 0.35
40.1mm thru 63mm	+/- 0.40
63.1mm thru 100mm	+/- 0.50
100.1mm thru 160mm	+/- 0.70

Hereafter the tolerance will be +/- 0.5% of the nominal inside diameter of the ring
Example: inside diameter of 310.0mm
tolerance = +/- 1.55mm (0.5%)

Benefits of Vulc-O-rings

The main benefits of utilising Vulc-O-rings are listed as follows.

- Molds are not required resulting in huge cost savings
- No upper diameter restrictions like molding
- Tolerances can be closer than molding
- No flash lines are present
- Can be used in standard housings
- Shapes other than round are possible
- Joints in some cases 90% of cord strength
- Short lead times (48 hour turn around possible)
- Hardnesses as low as 40 Shore A possible
- Hollow core and low load O-rings available
- Vacuum quality “ground finish” on demand
- Semi-com low outgassing grades with cleam room packaging
- USP class VI grades available
- Metal detectable grades available

Restrictions of Vulc-O-rings

There are however areas where Vulc-O-rings are restrictive.

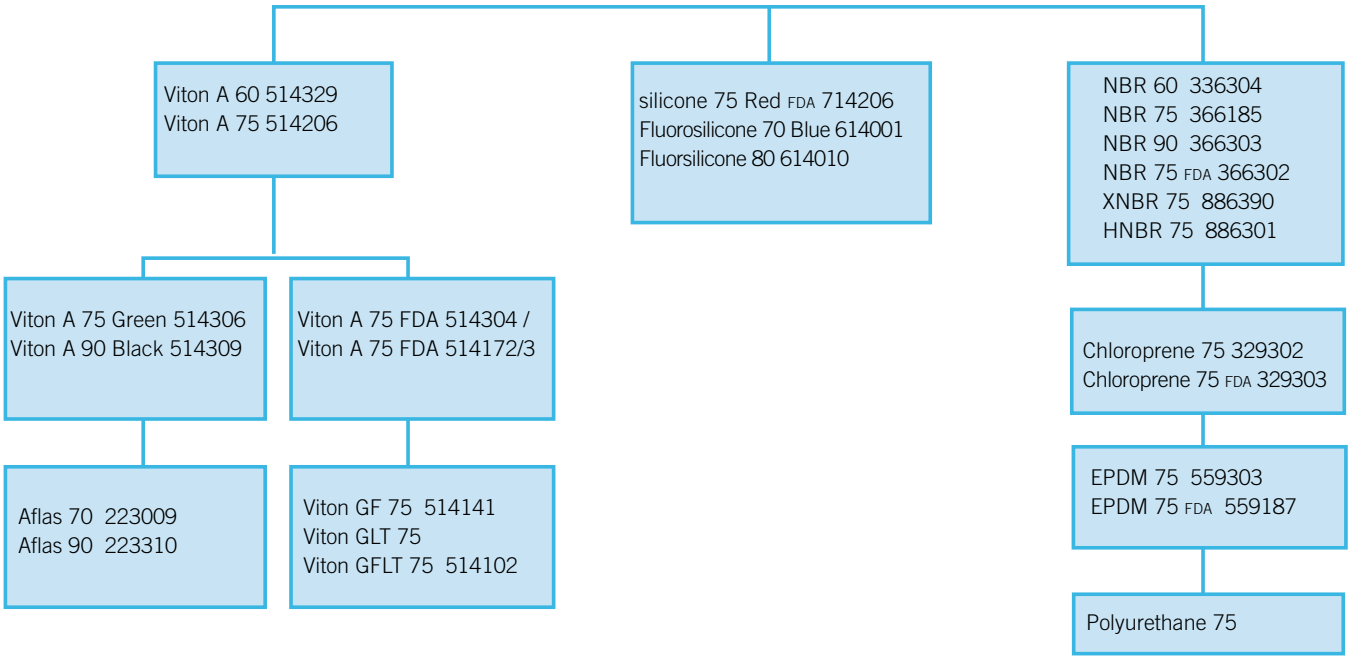
- Dynamic applications where roll may occur.
- Excessive stretching- low strength materials.
- Not competitive against moulded rings when small diameters in high volume.

Lead Times for Vulc-O-rings

Price list Vulc-O-rings up to 100 pcs will be shipped within seven working days from receipt of order.
Other volumes and sizes are available based on the application.

Materials

ERIKS maintains a standard range of materials in compound form for speedy conversion into extruded cord. This is a different policy than of holding cord on the shelf. There are more and more clients asking for current quarter cure dates and this policy ensures that the user gets this rather than cord which may have been on the shelf for longer.
Other materials, colors and hardness’s may be possible to special manufacture. Contact ERIKS with any requirements.



16. Vulc-O-rings and O-ring Cords

Rubber O-ring Cord

The table shows the available stock cord dimensions and elastomers. Upon request cord in special elastomers or special dimensions can be supplied.

Available materials:

Nitrile NBR 70 Shore A, NBR 90 Shore A, Fluorocarbon FKM 70 Shore A, FKM 75 Shore A, Neoprene CR 60 Shore A, EPDM 70 Shore A, Silicone MVQ 60 Shore A, Polyurethane AU/EU 90 Shore A, and Para NR 40 Shore A. Other elastomers, hardnesses, or special colors can also be supplied.
An O-ring splicing kit is available with the materials required for cold bonding of custom size O-rings.
Please note that vulcanized or spliced O-rings are only recommended for static applications.
For full information ask for the special brochure: Vulc-O-rings or contact the local ERIKS representative.

Rubber Cord

Cross section		NR Para	NBR Nitrile		Polyure-thane	CR. Neoprene	EPDM	FKM fluorocarbon		MVQ Silicone		
inch	mm	40 Sh.A Tol.E2 brown	70 Sh.A Tol.E1 black	90 Sh.A Tol.E2 black	90 Sh.A Tol.E2 green	60 Sh.A Tol.E2 white	70 Sh.A Tol.E2 black	70 Sh.A Original Viton Tol.E1 black	75 Sh.A 714 BF FDA/BGA Tol.E1 black	60 Sh.A 714 THT Tol.E2 transp.	60 Sh.A 714 MP FDA/BGA Tol.E2 grey	60 Sh.A Tol.E2 grey
.063	1,60		X				X	X				
.070	1,78		X				X	X				
.079	2,00		X				X	X		X		
.094	2,40		X					X				
.098	2,50		X							X		
.103	2,62		X				X	X		X		
.118	3,00	X	X	X	X	X	X	X	X	X	X	
.128	3,25		X									
.139	3,53		X	X		X	X	X	X	X		
.157	4,00	X	X		X	X	X	X	X	X	X	X
.177	4,50		X					X				
.187	4,75							X				
.197	5,00	X	X	X	X	X	X	X	X	X	X	
.210	5,33		X				X	X	X			
.224	5,70		X				X	X	X	X		
.236	6,00	X	X	X	X	X	X	X	X	X		X
.250	6,35		X					X				
.256	6,50							X				
.276	7,00	X	X		X	X	X	X	X	X	X	X
.295	7,50		X									
.315	8,00	X	X	X	X	X	X	X	X	X	X	X
.331	8,40		X				X	X				
.354	9,00	X	X			X	X	X		X		
.374	9,50		X									
.394	10,00	X	X		X	X	X	X	X	X	X	X
.433	11,00		X				X	X				
.472	12,00	X	X			X	X	X	X	X	X	X
.512	13,00		X			X		X		X		
.551	14,00		X			X	X	X				
.571	14,50					X						
.591	15,00		X			X	X	X		X		X
.630	16,00		X			X	X	X		X		
.669	17,00											X
.709	18,00	X	X			X				X		
.787	20,00	X	X			X	X	X		X		
.866	22,00		X							X	X	X
.906	23,00										X	X
.984	25,00	X	X			X						X
1.181	30,00		X			X	X					
1.220	31,00									X		
1.260	32,00		X									
1.575	40,00		X									