Comercial Hidromar, S.L.

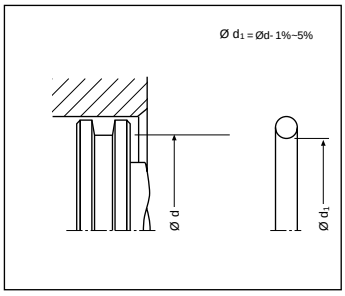
OR 90 sh

Engineering – Systems Design

Actually, industrial manufacturing is tend to use more compact components also as designing . The benefits of a more compact and small machinary is obvius, material acenomy, less energy comsumption, and less area required to install those somponents.
But one of the points that is mis-observed is about the crescent probability of failures in the system due to O-Rings damages because excesive pressure in the system is used for those ones. This is one of the most common failures shown.

Antecedents

We need to remember that O-rings, manufactured from various rubber compounds, when installed into the housing designed for it, it is radial or axially compressed or stretched, due to the kind of job it will do, thus, once installed, produce an increase of volume becuse the raw material used to produce the O-Rings are mostly free of gases, thus, can't be compressed. This is the reason why it's very important, where the O-Ring has a dynamic function, that the housing of this one is big enough to acommodate this volume variation. It's also important the stretching of the O-Ring, with any class of rubber i.e.: N.B.R., F.P.M. (Viton®) E.P.D.M., etc., when mounting this one into its housing when installed in systems where this one with a radial compression and O.D. working (pic. 1) or, in the oposite, a compression of the O-Ring when working in the I.D.. This stretching or compression of the seal should have a value between 1% and 5%, being adviseable a 2%. Those values are given due to the behaviour of the material due that it suffers expansions that are injurious while working the system, this takes more importance in dynamic systems thus, when expansions occur on the seal, it produces more load against the moving surface and, because of this, a major damage is caused due to friction and, again, this one produces an increase of the power needed to develop the same work and, lately, the a new damage of the seal. In systems where the seal is exclusively static, this relation can be equal to 0, so the size of the O-Ring and this one of the housing can be the same.



Pic. 1

Another point, as important as the above one is the extrusion gap between moving surfaces, i.e.: between the rod and the bore, and the part that contains the housing for the seal

As stated before, the seal needs to have an initial load p0 against the surface to seal in order to work properly. This load is enough when there are no pressure in the system, thus, p=0. While increasing the system pressure, also it increases the initia load of the seal resulting in an adition of both pressures, so p1 = p0+p. The final pressure, means, the one that produces a bypass of the fluid over the seal, will be defined by the material used on the seal because this one is the one that will conferes more or less flexibility to the seal, thus, higher resistance against extrusion.

O-Rings, when working in a dynamic system, should be installed with a stress between 1% and 5%, being adviseable a 2%

Again, as the system pressure increases, it also increase the load distribution internally within the O-Ring and, because of this behaviour, the pressure made by the seal against the sealing faces is also increased. So, as soon as between the two main sealing faces, being the primary and secondary, we can find the extrusion gap between the moving parts, it will be generated a trend of the O-Ring to enter in between this gap. So it is important to make the gap as smallest as possible, because, as larger the gap in, the major trend to O-Ring extrusion we get. Generally speaking, for 70 Shores O-Ring we can unse a 0,008 in (0,2 mm) extrusion gap without resulting damage of the seal up to 1160 PSI (80 bar), and 0,004 in (0,1 mm) for pressures up to 2175 PSI (150 bar).

This damage of the seal is known as "extrusion", and it is shown as a peeling of the seal close to the edge of the housing. This damage is being produced when the seal rest against this edge, so it produces this peeling on the surface of the seal along the entire circumference of this one. In an O-Ring, our case, and thanks to the flexibility of the seal, the damage can also be shown in different areas of the seal. After some time producing the damage on the seal, we can fing some fragments of the O-Ring, thus showing like pinch on this one. This

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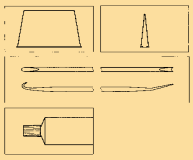

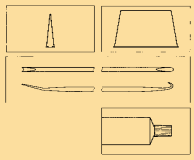

damage can be avoided using harder O-Rings, or anti-extrusion or back-up rings.

Usually, when a mechanical failure is produced, this on is not shown up to a certain inactivity time that can be short or even long and, in some cases, could be a failure dificult to detect, i.e.: more than 50% of the O-Rings with extrussion failures can be destroyed by the system before the problem is shown. It should bear on mind that, after installation of the seal, those ones doesn't acommodate up to the system begins to work because the system pressure is the one encharged to move the seal up to this position and, in some cases, up to some working cycles.

90 Shore O-Ring

While the major systems actually, becuase of costs, design, or lack of space, doesn't enable too much room for the installation of anti-extrusion or back-up rings that prevents the seal to a damage caused by extrusion, we need to source for other solutions more or less expensives.

One of the valid solutions in many cases, with a low increase of costs, is the use of 90 Shores O-Rings. Those ones will help us to prevent extrusion failures due that, with an increase of plastifiers added into the compound used to manufacture the O-Ring, they are able to admit more system pressure.

It is very usual to think, as a mistake, that F.P.M. (Viton®) O-Rings as a "more quality O-Rings" and that those ones will help to avoid the problem of extrusion failures. The O-Ring in other materials such as F.P.M., silicone, E.P.D.M. or so, usually are provided in 70 shores ±5, thus, remaining with the same hardness, so the extrusion failures will be given at the same time.

Also, the retrofit of N.B.R. 70 sh O-Rings with 90 Shores -Rings will benefit to us the way that it is not necesary no change the hardware where there exist the housing to be replaced.

Availability

Comercial Hidromar, S.L. has a huge stock of 90 Shores O-Rings, including sizes in inches metrics, also those ones advised by AS 568 standard to be used in boss.

The stock replacement is very fast, so, in case of stock-rupture, we can suply the O-Rings in a short time from 3 days up to 2 weeks. Please, contact our commercial departament in order to get more information about the seal you need.

Referential System

Our reference includes the size of the O-Ring together with a "D" (material code incicating it is 90 Shores N.B.R.) at the end of the same.

Ej.: 024,99-3,53D

If you need further information about this or other seal styles, please, contact our commercial departament, or you can download from our web site at: www.hidromar.es

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