



Data Sheet

V-ring seals

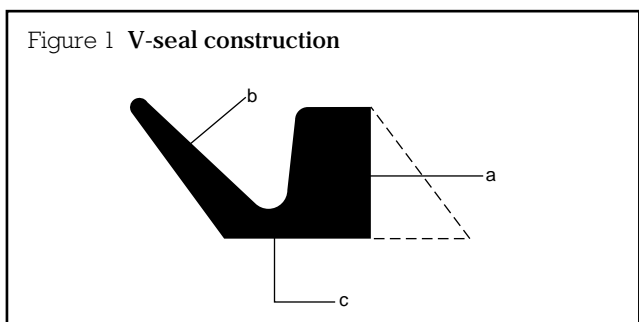
Introduction

The **RS** range of V-seals is an all rubber one-piece seal which is an interference fit on a shaft and seals axially against a counterface. This sealing method has been used extensively in a wide range of applications for many years and has been proved to be reliable against dust, dirt, grease, water splash, oil splash and other media.

The construction of the V-seal is divided into three parts (Figure 1).

The seal body (a); the conical self-adjusting lip (b); and the hinge (c).

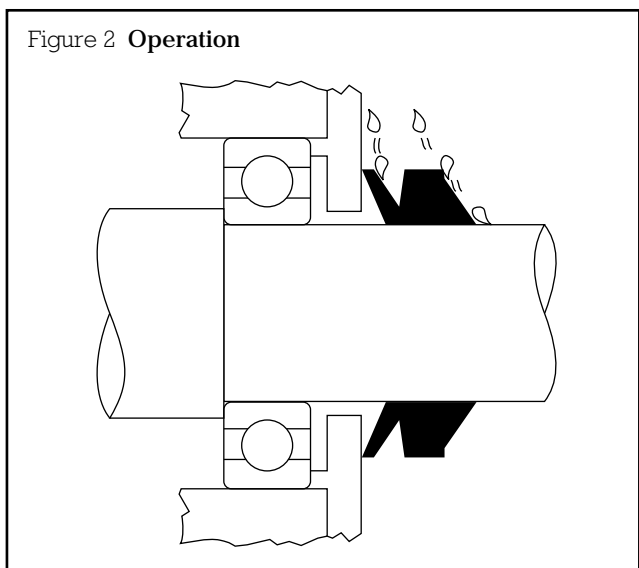
The hinge provides the flexible connection between the body and the sealing lip.



The body of the V-seal holds itself in position by its elastic fit on the shaft and rotates with the shaft. Dynamic sealing is produced by the contact of the flexible lip with the counterface (Figure 2).

The counterface can be the outside of the bearing cap, a washer or a suitable steel pressing.

Because of the centrifugal effect the V-seal acts as a deflector as well as a primary seal.



Advantages in using V-seals

1. **Low friction and therefore lower power losses**
Tests have shown that the power loss due to friction lies between that of a spring-loaded radial seal and a free-running shaft with no seal. This is especially important where small power units are concerned and where the power required to overcome seal friction is high in proportion to the output.
2. **Simplified design**
Generally, no seal housing is required. Ground shafts are not needed. No close tolerance machining or mating part is needed.
3. **Dual function**
The **RS** range of V-seals can be used both as a seal and a flinger.
4. Can accommodate some shaft misalignment and eccentric running.
5. The flexible lip is unlikely to become damaged during storage and assembly over splined shafts or other protruding parts. Wider machining tolerances mean less rejection and wastage of expensive mating components.
6. One size of V-seal can be used on more than one shaft size. Sizes overlap eliminating need for metric and imperial ranges and stocks. See table in the current **RS** Catalogue entry.

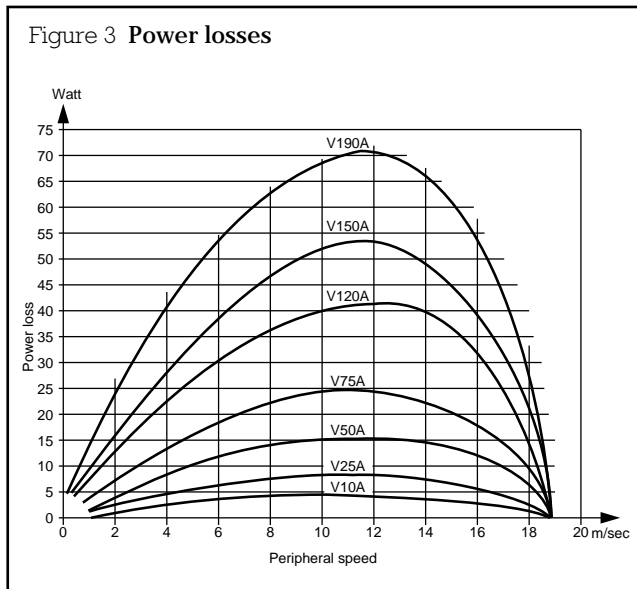
Fitting V-seals

Fitting the V-seal is simple and requires no great expenditure in time. The V-seal is stretched and pushed along the shaft. With a simple tool (eg. a screwdriver blade) the seal can be pushed into its correct working position.

For repetition work a simple tool can be used to ensure rapid location of the V-seal in its correct position.

Power losses are minimal, the pressure of the lip against the counterface is very light, resulting in low power losses and small heat increase. Above peripheral speeds of 12m/sec the friction decreases (Figure 3).

Figure 3 Power losses



Eccentricity/Misalignment

Because of its unique sealing action the V-seal can absorb some misalignment and seal effectively even when the shaft is eccentric. The amount of permissible misalignment depends on the shaft diameter and shaft speed.

Materials

The V-seal is manufactured from high wear-resistant nitrile rubber. The material has excellent resistance to oil and grease, weak alkalines and acids and many other media. Temperature range -40°C to +100°C.

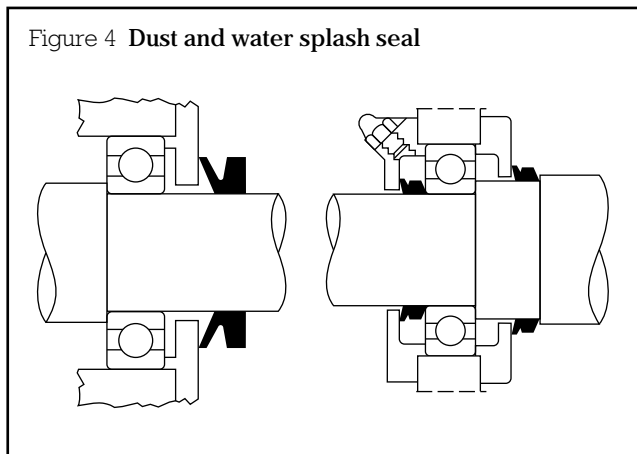
Typical applications

Sealing against dust and water splash

The V-seal is mounted on the *outside* of the bearing housing and seals against the ingress of dirt and water splash while retaining the *grease* in the bearing.

When the V-seal is used as a grease valve it is recommended that a stop on the shaft is incorporated to prevent movement of the seal due to pressure in the bearing. Axial support is also recommended with oil lubrication or when the peripheral speed exceeds 7-8m/s (Figure 4).

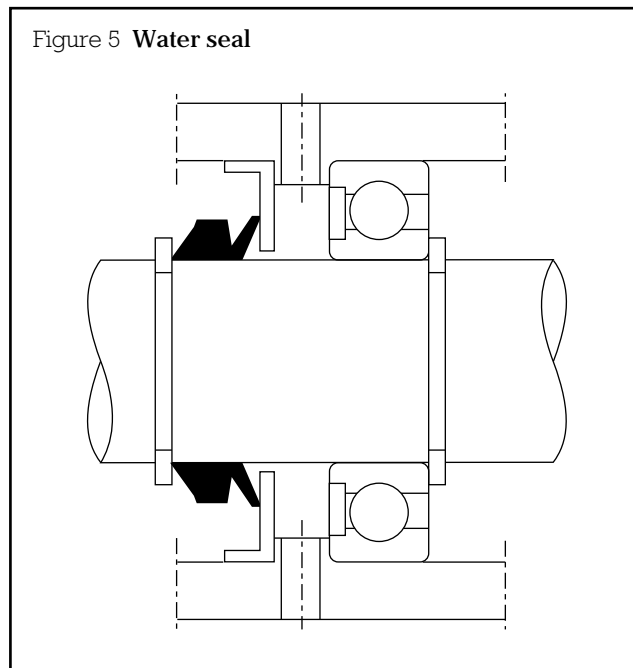
Figure 4 Dust and water splash seal



As a water seal

The V-seal can be used when partially or completely immersed in water. In such a case a combination of sealed bearing and drainage hole is necessary (Figure 5). With an unsealed bearing it is advisable to use two V-seals with a drainage hole between them.

Figure 5 Water seal

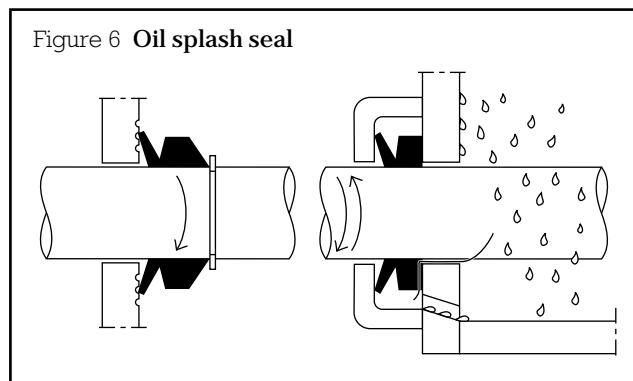


Sealing against oil splash

When the shaft always rotates in one direction a spiral groove can be incorporated in the counterface to give a pumping action which assists the sealing. In such a case the V-ring must be supported axially and mounted on the oil side of the housing.

Where the shaft can rotate in both directions use can be made of the back of the V-seal to provide the main seal while the lip acts as a secondary seal. In this application a drainage system must be provided and the peripheral speed kept below 12m/s. The oil level must not come above the level of the drainage hole and the shaft should be oiled before assembly to allow axial movement of the shaft (Figure 6).

Figure 6 Oil splash seal

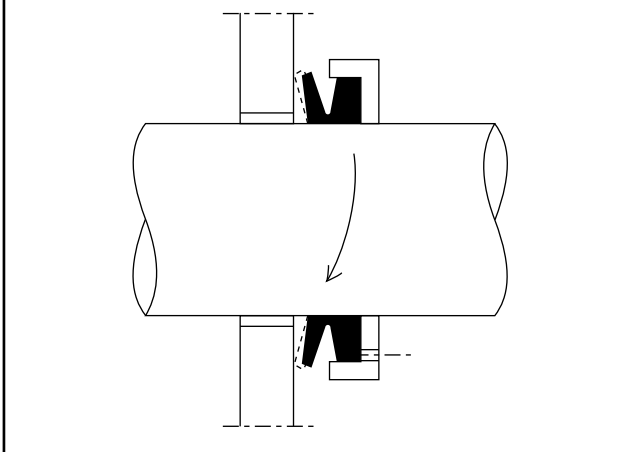


Sealing at high speeds

At high peripheral speeds the pressure of the V-seal lip against the counterface decreases until at approximately 15m/s the lip lifts away from the face and acts as a frictionless clearance seal. As the speed reduces the lip resumes its function as a light contact seal.

At peripheral speeds over 8m/s the V-seal must be supported axially and above 12m/s radial retention is required. This can be achieved by mounting the V-seal in an axial groove or incorporating a sleeve or clamping band as shown (Figure 7).

Figure 7 High speed sealing

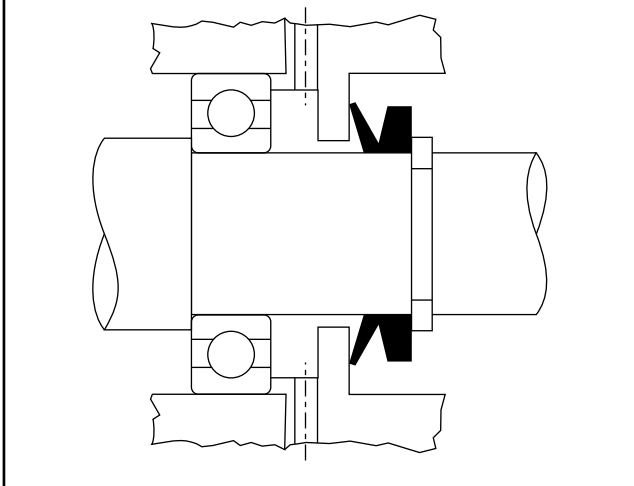


Sealing against a counterface

For most applications a surface finish of 16-125 CLA is adequate to provide an effective reliable seal. The surface should feel smooth, and sharp peaks which could cause wear should be removed.

Materials can be steel, stainless steel, bronze or brass. For non-lubricated applications the surface should be treated with a dry lubricant such as a Molykote spray. For lubricated applications, softer metals, light alloys or cast metal can be used. Hard plastic materials may be used provided that adequate lubrication is incorporated and that frictional heat does not produce temperatures affecting the material (Figure 8).

Figure 8 Sealing against a counterface



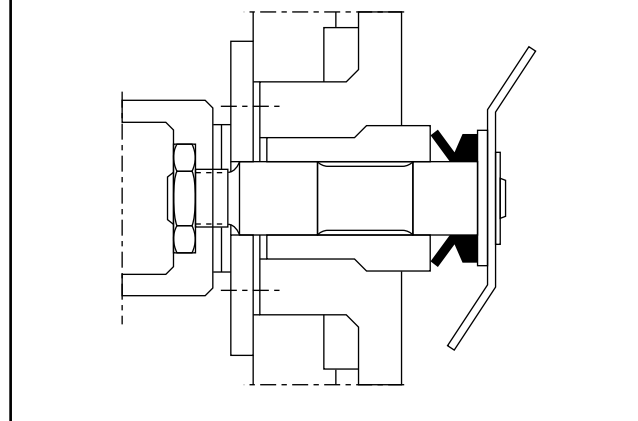
Further applications

V-ring seals have a multitude of uses, listed below are just a few typical industrial applications.

General machinery, machine tools, woodworking machinery, building and road machinery and plant. Rolling mills, automotive industry, domestic machinery (washing machines, food mixers, etc.) electric motors, electric switches, conveyors and materials-handling machinery, agricultural and earthmoving machinery, marine engines and equipment, paper making machinery.

Domestic juice mixer

Figure 9



RS stock no. 749-575

Shaft diameter – 6mm

Seal counterface – sintered bronze

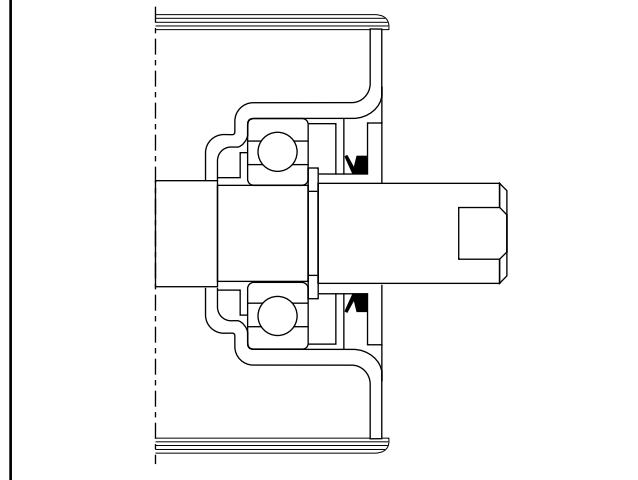
Surface finish – as cast

Speed (max) – 12,000 rpm

Seals against water, etc.

Conveyor roller

Figure 10



RS stock no. 749-654

Shaft diameter – 30mm

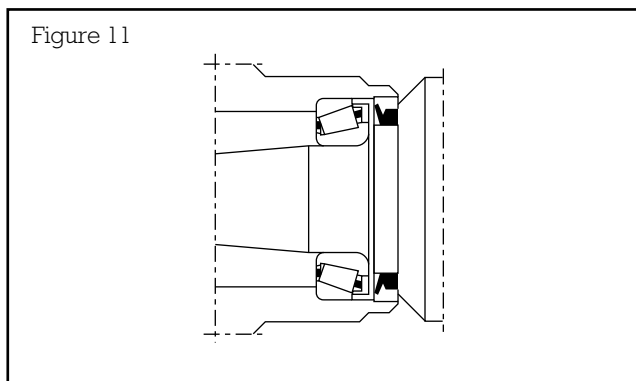
Seal counterface – cold rolled steel

Surface finish – as rolled and stamped

Speed – approx 300rpm

Seals against water, dirt, etc.

Wheel hub



RS stock no. 749-676
Shaft diameter – 40mm
Seal counterface – cold rolled steel
Hardness – approx 125HB
Surface finish – as rolled and stamped
Speed max – 2000rpm
Seals against grease and ingress of contaminant.

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