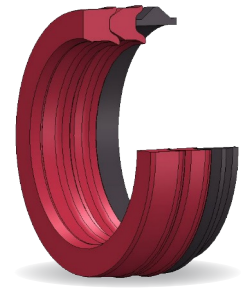
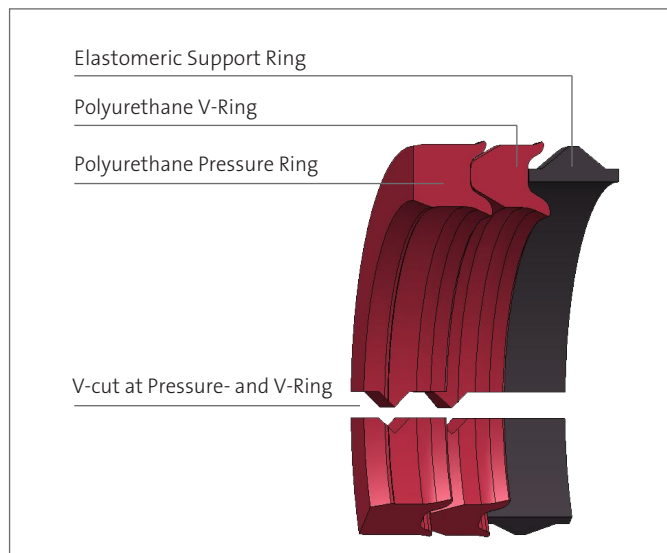


MERKEL V-PACKING SET VPS40



Merkel V-Packing Set VPS40 is a multi-part seal set for sealing piston rods, comprising one polyurethane pressure ring, one polyurethane V-ring and one elastomeric support ring as energizer .



VALUES FOR THE CUSTOMER

- Innovative design with focus on low friction
- Best sealing functionality at the V-cut, since sealing edges are perfectly aligned
- No loss of sealing function at low starting temperatures, as the influence of the thermal expansion in the area of the V-cut has been optimized by FE calculations
- Longevity thanks to the use of wear-resistant and hydrolysis-stabilized high performance polyurethane
- Based on the proven U-Ring design, the seal set can also be used with increased radial deflection, e. g. as a result of worn metal guides
- Easy installation due to the use of robust materials and a self-adjusting preload element
- Ready to install delivery. Cutting on site is not required

Applications

For challenging heavy duty applications, as well as for large diameter hydraulic cylinders up to \varnothing 1900 mm.

The seal set is able to handle high operating pressures up to 40 MPa and unfavorable operating conditions like long stroke / low speed / high pressure or short stroke / high frequency / low pressure.

The seal set can be placed in adjustable and non-adjustable housings.

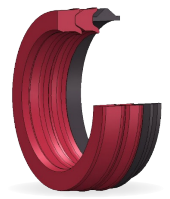
Material

Pressure Ring / V-Ring

| Material | Designation | Color |
|--------------|-------------|-------|
| Polyurethane | 93 AU V167 | Red |

Support Ring

| Material | Designation | Color |
|----------------|-------------|-------|
| Nitrile Rubber | NBR | Black |



GLAND DESIGN

Operating Conditions

| Material | 93 AU V167/NBR |
|-------------------------|-----------------|
| Hydraulic oils, HL, HLP | -30 ... +100 °C |
| HFA fluids | +5 ... +50 °C |
| HFB fluids | +5 ... +50 °C |
| HFC fluids | -30 ... +40 °C |
| HFD fluids | - |
| Water | +5 ... +60 °C |
| HETG (rape-seed oil) | -30 ... +60 °C |
| HEES (synth. ester) | -30 ... +60 °C |
| HEPG (glycol) | -30 ... +40 °C |
| Mineral greases | -30 ... +100 °C |
| Pressure | 40 MPa |
| Sliding speed | 0,5 m/s |

The figures given are maximum values and must not be applied simultaneously.

Surface Finish

| Peak-to-valley heights | R_a | R_{max} |
|------------------------|----------------------------|-------------------------|
| Sliding Surface | 0,05 ... 0,3 μm | $\leq 2,5 \mu\text{m}$ |
| Groove | $\leq 1,6 \mu\text{m}$ | $\leq 6,3 \mu\text{m}$ |
| Groove Sides | $\leq 3,0 \mu\text{m}$ | $\leq 15,0 \mu\text{m}$ |

Material content $M_r > 50\%$ to max. 90%, with cut depth $c = R_z/2$ and reference line $C_{ref} = 0\%$

The long-time behavior of a sealing element and its dependability against early failures are crucially influenced by the quality of the counter surface.

A precise description and assessment of the surface is thus indispensable.

Based on recent findings, we recommend supplementing the above definition of surface finish for the sliding surface by the characteristics detailed in the table below. With these new characteristics derived from the material content, the hitherto merely general description of the material content is significantly improved, not least in regard to the abrasiveness of the surface. Please also consult our Technical Manual.

Surface Finish of the Sliding Surfaces

| Characteristic Value | Limit | |
|----------------------|---------------------|---------------------|
| R_a | $>0,05 \mu\text{m}$ | $<0,30 \mu\text{m}$ |
| R_{max} | $<2,5 \mu\text{m}$ | |
| R_{pkx} | $<0,5 \mu\text{m}$ | |
| R_{pk} | $<0,5 \mu\text{m}$ | |
| R_k | $>0,25 \mu\text{m}$ | $<0,7 \mu\text{m}$ |
| R_{vk} | $>0,2 \mu\text{m}$ | $<0,65 \mu\text{m}$ |
| R_{vlox} | $>0,2 \mu\text{m}$ | $<2,0 \mu\text{m}$ |

The limit values listed in the table do not currently apply for ceramic or semi-ceramic counterfaces. Please also consult our Technical Manual.

Gap Dimension

The dimension D_2 is determined by factoring in the maximum permissible extrusion gap, the tolerances, the guide clearance, the deflection of the guide under load, and the pipe expansion.

The maximum permissible extrusion gap with a one-sided position of the piston is significantly determined by the maximum operating pressure and the temperature-dependent dimensional stability of the seal material.

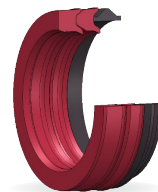
Recommended Gap Dimension Including Pipe Expansion

| Profile Dimension [mm] | Max. Permissible Gap Dimension [mm] | | | |
|------------------------|-------------------------------------|--------|--------|--------|
| | 16 MPa | 26 MPa | 32 MPa | 40 MPa |
| 10 | 0,70 | 0,65 | 0,60 | 0,55 |
| 12,5 | 0,75 | 0,70 | 0,65 | 0,60 |
| 15 | 0,80 | 0,75 | 0,70 | 0,65 |
| 20 | 0,95 | 0,90 | 0,85 | 0,80 |
| 25 | 1,0 | 0,95 | 0,90 | |
| 30 | 1,10 | 1,05 | 1,00 | |
| 35 | 1,20 | 1,10 | 1,00 | |

Tolerances

Recommended fit, if metallic guides are used on both sides.

| Diameter d resp. D [mm] | Tolerance |
|-----------------------------|-----------|
| ≤ 800 | H8/f8 |
| > 800 | +0,1/f7 |

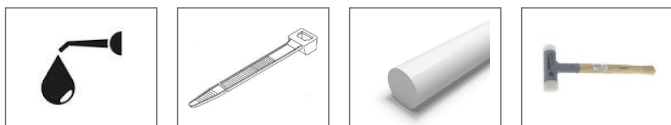


INSTALLATION AND GLAND DESIGN

Design notes

An axially accessible housing is required for installation. Please also note the general design remarks in our Technical Manual.

Installation



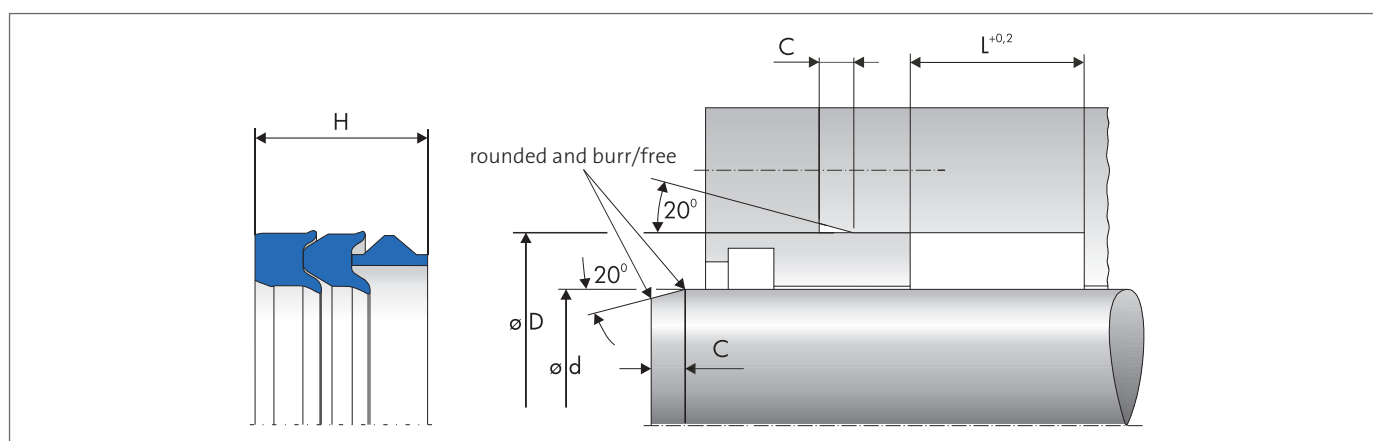
Necessary tools for installation are:

Suitable grease, a cable fastener, a round and burr-free plastic slat and a hammer.

For general information on assembly, please refer to our installation instructions/animations for V-Packing Sets Merkel V1000, ES respectively ESV (YouTube channel via www.fst.com).

- Please begin with the support ring, continue with the V-ring and end the installation with the pressure ring.
- Pressure ring and V-packing ring are supplied with a functionally relevant oversized circumferential length. Install each component with the butt joint first. Use the plastic slat and the hammer and proceed at the point opposite the butt joint, knocking that part of the seal into the housing. Then proceed with the 3 and 9 o'clock position. Knock the seal down into the housing with short, powerful hammer blows. Work circumferentially towards the butt joint.
- Check the correct position of the seal's ends at the V-cut.
- For all V-rings, it is helpful to place a cable fastener between the V-ring and the outer diameter of the housing. This will allow the air which is trapped to escape. Always remove the cable fastener after installation.
- When installing the individual rings, please make sure that the butt joints are offset by 120/180 degrees respectively.
- All components of the seal set are correctly located in the housing by axial tightening of the gland.
- Make sure that length of the seal set matches with the installation space.
- Only wet the housing sparingly with grease. In general, the installation is simplified by a minimum of friction.
- Install the components of the set individually and in the correct order and orientation. The piston rod must be installed in the cylinder before mounting.

Installation Diagram



The information contained herein is believed to be reliable, but no representation, guarantees or warranties of any kind are made to its accuracy or suitability for any purpose. The information presented herein is based on laboratory testing and does not necessarily indicate end product performance. Full scale testing and end product performance are the responsibility of the user.

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