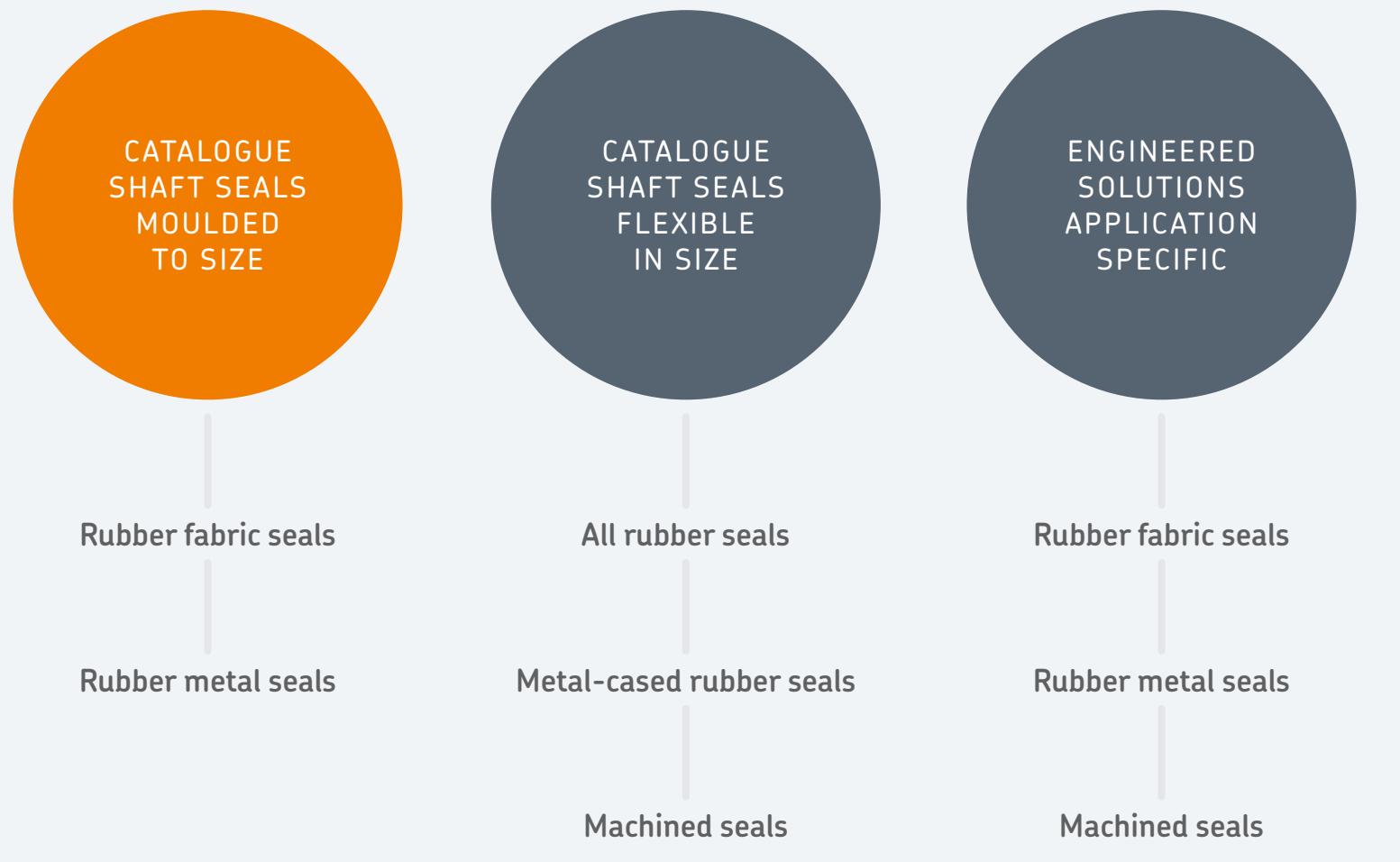


# Reinforced shaft seals

Catalogue radial shaft seals for heavy duty industrial applications



# Radial shaft seals for heavy industrial applications



## Foreword

### From catalogue to engineered solutions

SKF created a complete Heavy Industrial Seals (HIS) offer to meet our customer needs. This brochure provides an overview on SKF catalogue heavy industrial shaft seals. The brochure is a guide to seal selection. It provides an introduction to the most important factors to be considered.

The catalogue seal offer has been expanded by complementary offers with size flexibility, customization and engineering services.

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#### Catalogue seals and expanded offer

- HIS flexible in size
- Express service
- Engineered solutions

#### Catalogue seals for easy retrofit

*Catalogue shaft seals moulded to size* are manufactured in an efficient moulding process for mid and higher volumes. Please refer to the enclosed size tables in this catalogue. On request SKF tools up additional sizes.

#### Express service with flexible manufacturing processes

*Catalogue shaft seals flexible in size* are available in customized main dimensions with minimum order quantity of just one seal and optional express service. Please refer to shaft seals flexible in size.

#### Engineering service to exceed limits in extreme conditions

*Engineered solutions application specific* demands are relevant where operating parameters are exceeding the limits of catalogue seals. Please refer to engineered solutions.

#### SKF heavy industrial seals

- Availability, matching your needs schedule and express service
- Unlimited size range, not limited to listed catalogue part numbers
- Fast and simple installation, reduces risk of failure and resulting downtime
- Highly flexible design options, configured to your requirements
- Improve rotating equipment performance

Heavy duty industrial applications, like in construction equipment, metal, mining, paper, oil drilling or wind turbines can be very challenging for radial shaft seals. In operation, the seals are exposed to a wide range of temperatures, speeds and abrasive contaminants. Besides their generally sturdy designs and often large size, seals for these applications come with some special features to help improve seal performance, reliability and handling.

#### Typical applications

- Steel and aluminium rolling
- Pulp and paper feeders and paper machine wet section
- Mining and cement machinery
- Traditional energy – coal grinding mills
- Wind turbines
- Tunnel boring machines
- Heavy duty gearboxes
- Special purpose machinery
- Construction machinery

Designed to the  
toughest operating  
conditions



# Catalogue shaft seals moulded to size

Catalogue shaft seals moulded to size are manufactured in an efficient moulding process for mid and higher volumes. Typical applications in rough environment in heavy duty operations for large machinery.

| Seal capabilities |   |
|-------------------|---|
| Size              | from 25 to 2 350 mm<br>(from 0.98 to 92.52 in.) |
| Pressure          | max. 0.5 bar<br>(max. 7.25 psi)                 |
| TIR               | max. $\pm$ 1,025 mm<br>(max. $\pm$ 0.04 in.)    |
| Speed             | max. 25 m/s<br>(max. 4 900 ft/min)              |
| Temperature       | from -25 to +200 °C<br>(from -13 to +392 °F)    |
| Materials         | NBR<br>HNBR<br>FKM                              |

Selection criteria are the internal and external application environment, seal housing designs and the operating parameters such as media, rotating speed, DRO (Dynamic runout) and mis-alignment, operating temperature and pressure. For the seal-system performance it is important to have the right seal, seal counterface conditions, effective lubrication and installation procedures.

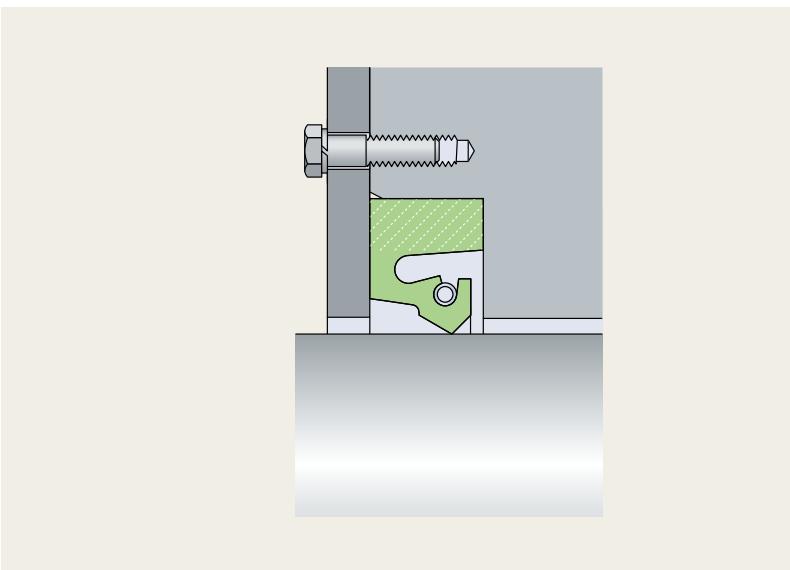
Shaft seals – moulded to size by SKF is a range of seal designs for easy retrofit. The size tables include a selection of available sizes. On request SKF tools up additional sizes. For seals with full size flexibility and express service – even for just one seal – please refer to **page 54 catalogue shaft seals flexible in size**.

For seals with capabilities exceeding the limits (→ **table 1**) or special customer requirements please refer to *engineered solutions application specific* on **page 56**.

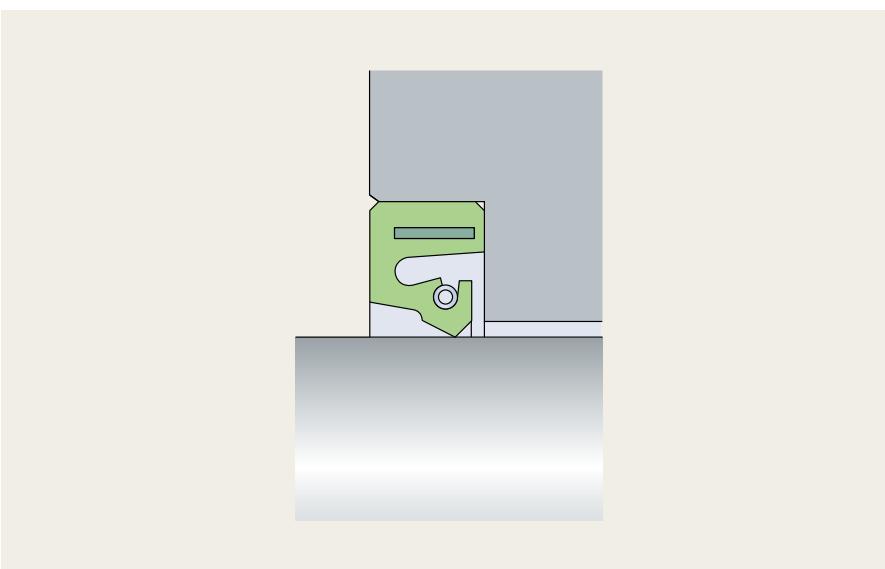
EASY  
RETROFIT!

# Seal selection

The most important factors to consider for seal selection are:



Housing with cover plate, seal axially clamped



Open housing, seal self-retaining

## 1. Seal housing designs

The two common housing designs determine the seal selection. Housings with cover plate ensure proper stability by axial clamping for rubber fabric seals. Open housings require a metal reinforced self-retaining seal.

### Rubber fabric reinforced (solid + split)

The fabric reinforced rubber seals are available in solid and split executions. The seals are finished oversized to the housing bore to allow proper compression and stability. A cover plate is required to compress the seal within the housing, helping to stabilize the seal. The split seal execution allows seal replacement without shaft removal or dismounting of other machine components.

### Rubber metal reinforced

The seals are self-retaining in open housing bores without the use of a cover plate. The metal reinforcement provides the required stability in the housing bore. The L-shape metal reinforcement further increases seal stability e.g. in case of vibrations in the system.

## 2. Lip features

A garter or finger spring provides the appropriate radial load against the shaft. To avoid the potential risk of losing a spring in blind installations SKF seals feature an optional moulded-in garter spring or the finger spring execution.

## 3. Re-lubrication features

All seals of the range can be equipped with lubrication grooves at the back of the seal to allow the re-greasing between the sealing lips in back-to-back or tandem installations of two seals. For metal reinforced seals spacer lugs in customized dimensions are available on request.

## 4. Auxiliary lip

The auxiliary lip on radial shaft seals is an optional feature for increased protection against contaminants. Auxiliary lips are meant for applications in slightly contaminated environment. In an environment with heavy contamination an additional seal with excluding function is highly recommended.

## 5. Main lip materials

Material selection has a significant impact on seal performance and reliability. Important material properties are resistance to swelling, elasticity, chemical resistance, thermal resistance and low temperature behaviour. Seals are available in nitrile rubber (NBR), hydrogenated nitrile rubber (HNBR) and fluoro rubber (FKM).

The recommended maximum rotating speed for a seal is linked to the thermal resistance of the sealing lip material. Radial force and friction causes elevated temperatures under the sealing lip, which may require increased thermal resistance of the sealing material.

Details about the chemical resistance of the sealing material against the various media can be found in the section "chemical resistance" of SKF publication "10919-Industrial shaft seals".

NBR is a general purpose sealing material with good resistance to most mineral oils and greases, normal fuels such as gasoline, diesel and light heating oils, animal and vegetable oils and hot water. The permissible operating temperature range is +30 to +100 °C (+22 to +210 °F) for brief periods temperatures of up to +120 °C (+250 °F) can be tolerated.

HNBR combines increased wear resistance with increased high-temperature resistance. HNBR additionally features increased resistance to chemical attack, weather, ageing and ozone. Mixtures of oil in air may have a negative effect. The upper operating temperature limit is +150 °C (+300 °F).

FKM features a very good thermal and chemical resistance with very good ageing, weather, UV light and ozone resistance. The upper operating temperature limit is +200 °C (+390 °F).



Rubber fabric reinforced (solid + split), seal axially clamped



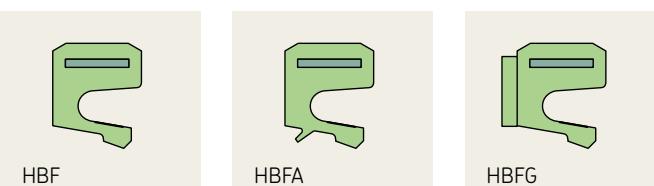
Rubber metal reinforced, self retaining seal with auxiliary lip

# Design overview

## HF seals – rubber fabric reinforced



## HB and HL seals – rubber metal reinforced



## Operating parameters

| Material<br>Seal | Temperature |      |      |      | Pressure |      | Rotating speed |        |
|------------------|-------------|------|------|------|----------|------|----------------|--------|
|                  | from        | to   | from | to   | max.     |      | max.           |        |
|                  | °C          |      | °F   |      | MPa      | psi  | m/s            | ft/min |
| NBR              | -25         | +100 | -13  | +212 | 0,05     | 7,25 | 15             | 2 950  |
| HNBR             | -25         | +150 | -13  | +302 | 0,05     | 7,25 | 20             | 3 950  |
| FKM              | -15         | +200 | -5   | +392 | 0,05     | 7,25 | 25             | 4 900  |

High pressure and high speed seals are available as engineered solutions

## Seal design configuration

| Seal body designs | Reinforcement                      | Fabric solid         | Fabric split (O) | Metal band (B)       | L shape metal band (L) |
|-------------------|------------------------------------|----------------------|------------------|----------------------|------------------------|
|                   | Main construction type             | HF                   | HF               | HB                   | HL                     |
| Main lip features | No spring                          | HF                   | –                | HB                   | HL                     |
|                   | Garter spring (S)                  | HFS                  | HFSO             | HBS                  | HLS                    |
|                   | Garter spring – moulded-in (M)     | HFM                  | –                | HBM                  | HLM                    |
|                   | Finger spring (F)                  | HFF                  | HFFO             | HBF                  | HLF                    |
|                   | Garter spring + Finger spring (SF) | –                    | –                | –                    | HLSF                   |
|                   | Pressure design (P)                | –                    | –                | –                    | HLP                    |
| Re-lub features   | Lub groove (G)                     | HFSG<br>HFMG<br>HFFG | HFSGO            | HBSG<br>HBMG<br>HBFG | HLSG<br>HLMG<br>HLFG   |
|                   | Lugs (L)                           | –                    | –                | HBSL<br>HBML         | HLSL<br>HMLM<br>HLSFL  |
|                   |                                    |                      |                  |                      |                        |
| Auxiliary lip     | Dust lip (A)                       | HFSA<br>HFMA<br>HFFA | HFSAO<br>HFFAO   | HBSA<br>HBMA<br>HBFA | HLSA<br>HLMA<br>HLSFA  |
|                   |                                    |                      |                  |                      |                        |
|                   |                                    |                      |                  |                      |                        |
| Design variation  | 1, 2, ...                          | HFS1                 | –                | –                    | HLSF1                  |
|                   |                                    |                      |                  |                      |                        |
|                   |                                    |                      |                  |                      |                        |
| Main lip material | NBR                                | R                    | R                | R                    | R                      |
|                   | HNBR                               | H                    | H                | H                    | H                      |
|                   | FKM                                | V                    | V                | V                    | V                      |

## Designation examples metric and imperial

### 50x75x10 HFSA V

The metric seal designation shows the dimensions, the design and the material.

### 208-316-32 HFSA R

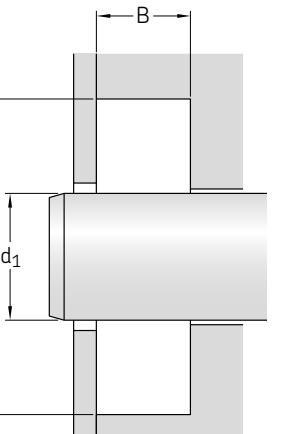
Inch dimensions are coded and separated with an hyphen.  
See product tables at the following pages.

## HFS seals – rubber fabric reinforced

$d_1$  25–80 mm



The size tables include a selection of available sizes. **On request SKF tools up additional sizes.** For seals with full size flexibility and express service – even for just one seal – refer to page 54 catalogue shaft seals flexible in size.



Dimensions Dimensions Mate- SKF Designation  
 $d_1$  D B  $d_1$  D B material

$d_1$  D B  $d_1$  D B  
mm in.

25 38 8 0.984 1.496 0.315 NBR 25x38x8 HFS R  
HNBR 25x38x8 HFS H  
FKM 25x38x8 HFS V

25 50 10 0.984 1.969 0.394 NBR 25x50x10 HFS R  
HNBR 25x50x10 HFS H  
FKM 25x50x10 HFS V

28 50 10 1.102 1.969 0.394 NBR 28x50x10 HFS R  
HNBR 28x50x10 HFS H  
FKM 28x50x10 HFS V

30 48 8 1.181 1.890 0.315 NBR 30x48x8 HFS R  
HNBR 30x48x8 HFS H  
FKM 30x48x8 HFS V

30 50 10 1.181 1.969 0.394 NBR 30x50x10 HFS R  
HNBR 30x50x10 HFS H  
FKM 30x50x10 HFS V

30 52 10 1.181 2.047 0.394 NBR 30x52x10 HFS R  
HNBR 30x52x10 HFS H  
FKM 30x52x10 HFS V

30,16 47,72 9,52 1.187 1.879 0.375 NBR 112-156-24 HFS R  
HNBR 112-156-24 HFS H  
FKM 112-156-24 HFS V

35 60 10 1.378 2.362 0.394 NBR 35x60x10 HFS R  
HNBR 35x60x10 HFS H  
FKM 35x60x10 HFS V

38,1 53,98 11,11 1.500 2.125 0.437 NBR 132-208-28 HFS R  
HNBR 132-208-28 HFS H  
FKM 132-208-28 HFS V

42 65 10 1.654 2.559 0.394 NBR 42x65x10 HFS R  
HNBR 42x65x10 HFS H  
FKM 42x65x10 HFS V

44,4 73,1 10 1.748 2.878 0.394 NBR 44,4x73,1x10 HFS R  
HNBR 44,4x73,1x10 HFS H  
FKM 44,4x73,1x10 HFS V

45 60 7 1.772 2.362 0.276 NBR 45x60x7 HFS R  
HNBR 45x60x7 HFS H  
FKM 45x60x7 HFS V

Dimensions Dimensions Mate- SKF Designation  
 $d_1$  D B  $d_1$  D B material

mm in.

55 76 12 2.165 2.992 0.472 NBR 55x76x12 HFS R  
HNBR 55x76x12 HFS H  
FKM 55x76x12 HFS V

55 80 11 2.165 3.150 0.433 NBR 55x80x11 HFS R  
HNBR 55x80x11 HFS H  
FKM 55x80x11 HFS V

55 80 12 2.165 3.150 0.472 NBR 55x80x12 HFS R  
HNBR 55x80x12 HFS H  
FKM 55x80x12 HFS V

58,7 79,4 9,5 2.313 3.125 0.375 NBR 220-308-24 HFS R  
HNBR 220-308-24 HFS H  
FKM 220-308-24 HFS V

60 80 10 2.362 3.150 0.394 NBR 60x80x10 HFS R  
HNBR 60x80x10 HFS H  
FKM 60x80x10 HFS V

60 85 11 2.362 3.346 0.433 NBR 60x85x11 HFS R  
HNBR 60x85x11 HFS H  
FKM 60x85x11 HFS V

60 86 10 2.362 3.386 0.394 NBR 60x86x10 HFS R  
HNBR 60x86x10 HFS H  
FKM 60x86x10 HFS V

60 90 13 2.362 3.543 0.512 NBR 60x90x13 HFS R  
HNBR 60x90x13 HFS H  
FKM 60x90x13 HFS V

60,33 79,38 9,53 2.375 3.125 0.375 NBR 224-308-24 HFS R  
HNBR 224-308-24 HFS H  
FKM 224-308-24 HFS V

62,5 95 10 2.461 3.740 0.394 NBR 62,5x95x10 HFS R  
HNBR 62,5x95x10 HFS H  
FKM 62,5x95x10 HFS V

65 85 10 2.559 3.346 0.394 NBR 65x85x10 HFS R  
HNBR 65x85x10 HFS H  
FKM 65x85x10 HFS V

65 90 11 2.559 3.543 0.433 NBR 65x90x11 HFS R  
HNBR 65x90x11 HFS H  
FKM 65x90x11 HFS V

65 95 10 2.559 3.740 0.394 NBR 65x95x10 HFS R  
HNBR 65x95x10 HFS H  
FKM 65x95x10 HFS V

66,67 82,55 7,95 2.625 3.250 0.313 NBR 240-316-20 HFS R  
HNBR 240-316-20 HFS H  
FKM 240-316-20 HFS V

69,8 85,7 7,9 2.750 3.375 0.313 NBR 248-324-20 HFS R  
HNBR 248-324-20 HFS H  
FKM 248-324-20 HFS V

69,85 95,25 12,7 2.750 3.750 0.5 NBR 248-348-32 HFS R  
HNBR 248-348-32 HFS H  
FKM 248-348-32 HFS V

Dimensions Dimensions Mate- SKF Designation  
 $d_1$  D B  $d_1$  D B material

mm in.

69,85 101,6 12,7 2.750 4.000 0.5 NBR 248-400-32 HFS R  
HNBR 248-400-32 HFS H  
FKM 248-400-32 HFS V

70 90 7 2.756 3.543 0.276 NBR 70x90x7 HFS R  
HNBR 70x90x7 HFS H  
FKM 70x90x7 HFS V

70 90 8 2.756 3.543 0.315 NBR 70x90x8 HFS R  
HNBR 70x90x8 HFS H  
FKM 70x90x8 HFS V

70 105 12,5 2.756 4.134 0.492 NBR 70x105x12,5 HFS R  
HNBR 70x105x12,5 HFS H  
FKM 70x105x12,5 HFS V

70 110 13 2.756 4.331 0.512 NBR 70x110x13 HFS R  
HNBR 70x110x13 HFS H  
FKM 70x110x13 HFS V

72 100 10 2.835 3.937 0.394 NBR 72x100x10 HFS R  
HNBR 72x100x10 HFS H  
FKM 72x100x10 HFS V

73 95 12,5 2.874 3.740 0.492 NBR 73x95x12,5 HFS R  
HNBR 73x95x12,5 HFS H  
FKM 73x95x12,5 HFS V

74,6 92 9,5 2.937 3.622 0.374 NBR 75x92x9,5 HFS R  
HNBR 75x92x9,5 HFS H  
FKM 75x92x9,5 HFS V

75 95 12,5 2.953 3.740 0.492 NBR 75x95x12,5 HFS R  
HNBR 75x95x12,5 HFS H  
FKM 75x95x12,5 HFS V

75 100 12 2.953 3.937 0.472 NBR 75x100x12 HFS R  
HNBR 75x100x12 HFS H  
FKM 75x100x12 HFS V

75 105 15 2.953 4.134 0.591 NBR 75x105x15 HFS R  
HNBR 75x105x15 HFS H  
FKM 75x105x15 HFS V

76,5 113 12 3.012 4.449 0.472 NBR 76,5x113x12 HFS R  
HNBR 76,5x113x12 HFS H  
FKM 76,5x113x12 HFS V

77,5 113 12 3.051 4.449 0.472 NBR 77,5x113x12 HFS R  
HNBR 77,5x113x12 HFS H  
FKM 77,5x113x12 HFS V

80 100 10 3.150 3.937 0.394 NBR 80x100x10 HFS R  
HNBR 80x100x10 HFS H  
FKM 80x100x10 HFS V

80 100 13 3.150 3.937 0.512 NBR 80x100x13 HFS R  
HNBR 80x100x13 HFS H  
FKM 80x100x13 HFS V

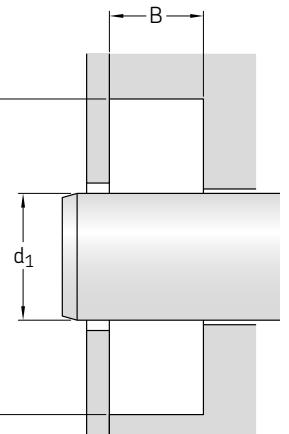
80 100 13 3.150 3.937 0.512 NBR 80x100x13 HFS R  
HNBR 80x100x13 HFS H  
FKM 80x100x13 HFS V

## HFS seals – rubber fabric reinforced

$d_1$  80–110 mm



The size tables include a selection of available sizes. On request SKF tools up additional sizes. For seals with full size flexibility and express service – even for just one seal – refer to page 54 catalogue shaft seals flexible in size.



### Dimensions Dimensions Mater- SKF Designation

$d_1$  D B  $d_1$  D B

mm in.

80 112 12,5 3.150 4.409 0.492 NBR 80x112x13 HFS R  
HNBR 80x112x13 HFS H  
FKM 80x112x13 HFS V

80 115 10 3.150 4.528 0.394 NBR 80x115x10 HFS R  
HNBR 80x115x10 HFS H  
FKM 80x115x10 HFS V

82,6 110 12 3.250 4.331 0.472 NBR 82,6x110x12 HFS R  
HNBR 82,6x110x12 HFS H  
FKM 82,6x110x12 HFS V

85 102 13 3.346 4.016 0.512 NBR 85x102x13 HFS R  
HNBR 85x102x13 HFS H  
FKM 85x102x13 HFS V

85 105 10 3.346 4.134 0.394 NBR 85x105x10 HFS R  
HNBR 85x105x10 HFS H  
FKM 85x105x10 HFS V

85 109 12 3.346 4.291 0.472 NBR 85x109x12 HFS R  
HNBR 85x109x12 HFS H  
FKM 85x109x12 HFS V

85 110 12,5 3.346 4.331 0.492 NBR 85x110x13 HFS R  
HNBR 85x110x13 HFS H  
FKM 85x110x13 HFS V

85 117 12,5 3.346 4.606 0.492 NBR 85x117x13 HFS R  
HNBR 85x117x13 HFS H  
FKM 85x117x13 HFS V

85,6 106,4 8,7 3.370 4.188 0.341 NBR 85,6x106,4x8,7 HFS R  
HNBR 85,6x106,4x8,7 HFS H  
FKM 85,6x106,4x8,7 HFS V

88 126 12 3.465 4.961 0.472 NBR 88x126x12 HFS R  
HNBR 88x126x12 HFS H  
FKM 88x126x12 HFS V

88,9 111,1 9,5 3.500 4.375 0.375 NBR 332-424-24 HFS R  
HNBR 332-424-24 HFS H  
FKM 332-424-24 HFS V

88,9 114,3 12,7 3.500 4.500 0.5 NBR 332-432-32 HFS R  
HNBR 332-432-32 HFS H  
FKM 332-432-32 HFS V

### Dimensions Dimensions Mater- SKF Designation

$d_1$  D B  $d_1$  D B

mm in.

95 115 10 3.740 4.528 0.394 NBR 95x115x10 HFS R  
HNBR 95x115x10 HFS H  
FKM 95x115x10 HFS V

95 120 10 3.740 4.724 0.394 NBR 95x120x10 HFS R  
HNBR 95x120x10 HFS H  
FKM 95x120x10 HFS V

95 120 13 3.740 4.724 0.512 NBR 95x120x13 HFS R  
HNBR 95x120x13 HFS H  
FKM 95x120x13 HFS V

95 127 12,5 3.740 5.000 0.492 NBR 95x127x13 HFS R  
HNBR 95x127x13 HFS H  
FKM 95x127x13 HFS V

95,25 127 15,88 3.750 5.000 0.625 NBR 348-500-40 HFS R  
HNBR 348-500-40 HFS H  
FKM 348-500-40 HFS V

98 115 9 3.858 4.528 0.354 NBR 98x115x9 HFS R  
HNBR 98x115x9 HFS H  
FKM 98x115x9 HFS V

98 125 13 3.858 4.921 0.512 NBR 98x125x13 HFS R  
HNBR 98x125x13 HFS H  
FKM 98x125x13 HFS V

98,4 123,88 12,7 3.875 4.875 0.5 NBR 356-456-32 HFS R  
HNBR 356-456-32 HFS H  
FKM 356-456-32 HFS V

98,4 136,4 12,7 3.875 5.370 0.5 NBR 98,4x136,4x12,7 HFS R  
HNBR 98,4x136,4x12,7 HFS H  
FKM 98,4x136,4x12,7 HFS V

99,5 127 12,7 3.917 5.000 0.5 NBR 99,5x127x12,7 HFS R  
HNBR 99,5x127x12,7 HFS H  
FKM 99,5x127x12,7 HFS V

100 120 10 3.937 4.724 0.394 NBR 100x120x10 HFS R  
HNBR 100x120x10 HFS H  
FKM 100x120x10 HFS V

100 125 10 3.937 4.921 0.394 NBR 100x125x10 HFS R  
HNBR 100x125x10 HFS H  
FKM 100x125x10 HFS V

100 127 13 3.937 5.000 0.512 NBR 100x127x13 HFS R  
HNBR 100x127x13 HFS H  
FKM 100x127x13 HFS V

100 128,5 9,5 3.937 5.059 0.374 NBR 100x128,5x9,5 HFS R  
HNBR 100x128,5x9,5 HFS H  
FKM 100x128,5x9,5 HFS V

100 130 12 3.937 5.118 0.472 NBR 100x130x12 HFS R  
HNBR 100x130x12 HFS H  
FKM 100x130x12 HFS V

100 130 13 3.937 5.118 0.512 NBR 100x130x13 HFS R  
HNBR 100x130x13 HFS H  
FKM 100x130x13 HFS V

100 130 16 3.937 5.118 0.63 NBR 100x130x16 HFS R  
HNBR 100x130x16 HFS H  
FKM 100x130x16 HFS V

### Dimensions Dimensions Mater- SKF Designation

$d_1$  D B  $d_1$  D B

mm in.

100 140 16 3.937 5.512 0.63 NBR 100x140x16 HFS R  
HNBR 100x140x16 HFS H  
FKM 100x140x16 HFS V

100,01 130,17 15,88 3.938 5.125 0.625 NBR 360-508-40 HFS R  
HNBR 360-508-40 HFS H  
FKM 360-508-40 HFS V

101,6 127 12,7 4.000 5.000 0.5 NBR 400-500-32 HFS R  
HNBR 400-500-32 HFS H  
FKM 400-500-32 HFS V

101,6 133,35 12,7 4.000 5.250 0.5 NBR 400-516-32 HFS R  
HNBR 400-516-32 HFS H  
FKM 400-516-32 HFS V

101,6 142,9 12,7 4.000 5.626 0.5 NBR 400-540-32 HFS R  
HNBR 400-540-32 HFS H  
FKM 400-540-32 HFS V

102,2 134,8 12,4 4.022 5.306 0.488 NBR 102,2x134,8x12,4 HFS R  
HNBR 102,2x134,8x12,4 HFS H  
FKM 102,2x134,8x12,4 HFS V

105 130 12 4.134 5.118 0.472 NBR 105x130x12 HFS R  
HNBR 105x130x12 HFS H  
FKM 105x130x12 HFS V

105 145 16 4.134 5.709 0.63 NBR 105x145x16 HFS R  
HNBR 105x145x16 HFS H  
FKM 105x145x16 HFS V

106,37 139,7 14,3 4.188 5.500 0.563 NBR 412-532-36 HFS R  
HNBR 412-532-36 HFS H  
FKM 412-532-36 HFS V

107,95 133,35 12,7 4.250 5.250 0.5 NBR 416-516-32 HFS R  
HNBR 416-516-32 HFS H  
FKM 416-516-32 HFS V

107,95 138,1 12,7 4.250 5.438 0.5 NBR 416-528-32 HFS R  
HNBR 416-528-32 HFS H  
FKM 416-528-32 HFS V

107,95 138,1 9,52 4.250 5.438 0.375 NBR 416-528-24 HFS R  
HNBR 416-528-24 HFS H  
FKM 416-528-24 HFS V

110 130 9 4.331 5.118 0.354 NBR 110x130x9 HFS R  
HNBR 110x130x9 HFS H  
FKM 110x130x9 HFS V

110 140 15 4.331 5.512 0.591 NBR 110x140x15 HFS R  
HNBR 110x140x15 HFS H  
FKM 110x140x15 HFS V

110 145 19 4.331 5.709 0.748 NBR 110x145x19 HFS R  
HNBR 110x145x19 HFS H  
FKM 110x145x19 HFS V

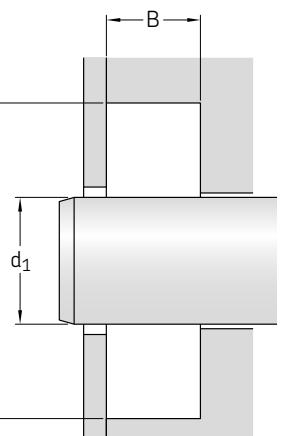
110 152 15 4.331 5.984 0.591 NBR 110x152x15 HFS R  
HNBR 110x152x15 HFS H  
FKM 110x152x15 HFS V

112,7 139,7 12,7 4.438 5.500 0.5 NBR 428-532-32 HFS R  
HNBR 428-532-32 HFS H  
FKM 428-532-32 HFS V

## HFS seals – rubber fabric reinforced

d<sub>1</sub> 112,7–148 mm

The size tables include a selection of available sizes. **On request SKF tools up additional sizes.** For seals with full size flexibility and express service – even for just one seal – refer to **page 54 catalogue shaft seals flexible in size.**



| Dimensions     |        |       | Dimensions     |       |       | Mate-              | SKF Designation  |
|----------------|--------|-------|----------------|-------|-------|--------------------|--|
| d <sub>1</sub> | D      | B     | d <sub>1</sub> | D     | B     | rial               |  |
| mm             |        |       |                |       |       |                    |  |
| in.            |        |       |                |       |       |                    |  |
| 112,72         | 139,7  | 14,27 | 4.438          | 5.500 | 0.563 | NBR<br>HNBR<br>FKM | 428-532-36 HFS R<br>428-532-36 HFS H<br>428-532-36 HFS V                   |
| 113            | 140    | 13    | 4.449          | 5.512 | 0.512 | NBR<br>HNBR<br>FKM | 113x140x13 HFS R<br>113x140x13 HFS H<br>113x140x13 HFS V                   |
| 114,29         | 139,69 | 9,52  | 4.500          | 5.500 | 0.375 | NBR<br>HNBR<br>FKM | 432-532-24 HFS R<br>432-532-24 HFS H<br>432-532-24 HFS V                   |
| 114,3          | 152,41 | 15,88 | 4.500          | 6.000 | 0.625 | NBR<br>HNBR<br>FKM | 432-600-40 HFS R<br>432-600-40 HFS H<br>432-600-40 HFS V                   |
| 115            | 135    | 10    | 4.528          | 5.315 | 0.394 | NBR<br>HNBR<br>FKM | 115x135x10 HFS R<br>115x135x10 HFS H<br>115x135x10 HFS V                   |
| 115            | 137    | 9     | 4.528          | 5.394 | 0.354 | NBR<br>HNBR<br>FKM | 115x137x9 HFS R<br>115x137x9 HFS H<br>115x137x9 HFS V                      |
| 115            | 140    | 12    | 4.528          | 5.512 | 0.472 | NBR<br>HNBR<br>FKM | 115x140x12 HFS R<br>115x140x12 HFS H<br>115x140x12 HFS V                   |
| 120,65         | 152,43 | 14,3  | 4.750          | 6.000 | 0.563 | NBR<br>HNBR<br>FKM | 448-600-36 HFS R<br>448-600-36 HFS H<br>448-600-36 HFS V                   |
| 115            | 150    | 10    | 4.528          | 5.906 | 0.394 | NBR<br>HNBR<br>FKM | 115x150x10 HFS R<br>115x150x10 HFS H<br>115x150x10 HFS V                   |
| 123,8          | 149,2  | 12,7  | 4.875          | 5.875 | 0.5   | NBR<br>HNBR<br>FKM | 456-556-32 HFS R<br>456-556-32 HFS H<br>456-556-32 HFS V                   |
| 115            | 155    | 16    | 4.528          | 6.102 | 0.63  | NBR<br>HNBR<br>FKM | 115x155x16 HFS R<br>115x155x16 HFS H<br>115x155x16 HFS V                   |
| 117,48         | 146,08 | 14,3  | 4.625          | 5.750 | 0.563 | NBR<br>HNBR<br>FKM | 440-548-36 HFS R<br>440-548-36 HFS H<br>440-548-36 HFS V                   |
| 117,48         | 152,4  | 12,7  | 4.625          | 6.000 | 0.5   | NBR<br>HNBR<br>FKM | 440-600-32 HFS R<br>440-600-32 HFS H<br>440-600-32 HFS V                   |
| 117,5          | 142,5  | 12,5  | 4.626          | 5.610 | 0.492 | NBR<br>HNBR<br>FKM | 117,5x142,5x12,5 HFS R<br>117,5x142,5x12,5 HFS H<br>117,5x142,5x12,5 HFS V |

| Dimensions     | Dimensions | Mate- | SKF Designation | Dimensions | Dimensions | Mate-              | SKF Designation  |
|----------------|------------|-------|-----------------|------------|------------|--------------------|--|
| d <sub>1</sub> | D          | B     | d <sub>1</sub>  | D          | B          | d <sub>1</sub>     | D  |
| mm             |            |       |                 |            |            |                    |  |
| in.            |            |       |                 |            |            |                    |  |
| 125,43         | 158,75     | 12,7  | 4.938           | 6.250      | 0.5        | NBR<br>HNBR<br>FKM | 460-616-32 HFS R<br>460-616-32 HFS H<br>460-616-32 HFS V             |
| 126            | 160        | 15    | 4.961           | 6.299      | 0.591      | NBR<br>HNBR<br>FKM | 126x160x15 HFS R<br>126x160x15 HFS H<br>126x160x15 HFS V             |
| 127            | 152,4      | 9,5   | 5.000           | 6.000      | 0.375      | NBR<br>HNBR<br>FKM | 500-600-24 HFS R<br>500-600-24 HFS H<br>500-600-24 HFS V             |
| 127            | 171,5      | 15,9  | 5.000           | 6.752      | 0.626      | NBR<br>HNBR<br>FKM | 127x171,5x15,9 HFS R<br>127x171,5x15,9 HFS H<br>127x171,5x15,9 HFS V |
| 130            | 155        | 12,5  | 5.118           | 6.102      | 0.492      | NBR<br>HNBR<br>FKM | 130x155x12,5 HFS R<br>130x155x12,5 HFS H<br>130x155x12,5 HFS V       |
| 130            | 155        | 15,5  | 5.118           | 6.102      | 0.61       | NBR<br>HNBR<br>FKM | 130x155x15,5 HFS R<br>130x155x15,5 HFS H<br>130x155x15,5 HFS V       |
| 130            | 160        | 15    | 5.118           | 6.299      | 0.591      | NBR<br>HNBR<br>FKM | 130x160x15 HFS R<br>130x160x15 HFS H<br>130x160x15 HFS V             |
| 130            | 170        | 10    | 5.118           | 6.693      | 0.394      | NBR<br>HNBR<br>FKM | 130x170x10 HFS R<br>130x170x10 HFS H<br>130x170x10 HFS V             |
| 133,36         | 171,46     | 15,88 | 5.250           | 6.750      | 0.625      | NBR<br>HNBR<br>FKM | 516-628-40 HFS R<br>516-628-40 HFS H<br>516-628-40 HFS V             |
| 135            | 155        | 12    | 5.315           | 6.102      | 0.472      | NBR<br>HNBR<br>FKM | 135x155x12 HFS R<br>135x155x12 HFS H<br>135x155x12 HFS V             |
| 120            | 150        | 15    | 4.724           | 5.906      | 0.591      | NBR<br>HNBR<br>FKM | 120x150x15 HFS R<br>120x150x15 HFS H<br>120x150x15 HFS V             |
| 135            | 165        | 12    | 5.315           | 6.496      | 0.472      | NBR<br>HNBR<br>FKM | 135x165x12 HFS R<br>135x165x12 HFS H<br>135x165x12 HFS V             |
| 120            | 152        | 16    | 4.724           | 5.984      | 0.63       | NBR<br>HNBR<br>FKM | 120x152x16 HFS R<br>120x152x16 HFS H<br>120x152x16 HFS V             |
| 135            | 170        | 12    | 5.315           | 6.693      | 0.472      | NBR<br>HNBR<br>FKM | 135x170x12 HFS R<br>135x170x12 HFS H<br>135x170x12 HFS V             |
| 146            | 177,8      | 15,9  | 5.748           | 7.000      | 0.626      | NBR<br>HNBR<br>FKM | 146x177,8x15,9 HFS R<br>146x177,8x15,9 HFS H<br>146x177,8x15,9 HFS V |
| 146            | 178        | 16    | 5.748           | 7.008      | 0.63       | NBR<br>HNBR<br>FKM | 146x178x16 HFS R<br>146x178x16 HFS H<br>146x178x16 HFS V             |
| 148            | 170        | 16    | 5.827           | 6.693      | 0.63       | NBR<br>HNBR<br>FKM | 148x170x16 HFS R<br>148x170x16 HFS H<br>148x170x16 HFS V             |
| 150            | 170        | 15    | 5.906           | 6.693      | 0.591      | NBR<br>HNBR<br>FKM | 150x170x15 HFS R<br>150x170x15 HFS H<br>150x170x15 HFS V             |
| 150            | 175        | 15    | 5.512           | 6.693      | 0.591      | NBR<br>HNBR<br>FKM | 140x175x15 HFS R<br>140x175x15 HFS H<br>140x175x15 HFS V             |
| 150            | 178        | 16    | 5.512           | 6.693      | 0.591      | NBR<br>HNBR<br>FKM | 140x178x16 HFS R<br>140x178x16 HFS H<br>140x178x16 HFS V             |
| 150            | 180        | 14    | 5.906           | 7.087      | 0.551      | NBR<br>HNBR<br>FKM | 150x180x14 HFS R<br>150x180x14 HFS H<br>150x180x14 HFS V             |
| 150            | 182        | 16    | 5.906           | 7.165      | 0.63       | NBR<br>HNBR<br>FKM | 150x182x16 HFS R<br>150x182x16 HFS H<br>150x182x16 HFS V             |













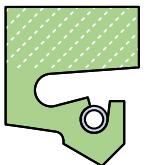




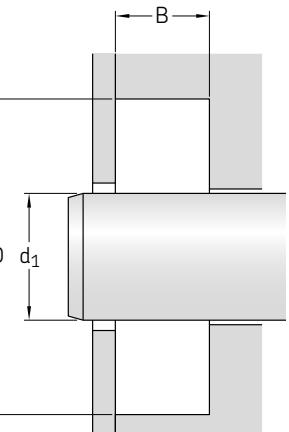


## HFS seals – rubber fabric reinforced

d<sub>1</sub> 990–2 350 mm



The size tables include a selection of available sizes. **On request SKF tools up additional sizes.** For seals with full size flexibility and express service – even for just one seal – refer to **page 54 catalogue shaft seals flexible in size.**



| Dimensions     |      | Dimensions |                | Mate-<br>rial | SKF Designation |  |
|----------------|------|------------|----------------|---------------|-----------------|--|
| d <sub>1</sub> | D    | B          | d <sub>1</sub> | D             | B               |  |
| mm             |      |            |                |               |                 | <i>in.</i>   |
|                |      |            |                |               |                 |  |
| 1310           | 1374 | 25         | 51.575         | 54.094        | 0.984           | NBR <b>1310x1374x25 HFS R</b><br>HNBR <b>1310x1374x25 HFS H</b><br>FKM <b>1310x1374x25 HFS V</b>       |
| 1320           | 1370 | 20         | 51.969         | 53.937        | 0.787           | NBR <b>1320x1370x20 HFS R</b><br>HNBR <b>1320x1370x20 HFS H</b><br>FKM <b>1320x1370x20 HFS V</b>       |
| 1330           | 1394 | 25         | 52.362         | 54.882        | 0.984           | NBR <b>1330x1394x25 HFS R</b><br>HNBR <b>1330x1394x25 HFS H</b><br>FKM <b>1330x1394x25 HFS V</b>       |
| 1385           | 1435 | 25         | 54.528         | 56.496        | 0.984           | NBR <b>1385x1435x25 HFS R</b><br>HNBR <b>1385x1435x25 HFS H</b><br>FKM <b>1385x1435x25 HFS V</b>       |
| 1435           | 1499 | 25         | 56.496         | 59.016        | 0.984           | NBR <b>1435x1499x25 HFS R</b><br>HNBR <b>1435x1499x25 HFS H</b><br>FKM <b>1435x1499x25 HFS V</b>       |
| 1447,8         | 1524 | 19,1       | 57.000         | 60.000        | 0.75            | NBR <b>5700-6000-48 HFS R</b><br>HNBR <b>5700-6000-48 HFS H</b><br>FKM <b>5700-6000-48 HFS V</b>       |
| 1550           | 1614 | 25         | 61.024         | 63.543        | 0.984           | NBR <b>1550x1614x25 HFS R</b><br>HNBR <b>1550x1614x25 HFS H</b><br>FKM <b>1550x1614x25 HFS V</b>       |
| 1556           | 1620 | 25         | 61.260         | 63.780        | 0.984           | NBR <b>1556x1620x25 HFS R</b><br>HNBR <b>1556x1620x25 HFS H</b><br>FKM <b>1556x1620x25 HFS V</b>       |
| 1600           | 1664 | 25,3       | 62.992         | 65.512        | 0.996           | NBR <b>1600x1664x25,3 HFS R</b><br>HNBR <b>1600x1664x25,3 HFS H</b><br>FKM <b>1600x1664x25,3 HFS V</b> |
| 1610           | 1660 | 20         | 63.386         | 65.354        | 0.787           | NBR <b>1610x1660x20 HFS R</b><br>HNBR <b>1610x1660x20 HFS H</b><br>FKM <b>1610x1660x20 HFS V</b>       |
| 1610           | 1670 | 20         | 63.386         | 65.748        | 0.787           | NBR <b>1610x1670x20 HFS R</b><br>HNBR <b>1610x1670x20 HFS H</b><br>FKM <b>1610x1670x20 HFS V</b>       |
| 1620           | 1684 | 25         | 63.780         | 66.299        | 0.984           | NBR <b>1620x1684x25 HFS R</b><br>HNBR <b>1620x1684x25 HFS H</b><br>FKM <b>1620x1684x25 HFS V</b>       |

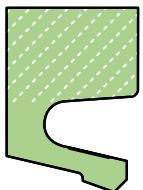
| Dimensions     |      |    | Dimensions     |        |       | Mate-<br>rial  | SKF Designation |
|----------------|------|----|----------------|--------|-------|--|-----------------|
| d <sub>1</sub> | D    | B  | d <sub>1</sub> | D      | B     |  |                 |
| mm             |      |    |                |        |       | <i>in.</i>   |                 |
|                |      |    |                |        |       |  |                 |
| 1656           | 1720 | 25 | 65.197         | 67.717 | 0.984 | NBR <b>1656x1720x25 HFS R</b><br>HNBR <b>1656x1720x25 HFS H</b><br>FKM <b>1656x1720x25 HFS V</b> |                 |
| 2350           | 2414 | 25 | 92.520         | 95.039 | 0.984 | NBR <b>2350x2414x25 HFS R</b><br>HNBR <b>2350x2414x25 HFS H</b><br>FKM <b>2350x2414x25 HFS V</b> |                 |



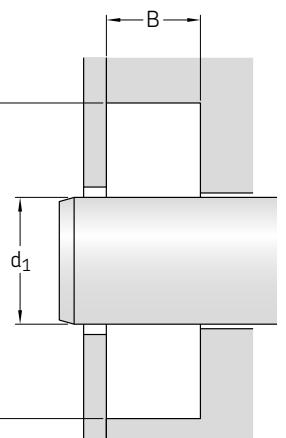


## HFF seals – rubber fabric reinforced

d<sub>1</sub> 580–1 163 mm



The size tables include a selection of available sizes. **On request SKF tools up additional sizes.** For seals with full size flexibility and express service – even for just one seal – refer to **page 54 catalogue shaft seals flexible in size.**



| Dimensions                      |       | Dimensions                |                | Mate-  | SKF Designation |
|---------------------------------|-------|---------------------------|----------------|--------|-----------------|
| d <sub>1</sub>                  | D     | B                         | d <sub>1</sub> | D      | B               |
| mm                          in. |       |                           |                |        |                 |
|                                 |       |                           |                |        |                 |
| 580                             | 615   | 20                        | 22.835         | 24.213 | 0.787           |
|                                 | NBR   | <b>580x615x20 HFF R</b>   |                |        |                 |
|                                 | HNBR  | <b>580x615x20 HFF H</b>   |                |        |                 |
|                                 | FKM   | <b>580x615x20 HFF V</b>   |                |        |                 |
| 609,6                           | 673,1 | 25,4                      | 24.000         | 26.500 | 1.000           |
|                                 | NBR   | <b>2400-2632-64 HFF R</b> |                |        |                 |
|                                 | HNBR  | <b>2400-2632-64 HFF H</b> |                |        |                 |
|                                 | FKM   | <b>2400-2632-64 HFF V</b> |                |        |                 |
| 640                             | 700   | 25                        | 25.197         | 27.559 | 0.984           |
|                                 | NBR   | <b>640x700x25 HFF R</b>   |                |        |                 |
|                                 | HNBR  | <b>640x700x25 HFF H</b>   |                |        |                 |
|                                 | FKM   | <b>640x700x25 HFF V</b>   |                |        |                 |
| 670                             | 710   | 20                        | 26.378         | 27.953 | 0.787           |
|                                 | NBR   | <b>670x710x20 HFF R</b>   |                |        |                 |
|                                 | HNBR  | <b>670x710x20 HFF H</b>   |                |        |                 |
|                                 | FKM   | <b>670x710x20 HFF V</b>   |                |        |                 |
| 707,3                           | 758,0 | 22,2                      | 27.844         | 29.844 | 0.875           |
|                                 | NBR   | <b>2754-2954-56 HFF R</b> |                |        |                 |
|                                 | HNBR  | <b>2754-2954-56 HFF H</b> |                |        |                 |
|                                 | FKM   | <b>2754-2954-56 HFF V</b> |                |        |                 |
| 720                             | 770   | 20                        | 28.346         | 30.315 | 0.787           |
|                                 | NBR   | <b>720x770x20 HFF R</b>   |                |        |                 |
|                                 | HNBR  | <b>720x770x20 HFF H</b>   |                |        |                 |
|                                 | FKM   | <b>720x770x20 HFF V</b>   |                |        |                 |
| 745                             | 795   | 30                        | 29.331         | 31.299 | 1.181           |
|                                 | NBR   | <b>745x795x30 HFF R</b>   |                |        |                 |
|                                 | HNBR  | <b>745x795x30 HFF H</b>   |                |        |                 |
|                                 | FKM   | <b>745x795x30 HFF V</b>   |                |        |                 |
| 750                             | 800   | 22                        | 29.528         | 31.496 | 0.866           |
|                                 | NBR   | <b>750x800x22 HFF R</b>   |                |        |                 |
|                                 | HNBR  | <b>750x800x22 HFF H</b>   |                |        |                 |
|                                 | FKM   | <b>750x800x22 HFF V</b>   |                |        |                 |
| 850                             | 910   | 25                        | 33.465         | 35.827 | 0.984           |
|                                 | NBR   | <b>850x910x25 HFF R</b>   |                |        |                 |
|                                 | HNBR  | <b>850x910x25 HFF H</b>   |                |        |                 |
|                                 | FKM   | <b>850x910x25 HFF V</b>   |                |        |                 |
| 860                             | 910   | 22                        | 33.858         | 35.827 | 0.866           |
|                                 | NBR   | <b>860x910x22 HFF R</b>   |                |        |                 |
|                                 | HNBR  | <b>860x910x22 HFF H</b>   |                |        |                 |
|                                 | FKM   | <b>860x910x22 HFF V</b>   |                |        |                 |
| 920                             | 970   | 20                        | 36.220         | 38.189 | 0.787           |
|                                 | NBR   | <b>920x970x20 HFF R</b>   |                |        |                 |
|                                 | HNBR  | <b>920x970x20 HFF H</b>   |                |        |                 |
|                                 | FKM   | <b>920x970x20 HFF V</b>   |                |        |                 |
| 980                             | 1 054 | 25                        | 38.583         | 41.496 | 0.984           |
|                                 | NBR   | <b>980x1054x25 HFF R</b>  |                |        |                 |
|                                 | HNBR  | <b>980x1054x25 HFF H</b>  |                |        |                 |
|                                 | FKM   | <b>980x1054x25 HFF V</b>  |                |        |                 |







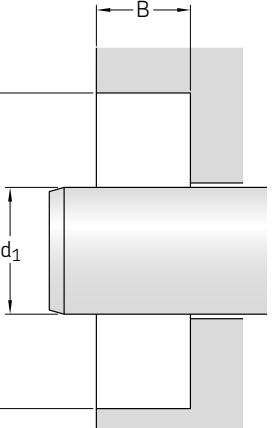


## HBS seals – rubber metal reinforced

d<sub>1</sub> 650–1 496,6 mm



The size tables include a selection of available sizes. On request SKF tools up additional sizes. For seals with full size flexibility and express service – even for just one seal – refer to page 54 catalogue shaft seals flexible in size.



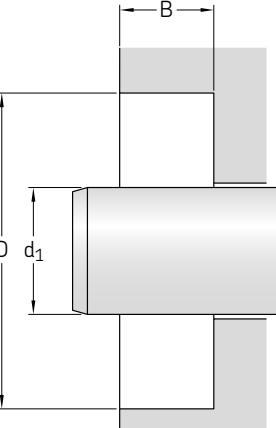
|                | Dimensions |      |                | Dimensions |       |      | Mate-<br>rial        | SKF Designation |  |
|----------------|------------|------|----------------|------------|-------|------|----------------------|-----------------|--|
| d <sub>1</sub> | D          | B    | d <sub>1</sub> | D          | B     |      |                      |                 |  |
| mm             |            | in.  |                |            |       |      |                      |                 |  |
| 650            | 700        | 20   | 25.591         | 27.559     | 0.787 | NBR  | 650x700x20 HBS R     |                 |  |
|                |            |      |                |            |       | HNBR | 650x700x20 HBS H     |                 |  |
|                |            |      |                |            |       | FKM  | 650x700x20 HBS V     |                 |  |
| 650            | 700        | 20   | 25.591         | 27.559     | 0.787 | NBR  | 650x700x20 HBS R     |                 |  |
|                |            |      |                |            |       | HNBR | 650x700x20 HBS H     |                 |  |
|                |            |      |                |            |       | FKM  | 650x700x20 HBS V     |                 |  |
| 685,8          | 736,6      | 22,2 | 27.000         | 29.000     | 0.875 | NBR  | 2700-2900-56 HBS R   |                 |  |
|                |            |      |                |            |       | HNBR | 2700-2900-56 HBS H   |                 |  |
|                |            |      |                |            |       | FKM  | 2700-2900-56 HBS V   |                 |  |
| 692            | 732        | 15   | 27.244         | 28.819     | 0.591 | NBR  | 692x732x15 HBS R     |                 |  |
|                |            |      |                |            |       | HNBR | 692x732x15 HBS H     |                 |  |
|                |            |      |                |            |       | FKM  | 692x732x15 HBS V     |                 |  |
| 700            | 750        | 20   | 27.559         | 29.528     | 0.787 | NBR  | 700x750x20 HBS R     |                 |  |
|                |            |      |                |            |       | HNBR | 700x750x20 HBS H     |                 |  |
|                |            |      |                |            |       | FKM  | 700x750x20 HBS V     |                 |  |
| 710            | 760        | 25   | 27.953         | 29.921     | 0.984 | NBR  | 710x760x25 HBS R     |                 |  |
|                |            |      |                |            |       | HNBR | 710x760x25 HBS H     |                 |  |
|                |            |      |                |            |       | FKM  | 710x760x25 HBS V     |                 |  |
| 780            | 830        | 25   | 30.709         | 32.677     | 0.984 | NBR  | 780x830x25 HBS R     |                 |  |
|                |            |      |                |            |       | HNBR | 780x830x25 HBS H     |                 |  |
|                |            |      |                |            |       | FKM  | 780x830x25 HBS V     |                 |  |
| 780            | 844        | 25   | 30.709         | 33.228     | 0.984 | NBR  | 780x844x25 HBS R     |                 |  |
|                |            |      |                |            |       | HNBR | 780x844x25 HBS H     |                 |  |
|                |            |      |                |            |       | FKM  | 780x844x25 HBS V     |                 |  |
| 780            | 844        | 25   | 30.709         | 33.228     | 0.984 | NBR  | 780x844x25 HBS R     |                 |  |
|                |            |      |                |            |       | HNBR | 780x844x25 HBS H     |                 |  |
|                |            |      |                |            |       | FKM  | 780x844x25 HBS V     |                 |  |
| 816            | 866,8      | 22,5 | 32.126         | 34.126     | 0.886 | NBR  | 816x866,8x22,5 HBS R |                 |  |
|                |            |      |                |            |       | HNBR | 816x866,8x22,5 HBS H |                 |  |
|                |            |      |                |            |       | FKM  | 816x866,8x22,5 HBS V |                 |  |
| 825,5          | 876,3      | 22,2 | 32.500         | 34.500     | 0.875 | NBR  | 3232-3432-56 HBS R   |                 |  |
|                |            |      |                |            |       | HNBR | 3232-3432-56 HBS H   |                 |  |
|                |            |      |                |            |       | FKM  | 3232-3432-56 HBS V   |                 |  |
| 860            | 924        | 25   | 33.858         | 36.378     | 0.984 | NBR  | 860x924x25 HBS R     |                 |  |
|                |            |      |                |            |       | HNBR | 860x924x25 HBS H     |                 |  |
|                |            |      |                |            |       | FKM  | 860x924x25 HBS V     |                 |  |

## HBSA seals – rubber metal reinforced

d<sub>1</sub> 90–1 100 mm



The size tables include a selection of available sizes. On request SKF tools up additional sizes. For seals with full size flexibility and express service – even for just one seal – refer to page 54 catalogue shaft seals flexible in size.



|                | Dimensions |      |                | Dimensions |       |      | Mate-<br>rial           | SKF Designation |  |
|----------------|------------|------|----------------|------------|-------|------|-------------------------|-----------------|--|
| d <sub>1</sub> | D          | B    | d <sub>1</sub> | D          | B     |      |                         |                 |  |
| 90             | 120        | 13   | 3.543          | 4.724      | 0.512 | NBR  | 90x120x13 HBSA R        |                 |  |
|                |            |      |                |            |       | HNBR | 90x120x13 HBSA H        |                 |  |
|                |            |      |                |            |       | FKM  | 90x120x13 HBSAV         |                 |  |
| 970            | 1 030      | 21,5 | 38.189         | 40.551     | 0.846 | NBR  | 970x1030x21,5 HBS R     |                 |  |
|                |            |      |                |            |       | HNBR | 970x1030x21,5 HBS H     |                 |  |
|                |            |      |                |            |       | FKM  | 970x1030x21,5 HBS V     |                 |  |
| 970            | 1 030      | 21,5 | 38.189         | 40.551     | 0.846 | NBR  | 970x1030x22 HBS R       |                 |  |
|                |            |      |                |            |       | HNBR | 970x1030x22 HBS H       |                 |  |
|                |            |      |                |            |       | FKM  | 970x1030x22 HBS V       |                 |  |
| 970            | 1 034      | 25   | 38.189         | 40.709     | 0.984 | NBR  | 970x1034x25 HBS R       |                 |  |
|                |            |      |                |            |       | HNBR | 970x1034x25 HBS H       |                 |  |
|                |            |      |                |            |       | FKM  | 970x1034x25 HBS V       |                 |  |
| 985            | 1 045      | 25   | 38.780         | 41.142     | 0.984 | NBR  | 985x1045x25 HBS R       |                 |  |
|                |            |      |                |            |       | HNBR | 985x1045x25 HBS H       |                 |  |
|                |            |      |                |            |       | FKM  | 985x1045x25 HBS V       |                 |  |
| 985            | 1 045      | 25   | 38.780         | 41.142     | 0.984 | NBR  | 985x1045x25 HBS R       |                 |  |
|                |            |      |                |            |       | HNBR | 985x1045x25 HBS H       |                 |  |
|                |            |      |                |            |       | FKM  | 985x1045x25 HBS V       |                 |  |
| 985            | 1 045      | 25   | 38.780         | 41.142     | 0.984 | NBR  | 985x1045x25 HBS R       |                 |  |
|                |            |      |                |            |       | HNBR | 985x1045x25 HBS H       |                 |  |
|                |            |      |                |            |       | FKM  | 985x1045x25 HBS V       |                 |  |
| 1 024,5        | 1 070      | 24,4 | 40.335         | 42.126     | 0.961 | NBR  | 1 024,5x1070x24,4 HBS R |                 |  |
|                |            |      |                |            |       | HNBR | 1 024,5x1070x24,4 HBS H |                 |  |
|                |            |      |                |            |       | FKM  | 1 024,5x1070x24,4 HBS V |                 |  |
| 1 100          | 1 164      | 25   | 43.307         | 45.827     | 0.984 | NBR  | 1 100x1164x25 HBS R     |                 |  |
|                |            |      |                |            |       | HNBR | 1 100x1164x25 HBS H     |                 |  |
|                |            |      |                |            |       | FKM  | 1 100x1164x25 HBS V     |                 |  |
| 1 100          | 1 164      | 25   | 43.307         | 45.827     | 0.984 | NBR  | 1 100x1164x25 HBS R     |                 |  |
|                |            |      |                |            |       | HNBR | 1 100x1164x25 HBS H     |                 |  |
|                |            |      |                |            |       | FKM  | 1 100x1164x25 HBS V     |                 |  |
| 1 302          | 1 353      | 22,2 | 51.260         | 53.268     | 0.875 | NBR  | 1 302x1353x22,2 HBS R   |                 |  |
|                |            |      |                |            |       | HNBR | 1 302x1353x22,2 HBS H   |                 |  |
|                |            |      |                |            |       | FKM  | 1 302x1353x22,2 HBS V   |                 |  |
| 1 320          | 1 384      | 25   | 51.969         | 54.488     | 0.984 | NBR  | 1 320x1384x25 HBS R     |                 |  |
|                |            |      |                |            |       | HNBR | 1 320x1384x25 HBS H     |                 |  |
|                |            |      |                |            |       | FKM  | 1 320x1384x25 HBS V     |                 |  |
| 1 496,6        | 1 549,4    | 25   | 58.921         | 61.000     | 0.984 | NBR  | 5859-6100-63 HBS R      |                 |  |
|                |            |      |                |            |       | HNBR | 5859-6100-63 HBS H      |                 |  |
|                |            |      |                |            |       | FKM  | 5859-6100-63 HBS V      |                 |  |
| 515            | 555        | 20   | 20.276         | 21.850     | 0.787 | NBR  | 515x555x20 HBS A R      |                 |  |
|                |            |      |                |            |       | HNBR | 515x555x20 HBS A H      |                 |  |
|                |            |      |                |            |       | FKM  | 515x555x20 HBS AV       |                 |  |

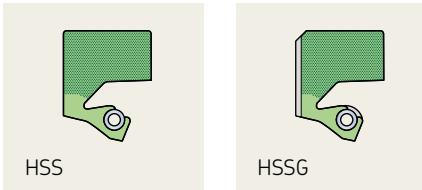
D





# Catalogue shaft seals flexible in size

The catalogue seal offer with the highest availability in customized dimensions



These SKF seals are manufactured in flexible sizing processes.

The highest flexibility for customized main dimensions is available with minimum order quantity of one seal only, even for a new size.

Innovative manufacturing processes do not require moulds and machine set up enabling optional express service.

The assortment includes heavy duty all rubber seals and metal cased rubber seals in NBR, HNBR and FKM.

Seal design and material selection follows the same criteria as for the *catalogue shaft seals moulded to size*.

HSS, R01 and HDS seals

## Seal design options

### All rubber seals (solid + split)

The all rubber seals HS, HSS and R01 are available in solid and split executions. The seals are finished oversized to the housing bore. A cover plate is required to ensure proper compression and stability within the housing. The optional split seal execution allows seal replacement without shaft removal or dismounting of other machine components.

HSS features an all rubber reinforcement of the outer diameter further stabilizing the seal in the housing bore. Lubrication grooves at the back of the seal are optional to allow the re-greasing between the sealing lips in back-to-back or tandem installations of two seals.

R01 is a machined seal available from local manufacturing in many countries around the globe. R01 features an optional auxiliary lip for contamination exclusion.

### Metal cased rubber seals

The seals are self retaining in open housing bores without the use of a cover plate. The metal casing provides the required stability in the housing bore.

Spacer lugs are optional to provide space for grease lubrication in between 2 seals in tandem or back to back installations.

HDS7 features a sealing lip without spring, optimized for excluding contaminations in grease purge applications.

### Spring activated sealing lips

HS, HSS and HDS seals feature the same heavy duty spring activated lip design. The seals are equipped with stainless garter springs. The SKF Springfix for HSS and HDS seals is an optional feature for blind installations, where spring displacement may go undetected.

For this range catalogue size tables are obsolete. The seals are configured by the customer with the full size flexibility within the range of the offering (→ fig. 1, 2, 3).

Please refer to the SKF seal configuration tools or contact SKF.

Fig. 1

#### HS and HSS nominal housing dimensions

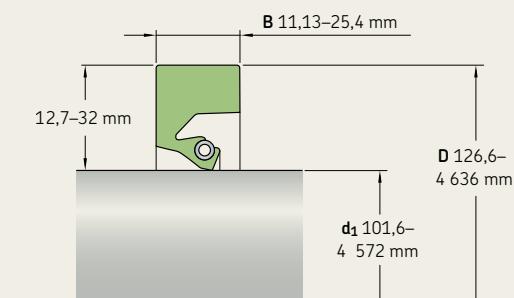


Fig. 2

#### R01 nominal housing dimensions

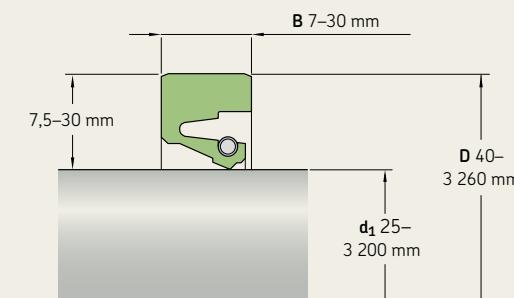
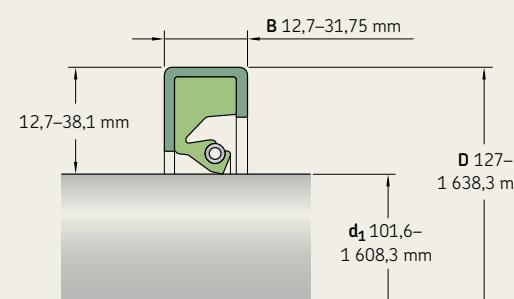


Fig. 3

#### HDS nominal housing dimensions



# Engineered solutions application specific

Engineered solutions is the service offer by SKF to exceed the limits of catalogue seals

Customer requirements and experience indicate the need for advanced seal engineering.

Proprietary SKF seal design and material competences, innovative manufacturing processes and the vast SKF application experience enable outstanding solutions meeting our customers' demand.



**Customers and SKF engineers cooperate and create solutions meeting the application parameters**

## Seal application parameters

- Type of machine
- Expected seal function
- Environment, contamination
- Contact media
- Pressure (min./max.)
- Temperature (min./max.)
- Application speed
- Misalignment/Runout
- Seal counterface material
- Counterface finish and roughness
- Seal housing design and dimensions



Cement grinding mill



Wind turbine



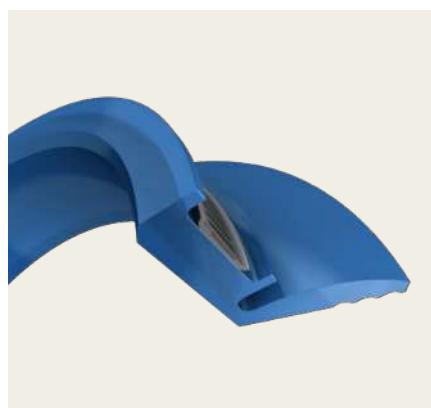
Aluminium rolling mill



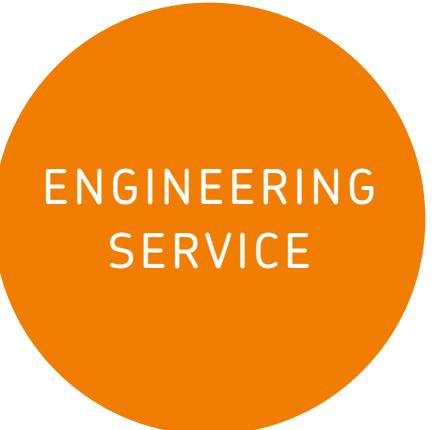
Tunnel boring machine



Steel wire mill



Mining equipment





Application specific design

# Shaft and bore requirements

## Shaft requirements

### Hardness

The surface hardness of the seal counterface should be at least 30 HRC. If the counterface surface could be damaged during transport or installation, this value should be increased to 45 HRC.

### Lead-in chamfers

The sealing lip must not be damaged during installation. Depending on the installation direction Y or Z, a chamfer or radius on the shaft is recommended first. If the direction of installation of the shaft is Y the values of **table 2** ( $d_1 - d_2$ ) should be adhered to. If the direction is Z, the shaft end could be either rounded (r) or chamfered ( $d_1 - d_2$ ).

### Surface finish

Depending on the direction of rotation, directionality on the seal counterface may cause a seal to leak. Plunge grinding is the preferred machining method to minimize directionality ( $0\pm0,05^\circ$ ) on the seal counterface. When plunge grinding, whole number ratios of the grinding wheel speed to the work piece speed should be avoided.

### Surface roughness

The surface roughness values of the counterface for radial shaft seals, calculated according to methods described in ISO 4288 (DIN 4768), should be kept within the limits specified in **table 3**.

### Tolerances

The diameter of the shaft  $d_1$  at the counterface should be machined to the tolerances provided in **table 4**. Out-of-roundness must be less than 0,005 mm (0.0002 in.) at a maximum of 2 lobes or less than 0,0025 mm (0.0001 in.) at a maximum of 7 lobes.

| Table 2<br>Lead-in chamfers and radii |      |        |        |                                   |           |                                  |                         |   |       |
|---------------------------------------|------|--------|--------|-----------------------------------|-----------|----------------------------------|-------------------------|---|-------|
| Shaft diameter Nominal                |      |        |        | Diameter difference <sup>1)</sup> |           | Radii Seal without auxiliary lip |                         |   |       |
| $d_1$<br>over                         | over | incl.  | incl.  | $d_1 - d_2$<br>min.               | r<br>min. | r<br>min.                        | Seal with auxiliary lip |   |       |
| mm                                    | in.  |        |        | mm                                | in.       | mm                               | in.                     |   |       |
| -                                     | 10   | -      | 0.394  | 1,5                               | 0.059     | 0,6                              | 0.024                   | 1 | 0.039 |
| 10                                    | 20   | 0.394  | 0.787  | 2                                 | 0.079     | 0,6                              | 0.024                   | 1 | 0.039 |
| 20                                    | 30   | 0.787  | 1.181  | 2,5                               | 0.098     | 0,6                              | 0.024                   | 1 | 0.039 |
| 30                                    | 40   | 1.181  | 1.575  | 3                                 | 0.118     | 0,6                              | 0.024                   | 1 | 0.039 |
| 40                                    | 50   | 1.575  | 1.968  | 3,5                               | 0.138     | 0,6                              | 0.024                   | 1 | 0.039 |
| 50                                    | 70   | 1.968  | 2.756  | 4                                 | 0.157     | 0,6                              | 0.024                   | 1 | 0.039 |
| 70                                    | 95   | 2.756  | 3.740  | 4,5                               | 0.177     | 0,6                              | 0.024                   | 1 | 0.039 |
| 95                                    | 130  | 3.740  | 5.118  | 5,5                               | 0.216     | 1                                | 0.039                   | 2 | 0.079 |
| 130                                   | 240  | 5.118  | 9.449  | 7                                 | 0.216     | 1                                | 0.039                   | 2 | 0.079 |
| 240                                   | 500  | 9.449  | 19.685 | 11                                | 0.433     | 2                                | 0.079                   | 3 | 0.118 |
| 500                                   | -    | 19.685 | -      | 13                                | 0.512     | 5                                | 0.197                   | 5 | 0.197 |

<sup>1)</sup> If the corner is blended rather than chamfered, the blended section should not be smaller than the difference in diameters  $d_1 - d_2$ .

Table 2

| Counterface tolerances for metric shafts (ISO) |                                  |      |        |
|--|----------------------------------|------|--------|
| Shaft diameter Nominal                         | Diameter tolerance h11 Deviation |      |        |
| $d_1$<br>over                                  | incl.                            | high | low    |
| mm   |                                  | µm   |        |
| 6  | 10                               | 0    | -90    |
| 10   | 18                               | 0    | -110   |
| 18   | 30                               | 0    | -130   |
| 30   | 50                               | 0    | -160   |
| 50   | 80                               | 0    | -190   |
| 80   | 120                              | 0    | -220   |
| 120  | 180                              | 0    | -250   |
| 180  | 250                              | 0    | -290   |
| 250  | 315                              | 0    | -320   |
| 315  | 400                              | 0    | -360   |
| 400  | 500                              | 0    | -400   |
| 500  | 630                              | 0    | -440   |
| 630  | 800                              | 0    | -500   |
| 800  | 1 000                            | 0    | -560   |
| 1 000  | 1 250                            | 0    | -660   |
| 1 250  | 1 600                            | 0    | -780   |
| 1 600  | 2 000                            | 0    | -920   |
| 2 000  | 2 500                            | 0    | -1 100 |
| 2 500  | 3 150                            | 0    | -1 350 |
| 3 150  | 4 000                            | 0    | -1 650 |
| 4 000  | 5 000                            | 0    | -2 000 |

Table 4

| Table 3<br>Recommended shaft surface roughness values |         |        |         |        |          |
|---|---------|--------|---------|--------|----------|
| ISO   |         | DIN    |         | RMA    |          |
|   | µm      |        | µin.    |        | µm       |
| $R_a$   | 0,2–0,5 | 8–20   | 0,2–0,8 | 8–32   | 0,2–0,43 |
| $R_z$   | 1,2–3   | 48–120 | 1–5     | 40–200 | 1,65–2,9 |
| $R_{pm}$  | N/A     | N/A    | N/A     | N/A    | 0,5–1,5  |
|   |         |        |         |        | 20–50    |

Table 3

| Table 5<br>Counterface tolerances for inch-size shafts (RMA) |                                   |        |        |
|--|-----------------------------------|--------|--------|
| Shaft diameter Nominal                                       | Diameter tolerance OS-4 Deviation |        |        |
| $d_1$<br>over  | incl.                             | high   | low    |
| in.  |                                   | in     |        |
| -  | 4                                 | +0,003 | -0,003 |
| 4  | 6                                 | +0,004 | -0,004 |
| 6  | 10                                | +0,005 | -0,005 |
| 10   |                                   | +0,006 | -0,006 |

Table 5

## Housing bore requirements

### Lead-in chamfers

To reduce the risk of seal damage during installation, the housing bore should have a 15 to 30° lead-in chamfer. The chamfer should be free of burrs and the transition radius  $r$  between the seal seat and shoulder should be in accordance with the recommendations in **table 6**.

### Housing bore depth tolerances

For housings with cover plate (axially clamped seals), the bore depth tolerance should be in accordance with the recommendations in **table 8**.

### Housing bore surfaces

The surface roughness (to ISO 4288, DIN 4768 or RMA OS-1-1) of the housing bore should be kept within the limits specified in **table 7**.

Table 6

#### Housing bore tolerances

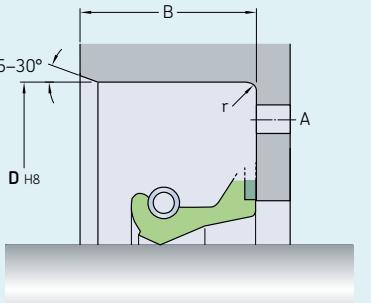
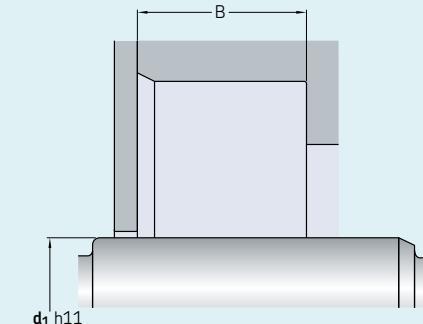


Table 7

#### Housing with cover plate, bore depth tolerances



#### Housing bore for metric seals (ISO)

#### Housing bore for inch-size seals (RMA)

| Nominal diameter    | Housing bore tolerance (ISO tolerance H8) |       |      | Nominal diameter | Housing bore tolerance |        |         | Fillet radii |       |
|---------------------|---|-------|------|------------------|------------------------|--------|---------|--------------|-------|
|                     | D over                                    | incl. | high |                  | D over                 | incl.  | high    |              |       |
| mm                  |   | µm    |      | mm               | in.                    | in.    | in.     | mm           |       |
| -                   | 3   | +14   | 0    | 0,3              | -                      | 3.000  | +0.001  | -0.001       | 0.031 |
| 3                   | 6   | +18   | 0    | 0,3              | 3.000                  | 7.000  | +0.0015 | -0.0015      | 0.031 |
| 6                   | 10  | +22   | 0    | 0,3              | 7.000                  | 10.000 | +0.002  | -0.002       | 0.031 |
| 10                  | 18  | +27   | 0    | 0,3              | 10.000 <sup>2)</sup>   | 12.000 | +0.002  | -0.002       | 0.031 |
| 18                  | 30  | +33   | 0    | 0,3              | 12.000 <sup>2)</sup>   | 20.000 | +0.003  | -0.003       | 0.031 |
| 30                  | 50  | +39   | 0    | 0,3              | 20.000 <sup>2)</sup>   | 40.000 | +0.004  | -0.004       | 0.031 |
| 50                  | 80  | +46   | 0    | 0,4              | 40.000 <sup>2)</sup>   | 60.000 | +0.006  | -0.006       | 0.031 |
| 80                  | 120                                       | +54   | 0    | 0,8              |                        |        |         |              |       |
| 120                 | 180                                       | +63   | 0    | 0,8              |                        |        |         |              |       |
| 180                 | 250                                       | +72   | 0    | 0,8              |                        |        |         |              |       |
| 250                 | 315                                       | +81   | 0    | 0,8              |                        |        |         |              |       |
| 315                 | 400                                       | +89   | 0    | 0,8              |                        |        |         |              |       |
| 400                 | 500                                       | +97   | 0    | 0,8              |                        |        |         |              |       |
| 500                 | 630                                       | +110  | 0    | 0,8              |                        |        |         |              |       |
| 630                 | 800                                       | +125  | 0    | 0,8              |                        |        |         |              |       |
| 800                 | 1 000                                     | +140  | 0    | 0,8              |                        |        |         |              |       |
| 1 000               | 1 250                                     | +165  | 0    | 0,8              |                        |        |         |              |       |
| 1 250               | 1 600                                     | +195  | 0    | 0,8              |                        |        |         |              |       |
| 1 600               | 2 000                                     | +230  | 0    | 0,8              |                        |        |         |              |       |
| 2 000               | 2 500                                     | +280  | 0    | 0,8              |                        |        |         |              |       |
| 2 500               | 3 150                                     | +330  | 0    | 0,8              |                        |        |         |              |       |
| 3 150 <sup>1)</sup> | 4 000                                     | +410  | 0    | 0,8              |                        |        |         |              |       |
| 4 000               | 5 000                                     | +500  | 0    | 0,8              |                        |        |         |              |       |

<sup>1)</sup> SKF recommended bore specifications not covered in ISO 286-2

<sup>2)</sup> SKF recommended bore specifications not covered in RMA OS-4

#### Metric housings (ISO)

#### Inch-size housings (RMA)

| Nominal shaft diameter | Bore depth B tolerance | Nominal shaft diameter | Bore depth B tolerance |                     |        |        |        |
|------------------------|------------------------|------------------------|------------------------|---------------------|--------|--------|--------|
| d <sub>1</sub> over    | incl.                  | high                   | low                    | d <sub>1</sub> over | until  | high   | low    |
| mm                     |                        | mm                     |                        | in.                 |        | in.    |        |
| -                      | 15                     | 0                      | -0,1                   | -                   | 1.000  | 0      | -0,004 |
| 16                     | +0,1                   | -0,1                   |                        | 1.000               | +0,004 | -0,004 |        |

Table 8

#### Recommended housing bore surface roughness values

|                 | ISO <sup>1)</sup> |         | DIN     |         | RMA <sup>2,3)</sup> |        |
|-----------------|-------------------|---------|---------|---------|---------------------|--------|
|                 | µm                | µin.    | µm      | µin.    | µm                  | µin.   |
| R <sub>a</sub>  | 1,6–3,2           | 64–128  | 1,6–3,2 | 64–128  | 1–2,5               | 40–100 |
| R <sub>z</sub>  | 6,3–12,5          | 252–500 | 10–20   | 400–800 | N/A                 | N/A    |
| R <sub>pm</sub> | N/A               | N/A     | 25      | 1 000   | N/A                 | N/A    |

<sup>1)</sup> ISO – The housing bore surface roughness may require lower values when metal-cased seals are used, in which case they should be subject to agreement between the manufacturer and user.

<sup>2)</sup> RMA – If the bore surface texture is greater than 2,5 µm (100 µin.) R<sub>a</sub>, a sealant should be used.

<sup>3)</sup> RMA – Turned bores, where a lubricant head of up to 0,20 bar (3,0 psi) is present at the seal. If this texture is maintained and tool removal marks or bore defects are present, no outside diameter leakage should occur.

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