Rotary shaft lip seals

DIN 3760

ICS 21.120.10

Supersedes
April 1972 edition.

Descriptors: Fluid power, lip seals.

Radial-Wellendichtringe

In keeping with current practice in standards published by the International Organization for Standardization (ISO), a comma has been used throughout as the decimal marker.

Foreword

This standard has been prepared by the *Normenausschuß Kautschuktechnik* (Rubber Technology Standards Committee). It is based on ISO 6194-1 : 1982.

Amendments

The following amendments have been made to the April 1972 edition.

a) For shaft diameters 32, 35, 38 and 40 mm, a nominal width of 8 mm has been introduced to account for new designs.
b) Information to be provided by both the manufacturer and the purchaser has been included.
c) The standard has been editorially revised.

Previous editions

DIN 3760: 1962-02, 1972-04.

Dimensions in mm

1 Scope and field of application

This standard specifies dimensions and requirements for materials, marking, use and installation of rotary shaft lip seals used for retaining fluid or grease in unpressurized equipment, or equipment with a low differential pressure, that has rotating shafts.

Where seals are intended for use in applications other than those specified in this standard, the seal manufacturer should be consulted.

2 Normative references

This standard incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the titles of the publications are listed below. For dated references, subsequent amendments to or revisions of any of these publications apply to this standard only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies.

DIN 51524-1	Type HL hydraulic oils – Minimum requirements
DIN 51524-2	Type HLP hydraulic oils – Minimum requirements
DIN 51524-3	Type HVLP hydraulic oils – Minimum requirements
ISO 1629 : 1995	Rubbers and latices – Nomenclature
ISO 4287-1 : 1984	Surface roughness – Terminology – Part 1: Surface and its parameters
ISO 6194-1 : 1982	Rotary shaft lip type seals – Part 1: Nominal dimensions and tolerances

Continued on pages 2 to 13.

Translation by DIN-Sprachendienst.

In case of doubt, the German-language original should be consulted as the authoritative text.

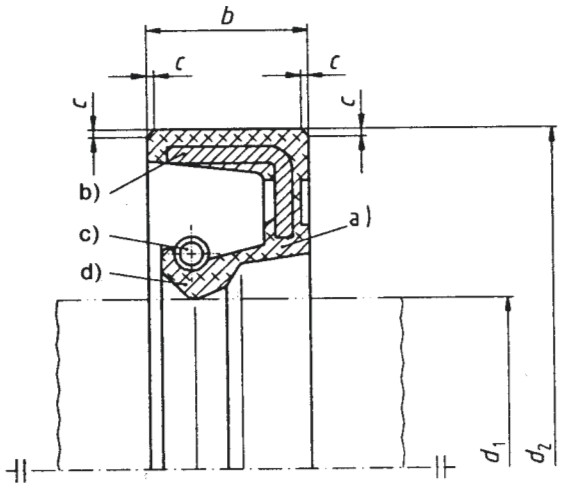
VDMA-Einheitsblatt (VDMA Code of practice) 24317 Fluid power systems – Hydraulics – Fire-resistant hydraulic fluids, guidelines

ASTM D 1418 : 1992*) Rubber and rubber latices – Nomenclature

3 Dimensions and designations

Rotary shaft lip seals are not expected to conform to the designs illustrated here; compliance is only required in the case of the dimensions specified.

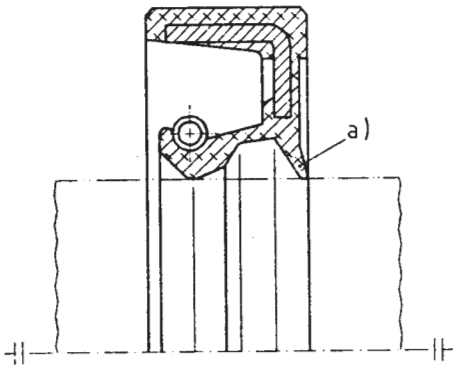
Type A



a) Elastomeric component
b) Metal insert
c) Garter spring
d) Sealing lip

Figure 1: Rotary shaft lip seal without minor lip

Type AS



a) Minor lip

Dimensions and details as for type A.

Figure 2: Rotary shaft lip seal with minor lip

Designation of a type A rotary shaft lip seal intended for a shaft diameter, d_1, of 25 mm, with an outside diameter, d_2, of 40 mm and a width, b, of 7 mm, with an elastomeric component of acrylonitrile/butadiene rubber (NBR):

EXAMPLE 1:

Lip seal DIN 3760 – A25 × 40 × 7 – NBR

If seals are to be marked with a symbol denoting the material of the elastomeric component used (cf. subclause 5.2), a 'G' shall be included in the designation.

EXAMPLE 2:

Lip seal DIN 3760 – A25 × 40 × 7 – NBR – G

If it is required that metal inserts and springs be provided with an improved corrosion protection, a 'K' shall be included in the designation.

EXAMPLE 3:

Lip seal DIN 3760 – A25 × 40 × 7 – FKM – K

or

Lip seal DIN 3760 – A25 × 40 × 7 – FKM – GK

*) Obtainable from *Beuth Verlag GmbH (Auslandsnormen-Service)*, D-10772 Berlin.

Table 1: Nominal dimensions

Shaft diameter, d_1	d_2 [1]	b ± 0,2	c [2] min.	Shaft diameter, d_1	d_2 [1]	b ± 0,2	c [2] min.	Shaft diameter, d_1	d_2 [1]	b ± 0,2	c [2] min.
6	16	7	0,3	35	47	7 [3]	0,4	95	120	12	0,8
	22				50				125		
7	22	7	0,3		52			100	120	12	0,8
8	22	7	0,3		55				125		
	24				47	8	0,4		130		
9	22	7	0,3		50			105	130	12	0,8
10	22	7	0,3		52			110	130	12	0,8
	25				55				140		
	26			38	55	7 [3]	0,4	115	140	12	0,8
12	22	7	0,3		62			120	150	12	0,8
	25				55	8	0,4	125	150	12	0,8
	30				62			130	160	12	0,8
14	24	7	0,3	40	52	7 [3]	0,4	135	170	12	0,8
	30				55			140	170	15	1
15	26	7	0,3		62			145	175		
	30				52	8	0,4	150	180	15	1
	35				55			160	190		
16	30	7	0,3		62			170	200		
	35			42	55	8	0,4	180	210	15	1
18	30	7	0,3		62			190	220		
	35			45	60	8	0,4	200	230		
20	30	7	0,3		62			210	240	15	1
	35				65			220	250		
	40			48	62	8	0,4	230	260		
22	35	7	0,3	50	65	8	0,4	240	270	15	1
	40				68			250	280		
	47				72			260	300	20	1
25	35	7	0,3	55	70	8	0,4	280	320		
	40				72			300	340		
	47				80			320	360	20	1
	52			60	75	8	0,4	340	380		
28	40	7	0,4		80			360	400		
	47				85			380	420	20	1
	52			65	85	10	0,5	400	440		
30	40	7	0,4		90			420	460		
	42			70	90	10	0,5	440	480	20	1
	47				95			460	500		
	52			75	95	10	0,5	480	520		
32	45	7 [3]	0,4		100			500	540		
	47			80	100	10	0,5				
	52				110						
	45	8	0,4	85	110	12	0,8				
	47				120						
	52			90	110	12	0,8				
					120						

[1]) Limit deviations for d_2 are given in table 2.
[2]) Edges chamfered or rounded (optional).
[3]) These values are not specified in ISO 6194 and should therefore not be used for new designs.

Table 2: Interference allowance and tolerance on d_2

Outside diameter, d_2	Interference allowance[1])	Tolerance on d_2[2])
Up to 50	+ 0,3 + 0,15	0,25
Over 50 up to 80	+ 0,35 + 0,2	0,35
Over 80 up to 120	+ 0,35 + 0,2	0,5
Over 120 up to 180	+ 0,45 + 0,25	0,65
Over 180 up to 300	+ 0,45 + 0,25	0,8
Over 300 up to 500	+ 0,55 + 0,3	1,0

[1]) The average value for d_2 taken from a number of measurements shall not be greater than the value specified for d_2 plus the interference allowance. For seals having grooved outside surfaces, additional interference allowances are to be agreed upon.

[2]) The tolerance on d_2 (i.e. $d_{2\,max} - d_{2\,min}$) is to be determined by taking three or more measurements equally spaced around the circumference.

4 Materials and surface protection

Metal inserts and garter springs shall be made from steel, the grade and surface protection being at the manufacturer's discretion. Where seals are exposed to fluids which will cause corrosive damage to the steel, a 'K' shall be included in the designation (see example 3 in clause 3) and agreement should be reached between manufacturer and user with regard to the corrosion protection of the metal insert and the material for the garter spring.

For materials to be used for the elastomeric component, see table 3.

Table 3: Materials

Base elastomer	Material designation to ISO 1629 and ASTM D 1418
Acrylonitrile/ butadiene rubber	NBR
Fluorinated rubber	FKM

The selection of the base elastomer shall take into consideration the type of fluid to be sealed, the maximum continuous operating temperature and the rotational speed of the shaft (cf. clause 6).

5 Marking of seals

5.1 Size

Seals conforming to this standard shall be permanently marked with at least the size ($d_1 \times d_2 \times b$) and the manufacturer's symbol (only where space allows).

5.2 Material of the elastomeric component

The original packaging of the seal shall be marked with a symbol denoting the material of the elastomeric component used. If requested, the seal itself shall also be marked with this symbol.

The following methods of applying the marking to the seal are permissible:

a) vulcanization;
b) using a durable colour resistant to both mineral oil and fat;
c) using a label that is the same colour as the seal.

The following colours shall be used: RAL 9002 white (for NBR) and RAL 3000 red (for FKM).*)

*) Colours according to the RAL 840 HR Colour index, which is obtainable from *Beuth Verlag GmbH,* Burggrafenstraße 6, D-10787 Berlin.