International Standard ISO 6864

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION•МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ•ORGANISATION INTERNATIONALE DE NORMALISATION

Plain bearings — Thin-walled flanged half bearings — Dimensions, tolerances and methods of checking

Paliers lisses — Demi-coussinets minces à collerettes — Dimensions, tolérances et méthodes de contrôle

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been authorized has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 6864 was developed by Technical Committee ISO/TC 123, *Plain bearings*, and was circulated to the member bodies in April 1982.

It has been approved by the member bodies of the following countries:

Czechoslovakia	India	Sweden
Egypt, Arab Rep. of	Italy	United Kingdom
France	Poland	USA
Germany, F.R.	Romania	USSR

No member body expressed disapproval of the document.

Plain bearings — Thin-walled flanged half bearings — Dimensions, tolerances and methods of checking

1 Scope and field of application

This International Standard lays down the main dimensions and tolerances for thin-walled flanged half bearings used in reciprocating machinery. It is not expected that all flanged half bearings with the main dimensions listed will be available from stock but adoption of standard sizes should lead to economies in tooling costs.

The main dimensions and tolerances are fixed for a series of thin-walled flanged half bearings suitable for housings having inside diameters from 40 to 250 mm. Flanged half bearings for larger or smaller inside diameters are only rarely used.

This International Standard also lays down dimensions and tolerances for characteristics features of thin-walled flanged half bearings. The introduction of such features into a particular design is a decision that shall be made by the user in the light of his knowledge of the application.

Flanged half bearings are generally used in connection with half bearings without flange according to ISO 3548.

Alternatively to serve as a flanged half bearing, it is admittedly possible to use a prefitted assembly of a half bearing without flange with two half thrust washers, the specifications of which should be agreed between user and manufacturer, taking acount of ISO 3548 and ISO 6526.

NOTE — All the dimensions and tolerances are expressed in millimetres unless otherwise indicated.

2 References

ISO 497, *Guide to the choice of series to the use of preferred numbers and of series containing more rounded values of preferred numbers.*

ISO 3548, *Plain bearings — Thin-walled half bearings — Dimensions, tolerances and methods of checking.*

ISO 4383, *Plain bearings — Metallic multilayer materials for thin-walled plain bearings.*

ISO 4384, *Plain bearings — Hardness testing of bearing materials.*

ISO 6282, *Thin-walled plain bearings — Determination of* $\delta_{0,01}$* *limit.*

ISO 6526, *Plain bearings — Pressed bimetallic half thrust washers — Features and tolerances.*

3 Definition

For the purpose of this International Standard, the following definition is applicable:

flanged bearing : A combination of a radial bearing (cylindrical radial part) with an axial bearing (flanges at the ends) (see figure 1).

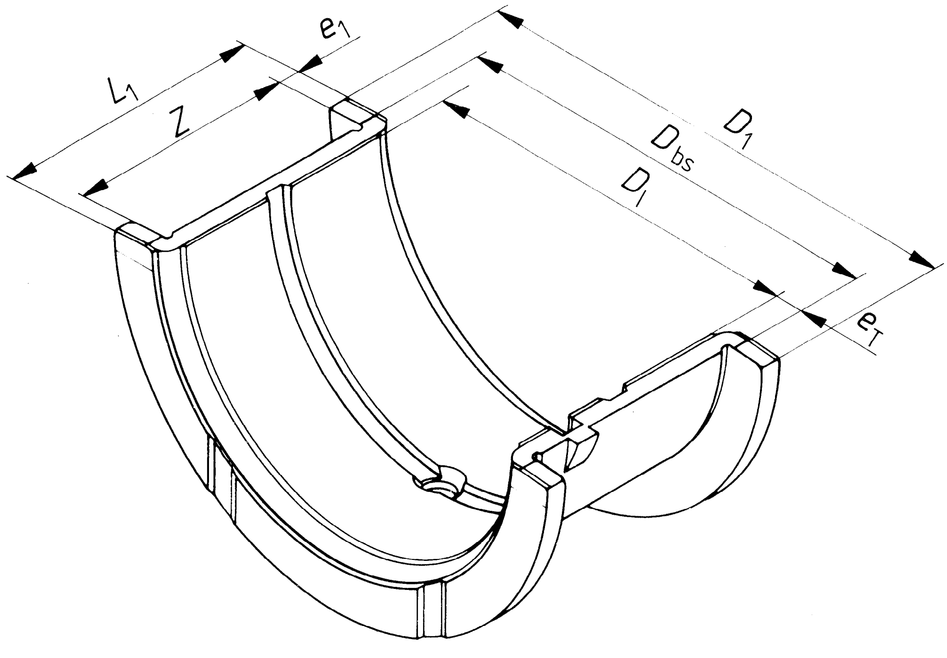


Figure 1 — Flanged half bearing

4 Symbols

D_L = housing diameter

D_I = inside diameter of the bearing

D_{bs} = outside diameter of the bearing

D_1 = outside diameter of flange

D_{cb} = diameter of the checking block bore

e_T = bearing wall thickness

e_1 = flange thickness

Z = distance between flanges

L_L = housing width

L_1 = overall bearing width

S_N or $S_{N1} + S_{N2}$ = nip

F = $F_1 = F_2$ = checking load, in newtons

E_x = eccentricity

A = locating nick width

B = locating nick length

N_D = locating nick height

H = distance between nick and flange

h = height and width at transition between radial part and flange

J = distance between nick and groove

E = notch recess width

N_Z = notch recess length

G = notch recess height

H_D = height of the joint face bore relief

P_D = depth of the joint face bore relief

e_J = wall thickness at the joint face

l = height of the flange relief

t = depth of the flange relief

G_W = groove width

G_E = wall thickness at the back of the groove

α = groove side angle

r_1 = radius at the back of the groove

r_2 = oil pocket radius

G_X = distance between grooves and the flange axis.

5 Main dimensions and tolerances

All sharp edges should be free of burrs. If chamfers are desired, they should have an angle of 45°.

5.1 Nominal dimensions

The nominal dimensions of housing (inside) diameter, inside diameter and wall thickness are given in table 1.

The nominal overall width should be equal to the nominal distance between flanges plus two times the nominal wall thickness.

5.2 Tolerance for the housing

Ferrous housings should be manufactured to ISO H6, but in the case of housings made from materials having a high coefficient of expansion, or where other factors such as housing dimensional stability are involved, then the housing size may depart from ISO H6 limits but should always be produced in accordance with a grade 6 tolerance.

5.3 Tolerance for nip and wall thickness

The bearings that are the subject of this International Standard are thin and flexible and their outside diameter cannot be measured by conventional means. The peripheral length is therefore usually measured by use of the checking method given in clause 10.

It is not possible to specify the actual size of peripheral length in this International Standard since it will be dependent upon the precise application (for example factors such as housing rigidity and material and operating temperatures, have to be taken into account).

However for bearings that are finished by machining on joint faces, the manufacturing tolerances on peripheral length should be in accordance with the values of the tolerance on measured nip S_N, (see figure 11) given in table 2.

The tolerance for wall thickness e_T depends on the fact whether the bearings inside diameter is subject to a final machining operation (i.e. "as machined") or whether the bearing inside diameter is electroplated without further machining (i.e. "as plated"). The relevant tolerances are included in table 2.

Slight surface depressions are acceptable on the outside diameter of the bearing provided that they are not numerous. However, the measurement of the wall thickness shall not be carried out in these areas.

Table 1 — Housing diameter, inside diameters, wall thicknesses, outside diameter of flange and distance between flanges

Housing diameter[1)] D_L	Inside diameters, D_I, for wall thickness, e_T 2,0	2,5	3,0	3,5	4,0	5,0	6,0	D_1	Z		
40	36	35						52	15	17	21
42	38	37						54	16	18	22
45	41	40						57	17	19	24
48	44	43						60	18	21	25
50	46	45						62	18	21	26
53	49	48						65	19	23	28
56	52	51						68	20	24	29
60	56	55						72	22	25	31
63	59	58						79	23	27	33
67		62	61					83	24	28	34
71		66	65					87	25	29	36
75		70	69					91	26	31	38
80		75	74					96	28	33	41
85		80	79					105	30	35	43
90			84	83				110	31	37	45
95			89	88				115	33	39	48
100			94	93				120	34	41	50
105			99	98				129	36	43	53
110			104	103				134	38	45	55
120			114	113				144	41	49	60
125				118	117			149	42	50	62
130				123	122			154	44	52	65
140				133	132			170	47	56	70
150				143	142			180	51	60	75
160				153	152			190	54	64	80
170					162	160		200	57	68	84
180					172	170		210	60	72	89
190					182	180		220	64	76	94
200					192	190		230	67	80	99
210						200	198	250	70	83	103
220						210	208	260	73	87	108
240						230	228	280	80	95	118
250						240	238	290	83	99	123

1) Based on the R′40 series of preferred numbers (ISO 497)

Table 2 — Tolerances for measured nip S_N and wall thickness e_T

Housing diameter D_L above	up to	Tolerance for S_N ($S_{N\ max} - S_{N\ min}$)	Tolerance for e_T "as machined" bearing	"as plated" bearing
—	45	0,030	0,008	0,012
45	75	0,035	0,008	0,012
75	110	0,040	0,010	0,015
110	160	0,045	0,015	0,022
160	200	0,050	0,015	0,022
200	250	0,055	0,020	0,030

NOTE — Closer tolerances should be subject to agreement between user and manufacturer.

5.4 Tolerances for distance between flanges, housing width, bearing width, flange thickness, and outside diameter of flange

Table 3 — Tolerances for distance between flanges, housing width, bearing width, flange thickness, and outside diameter of flange

Housing diameter D_L above	Housing diameter D_L up to	Tolerance for Z 1) 3)	Tolerance for L_L	Tolerance for L_1	Tolerance for e_1 2) 3)	Tolerance for D_1
—	75	+ 0,05 0	− 0,02 − 0,07	0 − 0,12		± 1
75	110	+ 0,07 0	− 0,02 − 0,07	0 − 0,12	0 − 0,05	
110	250	+ 0,07 0	− 0,02 − 0,10	0 − 0,20		± 1,5

1) In free state.

2) On the pressure loaded side (see 5.4.1).

3) The tolerances should not be added; they represent the permissible value functionnally required for each of the dimensions.

5.4.1 In general, a dimensional tolerance is only fixed for the flange thickness of the pressure loaded side in order to ensure that these flanges of the upper and lower half bearing approximately have the same thickness. In this case, the position of these flanges with respect to the locating nicks is fixed.

If the upper and lower half bearings are of the same design, then generally the two flanges of one half bearing must have the same thickness within the tolerance range fixed in table 3. In that case, the flange thicknesses result from the bearing width and the distance between flanges. Nevertheless some other tolerance may be accepted after agreement between the user and the manufacturer.

5.4.2 The flange outside diameter should be smaller than the diameter of the shoulder of the shaft.

5.5 Detailed features

5.5.1 Eccentric bore

In certain applications it may be necessary to use flanged half bearings with eccentric bores, i.e. the wall thickness of the half bearing decreases uniformly from the crown to the joint faces (see figure 2).

NOTE — The eccentricity E_x is characterized in a radial plane by the distance between the centre C_1 of the bearing outside surface and the centre C_2 of the bearing bore.

E_x is determined by the difference in wall thickness between the crown and the joint faces. It is subject to agreement between user and manufacturer.

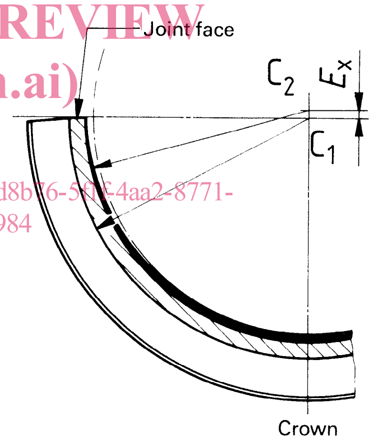


Figure 2 — Eccentric bore

5.5.2 Free spread

Free spread is influenced by factors such as the lining material, its thickness and its physical properties, by the backing material and its properties, and by the operating temperature of the assembly. Since these features are not specified in this International Standard, it is not possible to specify free spread. However, free spread must in all circumstances remain positive and be such that after operation in the engine at normal conditions, a sufficient amount of free spread remains in the bearing to enable it to be refitted. The actual amount of free spread shall be the subject of agreement between manufacturer and user.

5.5.3 Locating nicks and notch recesses in the housing

When nicks are used for location, the dimensions of the locating nicks and notch recesses should be as shown in figure 3 and table 4.

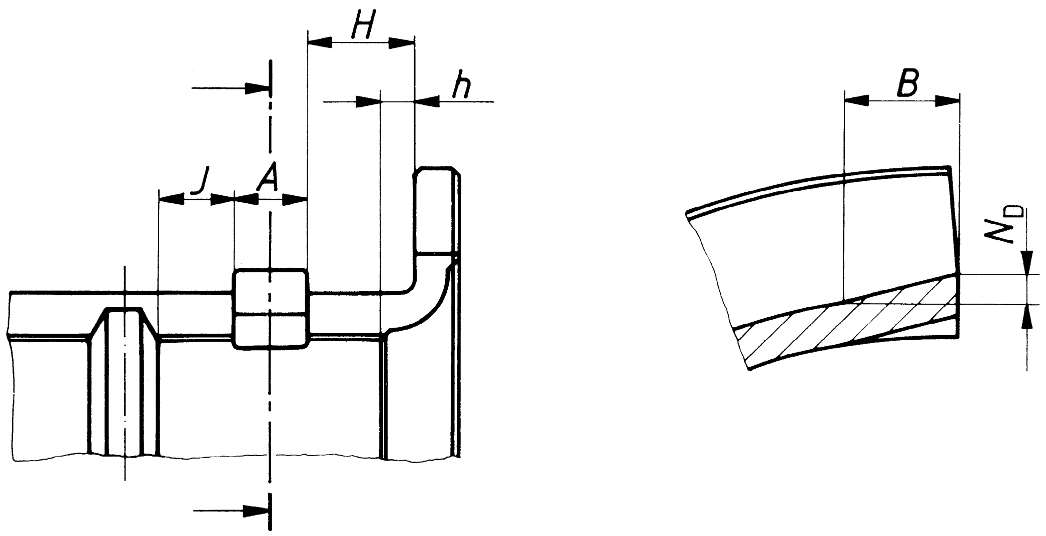


Figure 3a — Locating nick

The difference $H - h$ shall not be smaller than 2 mm in order to avoid the breaking of antifriction material when the bearing bore is machined. For the same reason, the dimension J shall not be smaller than 2 mm or the nick breaks into the oil groove.

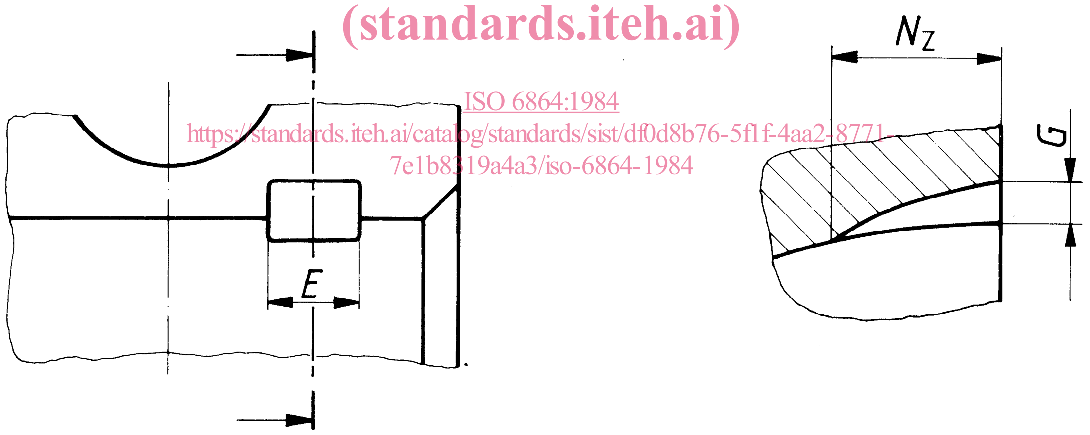


Figure 3b — Notch recess in the housing

Table 4 — Dimensions of the locating nicks and notch recesses and tolerances for the distance from the locating nick to the flange

Housing diameter D_L		Locating nick			Tolerance for	Notch recess		
above	up to	A	B	N_D	H	E	N_Z	G
—	45	2,2 to 2,35	3 to 4	0,8 to 1,1	$^{+0,15}_{0}$	3,06 to 2,94	5,5 to 4,5	1,75 to 1,50
45	65	3,2 to 3,35	5 to 6	1 to 1,3		4,06 to 3,94	8,5 to 7	2,15 to 1,75
65	85	4,2 to 4,35	5 to 6	1,2 to 1,5		5,07 to 4,93	10 to 8	2,60 to 2
85	120	5,2 to 5,35	6 to 7	1,4 to 1,7		6,07 to 5,93	12 to 9	3 to 2,25
120	200	6,2 to 6,35	8,5 to 10	1,5 to 2	$^{+0,2}_{0}$	8,08 to 7,92	15,5 to 12	4 to 3
200	250	7,2 to 7,35	11,5 to 13	2 to 2,5		10,08 to 9,92	20 to 15	4,70 to 3,50

5.5.4 Reliefs

5.5.4.1 Joint face bore reliefs

Joint face bore reliefs are provided at both sides of the half bearing on the whole width. The relevant dimensions are given in table 5.

The dimension H_D is dependent upon the application and should be subject to agreement between user and manufacturer.

For guidance, it can be assumed that the dimension H_D is 1/7 of the inside diameter.

Table 5 — Dimensions and tolerance of relief of joint face bores

Housing diameter D_L above	Housing diameter D_L up to	Tolerance for H_D	$P_D = e_T - e_J$
—	85	0 −3	0,012 to 0,025
85	120	0 −4	0,015 to 0,030
120	200	0 −5	0,020 to 0,040
200	250	0 −6	0,030 to 0,055

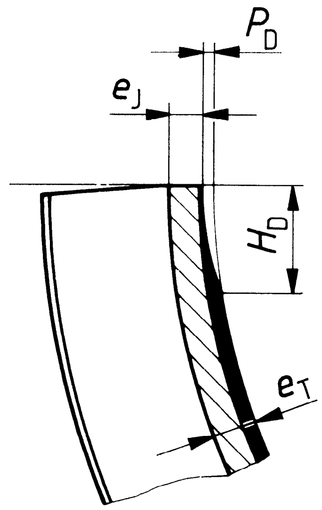
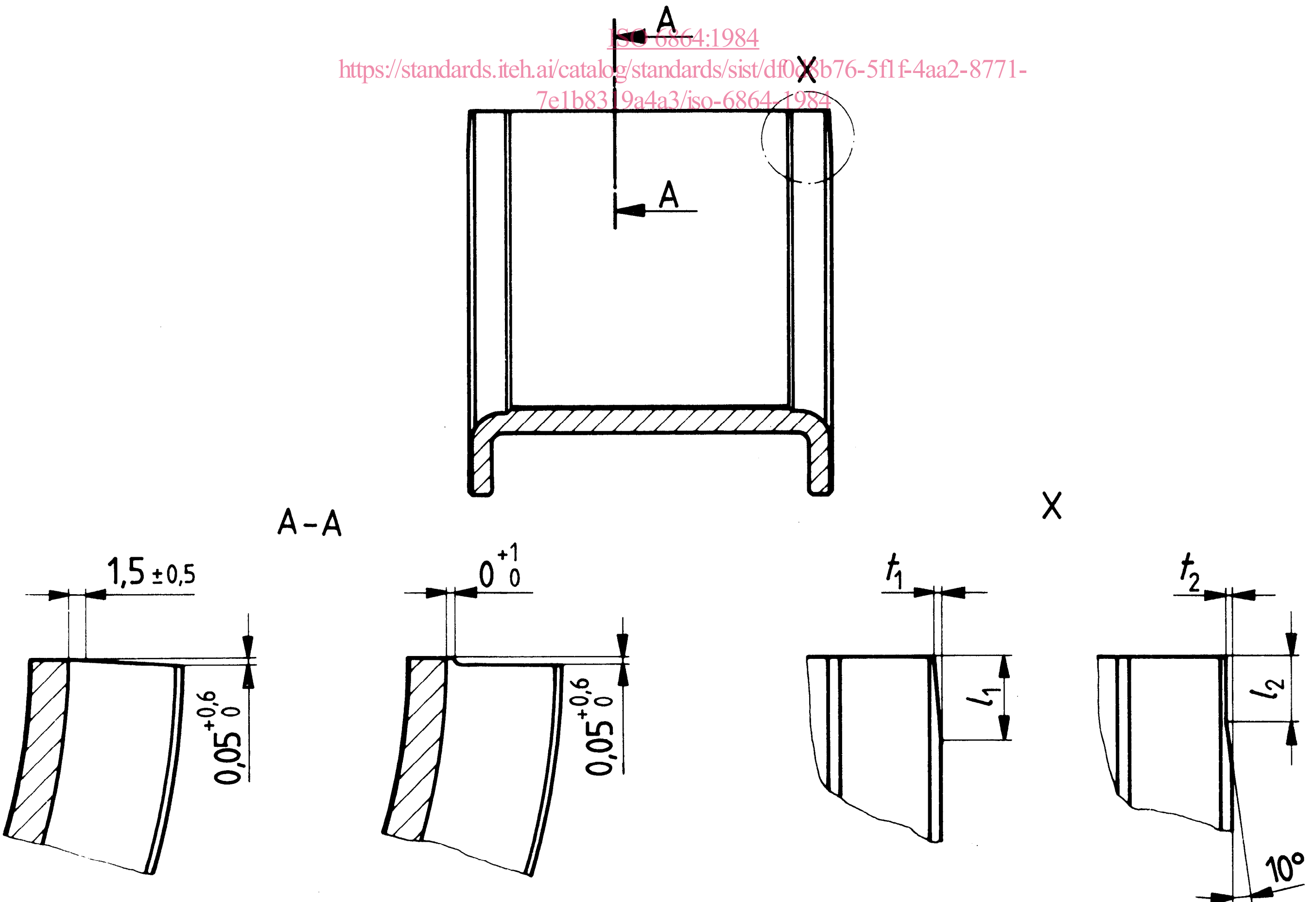


Figure 4 — Joint face bore relief

5.5.4.2 Flange reliefs

Flange reliefs are provided at all joints faces (see figure 5, enlarged section A-A) as well as at all sliding surfaces edges (see figure 5, detail X).



Joint face relief (design at the option of the manufacturer) **Sliding surface relief** (Design at the option of the manufacturer)

Figure 5 — Flange reliefs

Table 6 — Dimensions and tolerances of the relief of the flanges

Housing diameter D_L above	up to	t_1 $^{+0,2}_{0}$	l_1 ± 2	t_2 $^{+0,3}_{0}$	l_2 ± 0,5
—	120	0,1	5,5	0,3	3
120	250	0,2	8		

5.5.5 Transition between radial part and flange

Figure 6 shows typical examples of the transition region, the actual form used being dependent upon the manufacturing method and the ratio between wall thickness and flange thickness.

The transition between the radial part and flange must be within dimension h given in table 7 in order to avoid cracking.

The transition geometry must be adapted to the form of the shaft in order to avoid fouling of the fillet radius and of the housing inside diameter.

Table 7 — Minimum height (and width) of transition

Housing diameter D_L above	up to	h min.
—	120	2
120	250	3

5.5.6 Oil grooves and holes

5.5.6.1 Oil grooves and holes in the bore

The position of the annular groove and the oil hole (oil holes) is fixed in figure 7.

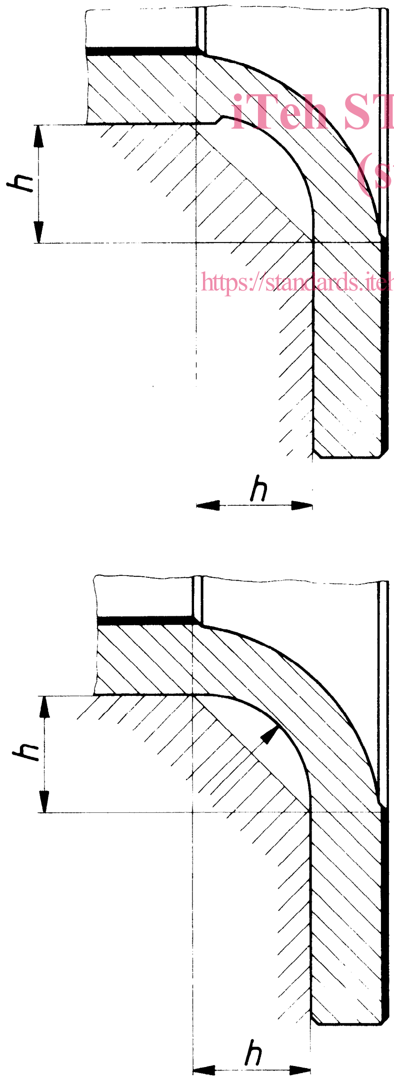


Figure 6 — Two types of transition between radial part and flange

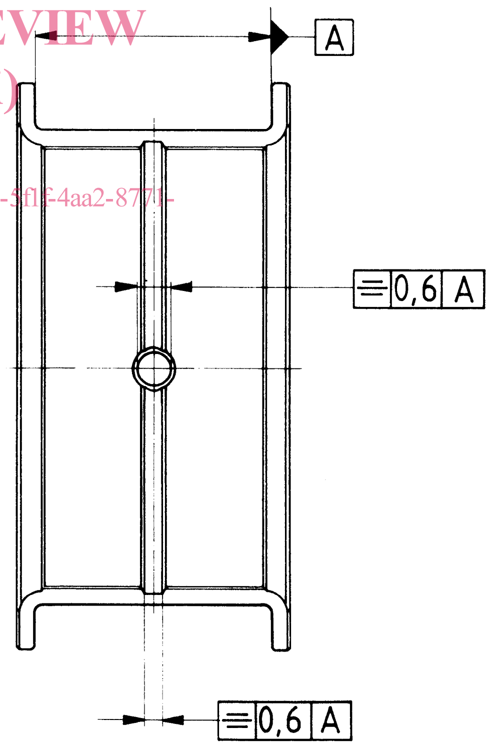


Figure 7 — Position of the annular groove and oil hole in the radial part of the bore