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# INTERNATIONAL STANDARD



# 3548

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

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

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

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**Descriptors** : bearings, plain bearings, bearing bushes, dimensions, dimensional tolerances.

## FOREWORD

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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 3548 was developed by Technical Committee ISO/TC 123, *Plain bearings*, and was circulated to the member bodies in September 1977.

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

Australia	Korea, Rep. of	Spain
Bulgaria	Mexico	Sweden
Chile	Netherlands	Turkey
Czechoslovakia	New Zealand	United Kingdom
France	Poland	U.S.S.R.
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The member bodies of the following countries expressed disapproval of the document on technical grounds :

Germany  
U.S.A.

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

## 1 SCOPE

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

For each housing size to be used, this International Standard recommends a range of wall thicknesses in order to permit a choice of a shaft size that can accommodate the detailed design features necessary for the application under consideration.

As certain dimensions and tolerances of thin-walled half bearings cannot, because of the very nature of these parts, be directly measured, it was considered necessary to specify the methods for checking these dimensions and tolerances in clause 6.

## 2 FIELD OF APPLICATION

This International Standard applies to thin-walled half bearings used in reciprocating machinery and suitable for housings having inside diameters from 20 to 500 mm.

Features which are defined are commonly incorporated in thin-walled half bearings, but the introduction of such features into a particular design is a decision that must be made by the user in the light of his knowledge of the application.

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

## 3 REFERENCE

ISO 3547, *Plain bearings — Wrapped bushes — Dimensions, tolerances and methods of checking.*

## 4 DIMENSIONS AND TOLERANCES

### 4.1 Dimensions

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

TABLE 1 – Housing diameters, inside diameters and wall thicknesses of thin-walled half bearings

Preferred housing diameters <sup>1)</sup> $D_L$	Inside diameters, for wall thickness											
	1,5	1,75	2,0	2,5	3,0	3,5	4,0	5,0	6,0	8,0	10,0	12,0
20	17	16,5										
21	18	17,5										
22	19	18,5										
24	21	20,5										
25	22	21,5										
26	23	22,5										
28	25	24,5										
30	27	26,5										
32	29	28,5	28									
34	31	30,5	30									
36	33	32,5	32									
38	35	34,5	34									
40		36,5	36	35								
42		38,5	38	37								
45		41,5	41	40								
48		44,5	44	43								
50		46,5	46	45								
53		49,5	49	48								
56		52,5	52	51								
60		56,5	56	55								
63		59,5	59	58								
67			63	62	61							
71			67	66	65							
75			71	70	69							
80			76	75	74							
85			81	80	79							
90				85	84	83						
95				90	89	88						
100				95	94	93						
105				100	99	98						
110				105	104	103						
120				115	114	113						
125					119	118	117					
130					124	123	122					
140					134	133	132					
150					144	143	142					
160					154	153	152					
170						163	162	160				
180						173	172	170				
190						183	182	180				
200						193	192	190				
210							202	200	198			
220							212	210	208			
240							232	230	228			
250							242	240	238			
260							252	250	248			
280								270	268	264		
300								290	288	284		
320								310	308	304		
340								330	328	324		
360									348	344	340	
380									368	364	360	
400									388	384	380	
420										404	400	396
450										434	430	426
480										464	460	456
500										484	480	476

1) Based on the R<sup>40</sup> series of preferred numbers (ISO 497).

**4.2 Housing diameter tolerance**

Ferrous housings should be manufactured to ISO H6 limits, 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 H6 limits but should always be produced in accordance with a grade 6 tolerance.

**4.3 Tolerance on peripheral length**

The bearings that are the subject of this International Standard are thin and flexible and their outside diameters cannot be measured by conventional means. The peripheral length is therefore usually measured by use of the checking method given in clause 6.

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 machined bearings the manufacturing tolerances on peripheral length should be in accordance with the values of the tolerance on measured nip,  $S_N$ , (see figure 8) given in table 2.

TABLE 2 – Tolerance on measured nip

Housing diameter $D_L$		Tolerance on $S_N$ ( $S_{N\max} - S_{N\min}$ )
above	up to (including)	
—	45	0,030
45	75	0,035
75	110	0,040
110	160	0,045
160	200	0,050
200	250	0,055
250	300	0,060
300	400	0,070
400	500	0,080

**4.4 Tolerance on wall thickness**

The tolerance on wall thickness  $e_T$  will depend upon whether the bearing inside diameter is subject to a final machining operation (i.e. "as machined") or whether its inside bearing surface is electroplated (i.e. "as plated"). The relevant tolerances are shown in table 3.

TABLE 3 – Wall thickness tolerance

Housing diameter $D_L$		Tolerance on $e_T$ ( $e_{T\max} - e_{T\min}$ )	
above	up to (including)	"As machined" bearing	"As plated" bearing
—	45	0,008	*
45	75	0,008	0,012
75	110	0,010	0,015
110	200	0,015	0,022
200	300	0,020	0,030
300	400	0,025	0,035
400	500	0,030	0,040

\* To be agreed between users and suppliers.

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

Slight surface depressions are acceptable on the outside diameter of the bearings provided that they are randomly distributed; however, the measurement of wall thickness shall not be carried out in these areas.

**4.5 Bearing width tolerance**

This International Standard does not specify bearing widths  $L$  since this feature will be determined by the application. However, the following limits apply on the width of the bearing, for various inside diameters of the thin-walled half bearings (see table 4).

TABLE 4 – Bearing width tolerance

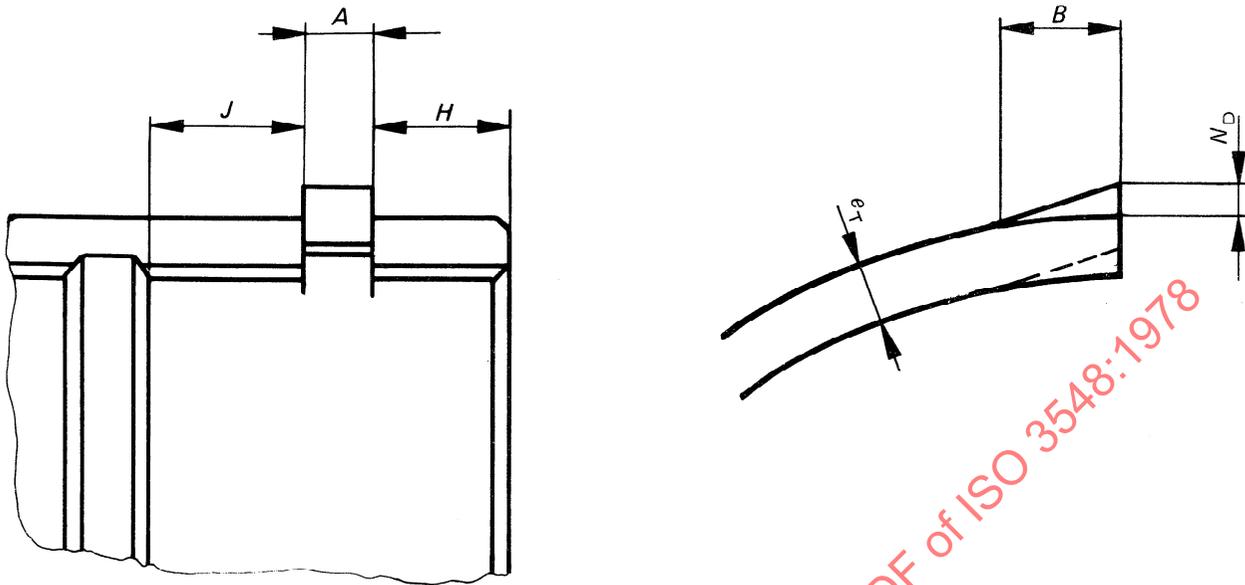
Inside diameter		Tolerance on $L$
above	up to (including)	
20*	120	0 – 0,25
120	260	0 – 0,40
260	500	0 – 0,50

\* included

**4.6 Detailed features**

**4.6.1 Locating nick and notch recess**

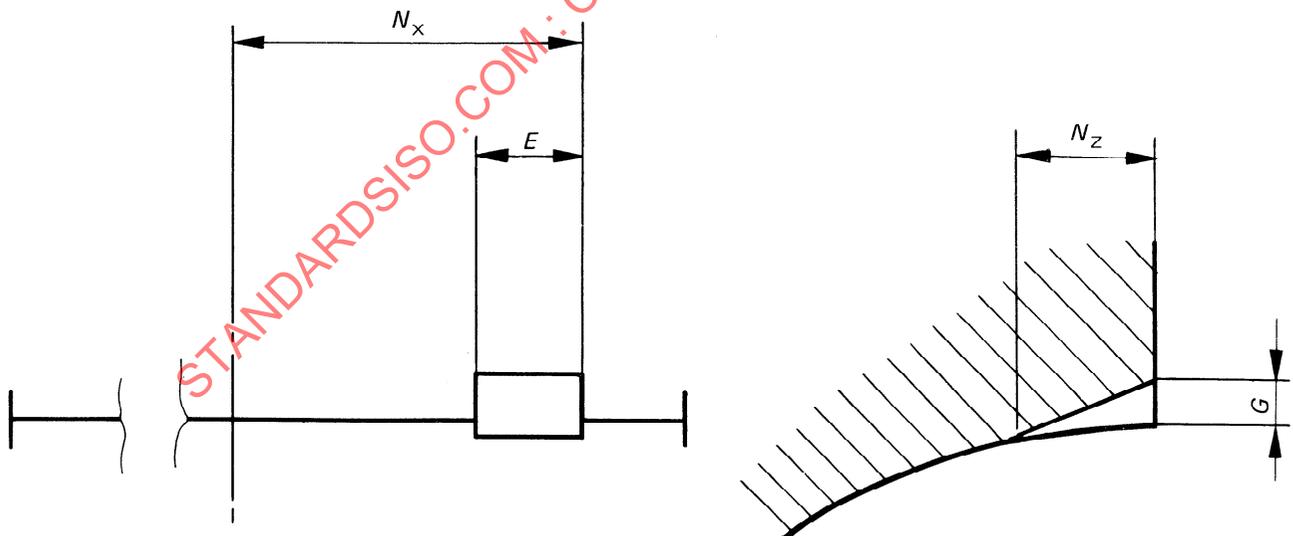
When nicks are used for location, the dimensions and tolerances of the locating nick and the notch in the housing shall be as shown in figures 1 and 2 and tables 5, 6 and 7.



NOTES

- 1 **Dimension H** : The nick may be produced at the end of the bearing, in which case  $H = 0$ .  
Otherwise,  $H \geq 1,5 \times e_T$ , but shall be not less than 3 mm.
- 2 **Dimension J** : The nick shall be permitted to break into the groove, in which case  $J = 0$ .  
Otherwise,  $J \geq 2$  mm.

FIGURE 1 – Locating nick



NOTES

- 1 **Dimension  $N_X$**  :  $N_X = \frac{L}{2} - H_{\min}$
- 2 **Tolerance on  $N_X$**  :  $\begin{matrix} +0,13 \text{ mm} \\ 0 \end{matrix}$

FIGURE 2 – Notch in housings

TABLE 5 – Nick dimensions

Housing diameter $D_L$		A	B	$N_D$
above	up to (including)			
—	38	2,72 to 2,84	3,0 to 4,0	0,8 to 1,1
38	63	3,72 to 3,84	5,0 to 6,0	1,0 to 1,3
63	85	4,67 to 4,81	5,0 to 6,0	1,2 to 1,5
85	120	5,67 to 5,81	6,0 to 7,0	1,4 to 1,7
120	200	7,61 to 7,77	8,5 to 10,0	1,5 to 2,0
200	340	9,59 to 9,75	11,5 to 13,0	2,0 to 2,5
340	500	14,50 to 14,70	16,0 to 18,0	3,0 to 3,5

TABLE 7 – Notch dimensions

Housing diameter $D_L$		E	$N_z$	G
above	up to (including)			
—	38	3,06 to 2,94	5,5 to 4,5	1,75 to 1,50
38	63	4,06 to 3,94	8,5 to 7,0	2,15 to 1,75
63	85	5,07 to 4,93	10,0 to 8,0	2,60 to 2,00
85	120	6,07 to 5,93	12,0 to 9,0	3,00 to 2,25
120	200	8,08 to 7,92	15,5 to 12,0	4,00 to 3,00
200	340	10,08 to 9,92	20,0 to 15,0	4,70 to 3,50
340	500	15,10 to 14,90	26,0 to 20,0	6,00 to 4,50

TABLE 6 – Tolerance on dimension H

Housing diameter $D_L$		Tolerance on H
above	up to (including)	
—	120	+ 0,15 0
120	260	+ 0,20 0
260	500	+ 0,30 0

4.6.2 Joint face bore relief

Joint face bore reliefs are usually provided in thin-walled half bearings although they may be omitted in certain cases of bearings for oblique split connecting rods.

Joint face bore relief is provided at both sides of thin-walled half bearings on the whole width. The relevant dimensions are given in table 8.

For guidance it is suggested that dimension  $H_D$  be 1/7 of the bore diameter, but the actual value of this dimension will be dependent upon the application and will be subject to agreement between user and manufacturer.

4.6.3 Eccentric bore

In certain applications it may be necessary to use bearings having eccentric bores, i.e. the wall thickness of the bearing decreases uniformly from the crown to the joint faces (see figure 4).

Eccentric bores are not generally required in bearings larger than 120 mm housing diameter.

TABLE 8 – Relief dimensions and tolerance

Housing diameter $D_L$		Tolerance on $H_D$	$P_D = e_T - e_J$
above	up to (including)		
—	38	0 -2	0,025 to 0,012
38	63	0 -3	
63	85	0 -3	
85	120	0 -4	0,030 to 0,015
120	200	0 -5	0,040 to 0,020
200	340	0 -6	0,055 to 0,030
340	500	0 -8	0,070 to 0,040

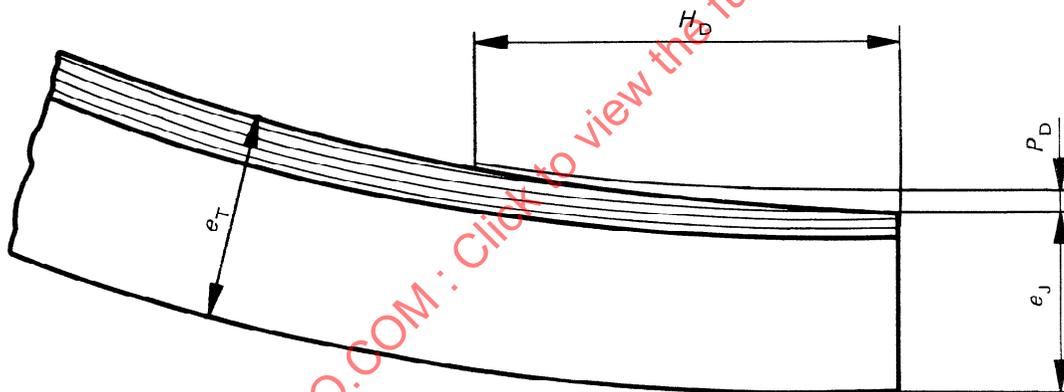


FIGURE 3 – Joint face bore relief

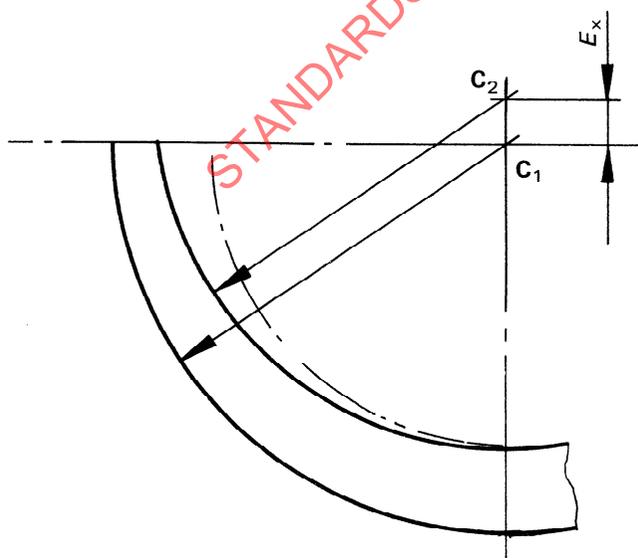


FIGURE 4 – Eccentric bore

NOTES

1 **Eccentricity  $E_x$**  : It 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.

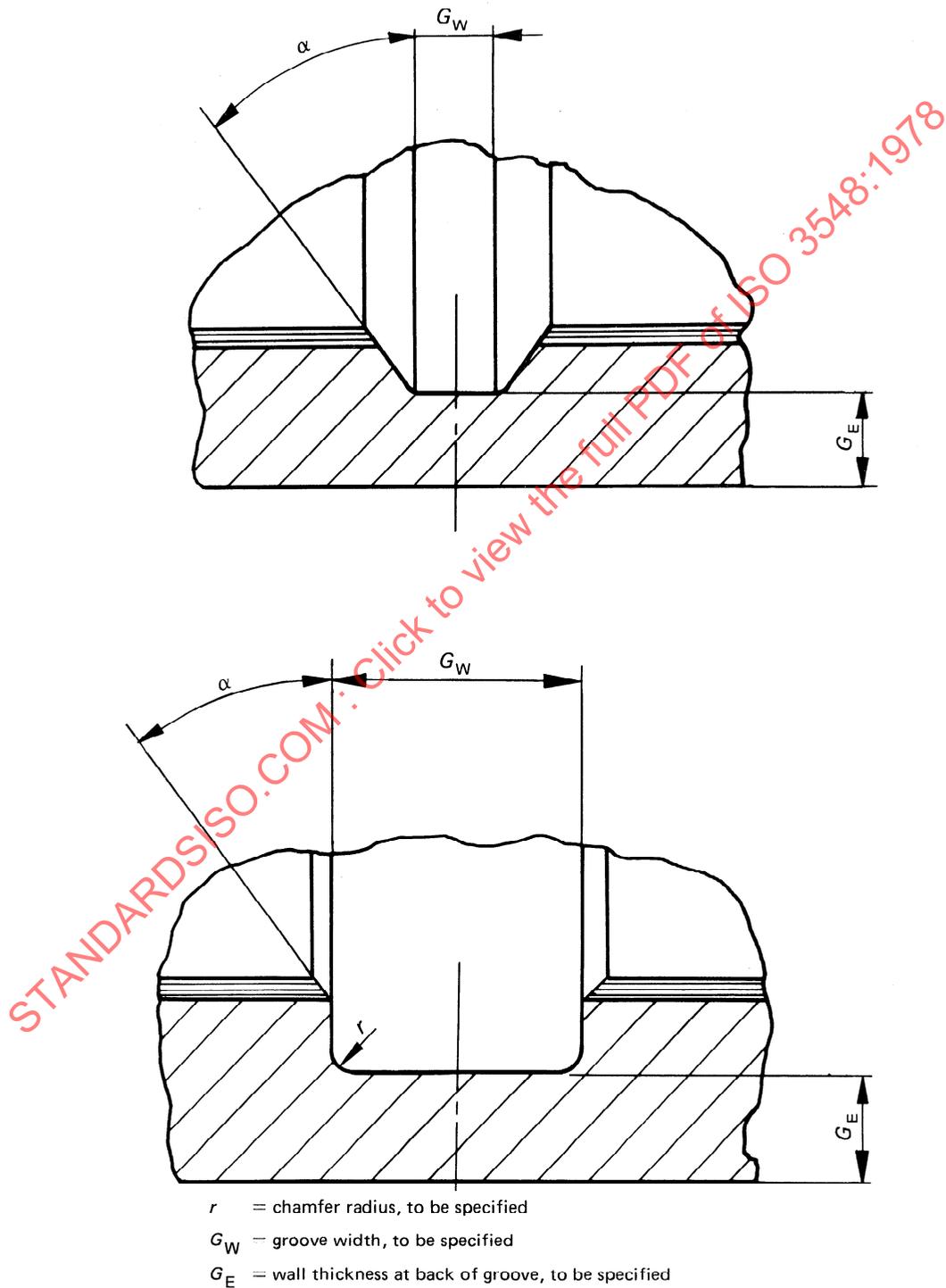
2 **Tolerances on  $E_x$**  : Converted into wall thickness variation in order to check it easily on finished bearings. It should be subject to agreement between the user and the manufacturer.

4.6.4 Grooves

Groove sizes are determined by functional requirements and are not specified in this International Standard.

4.6.4.1 GROOVE FORMS

The preferred groove forms are shown in figure 5.



NOTE — Angle  $\alpha$ : Angles of  $\alpha = 30^\circ$  and  $45^\circ$  are most frequently used.

FIGURE 5 — Groove forms