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# Plain bearings — Pressed bimetallic half thrust washers — Features and tolerances

*Paliers lisses — Demi-flasques de butée bimétalliques découpés à la presse — Caractéristiques et tolérances*



Reference number
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# Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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This document was prepared by Technical Committee ISO/TC 123, *Plain bearings*, Subcommittee SC 3, *Dimensions, tolerances and construction details*.

This second edition cancels and replaces the first edition (ISO 6526:1983), which has been technically revised.



# Plain bearings — Pressed bimetallic half thrust washers — Features and tolerances

## 1 Scope

This document specifies the main features and tolerances for pressed bimetallic half thrust washers having an outside diameter up to 160 mm.

NOTE 1 All the linear dimensions and tolerances are expressed in millimetres.

NOTE 2 The main dimensions for the half thrust washers are not the subject of this document.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 286-2, *Geometrical product specifications (GPS) — ISO code system for tolerances on linear sizes — Part 2: Tables of standard tolerance classes and limit deviations for holes and shafts*

## 3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

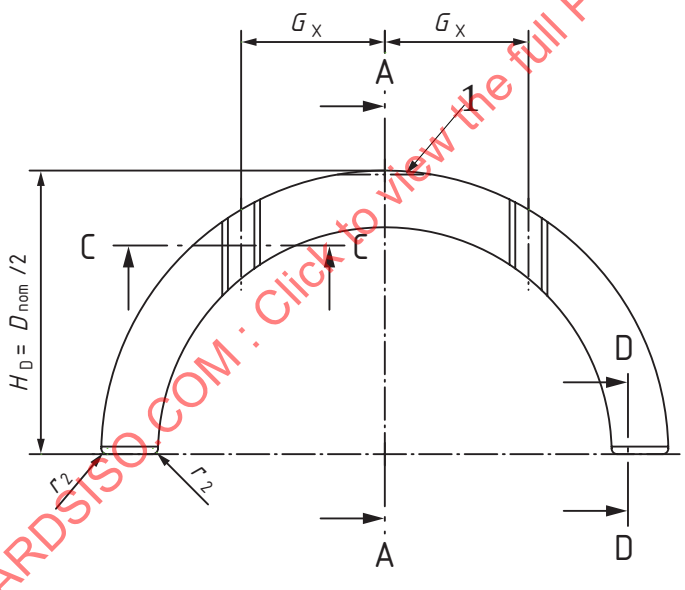
— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

## 4 Symbols

| | |
|---|---|
| $D$ | outside diameter of the washer |
| $D_{nom}$ | nominal outside diameter of the washer |
| $d$ | inside diameter of the washer |
| $H_D$ | washer height |
| $e_T$ | total washer thickness |
| $E_D$ | height at lug top |
| $F_D$ | height at lug root |
| $A$ | lug width |
| $\alpha$ | groove side angle |
| $G_W$ | groove width |

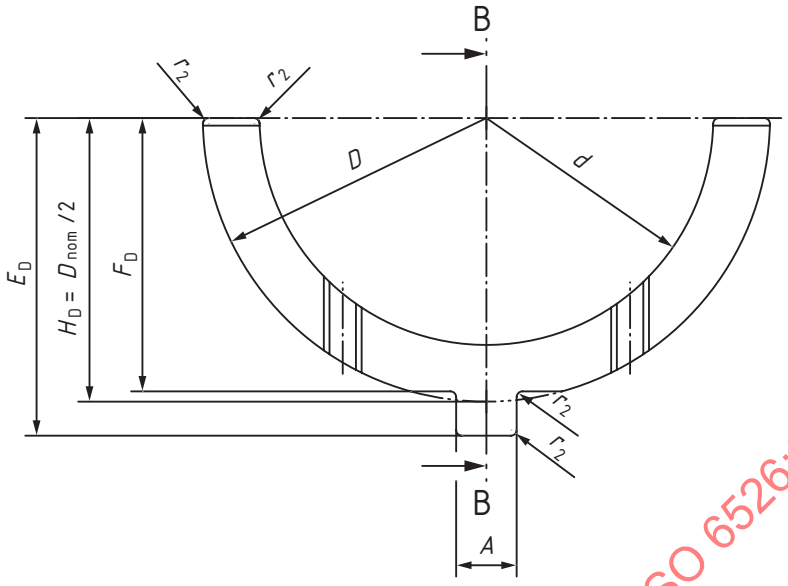
| | |
|---|---|
| $G_E$ | wall thickness at the back of the groove |
| $G_x$ | distance between groove and the washer axis |
| $r_1$ | width of back chamfer or radius |
| $r_2$ | lug and joint face radius and lug fillet radius |
| $r_3$ | width of sliding surface chamfer or radius |
| $L_j$ | scalloped toe width at joint face |
| $t_1$ | depth of the sliding chamfered relief |
| $t_2$ | depth of the sliding flat relief |
| $l_2$ | height of the sliding flat relief |
| $\beta$ | sliding surface relief angle at joint faces |
| $p$ | flatness limit |



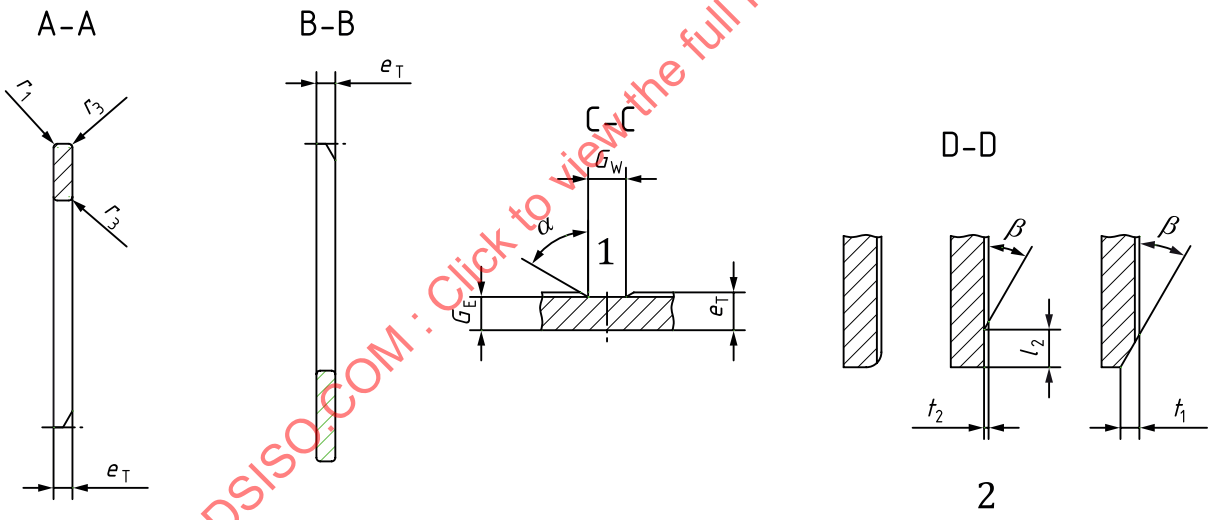

**a) Without lug**

**Key**

1 optional flat




**b) With lug**




**c) Cross sections**

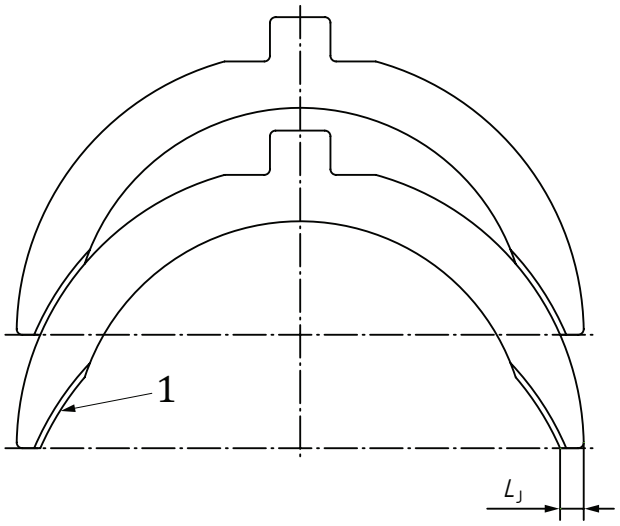


**Key**

1 groove

2 blanking radius and joint face sliding surface relief

**Figure 1 — Half thrust washers with and without lug**




**Key**

1 blanking fall-away

**Figure 2 — Blanking fall-away for scalloped toe thrust washers**



## 5 General tolerances

For dimensions without tolerance indication, the following values apply:

— linear dimensions: ±0,25 mm;

— angular dimensions: ±5°.

## 6 Tolerances for diameters and for heights

Tolerances for the outside diameter, $D$, and the inside diameter, $d$, are shown in Tables 1 and 2. The difference $D - d$ should be greater than $7 \cdot e_T$.

Tolerances for heights $H_D$ and $F_D$ are shown in Table 3.

**Table 1 — Tolerance for the outside diameter, $D$**

| $D$ | | Tolerance |
|---|---|---|
| Above | Up to and including | |
| — | 120 | 0<br>−0,25 |
| 120 | 160 | 0<br>−0,35 |

**Table 2 — Tolerance for the inside diameter, $d$**

| $D$ | | Tolerance for $d$ |
|---|---|---|
| Above | Up to and including | |
| — | 120 | +0,25<br>0 |
| 120 | 160 | +0,35<br>0 |

**Table 3 — Tolerances for heights $H_D$ and $F_D$**

| $D$ | | Tolerance for $H_D$ | Tolerance for $F_D = H_{Dmin} - (r_{2max} + 0,5)$ |
|---|---|---|---|
| Above | Up to and including | | |
| — | 120 | 0<br>−0,20 | 0<br>−0,5 |
| 120 | 160 | 0<br>−0,25 | |

## 7 Total thickness

Total thickness, $e_T$, is shown in Table 4.

For over-sizes, it is recommended to increase the total thickness by a 0,10 step to which the same tolerance as for the corresponding original size is applied.

**Table 4 — Total thickness, $e_T$**

| $D$ | | $e_T$ Preferred dimensions (original size) | | | | Tolerance for $e_T$ |
|---|---|---|---|---|---|---|
| Above | Up to and including | 1,75 | 2 | 2,5 | 3 | |
| — | 80 | x | x | | | 0<br>−0,05 |
| 80 | 120 | | x | x | | 0<br>−0,06 |
| 120 | 160 | | | x | x | 0<br>−0,07 |

## 8 Locating lug

### 8.1 Lug width

Lug width, $A$, is shown in Table 5.

**Table 5 — Lug width, $A$**

| $D$ | | $A$ | |
|---|---|---|---|
| Above | Up to and including | Preferred dimension | Tolerance |
| — | 80 | 8 | −0,25<br>−0,50 |
| 80 | 120 | 10 | |
| 120 | 160 | 12 | |

### 8.2 Notch recess

The notch recesses should be mostly manufactured with a tolerance JS13 in accordance with ISO 286-2.

### 8.3 Lug length

The length of the lug is determined by dimension $E_D$ given in Table 6.

NOTE Lug design is usually as shown in Figure 1 b), but washers can also be provided with an offset locating lug in order to avoid incorrect assembly.

**Table 6 — Length of the lug**

| $D$ | | $E_D$ |
|---|---|---|
| **Above** | **Up to and including** | **Preferred dimension**[a] |
| — | 80 | $H_D + 5$ |
| 80 | 160 | $H_D + 8$ |

[a] Dimension $E_D$ is left without a tolerance because it is the difference of two dimensions for which the normal tolerance of ±0,25 mm would apply.

## 9 Grooves

### 9.1 Groove width

Groove width, $G_W$, is shown in Table 7.

**Table 7 — Groove width, $G_W$**

| $D$ | | $G_W$ | |
|---|---|---|---|
| **Above** | **Up to and including** | **Preferred dimension** | **Tolerance** |
| — | 60 | 3,5 | +0,50 |
| 60 | 160 | 4,5 | 0 |

### 9.2 Wall thickness at the back of the groove

The tolerance for wall thickness at the back of the groove, $G_E$, is $G_E : ^{0}_{-0,30}$.

### 9.3 Groove position (with respect to the axis)

Tolerance of groove position (with respect to the axis), $G_X$, is shown in Table 8.

**Table 8 — Tolerance of groove position (with respect to the axis), $G_X$**

| $D$ | | **Tolerance for $G_X$** |
|---|---|---|
| **Above** | **Up to and including** | |
| — | 60 | ±1,5 |
| 60 | 160 | ±2,5 |

## 10 Joint faces

Joint face forms are shown in Figure 1, and also in Figure 2 for scalloped toe where $L_{Jmin} = \frac{D-d}{4}$ or 3 mm whichever is the wider.



# 11 Fillet radii and chamfers

## 11.1 Radius on lug and joint faces and lug fillet radius

Radius on lug and joint faces and lug fillet radius, $r_2$, are shown in Table 9.

**Table 9 — Radius on lug and joint faces and lug fillet radius, $r_2$**

| $e_T$ | | Preferred maximum radius |
|---|---|---|
| Above | Up to and including | $r_{2max}$ |
| — | 2,59 | 1 |
| 2,59 | — | 1,5 |

## 11.2 Joint face relief

Joint face relief can be either a blanking radius or a relief the depth of which, $t_1$ and $t_2$, should not exceed 30 % of the total thickness $e_T$. Another design is shown in Figure 1 c) (centre, cross section D–D).

The angle $\beta$ should not exceed 30°.

## 11.3 Chamfer or radius between the sliding surface and side faces

Chamfer or radius between the sliding surface and side faces, $r_3$, is shown in Table 10.

**Table 10 — Chamfer or radius between the sliding surface and side faces, $r_3$**

| $e_T$ | | Maximum width of chamfer or radius on sliding surface |
|---|---|---|
| Above | Up to and including | $r_{3max}$ |
| — | 2,59 | $0,1 \cdot \frac{(D-d)}{2}$ |
| 2,59 | — | $0,15 \cdot \frac{(D-d)}{2}$ |

## 11.4 Chamfer or radius between back and external side face

Chamfer or radius between back and external side face, $r_1$, can be either a blanking radius or a chamfer whose sharp edges shall be free of burrs. The latter can be at 45° and its width range can be $0,3 \leq r_1 \leq 0,6$ with a tolerance of ±0,20.

Tool scoring due to chamfering operation is permissible on the lug and its depth can be equal to 0,15 mm over the maximum chamfer height.

The chamfer between the back and the inside face is not specified. It shall only be free of burrs.

# 12 Flatness

Half washers shall slide (under gravity) between parallel plates set at $e_{Tmax} + p$ where $p$ is given in Table 11.