



**International
Standard**

ISO 12129-1

Plain bearings — Tolerances —

**Part 1:
Fits**

*Paliers lisses — Tolérances —
Partie 1: Ajustements*

**Third edition
2024-12**

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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 preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established 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. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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 document 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).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

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

This third edition cancels and replaces the second edition (ISO 12129-1:2019), which has been technically revised.

The main changes are as follows:

- [Clause 4](#) “Symbols” has been added;
- [Table 1](#) and [Table 2](#) have been added, and the previous Table 1 and Table 2 have been renumbered [Table 3](#) and [Table 4](#);
- [Table 3](#) and [Table 4](#) have been corrected.

A list of all parts in the ISO 12129 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

This document has been established because it is not possible to use the ISO deviations given in ISO 286-1 and ISO 286-2 to develop clearance fits which correspond to the requirements of plain bearing engineering for approximately uniform mean relative bearing clearances for all nominal size ranges.

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Plain bearings — Tolerances —

Part 1: Fits

1 Scope

This document specifies a system of fits applicable to metallic plain bearings used in general engineering for mean relative bearing clearances, ψ_m , of 0,56 ‰ up to 3,15 ‰. Other clearance ranges can be used depending upon the requirements in specific applications.

This system of fits is not applicable to half-bearings and bushes which, due to their special characteristics, are not measured by diameter but by wall thickness, and which are dimensionally changed on assembly. It is not applicable to profile bore or tilting pad bearings, or to cases where specific tolerances have been established by consideration of the bearing performance at both extremes of clearance.

This document is applicable preferably to bearings in rotating machines or transmissions, but it can be used similarly in other ranges of application.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

No terms and definitions are listed in this document.

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

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

4 Symbols

For the purposes of this documents, the symbols and indices given in Tables 1 and 2, respectively, apply.

Table 1 — Symbols

Symbol	Description	Unit
C	Bearing clearance	μm
C^*	Alternative symbol for ψ	‰
D	Nominal dimension	mm
ψ	Relative bearing clearance	‰

Table 2 — Indices

Indice	Description
D	Diametral
m	Mean value
max	Maximum value
min	Minimum value

5 System of fits

The system of fits specified in this document is a normal system of fits, in which the fundamental deviation H of the bearing bore diameter is in accordance with ISO 286-2. The tolerance interval of the shaft is correlated to correspond to the mean relative bearing clearance, ψ_m .

6 Mean relative bearing clearance

The mean relative bearing clearance, ψ_m , in per thousand (‰), of a range of nominal dimensions is given by [Formula \(1\)](#):

$$\psi_m = \frac{C_{D,m}}{D_m} \quad (1)$$

$$C_{D,m} = \frac{C_{D,max} + C_{D,min}}{2} \quad (2)$$

EXAMPLE For the nominal dimension range from 250 mm to 280 mm, the arithmetic mean of the range of nominal dimensions is given by

$$D_m = \frac{250 + 280}{2} = 265 \text{ mm}$$

For $\psi_m = 1,6 \text{ ‰}$, [Table 1](#) and [Formula \(2\)](#) lead to the mean bearing diametral clearance

$$C_{D,m} = \frac{0,466 + 0,382}{2} = 0,424 \text{ mm} = 424 \text{ } \mu\text{m}$$

and to the mean relative bearing clearance

$$\psi_m = \frac{0,424}{265} = 1,6 \text{ ‰}$$

7 Tolerance intervals

7.1 Tolerance

The tolerance is chosen so that, for a uniform mean relative bearing clearance, ψ_m , in each case from the minimum to the maximum range of nominal dimensions, an approximately uniform maximum deviation from the relative bearing clearance within a tolerance interval is not exceeded. The lower limit is dictated by economy and methods of production.

The tolerance interval of the shaft in each case is smaller by one IT grade (basic tolerance grade in accordance with ISO 286-1) than the tolerance interval of the correlated bearing bore.

7.2 Fundamental deviation

The fundamental deviation is determined by the mean relative bearing clearance, ψ_m .

7.3 Number

Each of the following values of ψ_m , in per thousand, corresponds to one tolerance interval:

- 0,56;
- 0,8;
- 1,12;
- 1,32;
- 1,6;
- 1,9;
- 2,24;
- 3,15.

When determining the value of ψ_m , it is recommended to consider the bearing material, load and speed conditions, environmental temperature, and required mechanical accuracy.

7.4 Symbol

The symbol for the mean relative bearing clearance is ψ_m . If Greek letters are not available, the symbol C^* may be used instead of the Greek letter ψ .

8 Ranges of nominal dimensions

The ranges of nominal dimensions are more closely stepped than in ISO 286-2 so that the maximum deviation from the mean relative bearing clearance, ψ_m , can be more closely adhered to.

9 Limit deviations

The limit deviations for the shafts are given in [Table 3](#).

10 Minimum and maximum clearances

The minimum clearance, $C_{D,min}$, and maximum clearance, $C_{D,max}$, between the shaft and bearing bore, together with the limit deviations for the shaft which are required for the calculation of the plain bearings, are given in [Table 3](#).

The corresponding tolerance intervals of the relative bearing clearance are given in [Table 4](#).

11 Example of shaft fit dimension indications

The shaft fit dimension 200 mm for a mean bearing clearance is: $\psi_m = 1,12 \text{ ‰}$.

The preferred form is: $\text{Ø}200_{\psi 1,12}$.

The alternative form where Greek letters are not available is: $\text{Ø}200_{C^* 1,12}$.

The alternative form where subscripts are not available is: $\text{Ø}200 (C^* 1,12)$.

12 Limit deviations and tolerance intervals

Limit deviations for shafts and tolerance intervals for bearing clearance are given in [Table 3](#) and tolerance intervals of bearing clearance are given in [Table 4](#).

Table 3 — Limit deviations for shafts and tolerance intervals for bearing clearance

Nominal dimension, <i>D</i> mm	Limit deviations for the shaft ^a μm										Maximum clearance, <i>C_{D,max}</i> and minimum clearance, <i>C_{D,min}</i> , between the shaft and the bearing bore ^b μm									
	for mean relative bearing clearance, ψ_m , of										for mean relative bearing clearance, ψ_m , of									
over	0,56 %	0,8 %	1,12 %	1,32 %	1,6 %	1,9 %	2,24 %	3,15 %	0,56 %	0,8 %	1,12 %	1,32 %	1,6 %	1,9 %	2,24 %	3,15 %				
up to and including																				
25	—	-15	-23	-29	-37	-41	-51	-76	—	30	38	44	52	63	73	98				
30	—	-21	-29	-35	-43	-50	-60	-85	—	15	23	29	37	41	51	76				
35	—	-17	-27	-34	-43	-48	-59	-89	—	35	45	52	61	75	86	116				
40	—	-24	-34	-41	-50	-59	-70	-100	—	17	27	34	43	48	59	89				
45	-12	-21	-33	-36	-47	-58	-71	-105	30	39	51	63	74	85	98	132				
50	-19	-28	-40	-47	-58	-69	-82	-116	12	21	33	36	47	58	71	105				
55	-14	-25	-34	-43	-55	-67	-82	-120	32	43	61	70	82	94	109	147				
60	-21	-32	-45	-54	-66	-78	-93	-131	14	25	34	43	55	67	82	120				
65	-18	-25	-40	-49	-63	-77	-93	-136	36	52	67	76	90	104	120	163				
70	-25	-36	-51	-60	-74	-88	-104	-147	18	25	40	49	63	77	93	136				
75	-19	-26	-43	-53	-68	-84	-102	-149	40	58	75	85	100	116	134	181				
80	-27	-39	-56	-66	-81	-97	-115	-162	19	26	43	53	68	84	102	149				
85	-22	-30	-48	-60	-76	-93	-113	-165	43	62	80	92	108	125	145	197				
90	-30	-43	-61	-73	-89	-106	-126	-178	22	30	48	60	76	93	113	165				
95	-20	-36	-57	-70	-80	-99	-121	-180	52	68	89	102	129	148	170	229				
100	-33	-49	-70	-83	-99	-118	-140	-199	20	36	57	70	80	99	121	180				
105	-26	-44	-60	-75	-96	-118	-144	-212	58	76	109	124	145	167	193	261				
110	-39	-57	-79	-94	-115	-137	-163	-231	26	44	60	75	96	118	144	212				
115	-29	-50	-67	-84	-108	-133	-162	-239	66	87	124	141	165	190	219	296				
120	-44	-65	-89	-106	-130	-155	-184	-261	29	50	67	84	108	133	162	239				
125	-35	-58	-78	-97	-124	-152	-184	-271	72	95	135	154	181	209	241	328				
130	-50	-73	-100	-119	-146	-174	-206	-293	35	58	78	97	124	152	184	271				
135	-40	-56	-89	-110	-140	-171	-207	-302	77	113	146	167	197	228	264	359				
140	-55	-78	-111	-132	-162	-193	-229	-324	40	56	89	110	140	171	207	302				
145	-36	-64	-100	-123	-156	-190	-229	-334	93	121	157	180	213	247	286	391				
150	-58	-86	-122	-145	-178	-212	-251	-356	36	64	100	123	156	190	229	334				
155	-40	-72	-113	-139	-176	-215	-259	-377	105	137	178	204	241	280	324	442				
160	-65	-97	-138	-164	-201	-240	-284	-402	40	72	113	139	176	215	259	377				
165	-52	-88	-136	-166	-208	-253	-304	-440	117	153	201	231	273	318	369	505				
170	-77	-113	-161	-191	-233	-278	-329	-465	52	88	136	166	208	253	304	440				
175	-63	-104	-158	-192	-240	-291	-348	-503	128	169	223	257	305	356	413	568				
180	-88	-129	-183	-217	-265	-316	-373	-528	63	104	158	192	240	291	348	503				

^a The limit deviations of the shaft correspond to IT4 above the upper bold stepped line, to IT5 between the stepped lines, and to IT6 below the lower bold stepped line.

^b The maximum and minimum clearances correspond to IT4/H 5 for the fit shaft/bearing bore above the upper bold stepped line, to IT5/H 6 between the bold stepped lines, and to IT6/H 7 below the lower bold stepped line.

Table 3 (continued)

Nominal dimension, D mm	Limit deviations for the shaft ^a μm										Maximum clearance, $C_{D,max}$ and minimum clearance, $C_{D,min}$, between the shaft and the bearing bore ^b μm									
	for mean relative bearing clearance, ψ_m , of										for mean relative bearing clearance, ψ_m , of									
over	0,56 %	0,8 %	1,12 %	1,32 %	1,6 %	1,9 %	2,24 %	3,15 %	0,56 %	0,8 %	1,12 %	1,32 %	1,6 %	1,9 %	2,24 %	3,15 %				
180	-69	-115	-175	-213	-267	-324	-388	-561	144	190	250	288	342	399	463	636				
200	-98	-144	-204	-242	-296	-353	-417	-590	69	115	175	213	267	324	388	561				
225	-82	-133	-201	-243	-303	-366	-439	-632	157	208	276	318	378	441	514	707				
250	-111	-162	-230	-272	-332	-395	-468	-661	82	133	201	243	303	366	439	632				
280	-96	-153	-229	-276	-343	-414	-495	-711	171	228	304	351	418	489	570	786				
315	-125	-182	-258	-305	-372	-443	-524	-740	96	153	229	276	343	414	495	711				
355	-106	-170	-255	-308	-382	-462	-552	-793	190	254	339	392	466	546	636	877				
400	-138	-202	-287	-340	-414	-494	-584	-825	106	170	255	308	382	462	552	793				
450	-125	-196	-291	-351	-434	-523	-624	-895	209	280	375	435	518	607	708	979				
500	-157	-228	-323	-383	-466	-555	-656	-927	125	196	291	351	434	523	624	895				
560	-141	-222	-329	-396	-490	-590	-704	-1 009	234	315	422	489	583	683	797	1 102				
630	-177	-258	-365	-432	-526	-626	-740	-1 045	141	222	329	396	490	590	704	1 009				
710	-165	-256	-376	-452	-558	-671	-799	-1 143	258	349	469	545	651	764	892	1 236				
800	-201	-292	-412	-488	-594	-707	-835	-1 179	165	256	376	452	558	671	799	1 143				
900	-187	-289	-425	-510	-629	-756	-901	-1 287	290	392	528	613	732	859	1 004	1 390				
1 000	-227	-329	-465	-550	-669	-796	-941	-1 327	187	289	425	510	629	756	901	1 287				
1 100	-215	-329	-481	-576	-709	-851	-1 013	-1 445	318	432	584	679	812	954	1 116	1 548				
1 200	-255	-369	-521	-616	-749	-891	-1 053	-1 485	329	451	613	708	842	994	1 166	1 605				
1 300	-240	-367	-537	-643	-791	-950	-1 130	-1 613	354	481	651	757	905	1 064	1 244	1 727				
1 400	-284	-411	-581	-687	-835	-994	-1 174	-1 657	240	367	537	643	791	950	1 130	1 613				
1 500	-276	-419	-609	-728	-895	-1 074	-1 276	-1 852	390	533	723	842	1 009	1 188	1 390	1 966				
1 600	-320	-463	-653	-772	-939	-1 118	-1 320	-1 896	276	419	609	728	895	1 074	1 276	1 852				
1 700	-310	-471	-685	-819	-1 007	-1 208	-1 436	-2 046	440	601	815	949	1 137	1 338	1 566	2 176				
1 800	-360	-521	-735	-869	-1 057	-1 258	-1 486	-2 096	310	471	685	819	1 007	1 208	1 436	2 046				
1 900	-358	-539	-781	-932	-1 143	-1 370	-1 626	-2 313	488	669	901	1 062	1 273	1 500	1 756	2 443				
2 000	-408	-589	-831	-982	-1 193	-1 420	-1 676	-2 363	358	539	781	932	1 143	1 370	1 626	2 313				
2 100	-403	-607	-879	-1 049	-1 287	-1 542	-1 831	-2 605	549	753	1 025	1 195	1 433	1 688	1 977	2 751				
2 200	-459	-663	-935	-1 105	-1 343	-1 598	-1 887	-2 661	403	607	879	1 049	1 287	1 542	1 831	2 605				

^a The limit deviations of the shaft correspond to IT4 above the upper bold stepped line, to IT5 between the stepped lines, and to IT6 below the lower bold stepped line.

^b The maximum and minimum clearances correspond to IT4/H 5 for the fit shaft/bearing bore above the upper bold stepped line, to IT5/H 6 between the bold stepped lines, and to IT6/H 7 below the lower bold stepped line.

Table 3 (continued)

Nominal dimension, <i>D</i> mm	Limit deviations for the shaft ^a												Maximum clearance, <i>C_{D,max}</i> and minimum clearance, <i>C_{D,min}</i> , between the shaft and the bearing bore ^b											
	μm for mean relative bearing clearance, ψ_m , of												μm for mean relative bearing clearance, ψ_m , of											
over	up to and including	0,56 %	0,8 %	1,12 %	1,32 %	1,6 %	1,9 %	2,24 %	3,15 %	0,56 %	0,8 %	1,12 %	1,32 %	1,6 %	1,9 %	2,24 %	3,15 %							
900	1 000	-459	-687	-991	-1 181	-1 447	-1 732	-2 055	-2 920	605	833	1 137	1 327	1 593	1 878	2 201	3 066							
1 000	1 120	-515	-743	-1 047	-1 237	-1 503	-1 788	-2 111	-2 976	459	687	991	1 181	1 447	1 732	2 055	2 920							
1 120	1 250	-508	-763	-1 102	-1 314	-1 611	-1 929	-2 289	-3 254	679	934	1 273	1 485	1 782	2 100	2 460	3 425							
1 250	1 400	-574	-829	-1 168	-1 380	-1 677	-1 995	-2 355	-3 320	508	763	1 102	1 314	1 611	1 929	2 289	3 254							
1 400	1 600	-578	-863	-1 242	-1 479	-1 811	-2 166	-2 569	-3 647	749	1 034	1 413	1 650	1 982	2 337	2 740	3 818							
1 600	1 800	-644	-929	-1 308	-1 545	-1 877	-2 232	-2 635	-3 713	578	863	1 242	1 479	1 811	2 166	2 569	3 647							

^a The limit deviations of the shaft correspond to IT4 above the upper bold stepped line, to IT5 between the stepped lines, and to IT6 below the lower bold stepped line.

^b The maximum and minimum clearances correspond to IT4/H 5 for the fit shaft/bearing bore above the upper bold stepped line, to IT5/H 6 between the bold stepped lines, and to IT6/H 7 below the lower bold stepped line.

