INTERNATIONAL STANDARD

ISO 12129-1

First edition
1995-04-01

Plain bearings —

Part 1:
Fits

Paliers lisses —

Partie 1: Ajustements

Reference number
ISO 12129-1.1995(E)

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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 12129-1 was prepared by Technical Committee ISO/TC 123, *Plain bearings*, Subcommittee SC 3, *Dimensions, tolerances and construction details*.

ISO 12129 consists of the following parts, under the general title *Plain bearings*:

— *Part 1: Fits*

— *Part 2: Tolerances on form and position and surface roughness for shafts, flanges and thrust collars*

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Printed in Switzerland

Plain bearings —

Part 1:
Fits

1 Scope

This part of ISO 12129 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 ‰.

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.

This part of ISO 12129 is applicable preferably to rotating machine parts and shafting, but it may be used similarly in other ranges of application.

This part of ISO 12129 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.

Other clearance ranges may be used depending upon the requirements in specific applications.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 12129. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 12129 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 286-1:1988, *ISO system of limits and fits — Part 1: Bases of tolerances, deviations and fits.*

ISO 286-2:1988, *ISO system of limits and fits — Part 2: Tables of standard tolerance grades and limit deviations for holes and shafts.*

3 System of fits

The system of fits specified in this part of ISO 12129 is a normal system of fits, in which the tolerance zone H of the bearing bore is in accordance with ISO 286-2. The tolerance zone of the shaft is correlated to correspond to the mean relative bearing clearance ψ_m.

4 Mean relative bearing clearance

The mean relative bearing clearance ψ_m, in per mill (‰), of a range of nominal dimensions is given by

$$\psi_m = \frac{S_m}{D_m}$$

where

S_m is the mean absolute bearing clearance, in micrometres

$$S_m = \frac{\text{max. clearance} + \text{min. clearance}}{2}$$

D_m is the arithmetic mean of the range of nominal dimensions, in millimetres.

5 Tolerance zones

5.1 Size

The size of the tolerance zones 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 zone is not exceeded. The lower limit is dictated by economy and methods of production.

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

5.2 Position

The position of the tolerance zone relative to the zero line is determined by the mean relative bearing clearance ψ_m.

5.3 Number

Each of the following values of ψ_m, in per mill, corresponds to one tolerance zone:

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

5.4 Symbol

The symbol for the mean relative bearing clearance is ψ_m. In view of the method of lettering with data processing and on typewriters, the letters PSI are used instead of the Greek letter ψ.

6 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.

7 Deviations

The deviations for the shafts are given in table 1.

8 Minimum and maximum clearances

The minimum and maximum clearances between the shaft and bearing bore, together with the deviations for the shaft which are required for the calculation of the plain bearings, are given in table 1.

9 Example

Shaft fit dimension 200 mm for a mean bearing clearance $\psi_m = 1{,}12$ ‰.

$\varnothing 200_{\mathrm{PSI}\ 1{,}12}$

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Table 1

Nominal dimension range mm		Deviations for the shaft [1] μm								Maximum and minimum clearances between shaft and bearing bore [2] μm								
		Mean relative clearance, ψ_m, ‰								Mean relative clearance, ψ_m, ‰								
over	up to and incl.	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	
25	30	—	− 15	− 23	− 29	− 37	− 45	− 51	− 76	—	30	38	44	52	60	73	98	
		—	− 21	− 29	− 35	− 43	− 51	− 60	− 85	—	15	23	29	37	45	51	76	
30	35	—	− 17	− 27	− 34	− 43	− 48	− 59	− 89	—	35	45	52	61	75	86	116	
		—	− 24	− 34	− 41	− 50	− 59	− 70	− 100	—	17	27	34	43	48	59	89	
35	40	− 12	− 21	− 33	− 36	− 47	− 58	− 71	− 105	30	39	51	63	74	85	98	132	
		− 19	− 28	− 40	− 47	− 58	− 69	− 82	− 116	12	21	33	36	47	58	71	105	
40	45	− 14	− 25	− 34	− 43	− 55	− 67	− 82	− 120	31	43	61	70	82	94	109	147	
		− 21	− 32	− 45	− 54	− 66	− 78	− 93	− 131	14	25	34	43	55	67	82	120	
45	50	− 18	− 25	− 40	− 50	− 63	− 77	− 93	− 136	36	52	67	76	90	104	120	163	
		− 25	− 36	− 51	− 60	− 74	− 88	− 104	− 147	18	25	40	49	63	77	93	136	
50	55	− 19	− 26	− 43	− 53	− 68	− 84	− 102	− 149	40	58	75	85	100	116	144	181	
		− 27	− 39	− 56	− 66	− 81	− 97	− 115	− 162	19	26	43	53	68	84	102	149	
55	60	− 22	− 30	− 48	− 60	− 76	− 93	− 113	− 165	43	62	80	92	108	125	145	197	
		− 30	− 43	− 61	− 73	− 89	− 106	− 126	− 178	22	30	48	60	76	93	113	165	
60	70	− 20	− 36	− 57	− 70	− 80	− 99	− 121	− 180	53	68	90	102	129	148	170	229	
		− 33	− 49	− 70	− 83	− 99	− 118	− 140	− 199	20	36	57	70	80	99	121	180	
70	80	− 26	− 44	− 60	− 75	− 96	− 118	− 144	− 212	58	76	109	124	145	167	193	261	
		− 39	− 57	− 79	− 94	− 115	− 137	− 162	− 231	26	44	60	75	96	118	144	212	
80	90	− 29	− 50	− 67	− 84	− 108	− 133	− 162	− 239	66	87	124	141	165	190	219	296	
		− 44	− 65	− 89	− 106	− 130	− 155	− 184	− 261	29	50	67	84	108	133	162	239	
90	100	− 35	− 58	− 78	− 97	− 124	− 152	− 184	− 271	72	95	135	154	181	209	241	328	
		− 50	− 73	− 100	− 119	− 146	− 174	− 206	− 293	35	58	78	97	124	152	184	271	
100	110	− 40	− 56	− 89	− 110	− 140	− 171	− 207	− 302	77	113	146	167	197	228	264	359	
		− 55	− 78	− 111	− 132	− 162	− 193	− 229	− 324	40	56	89	110	140	171	207	302	
110	120	− 36	− 64	− 100	− 122	− 156	− 190	− 229	− 334	93	121	157	180	213	247	286	391	
		− 60	− 86	− 122	− 145	− 178	− 212	− 251	− 356	36	64	100	122	156	190	229	334	
120	140	− 40	− 72	− 113	− 139	− 176	− 215	− 259	− 377	105	137	178	204	241	280	324	442	
		− 65	− 97	− 138	− 164	− 201	− 240	− 284	− 402	40	72	113	139	176	215	259	377	
140	160	− 52	− 88	− 136	− 166	− 208	− 253	− 304	− 440	117	153	201	231	273	318	369	505	
		− 77	− 113	− 161	− 191	− 233	− 278	− 329	− 465	52	88	136	166	208	253	304	440	
160	180	− 63	− 104	− 158	− 192	− 240	− 291	− 348	− 503	128	179	223	257	305	356	413	568	
		− 88	− 129	− 183	− 217	− 265	− 316	− 373	− 528	63	104	158	192	240	291	348	503	
180	200	− 69	− 115	− 175	− 213	− 267	− 324	− 388	− 561	144	190	250	288	342	399	463	636	
		− 98	− 144	− 204	− 242	− 296	− 353	− 417	− 590	69	115	175	213	267	324	388	581	
200	225	− 82	− 133	− 201	− 243	− 303	− 366	− 439	− 632	157	208	276	318	378	441	514	707	
		− 111	− 162	− 230	− 272	− 332	− 395	− 468	− 661	82	133	201	243	303	366	439	632	
225	250	− 96	− 153	− 229	− 276	− 343	− 414	− 495	− 711	171	228	304	351	418	489	570	786	
		− 125	− 182	− 258	− 305	− 372	− 443	− 524	− 740	96	153	229	276	343	414	495	711	

250	280	− 106 − 138	− 170 − 202	− 255 − 287	− 308 − 340	− 382 − 414	− 462 − 494	− 552 − 584	− 793 − 825	190 106	254 170	339 255	392 308	466 382	546 462	636 552	877 793
280	315	− 125 − 157	− 196 − 228	− 291 − 323	− 351 − 383	− 434 − 466	− 523 − 555	− 624 − 656	− 895 − 927	209 125	280 196	375 291	435 351	518 434	607 523	708 624	979 895
315	355	− 141 − 177	− 222 − 258	− 329 − 365	− 396 − 432	− 490 − 526	− 590 − 626	− 704 − 740	− 1 009 − 1 045	234 141	315 222	422 329	489 396	583 490	683 590	799 704	1 102 1 009
355	400	− 165 − 201	− 256 − 292	− 376 − 412	− 452 − 488	− 558 − 594	− 671 − 707	− 799 − 835	− 1 143 − 1 179	258 165	349 256	469 376	545 452	651 558	764 671	892 799	1 236 1 143
400	450	− 187 − 227	− 289 − 329	− 425 − 465	− 510 − 550	− 629 − 669	− 756 − 796	− 901 − 941	− 1 287 − 1 327	290 187	392 289	528 425	613 510	732 629	859 756	1 004 901	1 390 1 287
450	500	− 215 − 255	− 329 − 369	− 481 − 520	− 576 − 616	− 709 − 749	− 851 − 891	− 1 013 − 1 053	− 1 445 − 1 485	318 215	432 329	584 481	679 576	812 709	954 851	1 116 1 013	1 548 1 445
500	560	− 240 − 284	− 367 − 411	− 537 − 581	− 643 − 687	− 791 − 835	− 950 − 994	− 1 130 − 1 174	− 1 613 − 1 657	354 240	481 367	651 537	757 643	905 791	1 064 950	1 244 1 130	1 727 1 613
560	630	− 276 − 320	− 419 − 463	− 609 − 653	− 728 − 772	− 895 − 939	− 1 074 − 1 118	− 1 276 − 1 320	− 1 852 − 1 896	390 276	533 419	723 609	842 728	1 009 895	1 188 1 074	1 390 1 276	1 966 1 852
630	710	− 310 − 360	− 471 − 521	− 685 − 735	− 819 − 869	− 1 007 − 1 057	− 1 208 − 1 258	− 1 436 − 1 486	− 2 046 − 2 096	440 310	601 471	815 685	949 819	1 137 1 007	1 338 1 208	1 566 1 436	2 176 2 046
710	800	− 358 − 408	− 539 − 589	− 781 − 831	− 932 − 982	− 1 143 − 1 193	− 1 370 − 1 420	− 1 626 − 1 676	− 2 313 − 2 363	488 358	669 539	911 781	1 062 932	1 273 1 143	1 500 1 370	1 756 1 626	2 443 2 313
800	900	− 403 − 459	− 607 − 663	− 879 − 935	− 1 049 − 1 105	− 1 287 − 1 343	− 1 542 − 1 598	− 1 831 − 1 887	− 2 605 − 2 661	549 403	753 607	1 025 879	1 195 1 049	1 433 1 287	1 688 1 542	1 977 1 831	2 751 2 605
900	1 000	− 459 − 515	− 687 − 743	− 991 − 1 047	− 1 181 − 1 237	− 1 447 − 1 503	− 1 732 − 1 788	− 2 055 − 2 111	− 2 920 − 2 976	605 459	833 687	1 137 991	1 327 1 181	1 593 1 447	1 878 1 732	2 201 2 055	3 066 2 920
1 000	1 120	− 508 − 574	− 763 − 829	− 1 102 − 1 168	− 1 314 − 1 380	− 1 611 − 1 677	− 1 929 − 1 995	− 2 289 − 2 355	− 3 254 − 3 320	679 508	934 763	1 273 1 102	1 485 1 314	1 782 1 611	2 100 1 929	2 460 2 289	3 425 3 254
1 120	1 250	− 578 − 644	− 863 − 929	− 1 242 − 1 308	− 1 479 − 1 545	− 1 811 − 1 877	− 2 166 − 2 232	− 2 569 − 2 635	− 3 647 − 3 713	749 578	1 034 863	1 413 1 242	1 650 1 479	1 982 1 811	2 337 2 166	2 740 2 569	3 818 3 647

1) The 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

2) 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

ICS 21.100.10

Descriptors: bearings, plain bearings, fits, dimensional tolerances, dimensional deviations, clearances.

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