

ISO system of limits and fits —

Part 2: Tables of standard tolerance grades and limit deviations for holes and shafts

The European Standard EN 20286-2:1993 has the status of a British Standard

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Committees responsible for this British Standard

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- BCIRA
- BEAMA Ltd.
- British Railways Board
- EBEA (the Electronics and Business Equipment Association)
- Federation of British Engineers' Tool Manufacturers
- Gauge and Tool Makers' Association
- Institution of Production Engineers
- Railway Industry Association of Great Britain
- Society of British Aerospace Companies Limited
- Society of Motor Manufacturers and Traders Limited
- Steel Casting Research and Trade Association
- Zinc Development Association

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National foreword

This Section of BS 4500 has been prepared under the direction of the General Mechanical Engineering Standards Policy Committee and is identical with ISO 286:1988 “*ISO system of limits and fits — Part 2: Tables of standard tolerance grades and limit deviations for holes and shafts*”, published by the International Organization for Standardization (ISO). Together with BS 4500-1.1, it is a revision of BS 4500-1:1969 which is withdrawn.

In 1993 the European Committee for Standardization (CEN) accepted ISO 286-2:1988 as European Standard EN 20286-2:1993. As a consequence of implementing the European Standard this British Standard is renumbered as BS EN 20286-2:1993 and any reference to BS 4500-1.2:1990 should be read as a reference to BS EN 20286-2:1993.

The major changes incorporated in this Section of BS 4500 are as follows.

- a) The presentation of the information has been modified so that this standard can be used directly in both the design office and the workshop. This has been achieved by separating the material dealing with the bases of the system, and the calculated values of standard tolerances and fundamental deviations, from the tables giving specific limits of the most commonly used tolerances and deviations.
- b) The new symbols j_s and J_S replace the former symbols j_s and J_s (i.e. s and S are no longer placed as subscripts) to facilitate the use of symbols on equipment with limited character sets, e.g. computer graphics. The letters “ s ” and “ S ” stand for “symmetrical deviation”.
- c) Limit deviations have been included for basic sizes from 500 mm to 3 150 mm as standard requirements; (these were previously included on an experimental basis only).
- d) Limit deviations have been extended for holes H and J_S , and for shafts h and j_s by including tolerance grades IT17 and IT18 in all basic sizes, and, for experimental purposes only, by including tolerance grades IT1 to IT5 in basic sizes over 500 mm up to 3 150 mm.
- e) Limit deviations have been extended for some tolerance classes used in fine mechanisms and horology, in basic sizes up to 50 mm.
- f) Inch values have been deleted.
- g) The principles, terminology and symbols have been aligned with those required by contemporary technology.

Cross-references

International standard	Corresponding British Standard
ISO 286-1:1988	BS 4500 <i>ISO limits and fits</i> Section 1.1:1990 <i>Specification for bases of tolerances, deviations and fits</i> (Identical)
ISO 406:1987	BS 308 <i>Engineering drawing practice</i> Part 2:1985 <i>Recommendations for dimensioning and tolerancing of size</i> (Technically equivalent)
ISO 5166:1982	BS 4500 <i>ISO limits and fits</i> Part 4:1985 <i>Specification for system of cone (taper) fits for cones from $C = 1 : 3$ to $1 : 500$, lengths from 6 mm to 630 mm and diameters up to 500 mm</i> (Identical)
ISO 8062:1984	BS 6615:1985 <i>Specification for dimensional tolerances for metal and metal alloy castings</i> (Identical)

The Technical Committee has reviewed the provisions of ISO 1829:1975, to which reference is made in the text, and has decided that they are acceptable for use in conjunction with this standard.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, the EN title page, the EN foreword page, pages 1 to 45 and a back cover.

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ISO system of limits and fits — Part 2: Tables of standard tolerance grades and limit deviations for holes and shafts

(ISO 286-2:1988)

Système ISO de tolérances et d'ajustements —
Partie 2: Tables des degrés de tolérance
normalisés et des écarts limites des alésages et
des arbres
(ISO 286-2:1988)

ISO-System für Grenzabmaße und
Passungen — Teil 2: Tabellen der
Grundtoleranzgrade und Grenzabmaße für
Bohrungen und Wellen
(ISO 286-2:1988)

This European Standard was approved by CEN on 1993-04-15. CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

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CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart 36, B-1050 Brussels

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Foreword

In 1991, the International Standard ISO 286-2:1988 *ISO system of limits and fits — Part 2: Tables of standard tolerance grades and limit deviations for holes and shafts* was submitted to the CEN Primary Questionnaire procedure.

Following the positive result of the CEN/CS Proposal, ISO 286-2:1988 was submitted to the Formal Vote.

The result of the Formal Vote was positive.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by October 1993, and conflicting national standards shall be withdrawn at the latest by October 1993.

According to the CEN/CENELEC Internal Regulations, the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom.

NOTE The European references to international publications are given in Annex ZA (normative).

Introduction

The need for limits and fits for machined workpieces was brought about mainly by the inherent inaccuracy of manufacturing methods, coupled with the fact that “exactness” of size was found to be unnecessary for most workpieces. In order that function could be satisfied, it was found sufficient to manufacture a given workpiece so that its size lay within two permissible limits, i.e. a tolerance, this being the variation in size acceptable in manufacture.

Similarly, where a specific fit condition is required between mating workpieces, it is necessary to ascribe an allowance, either positive or negative, to the basic size to achieve the required clearance or interference, i.e. a “deviation”.

With developments in industry and international trade, it became necessary to develop formal systems of limits and fits, firstly at the industrial level, then at the national level and later at the international level.

This International Standard therefore gives the internationally accepted system of limits and fits.

A general graphical representation of the relationship between the respective tolerance classes and their deviations is given in the annex.

1 Scope

This part of ISO 286 gives values of the limit deviations for commonly used tolerance classes (zones) for holes and shafts calculated from the information given in ISO 286-1. This part of ISO 286 covers values for the upper deviations *ES* (for holes) and *es* (for shafts), and the lower deviations *EI* (for holes) and *ei* (for shafts) (see Figure 1).

NOTE In the tables of limit deviations, the values for the upper deviation *ES* or *es* are shown above the values for the lower deviation *EI* or *ei* except for tolerance class JS and js which is symmetrical about the zero line.

2 Field of application

The ISO system of limits and fits provides a system of tolerances and deviations suitable for plain workpieces.

It should be noted that the general term “hole” or “shaft” used in this International Standard can be taken as referring to the space contained by (or containing) the two parallel faces (or tangent planes) of any workpiece, such as the width of a slot or the thickness of a key (see also ISO 286-1). Similarly, the term “commonly used holes and shafts” shall be interpreted as providing a very wide choice of limit deviations suitable for a wide variety of requirements.

For further information on terminology, symbols, bases of the system, etc., see ISO 286-1.

Notes on the presentation of Table 2 to Table 32 are given on page 7.

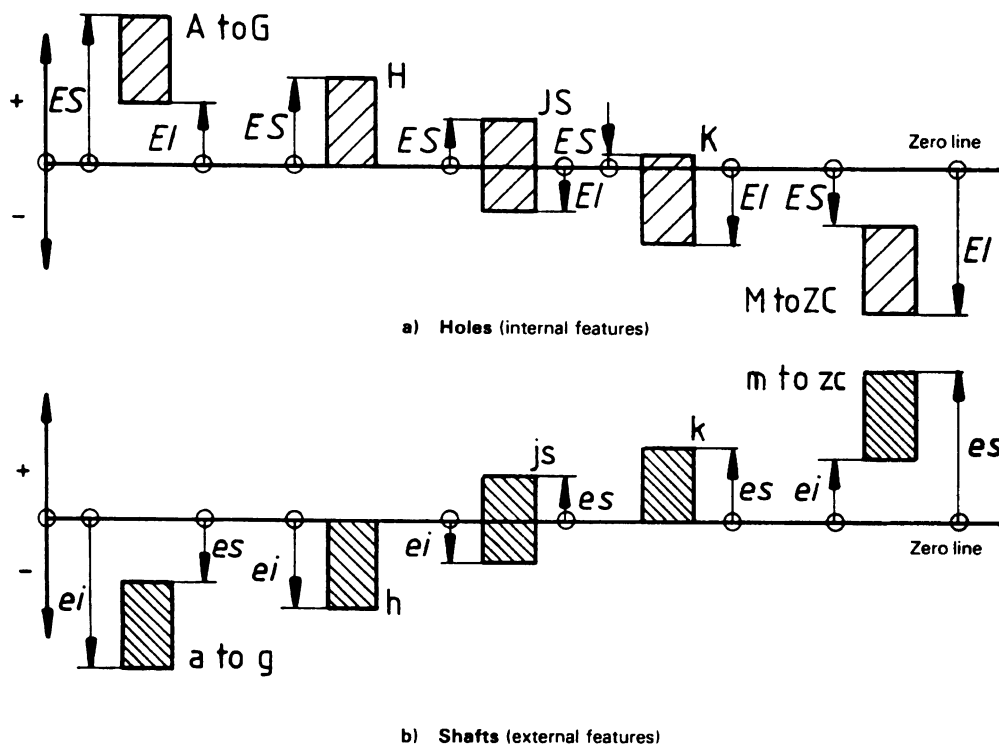


Figure 1 — Upper and lower deviations

3 References

NOTE See also clause 7.

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

ISO 1829, *Selection of tolerance zones for general purposes*.

4 Standard tolerances

The values of standard tolerance grades IT1 to IT18 inclusive are given in Table 1.

For information on the bases of the system and its application, see ISO 286-1; for values of standard tolerances IT0 and IT01, see ISO 286-1; Annex A, Table 5.

5 Limit deviations for holes

A synoptic representation of the tolerance classes for holes, given in this part of ISO 286, is shown in Figure 2 and Figure 3.

Attention is drawn to the fact that the tolerance classes shown in Figure 2 and Figure 3, and their limit deviations, given in Table 2 to Table 16, are not intended to give detailed directives on the selection of tolerance classes for any purpose. Recommendations for the selection of tolerance classes are given in ISO 1829.

NOTE Some tolerance classes are only provided for a restricted range of basic size steps. For further information, see note 1 on page 7.

6 Limit deviations for shafts

A synoptic representation of the tolerance classes for shafts, given in this part of ISO 286, is shown in Figure 4 and Figure 5.

Attention is drawn to the fact that the tolerance classes shown in Figure 4 and Figure 5, and their limit deviations, given in Table 17 to Table 32, are not intended to give detailed directives on the selection of tolerance classes for any purpose. Recommendations for the selection of tolerance classes are given in ISO 1829.

NOTE Some tolerance classes are only provided for a restricted range of basic size steps. For further information, see note 1 on page 7.

7 Bibliography

The following International Standards on tolerancing and tolerance systems will be useful with regard to the application of this part of ISO 286:

ISO 406, *Technical drawings — Linear and angular tolerancing — Indications on drawings*.

ISO 1101, *Technical drawings — Geometrical tolerancing — Tolerancing of form, orientation, location and run-out — Generalities, definitions, symbols, indications on drawings*.

ISO/R 1938, *ISO system of limits and fits — Inspection of plain workpieces*¹⁾.

ISO 2692, *Technical drawings — Geometrical tolerancing — Maximum material principle*.

ISO 2768-1, *General tolerances for dimensions without tolerance indications — Part 1: Tolerances for linear and angular dimensions*²⁾.

ISO 5166, *System of cone fits for cones from C = 1 : 3 to 1 : 500, lengths from 6 to 630 mm and diameters up to 500 mm*.

ISO 8015, *Technical drawings — Fundamental tolerancing principle*.

ISO 8062, *Castings — System of dimensional tolerances*.

¹⁾ At present under revision.

²⁾ At present at the stage of draft. (Revision, in part, of ISO 2768:1973.)

Table 1 — Numerical values of standard tolerance grades IT for basic sizes up to 3 150 mm^a

NOTE This table, taken from ISO 286-1, has been included in this part of ISO 286 to facilitate understanding and use of the system.

Basic size		Standard tolerance grades																	
mm		IT1 ^b	IT2 ^b	IT3 ^b	IT4 ^b	IT5 ^b	IT6	IT7	IT8	IT9	IT10	IT11	IT12	IT13	IT14 ^c	IT15 ^c	IT16 ^c	IT17 ^c	IT18 ^c
Above	Up to and including	Tolerances																	
		µm											mm						
—	3 ^c	0,8	1,2	2	3	4	6	10	14	25	40	60	0,1	0,14	0,25	0,4	0,6	1	1,4
3	6	1	1,5	2,5	4	5	8	12	18	30	48	75	0,12	0,18	0,3	0,48	0,75	1,2	1,8
6	10	1	1,5	2,5	4	6	9	15	22	36	58	90	0,15	0,22	0,36	0,58	0,9	1,5	2,2
10	18	1,2	2	3	5	8	11	18	27	43	70	110	0,18	0,27	0,43	0,7	1,1	1,8	2,7
18	30	1,5	2,5	4	6	9	13	21	33	52	84	130	0,21	0,33	0,52	0,84	1,3	2,1	3,3
30	50	1,5	2,5	4	7	11	16	25	39	62	100	160	0,25	0,39	0,62	1	1,6	2,5	3,9
50	80	2	3	5	8	13	19	30	46	74	120	190	0,3	0,46	0,74	1,2	1,9	3	4,6
80	120	2,5	4	6	10	15	22	35	54	87	140	220	0,35	0,54	0,87	1,4	2,2	3,5	5,4
120	180	3,5	5	8	12	18	25	40	63	100	160	250	0,4	0,63	1	1,6	2,5	4	6,3
180	250	4,5	7	10	14	20	29	46	72	115	185	290	0,46	0,72	1,15	1,85	2,9	4,6	7,2
250	315	6	8	12	16	23	32	52	81	130	210	320	0,52	0,81	1,3	2,1	3,2	5,2	8,1
315	400	7	9	13	18	25	36	57	89	140	230	360	0,57	0,89	1,4	2,3	3,6	5,7	8,9
400	500	8	10	15	20	27	40	63	97	155	250	400	0,63	0,97	1,55	2,5	4	6,3	9,7
500	630 ^b	9	11	16	22	32	44	70	110	175	280	440	0,7	1,1	1,75	2,8	4,4	7	11
630	800 ^b	10	13	18	25	36	50	80	125	200	320	500	0,8	1,25	2	3,2	5	8	12,5
800	1 000 ^b	11	15	21	28	40	56	90	140	230	360	560	0,9	1,4	2,3	3,6	5,6	9	14
1 000	1 250 ^b	13	18	24	33	47	66	105	165	260	420	660	1,05	1,65	2,6	4,2	6,6	10,5	16,5
1 250	1 600 ^b	15	21	29	39	55	78	125	195	310	500	780	1,25	1,95	3,1	5	7,8	12,5	19,5
1 600	2 000 ^b	18	25	35	46	65	92	150	230	370	600	920	1,5	2,3	3,7	6	9,2	15	23
2 000	2 500 ^b	22	30	41	55	78	110	175	280	440	700	1 100	1,75	2,8	4,4	7	11	17,5	28
2 500	3 150 ^b	26	36	50	68	96	135	210	330	540	860	1 350	2,1	3,3	5,4	8,6	13,5	21	33

^a Values for standard tolerance grades IT01 and IT0 for basic sizes less than or equal to 500 mm are given in ISO 286-1, Annex A, Table 5.

^b Values for standard tolerance grades IT1 to IT5 (incl.) for basic sizes over 500 mm are included for experimental use.

^c Standard tolerance grades IT14 to IT18 (incl.) shall not be used for basic sizes less than or equal to 1 mm.

[illegible]

				H1	JS1						
				H2	JS2						
				H3	JS3						
				H4	JS4						
				H5	JS5						
D6 E6	F6	G6	H6	JS6	K6	M6 N6	P6	R6	S6	T6 U6	
D7 E7	F7	G7	H7	JS7	K7	M7 N7	P7	R7	S7	T7 U7	
D8 E8	F8	G8	H8	JS8	K8	M8 N8	P8	R8	S8	T8 U8	
D9 E9	F9		H9	JS9		N9	P9				
D10 E10			H10	JS10							
D11			H11	JS11							
D12			H12	JS12							
D13			H13	JS13							
			H14	JS14							
			H15	JS15							
			H16	JS16							
			H17	JS17							
			H18	JS18							
3	4	5	6	7	8	9	10	11	12	13	
Tables											

NOTE — The tolerance classes in the frame are given for experimental use.

Figure 3 — Synoptic representation of tolerance classes for holes for basic sizes greater than 500 mm and less than or equal to 3 150 mm

Figure 4 — Synoptic representation of tolerance classes for shafts for basic sizes less than or equal to 500 mm

NOTE – The tolerance classes in the frame are given for experimental use.

Notes on the presentation of Table 2 to Table 32

NOTE 2 A small horizontal separation has been inserted in the tables, where appropriate, to distinguish between values for basic sizes less than or equal to 500 mm and those greater than 500 mm, which have been derived from different bases.

Table 2 — Limit deviations for holes A, B and C^a

Upper limit deviation = *ES*

Lower limit deviation = *EI*

Deviations in micrometres

Basic size mm		A ^b					B ^b						C					
Above	Up to and including	9	10	11	12	13	8	9	10	11	12	13	8	9	10	11	12	13
—	3 ^b	+ 295 + 270	+ 310 + 270	+ 330 + 270	+ 370 + 270	+ 410 + 270	+ 154 + 140	+ 165 + 140	+ 180 + 140	+ 200 + 140	+ 240 + 140	+ 280 + 140	+ 74 + 60	+ 85 + 60	+ 100 + 60	+ 120 + 60	+ 160 + 60	+ 200 + 60
3	6	+ 300 + 270	+ 318 + 270	+ 345 + 270	+ 390 + 270	+ 450 + 270	+ 158 + 140	+ 170 + 140	+ 188 + 140	+ 215 + 140	+ 260 + 140	+ 320 + 140	+ 88 + 70	+ 100 + 70	+ 118 + 70	+ 145 + 70	+ 190 + 70	+ 250 + 70
6	10	+ 316 + 280	+ 338 + 280	+ 370 + 280	+ 430 + 280	+ 500 + 280	+ 172 + 150	+ 186 + 150	+ 208 + 150	+ 240 + 150	+ 300 + 150	+ 370 + 150	+ 102 + 80	+ 116 + 80	+ 138 + 80	+ 170 + 80	+ 230 + 80	+ 300 + 80
10	18	+ 333 + 290	+ 360 + 290	+ 400 + 290	+ 470 + 290	+ 560 + 290	+ 177 + 150	+ 193 + 150	+ 220 + 150	+ 260 + 150	+ 330 + 150	+ 420 + 150	+ 122 + 95	+ 138 + 95	+ 165 + 95	+ 205 + 95	+ 275 + 95	+ 365 + 95
18	30	+ 352 + 300	+ 384 + 300	+ 430 + 300	+ 510 + 300	+ 630 + 300	+ 193 + 160	+ 212 + 160	+ 244 + 160	+ 290 + 160	+ 370 + 160	+ 490 + 160	+ 143 + 110	+ 162 + 110	+ 194 + 110	+ 240 + 110	+ 320 + 110	+ 440 + 110
30	40	+ 372 + 310	+ 410 + 310	+ 470 + 310	+ 560 + 310	+ 700 + 310	+ 209 + 170	+ 232 + 170	+ 270 + 170	+ 330 + 170	+ 420 + 170	+ 560 + 170	+ 159 + 120	+ 182 + 120	+ 220 + 120	+ 280 + 120	+ 370 + 120	+ 510 + 120
40	50	+ 382 + 320	+ 420 + 320	+ 480 + 320	+ 570 + 320	+ 710 + 320	+ 219 + 180	+ 242 + 180	+ 280 + 180	+ 340 + 180	+ 430 + 180	+ 570 + 180	+ 169 + 130	+ 192 + 130	+ 230 + 130	+ 290 + 130	+ 380 + 130	+ 520 + 130
50	65	+ 414 + 340	+ 460 + 340	+ 530 + 340	+ 640 + 340	+ 800 + 340	+ 236 + 190	+ 264 + 190	+ 310 + 190	+ 380 + 190	+ 490 + 190	+ 650 + 190	+ 186 + 140	+ 214 + 140	+ 260 + 140	+ 330 + 140	+ 440 + 140	+ 600 + 140
65	80	+ 434 + 360	+ 480 + 360	+ 550 + 360	+ 660 + 360	+ 820 + 360	+ 246 + 200	+ 274 + 200	+ 320 + 200	+ 390 + 200	+ 500 + 200	+ 660 + 200	+ 196 + 150	+ 224 + 150	+ 270 + 150	+ 340 + 150	+ 450 + 150	+ 610 + 150
80	100	+ 467 + 380	+ 520 + 380	+ 600 + 380	+ 730 + 380	+ 920 + 380	+ 274 + 220	+ 307 + 220	+ 360 + 220	+ 440 + 220	+ 570 + 220	+ 760 + 220	+ 224 + 170	+ 257 + 170	+ 310 + 170	+ 390 + 170	+ 520 + 170	+ 710 + 170
100	120	+ 497 + 410	+ 550 + 410	+ 630 + 410	+ 760 + 410	+ 950 + 410	+ 294 + 240	+ 327 + 240	+ 380 + 240	+ 460 + 240	+ 590 + 240	+ 780 + 240	+ 234 + 180	+ 267 + 180	+ 320 + 180	+ 400 + 180	+ 530 + 180	+ 720 + 180
120	140	+ 560 + 460	+ 620 + 460	+ 710 + 460	+ 860 + 460	+ 1 090 + 460	+ 323 + 260	+ 360 + 260	+ 420 + 260	+ 510 + 260	+ 660 + 260	+ 890 + 260	+ 263 + 200	+ 300 + 200	+ 360 + 200	+ 450 + 200	+ 600 + 200	+ 830 + 200
140	160	+ 620 + 520	+ 680 + 520	+ 770 + 520	+ 920 + 520	+ 1 150 + 520	+ 343 + 280	+ 380 + 280	+ 440 + 280	+ 530 + 280	+ 680 + 280	+ 910 + 280	+ 273 + 210	+ 310 + 210	+ 370 + 210	+ 460 + 210	+ 610 + 210	+ 840 + 210
160	180	+ 680 + 580	+ 740 + 580	+ 830 + 580	+ 980 + 580	+ 1 210 + 580	+ 373 + 310	+ 410 + 310	+ 470 + 310	+ 560 + 310	+ 710 + 310	+ 940 + 310	+ 293 + 230	+ 330 + 230	+ 390 + 230	+ 480 + 230	+ 630 + 230	+ 860 + 230
180	200	+ 775 + 660	+ 845 + 660	+ 950 + 660	+ 1 120 + 660	+ 1 380 + 660	+ 412 + 340	+ 455 + 340	+ 525 + 340	+ 630 + 340	+ 800 + 340	+ 1 060 + 340	+ 312 + 240	+ 355 + 240	+ 425 + 240	+ 530 + 240	+ 700 + 240	+ 960 + 240
200	225	+ 855 + 740	+ 925 + 740	+ 1 030 + 740	+ 1 200 + 740	+ 1 460 + 740	+ 452 + 380	+ 495 + 380	+ 565 + 380	+ 670 + 380	+ 840 + 380	+ 1 100 + 380	+ 332 + 260	+ 375 + 260	+ 445 + 260	+ 550 + 260	+ 720 + 260	+ 980 + 260
225	250	+ 935 + 820	+ 1 005 + 820	+ 1 110 + 820	+ 1 280 + 820	+ 1 540 + 820	+ 492 + 420	+ 535 + 420	+ 605 + 420	+ 710 + 420	+ 880 + 420	+ 1 140 + 420	+ 352 + 280	+ 395 + 280	+ 465 + 280	+ 570 + 280	+ 740 + 280	+ 1 000 + 280
250	280	+ 1 050 + 920	+ 1 130 + 920	+ 1 240 + 920	+ 1 440 + 920	+ 1 730 + 920	+ 561 + 480	+ 610 + 480	+ 690 + 480	+ 800 + 480	+ 1 000 + 480	+ 1 290 + 480	+ 381 + 300	+ 430 + 300	+ 510 + 300	+ 620 + 300	+ 820 + 300	+ 1 110 + 300
280	315	+ 1 180 + 1 050	+ 1 260 + 1 050	+ 1 370 + 1 050	+ 1 570 + 1 050	+ 1 860 + 1 050	+ 621 + 540	+ 670 + 540	+ 750 + 540	+ 860 + 540	+ 1 060 + 540	+ 1 350 + 540	+ 411 + 330	+ 460 + 330	+ 540 + 330	+ 650 + 330	+ 850 + 330	+ 1 140 + 330
315	355	+ 1 340 + 1 200	+ 1 430 + 1 200	+ 1 560 + 1 200	+ 1 770 + 1 200	+ 2 000 + 1 200	+ 689 + 600	+ 740 + 600	+ 830 + 600	+ 960 + 600	+ 1 170 + 600	+ 1 490 + 600	+ 449 + 360	+ 500 + 360	+ 590 + 360	+ 720 + 360	+ 930 + 360	+ 1 250 + 360
355	400	+ 1 490 + 1 350	+ 1 580 + 1 350	+ 1 710 + 1 350	+ 1 920 + 1 350	+ 2 240 + 1 350	+ 769 + 680	+ 820 + 680	+ 910 + 680	+ 1 040 + 680	+ 1 250 + 680	+ 1 570 + 680	+ 489 + 400	+ 540 + 400	+ 630 + 400	+ 760 + 400	+ 970 + 400	+ 1 290 + 400
400	450	+ 1 655 + 1 500	+ 1 750 + 1 500	+ 1 900 + 1 500	+ 2 130 + 1 500	+ 2 470 + 1 500	+ 857 + 760	+ 915 + 760	+ 1 010 + 760	+ 1 160 + 760	+ 1 390 + 760	+ 1 730 + 760	+ 537 + 440	+ 595 + 440	+ 690 + 440	+ 840 + 440	+ 1 070 + 440	+ 1 410 + 440
450	500	+ 1 805 + 1 650	+ 1 900 + 1 650	+ 2 050 + 1 650	+ 2 280 + 1 650	+ 2 620 + 1 650	+ 937 + 840	+ 995 + 840	+ 1 090 + 840	+ 1 240 + 840	+ 1 470 + 840	+ 1 810 + 840	+ 577 + 480	+ 635 + 480	+ 730 + 480	+ 880 + 480	+ 1 110 + 480	+ 1 450 + 480

Fundamental deviations A, B and C are not provided for basic sizes greater than 500 mm.

Fundamental deviations A and B shall not be used for any standard tolerance in basic sizes less than or equal to 1 mm.

Table 3 — Limit deviations for holes CD, D and E

Upper limit deviation = *ES*Lower limit deviation = *EI*

Deviations in micrometres

Basic size mm		CD ^a					D									E					
Above	Up to and including	6	7	8	9	10	6	7	8	9	10	11	12	13	5	6	7	8	9	10	
—	3	+ 40 + 34	+ 44 + 34	+ 48 + 34	+ 59 + 34	+ 74 + 34	+ 26 + 20	+ 30 + 20	+ 34 + 20	+ 45 + 20	+ 60 + 20	+ 80 + 20	+ 120 + 20	+ 160 + 20	+ 18 + 14	+ 20 + 14	+ 24 + 14	+ 28 + 14	+ 39 + 14	+ 54 + 14	
3	6	+ 54 + 46	+ 58 + 46	+ 64 + 46	+ 76 + 46	+ 94 + 46	+ 38 + 30	+ 42 + 30	+ 48 + 30	+ 60 + 30	+ 78 + 30	+ 105 + 30	+ 150 + 30	+ 210 + 30	+ 25 + 20	+ 28 + 20	+ 32 + 20	+ 38 + 20	+ 50 + 20	+ 68 + 20	
6	10	+ 65 + 56	+ 71 + 56	+ 78 + 56	+ 92 + 56	+ 114 + 56	+ 49 + 40	+ 55 + 40	+ 62 + 40	+ 76 + 40	+ 98 + 40	+ 130 + 40	+ 190 + 40	+ 260 + 40	+ 31 + 25	+ 34 + 25	+ 40 + 25	+ 47 + 25	+ 61 + 25	+ 83 + 25	
10	18						+ 61 + 50	+ 68 + 50	+ 77 + 50	+ 93 + 50	+ 120 + 50	+ 160 + 50	+ 230 + 50	+ 320 + 50	+ 40 + 32	+ 43 + 32	+ 50 + 32	+ 59 + 32	+ 75 + 32	+ 102 + 32	
18	30						+ 78 + 65	+ 86 + 65	+ 98 + 65	+ 117 + 65	+ 149 + 65	+ 195 + 65	+ 275 + 65	+ 395 + 65	+ 49 + 40	+ 53 + 40	+ 61 + 40	+ 73 + 40	+ 92 + 40	+ 124 + 40	
30	50						+ 96 + 80	+ 105 + 80	+ 119 + 80	+ 142 + 80	+ 180 + 80	+ 240 + 80	+ 330 + 80	+ 470 + 80	+ 61 + 50	+ 66 + 50	+ 75 + 50	+ 89 + 50	+ 112 + 50	+ 150 + 50	
50	80						+ 119 + 100	+ 130 + 100	+ 146 + 100	+ 174 + 100	+ 220 + 100	+ 290 + 100	+ 400 + 100	+ 560 + 100	+ 73 + 60	+ 79 + 60	+ 90 + 60	+ 106 + 60	+ 134 + 60	+ 180 + 60	
80	120						+ 142 + 120	+ 155 + 120	+ 174 + 120	+ 207 + 120	+ 260 + 120	+ 340 + 120	+ 470 + 120	+ 660 + 120	+ 87 + 72	+ 94 + 72	+ 107 + 72	+ 125 + 72	+ 159 + 72	+ 212 + 72	
120	180						+ 170 + 145	+ 185 + 145	+ 208 + 145	+ 245 + 145	+ 305 + 145	+ 395 + 145	+ 545 + 145	+ 775 + 145	+ 103 + 85	+ 110 + 85	+ 125 + 85	+ 148 + 85	+ 185 + 85	+ 245 + 85	
180	250						+ 199 + 170	+ 216 + 170	+ 242 + 170	+ 285 + 170	+ 355 + 170	+ 460 + 170	+ 630 + 170	+ 890 + 170	+ 120 + 100	+ 129 + 100	+ 146 + 100	+ 172 + 100	+ 215 + 100	+ 285 + 100	
250	315						+ 222 + 190	+ 242 + 190	+ 271 + 190	+ 320 + 190	+ 400 + 190	+ 510 + 190	+ 710 + 190	+ 1 000 + 190	+ 133 + 110	+ 142 + 110	+ 162 + 110	+ 191 + 110	+ 240 + 110	+ 320 + 110	
315	400						+ 246 + 210	+ 267 + 210	+ 299 + 210	+ 350 + 210	+ 440 + 210	+ 570 + 210	+ 780 + 210	+ 1 100 + 210	+ 150 + 125	+ 161 + 125	+ 182 + 125	+ 214 + 125	+ 265 + 125	+ 355 + 125	
400	500						+ 270 + 230	+ 293 + 230	+ 327 + 230	+ 385 + 230	+ 480 + 230	+ 630 + 230	+ 860 + 230	+ 1 200 + 230	+ 162 + 135	+ 175 + 135	+ 198 + 135	+ 232 + 135	+ 290 + 135	+ 385 + 135	
500	630						+ 304 + 260	+ 330 + 260	+ 370 + 260	+ 435 + 260	+ 540 + 260	+ 700 + 260	+ 960 + 260	+ 1 360 + 260		+ 189 + 145	+ 215 + 145	+ 255 + 145	+ 320 + 145	+ 425 + 145	
630	800						+ 340 + 290	+ 370 + 290	+ 415 + 290	+ 490 + 290	+ 610 + 290	+ 790 + 290	+ 1 090 + 290	+ 1 540 + 290		+ 210 + 160	+ 240 + 160	+ 285 + 160	+ 360 + 160	+ 480 + 160	
800	1 000						+ 376 + 320	+ 410 + 320	+ 460 + 320	+ 550 + 320	+ 680 + 320	+ 880 + 320	+ 1 220 + 320	+ 1 720 + 320		+ 226 + 170	+ 260 + 170	+ 310 + 170	+ 400 + 170	+ 530 + 170	
1 000	1 250						+416 +350	+ 455 + 350	+ 515 + 350	+ 610 + 350	+ 770 + 350	+ 1 010 + 350	+ 1 400 + 350	+ 2 000 + 350		+ 261 + 195	+ 300 + 195	+ 360 + 195	+ 455 + 195	+ 615 + 195	
1 250	1 600						+ 468 + 390	+ 515 + 390	+ 585 + 390	+ 700 + 390	+ 890 + 390	+ 1 170 + 390	+ 1 640 + 390	+ 2 340 + 390		+ 298 + 220	+ 345 + 220	+ 415 + 220	+ 530 + 220	+ 720 + 220	
1 600	2 000						+ 522 + 430	+ 580 + 430	+ 660 + 430	+ 800 + 430	+ 1 030 + 430	+ 1 350 + 430	+ 1 930 + 430	+ 2 730 + 430		+ 332 + 240	+ 390 + 240	+ 470 + 240	+ 610 + 240	+ 840 + 240	
2 000	2 500						+ 590 + 480	+ 655 + 480	+ 760 + 480	+ 920 + 480	+ 1 180 + 480	+ 1 580 + 480	+ 2 230 + 480	+ 3 280 + 480		+ 370 + 260	+ 435 + 260	+ 540 + 260	+ 700 + 260	+ 960 + 260	
2 500	3 150						+ 655 + 520	+ 730 + 520	+ 850 + 520	+ 1 060 + 520	+ 1 380 + 520	+ 1 870 + 520	+ 2 620 + 520	+ 3 820 + 520		+ 425 + 290	+ 500 + 290	+ 620 + 290	+ 830 + 290	+ 1 150 + 290	

The intermediate fundamental deviation CD is provided primarily for fine mechanisms and horology. If tolerance classes involving this fundamental deviation in other basic sizes are required, they may be calculated in accordance with ISO 286-1.

Table 4 — Limit deviations for holes EF and F

Upper limit deviation = *ES*Lower limit deviation = *EI*

Deviations in micrometres

Basic size mm		EF ^a								F							
Above	Up to and including	3	4	5	6	7	8	9	10	3	4	5	6	7	8	9	10
—	3	+12 +10	+13 +10	+14 +10	+16 +10	+20 +10	+24 +10	+35 +10	+50 +10	+8 +6	+9 +6	+10 +6	+12 +6	+16 +6	+20 +6	+31 +6	+46 +6
3	6	+16,5 +14	+18 +14	+19 +14	+22 +14	+26 +14	+32 +14	+44 +14	+62 +14	+12,5 +10	+14 +10	+15 +10	+18 +10	+22 +10	+28 +10	+40 +10	+58 +10
6	10	+20,5 +18	+22 +18	+24 +18	+27 +18	+33 +18	+40 +18	+54 +18	+76 +18	+15,5 +13	+17 +13	+19 +13	+22 +13	+28 +13	+35 +13	+49 +13	+71 +13
10	18									+19 +16	+21 +16	+24 +16	+27 +16	+34 +16	+43 +16	+59 +16	+86 +16
18	30									+24 +20	+26 +20	+29 +20	+33 +20	+41 +20	+53 +20	+72 +20	+104 +20
30	50									+29 +25	+32 +25	+36 +25	+41 +25	+50 +25	+64 +25	+87 +25	+125 +25
50	80											+43 +30	+49 +30	+60 +30	+76 +30	+104 +30	
80	120											+51 +36	+58 +36	+71 +36	+90 +36	+123 +36	
120	180											+61 +43	+68 +43	+83 +43	+106 +43	+143 +43	
180	250											+70 +50	+79 +50	+96 +50	+122 +50	+165 +50	
250	315											+79 +56	+88 +56	+108 +56	+137 +56	+186 +56	
315	400											+87 +62	+98 +62	+119 +62	+151 +62	+202 +62	
400	500											+95 +68	+108 +68	+131 +68	+165 +68	+223 +68	
500	630												+120 +76	+146 +76	+186 +76	+251 +76	
630	800												+130 +80	+160 +80	+205 +80	+280 +80	
800	1 000												+142 +86	+176 +86	+226 +86	+316 +86	
1 000	1 250												+164 +98	+203 +98	+263 +98	+358 +98	
1 250	1 600												+188 +110	+235 +110	+305 +110	+420 +110	
1 600	2 000												+212 +120	+270 +120	+350 +120	+490 +120	
2 000	2 500												+240 +130	+305 +130	+410 +130	+570 +130	
2 500	3 150												+280 +145	+355 +145	+475 +145	+685 +145	

^a The intermediate fundamental deviation EF is provided primarily for fine mechanisms and horology. If tolerance classes involving this fundamental deviation in other basic sizes are required, they may be calculated in accordance with ISO 286-1.