

# Geometriske produktspecifikationer (GPS) – ISO-kodesystem for tolerancer på lineære størrelser – Del 2: Tabeller for standardtolerancegrader og grundafvigelser for huller og aksler

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

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English Version

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 (ISO 286-  
2:2010)

Spécification géométrique des produits (GPS) - Système  
de codification ISO pour les tolérances sur les tailles  
linéaires - Partie 2: Tableaux des classes de tolérance  
normalisées et des écarts limites des alésages et des  
arbres (ISO 286-2:2010)

Geometrische Produktspezifikation (GPS) - ISO-  
Toleranzsystem für Längenmaße - Teil 2: Tabellen der  
Grundtoleranzgrade und Grenzabmaße für Bohrungen und  
Wellen (ISO 286-2:2010)

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## Foreword

This document (EN ISO 286-2:2010) has been prepared by Technical Committee ISO/TC 213 "Dimensional and geometrical product specifications and verification" in collaboration with Technical Committee CEN/TC 290 "Dimensional and geometrical product specification and verification" the secretariat of which is held by AFNOR.

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of an identical text or by endorsement, at the latest by December 2010, and conflicting national standards shall be withdrawn at the latest by December 2010.

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### Endorsement notice

The text of ISO 286-2:2010 has been approved by CEN as a EN ISO 286-2:2010 without any modification.



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## 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

*Spécification géométrique des produits (GPS) — Système de  
codification ISO pour les tolérances sur les tailles linéaires —*

*Partie 2: Tableaux des classes de tolérance normalisées et des écarts  
limites des alésages et des arbres*



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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. 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.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 286-2 was prepared by Technical Committee ISO/TC 213, *Dimensional and geometrical product specifications and verification*.

This second edition cancels and replaces the first edition (ISO 286-2:1988), which has been technically revised. It also incorporates the Technical Corrigendum ISO 286-2:1988/Cor.1:2006.

ISO 286 consists of the following parts, under the general title *Geometrical product specifications (GPS) — ISO code system for tolerances on linear sizes*:

- *Part 1: Basis of tolerances, deviations and fits*
- *Part 2: Tables of standard tolerance classes and limit deviations for holes and shafts*

## Introduction

This part of ISO 286 is a geometrical product specification (GPS) standard and is to be regarded as a general GPS standard (see ISO/TR 14638). It influences chain links 1 and 2 of the chain of standards on size in the general GPS matrix.

For more detailed information on the relationship of this part of ISO 286 to the GPS matrix model, see Annex B.

The need for limits and fits for machined workpieces was brought about mainly by the requirement for interchangeability between mass-produced parts and the inherent inaccuracy of manufacturing methods, coupled with the fact that “exactness” of size was found to be unnecessary for most workpiece features. In order that the fit 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 while ensuring the functional fit requirements of the product.

Similarly, where a specific fit condition is required between mating features of two different workpieces, it is necessary to ascribe an allowance, either positive or negative, to the nominal size to achieve the required clearance or interference. ISO 286 gives the internationally accepted code system for tolerances on linear sizes. It provides a system of tolerances and deviations suitable for two types of feature: “cylinder” and “two parallel opposite surfaces”. The main intention of this code system is the fulfilment of the function fit.

The terms “hole”, “shaft” and “diameter” are used to designate the types of feature of cylinders (e.g. for the tolerancing of the diameter of a hole or shaft). For simplicity, they are also used for two parallel opposite surfaces (e.g. for the tolerancing of the thickness of a key or the width of a slot).

The pre-condition for the application of the ISO code system for tolerances on linear sizes for the features forming a fit is that the nominal sizes of the hole and the shaft are identical.

The previous edition of ISO 286-2 (published in 1988) had the envelope criterion as the default association criterion for the size of a feature; however, ISO 14405-1 changes this default association criterion to the two-point size criterion. This means that form is no longer controlled by the default specification of size.

In many cases, the diameter tolerances specified in this part of ISO 286 are not sufficient for effective control of the intended function of the fit. The envelope criterion specified in ISO 14405-1 may be required. In addition, the use of geometrical form tolerances and surface texture requirements may improve the control of the intended function.

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



# 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

### 1 Scope

This part of ISO 286 gives values of the limit deviations for commonly used tolerance classes for holes and shafts calculated from the tables given in ISO 286-1. This part of ISO 286 covers values for the upper limit deviations  $ES$  (for holes) and  $es$  (for shafts), and the lower limit deviations  $EI$  (for holes) and  $ei$  (for shafts) (see Figures 1 and 2).

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

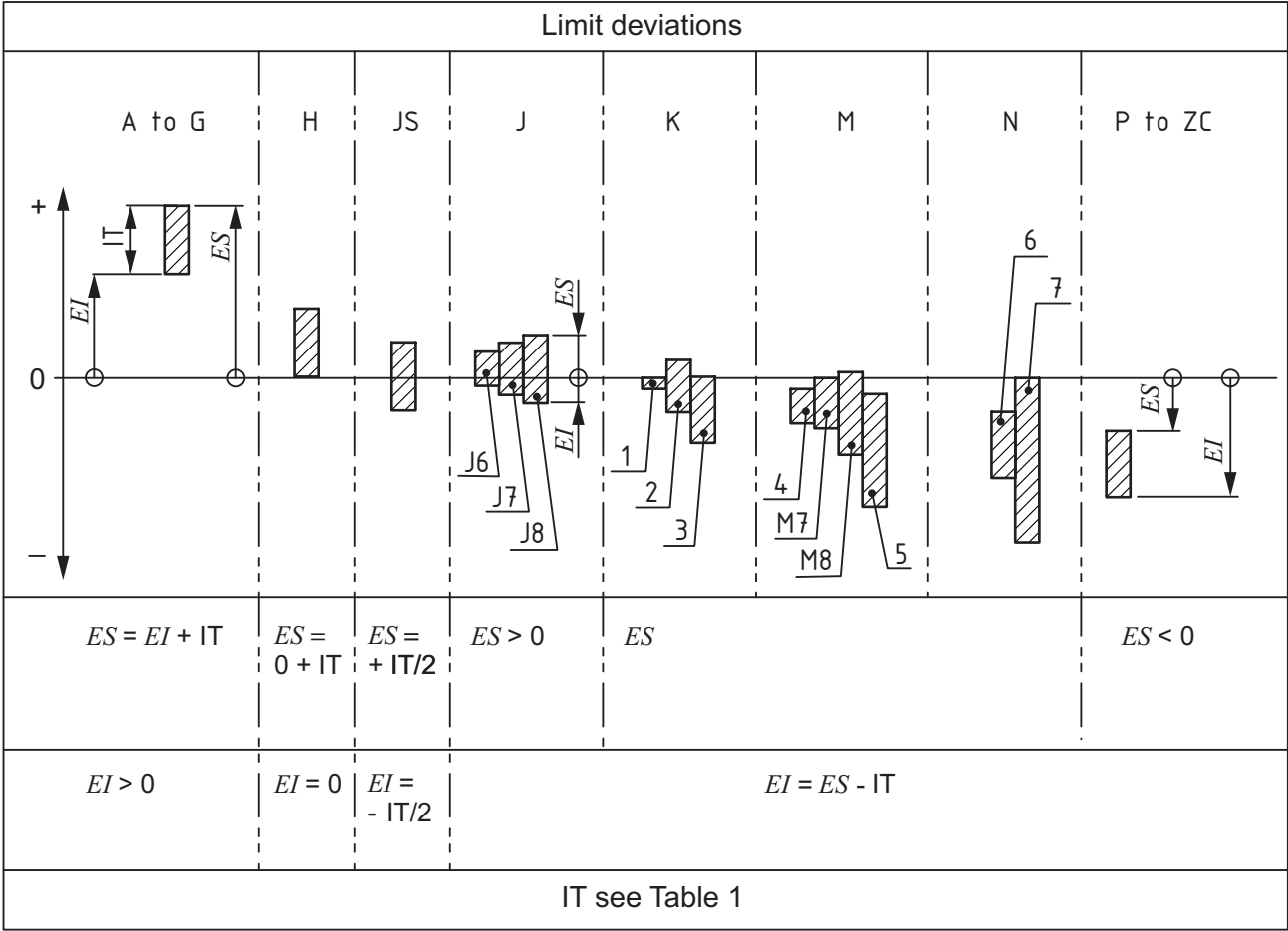
The ISO system for tolerances on linear size provides a system of tolerances and deviations suitable for features of the following types:

- a) cylinders;
- b) two parallel opposite surfaces.

For simplicity, and also because of the importance of cylindrical workpieces of circular section, only these are referred to explicitly. It should be clearly understood, however, that the tolerances and deviations given in this part of ISO 286 equally apply to workpieces of other than circular sections.

In particular, the term “hole” or “shaft” is used to designate features of the cylinder type (e.g. for the tolerancing of the diameter of a hole or shaft) and, for simplicity, these terms are also used for two parallel opposite surfaces (e.g. for the tolerancing of the thickness of a key or the width of a slot).

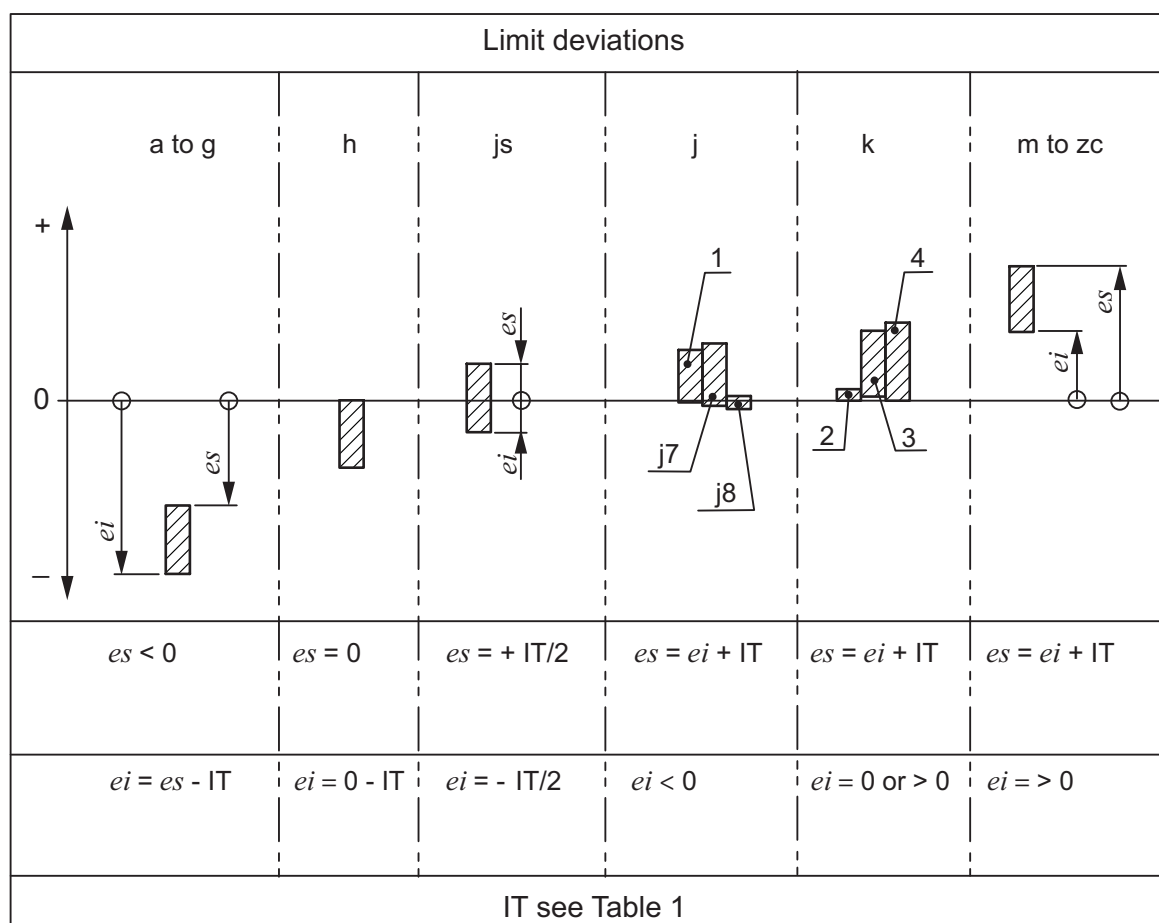
For further information on terminology, symbols, the basis of the system, etc., see ISO 286-1.



Key

- 1 K1 to K3, and also K4 to K8 for sizes for which — < nominal size ≤ 3 mm (for the significance of the dash, see e.g. footnote “b” to Table 2)
- 2 K4 to K8 for sizes for which 3 mm < nominal size ≤ 500 mm
- 3 K9 to K18
- 4 M1 to M6
- 5 M9 to M18
- 6 N1 to N8
- 7 N9 to N18

Figure 1 — Upper and lower limit deviations for holes (internal features)

**Key**

- 1 j5, j6
- 2 k1 to k3, and k4 to k7 for sizes for which  $\text{—} < \text{nominal size} \leq 3 \text{ mm}$  (for the significance of the dash, see e.g. footnote "b" to Table 2)
- 3 k4 to k7 for sizes for which  $3 \text{ mm} < \text{nominal size} \leq 500 \text{ mm}$
- 4 k8 to k18

**Figure 2 — Upper and lower limit deviations for shafts (external features)****2 Normative references**

The following referenced documents are indispensable for the application 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 286-1:2010, *Geometrical product specifications (GPS) — ISO code system for tolerances of linear sizes — Part 1: Basis of tolerances, deviations and fits*

**3 Standard tolerances**

The values of standard tolerance grades IT01 to IT18, inclusive, are given in Table 1.

## 4 Limit deviations for holes

A synoptic representation of the tolerance classes for holes, as given in this part of ISO 286, is shown in Figures 3 and 4.

Attention is drawn to the fact that the tolerance classes shown in Figures 3 and 4, and their limit deviations given in Tables 2 to 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 286-1:2010, Subclause 4.4 and Clause 5.

NOTE Some tolerance classes are only provided for a restricted number of nominal size ranges. For further information, see 6.1.

## 5 Limit deviations for shafts

A synoptic representation of the tolerance classes for shafts, as given in this part of ISO 286, is shown in Figures 5 and 6.

Attention is drawn to the fact that the tolerance classes shown in Figures 5 and 6, and their limit deviations given in Tables 17 to 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 286-1:2010, Subclause 4.4 and Clause 5.

NOTE Some tolerance classes are only provided for a restricted number of nominal size ranges. For further information, see 6.1.

## 6 Presentation of Tables 2 to 32

**6.1** Values may be calculated, from the tables given in ISO 286-1, for fundamental deviations used for tolerance classes for which there is no entry in the tables but for which the space has been left blank.

**6.2** A small horizontal separation has been inserted in the tables, where appropriate, to distinguish between values for nominal sizes less than or equal to 500 mm and those greater than 500 mm.



**Table 1 — Values of standard tolerance grades for nominal sizes up to 3 150 mm**

NOTE This table, taken from ISO 286-1:2010, has been included in this part of ISO 286 to facilitate the use and understanding of the tables for limit deviations and of Figures 1 and 2.

Nominal size		Standard tolerance grades																			
mm		IT01	IT0	IT1	IT2	IT3	IT4	IT5	IT6	IT7	IT8	IT9	IT10	IT11	IT12	IT13	IT14	IT15	IT16	IT17	IT18
Above	Up to and including	Standard tolerance values																			
		μm														mm					
—	3	0,3	0,5	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	0,4	0,6	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	0,4	0,6	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	0,5	0,8	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	0,6	1	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	0,6	1	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	0,8	1,2	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	1	1,5	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	1,2	2	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	2	3	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	2,5	4	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	3	5	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	4	6	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			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			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			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			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			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			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			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			26	36	50	68	96	135	210	330	540	860	1 350	2,1	3,3	5,4	8,6	13,5	21	33

**Figure 3 — Synoptic representation of tolerance classes for holes of nominal sizes less than or equal to 500 mm**

**Figure 4 — Synoptic representation of tolerance classes for holes of nominal sizes greater than 500 mm and less than or equal to 3 150 mm**

**Figure 5 — Synoptic representation of tolerance classes for shafts of nominal sizes less than or equal to 500 mm**

**Figure 6 — Synoptic representation of tolerance classes for shafts of nominal sizes greater than 500 mm and less than or equal to 3 150 mm**

**Table 2 — Limit deviations for holes (fundamental deviations A, B and C)<sup>a</sup>**Upper limit deviation = *ES*Lower limit deviation = *EI*

Deviations in micrometres

Nominal size mm		A <sup>b</sup>					B <sup>b</sup>						C					
Above	Up to and including	9	10	11	12	13	8	9	10	11	12	13	8	9	10	11	12	13
—	3 <sup>b</sup>	+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 +60	+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	+2 090 +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

<sup>a</sup> Fundamental deviations A, B and C are not provided for nominal sizes greater than 500 mm.<sup>b</sup> Fundamental deviations A and B shall not be used for any standard tolerances in nominal sizes less than or equal to 1 mm.

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

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

Deviations in micrometres

Nominal size mm		CD <sup>a</sup>					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	+126 +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

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

Table 4 — Limit deviations for holes (fundamental deviations EF and F)

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

Deviations in micrometres

Nominal size mm		EF <sup>a</sup>								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	

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

Table 5 — Limit deviations for holes (fundamental deviations FG and G)

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

Deviations in micrometres

Nominal size mm		FG <sup>a</sup>								G							
Above	Up to and including	3	4	5	6	7	8	9	10	3	4	5	6	7	8	9	10
—	3	+6 +4	+7 +4	+8 +4	+10 +4	+14 +4	+18 +4	+29 +4	+44 +4	+4 +2	+5 +2	+6 +2	+8 +2	+12 +2	+16 +2	+27 +2	+42 +2
3	6	+8,5 +6	+10 +6	+11 +6	+14 +6	+18 +6	+24 +6	+36 +6	+54 +6	+6,5 +4	+8 +4	+9 +4	+12 +4	+16 +4	+22 +4	+34 +4	+52 +4
6	10	+10,5 +8	+12 +8	+14 +8	+17 +8	+23 +8	+30 +8	+44 +8	+66 +8	+7,5 +5	+9 +5	+11 +5	+14 +5	+20 +5	+27 +5	+41 +5	+63 +5
10	18									+9 +6	+11 +6	+14 +6	+17 +6	+24 +6	+33 +6	+49 +6	+76 +6
18	30									+11 +7	+13 +7	+16 +7	+20 +7	+28 +7	+40 +7	+59 +7	+91 +7
30	50									+13 +9	+16 +9	+20 +9	+25 +9	+34 +9	+48 +9	+71 +9	+109 +9
50	80											+23 +10	+29 +10	+40 +10	+56 +10		
80	120											+27 +12	+34 +12	+47 +12	+66 +12		
120	180											+32 +14	+39 +14	+54 +14	+77 +14		
180	250											+35 +15	+44 +15	+61 +15	+87 +15		
250	315											+40 +17	+49 +17	+69 +17	+98 +17		
315	400											+43 +18	+54 +18	+75 +18	+107 +18		
400	500											+47 +20	+60 +20	+83 +20	+117 +20		
500	630												+66 +22	+92 +22	+132 +22		
630	800												+74 +24	+104 +24	+149 +24		
800	1 000												+82 +26	+116 +26	+166 +26		
1 000	1 250												+94 +28	+133 +28	+193 +28		
1 250	1 600												+108 +30	+155 +30	+225 +30		
1 600	2 000												+124 +32	+182 +32	+262 +32		
2 000	2 500												+144 +34	+209 +34	+314 +34		
2 500	3 150												+173 +38	+248 +38	+368 +38		

<sup>a</sup> The intermediate fundamental deviation FG is provided primarily for fine mechanisms and horology. If tolerance classes involving this fundamental deviation in other nominal sizes are required, they may be calculated in accordance with ISO 286-1.

Table 6 — Limit deviations for holes (fundamental deviation H)

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

Nominal size		H																	
mm		1	2	3	4	5	6	7	8	9	10	11	12	13	14 <sup>a</sup>	15 <sup>a</sup>	16 <sup>a</sup>	17 <sup>a</sup>	18 <sup>a</sup>
Above	Up to and including	Deviations																	
		µm											mm						
—	3 <sup>a</sup>	+0,8 0	+1,2 0	+2 0	+3 0	+4 0	+6 0	+10 0	+14 0	+25 0	+40 0	+60 0	+0,1 0	+0,14 0	+0,25 0	+0,4 0	+0,6 0		
3	6	+1 0	+1,5 0	+2,5 0	+4 0	+5 0	+8 0	+12 0	+18 0	+30 0	+48 0	+75 0	+0,12 0	+0,18 0	+0,3 0	+0,48 0	+0,75 0	+1,2 0	+1,8 0
6	10	+1 0	+1,5 0	+2,5 0	+4 0	+6 0	+9 0	+15 0	+22 0	+36 0	+58 0	+90 0	+0,15 0	+0,22 0	+0,36 0	+0,58 0	+0,9 0	+1,5 0	+2,2 0
10	18	+1,2 0	+2 0	+3 0	+5 0	+8 0	+11 0	+18 0	+27 0	+43 0	+70 0	+110 0	+0,18 0	+0,27 0	+0,43 0	+0,7 0	+1,1 0	+1,8 0	+2,7 0
18	30	+1,5 0	+2,5 0	+4 0	+6 0	+9 0	+13 0	+21 0	+33 0	+52 0	+84 0	+130 0	+0,21 0	+0,33 0	+0,52 0	+0,84 0	+1,3 0	+2,1 0	+3,3 0
30	50	+1,5 0	+2,5 0	+4 0	+7 0	+11 0	+16 0	+25 0	+39 0	+62 0	+100 0	+160 0	+0,25 0	+0,39 0	+0,62 0	+1 0	+1,6 0	+2,5 0	+3,9 0
50	80	+2 0	+3 0	+5 0	+8 0	+13 0	+19 0	+30 0	+46 0	+74 0	+120 0	+190 0	+0,3 0	+0,46 0	+0,74 0	+1,2 0	+1,9 0	+3 0	+4,6 0
80	120	+2,5 0	+4 0	+6 0	+10 0	+15 0	+22 0	+35 0	+54 0	+87 0	+140 0	+220 0	+0,35 0	+0,54 0	+0,87 0	+1,4 0	+2,2 0	+3,5 0	+5,4 0
120	180	+3,5 0	+5 0	+8 0	+12 0	+18 0	+25 0	+40 0	+63 0	+100 0	+160 0	+250 0	+0,4 0	+0,63 0	+1 0	+1,6 0	+2,5 0	+4 0	+6,3 0
180	250	+4,5 0	+7 0	+10 0	+14 0	+20 0	+29 0	+46 0	+72 0	+115 0	+185 0	+290 0	+0,46 0	+0,72 0	+1,15 0	+1,85 0	+2,9 0	+4,6 0	+7,2 0
250	315	+6 0	+8 0	+12 0	+16 0	+23 0	+32 0	+52 0	+81 0	+130 0	+210 0	+320 0	+0,52 0	+0,81 0	+1,3 0	+2,1 0	+3,2 0	+5,2 0	+8,1 0
315	400	+7 0	+9 0	+13 0	+18 0	+25 0	+36 0	+57 0	+89 0	+140 0	+230 0	+360 0	+0,57 0	+0,89 0	+1,4 0	+2,3 0	+3,6 0	+5,7 0	+8,9 0
400	500	+8 0	+10 0	+15 0	+20 0	+27 0	+40 0	+63 0	+97 0	+155 0	+250 0	+400 0	+0,63 0	+0,97 0	+1,55 0	+2,5 0	+4 0	+6,3 0	+9,7 0
500	630	+9 0	+11 0	+16 0	+22 0	+32 0	+44 0	+70 0	+110 0	+175 0	+280 0	+440 0	+0,7 0	+1,1 0	+1,75 0	+2,8 0	+4,4 0	+7 0	+11 0
630	800	+10 0	+13 0	+18 0	+25 0	+36 0	+50 0	+80 0	+125 0	+200 0	+320 0	+500 0	+0,8 0	+1,25 0	+2 0	+3,2 0	+5 0	+8 0	+12,5 0
800	1 000	+11 0	+15 0	+21 0	+28 0	+40 0	+56 0	+90 0	+140 0	+230 0	+360 0	+560 0	+0,9 0	+1,4 0	+2,3 0	+3,6 0	+5,6 0	+9 0	+14 0
1 000	1 250	+13 0	+18 0	+24 0	+33 0	+47 0	+66 0	+105 0	+165 0	+260 0	+420 0	+660 0	+1,05 0	+1,65 0	+2,6 0	+4,2 0	+6,6 0	+10,5 0	+16,5 0
1 250	1 600	+15 0	+21 0	+29 0	+39 0	+55 0	+78 0	+125 0	+195 0	+310 0	+500 0	+780 0	+1,25 0	+1,95 0	+3,1 0	+5 0	+7,8 0	+12,5 0	+19,5 0
1 600	2 000	+18 0	+25 0	+35 0	+46 0	+65 0	+92 0	+150 0	+230 0	+370 0	+600 0	+920 0	+1,5 0	+2,3 0	+3,7 0	+6 0	+9,2 0	+15 0	+23 0
2 000	2 500	+22 0	+30 0	+41 0	+55 0	+78 0	+110 0	+175 0	+280 0	+440 0	+700 0	+1 100 0	+1,75 0	+2,8 0	+4,4 0	+7 0	+11 0	+17,5 0	+28 0
2 500	3 150	+25 0	+36 0	+50 0	+68 0	+96 0	+135 0	+210 0	+330 0	+540 0	+860 0	+1 350 0	+2,1 0	+3,3 0	+5,4 0	+8,6 0	+13,5 0	+21 0	+33 0

<sup>a</sup> Tolerance grades IT14 to IT18 (incl.) shall not be used for nominal sizes less than or equal to 1 mm.



Table 7 — Limit deviations for holes (fundamental deviation JS)<sup>a</sup>Upper limit deviation = *ES*Lower limit deviation = *EI*

Nominal size		JS																	
mm		1	2	3	4	5	6	7	8	9	10	11	12	13	14 <sup>b</sup>	15 <sup>b</sup>	16 <sup>b</sup>	17	18
Above	Up to and including	Deviations																	
		µm											mm						
—	3 <sup>b</sup>	±0,4	±0,6	±1	±1,5	±2	±3	±5	±7	±12,5	±20	±30	±0,05	±0,07	±0,125	±0,2	±0,3		
3	6	±0,05	±0,75	±1,25	±2	±2,5	±4	±6	±9	±15	±24	±37,5	±0,06	±0,09	±0,15	±0,24	±0,375	±0,6	±0,9
6	10	±0,05	±0,75	±1,25	±2	±3	±4,5	±7,5	±11	±18	±29	±45	±0,075	±0,11	±0,18	±0,29	±0,45	±0,75	±1,1
10	18	±0,6	±1	±1,5	±2,5	±4	±5,5	±9	±13,5	±21,5	±35	±55	±0,09	±0,135	±0,215	±0,35	±0,55	±0,9	±1,35
18	30	±0,75	±1,25	±2	±3	±4,5	±6,5	±10,5	±16,5	±26	±42	±65	±0,105	±0,165	±0,26	±0,42	±0,65	±1,05	±1,65
30	50	±0,75	±1,25	±2	±3,5	±5,5	±8	±12,5	±19,5	±31	±50	±80	±0,125	±0,195	±0,31	±0,5	±0,8	±1,25	±1,95
50	80	±1	±1,5	±2,5	±4	±6,5	±9,5	±15	±23	±37	±60	±95	±0,15	±0,23	±0,37	±0,6	±0,95	±1,5	±2,3
80	120	±1,25	±2	±3	±5	±7,5	±11	±17,5	±27	±43,5	±70	±110	±0,175	±0,27	±0,435	±0,7	±1,1	±1,75	±2,7
120	180	±1,75	±2,5	±4	±6	±9	±12,5	±20	±31,5	±50	±80	±125	±0,2	±0,315	±0,5	±0,8	±1,25	±2	±3,15
180	250	±2,25	±3,5	±5	±7	±10	±14,5	±23	±36	±57,5	±92,5	±145	±0,23	±0,36	±0,575	±0,925	±1,45	±2,3	±3,6
250	315	±3	±4	±6	±8	±11,5	±16	±26	±40,5	±65	±105	±160	±0,26	±0,405	±0,65	±1,05	±1,6	±2,6	±4,05
315	400	±3,5	±4,5	±6,5	±9	±12,5	±18	±28,5	±44,5	±70	±115	±180	±0,285	±0,445	±0,7	±1,15	±1,8	±2,85	±4,45
400	500	±4	±5	±7,5	±10	±13,5	±20	±31,5	±48,5	±77,5	±125	±200	±0,315	±0,485	±0,775	±1,25	±2	±3,15	±4,85
500	630	±4,5	±5,5	±8	±11	±16	±22	±35	±55	±87,5	±140	±220	±0,35	±0,55	±0,875	±1,4	±2,2	±3,5	±5,5
630	800	±5	±6,5	±9	±12,5	±18	±25	±40	±62,5	±100	±160	±250	±0,4	±0,625	±1	±1,6	±2,5	±4	±6,25
800	1 000	±5,5	±7,5	±10,5	±14	±20	±28	±45	±70	±115	±180	±280	±0,45	±0,7	±1,15	±1,8	±2,8	±4,5	±7
1 000	1 250	±6,5	±9	±12	±16,5	±23,5	±33	±52,5	±82,5	±130	±210	±330	±0,525	±0,825	±1,3	±2,1	±3,3	±5,25	±8,25
1 250	1 600	±7,5	±10,5	±14,5	±19,5	±27,5	±39	±62,5	±97,5	±155	±250	±390	±0,625	±0,975	±1,55	±2,5	±3,9	±6,25	±9,75
1 600	2 000	±9	±12,5	±17,5	±23	±32,5	±46	±75	±115	±185	±300	±460	±0,75	±1,15	±1,85	±3	±4,6	±7,5	±11,5
2 000	2 500	±11	±15	±20,5	±27,5	±39	±55	±87,5	±140	±220	±350	±550	±0,875	±1,4	±2,2	±3,5	±5,5	±8,75	±14
2 500	3 150	±13	±18	±25	±34	±48	±67,5	±105	±165	±270	±430	±675	±1,05	±1,65	±2,7	±4,3	±6,75	±10,5	±16,5
<sup>a</sup> In order to avoid repetition of equal values, the table lists the values as "±x"; this is to be interpreted as <i>ES</i> = +x and <i>EI</i> = -x, e.g. $\begin{smallmatrix} +0,23 \\ -0,23 \end{smallmatrix}$ mm.																			
<sup>b</sup> Tolerance grades IT14 to IT16 (incl.) shall not be used for nominal sizes less than or equal to 1 mm.																			

Table 8 — Limit deviations for holes (fundamental deviations J and K)

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

Deviations in micrometres

Nominal size mm		J				K							
Above	Up to and including	6	7	8	9 <sup>a</sup>	3	4	5	6	7	8	9 <sup>b</sup>	10 <sup>b</sup>
—	3	+2 −4	+4 −6	+6 −8		0 −2	0 −3	0 −4	0 −6	0 −10	0 −14	0 −25	0 −40
3	6	+5 −3	±6 <sup>c</sup>	+10 −8		0 −2,5	+0,5 −3,5	0 −5	+2 −6	+3 −9	+5 −13		
6	10	+5 −4	+8 −7	+12 −10		0 −2,5	+0,5 −3,5	+1 −5	+2 −7	+5 −10	+6 −16		
10	18	+6 −5	+10 −8	+15 −12		0 −3	+1 −4	+2 −6	+2 −9	+6 −12	+8 −19		
18	30	+8 −5	+12 −9	+20 −13		−0,5 −4,5	0 −6	+1 −8	+2 −11	+6 −15	+10 −23		
30	50	+10 −6	+14 −11	+24 −15		−0,5 −4,5	+1 −6	+2 −9	+3 −13	+7 −18	+12 −27		
50	80	+13 −6	+18 −12	+28 −18				+3 −10	+4 −15	+9 −21	+14 −32		
80	120	+16 −6	+22 −13	+34 −20				+2 −13	+4 −18	+10 −25	+16 −38		
120	180	+18 −7	+26 −14	+41 −22				+3 −15	+4 −21	+12 −28	+20 −43		
180	250	+22 −7	+30 −16	+47 −25				+2 −18	+5 −24	+13 −33	+22 −50		
250	315	+25 −5	+36 −16	+55 −26				+3 −20	+5 −27	+16 −36	+25 −56		
315	400	+29 −7	+39 −18	+60 −29				+3 −22	+7 −29	+17 −40	+28 −61		
400	500	+33 −7	+43 −20	+66 −31				+2 −25	+8 −32	+18 −45	+29 −68		
500	630								0 −44	0 −70	0 −110		
630	800								0 −50	0 −80	0 −125		
800	1 000								0 −56	0 −90	0 −140		
1 000	1 250								0 −66	0 −105	0 −165		
1 250	1 600								0 −78	0 −125	0 −195		
1 600	2 000								0 −92	0 −150	0 −230		
2 000	2 500								0 −110	0 −175	0 −280		
2 500	3 150								0 −135	0 −210	0 −330		

<sup>a</sup> The tolerance limits for tolerance classes J9, J10, etc., are symmetrical about the nominal size line (for the values of these tolerance limits, see Table 7 and Figure 1).

<sup>b</sup> Deviations for K in tolerance grades above IT8 are not defined for nominal sizes greater than 3 mm.

<sup>c</sup> Identical with JS7.

**Table 9 — Limit deviations for holes (fundamental deviations M and N)**Upper limit deviation = *ES*Lower limit deviation = *EI*

Deviations in micrometres

Nominal size mm		M								N								
Above	Up to and including	3	4	5	6	7	8	9	10	3	4	5	6	7	8	9 <sup>a</sup>	10 <sup>a</sup>	11 <sup>a</sup>
—	3 <sup>a</sup>	-2 -4	-2 -5	-2 -6	-2 -8	-2 -12	-2 -16	-2 -27	-2 -42	-4 -6	-4 -7	-4 -8	-4 -10	-4 -14	-4 -18	-4 -29	-4 -44	-4 -64
3	6	-3 -5,5	-2,5 -6,5	-3 -8	-1 -9	0 -12	+2 -16	-4 -34	-4 -52	-7 -9,5	-6,5 -10,5	-7 -12	-5 -13	-4 -16	-2 -20	0 -30	0 -48	0 -75
6	10	-5 -7,5	-4,5 -8,5	-4 -10	-3 -12	0 -15	+1 -21	-6 -42	-6 -64	-9 -11,5	-8,5 -12,5	-8 -14	-7 -16	-4 -19	-3 -25	0 -36	0 -58	0 -90
10	18	-6 -9	-5 -10	-4 -12	-4 -15	0 -18	+2 -25	-7 -50	-7 -77	-11 -14	-10 -15	-9 -17	-9 -20	-5 -23	-3 -30	0 -43	0 -70	0 -110
18	30	-6,5 -10,5	-6 -12	-5 -14	-4 -17	0 -21	+4 -29	-8 -60	-8 -92	-13,5 -17,5	-13 -19	-12 -21	-11 -24	-7 -28	-3 -36	0 -52	0 -84	0 -130
30	50	-7,5 -11,5	-6 -13	-5 -16	-4 -20	0 -25	+5 -34	-9 -71	-9 -109	-15,5 -19,5	-14 -21	-13 -24	-12 -28	-8 -33	-3 -42	0 -62	0 -100	0 -160
50	80			-6 -19	-5 -24	0 -30	+5 -41					-15 -28	-14 -33	-9 -39	-4 -50	0 -74	0 -120	0 -190
80	120			-8 -23	-6 -28	0 -35	+6 -48					-18 -33	-16 -38	-10 -45	-4 -58	0 -87	0 -140	0 -220
120	180			-9 -27	-8 -33	0 -40	+8 -55					-21 -39	-20 -45	-12 -52	-4 -67	0 -100	0 -160	0 -250
180	250			-11 -31	-8 -37	0 -46	+9 -63					-25 -45	-22 -51	-14 -60	-5 -77	0 -115	0 -185	0 -290
250	315			-13 -36	-9 -41	0 -52	+9 -72					-27 -50	-25 -57	-14 -66	-5 -86	0 -130	0 -210	0 -320
315	400			-14 -39	-10 -46	0 -57	+11 -78					-30 -55	-26 -62	-16 -73	-5 -94	0 -140	0 -230	0 -360
400	500			-16 -43	-10 -50	0 -63	+11 -86					-33 -60	-27 -67	-17 -80	-6 -103	0 -155	0 -250	0 -400
500	630				-26 -70	-26 -96	-26 -136						-44 -88	-44 -114	-44 -154	-44 -219		
630	800				-30 -80	-30 -110	-30 -155						-50 -100	-50 -130	-50 -175	-50 -250		
800	1 000				-34 -90	-34 -124	-34 -174						-56 -112	-56 -146	-56 -196	-56 -286		
1 000	1 250				-40 -106	-40 -145	-40 -205						-66 -132	-66 -171	-66 -231	-66 -326		
1 250	1 600				-48 -126	-48 -173	-48 -243						-78 -156	-78 -203	-78 -273	-78 -388		
1 600	2 000				-58 -150	-58 -208	-58 -288						-92 -184	-92 -242	-92 -322	-92 -462		
2 000	2 500				-68 -178	-68 -243	-68 -348						-110 -220	-110 -285	-110 -390	-110 -550		
2 500	3 150				-76 -211	-76 -286	-76 -406						-135 -270	-135 -345	-135 -465	-135 -675		

<sup>a</sup> Tolerance classes N9, N10 and N11 shall not be used for nominal sizes less than or equal to 1 mm.

**Table 10 — Limit deviations for holes (fundamental deviation P)**Upper limit deviation = *ES*Lower limit deviation = *EI*

Deviations in micrometres

Nominal size mm		P							
Above	Up to and including	3	4	5	6	7	8	9	10
—	3	−6 −8	−6 −9	−6 −10	−6 −12	−6 −16	−6 −20	−6 −31	−6 −46
3	6	−11 −13,5	−10,5 −14,5	−11 −16	−9 −17	−8 −20	−12 −30	−12 −42	−12 −60
6	10	−14 −16,5	−13,5 −17,5	−13 −19	−12 −21	−9 −24	−15 −37	−15 −51	−15 −73
10	18	−17 −20	−16 −21	−15 −23	−15 −26	−11 −29	−18 −45	−18 −61	−18 −88
18	30	−20,5 −24,5	−20 −26	−19 −28	−18 −31	−14 −35	−22 −55	−22 −74	−22 −106
30	50	−24,5 −28,5	−23 −30	−22 −33	−21 −37	−17 −42	−26 −65	−26 −88	−26 −126
50	80			−27 −40	−26 −45	−21 −51	−32 −78	−32 −106	
80	120			−32 −47	−30 −52	−24 −59	−37 −91	−37 −124	
120	180			−37 −55	−36 −61	−28 −68	−43 −106	−43 −143	
180	250			−44 −64	−41 −70	−33 −79	−50 −122	−50 −165	
250	315			−49 −72	−47 −79	−36 −88	−56 −137	−56 −186	
315	400			−55 −80	−51 −87	−41 −98	−62 −151	−62 −202	
400	500			−61 −88	−55 −95	−45 −108	−68 −165	−68 −223	
500	630				−78 −122	−78 −148	−78 −188	−78 −253	
630	800				−88 −138	−88 −168	−88 −213	−88 −288	
800	1 000				−100 −156	−100 −190	−100 −240	−100 −330	
1 000	1 250				−120 −186	−120 −225	−120 −285	−120 −380	
1 250	1 600				−140 −218	−140 −265	−140 −335	−140 −450	
1 600	2 000				−170 −262	−170 −320	−170 −400	−170 −540	
2 000	2 500				−195 −305	−195 −370	−195 −475	−195 −635	
2 500	3 150				−240 −375	−240 −450	−240 −570	−240 −780	

**Table 11 — Limit deviations for holes (fundamental deviation R)**Upper limit deviation = *ES*Lower limit deviation = *EI*

Deviations in micrometres

Nominal size mm		R							
Above	Up to and including	3	4	5	6	7	8	9	10
—	3	-10 -12	-10 -13	-10 -14	-10 -16	-10 -20	-10 -24	-10 -35	-10 -50
3	6	-14 -16,5	-13,5 -17,5	-14 -19	-12 -20	-11 -23	-15 -33	-15 -45	-15 -63
6	10	-18 -20,5	-17,5 -21,5	-17 -23	-16 -25	-13 -28	-19 -41	-19 -55	-19 -77
10	18	-22 -25	-21 -26	-20 -28	-20 -31	-16 -34	-23 -50	-23 -66	-23 -93
18	30	-26,5 -30,5	-26 -32	-25 -34	-24 -37	-20 -41	-28 -61	-28 -80	-28 -112
30	50	-32,5 -36,5	-31 -38	-30 -41	-29 -45	-25 -50	-34 -73	-34 -96	-34 -134
50	65			-36 -49	-35 -54	-30 -60	-41 -87		
65	80			-38 -51	-37 -56	-32 -62	-43 -89		
80	100			-46 -61	-44 -66	-38 -73	-51 -105		
100	120			-49 -64	-47 -69	-41 -76	-54 -108		
120	140			-57 -75	-56 -81	-48 -88	-63 -126		
140	160			-59 -77	-58 -83	-50 -90	-65 -128		
160	180			-62 -80	-61 -86	-53 -93	-68 -131		
180	200			-71 -91	-68 -97	-60 -106	-77 -149		
200	225			-74 -94	-71 -100	-63 -109	-80 -152		
225	250			-78 -98	-75 -104	-67 -113	-84 -156		
250	280			-87 -110	-85 -117	-74 -126	-94 -175		
280	315			-91 -114	-89 -121	-78 -130	-98 -179		
315	355			-101 -126	-97 -133	-87 -144	-108 -197		
355	400			-107 -132	-103 -139	-93 -150	-114 -203		
400	450			-119 -146	-113 -153	-103 -166	-126 -223		
450	500			-125 -152	-119 -159	-109 -172	-132 -229		

Table 11 (continued)

Deviations in micrometres

Nominal size mm		R							
Above	Up to and including	3	4	5	6	7	8	9	10
500	560				–150 –194	–150 –220	–150 –260		
560	630				–155 –199	–155 –225	–155 –265		
630	710				–175 –225	–175 –255	–175 –300		
710	800				–185 –235	–185 –265	–185 –310		
800	900				–210 –266	–210 –300	–210 –350		
900	1 000				–220 –276	–220 –310	–220 –360		
1 000	1 120				–250 –316	–250 –355	–250 –415		
1 120	1 250				–260 –326	–260 –365	–260 –425		
1 250	1 400				–300 –378	–300 –425	–300 –495		
1 400	1 600				–330 –408	–330 –455	–330 –525		
1 600	1 800				–370 –462	–370 –520	–370 –600		
1 800	2 000				–400 –492	–400 –550	–400 –630		
2 000	2 240				–440 –550	–440 –615	–440 –720		
2 240	2 500				–460 –570	–460 –635	–460 –740		
2 500	2 800				–550 –685	–550 –760	–550 –880		
2 800	3 150				–580 –715	–580 –790	–580 –910		

**Table 12 — Limit deviations for holes (fundamental deviation S)**Upper limit deviation =  $ES$ Lower limit deviation =  $EI$ 

Deviations in micrometres

Nominal size mm		S							
Above	Up to and including	3	4	5	6	7	8	9	10
—	3	-14 -16	-14 -17	-14 -18	-14 -20	-14 -24	-14 -28	-14 -39	-14 -54
3	6	-18 -20,5	-17,5 -21,5	-18 -23	-16 -24	-15 -27	-19 -37	-19 -49	-19 -67
6	10	-22 -24,5	-21,5 -25,5	-21 -27	-20 -29	-17 -32	-23 -45	-23 -59	-23 -81
10	18	-27 -30	-26 -31	-25 -33	-25 -36	-21 -39	-28 -55	-28 -71	-28 -96
18	30	-33,5 -37,5	-33 -39	-32 -41	-31 -44	-27 -48	-35 -68	-35 -87	-35 -119
30	50	-41,5 -45,5	-40 -47	-39 -50	-38 -54	-34 -59	-43 -82	-43 -105	-43 -143
50	65			-48 -61	-47 -66	-42 -72	-53 -99	-53 -127	
65	80			-54 -67	-53 -72	-48 -78	-59 -105	-59 -133	
80	100			-66 -81	-64 -86	-58 -93	-71 -125	-71 -158	
100	120			-74 -89	-72 -94	-66 -101	-79 -133	-79 -165	
120	140			-86 -104	-85 -110	-77 -117	-92 -155	-92 -192	
140	160			-94 -112	-93 -118	-85 -125	-100 -163	-100 -200	
160	180			-102 -120	-101 -126	-93 -133	-108 -171	-108 -208	
180	200			-116 -136	-113 -142	-105 -151	-122 -194	-122 -237	
200	225			-124 -144	-121 -150	-113 -159	-130 -202	-130 -245	
225	250			-134 -154	-131 -160	-123 -169	-140 -212	-140 -255	
250	280			-151 -174	-149 -181	-138 -190	-158 -239	-158 -288	
280	315			-163 -186	-161 -193	-150 -202	-170 -251	-170 -300	
315	355			-183 -208	-179 -215	-169 -226	-190 -279	-190 -330	
355	400			-201 -226	-197 -233	-187 -244	-208 -297	-208 -348	
400	450			-225 -252	-219 -259	-209 -272	-232 -329	-232 -387	
450	500			-245 -272	-239 -279	-229 -292	-252 -349	-252 -387	

Table 12 (continued)

Deviations in micrometres

Nominal size mm		S							
Above	Up to and including	3	4	5	6	7	8	9	10
500	560				-280 -324	-280 -350	-280 -390		
560	630				-310 -354	-310 -380	-310 -420		
630	710				-340 -390	-340 -420	-340 -465		
710	800				-380 -430	-380 -460	-380 -505		
800	900				-430 -486	-430 -520	-430 -570		
900	1 000				-470 -526	-470 -560	-470 -610		
1 000	1 120				-520 -586	-520 -625	-520 -685		
1 120	1 250				-580 -646	-580 -685	-580 -745		
1 250	1 400				-640 -718	-640 -765	-640 -835		
1 400	1 600				-720 -798	-720 -845	-720 -915		
1 600	1 800				-820 -912	-820 -970	-820 -1 050		
1 800	2 000				-920 -1 012	-920 -1 070	-920 -1 150		
2 000	2 240				-1 000 -1 110	-1 000 -1 175	-1 000 -1 280		
2 240	2 500				-1 100 -1 210	-1 100 -1 275	-1 100 -1 380		
2 500	2 800				-1 250 -1 385	-1 250 -1 460	-1 250 -1 580		
2 800	3 150				-1 400 -1 535	-1 400 -1 610	-1 400 -1 730		



**Table 13 — Limit deviations for holes (fundamental deviations T and U)**Upper limit deviation = *ES*Lower limit deviation = *EI*

Deviations in micrometres

Nominal size mm		T <sup>a</sup>				U					
Above	Up to and including	5	6	7	8	5	6	7	8	9	10
—	3					-18 -22	-18 -24	-18 -28	-18 -32	-18 -43	-18 -58
3	6					-22 -27	-20 -28	-19 -31	-23 -41	-23 -53	-23 -71
6	10					-26 -32	-25 -34	-22 -37	-28 -50	-28 -64	-28 -86
10	18					-30 -38	-30 -41	-26 -44	-33 -60	-33 -76	-33 -103
18	24					-38 -47	-37 -50	-33 -54	-41 -74	-41 -93	-41 -125
24	30	-38 -47	-37 -50	-33 -54	-41 -74	-45 -54	-44 -57	-40 -61	-48 -81	-48 -100	-48 -132
30	40	-44 -55	-43 -59	-39 -64	-48 -87	-56 -67	-55 -71	-51 -76	-60 -99	-60 -122	-60 -160
40	50	-50 -61	-49 -65	-45 -70	-54 -93	-66 -77	-65 -81	-61 -86	-70 -109	-70 -132	-70 -170
50	65		-60 -79	-55 -85	-66 -112		-81 -100	-76 -106	-87 -133	-87 -161	-87 -207
65	80		-69 -88	-64 -94	-75 -121		-96 -115	-91 -121	-102 -148	-102 -176	-102 -222
80	100		-84 -106	-78 -113	-91 -145		-117 -139	-111 -146	-124 -178	-124 -211	-124 -264
100	120		-97 -119	-91 -126	-104 -158		-137 -159	-131 -166	-144 -198	-144 -231	-144 -284
120	140		-115 -140	-107 -147	-122 -185		-163 -188	-155 -195	-170 -233	-170 -270	-170 -330
140	160		-127 -152	-119 -159	-134 -197		-183 -208	-175 -215	-190 -253	-190 -290	-190 -350
160	180		-139 -164	-131 -171	-146 -209		-203 -228	-195 -235	-210 -273	-210 -310	-210 -370
180	200		-157 -186	-149 -195	-166 -238		-227 -256	-219 -265	-236 -308	-236 -351	-236 -421
200	225		-171 -200	-163 -209	-180 -252		-249 -278	-241 -287	-258 -330	-258 -373	-258 -443
225	250		-187 -216	-179 -225	-196 -268		-275 -304	-267 -313	-284 -356	-284 -399	-284 -469
250	280		-209 -241	-198 -250	-218 -299		-306 -338	-295 -347	-315 -396	-315 -445	-315 -525
280	315		-231 -263	-220 -272	-240 -321		-341 -373	-330 -382	-350 -431	-350 -480	-350 -560
315	355		-257 -293	-247 -304	-268 -357		-379 -415	-369 -426	-390 -479	-390 -530	-390 -620
355	400		-283 -319	-273 -330	-294 -383		-424 -460	-414 -471	-435 -524	-435 -575	-435 -665
400	450		-317 -357	-307 -370	-330 -427		-477 -517	-467 -530	-490 -587	-490 -645	-490 -740
450	500		-347 -387	-337 -400	-360 -457		-527 -567	-517 -580	-540 -637	-540 -695	-540 -790

Table 13 (continued)

Deviations in micrometres

Nominal size mm		T <sup>a</sup>				U					
Above	Up to and including	5	6	7	8	5	6	7	8	9	10
500	560		-400 -444	-400 -470	-400 -510		-600 -644	-600 -670	-600 -710		
560	630		-450 -494	-450 -520	-450 -560		-660 -704	-660 -730	-660 -770		
630	710		-500 -550	-500 -580	-500 -625		-740 -790	-740 -820	-740 -865		
710	800		-560 -610	-560 -640	-560 -685		-840 -890	-840 -920	-840 -965		
800	900		-620 -676	-620 -710	-620 -760		-940 -996	-940 -1 030	-940 -1 080		
900	1 000		-680 -736	-680 -770	-680 -820		-1 050 -1 106	-1 050 -1 140	-1 050 -1 190		
1 000	1 120		-780 -846	-780 -885	-780 -945		-1 150 -1 216	-1 150 -1 255	-1 150 -1 315		
1 120	1 250		-840 -906	-840 -945	-840 -1 005		-1 300 -1 366	-1 300 -1 405	-1 300 -1 465		
1 250	1 400		-960 -1 038	-960 -1 085	-960 -1 155		-1 450 -1 528	-1 450 -1 575	-1 450 -1 645		
1 400	1 600		-1 050 -1 128	-1 050 -1 175	-1 050 -1 245		-1 600 -1 678	-1 600 -1 725	-1 600 -1 795		
1 600	1 800		-1 200 -1 292	-1 200 -1 350	-1 200 -1 430		-1 850 -1 942	-1 850 -2 000	-1 850 -2 080		
1 800	2 000		-1 350 -1 442	-1 350 -1 500	-1 350 -1 580		-2 000 -2 092	-2 000 -2 150	-2 000 -2 230		
2 000	2 240		-1 500 -1 610	-1 500 -1 675	-1 500 -1 780		-2 300 -2 410	-2 300 -2 475	-2 300 -2 580		
2 240	2 500		-1 650 -1 760	-1 650 -1 825	-1 650 -1 930		-2 500 -2 610	-2 500 -2 675	-2 500 -2 780		
2 500	2 800		-1 900 -2 035	-1 900 -2 110	-1 900 -2 230		-2 900 -3 035	-2 900 -3 110	-2 900 -3 230		
2 800	3 150		-2 100 -2 235	-2 100 -2 310	-2 100 -2 430		-3 200 -3 335	-3 200 -3 410	-3 200 -3 530		
<sup>a</sup> Tolerance classes T5 to T8 (incl.) have not been tabulated for nominal sizes less than or equal to 24 mm. It is recommended that tolerance classes U5 to U8 (incl.) be used instead.											

**Table 14 — Limit deviations for holes (fundamental deviations V, X and Y)<sup>a</sup>**Upper limit deviation = *ES*Lower limit deviation = *EI*

Deviations in micrometres

Nominal size mm		V <sup>b</sup>				X						Y <sup>c</sup>				
Above	Up to and including	5	6	7	8	5	6	7	8	9	10	6	7	8	9	10
—	3					-20 -24	-20 -26	-20 -30	-20 -34	-20 -45	-20 -60					
3	6					-27 -32	-25 -33	-24 -36	-28 -46	-28 -58	-28 -76					
6	10					-32 -38	-31 -40	-28 -43	-34 -56	-34 -70	-34 -92					
10	14					-37 -45	-37 -48	-33 -51	-40 -67	-40 -83	-40 -110					
14	18	-36 -44	-36 -47	-32 -50	-39 -66	-42 -50	-42 -53	-38 -56	-45 -72	-45 -88	-45 -115					
18	24	-44 -53	-43 -56	-39 -60	-47 -80	-51 -60	-50 -63	-46 -67	-54 -87	-54 -106	-54 -138	-59 -72	-55 -76	-63 -96	-63 -115	-63 -147
24	30	-52 -61	-51 -64	-47 -68	-55 -88	-61 -70	-60 -73	-56 -77	-64 -97	-64 -116	-64 -148	-71 -84	-67 -88	-75 -108	-75 -127	-75 -159
30	40	-64 -75	-63 -79	-59 -84	-68 -107	-76 -87	-75 -91	-71 -96	-80 -119	-80 -142	-80 -180	-89 -105	-85 -110	-94 -133	-94 -156	-94 -194
40	50	-77 -88	-76 -92	-72 -97	-81 -120	-93 -104	-92 -108	-88 -113	-97 -136	-97 -159	-97 -197	-109 -125	-105 -130	-114 -153	-114 -176	-114 -214
50	65		-96 -115	-91 -121	-102 -148		-116 -135	-111 -141	-122 -168	-122 -196		-138 -157	-133 -163	-144 -190		
65	80		-114 -133	-109 -139	-120 -166		-140 -159	-135 -165	-146 -192	-146 -220		-168 -187	-163 -193	-174 -220		
80	100		-139 -161	-133 -168	-146 -200		-171 -193	-165 -200	-178 -232	-178 -265		-207 -229	-201 -236	-214 -268		
100	120		-165 -187	-159 -194	-172 -226		-203 -225	-197 -232	-210 -264	-210 -297		-247 -269	-241 -276	-254 -308		
120	140		-195 -220	-187 -227	-202 -265		-241 -266	-233 -273	-248 -311	-248 -348		-293 -318	-285 -325	-300 -363		
140	160		-221 -246	-213 -253	-228 -291		-273 -298	-265 -305	-280 -343	-280 -380		-333 -358	-325 -365	-340 -403		
160	180		-245 -270	-237 -277	-252 -315		-303 -328	-295 -335	-310 -373	-310 -410		-373 -398	-365 -405	-380 -443		
180	200		-275 -304	-267 -313	-284 -356		-341 -370	-333 -379	-350 -422	-350 -465		-416 -445	-408 -454	-425 -497		
200	225		-301 -330	-293 -339	-310 -382		-376 -405	-368 -414	-385 -457	-385 -500		-461 -490	-453 -499	-470 -542		
225	250		-331 -360	-323 -369	-340 -412		-416 -445	-408 -454	-425 -497	-425 -540		-511 -540	-503 -549	-520 -592		
250	280		-376 -408	-365 -417	-385 -466		-466 -498	-455 -507	-475 -556	-475 -605		-571 -603	-560 -612	-580 -661		
280	315		-416 -448	-405 -457	-425 -506		-516 -548	-505 -557	-525 -606	-525 -655		-641 -673	-630 -682	-650 -731		
315	355		-464 -500	-454 -511	-475 -564		-579 -615	-569 -626	-590 -679	-590 -730		-719 -755	-709 -766	-730 -819		
355	400		-519 -555	-509 -566	-530 -619		-649 -685	-639 -696	-660 -749	-660 -800		-809 -845	-799 -856	-820 -909		
400	450		-582 -622	-572 -635	-595 -692		-727 -767	-717 -780	-740 -837	-740 -895		-907 -947	-897 -960	-920 -1 017		
450	500		-647 -687	-637 -700	-660 -757		-807 -847	-797 -860	-820 -917	-820 -975		-987 -1 027	-977 -1 040	-1 000 -1 097		

<sup>a</sup> Fundamental deviations V, X and Y are not provided for nominal sizes greater than 500 mm.<sup>b</sup> Tolerance classes V5 to V8 (incl.) have not been tabulated for nominal sizes less than or equal to 14 mm. It is recommended that tolerance classes X5 to X8 (incl.) be used instead.<sup>c</sup> Tolerance classes Y6 to Y10 (incl.) have not been tabulated for nominal sizes less than or equal to 18 mm. It is recommended that tolerance classes Z6 to Z10 (incl.) be used instead.

Table 15 — Limit deviations for holes (fundamental deviations Z and ZA)<sup>a</sup>Upper limit deviation = *ES*Lower limit deviation = *EI*

Deviations in micrometres

Nominal size mm		Z						ZA					
Above	Up to and including	6	7	8	9	10	11	6	7	8	9	10	11
—	3	−26 −32	−26 −36	−26 −40	−26 −51	−26 −66	−26 −86	−32 −38	−32 −42	−32 −46	−32 −57	−32 −72	−32 −92
3	6	−32 −40	−31 −43	−35 −53	−35 −65	−35 −83	−35 −110	−39 −47	−38 −50	−42 −60	−42 −72	−42 −90	−42 −117
6	10	−39 −48	−36 −51	−42 −64	−42 −78	−42 −100	−42 −132	−49 −58	−46 −61	−52 −74	−52 −88	−52 −110	−52 −142
10	14	−47 −58	−43 −61	−50 −77	−50 −93	−50 −120	−50 −160	−61 −72	−57 −75	−64 −91	−64 −107	−64 −134	−64 −174
14	18	−57 −68	−53 −71	−60 −87	−60 −103	−60 −130	−60 −170	−74 −85	−70 −88	−77 −104	−77 −120	−77 −147	−77 −187
18	24	−69 −82	−65 −86	−73 −106	−73 −125	−73 −157	−73 −203	−94 −107	−90 −111	−98 −131	−98 −150	−98 −182	−98 −228
24	30	−84 −97	−80 −101	−88 −121	−88 −140	−88 −172	−88 −218	−114 −127	−110 −131	−118 −151	−118 −170	−118 −202	−118 −248
30	40	−107 −123	−103 −128	−112 −151	−112 −174	−112 −212	−112 −272	−143 −159	−139 −164	−148 −187	−148 −210	−148 −248	−148 −308
40	50	−131 −147	−127 −152	−136 −175	−136 −198	−136 −236	−136 −296	−175 −191	−171 −196	−180 −219	−180 −242	−180 −280	−180 −340
50	65		−161 −191	−172 −218	−172 −246	−172 −292	−172 −362		−215 −245	−226 −272	−226 −300	−226 −346	−226 −416
65	80		−199 −229	−210 −256	−210 −284	−210 −330	−210 −400		−263 −293	−274 −320	−274 −348	−274 −394	−274 −464
80	100		−245 −280	−258 −312	−258 −345	−258 −398	−258 −478		−322 −357	−335 −389	−335 −422	−335 −475	−335 −555
100	120		−297 −332	−310 −364	−310 −397	−310 −450	−310 −530		−387 −422	−400 −454	−400 −487	−400 −540	−400 −620
120	140		−350 −390	−365 −428	−365 −465	−365 −525	−365 −615		−455 −495	−470 −533	−470 −570	−470 −630	−470 −720
140	160		−400 −440	−415 −478	−415 −515	−415 −575	−415 −665		−520 −560	−535 −598	−535 −635	−535 −695	−535 −785
160	180		−450 −490	−465 −528	−465 −565	−465 −625	−465 −715		−585 −625	−600 −663	−600 −700	−600 −760	−600 −850
180	200		−503 −549	−520 −592	−520 −635	−520 −705	−520 −810		−653 −699	−670 −742	−670 −785	−670 −855	−670 −960
200	225		−558 −604	−575 −647	−575 −690	−575 −760	−575 −865		−723 −769	−740 −812	−740 −855	−740 −925	−740 −1 030
225	250		−623 −669	−640 −712	−640 −755	−640 −825	−640 −930		−803 −849	−820 −892	−820 −935	−820 −1 005	−820 −1 110
250	280		−690 −742	−710 −791	−710 −840	−710 −920	−710 −1 030		−900 −952	−920 −1 001	−920 −1 050	−920 −1 130	−920 −1 240
280	315		−770 −822	−790 −871	−790 −920	−790 −1 000	−790 −1 110		−980 −1 032	−1 000 −1 081	−1 000 −1 130	−1 000 −1 210	−1 000 −1 320
315	355		−879 −936	−900 −989	−900 −1 040	−900 −1 130	−900 −1 260		−1 129 −1 186	−1 150 −1 239	−1 150 −1 290	−1 150 −1 380	−1 150 −1 510
355	400		−979 −1 036	−1 000 −1 089	−1 000 −1 140	−1 000 −1 230	−1 000 −1 360		−1 279 −1 336	−1 300 −1 389	−1 300 −1 440	−1 300 −1 530	−1 300 −1 660
400	450		−1 077 −1 140	−1 100 −1 197	−1 100 −1 255	−1 100 −1 350	−1 100 −1 500		−1 427 −1 490	−1 450 −1 547	−1 450 −1 605	−1 450 −1 700	−1 450 −1 850
450	500		−1 227 −1 290	−1 250 −1 347	−1 250 −1 405	−1 250 −1 500	−1 250 −1 650		−1 577 −1 640	−1 600 −1 697	−1 600 −1 755	−1 600 −1 850	−1 600 −2 000

<sup>a</sup> Fundamental deviations Z and ZA are not provided for nominal sizes greater than 500 mm.

**Table 16 — Limit deviations for holes (fundamental deviations ZB and ZC)<sup>a</sup>**Upper limit deviation = *ES*Lower limit deviation = *EI*

Deviations in micrometres

Nominal size mm		ZB					ZC				
Above	Up to and including	7	8	9	10	11	7	8	9	10	11
—	3	-40 -50	-40 -54	-40 -65	-40 -80	-40 -100	-60 -70	-60 -74	-60 -85	-60 -100	-60 -120
3	6	-46 -58	-50 -68	-50 -80	-50 -98	-50 -125	-76 -88	-80 -98	-80 -110	-80 -128	-80 -155
6	10	-61 -76	-67 -89	-67 -103	-67 -125	-67 -157	-91 -106	-97 -119	-97 -133	-97 -155	-97 -187
10	14	-83 -101	-90 -117	-90 -133	-90 -160	-90 -200	-123 -141	-130 -157	-130 -173	-130 -200	-130 -240
14	18	-101 -119	-108 -135	-108 -151	-108 -178	-108 -218	-143 -161	-150 -177	-150 -193	-150 -220	-150 -260
18	24	-128 -149	-136 -169	-136 -188	-136 -220	-136 -266	-180 -201	-188 -221	-188 -240	-188 -272	-188 -318
24	30	-152 -173	-160 -193	-160 -212	-160 -244	-160 -290	-210 -231	-218 -251	-218 -270	-218 -302	-218 -348
30	40	-191 -216	-200 -239	-200 -262	-200 -300	-200 -360	-265 -290	-274 -313	-274 -336	-274 -374	-274 -434
40	50	-233 -258	-242 -281	-242 -304	-242 -342	-242 -402	-316 -341	-325 -364	-325 -387	-325 -425	-325 -485
50	65	-289 -319	-300 -346	-300 -374	-300 -420	-300 -490	-394 -424	-405 -451	-405 -479	-405 -525	-405 -595
65	80	-349 -379	-360 -406	-360 -434	-360 -480	-360 -550	-469 -499	-480 -526	-480 -554	-480 -600	-480 -670
80	100	-432 -467	-445 -499	-445 -532	-445 -585	-445 -665	-572 -607	-585 -639	-585 -672	-585 -725	-585 -805
100	120	-512 -547	-525 -579	-525 -612	-525 -665	-525 -745	-677 -712	-690 -744	-690 -777	-690 -830	-690 -910
120	140	-605 -645	-620 -683	-620 -720	-620 -780	-620 -870	-785 -825	-800 -863	-800 -900	-800 -960	-800 -1 050
140	160	-685 -725	-700 -763	-700 -800	-700 -860	-700 -950	-885 -925	-900 -963	-900 -1 000	-900 -1 060	-900 -1 150
160	180	-765 -805	-780 -843	-780 -880	-780 -940	-780 -1 030	-985 -1 025	-1 000 -1 063	-1 000 -1 100	-1 000 -1 160	-1 000 -1 250
180	200	-863 -909	-880 -952	-880 -995	-880 -1 065	-880 -1 170	-1 133 -1 179	-1 150 -1 222	-1 150 -1 265	-1 150 -1 335	-1 150 -1 440
200	225	-943 -989	-960 -1 032	-960 -1 075	-960 -1 145	-960 -1 250	-1 233 -1 279	-1 250 -1 322	-1 250 -1 365	-1 250 -1 435	-1 250 -1 540
225	250	-1 033 -1 079	-1 050 -1 122	-1 050 -1 165	-1 050 -1 235	-1 050 -1 340	-1 333 -1 379	-1 350 -1 422	-1 350 -1 465	-1 350 -1 535	-1 350 -1 640
250	280	-1 180 -1 232	-1 200 -1 281	-1 200 -1 330	-1 200 -1 410	-1 200 -1 520	-1 530 -1 582	-1 550 -1 631	-1 550 -1 680	-1 550 -1 760	-1 550 -1 870
280	315	-1 280 -1 332	-1 300 -1 381	-1 300 -1 430	-1 300 -1 510	-1 300 -1 620	-1 680 -1 732	-1 700 -1 781	-1 700 -1 830	-1 700 -1 910	-1 700 -2 020
315	355	-1 479 -1 536	-1 500 -1 589	-1 500 -1 640	-1 500 -1 730	-1 500 -1 860	-1 879 -1 936	-1 900 -1 989	-1 900 -2 040	-1 900 -2 130	-1 900 -2 260
355	400	-1 629 -1 686	-1 650 -1 739	-1 650 -1 790	-1 650 -1 880	-1 650 -2 010	-2 079 -2 136	-2 100 -2 189	-2 100 -2 240	-2 100 -2 330	-2 100 -2 460
400	450	-1 827 -1 890	-1 850 -1 947	-1 850 -2 005	-1 850 -2 100	-1 850 -2 250	-2 377 -2 440	-2 400 -2 497	-2 400 -2 555	-2 400 -2 650	-2 400 -2 800
450	500	-2 077 -2 140	-2 100 -2 197	-2 100 -2 255	-2 100 -2 350	-2 100 -2 500	-2 577 -2 640	-2 600 -2 697	-2 600 -2 755	-2 600 -2 850	-2 600 -3 000

<sup>a</sup> Fundamental deviations ZB and ZC are not provided for nominal sizes greater than 500 mm.

Table 17 — Limit deviations for shafts (fundamental deviations a, b and c)<sup>a</sup>Upper limit deviation =  $es$ Lower limit deviation =  $ei$ 

Deviations in micrometres

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

<sup>a</sup> Fundamental deviations a, b and c are not provided for nominal sizes greater than 500 mm.<sup>b</sup> Fundamental deviations a and b shall not be used for any standard tolerance grades in nominal sizes less than or equal to 1 mm.

**Table 18 — Limit deviations for shafts (fundamental deviations cd and d)**Upper limit deviation =  $es$ Lower limit deviation =  $ei$ 

Deviations in micrometres

Nominal size mm		$cd^a$						$d$								
Above	Up to and including	5	6	7	8	9	10	5	6	7	8	9	10	11	12	13
—	3	−34 −38	−34 −40	−34 −44	−34 −48	−34 −59	−34 −74	−20 −24	−20 −26	−20 −30	−20 −34	−20 −45	−20 −60	−20 −80	−20 −120	−20 −160
3	6	−46 −51	−46 −54	−46 −58	−46 −64	−46 −76	−46 −94	−30 −35	−30 −38	−30 −42	−30 −48	−30 −60	−30 −78	−30 −105	−30 −150	−30 −210
6	10	−56 −62	−56 −65	−56 −71	−56 −78	−56 −92	−56 −114	−40 −46	−40 −49	−40 −55	−40 −62	−40 −76	−40 −98	−40 −130	−40 −190	−40 −260
10	18							−50 −58	−50 −61	−50 −68	−50 −77	−50 −93	−50 −120	−50 −160	−50 −230	−50 −320
18	30							−65 −74	−65 −78	−65 −86	−65 −98	−65 −117	−65 −149	−65 −195	−65 −275	−65 −395
30	50							−80 −91	−80 −96	−80 −105	−80 −119	−80 −142	−80 −180	−80 −240	−80 −330	−80 −470
50	80							−100 −113	−100 −119	−100 −130	−100 −146	−100 −174	−100 −220	−100 −290	−100 −400	−100 −560
80	120							−120 −135	−120 −142	−120 −155	−120 −174	−120 −207	−120 −260	−120 −340	−120 −470	−120 −660
120	180							−145 −163	−145 −170	−145 −185	−145 −208	−145 −245	−145 −305	−145 −395	−145 −545	−145 −775
180	250							−170 −190	−170 −199	−170 −216	−170 −242	−170 −285	−170 −355	−170 −460	−170 −630	−170 −890
250	315							−190 −213	−190 −222	−190 −242	−190 −271	−190 −320	−190 −400	−190 −510	−190 −710	−190 −1 000
315	400							−210 −235	−210 −246	−210 −267	−210 −299	−210 −350	−210 −440	−210 −570	−210 −780	−210 −1 100
400	500							−230 −257	−230 −270	−230 −293	−230 −327	−230 −385	−230 −480	−230 −630	−230 −860	−230 −1 200
500	630									−260 −330	−260 −370	−260 −435	−260 −540	−260 −700		
630	800									−290 −370	−290 −415	−290 −490	−290 −610	−290 −790		
800	1 000									−320 −410	−320 −460	−320 −550	−320 −680	−320 −880		
1 000	1 250									−350 −455	−350 −515	−350 −610	−350 −770	−350 −1 010		
1 250	1 600									−390 −515	−390 −585	−390 −700	−390 −890	−390 −1 170		
1 600	2 000									−430 −580	−430 −660	−430 −800	−430 −1 030	−430 −1 350		
2 000	2 500									−480 −655	−480 −760	−480 −920	−480 −1 180	−480 −1 580		
2 500	3 150									−520 −730	−520 −850	−520 −1 060	−520 −1 380	−520 −1 870		

<sup>a</sup> The intermediate fundamental deviation  $cd$  is provided primarily for fine mechanisms and horology. If tolerance classes involving this fundamental deviation in other nominal sizes are required, they may be calculated in accordance with ISO 286-1.

Table 19 — Limit deviations for shafts (fundamental deviations e and ef)

Upper limit deviation =  $es$ Lower limit deviation =  $ei$ 

Deviations in micrometres

Nominal size mm		e						ef <sup>a</sup>							
Above	Up to and including	5	6	7	8	9	10	3	4	5	6	7	8	9	10
—	3	−14 −18	−14 −20	−14 −24	−14 −28	−14 −39	−14 −54	−10 −12	−10 −13	−10 −14	−10 −16	−10 −20	−10 −24	−10 −35	−10 −50
3	6	−20 −25	−20 −28	−20 −32	−20 −38	−20 −50	−20 −68	−14 −16,5	−14 −18	−14 −19	−14 −22	−14 −26	−14 −32	−14 −44	−14 −62
6	10	−25 −31	−25 −34	−25 −40	−25 −47	−25 −61	−25 −83	−18 −20,5	−18 −22	−18 −24	−18 −27	−18 −33	−18 −40	−18 −54	−18 −76
10	18	−32 −40	−32 −43	−32 −50	−32 −59	−32 −75	−32 −102								
18	30	−40 −49	−40 −53	−40 −61	−40 −73	−40 −92	−40 −124								
30	50	−50 −61	−50 −66	−50 −75	−50 −89	−50 −112	−50 −150								
50	80	−60 −73	−60 −79	−60 −90	−60 −106	−60 −134	−60 −180								
80	120	−72 −87	−72 −94	−72 −107	−72 −126	−72 −159	−72 −212								
120	180	−85 −103	−85 −110	−85 −125	−85 −148	−85 −185	−85 −245								
180	250	−100 −120	−100 −129	−100 −146	−100 −172	−100 −215	−100 −285								
250	315	−110 −133	−110 −142	−110 −162	−110 −191	−110 −240	−110 −320								
315	400	−125 −150	−125 −161	−125 −182	−125 −214	−125 −265	−125 −355								
400	500	−135 −162	−135 −175	−135 −198	−135 −232	−135 −290	−135 −385								
500	630		−145 −189	−145 −215	−145 −255	−145 −320	−145 −425								
630	800		−160 −210	−160 −240	−160 −285	−160 −360	−160 −480								
800	1 000		−170 −226	−170 −260	−170 −310	−170 −400	−170 −530								
1 000	1 250		−195 −261	−195 −300	−195 −360	−195 −455	−195 −615								
1 250	1 600		−220 −298	−220 −345	−220 −415	−220 −530	−220 −720								
1 600	2 000		−240 −332	−240 −390	−240 −470	−240 −610	−240 −840								
2 000	2 500		−260 −370	−260 −435	−260 −540	−260 −700	−260 −960								
2 500	3 150		−290 −425	−290 −500	−290 −620	−290 −830	−290 −1 150								

<sup>a</sup> The intermediate fundamental deviation ef is provided primarily for fine mechanisms and horology. If tolerance classes involving this fundamental deviation in other nominal sizes are required, they may be calculated in accordance with ISO 286-1.



**Table 20 — Limit deviations for shafts (fundamental deviations f and fg)**Upper limit deviation =  $es$ Lower limit deviation =  $ei$ 

Deviations in micrometres

Nominal size mm		f								fg <sup>a</sup>							
Above	Up to and including	3	4	5	6	7	8	9	10	3	4	5	6	7	8	9	10
—	3	-6 -8	-6 -9	-6 -10	-6 -12	-6 -16	-6 -20	-6 -31	-6 -46	-4 -6	-4 -7	-4 -8	-4 -10	-4 -14	-4 -18	-4 -29	-4 -44
3	6	-10 -12,5	-10 -14	-10 -15	-10 -18	-10 -22	-10 -28	-10 -40	-10 -58	-6 -8,5	-6 -10	-6 -11	-6 -14	-6 -18	-6 -24	-6 -36	-6 -54
6	10	-13 -15,5	-13 -17	-13 -19	-13 -22	-13 -28	-13 -35	-13 -49	-13 -71	-8 -10,5	-8 -12	-8 -14	-8 -17	-8 -23	-8 -30	-8 -44	-8 -66
10	18	-16 -19	-16 -21	-16 -24	-16 -27	-16 -34	-16 -43	-16 -59	-16 -86								
18	30	-20 -24	-20 -26	-20 -29	-20 -33	-20 -41	-20 -53	-20 -72	-20 -104								
30	50	-25 -29	-25 -32	-25 -36	-25 -41	-25 -50	-25 -64	-25 -87	-25 -125								
50	80		-30 -38	-30 -43	-30 -49	-30 -60	-30 -76	-30 -104									
80	120		-36 -46	-36 -51	-36 -58	-36 -71	-36 -90	-36 -123									
120	180		-43 -55	-43 -61	-43 -68	-43 -83	-43 -106	-43 -143									
180	250		-50 -64	-50 -70	-50 -79	-50 -96	-50 -122	-50 -165									
250	315		-56 -72	-56 -79	-56 -88	-56 -108	-56 -137	-56 -186									
315	400		-62 -80	-62 -87	-62 -98	-62 -119	-62 -151	-62 -202									
400	500		-68 -88	-68 -95	-68 -108	-68 -131	-68 -165	-68 -223									
500	630				-76 -120	-76 -146	-76 -186	-76 -251									
630	800				-80 -130	-80 -160	-80 -205	-80 -280									
800	1 000				-86 -142	-86 -176	-86 -226	-86 -316									
1 000	1 250				-98 -164	-98 -203	-98 -263	-98 -358									
1 250	1 600				-110 -188	-110 -235	-110 -305	-110 -420									
1 600	2 000				-120 -212	-120 -270	-120 -350	-120 -490									
2 000	2 500				-130 -240	-130 -305	-130 -410	-130 -570									
2 500	3 150				-145 -280	-145 -355	-145 -475	-145 -685									

<sup>a</sup> The intermediate fundamental deviation fg is provided primarily for fine mechanisms and horology. If tolerance classes involving this fundamental deviation in other nominal sizes are required, they may be calculated in accordance with ISO 286-1.

**Table 21 — Limit deviations for shafts (fundamental deviation g)**Upper limit deviation =  $es$ Lower limit deviation =  $ei$ 

Deviations in micrometres

Nominal size mm		g							
Above	Up to and including	3	4	5	6	7	8	9	10
—	3	-2 -4	-2 -5	-2 -6	-2 -8	-2 -12	-2 -16	-2 -27	-2 -42
3	6	-4 -6,5	-4 -8	-4 -9	-4 -12	-4 -16	-4 -22	-4 -34	-4 -52
6	10	-5 -7,5	-5 -9	-5 -11	-5 -14	-5 -20	-5 -27	-5 -41	-5 -63
10	18	-6 -9	-6 -11	-6 -14	-6 -17	-6 -24	-6 -33	-6 -49	-6 -76
18	30	-7 -11	-7 -13	-7 -16	-7 -20	-7 -28	-7 -40	-7 -59	-7 -91
30	50	-9 -13	-9 -16	-9 -20	-9 -25	-9 -34	-9 -48	-9 -71	-9 -109
50	80		-10 -18	-10 -23	-10 -29	-10 -40	-10 -56		
80	120		-12 -22	-12 -27	-12 -34	-12 -47	-12 -66		
120	180		-14 -26	-14 -32	-14 -39	-14 -54	-14 -77		
180	250		-15 -29	-15 -35	-15 -44	-15 -61	-15 -87		
250	315		-17 -33	-17 -40	-17 -49	-17 -69	-17 -98		
315	400		-18 -36	-18 -43	-18 -54	-18 -75	-18 -107		
400	500		-20 -40	-20 -47	-20 -60	-20 -83	-20 -117		
500	630				-22 -66	-22 -92	-22 -132		
630	800				-24 -74	-24 -104	-24 -149		
800	1 000				-26 -82	-26 -116	-26 -166		
1 000	1 250				-28 -94	-28 -133	-28 -193		
1 250	1 600				-30 -108	-30 -155	-30 -225		
1 600	2 000				-32 -124	-32 -182	-32 -262		
2 000	2 500				-34 -144	-34 -209	-34 -314		
2 500	3 150				-38 -173	-38 -248	-38 -368		

Table 22 — Limit deviations for shafts (fundamental deviation h)

Upper limit deviation =  $es$ Lower limit deviation =  $ei$ 

Nominal size		h																	
mm		1	2	3	4	5	6	7	8	9	10	11	12	13	14 <sup>a</sup>	15 <sup>a</sup>	16 <sup>a</sup>	17	18
Above	Up to and including	Deviations																	
		$\mu\text{m}$											mm						
—	3 <sup>a</sup>	0 -0,8	0 -1,2	0 -2	0 -3	0 -4	0 -6	0 -10	0 -14	0 -25	0 -40	0 -60	0 -0,1	0 -0,14	0 -0,25	0 -0,4	0 -0,6		
3	6	0 -1	0 -1,5	0 -2,5	0 -4	0 -5	0 -8	0 -12	0 -18	0 -30	0 -48	0 -75	0 -0,12	0 -0,18	0 -0,3	0 -0,48	0 -0,75	0 -1,2	0 -1,8
6	10	0 -1	0 -1,5	0 -2,5	0 -4	0 -6	0 -9	0 -15	0 -22	0 -36	0 -58	0 -90	0 -0,15	0 -0,22	0 -0,36	0 -0,58	0 -0,9	0 -1,5	0 -2,2
10	18	0 -1,2	0 -2	0 -3	0 -5	0 -8	0 -11	0 -18	0 -27	0 -43	0 -70	0 -110	0 -0,18	0 -0,27	0 -0,43	0 -0,7	0 -1,1	0 -1,8	0 -2,7
18	30	0 -1,5	0 -2,5	0 -4	0 -6	0 -9	0 -13	0 -21	0 -33	0 -52	0 -84	0 -130	0 -0,21	0 -0,33	0 -0,52	0 -0,84	0 -1,3	0 -2,1	0 -3,3
30	50	0 -1,5	0 -2,5	0 -4	0 -7	0 -11	0 -16	0 -25	0 -39	0 -62	0 -100	0 -160	0 -0,25	0 -0,39	0 -0,62	0 -1	0 -1,6	0 -2,5	0 -3,9
50	80	0 -2	0 -3	0 -5	0 -8	0 -13	0 -19	0 -30	0 -46	0 -74	0 -120	0 -190	0 -0,3	0 -0,46	0 -0,74	0 -1,2	0 -1,9	0 -3	0 -4,6
80	120	0 -2,5	0 -4	0 -6	0 -10	0 -15	0 -22	0 -35	0 -54	0 -87	0 -140	0 -220	0 -0,35	0 -0,54	0 -0,87	0 -1,4	0 -2,2	0 -3,5	0 -5,4
120	180	0 -3,5	0 -5	0 -8	0 -12	0 -18	0 -25	0 -40	0 -63	0 -100	0 -160	0 -250	0 -0,4	0 -0,63	0 -1	0 -1,6	0 -2,5	0 -4	0 -6,3
180	250	0 -4,5	0 -7	0 -10	0 -14	0 -20	0 -29	0 -46	0 -72	0 -115	0 -185	0 -290	0 -0,46	0 -0,72	0 -1,15	0 -1,85	0 -2,9	0 -4,6	0 -7,2
250	315	0 -6	0 -8	0 -12	0 -16	0 -23	0 -32	0 -52	0 -81	0 -130	0 -210	0 -320	0 -0,52	0 -0,81	0 -1,3	0 -2,1	0 -3,2	0 -5,2	0 -8,1
315	400	0 -7	0 -9	0 -13	0 -18	0 -25	0 -36	0 -57	0 -89	0 -140	0 -230	0 -360	0 -0,57	0 -0,89	0 -1,4	0 -2,3	0 -3,6	0 -5,7	0 -8,9
400	500	0 -8	0 -10	0 -15	0 -20	0 -27	0 -40	0 -63	0 -97	0 -155	0 -250	0 -400	0 -0,63	0 -0,97	0 -1,55	0 -2,5	0 -4	0 -6,3	0 -9,7
500	630	0 -9	0 -11	0 -16	0 -22	0 -32	0 -44	0 -70	0 -110	0 -175	0 -280	0 -440	0 -0,7	0 -1,1	0 -1,75	0 -2,8	0 -4,4	0 -7	0 -11
630	800	0 -10	0 -13	0 -18	0 -25	0 -36	0 -50	0 -80	0 -125	0 -200	0 -320	0 -500	0 -0,8	0 -1,25	0 -2	0 -3,2	0 -5	0 -8	0 -12,5
800	1 000	0 -11	0 -15	0 -21	0 -28	0 -40	0 -56	0 -90	0 -140	0 -230	0 -360	0 -560	0 -0,9	0 -1,4	0 -2,3	0 -3,6	0 -5,6	0 -9	0 -14
1 000	1 250	0 -13	0 -18	0 -24	0 -33	0 -47	0 -66	0 -105	0 -165	0 -260	0 -420	0 -660	0 -1,05	0 -1,65	0 -2,6	0 -4,2	0 -6,6	0 -10,5	0 -16,5
1 250	1 600	0 -15	0 -21	0 -29	0 -39	0 -55	0 -78	0 -125	0 -195	0 -310	0 -500	0 -780	0 -1,25	0 -1,95	0 -3,1	0 -5	0 -7,8	0 -12,5	0 -19,5
1 600	2 000	0 -18	0 -25	0 -35	0 -46	0 -65	0 -92	0 -150	0 -230	0 -370	0 -600	0 -920	0 -1,5	0 -2,3	0 -3,7	0 -6	0 -9,2	0 -15	0 -23
2 000	2 500	0 -22	0 -30	0 -41	0 -55	0 -78	0 -110	0 -175	0 -280	0 -440	0 -700	0 -1 100	0 -1,75	0 -2,8	0 -4,4	0 -7	0 -11	0 -17,5	0 -28
2 500	3 150	0 -26	0 -36	0 -50	0 -68	0 -96	0 -135	0 -210	0 -330	0 -540	0 -860	0 -1 350	0 -2,1	0 -3,3	0 -5,4	0 -8,6	0 -13,5	0 -21	0 -33

<sup>a</sup> Tolerance grades IT14 to IT16 (incl.) shall not be used for nominal sizes less than or equal to 1 mm.

Table 23 — Limit deviations for shafts (fundamental deviation js)<sup>a</sup>Upper limit deviation =  $es$ Lower limit deviation =  $ei$ 

Nominal size		js																	
mm		1	2	3	4	5	6	7	8	9	10	11	12	13	14 <sup>b</sup>	15 <sup>b</sup>	16 <sup>b</sup>	17	18
Above	Up to and including	Deviations																	
		$\mu\text{m}$										mm							
—	3 <sup>b</sup>	$\pm 0,4$	$\pm 0,6$	$\pm 1$	$\pm 1,5$	$\pm 2$	$\pm 3$	$\pm 5$	$\pm 7$	$\pm 12,5$	$\pm 20$	$\pm 30$	$\pm 0,05$	$\pm 0,07$	$\pm 0,125$	$\pm 0,2$	$\pm 0,3$		
3	6	$\pm 0,5$	$\pm 0,75$	$\pm 1,25$	$\pm 2$	$\pm 2,5$	$\pm 4$	$\pm 6$	$\pm 9$	$\pm 15$	$\pm 24$	$\pm 37,5$	$\pm 0,06$	$\pm 0,09$	$\pm 0,15$	$\pm 0,24$	$\pm 0,375$	$\pm 0,6$	$\pm 0,9$
6	10	$\pm 0,5$	$\pm 0,75$	$\pm 1,25$	$\pm 2$	$\pm 3$	$\pm 4,5$	$\pm 7,5$	$\pm 11$	$\pm 18$	$\pm 29$	$\pm 45$	$\pm 0,075$	$\pm 0,11$	$\pm 0,18$	$\pm 0,29$	$\pm 0,45$	$\pm 0,75$	$\pm 1,1$
10	18	$\pm 0,6$	$\pm 1$	$\pm 1,5$	$\pm 2,5$	$\pm 4$	$\pm 5,5$	$\pm 9$	$\pm 13,5$	$\pm 21,5$	$\pm 35$	$\pm 55$	$\pm 0,09$	$\pm 0,135$	$\pm 0,215$	$\pm 0,35$	$\pm 0,55$	$\pm 0,9$	$\pm 1,35$
18	30	$\pm 0,75$	$\pm 1,25$	$\pm 2$	$\pm 3$	$\pm 4,5$	$\pm 6,5$	$\pm 10,5$	$\pm 16,5$	$\pm 26$	$\pm 42$	$\pm 65$	$\pm 0,105$	$\pm 0,165$	$\pm 0,26$	$\pm 0,42$	$\pm 0,65$	$\pm 1,05$	$\pm 1,65$
30	50	$\pm 0,75$	$\pm 1,25$	$\pm 2$	$\pm 3,5$	$\pm 5,5$	$\pm 8$	$\pm 12,5$	$\pm 19,5$	$\pm 31$	$\pm 50$	$\pm 80$	$\pm 0,125$	$\pm 0,195$	$\pm 0,31$	$\pm 0,5$	$\pm 0,8$	$\pm 1,25$	$\pm 1,95$
50	80	$\pm 1$	$\pm 1,5$	$\pm 2,5$	$\pm 4$	$\pm 6,5$	$\pm 9,5$	$\pm 15$	$\pm 23$	$\pm 37$	$\pm 60$	$\pm 95$	$\pm 0,15$	$\pm 0,23$	$\pm 0,37$	$\pm 0,6$	$\pm 0,95$	$\pm 1,5$	$\pm 2,3$
80	120	$\pm 1,25$	$\pm 2$	$\pm 3$	$\pm 5$	$\pm 7,5$	$\pm 11$	$\pm 17,5$	$\pm 27$	$\pm 43,5$	$\pm 70$	$\pm 110$	$\pm 0,175$	$\pm 0,27$	$\pm 0,435$	$\pm 0,7$	$\pm 1,1$	$\pm 1,75$	$\pm 2,7$
120	180	$\pm 1,75$	$\pm 2,5$	$\pm 4$	$\pm 6$	$\pm 9$	$\pm 12,5$	$\pm 20$	$\pm 31,5$	$\pm 50$	$\pm 80$	$\pm 125$	$\pm 0,2$	$\pm 0,315$	$\pm 0,5$	$\pm 0,8$	$\pm 1,25$	$\pm 2$	$\pm 3,15$
180	250	$\pm 2,25$	$\pm 3,5$	$\pm 5$	$\pm 7$	$\pm 10$	$\pm 14,5$	$\pm 23$	$\pm 36$	$\pm 57,5$	$\pm 92,5$	$\pm 145$	$\pm 0,23$	$\pm 0,36$	$\pm 0,575$	$\pm 0,925$	$\pm 1,45$	$\pm 2,3$	$\pm 3,6$
250	315	$\pm 3$	$\pm 4$	$\pm 6$	$\pm 8$	$\pm 11,5$	$\pm 16$	$\pm 26$	$\pm 40,5$	$\pm 65$	$\pm 105$	$\pm 160$	$\pm 0,26$	$\pm 0,405$	$\pm 0,65$	$\pm 1,05$	$\pm 1,6$	$\pm 2,6$	$\pm 4,05$
315	400	$\pm 3,5$	$\pm 4,5$	$\pm 6,5$	$\pm 9$	$\pm 12,5$	$\pm 18$	$\pm 28,5$	$\pm 44,5$	$\pm 70$	$\pm 115$	$\pm 180$	$\pm 0,285$	$\pm 0,445$	$\pm 0,7$	$\pm 1,15$	$\pm 1,8$	$\pm 2,85$	$\pm 4,45$
400	500	$\pm 4$	$\pm 5$	$\pm 7,5$	$\pm 10$	$\pm 13,5$	$\pm 20$	$\pm 31,5$	$\pm 48,5$	$\pm 77,5$	$\pm 125$	$\pm 200$	$\pm 0,315$	$\pm 0,485$	$\pm 0,775$	$\pm 1,25$	$\pm 2$	$\pm 3,15$	$\pm 4,85$
500	630	$\pm 4,5$	$\pm 5,5$	$\pm 8$	$\pm 11$	$\pm 16$	$\pm 22$	$\pm 35$	$\pm 55$	$\pm 87,5$	$\pm 140$	$\pm 220$	$\pm 0,35$	$\pm 0,55$	$\pm 0,875$	$\pm 1,4$	$\pm 2,2$	$\pm 3,5$	$\pm 5,5$
630	800	$\pm 5$	$\pm 6,5$	$\pm 9$	$\pm 12,5$	$\pm 18$	$\pm 25$	$\pm 40$	$\pm 62,5$	$\pm 100$	$\pm 160$	$\pm 250$	$\pm 0,4$	$\pm 0,625$	$\pm 1$	$\pm 1,6$	$\pm 2,5$	$\pm 4$	$\pm 6,25$
800	1 000	$\pm 5,5$	$\pm 7,5$	$\pm 10,5$	$\pm 14$	$\pm 20$	$\pm 28$	$\pm 45$	$\pm 70$	$\pm 115$	$\pm 180$	$\pm 280$	$\pm 0,45$	$\pm 0,7$	$\pm 1,15$	$\pm 1,8$	$\pm 2,8$	$\pm 4,5$	$\pm 7$
1 000	1 250	$\pm 6,5$	$\pm 9$	$\pm 12$	$\pm 16,5$	$\pm 23,5$	$\pm 33$	$\pm 52,5$	$\pm 82,5$	$\pm 130$	$\pm 210$	$\pm 330$	$\pm 0,525$	$\pm 0,825$	$\pm 1,3$	$\pm 2,1$	$\pm 3,3$	$\pm 5,25$	$\pm 8,25$
1 250	1 600	$\pm 7,5$	$\pm 10,5$	$\pm 14,5$	$\pm 19,5$	$\pm 27,5$	$\pm 39$	$\pm 62,5$	$\pm 97,5$	$\pm 155$	$\pm 250$	$\pm 390$	$\pm 0,625$	$\pm 0,975$	$\pm 1,55$	$\pm 2,5$	$\pm 3,9$	$\pm 6,25$	$\pm 9,75$
1 600	2 000	$\pm 9$	$\pm 12,5$	$\pm 17,5$	$\pm 23$	$\pm 32,5$	$\pm 46$	$\pm 75$	$\pm 115$	$\pm 185$	$\pm 300$	$\pm 460$	$\pm 0,75$	$\pm 1,15$	$\pm 1,85$	$\pm 3$	$\pm 4,6$	$\pm 7,5$	$\pm 11,5$
2 000	2 500	$\pm 11$	$\pm 15$	$\pm 20,5$	$\pm 27,5$	$\pm 39$	$\pm 55$	$\pm 87,5$	$\pm 140$	$\pm 220$	$\pm 350$	$\pm 550$	$\pm 0,875$	$\pm 1,4$	$\pm 2,2$	$\pm 3,5$	$\pm 5,5$	$\pm 8,75$	$\pm 14$
2 500	3 150	$\pm 13$	$\pm 18$	$\pm 25$	$\pm 34$	$\pm 48$	$\pm 67,5$	$\pm 105$	$\pm 165$	$\pm 270$	$\pm 430$	$\pm 675$	$\pm 1,05$	$\pm 1,65$	$\pm 2,7$	$\pm 4,3$	$\pm 6,75$	$\pm 10,5$	$\pm 16,5$
<sup>a</sup> In order to avoid repetition of equal values, the table lists the values as " $\pm x$ "; this is to be interpreted as $es = +x$ and $ei = -x$ , e.g. $\begin{smallmatrix} +0,23 \\ -0,23 \end{smallmatrix}$ mm.																			
<sup>b</sup> Tolerance grades IT14 to IT16 (incl.) shall not be used for nominal sizes less than or equal to 1 mm.																			

Lower limit deviation =  $ei$

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Table 25 — Limit deviations for shafts (fundamental deviations m and n)

Upper limit deviation =  $es$ Lower limit deviation =  $ei$ 

Deviations in micrometres

Nominal size mm		m							n						
Above	Up to and including	3	4	5	6	7	8	9	3	4	5	6	7	8	9
—	3	+4 +2	+5 +2	+6 +2	+8 +2	+12 +2	+16 +2	+27 +2	+6 +4	+7 +4	+8 +4	+10 +4	+14 +4	+18 +4	+29 +4
3	6	+6,5 +4	+8 +4	+9 +4	+12 +4	+16 +4	+22 +4	+34 +4	+10,5 +8	+12 +8	+13 +8	+16 +8	+20 +8	+26 +8	+38 +8
6	10	+8,5 +6	+10 +6	+12 +6	+15 +6	+21 +6	+28 +6	+42 +6	+12,5 +10	+14 +10	+16 +10	+19 +10	+25 +10	+32 +10	+46 +10
10	18	+10 +7	+12 +7	+15 +7	+18 +7	+25 +7	+34 +7	+50 +7	+15 +12	+17 +12	+20 +12	+23 +12	+30 +12	+39 +12	+55 +12
18	30	+12 +8	+14 +8	+17 +8	+21 +8	+29 +8	+41 +8	+60 +8	+19 +15	+21 +15	+24 +15	+28 +15	+36 +15	+48 +15	+67 +15
30	50	+13 +9	+16 +9	+20 +9	+25 +9	+34 +9	+48 +9	+71 +9	+21 +17	+24 +17	+28 +17	+33 +17	+42 +17	+56 +17	+79 +17
50	80		+19 +11	+24 +11	+30 +11	+41 +11				+28 +20	+33 +20	+39 +20	+50 +20		
80	120		+23 +13	+28 +13	+35 +13	+48 +13				+33 +23	+38 +23	+45 +23	+58 +23		
120	180		+27 +15	+33 +15	+40 +15	+55 +15				+39 +27	+45 +27	+52 +27	+67 +27		
180	250		+31 +17	+37 +17	+46 +17	+63 +17				+45 +31	+51 +31	+60 +31	+77 +31		
250	315		+36 +20	+43 +20	+52 +20	+72 +20				+50 +34	+57 +34	+66 +34	+86 +34		
315	400		+39 +21	+46 +21	+57 +21	+78 +21				+55 +37	+62 +37	+73 +37	+94 +37		
400	500		+43 +23	+50 +23	+63 +23	+86 +23				+60 +40	+67 +40	+80 +40	+103 +40		
500	630				+70 +26	+96 +26						+88 +44	+114 +44		
630	800				+80 +30	+110 +30						+100 +50	+130 +50		
800	1 000				+90 +34	+124 +34						+112 +56	+146 +56		
1 000	1 250				+106 +40	+145 +40						+132 +66	+171 +66		
1 250	1 600				+126 +48	+173 +48						+156 +78	+203 +78		
1 600	2 000				+150 +58	+208 +58						+184 +92	+242 +92		
2 000	2 500				+178 +68	+243 +68						+220 +110	+285 +110		
2 500	3 150				+211 +76	+286 +76						+270 +135	+345 +135		

**Table 26 — Limit deviations for shafts (fundamental deviation p)**Upper limit deviation =  $es$ Lower limit deviation =  $ei$ 

Deviations in micrometres

Nominal size mm		p							
Above	Up to and including	3	4	5	6	7	8	9	10
—	3	+8 +6	+9 +6	+10 +6	+12 +6	+16 +6	+20 +6	+31 +6	+46 +6
3	6	+14,5 +12	+16 +12	+17 +12	+20 +12	+24 +12	+30 +12	+42 +12	+60 +12
6	10	+17,5 +15	+19 +15	+21 +15	+24 +15	+30 +15	+37 +15	+51 +15	+73 +15
10	18	+21 +18	+23 +18	+26 +18	+29 +18	+36 +18	+45 +18	+61 +18	+88 +18
18	30	+26 +22	+28 +22	+31 +22	+35 +22	+43 +22	+55 +22	+74 +22	+106 +22
30	50	+30 +26	+33 +26	+37 +26	+42 +26	+51 +26	+65 +26	+88 +26	+126 +26
50	80		+40 +32	+45 +32	+51 +32	+62 +32	+78 +32		
80	120		+47 +37	+52 +37	+59 +37	+72 +37	+91 +37		
120	180		+55 +43	+61 +43	+68 +43	+83 +43	+106 +43		
180	250		+64 +50	+70 +50	+79 +50	+96 +50	+122 +50		
250	315		+72 +56	+79 +56	+88 +56	+108 +56	+137 +56		
315	400		+80 +62	+87 +62	+98 +62	+119 +62	+151 +62		
400	500		+88 +68	+95 +68	+108 +68	+131 +68	+165 +68		
500	630				+122 +78	+148 +78	+188 +78		
630	800				+138 +88	+168 +88	+213 +88		
800	1 000				+156 +100	+190 +100	+240 +100		
1 000	1 250				+186 +120	+225 +120	+285 +120		
1 250	1 600				+218 +140	+265 +140	+335 +140		
1 600	2 000				+262 +170	+320 +170	+400 +170		
2 000	2 500				+305 +195	+370 +195	+475 +195		
2 500	3 150				+375 +240	+450 +240	+570 +240		

**Table 27 — Limit deviations for shafts (fundamental deviation r)**Upper limit deviation =  $es$ Lower limit deviation =  $ei$ 

Deviations in micrometres

Nominal size mm		r							
Above	Up to and including	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
3	6	+17,5 +15	+19 +15	+20 +15	+23 +15	+27 +15	+33 +15	+45 +15	+63 +15
6	10	+21,5 +19	+23 +19	+25 +19	+28 +19	+34 +19	+41 +19	+55 +19	+77 +19
10	18	+26 +23	+28 +23	+31 +23	+34 +23	+41 +23	+50 +23	+66 +23	+93 +23
18	30	+32 +28	+34 +28	+37 +28	+41 +28	+49 +28	+61 +28	+80 +28	+112 +28
30	50	+38 +34	+41 +34	+45 +34	+50 +34	+59 +34	+73 +34	+96 +34	+134 +34
50	65		+49 +41	+54 +41	+60 +41	+71 +41	+87 +41		
65	80		+51 +43	+56 +43	+62 +43	+73 +43	+89 +43		
80	100		+61 +51	+66 +51	+73 +51	+86 +51	+105 +51		
100	120		+64 +54	+69 +54	+76 +54	+89 +54	+108 +54		
120	140		+75 +63	+81 +63	+88 +63	+103 +63	+126 +63		
140	160		+77 +65	+83 +65	+90 +65	+105 +65	+128 +65		
160	180		+80 +68	+86 +68	+93 +68	+108 +68	+131 +68		
180	200		+91 +77	+97 +77	+106 +77	+123 +77	+149 +77		
200	225		+94 +80	+100 +80	+109 +80	+126 +80	+152 +80		
225	250		+98 +84	+104 +84	+113 +84	+130 +84	+156 +84		
250	280		+110 +94	+117 +94	+126 +94	+146 +94	+175 +94		
280	315		+114 +98	+121 +98	+130 +98	+150 +98	+179 +98		
315	355		+126 +108	+133 +108	+144 +108	+165 +108	+197 +108		
355	400		+132 +114	+139 +114	+150 +114	+171 +114	+203 +114		
400	450		+146 +126	+153 +126	+166 +126	+189 +126	+223 +126		
450	500		+152 +132	+159 +132	+172 +132	+195 +132	+229 +132		



Table 27 (continued)

Deviations in micrometres

Nominal size mm		r							
Above	Up to and including	3	4	5	6	7	8	9	10
500	560				+194 +150	+220 +150	+260 +150		
560	630				+199 +155	+225 +155	+265 +155		
630	710				+225 +175	+255 +175	+300 +175		
710	800				+235 +185	+265 +185	+310 +185		
800	900				+266 +210	+300 +210	+350 +210		
900	1 000				+276 +220	+310 +220	+360 +220		
1 000	1 120				+316 +250	+355 +250	+415 +250		
1 120	1 250				+326 +260	+365 +260	+425 +260		
1 250	1 400				+378 +300	+425 +300	+495 +300		
1 400	1 600				+408 +330	+455 +330	+525 +330		
1 600	1 800				+462 +370	+520 +370	+600 +370		
1 800	2 000				+492 +400	+550 +400	+630 +400		
2 000	2 240				+550 +440	+615 +440	+720 +440		
2 240	2 500				+570 +460	+635 +460	+740 +460		
2 500	2 800				+685 +550	+760 +550	+880 +550		
2 800	3 150				+715 +580	+790 +580	+910 +580		

**Table 28 — Limit deviations for shafts (fundamental deviation s)**Upper limit deviation =  $es$ Lower limit deviation =  $ei$ 

Deviations in micrometres

Nominal size mm		s							
Above	Up to and including	3	4	5	6	7	8	9	10
—	3	+16 +14	+17 +14	+18 +14	+20 +14	+24 +14	+28 +14	+39 +14	+54 +14
3	6	+21,5 +19	+23 +19	+24 +19	+27 +19	+31 +19	+37 +19	+49 +19	+67 +19
6	10	+25,5 +23	+27 +23	+29 +23	+32 +23	+38 +23	+45 +23	+59 +23	+81 +23
10	18	+31 +28	+33 +28	+36 +28	+39 +28	+46 +28	+55 +28	+71 +28	+98 +28
18	30	+39 +35	+41 +35	+44 +35	+48 +35	+56 +35	+68 +35	+87 +35	+119 +35
30	50	+47 +43	+50 +43	+54 +43	+59 +43	+68 +43	+82 +43	+105 +43	+143 +43
50	65		+61 +53	+66 +53	+72 +53	+83 +53	+99 +53	+127 +53	
65	80		+67 +59	+72 +59	+78 +59	+89 +59	+105 +59	+133 +59	
80	100		+81 +71	+86 +71	+93 +71	+106 +71	+125 +71	+158 +71	
100	120		+89 +79	+94 +79	+101 +79	+114 +79	+133 +79	+166 +79	
120	140		+104 +92	+110 +92	+117 +92	+132 +92	+155 +92	+192 +92	
140	160		+112 +100	+118 +100	+125 +100	+140 +100	+163 +100	+200 +100	
160	180		+120 +108	+126 +108	+133 +108	+148 +108	+171 +108	+208 +108	
180	200		+136 +122	+142 +122	+151 +122	+168 +122	+194 +122	+237 +122	
200	225		+144 +130	+150 +130	+159 +130	+176 +130	+202 +130	+245 +130	
225	250		+154 +140	+160 +140	+169 +140	+186 +140	+212 +140	+255 +140	
250	280		+174 +158	+181 +158	+190 +158	+210 +158	+239 +158	+288 +158	
280	315		+186 +170	+193 +170	+202 +170	+222 +170	+251 +170	+300 +170	
315	355		+208 +190	+215 +190	+226 +190	+247 +190	+279 +190	+330 +190	
355	400		+226 +208	+233 +208	+244 +208	+265 +208	+297 +208	+348 +208	
400	450		+252 +232	+259 +232	+272 +232	+295 +232	+329 +232	+387 +232	
450	500		+272 +252	+279 +252	+292 +252	+315 +252	+349 +252	+407 +252	

Table 28 (continued)

Deviations in micrometres

Nominal size mm		s							
Above	Up to and including	3	4	5	6	7	8	9	10
500	560				+324 +280	+350 +280	+390 +280		
560	630				+354 +310	+380 +310	+420 +310		
630	710				+390 +340	+420 +340	+465 +340		
710	800				+430 +380	+460 +380	+505 +380		
800	900				+486 +430	+520 +430	+570 +430		
900	1 000				+526 +470	+560 +470	+610 +470		
1 000	1 120				+586 +520	+625 +520	+685 +520		
1 120	1 250				+646 +580	+685 +580	+745 +580		
1 250	1 400				+718 +640	+765 +640	+835 +640		
1 400	1 600				+798 +720	+845 +720	+915 +720		
1 600	1 800				+912 +820	+970 +820	+1 050 +820		
1 800	2 000				+1 012 +920	+1 070 +920	+1 150 +920		
2 000	2 240				+1 110 +1 000	+1 175 +1 000	+1 280 +1 000		
2 240	2 500				+1 210 +1 100	+1 275 +1 100	+1 380 +1 100		
2 500	2 800				+1 385 +1 250	+1 460 +1 250	+1 580 +1 250		
2 800	3 150				+1 535 +1 400	+1 610 +1 400	+1 730 +1 400		

**Table 29 — Limit deviations for shafts (fundamental deviations t and u)**Upper limit deviation =  $es$ Lower limit deviation =  $ei$ 

Deviations in micrometres

Nominal size mm		$t^a$				$u$				
Above	Up to and including	5	6	7	8	5	6	7	8	9
—	3					+22 +18	+24 +18	+28 +18	+32 +18	+43 +18
3	6					+28 +23	+31 +23	+35 +23	+41 +23	+53 +23
6	10					+34 +28	+37 +28	+43 +28	+50 +28	+64 +28
10	18					+41 +33	+44 +33	+51 +33	+60 +33	+76 +33
18	24					+50 +41	+54 +41	+62 +41	+74 +41	+93 +41
24	30	+50 +41	+54 +41	+62 +41	+74 +41	+57 +48	+61 +48	+69 +48	+81 +48	+100 +48
30	40	+59 +48	+64 +48	+73 +48	+87 +48	+71 +60	+76 +60	+85 +60	+99 +60	+122 +60
40	50	+65 +54	+70 +54	+79 +54	+93 +54	+81 +70	+86 +70	+95 +70	+109 +70	+132 +70
50	65	+79 +66	+85 +66	+96 +66	+112 +66	+100 +87	+106 +87	+117 +87	+133 +87	+161 +87
65	80	+88 +75	+94 +75	+105 +75	+121 +75	+115 +102	+121 +102	+132 +102	+148 +102	+176 +102
80	100	+106 +91	+113 +91	+126 +91	+145 +91	+139 +124	+146 +124	+159 +124	+178 +124	+211 +124
100	120	+119 +104	+126 +104	+139 +104	+158 +104	+159 +144	+166 +144	+179 +144	+198 +144	+231 +144
120	140	+140 +122	+147 +122	+162 +122	+185 +122	+188 +170	+195 +170	+210 +170	+233 +170	+270 +170
140	160	+152 +134	+159 +134	+174 +134	+197 +134	+208 +190	+215 +190	+230 +190	+253 +190	+290 +190
160	180	+164 +146	+171 +146	+186 +146	+209 +146	+228 +210	+235 +210	+250 +210	+273 +210	+310 +210
180	200	+186 +166	+195 +166	+212 +166	+238 +166	+256 +236	+265 +236	+282 +236	+308 +236	+351 +236
200	225	+200 +180	+209 +180	+226 +180	+252 +180	+278 +258	+287 +258	+304 +258	+330 +258	+373 +258
225	250	+216 +196	+225 +196	+242 +196	+268 +196	+304 +284	+313 +284	+330 +284	+356 +284	+399 +284
250	280	+241 +218	+250 +218	+270 +218	+299 +218	+338 +315	+347 +315	+367 +315	+396 +315	+445 +315
280	315	+263 +240	+272 +240	+292 +240	+321 +240	+373 +350	+382 +350	+402 +350	+431 +350	+480 +350
315	355	+293 +268	+304 +268	+325 +268	+357 +268	+415 +390	+426 +390	+447 +390	+479 +390	+530 +390
355	400	+319 +294	+330 +294	+351 +294	+383 +294	+460 +435	+471 +435	+492 +435	+524 +435	+575 +435
400	450	+357 +330	+370 +330	+393 +330	+427 +330	+517 +490	+530 +490	+553 +490	+587 +490	+645 +490
450	500	+387 +360	+400 +360	+423 +360	+457 +360	+567 +540	+580 +540	+603 +540	+637 +540	+695 +540

Table 29 (continued)

Deviations in micrometres

Nominal size mm		$t^a$				$u$				
Above	Up to and including	5	6	7	8	5	6	7	8	9
500	560		+444 +400	+470 +400			+644 +600	+670 +600	+710 +600	
560	630		+494 +450	+520 +450			+704 +660	+730 +660	+770 +660	
630	710		+550 +500	+580 +500			+790 +740	+820 +740	+865 +740	
710	800		+610 +560	+640 +560			+890 +840	+920 +840	+965 +840	
800	900		+676 +620	+710 +620			+996 +940	+1 030 +940	+1 080 +940	
900	1 000		+736 +680	+770 +680			+1 106 +1 050	+1 140 +1 050	+1 190 +1 050	
1 000	1 120		+846 +780	+885 +780			+1 216 +1 150	+1 255 +1 150	+1 315 +1 150	
1 120	1 250		+906 +840	+945 +840			+1 366 +1 300	+1 405 +1 300	+1 465 +1 300	
1 250	1 400		+1 038 +960	+1 085 +960			+1 528 +1 450	+1 575 +1 450	+1 645 +1 450	
1 400	1 600		+1 128 +1 050	+1 175 +1 050			+1 678 +1 600	+1 725 +1 600	+1 795 +1 600	
1 600	1 800		+1 292 +1 200	+1 350 +1 200			+1 942 +1 850	+2 000 +1 850	+2 080 +1 850	
1 800	2 000		+1 442 +1 350	+1 500 +1 350			+2 092 +2 000	+2 150 +2 000	+2 230 +2 000	
2 000	2 240		+1 610 +1 500	+1 675 +1 500			+2 410 +2 300	+2 475 +2 300	+2 580 +2 300	
2 240	2 500		+1 760 +1 650	+1 825 +1 650			+2 610 +2 500	+2 675 +2 500	+2 780 +2 500	
2 500	2 800		+2 035 +1 900	+2 110 +1 900			+3 035 +2 900	+3 110 +2 900	+3 230 +2 900	
2 800	3 150		+2 235 +2 100	+2 310 +2 100			+3 335 +3 200	+3 410 +3 200	+3 530 +3 200	
<sup>a</sup> Tolerance classes $t_5$ to $t_8$ (incl.) have not been tabulated for nominal sizes less than or equal to 24 mm. It is recommended that tolerance classes $u_5$ to $u_8$ (incl.) be used instead.										

**Table 30 — Limit deviations for shafts (fundamental deviations v, x and y)<sup>a</sup>**Upper limit deviation = *es*Lower limit deviation = *ei*

Deviations in micrometres

Nominal size mm		<i>v</i> <sup>b</sup>				<i>x</i>						<i>y</i> <sup>c</sup>				
Above	Up to and including	5	6	7	8	5	6	7	8	9	10	6	7	8	9	10
—	3					+24 +20	+26 +20	+30 +20	+34 +20	+45 +20	+60 +20					
3	6					+33 +28	+36 +28	+40 +28	+46 +28	+58 +28	+76 +28					
6	10					+40 +34	+43 +34	+49 +34	+56 +34	+70 +34	+92 +34					
10	14					+48 +40	+51 +40	+58 +40	+67 +40	+83 +40	+110 +40					
14	18	+47 +39	+50 +39	+57 +39	+66 +39	+53 +45	+56 +45	+63 +45	+72 +45	+88 +45	+115 +45					
18	24	+56 +47	+60 +47	+68 +47	+80 +47	+63 +54	+67 +54	+75 +54	+87 +54	+106 +54	+138 +54	+76 +63	+84 +63	+96 +63	+115 +63	+147 +63
24	30	+64 +55	+68 +55	+76 +55	+88 +55	+73 +64	+77 +64	+85 +64	+97 +64	+116 +64	+148 +64	+88 +75	+96 +75	+108 +75	+127 +75	+159 +75
30	40	+79 +68	+84 +68	+93 +68	+107 +68	+91 +80	+96 +80	+105 +80	+119 +80	+142 +80	+180 +80	+110 +94	+119 +94	+133 +94	+156 +94	+194 +94
40	50	+92 +81	+97 +81	+106 +81	+120 +81	+108 +97	+113 +97	+122 +97	+136 +97	+159 +97	+197 +97	+130 +114	+139 +114	+153 +114	+176 +114	+214 +114
50	65	+115 +102	+121 +102	+132 +102	+148 +102	+135 +122	+141 +122	+152 +122	+168 +122	+196 +122	+242 +122	+163 +144	+174 +144	+190 +144		
65	80	+133 +120	+139 +120	+150 +120	+166 +120	+159 +146	+165 +146	+176 +146	+192 +146	+220 +146	+266 +146	+193 +174	+204 +174	+220 +174		
80	100	+161 +146	+168 +146	+181 +146	+200 +146	+193 +178	+200 +178	+213 +178	+232 +178	+265 +178	+318 +178	+236 +214	+249 +214	+268 +214		
100	120	+187 +172	+194 +172	+207 +172	+226 +172	+225 +210	+232 +210	+245 +210	+264 +210	+297 +210	+350 +210	+276 +254	+289 +254	+308 +254		
120	140	+220 +202	+227 +202	+242 +202	+265 +202	+266 +248	+273 +248	+288 +248	+311 +248	+348 +248	+408 +248	+325 +300	+340 +300	+363 +300		
140	160	+246 +228	+253 +228	+268 +228	+291 +228	+298 +280	+305 +280	+320 +280	+343 +280	+380 +280	+440 +280	+365 +340	+380 +340	+403 +340		
160	180	+270 +252	+277 +252	+292 +252	+315 +252	+328 +310	+335 +310	+350 +310	+373 +310	+410 +310	+470 +310	+405 +380	+420 +380	+443 +380		
180	200	+304 +284	+313 +284	+330 +284	+356 +284	+370 +350	+379 +350	+396 +350	+422 +350	+465 +350	+535 +350	+454 +425	+471 +425	+497 +425		
200	225	+330 +310	+339 +310	+356 +310	+382 +310	+405 +385	+414 +385	+431 +385	+457 +385	+500 +385	+570 +385	+499 +470	+516 +470	+542 +470		
225	250	+360 +340	+369 +340	+386 +340	+412 +340	+445 +425	+454 +425	+471 +425	+497 +425	+540 +425	+610 +425	+549 +520	+566 +520	+592 +520		
250	280	+408 +385	+417 +385	+437 +385	+466 +385	+498 +475	+507 +475	+527 +475	+556 +475	+650 +475	+685 +475	+612 +580	+632 +580	+661 +580		
280	315	+448 +425	+457 +425	+477 +425	+506 +425	+548 +525	+557 +525	+577 +525	+606 +525	+655 +525	+735 +525	+682 +650	+702 +650	+731 +650		
315	355	+500 +475	+511 +475	+532 +475	+564 +475	+615 +590	+626 +590	+647 +590	+679 +590	+730 +590	+820 +590	+766 +730	+787 +730	+819 +730		
355	400	+555 +530	+566 +530	+587 +530	+619 +530	+685 +660	+696 +660	+717 +660	+749 +660	+800 +660	+890 +660	+856 +820	+877 +820	+909 +820		
400	450	+622 +595	+635 +595	+658 +595	+692 +595	+767 +740	+780 +740	+803 +740	+837 +740	+895 +740	+990 +740	+960 +920	+983 +920	+1 017 +920		
450	500	+687 +660	+700 +660	+723 +660	+757 +660	+847 +820	+860 +820	+883 +820	+917 +820	+975 +820	+1 070 +820	+1 040 +1 000	+1 063 +1 000	+1 097 +1 000		

<sup>a</sup> Fundamental deviations v, x and y are not provided for nominal sizes greater than 500 mm.<sup>b</sup> Tolerance classes v5 to v8 (incl.) have not been tabulated for nominal sizes less than or equal to 14 mm. It is recommended that tolerance classes x5 to x8 (incl.) be used instead.<sup>c</sup> Tolerance classes y6 to y10 (incl.) have not been tabulated for nominal sizes less than or equal to 18 mm. It is recommended that tolerance classes z6 to z10 (incl.) be used instead.

**Table 31 — Limit deviations for shafts (fundamental deviations z and za)<sup>a</sup>**Upper limit deviation = *es*Lower limit deviation = *ei*

Deviations in micrometres

Nominal size mm		z						za					
Above	Up to and including	6	7	8	9	10	11	6	7	8	9	10	11
—	3	+32 +26	+36 +26	+40 +26	+51 +26	+66 +26	+86 +26	+38 +32	+42 +32	+46 +32	+57 +32	+72 +32	+92 +32
3	6	+43 +35	+47 +35	+53 +35	+65 +35	+83 +35	+110 +35	+50 +42	+54 +42	+60 +42	+72 +42	+90 +42	+117 +42
6	10	+51 +42	+57 +42	+64 +42	+78 +42	+100 +42	+132 +42	+61 +52	+67 +52	+74 +52	+88 +52	+110 +52	+142 +52
10	14	+61 +50	+68 +50	+77 +50	+93 +50	+120 +50	+160 +50	+75 +64	+82 +64	+91 +64	+107 +64	+134 +64	+174 +64
14	18	+71 +60	+78 +60	+87 +60	+103 +60	+130 +60	+170 +60	+88 +77	+95 +77	+104 +77	+120 +77	+147 +77	+187 +77
18	24	+86 +73	+94 +73	+106 +73	+125 +73	+157 +73	+203 +73	+111 +98	+119 +98	+131 +98	+150 +98	+182 +98	+228 +98
24	30	+101 +88	+109 +88	+121 +88	+140 +88	+172 +88	+218 +88	+131 +118	+139 +118	+151 +118	+170 +118	+202 +118	+248 +118
30	40	+128 +112	+137 +112	+151 +112	+174 +112	+212 +112	+272 +112	+164 +148	+173 +148	+187 +148	+210 +148	+248 +148	+308 +148
40	50	+152 +136	+161 +136	+175 +136	+198 +136	+236 +136	+296 +136	+196 +180	+205 +180	+219 +180	+242 +180	+280 +180	+340 +180
50	65	+191 +172	+202 +172	+218 +172	+246 +172	+292 +172	+362 +172	+245 +226	+256 +226	+272 +226	+300 +226	+346 +226	+416 +226
65	80	+229 +210	+240 +210	+256 +210	+284 +210	+330 +210	+400 +210	+293 +274	+304 +274	+320 +274	+348 +274	+394 +274	+464 +274
80	100	+280 +258	+293 +258	+312 +258	+345 +258	+398 +258	+478 +258	+357 +335	+370 +335	+389 +335	+422 +335	+475 +335	+555 +335
100	120	+332 +310	+345 +310	+364 +310	+397 +310	+450 +310	+530 +310	+422 +400	+435 +400	+454 +400	+487 +400	+540 +400	+620 +400
120	140	+390 +365	+405 +365	+428 +365	+465 +365	+525 +365	+615 +365	+495 +470	+510 +470	+533 +470	+570 +470	+630 +470	+720 +470
140	160	+440 +415	+455 +415	+478 +415	+515 +415	+575 +415	+665 +415	+560 +535	+575 +535	+598 +535	+635 +535	+695 +535	+785 +535
160	180	+490 +465	+505 +465	+528 +465	+565 +465	+625 +465	+715 +465	+625 +600	+640 +600	+663 +600	+700 +600	+760 +600	+850 +600
180	200	+549 +520	+566 +520	+592 +520	+635 +520	+705 +520	+810 +520	+699 +670	+716 +670	+742 +670	+785 +670	+855 +670	+960 +670
200	225	+604 +575	+621 +575	+647 +575	+690 +575	+760 +575	+865 +575	+769 +740	+786 +740	+812 +740	+855 +740	+925 +740	+1 030 +740
225	250	+669 +640	+686 +640	+712 +640	+755 +640	+825 +640	+930 +640	+849 +820	+866 +820	+892 +820	+935 +820	+1 005 +820	+1 100 +820
250	280	+742 +710	+762 +710	+791 +710	+840 +710	+920 +710	+1 030 +710	+952 +920	+972 +920	+1 001 +920	+1 050 +920	+1 130 +920	+1 240 +920
280	315	+822 +790	+842 +790	+871 +790	+920 +790	+1 000 +790	+1 110 +790	+1 032 +1 000	+1 052 +1 000	+1 081 +1 000	+1 130 +1 000	+1 210 +1 000	+1 320 +1 000
315	355	+936 +900	+957 +900	+989 +900	+1 040 +900	+1 130 +900	+1 260 +900	+1 186 +1 150	+1 207 +1 150	+1 239 +1 150	+1 290 +1 150	+1 380 +1 150	+1 510 +1 150
355	400	+1 036 +1 000	+1 057 +1 000	+1 089 +1 000	+1 140 +1 000	+1 230 +1 000	+1 360 +1 000	+1 336 +1 300	+1 357 +1 300	+1 389 +1 300	+1 440 +1 300	+1 530 +1 300	+1 660 +1 300
400	450	+1 140 +1 100	+1 163 +1 100	+1 197 +1 100	+1 255 +1 100	+1 350 +1 100	+1 500 +1 100	+1 490 +1 450	+1 513 +1 450	+1 547 +1 450	+1 605 +1 450	+1 700 +1 450	+1 850 +1 450
450	500	+1 290 +1 250	+1 313 +1 250	+1 347 +1 250	+1 405 +1 250	+1 500 +1 250	+1 650 +1 250	+1 640 +1 600	+1 663 +1 600	+1 697 +1 600	+1 755 +1 600	+1 850 +1 600	+2 000 +1 600

<sup>a</sup> Fundamental deviations z and za are not provided for nominal sizes greater than 500 mm.

Table 32 — Limit deviations for shafts (fundamental deviations zb and zc)<sup>a</sup>Upper limit deviation = *es*Lower limit deviation = *ei*

Deviations in micrometres

Nominal size mm		zb					zc				
Above	Up to and including	7	8	9	10	11	7	8	9	10	11
—	3	+50 +40	+54 +40	+65 +40	+80 +40	+100 +40	+70 +60	+74 +60	+85 +60	+100 +60	+120 +60
3	6	+62 +50	+68 +50	+80 +50	+98 +50	+125 +50	+92 +80	+98 +80	+110 +80	+128 +80	+155 +80
6	10	+82 +67	+89 +67	+103 +67	+125 +67	+157 +67	+112 +97	+119 +97	+133 +97	+155 +97	+187 +97
10	14	+108 +90	+117 +90	+133 +90	+160 +90	+200 +90	+148 +130	+157 +130	+173 +130	+200 +130	+240 +130
14	18	+126 +108	+135 +108	+151 +108	+178 +108	+218 +108	+168 +150	+177 +150	+193 +150	+220 +150	+260 +150
18	24	+157 +136	+169 +136	+188 +136	+220 +136	+266 +136	+209 +188	+221 +188	+240 +188	+272 +188	+318 +188
24	30	+181 +160	+193 +160	+212 +160	+244 +160	+290 +160	+239 +218	+251 +218	+270 +218	+302 +218	+348 +218
30	40	+225 +200	+239 +200	+262 +200	+300 +200	+360 +200	+299 +274	+313 +274	+336 +274	+374 +274	+434 +274
40	50	+267 +242	+281 +242	+304 +242	+342 +242	+402 +242	+350 +325	+364 +325	+387 +325	+425 +325	+485 +325
50	65	+330 +300	+346 +300	+374 +300	+420 +300	+490 +300	+435 +405	+451 +405	+479 +405	+525 +405	+595 +405
65	80	+390 +360	+406 +360	+434 +360	+480 +360	+550 +360	+510 +480	+526 +480	+554 +480	+600 +480	+670 +480
80	100	+480 +445	+499 +445	+532 +445	+585 +445	+665 +445	+620 +585	+639 +585	+672 +585	+725 +585	+805 +585
100	120	+560 +525	+579 +525	+612 +525	+665 +525	+745 +525	+725 +690	+744 +690	+777 +690	+830 +690	+910 +690
120	140	+660 +620	+683 +620	+720 +620	+780 +620	+870 +620	+840 +800	+863 +800	+900 +800	+960 +800	+1 050 +800
140	160	+740 +700	+763 +700	+800 +700	+860 +700	+950 +700	+940 +900	+963 +900	+1 000 +900	+1 060 +900	+1 150 +900
160	180	+820 +780	+843 +780	+880 +780	+940 +780	+1 030 +780	+1 040 +1 000	+1 063 +1 000	+1 100 +1 000	+1 160 +1 000	+1 250 +1 000
180	200	+926 +880	+952 +880	+995 +880	+1 065 +880	+1 170 +880	+1 196 +1 150	+1 222 +1 150	+1 265 +1 150	+1 335 +1 150	+1 440 +1 150
200	225	+1 006 +960	+1 032 +960	+1 075 +960	+1 145 +960	+1 250 +960	+1 296 +1 250	+1 322 +1 250	+1 365 +1 250	+1 435 +1 250	+1 540 +1 250
225	250	+1 096 +1 050	+1 122 +1 050	+1 165 +1 050	+1 235 +1 050	+1 340 +1 050	+1 396 +1 350	+1 422 +1 350	+1 465 +1 350	+1 535 +1 350	+1 640 +1 350
250	280	+1 252 +1 200	+1 281 +1 200	+1 330 +1 200	+1 410 +1 200	+1 520 +1 200	+1 602 +1 550	+1 631 +1 550	+1 680 +1 550	+1 760 +1 550	+1 870 +1 550
280	315	+1 352 +1 300	+1 381 +1 300	+1 430 +1 300	+1 510 +1 300	+1 620 +1 300	+1 752 +1 700	+1 781 +1 700	+1 830 +1 700	+1 910 +1 700	+2 020 +1 700
315	355	+1 557 +1 500	+1 589 +1 500	+1 640 +1 500	+1 730 +1 500	+1 860 +1 500	+1 957 +1 900	+1 989 +1 900	+2 040 +1 900	+2 130 +1 900	+2 260 +1 900
355	400	+1 707 +1 650	+1 739 +1 650	+1 790 +1 650	+1 880 +1 650	+2 010 +1 650	+2 157 +2 100	+2 189 +2 100	+2 240 +2 100	+2 330 +2 100	+2 460 +2 100
400	450	+1 913 +1 850	+1 947 +1 850	+2 005 +1 850	+2 100 +1 850	+2 250 +1 850	+2 463 +2 400	+2 497 +2 400	+2 555 +2 400	+2 650 +2 400	+2 800 +2 400
450	500	+2 163 +2 100	+2 197 +2 100	+2 255 +2 100	+2 350 +2 100	+2 500 +2 100	+2 663 +2 600	+2 697 +2 600	+2 755 +2 600	+2 850 +2 600	+3 000 +2 600

<sup>a</sup> Fundamental deviations zb and zc are not provided for nominal sizes greater than 500 mm.



## Annex A (informative)

### Graphical review of tolerance intervals for holes and shafts

#### A.1 Representation of tolerance intervals for holes

A graphical review of a broad selection of tolerance classes for holes is given in Figures A.1 and A.2. Figure A.1 shows the tolerance classes in terms of the fundamental deviation (A to ZC), whereas Figure A.2 gives the same information in terms of the standard tolerance grade (IT5 to IT11). Figures A.1 and A.2 do not include all the tolerance classes given in this part of ISO 286 and reference should be made to the tables for specific details.

For comparative purposes, the tolerance classes given in Figures A.1 and A.2 illustrate the values for  $ES$ ,  $EI$  and IT given for the nominal size range above 6 mm up to and including 10 mm. Where there are no tabulated values for this nominal size range, i.e. those tolerance classes involving fundamental deviations T, V and Y, the values have been given, again for comparative purposes, for the nominal size range above 24 mm up to and including 30 mm, characterized by unfilled rectangles.

#### A.2 Representation of tolerance intervals for shafts

A graphical review of a broad selection of tolerance classes for shafts is given in Figures A.3 and A.4. Figure A.3 shows the tolerance classes in terms of the fundamental deviation (a to zc), whereas Figure A.4 gives the same information in terms of the standard tolerance grade (IT5 to IT11). Figures A.3 and A.4 do not include all the tolerance classes given in this part of ISO 286 and reference should be made to the tables for specific details.

For comparative purposes, the tolerance classes given in Figures A.3 and A.4 illustrate the values for  $es$ ,  $ei$  and IT given for the nominal size range above 6 mm up to and including 10 mm. Where there are no tabulated values for this nominal size range, i.e. those tolerance classes involving fundamental deviations t, v and y, the values have been given, again for comparative purposes, for the nominal size range above 24 mm up to and including 30 mm, characterized by unfilled rectangles.

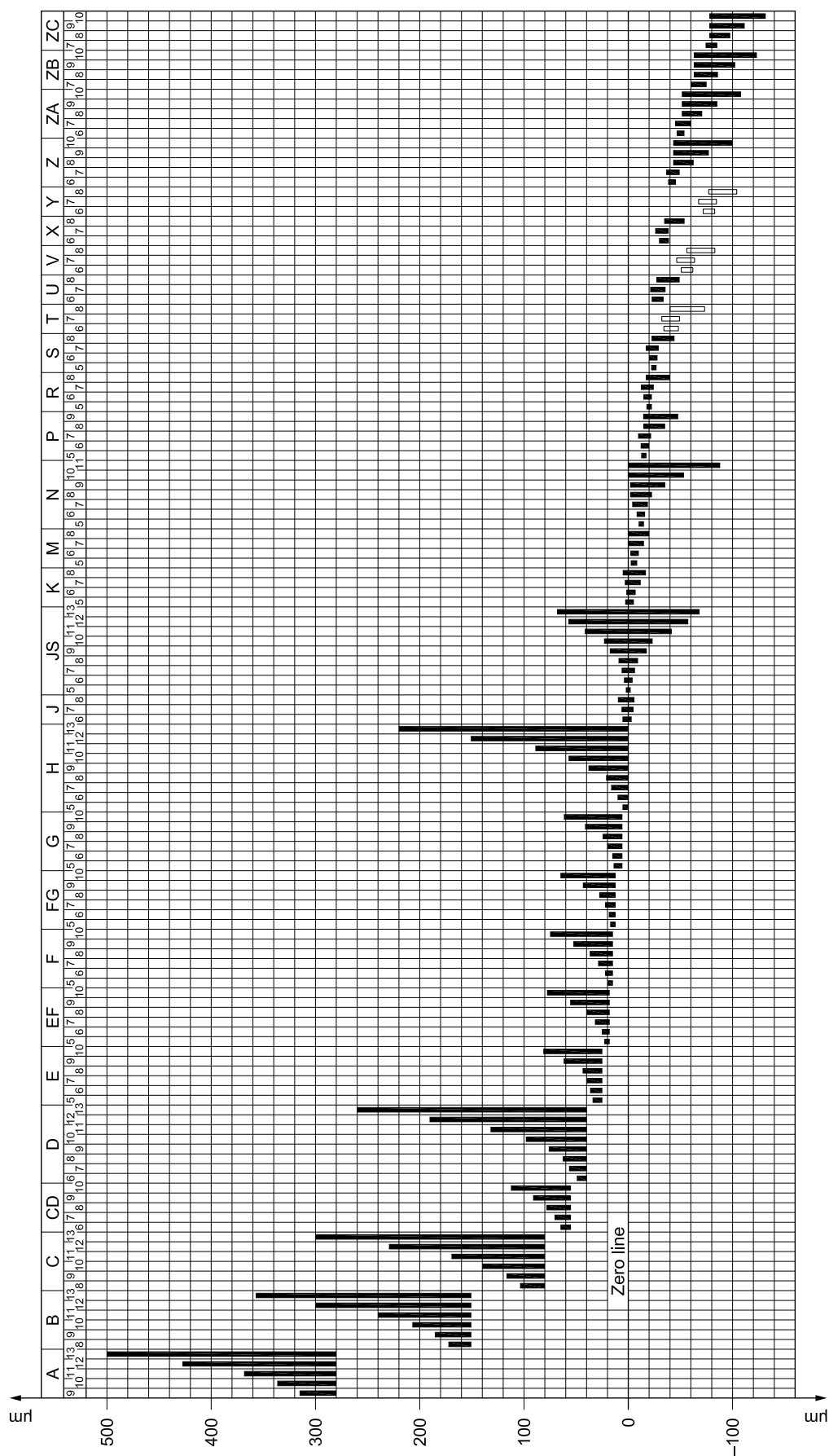


Figure A.1 — Graphical review of tolerance classes for holes in terms of fundamental deviations

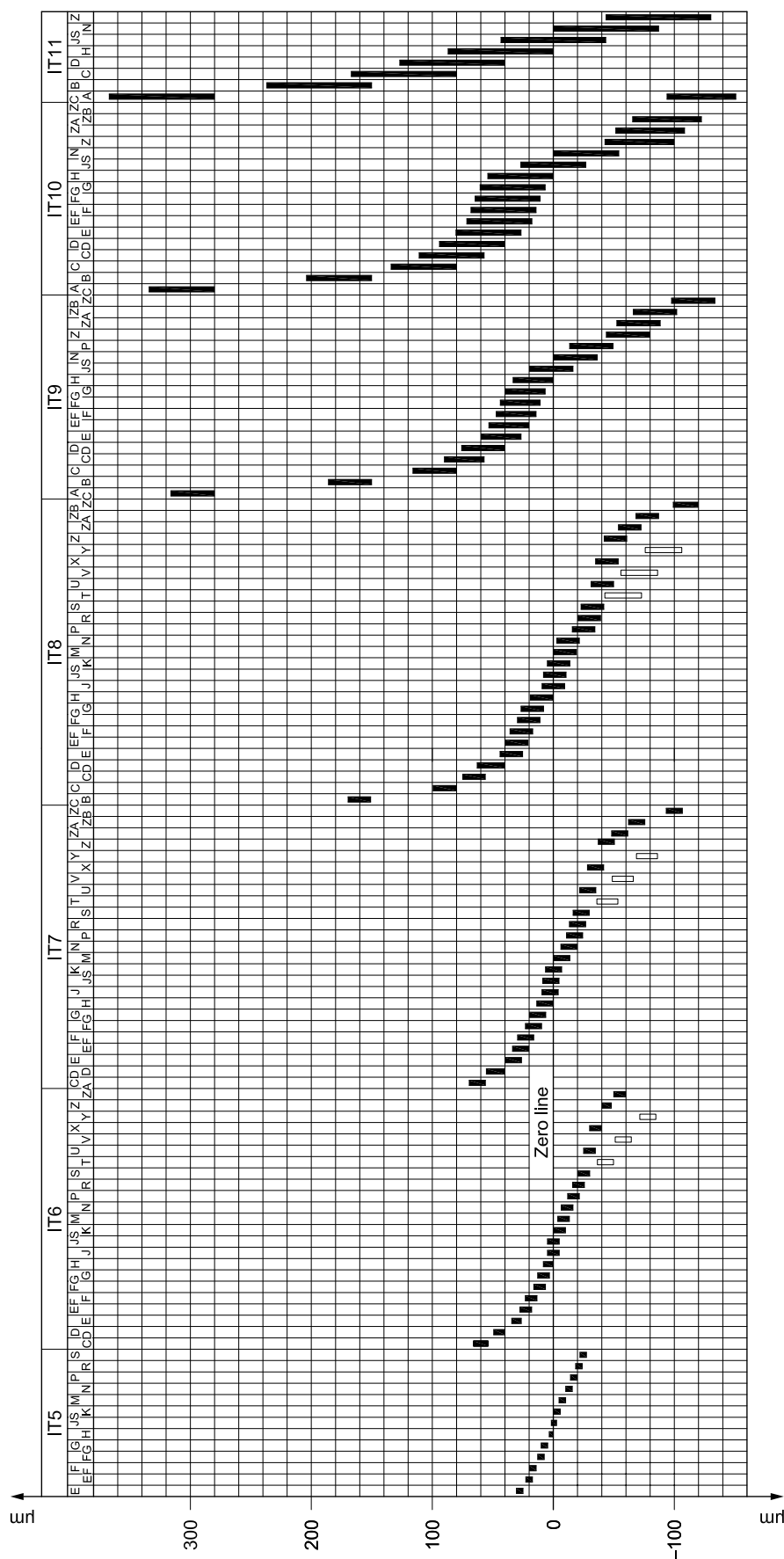


Figure A.2 — Graphical review of tolerance classes for holes in terms of standard tolerance grades

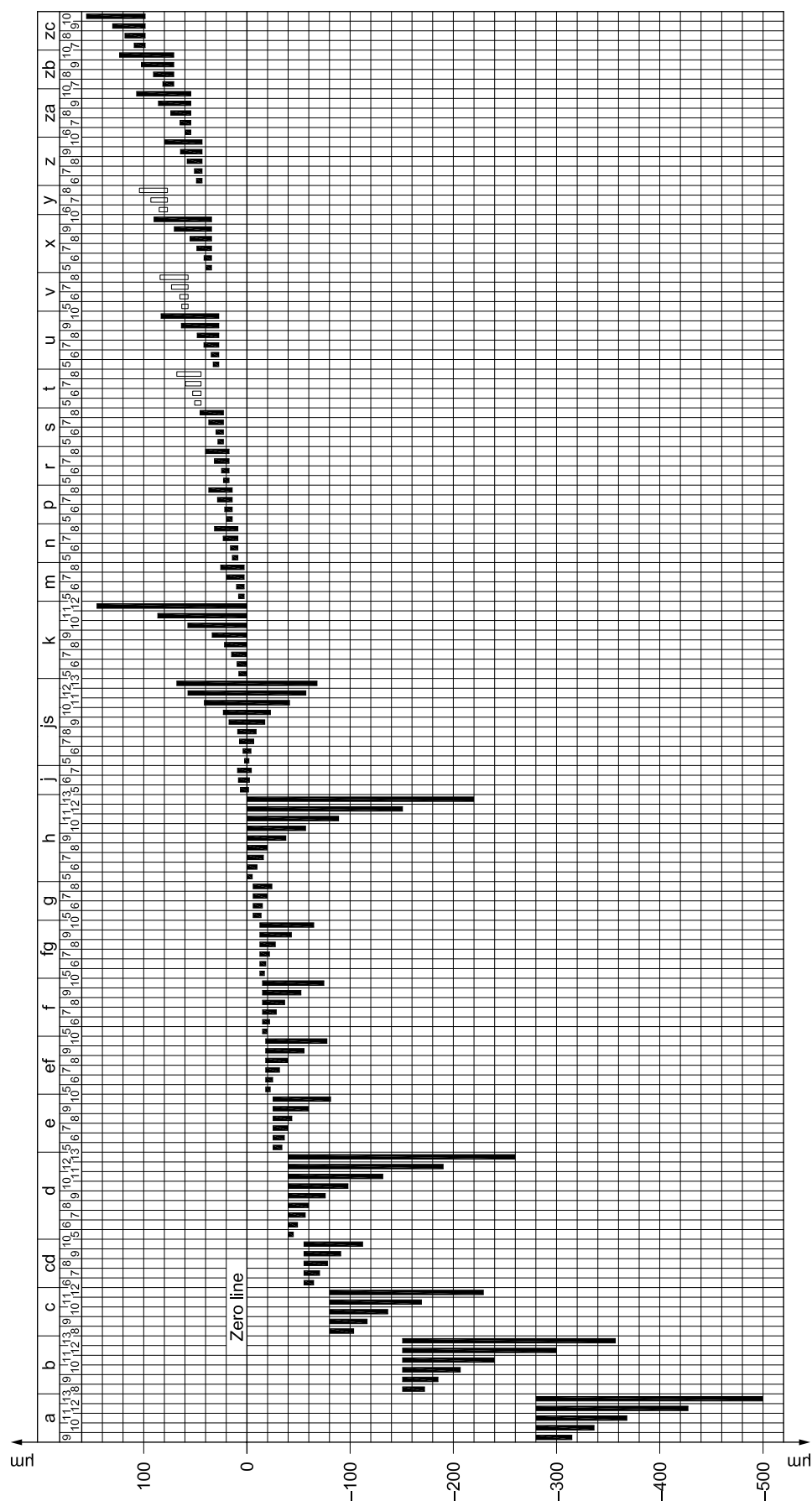


Figure A.3 — Graphical review of tolerance classes for shafts in terms of fundamental deviations

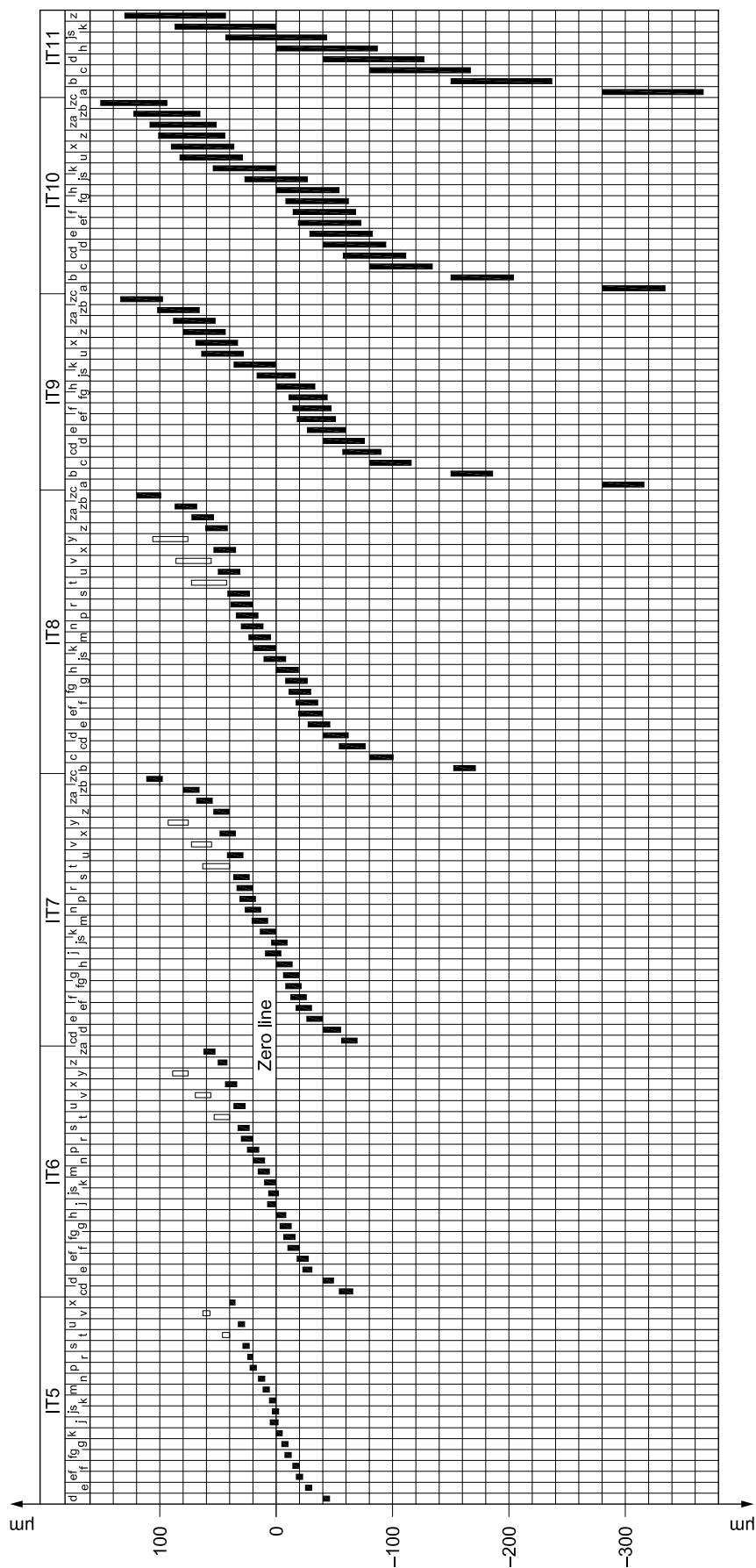


Figure A.4 — Graphical review of tolerance classes for shafts in terms of standard tolerance grades

## Annex B (informative)

### Relationship to the GPS matrix model

#### B.1 General

For full details about the GPS matrix model, see ISO/TR 14638.

#### B.2 Information about this International Standard and its use

This part of ISO 286 gives values of the limit deviations for commonly used tolerance classes for holes and shafts calculated from the tables given in ISO 286-1.

#### B.3 Position in the GPS matrix model

This part of ISO 286 is a GPS standard and is to be regarded as a general GPS standard (see ISO/TR 14638). It influences chain links 1 and 2 of the chains of standards on size in the general GPS matrix, as graphically illustrated in Figure B.1.

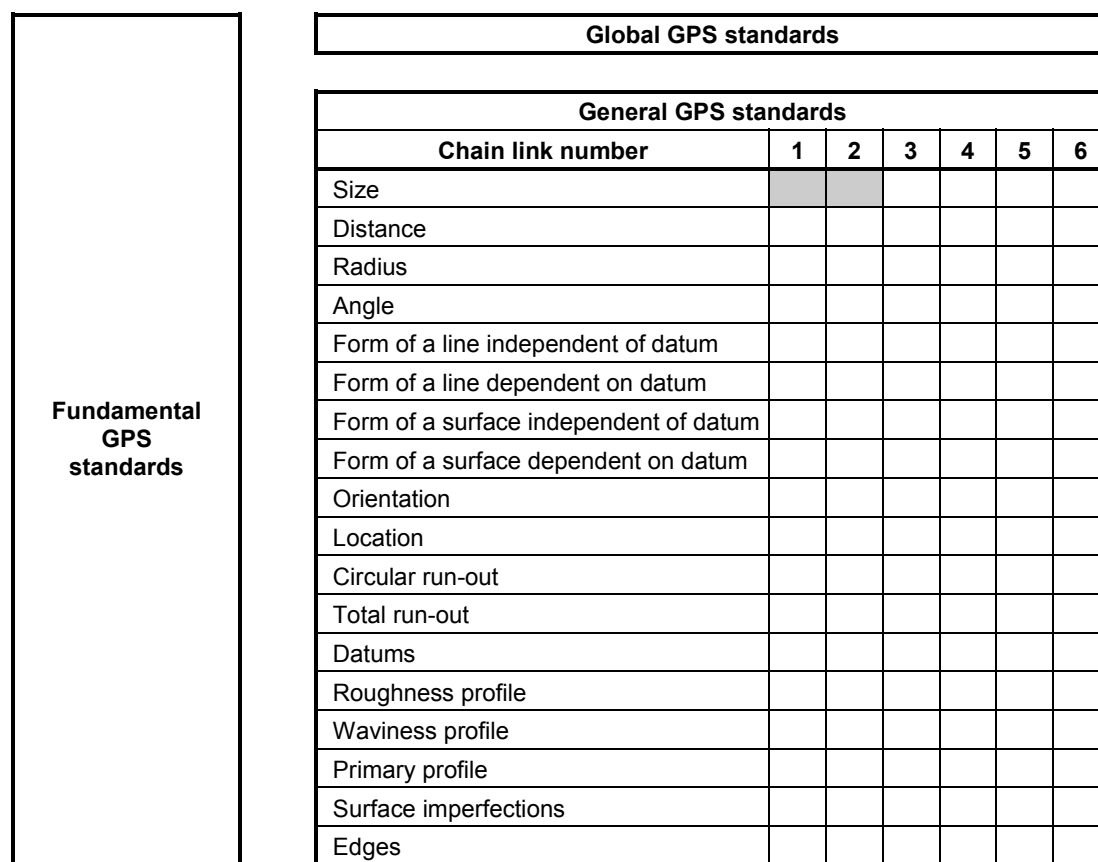


Figure B.1 — Position in the GPS matrix model

## B.4 Related International Standards

The related International Standards are those of the chains of standards indicated in Figure B.1.

## Bibliography

- [1] ISO 1101, *Geometrical Product Specifications (GPS) — Geometrical tolerancing — Tolerances of form, orientation, location and run-out*
- [2] ISO 1302, *Geometrical Product Specifications (GPS) — Indication of surface texture in technical product documentation*
- [3] ISO/R 1938, *ISO system of limits and fits — Part II: Inspection of plain workpieces*
- [4] ISO 2692, *Geometrical product specifications (GPS) — Geometrical tolerancing — Maximum material requirement (MMR), least material requirement (LMR) and reciprocity requirement (RPR)*
- [5] ISO 2768-1, *General tolerances — Part 1: Tolerances for linear and angular dimensions without individual tolerance indications*
- [6] ISO 14405-1, *Geometrical product specifications (GPS) — Dimensional tolerancing — Part 1: Linear sizes*
- [7] ISO/TR 14638, *Geometrical product specifications (GPS) — Masterplan*





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