Tolerances for Cylindrical Gear Teeth

Tolerances for Working Deviations

DIN 3963

Toleranzen für Stirnradverzahnungen; Toleranzen für Wälzabweichungen

1 Scope

The tolerances listed in this Standard apply to the amounts of the deviations defined in DIN 3960.

It contains tolerances for:

- two-flank working deviation F_i''
- two-flank working error f_i''
- single-flank working deviation F_i'
- single-flank working error f_i'

2 Other relevant Standards

DIN 3960 Definitions and parameters for cylindrical gears and cylindrical gear pairs with involute teeth

DIN 3961 Tolerances for cylindrical gear teeth; bases

Continued on page 2 to 18
Explanations on page 18

Normal module over 40 up to 70 mm

Tolerances in µm

Reference circle diameter d in mm	Deviation F_i''						Deviation f_i''					
Gear tooth quality	7	8	9	10	11	12	7	8	9	10	11	12
over 125 up to 280	71	100	140	200	280	400	36	50	71	100	140	200
over 280 up to 560	80	110	160	220	320	450	40	56	80	110	160	220
over 560 up to 1000	80	110	160	220	320	450	40	56	80	110	160	220
over 1000 up to 1600	90	125	180	250	360	500	45	63	90	125	180	250
over 1600 up to 2500	90	125	180	250	360	500	45	63	90	125	180	250
over 2500 up to 4000	100	140	200	280	400	560	50	71	100	140	200	280
over 4000 up to 6300	110	160	220	280	400	630	50	71	100	140	200	280
over 6300 up to 10000	110	160	220	320	450	630	56	80	110	160	220	320

Reference circle diameter d in mm	Deviation F_i'						Deviation f_i'					
Gear tooth quality	7	8	9	10	11	12	7	8	9	10	11	12
over 125 up to 280	110	160	220	360	560	900	80	110	160	250	400	630
over 280 up to 560	125	180	250	400	630	1000	80	125	160	250	400	630
over 560 up to 1000	125	180	250	400	630	1000	80	125	160	250	400	630
over 1000 up to 1600	140	200	280	450	710	1100	90	125	180	280	450	710
over 1600 up to 2500	140	200	280	450	710	1100	90	125	180	280	450	710
over 2500 up to 4000	160	220	320	500	800	1250	90	125	180	280	450	710
over 4000 up to 6300	160	220	320	500	800	1250	90	125	180	280	450	710
over 6300 up to 10000	180	250	360	560	900	1400	90	125	180	280	450	710

...nce data

...nal module from 1 to 2 mm

Tolerances in µm

Reference circle diameter d in mm	Deviation F_i''						Deviation f_i''					
Gear tooth quality	1	2	3	4	5	6	1	2	3	4	5	6
up to 10	2,5	3,5	5	7	9	14	1	1	1,5	2,5	3	4,5
over 10 up to 50	3	4,5	6	9	12	16	1	1,5	2,5	3,5	4,5	6
over 50 up to 125	4	5	7	10	14	20	1,5	2	3	4	6	8
over 125 up to 280	4,5	6	9	12	16	25	2	2,5	3,5	5	7	10
over 280 up to 560	5	7	10	14	20	28	2	3	4	6	8	12
over 560 up to 1000	5,5	8	11	16	22	32	2,5	3,5	5	7	10	14
over 1000 up to 1600	6	9	12	18	25	32	3	4	5,5	8	11	14
over 1600 up to 2500	7	10	14	18	28	36	3	4,5	6	8	12	16
over 2500 up to 4000	8	11	14	20	28	40	3,5	5	7	9	14	18
over 4000 up to 6300	8	11	16	22	32	45	3,5	5	7	10	14	20
over 6300 up to 10000	9	12	18	25	36	50	4	6	8	12	16	22

Reference circle diameter d in mm	Deviation F_i						Deviation f_i					
Gear tooth quality	1	2	3	4	5	6	1	2	3	4	5	6
up to 10	3	4,5	6	9	12	18	2	2,5	3,5	5	7	10
over 10 up to 50	4	5,5	8	11	16	22	2	2,5	4	5,5	7	10
over 50 up to 125	5	7	10	14	18	25	2	3	4	5,5	8	11
over 125 up to 280	5,5	8	11	16	22	28	2	3	4	5,5	8	11
over 280 up to 560	6	9	12	16	25	32	2	3	4	6	8	12
over 560 up to 1000	7	10	14	18	25	36	2,5	3	4,5	6	9	12
over 1000 up to 1600	7	10	14	20	28	40	2,5	3,5	4,5	7	9	12
over 1600 up to 2500	8	11	16	22	32	45	2,5	3,5	5	7	10	14
over 2500 up to 4000	9	12	16	25	32	45	2,5	4	5,5	7	10	14
over 4000 up to 6300	9	12	18	25	36	50	3	4	5,5	8	11	16
over 6300 up to 10000	10	14	20	28	40	56	3	4,5	6	9	12	18

...nce data

...mal module from 1 to 2 mm

Tolerances in µm

Reference circle diameter d in mm	Deviation F_i''						Deviation f_i''					
Gear tooth quality	1	2	3	4	5	6	1	2	3	4	5	6
up to 10	2,5	3,5	5	7	9	14	1	1	1,5	2,5	3	4,5
over 10 up to 50	3	4,5	6	9	12	16	1	1,5	2,5	3,5	4,5	6
over 50 up to 125	4	5	7	10	14	20	1,5	2	3	4	6	8
over 125 up to 280	4,5	6	9	12	16	25	2	2,5	3,5	5	7	10
over 280 up to 560	5	7	10	14	20	28	2	3	4	6	8	12
over 560 up to 1000	5,5	8	11	16	22	32	2,5	3,5	5	7	10	14
over 1000 up to 1600	6	9	12	18	25	32	3	4	5,5	8	11	14
over 1600 up to 2500	7	10	14	18	28	36	3	4,5	6	8	12	16
over 2500 up to 4000	8	11	14	20	28	40	3,5	5	7	9	14	18
over 4000 up to 6300	8	11	16	22	32	45	3,5	5	7	10	14	20
over 6300 up to 10000	9	12	18	25	36	50	4	6	8	12	16	22

Reference circle diameter d in mm	Deviation F_i						Deviation f_i					
Gear tooth quality	1	2	3	4	5	6	1	2	3	4	5	6
up to 10	3	4,5	6	9	12	18	2	2,5	3,5	5	7	10
over 10 up to 50	4	5,5	8	11	16	22	2	2,5	4	5,5	7	10
over 50 up to 125	5	7	10	14	18	25	2	3	4	5,5	8	11
over 125 up to 280	5,5	8	11	16	22	28	2	3	4	5,5	8	11
over 280 up to 560	6	9	12	16	25	32	2	3	4	6	8	12
over 560 up to 1000	7	10	14	18	25	36	2,5	3	4,5	6	9	12
over 1000 up to 1600	7	10	14	20	28	40	2,5	3,5	4,5	7	9	12
over 1600 up to 2500	8	11	16	22	32	45	2,5	3,5	5	7	10	14
over 2500 up to 4000	9	12	16	25	32	45	2,5	4	5,5	7	10	14
over 4000 up to 6300	9	12	18	25	36	50	3	4	5,5	8	11	16
over 6300 up to 10000	10	14	20	28	40	56	3	4,5	6	9	12	18

Normal module from 1 to 2 mm

Tolerances in µm

Reference circle diameter d in mm	Deviation F_i''						Deviation f_i''					
Gear tooth quality	7	8	9	10	11	12	7	8	9	10	11	12
up to 10	18	25	36	50	71	100	6	9	12	18	25	36
over 10 up to 50	22	32	45	63	90	125	9	12	18	25	36	50
over 50 up to 125	28	40	56	80	110	160	12	16	22	32	45	63
over 125 up to 280	32	45	63	90	125	180	14	20	28	36	56	71
over 280 up to 560	36	50	71	100	140	200	16	22	32	45	63	90
over 560 up to 1000	45	63	80	110	160	220	18	25	36	50	71	100
over 1000 up to 1600	45	63	90	125	180	250	20	28	40	56	80	110
over 1600 up to 2500	50	71	100	140	200	280	22	32	45	63	90	125
over 2500 up to 4000	56	80	110	160	220	320	25	36	50	71	100	140
over 4000 up to 6300	63	90	125	180	250	360	28	40	56	80	110	160
over 6300 up to 10000	71	100	140	200	280	400	32	45	63	90	125	180

Reference circle diameter d in mm	Deviation F_i						Deviation f_i					
Gear tooth quality	7	8	9	10	11	12	7	8	9	10	11	12
up to 10	25	32	45	80	125	200	14	20	28	45	71	110
over 10 up to 50	32	45	63	100	160	250	14	20	28	45	71	110
over 50 up to 125	36	50	71	110	180	280	16	22	28	45	80	125
over 125 up to 280	40	56	80	125	200	320	16	22	32	50	80	125
over 280 up to 560	45	63	90	140	220	360	16	22	32	50	80	140
over 560 up to 1000	50	71	100	160	250	400	18	25	32	56	90	140
over 1000 up to 1600	56	80	110	180	280	450	18	25	36	56	90	140
over 1600 up to 2500	63	80	125	180	320	500	18	28	36	63	100	160
over 2500 up to 4000	63	90	125	200	320	500	20	28	40	63	100	160
over 4000 up to 6300	71	100	140	220	360	560	22	32	45	71	110	180
over 6300 up to 10000	80	110	160	250	400	630	25	36	50	80	125	200

rmal module over 2 up to 3.55 mm

Tolerances in µm

Reference circle diameter d in mm	Deviation F_i''						Deviation f_i''					
Gear tooth quality	1	2	3	4	5	6	1	2	3	4	5	6
over 10 up to 50	3,5	5	7	10	14	18	1,5	2	3	4	5,5	8
over 50 up to 125	4	6	8	11	16	22	1,5	2,5	3,5	5	7	9
over 125 up to 280	5	7	9	14	18	25	2	3	4	5,5	8	11
over 280 up to 560	5	8	11	14	20	28	2,5	3,5	4,5	6	9	12
over 560 up to 1000	6	9	12	16	22	32	2,5	3,5	5	7	10	14
over 1000 up to 1600	7	9	14	18	25	36	3	4	6	8	11	16
over 1600 up to 2500	7	10	14	20	28	40	3,5	4,5	6	9	12	18
over 2500 up to 4000	8	11	16	22	32	45	3,5	5	7	10	14	20
over 4000 up to 6300	9	12	18	25	36	50	4	5,5	8	11	16	22
over 6300 up to 10000	9	14	18	28	36	50	4,5	6	9	12	18	25

Reference circle diameter d in mm	Deviation F_i'						Deviation f_i'					
Gear tooth quality	1	2	3	4	5	6	1	2	3	4	5	6
over 10 up to 50	4,5	7	9	12	18	25	2,5	3	4,5	6	9	12
over 50 up to 125	5,5	8	11	16	22	28	2,5	3,5	4,5	6	9	12
over 125 up to 280	6	9	12	18	25	32	2,5	3,5	4,5	7	9	12
over 280 up to 560	7	10	14	20	25	36	2,5	3,5	5	7	10	14
over 560 up to 1000	8	11	16	22	28	40	2,5	3,5	5	7	10	14
over 1000 up to 1600	8	12	16	22	32	45	2,5	4	5,5	7	10	14
over 1600 up to 2500	9	12	18	25	36	50	3	4	5,5	8	11	16
over 2500 up to 4000	10	14	18	25	36	50	3	4	6	8	12	16
over 4000 up to 6300	10	14	20	28	40	56	3,5	4,5	6	9	12	18
over 6300 up to 10000	11	16	22	32	45	63	3,5	5	7	10	14	18

Normal module over 2 up to 3.55 mm

Tolerances in µm

Reference circle diameter d in mm	Deviation F_i''						Deviation f_i''					
Gear tooth quality	7	8	9	10	11	12	7	8	9	10	11	12
over 10 up to 50	25	36	50	71	100	140	11	14	20	28	40	56
over 50 up to 125	32	45	63	90	125	160	14	18	25	36	50	71
over 125 up to 280	36	50	71	100	140	200	16	22	32	40	56	80
over 280 up to 560	40	56	80	110	160	220	18	25	36	50	71	100
over 560 up to 1000	45	63	90	125	180	250	20	28	40	56	80	110
over 1000 up to 1600	50	71	100	140	200	280	22	32	45	63	90	125
over 1600 up to 2500	56	80	110	160	220	280	25	36	50	71	100	140
over 2500 up to 4000	63	90	125	160	250	320	28	40	56	80	100	160
over 4000 up to 6300	71	100	140	200	280	400	32	45	63	90	125	180
over 6300 up to 10000	71	110	140	220	280	400	36	50	71	100	140	200

Reference circle diameter d in mm	Deviation F_i'						Deviation f_i'					
Gear tooth quality	7	8	9	10	11	12	7	8	9	10	11	12
over 10 up to 50	36	50	71	110	180	280	18	25	32	50	90	140
over 50 up to 125	40	56	80	125	200	320	18	25	36	56	90	140
over 125 up to 280	45	63	90	140	250	360	18	25	36	56	90	140
over 280 up to 560	50	71	100	160	250	400	18	25	36	56	90	160
over 560 up to 1000	56	80	110	180	280	450	20	28	40	63	100	160
over 1000 up to 1600	63	90	125	200	320	500	20	28	40	63	100	160
over 1600 up to 2500	71	90	125	220	320	560	22	32	40	71	110	180
over 2500 up to 4000	71	100	140	220	360	560	22	32	45	71	110	180
over 4000 up to 6300	80	110	160	250	400	630	25	36	50	80	125	200
over 6300 up to 10000	90	125	180	280	450	710	28	36	56	90	140	220

module over 3.55 up to 6 mm

Tolerances in µm

Reference circle diameter d in mm	Deviation F_i''						Deviation f_i''					
Gear tooth quality	1	2	3	4	5	6	1	2	3	4	5	6
over 10 up to 50	4	5,5	8	11	14	20	1,5	2,5	3	4,5	6	9
over 50 up to 125	4,5	6	9	12	18	25	2	3	4	5,5	8	11
over 125 up to 280	5	7	10	14	20	28	2,5	3	4,5	6	9	12
over 280 up to 560	6	8	12	16	22	32	2,5	3,5	5	7	10	14
over 560 up to 1000	7	9	12	18	25	36	3	4	6	8	11	16
over 1000 up to 1600	7	10	14	20	28	40	3	4,5	6	9	12	18
over 1600 up to 2500	8	11	16	22	32	40	3,5	5	7	10	14	18
over 2500 up to 4000	9	12	18	25	32	45	4	5,5	8	11	16	22
over 4000 up to 6300	9	12	18	25	36	50	4	6	8	12	16	22
over 6300 up to 10000	10	14	20	28	40	56	4,5	6	9	12	18	25

Reference circle diameter d in mm	Deviation F_i						Deviation f_i					
Gear tooth quality	1	2	3	4	5	6	1	2	3	4	5	6
over 10 up to 50	5,5	7	10	14	20	28	2,5	4	5,5	7	10	14
over 50 up to 125	6	9	12	18	25	32	3	4	5,5	8	11	14
over 125 up to 280	7	10	14	20	28	36	3	4	5,5	8	11	16
over 280 up to 560	8	11	16	22	28	40	3	4	6	8	11	16
over 560 up to 1000	9	12	16	22	32	45	3	4,5	6	8	12	16
over 1000 up to 1600	9	12	18	25	36	50	3	4,5	6	9	12	18
over 1600 up to 2500	10	14	20	28	40	56	3,5	4,5	6	9	14	18
over 2500 up to 4000	11	14	20	28	40	56	3,5	5	7	10	14	18
over 4000 up to 6300	11	16	22	32	45	63	3,5	5	7	10	14	20
over 6300 up to 10000	12	16	25	32	45	63	4	5,5	8	11	16	22

Normal module over 3.55 up to 6 mm

Tolerances in µm

Reference circle diameter d in mm	Deviation F_i''						Deviation f_i''					
Gear tooth quality	7	8	9	10	11	12	7	8	9	10	11	12
over 10 up to 50	32	40	56	80	110	160	12	18	25	36	50	63
over 50 up to 125	36	50	71	100	140	180	14	20	28	40	56	80
over 125 up to 280	40	56	80	110	160	200	18	25	32	45	63	90
over 280 up to 560	45	63	90	125	180	250	20	28	40	56	71	110
over 560 up to 1000	50	71	100	140	200	280	22	32	45	60	80	125
over 1000 up to 1600	56	80	110	140	200	280	25	36	50	63	90	125
over 1600 up to 2500	63	80	110	160	220	320	28	36	50	71	100	140
over 2500 up to 4000	63	90	125	180	250	360	32	40	56	80	110	160
over 4000 up to 6300	71	100	140	200	280	400	32	45	63	90	125	180
over 6300 up to 10000	80	110	160	220	320	450	36	50	71	100	140	200

Reference circle diameter d in mm	Deviation F_i						Deviation f_i					
Gear tooth quality	7	8	9	10	11	12	7	8	9	10	11	12
over 10 up to 50	40	56	80	125	200	320	20	28	40	63	100	160
over 50 up to 125	45	63	90	140	250	360	20	28	40	63	110	160
over 125 up to 280	52	71	100	160	250	400	22	32	40	71	110	160
over 280 up to 560	56	80	110	180	280	450	22	32	45	71	110	180
over 560 up to 1000	63	90	125	200	320	500	22	32	45	71	110	180
over 1000 up to 1600	71	100	140	220	360	560	25	32	50	71	125	200
over 1600 up to 2500	71	100	140	220	360	630	25	36	50	80	125	200
over 2500 up to 4000	80	110	160	250	400	630	25	36	50	80	125	200
over 4000 up to 6300	90	125	180	280	450	710	28	40	56	90	140	220
over 6300 up to 10000	90	140	180	280	450	710	32	45	63	100	160	250

nal module over 6 up to 10 mm

Tolerances in μm

Reference circle diameter d in mm	Deviation F_i''						Deviation f_i''					
Gear tooth quality	1	2	3	4	5	6	1	2	3	4	5	6
over 10 up to 50	4,5	6	9	12	16	22	2	3	4	5	7	10
over 50 up to 125	5	7	10	14	20	28	2,5	3	4,5	6	9	12
over 125 up to 280	6	8	11	16	22	32	2,5	3,5	5	7	10	14
over 280 up to 560	6	9	12	18	25	36	3	4	5,5	8	11	16
over 560 up to 1000	7	10	14	20	28	40	3	4,5	6	9	12	18
over 1000 up to 1600	8	11	16	22	32	40	3,5	5	7	10	14	18
over 1600 up to 2500	8	12	16	22	32	45	4	5,5	7	10	14	20
over 2500 up to 4000	9	14	18	25	36	50	4	6	8	11	16	22
over 4000 up to 6300	10	14	20	28	40	56	4,5	6	9	12	18	25
over 6300 up to 10000	11	16	22	28	40	63	5	7	10	14	20	28

Reference circle diameter d in mm	Deviation F_i'						Deviation f_i'					
Gear tooth quality	1	2	3	4	5	6	1	2	3	4	5	6
over 10 up to 50	6	9	12	16	22	32	3,5	4,5	7	9	12	18
over 50 up to 125	7	10	14	20	28	40	3,5	5	7	9	14	18
over 125 up to 280	8	11	16	22	32	45	3,5	5	7	10	14	18
over 280 up to 560	9	12	18	25	32	45	3,5	5	7	10	14	20
over 560 up to 1000	10	14	18	25	36	50	3,5	5	7	10	14	20
over 1000 up to 1600	10	14	20	28	40	56	4	5	7	10	14	20
over 1600 up to 2500	11	16	22	32	40	56	4	5,5	8	11	16	22
over 2500 up to 4000	12	16	22	32	45	63	4	6	8	11	16	22
over 4000 up to 6300	12	18	25	36	50	71	4	6	8	12	16	22
over 6300 up to 10000	14	18	25	36	50	71	4,5	6	9	12	18	25

Normal module over 6 up to 10 mm

Tolerances in μm

Reference circle diameter d in mm	Deviation F_i''						Deviation f_i''					
Gear tooth quality	7	8	9	10	11	12	7	8	9	10	11	12
over 10 up to 50	32	45	63	90	125	180	14	20	28	40	56	80
over 50 up to 125	40	56	71	110	140	200	18	25	32	45	63	90
over 125 up to 280	45	63	80	120	160	250	20	28	40	56	71	100
over 280 up to 560	50	71	100	140	180	250	22	32	45	63	80	125
over 560 up to 1000	56	71	110	140	200	280	25	32	50	63	90	125
over 1000 up to 1600	56	80	110	160	250	320	28	36	50	71	100	140
over 1600 up to 2500	63	90	125	180	250	360	28	40	56	80	110	160
over 2500 up to 4000	71	100	140	180	280	360	32	45	63	90	125	180
over 4000 up to 6300	80	110	160	220	320	450	36	50	71	100	140	200
over 6300 up to 10000	80	125	160	250	320	450	40	56	80	110	160	220

Reference circle diameter d in mm	Deviation F_i						Deviation f_i					
Gear tooth quality	7	8	9	10	11	12	7	8	9	10	11	12
over 10 up to 50	45	63	90	140	220	360	25	36	50	80	125	200
over 50 up to 125	56	71	100	160	280	450	25	36	50	80	125	200
over 125 up to 280	63	80	110	180	280	500	25	36	50	80	125	220
over 280 up to 560	63	90	125	200	320	500	28	36	50	80	140	220
over 560 up to 1000	71	100	140	220	360	560	28	40	56	90	140	220
over 1000 up to 1600	80	110	160	250	400	630	28	40	56	90	140	220
over 1600 up to 2500	80	110	160	250	400	630	28	40	56	90	140	250
over 2500 up to 4000	90	125	180	280	450	710	32	45	63	100	160	250
over 4000 up to 6300	100	140	200	320	500	800	32	45	63	100	160	250
over 6300 up to 10000	100	140	200	320	500	800	36	50	71	110	180	280

ormal module over 10 up to 16 mm

Tolerances in µm

Reference circle diameter d in mm	Deviation F_i''						Deviation f_i''					
Gear tooth quality	1	2	3	4	5	6	1	2	3	4	5	6
over 50 up to 125	5,5	8	11	16	22	32	2,5	3,5	5	7	10	14
over 125 up to 280	6	9	12	18	25	36	3	4	6	8	11	16
over 280 up to 560	7	10	14	20	28	40	3,5	4,5	6	9	12	18
over 560 up to 1000	8	11	16	22	28	40	3,5	5	7	10	14	20
over 1000 up to 1600	8	12	16	22	32	45	4	5,5	8	11	14	20
over 1600 up to 2500	9	12	18	25	36	50	4	6	8	11	16	22
over 2500 up to 4000	10	14	20	28	40	56	4,5	6	9	12	18	25
over 4000 up to 6300	10	14	20	28	40	56	4,5	7	9	14	18	28
over 6300 up to 10000	11	16	22	32	45	63	5	7	10	14	20	28

Reference circle diameter d in mm	Deviation F_i'						Deviation f_i'					
Gear tooth quality	1	2	3	4	5	6	1	2	3	4	5	6
over 50 up to 125	8	11	16	22	32	45	4,5	6	9	12	16	22
over 125 up to 280	9	12	18	25	36	50	4,5	6	9	12	16	25
over 280 up to 560	10	14	20	28	40	56	4,5	6	9	12	18	25
over 560 up to 1000	11	16	22	28	40	56	4,5	6	9	12	18	25
over 1000 up to 1600	12	16	22	32	45	63	4,5	6	9	12	18	25
over 1600 up to 2500	12	18	25	36	45	63	5	7	10	14	18	25
over 2500 up to 4000	14	18	25	36	50	71	5	7	10	14	20	28
over 4000 up to 6300	14	20	28	40	56	80	5	7	10	14	20	28
over 6300 up to 10000	14	20	28	40	56	80	5,5	8	11	14	22	28

Normal module over 10 up to 16 mm

Tolerances in µm

Reference circle diameter d in mm	Deviation F_i''						Deviation f_i''					
Gear tooth quality	7	8	9	10	11	12	7	8	9	10	11	12
over 50 up to 125	45	63	80	125	160	250	20	28	40	56	80	110
over 125 up to 280	50	71	90	125	180	250	22	32	45	63	90	125
over 280 up to 560	56	71	100	140	200	280	25	36	50	71	90	125
over 560 up to 1000	56	80	110	160	250	320	28	36	50	71	100	140
over 1000 up to 1600	63	90	125	180	250	360	28	40	56	80	110	160
over 1600 up to 2500	71	100	140	180	250	360	32	45	63	90	125	160
over 2500 up to 4000	71	100	140	200	280	400	36	50	63	90	125	180
over 4000 up to 6300	80	110	160	220	320	450	36	56	71	110	160	220
over 6300 up to 10000	90	125	180	250	360	500	40	56	80	110	160	220

Reference circle diameter d in mm	Deviation F_i'						Deviation f_i'					
Gear tooth quality	7	8	9	10	11	12	7	8	9	10	11	12
over 50 up to 125	63	90	125	200	320	500	32	45	63	100	160	250
over 125 up to 280	71	100	140	220	360	560	32	45	63	100	160	280
over 280 up to 560	71	100	140	220	360	630	32	45	63	110	180	280
over 560 up to 1000	80	110	160	250	400	630	36	50	71	110	180	280
over 1000 up to 1600	90	125	180	280	450	710	36	50	71	110	180	280
over 1600 up to 2500	90	125	180	280	450	710	36	50	71	110	180	280
over 2500 up to 4000	100	140	200	320	500	800	36	50	71	125	180	320
over 4000 up to 6300	110	160	220	360	560	900	40	56	80	125	200	320
over 6300 up to 10000	110	160	220	360	560	900	40	63	80	125	200	320

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module over 16 up to 25 mm

Tolerances in μm

Reference circle diameter d in mm	Deviation F_i''						Deviation f_i''					
Gear tooth quality	1	2	3	4	5	6	1	2	3	4	5	6
over 50 up to 125	6	9	12	18	25	36	3	4,5	6	8	12	16
over 125 up to 280	7	10	14	20	28	36	3,5	4,5	7	9	12	18
over 280 up to 560	8	11	16	22	28	40	3,5	5	7	10	14	20
over 560 up to 1000	9	12	16	22	32	45	4	5,5	8	11	16	22
over 1000 up to 1600	9	12	18	25	36	50	4,5	6	8	12	16	22
over 1600 up to 2500	10	14	20	28	40	56	4,5	6	9	12	18	25
over 2500 up to 4000	11	14	20	28	40	56	5	7	10	14	20	28
over 4000 up to 6300	11	16	22	32	45	63	5	7	10	14	20	28
over 6300 up to 10000	12	18	25	36	50	71	5,5	8	11	16	22	32

Reference circle diameter d in mm	Deviation F_i						Deviation f_i					
Gear tooth quality	1	2	3	4	5	6	1	2	3	4	5	6
over 50 up to 125	9	12	18	25	36	50	5,5	8	11	16	22	32
over 125 up to 280	10	14	20	28	40	56	5,5	8	11	16	22	32
over 280 up to 560	11	16	22	32	45	63	6	8	11	16	22	32
over 560 up to 1000	12	18	25	32	45	63	6	8	12	16	22	32
over 1000 up to 1600	14	18	25	36	50	71	6	8	12	16	22	32
over 1600 up to 2500	14	20	28	40	56	71	6	9	12	16	25	32
over 2500 up to 4000	14	20	28	40	56	80	6	9	12	18	25	32
over 4000 up to 6300	16	22	32	45	63	90	6	9	12	18	25	36
over 6300 up to 10000	16	22	32	45	63	90	7	9	14	18	25	36

Normal module over 16 up to 25 mm

Tolerances in µm

Reference circle diameter d in mm	Deviation F_i''						Deviation f_i''					
Gear tooth quality	7	8	9	10	11	12	7	8	9	10	11	12
over 50 up to 125	50	71	90	125	180	250	22	32	45	63	90	125
over 125 up to 280	56	71	100	140	200	280	25	36	50	71	100	140
over 280 up to 560	56	80	110	160	250	320	28	40	56	80	110	140
over 560 up to 1000	63	90	125	180	250	360	32	40	56	80	110	160
over 1000 up to 1600	71	100	140	200	280	360	32	45	63	90	110	160
over 1600 up to 2500	71	100	140	200	280	400	36	50	71	100	140	180
over 2500 up to 4000	80	110	160	220	320	450	36	50	71	100	140	200
over 4000 up to 6300	90	125	180	250	360	500	40	56	80	110	160	220
over 6300 up to 10000	100	140	200	280	400	560	45	63	90	125	180	250

Reference circle diameter d in mm	Deviation F_i						Deviation f_i					
Gear tooth quality	7	8	9	10	11	12	7	8	9	10	11	12
over 50 up to 125	71	100	140	220	360	560	40	56	80	140	220	320
over 125 up to 280	80	110	160	250	400	630	45	63	80	140	220	360
over 280 up to 560	90	125	160	280	450	710	45	63	90	140	220	360
over 560 up to 1000	90	125	180	280	450	710	45	63	90	140	220	360
over 1000 up to 1600	100	140	200	320	500	800	45	63	90	140	220	360
over 1600 up to 2500	110	140	200	320	500	800	45	63	90	140	220	360
over 2500 up to 4000	110	160	220	360	560	900	45	63	90	140	250	400
over 4000 up to 6300	125	180	250	400	630	1000	50	71	100	160	250	400
over 6300 up to 10000	125	180	250	400	630	1000	50	71	100	160	250	400

mal module over 25 up to 40 mm

Tolerances in µm

Reference circle diameter d in mm	Deviation F_i'						Deviation f_i'					
Gear tooth quality	1	2	3	4	5	6	1	2	3	4	5	6
over 125 up to 280	8	11	16	22	32	45	4	5,5	8	11	16	22
over 280 up to 560	9	12	16	25	32	45	4	6	8	12	16	22
over 560 up to 1000	9	14	18	25	36	50	4,5	6	9	12	18	25
over 1000 up to 1600	10	14	20	28	40	56	5	7	10	14	18	25
over 1600 up to 2500	11	16	22	28	40	56	5	7	10	14	20	28
over 2500 up to 4000	12	16	25	32	45	63	5,5	8	11	16	22	32
over 4000 up to 6300	12	18	25	36	50	71	5,5	8	11	16	22	32
over 6300 up to 10000	14	18	25	36	50	71	6	9	12	18	25	36

Reference circle diameter d in mm	Deviation F_i						Deviation f_i					
Gear tooth quality	1	2	3	4	5	6	1	2	3	4	5	6
over 125 up to 280	12	18	25	32	45	63	8	11	14	20	28	40
over 280 up to 560	14	18	25	36	50	71	8	11	14	20	28	40
over 560 up to 1000	14	20	28	40	56	80	8	11	16	22	28	40
over 1000 up to 1600	16	22	28	40	56	80	8	11	16	22	32	40
over 1600 up to 2500	16	22	32	45	63	90	8	11	16	22	32	45
over 2500 up to 4000	16	25	32	45	63	90	8	11	16	22	32	45
over 4000 up to 6300	18	25	36	50	71	100	8	11	16	22	32	45
over 6300 up to 10000	18	25	36	50	71	100	8	12	16	25	32	45

Normal module over 25 up to 40 mm

Tolerances in µm

Reference circle diameter d in mm	Deviation F_i''						Deviation f_i''					
Gear tooth quality	7	8	9	10	11	12	7	8	9	10	11	12
over 125 up to 280	56	80	110	160	220	320	28	40	56	80	110	160
over 280 up to 560	63	90	125	180	250	360	32	45	63	90	125	180
over 560 up to 1000	71	100	140	200	280	400	36	45	71	90	125	180
over 1000 up to 1600	80	110	160	200	280	400	36	50	71	100	140	200
over 1600 up to 2500	80	110	160	250	320	450	40	56	80	110	140	200
over 2500 up to 4000	90	125	180	250	320	450	45	56	80	110	160	220
over 4000 up to 6300	100	140	200	280	400	560	45	63	90	125	180	250
over 6300 up to 10000	100	140	200	280	400	560	50	71	100	140	200	280

Reference circle diameter d in mm	Deviation F_i						Deviation f_i					
Gear tooth quality	7	8	9	10	11	12	7	8	9	10	11	12
over 125 up to 280	90	125	180	280	450	710	56	80	110	180	280	450
over 280 up to 560	100	140	200	320	500	800	56	80	110	180	280	450
over 560 up to 1000	110	160	220	320	560	800	56	80	110	180	280	450
over 1000 up to 1600	110	160	220	360	560	900	56	80	110	180	280	500
over 1600 up to 2500	125	160	250	360	630	900	63	80	125	180	320	500
over 2500 up to 4000	125	180	250	400	630	1000	63	90	125	200	320	500
over 4000 up to 6300	140	200	280	450	710	1100	63	90	125	200	320	500
over 6300 up to 10000	140	200	280	450	710	1100	63	90	125	200	320	500

mal module over 40 up to 70 mm

Tolerances in μm

Reference circle diameter d in mm	Deviation F_i'						Deviation f_i'					
Gear tooth quality	1	2	3	4	5	6	1	2	3	4	5	6
over 125 up to 280	9	12	18	25	36	50	4,5	6	9	12	18	25
over 280 up to 560	10	14	20	28	36	56	5	7	10	14	20	28
over 560 up to 1000	10	14	20	28	40	56	5	7	10	14	20	28
over 1000 up to 1600	11	16	22	32	45	63	5,5	8	11	16	22	32
over 1600 up to 2500	12	16	22	32	45	63	5,5	8	11	16	22	32
over 2500 up to 4000	12	18	25	36	50	71	6	9	12	18	25	36
over 4000 up to 6300	14	18	28	36	56	71	6	9	12	18	25	36
over 6300 up to 10000	14	20	28	40	56	80	7	10	14	20	28	40

Reference circle diameter d in mm	Deviation F_i						Deviation f_i					
Gear tooth quality	1	2	3	4	5	6	1	2	3	4	5	6
over 125 up to 280	14	20	28	40	56	80	10	14	20	28	40	56
over 280 up to 560	16	22	32	45	63	90	11	14	22	28	40	56
over 560 up to 1000	16	25	32	45	63	90	11	16	22	32	40	63
over 1000 up to 1600	18	25	36	50	71	100	11	16	22	32	45	63
over 1600 up to 2500	18	25	36	50	71	100	11	16	22	32	45	63
over 2500 up to 4000	20	28	40	56	80	110	11	16	22	32	45	63
over 4000 up to 6300	20	28	40	56	80	110	11	16	22	32	45	63
over 6300 up to 10000	22	32	45	63	90	125	11	16	22	32	45	63