nitee can be given in respect of this translate

Tolerances for Cylindrical Gear Teeth

Tolerances for Working Deviations

<u>DIN</u> 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 $F_1^{\prime\prime}$ $ag{TCE}$
- single-flank working deviation F_1^\prime
- single-flank working error $f_{f i}'$

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

				•		_	Trends (Devia		ya Minin. Hariya a	fi			
						F	i 10	11	12	7 1	, B :- \	9	10	11	12
	Gear	r tooth q		7	8	9	200	280	400	36	50	71	100	140	200
		over up to	125 280	71	.100	140				40	56	80	110	160	220
	C	over up to	280 560	80	110	160	220	320	450				110	160	220
	in mm	over up to	560 1000	80	110	160	220	320	450	40	56	80			· ·
اند والقار		over	1000	90	125	180	250	360	500	45	63	90	125	180	250
	diameter	up to	1600	90	125	180	250	360	500	45	63	90	125	180	250
,	circle d	up to	2500	90	-		200	400	560	50	71	100	140	200	280
		over up to	2500 4000	100	140	200	280	400		-	71	100	140	200	280
	Reference	over up to	4000 6300	110	160	220	280	400	630	50	71				320
	R.	over	6300	110	160	220	320	450	630	56	80	110	160	220] 32
		up to	10000					_ 			a mitti	. •	4 1		

							1		:	· • • • • • • • • • • • • • • • • • • •				i
					F	•		Devia:	tion :	anath Light				
						i 10	11	12	7	8	9	10	11	1
Gear	r tooth qu		7	8	9				80	110	160	250	400	63
	over up to	125 280	110	160	220	360	560	900					400	 6
	over	280	125	180	250	400	630	1000	80	125	160	250 .	400	
E	up to	560	_		050	400	630	1000	80	125	160	250	400	6
in mm	over up to	560 1000	125	180	250	400	030	1000	,		100	280	450	7
ter d	over	1000	140	200	280	450	710	1100	90	125	180	280	430	-
circle diameter	up to	1600		200	280	450	710	1100	90	125	180	280	450	7
le di	over up to	2500	140	200	200				0.0	125	180	280	450	7
	over	2500 4000	160	220	320	500	800	1250	90	125		-		-
Reference	up to over	4000	160	220	320	500	800	1250	90	125	180	280	450	_
efer	up to	6300		-				1400	90	125	180	280	450	
Œ	over	6300 10000	180	250	360	560	900	1400	30				ــــــــــــــــــــــــــــــــــــــ	

							Devi	ation					
			•	. F	i'		•			f	ï'		
Ge	ear 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
mm mm	over 125 up to 280	4,5	6	9	12	16	25	2	2,5	3,5	5	7	10
ar d in	over 280 up to 560	5	7	10	14	20	28	2	3	4	6	8	12
Reference circle diameter d in mm	over 560 up to 1000	5,5	8	11	16	22	32	2,5	3,5	5	7	10	14
ircle d	over 1000 up to 1600	6	9	12	18	25	32	3	4	5,5	8	11	14
ence c	over 1600 up to 2500	7	10	14	18	28	36	3	4,5	6	8	12	16
Refer	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

							Devi	ation					
				F	'í					f	ĩ		
Ge	ear 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
mm .	over / 125 up to 280	5,5	8	11	16	22	28	2	3	4	5,5	8	11
er d in	over 280 up to 560	6	9	12	16	25	32	2	3	4	6	8	12
liamet	over 560 up to 1000	7	10	. 14	18	25	36	2,5	3	4,5	6	9	12
Reference circle diameter d in mm	over 1000 up to 1600	7	10	14	20	28	40	2,5	3,5	4,5	7	9 .	12
о ариа.	over 1600 up to 2500	8	11	16	22	32	45	2,5	3,5	5	7	10	14
Refer	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

							Devi	ation					
				. F	7''		٠			, f	ï'		
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
mm	over 125 up to 280	4,5	6	9	12	16	25	2	2,5	3,5	5	7	10
er d in	over 280 up to 560	5	7	10	14	20	28	2	3	4	6	8	12
Reference circle diameter d in mm	over 560 up to 1000	5,5	8	11	16	22	32	2,5	3,5	5	7	10	14
Sircle di	over 1000 up to 1600	6	9	12	18	25	32	3	4	5,5	8	11	14
rence c	over 1600 up to 2500	7	10	14	18	28	36	3	4,5	6	8	12	16
1	over 2500 up to 4000	8	11	14	20	28	40	3,5	, 5	7	9	14	18
Person Silver	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

							Devi	ation					
				F	ĭ.					1	ĩ		
G	ear 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	<i>'</i> 10
	over 50 up to 125	5	7	10	14	18	25	2	3	4	5,5	8	11
E .	over / 125 up to 280	5,5	8	11	16	22	28	2	3	4	5,5	8	11
er d in	over 280 up to 560	6	9	12	16	25	32	2	3 -	4	6	8	12
Reference circle diameter d in mm	over 560 up to 1000	7	10	. 14	18	25	36	2,5	3	4,5	6	9	12
sircle c	over 1000 up to 1600	7	10	14	20	28	40	2,5	3,5	4,5	7	9	12
rence (over 1600 up to 2500	8.	11	16	22	32	45	2,5	3,5	5	7	10	14
Refer	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



Γ							108	·	Devia	ition			11	CC.	
						F	i				e de la composición dela composición de la composición dela composición de la composición de la composición dela composición dela composición de la composición de la composición dela composición de la composición dela composición dela composición	f.	,		
	Gear	tooth o	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 up to	10 50	22	32	45	63	9 <u>0</u>	125	9 - 1	12	18,	25	36	50
	•	over up to	50 125	28	40	56	80	110	160	12	16	(22)	32	45	63
	E	over up to	125 280	32	45	63	90	125	180	14	20	28	36	56	71
	er d in	over up to	280 560	36	50	71	100	140	200	16	22	32	45	63	90
	Reference circle diameter d in mm	over up to	560 1000	45	63	80	110	160	220	18	25	36	50	71	100
	sircle d	over up to	1000 · 1600	45	63	90	_125	180	250	20	28	40	56	80	110
	rence c	over up to	1600 2500	50	71	100	140	200	280	22	32	45	63	90	125
	Refer	over up to	2500 4000	38-	80	110	160	220	320	25	36	50	71	100	140
		over up to	4000 6300	63	90	125	180	250	360	28	40	56	80	110	160
		over	6300 · 10000	71 '	100	140	200	280	400	32	45	63	90	125	180

							/ Devi	ation		•			
		-		F	í					ſ	í		
Gea	r 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
r d in	over 280 up to 560	45	63	90	140	220	360	16	22	32	50	80	140
amete	over 560 up to 1000	50	71	100	160	250	400	18	25	32	56	90	140
Reference circle diameter d in mm	over 1000 up to 1600	56	80	110	180	280	450	18	25	36	56	90	-140
nce ci	over 1600 up to 2500	63	80	125	180	320	500	18	28	36	63	100	160
Refere	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

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	•			I	7í′					f	ï		. [
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
Ē	over 125 up to 280	5	7	9	14	18	25	2	3	4	5,5	8	11
d in mm	over 280 up to 560	5	8	11	14	20	28	2,5	3,5	4,5	6	9	12
imeter	over 560 up to 1000	6	9	12	16	22	32	2,5	3,5	5	7	10	14
cle dia	over 1000 up to 1600	7	9	14	18	25	36	3	4	6	8	11	16
nce cir	over 1600	7	10	14.	20	28	40	3,5	4,5	6	9	12	18
Reference circle diameter	over 2500 up to 4000	8	11	16	22	32	45	3,5	5	7	10	14	20
LL.	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

·							Devi	ation					
				Ι	7í				٠.	f	i		
Gear	r 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
mi	over 125 up to 280	6	9	12	18	25	32	2,5	3,5.	4,5	7	9	12
Reference circle diameter d in mim	over 280 up to 560	7	10.	14	20	25	36	2,5	3,5	5	7	10	14
ameter	over 560 up to 1000	8	11	16	22	28	40	2,5	3,5	5	7	10	14
cle dia	over 1.00 <u>0</u> up to 1600	8	12	16	22	32	45	2,5	. 4	5,5	7	10	14
nce cii	over 1600 up to 2500	9	12.	18	25	36	50	3	4	5,5	8	11	16
Refere	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



							Dev	iation					
			1."	1	?''					7. · · · · · · · · · · · · · · · · · · ·	ſ'i'	*.	3 4
Gea	ar tooth quality	7	8	9	10	11	12	7	8	9	10	1.11	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
E	over 125 up to 280	36	50	71	100	140	200	16	22	32	40	56	80
Reference circle diameter d in mm	over 280 up to 560	40	56	80	110	160	220	18	25	36	50	71	100
ameter	over 560 up to 1000	45	63	90	125	180	250	20	28	40	56	80	110
rcle di	over 1000 up to 1600	50	71	100	140	200	280	22	32	45	- 63	90	125
ince ci	over 1600 up to 2500.	56	80	110	160	220	280	25	36	50	71	100	140
Refere	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

							Dev	iation					:
					F_i'] .	·.		f'i		1
Ge	ear 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
d in mm	over 280 up to 560	50	7,1	100	160	250	400	18	25	36	56	90	160
Reference circle diameter d	over 560 up to 1000	56	80	110	180	280	450	20	28	40	63	100	160
rcle di	over 1000 up to 1600	63	90	125	200	320	500	20	28	40	63	100	160
nce ci	over 1600 up to 2500	71.	90	125	220	320	560	.22	32	40	71	110	180
Refere	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

					F	~i"		Devi	ation .		f	i de la companya de l		
Gear	r tooth (quality	1	2	3	4	5	6	1	2	3	4	5	6
	over up to	10 50	4	5,5	8	11	14	20	1,5	2,5	3	4,5	6	9
Complete Com	over up to	50 125	4,5	6	9	12	18	25	2	3	4	5,5	. 8	11
<u> </u>	over up to	125 280	5	7	10	14	20	28	2,5	3	4,5	6	9	12
d in mm	over up to	280 560	6	8	12	16	22	32	2,5	3,5	5	7	10	14
meter d	over up to	560 1000	7	9	12	18	25	36	3	4	6	8	11	16
circle diameter d	over up to	1000 1600	7	10	14	20	28	4Ò	3	4,5	6	⁷ 9	12	18
oe cir	over up to	1600 2500	8	11	16	22	- 32	40	3,5	5	7	10	14	18
Reference	over up to	2500 4000	9	12	18	25	32	45	4	5,5	8	11	16	22
<u>u</u>	over up to	4000 6300	9	12	18	25	36	50	4	6	8	12	16	22
	over up to	6300 10000	10	14	20	28	40	56	4,5	6	9	12 :	18	25

							Devi	ation					
				1	T'i					f	i		
	ear 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
٤	over 125 up to 280	7	10.	14	20	28	36	3	4	5,5	8	11	16
Reference circle diameter d in mm	over 280 up to 560	. 8	11	16	22	28	40	3	4	6	8	11	. 16
ımeter	over 560 up to 1000	9	12	.16	22	32	45	3	4,5	6	8	12	16
cle dia	over 1000 up to 1600	9	12	18	25	36	50	3	4,5	6	9	12	18
nce cir	over 1600 up to 2500	10	14	20	28	40	56	3,5	4,5	6	9	14	18
Refere	over 2500 up to 4000	11	14	20	28	40	56	3,5	5	7	10	14	18
<u> </u>	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



		7											
							Dev	iation			-		
	,				$F_{i}^{\prime\prime}$: , ·	$f_{\mathbf{i}_{j}}^{\prime\prime}$		
, (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
mm n	over 125 · up to 280	40	56	80	110	160	200	18	25	32	45	63	90
ter d i	over 280 up to 560	45	63	90	125	180	250	20	28	40	56	71	110
diame	over 560 up to 1000	50	71	100	140	200	280	22	32	45	60	80	125
Reference circle diameter d in mm	over 1000 up to 1600	56	80	110	140	200	280	25	36	50	63	90	125
erence	over 1600 up to 2500	63	80	110	160	220	320	28	36	50	71	100	140
Ref	over 2500 up to 4000	63	90	125	180	250	360	32	40	56	80	110	~130
	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

		T				'							
• •	· ·			•			Dev	iation					
			, .		$F_{\mathbf{i}}'$.						$f'_{\mathbf{i}}$		
Ge	ar 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
mm	over 125 up to 280	52	71	100	160	250	400	22	32	40	71	110	160
er d in	over 280 up to 560	56	80	110	180	.280	450	22	32	45	71	110	180
Jiamet	over 560 up to 1000	63	90	125	200	320	500	22	32	45	71	110	180
Reference circle diameter d in nım	over 1000 up to 1600	71	100	140	220	360	560	25	32	50	71	125	200
rence o	over 1600 up to 2500	. 71	100	140	220	360	630	25	36	50	80	125	200
Refe	over 2500 up to 4000	80	110	160	250	400	630	25	36	50	. 80	125	200
	over 4000 up to 6300	90	1,25	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

Tolerances in µm

						Devi	ation	2 (* 1871) 2 (* 1871)				
			F	1					f	ï		
- 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 E 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
e over 560 up to 1000	7	10	14	20	28	40	3	4,5	6	9	12	18
over 280 up to 560 up to 560 up to 1000 en up to 1000 over 1000 up to 1600 over 1600 up to 2500 over 2500 up to 4000	8	11	16	22	32	40	3,5	5	7	10	14	18
ច over 1600 ខ្លុំ 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	122
over 4000 y 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

				-			Devi	ation					
				1	7′i					f	í		
	ear 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
. Ши	over 125 up to 280	8	11	. 16	22	32	45	3,5	5	7	10	14	18
d in n	over 280 up to 560	9	12	18	25	32	45	3,5	5	7	10	14	. 20
imeter	over 560 up to 1000	10	14 .	18	25	36	50	3,5	5	7	10	14	,20
cle dia	over 1000 up to 1600	10	14	. 20	28	40	56	4	5	7	10	14	20
nce cir	over 1600 up to 2500	11	16	22	32	40	56	4	. 5,5	8	11	16	22
Reference circle diameter d in mm	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



$\overset{\circ}{\text{Tolerances in}}\,\mu\text{m}$

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					Eu.	:	Dev	iation					
					$F_{\mathbf{i}}^{\prime\prime}$			1			$f_1^{\prime\prime}$		*
	Gear tooth quality	7	8	9	10	11	12	7	8	9	10	1 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
mr	over 125 up to 280	45	63	80	120	160	250	20	28	40	56	71	100
d in n	over 280 up to 560	50.	71	100	140	180	250	22	32	45	63	80	125
meter	over 560 up to 1000	56	7.1	110	140	200	280	25	32	50	63	90	125
cle dia	over 1000 up to 1600	56	80	110	160	250	320	28	36	50	71	100	140
, nce cir	over 1600 up to 2500	63	90	125	180	- 250	360	28	40	56	80	110	160
Reference circle diameter d in mm	over 2500 up to 4000	71	100	140	180	280	360	32	45	63		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

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				<u>.</u>				.:			·			
					$F_{\mathbf{i}}'$		Der	viation						
	Gear tooth quality	7						1.	``.		fi			
+		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 E 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	-
	E up to 280 E over 280 up to 560 up to 1000 over 1000	71	100	140	220	360	560	28	40	56	90	140	220	-
	over 1000		<u> </u>			ļ ·		-	-			140	220	_
	up to 1600 over 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	

									Devi	tion					-
						F	ï					f	ľ		
	Gear	tooth o	quality	1	. 2	3	4	5	6	1	2	3	4	5	6
		over up to	50 125	5,5	8	11	16	22	32	2,5	3,5		7	10	14
-		over up to	125 280	6	9	12	18	25	36	3	4 .	6	8	11	16
7	E u	over up to	280 560	7	10	14	20	28	40	3,5	4,5	6	9	12	18
-	Reference circle diameter d in mm	over up to	560 1000	8	11	16	22	28	40	3,5	5	7	10	14	20
-	diame	over up to	1000 1600	8	12	16	22	32	45	4	5,5	8	11	14	20
,	circle	over up to	1600 2500	9	. 12	18	25	36	50 4	4	6	8 *	*** 111	16	22
	erence	over up to	2500 <u> </u>	10	14	20	28	40	56	4,5	6	9	12	18	25
	Refe	over up to	4000 6300	10	14	20	28	40	56	4,5	7	9	14	18	28
		over up to	63 <u>0</u> 0 10000	11	16	22	32	45	63	5	7	10	14	20	28

							Devi	ation		•			
	,			F	i'					f	í :	•	
G	Sear tooth quality	1 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
mm u	over 280 up to 560	10	14	20	28	40	56	4,5	6	9	12	18	25
Reference circle diameter d in mm	over 560 up to 1000	11	16	22	28	40	56	4,5	6	9	12	18	25
diame	over 1000 up to 1600	12	16	22	32	45	63	4,5	6	. 9	12	18	25
circle	over 1600 up to 2500	12	18	25	36	45	63	5	7	10	14	18	25
rence	over 2500 up to 4000	14	18	25	36	50	71	5	7	10	14	20	28
Refe	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



			•			•	Devia	ition					·
			•	F	i					f	• • • • • • • • • • • • • • • • • • • •		
Gea	ar 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 4	56	80	110
	over 125 up to 280	50	71	90	125	180	250	22	32	45	63	90	125
mm r	over 280 up to 560	56	71	100	140	200	280	25	36	50	71	90	125
er d ir	ōver 560 up to 1000	56	80	110	160	250	320	28	36	50	71	100	140
Reference circle diameter d in mm	over 1000 up to 1600	63	90	125	180	250	360	28	40	56	80	110	160
circle	over 1600 up to 2500	71	100	140	180	250	360	32	45	63	90	125	160
rence	over 2500 up to 4000	71	100	140	200	280	. 400	36	50	63	90	125	180
Refe	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

							Devia	ation	•				
				F	Sí.			t		f	í ·	•	
Gea	r tooth quality	7	8	9	10	11	12	7	8 7	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
mm r	over 280 up to 560	71	100	140	220	360	630	32	45	63	110	180	280
ter d in	over 560 up to 1000	80	110	160	250	400	630	36	50	71	110	180	280
diame	over 1000 up to 1600	90	125	180	280	450	710	36	50	71	110	180	280
circle	over 1600 up to 2500	90	125	180	280	450	710	36	50	71	110	180	280
Reference circle diameter d in mm	over 2500 up to 4000	100	140	200	320	500	800	36	50	71	125	180	320
Refe	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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					,				Devi	ation			**; _ (52 , ***)			-
					•	F	ï					. <i>f</i>	í'			
	Gea	r tooth c	quality	1	2	3	4	5	6	1	2	3	4	5	6	-
1		over up to	50 125	6	9	12	18	25	36	3	4,5	6 ,	8	12	16	
		over up to	125 280	7	10	14	. 20	28	36	3,5	4,5	7	9	12	18	
	E E E	over up to	280 560	8	11	16	22	28	40	3,5	5	7	10	14	20	
	terd ir	over up to	560 1000	9	- 12	16	22	32	45	. 4	5,5	8	11	16	22	-
	Reference circle diameter d in mm	over up to	1000 1600	. 9	12	18	25	36	50	4,5	6	8	12	16	22	-
	circle	over up to	1600 2500	10	14	20	28	40″	56	4,5	6	9	12	18	25	
-	rence	over up to	2500 4000	11	14	20	28	40	 56	5	7	10	14	20	28	-
	Refe		4000 6300	11	16	22	32	45	63	5	7	10	14	20	28	
.		over up to 1	6300 0000	12	18	_: 25	36	50	71	5,5	8	11	16	22	32	

				. 1	,		Devi	ation					
				· 1	7¦					1	í		<i>*</i> ~
Ge	ar 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
mm n	over 280 up to 560	11	16	22	32	45	63	6	8	. 11.	16	22	32
iter d i	over 560 up to 1000	12	18	25	32	45	63	6	8	12	16	22	32
$_{ m c}$ Reference circle diameter d in mm	over 1000 up to 1600	14	18	25	36	50	71	6	8	12	16	22	32
e circle	over 1600 up to 2500	14	20	28	40	56	71	6	, 9	12	. 16	25	32
ferenci	over 2500 up to 4000	14	20	28	40	⁷ 56	80	6	9	12	18.	25	32
Re	ove 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

fi'	
$f_i^{\prime\prime}$	
9 10	11 12
15 63	90 125
0 71	100 140
6 80	110 140
6 80	110 160
3 90 1	110 160
1 100 1	140 180
1 100 1	140 200
0 110 1	160 220
0 125 1	180 250
5 - 5 - 7 - 30	56 80 53 90 71 100 71 100 80 110

							Dev	iation	\$ 1,0				
					$F_{\mathbf{i}}'$		•				f'i	/ ***	
(Bear 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
n mm	over 280 up to 560	90	125	160	280	450	710	45	63	90	140	220	360
Reference circle diameter d in mm	over 560 up to 1000	90	125	180	280	450	710	45	63	90	140	220	360
diame	over 1000 up to 1600	100	140	200	320	500	800	45	63	90	140	220	360
circle	over 1600 up to 2500	110	140	200	320	500	800	. 45	63	90	140	220	360
erence	over 2500 up to 4000	110	160	220	360	560	900	45	63	90	140	250	400
Ref	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

		1											
							Devi	ation			•		*
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	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 E up to 560	9	12	16	25	32	45	4	- 6	8	12	16	22
7	up to 560 E over 560 up to 1000	9	14	18	25	36	50	4,5	6	9	12	18	25
ere ser	over 1000 up to 1600	10	14	20	28	40	56	5	7	10	14	18	25
1 0	over 1600 up to 2500	11	16	22	28	40	56	5	7	10	14	20	- 28
1000	over 1000 up to 1600 over 1600 up to 2500 over 2500 up to 4000 over 4000 up to 6300	12	16	25	32	45	63	5,5	8	11	16	22	32
Rafero	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

3							Devi	ation					<i>P</i> ~			
				1	Fi .					$f_{\mathbf{i}}$						
Ge	ar 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			
<u>E</u>	over 280 up to 560	14	18	25	36	50	71	8	11	14	20	28	40			
Reference circle diameter d in mm	over 560 up to 1000	14	20	28	40	56	80	8	11	16	22	28	40			
meter	over 1000 up to 1600	16	22	28	40	56	80	8	11	16	22	32	40			
cle dia	over 1600 up to 2500	16	22	32	45	63	90	8	, 11	16	22	32	45			
nce cir	over 2500 up to 4000	16	25	32	45	63	90	8	11	16	22	32	45			
Refere	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			

Tolerances in µm

							Devi	ation				,	
			•		F;'			1			fi'		
Gea	r tooth quality	7	8	. 9	10	11	12	7 7	8	9 -	- 10	1.1	12
	over 125 up to 280	56	80	110	160	220	320	28	40	56	80	110	160
, Ē	over 280 up to 560	63	90	125	180	250	360	32	45	63	90	125	180
d in mm	over 560 up to 1000	71	100	140	200	280	400	36	45	71	90	125	180
ameter	over 1000 up to 1600	80	110	160	200	280	400	36	50	71	100	140	200
îcle di	over 1600 up to 2500	8.0	110	160	250	320	. 450	40	56	80	110	140	200
Reference circle diameter	over 2500 up to 4000	90	125	180	250	320	450	45	56	80	110	160	220
Refere	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	7.1	100	140	200	280

17		E'					Devi	ation	·		* · ·		
			*.	j	F_1'		·	9		·	ſ'i	,	
Ge	ar 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	80ــ	110	180	280	450
mn	over 280 up to 560	100	140	200	320	500	800	56	80	110	180	280	450
d in mm	over 560 up to 1000	110	160	220	320	560	800	56	80	110	180	280	450
Reference circle diameter d	over 1000 up to 1600	1.10	160	220	360	560	900	56	8,0	110	180	280	500
rcle di	over 1600 up to 2500	125	160	250	360	630	900	63	80	125	180	320	500
ence ci	over 2500 up to 4000	125	180	250	400	630	1000	63	90	125	200	320	500
Refere	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

				•			Devi	ation	÷	ontoneng e.	**************************************		
				1	?"					1	fí'		
Gea	r tooth quality	1	2	3	4	5	6	1	2 .	3	4	5	6
	over 125 up to 280	9, 1	12	18	25	36	50	4,5	6	9	1.2	18	25
, E = 2	over 280 up to 560	10	14	20	28	36	56	5	7	10	14	20	28
d in mm	over 560 up to 1000	10	14	₋ 20	28	40	56	5	7	10	14	20	28
meter	over 1000 up to 1600	11	16	22	32	45	63	5,5	8	11	16	22	32
Reference circle diameter	over 1600 up to 2500	12	16	22	32	45	63	5,5	8	11	16	22	32
nce cir	over 2500 up to 4000	12	18	25	36	50	71	6	9	12	18	25	36
Referen	over 4000 up to 6300	14	18	28	36	56	71	6	9	12	18	25	36
<u> </u>	over 6300 up to 10000	14	20	28	· 40	56	80	7	10	14	20	28	40

							Devi	ation		. • .			<i>P</i> ~
				1	7í					1	ή `	٠	
(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
E	over 280 up to 560	16	22	·32	45	63	90	11	14	22	28	40	. 56
Jin m	over 560 up to 1000	16	25	32	45	63,	90	11	16	22	32	40	63
neter	over 1000 up to 1600	18	25	36	50	71	100	11	16	22	32	45	63
le diar	over 1600 up to 2500	18	25	36	50	71	100	11	.16	22	32	45	63
Ce ciro	over 2500 g up to 4000	20	28	40	56	80	110	11	16	22	32	45	63
Reference circle diameter d in mm	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

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