

**Tolerances for Single-start Hobs  
for Involute Spur Gears**

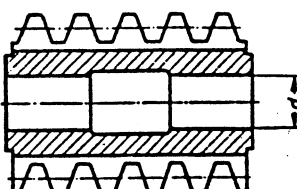
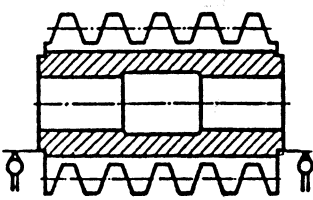
DIN

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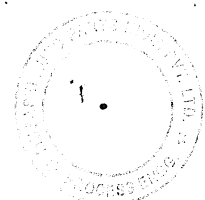
Toleranzen eingängiger Wälzfräser für Stirnräder mit Evolventenverzahnung

The tolerances indicated in this Standard apply to all angles of action. Hobs are divided according to accuracy into five quality classes, namely A, B, C and D plus a special class AA to meet the most exacting requirements. The method of producing hobs of the various quality classes is left to the manufacturer.

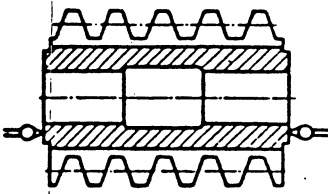
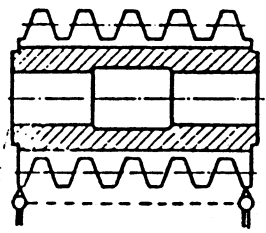
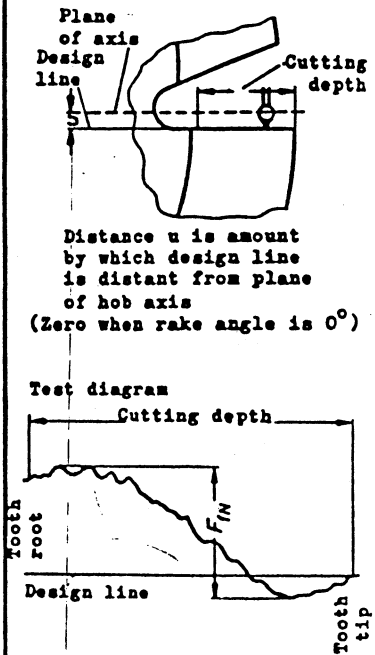
Hob terms are dealt with in DIN 8000 (at present undergoing revision).

Serial No.	Measured quantity	Symbol denoting variation	Quality class	Tolerances in $\mu\text{m}$ ( $1\text{ }\mu\text{m} = 0.001\text{ mm}$ ) for modules									
				over 0,63 to 1	over 1 to 1,6	over 1,6 to 2,5	over 2,5 to 4	over 4 to 6,3	over 6,3 to 10	over 10 to 16	over 16 to 25	over 25 to 40	
1	<u>Bore diameter<sup>1)</sup></u> 		A	ISA tolerance field H 5									
	B		ISA tolerance field H 6										
	C		ISA tolerance field H 6										
	D		ISA tolerance field H 7										
	AA <sup>1)</sup>		ISA tolerance field H 5										
2	<u>Form tolerance of bore<sup>1)</sup></u>		All quality classes	1/2 the bore tolerance									
3	<u>Tolerances for longitudinal or clutch drive keyway</u>		All quality classes	according to DIN 138									
4	<u>Radial run-out on both proof flanges referenced to bore axis</u> 	$f_r$	A	5	5	5	6	8	10	12	16	20	
	B		6	6	6	8	10	12	16	20	25		
	C		10	10	10	12	16	20	25	32	40		
	D		not defined										
	AA		5	5	5	5	5	5	6	6	8		
			The highest points measured on the two proof flanges must not be more than 90° apart										

<sup>1)</sup> Bores with recess are to be treated as a single-diameter through bore with regard to diameter and form tolerances. For hobs of quality class AA it is desirable that the bore should not be made with a recess.



Continued on pages 2 to 5

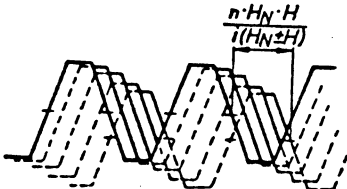
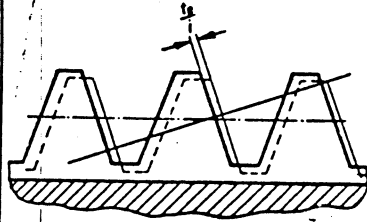
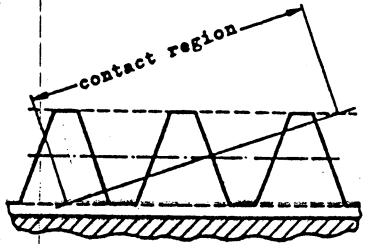

Serial No.	Measured quantity	Symbol denoting variation	Quality class	Tolerances in $\mu\text{m}$ ( $1 \mu\text{m} = 0.001 \text{ mm}$ ) for modules									
				over 0,63 to 1	over 1 to 1,6	over 1,6 to 2,5	over 2,5 to 4	over 4 to 6,3	over 6,3 to 10	over 10 to 16	over 16 to 25	over 25 to 40	
5	<u>Axial run-out on hub faces</u> <u>referenced to bore axis</u> 	$f_{pe}$	A	3	3	3	5	5	8	8	10	10	
			B	4	4	4	6	6	10	10	12	12	
			C	6	6	6	10	10	16	16	20	20	
			D	10	10	10	16	16	25	25	32	32	
			AA	3	3	3	3	3	4	5	5	6	
6	<u>Radial run-out on tooth tips</u> <u>referenced to bore axis</u> 	$f_{rk}$	A	12	16	20	25	32	40	50	63	80	
			B	25	32	40	50	63	80	100	125	160	
			C	50	63	80	100	125	160	200	250	315	
			D	100	125	160	200	250	315	400	500	630	
			AA	10	10	12	16	20	25	32	40	50	
7	<u>Form and positional variation of cutting faces</u>  <p>Distance <math>u</math> is amount by which design line is distant from plane of hob axis (Zero when rake angle is <math>0^\circ</math>)</p>	$F_{IN}$	A	12	16	20	25	32	40	50	63	80	
			B	25	32	40	50	63	80	100	125	160	
			C	50	63	80	100	125	160	200	250	315	
			D	100	125	160	200	250	315	400	500	630	
			AA	10	10	12	16	20	25	32	40	50	

Serial No.	Measured quantity	Symbol denoting variation	Quality class	Tolerances in $\mu\text{m}$ ( $1\mu\text{m} = 0.001\text{ mm}$ ) for modules									
				over 0,63 to 1	over 1 to 1,6	over 1,6 to 2,5	over 2,5 to 4	over 4 to 6,3	over 6,3 to 10	over 10 to 16	over 16 to 25	over 25 to 40	
8	<u>Individual pitch</u> measured at half tooth height	$f_{IN}$											
	A		$\pm 12$	$\pm 16$	$\pm 20$	$\pm 25$	$\pm 32$	$\pm 40$	$\pm 50$	$\pm 63$	$\pm 80$		
	B		$\pm 25$	$\pm 32$	$\pm 40$	$\pm 50$	$\pm 63$	$\pm 80$	$\pm 100$	$\pm 125$	$\pm 160$		
	C		$\pm 50$	$\pm 63$	$\pm 80$	$\pm 100$	$\pm 125$	$\pm 160$	$\pm 200$	$\pm 250$	$\pm 315$		
	D		$\pm 100$	$\pm 125$	$\pm 160$	$\pm 200$	$\pm 250$	$\pm 315$	$\pm 400$	$\pm 500$	$\pm 630$		
		AA	$\pm 10$	$\pm 10$	$\pm 12$	$\pm 16$	$\pm 20$	$\pm 25$	$\pm 32$	$\pm 40$	$\pm 50$		
9	<u>Tooth to tooth pitch</u> measured at half tooth height	$f_{tN}$											
	A		12	16	20	25	32	40	50	63	80		
	B		25	32	40	50	63	80	100	125	160		
	C		50	63	80	100	125	160	200	250	315		
	D		100	125	160	200	250	315	400	500	630		
		AA	10	10	12	16	20	25	32	40	50		
10	<u>Cumulative pitch</u> measured at half tooth height	$F_{tN}$											
	A		25	32	40	50	63	80	100	125	160		
	B		50	63	80	100	125	160	200	250	315		
	C		100	125	160	200	250	315	400	500	630		
	D		200	250	315	400	500	630	800	1000	1250		
		AA	20	20	25	32	40	50	63	80	100		
The tolerances are referenced to the total pitch error; that is to say to the largest cumulative pitch error measured on the ten teeth													

Where:

$E_N$  = lead of gashes or tooth rows  
 $E$  = hob lead (helix)  
 $i$  = number of gashes or tooth rows

The sign in the brackets is + if the gash lead and the hob lead are in opposite directions, and - if they are in the same direction.

Serial No.	Measured quantity	Symbol denoting variation	Quality class	Tolerances in $\mu\text{m}$ ( $1 \mu\text{m} = 0.001 \text{ mm}$ ) for modules								
				over 0,63 to 1	over 1 to 1,6	over 1,6 to 2,5	over 2,5 to 4	over 4 to 6,3	over 6,3 to 10	over 10 to 16	over 16 to 25	over 25 to 40
15	<p>Hob lead in the direction of hand between any two cutting edges on the same thread</p> 	$F_{HF}$	A	10	11	12	14	16	20	25	32	40
			B	20	22	25	28	32	40	50	63	80
			C	40	45	50	56	63	80	100	125	160
			D	80	90	100	112	125	160	200	250	320
			AA	6	6	6	8	10	12	14	18	22
				<p>Where:  <math>H_N</math> = lead of gashes or tooth rows  <math>H</math> = hob lead (helix)  <math>i</math> = number of gashes or tooth rows  <math>n</math> = number of cutting edges over which the measurement is made</p> <p>The sign in the brackets is + if the gash lead and the hob lead are in opposite directions, and - if they are in the same direction.</p>								
16	<p>Base pitch element measured from cutting edge to cutting edge</p> 	$f_0$	A	$\pm 6$	$\pm 7$	$\pm 8$	$\pm 9$	$\pm 10$	$\pm 12$	$\pm 16$	$\pm 20$	$\pm 25$
			B	$\pm 12$	$\pm 14$	$\pm 16$	$\pm 18$	$\pm 20$	$\pm 25$	$\pm 32$	$\pm 40$	$\pm 50$
			C	$\pm 25$	$\pm 28$	$\pm 32$	$\pm 36$	$\pm 40$	$\pm 50$	$\pm 63$	$\pm 80$	$\pm 100$
			D	not defined								
			AA	$\pm 4$	$\pm 4$	$\pm 4$	$\pm 5$	$\pm 6$	$\pm 8$	$\pm 10$	$\pm 12$	$\pm 16$
				<p>Where:  <math>t_0</math> = base pitch  <math>i</math> = number of gashes or tooth rows</p>								
17	<p>Base pitch within a contact region</p>  <p>Test diagram</p> 	$F_0$	A	12	14	16	18	20	25	32	40	50
			B	25	28	32	36	40	50	63	80	100
			C	50	56	63	71	80	100	125	160	200
			D	not defined								
			AA	8	8	8	10	12	16	20	25	32

Other relevant standards:

For fundamental terms and notation for hobs for involute spur gears, see DIN 8000 (at present undergoing revision)

For dimensions for hobs for spur gears with clutch drive slot or keyway, see DIN 8002

For bores, keyways and driving features for tools with parallel bore, see DIN 138

