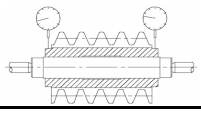
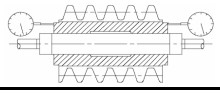
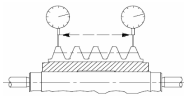
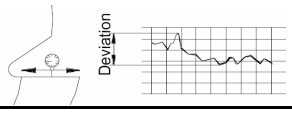
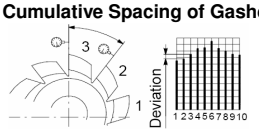
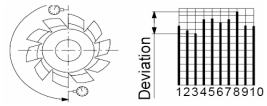
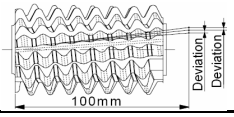
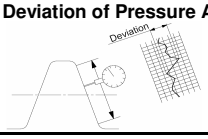
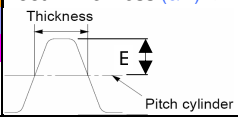
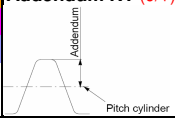
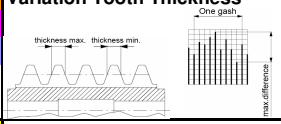
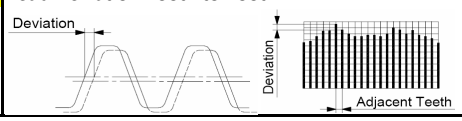
SCHNYDER NORM

Quality Norm for Gear Cutting Tools
Generating Hobs, Worm Milling Cutters, Rack Cutters
Based upon: ISO 4468, DIN 58413

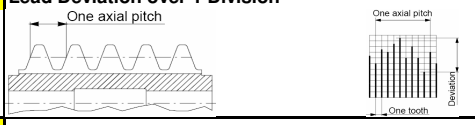
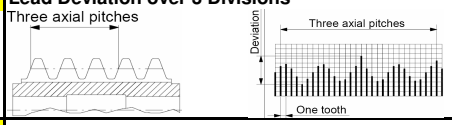
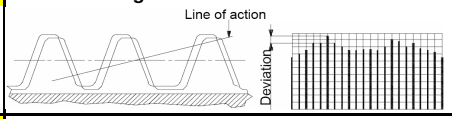
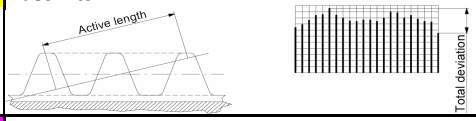
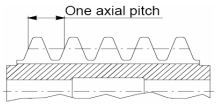
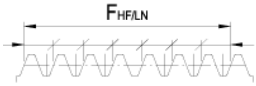
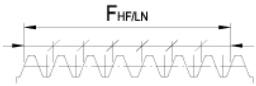
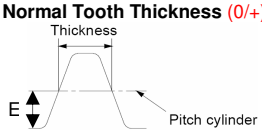
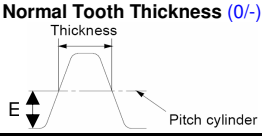
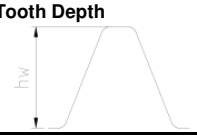
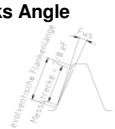
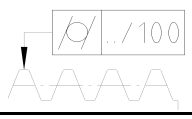
SCHNYDER SA
GEAR CUTTING SOLUTIONS
2504 BIEL-BIENNE

Vers. 8e1

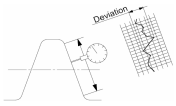
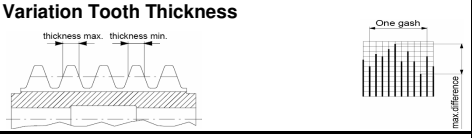
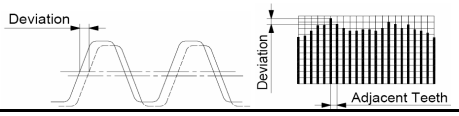
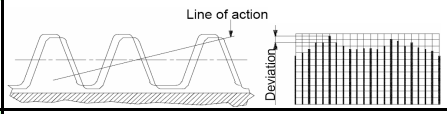
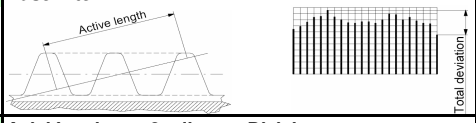
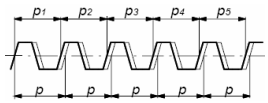
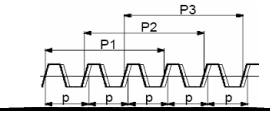
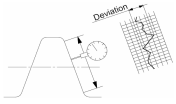
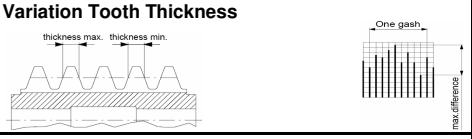
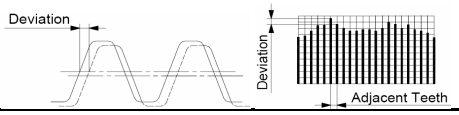
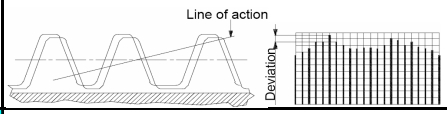
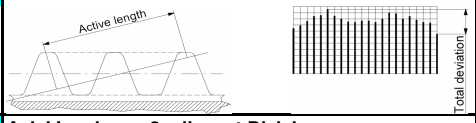
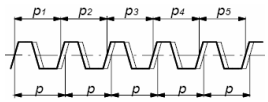
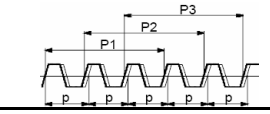
0	**Hole Diameter**		Ø 8 - Ø13	Ø16, Ø19.05, Ø22, Ø25.4, Ø27, Ø31.75, Ø32, Ø40, Ø50, Ø60, Ø80
		4A	**H3**	
	Hole Tolerane **H4/ H3**	3A	**H3**	**H4**
	-> H5 when Hob Length > 4x ∅	2A	**H3**	**H4**
	Scape Tolerance = 1/2 Hole Tolerance	A	**H4**	**H5**
		B	**H5**	

MP	Points of Control	Short	Quality Class	Module 0.10 - 0.25	0.26 - 0.60	0.61 - 1.0	1.01 - 1.6	1.61 - 2.25	2.26 - 3.5	3.51 - 6.0
1	**Hob Runout at Control Diameter** 	**frp**	4A	2	2	2	2	2	2	2
			3A	2	2	2	2	2	3	3
			2A	3	3	3	3	3	4	5
			A	4	4	4	4	5	6	7
			B	6	6	7	7	8	9	11
2	**Face Runout** 	**fps**	4A	2	2	2	2	2	2	2
			3A	2	2	2	2	2	2	3
			2A	3	3	3	3	3	3	4
			A	3	3	4	4	4	5	6
			B	4	4	4	4	4	6	6
3	**Runout of Outside Diameter** 	**frk**	4A	4	5	6	6	7	8	10
			3A	4	5	6	6	7	8	10
			2A	5	6	10	10	12	14	16
			A	8	10	12	16	20	22	25
			B	15	20	25	32	40	44	50
4	**Form and Position of Cutting Surface** 	**FfN**	4A	6	6	6	6	7	8	10
			3A	8	8	9	9	10	12	14
			2A	10	10	13	13	15	16	20
			A	12	12	19	19	21	23	29
			B	14	18	33	33	36	42	52
5	**Cumulative Spacing of Gashes** 	**ftN**	4A	7	7	7	7	8	9	11
			3A	10	10	10	10	11	13	16
			2A	10	10	15	15	16	18	23
			A	12	12	21	21	23	26	32
			B	25	25	37	37	40	46	58
6	**Total Spacing Deviation of Flutes** 	**FtN**	4A	14	14	14	14	14	14	14
			3A	16	16	16	16	16	16	16
			2A	20	20	20	20	25	25	32
			A	25	25	25	32	40	40	50
			B	50	50	50	63	80	80	100
7	**Gash Lead** 	**fHN**	4A	28	28	28	28	28	28	28
			3A	40	40	40	40	40	40	40
			2A	57	57	57	57	57	57	57
			A	80	80	80	80	80	80	80
			B	100	100	100	100	100	100	100
	Hob: 1 Start									
8	**Deviation of Pressure Angle** 	**FfS**	4A	3	3	3	3	3	3	4
			3A	3	4	4	4	4	5	6
			2A	4	5	5	5	5	6	8
			A	6	7	7	7	8	9	11
			B	10	14	15	15	16	18	23
9	**Tooth Thickness** (0/-) --> NT /ST 	**fs**	4A	-6	-8	-10	-12	-16	-20	-24
			3A	-7	-10	-12	-14	-16	-20	-24
			2A	-8	-11	-14	-17	-22	-28	-34
			A	-8	-11	-14	-17	-22	-28	-34
			B	-19	-25	-31	-38	-45	-55	-69
9A	**Addendum NT** (0/+) Tol. MP9/2*(tan αλπηα) 	**haP**	4A	Tolerance= MP9/2*(tanα)						
			3A							
			2A							
			A							
			B							
9B	**Variation Tooth Thickness** 	**Fs**	4A	3	4	4	4	4	5	6
			3A	4	5	6	6	6	7	9
			2A	5	7	8	8	8	10	13
			A	7	8	10	11	13	15	17
			B	12	14	18	18	20	22	22
10	**Lead Deviation Tooth to Tooth** 	**fHF**	4A	2	2	2	2	2	3	3
			3A	3	3	3	3	3	4	5
			2A	3	4	4	4	4	5	7
			A	5	6	6	6	6	7	9
			B	10	12	12	12	12	15	18

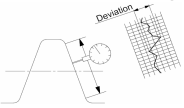
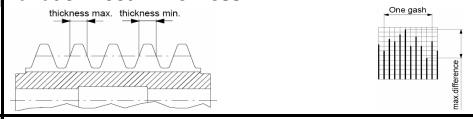
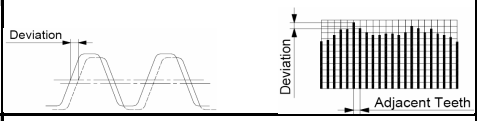
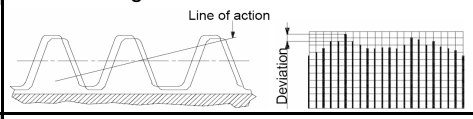
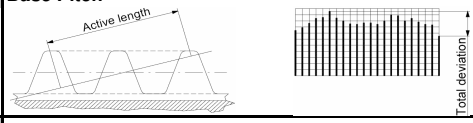
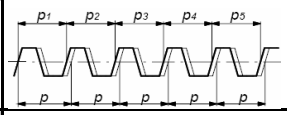
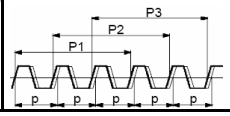
MP Worm Milling Cutter **MP** Rack Cutter **MP** Hob 1 to 7 Starts

MP	Points of Control	Short	Quality Class	Module 0.10 - 0.25	0.26 - 0.60	0.61 - 1.0	1.01 - 1.6	1.61 - 2.25	2.26 - 3.5	3.51 - 6.0
11	**Lead Deviation over 1 Division** 	$F_{HF/1}$	4A	4	4	4	4	4	5	6
			3A	4	5	5	5	5	6	8
			2A	5	6	7	7	8	9	11
			A	8	10	10	10	11	13	16
			B	12	16	21	21	22	26	32
12	**Lead Deviation over 3 Divisions** 	$F_{HF/3}$	4A	5	6	7	7	7	8	10
			3A	6	8	10	10	11	12	15
			2A	10	12	14	14	15	17	21
			A	15	17	19	19	20	24	30
			B	28	32	39	39	43	48	60
13	**Base Pitch Segment** 	fe	4A	2	2	2	2	2	3	3
			3A	3	3	3	3	3	4	5
			2A	3	4	4	4	4	5	7
			A	5	6	6	6	6	7	9
			B	10	12	12	12	12	14	18
14	**Base Pitch** 	Fe	4A	5	5	6	6	6	6	7
			3A	5	6	8	8	8	8	10
			2A	6	8	8	8	8	10	12
			A	10	12	12	14	16	18	20
			B	20	25	25	28	32	36	40
E	**Lead Milling Cutter and Rack Cutter** 	$F_{HF/1}$	4A	4	4	4	4	4	5	6
			3A	4	5	5	5	5	6	8
			2A	5	6	7	7	8	9	11
			A	8	10	10	10	11	13	16
			B	12	16	21	21	22	26	32
E	**Lead over Cutting Length Rack Cutter** 	$F_{HF/LN}$	4A	4	4	4	4	4	5	6
			3A	4	5	5	5	5	6	8
			2A	5	6	7	7	8	9	11
			A	8	10	10	10	11	13	16
			B	12	16	21	21	22	26	32
E	**Lead over Cutting Length** 	$F_{HF/LN}$	4A	7	8	10	10	10	12	15
			3A	9	11	14	14	15	17	21
			2A	13	16	19	19	20	23	28
			A	19	22	25	25	26	31	40
			B	33	38	46	46	50	56	74
E	**Normal Tooth Thickness** (0/+) TOP 	fs	4A	3	4	5	6	7	8	8
			3A	4	5	6	7	8	9	9
			2A	5	7	8	10	12	14	14
			A	7	8	9	11	13	15	15
			B	12	14	16	18	20	22	22
E	**Normal Tooth Thickness** (0/-) TOP 	fs	4A	-3	-4	-5	-6	-7	-8	-9
			3A	-4	-5	-6	-7	-8	-9	-9
			2A	-5	-7	-8	-10	-12	-14	-15
			A	-7	-8	-9	-11	-13	-15	-15
			B	-12	-14	-16	-18	-20	-22	-22
E	**General Tolerances (non involute profile)**	Fft	4A	4	5	6	7	8	9	10
			3A	4	5	6	7	8	9	10
			2A	5	6	7	8	9	10	12
			A	6	8	10	11	13	15	18
			B	10	14	20	22	24	28	32
I	**Tooth Depth**  (0/+)	(hw)	4A	7	7	10	10	10	10	10
			3A	7	7	10	10	10	10	10
			2A	7	7	10	10	10	10	10
			A	7	7	10	10	10	10	10
			B	7	7	10	10	10	10	10
I	**Flanks Angle**  (0/+) Gears W-EV, W-SG, W-SR, W-ZY, .. (+/-) Splines W-ZW, W-KBW, W-KW, ..	FwS	4A	25'	12'	6'	4'	3'	1'30"	1'30"
			3A	25'	16'	8'	5'	4'	3'	2'
			2A	33'	21'	10'	6'	5'	4'	3'
			A	50'	29'	14'	9'	7'	5'	4'
			B	1°24'	59'	31'	20'	15'	11'	8'
I	**Gash Lead** 	(Zyl)	4A	7	7	7	7	7	7	7
			3A	8	8	8	8	8	8	8
			2A	10	10	10	10	10	10	10
			A	12	12	12	12	12	12	12
			B	15	15	15	15	15	15	15

MP Worm Milling Cutter **MP** Rack Cutter **MP** Hob 1 to 7 Starts

MP	Points of Control	Short	Quality Class	Module 0.10 - 0.25	0.26 - 0.60	0.61 - 1.0	1.01 - 1.6	1.61 - 2.25	2.26 - 3.5	3.51 - 6.0
	Hob: 2-Starts									
8	**Deviation of Pressure Angle** 	FfS	4A	3	3	3	3	3	4	5
			3A	4	5	5	5	5	6	7
			2A	6	7	7	7	7	8	10
			A	7	8	9	9	9	12	14
			B	12	15	19	19	19	23	29
9B	**Variation Tooth Thickness** 	Fs	4A	4	5	5	5	5	6	8
			3A	5	6	7	7	7	9	11
			2A	7	9	11	11	11	13	16
			A	10	12	14	15	17	19	22
			B	16	19	22	23	25	27	28
10	**Lead Deviation Tooth to Tooth** 	fHF	4A	3	3	3	3	3	3	4
			3A	4	4	4	4	4	5	6
			2A	4	5	5	5	5	7	8
			A	6	6	7	7	7	9	11
			B	12	13	15	15	15	18	23
13	**Base Pitch Segment** 	fe	4A	3	3	3	3	3	3	4
			3A	3	3	4	4	4	5	6
			2A	3	4	5	5	5	7	8
			A	5	6	7	7	7	9	11
			B	10	12	15	15	15	18	23
14	**Base Pitch** 	Fe	4A	6	6	6	6	7	8	9
			3A	6	7	7	9	9	10	12
			2A	7	9	9	13	13	16	18
			A	11	13	13	16	18	20	22
			B	22	26	26	30	32	38	44
15	**Axial Lead over 2 adjacent Divisions** 	fpx	4A	2	2	3	3	3	4	5
			3A	2	2	4	4	4	5	6
			2A	2	2	6	6	6	7	9
			A	4	4	8	8	8	10	13
			B	8	10	17	17	17	21	26
16	**Total Axial Lead over 3 Divisions** 	Fpx	4A	4	4	5	5	5	6	8
			3A	4	4	7	7	7	9	11
			2A	5	5	11	11	11	13	16
			A	8	10	15	15	15	18	23
			B	14	16	30	30	30	37	46
	Hob: 3, 4-Starts									
8	**Deviation of Pressure Angle** 	FfS	4A	4	4	4	4	4	5	6
			3A	5	6	6	6	6	7	9
			2A	7	8	8	8	8	10	13
			A	9	10	12	12	12	14	18
			B	14	18	23	23	23	29	36
9B	**Variation Tooth Thickness** 	Fs	4A	5	6	6	6	6	8	10
			3A	7	8	9	9	9	12	14
			2A	9	11	13	13	13	16	20
			A	13	15	17	18	20	23	27
			B	19	23	26	28	29	32	34
10	**Lead Deviation Tooth to Tooth** 	fHF	4A	3	3	3	3	3	4	5
			3A	4	4	5	5	5	6	7
			2A	5	6	7	7	7	8	10
			A	7	8	9	9	9	12	14
			B	14	16	19	19	19	23	29
13	**Base Pitch Segment** 	fe	4A	3	3	3	3	3	4	5
			3A	4	4	5	5	5	6	7
			2A	4	5	7	7	7	8	10
			A	7	8	9	9	9	12	14
			B	14	16	19	19	19	23	29
14	**Base Pitch** 	Fe	4A	7	7	7	8	8	10	13
			3A	7	8	8	12	12	14	18
			2A	8	10	10	15	16	20	25
			A	12	15	15	18	23	29	36
			B	24	30	30	32	46	58	72
15	**Axial Lead over 2 adjacent Divisions** 	fpx	4A	3	3	4	4	4	5	6
			3A	3	3	5	5	5	6	8
			2A	3	4	7	7	7	9	11
			A	7	8	10	10	10	13	16
			B	9	11	21	21	21	26	32
16	**Total Axial Lead over 3 Divisions** 	Fpx	4A	5	5	6	6	6	8	10
			3A	5	5	9	9	9	12	14
			2A	6	7	13	13	13	16	20
			A	10	11	19	19	19	23	29
			B	15	18	37	37	37	46	57

MP Worm Milling Cutter **MP** Rack Cutter **MP** Hob 1 to 7 Starts

MP	Points of Control	Short	Quality Class	Module 0.10 - 0.25	0.26 - 0.60	0.61 - 1.0	1.01 - 1.6	1.61 - 2.25	2.26 - 3.5	3.51 - 6.0
	Hob: 5, 6, 7-Starts									
8	**Deviation of Pressure Angle** 	**FfS**	4A	5	5	5	5	5	6	6
			3A	6	7	7	7	7	9	9
			2A	8	9	10	10	10	13	13
			A	14	14	14	14	14	18	18
			B	19	23	29	29	29	72	72
9B	**Variation Tooth Thickness** 	**Fs**	4A	7	8	8	8	8	10	10
			3A	9	10	12	12	12	14	14
			2A	12	14	16	16	16	20	20
			A	16	18	20	21	23	27	27
			B	23	27	30	33	34	37	40
10	**Lead Deviation Tooth to Tooth** 	**fHF**	4A	4	4	4	4	4	5	5
			3A	5	5	6	6	6	7	7
			2A	6	7	8	8	8	10	10
			A	8	10	12	12	12	14	14
			B	16	19	23	23	23	29	29
13	**Base Pitch Segment** 	**fe**	4A	3	4	4	4	4	5	5
			3A	4	5	6	6	6	7	7
			2A	5	6	8	8	8	10	10
			A	8	10	12	12	12	14	14
			B	15	18	23	23	23	29	29
14	**Base Pitch** 	**Fe**	4A	8	8	8	9	10	10	13
			3A	9	9	9	12	12	14	18
			2A	10	12	12	17	18	20	25
			A	14	17	17	20	22	24	36
			B	26	32	32	34	36	42	72
15	**Axial Lead over 2 adjacent Divisions** 	**fpx**	4A	4	4	5	5	5	6	6
			3A	4	4	7	7	7	8	8
			2A	4	5	9	9	9	11	11
			A	7	9	13	13	13	16	16
			B	10	12	26	26	26	32	32
16	**Total Axial Lead over 3 Divisions** 	**Fpx**	4A	6	6	8	8	8	10	10
			3A	6	6	12	12	12	14	14
			2A	7	8	16	16	16	20	20
			A	12	12	23	23	23	29	29
			B	16	20	46	46	46	58	58

E	**K-Chart Tol of Fpr (Addendum)** (+/-)		4A				2	2.5	3	3.5
			3A				3	3.5	4	4.5
			2A				4	4.5	5	5.5
			A							
			B							
E	**K-Chart Tol of fHaK (Dedendum)** (+/-)		4A				2	2.5	3	3.5
			3A				3	3.5	4	4.5
			2A				4	4.5	5	5.5
			A							
			B							
E	**K-Chart Symmetrical Deviation Flancs** (+/-)		4A				3	3	4	5
			3A				4	4	5	6
			2A							
			A							
			B							

MP Worm Milling Cutter **MP** Rack Cutter **MP** Hob 1 to 7 Starts

I = Internal MP
E = External Communication MP