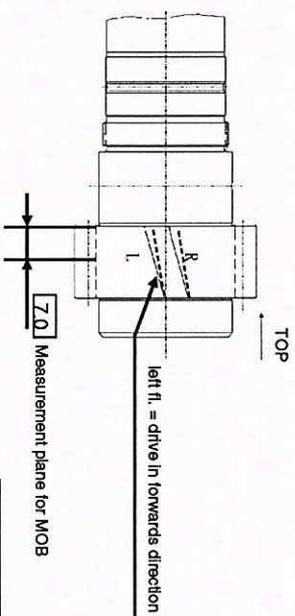


STIRNRAD	external	Toleranzen der Verzahnung (DIN 3961 vom Aug.-1978)		(9)
GEAR	außenverzahnt	gültig für Werte am Einzelzahn Tolerances of gearing (DIN 3961 of Aug. 1978) valid for values at individual tooth		
Zahnezahl	z	18		
Modul	m _n	2,450000		
Normal module	m _n	2,450000		
Eintrittswinkel	α _n	20° 0' 0"		
Normal pressure angle	α _n	20° 0' 0"		
Schrägungswinkel	β	29° 0' 0"		
Helix angle	β	29° 0' 0"		
Steigungsrichtung		LEFT		
Hand of helix		LEFT		
Profilverschlebungsfaktor	x	0,731		
Addendum modification coeff.	x	0,731		
Teilkeisdurchmesser	d	50,422		
Pitch diameter	d	50,422		
Kopfkreisdurchmesser	d _a	59,50 -0,26		
Outside diameter	d _a	59,50 -0,26		
Kopfnutkreisd. theo. max. d _h	d _h	59,05		
Tip diam. usable theo.	d _h	59,05		
Kopfnutkreisd. theo. min. d _h	d _h	58,58		
Tip diam. usable theo.	d _h	58,58		
Fußkreisdurchmesser	d _f	45,00 -0,45		
Root diameter	d _f	45,00 -0,45		
Fußnutkreisdurchmesser	d _w	48,13		
Root diameter usable	d _w	48,13		
Grundkreisradius	r _b	23,276		
Base circle radius	r _b	23,276		
Grundkreisdurchmesser	d _b	46,552		
Base diameter	d _b	46,552		
Normalzahnstärke	max. s _n	5,152		
Normal tooth thickness	max. s _n	5,152		
Normalzahnstärke	min. s _n	5,122		
Normal tooth thickness	min. s _n	5,122		
Meßzahnzahl	k			
Number of teeth spanned	k			
Zahnweite	max. W _k			
Base tangent length	min. W _k			
Zahnweite	min. W _k			
Base tangent length	D _m	3,5000		
Meßkegeldurchmesser	D _m	3,5000		
Ball diameter		56,763		
Diam. Zweikugelmäß max. M _K		56,763		
Measurement o. balls		56,698		
Diam. Zweikugelmäß min. M _K		56,698		
Measurement o. balls		0,072		
Verdrehflankenspiel	theo.	0,072		
Circumferential backlash	theo.	0,172		



Hondurchmesser = 46,81 -0,30 = 2,45
honing diameter

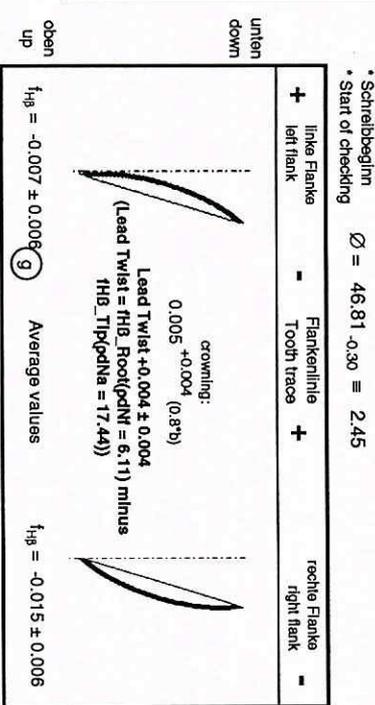
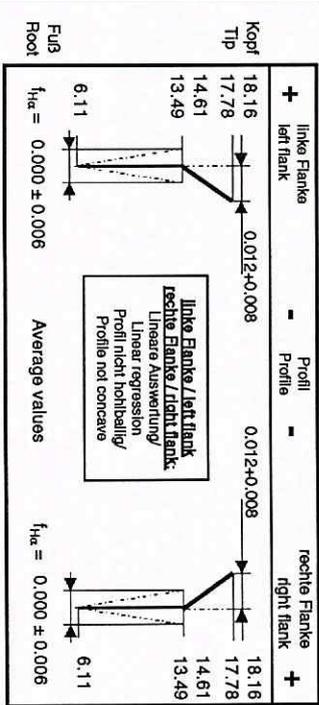
Der Verlauf der Profil- und Flankenlinie muss über den Messbereich stetig sein (ein- oder mehrfache Richtungsänderungen sind nicht zulässig)

The form of the profile and helix has to be continuous (one or more changes of directions are not allowed)

Für fp max. zwei Wellen zulässig
Für fp max. two waves allowed

Vorarbeitungsdaten siehe Verzahnungsblatt Vorbearbeitung gleicher Nr.
For pre-machining dimensions, see gear data sheet same number

Wkz-Profil siehe Werkzeugdatenblatt Nr. 250.6.3771.35
For Tooth profile, see tool data sheet number



Profile and helix checking according to VDI/VDE 2612
Listed tolerance data for F_p and f_{hg} refers to the total face width in the meas. dia. d_m
Tooth trace testing area L_p = 0,8**b* hochgerechnet auf 1,0**b*
Terms of the tooth system according to DIN (German Industrial Standards) No. 889, 3960, 3998

g	Anz.	Änd./Nr.	zuletzt	Checklist
2	35580			
Abbildungen sind unmaßstäblich. Diagrams not to scale.				
Datum		Name		
gez. 2009-05-13 Cricenti, Fabrizio		Fabrizio Cricenti		
gepr.		Benennung:		
		Verzahnungsblatt Endkontrolle		
		Rev. "A" 20110606		
		Entwurf/Änderung bei GetriebeTyp:		
		250.0.0083.18		
		Firma:		
		GETRAG Getriebe- und Zahnfabrik Hermann Hagenmeyer GmbH & Co. KG		
		Zeichnungsnummer:		
		Drawing number:		
		250.6.3771.35		

GEAR		External gearing		Remark:																										
Geardata-Sheet		D-No.: 250.6.3771.35		z = 38																										
Mating gear: ./.		! 38 / 38 a ./.		Type: 250 Speed: Output Shaft 2																										
		! / a		Customer: Ford																										
z	38	m_n	1.000000	α	30 ° 0 ' 0 "																									
x	0.450	d	38.000	d_p	32.909																									
		d_a	39.84 ^{-0.25}	d_f	37.80 ^{-0.59}																									
Tolerance Class		9		Tooth thckn. sn 2.207 ÷ 2.167																										
GO-GAGE takes priority over inspection of individual deviations																														
Radial composite err.		F _r		Tangent. comp. err.																										
Rad. tooth to tooth comp. err. f _r		Tang. tooth to tooth comp. err. f _r		shaped: finished: 20.005 ÷ 19.970																										
Profile form error f _{fa}		Profile angle error f _{fta}		shaped: hobbled: ÷																										
Total profile error f _{pt} 0.021		Adjacent pitch err. f _{pta} 0.017		Measurement over 2 balls DM=2.00																										
Normal pitch error f _{pe}		Diff. bet. adj. pitch. f _{pe}		finished: 42.209 ÷ 42.148																										
Cumulative pitch error f _{cp} 0.040		Cum. circ. pitch err. f _{cp}		shaped: hobbled: ÷																										
1/8 extent FpZ/8		Radial run-out f _r 0.040		shaved: ÷																										
Range of tooth thckn. error f _{rt}		Longit. alignm. err. f _{rt}		usable diameter d _{na} 39.59 dNF 37.94																										
Tooth alignment err. f _{tb}		Total alignment err. f _{tb} 0.011		rad. of curvature pd _{na} 11.00 pdNF 9.44																										
Tool		Bezugsprofil		DIN 5480																										
grinding wheel		h _{apo}		p _{apo}																										
		b																												
<p>External Spline DIN 5480-W 40 x 1.00 x 38 x 9 freely selected</p> <p>GAGE DIMENSION sn max. eff. = 2.230</p> <p>da und dna NON STANDARD</p>																														
<p>VBL drawn: CRICENTI Date: 13.05.09 Subst. For:</p> <table border="1"> <tr> <th>Ch.ind.</th> <th>Ch. No.</th> <th>Changes</th> <th>Date</th> <th>Name</th> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </table>						Ch.ind.	Ch. No.	Changes	Date	Name																				
Ch.ind.	Ch. No.	Changes	Date	Name																										

Geardata-Sheet		External gearing		Remark:	
D-No.: 250.6.3771.35		z = 38		illia	
Mating gear: ./.		! 38 / 38 a ./.		Type: 250 Speed: Output Shaft 2	
Customer: Ford		! / a			
z	38	m_n	1.000000	α	30 ° 0 ' 0 "
x	0.450	d	38.000	d_p	32.909
		d_a	39.66	d_f	37.60
			-0.16		-0.59
Tolerance Class		9		Tooth thckn. sn 2.156 ÷ 2.116	
GO-GAGE takes priority over inspection of individual deviations					
Radial composite err.					
Tangent. comp. err.					
Rad. tooth to tooth					
Tang. tooth to tooth					
shaped: hobbled: ÷					
Profile form error					
Profile angle error					
shaved: ÷					
Adjacent pitch err.					
0.021					
Normal pitch error					
Diff. bet. adj. pitch.					
finished: 42.132 ÷ 42.071					
Cumulative pitch error					
0.040					
Cum. circ. pitch err.					
shaped: hobbled: ÷					
Radial run-out					
0.040					
1/8 extent Fp/z/8					
Range of tooth thckn.					
Longit. alignm. err.					
usable diameter dNa 39.44 dNF 37.94					
Total alignment err.					
0.011					
rad. of curvature pdNa 10.87 pdNF 9.44					
Total alignment err.					
0.011					
Tool					
Bezugsprofil					
DIN 5480					
grinding wheel					
h_{apo}					
p_{apo}					
b					
External Spline DIN 5480-W 40 x 1.00 x 38 x 9 freely selected					
GAGE DIMENSION sn max. eff. = 2.179					
da, dNa und df NON STANDARD					
Spline rolled					
VBL drawn: CRICENTI Date: 13.05.09 Subst. For:					
Ch.ind.		Ch. No.		Changes	
a		35112		Siehe And.	
				Date	
				30.04.10	
				Name	
				Cricenti	

GEARAG		External gearing		Remark: IIIb	
Geardata-Sheet		D-No.: 250.6.3771.35		z = 38	
Mating gear: ./.		! 38 / 38		a ./.	
Type: 250		Speed: output Shaft 2		Customer: Ford	
z 38		m _n 1.000000		α 30 ° 0 ' 0 "	
x 0.450		d 38.000		d _p 32.909	
				d _a 39.69	
				d _f 37.60	
				-0.59	
Tolerance Class		9.3		Tooth thic kn. sn 2.053	
				÷ 2.008	
GO-GAGE takes priority over inspection of individual deviations					
Radial composite err.					
F _r Tangent. comp. err.					
Rad. tooth to tooth					
F _r Tang. tooth to tooth					
shaped: hobbled: ÷					
Profile form error					
F _{pa} Profile angle error					
Total profile error					
0.023					
F _{pa} Adjacent pitch err.					
Measurement over 2 balls DM=2.00					
Normal pitch error					
F _{pe} Diff. bet. adj. pitch.					
Cumulative pitch error					
0.045					
F _{pk} Cum. circ. pitch err.					
shaped: hobbled: ÷					
Cum. circ. pitch error					
F _{1/8} Radial run-out					
0.040					
shaved: ÷					
1/8 extent F _{pz/8}					
Range of tooth thic kn.					
F _r Longit. alignm. err.					
usable diameter d _{Na} 39.44					
DNF 37.94					
rad. of curvature p _{dNa} 10.87					
pDNF 9.44					
Total alignment err.					
F _{FB} Total alignment err.					
0.012					
F _{FB} rad. of curvature p _{dNa} 10.87					
pDNF 9.44					
Tool					
Bezugsprofil					
DIN 5480					
grinding wheel					
h _{apo}					
p _{apo}					
b					
External Spline DIN 5480-W 40 x 1.00 x 38 x 9.3 freely selected					
GAGE DIMENSION sn max. eff. = 2.079					
da, d _{Na} und d _f NON STANDARD					
Spline rolled					
VBL drawn: CRICENTI Date: 13.05.09 Subst. For:					
Ch.ind. a					
Ch.No. 35112					
Siehe And.					
Changes					
Date 30.04.10					
Cricenti					
Name					

Geardata-Sheet		External gearing		Remark:	
D-No.: 250.6.3771.35		z = 32			
Mating gear: ./.		! 32 / 32		Type: 250 Speed: Output Shaft 2	
Customer: Ford		!		a	
z	32	m_n	1.000000	α	30 ° 0 ' 0 "
x	-0.050	d	32.000	d_p	27.713
				d_a	32.89 -0.25
				d_f	30.80 -0.59
Tolerance Class		9		Tooth thckn. sn 1.590 ÷ 1.550	
GO-GAGE takes priority over inspection of individual deviations					
Radial composite err.		F_t		finished: 16.470 ÷ 16.435	
Rad. tooth to tooth comp. err.		$f_{t\alpha}$		shaped: hobbled: ÷	
Profile form error		$f_{t\alpha}$		shaved: ÷	
Total profile error		0.021		Adjacent pitch err. 0.017	
Normal pitch error		Diff. bet. adj. pitch.		fertig: 35.245 ÷ 35.182	
Cumulative pitch error		0.040		Cum. circ. pitch err. shaped: hobbled: ÷	
Cum. circ. pitch err.		Radial run-out		0.040	
1/8 extent $F_p/8$		Fr		shaved: ÷	
Range of tooth thckn. error		Longit. alignm. err.		usable diameter dNa 32.64 dNF 30.94	
error		$f_{t\beta}$		rad. of curvature pdNa 8.62 pdNF 6.88	
Tooth alignment err.		Total alignment err.		0.011	
$f_{t\beta}$					
Tool		Bezugsprofil		DIN 5480	
grinding wheel		h_{ap0}		p_{ap0}	
				b	
<p>External Spline DIN 5480-W 33 x 1.00 x 32 x 9 v</p> <p>GAGE DIMENSION sn max. eff. = 1.613</p> <p>da NON STANDARD</p>					
Ch.ind.		Ch. No.		Changes	
a		35252		See change report	
				28/10/10	
				Cricenti	
				Name	
VBL drawn: CRICENTI Date: 13/05/09 Subst. For:					