

312176

Document Status: approved

# Geardata-Sheet

D-No.: 251.6.1073.35

z = 16

GETRAG

External gearing

Remark:

Mating gear: ./. i 16 / 16 a ./. Type: 251 Speed: IS1 clutch spline
i / a Customer: RSA

z 16	$m_n$ 1.000000	$\alpha$ 30 ° 0 ' 0 "	$\beta$ 0 ° 0 ' 0 "	STRAIGHT
x 0.450	d 16.000	$d_b$ 13.856	$d_a$ 17.84 $_{-0.25}$	$d_f$ 15.30 $_{-0.30}$

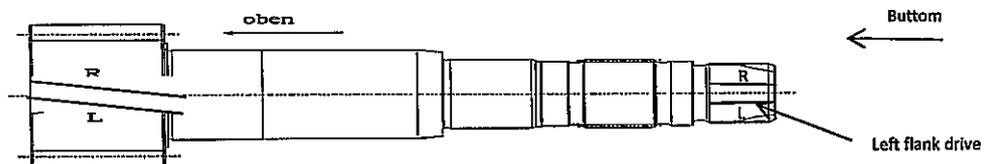
Tolerance Class -9		TOOTH THICKNESS $s_n$ 2.043 $\div$ 2.007
GO-GAGE takes priority over inspection of individual deviations		Base tangent length over 4 teeth
Radial composite err. $F_i''$	Tangent. comp. err. $F_i'$	finished: 10.677 $\div$ 10.645
Rad. tooth to tooth comp. err. $f_i''$	Tang. tooth to tooth comp. err. $f_i'$	shaped: $\div$
Profile form error $f_{f\alpha}$	Profile angle error $f_{H\alpha}$	shaved: $\div$
Total profile error $F_\alpha$ 0.019	Adjacent pitch err. $f_p$ 0.015	Measurement over 2 balls DM= 2.50
Normal pitch error $f_{pe}$	Diff. bet. adj. pitch. $f_u$	finished: 21.108 $\div$ 21.061
Cumulative pitch error $F_p$ 0.036	Cum. circ. pitch err. $F_{pk}$	shaped: $\div$
Cumu. circ. pitch err. 1/8 extent $F_{pz/8}$	Radial run-out $F_r$ 0.040	shaved: $\div$
Range of tooth thckn. error $R_s$	Longit. alignm. err. $f_{f\beta}$	usable diameter $d_{Na}$ 17.69 $d_{Nf}$ 15.94
Tooth alignment err. $f_{H\beta}$	Total alignment err. $F_\beta$ 0.010	rad. of curvature $\rho_{dNa}$ 5.50 $\rho_{dNf}$ 3.94

Tool	Bezugsprofil	DIN 5480		
grinding wheel	$h_{aP0}$	$\rho_{aP0}$	b	

External Spline DIN 5480-W 18 x 1.00 x 16 x 9 e

GAGE DIMENSION  $s_n$  max. eff. = 2.063

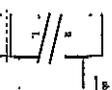
$d_a$  and  $d_f$  NON STANDARD



Ch.ind.	Ch. No.	Changes	Date	Name
VBL created: CRICENTI Date: 2015-12-04 Subst. for:				

Document Status: approved	<b>Geardata-Sheet</b>		D-No.: 251.6.1073.35	z = 13
<b>GETRAG</b>	External gearing		Remark: -	
Mating gear: ./.	i 0 / 13	a ./.	Type: 251	Speed: IS1 1st
	i /	a	Customer: RSA	
z 13	m <sub>n</sub> 2.100000	α 20 ° 0 ' 0 "	β 23 ° 15 ' 0 "	RIGHT
x 0.800	d 29.713	d <sub>b</sub> 27.624	d <sub>a</sub> 36.95 <sub>-0.26</sub>	d <sub>f</sub> 25.65 <sub>-0.30</sub>
Gear quality; Tolerance zone			Tooth thckn. sn [ 4.522 ÷ 4.492 ]	
Test group acc. to DIN 3961 of Aug. 78			Base tangent length over 3 teeth	
Radial composite err. Fi''	Tangent. comp. err. Fi'		finished: [ 17.134 ÷ 17.106 ]	
Rad. tooth to tooth comp. err. fi''	Tang. tooth to tooth comp. err. fi'		shaped: 17.230 ÷ 17.202	
Profile form error ffa	Profile angle error fHα		shaved: ÷	
Total profile error Fα	Adjacent pitch err. fp		Measurement over 2 balls DM= 5.00	
Normal pitch error fpe	Diff. bet. adj. pitch. fu		finished: [ 40.664 ÷ 40.617 ]	
Cumulative pitch error Fp	Cum. circ. pitch err. Fpk		shaped: 40.831 ÷ 40.784	
Cumu. circ. pitch err. 1/8 extent Fpz/8	Radial run-out Fr		shaved: ÷	
Range of tooth thckn. error Rs	Longit. alignm. err. fβ		usable diameter dNa 36.03	dNf 28.34
Tooth alignment err. fHβ	Total alignment err. Fβ		rad. of curvature pdNa 11.57	pdNf 3.17
Tool	FRW -	m <sub>n0</sub> 2.069120	α <sub>n0</sub> 17.2189 °	β <sub>0</sub> 22.8885 °
grinding wheel	h <sub>aP0</sub>	ρ <sub>aP0</sub>	b	-
<b>FOR PREMACHINING ONLY (HARD CONDITION) !</b>				
Final measurement dimensions (gear errors and modifications) see final check gear data !				
Correction dimensions for machining in hard and soft condition in accordance with final measurement dim. !				
Root diam. (soft): df = 25.56 -0.20				
Premachining with comma chip (soft): fHα = 15 μm				
Measurement according to the tool data, fHα ca. 0 μm				
Feedback soft - hard analysis necessary?				
no				
yes · X				
Ch.ind.	Ch. No.	Changes	Date	Name
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Teilname	external	Toleranzen der Verzahnung (DIN 3961 vom Aug. 1978)	
GEAR		Toleranzen für die Einzelverzahnung Tolerances of gearing (DIN 3961 of Aug. 1978) Valid for values at individual tooth	
Zahnezahl	z	13	
Normal module	$m_n$	2.100000	
Normal pressure angle	$\alpha_n$	20° 0' 0"	
Helix angle	$\beta$	23° 15' 0"	
Steigungsrichtung		RECHTS	
Hand of helix			
Profilverschlebungsfaktor	x	0.800	
Addendum modification coeff.			
Teilkreisdurchmesser	d	29.713	
Pitch diameter			
Kopfkreisdurchmesser	$d_a$	36.95 -0.26	
Outside diameter			
Kopfnutzkreisd. theo. max. $d_{ha}$		36.50	
Tip diam. usable theo.			
Kopfnutzkreisd. theo. min. $d_{ha}$		36.15	
Tip diam. usable theo.			
Fußkreisdurchmesser	d	25.65 -0.30	
Root diameter			
Fußnutkreisdurchmesser	$d_w$	28.34	
Root diameter usable			
Grundkreisradius	$r_b$	13.812	
Base circle radius			
Grundkreisdurchmesser	$d_b$	27.624	
Base diameter			
Normalzahndicke	max. $s_n$	4.522	
Normal tooth thickness			
Normalzahndicke	min. $s_n$	4.492	
Normal tooth thickness			
Meißzahnezahl	k	3	
Number of teeth spanned			
Zahnweite	max. $W_k$	17.134	
Base tangent length			
Zahnweite	min. $W_k$	17.106	
Base tangent length			
Meßkugeldurchmesser	$D_M$	5.0000	
Ball diameter			
Diam. Zweikugeln max. $M_{kk}$		40.664	
Measurement o. balls			
Diam. Zweikugeln min. $M_{kk}$		40.617	
Measurement o. balls			
Verdrehflankenspiel	theo.	0.064	
Circumferential backlash		0.177	



r, Fl, Zug

Hondurchmesser = 27.70 -0.30 = 1.03 honing diameter

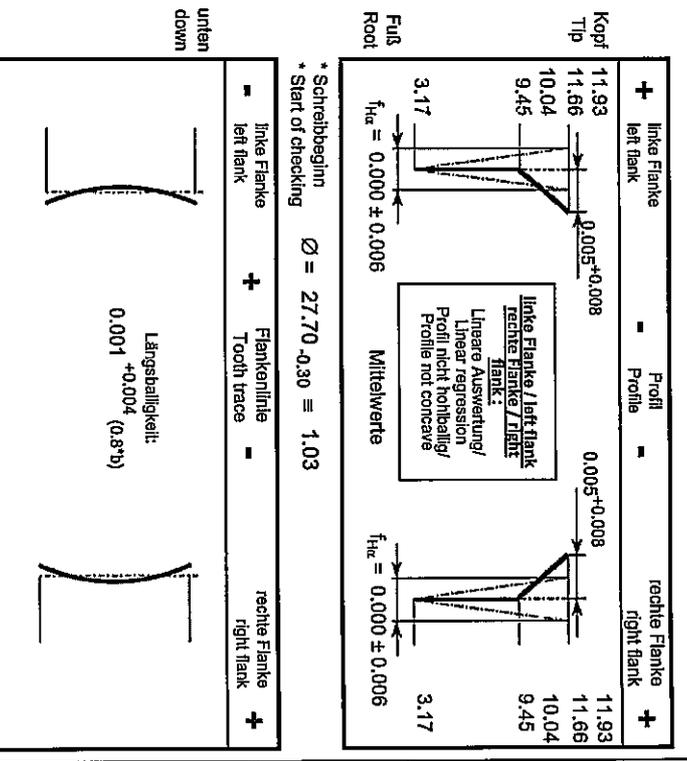
#Flanken- und Profilformabweichung  $f_{fa}$  und  $f_{fb}$  ausgewertet mit Fourier, Auswertung bis 30. Ordnung  
# Flank and profile form errors  $f_{fa}$  and  $f_{fb}$  evaluated using Fourier, Evaluation until 30th order

$f_{fa}$   
 $n0 = ?$   
 $R = ?$   
 $K = ?$

$f_{fb}$   
 $n0 = ?$   
 $R = ?$   
 $K = ?$

## Teilungs-Einzelabweichung  $f_p$  ausgewertet mit Fourier, Auswertung bis 20. Ordnung  
## Adjacent pitch error evaluated using Fourier, Evaluation until 20th order

$n0 = ?$   
 $R = ?$   
 $K = ?$



oben  
up  
 $f_{fp} = 0.000 \pm 0.006$  Mittelwerte  
 $f_{fm} = 0.000 \pm 0.006$

\*  $f_{fl}$  (zwischen d<sub>W</sub> und dem Schreibegehm d<sub>s</sub>) max  $f_{fl2}$ , jedoch 0,003 zulässig  
\*  $f_{flf}$  (between d<sub>W</sub> and start of checking d<sub>s</sub>) max  $f_{fl2}$ , 0.003 allowable.

Profil- und Flankenlinienmessung nach G. 808006 und VDI/VDE 2612  
Flankenlinienprüfbereich  $L_p = 0.8 \cdot b$  hochgerechnet auf 1,0" b  
Begriffe für Stirnräder nach DIN 668, 3960, 3998

Profile and helix checking according to G. 808006 and VDI/VDE 2612  
Tooth trace testing area  $L_p = 0.8 \cdot b$  calculated to 1.0" b  
Terms of the tooth system according to DIN (German Industrial Standards) No. 668, 3960, 3998

Buch.	Anz.	Änd.Nr.	Datum	Name
Abbildungen sind unverändert, Diagrams not to scale.				
Erstverwendung		251		
bei Geplänebezug:				
Verzahnungsblatt	Endkontrolle	Datum	Name	
Final Check Gear Data				
Bearbeitung:				
Namens:				
Input shaft inner ist.				
Schutzvermerk nach ISO 16018 beachten				
Protection per ISO 16018				
■ ■ ■ GETRAG				
GETRAG Getriebe- und Zahnradfabrik				
Hermann Hagemeyer GmbH & Co KG				
Remark:				

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

Wkz-Profil siehe Werkzeugaufbau Nr. 251.6.1073.35  
For Tool profile, see tool data sheet number

Zeitungsnummer  
Drawing number  
251.6.1073.35