

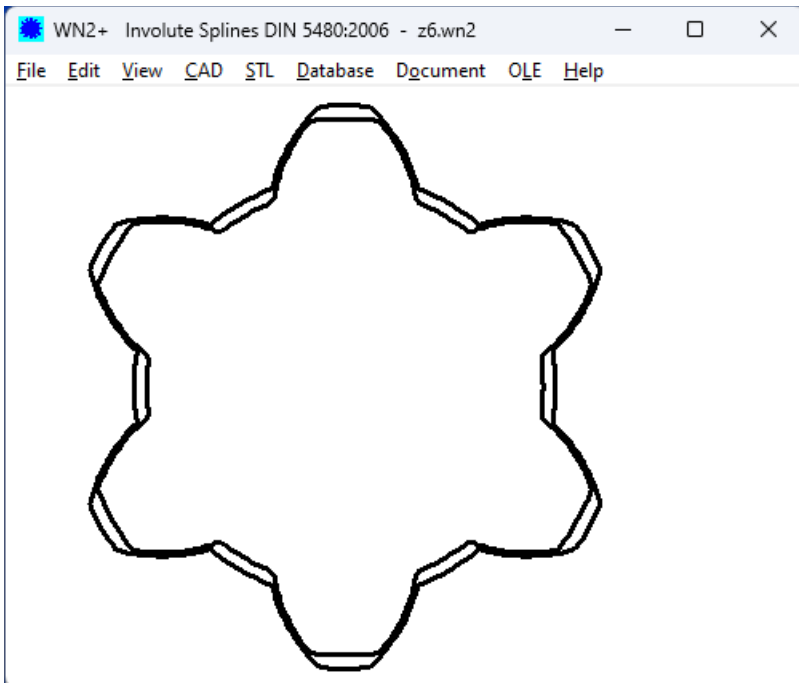
# WN2 / WN2+



## Software for Involute Splines according to DIN 5480

for Windows

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### Involute Splines to DIN 5480

WN2 software calculates dimensions and transferable torque of involute splined shaft/hub joints according to DIN 5480. The plus version WN2+ provides additionally the calculation of non-standard splines by input of tooth height factors and profile shift or measured dimensions over/between pins.

### Dimensions

From reference diameter, pressure angle, module, number of teeth and DIN 5480 tolerance zone, WN2 calculates the involute spline dimensions. Profile drawing and data table can be displayed on screen, printed or exported to CAD.

### Data Base

WN2 includes a data base which contains all combinations of DIN 5480 standard sizes (700 data records). The database file may be modified and extended by the user. Material properties can be selected from included material database.

### Tolerances

Select DIN 5480 tolerance series and tolerance row, and WN2 calculates tolerances and permissible deviations of shape, angle and run-out.

Shaft DIN 5480 - W 120 x 3 x 38 x 3H			Hub DIN 5480 - N 120 x 3 x 38 x 3H		
No. of teeth	z	38	No. of teeth	z	38
module	m	3	module	m	3
Pressure angle	alpha	20	Pressure angle	alpha	20
Underform coeff	dfp/m	0.55	Underform coeff	dfp/m	0.55
Tip diameter	da1	113.40 ± 0.11	Root diameter	df1	126.00 ± 0.18
Root form diameter	dfF1	113.91 max	Root form diameter	dfF2	113.49 min
Root diameter	df1	111.40 - 0.13	Tip diameter	da2	114.111
tooth thick. max. eff.	s v max	6.243	tooth gap max. actual	e max	6.381
tooth thick. max. act. H9a	s max	6.229	tooth gap min. act. H7a	e min	6.305
tooth thick. min. actual	s min	6.180	tooth gap min. eff.	e v min	6.271
Pin/ball diameter	DM	6.000	Pin/ball diameter	DM	5.250
Measurement over pins	MFmax/huf	126.017	Measurement between pins	MFmax	103.283
Measurement over pins	MFmin	125.356	Measurement between pins	MFmin/huf	103.169

tolerance tooth thick. / tooth gap DIN 5480 - 120 x 3 x 38 x 3H 3H		
e max act	6.381	6.381
e min act	6.305	6.305
e v min eff	6.271	6.271
e2 = a1	6.271	6.271
e v max eff	6.243	6.243
a max act	6.229	6.229
a min act	6.180	6.180

load		
Nominal torque	TN	Nm 20000
Maximum torque	Tmax	Nm 60000
Application factor	KA	1.30
Equivalent torque	Teq	Nm 30000
Face width	b	mm 30.00
Alternating load factor	KW	1.00
Load distribution factor	KHbeta	1.06
Equivalent surface pressure	pmax	MPa 138
Max. eff. surface pressure	pmax	MPa 235

STRENGTH		
material	30CrMo12-30	12C18Al
Yield Point	Re	230
SAE Compressive stress	Sc	134
SAE Hoop stress	Sh	27
SAE Bending stress	Sb	12
SAE Torsional shear stress	St	47
SAE Equivalent stress	Se	816
Safety: 1st order/2nd	S.w.	3.10
Safety: 1st order/3rd	S.w.	7.33
Safety: 1st order/4th	S.w.	2.25

WN2+ Gear quality DIN 5480

Edit Ase1, Asi1, Ase2, Asi2

shaft: Tolerance series 8, tolerance zone f

hub: Tolerance series 9, tolerance zone H

Ase1: -0.028 mm, Asi1: -0.091 mm, it min = 0.028 mm, it max = 0.181 mm, -Ase2: 0 mm, -Asi2: -0.09 mm

Buttons: OK, Cancel, Help Text, Calc

### Measurement

The program calculates span width and dimensions over / between pins (min, max & nom. values). Number of teeth measured and pin diameter can be modified.

Shaft DIN 5480 - W 120 x 3 x 38 x 8f			Hub DIN 5480 - N 120 x 3 x 38 x 9H		
No. of teeth	z	38	No. of teeth	z	38
module	m	3	module	m	3
Pressure angle	alpha	30 °	Pressure angle	alpha	30 °
Dedendum coeff	hfp/m	0,55	Dedendum coeff	hfp/m	0,55
Tip diameter	da1	119,40 h11	Root diameter	df2	120,00 -0,78
Root form diameter	dFF1	113,91 max	Root form diameter	dFF2	119,49 min
Root diameter	df1	113,40 -1,15	Tip diameter	da2	114 H11
Tooth thckn. max. eff.	s v max	6,243	Tooth gap max. actual	e max	6,361
Tooth thckn. max. act. Ref.	s max	6,220	Tooth gap min. act. Ref.	e min	6,305
Tooth thckn. min. actual	s min	6,180	Tooth gap min. eff.	e v min	6,271
Pin/ball diameter	DM	6,000	Pin/ball diameter	DM	5,250
Measurement over pins	M1maxRef.	126,017	Measurement between pins	M2max	109,265
Measurement over pins	M1min	125,956	Measurement between pins	M2minRef.	109,169

load			STRENGTH		
Nominal torque	TN	Nm	20000	1	2
Maximum torque	Tmax	Nm	80000	30CrMoV9	GG-30
Application factor	KA		1,50	Re	1050
Equivalent torque	Teq	Nm	30000	Yield Point	230
Face width	b eff	mm	80,00	SAE Compressive stress	Sc
Alternating load factor	FW		1,00	SAE Hoop stress	Sh
Load distribution factor	K l bda		1,06	SAE Bending stress	Sb
Equiv. eff. surface pressure	peq	MPa	138	SAE Torsional shear stress	St
Max eff. surface pressure	pmax	MPa	235	SAE Equivalent stress	Se
				Safety FW*padm/peq	S.eq
				Safety FL*padm/pmax	S.max

## Strength Calculation

WN2 calculates transmissible torque or safety according to Niemann/Höhn (2005, as in DIN 3892) or according to Rolloff/Matek.

## Drawing Tables

Drawing tables with dimensions and results can be printed or exported to CAD.

## Tooth Contact

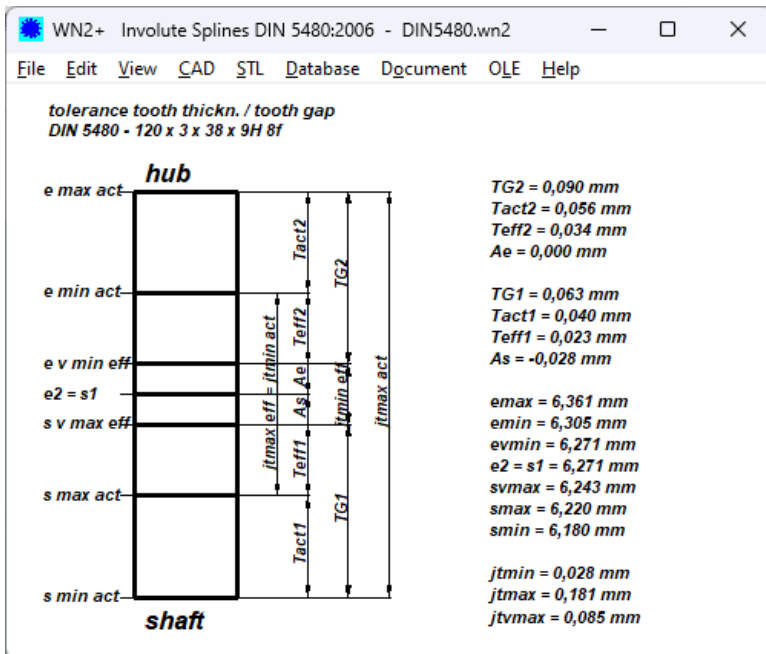
Drawings of involute spline profile, tooth gap, tooth contact, tooth shape and reference profile can be printed or exported as true-scale drawing to CAD.

## Production Drawing

Drawing and table with dimensions may be generated by WN2 with ISO 7200 drawing header.

## WN2+ for Non-Standard Splines

The extended version WN2+ provides an additional input window for tooth height factors and profile shift coefficients. This enables you to design non-standard splines. Reference diameter dB is calculated from profile shift x for this case. Profile shift coefficients can be entered, or calculated from span width or over-pin-dimension. This eases the design of a partner profile for an existing internal/external spline.



WN2+ Dimensions

Pressure angle alpha 30 °

Normal module mn 2 mm

Number of teeth z 22

DIN 5480

Nominal Diameter dB 47 mm

1 (extern.) 2 (intern.spline)

Addendum ha/m 0,45 0,57

Dedendum hfp/mn=haP0/mn 0,55 0,52

Root fillet radius rf/m 0,16 0,16

Profile shift coeff. x nom 0,2 -0,2

Profile shift coeff. xe min 0,169 -0,23  Edit xe min/max

Profile shift coeff. xe max 0,19 -0,2

DM, k Ase, Asi s1min W1min M1min M2min e2max W ?  
s1max W1max M1max M2max e2min M ?

OK Cancel Help Aux. Image mm <-> inch Calc

Shaft DIN 5480 - W 120 x 3 x 38 x 8f		
No. of teeth	z	38
module	m	3
Pressure angle	alpha	30 °
Dedendum coeff	hfp/m	0,55
Tip diameter	da1	119,40 h11
Root form diameter	dFF1	113,91 max
Root diameter	df1	113,40 -1,15
Tooth thckn. max. eff.	s v max	6,243
Tooth thckn. max. act. Ref.	s max	6,220
Tooth thckn. min. actual	s min	6,180
Pin/ball diameter	DM	6,000
Measurement over pins	M1maxRef.	126,017
Measurement over pins	M1min	125,956

Fit Dim.	Max.Dim.	Min.Dim.	material: 30CrMoV9
119,4 h 11	119,400	119,180	

Responsible dept. Technical reference Created by Approved by

## CAD Interface

A true-scale drawing of the involute splines can be exported to CAD via DXF or IGES files.

## Hard and Software Requirements

WN2 / WN2+ is available as 32-bit app or 64-bit app for Windows 11, Windows 10, Windows 7.

## Scope of Delivery

Program with user manual (pdf), database files, example applications, declaration of conformity, non-expiring perpetual license for unlimited time use with update rights.

## Guarantee

HEXAGON gives a 24 month guarantee on full functionality of the software. HEXAGON Software is continuously improved and updated. Registered users are kept informed of updates and new editions.