

by Fritz Ruoss

ZAR3+: Scope of application of DIN 3996

The strength calculation according to DIN 3996 is limited to:

- Center distance $a \geq 63$ mm
- Worm speed $n_1 \geq 60$ rpm
- Sliding velocity $v_{gm} < 25$ m/s

ZAR3+ calculates the worm gear even if these conditions are not met, but now provides corresponding warnings.

Error: SW < 1.1! DIN 3996:2012

Cause: Wear resistance SW should be greater than 1.1 (DIN 3996)

Remedy: Use higher-quality material or improve lubrication

Warning: DIN 3996:

Cause: DIN 3996 Application range: Center distance $a \geq 63$ mm, speed < 25 m/s, $n_1 \geq 60$ rpm

Remedy: Edit\Application: disable DIN3996

Warning: no DIN 3996 material

Cause: Strength calculation according to DIN 3996 not for this material

Remedy: Select steel for worm and bronze for worm gear from the database.

ZAR3+: Calculation according to DIN 3996 only for these materials:

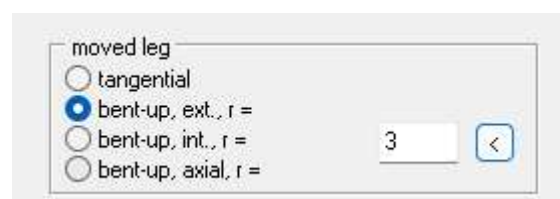
Worm materials: Case-hardened steels, flame- or induction-hardened steels, gas-nitrided steels

Worm gear materials: G-CuSn12, Cu-Al10Fe5Ni5, EN-GJS-400, EN-GJL-250

Although other materials are also calculated, the results are sometimes very inaccurate.

FED3+ Tip: Factor q for torsion springs with bent legs

For torsion springs with tangential legs, the stress coefficient q for the increased bending stress on the inside is calculated from the coil ratio. However, for bent springs, it is also calculated from the bending radius, and this factor q is usually higher than the one from Dm/d . Enter the bending radius as large as possible. For a turning radius of 0, q is approximately 2.5, and the stress at the turning radius is then 250% higher in the tensile direction than with tangential legs. The stress coefficients on the inside of the turn and at the turning radius are displayed under "View\Stress\q."



Tip: Production drawing with additional text

Info drawing ISO 7200

	(Date)	Name
Created by	13.10.1996	Fritz Ruoss
Approved by	08.01.2025	Manuel Nicola
Technical reference	08.01.2025	Lucas Nicola

Responsible dept.	
Document type	
Document status	

	x	y	h	phi	Text	Layer
1	25	50	3.5	0	EN 13906-1 (basis for Hexagon calculation)	3
2	25	20	5	0	My Company	5
3						
4						
5						
6						
7						
8						

A4

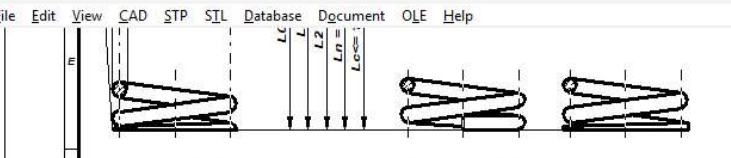
OK Cancel Help

A customer asks if it's possible to add text "calculated according to DIN/EN" to the FED1+ production drawing. This is possible; you don't even have to change the program; you can do it yourself. You can enter up to eight texts under "Document/Drawing Data." The x/y coordinates are the text insertion points in the bottom left corner, and h is the text height. Layer 5 represents thick line width, layer 4 medium, and layer 3 thin.

If the text should apply to every drawing, save the data with the file name "null." The null file will then be loaded automatically when the program starts.

FED1+ Compression Spring Software to EN 13906-1 - 0.fed

File Edit View CAD STP STL Database Document OLE Help



Illustr. 1: Spring ends lined up and ground
☐ Spring ends lined up
☒ Spring ends angelegt und geschliffen

Illustr. 2: Spring ends lined up
☐ Spring ends lined up and ground

Illustr. 3: Spring ends lined up, forged and ground
☐ Spring ends lined up and ground

1	No. of Active Coils	$n = 4.52$
	Total No. of Coils	$n_t = 8.52$
2	Direction of Coils	right: ☐ left: ☐
3	Deburring of Spring Ends	no: ☐ inside: ☐ outside: ☐
4	Working Path (Stroke)	$s_h = 1.5 \text{ mm}$
5	Stress Cycle Frequency	$f = 150 \text{ Hz}$
6	Range of working temperature from 20 to 100 °C	
7	Wire or Rod Surface	drawn: ☒ rolled: ☐ apless grinding: ☐ spring shot-blasted with steel balls: ☐
8	Surface Protection:	
9	material: EN 10270-2-VDC oilhardened spring steel wire (VD) Permissible Shear Stress $\tau_{perm} = 903 \text{ MPa}$ Calc. Basis of Shear Modulus $G = 78400 \text{ MPa}$	

Permissible Deviations according to EN 15800 Quality Class					DIN 2096
De, Di	1	2	3		☐
L0	☐	☒	☐		☐
F1	☐	☒	☐		☐
F2	☐	☒	☐		☐
e1	☐	☒	☐		☐
e2	☐	☒	☐		☐
d	DIN 2078 C				

11 Manufacturing Tolerance by:

a) if the spring force and the spring length are specified L_0 ☐

b) if the spring force, the spring length and L_0 are specified n and d ☐
 n and De, Di ☐

c) if two spring forces and the spring lengths are specified L_0, n and d ☐
 L_0, n and De, Di ☐

12 Supply springs ☒
 not set: ☐

EN 13906-1 (basis for Hexagon calculation)

Responsible dept.	Technical reference	Created by	Approved by
	Lucas Nicola	Fritz Ruoss	Manuel Nicola
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Updates:

Software Update Windows: 40 EUR, Update Win64: 50 EUR

Update Mechanical Engineering Package: 800 EUR, Update Complete Package: 1200 EUR

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