

# Leg Spring Verification

Sample document with complete example values. It shows the report the purchased export produces for YOUR input - it is not itself a report for any part.

Project: Sample project

Part/Position: no real part

Prepared by: Sample, not released

Cylindrical torsion spring (leg spring) made of round wire

Overall assessment: OK (stress verification satisfied).

## Geometry and material

|                                     |                           |
|-------------------------------------|---------------------------|
| Wire diameter d                     | 3 mm                      |
| Coil diameter Dm / De / Di          | 20 / 23 / 17 mm           |
| Spring index w = Dm/d               | 6.67                      |
| Curvature correction factor q       | 1.1386                    |
| Active coils n                      | 5                         |
| Spring rate R_M (torque per degree) | 45.503 Nmm/deg            |
| Modulus of elasticity E             | 206,000 N/mm <sup>2</sup> |

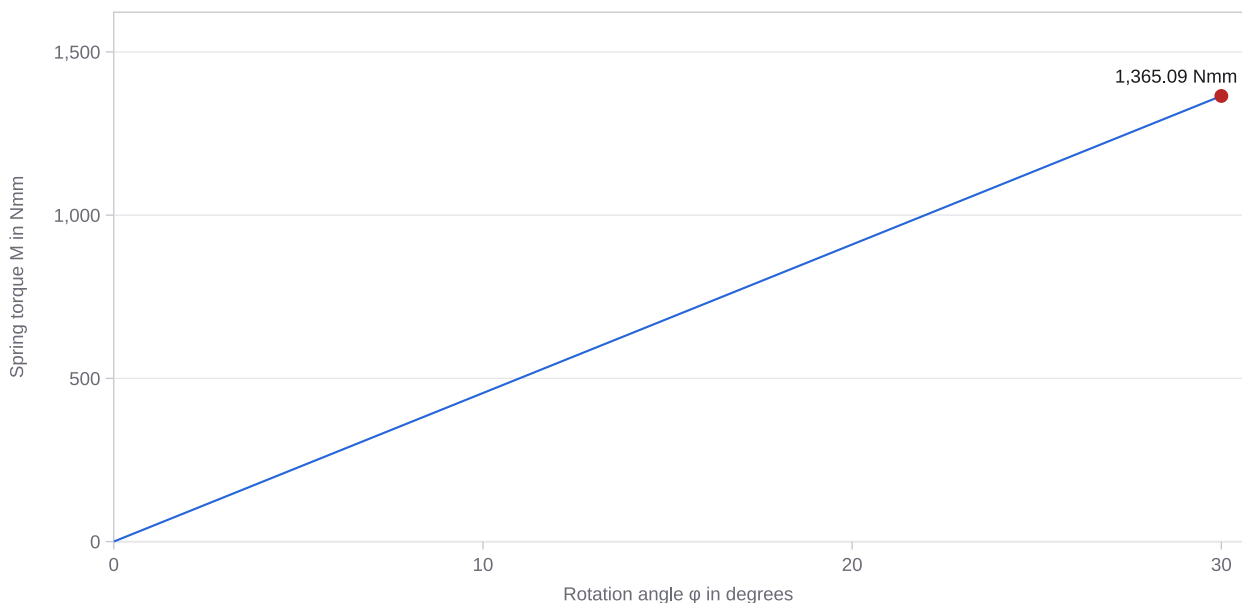
## Operating point

|                                                       |                          |
|-------------------------------------------------------|--------------------------|
| Rotation angle $\varphi$                              | 30 deg                   |
| Spring torque M = R_M · $\varphi$                     | 1,365.09 Nmm             |
| Bending stress $\sigma$ (uncorrected)                 | 514.99 N/mm <sup>2</sup> |
| Bending stress $\sigma_k$ (with curvature correction) | 586.36 N/mm <sup>2</sup> |

## Assessment criterion

| Criterion                                            | Value                    | Limit                   | Status |
|------------------------------------------------------|--------------------------|-------------------------|--------|
| Bending stress $\sigma_k \leq \sigma_{\text{allow}}$ | 586.36 N/mm <sup>2</sup> | 1,000 N/mm <sup>2</sup> | ● OK   |

## Spring characteristic M( $\varphi$ ) with operating point



## Calculation basis

Calculation per DIN EN 13906-3 for cylindrical leg springs (torsion springs) made of round wire: the wire is loaded in bending, governed by the modulus of elasticity. The spring rate as torque per degree is  $R_M = E \cdot d^4 / (3667 \cdot D_m \cdot n)$ , the spring torque  $M = R_M \cdot \varphi$ , and the bending stress  $\sigma = 32 \cdot M / (\pi \cdot d^3)$ . The curvature correction factor  $q = (w + 0.07) / (w - 0.75)$  accounts for the stress

concentration at the inner fiber ( $w = Dm/d$ ). The static verification compares the corrected bending stress  $\sigma_k$  with the allowable bending stress (material- and wire-dependent, from  $R_m$  per EN 10270). Under cyclic loading a fatigue verification is required; the legs (load introduction points) are subject to additional stress and must be verified separately, which is not covered here.

## About this sample

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