# Flexural Buckling Check per EC3

**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

Overall assessment: OK - the buckling check N_Ed <= N_b,Rd is satisfied.

## Input quantities

| | |
|---|---|
| Modulus of elasticity E | 210,000 N/mm² |
| Second moment of area I | 1,000,000 mm⁴ |
| Cross-sectional area A | 1,000 mm² |
| Buckling length L_cr | 2,000 mm |
| Yield strength f_y | 235 N/mm² |
| Buckling curve | b (α = 0.34) |
| Compressive force N_Ed | 150 kN |
| Partial safety factor γ_M1 | 1 |

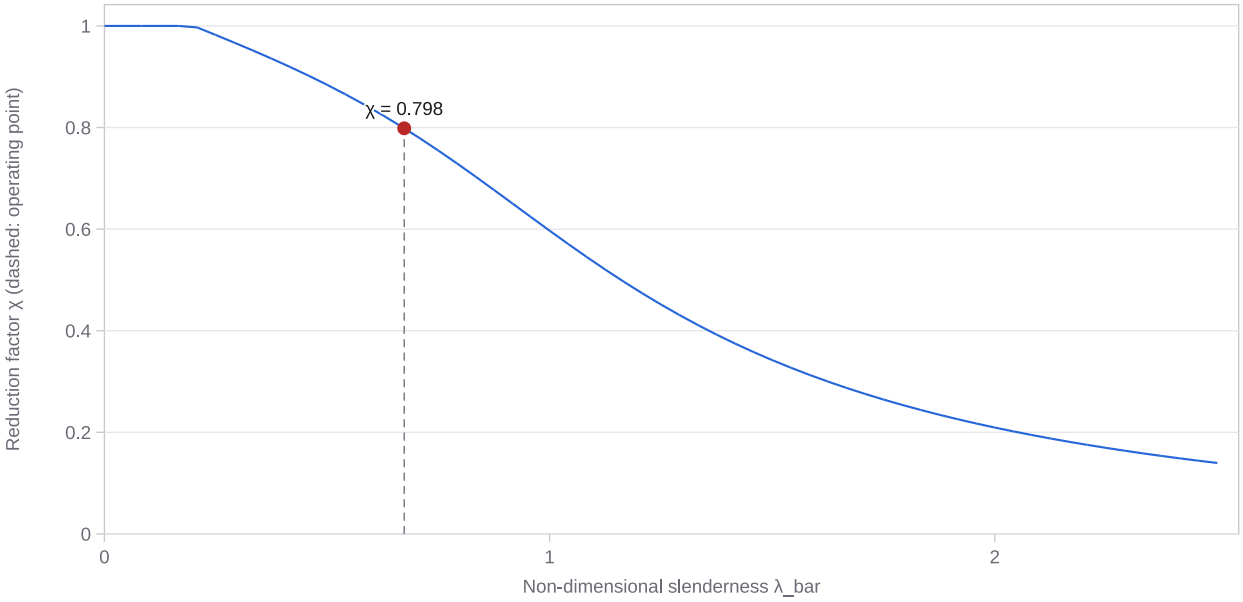
## Results

| | |
|---|---|
| Elastic critical force N_cr | 518.15 kN |
| Radius of gyration i | 31.62 mm |
| Slenderness λ = L_cr/i | 63.25 |
| Non-dimensional slenderness λ_bar | 0.6734 |
| Auxiliary value Φ | 0.8073 |
| Reduction factor χ | 0.7985 |
| Buckling resistance N_b,Rd | 187.65 kN |

## Check

| Criterion | Value | Limit | Status |
|---|---|---|---|
| Utilization η = N_Ed/N_b,Rd | 0.799 | 1.000 | ● OK |

## Buckling curve χ(λ_bar)



## Calculation basis

Flexural buckling check using the equivalent member method (buckling curves) of DIN EN 1993-1-1, Section 6.3.1. The elastic critical force $N_{cr} = \pi^2 \cdot E \cdot I / L_{cr}^2$ gives the non-dimensional slenderness $\lambda_{bar} = \sqrt{(A \cdot f_y / N_{cr})}$. The imperfection factor α of the selected buckling curve gives, via $\Phi = 0.5 \cdot [1 + \alpha \cdot (\lambda_{bar} - 0.2) + \lambda_{bar}^2]$, the reduction factor $\chi = 1 / (\Phi + \sqrt{(\Phi^2 - \lambda_{bar}^2)}) \leq 1.0$. The buckling resistance is $N_{b,Rd} = \chi \cdot A \cdot f_y / \gamma_{M1}$ with $\gamma_{M1} = 1.0$; the check requires $N_{Ed} \leq N_{b,Rd}$, i.e. $\eta = N_{Ed} / N_{b,Rd} \leq 1.0$. The Euler load $N_{cr}$ is textbook mechanics; the χ method, α values (a0…d) and $\gamma_{M1}$ are standard values from DIN EN 1993-1-1. Only flexural buckling about the entered axis is covered; torsional and torsional-flexural buckling as well as local plate buckling are not captured.

## About this sample

All values on these pages come from a freely chosen example calculation and belong to no real part. The purchased export contains the same sections with your input, your header data (project, part, prepared by) and as searchable text. Pricing and scope: maschinenbaurechner.de/en/pricing