

# Gas Spring Sizing (Hood/Cover)

Sample document - numeric values are only included in the purchased Pro export.

Project: \_\_\_\_\_ Part/Position: \_\_\_\_\_ Prepared by: \_\_\_\_\_

Overall assessment: PASS with notes

Recommended extension force  $F_1 = ??? \text{ N}$  per spring. Closing hand force  $??? \text{ N}$ , stroke  $??? \text{ mm}$ .

Note: the calculator simplifies by assuming a constant spring force. Real gas springs have a progressive characteristic (force rises on compression by roughly a factor of  $??? \dots ???$ ); the final type selection is manufacturer-specific and based on the characteristic curve (e.g. Suspa, Stabilus).

## Inputs

|                                                     |         |
|-----------------------------------------------------|---------|
| Hood mass $m$                                       | ??? kg  |
| Centre-of-gravity distance $L_S$                    | ??? mm  |
| Handle distance $L_G$                               | ??? mm  |
| Number of gas springs $n_F$                         | ???     |
| Opening angle $\alpha_{\max}$                       | ??? deg |
| Hood attachment $r_D$                               | ??? mm  |
| Frame point $x_R / y_R$                             | ??? mm  |
| Chosen spring force $F_{\text{gewählt}}$ per spring | ??? N   |

## Spring force

|                                             |       |
|---------------------------------------------|-------|
| Maximum required force $F_{\text{erf,max}}$ | ??? N |
| Recommended extension force $F_1$           | ??? N |

## Spring lengths and stroke

|                                           |        |
|-------------------------------------------|--------|
| Spring length closed $L_{F(0)}$           | ??? mm |
| Spring length open $L_{F(\alpha_{\max})}$ | ??? mm |
| Stroke                                    | ??? mm |

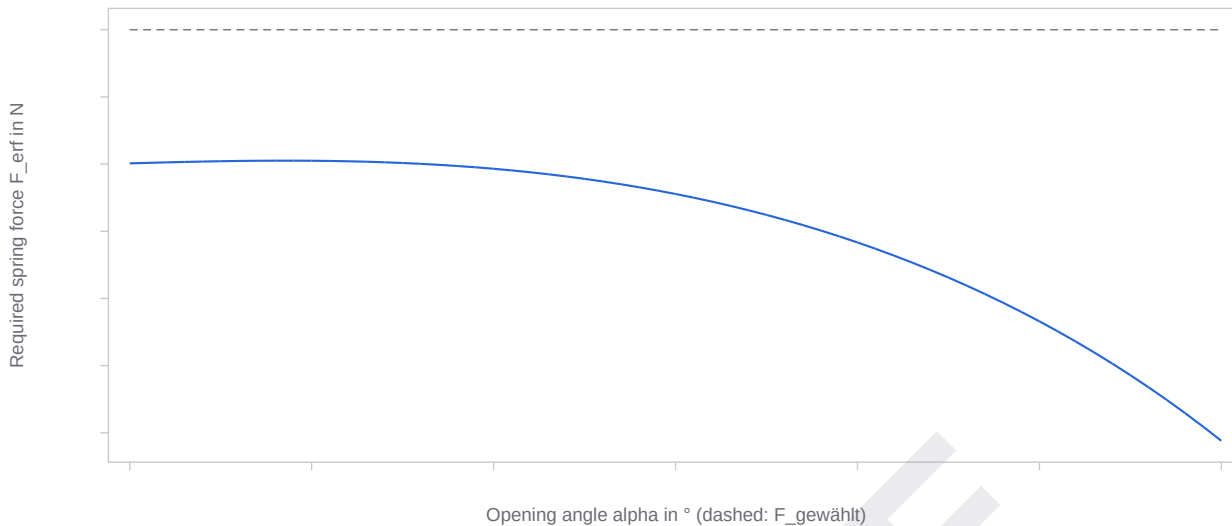
## Hand force

|                                                |       |
|------------------------------------------------|-------|
| Closing force $F_{\text{hand}}(\alpha_{\max})$ | ??? N |
| Residual force $F_{\text{hand}}(0)$            | ??? N |

## Evaluation criteria

| Criterion                                               | Value  | Limit  | Status |
|---------------------------------------------------------|--------|--------|--------|
| Closing hand force $ F_{\text{hand}}(\alpha_{\max}) $   | ??? N  | ??? N  | ● PASS |
| Residual force $F_{\text{hand}}(0)$ (hood stays closed) | ??? N  | ??? N  | ● WARN |
| Stroke-length plausibility                              | ??? mm | ??? mm | ● PASS |

## Required spring force over the opening angle



### Calculation basis

Moment equilibrium about the hinge: the hood's load moment  $M_L(\alpha) = m \cdot g \cdot L_S \cdot \cos(\alpha) \cdot 1e-3$  decreases with the cosine as the hood opens. The hood point  $D(\alpha) = r_D \cdot (\cos \alpha, \sin \alpha)$  rotates with the hood, the frame point  $R = (x_R, y_R)$  is fixed; the spring acts along R-D with length  $L_F = |D-R|$ . The effective lever arm that matters for the moment is the perpendicular distance from the hinge to this line of action,  $h(\alpha) = |x_R \cdot (D_y - y_R) - y_R \cdot (D_x - x_R)| / L_F$  (cross product). This gives the required spring force per angle  $F_{\text{erf}}(\alpha) = M_L(\alpha) \cdot 1e3 / (n_F \cdot h(\alpha))$ ; evaluated on a  $1^\circ$  raster across the full opening range, the maximum with a 10% reserve, rounded up to 1 N, gives the recommended extension force  $F_1$ . The hand-force check  $F_{\text{hand}}(\alpha) = (n_F \cdot F_{\text{gewählt}} \cdot h(\alpha) - M_L(\alpha) \cdot 1e3) / L_G$  is evaluated at the fully open angle (closing force) and at  $\alpha = 0$  (residual force in the closed position). As a buildability guideline, the extended spring length should satisfy  $L_F(\alpha_{\text{max}}) \geq 2 \cdot \text{stroke} + 10 \text{ mm}$ .

Note: The results are design and orientation aids. They do not replace independent verification, calculation and approval by a qualified person. The terms of use at [maschinenbaurechner.de](https://maschinenbaurechner.de) apply.