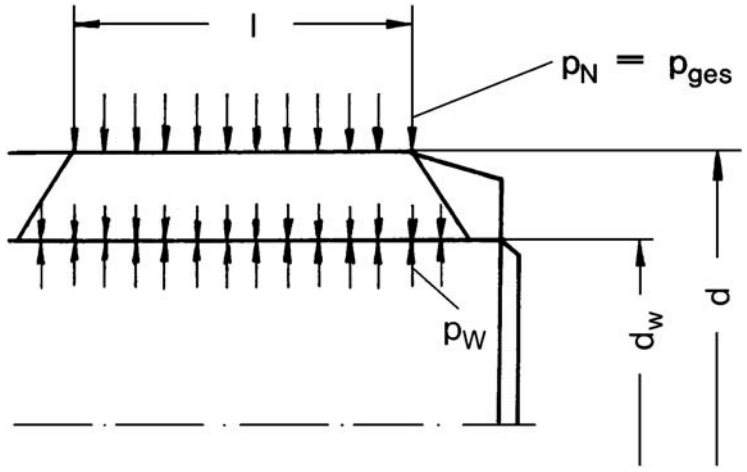
Calculation of hubs

Equations for thick-walled tubes are taken as the basis, for which axial stresses are disregarded.



Maximum stresses occur at the internal face of the hub. The following apply:

$$\sigma r_N = - p_w \frac{l}{l + (d - d_w)}$$

$$\sigma t_N = \frac{p_w (Q^2 + 1) - 2 \cdot p_{ges.} \cdot Q^2}{Q^2 - 1} \quad \text{with } Q = \frac{d}{d_w}$$

$$\tau_N = \frac{16 \cdot M_t \cdot d_w \cdot 10^3}{\pi (d^4 - d_w{}^4)} \quad M_t \text{ in Nm}$$

Based on the deformation hypothesis, these stresses may be expressed by a reference stress:

$$\sigma_V = \sqrt{1/2 \left[(\sigma t_N - \delta r_N)^2 + (\delta r_N - \delta B_N)^2 + (\delta B_N - \delta t_N)^2 \right] + 3 \tau_N{}^2}$$

The reference stress must always be lower than the 0.2 yield strength limit of the hub material.