

Allowable Hertz pressure

Hertz pressure:

It is the pressure that arises at the point of mutual force interaction of two bodies with defined surface curvature.

Safety factor:

Determination of the corresponding coefficient of safety is a complicated and responsible task. A high coefficient of safety usually results in a safer design, however with a higher weight and thus a higher price and vice versa. It is the basic engineering compromise of "price vs. safety". However, it is the responsibility of the designer to determine such coefficient of safety that ensures corresponding safety at an acceptable price. At the same time, the coefficient of safety can vary within a wide range 1,1 to 5+.

Coefficient according to load:

load	[]
Static load	1
Unidirectional load, non-impact load	0,8
Unidirectional load, with a small impact load	0,7
Unidirectional load, with a big impact load	0,6
Alternating load, with a small impact load	0,45
Alternating load, with a big impact load	0,25

Allowable hertz pressure:

- for non-hardened material

$$\sigma_H = \frac{7HB}{S_F} * C_c$$

- for hardened material

$$\sigma_H = \frac{4,2R_{p0,2T}}{S_F} * C_c$$

σ_H	allowable hertz pressure	[MPa]
HB	hardness	[HB]
$R_{p0,2T}$	the minimum yield strength or 0,2% proof strength at calculation temperature	[MPa]
S_F	safety factor	[]
C_c	coefficient according to load	[]

Literature:

ČSN EN 13001-3-3: Jeřáby – Návrh všeobecně – Část 3-3: Mezní stavy a prokázání způsobilosti kontaktů kolo/kolejnice.

Joseph E. Shigley, Charles R. Mischke, Richard G. Budynas: Konstruování strojních součástí 2010.