

Calculation

Pretensioning force TSG toothed belt

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1 Run length

The run length is the length of the belt run between the two contact points on the pulleys.

$$L_t = \sqrt{a^2 - \frac{(d_{wg} - d_{wk})^2}{4}}$$

With an example centre distance of $a = 1000[\text{mm}]$ and with the same radii of the pulleys ($55[\text{mm}]$) the result is:

$$L_t = \sqrt{(1000[\text{mm}])^2 - \frac{(55[\text{mm}] - 55[\text{mm}])^2}{4}}$$

$$\underline{L_t = 1000[\text{mm}]}$$

L_t	=	Run length [mm]
a	=	Centre distance [mm]
d_{wg}	=	Effective diameter of the large disc [mm]
d_{wk}	=	Effective diameter of the small disc [mm]

2 Indentation depth

The toothed belt is pressed in at the centre of the run, the depth of indentation being δ .

$$\delta = 0,016 * L_t$$

$$\delta = 0,016 * 1000[\text{mm}]$$

$$\underline{\delta = 16[\text{mm}]}$$

δ	=	Indentation depth [mm]
L_t	=	Run length [mm]

3 Effective length of the toothed belt

$$L_w = 2 * a + 1,57 * (d_{wg} + d_{wk}) + \frac{(d_{wg} - d_{wk})^2}{4 * a}$$

$$L_w = 2 * 1000[mm] + 1,57 * (55[mm] + 55[mm]) + \frac{(55[mm] - 55[mm])^2}{4 * 1000[mm]}$$

$$\underline{L_w = 2172,7[mm]}$$

L_w	=	Effective length of the toothed belt [mm]
a	=	Centre distance [mm]
d_{wg}	=	Effective diameter of the large disc [mm]
d_{wk}	=	Effective diameter of the small disc [mm]

4 Test force

The toothed belt is pressed in at the centre of the run, the depth of indentation being δ . In this state, the belt is tensioned so that the test force is F_p .

$$F_p = \frac{F_k + \frac{L_t}{L_w} * Y}{16}$$

$$F_p = \frac{250[N] + \frac{1000[mm]}{2172,7[mm]} * 100}{16}$$

$$\underline{F_p = 18,50[N]}$$

F_k	=	Preload force [N] (manufacturer's specification)
L_t	=	Run length [mm]
L_w	=	Effective length of the toothed belt [mm]
Y	=	Factor (manufacturer's specification)

5 Run frequency

The frequency of the vibrating belt run is the easiest and most accurate way to set and check the pretension (frequency meter required).

$$f = \sqrt{\frac{F_k}{4 * m * L_t^2}}$$

$$f = \sqrt{\frac{250[N]}{4 * 0,0552 \left[\frac{kg}{m}\right] * (1[m])^2}}$$

$$f = 33,65[Hz]$$

- F_k = Preload force [N] (manufacturer's specification)
- L_t = Run length [mm]
- m = Specific belt weight (manufacturer's specification)

6 Contact

If you have any questions or concerns, we can be reached at the following address:

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