Calculation

Pretensioning force TSG toothed belt

Documentation history

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Langer & Laumann Ing.-Büro GmbH
Wilmsberger Weg 8
48565 Steinfurt
Germany

Tel.: +49 (2552) 92791 0

www.lul-ing.de
info@lul-ing.de

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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.

$$Lt = \sqrt{a^2 - \frac{(\mathrm{dwg} - dwk)^2}{4}}$$

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

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

$$\underline{Lt = 1000[mm]}$$

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.

$$\delta = 0{,}016 * Lt$$

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

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

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

3 Effective length of the toothed belt

$$Lw = 2 * a + 1{,}57 * (dwg + dwk) + \frac{(dwg - dwk)^2}{4 * a}$$

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

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

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.

$$Fp = \frac{Fk + \frac{Lt}{Lw} * Y}{16}$$

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

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

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).

$$f = \sqrt{\frac{Fk}{4 * m * Lt^2}}$$

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

$$\underline{f = 33{,}65[Hz]}$$

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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Wilmsberger Weg 8
48565 Steinfurt
Germany

Tel.: +49 (2552) 92791 0

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