Calculation for PU-Polyester Round and V-belts (simplified)

a) Determine the load (kg) on the total conveyor.

b) Please observe the minimum effective diameter of the pulley made of PU/Polyester material at required belt cross section according to our technical recommendations.

c) Support the belt conveyer on the load carrying side. Coefficient of friction μ of the sliding surface with steel, PE, HDPE, rollers or rolls or any other support needs to be determined.

The calculation for round, V- or special profiles is always identical.

$$\text{Allowed load kg} = \frac{\text{material cross section cm}^2 \text{ x working tension of the material quality daN/cm}^2}{\text{coefficient of friction } \mu}$$

$$\text{Example} = \frac{\text{profile 17 x 11 material cross section: 1.46 cm}^2 \text{ x working tension force PU 85 A : 18 daN/cm}^2}{\text{coefficient of friction HDPE 0.25}} = 105 \text{ kg}$$

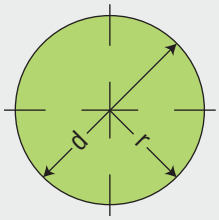
You will find the values which we used for this calculation in the chapters of the corresponding profile charts.

The calculated allowed load always corresponds to the highest load of the belt cross section and material quality for the recommended pretension (highest value).

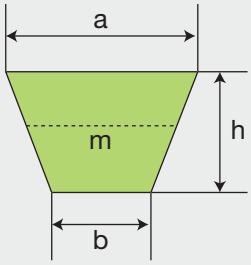
ATTENTION: The adhesion factors may change to negative values due to contamination or wear. The tensioning of the belts is very important.

NOTE: In order to perform detailed calculations, we recommend you to have a look at Roloff/Matek “machine elements” – Internet: www.roloff-matek.de

Calculation of the cross section of round and V-belts



$$A_{cm^2} = \frac{\pi}{4} \times d^2 \approx 0{,}785 \times d^2$$



$$A_{cm^2} = \frac{a+b}{2} \times h = m \times h$$

$$m = \frac{a+b}{2}$$

Select the belt cross section or the number of required belts

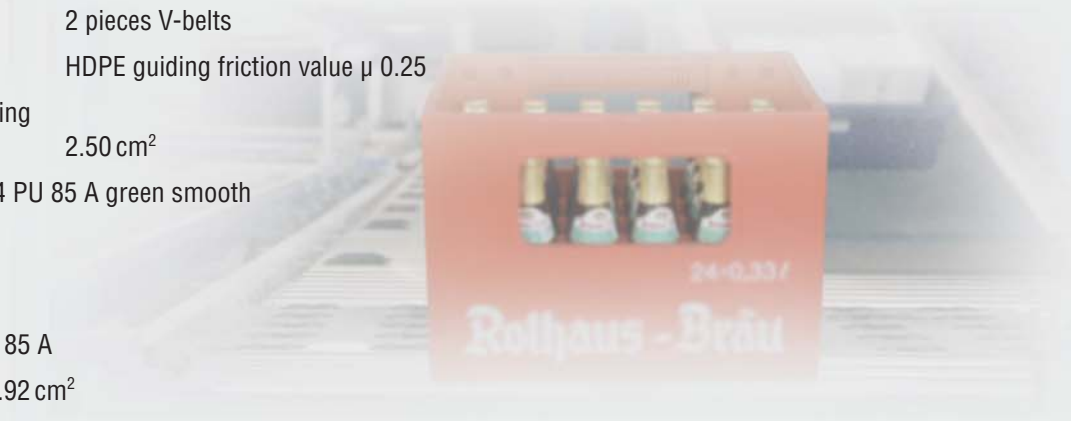
$$\text{Belt cross section} = \frac{\text{total load kg x coefficient of friction } \mu}{\text{Working tension force PU-type per cm}^2}$$

$$\text{Example} = \frac{\text{conveying weight 180 kg x coefficient of friction HDPE 0.25}}{\text{Working tension PU 85 A 18 daN/cm}^2} = 2.50\,\text{cm}^2 \text{ traction}$$

Example of the assignment: transport installation for empty beer crates

Total conveying weight max.:	180 kg ✓
Centre distance conveying installation:	7 m
Effective diameter of pulleys:	140 mm
Considered belt quality:	PU 85 A (18 daN/cm²)
Required number of belts:	2 pieces V-belts
Support of the belts:	HDPE guiding friction value μ 0.25
Required belt cross section according to the calculation:	2.50 cm²

Refer to the V-belt table on page 24 PU 85 A green smooth



Results in:

2 pieces V-belts profile 17 x 11 PU 85 A

Belt cross section 1.46 cm² x 2 = 2.92 cm²

$$\text{Working tension} = \frac{\text{26 daN/belt PU 85 A}}{\text{coefficient of friction HDPE 0.25}} = 104\,\text{kg/belt x 2} = 208\,\text{kg}$$ ✓

Selection of the belt quality

- It generally takes place for the calculated belt cross sections cm² with the working tension of the belt daN/cm² according to the quality as well as to the coefficient of friction μ of the belt support.
- The traction force is increased by more pretension; thus the belt can convey a higher load.
- The sliding surfaces (support) of the belts should generally have a low adhesion factor μ.
- For the product storage on a conveyer the traction force of the belt needs to be divided by the average value of both coefficient of friction μ.

$$\text{Adhesion factor } \mu \text{ NEW} = \frac{\text{coefficient of friction product + coefficient of friction sliding surface}}{2}$$