Important Velocity Ratio Formulas PDF

Formulas
Examples
with Units

List of 10
Important Velocity Ratio Formulas

1) Peripheral Velocity of Driving Pulley Formula

Formula

$$V = \pi \cdot d_d \cdot N_d$$

Example with Units

$$4.3001_{\,m/s} = 3.1416 \cdot 0.011_{\,m} \cdot 7466_{\,rev/min}$$

2) Peripheral Velocity of Follower Pulley Formula

Formula

$$V = \pi \cdot d_f \cdot N_f$$

Example with Units

$$4.3_{\,m/s} = 3.1416 \cdot 0.014_{\,m} \cdot 5866_{\,rev/min}$$

3) Velocity Ratio Formula

Formula

$$i = \frac{T_d}{T_{dr}}$$

Example

$$0.78 = \frac{15.6}{20}$$

4) Velocity Ratio of Belt Drive Formula

Formula

$$i = \frac{N_f}{N_d}$$

Example with Units

$$0.7857 = \frac{5866_{\,rev/min}}{7466_{\,rev/min}}$$

5) Velocity Ratio of Belt given Creep of Belt Formula

Formula

$$i = \frac{d_d \cdot \left(E + \sqrt{\sigma_2} \right)}{d_f \cdot \left(E + \sqrt{\sigma_1} \right)}$$

Example with Units

$$0.7858 = \frac{0.011_{\,m} \cdot \left(10000_{\,N/m^2} + \sqrt{8_{\,N/m^2}} \right)}{0.014_{\,m} \cdot \left(10000_{\,N/m^2} + \sqrt{5_{\,N/m^2}} \right)}$$

6) Velocity Ratio of Belt given Total Percentage Slip Formula

Formula

$$i = \left(d_d + t \right) \cdot \frac{1 - 0.01 \cdot s}{d_f + t}$$

Example with Units

$$0.7839 = \left(0.011_{\,m} + 9E\text{-}5_{\,m} \right) \cdot \frac{1 - 0.01 \cdot 0.4}{0.014_{\,m} + 9E\text{-}5_{\,m}}$$

7) Velocity Ratio of Compound Belt Drive Formula 📲

Formula

$$i = \frac{N_n}{N_{d'}}$$

Example with Units

$$0.7857 = \frac{22\,\text{rev/min}}{28\,\text{rev/min}}$$

Evaluate Formula 📲

8) Velocity Ratio of Compound Belt Drive given Product of Diameter of Driven Formula 📲

Formula

$$i = \frac{P_1}{P_2}$$

Example

$$0.78 = \frac{46.8}{60}$$

Evaluate Formula 📲

9) Velocity Ratio of Simple Belt Drive when Thickness Considered Formula 📲

Formula

$$i = \frac{d_d + t}{d_f + t}$$

Example with Units

$$0.7871 = \frac{0.011\,\text{m} + 9\text{E-5}\,\text{m}}{0.014\,\text{m} + 9\text{E-5}\,\text{m}}$$

Evaluate Formula 📲

10) Velocity Ratio of Simple Belt Drive when Thickness Not Considered Formula 📲

Formula

$$i = \frac{d_d}{d_f}$$

Example with Units

$$0.7857 = \frac{0.011\,\text{m}}{0.014\,\text{m}}$$

Evaluate Formula 📲

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Variables used in list of Velocity Ratio Formulas above

- d_d Diameter of Driver *(Meter)*
- d_f Diameter of Follower *(Meter)*
- E Young's Modulus of Belt *(Newton per Square Meter)*
- i Velocity Ratio
- N_d Speed of Driver *(Revolution per Minute)*
- $N_{d'}$ Speed of First Driver *(Revolution per Minute)*
- N_f Speed of Follower *(Revolution per Minute)*
- N_n Speed of Last Driven Pulley *(Revolution per Minute)*
- P_1 Product of Diameters of Drivers
- P_2 Product of Diameters of Drivens
- s Total Percentage of Slip
- t Belt Thickness *(Meter)*
- T_d Number of Teeth on Driven
- T_{dr} Number of Teeth on Driver
- V Peripheral Velocity of Pulley *(Meter per Second)*
- σ_1 Stress in Tight Side of Belt *(Newton per Square Meter)*
- σ_2 Stress in Slack Side of Belt *(Newton per Square Meter)*

Constants, Functions, Measurements used in list of Velocity Ratio Formulas above

- constant(s): **pi**, 3.14159265358979323846264338327950288 *Archimedes' constant*
- Functions: **sqrt**, sqrt(Number) *A square root function is a function that takes a non-negative number as an input and returns the square root of the given input number.*
- Measurement: **Length** in Meter (m) *Length Unit Conversion*
- Measurement: **Pressure** in Newton per Square Meter (N/m²) *Pressure Unit Conversion*
- Measurement: **Speed** in Meter per Second (m/s) *Speed Unit Conversion*
- Measurement: **Frequency** in Revolution per Minute (rev/min) *Frequency Unit Conversion*

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