



Rates for Axle Suspension in Race Car Formulas

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List of 10 Rates for Axle Suspension in Race Car Formulas

Rates for Axle Suspension in Race Car

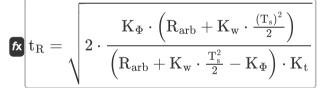
1) Rear Track Width given Roll Rate

 $\mathbf{K} \left[t_{\mathrm{R}} = \sqrt{ \left. rac{K_{\Phi} \cdot K_{\mathrm{w}} \cdot \overline{T_{\mathrm{s}}^{2}}}{\left(K_{\mathrm{w}} \cdot rac{T_{\mathrm{s}}^{2}}{2} - K_{\Phi}
ight) \cdot K_{\mathrm{t}} }
ight]}$

Open Calculator

$$= \sqrt{\frac{10297.43 \text{Nm/rad} \cdot 30366.46 \text{N/m} \cdot (0.9 \text{m})^2}{\left(30366.46 \text{N/m} \cdot \frac{(0.9 \text{m})^2}{2} - 10297.43 \text{Nm/rad}\right) \cdot 321300 \text{N/m}} }$$

2) Rear Track Width given Roll Rate of Suspension with Anti-Roll Bar



Open Calculator

ex

$$0.4 m = \sqrt{2 \cdot \frac{10297.43 Nm/rad \cdot \left(4881.6 Nm/rad + 30366.46 N/m \cdot \frac{(0.9 m)^2}{2}\right)}{\left(4881.6 Nm/rad + 30366.46 N/m \cdot \frac{(0.9 m)^2}{2} - 10297.43 Nm/rad\right) \cdot 321300 N/m}}$$

3) Roll Rate

$$K_{\Phi}=rac{K_{
m t}\cdotrac{t_{
m R}^2}{2}\cdot K_{
m w}\cdotrac{T_{
m s}^2}{2}}{K_{
m t}\cdotrac{t_{
m R}^2}{2}+K_{
m w}\cdotrac{T_{
m s}^2}{2}}$$





4) Roll Rate with Anti-Roll Bar

 $K_{\Phi} = rac{K_{ ext{t}} \cdot rac{ ext{t}_{ ext{R}}^2}{2} \cdot \left(R_{ ext{arb}} + K_{ ext{w}} \cdot rac{T_{ ext{s}}^2}{2}
ight)}{K_{ ext{t}} \cdot rac{ ext{t}_{ ext{R}}^2}{2} + R_{ ext{arb}} + K_{ ext{w}} \cdot rac{T_{ ext{s}}^2}{2}}$

Open Calculator 🗗

$$\boxed{ \textbf{ex} \ 10297.43 \text{Nm/rad} = \frac{321300 \text{N/m} \cdot \frac{(0.4 \text{m})^2}{2} \cdot \left(4881.6 \text{Nm/rad} + 30366.46 \text{N/m} \cdot \frac{(0.9 \text{m})^2}{2}\right)}{321300 \text{N/m} \cdot \frac{(0.4 \text{m})^2}{2} + 4881.6 \text{Nm/rad} + 30366.46 \text{N/m} \cdot \frac{(0.9 \text{m})^2}{2}}{2} }$$

5) Spring Track Width given Roll Rate

 $\left| \mathbf{T}_{s} = \sqrt{ rac{K_{\Phi} \cdot K_{t} \cdot t_{R}^{2}}{\left(K_{t} \cdot rac{t_{R}^{2}}{2} - K_{\Phi}
ight) \cdot K_{w}} }
ight|}$

Open Calculator

$$= \sqrt{\frac{10297.43 \text{Nm/rad} \cdot 321300 \text{N/m} \cdot (0.4 \text{m})^2}{\left(321300 \text{N/m} \cdot \frac{(0.4 \text{m})^2}{2} - 10297.43 \text{Nm/rad}\right) \cdot 30366.46 \text{N/m}} }$$

6) Spring Track Width given Roll Rate of Suspension with Anti-Roll Bar

 $T_{
m s} = \sqrt{2 \cdot \left(rac{rac{K_{\Phi} \cdot K_{
m t} \cdot rac{t_{
m R}^2}{2}}{\left(K_{
m t} \cdot rac{t_{
m R}^2}{2} - K_{
m \Phi}
ight)} - R_{
m arb}}}{K_{
m W}}
ight)}$

$$\boxed{ 2 \cdot \left(\frac{\frac{10297.43 \mathrm{Nm/rad \cdot } 321300 \mathrm{N/m \cdot } \frac{(0.4 \mathrm{m})^2}{2}}{\left(321300 \mathrm{N/m \cdot } \frac{(0.4 \mathrm{m})^2}{2} - 10297.43 \mathrm{Nm/rad} \right)} - 4881.6 \mathrm{Nm/rad} }{30366.46 \mathrm{N/m}} \right) }$$





7) Tyre Rate given Roll Rate

 $K_{\mathrm{t}} = rac{K_{\Phi} \cdot \left(K_{\mathrm{w}} \cdot rac{T_{\mathrm{s}}^2}{2}
ight)}{\left(K_{\mathrm{w}} \cdot rac{T_{\mathrm{s}}^2}{2} - K_{\Phi}
ight) \cdot rac{t_{\mathrm{R}}^2}{2}}$

Open Calculator 🗗

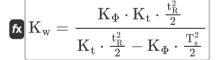
8) Tyre Rate given Roll Rate of Suspension with Anti-Roll Bar

 $K_{t} = rac{K_{\Phi} \cdot \left(R_{arb} + K_{w} \cdot rac{T_{s}^{2}}{2}
ight)}{\left(R_{arb} + K_{w} \cdot rac{T_{s}^{2}}{2} - K_{\Phi}
ight) \cdot rac{t_{R}^{2}}{2}}$

Open Calculator

$$\boxed{ \mathbf{ex} \\ 321300 \mathrm{N/m} = \frac{10297.43 \mathrm{Nm/rad} \cdot \left(4881.6 \mathrm{Nm/rad} + 30366.46 \mathrm{N/m} \cdot \frac{(0.9 \mathrm{m})^2}{2}\right) }{\left(4881.6 \mathrm{Nm/rad} + 30366.46 \mathrm{N/m} \cdot \frac{(0.9 \mathrm{m})^2}{2} - 10297.43 \mathrm{Nm/rad}\right) \cdot \frac{(0.4 \mathrm{m})^2}{2} } }$$

9) Vertical Tyre Axle Rate given Roll Rate

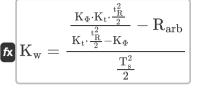


$$\boxed{ 12291.76 \text{N/m} = \frac{10297.43 \text{Nm/rad} \cdot 321300 \text{N/m} \cdot \frac{(0.4 \text{m})^2}{2}}{321300 \text{N/m} \cdot \frac{(0.4 \text{m})^2}{2} - 10297.43 \text{Nm/rad} \cdot \frac{(0.9 \text{m})^2}{2}} } }$$



10) Vertical Tyre Axle Rate given Roll Rate of Suspension with Anti-Roll Bar 🗗





$$= \frac{\frac{10297.43 \text{Nm/rad} \cdot 321300 \text{N/m} \cdot \frac{(0.4 \text{m})^2}{2}}{321300 \text{N/m} \cdot \frac{(0.4 \text{m})^2}{2} - 10297.43 \text{Nm/rad}} - 4881.6 \text{Nm/rad}}{\frac{(0.9 \text{m})^2}{2}}$$





Variables Used

- K_t Tyre Vertical Rate (Newton per Meter)
- Kw Wheel Centre Rate (Newton per Meter)
- K_Φ Roll Rate (Newton Meter per Radian)
- Rarb Roll Rate of Anti-Roll Bar (Newton Meter per Radian)
- t_R Rear Track Width (Meter)
- T_S Spring Track Width (Meter)





Constants, Functions, Measurements used

- Function: 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: Surface Tension in Newton per Meter (N/m)
 Surface Tension Unit Conversion
- Measurement: Torsion Constant in Newton Meter per Radian (Nm/rad)

 Torsion Constant Unit Conversion





Check other formula lists

- Rates for Axle Suspension in Race Car Formulas
- Ride Rate and Ride Frequency for Race Cars Formulas
- Vehicle Cornering in Race Cars Formulas
- Weight Transfer during Braking Formulas
- Wheel Centre Rates for Independent Suspension Formulas

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