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Film Thickness Formulas

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List of 11 Film Thickness Formulas

Film Thickness

1) Eccentricity of Bearing in Terms of Minimum Film Thickness

Open Calculator

fx $e = R - (h_\circ + r)$

ex $0.48776\text{mm} = 26\text{mm} - (0.01224\text{mm} + 25.5\text{mm})$

2) Eccentricity Ratio in Terms of Minimum Film Thickness of Bearing

Open Calculator

fx $\varepsilon = 1 - \left(\frac{h_\circ}{c}\right)$

ex $0.49 = 1 - \left(\frac{0.01224\text{mm}}{0.024\text{mm}}\right)$

3) Eccentricity Ratio of Bearing in Terms of Minimum Film Thickness Variable

Open Calculator

fx $\varepsilon = 1 - h_{min}$

ex $0.5 = 1 - 0.5$

4) Film Thickness in Terms of Absolute Viscosity and Tangential Force

Open Calculator

fx $$h = \mu_o \cdot A_{po} \cdot \frac{V_m}{P}$$

ex $$0.020035\text{mm} = 490\text{cP} \cdot 1750\text{mm}^2 \cdot \frac{5\text{m/s}}{214\text{N}}$$

5) Film Thickness in Terms of Flow Coefficient and Flow of Lubricant

Open Calculator

fx $$h = \left(Q \cdot A_p \cdot \frac{\mu_l}{W \cdot q_f}\right)^{\frac{1}{3}}$$

ex $$0.019537\text{mm} = \left(1600\text{mm}^3/\text{s} \cdot 450\text{mm}^2 \cdot \frac{220\text{cP}}{1800\text{N} \cdot 11.80}\right)^{\frac{1}{3}}$$

6) Fluid Film Thickness in Terms of Flow of Lubricant

Open Calculator

fx $$h = \left(l \cdot 12 \cdot \mu_l \cdot \frac{Q_{slot}}{b \cdot \Delta P}\right)^{\frac{1}{3}}$$

ex $$0.019666\text{mm} = \left(48\text{mm} \cdot 12 \cdot 220\text{cP} \cdot \frac{15\text{mm}^3/\text{s}}{49\text{mm} \cdot 5.1\text{MPa}}\right)^{\frac{1}{3}}$$

7) Minimum Film Thickness given Radius of Bearing

Open Calculator

fx $$h_\circ = R - (e + r)$$

ex $$0.013\text{mm} = 26\text{mm} - (0.487\text{mm} + 25.5\text{mm})$$

8) Minimum Film Thickness in Terms of Minimum Film Thickness Variable of Bearing

Open Calculator

fx $h_\circ = h_{min} \cdot c$

ex $0.012\text{mm} = 0.5 \cdot 0.024\text{mm}$

9) Minimum Film Thickness of bearing in Terms of Eccentricity Ratio

Open Calculator

fx $h_\circ = c \cdot (1 - \varepsilon)$

ex $0.01224\text{mm} = 0.024\text{mm} \cdot (1 - 0.49)$

10) Minimum Film Thickness Variable of Bearing

Open Calculator

fx $h_{min} = \frac{h_\circ}{c}$

ex $0.51 = \frac{0.01224\text{mm}}{0.024\text{mm}}$

11) Minimum Film Thickness Variable of Bearing in Terms of Eccentricity Ratio

Open Calculator

fx $h_{min} = 1 - \varepsilon$

ex $0.51 = 1 - 0.49$

Variables Used

- A_p Total Projected Area of Bearing Pad *(Square Millimeter)*
- A_{po} Area of Moving Plate on Oil *(Square Millimeter)*
- **b** Breadth of Slot for Oil Flow *(Millimeter)*
- **c** Radial clearance for bearing *(Millimeter)*
- **e** Eccentricity in Bearing *(Millimeter)*
- **h** Oil Film thickness *(Millimeter)*
- $h_\circ$ Minimum Film Thickness *(Millimeter)*
- h_{min} Minimum Film Thickness Variable
- **l** Length of Slot in Direction of Flow *(Millimeter)*
- **P** Tangential Force on Moving Plate *(Newton)*
- **Q** Flow of Lubricant *(Cubic Millimeter per Second)*
- q_f Flow Coefficient
- Q_{slot} Flow of Lubricant from Slot *(Cubic Millimeter per Second)*
- **r** Radius of Journal *(Millimeter)*
- **R** Radius of Bearing *(Millimeter)*
- V_m Velocity of Moving Plate on Oil *(Meter per Second)*
- **W** Load Acting on Sliding Bearing *(Newton)*
- **ΔP** Pressure Difference between Slot Sides *(Megapascal)*
- **ε** Eccentricity Ratio of Journal Bearing
- μ_l Dynamic Viscosity of Lubricant *(Centipoise)*
- μ_o Dynamic Viscosity of Oil *(Centipoise)*

Constants, Functions, Measurements used

- Measurement: **Length** in Millimeter (mm)
  Length Unit Conversion
- Measurement: **Area** in Square Millimeter (mm²)
  Area Unit Conversion
- Measurement: **Pressure** in Megapascal (MPa)
  Pressure Unit Conversion
- Measurement: **Speed** in Meter per Second (m/s)
  Speed Unit Conversion
- Measurement: **Force** in Newton (N)
  Force Unit Conversion
- Measurement: **Volumetric Flow Rate** in Cubic Millimeter per Second (mm³/s)
  Volumetric Flow Rate Unit Conversion
- Measurement: **Dynamic Viscosity** in Centipoise (cP)
  Dynamic Viscosity Unit Conversion

Check other formula lists

- **Film Thickness Formulas**

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