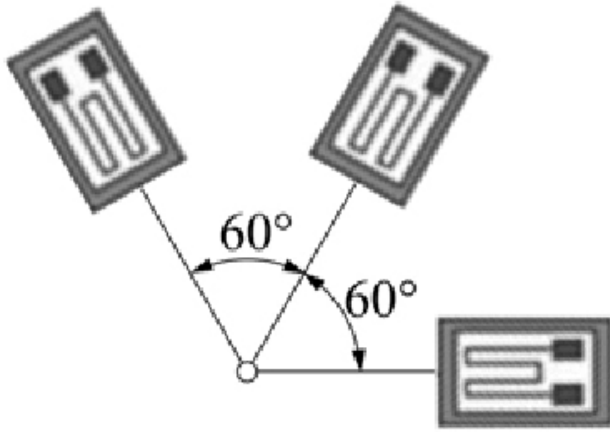


0° – 60° – 120° STRAIN-GAUGE ROZET HESABI



Ölçülen Değerler

$$\epsilon_0 = 55 \cdot 10^{-5}$$

$$\epsilon_{60} = -10 \cdot 10^{-5}$$

$$\epsilon_{120} = 15 \cdot 10^{-5}$$

Verilen Değerler

$$E = 2,1 \cdot 10^5 \text{ N/mm}^2$$

$$\nu = 0,3$$

Rozet Hesabı

$$\epsilon_0 = \epsilon_x \cos^2(0) + \epsilon_y \sin^2(0) + \gamma_{xy} \sin(0) \cos(0)$$

$$\epsilon_{60} = \epsilon_x \cos^2(60) + \epsilon_y \sin^2(60) + \gamma_{xy} \sin(60) \cos(60)$$

$$\epsilon_{120} = \epsilon_x \cos^2(120) + \epsilon_y \sin^2(120) + \gamma_{xy} \sin(120) \cos(120)$$

$$\epsilon_0 = \epsilon_x = 55 \cdot 10^{-5}$$

$$\epsilon_{60} = 55 \cdot 10^{-5} \cos^2(60) + \epsilon_y \sin^2(60) + \gamma_{xy} \sin(60) \cos(60)$$

$$\epsilon_{120} = 55 \cdot 10^{-5} \cos^2(120) + \epsilon_y \sin^2(120) + \gamma_{xy} \sin(120) \cos(120)$$

$$\epsilon_y \sin^2(60) + \gamma_{xy} \sin(60) \cos(60) = \epsilon_{60} - 55 \cdot 10^{-5} \cos^2(60)$$

$$\epsilon_y \sin^2(120) + \gamma_{xy} \sin(120) \cos(120) = \epsilon_{120} - 55 \cdot 10^{-5} \cos^2(120)$$

$$\epsilon_y \sin^2(60) + \gamma_{xy} \sin(60) \cos(60) = -10 \cdot 10^{-5} - 55 \cdot 10^{-5} \cos^2(60)$$

$$\epsilon_y \sin^2(120) + \gamma_{xy} \sin(120) \cos(120) = 15 \cdot 10^{-5} - 55 \cdot 10^{-5} \cos^2(120)$$

$$\epsilon_y \sin^2(60) + \gamma_{xy} \sin(60) \cos(60) = -23,75 \cdot 10^{-5}$$

$$\epsilon_y \sin^2(120) + \gamma_{xy} \sin(120) \cos(120) = 1,25 \cdot 10^{-5}$$

$$0,75 \cdot \epsilon_y + 0,433 \cdot \gamma_{xy} = -23,75 \cdot 10^{-5}$$

$$0,75 \cdot \epsilon_y - 0,433 \cdot \gamma_{xy} = 1,25 \cdot 10^{-5}$$

$$1,50 \cdot \epsilon_y = -22,5 \cdot 10^{-5}$$

$$\epsilon_y = -15 \cdot 10^{-5}$$

$$\gamma_{xy} = -29 \cdot 10^{-5}$$

Hesaplanan Değerler

$$\epsilon_x = 55 \cdot 10^{-5}$$

$$\epsilon_y = -15 \cdot 10^{-5}$$

$$\gamma_{xy} = -29 \cdot 10^{-5}$$

Hooke Bağlıları ve Gerilme Hesabı

$$\sigma_x = \frac{E}{(1-\nu^2)} (\epsilon_x + \nu \epsilon_y)$$

$$\sigma_y = \frac{E}{(1-\nu^2)} (\epsilon_y + \nu \epsilon_x)$$

$$\tau_{xy} = G \cdot \gamma_{xy}$$

$$G = \frac{E}{2(1+\nu)}$$

$$\sigma_x = 116,5 \text{ N/mm}^2$$

$$\sigma_y = 3,5 \text{ N/mm}^2$$

$$\tau_{xy} = -23,4 \text{ N/mm}^2$$

$$\sigma_{1,2} = \left(\frac{\sigma_x + \sigma_y}{2} \right) \pm \sqrt{\left(\frac{\sigma_x - \sigma_y}{2} \right)^2 + (\tau_{xy})^2}$$

$$\sigma_1 = 121,15 \text{ N/mm}^2$$

$$\sigma_2 = -1,15 \text{ N/mm}^2$$

Von Mises Hipotezine Göre Eşdeğer Gerilme Hesabı

$$\sigma_v = \sqrt{(\sigma_1)^2 + (\sigma_2)^2 - (\sigma_1) \cdot (\sigma_2)}$$

$$\sigma_v = \sqrt{(121,15)^2 + (-1,15)^2 - (121,15) \cdot (-1,15)}$$

$$\sigma_v = 121,73 \text{ N/mm}^2$$

Tresca Hipotezine Göre Eşdeğer Gerilme Hesabı

$$\sigma_v = \sigma_1 - \sigma_2$$

$$\sigma_v = (121,15) - (-1,15)$$

$$\sigma_v = 122,30 \text{ N/mm}^2$$