

Soru : Enine kuvvete maruz ön gerilmeli bir cıvata bağlantısı $F = 25 \text{ kN}$ 'lık kuvvet taşıyacaktır.

$k_0 = 1,2$ $\frac{\mu}{\rho} = 0,12$ $z = 10$ olduğuna göre kullanılacak cıvatayı belirleyiniz. Cıvata kalitesi (malzemesi) 6x6'dır.
 $S = 1,5$
Görmüşüm:

$$F_{\text{ön}} = \frac{k_0 \cdot F}{\mu \cdot z}$$

$$F_{\text{ön}} = \frac{1,2 \cdot 25.000}{0,12 \cdot 10} = 25.000 \text{ N}$$

Yaklaşık hesap

$$\sigma_{\text{ak}} \approx 1,3 \frac{4 F_{\text{ön}}}{\pi d_1^2} \leq \frac{\sigma_{\text{AK}}}{S}$$

$$d_1 \geq \sqrt{\frac{1,3 \cdot 4 \cdot F_{\text{ön}} \cdot S}{\pi \cdot \sigma_{\text{AK}}}}$$

yaklaşık hesap

$$\sigma_{\text{AK}} = 6 \cdot 6 \cdot 10 = 360 \text{ MPa}$$

$$d_1 \geq \sqrt{\frac{1,3 \cdot 4 \cdot 25000 \cdot 1,5}{\pi \cdot 360}} = 13,130 \text{ mm}$$

$$d_1 = 13,546 \text{ mm} \rightarrow \text{M16 Standart olur.}$$

Bu YAKLAŞIK HESAP

Tom hesaplama

$$\sigma_B = \sqrt{\sigma_a^2 + 3\tau_b^2} \leq \frac{\sigma_{AK}}{5} \quad \text{olmalı}$$

$$\sigma_a = \frac{4F_{on}}{\pi d_1^2} \quad \tau_b = \frac{16M_{s1}}{\pi d_1^3} \quad \text{olur}$$

$$M_{s1} = F_{on} \cdot \frac{d_2}{2} \tan(\beta + f')$$

$$\mu' = \frac{\mu}{\cos(\frac{\alpha}{2})} = \frac{0,12}{\cos(\frac{60}{2})} \quad \mu' = 0,138$$

$M16 \quad h=2 \text{ mm} \quad d_2=14,701 \text{ mm} \quad d_1=13,546 \text{ mm}$

$$\tan \beta = \frac{h}{\pi d_2} = \frac{2}{\pi \cdot 14,701} \quad \beta \approx 2,479^\circ$$

$$f' = \text{Arctan} \mu' = \text{Arctan} 0,138 \quad f' = 7,857^\circ$$

$$M_{s1} = 25000 \cdot \frac{14,701}{2} \tan(2,479 + 7,857)$$

$$M_{s1} \approx 50251 \text{ Nmm}$$

$$\sigma_a = \frac{4 \cdot 25.000}{\pi \cdot 13,546^2} = 86,735 \text{ MPa}$$

$$\tau_b = \frac{16 \cdot 50251}{\pi \cdot 13,546^3} = 102,963 \text{ MPa}$$

$$\sigma_B = \sqrt{86,735^2 + 3 \cdot 102,963^2} \leq \frac{360}{1,5} \quad ?$$

$$198,310 \text{ MPa} < 240 \text{ MPa}$$

uygundur.