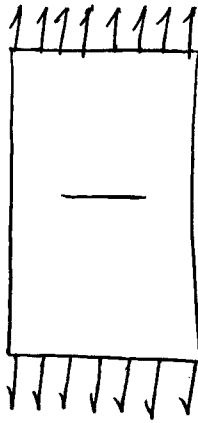


Given:



Through crack with length of $\frac{1}{2}$ inch.

$$K_{IC} = 80 \text{ ksi} \cdot \sqrt{\text{in}}$$

$$\sigma_{nom} = 100 \text{ ksi}$$

Find: Will the plate experience unstable crack propagation?

Solution

$$2a = 0.5 \text{ in} \Rightarrow a = \frac{1}{4} \text{ in.}$$

$$K = Y \sigma_{nom} \sqrt{\pi a}$$

$Y = 1$ for centered through crack

$$\Rightarrow K = (1.0)(100 \text{ ksi}) \sqrt{\pi \cdot 0.25 \text{ in}} = 88.6 \text{ ksi} \cdot \sqrt{\text{in}}$$

$$K_{IC} = 80 \text{ ksi} \cdot \sqrt{\text{in}} < K = 88.6 \text{ ksi} \cdot \sqrt{\text{in}}$$

\Rightarrow Crack is unstable.