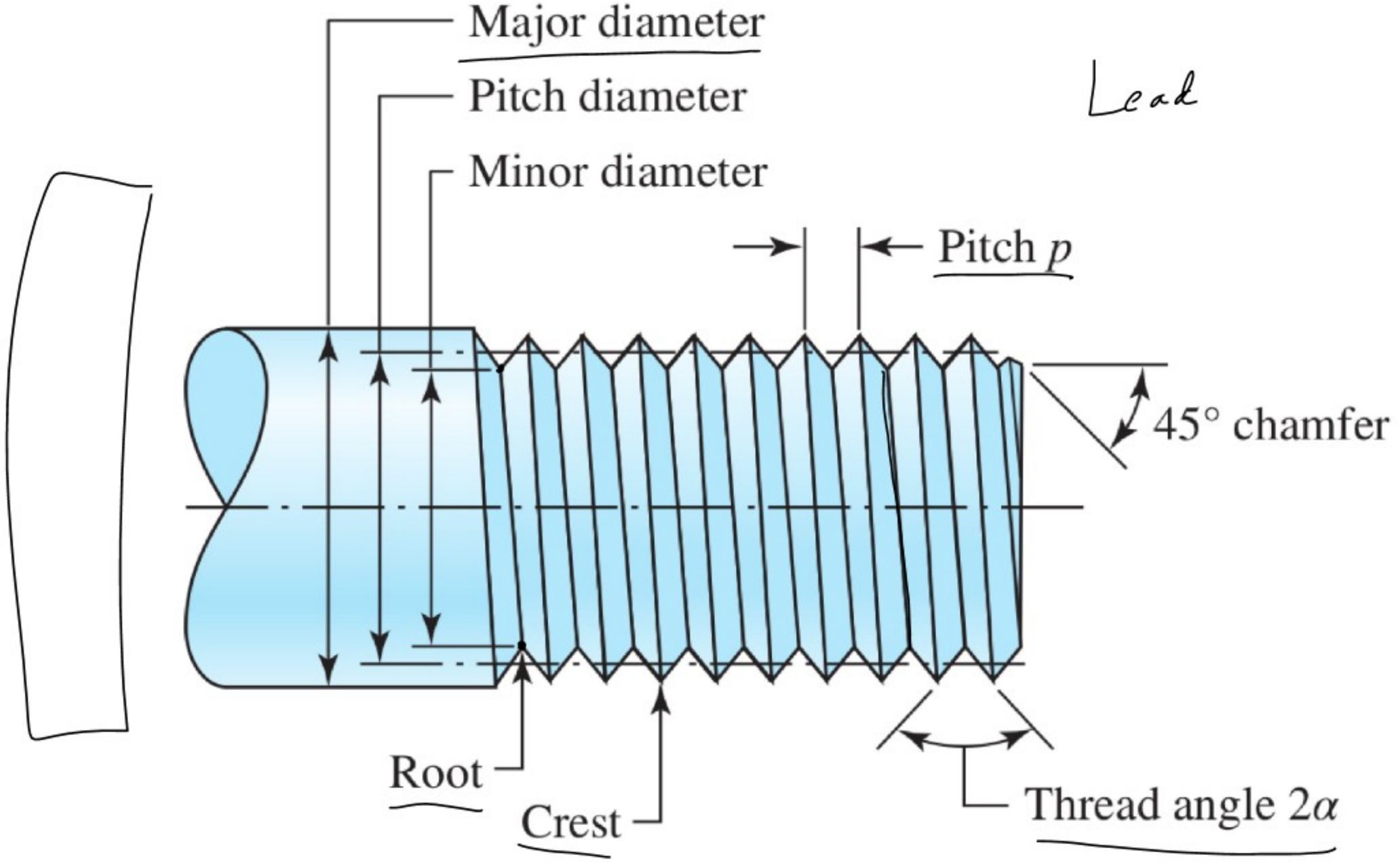
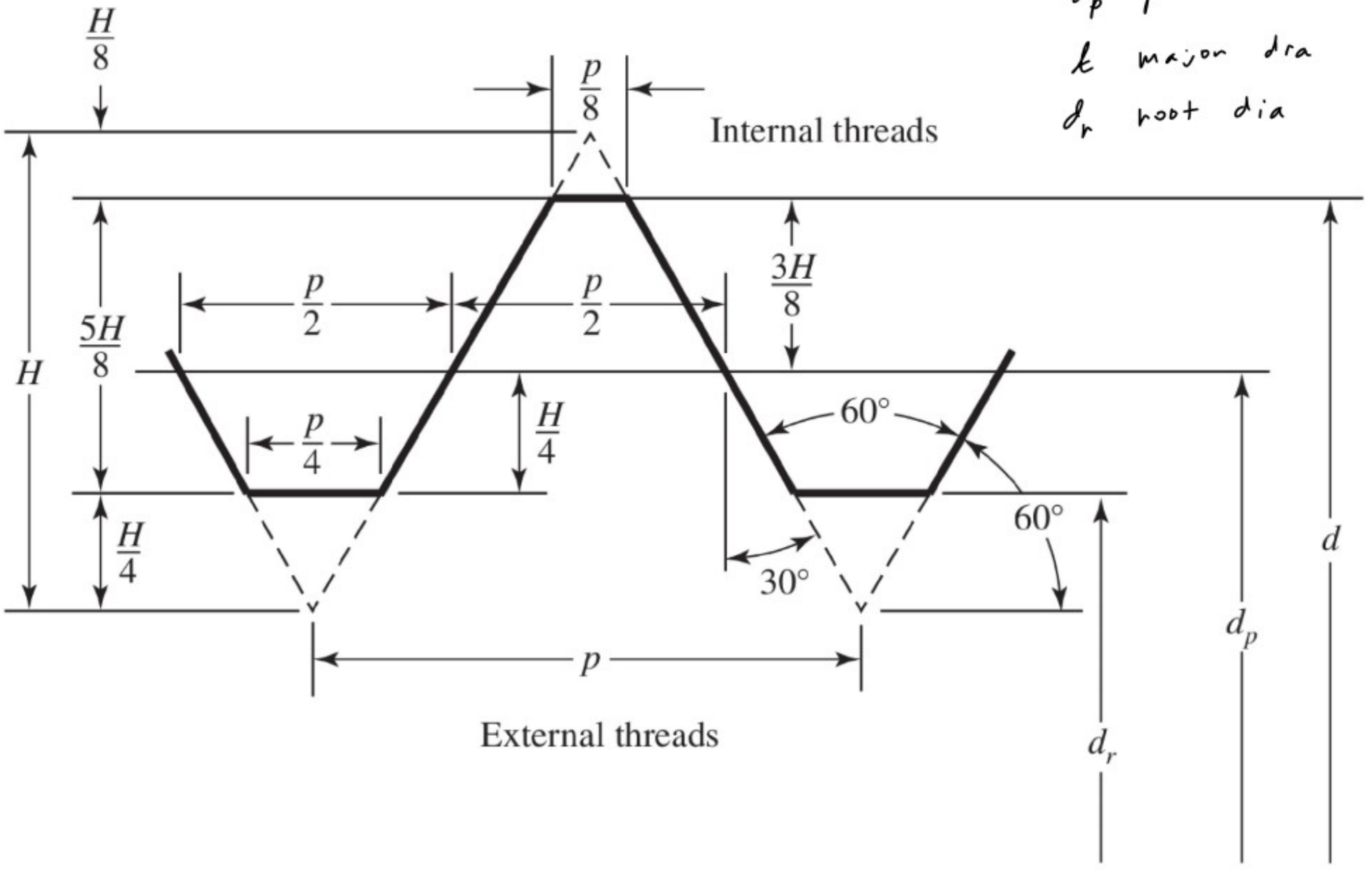
Bolts


Major diameter
Pitch diameter
Minor diameter
Lead
Pitch p
45° chamfer
Root
Crest
Thread angle 2α

d_p pitch dia

d major dia

d_r root dia



Thread Standards

Metric

M4×0.7 Major dia 4 mm pitch 0.7 mm

M12×1.75 Major dia 12 mm pitch 1.75 mm

M12×1.25 Major dia 12mm pitch 1.25 mm

Not standard

M12×0.1

UNC UNF

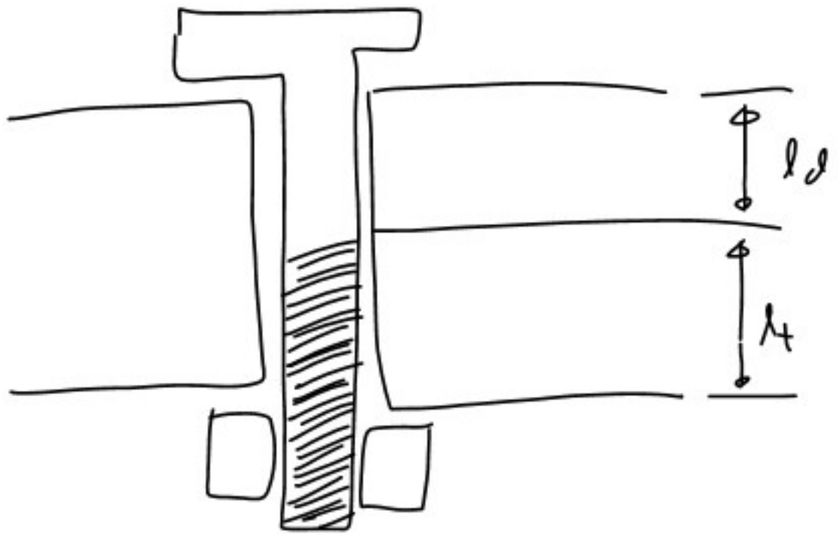
5-40 Major dia $\frac{1}{8}$ in 40 $\frac{\text{threads}}{\text{in}}$ pitch 0.025 in

10-32 Major dia 0.19 in 32 $\frac{\text{threads}}{\text{in}}$ pitch 0.03125 in

$\frac{1}{4}$-20 Major dia $\frac{1}{4}$ in 20 $\frac{\text{threads}}{\text{in}}$ pitch 0.05 in

$d = 0.13n + 0.06$

Bolt stiffness



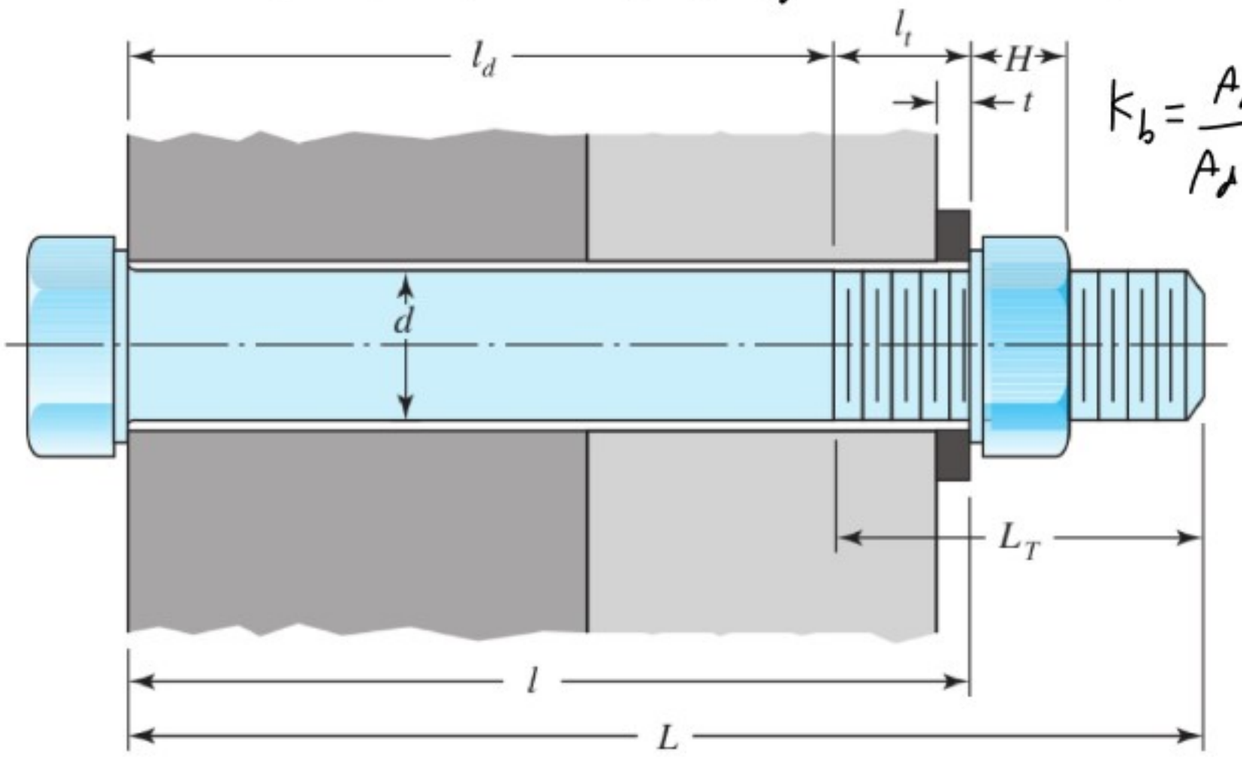
$$k_r = \frac{A_d A_t E}{A_d l_t + A_t l_d}$$

A_t tab 8-1 or 8-2

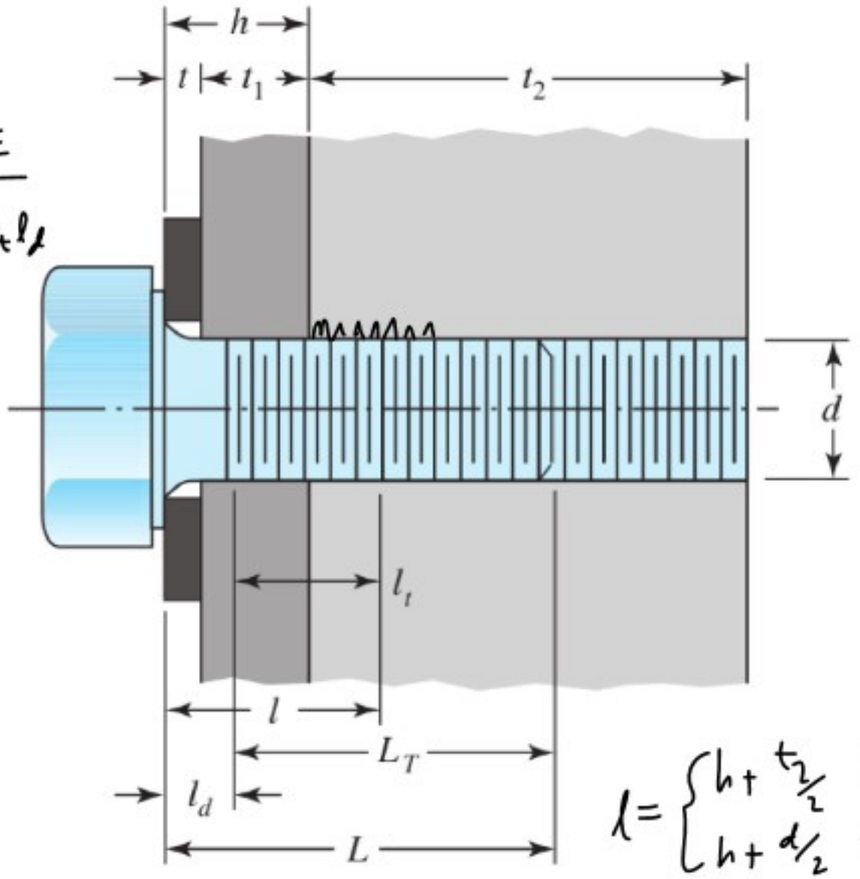
page 424 - 425

$l_d = L - L_T$ $\quad l_t = l - l_d$ $\quad A_d = \pi d^2/4$

$$k_b = \frac{A_d A_t E}{A_d l_t + A_t l_d}$$



$L > l + H$



$$l = \begin{cases} h + t_2/2 & t_2 < d \\ h + d/2 & t_2 \geq d \end{cases}$$

$L > h + 1.5d$

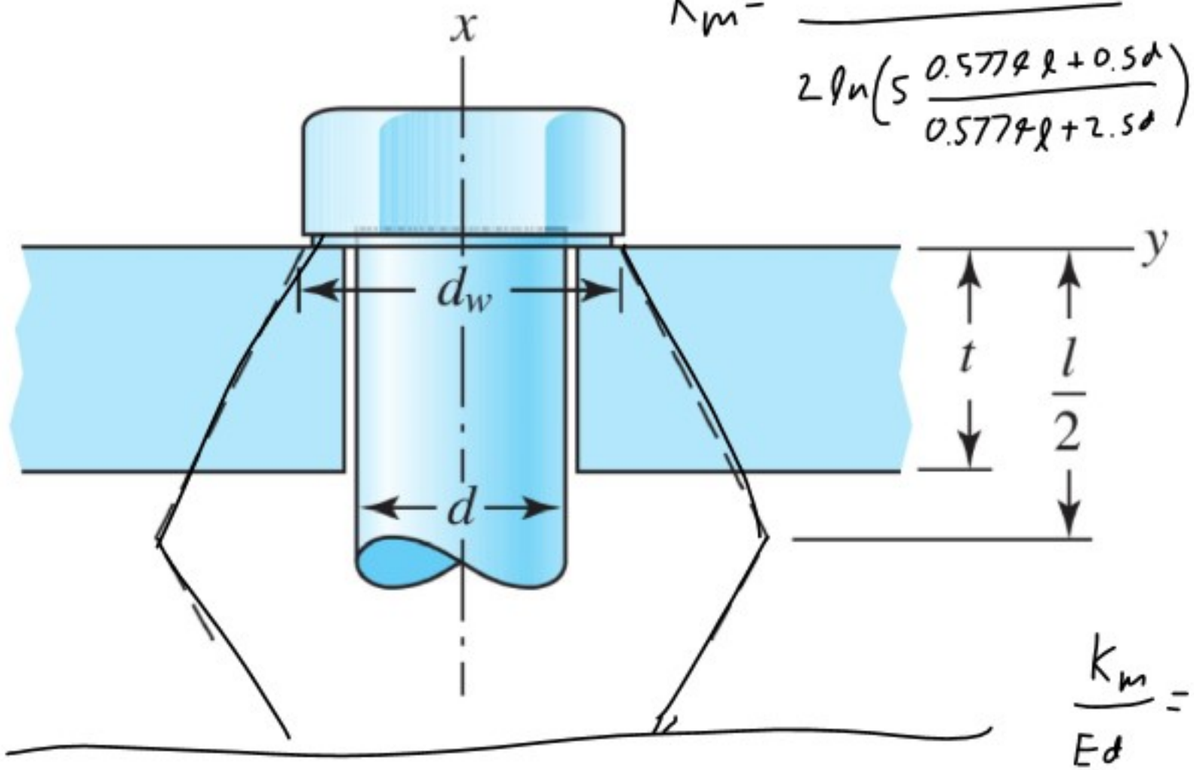
inch

$$L_T = \begin{cases} 2d + 1/4 & L \le 6 \\ 2d + 1/2 & L > 6 \end{cases}$$

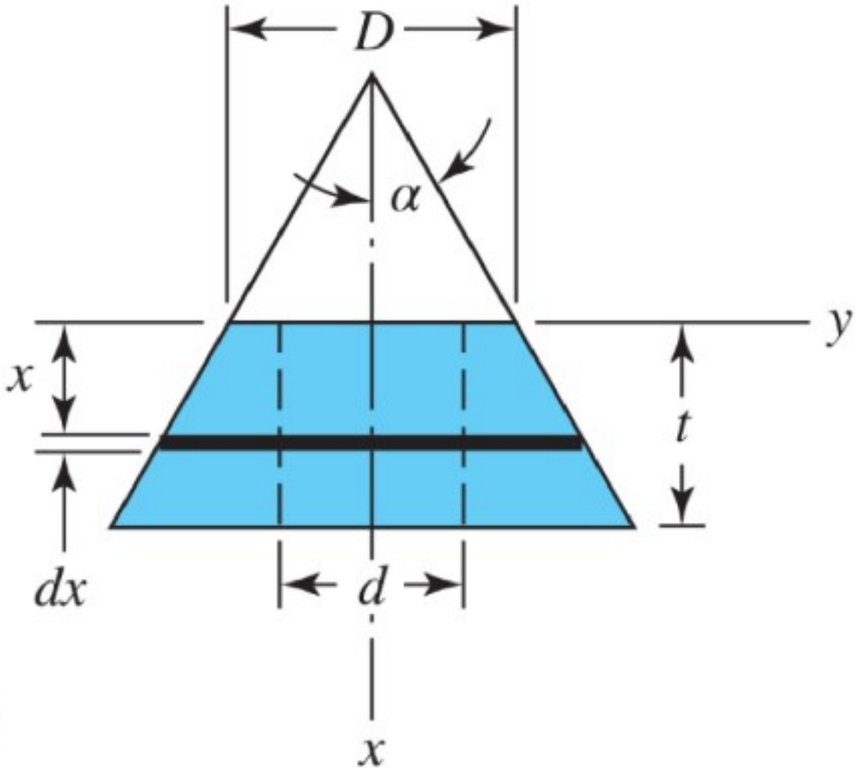
metric (mm)

$$L_T = \begin{cases} 2d + 6 & L \le 125 \quad d \le 48 \\ 2d + 12 & 125 < L \le 200 \\ 2d + 25 & L > 200 \end{cases}$$

$$K_m = \frac{0.577\pi E d}{2\ln\left(5\,\frac{0.577\pi l + 0.5d}{0.577\pi l + 2.5d}\right)}$$



$$\frac{K_m}{Ed} = A e^{B d/l}$$



A and B
Table 8-8 page 441

Bolt Strength

ASTM

SAE

S_{ut} min (99%)

Proof Strength ≈ yield strength

grade 1–4  60–115 Kpsi.

5  105–120

7  133