

APPENDIX B-1
Properties of Sections

A = area, in.²

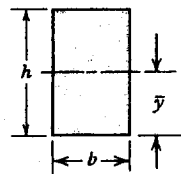
I = moment of inertia, in.⁴

J = polar moment of inertia, in.⁴

Z = section modulus, in.³

ρ = radius of gyration, in.

\bar{y} = centroidal distance, in.



Rectangle

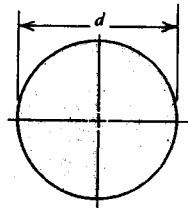
$$A = bh$$

$$I = \frac{bh^3}{12}$$

$$Z = \frac{bh^2}{6}$$

$$\rho = 0.289h$$

$$\bar{y} = \frac{h}{2}$$



Circle

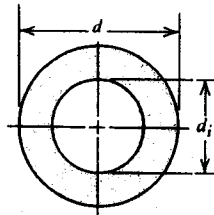
$$A = \frac{\pi d^2}{4}$$

$$I = \frac{\pi d^4}{64}$$

$$Z = \frac{\pi d^3}{32}$$

$$J = \frac{\pi d^4}{32}$$

$$\rho = \frac{d}{4}$$



Hollow circle

$$A = \frac{\pi}{4} (d^2 - d_i^2)$$

$$I = \frac{\pi}{64} (d^4 - d_i^4)$$

$$Z = \frac{\pi}{32d} (d^4 - d_i^4)$$

$$J = \frac{\pi}{32} (d^4 - d_i^4)$$

$$\rho = \sqrt{\frac{d^2 + d_i^2}{16}}$$