

3.1 General

The section property tables include all relevant section dimensions and properties necessary for assessing steel structures in accordance with AS 4100. The structural hollow sections included in these tables are:

- | | |
|-------------------------------|---------------------|
| – Circular Hollow Sections | Grade C250 and C350 |
| – Rectangular Hollow Sections | Grade C350 and C450 |
| – Square Hollow Sections | Grade C350 and C450 |

3.2 Section Property Tables

For each group of structural hollow sections the tables include:

- Dimensions, Ratios and Properties
- Properties for Design to AS 4100

These parameters are considered in the Tables 3.1-1 to 3.1-6 inclusive.

3.2.1 Dimensions, Ratios and Properties

The Tables give standard dimensions and properties for the structural steel hollow sections noted in Sections 2.1 and 2.7. These properties, such as gross cross-section area (A_g), second moments of area (I_x, I_y), elastic and plastic section moduli (Z_x, S_x, Z_y, S_y) and the torsion constant (J) are the fundamental geometric properties required by design Standards. It should be noted that Clause 5.6 of AS 4100 recommends that the warping constant (I_w) for hollow sections is approximately zero.

Additionally, the external surface area of the hollow section - as used in estimating quantities of protective coatings - is also considered within these Tables.

3.2.1.1 Torsion Constants

The torsional constant (J) and the torsional modulus constant (C) for square and rectangular hollow sections are defined as follows:

$$J = \left(t^3 \frac{h}{3} + 2kA_h \right)$$

$$C = \left(\frac{t^3 \frac{h}{3} + 2kA_h}{t + \frac{k}{t}} \right)$$

where $R_c = \frac{R_o + R_i}{2}$

$h = 2[(b-t) + (d-t)] - 2R_c(4-\pi)$

$A_h = (b-t)(d-t) - R_c^2(4-\pi)$

$k = \frac{2A_h t}{h}$

and t = specified thickness of section

b = width of section

d = depth of section

R_o = outer corner radius

R_i = inner corner radius

R_c = mean corner radius

h = length of the mid-contour

A_h = area enclosed by h

k = integration constant

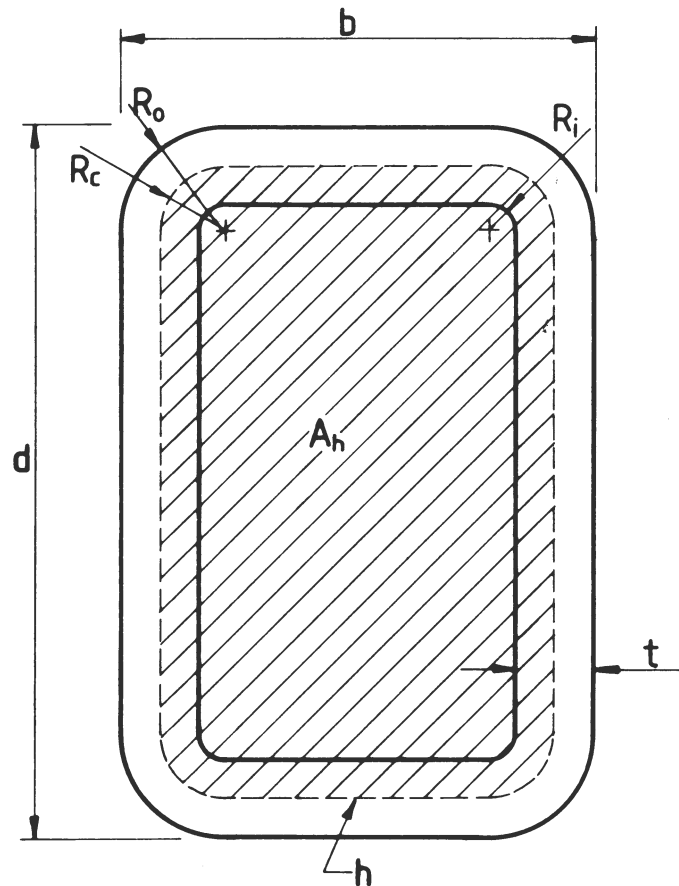


Figure 3.1: Parameters for Calculation of Torsion Constants

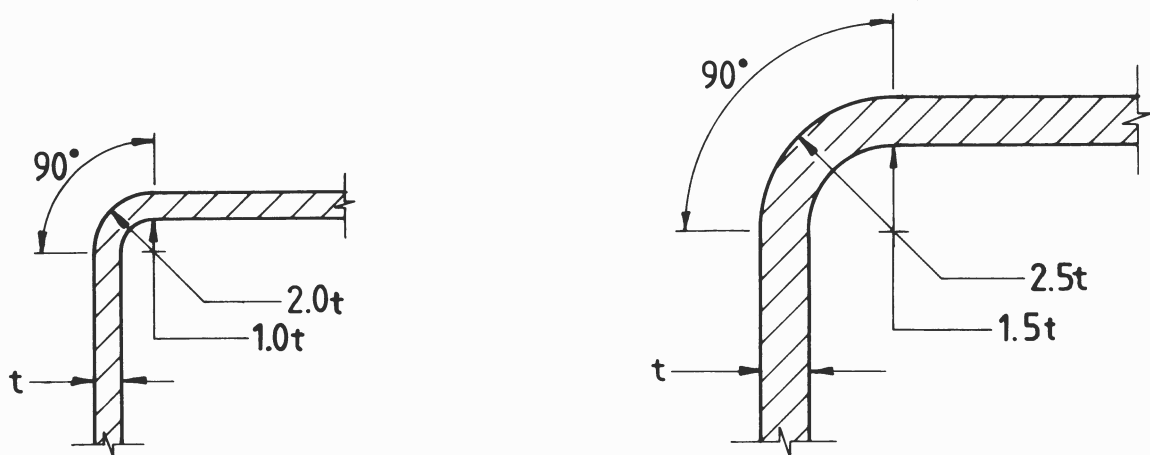
as shown in Figure 3.1.

The above calculation method for J and C is extracted from Ref.[3.1].

3.2.1.2 Corner Radii

The section properties presented in this publication are calculated in accordance with AS 1163.

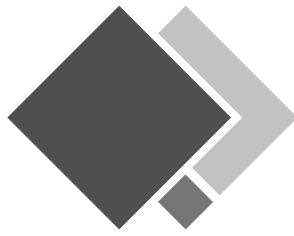
Figure 3.2 shows the corner radii detail used in determining section properties. However it should be noted that the actual corner geometry may vary from that shown.



a) thickness less than 3.0 mm

b) thickness 3.0 mm and greater

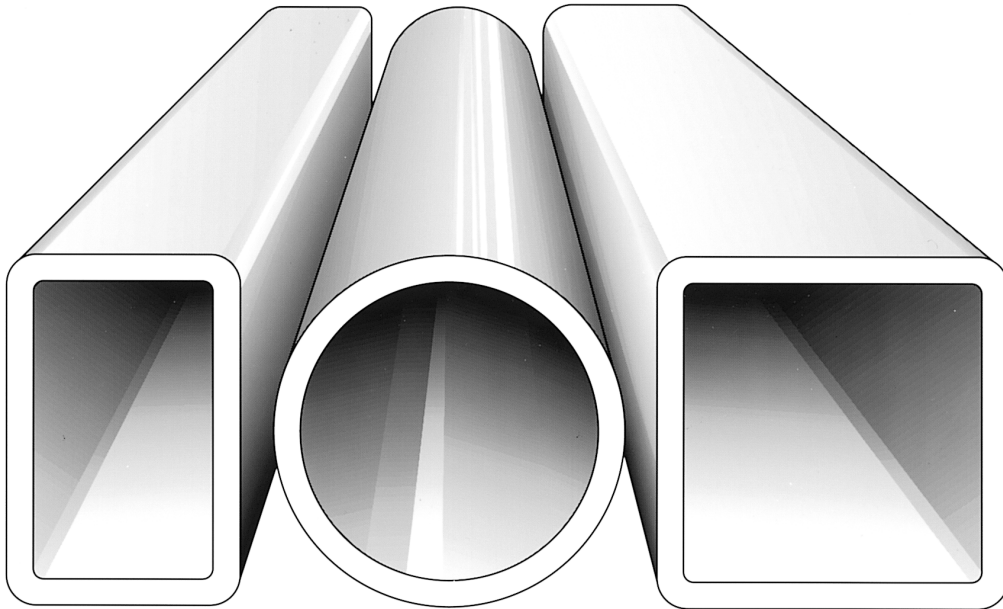
Figure 3.2: Corner Geometry for Determining Section Properties



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Volume 2: Hollow Sections

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LIMIT STATES
EDITION TO
AS 4100-1998
 $S^* \leq \phi R_u$

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NOTE: SEE SECTION 2.1 FOR THE SPECIFIC MATERIAL STANDARD (AS 1163) REFERRED TO BY THE SECTION TYPE AND STEEL GRADE IN THESE TABLES

SECTION PROPERTIES