3.2.2 Properties for Design to AS 4100

These properties are necessary for calculating the section capacities of hollow sections in accordance with AS 4100. The section form factor, compactness and effective section moduli are tabulated. These values are dependent on steel grade.

3.2.2.1 Compactness

In Clauses 5.2.3, 5.2.4 and 5.2.5 of AS 4100, sections are described as **compact, non-compact** or **slender** (C, N or S respectively). This categorisation provides a measure of the relative importance of yielding and local buckling of the plate elements in compression caused by bending.

The Design to AS 4100 listings include a column(s) headed "Compactness" for a given (principal) axis of bending.

The compactness of a hollow section is also important when selecting the methods of analysis (elastic or plastic) used to determine the design action effects (Clause 4.5 of AS 4100) or in using the higher tier provisions of Section 8 of AS 4100 for designing members subject to combined actions. Clause 4.5 of AS 4100 does not currently permit plastic analysis when designing with hollow sections and further research is required to determine the suitability of plastic analysis in the design of such sections.

General worked examples for calculating section compactness are provided in Section 3.2.3 and Refs.[3.2,3.3].

3.2.2.2 Effective Section Modulus

Having evaluated the compactness of a hollow section, the effective section modulus (Z_e) is then evaluated. This parameter is based on the section moduli (*S, Z*) and is used in the determination of the design section moment capacity (ϕM_s). Z_e is then calculated using Clauses 5.2.3, 5.2.4 and 5.2.5 of AS 4100. The equations for determining Z_e reflect the proportion of the hollow section that is effective in resisting the compression in the section caused by flexure.

From Table 5.2 of AS 4100, the cold-formed (CF) residual stress category is used in the calculation of Z_e for hollow sections complying with AS 1163. Except for the 150x50x2.0RHS bending about the minor principal axis, it should be noted that the deformation limit (λ_{ed}) is not exceeded for hollow sections manufactured in accordance with AS 1163 and listed in the Tables and therefore noticeable deformations will not occur for such sections. General worked examples for calculating Z_e are provided in Section 3.2.3 and Refs.[3.2,3.3].

3.2.2.3 Form Factor

The form factor (k_f) is defined in Clause 6.2.2 of AS 4100. k_f is used to determine the design section capacity of a concentrically loaded compression member (ϕN_s). The calculation of k_f indicates the degree to which the column section will buckle locally before squashing. k_f represents the proportion of the hollow section that is effective in compression and is based on the effective width of each element in the section (i.e. $k_f = 1.0$ signifies a column section which will yield rather than buckle locally in a short or stub column test). The evaluation of k_f is also important when designing to the higher tier provisions for members subject to combined actions as noted in Section 8 of AS 4100.

From Table 6.2.4 of AS 4100, the cold-formed (CF) residual stress category is used in the calculation of k_f for hollow sections complying with AS 1163. General worked examples for calculating k_f are provided in Section 3.2.3 and Refs.[3.2,3.3].

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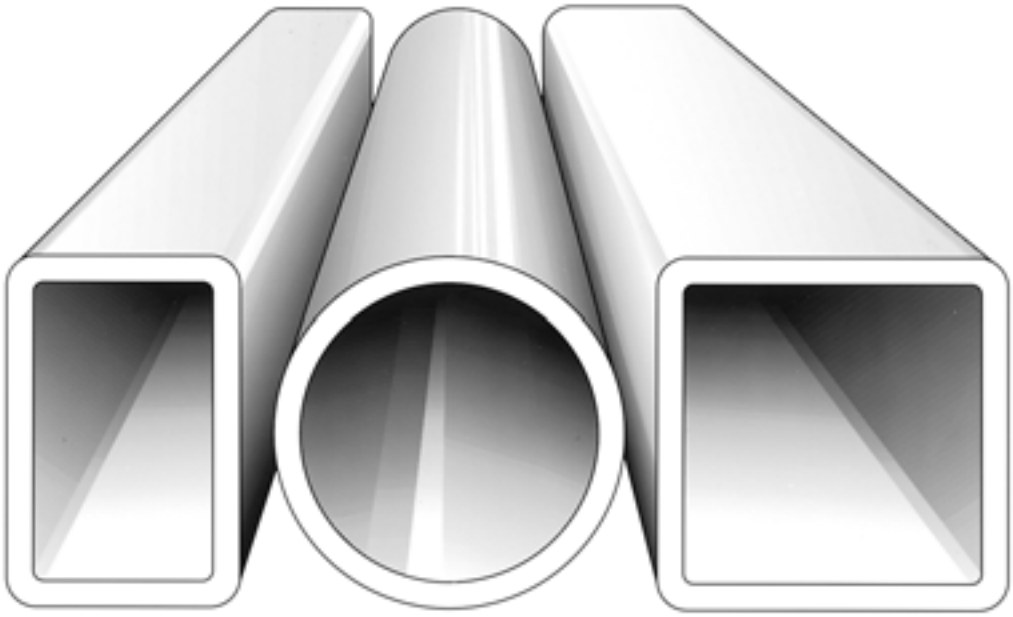

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$S^* \leq \phi R_u$

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PART 3 SECTION PROPERTIES

TABLES

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