3.3 Properties for Fire Design

To assist with the design of structural steel hollow sections for fire resistance (Section 12 of AS 4100), values of the exposed surface area to mass ratio (k_{sm}) are tabulated in Tables 3.2-1 to 3.2-6 for the various cases shown in Figure 3.3.

For **unprotected steel hollow sections** the values of k_{sm} corresponding to four- and three-sided exposure should be taken as those corresponding to Cases 1 and 4 respectively in Figure 3.3.

For members requiring the addition of fire protection materials, Ref.[3.4] may be used to determine the thickness of proprietary materials required for a given value of k_{sm} and Fire Resistance Level (FRL). It should be noted that k_{sm} is equivalent to *E* in Ref.[3.4]. Further information and worked examples on fire design to Section 12 of AS 4100 can be found in Refs.[3.5,3.6].



Cases of fire exposure considered:

1 = Total Perimeter, Profile-protected4 = Top2 = Total Perimeter, Box-protected, No Gap5 = Top I

4 = Top Flange Excluded, Profile-protected

5 = Top Flange Excluded, Box-protected, No Gap

3 = Total Perimeter, Box-protected, 25 mm Gap 6 = Top Flange Excluded, Box-protected, 25 mm Gap

Figure 3.3: Cases for calculation of Exposed Surface Area to Mass Ratio

3.4 Telescoping Sections

Tables 3.3-1 to 3.3-3 can be used to determine hollow sections which are suitable for telescoping. Within these tables the total available clearance is tabulated to allow designers to select hollow sections with suitable clearance for the type of fit required. Sections with clearances less than 2.0 mm are shown in **bold** in the tables. Figure 3.4 shows the typical telescoping data required to select appropriate sections.

All calculations used in the preparation of the tables are based on the nominal dimensions of hollow sections and manufacturing tolerances specified in AS 1163. Owing to dimensional tolerances permitted within that Standard actual clearances of sections manufactured to this specification will vary marginally from the values tabulated.



design capacity tables for structural steel



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

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