PART 7 MEMBERS SUBJECT TO AXIAL TENSION

7.1 General

Tables 7-1 to 7-6 give values of design section capacity in axial tension. Section 7 of AS 4100 is used to determine these values.

The tables list the design section capacity in tension for various grades and types of structural steel hollow sections with full perimeter welded connections to uniformly stiff supports.

7.2 Design Section Capacity in Axial Tension

The design section capacity in axial tension (ϕN_t) has been determined from Clause 7.2 of AS 4100 and is taken as the *lesser* of:

$\phi N_t = \phi A_g f_y$ (yielding of the gross section)

$\phi N_t = \phi(0.85) k_t A_n f_u$ (fracture of the net section)

where ϕ = 0.9 (Table 3.4 of AS 4100)

f_y = yield stress used in design

f_u = ultimate tensile strength used in design

A_g = gross area of the cross-section

A_n = net area of the cross-section

= A_g (for full perimeter welded connections to uniformly stiff supports)

k_t = 1.0 (Clause 7.3.1 of AS 4100)

The *lesser* value of $\phi N_t(1) = \phi A_g f_y$ and $\phi N_t(2) = \phi(0.85) A_g f_u$ is **highlighted in bold type** in the tables.

Note: for Grade C250 and C350 hollow sections, $\phi N_t = \phi A_g f_y$ is always less than $\phi N_t = \phi(0.85) A_g f_u$ though for Grade C450 $\phi N_t = \phi(0.85) A_g f_u$ is the *lesser* value of ϕN_t.

For sections reduced by penetrations or holes, the value of ϕN_t can be determined from the tables as the *lesser* value of:

$\phi N_t = \phi A_g f_y$

and $\phi N_t = \phi(0.85) k_t A_g f_u (A_n/A_g)$

where A_n = net area of the cross-section

k_t = tension correction factor (Clause 7.3.1 of AS 4100)

Values of A_g are tabulated in Tables 7-1 to 7- 6. *Note that all the values in Tables 7-1 to 7-6 assume* k_t = 1.0

7.3 Example

1. A tension member with a full perimeter welded connection to a uniformly stiff support is subjected to an axial tension force of 150 kN. Design a suitable RHS tension member.

<u>Design Data:</u>

N^* = 150kN

k_t = 1.0 (for a full perimeter welded connection)

<u>Solution:</u>

Select a suitable RHS member from Tables 7-3(2) and 7-4(2). The alternatives are:

65x35x3.0RHS – Grade C350 (4.25 kg/m) ϕN_t = 170 kN > N^*

65x35x2.3RHS – Grade C450 (3.34 kg/m) ϕN_t = 163 kN > N^*

Choose the 65x35x2.3RHS – Grade C450 (3.34 kg/m) because it is more economical based on mass.

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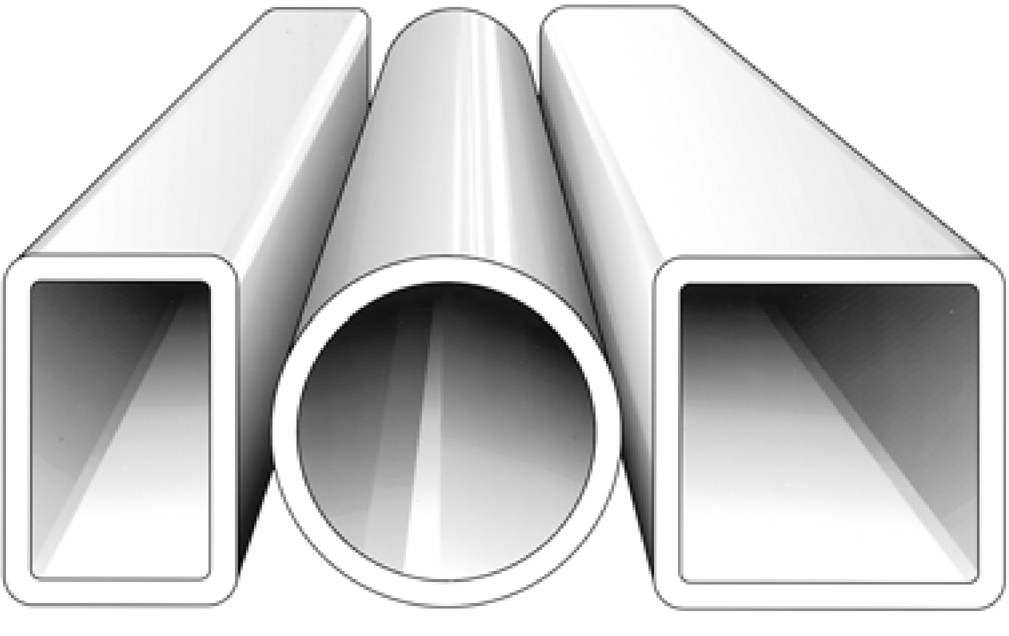
design capacity tables for structural steel



Volume 2: Hollow Sections

second edition

CHS - Grade C250/C350 (to AS 1163)

RHS - Grade C350/C450 (to AS 1163)

SHS - Grade C350/C450 (to AS 1163)

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

design capacity tables for structural steel

Volume 2: Hollow Sections

second edition

TABLE OF CONTENTS

PART 7 MEMBERS SUBJECT TO AXIAL TENSION

TABLES

TABLES 7-1 to 7-6

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