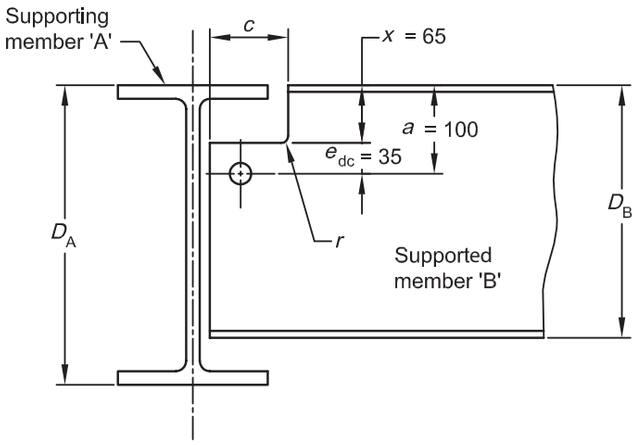


*FIGURE 9. SINGLE WEB COPE*

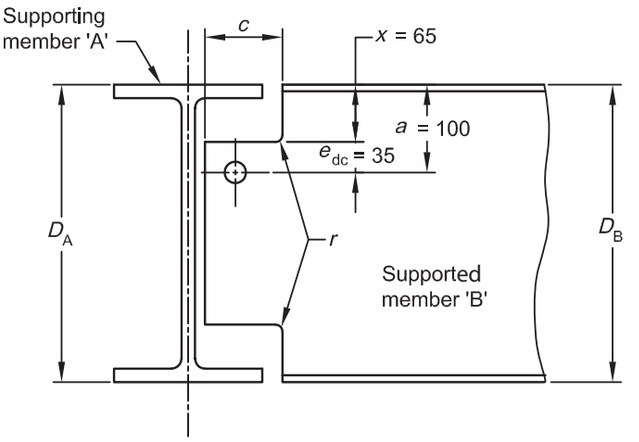


*FIGURE 10. DOUBLE WEB COPE*

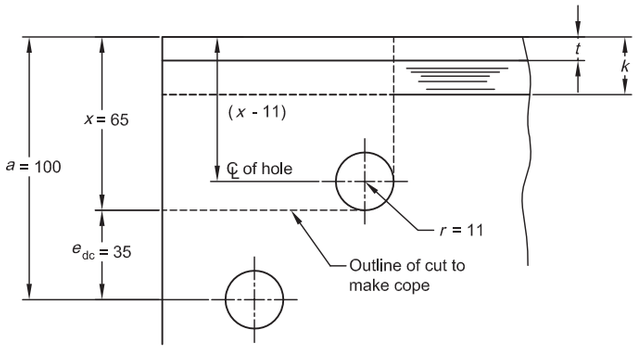


*FIGURE 11. HOLE AT RE-ENTRANT CORNER*

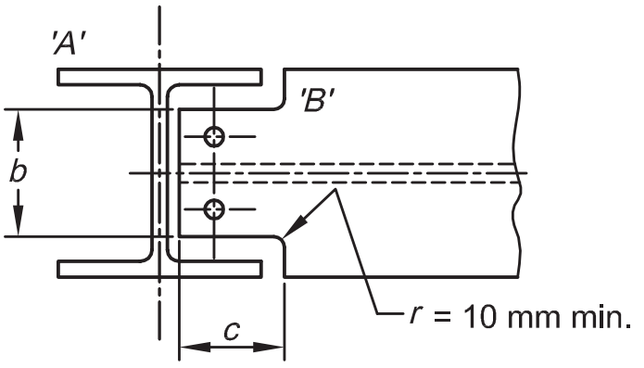


*FIGURE 12. FLANGE COPE DFC.c.b.*

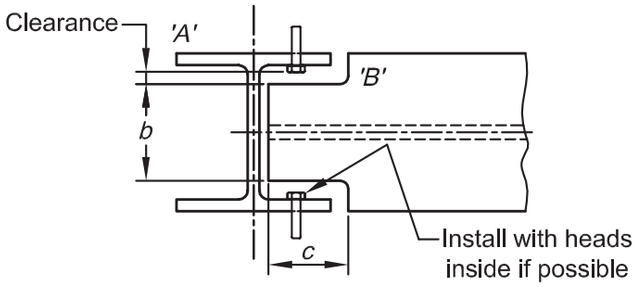


*FIGURE 13. BOLT CLEARANCE FOR FLANGE COPING*

**Flange Coping**

The most common type of flange cope is shown in Figure 12. A suitable designation is:

DFC.c.b.

where ‘c’ and ‘b’ are the dimensions shown in Figure 12. and DFC stands for double flange cope.

Standard double flange copes required for beam-column connections involving universal sections are given in Ref 4.

Detailing Note

Where member ‘A’ is either a 250UB or 250UC or smaller and flange bolts protrude within the profile of the member (see Figure 13.), care must be taken to ensure sufficient clearance is present to allow erection and tightening of flange connection bolts.

**5. DESIGN CAPACITY TABLES FOR STRUCTURAL STEEL, V3: SIMPLE CONNECTIONS, OPEN SECTIONS (SIMPLE CONNECTIONS DCTS, V3) – REF. 4.**

This publication is intended as a replacement for Reference 3. It contains no information on the design model used for an individual connection - leaving that to the individual design guide for that connection - but contains extracts of the typical details and design capacity tables from Design Guides 3, 4, and 5. Hence, it serves as a ready source of typical details and load capacity tables for those users not interested in the detailed treatment contained in each Design Guide.

**DESIGN BASIS**

Design Models

For the three connections included in Simple

extracted from the relevant design guide for inclusion:

- Description of connection
- Typical detailing of connection
- Recommended design model—summary of checks
- Design capacity tables for selected configurations

The basis for selecting the recommended design models are detailed in Sections 2.3 and 2.4 of Handbook 1 (Ref. 5). A detailed explanation of each recommended design model is contained in the relevant Design Guide (Refs. 8, 9, 10).

For each connection, the Summary of Checks will indicate:

- Which design checks have been considered in preparing the design capacity tables
- Which design checks must be done after selecting the required connection details from the design capacity tables. These checks primarily relate to checking local effects on the supporting member

The design capacity tables are presented so that, knowing the supported member size and design reaction R* on the connection, the required connection components, bolt numbers and weld sizes are simply read from the relevant table for the selected configuration.

The design capacity tables meet the requirements of AS 4100 by providing a rational and recognised design model for a range of common steel connections, the design model in each design guide reflecting engineering principles and known connection behaviour from experimental data. The emphasis in all publications is on practical design models whose assumptions are transparent to the user. The model in each design guide is related to current codes of Standards Australia in respect of member and fastener design and member and fastener mechanical properties which are presented in Handbook 1 (Ref. 7).

The philosophy of the publication is the same as that described in Reference 7, being as follows:

- Take into account overall connection behaviour and carry out an appropriate analysis in order to determine a realistic distribution of forces within the connection;
- Ensure that each component or fastener in each action path has sufficient capacity to transmit the applied action; and
- Recognise that this procedure can only give a connection where equilibrium is capable of being achieved but where compatibility is unlikely to be satisfied and therefore ensure that the connection elements are capable of ductile behaviour.

The design models contained within the design guides are considered to be applicable only to connections which are essentially statically loaded. Connections subject to dynamic loads, earthquake loads or fatigue applications may require additional considerations.

Minimum Design Actions on Connections

AS 4100 Clause 9.1.4 provides that connections shall be designed at the strength limit state for the greater of:

- The design action in the member; or
- The minimum design action effects expressed either as the value or the factor times the member design capacity for the minimum size of member required by the strength limit state, specified in items (i) to (vii) below:

(i) Connections in rigid construction - a bending moment of 0.5 times the member design moment capacity.

(ii) Connections to beams in simple construction - a shear force of 40kN or 0.15 x member design shear capacity, whichever is the lesser.

(iii) Connections at the ends of tension or compression members - a force of 0.3 times the member design capacity, except that for the threaded rod acting as a bracing member with turnbuckles the minimum tension force shall be equal to the member design capacity.

(iv) Splices in members subject to axial tension - a force of 0.3 times the member design capacity in tension.

(v) Splices in members subject to axial compression - for ends prepared for full contact in accordance with Clause 14.4.4.2 of AS 4100, it shall be permissible to carry compressive actions by bearing on contact surfaces. When members are prepared for full contact to bear at splices there shall be sufficient fasteners to hold all parts securely in place. The fasteners shall be sufficient to transmit a force of 0.15 times the member design capacity in axial compression.

In addition, splices located between points of effective

lateral support shall be designed for the design axial force (N*) plus a design bending moment not less than the design bending moment (M*) where:

$M^* = \frac{\delta N^* L_s}{1000}$

S = appropriate amplification factor $S_b$ or $s_S$ determined in accordance with Clause 4.4 of AS 4100

$L_S$ = Distance between points of effective lateral support

When members are not prepared for full contact the splice material and its fasteners shall be arranged to hold all parts in line and shall be designed to transmit a force of 0.3 times the member design capacity in axial compression.

(vi) Splices in flexural members - a bending moment of 0.3 times the member design capacity in bending. This provision shall not apply to splices designed to transmit shear force only.

A splice subjected to a shear force only shall be designed to transmit the design shear force together with any bending moment resulting from the eccentricity of the force with respect to the centroid of the connector group.

(vii) Splices in members subject to combined actions - a splice in a member subject to a combination of design axial tension or design axial compression and design bending moment shall satisfy (iv), (v)

and (vi) simultaneously.

The action to be designed for is the greater of the calculated design actions or the minimum specified in (i) to (vii) as appropriate.

The minimum is generally expressed as a factor times the design capacity (Ru) for the minimum size of member required by the strength limit state. Hence, if a member is increased in size above the minimum size for whatever reason (rationalisation of member sizes, slenderness or serviceability considerations) it is only necessary to use the design capacity of the minimum size required by the strength limit state for the purpose of determining the minimum design action. For example, for columns which may be subject to large compressive forces and only minor tensile forces, any splice has to be designed for both the specified value for the minimum member size required to resist the compression and for the specified value for the minimum member size required to resist the tension.

Where the connection design is carried out by the structural engineer, the minimum design actions are as shown in Tables 11 to 13 in Simple Connections DCTs V3. These minima are based on the above provisions from AS 4100.

Where connection design is left to the shop detailer/ fabricator, the following design actions should be shown in the contract documents.

| | |
|---|---|
| Simple construction | design reaction R* |
| Rigid construction and splices | design bending moment M* |
| | design shear force V* |
| | design axial force N* |

(Different combinations of these actions might need to be specified to encompass all likely load combinations.)

**Design Capacity Tables**

**Web Side Plate Connection**

The web side plate (WSP) connection consists of a length of plate or flat bar, fillet welded on both sides to a supporting member with bolts connecting the supported beam web to the web side plate with some typical examples shown in Fig.14.

The supported member may require the flange and/or the web to be coped in order to enable the connection to be effected, illustrated in Fig.14(b).

Features of the connection are:

— Welds are fillet welds to both sides of the component connecting it to the supporting member.

— The component is either a standard size flat bar or a plate cut to suit.

— The bolting category normally used is 8.8/S.

— The connection can be used with skew beams.