9 RECOMMENDED DESIGN MODEL—BEAM WELDS

9.1 DESIGN CHECK NO. 1—Design capacity of flange welds to beam

FLANGE WELDS

NOTE: Reference 4 recommends that full strength welds be provided for statically indeterminate frames, such welds being either full penetration butt welds or partial penetration butt welds or fillet welds sized such that the sum of the throat thicknesses equals the beam flange thickness.

Full penetration butt weld—No design check necessary provided weld complies with AS 4100 (Ref. 1) and AS 1554.1 (Ref. 8). SP weld category only.

Incomplete penetration butt weld or fillet weld

Design requirement —assuming that the flange weld transmits design forces N^*_{ftw} and N^*_{fcw} only (as calculated in accordance with Table 1 of Section 7)

$$\phi N_w > N^*_{ftw} \text{ and } N^*_{fcw}$$

Incomplete penetration butt weld: —ϕN_w as for fillet weld with leg length = (design throat thickness/0.707) where design throat thickness is defined in Clause 9.7.2.3 of AS 4100

Fillet weld: —$\phi N_w = 2L_w(\phi v_w)$

where: L_w =weld length across beam flange, usually b_{fb} in Figures 14 and 17

ϕv_w =design capacity of fillet weld per unit length, weld category SP

Fillet welds for economy should be sized to be single pass welds if possible—this generally means 6 mm or 8 mm fillet welds, although some welding procedures will allow 10 mm single pass fillet welds to be deposited. Check individual situations using 10 mm fillet welds with fabricators before specifying. Welds would normally be weld category SP.

For weld category SP,	ϕv_w	= 0.835 kN/mm	E41/W40X electrodes, 6 mm fillet
		= 0.978 kN/mm	E48/W50X electrodes, 6 mm fillet
		= 1.11 kN/mm	E41/W40X electrodes, 8 mm fillet
		= 1.30 kN/mm	E48/W50X electrodes, 8 mm fillet

NOTE: ϕv_w values are based on the design throat thickness of an equal leg fillet weld on a flange at right-angles to the support (as Figure 17). Where the flange is not at right-angles to its support (as in the inclined beam-to-column connection), the design throat thickness (dtt) of the fillet welds on either side of the flange will be different to that on a flange at right-angles to the support. One side will have a lesser dtt, the other side a greater dtt. For angles up to 20 degrees, the difference in the sum of the dtt's compared to the sum of the dtt's for two fillet welds as in Figure 17 is small enough to be ignored. For larger angles, the dtt's of each fillet weld need to be determined in order to evaluate ϕv_w for the fillet weld on each side. ϕN_w then becomes equal to ($L_{w1}\phi v_{w1} + L_{w2}\phi v_{w2}$), where the subscripts 1 and 2 refer to the fillet weld on the acute and obtuse sides respectively.

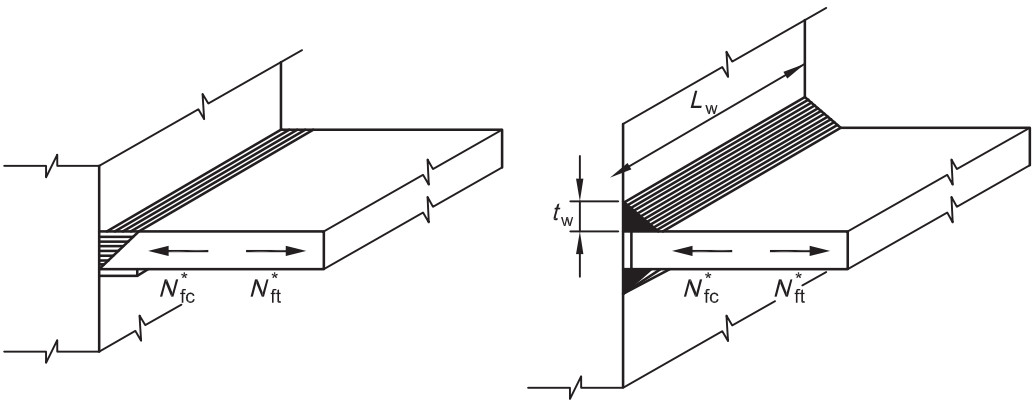

FIGURE 17 FLANGE WELD DESIGN ACTIONS

DESIGN GUIDE 11

Welded beam to column moment connections

by

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Design Guide 12: Bolted end plate beam to column moment connections
Design Guide 13: Splice connections

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