

CONTENTS

	<i>Page</i>		<i>Page</i>
List of figures	iv	9.5 DESIGN CHECK NO. 5—Design capacity of bolts in shear	26
List of tables	v	9.6 DESIGN CHECK NO. 6—Design capacity of end plate at tension flange	27
Preface	vi	9.7 DESIGN CHECK NO. 7—Design capacity of end plate in shear	31
About the author	vii	9.8 DESIGN CHECK NO. 8—Design requirements for stiffener to end plate	32
About the contributing author	vii	9.9 DESIGN CHECK NO. 9—Design capacity of stiffener welds to end plate	33
Acknowledgements	viii	10 DESIGN EXAMPLES	34
1 CONCEPT OF DESIGN GUIDES.....	1	10.1 Design example No. 1—Four bolt unstiffened end plate beam splice	34
1.1 Background	1	10.2 Design example No. 2—Four bolt stiffened apex connection	37
2 DESCRIPTION OF CONNECTION	2	11 REFERENCES.....	41
3 TYPICAL DETAILING OF CONNECTION..	4	12 DESIGN CAPACITY TABLES	42
4 DETAILING CONSIDERATIONS.....	6	12.1 Four bolt unstiffened end plate	43
5 AS 4100 REQUIREMENTS	8	12.2 Four bolt stiffened end plate	45
6 BASIS OF DESIGN MODEL.....	9	12.3 Six bolt unstiffened end plate	47
7 CALCULATION OF DESIGN ACTIONS ...	11	12.4 Eight bolt stiffened end plate	49
8 RECOMMENDED DESIGN MODEL— SUMMARY OF DESIGN CHECKS.....	17	APPENDICES	
9 RECOMMENDED DESIGN MODEL.....	20	A Thick and thin end plate behaviour	50
9.1 DESIGN CHECK NO. 1—Detailing requirements	20	B Limcon software	52
9.2 DESIGN CHECK NO. 2—Design capacity of welds to beam flanges	22	C ASI Design Guide 10 comment form	59
9.3 DESIGN CHECK NO. 3—Design capacity of welds to beam web	23		
9.4 DESIGN CHECK NO. 4—Design capacity of bolts at tension flange	25		



LIST OF FIGURES

	<i>Page</i>		<i>Page</i>
Figure 1	Bolted moment end plate beam splice connection 2	Figure 15	Notation used for 6 bolt (2/4) unstiffened end plate 19
Figure 2	Forms of extended bolted end plate connection 3	Figure 16	Notation used for 8 bolt (2/6) unstiffened end plate 19
Figure 3	Typical detailing for unstiffened variations of extended bolted moment end plate 4	Figure 17	Clearance dimensions a_f , a_e , s_{po}21
Figure 4	Typical detailing for stiffened variations of extended bolted moment end plate 5	Figure 18	End plate stiffener detailing21
Figure 5	Shims used between end plates 6	Figure 19	Flange weld design actions22
Figure 6	Clearance required for tensioning bolts 7	Figure 20	Web weld design actions24
Figure 7	Design actions at connection 11	Figure 21	Yield line pattern 4 bolt (2/2) unstiffened end plate27
Figure 8	Calculation of flange force due to bending moment and axial force—Horizontal beam 12	Figure 22	Yield line pattern 4 bolt (2/2) stiffened end plate28
Figure 9	Calculation of force components—Apex connection 13	Figure 23	Yield line pattern 6 bolt (2/4) unstiffened end plate29
Figure 10	Calculation of force components—Mitred knee connection 14	Figure 24	Yield line pattern 8 bolt (2/6) unstiffened end plate29
Figure 11	Alternative stress distributions in beam 15	Figure 25	Yield line pattern 8 bolt (4/4) stiffened end plate30
Figure 12	Notation used for 4 bolt (2/2) unstiffened end plate 18	Figure 26	Beam splice example no. 134
Figure 13	Notation used for 4 bolt (2/2) stiffened end plate 18	Figure 27	Stress distribution in beam of example no. 135
Figure 14	Notation used for 8 bolt (4/4) stiffened end plate 18	Figure 28	Apex end plate example no. 237
		Figure 29	Stress distribution in rafter for example no. 238
		Figure 30	Stiffener detailing example no. 240
		Figure 31	End plate behaviour idealisation50



LIST OF TABLES

		<i>Page</i>			<i>Page</i>
Table 1	Range of tested parameters (Ref. 6)	10	Table 9	Design moment capacity of connection ϕM_{conn} —Four bolt stiffened end plate M20 bolts 8.8/TB category threads excluded from shear plane—Universal beam sections > 200 mm deep	46
Table 2	Equations to be applied for different configurations and connection elements	16	Table 10	Design moment capacity of connection ϕM_{conn} —Six bolt unstiffened end plate M24 bolts 8.8/TB category threads excluded from shear plane—Welded beam/Universal beam sections > 450 mm deep	47
Table 3	Recommended limits on detailing parameters	20	Table 11	Design moment capacity of connection ϕM_{conn} —Six bolt unstiffened end plate M20 bolts 8.8/TB category threads excluded from shear plane—Universal beam sections > 350 mm deep	48
Table 4	Strength of plate to AS 3678 Grade 250	28	Table 12	Design moment capacity of connection ϕM_{conn} —Eight bolt stiffened end plate M24 bolts 8.8/TB category threads excluded from shear plane—Welded beam and universal beam sections > 520 mm deep	49
Table 5	Strength of flat bars to AS 3679.1 Grade 300	32			
Table 6	Design moment capacity of connection ϕM_{conn} —Four bolt unstiffened end plate M24 bolts 8.8/TB category threads excluded from shear plane—Welded beam/Universal beam sections > 300 mm deep	43			
Table 7	Design moment capacity of connection ϕM_{conn} —Four bolt unstiffened end plate M20 bolts 8.8/TB category threads excluded from shear plane—Universal beam sections > 200 mm deep	44			
Table 8	Design moment capacity of connection ϕM_{conn} —Four bolt stiffened end plate M24 bolts 8.8/TB category threads excluded from shear plane—Welded beam/Universal beam sections > 300 mm deep	45			

