CONTENTS

		Pa	age		Pag	је
List of figures				10.5	5 DESIGN CHECK NO. 14—Column	
List of tables				10.6		49
Preface				10.6	DESIGN CHECK NO. 15—Column web panel in shear	50
About the author				11 DEC	'	,0
About the contributing author Acknowledgements				11 RECOMMENDED DESIGN MODEL— COLUMNS WITH DOUBLER PLATES		51
		CEPT OF DESIGN GUIDES	ix 1		DESIGN CHECK NO. 16—Local	,
ı	1.1	Background	I		bending of column flange with	
2		CRIPTION OF CONNECTION	•		flange doubler plates at beam	
				44.6	3	51
3		CAL DETAILING OF CONNECTION		11.2	2 DESIGN CHECK NO. 17—Local	
4	DETA	ILING CONSIDERATIONS	9		yielding of column web with doubler plate(s) at beam tension flange	52
5	AS 41	100 REQUIREMENTS	12	11.3	,	,_
6	BASIS	S OF DESIGN MODEL	13		yielding of column web with doubler	
7	CALC	CULATION OF DESIGN ACTIONS	15		plate(s) at beam compression	
8		DMMENDED DESIGN MODEL—		44	9	54
O	SUMMARY OF DESIGN CHECKS		21	11.4	DESIGN CHECK NO. 19—Crippling of column web with doubler plate(s)	
9	RECO	DMMENDED DESIGN MODEL				55
•	9.1	DESIGN CHECK NO. 1—Detailing		11.5		,,
		requirements	26		Compression buckling of column	
	9.2	DESIGN CHECK NO. 2—Design			1 \ /	57
	0.0	capacity of flange welds to beam	28	11.6		
	9.3	DESIGN CHECK NO. 3—Design capacity of web welds to beam	29		web panel with doubler plate(s) in shear	59
	9.4	DESIGN CHECK NO. 4—Design	20	12 DE		,,
		capacity of bolts at tension flange	31		COMMENDED DESIGN MODEL— LUMNS WITH TRANSVERSE	
	9.5	DESIGN CHECK NO. 5—Design			FFENERS	31
		capacity of bolts in shear	33	12.1		-
	9.6	DESIGN CHECK NO. 6—Design capacity of end plate at			with transverse stiffeners at tension	
		tension flange	34	40.6	3	31
	9.7	DESIGN CHECK NO. 7—Design	0.	12.2	2 DESIGN CHECK NO. 23—Column with transverse stiffeners at	
		capacity of end plate in shear	38			35
	9.8	DESIGN CHECK NO. 8—Design		12.3	B DESIGN CHECK NO. 24—Column	,,
		requirements for stiffener to	20		with transverse diagonal shear	
	9.9	end plate DESIGN CHECK NO. 9—Design	39		stiffeners 6	37
	0.0	capacity of stiffener welds to		13 ADE	DITIONAL CONSIDERATIONS6	69
			40	14 ECC	ONOMICAL CONSIDERATIONS	70
10	RECC	OMMENDED DESIGN MODEL—		15 DES	SIGN EXAMPLE	71
		TIFFENED COLUMN	41	15.1	Design example—Four bolt	
	10.1	DESIGN CHECK NO. 10—Local			unstiffened end plate to column	
		bending of column flange at beam	44			71
	10.2	tension flange DESIGN CHECK NO. 11—Local	41	16 REF	FERENCES7	79
	10.2	yielding of column web at beam			SIGN CAPACITY TABLES8	30
		tension flange	44		•	31
	10.3	DESIGN CHECK NO. 12—Local			•	35 37
		yielding of column web at beam	45		·	3 <i>1</i> 39
	10.4	compression flange DESIGN CHECK NO. 13— Column web crippling at beam	45		•	,,
	10.4			APPEN A	NDICES Thick and thin end plate behaviour 9	90
		compression flange	47	В	• • • • • • • • • • • • • • • • • • •	90 92
		-		Č	ASI Design Guide 12	_
						97



LIST OF FIGURES

	Page		Page
Figure 1	Bolted end plate to column moment connections		Clearance dimensions a_f and s_{po} 27
T: 0		•	End plate stiffener detailing27
Figure 2	Forms of extended end plate connection	Figure 26	Flange weld design actions28
Figure 3	Possible configurations of the	=	Web weld design actions30
r igure 3	bolted moment end plate beam to column connection	Figure 28	Yield line pattern 4 bolt (2/2) unstiffened end plate34
Figure 4A	Typical detailing for 4 bolt unstiffened bolted end plate to	Figure 29	Yield line pattern 4 bolt (2/2) stiffened end plate35
Figure 4R	column connection	Figure 30	Yield line pattern 6 bolt (2/4) unstiffened end plate36
r iguro 12	rafter to column bolted end plate connection	Figure 31	Yield line pattern 8 bolt (2/6) unstiffened end plate36
Figure 5	Removal of column flange with thicker plate inserted	Figure 32	Yield line pattern 8 bolt (4/4) stiffened end plate37
Figure 6	Column doubler plate types 7	Figure 33	Yield line pattern 4 bolt (2/2)
Figure 7	Column transverse stiffener types 8		end plate to unstiffened column
Figure 8	Shims used between end plate and column flange	Figure 34	flange
Figure 9	Stiffener detailing 10		end plate to unstiffened column flange42
Figure 10	Clearance required for tensioning bolts 11	Figure 35	Yield line pattern 2/6(8) bolt end plate to unstiffened column
Figure 11	Design actions on beam at		flange42
Figure 12	column	Figure 36	Yield line pattern 4/4(8) bolt end plate to unstiffened column flange43
Figure 13	force—horizontal beam 16 Calculation of force components	Figure 37	Flange removed with new plate inserted43
J	where beam is inclined to column in upwards direction	Figure 38	Application of c_t term—Column web yielding at beam tension
Figure 14	Calculation of force components		flange44
	where beam is inclined to column in downwards direction	Figure 39	Application of c_t term—Column web yielding at beam
Figure 15	Alternative stress distributions		compression flange45
Figure 16	Notation used for 4 bolt (2/2)	Figure 40	Angle of dispersion used in DESIGN CHECK NO. 1246
Figure 17	unstiffened end plate	Figure 41	Dispersion arrangement used in DESIGN CHECK NO. 1446
	stiffened end plate 22	Figure 42	Case I arrangement47
Figure 18	Notation used for 8 bolt (4/4) stiffened end plate 22	ŭ	Case II and case III arrangement47 Examples of web panel shear
Figure 19	Notation used for 6 bolt (2/4) unstiffened end plate		conditions50
Figure 20	Notation used for 8 bolt (2/6) unstiffened end plate	-	Column flange doubler plate details at beam tension flange51
Figure 21	Summary of design check locations on column	•	Column web doubler plate details at beam tension flange53
Figure 22	Column and beam dimensions	Figure 47	Column web doubler plate details at beam compression flange53
Figure 23	used in design model	Figure 48	Web doubler plate—Welds to column flange53
	in design model25	Figure 49	Case I arrangement55





	Page		Page
•	Case II and case III arrangement . 55 Column web doubler plate details	Figure 60	Diagonal shear stiffener arrangements68
_	at beam compression flange 56 Column web doubler plate details at beam compression flange 58	Figure 61	Transverse stiffener options when beam flanges are offset due to unequal beam depths69
Figure 53	Column web doubler plate details for shear	Figure 62	Bolted end plate to column example71
Figure 54	Tension stiffener arrangement 62	Figure 63	Stress distribution in beam due to $M^* = 210 \text{ kNm}72$
Figure 55	Yield line pattern 4 bolt (2/2) end plate to stiffened column flange 63	Figure 64	Alternative solution no. 1—
Figure 56	Yield line pattern 2/4 (6) bolt unstiffened end plate to stiffened column flange 63		Replacement flange plate inserted into column at beam tension flange plus web doubler plate77
Figure 57	ure 57 Yield line pattern 2/6 (8) bolt unstiffened end plate to stiffened column flange	Figure 65	Alternative solution no. 2—Flange doubler plates at beam tension flange plus web doubler plate77
Figure 58	Yield line pattern 4/4 (8) bolt stiffened end plate to stiffened column flange	Figure 66	Alternative solution no. 3—Flange doubler plates and transverse stiffeners at beam tension flange78
Figure 59	Compression stiffener details 65	Figure 67	End plate behaviour idealisation90



