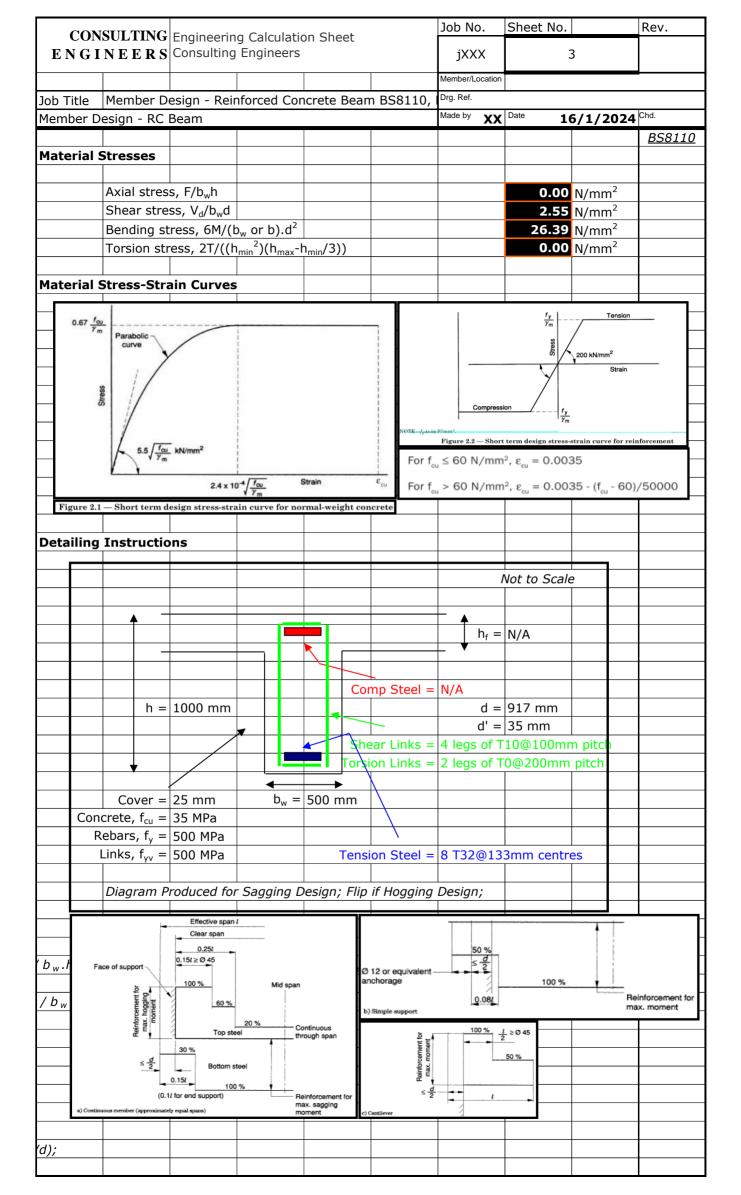
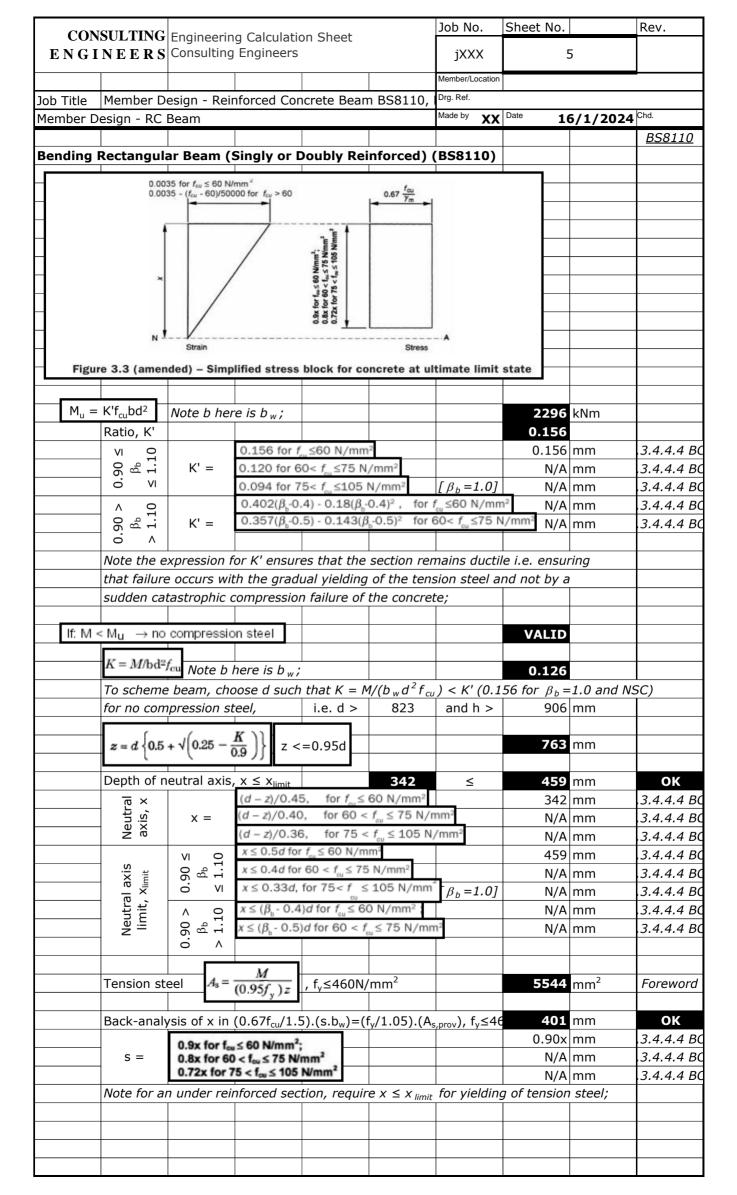
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S/S S/S Cont. Cont. Cont. Cont. Cont. Cant. Cant. Overall de Depth of f Width (red Cover to a Add cover Add cover Effective o Effective o Effective o Effective o Compress Compress Compress	Sag Sag Sag Sag Hog Hog Hog Hog Hog Stangular) of the tension of tension of the t	Precast Insitu Precast Insitu Precast Insitu Precast Insitu Precast Insitu Precast Insitu Undes insitu Under insitu Undes insitu Under insitu Undes	Rect-s/s T/L-s/s Rect-cont. T/L-cont. Rect-cont. Rect-cont. Rect-cant. Rect-cant. Rect-cant. I (flanged) I (usually 3 I (Defl'n Yes Yes Yes Yes N/A N/A Yes Yes excludes pro longitudina bw 5 (C35) or se steel layer exer - MAX(ϕ_{li}) cover + MAX	Support S/S S/S Cont. Cont. Cont. Cant. Cant. I shear calc Cant. Cant. (C40) in cer(s)), cover cer(s),	Effect Sag Sag Sag Sag Hog Hog Hog Hog cs) hternal; 40 er _{add,t} , cover _{add,t} over _{add,t}) -	Jpstand Slat Preca Insit Preca Insit Preca Insit Insit	0	Rect-s/s Rect-cont. Rect-cont. Rect-cont. T/L-cont. Rect-cant. T/L-cant. mm m	Yes Yes Yes Yes N/A N/A Yes Yes
S/S S/S Cont. Cont. Cont. Cont. Cont. Cont. Cant. Cant. Cant. Overall de Depth of f Width (rec Cover to a Add cover Effective of Effective of Effective of Congitud Tension st Tension st Compress Compress Compress	Sag Sag Sag Sag Hog Hog Hog Hog Gepth, h (incleating to tension to compression to compression to tension to te	Precast Insitu Undes insitu Unde	Type Rect-s/s T/L-s/s Rect-cont. T/L-cont. Rect-cont. Rect-cont. Rect-cant. Rect-cant. I (langed) I (usually 3 to transvers (due to transvers (due to transvers I (all to transvers I (a	Defl'n Yes Yes Yes Yes N/A N/A Yes Yes longitudina bw 5 (C35) or se steel layer se steel layer cover + MAX $ a ^{2}/4$ $ a _{c} (where a)$ $ a _{c} (m_{c}.\pi.\phi_{c}^{2}/4)$	Support S/S S/S Cont. Cont. Cont. Cant. Cant. I shear calc Cant. Cant. (C40) in cer(s)), cover cer(s),	Effect Sag Sag Sag Sag Hog Hog Hog Hog cs) hternal; 40 er _{add,t} , cover _{add,t} over _{add,t}) -	Jpstand Slat Preca Insit Preca Insit Preca Insit Insit	0	Rect-s/s Rect-s/s Rect-cont. Rect-cont. T/L-cont. Rect-cant. T/L-cant. mm m	Yes Yes Yes Yes N/A N/A Yes Yes
S/S S/S Cont. Cont. Cont. Cont. Cont. Cont. Cant. Cant. Cant. Overall de Depth of f Width (red Add cover Add cover Effective of Effective of Effective of Compress Compress Compress Number o	Sag Sag Sag Sag Hog Hog Hog Hog Hog Sal Hog Hog Hog Hog Sag Hog Hog Hog Hog Sag Hog Hog Hog Hog Hog Hog Hog Sag Hog Hog Hog Hog Hog Hog Hog Hog Hog Ho	Precast Insitu udes insitu ending flan r web widt ment, cove steel (due to sion steel) sion steel, mpression steel ement dian ement num ovided, A _{s,p} inforcement inforcement ea provided ension steel ension steel ension steel	Type Rect-s/s T/L-s/s Rect-cont. T/L-cont. Rect-cont. Rect-cont. Rect-cant. Rect-cant. slab thks; ged beam, h (flanged) r (usually 3 to transvers (due to transvers deel, d' = cont continue of the continu	Defl'n Yes Yes Yes Yes N/A N/A Yes Yes longitudina bw So (C35) or se steel layer reser - MAX(\phi_1) cover + MAX	Support S/S S/S Cont. Cont. Cont. Cant. Cant. I shear calc Cant. Cant. (C40) in cer(s)), cover cer(s),	Effect Sag Sag Sag Sag Hog Hog Hog Hog cs) hternal; 40 er _{add,t} , cover _{add,t} over _{add,t}) -	Jpstand Slat Preca Insit Preca Insit Preca Insit Insit	0	Rect-s/s Rect-cont. Rect-cont. Rect-cont. T/L-cont. Rect-cant. T/L-cant. mm m	Yes Yes Yes Yes N/A N/A Yes Yes OK
S/S S/S Cont. Cont	Effect Sag Sag Sag Sag Hog Hog Hog Hog Hog Septh, h (inclination of the compression of th	Precast Insitu Precast Insitu Insitu Insitu Insitu Insitu Insitu Insitu Insitu Insit	Type Rect-s/s T/L-s/s Rect-cont. Rect-cont. Rect-cont. Rect-cant. Rect-cant. Slab thks; ged beam, h (flanged) r (usually 3 to transvers (due to tr	Defl'n Yes Yes Yes Yes N/A N/A Yes Yes excludes pro longitudina bw 55 (C35) or 3 se steel laye reser - MAX(ϕ_{li}) cover + MAX ϕ_{li}	Support S/S S/S Cont. Cont. Cont. Cant. Cant. I shear calc Cant. Cant. (C40) in cer(s)), cover cer(s),	Effect Sag Sag Sag Sag Hog Hog Hog Hog cs) hternal; 40 er _{add,t} , cover _{add,t} over _{add,t}) -	Jpstand Slat Preca Insit Preca Insit Preca Insit Insit	0000 2500 0000 2500 0000 2500 0000 2500 0000 2500 0000 2500 0000 2500 0000 2500 0000 0000 0000 0000 0000 0000 0000 0000	Rect-s/s Rect-s/s Rect-cont. Rect-cont. T/L-cont. Rect-cant. T/L-cant. mm m	Yes Yes Yes Yes N/A N/A Yes Yes
S/S S/S Cont. Cont	Sag Sag Sag Hog Hog Hog Hog Gepth, h (incleating to tension to compressed to tension to compressed the tension to tension tension steel reinforce tension steel area for layers of the	r web width ment, cover steel (due to sion steel (sion steel (moreover the sion steel (moreover	Type Rect-s/s T/L-s/s Rect-cont. Rect-cont. Rect-cont. Rect-cant. Rect-cant. Rect-cant. I (langed) I (usually 3 I (usually 4 I (u	Defl'n Yes Yes Yes Yes N/A N/A Yes Yes excludes pro longitudina bw 15 (C35) or 15 se steel layer reverse steel ever - MAX(bill sover + MAX cover + MAX cover + MAX anc nc.m.bc²/4 25mm)) ers,comp	Support S/S S/S Cont. Cont. Cont. Cant. Cant. Cant. I shear calc 30 (C40) ir er(s)), cove el layer(s)) ink, $\phi_{link,t}$, cove ((ϕ_{link} , $\phi_{link,t}$) applicable)	Effect Sag Sag Sag Sag Hog Hog Hog Hog cs) hternal; 40 er _{add,t} , cover _{add,t} over _{add,t}) -	Jpstand Slat Preca Insit Preca Insit Preca Insit Insit	0	Rect-s/s Rect-s/s Rect-cont. Rect-cont. Rect-cont. T/L-cont. mm m	Yes Yes Yes Yes N/A N/A Yes Yes OK
S/S S/S Cont. Cont	Effect Sag Sag Sag Sag Hog Hog Hog Hog Hog Septh, h (inclination of the compression of th	r web width ment, cover steel (due to sion steel (sion steel (moreover the sion steel (moreover	Type Rect-s/s T/L-s/s Rect-cont. Rect-cont. Rect-cont. Rect-cant. Rect-cant. Rect-cant. I (langed) I (usually 3 I (usually 4 I (u	Defl'n Yes Yes Yes Yes N/A N/A Yes Yes excludes pro longitudina bw 15 (C35) or 15 se steel layer reverse steel ever - MAX(bill sover + MAX cover + MAX cover + MAX anc nc.m.bc²/4 25mm)) ers,comp	Support S/S S/S Cont. Cont. Cont. Cant. Cant. Cant. I shear calc 30 (C40) ir er(s)), cove el layer(s)) ink, $\phi_{link,t}$, cove ((ϕ_{link} , $\phi_{link,t}$) applicable)	Effect Sag Sag Sag Sag Hog Hog Hog Hog cs) hternal; 40 er _{add,t} , cover _{add,t} over _{add,t}) -	Jpstand Slat Preca Insit Preca Insit Preca Insit Insit	0	Rect-s/s Rect-s/s Rect-cont. Rect-cont. T/L-cont. Rect-cant. T/L-cant. mm m	Yes Yes Yes Yes N/A N/A Yes Yes OK

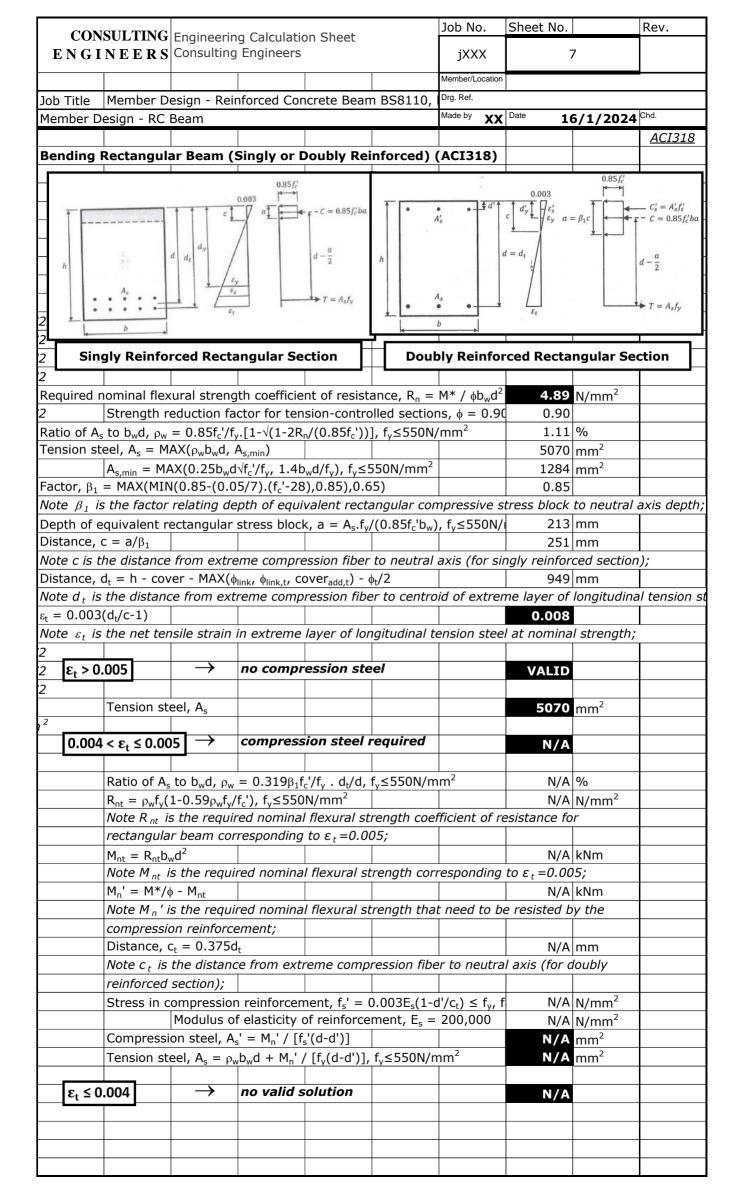
CON	SULTING Engineerin	a Calculatio	on Choot		Job No.	Sheet No.		Rev.
	NEERS Consulting		on Sneet		jXXX		2	
					Member/Location			
ob Title	Member Design - Rei	oforcod Cor	ocroto Boan	n BCQ110	Drg. Ref.			
	esign - RC Beam	norced Cor	iciete beaii	1 030110,	· ·	Date 1	6/1/2024	1 Chd.
ACTIDET D	csign Re Beam					1	0,1,202	BS8110
Shear Re	inforcement Details							<u> </u>
51 1: 1								
	diameter, φ _{link} f shear links in a cross	section, i.e	e. number o	f leas, n _{iss}		10	mm	
	ded by all shear links			- 3	. ² /4.n	314	mm ²	
	ear links, S		, section, rigg,	DIOV 7014IIIK	, ····leg		mm	
forsion R	Reinforcement Detail	ls 						
orsion lin	k diameter, $\phi_{link,t}$					None 🔻	mm	
	f torsion links in a cros	s section, i	.e. number	of legs, n _{le}	$r_{a,t} = 2$	2		
	ded by all torsion links				31 -		mm ²	
	rsion links, S _t		, ,	ν,ριον,ε · · · ·	link,c / icg		mm	
	further longitudinal ste	eel A mus	0	0	0		mm²	
		3,0						
Utilisatio	n Summary							
	Item				UT	Remark	<u> </u>	
	RB tens steel		86%	<i>7</i> 9%	86%	OK		
	RB comp steel		N/A	N/A	N/A	N/A		
	RB % min tens reinf.		10%	20%	20%	OK		
	RB % min comp reinf	 			N/A	N/A		
	RB % max tens and o				32%	OK		
	FB tens steel				N/A	N/A		
	FB comp steel				N/A	N/A		
	FB % min tens reinf.				N/A	N/A		
	FB % min comp reinf				N/A	N/A		
	FB % max tens and c				N/A	N/A		
	RB shear ultimate str		<i>57</i> %	77%	77%	OK		
	RB shear design capa		42%	96%	96%	OK		
	RB torsion ultimate st		0%	0%	0%	OK		
	RB torsion design cap		0%	0%	0%	OK		
	RB shear and torsion		<i>57</i> %	77%	77%	OK		
	RB or FB deflection re				49%	OK		
	Total utilisation red	•			96%	ОК		
	Total utilisation red			ludina del		ОК		
	Total utilisation fla				N/A	N/A		
	Detailing requireme	_				OK		
	Note RB = rectangula		B = flanged	beam:				
	% Tension reinforcem					1.29	%	
	% Compression reinfo	-)		N/A	%	
	% Tension reinforcem					N/A	%	
	% Compression reinfo					N/A	%	
	Estimated steel reinfo				n ³)	158	kg/m ³	1
	7850 . $[(A_{s,prov} + A_{s,prov})]$							+anc.)/S.
	Estimated steel reinfo				_		kg/m^3	IStruct
	11000 . $[(A_{s,prov} + A_{s,p})]$						٠,	_1
	[Note that steel quan						,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	
		concrete, c		units/m ³	steel, s		units/ton	_L ne
	Reinforced concrete r					667	units/torn	1
	TREMINISTECT CONCIECTED		[c+(csi	. rebai que	211c).3].(D _W	-007	umics/III	
	Ductility of failure me	chanicm	Consider ▼	Section	Under Re	inforced		ОК
	<i>'</i>		Consider ▼	Section	onder Re			
		12 MUZIED	I .			101%		NOT O
	Rectangular beam cra		lango) ===+	rainta ara-	ing !	20.0		
	Max LTB stability (con Note s/s / cont L _{LTB} =	mpression f				30.0	m	



CON	CIII TIMO	Fn =! :	a Calant II	an Chart		Job No.	Sheet I	No.	Rev.
		Engineerin		on Sheet		:\\\\		1	
ENGI	NEERS	Consulting	∟ugineers			jXXX		4	
						Member/Location	ו		
Job Title	Member D	esign - Reir	nforced Cor	crete Bean	n BS8110.	Drg. Ref.	1		
	esign - RC	_			7	Made by XX	Date	16/1/20	24 Chd.
									BS8110
Additiona	l Lonaitud	linal Shea	r Rectangi	ular or Fla	nged Bear	n Utilisati	on Sum	marv	500110
710001010									
Lonaitudir	ıal shear be	tween web	and flange		Consider	only if application	able	▼	
_	ıal shear wi		and nange			only if application		V	
		eration, Δx (⊥ ′snan/2 s/s	snan/4 co		, ,,	2500		
		udinal shea	· ·	, 55411, 1 60	Tie, Spair co		icable		
тррпсавш			design			рр.	leas.e		
	Longitudi	⊥ inal Shear	Retween	Web and F	lange (FC	`2\			
						,	32%		OK
	_	al shear str al shear str				rcomont	3129		NOT OK
	+ -						94%		OK
		design trans				_	940/	0	UK
		inal Shear) 	CAO		-01/-
		al shear for				nath	64%		OK
		nominal trai					38% 94%		OK
	Longitua	inal Shear	Between	web and F	lange Mai	ndatory C	94%	0	ОК
							-		
		inal Shear		eb (EC2)					
	-	al shear str					49%	0	OK
		inal Shear				<u> </u>			
	+	al shear str							NOT OK
ļ	1 1	nominal ver					24%		ОК
	+ · · · · · · · · · · · · · · · · · · ·	design verti					94%	0	ОК
		inal Shear							
	Longitudin	al shear for	rce limit pe	r unit lengtl	h		79%	o	ОК
	1	nominal ver					24%		ОК
	Longitudi	inal Shear	Within W	eb Mandat	ory Criter	ia	94%	o	ОК
Additiona	al Deep Be	am Rectar	ngular Bea	m Utilisat	ion Summ	ary			
Deep bear	n design				Consider	only if application	able	▼	
Span to de	epth ratio, s	span / h					10.0	0	ОК
Applicabili	ty of deep l	beam desig	n			Not Ap	plicable	е	
Concrete t	уре					Norma	l weight	▼	
		diameter, ø	link.h				None	▼ mm	
		shear links		ntal section	n, i.e. numl	ber of legs,	<u> </u>		
		ear links, S					0	mm	
		dge of load	• •	support, a₁	O DL @ mid	0.625h ▼	N/A	_	
	equirement			, -1			N/A		
	-1								
	Reynolds								
	+	eel (deep b	leam)				N/A		N/A
		eel zone de		Sag s/s sag	cont hog	cant)	N/A		
		eel zone de				Jane	N/A		
		breadth for					N/F		N/A
		mate force	• •	•			N/A		N/A
	Shear des	ign capacity	y (ueep bea	IIII <i>)</i>			N/A	\	N/A
	CTDT 4 C	.:4- 2					1		
	CIRIA Gu								
		Itimate mor		beam)			N/A		N/A
		eel (deep b		<u>.</u>			N/A		N/A
		eel zone de					N/A		
		eel zone de				N/A	N/A	mm	
	Tension st	eel zone de	epth, T _{zone} (hog cont) lo	ower band	N/A	N/A	mm	
	Shear ultir	mate force	(deep bean	າ)			N/A	\	N/A
	Shear des	ign capacity	(deep bea	ım)			N/A		N/A



						T	T		1_
CON	SULTING	Engineerin	a Calculatio	on Sheet		Job No.	Sheet No.		Rev.
		Consulting				jXXX		6	
						Member/Location	1		
		esign - Reii	nforced Con	icrete Bean	n BS8110,	Drg. Ref.	1-		T
Member D	esign - RC	Beam				Made by XX	Date 1	6/1/2024	Chd.
									<u>BS8110</u>
If: M >	Mu → cor	mpression st	teel required				N/A		
	To scheme	e beam, wit	h compress	sion steel, c	hoose d su	ich that K	$= M/(b_w d^2)$	f_{cu}) < 10/1	f _{cu}
		cessive cor		i.e. d >	608	and h >		mm	
	$z = d \left\{ 0.5 \right\}$	5 + √(0.25 -	$\left\{\frac{K'}{2}\right\}$				N/A	mm	
		(0.9 /)				K//A		
	Denth of n	ı neutral axis,	Y < Y ₁ , .,		N/A	≤	N/A	mm	N/A
		leatrar axis,	(d-7)/0.45	5 for f < 1				mm	.3.4.4.4 E
	Neutral axis, x	x =	(d-z)/0.40	for $f_{\infty} \le 0$, for $60 < 0$	f < 75 N/i	mm²	+	!	_
	leu axis				C - 405 N		-	mm	3.4.4.4 E
	2 10	$0.90 > 0.90 \le \beta_{\rm b}$ $0.90 \le \beta_{\rm b}$ $0.1.10 \le 1.10$	v < 0 Edfor	f < 60 N/~	' _{GU} ≃ ±05 N	/ mint	+	mm	3.4.4.4 E
	S	10	x ≤ 0.30 for	1 ₀₀ ≥ 00 N/M	M /mana2			mm	.3.4.4.4 E
	Neutral axis limit, X _{limit}	.9C მგ	x ≤ 0.4d for	00 < 1 _{cu} ≤ 15	105 N (***	-		mm	.3.4.4.4 E
	<u>is</u> ×	0 VI	$x \le 0.33d$,	TOT /5< f ≤	105 N/mm	$\beta_b = 1.0$		mm	.3.4.4.4 E
	nit ut	^ 01	$x \le (\beta_b - 0.4)$)d for f _{eu} ≤ 60) N/mm² ;	L	N/A	mm	.3.4.4.4 E
?	_ Re ⊨	90 β _b 1	$x \le (\beta_b - 0.5)$)d for 60 < f	ມ≤ 75 N/mr	n²	N/A	mm	.3.4.4.4 E
2		۸ .							
2									
)	Compressi	ion steel	$A_r' = \frac{M}{2}$	$\frac{K' f_{cu}b d^2}{5 f_y (d-d')}$, f _v ≤460N	l/mm ²	N/A	mm ²	Foreword
)			0.93	of _y (a-a)	, ,				
			. N	Ли , , ,					
	Tension st	reel	$A_s = \frac{0.95 \text{ f}}{0.95 \text{ f}}$	$\frac{A_u}{y - Z} + A_s'$	f <460	N/mm ²	N/A	mm ²	Foreword
			_				1.722	111111	7 07 07 07 0
	16.45 1 _	$\left(\frac{f_y}{735}\right)x$, use 7	$\log \left(1 - \frac{d'}{d}\right)$	in lieu of 0.05	F - 10	ON /no no ²	N/A		Foreword
	1114 - 11-	735 x, use	00(1-x)	m neu or 0.9.	y, 1, 1 _y ≤40		IN/A		roreword
		1					4		01.70
	Back-analy	ysis of x in	$(0.6/f_{cu}/1.5)$	$(s.b_w)+(t)$	_y /1.05).(A	$_{s,prov}$ ')=(f_{y} /			N/A
	_	0.9x for for	≤ 60 N/mm ² ;				<u> </u>	mm	.3.4.4.4 E
	s =	0.8x for 60	< fou ≤ 75 N/	mm²			<u> </u>	mm	.3.4.4.4 E
			5 < f _{ou} ≤ 105					mm	.3.4.4.4 E
	Note for a	n under rei	nforced sec	tion, requir	$e \ \varepsilon_{st} = \varepsilon_{cc} ($	$(d-x)/x \geq x$	$arepsilon_{y}$ for yieldi	ng of tensi	ion steel
	and $\varepsilon_{sc} = \epsilon$	$\varepsilon_{cc}(x-d')/x$	$\geq \varepsilon_y$ for yi	elding of co	mpression	steel, whe	ere $\varepsilon_{cc} = 0.0$	035 for f _{cu}	≤ 60N/m
	and $\varepsilon_{cc} = 0$	0.0035 –(f _{ct}	, –60)/5000	00 for f_{cu} >	60N/mm ²	2 and $\varepsilon_{y} = 0$	$(f_y/1.05)/E$	s,	
ension st	eel area pr	ovided					6434	mm ²	
		ovided utilis	sation				86%		ОК
		ea provided						mm ²	
		ea provided					N/A		N/A
	sion reinfor		. acmount				1.29	0/0	TR49
			- 0 0024h	h G250+ >	- MAY (0	0012 0 00			
		rcement uti		y 11 G250; >	- MAX (U.	0013, 0.00	013(f _{cu} /40) 10 %		
				126 61					ОК
		einforceme					N/A	70	
	•	einforceme					N/A	0.4	N/A
		rcement (<)			1.29		
		rcement ut					32%		ОК
		reinforceme					N/A	%	
6 Max co	mpression i	reinforceme	ent utilisatio	n			N/A		N/A
% Max ter	nsion or cor	mpression r	einforceme	nt utilisatio	n		32%		ОК
1									
)									
									1
									+
									1
									1



CON	SULTING	Engineerin	n Calculatio	on Sheet		Job No.	Sheet No.		Rev.
ENGI	NEERS	Consulting	Engineers	JII JIIEEL		jXXX	8	3	
21, 01			J 22.0	1	1		`	-	
				_		Member/Location			
ob Title			nforced Cor	crete Bean	n BS8110,	Drg. Ref. Made by	Data		Chd
dember D	esign - RC	Beam				Made by XX	10 1 0	6/1/2024	
									<u>ACI318</u>
Tension st	eel area pro	 ovided					6434	mm ²	
	eel area pro		sation				79%		ОК
	ion steel are							mm ²	
	ion steel are						N/A		N/A
% Min ten	sion reinfor	cement					1.29		cl.9.6.1
% Min ten	sion reinfor	cement (>	= MAX (0.2	5b _w d √f _c '/	f_y , 1.4 b_w	$d/f_y))$			
	sion reinfor						20%		ОК
									1
									<u> </u>
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el;									
C1,									
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CON	ISULTING	Engineering	Calculation She	Δt	Job No.	Sheet No.		Rev.
		Consulting		Ct	jXXX		9	
					Member/Location	n		
ob Title	Member D	esign - Rein	forced Concrete	Beam BS8110,	Drg. Ref.			
	Design - RC			•	Made by XX	Date 1	6/1/202	24 Chd.
								<u>BS8110</u>
ending	Flanged Be	eam (Singl	y or Doubly Rei	nforced)				
	<u> </u>	Simply	Continuous	Cantilever	For c	antilevers, ı	width sho	own
l	s	upported			is app	plicable for	downstar	
T-Be		w + L / 5 v + L / 10	b _w + L / 7.14 b _w + L / 14.29	b _w		ns as rect- s pstand bear		
	(i) actual flar		(ii) beam spacing			ons will app		
								<u> </u>
pan						N/A	m	
•	flange, h _f					<u> </u>	mm	N/A
			nction (span, sec	-	, beam spa	N/A	mm	
		m, deflectio	n calcs flanged b	eam)		21.70		
$C = M/bd^2$		((0, 0),0.5]	0.054			N/A		
		K/0.9) ^{0.5}] <:	= 0.95d k, s = 2.(d-z) (a	nnlicable for all	f)	-	mm mm	
cpui oi (2011101 (233101	. 30 033 0100	$\frac{1}{1}$ $\frac{1}$		·cu/	IN/A	111111	
compres	sion Stress	Block in F	lange (s <= h _f)		N/A		
M _u =	: K'f _{cu} bd ²					N/A	kNm	
•	Ratio, K'					N/A		
	N 01		0.156 for f _{eu} ≤60 N	l/mm²		N/A	mm	.3.4.4.4
	0.90 ≤ β _b ≤ 1.10	K' =	0.120 for 60< f _{ou} ≤				mm	.3.4.4.4
			0.094 for 75< f _{ou} ≤		$[\beta_b = 1.0]$		mm	.3.4.4.4 I
	0.90 > β _b > 1.10	ļ ļ	$0.402(\beta_b-0.4) - 0.1$				mm	.3.4.4.4
].90 β.1.	K' =	0.357(β _b -0.5) - 0.1	.43(p _b -0.5)- for	60< I _{cu} ≤75 I	N/mm ^a N/A	mm	3.4.4.4 E
						., .		
		•	or K' ensures that					
			h the gradual yie ompression failur			ana not by a	<i>i</i> 	
	Suuden Ca	Lastrophic Co	Jiripi ession Tallul	e or the concre				
If: M	< Mu → no	compression	steel			N/A		
11. 141			1 01001			IN/A		
	$K = M/bd^2$	$f_{\rm cu}$				N/A		
	To scheme	beam, cho	ose d such that k	$C = M/(bd^2 f_{cu})$	< K' (0.15			SC)
		pression ste			and h >		mm	
	,	/ 1	z 1)	7				
	$z = d \left\{ 0.5 \right\}$	$+\sqrt{0.25-\frac{1}{0}}$	$\left\{\frac{K}{9}\right\}$ $z <= 0.95$	d		N/A	mm	
		eutral axis,	x ≤ x _{limit}	N/A	≤	N/A		N/A
	Neutral axis, x		(d-z)/0.45, for $(d-z)/0.40$, for	1 ≤ 60 N/mm ²	mm²	-	mm	3.4.4.4
	leu axis						mm	3.4.4.4
		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	$(d-z)/0.36$, for $x \le 0.5d$ for $f_{c_a} \le 60$ $x \le 0.4d$ for $60 < f_c$ $x \le 0.33d$, for $75 < c$ $x \le (\beta_b - 0.4)d$ for f_c $x \le (\beta_b - 0.5)d$ for 60	N/mm ²	,		mm mm	.3.4.4.4
	<u> 3</u>	3 _b 1C	$x \le 0.4d \text{ for } 60 < f$	≤ 75 N/mm²		-	mm	.3.4.4.4
	Neutral axis Iimit, X _{limit}	0.0 7 1	$x \le 0.33d$, for 75-	f ≤ 105 N/mm	$\beta_b = 1.0$		mm	3.4.4.4
	tra lit,	۸ ٥	$x \le (\beta - 0.4)d$ for f	≤ 60 N/mm² ;			mm	3.4.4.4
	lin de u	30 × β _b 1.1	$x \le (\beta - 0.5)d$ for 6	0 < f _m ≤ 75 N/mr	m ²	-	mm	3.4.4.4
		0 ^				,		
	I - · ·	eel $A_3 =$	$\frac{M}{(0.95f_y)z}$, $f_y \le$	460N/mm ²		N/A	mm²	Forework
	Tension st		\J y / -					
	Tension st			_(f /1 05) (\	$_{\text{prov}}$), $f_{\text{v}} \leq 4\overline{6}$	N/A	mm	N/A
		sis of x in (0.67f _{cu} /1.5).(s.b) — (1 _y / 1.03).(A _{s/}	T T			
		0.9x for fou:	≤ 60 N/mm²;) – (1 _V / 1.05).(A _{s,}	, proving	1	mm	
		0.9x for f _{cu} : 0.8x for 60	≤ 60 N/mm²; < f _{ou} ≤ 75 N/mm²) – (1 _V) 1.03).(A _{s,}	J. V. Y	N/A	mm	3.4.4.4
	Back-analy	0.9x for f _{cu} : 0.8x for 60 0.72x for 75	≤ 60 N/mm²;			N/A N/A	mm mm	.3.4.4.4 E

CON	ISIII TING	Enginoorin	g Calculation	Choot		Job No.	Sheet No.		Rev.
	INEERS			Sneet		jXXX	1	.0	
						Member/Location			
lob Title	Member D	 esian - Reii	nforced Concre	ete Beam	BS8110.	Drg. Ref.			
	Design - RC	_	norcea coner	ete Beam	B30110,	Made by XX	Date 1	6/1/20	24 Chd.
							_		BS8110
If: M	> M _u → cor	mpression s	teel required				N/A		
	To scheme	e beam, wit	h compressior			ch that K =	$M/(bd^2f_c)$	_u) < 10/	f _{cu}
	for non-ex	cessive cor	<i>np steel,</i> i	.e. d >	N/A	and h >	N/A	mm	
	. (K'))						
	$z = d \left\{ 0.5 \right\}$	5 + √(0.25 -	0.9				N/A	mm	
	Donth of n	outral avia	Y		NI / A		NI / A		NI / A
		eutral axis	$X \le X_{limit}$	for f < 6	N/A	≤	N/A		N/A
	Neutral axis, x	x =	(d - z)/0.45, (d - z)/0.40,	for 60 <	f < 75 N/n	nm²		mm	3.4.4.4 E
	deu	X =	(d-z)/0.36,	for 75 <	f < 105 N	/mm ²		mm	.3.4.4.4 E
		\/"						mm mm	.3.4.4.4 E
	t is t	0.90 ≤ β _b ≤ 1.10	$x \le 0.4d$ for 60				-	mm	.3.4.4.4 E
	, a a ⊢	0.9 ∃ ≥	$x \le 0.33d$, for	75< f ≤	105 N/mm	$\beta_b = 1.0$		mm	.3.4.4.4 E
	tral it,)		$x \le (\beta - 0.4)dx$	for $f \le 60$	N/mm²	ρ _b -1.0]		mm	.3.4.4.4 E
	Neutral axis limit, X _{limit}	0 × 00 × 35 × 100 × 110	$x \le (\beta - 0.5)df$	or 60 < f	< 75 N/mm	n ²		mm	.3.4.4.4 E
	_ Z	0.9 F × 1	$x \le 0.33d$, for $x \le (\beta_b - 0.4)d$ t $x \le (\beta_b - 0.5)d$ f	C, Cu			IN/A		3.7.7.4 6
	Compressi	on steel	$A_{x}' = \frac{M - K}{0.95 f_{x}}$	ten D d	. f.<460N	/mm ²	Ν/Δ	mm ²	Foreword
<u>-</u> 2	Compressi	on seech	0.95 f,	, (d - d')	, 1y=1001 1	/ 111111	N/A	111111	7 07 07 07 0
<u>-</u> 2	Tension st	 eel	$A_s = \frac{M_u}{0.95 f_y}$		f.<460N	N/mm ²	N/A	mm ²	Foreword
2	T CHSION SC		0.95 f _y	Z ,	, iy= 1001	1 / 111111	N/A	111111	7 07 2 17 07 0
2	(-)			<u> </u>				
	If d'> 1 -	$\left \frac{f_y}{735} \right x$, use 7	$700\left(1-\frac{d'}{x}\right)$ in I	ieu of 0.95	f _y , f _y ≤46	0N/mm ²	N/A		Foreword
			(0.67f _{cu} /1.5).(N/A	mm	N/A
	,	7 CONT. CO. C. S.	≤ 60 N/mm²;		, , ,,,	1077 ()	_	mm	3.4.4.4 B
	s =	0.8x for 60		12			N/A	mm	3.4.4.4 E
		0.72x for 7	'5 < f _{ou} ≤ 105 N/n	nm²			N/A	mm	3.4.4.4 E
	Note for a	n under rei	nforced section	n, require	$\varepsilon_{st} = \varepsilon_{cc}$ ($(d-x)/x \geq \varepsilon$	y for yieldi	ng of ter	sion steel
	and $\varepsilon_{sc} = \varepsilon$	$\varepsilon_{cc}(x-d')/x$	$\geq \varepsilon_y$ for yield	ling of co	mpression	steel, when	re $\varepsilon_{cc} = 0.00$	035 for f	c _u ≤ 60N/m
	and $\varepsilon_{cc} = 0$	0.0035 –(f _{ct}	, –60)/50000 i	for f _{cu} >	60N/mm ²	and $\varepsilon_y = 0$	f _y /1.05)/E	; ;;	
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CON	SULTING	Fnaineerin	n Calculatio	on Sheet		Job No.		Sheet No.		Rev.
	NEERS			on onecc		jXXX		1	1	
				I		Member/Loca				
							ation			
Job Title	Member De		ntorced Cor	icrete Bear	n BS8110,	Drg. Ref. Made by		Data		Chd
Member De	esign - RC I	Beam			ı	Iviade by	XX	Date 10	6/1/2024	
										<u>BS8110</u>
Compress	ion Stress	Block in	Weh (s >	h. AND h.	<={0.45,0	3603	n 3	N/A		
					n only valid					= 0.5d:
11010 01111/01	med meene	a as equal.			Tomy rana	7		.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		.3.4.4.4 BC
$h_f < 0$.45d for f _{cu} ≤	60 N/mm ² ;	or							.3.4.4.4 BC
h, < 0	.36d for 60	< f ≤ 75 N/	mm²; or							.3.4.4.4 BC
									cl	.3.4.4.4 BC
$n_{t} < 0$.30 <i>a</i> for 75	$< T_{cv} \le 105 \text{ N}$	i/mm² and n	o moment re	edistribution.					
2	,		>							
	0.45fcu (b -	b_{w}) hr $(d -$	$0.5h_{\rm f}$)					N/A	kNm	
2 A	$M - M_{\text{uf}}$									
$2 K_{\rm f} = \frac{\Lambda}{f}$	$\frac{M-M_{\text{uf}}}{\text{feu } b \text{w } d^2}$							N/A		
2	D 11 14							NI / 0		
2 2	Ratio, K'		0.450.4	200 N	.2			N/A		21110
2	$0.90 \le \beta_{\rm b}$ ≤ 1.10	K' =		≤60 N/mm 0< f _{ou} ≤75 N					mm	.3.4.4.4 BC .3.4.4.4 BC
2	0.9 β ≥ 1	κ =		$5 < f_{cu} \le 105$		$[\beta_b = 1.$	01		mm mm	.3.4.4.4 BC
			0.054 101 7	O Cu SIOO		$L \rho_b - 1$.	0,	11/ 🔼	111111	, <i>3.4.4.4 D</i> C
	If K _f < K'	→ no com	pression s	teel				N/A		
	$A_{\rm S} = \frac{M_{\rm S} + 1}{2}$	$k_1 f_{\text{cu}} b_{\text{w}} d$ $0.95 f_{\text{y}} (d$	$\frac{K_2 a - I}{100}$, f _v ≤46	0N/mm ²			N/A	mm ²	Foreword
									cl	.3.4.4.5 BC
		0.1 for f _{cu} ≤ 6			$k_2 = 0$.45 for f _{cv}	,≤60) N/mm²,	cl	.3.4.4.5 BC
		0.072 for 60	$< f_{cu} \le 75 \text{ N/}$	mm² and	0	.32 for 60) < f	້ _{ເພ} ≤75 N/mm	1 ² and <i>Cl</i>	.3.4.4.5 BC
		0.054 for 75	< f _{cu} ≤ 105 N	/mm²; and	0	.24 for 75	5< f	_ ≤105N/mm	cl	.3.4.4.5 BC
_		_		<u>"</u> L				_		
2	Back-analy	sis of x in	(0.67f _{cu} /1.5	5).[b.h _f +(s	$[-h_f).b_w] = (f_y)$	/1.05).(/	$A_{s,p}$	N/A		N/A
2	. –		≤ 60 N/mm ² ;	, ,	-0.54			-	mm	.3.4.4.4 BC .3.4.4.4 BC
2	s =		$< f_{eu} \le 75 \text{ N/}$ $5 < f_{eu} \le 105$	N/mm²	_{imit} =0.5d				mm mm	.3.4.4.4 ВС .3.4.4.4 ВС
, 2	Note for ar				e x ≤ x _{limit}	for vield	dina		l	, <i>3.4.4.4 D</i> C
				cion, requii		, , , , , , ,		0. 000.0.		
	If K _f > K'	→ compre	ssion stee	el required				N/A		
	Compression	on steel, A _s	' = [M-(K'f	cub _w d ² +M _{uf}]/[0.95f _v (d	-d')], f _v ≤	≤46	N/A		Foreword
	Tension ste	eel, A _s = [{	0.20,0.18,	0.16 $f_{cu}b_wc$	1+0.45f _{cu} h _f ((b-b _w)]/(0.9	N/A	mm ²	Foreword
	Note the co	oefficient 0	.20, 0.18 o	r 0.16 is us	sed for f cu	≤ <i>60, 75</i>	or	105N/mm	² respectiv	ely;
	. [f.,)	(a'\		``					
	If d'> 1 -	$\frac{3y}{735}$ x, use 7	$00\left(1-\frac{\alpha}{x}\right)$	in lieu of 0.9	$5f_y$ x=0.5	5d , f _y :	≤4€	N/A		Foreword
)	` ′							
	Back-analy	sis of x in	(0.67f _{cu} /1.5	5).[b.h _f +(s-	$-h_f).b_w]+(f_y)$	/1.05).(/	$A_{s,p}$	N/A		N/A
	. –		≤ 60 N/mm ² ;						mm	.3.4.4.4 BC
	s =		$< f_{eu} \le 75 \text{ N/}$ $5 < f_{eu} \le 105$						mm mm	.3.4.4.4 BC .3.4.4.4 BC
	Note for an				$e \ \varepsilon_{st} = \varepsilon_{cc}$	(d-x)/x >	ے <		l	L
					ompression					
					60N/mm ²					
		ι- εα	,, = = = =	Cu -	,			,, - <u>- </u>	-	

CON	SULTING	Fngineerin	n Calculati	on Sheet		Job No.	Sheet No.		Rev.
	NEERS			on sneet		jXXX	1	.2	
						Member/Location			
ob Title	Member D	ocian Poir	oforced Cor	ocroto Boon	2 BC0110	Drg. Ref.			
	esign - RC		norced Cor	iciete bean	1 030110,	Made by XX	Date 1	6/1/2024	Chd.
Terriber D	esign - icc	Deam							BS8110
									<u> </u>
Compress	sion Stress	s Block in	Web (s >	h _f AND h _f	> {0.45,0 .	.36,0.30}d	N/A		
	olex method								
	1516-6	1 00 N/2		I		<u> </u>		C	1.3.4.4.5
$n_r < 0$.45d for f _{cu} s	≤ 60 N/mm²;	or					C	1.3.4.4.5
$h_f < 0$).36d for 60	$< f_{cu} \le 75 \text{ N}$	/mm²; or					C	1.3.4.4.5
h < 0).30 <i>d</i> for 75	< f < 105 N	J/mm² and n	no moment re	distribution			C	1.3.4.4.5
",	7.000 101 70	'cu = 100 i	1/111111 GITG 1	io moment re	, distribution.	┘			
	L							2	
	eel area pro							mm ²	
	eel area pro						N/A	2	N/A
	ion steel ar							mm ²	N / A
	ion steel ard sion reinfor		utilisation				N/A N/A	0/0	N/A <i>TR49</i>
	sion reinfor		= 0 0032h	h G250+ >	$A = M\Delta Y / \Omega$	0018 0 00			
	sion reinfor			WII UZJU, 2	- 1·1/4/A (U.	0.00	N/A		N/A
	npression re			04bh _f flanae	e; >= 0.00	2b _w h web)	N/A		
	npression r				•	, ,	N/A		N/A
	nsion reinfo						N/A	%	
6 Max ter	nsion reinfo	rcement ut	ilisation				N/A		N/A
6 Max co	mpression r	reinforceme	ent (<= 0.0	4bh _f flange	; <= 0.04b	wh web)	N/A	%	
% Max coi	mpression r	reinforceme	nt utilisatio	n			N/A		N/A
% Max ter	nsion or cor	npression r	einforceme	nt utilisatio	n		N/A		N/A
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						Job No.	Sheet No.		Rev.
	SULTING	_	_			JOD IVO.	Sheet No.		Rev.
ENGI	INEERS	Consulting	J Engineers			jXXX	1	.3	
	T					Member/Location	ו		4
lob Title	Member D	esign - Rei	nforced Cor	ncrete Bean	n BS8110,	Drg. Ref.	•		
Member D	esign - RC	Beam				Made by XX	Date 1	6/1/2024	Chd.
									<u>BS8110</u>
Shear Re	ectangular	Beam (BS	8110)						
Note that	this design	check is pe	erformed fo	r both recta	angular and	d flanged se	ections, ado	pting	
rectangula	ar section ed	quations in	the case or	f flanged se	ections;				
	d is the effe								
	at midspan						s, tension st	eel is	
the botton	n steel while	st for supp	orts, tensio	n steel is th	e top stee	<i>l;</i>			
2				0.5					
Jltimate s	shear stress	$v_{ult} = V_d/l$	$\frac{18.0 \text{ pwc}}{1}$	_{cu} ^{0.5} & {5.0,	,7.0}N/mm	າ [∠])		N/mm ²	.3.4.5.2 E
	shear streng		.8f _{cu} 0.5 & {5	.0,7.0}N/m	nm²}			N/mm ²	.3.4.5.2 E
Ultimate s	shear stress	utilisation					54%		OK
	<u></u>						_	2	
	ear stress, \			05 - 4		2		N/mm ²	
Enhanced	shear stren		$v_{\rm c}$ (< $0.8f_{\rm cc}$	ي ^د & {5.0,7	/.0}N/mm [·]			N/mm ²	cl.3.4.5.8
/Ch -	Distance, a	•			24 - 5	2.00d ▼	1834		
	pacity enha								Note
	v _c within 2							ilculating v	d
at a from	support and					se 3.4.5.10 ⊤		2	
			reinforcem	ent provide	d, A _{s,prov}			mm ²	
	$\rho_{\rm W} = 100 A_{\rm S}$,,	(25) 1/3(40)	0 (1) 1/4			1.40		12.45
	$v_c = (0.79)$		_u /25) ^{1/3} (400					N/mm ²	cl.3.4.5.4
		$\rho_{\rm W} = 100{\rm A}$	$a_{s,prov}/b_w d \leq$	3			1.40		cl.3.4.5.4
			80N/mm ²	1.00)				N/mm ²	.3.4.5.4 E
			≥ (0.67 or				1.00		cl.3.4.5.4
	100A _a	Table 3.8 — Va	alues of v_c design con- Effective de						
	b _v d 12	125 150	211	225 250	300 400				
	N/n ≤0.15 0.45 0.25 0.53	N/mm ² N/mm ² N 0.43 0.41 0.51 0.49	0.40 0.39	9 0.38 0.30					
	0.50 0.67 0.75 0.77	0.64 0.62 0.73 0.71	2 0.60 0.58	8 0.56 0.5	4 0.50				
	1.00 0.84 1.50 0.97	0.81 0.78 0.92 0.89	0.86 0.83	3 0.81 0.78	8 0.72				
	2.00 1.06 ≥ 3.00 1.22	1.02 0.98 1.16 1.12	2 1.08 1.05						
		s has been made in these figures in the table are derived from	- 111		-				
	where	-			-				
	0,4	t be taken as greater than 3;			-				
	$\left(\frac{400}{d}\right)^{\frac{7}{4}}$ should not	t be taken as less than 0.67 f	for members without shear re	einforcement;					
					ŀ				
	$\left(\frac{400}{d}\right)^{\frac{1}{4}}$ should not $\geq 0.4 \text{ N/mm}^2$	t be taken as less than 1 for	members with shear reinforc	ement providing a design she	ear resistance of				
	$\left(\frac{400}{d}\right)^{\frac{2}{4}} \text{ should not}$ $\geq 0.4 \text{ N/mm}^2.$ For characteristic confound not be take		members with shear reinforc in 25 N/mm ² , the values in th		ear resistance of $(f_{\rm cu}/25)\%$. The value of				
Minimum	$\geq 0.4 \text{ N/mm}^2$. For characteristic con f_{cu} should not be take	encrete strengths greater than ten as greater than 40.	n 25 N/mm², the values in the	nis table may be multiplied by	ear resistance of (f _{CU} /25)%. The value of	/mm²	0.40	N/mm²	24525
Minimum :	\(\begin{align*} \left(\frac{400}{d}\) \\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	encrete strengths greater than ten as greater than 40.	n 25 N/mm², the values in the	nis table may be multiplied by	ear resistance of $(f_{cu}/25)^{1/3}$. The value of	/mm²	0.40	N/mm ²	.3.4.5.3 E
	> 0.4 N/mm². For characteristic con from should not be take	gth, $v_r = M$	n 25 N/mm², the values in th	4(f _{cu} /40) ^{2/3}		/mm²			
	>0.4 N/mm² For characteristic confused for the take shear streng	gth, $v_r = M$ $a_{v} \cdot v_c \text{ for } n$	n 25 N/mm², the values in the IAX (0.4, 0.	4(f _{cu} /40) ^{2/3}		/mm²	INVALID	0.40	.3.4.5.3 B
	>0.4 N/mm² For characteristic confused for the take shear streng	gth, $v_r = M$ $a_{v} \cdot v_c \text{ for } n$	n 25 N/mm², the values in th	4(f _{cu} /40) ^{2/3}		/mm²		0.40	
Check v _d	shear streng < 0.5.2d/a Concrete s	gth, v _r = M a _v .v _c for n	n 25 N/mm², the values in the IAX (0.4, 0. o links (m) city 2d/a _v .v _o	4 $(f_{cu}/40)^{2/3}$ inor eleme			INVALID 363	0.40 kN	cl.3.4.5.3 4.5.4, cl.3
Check v _d	shear streng one of the strength of the stren	merete strengths greater than 40 gth, $v_r = M$ $a_v.v_c$ for n shear capac	o links (m city 2d/a _v .v _c	is table may be multiplied by $4(f_{cu}/40)^{2/3}$ inor element (b_wd) inal links	ents)	0.00	INVALID 363 N/A	0.40 kN	cl.3.4.5.3 4.5.4, cl.3 cl.3.4.5.3
Check v _d	shear streng concrete s concrete s concrete s concrete s concrete s concrete s	merete strengths greater than 40. gth, $v_r = M$ $a_v.v_c$ for n shear capace $c + 2d/a_v.v_c$ $c + v_r.b_w/(0.00)$	n 25 N/mm ² , the values in the lAX (0.4, 0.4) o links (motity $2d/a_v.v_o$ v_c for nominate v_c	4 $(f_{cu}/40)^{2/3}$ inor eleme	ents)	0.00	INVALID 363 N/A 0.46	0.40 kN 1.19 mm²/mm	cl.3.4.5.3 4.5.4, cl.3 cl.3.4.5.3
Check v _d	shear streng concrete s concrete s concrete s concrete s concrete s concrete s	merete strengths greater than 40 gth, $v_r = M$ $a_v.v_c$ for n shear capac	n 25 N/mm ² , the values in the lAX (0.4, 0.4) o links (motity $2d/a_v.v_o$ v_c for nominate v_c	is table may be multiplied by $4(f_{cu}/40)^{2/3}$ inor element (b_wd) inal links	ents)	0.00	INVALID 363 N/A	0.40 kN 1.19 mm²/mm	cl.3.4.5.3 4.5.4, cl.3 cl.3.4.5.3
Check v _d	shear streng one of the strength of the stren	merete strengths greater than 40 gth, $v_r = M$ $a_v.v_c$ for n_c shear capace $a_v.v_c$	n 25 N/mm², the values in the last of the	4(f _{cu} /40) ^{2/3} inor eleme c-(b _w d) inal links	ents)	0.00) _{nom} >	INVALID 363 N/A 0.46 546	0.40 kN 1.19 mm²/mm kN	cl.3.4.5.3 4.5.4, cl.3 cl.3.4.5.3 4.5.3, cl.3
Check v _d	shear streng one of the strength of the stre	mereta strengths greater than 40 gth, $v_r = M$ $\mathbf{a_v} \cdot \mathbf{v_c}$ for $\mathbf{n_c}$ shear capace $\mathbf{v_r} \cdot \mathbf{v_c} \cdot \mathbf{v_r} \cdot$	n 25 Nmm ² , the values in the last $(0.4, 0.4)$ o links (m) City $2d/a_v.v_o$ v_c for nomine v_c for nomine v_c	4(f _{cu} /40) ^{2/3} inor elements c.(b _w d) inal links 460N/mm ²	i.e. (A _{sv} /S	0.00) _{nom} >	INVALID 363 N/A 0.46 546 VALID	0.40 kN 1.19 mm²/mm kN	cl.3.4.5 4.5.4, cl.3 cl.3.4.5 4.5.3, cl.3 4.5.3, cl.3
Check v _d	0.4 N/max Shear streng $0.5.2d/a$ Concrete s $0.5.2d/a$	merete strengths greater than the mean spreater than 40 gth, $v_r = M$ $a_v.v_c$ for n_c shear capace $a_v.v_c$ $v_r.b_w/(0.00)$ $v_r+2d/a_v.v_c$ $v_r+2d/a_v.v_c$ v_vv_c for v_vv_c	n 25 Nmm², the values in the lax (0.4, 0.4) o links (m) city $2d/a_v.v_o$ v_c for nominate v_c , v_c	inor elements in all links in	i.e. (A _{sv} /S	0.00) _{nom} > 1.19 A _{sv} /S >	INVALID 363 N/A 0.46 546 VALID 2.01	0.40 kN 1.19 mm²/mm kN 4.73 mm²/mm	cl.3.4.5.3 4.5.4, cl.3 cl.3.4.5.3 4.5.3, cl.3 cl.3.4.5.3 cl.3.4.5.8
Check v _d	0.4 N/max Shear streng $0.5.2d/a$ Concrete s $0.5.2d/a$	merete strengths greater than the mean spreater than 40 gth, $v_r = M$ $a_v.v_c$ for n_c shear capace $a_v.v_c$ $v_r.b_w/(0.00)$ $v_r+2d/a_v.v_c$ $v_r+2d/a_v.v_c$ v_vv_c for v_vv_c	n 25 Nmm², the values in the lax (0.4, 0.4) o links (m) city $2d/a_v.v_o$ v_c for nominate v_c , v_c	4(f _{cu} /40) ^{2/3} inor elements c.(b _w d) inal links 460N/mm ²	i.e. (A _{sv} /S	0.00) _{nom} > 1.19 A _{sv} /S >	INVALID 363 N/A 0.46 546 VALID 2.01	0.40 kN 1.19 mm²/mm kN 4.73 mm²/mm	cl.3.4.5 4.5.4, cl.3 cl.3.4.5 4.5.3, cl.3 4.5.3, cl.3 cl.3.4.5 cl.3.4.5
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Table 8.2 : $\rho_1 = A_s/b_0$	≤ 200	$\sigma_{cp} = F/b_{w}$	$A_{s,prov}/D_wG \le h \le 0.2f_{cd} = h \le 0.2f_{$	0.2α _{cc} .f _{ck/} : v _{Rd, c} N/mm ² (in, d (mm)				f _{ck} ≤		N/mm ²	2(1), cl.
$\rho_1 = A_s/b0$ 0.25% 0.50% 0.75% 1.00% 1.25% 1.50%	0.54 0.59 0.68 0.75 0.80 0.85	$\sigma_{cp} = F/b_w$ of slabs without sh 225 250 0.52 0.50 0.57 0.56 0.66 0.64 0.72 0.71 0.78 0.76 0.83 0.81	$\begin{array}{lll} h \leq 0.2f_{cd} = \\ & \\ & \\ & \\ & \\ & \\ & \\ & \\ & \\ & \\$	0.2α _{cc} ·f _{ck/} v _{Rd,c} N/mm ² (e. v _{Rd,c} N/mm ²) v _{Rd,c} N/mm ² (o. 0.43 0.51 0.58 0.64 0.69 0.73	500 0.40 0.48 0.55 0.61 0.66 0.70	600 0.38 0.47 0.53 0.59 0.63 0.67	750 0.36 0.45 0.51 0.57 0.61 0.65	f _{ck} ≤		<u> </u>	1
$\rho_1 = A_s/b$ 0.25% 0.50% 0.75% 1.00% 1.25% 1.50% 2.00%	0.54 0.54 0.59 0.68 0.75 0.80 0.85 0.94	$\sigma_{cp} = F/b_w$ of slabs without sh 225 250 0.52 0.50 0.57 0.56 0.66 0.64 0.72 0.71 0.78 0.76 0.83 0.81 0.91 0.89	$\begin{array}{lll} h \leq 0.2f_{cd} = \\ & \\ & \\ \text{lear reinforcement} \\ \hline & & \\$	0.2α _{cc} ·f _{ck/} v _{Rd,c} N/mm ² (contained by the distribution of the distribution o	Class C30/3 500 0.40 0.48 0.55 0.61 0.66 0.70 0.77	600 0.38 0.47 0.53 0.59 0.63 0.67 0.74	750 0.36 0.45 0.51 0.57 0.61 0.65 0.71	f _{ck} ≤		<u> </u>	1
$\rho_1 = A_s/b0$ 0.25% 0.50% 0.75% 1.00% 1.25% 1.50%	0.54 0.54 0.59 0.68 0.75 0.80 0.85 0.94	$\sigma_{cp} = F/b_w$ of slabs without sh 225 250 0.52 0.50 0.57 0.56 0.66 0.64 0.72 0.71 0.78 0.76 0.83 0.81	$\begin{array}{lll} h \leq 0.2f_{cd} = \\ & \\ & \\ & \\ & \\ & \\ & \\ & \\ & \\ & \\$	0.2α _{cc} ·f _{ck/} v _{Rd,c} N/mm ² (contained by the distribution of the distribution o	500 0.40 0.48 0.55 0.61 0.66 0.70	600 0.38 0.47 0.53 0.59 0.63 0.67	750 0.36 0.45 0.51 0.57 0.61 0.65	f _{ck} ≤		<u> </u>	1
$\rho_1 = A_s/b$ 0.25% 0.50% 0.75% 1.00% 1.25% 1.50% 2.00%	0.54 0.54 0.59 0.68 0.75 0.80 0.85 0.94	$\sigma_{cp} = F/b_w$ of slabs without shape of slabs without slabs without slabs without shape of slabs without slabs w	$\begin{array}{lll} h \leq 0.2f_{cd} = \\ & \\ & \\ \text{lear reinforcement} \\ \hline \textit{Effective depth} \\ 300 & 350 \\ 0.47 & 0.45 \\ 0.54 & 0.52 \\ 0.62 & 0.59 \\ 0.68 & 0.65 \\ 0.73 & 0.71 \\ 0.78 & 0.75 \\ 0.85 & 0.82 \\ 1.816 & 1.75 \\ \hline \end{array}$	0.2α _{cc} ·f _{ck/} v _{Rd,c} N/mm ² (contained by the distribution of the distribution o	Class C30/3 500 0.40 0.48 0.55 0.61 0.66 0.70 0.77	600 0.38 0.47 0.53 0.59 0.63 0.67 0.74	750 0.36 0.45 0.51 0.57 0.61 0.65 0.71	f _{ck} ≤		<u> </u>	1
0.25% 0.50% 0.75% 1.00% 1.25% 1.50% 2.00%	200 0.54 0.59 0.68 0.75 0.80 0.85 0.94 2.000	$\sigma_{cp} = F/b_w$ of slabs without sh 225 250 0.52 0.50 0.57 0.56 0.66 0.64 0.72 0.71 0.78 0.76 0.83 0.81 0.91 0.89 1.943 1.894	$\begin{array}{lll} h \leq 0.2f_{cd} = \\ & \\ & \\ \text{lear reinforcement} \\ \hline \textit{Effective depth} \\ 300 & 350 \\ 0.47 & 0.45 \\ 0.54 & 0.52 \\ 0.62 & 0.59 \\ 0.68 & 0.65 \\ 0.73 & 0.71 \\ 0.78 & 0.75 \\ 0.85 & 0.82 \\ 1.816 & 1.75 \\ \hline \end{array}$	0.2α _{cc} ·f _{ck/} v _{Rd,c} N/mm ² (contained by the distribution of the distribution o	500 0.40 0.48 0.55 0.61 0.66 0.70 0.77	600 0.38 0.47 0.53 0.59 0.63 0.67 0.74	750 0.36 0.45 0.51 0.57 0.61 0.65 0.71	f _{ck} ≤		<u> </u>	1
$\rho_{1} = A_{s}/b_{0}$ 0.25% 0.50% 0.75% 1.00% 1.25% 1.50% 2.00% k Table 8.3	200 0.54 0.59 0.68 0.75 0.80 0.85 0.94 2.000	$\sigma_{cp} = F/b_w$ of slabs without sh 225 250 0.52 0.50 0.57 0.56 0.66 0.64 0.72 0.71 0.78 0.76 0.83 0.81 0.91 0.89 1.943 1.894	$h \leq 0.2f_{cd} =$ lear reinforcement Effective depth 300 350 0.47 0.45 0.54 0.52 0.62 0.59 0.68 0.65 0.73 0.71 0.78 0.75 0.85 0.82 1.816 1.75	-0.2α _{cc} .f _{ck/} v _{Rd,c} N/mm ² (contained in the contained in the cont	Class C30/3 500 0.40 0.48 0.55 0.61 0.66 0.70 0.77 1.632	600 0.38 0.47 0.53 0.59 0.63 0.67 0.74	750 0.36 0.45 0.51 0.57 0.61 0.65 0.71	f _{ck} ≤		<u> </u>	1
ρ ₁ = A _s /b ₀ 0.25% 0.50% 0.75% 1.00% 1.25% 1.50% 2.00% k Table 8.3 f _{ck} (N/m Modifica	200 0.54 0.59 0.68 0.75 0.80 0.85 0.94 2.000 Concrete stren	$\sigma_{cp} = F/b_w$ of slabs without shape of s	$\begin{array}{llllllllllllllllllllllllllllllllllll$	0.2α _{cc} .f _{ck/} V _{Rd,c} N/mm ² (6) 1, V _{Rd,c} N/mm ² (6) 1, V _{Rd,c} N/mm ² (7) 1, V _{Rd,c} N/mm ² (8) 1, V _{Rd,c} N/mm ² (9) 1, V _{Rd,c} N/mm ² (10) 1, V _{Rd,c}	S00 0.40 0.48 0.55 0.61 0.66 0.70 0.77 1.632	7 concret 600 0.38 0.47 0.53 0.59 0.63 0.67 0.74 1.577	750 0.36 0.45 0.57 0.61 0.65 0.71	f _{ck} ≤	0.00	N/mm ²	2(1), cl.
ρ ₁ = A _s /b ₀ 0.25% 0.50% 0.75% 1.00% 1.25% 1.50% 2.00% k Table 8.3 f _{ck} (N/m Modifica	200 0.54 0.59 0.68 0.75 0.80 0.85 0.94 2.000 Concrete stren	$\sigma_{cp} = F/b_w$ of slabs without shape of s	$h \leq 0.2f_{cd} =$ lear reinforcement Effective depth 300 350 0.47 0.45 0.54 0.52 0.62 0.59 0.68 0.65 0.73 0.71 0.78 0.75 0.85 0.82 1.816 1.75	0.2α _{cc} .f _{ck/} V _{Rd,c} N/mm ² (6) 1, V _{Rd,c} N/mm ² (6) 1, V _{Rd,c} N/mm ² (7) 1, V _{Rd,c} N/mm ² (8) 1, V _{Rd,c} N/mm ² (9) 1, V _{Rd,c} N/mm ² (10) 1, V _{Rd,c}	S00 0.40 0.48 0.55 0.61 0.66 0.70 0.77 1.632	7 concret 600 0.38 0.47 0.53 0.59 0.63 0.67 0.74 1.577	750 0.36 0.45 0.57 0.61 0.65 0.71	f _{ck} ≤	0.00	<u> </u>	1
0.25% 0.50% 0.75% 1.00% 1.25% 2.00% k Table 8.3 f _{ck} (N/m Modifica	200 0.54 0.59 0.68 0.75 0.80 0.85 0.94 2.000 Concrete stren 2000 Concrete stren 2000 Concrete stren 2000	$\sigma_{cp} = F/b_w$ of slabs without shape of s	$\begin{array}{llllllllllllllllllllllllllllllllllll$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	Soo 0.40 0.48 0.55 0.61 0.66 0.70 0.77 1.632 Soo 4 1.19	7 concret 600 0.38 0.47 0.53 0.59 0.63 0.67 0.74 1.577	750 0.36 0.45 0.57 0.61 0.65 0.71	f _{ck} ≤	0.00	N/mm ² N/mm ²	2(1), cl.
0.25% 0.50% 0.75% 1.00% 1.25% 2.00% k Table 8.3 f _{ck} (N/m Modifica	200 0.54 0.59 0.68 0.75 0.80 0.85 0.94 2.000 Concrete stren 2.000 Concrete stren 2.000 Concrete stren 2.000	$\sigma_{cp} = F/b_w$ of slabs without shape of s	h ≤ $0.2f_{cd}$ = lear reinforcement Effective depth 300 350 0.47 0.45 0.54 0.52 0.62 0.59 0.68 0.65 0.73 0.71 0.78 0.75 0.85 0.82 1.816 1.75 In factor 0 35 0 1.05 .08/ γ_s . $f_{ck}^{0.5}$,	0.2α _{cc} .f _{ck/} v _{Rd,c} N/mm ² (control of the late	Soo 0.40 0.48 0.55 0.61 0.66 0.70 0.77 1.632 Soo 4 1.19	7 concret 600 0.38 0.47 0.53 0.59 0.63 0.67 0.74 1.577	750 0.36 0.45 0.57 0.61 0.65 0.71	f _{ck} ≤	0.00 0.37	N/mm ² N/mm ² 0.60	2(1), cl.
0.25% 0.50% 0.75% 1.00% 1.25% 2.00% k Table 8.3 f _{ck} (N/m Modifica	200 0.54 0.59 0.68 0.75 0.80 0.85 0.94 2.000 Concrete stren 2.000 Concrete stren 2.000 Concrete stren 2.000	$\sigma_{cp} = F/b_w$ of slabs without shape of s	$\begin{array}{llllllllllllllllllllllllllllllllllll$	0.2α _{cc} .f _{ck/} v _{Rd,c} N/mm ² (control of the late	Soo 0.40 0.48 0.55 0.61 0.66 0.70 0.77 1.632 Soo 4 1.19	7 concret 600 0.38 0.47 0.53 0.59 0.63 0.67 0.74 1.577	750 0.36 0.45 0.57 0.61 0.65 0.71	f _{ck} ≤	0.00	N/mm ² N/mm ² 0.60	2(1), cl.
0.25% 0.50% 0.75% 1.00% 1.25% 2.00% k Table 8.3 f _{ck} (N/m Modifica	200 0.54 0.59 0.68 0.75 0.80 0.85 0.94 2.000 Concrete stren 2000 Concrete stren Concrete stren Concrete stren Concrete	$\sigma_{cp} = F/b_w$ of slabs without shape of s	$\begin{array}{llllllllllllllllllllllllllllllllllll$	0.2α _{cc} .f _{ck/} v _{Rd,c} N/mm ² (control of the late	Soo 0.40 0.48 0.55 0.61 0.66 0.70 0.77 1.632 Soo 4 1.19	7 concret 600 0.38 0.47 0.53 0.59 0.63 0.67 0.74 1.577	750 0.36 0.45 0.57 0.61 0.65 0.71 1.516		0.00 0.37 INVALID 274	N/mm ² N/mm ² 0.60 kN	2(1), cl. 2(5), cl. cl.6.2.1(2(1), cl.
0.25% 0.50% 0.75% 1.00% 1.25% 1.50% 2.00% k Table 8.3 f _{ck} (N/m Modifica Minimum 9 Check V _d 5.8	Section Sec	$\sigma_{cp} = F/b_w$ of slabs without shape of s	h ≤ $0.2f_{cd}$ = lear reinforcement Effective depth 300 350 0.47 0.45 0.54 0.52 0.62 0.59 0.68 0.65 0.73 0.71 0.78 0.75 0.85 0.82 1.816 1.75 In factor 0 35 0 1.05 Iinks (mircity 2d/a _v . v	0.2α _{cc} ·f _{ck/} v _{Rd,c} N/mm ² (v v,d (mm) 400 0.43 0.51 0.58 0.64 0.69 0.73 0.80 1.707 40 45 1.10 1.14 1.14 1.15 1.16 1.16 1.16 1.16 1.17 1.16 1.16 1.17 1.18	S00 0.40 0.48 0.55 0.61 0.66 0.70 0.77 1.632 500 4 1.19 ents)	7 concret 600 0.38 0.47 0.53 0.59 0.63 0.67 0.74 1.577	750 0.36 0.45 0.57 0.61 0.65 0.71 1.516		0.00 0.37 INVALID 274	N/mm ² N/mm ² 0.60 kN	2(1), cl. 2(5), cl. cl.6.2.1(2(1), cl.
0.25% 0.50% 0.75% 1.00% 1.25% 2.00% k Table 8.3 f _{ck} (N/m Modifica Check V _d 5.8 Check 0.0 5.1	Section Sec	$\sigma_{cp} = F/b_w$ of slabs without shape of s	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	10.2α _{cc} ·f _{ck/} 10.2α _{cc} ·f	Soo 0.40 0.48 0.55 0.61 0.66 0.70 0.77 1.632 Soo 4 1.19 ents)	7 concret 600 0.38 0.47 0.53 0.63 0.67 0.74 1.577	750 0.36 0.45 0.51 0.57 0.61 0.65 0.71 1.516	00	0.00 0.37 INVALID 274 N/A 0.42	N/mm ² N/mm ² 0.60 kN 0.37 mm ² /mm	2(1), cl. 2(5), cl. cl.6.2.1(2(1), cl. cl.6.2.1(3(3), cl.
0.25% 0.50% 0.75% 1.00% 1.25% 2.00% k Table 8.3 f _{ck} (N/m Modifica Alinimum s Check v _d 5.8	Section Sec	$\sigma_{cp} = F/b_w$ of slabs without shape of s	h ≤ $0.2f_{cd}$ = lear reinforcement Effective depth 300 350 0.47 0.45 0.54 0.52 0.62 0.59 0.68 0.65 0.73 0.71 0.78 0.75 0.85 0.82 1.816 1.75 In factor 0 35 0 1.05 Iinks (mircity 2d/a _v . v	10.2α _{cc} ·f _{ck/} 10.2α _{cc} ·f	Soo 0.40 0.48 0.55 0.61 0.66 0.70 0.77 1.632 Soo 4 1.19 ents)	7 concret 600 0.38 0.47 0.53 0.63 0.67 0.74 1.577	750 0.36 0.45 0.51 0.57 0.61 0.65 0.71 1.516	00	0.00 0.37 INVALID 274	N/mm ² N/mm ² 0.60 kN 0.37 mm ² /mm	2(1), cl. 2(5), cl. cl.6.2.1(2(1), cl. cl.6.2.1(3(3), cl.
0.25% 0.50% 0.50% 0.75% 1.00% 1.25% 2.00% k Table 8.3 f _{ck} (N/m Modifica Check V _d 5.8 Check 0.0	Section Sec	$\sigma_{cp} = F/b_w$ of slabs without shape of s	$h \le 0.2f_{cd} =$ lear reinforcement Effective depth 300 350 0.47 0.45 0.54 0.52 0.62 0.59 0.68 0.65 0.73 0.71 0.78 0.75 0.85 0.82 1.816 1.75 In factor 0 35 0 1.05 Inks (mircity 2d/a _v . v mal links 87f _{yv}), f _{yv} ≤ S) _{nom} .(0.87	10.2α _{cc} ·f _{ck/} 10.2α _{cc} ·f	Soo 0.40 0.48 0.55 0.61 0.66 0.70 0.77 1.632 Soo 4 1.19 ents)	7 concret 600 0.38 0.47 0.53 0.63 0.67 0.74 1.577	750 0.36 0.45 0.57 0.61 0.65 0.71 1.516	000	0.00 0.37 INVALID 274 N/A 0.42 376	N/mm² N/mm² N/mm² 0.60 kN 0.37 mm²/mm kN	2(1), cl. 2(5), cl. cl.6.2.1(2(1), cl. cl.6.2.3(
0.25% 0.50% 0.50% 0.75% 1.00% 1.25% 2.00% k Table 8.3 f _{ck} (N/m Modifica Sheck V _d 5.8 Check V _d	$ \frac{200}{0.54} $ 0.54 0.59 0.68 0.75 0.80 0.85 0.94 2.000 Concrete strent $ \frac{200}{0.85} $ ation factor $ \frac{200}{0.85} $ $\frac{200}{0.85} $	$\sigma_{cp} = F/b_w$ of slabs without short slabs without slabs	$\begin{array}{c c} h \leq 0.2f_{cd} = \\ \hline & \\ & \\ & \\ & \\ & \\ & \\ & \\ & \\ & \\$	10.2α _{cc} ·f _{ck/} 10.31 10.58 10.58 10.64 10.69 10.73 10.80 10.64 10.70 10.73 10.80 10.73 10.80 10.73 10.80 10.73 10.80 10.73 10.80 10.73 10.80 10.73 10.80 10.73 10.80 10.80 10.73 10.80	500 0.40 0.48 0.55 0.61 0.66 0.70 0.77 1.632 500 4 1.19 ents) m ² i.e. (cotθ, f _{yv}	7 concret 600 0.38 0.47 0.53 0.59 0.63 0.67 1.577 N/mm A _{sv} /S) ò6000	750 0.36 0.45 0.57 0.61 0.65 0.71 1.516 2 0.00 0.00 0.00 0.00 0.00 0.00 0.00	000	0.00 0.37 INVALID 274 N/A 0.42 376	N/mm ² N/mm ² N/mm ² 0.60 kN 0.37 mm ² /mm kN	2(1), cl. 2(5), cl. cl.6.2.1(2(1), cl. cl.6.2.3(cl.6.2.1(
0.25% 0.50% 0.50% 0.75% 1.00% 1.25% 1.50% 2.00% k Table 8.3 f _{ck} (N/m Modifica Check V _d 5.8 Check V _d 1.3.4.5.1	$ \frac{200}{0.54} $ 0.54 0.59 0.68 0.75 0.80 0.85 0.94 2.000 Concrete stren $ \frac{2d}{a_{v}} $ Concrete $ \frac{2d}{a_{v}} $ Concrete $ \frac{\sqrt{A_{sv}/S}}{\sqrt{S}} $ $ \frac{\sqrt{A_{sv}/S}}{\sqrt{S}} $ $ \frac{\sqrt{A_{sv}/S}}{\sqrt{S}} $ Concrete	$\sigma_{cp} = F/b_w$ of slabs without short slabs without slabs witho	$h \le 0.2f_{cd} =$ lear reinforcement Effective depth 300 350 0.47 0.45 0.54 0.52 0.62 0.59 0.68 0.65 0.73 0.71 0.78 0.75 0.85 0.82 1.816 1.75 In factor 0 35 0 1.05 In factor 0 35 0 1.05 In factor 0 35 0 1.05 Selective 2d/a _v . V In al links 87f _{yv}), f _{yv} ≤ S) 887f _{yv}).cotθ	0.2α _{cc} ·f _{ck/} v _{Rd,c} N/mm² (v v _{Rd,c} N/m² (v v _{Rd,c} N/m	$\frac{500}{0.40}$ 0.40 0.48 0.55 0.61 0.66 0.70 0.77 1.632	7 concret 600 0.38 0.47 0.59 0.63 0.67 0.74 1.577 N/mm A _{sv} /S) ,≤6000	750 0.36 0.45 0.57 0.61 0.65 0.71 1.516 0.00 0.00 0.00 0.00 0.00 0.00 0.00	2 A _{sv} /\$	0.00 0.37 INVALID 274 N/A 0.42 376 VALID 1.32	N/mm ² N/mm ² 0.60 kN 0.37 mm ² /mm kN 4.48 mm ² /mm	2(1), cl. 2(5), cl. cl.6.2.1(2(1), cl. cl.6.2.3(cl.6.2.3(cl.6.2.3(
0.25% 0.50% 0.50% 0.75% 1.00% 1.25% 1.50% 2.00% k Table 8.3 f _{ck} (N/m Modifica Check V _d 5.8 Check V _d 1.3.4.5.1	$\begin{array}{c} \frac{1}{\sqrt{200}} \\ 0.54 \\ 0.59 \\ 0.68 \\ 0.75 \\ 0.80 \\ 0.85 \\ 0.94 \\ 2.000 \\ \hline \\ \text{Concrete strend} \\ \text{Concrete strend} \\ \text{Concrete} \\ C$	$\sigma_{cp} = F/b_w$ of slabs without short slabs without slabs witho	$h \le 0.2f_{cd} =$ lear reinforcement Effective depth 300 350 0.47 0.45 0.54 0.52 0.62 0.59 0.68 0.65 0.73 0.71 0.78 0.75 0.85 0.82 1.816 1.75 Infactor 0 35 0 1.05 Infactor Infactor 0 35 0 1.05 Infactor I	10.2α _{cc} ·f _{ck/} 10.2α _{cc} ·f	Class C30/3 500 0.40 0.48 0.55 0.61 0.66 0.70 0.77 1.632 50 4 1.19 $f_{ck} \le 50I$ ents) $f_{yv} \le 600$ f_{yv}).0.96	600 0.38 0.47 0.59 0.63 0.67 0.74 1.577 N/mm A _{sv} /S) ,≤600 0N/mid.cotθ	750 0.36 0.45 0.57 0.61 0.65 0.71 1.516	2 A _{sv} /S	0.00 0.37 INVALID 274 N/A 0.42 376 VALID 1.32 2792	N/mm² N/mm² N/mm² 0.60 kN 0.37 mm²/mm kN 4.48 mm²/mm kN	2(1), cl. 2(5), cl. cl.6.2.1(2(1), cl. cl.6.2.3(cl.6.2.3(cl.6.2.3(cl.6.2.3(
0.25% 0.50% 0.50% 0.75% 1.00% 1.25% 2.00% k Table 8.3 f _{ck} (N/m Modifica Check v _d 5.8 Check v _d 1.3.4.5.1	0.54 0.54 0.59 0.68 0.75 0.80 0.85 0.94	$\sigma_{cp} = F/b_w$ of slabs without shape of s	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	10.2α _{cc} .f _{ck/} 10.2α _{cc} .f _{ck/} 10.2α _{cc} .f _{ck/} 10.2α _{cc} .f _{ck/} 10.43 10.51 10.58 10.64 10.69 10.73 10.80 10.73 10.80 10.73 10.80 10.64 10.70 10.70 10.80 10.64 10.70 10.80	Class C30/3 500 0.40 0.48 0.55 0.61 0.66 0.70 0.77 1.632 50 4 1.19 ents) $f_{ck} \le 50I$ $f_{yv} \le 600$ $f_{yv} > 0.90$ $f_{yv} > 0.90$	7 concret 600 0.38 0.47 0.53 0.59 0.63 0.67 1.577 N/mm A_{sv}/S $_{v} \le 600$ 0N/mi d .cot θ $(\theta = 45^{\circ})$.	750 0.36 0.45 0.57 0.61 0.65 0.71 1.516 0.00 0.00 0.00 0.00 0.00 0.00 0.00	2 A _{sv} /S	0.00 0.37 INVALID 274 N/A 0.42 376 VALID 1.32 2792 22.0	N/mm² N/mm² N/mm² 0.60 kN 0.37 mm²/mm kN 4.48 mm²/mm kN o	2(1), cl. 2(5), cl. cl.6.2.1(2(1), cl. cl.6.2.3(cl.6.2.3(cl.6.2.3(
0.25% 0.50% 0.50% 0.75% 1.00% 1.25% 1.50% 2.00% k Table 8.3 f _{ck} (N/m Modifica Tinimum s Check v _d 5.8 Check v _d 1.3.4.5.1 d.3.4.5.1	$\begin{array}{c} & & \\$	$\sigma_{cp} = F/b_w$ of slabs without short slabs without slabs	$h \le 0.2f_{cd} =$ lear reinforcement Effective depth 300 350 0.47 0.45 0.54 0.52 0.62 0.59 0.68 0.65 0.73 0.71 0.78 0.75 0.85 0.82 1.816 1.75 In factor 0 35 links (mir city 2d/a _V .V mal links .87f _{yV}), f _{yV} ≤ S) _{nom} .(0.87 s .87f _{yV}).cotθ S+A _{SV,prov,t} / = 22° ≤ 0 ion links in	10.2α _{cc} .f _{ck/} 10.2α _{cc} .f _{ck/} 10.2α _{cc} .f _{ck/} 10.2α _{cc} .f _{ck/} 10.43 10.51 10.58 10.64 10.69 10.73 10.80 10.73 10.80 10.73 10.80 10.64 10.70 10.70 10.80 10.64 10.70 10.80	Class C30/3 500 0.40 0.48 0.55 0.61 0.66 0.70 0.77 1.632 50 4 1.19 ents) $f_{ck} \le 50I$ $f_{yv} \le 600$ $f_{yv} > 0.90$ $f_{yv} > 0.90$	7 concret 600 0.38 0.47 0.53 0.59 0.63 0.67 1.577 N/mm A_{sv}/S $_{v} \le 600$ 0N/mi d .cot θ $(\theta = 45^{\circ})$.	750 0.36 0.45 0.57 0.61 0.65 0.71 1.516 0.00	2 A _{sv} /S	0.00 0.37 INVALID 274 N/A 0.42 376 VALID 1.32 2792 22.0 314	N/mm² N/mm² N/mm² 0.60 kN 0.37 mm²/mm kN 4.48 mm²/mm kN o mm²	2(1), cl. 2(5), cl. 2(5), cl. cl.6.2.1(3(3), cl. cl.6.2.3(cl.6.2.3(cl.6.2.3(
0.25% 0.50% 0.50% 0.75% 1.00% 1.25% 2.00% k Table 8.3 f _{ck} (N/m Modifica Check v _d 5.8 Check v _d 3.4.5.1 Sid.3.4.5.1 Area prov. Fried A _{sv,pl}	$\begin{array}{c} & & \\ & \leq 200 \\ & 0.54 \\ & 0.59 \\ & 0.68 \\ & 0.75 \\ & 0.80 \\ & 0.85 \\ & 0.94 \\ & 2.000 \\ \\ & & $	$\sigma_{cp} = F/b_w$ of slabs without shape of s	$h \le 0.2f_{cd} =$ lear reinforcement Effective depth 300 350 0.47 0.45 0.54 0.52 0.62 0.59 0.68 0.65 0.73 0.71 0.78 0.75 0.85 0.82 1.816 1.75 Infactor 0 35 0 1.05 Inks (mircity 2d/a _V .V links (mircity 2d/a _V .V s (87f _{yV}), f _{yV} ≤ S) _{nom} .(0.87 S +A _{SV,prov,t} / = 22° ≤ 0 ion links in the	10.2α _{cc} .f _{ck/} 10.2α _{cc} .f _{ck/} 10.2α _{cc} .f _{ck/} 10.2α _{cc} .f _{ck/} 10.43 10.51 10.58 10.64 10.69 10.73 10.80 10.73 10.80 10.73 10.80 10.64 10.70 10.70 10.80 10.64 10.70 10.80	Class C30/3 500 0.40 0.48 0.55 0.61 0.66 0.70 0.77 1.632 50 4 1.19 ents) $f_{ck} \le 50I$ $f_{yv} \le 600$ $f_{yv} > 0.90$ $f_{yv} > 0.90$	7 concret 600 0.38 0.47 0.53 0.59 0.63 0.67 1.577 N/mm A_{sv}/S $_{v} \le 600$ 0N/mi d .cot θ $(\theta = 45^{\circ})$.	750 0.36 0.45 0.57 0.61 0.65 0.71 1.516 0.00	2 A _{sv} /S	0.00 0.00	N/mm² N/mm² N/mm² 0.60 kN 0.37 mm²/mm kN mm²/mm kN mm²/mm	2(1), cl. 2(5), cl. 2(5), cl. cl.6.2.1(2(1), cl. cl.6.2.3(cl.6.2.3(cl.6.2.3(cl.6.2.3(
0.25% 0.50% 0.50% 0.75% 1.00% 1.25% 1.50% 2.00% k Table 8.3 f _{ck} (N/m Modifica Check V _d 5.8 Check V _d 1.3.4.5.1 J.3.4.5.1 J. J	0.54 0.54 0.59 0.68 0.75 0.80 0.85 0.94	$\sigma_{cp} = F/b_w$ of slabs without shape of s	$h \le 0.2f_{cd} =$ lear reinforcement Effective depth 300 350 0.47 0.45 0.54 0.59 0.68 0.65 0.73 0.71 0.78 0.75 0.85 0.82 1.816 1.75 Infactor 0 35 Infactor 0 35 Infactor	10.2α _{cc} .f _{ck/} 10.2α _{cc} .f _{ck/} 10.2α _{cc} .f _{ck/} 10.2α _{cc} .f _{ck/} 10.43 10.58 10.64 10.69 10.73 10.80 10.64 10.707 11.10 1.14 1.10 1.14 1.10 1.14 1.10 1.14 1.10 1.14 1.10 1.14 1.10 1.14 1.10 1.14 1.10 1.14 1.10 1.14 1.10 1.14 1.10 1.14 1.10 1.14 1.10 1.14 1.10 1.14 1.10 1.15 1.10 1.14 1.10 1.14 1.10 1.14 1.10 1.15 1.10 1.14 1.10 1.14 1.10 1.15 1.10 1	Class C30/3 500 0.40 0.48 0.55 0.61 0.66 0.70 0.77 1.632 50 4 1.19 ents) $f_{ck} \le 50I$ $f_{yv} \le 600$ $f_{yv} > 0.90$ $f_{yv} > 0.90$ $f_{yv} > 0.90$ $f_{yv} > 0.90$	7 concret 600 0.38 0.47 0.53 0.63 0.67 0.74 1.577 N/mm A _{sv} /S) ,≤600 ON/mid.cotθ ((θ=45°). A _{sv} ,prov	750 0.36 0.45 0.57 0.61 0.65 0.71 1.516	2 A _{sv} /3	0.00 0.00 0.00 0.37 INVALID 274 N/A 0.42 376 VALID 1.32 2792 22.0 314 3.14 42%	N/mm² N/mm² N/mm² 0.60 kN 0.37 mm²/mm kN 4.48 mm²/mm kN o mm² mm²/mm	2(1), cl. 2(5), cl. 2(5), cl. cl.6.2.1(3(3), cl. cl.6.2.3(cl.6.2.3(cl.6.2.3(
0.25% 0.50% 0.50% 0.75% 1.00% 1.25% 1.50% 2.00% k Table 8.3 f _{ck} (N/m Modifica Tinimum s Check V _d 5.8 Check V _d 1.3.4.5.1 J.3.4.5.1 J.3.4.5.1 J. J	0.54 0.54 0.59 0.68 0.75 0.80 0.85 0.94	$\sigma_{cp} = F/b_w$ of slabs without shape of s	$h \le 0.2f_{cd} =$ lear reinforcement Effective depth 300 350 0.47 0.45 0.54 0.52 0.62 0.59 0.68 0.65 0.73 0.71 0.78 0.75 0.85 0.82 1.816 1.75 Infactor 0 35 0 1.05 Inks (mircity 2d/a _V .V links (mircity 2d/a _V .V s (87f _{yV}), f _{yV} ≤ S) _{nom} .(0.87 S +A _{SV,prov,t} / = 22° ≤ 0 ion links in the	10.2α _{cc} .f _{ck/} 10.2α _{cc} .f _{ck/} 10.2α _{cc} .f _{ck/} 10.2α _{cc} .f _{ck/} 10.43 10.58 10.64 10.69 10.73 10.80 10.64 10.707 11.10 1.14 1.10 1.14 1.10 1.14 1.10 1.14 1.10 1.14 1.10 1.14 1.10 1.14 1.10 1.14 1.10 1.14 1.10 1.14 1.10 1.14 1.10 1.14 1.10 1.14 1.10 1.14 1.10 1.14 1.10 1.15 1.10 1.14 1.10 1.14 1.10 1.14 1.10 1.15 1.10 1.14 1.10 1.14 1.10 1.15 1.10 1	Class C30/3 500 0.40 0.48 0.55 0.61 0.66 0.70 0.77 1.632 50 4 1.19 ents) $f_{ck} \le 50I$ $f_{yv} \le 600$ $f_{yv} > 0.90$ $f_{yv} > 0.90$ $f_{yv} > 0.90$ $f_{yv} > 0.90$	7 concret 600 0.38 0.47 0.53 0.63 0.67 0.74 1.577 N/mm A _{sv} /S) ,≤600 ON/mid.cotθ ((θ=45°). A _{sv} ,prov	750 0.36 0.45 0.57 0.61 0.65 0.71 1.516	2 A _{sv} /3	0.00 0.00 0.00 0.37 INVALID 274 N/A 0.42 376 VALID 1.32 2792 22.0 314 3.14 42%	N/mm² N/mm² N/mm² 0.60 kN 0.37 mm²/mm kN 4.48 mm²/mm kN o mm² mm²/mm	2(1), cl. 2(5), cl. 2(5), cl. cl.6.2.1(2(1), cl. cl.6.2.3(cl.6.2.3(cl.6.2.3(cl.6.2.3(
P1 = A _s /b 0.25% 0.50% 0.50% 0.50% 1.25% 1.00% 1.25% 1.50% 2.00% k Modifica	$\begin{array}{c} & & \\ & \leq 200 \\ & 0.54 \\ & 0.59 \\ & 0.68 \\ & 0.75 \\ & 0.80 \\ & 0.85 \\ & 0.94 \\ & 2.000 \\ \\ & & $	$\sigma_{cp} = F/b_w$ of slabs without shape of slabs without	$h \le 0.2f_{cd} =$ lear reinforcement Effective depth 300 350 0.47 0.45 0.54 0.59 0.68 0.65 0.73 0.71 0.78 0.75 0.85 0.82 1.816 1.75 Infactor 0 35 Infactor 0 35 Infactor	10.2α _{cc} .f _{ck/} 10.2α _{cc} .f _{ck/} 10.2α _{cc} .f _{ck/} 10.43 10.58 10.64 10.69 10.73 10.80 10.64 10.70 11.10 11.14 11.14	500 0.40 0.48 0.55 0.61 0.66 0.70 0.77 1.632 500 4 1.19 cotθ, f _{yv} ≤600 f _{yv}).0.9c d/V _{Rd,max} A _{sv,prov} +A ctural im	600 0.38 0.47 0.53 0.59 0.63 0.67 0.74 1.577 N/mm A _{sv} /S) A _{sv} /S) A _{sv} , prov	750 0.36 0.45 0.57 0.61 0.65 0.71 1.516	2 A _{sv} /S 00N/	0.00 0.37 INVALID 274 N/A 0.42 376 VALID 1.32 2792 22.0 314 3.14 42% ortance, it r	N/mm² N/mm² N/mm² 0.60 kN 0.37 mm²/mm kN 4.48 mm²/mm kN mm²/mm anay be	2(1), cl. 2(5), cl. 2(5), cl. cl.6.2.1(2(1), cl. cl.6.2.3(cl.6.2.3(cl.6.2.3(cl.6.2.3(

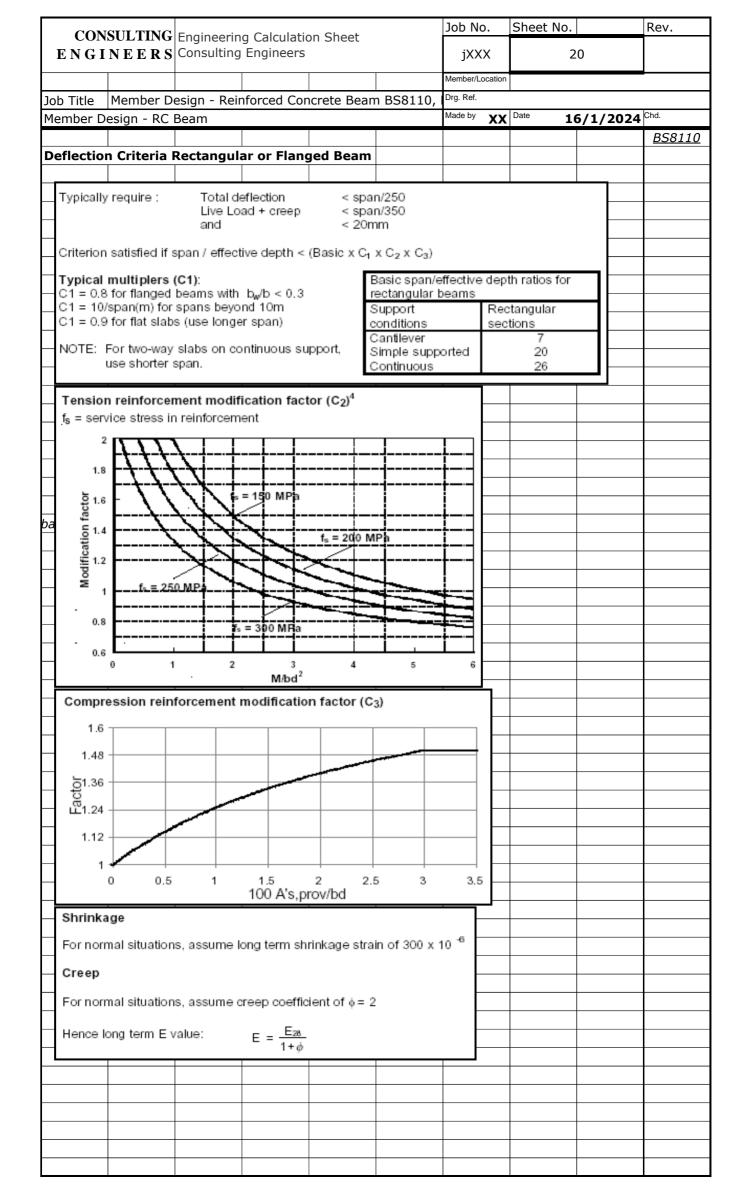
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Shear Re	ectangular	Beam (AC	I318)							
Note that	this design	n check is pe	erformed fo	r both re	ectangular	and fla	anged se	ections, ado	pting	
rectangula	ar section e	equations in	the case of	f flanged	sections;	:				
Note that	d is the eff	fective depti	h to the ten	sion reir	nforcemer	nt irresp	ective o	f whether t	he section	
		ns or hoggii					nidspans	, tension st	eel is	
the bottor	m steel whi	ilst for suppo	orts, tensio	n steel is	s the top s	steel;				
		s, $v_{ult} = V_d *$				'≤70N/r	mm²)		N/mm ²	cl.22.5.5
		gth, φ(0.66-	+0.17λ)√f _c ',	f _c '≤70N	l/mm²				N/mm ²	cl.22.5.5
Jltimate s	shear stres	s utilisation						77%		ОК
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.2(2)	$v_c = \phi V_c/t$	o _w d	Note $f_c \le 2$	70N/mm	² Simplifi	ed	_	0.67	N/mm ²	
		70 / 60 1								
	$V_c = 0.1$	$7\lambda\sqrt{f_c'}b_wd$			[Sim	plified]	$\phi V_c =$	309	kN	5.5.1, cl.2
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.2(2)	where λ =	= {1.00 NW	 C, 0.75 LW	C}			Normal	weight \blacktriangledown		
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		tailed metho			tailed MI		$\phi V_c =$	weight ▼	kN	5.5.1, cl.2
		tailed method	d for calcula						kN	5.5.1, cl.2
		tailed method	d for calcula		Note [Detail	f _c '≤70. led (a)]	$\phi V_c = \frac{\phi V_c}{N/mm^2}$ $\phi V_c = \frac{\phi V_c}{\rho V_c}$			
Table 22		tailed method V_c $\left(0.16\lambda\sqrt{f_c'} + 17\rho\right)$	d for calculation $b_w \frac{V_u d}{M_u} b_w d$	ating V _c	Note [Detail	f _c '≤70. led (a)]	$\phi V_c = N/mm^2$	339	kN	
Table 22	2.5.5.1—Det	tailed method	d for calculation $b_w \frac{V_u d}{M_u} b_w d$	ating V _c	Note [Detail Note [Detail	f _c '≤70. led (a)] f _c '≤70. led (b)]	$\phi V_c = \frac{N/mm^2}{\phi V_c} = \frac{N/mm^2}{\phi V_c}$	339	kN	5.5.1, cl.2
Table 22	2.5.5.1—Det	tailed method V_c $\left(0.16\lambda\sqrt{f_c'} + 17\rho\right)$	d for calcula $b_w \frac{V_u d}{M_u} b_w d$ [1] $b_w d$	ating V _c	Note [Detain Note [Detain Note	$f_c' \le 70$ $f_c' \le 70$ $f_c' \le 70$ $f_c' \le 70$ $f_c' \le 70$	$\phi V_c = \frac{N/mm^2}{\phi V_c} = \frac{N/mm^2}{\phi V_c} = \frac{N/mm^2}{\rho V_c} = \frac{N/mm^2}{\rho V_c} = \frac{N/mm^2}{\rho V_c}$	339	kN	5.5.1, cl.2
Least of	2.5.5.1—Def	tailed method V_c $\left(0.16\lambda\sqrt{f_c'} + 17\rho\right)$ $(0.16\lambda\sqrt{f_c'} + 17\rho)$	d for calcula $b_{w} \frac{V_{u}d}{M_{u}} b_{w}d$ $17\rho_{w})b_{w}d$ $c_{c}^{\prime}b_{w}d$	(a)	Note [Detail Note [Detail Note [Detail	$f_c' \le 70$ $f_c' \le 70$ $f_c' \le 70$ $f_c' \le 70$ $f_c' \le 70$ $f_c' \le 70$ $f_c' \le 70$	$\phi V_c = \frac{N/mm^2}{\phi V_c} = N$	339	kN kN	5.5.1, cl.2 5.5.1, cl.2
Least of	2.5.5.1—Def	tailed method V_c $\left(0.16\lambda\sqrt{f_c'} + 17\rho\right)$ $\left(0.16\lambda\sqrt{f_c'} + 0.29\lambda\sqrt{L}\right)$	d for calcula $b_{w} \frac{V_{u}d}{M_{u}} b_{w}d$ $17\rho_{w})b_{w}d$ $c_{c}^{\prime}b_{w}d$	(a)	Note [Detail Note [Detail Note [Detail	$f_c' \le 70$ $f_c' \le 70$ $f_c' \le 70$ $f_c' \le 70$ $f_c' \le 70$ $f_c' \le 70$ $f_c' \le 70$	$\phi V_c = \frac{N/mm^2}{\phi V_c} = \frac{N/mm^2}{\phi V_c} = \frac{N/mm^2}{\rho V_c} = \frac{N/mm^2}{\rho V_c} = \frac{N/mm^2}{\rho V_c}$	339 339 373	kN kN	5.5.1, cl.2 5.5.1, cl.2
Least of	2.5.5.1—Def	tailed method V_c $\left(0.16\lambda\sqrt{f_c'} + 17\rho\right)$ $\left(0.16\lambda\sqrt{f_c'} + 0.29\lambda\sqrt{L}\right)$	d for calcula $b_{w} \frac{V_{u} d}{M_{u}} b_{w} d$ $17 \rho_{w} b_{w} d$ $f_{c}^{c} b_{w} d$ Insidered.	(a) (b) (c)	Note [Detail Note [Detail Note [Detail	$f_c' \le 70$ $f_c' \le 70$ $f_c' \le 70$ $f_c' \le 70$ $f_c' \le 70$ $f_c' \le 70$ $f_c' \le 70$	$\phi V_c = \frac{N/mm^2}{\phi V_c} = N$	339 339 373 528	kN kN	5.5.1, cl.2 5.5.1, cl.2
Least of	2.5.5.1—Def	tailed method V_c $\left(0.16\lambda\sqrt{f_c'} + 17\rho\right)$ $\left(0.16\lambda\sqrt{f_c'} + 0.29\lambda\sqrt{f_c'}\right)$ th V_u at the section con	d for calcula $b_{w} \frac{V_{u} d}{M_{u}} b_{w} d$ $17 \rho_{w} b_{w} d$ $f_{c}^{c} b_{w} d$ Insidered.	(a) (b) (c)	Note [Detail Note [Detail Note [Detail	$f_c' \le 70$ $f_c' \le 70$ $f_c' \le 70$ $f_c' \le 70$ $f_c' \le 70$ $f_c' \le 70$ $f_c' \le 70$	$\phi V_c = \frac{N/mm^2}{\phi V_c} = N$	339 339 373 528	kN kN	5.5.1, cl.2 5.5.1, cl.2
Least of	f (a), (b), l (c): simultaneously wit where λ =	tailed method V_c $\left(0.16\lambda\sqrt{f_c'} + 17\rho\right)$ $\left(0.16\lambda\sqrt{f_c'} + 0.29\lambda\sqrt{f_c'}\right)$ th V_u at the section con	d for calculation $\frac{V_u d}{M_u}b_w d$ $\frac{V_u d}{M_u}b_w d$ $\frac{17\rho_w)b_w d}{f_c^c b_w d}$ insidered. C, 0.75 LW6	(a) (b) (c) C}	Note [Detail Note [Detail Note [Detail Note [Detail	$f_c' \le 70$ $f_c' \le 70$ $f_c' \le 70$ $f_c' \le 70$ $f_c' \le 70$ $f_c' \le 70$ $f_c' \le 70$	$\phi V_c = \frac{N/mm^2}{\phi V_c} = N$	339 339 373 528	kN kN	5.5.1, cl.2 5.5.1, cl.2
Least of and	2.5.5.1—Define $f(a)$, (b) , $f(c)$: simultaneously with $f(c)$: where $f(a)$ = Strength	tailed method V_c $\left(0.16\lambda\sqrt{f_c'} + 17\rho\right)$ $(0.16\lambda\sqrt{f_c'} + 17\rho\right)$ $(0.16\lambda\sqrt{f_c'} + 17\rho\right)$ $0.29\lambda\sqrt{f_c}$ th V_u at the section contains V_u at the section V_u	d for calcular $b_w \frac{V_u d}{M_u} b_w d$ $\frac{V_u d}{M_u} b_w d$ $\frac{f_c^2 b_w d}{g_w^2 b_w d}$ ctor for she	(a) (b) (c) C}	Note [Detain Note [Detain Note [Detain Note] Note] 0.75	$\begin{aligned} &f_c \leq 70, \\ &led (a) \\ &f_c \leq 70, \\ &led (b) \\ &f_c \leq 70, \\ &led (c) \\ &f_c \leq 70, \\ &led (c) \\ &f_c \leq 70, \end{aligned}$	$\phi V_c = \frac{N/mm^2}{\phi V_c} = N$	339 339 373 528 weight ▼	kN kN	5.5.1, cl.2 5.5.1, cl.2 5.5.1, cl.2 cl.21.2
Least of and	2.5.5.1—Def f (a), (b), l (c): where λ = Strength shear stren	tailed method V_{c} $\left(0.16\lambda\sqrt{f_{c}'}+17\rho\right)$ $(0.16\lambda\sqrt{f_{c}'}+10.29\lambda\sqrt{f_{c}'}+10.29\lambda\sqrt{f_{c}'}$ $= \{1.00 \text{ NWG}\}$ reduction faingth, $V_{r} = M$	d for calculation $b_w \frac{V_u d}{M_u} b_w d$ $\frac{V_u d}{M_u} b_w d$ $\frac{I}{I} 7 \rho_w b_w d$ $\frac{I}{I} c_w d$ insidered. $C, 0.75 LWC$ $Ctor for she AX (0.35, C)$	(a) (b) (c) C} ear, φ =	Note $[Detain]$ $Note$ $[Detain]$ $Note$ $[Detain]$ $Note$ $[Detain]$ $Note$ $[Detain]$ $[Detain$	$\begin{aligned} &f_c \leq 70, \\ &led (a) \\ &f_c \leq 70, \\ &led (b) \\ &f_c \leq 70, \\ &led (c) \\ &f_c \leq 70, \\ &led (c) \\ &f_c \leq 70, \end{aligned}$	$\phi V_c = \frac{N/mm^2}{\phi V_c} = N$	339 339 373 528 weight ▼	kN kN kN	5.5.1, cl.2 5.5.1, cl.2 5.5.1, cl.2 cl.21.2
Least of and	2.5.5.1—Def f (a), (b), l (c): where λ = Strength shear stren	tailed method V_c $\left(0.16\lambda\sqrt{f_c'} + 17\rho\right)$ $(0.16\lambda\sqrt{f_c'} + 0.29\lambda\sqrt{g_c'})$ $h V_u \text{ at the section continuous}$ $= \{1.00 \text{ NWG}\}$ $reduction fa$	d for calculation $b_w \frac{V_u d}{M_u} b_w d$ $\frac{V_u d}{M_u} b_w d$ $\frac{I}{I} 7 \rho_w b_w d$ $\frac{I}{I} c_w d$ insidered. $C, 0.75 LWC$ $Ctor for she AX (0.35, C)$	(a) (b) (c) C} ear, φ =	Note $[Detain]$ $Note$ $[Detain]$ $Note$ $[Detain]$ $Note$ $[Detain]$ $Note$ $[Detain]$ $[Detain$	$\begin{aligned} &f_c \leq 70, \\ &led (a) \\ &f_c \leq 70, \\ &led (b) \\ &f_c \leq 70, \\ &led (c) \\ &f_c \leq 70, \\ &led (c) \\ &f_c \leq 70, \end{aligned}$	$\phi V_c = \frac{N/mm^2}{\phi V_c} = N$	339 339 373 528 weight ▼	kN kN kN N/mm ²	5.5.1, cl.2 5.5.1, cl.2 5.5.1, cl.2 5.5.1, cl.2 6.2.2, cl.2 cl.9.6.3.
Least of and	2.5.5.1—Def f (a), (b), l (c): where λ = Strength shear stren < 0.5.d/a	tailed method V_{c} $\left(0.16\lambda\sqrt{f_{c}'}+17\rho\right)$ $(0.16\lambda\sqrt{f_{c}'}+10.29\lambda\sqrt{f_{c}'}+10.29\lambda\sqrt{f_{c}'}$ $= \{1.00 \text{ NWG}\}$ reduction faingth, $V_{r} = M$	d for calculation $\frac{V_u d}{M_u}b_w d$ $\frac{V_u d}{M_u}b_w d$ $\frac{17\rho_w)b_w d}{f_c^2b_w d}$ nsidered. C, 0.75 LWG ctor for she AX (0.35, 0)	(a) (b) (c) C} ear, φ = 0.062√f _c '	Note $[Detain]$ $Note$ $[Detain]$ $Note$ $[Detain]$ $Note$ $[Detain]$ $Note$ $[Detain]$ $[Detain$	$\begin{aligned} &f_c \leq 70, \\ &led (a) \\ &f_c \leq 70, \\ &led (b) \\ &f_c \leq 70, \\ &led (c) \\ &f_c \leq 70, \\ &led (c) \\ &f_c \leq 70, \end{aligned}$	$\phi V_c = \frac{N/mm^2}{\phi V_c} = N$	339 339 373 528 weight ▼ 0.75 0.35	kN kN kN N/mm ²	5.5.1, cl.2 5.5.1, cl.2 5.5.1, cl.2 cl.21.2 5.2.2, cl.2
Least of and	2.5.5.1—Def f (a), (b), l (c): where λ = Strength shear stren < 0.5.d/a	tailed method V_c $\left(0.16\lambda\sqrt{f_c'} + 17\rho\right)$ $(0.16\lambda\sqrt{f_c'} + 17\rho\right)$ $(0.16\lambda\sqrt{f_c'} + 17\rho\right)$ $0.29\lambda\sqrt{\rho}$ $h V_u at the section constant the section formula in the section formula $	d for calculation $\frac{V_u d}{M_u}b_w d$ $\frac{V_u d}{M_u}b_w d$ $\frac{17\rho_w)b_w d}{f_c^2b_w d}$ nsidered. C, 0.75 LWG ctor for she AX (0.35, 0)	(a) (b) (c) C} ear, φ = 0.062√f _c '	Note $[Detain]$ $Note$ $[Detain]$ $Note$ $[Detain]$ $Note$ $[Detain]$ $Note$ $[Detain]$ $[Detain$	$\begin{aligned} &f_c \leq 70, \\ &led (a) \\ &f_c \leq 70, \\ &led (b) \\ &f_c \leq 70, \\ &led (c) \\ &f_c \leq 70, \\ &led (c) \\ &f_c \leq 70, \end{aligned}$	$\phi V_c = \frac{N/mm^2}{\phi V_c} = N$	339 339 373 528 weight ▼ 0.75 0.35	kN kN kN N/mm ²	5.5.1, cl.2 5.5.1, cl.2 5.5.1, cl.2 6.5.1, cl.2 cl.21.2 5.2.2, cl.2 cl.9.6.3.
Least of and Minimum Check v _d .2(6)	2.5.5.1—Def f (a), (b), l (c): simultaneously wit where λ = Strength shear stren < 0.5.d/a	tailed method V_c $\left(0.16\lambda\sqrt{f_c'} + 17\rho\right)$ $(0.16\lambda\sqrt{f_c'} + 17\rho\right)$ $(0.16\lambda\sqrt{f_c'} + 17\rho\right)$ $0.29\lambda\sqrt{\rho}$ $h V_u at the section constant the section formula in the section formula $	d for calculation $\frac{V_u d}{M_u}b_w d$ $\frac{V_u d}{M_u}b_w d$ $\frac{1}{C}b_w d$ nsidered. C, 0.75 LWG Ctor for she AX (0.35, 0) Iinks (mir sity d/a _v .v _c .	(a) (b) (c) C} ear, φ = 0.062√f _c ' nor elen (b _w d)	Note [Detain Note [Detain Note [Detain Note] nents)	$\begin{aligned} &f_c \leq 70, \\ &led (a) \\ &f_c \leq 70, \\ &led (b) \\ &f_c \leq 70, \\ &led (c) \\ &f_c \leq 70, \\ &led (c) \\ &f_c \leq 70, \end{aligned}$	$\phi V_c = \frac{N/mm^2}{\phi V_c} = N$	339 339 373 528 weight ▼ 0.75 0.35	kN kN kN N/mm² 0.34 kN	5.5.1, cl.2 5.5.1, cl.2 5.5.1, cl.2 cl.21.2 5.2.2, cl.2 cl.9.6.3. 5.5.1, cl.
Least of and Immum Check v _d Check 0.1	2.5.5.1—Define $f(a)$, (b) , $f(a)$,	tailed method V_{c} $\left(0.16\lambda\sqrt{f_{c}'}+17\rho\right)$ $(0.16\lambda\sqrt{f_{c}'}+17\rho\right)$ $(0.16\lambda\sqrt{f_{c}'}+17\rho\right)$ $0.29\lambda\sqrt{J_{c}}$ th V_{u} at the section considering the section fangth, $V_{r}=M$ $P_{u}=0.00$ $P_{u}=$	d for calculation $\frac{V_u d}{M_u}b_w d$ $\frac{V_u d}{M_u}b_w d$ $\frac{17\rho_w)b_w d}{f_c^2b_w d}$ nsidered. C, 0.75 LWG Ctor for she AX (0.35, G) links (mirroity d/a _v .v _c .	(a) (b) (c) C} ear, φ = 0.062√f _c ' nor elen (b _w d) nal link	Note [Detain Note [Detain Note [Detain Note] Note	$\begin{aligned} &f_c \leq 70, \\ &led (a) \\ &f_c \leq 70, \\ &led (b) \\ &f_c \leq 70, \\ &led (c) \\ &f_c \leq 70, \\ &f_c \leq $	$\phi V_c = \frac{N/mm^2}{\phi V_c} = \frac{N/mm^2}{\phi V_c} = \frac{N/mm^2}{\phi V_c} = \frac{N/mm^2}{\rho V_c} = \frac{N/mm^2}{\rho V_c}$	339 339 373 528 weight ▼ 0.75 0.35 INVALID 309	kN kN kN N/mm² 0.34 kN	5.5.1, cl.2 5.5.1, cl.2 5.5.1, cl.2 6.5.1, cl.2 cl.21.2 5.2.2, cl.2 cl.9.6.3.
Least of and Minimum Check V _d .2(6) Check 0.1	2.5.5.1—Define $f(a)$, (b), $f(a)$, (c): simultaneously with $\lambda = 0$. Strength shear strength $\lambda = 0$. Concrete $\lambda = 0$. $\lambda = 0$	tailed method V_c $ \begin{pmatrix} 0.16\lambda\sqrt{f_c'} + 17\rho \\ 0.16\lambda\sqrt{f_c'} + 17\rho \\ 0.29\lambda\sqrt{f_c'} + 12\rho \\ 0.29\lambda\sqrt{f_c'} + 12\rho \\ 0.29\lambda\sqrt{f_c'} + 12\rho \\ 0.29\lambda\sqrt{f_c'} + 12\rho \\ 0.2$	d for calculation of the control of	(a) (b) (c) C} ear, \$\phi = 0.062\$\sqrt{f_c}\$ nor elen (b_wd) mal link mm² i.e.	Note [Detain Note [Detain Note [Detain Note] Note	$\begin{aligned} &f_c \leq 70, \\ &led (a) \\ &f_c \leq 70, \\ &led (b) \\ &f_c \leq 70, \\ &led (c) \\ &f_c \leq 70, \\ &f_c \leq $	$\phi V_c = \frac{N/mm^2}{\phi V_c} = \frac{N/mm^2}{\phi V_c} = \frac{N/mm^2}{\phi V_c} = \frac{N/mm^2}{\rho V_c} = \frac{N/mm^2}{\rho V_c}$	339 339 373 528 weight ▼ 0.75 0.35 INVALID 309	kN kN kN N/mm² 0.34 kN 0.94 mm²/mm	5.5.1, cl.2 5.5.1, cl.2 5.5.1, cl.2 6.21.2 5.2.2, cl.2 cl.9.6.3. 5.5.1, cl.
Least of and Least of and Check V _d . 2(6)	2.5.5.1—Define $f(a)$, (b), $f(a)$, (c): simultaneously with $\lambda = 0$. Strength shear strength $\lambda = 0$. Concrete $\lambda = 0$. $\lambda = 0$	tailed method V_c $\left(0.16\lambda\sqrt{f_c'} + 17\rho + 0.29\lambda\sqrt{f_c'} + 0.29\lambda\sqrt{f_c'} + 0.29\lambda\sqrt{f_c'}\right)$ $= \{1.00 \text{ NWO} + 1.00 \text{ NWO} + 0.200 \text{ NWO} + 0$	d for calculation of the control of	(a) (b) (c) C} ear, \$\phi = 0.062\$\sqrt{f_c}\$ nor elen (b_wd) mal link mm² i.e.	Note [Detain Note [Detain Note [Detain Note] Note	$\begin{aligned} &f_c \leq 70, \\ &led (a) \\ &f_c \leq 70, \\ &led (b) \\ &f_c \leq 70, \\ &led (c) \\ &f_c \leq 70, \\ &f_c \leq $	$\phi V_c = \frac{N/mm^2}{\phi V_c} = \frac{N/mm^2}{\phi V_c} = \frac{N/mm^2}{\phi V_c} = \frac{N/mm^2}{\rho V_c} = \frac{N/mm^2}{\rho V_c}$	339 339 373 528 weight ▼ 0.75 0.35 INVALID 309 N/A 0.42	kN kN kN N/mm² 0.34 kN 0.94 mm²/mm	cl.21.2 cl.9.6.3. 5.1, cl.2 cl.9.6.3. cl.9.6.3.
Least of and Check V _d Check 0.0 Classical Control	2.5.5.1—Define $f(a)$, (b) , $f(a)$, (b) , $f(a)$,	tailed method V_c $\left(0.16\lambda\sqrt{f_c'} + 17\rho + 0.29\lambda\sqrt{f_c'} + 0.29\lambda\sqrt{f_c'} + 0.29\lambda\sqrt{f_c'}\right)$ $= \{1.00 \text{ NWO} + 1.00 \text{ NWO} + 0.200 \text{ NWO} + 0$	d for calculation $\frac{V_u d}{M_u}b_w d$ $\frac{V_u d}{M_u}b_w d$ $\frac{1}{f_c}b_w d$ nsidered. Ctor for she AX (0.35, 0) links (mirroity d/a _v .v _c .	(a) (b) (c) C} ear, φ = 0.062√f _c ' nor elen (b _w d) mal link mm² i.e	Note [Detain Note [Detain Note [Detain Note] Note	$\begin{aligned} &f_c \leq 70, \\ &led (a) \\ &f_c \leq 70, \\ &led (b) \\ &f_c \leq 70, \\ &led (c) \\ &f_c \leq 70, \\ &f_c \leq $	$\phi V_c = \frac{N/mm^2}{\phi V_c} = \frac{N/mm^2}{\phi V_c} = \frac{N/mm^2}{\phi V_c} = \frac{N/mm^2}{\rho V_c} = \frac{N/mm^2}{\rho V_c}$	339 339 373 528 weight ▼ 0.75 0.35 INVALID 309 N/A 0.42	kN kN kN N/mm ² 0.34 kN 0.94 mm ² /mm kN	cl.21.2 cl.9.6.3. 5.10.5, cl.
Least of and Check V _d Check 0.0 Class 2(3) cl.3.2.2(3)	2.5.5.1—Define $f(a)$, (b) , $f(a)$,	tailed method V_c $ \begin{pmatrix} 0.16\lambda\sqrt{f_c'} + 17\rho \\ 0.16\lambda\sqrt{f_c'} + 17\rho \\ 0.29\lambda\sqrt{f_c'} \\ 0.29\lambda\sqrt{f_c'}$	d for calculation of the control of	(a) (b) (c) C} ear, \$\phi\$ = 0.062√f _c ' nor elen (b _w d) mal link mm² i.e.	Note [Detain Note [Detain Note [Detain Note [Detain Note] Note Note Note Note Note Note Note Note Note Note Note Note Note Note Note Note Note Note	$\begin{aligned} &f_c \leq 70, \\ &led (a)] \\ &f_c \leq 70, \\ &led (b)] \\ &f_c \leq 70, \\ &led (c)] \\ &f_c \leq 70, \\ &led (c) \\ &led ($	$\phi V_c = \frac{N/mm^2}{\phi V_c} = \frac{N/mm^2}{\phi V_c} = \frac{N/mm^2}{\phi V_c} = \frac{N/mm^2}{N/mm^2}$ Normal	339 339 373 528 weight ▼ 0.75 0.35 INVALID 309 N/A 0.42 430 VALID	kN kN kN N/mm ² 0.34 kN 0.94 mm ² /mm kN	cl.21.2 5.5.1, cl.2 5.5.1, cl.2 5.5.1, cl.2 5.2.2, cl.2 cl.9.6.3. 5.5.1, cl. cl.9.6.3. 5.10.5, cl.
Least of and Check v _d (2(3) cl.3.2.2(3) Check v _d cl.3.2.2(3)	2.5.5.1—Define $f(a)$, (b), $f(a)$, (c): simultaneously with $f(a)$,	tailed method V_c $ \left(0.16\lambda \sqrt{f_c'} + 17\rho \right) $ $ \left(0.16\lambda $	d for calcular $\frac{V_u d}{M_u} b_w d$ $\frac{V_u d}{M_u} b_w d$ $\frac{17\rho_w}{b_w} b_w d$ $\frac{17\rho_w}{b_w} b_w d$ nsidered. C, 0.75 LWG Ctor for she AX (0.35, G) links (minimate of the city d/a _v .v _c . $\frac{1}{2} c_v for nomional of the city d/a_v.v_c$. $\frac{1}{2} c_v for nomional of the city d/a_v.v_c$. $\frac{1}{2} c_v for nomional of the city d/a_v.v_c$. $\frac{1}{2} c_v for nomional of the city d/a_v.v_c$. $\frac{1}{2} c_v for nomional of the city d/a_v.v_c$.	(a) (b) (c) C} ear, φ = 0.062√f _c nor elen (b _w d) mm² i.e. d) s a _v), f _{yv} ≤4	Note [Detain Note [Detain Note] Note Note Note N	$f_c \le 70$ $[ed (a)]$ $f_c \le 70$ $[ed (b)]$ $f_c \le 70$ $[ed (c)]$	$\phi V_c = \frac{N/mm^2}{\phi V_c} = \frac{N/mm^2}{\phi V_c} = \frac{N/mm^2}{\phi V_c} = \frac{N/mm^2}{N/mm^2}$ Normal 0.00	339 339 373 528 weight ▼ 0.75 0.35 INVALID 309 N/A 0.42 430 VALID 2.98	kN kN kN N/mm² 0.34 kN 0.94 mm²/mm kN 3.29 mm²/mm	cl.21.2 cl.9.6.3. 5.5.1, cl.2 cl.9.6.3. 5.5.1, cl.2
Least of and Least	2.5.5.1—Define $f(a)$, (b), $f(a)$, (c): simultaneously with $f(a)$,	tailed method V_c $ \begin{pmatrix} 0.16\lambda\sqrt{f_c'} + 17\rho \\ 0.16\lambda\sqrt{f_c'} + 17\rho \\ 0.29\lambda\sqrt{J_c'} \end{pmatrix} $ th V_u at the section concepts and the section formula of the section fo	d for calcular $\frac{V_u d}{M_u} b_w d$ $\frac{V_u d}{M_u} b_w d$ $\frac{17\rho_w}{b_w} b_w d$ $\frac{17\rho_w}{b_w} b_w d$ nsidered. C, 0.75 LWG Ctor for she AX (0.35, G) links (minimate of the city d/a _v .v _c . $\frac{1}{2} c_v for nomional of the city d/a_v.v_c$. $\frac{1}{2} c_v for nomional of the city d/a_v.v_c$. $\frac{1}{2} c_v for nomional of the city d/a_v.v_c$. $\frac{1}{2} c_v for nomional of the city d/a_v.v_c$. $\frac{1}{2} c_v for nomional of the city d/a_v.v_c$.	(a) (b) (c) C} ear, φ = 0.062√f _c nor elen (b _w d) mm² i.e. d) s a _v), f _{yv} ≤4	Note [Detain Note [Detain Note] Note Note Note N	$f_c \le 70$ $[ed (a)]$ $f_c \le 70$ $[ed (b)]$ $f_c \le 70$ $[ed (c)]$	$\phi V_c = \frac{N/mm^2}{\phi V_c} = \frac{N/mm^2}{\phi V_c} = \frac{N/mm^2}{\phi V_c} = \frac{N/mm^2}{\rho V_c} = N$	339 339 373 528 weight ▼ 0.75 0.35 INVALID 309 N/A 0.42 430 VALID 2.98	kN kN kN N/mm² 0.34 kN 0.94 mm²/mm kN 3.29 mm²/mm	cl.21.2 5.5.1, cl.2 5.5.1, cl.2 5.5.1, cl.2 5.2.2, cl.2 cl.9.6.3. 5.5.1, cl. cl.9.6.3. 5.10.5, cl. 1.22.5.10 5, cl.9.4.3
Least of and Leas	2.5.5.1—Define $f(a)$, (b) , $f(a)$, (b) , $f(c)$: simultaneously with $f(a)$, $f($	tailed method V_c $ \begin{pmatrix} 0.16\lambda\sqrt{f_c'} + 17\rho \\ 0.16\lambda\sqrt{f_c'} + 17\rho \\ 0.29\lambda\sqrt{J_c'} \end{pmatrix} $ th V_u at the section concepts and the section formula of the section fo	d for calcular $b_w \frac{V_u d}{M_u} b_w d$ $b_w \frac{V_u d}{M_u} b_w d$ $c_v $	cating V_c (a) (b) (c) C} ear, $\phi = 0.062\sqrt{f_c}$ nor elen (b _w d) mal link mm² i.e. d) sa _v), $f_{yv} \le 2$ St). $f_{yv} \le 4$	Note [Detain Note [Detain Note] Note Note Note N	$ f_{c} \leq 70.$ $ ed(a) $ $ f_{c} \leq 70.$ $ ed(b) $ $ f_{c} \leq 70.$ $ ed(c) $ $ f_{c} \leq 70.$ $ f_{$	$\phi V_c = \frac{N/mm^2}{\phi V_c} = \frac{N/mm^2}{\phi V_c} = \frac{N/mm^2}{\phi V_c} = \frac{N/mm^2}{\rho V_c} = N$	339 339 373 528 weight ▼ 0.75 0.35 INVALID 309 N/A 0.42 430 VALID 2.98 1217	kN kN kN N/mm² 0.34 kN 0.94 mm²/mm kN 3.29 mm²/mm	cl.21.2 5.5.1, cl.2 5.5.1, cl.2 5.5.1, cl.2 5.2.2, cl.2 cl.9.6.3. 5.5.1, cl. cl.9.6.3. 5.10.5, cl. 1.22.5.10 5, cl.9.4.3
Minimum Check v _d .2(6) Check 0.1 .2(3) cl.3.2.2(3 cl.3.2.2(3 Area prov	2.5.5.1—Define $f(a)$, (b) , $f(a)$, (b) , $f(c)$: simultaneously with $f(a)$, $f($	tailed method V_c	d for calcular $\frac{V_u d}{M_u} b_w d$ $\frac{V_u d}{M_u} b_w d$ $\frac{17\rho_w}{b_w} b_w d$ $\frac{17\rho_w}{b_w} b_w d$ nsidered. C, 0.75 LWG Ctor for she AX (0.35, G) Iinks (mirrority d/a _V .V _c . $\frac{1}{c}$ for nomion $\frac{1}{c}$ fyv ≤ 420 N/ $\frac{1}{c}$ $\frac{1}{c}$ for links $\frac{1}{c}$ $\frac{1}{c}$ for $\frac{1}{c}$ for $\frac{1}{c}$ $\frac{1}{c}$ for $\frac{1}{c}$ for $\frac{1}{c}$ $\frac{1}{c}$ for \frac	cating V_c (a) (b) (c) C} ear, $\phi = 0.062\sqrt{f_c}$ nor elen (b _w d) mal link mm² i.e. d) sa _v), $f_{yv} \le 2$ St). $f_{yv} \le 4$	Note [Detain Note [Detain Note] Note Note Note N	$ f_{c} \leq 70.$ $ ed(a) $ $ f_{c} \leq 70.$ $ ed(b) $ $ f_{c} \leq 70.$ $ ed(c) $ $ f_{c} \leq 70.$ $ f_{$	$\phi V_c = \frac{N/mm^2}{\phi V_c} = \frac{N/mm^2}{\phi V_c} = \frac{N/mm^2}{\phi V_c} = \frac{N/mm^2}{\rho V_c} = N$	339 339 373 528 weight ▼ 0.75 0.35 INVALID 309 N/A 0.42 430 VALID 2.98 1217	kN kN kN N/mm² 0.34 kN 0.94 mm²/mm kN 3.29 mm²/mm kN	cl.21.2 5.5.1, cl.2 5.5.1, cl.2 5.5.1, cl.2 5.2.2, cl.2 cl.9.6.3. 5.5.1, cl. cl.9.6.3. 5.10.5, cl. 1.22.5.10 5, cl.9.4.3
Minimum Check V _d .2(6) Check 0.1 .2(3) cl.3.2.2(3 cl.3.2.2(3 Area prov	2.5.5.1—Define $f(a)$, (b) , $f(a)$, (b) , $f(a)$,	tailed method V_c $ \begin{pmatrix} 0.16\lambda\sqrt{f_c'} + 17\rho \\ 0.16\lambda\sqrt{f_c'} + 17\rho \\ 0.29\lambda\sqrt{f_c'} \\ 0.29\lambda\sqrt{f_c'}$	d for calcular $\frac{V_u d}{M_u}b_w d$ $\frac{V_u d}{M_u}b_w d$ $\frac{17\rho_w)b_w d}{f_c^2b_w d}$ nsidered. C, 0.75 LWG Ctor for she AX (0.35, G) links (mirroity d/a _V .v _c . c for nomi $\frac{1}{N_v} \leq 420N/M_v + \frac{1}{N_v} \leq 420N/M_v $	cating V_c (a) (b) (c) C} ear, $\phi = 0.062\sqrt{f_c}$ nor elen (b _w d) mal link mm² i.e. d) sa _v), $f_{yv} \le 2$ St). $f_{yv} \le 4$	Note [Detain Note [Detain Note] Note Note Note N	$ f_{c} \leq 70.$ $ ed(a) $ $ f_{c} \leq 70.$ $ ed(b) $ $ f_{c} \leq 70.$ $ ed(c) $ $ f_{c} \leq 70.$ $ f_{$	$\phi V_c = \frac{N/mm^2}{\phi V_c} = \frac{N/mm^2}{\phi V_c} = \frac{N/mm^2}{\phi V_c} = \frac{N/mm^2}{\rho V_c} = N$	339 339 373 528 weight ▼ 0.75 0.35 INVALID 309 N/A 0.42 430 VALID 2.98 1217	kN kN kN kN N/mm² 0.34 kN 0.94 mm²/mm kN 3.29 mm²/mm kN	cl.21.2 5.5.1, cl.2 5.5.1, cl.2 5.5.1, cl.2 5.2.2, cl.2 cl.9.6.3. 5.5.1, cl. cl.9.6.3. 5.10.5, cl. 1.22.5.10 5, cl.9.4.3
Least of and Minimum Check v _d .2(6) Check 0.1 .2(3)	2.5.5.1—Define $f(a)$, (b) , $f(a)$, (b) , $f(c)$: simultaneously with $f(a)$, $f($	tailed method V_c	d for calculation $\frac{V_u d}{M_u} b_w d$ $\frac{V_u d}{M_u} b_w d$ $\frac{V_u d}{M_u} b_w d$ $\frac{17\rho_w}{b_w} b_w d$ $\frac{17\rho_w}{b_w} b_w d$ notice $\frac{1}{c} b_w d$ and $\frac{1}{c} b_w d$ notice $\frac{1}{c} b_w d$ and $\frac{1}{c} b_w d$ C, 0.75 LWG Ctor for she AX (0.35, G) Inks (mirror of the control	cating V_c (a) (b) (c) C} ear, $\phi = 0.062\sqrt{f_c}$ nor elen (b _w d) mal link mm² i.e d) s St.).f _{yv} .d section,	Note [Detain Note [Detain Note] Note [Detain Note] Note Not	$ f_{c} \le 70.$ $ ed(a) $ $ f_{c} \le 70.$ $ ed(b) $ $ f_{c} \le 70.$ $ ed(c) $ $ f_{c} \le 70.$ $ f_{$	$\phi V_c = \frac{N/mm^2}{\phi V_c}$ $\phi V_c = \frac{N/mm^2}{\phi V_c}$ $\phi V_c = \frac{N/mm^2}{\phi V_c}$ N/mm^2 $Normal$ 0.00 0.94 $N/S > \frac{1}{2}$ $V/S > \frac{1}{2}$	339 339 373 528 weight ▼ 0.75 0.35 INVALID 309 N/A 0.42 430 VALID 2.98 1217 314 3.14 96%	kN kN kN kN N/mm² 0.34 kN 0.94 mm²/mm kN 3.29 mm²/mm kN mm² mm²/mm	cl.21.2 5.5.1, cl.2 5.5.1, cl.2 5.5.1, cl.2 5.2.2, cl.2 cl.9.6.3. 5.5.1, cl. cl.9.6.3. 5.10.5, cl. 1.22.5.10 5, cl.9.4.3 1.20.5.3,
Least of and limiting and limit	2.5.5.1—Define $f(a)$, (b) , $f(a)$, (b) , $f(c)$: simultaneously with $f(a)$, $f($	tailed method V_c $ (0.16\lambda\sqrt{f_c'} + 17\rho + 1$	d for calcular $\frac{V_u d}{M_u}b_w d$ $\frac{V_u d}{M_u}b_w d$ $\frac{17\rho_w)b_w d}{f_c^*b_w d}$ nsidered. C, 0.75 LWG Ctor for she AX (0.35, G) links (minimate of the content of the conten	(a) (b) (c) (c) (a) (b) (c) (c) (d) (e) (d) (e) (e) (f _c) (hor elen (b _w d) (hor e	Note [Detain Note [Detain Note [Detain Note] Note [Detain Note] Note] Note 0.75), $f_c \leq 70N$ nents) s . $(A_{sv}/S)_{no}$ 420N/mm + $d/a_v \cdot v_c$. $A_{sv,prov} + A$ beams of	$\begin{array}{c c} f_c ' \leq 70. \\ led (a)] \\ f_c ' \leq 70. \\ led (b)] \\ f_c ' \leq 70. \\ led (c)] \\ f_c ' \leq 70. \\ \\ l/mm^2 \\ \\ l/mm^2 \\ \\ \\ l/mm^2 \\ \\ \\ \\ l/mm^2 \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\$	$\phi V_c = \frac{N/mm^2}{\phi V_c} = \frac{N/mm^2}{\phi V_c} = \frac{N/mm^2}{\phi V_c} = \frac{N/mm^2}{N/mm^2} =$	339 339 373 528 weight ▼ 0.75 0.35 INVALID 309 N/A 0.42 430 VALID 2.98 1217 314 3.14 96% ortance, it refered	kN kN kN kN N/mm² 0.34 kN 0.94 mm²/mm kN mm²/mm kN	cl.21.2 5.5.1, cl.2 5.5.1, cl.2 5.5.1, cl.2 5.2.2, cl.2 cl.9.6.3. 5.5.1, cl. cl.9.6.3. 5.10.5, cl. 1.22.5.10 5, cl.9.4.3 1.20.5.3,
Least of and Least of Least of and Least of Least of and	2.5.5.1—Define $f(a)$, (b) , $f(a)$, (b) , $f(a)$,	tailed method V_c	d for calculation $\frac{V_u d}{M_u}b_w d$ $\frac{V_u d}{M_u}b_w d$ $\frac{17\rho_w}{b_w} b_w d$ $\frac{17\rho_w}{b_w} b_w d$ ctor for she has (0.35, 0) links (minimal for nominative for	(a)	Note [Detain Note [Detain Note [Detain Note [Detain Note]] Note [Detain Note] Note [Note] Note [N	$\begin{array}{c c} f_c ' \leq 70. \\ led (a)] \\ f_c ' \leq 70. \\ led (b)] \\ f_c ' \leq 70. \\ led (c)] \\ f_c ' \leq 70. \\ \\ l/mm^2 \\ \\ l/mm^2 \\ \\ \\ l/mm^2 \\ \\ \\ \\ l/mm^2 \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\$	$\phi V_c = \frac{N/mm^2}{\phi V_c} = \frac{N/mm^2}{\phi V_c} = \frac{N/mm^2}{\phi V_c} = \frac{N/mm^2}{N/mm^2} =$	339 339 373 528 weight ▼ 0.75 0.35 INVALID 309 N/A 0.42 430 VALID 2.98 1217 314 3.14 96% ortance, it refered	kN kN kN kN N/mm² 0.34 kN 0.94 mm²/mm kN mm²/mm kN	cl.21.2 5.5.1, cl.2 5.5.1, cl.2 5.5.1, cl.2 5.2.2, cl.2 cl.9.6.3. 5.5.1, cl. cl.9.6.3. 5.10.5, cl. 1.22.5.10 5, cl.9.4.3 1.20.5.3,

						Job No.	Sheet No.		Rev.
		Engineerin		on Sheet				<i>c</i>	_
ENGI	NEERS	Consulting	Liigineers			jXXX	¹	.6	
						Member/Location			
Job Title	Member D	esign - Reir	nforced Cor	ncrete Bean	n BS8110,	Drg. Ref.			
Member D	esign - RC	Beam				Made by XX	Date 1	6/1/2024	Chd.
									BS8110-2
Torsion R	Rectangula	ır Beam (B	S8110)						
Note that	this design	check is pe	rformed fo	r both recta	angular and	flanged se	ections, ado	pting	
rectangula	r section e	quations in	the case of	f flanged se	ections;				
		ectangular					1000		
		rectangular	r section, h	$_{\min} = MIN$ ((h, b _w)			mm	
	sion mome		2		0.5			kNm	
Design tor	sion stress,	$v_t = 2T/((l)$	h _{min} ²)(h _{max} -	·h _{min} /3)) (<	0.8f _{cu} 0.5 &	{5.0,7.0}N	0.00	N/mm ²	cl.2.4.4.1
				5.0,7.0}N/	mm²}			N/mm ²	.3.4.5.2 B
Design ult	imate torsio	on stress ut	ilisation				0%		OK
Cl l									10.16
Cneck V _t		no torsior		NATNI (O	6 0 067/6		VALID	2	cl.2.4.6
	Concrete t	orsion resis	tance, v _{t.mi}	= MIN (0)	.o, U.U6/√f	_{cu}), r _{cu} ≤ 80 I	0.40	N/mm ²	cl.2.3 BC2
Chasky			valam limbra				NI / A		-1246
CHECK Vt		design to			- 2 v covo	 r _ d	N/A	mm	cl.2.4.6
		dimension of						mm	
								mm²/mm	17 Forou
	1	rsion links <i>A</i> rsion longitu			ارز _{وی} ا	<u> </u>		mm ²	4.7, Forev 4.7, Forev
		ire $A_{s,t} > (A_s)$			\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	50N/mm ²			
Area nrovi		orsion links				, DON/IIIII		mm²	.4.7, FOIE
	$r_{ov,t}/S_t$ value		111 d C1033	Section, As	sv,prov,t			mm²/mm	
		nce utilisati	ion				0.00	-	ОК
Design to	1011 1031310	Thee acmount	1011				0 70		OI.
Combine	l d Shear an	nd Torsion	Rectangu	lar Ream ((BS8110)				
		check is pe			=	⊥ I flanged se	ctions, ado	ntina	
		quations in				mangea ee		<i>p g</i>	
.5.3.1									
	hear and to	orsion stress	ses v+ v.	(< 0.8f _{cu} ^{0.}	.5 & {5.0.7.	 0	2.55	N/mm ²	cl.2.4.5
Ultimate s	hear and to	orsion streng	gth, MIN{0	0.8f _{cu} ^{0.5} & {	5.0,7.0}N/i	mm ² }		N/mm ²	3.4.5.2 B
		orsion stress					54%		ОК
.5.3.1									
Check de	sign shear	r and torsic	on links						
		ngle torsion		A _{sv} /S/(n _{lea} +	$+n_{lea,t}) + A_s$	v.t/St/n _{lea.t}	0.34	mm²/mm	
			-						
Area provi	ded by sing	le torsion li	nk leg, A _{sv}	, _{prov,t} /n _{leg,t}			0	mm ²	
	$r_{ov,t}/n_{leg,t}/S_t$, , , -9/-				mm²/mm	
		sion resistar	nce utilisati	ion			0%	·	ОК
4.3.2									
2.5.3.3									
9.4.3.2, cl	.22.5.3.3								
, cl.22.5.3	.3								
9.4.3.2, cl	.22.5.3.3								

4						Job No.	Sheet No.		Rev.
		Engineerin		on Sheet				_	
ENGI	NEERS	Consulting	Engineers			jXXX	1	.7	
						Member/Location	n		1
Job Title	Member D	esign - Reir	nforced Cor	ncrete Bean	n BS8110,	Drg. Ref.	'		
Member D	esign - RC	Beam				Made by XX	Date 10	6/1/2024	Chd.
									<u>EC2</u>
Torsion R	lectangula	r Beam (E	C2)						
Note that	this design	check is pe	rformed for	r both recta	angular and	flanged se	ections, ado	pting	
rectangula	ar section ed	quations in	the case of	f flanged se	ections;				
Larger dim	nension of r	ectangular	section, h _m	$_{\text{nax}} = MAX$ (h, b _w)		1000	mm	
Smaller di	mension of	rectangular	r section, h	$_{min} = MIN $ ((h, b _w)		500	mm	
Design tor	sion mome	nt, T _d					0	kNm	
Design tor	sion stress,	$v_t = T_d/(t_{ef})$	_f .2A _k)				0.00	N/mm ²	MOSLEY
Ultimate to	orsion mom	nent capacit	y, T _{Rd,max(θ=}	_{-45°)} =1.33ν ₁	$_{\rm L}.f_{\rm ck}.t_{\rm ef}.A_{\rm k}/($	$cot\theta+tan\theta$)	459	kNm	2(4), cl.3.
Design ulti	imate torsio	on moment	capacity ut	tilisation			0%		ОК
Check T _d	$< T_{Rd,c}$ for	no torsion	ı links				VALID		
	Concrete t	orsion resis	stance, T _{Rd,o}	$= f_{ctd}.t_{ef}.2$	A _k , f _{ck} ≤50N	l/mm²	120	kNm	
				$\alpha_{ct}=1.0$, γ_c			$=0.30f_{\rm ck}^{-2/3}$		cl.3.1.6
Check T _d	$> T_{Rd,c}$ for	design to	rsion links	<u> </u>			N/A		
	Effective w	vall thicknes	ss, $\overline{t_{ef}} = (b_v)$	$_{\rm v}$.h)/[2 .($b_{\rm w}$ -	+h)]		167	mm	cl.6.3.2(1)
	Area enclo	sed, $A_k = ($	b _w -t _{ef}).(h-t	_{ef})			277778	mm ²	cl.6.3.2(1)
ord	Provide to	rsion links A	$A_{sv,t}/S_t > T_d$	$_{\rm l}/({\rm A_k}.(0.87{\rm f})$	c_{yv}). $\cot\theta$), f_v	_{/v} ≤600N/m	0.00	mm²/mm	MOSLEY
ord		rsion longitu						mm ²	cl.6.3.2(3)
ord					87f _v), u _k =	$=2.(b_w + h-$	$2t_{ef}$), $f_y \leq 6$		
Area provi		orsion links						mm ²	
Tried A _{sv,pr}	_{rov,t} /S _t value	و					0.00	mm²/mm	
		nce utilisati	ion				0%	,	ОК
							_		
Combined	d Shear an	d Torsion	Rectangu	lar Beam ((EC2)				
					= = =	flanged se	ections, ado	pting	
		quations in						,	
Ultimate s	hear and to	orsion V _d /V _R	d max(θ=45°) -	+ T _d /T _{Rd max}	(θ=45°) (≤ 1.	.00)	0.57		cl.6.3.2(4)
	hear and to				(0-45)	Τ΄	1.00		
							1,00		CI.b.3.2(4)
Olcilliace 5	hear and to		ation						cl.6.3.2(4)
_	hear and to	orsion utilisa 	ation				57%		OK
Check de		orsion utilisa							
Check de	sign shear	orsion utilisa r and torsio	on links		-n _{log t}) + A ₀	yy t/St/Nigg t	57%	mm²/mm	
Check de	sign shear	orsion utilisa	on links		$-n_{\text{leg,t}}$) + A _s	v,t/St/n _{leg,t}	57%	mm²/mm	
	sign shear Provide sir	orsion utilisa r and torsi ngle torsion	on links link leg > .	A _{sv} /S/(n _{leg} +	-n _{leg,t}) + A _s	$v_{t}/S_{t}/n_{leg,t}$	0.22		
Area provi	sign shear Provide sir ided by sing	r and torsion utilisate and torsion utilisate torsion lies torsion lies torsion lies torsion lies are also and to the lies are also are al	on links link leg > .	A _{sv} /S/(n _{leg} +	$-n_{\text{leg,t}}$) + A _s	$n_{v,t}/S_t/n_{leg,t}$	57% 0.22	mm ²	
Area provi Tried A _{sv,pr}	sign shear Provide sin ided by sing prov,t/n _{leg,t} /S _t	r and torsion utilisate of the second	on links link leg > , ink leg, A _{sv,}	A _{sv} /S/(n _{leg} +	$-n_{\text{leg,t}}$) + A _s	$_{\text{iv,t}}/S_{\text{t}}/n_{\text{leg,t}}$	0.22 0 0.00	mm ² mm ² /mm	ОК
Area provi Tried A _{sv,pr}	sign shear Provide sin ided by sing prov,t/n _{leg,t} /S _t	r and torsion utilisate and torsion utilisate torsion lies torsion lies torsion lies torsion lies are also and to the lies are also are al	on links link leg > , ink leg, A _{sv,}	A _{sv} /S/(n _{leg} +	-n _{leg,t}) + A _s	_{vv,t} /S _t /n _{leg,t}	57% 0.22	mm ² mm ² /mm	
Area provi Tried A _{sv,pr}	sign shear Provide sin ided by sing prov,t/n _{leg,t} /S _t	r and torsion utilisate of the second	on links link leg > , ink leg, A _{sv,}	A _{sv} /S/(n _{leg} +	$-n_{\text{leg,t}}$) + A_{s}	_{tv,t} /S _t /n _{leg,t}	0.22 0 0.00	mm ² mm ² /mm	ОК
Area provi Tried A _{sv,pr}	sign shear Provide sin ided by sing prov,t/n _{leg,t} /S _t	r and torsion utilisate of the second	on links link leg > , ink leg, A _{sv,}	A _{sv} /S/(n _{leg} +	-n _{leg,t}) + A _s	_{v,t} /S _t /n _{leg,t}	0.22 0 0.00	mm ² mm ² /mm	ОК
Area provi Tried A _{sv,pr}	sign shear Provide sin ided by sing prov,t/n _{leg,t} /S _t	r and torsion utilisate of the second	on links link leg > , ink leg, A _{sv,}	A _{sv} /S/(n _{leg} +	-n _{leg,t}) + A _s	v,t/St/n _{leg,t}	0.22 0 0.00	mm ² mm ² /mm	ОК
Area provi Tried A _{sv,pr}	sign shear Provide sin ided by sing prov,t/n _{leg,t} /S _t	r and torsion utilisate of the second	on links link leg > , ink leg, A _{sv,}	A _{sv} /S/(n _{leg} +	-n _{leg,t}) + A _s	_{tv,t} /S _t /n _{leg,t}	0.22 0 0.00	mm ² mm ² /mm	ОК
Area provi Tried A _{sv,pr}	sign shear Provide sin ided by sing prov,t/n _{leg,t} /S _t	r and torsion utilisate of the second	on links link leg > , ink leg, A _{sv,}	A _{sv} /S/(n _{leg} +	-n _{leg,t}) + A _s	v,t/St/n _{leg,t}	0.22 0 0.00	mm ² mm ² /mm	ОК
Area provi Tried A _{sv,pr}	sign shear Provide sin ided by sing prov,t/n _{leg,t} /S _t	r and torsion utilisate of the second	on links link leg > , ink leg, A _{sv,}	A _{sv} /S/(n _{leg} +	-n _{leg,t}) + A _s	v,t/St/n _{leg,t}	0.22 0 0.00	mm ² mm ² /mm	OK
Area provi Tried A _{sv,pr}	sign shear Provide sin ided by sing prov,t/n _{leg,t} /S _t	r and torsion utilisate of the second	on links link leg > , ink leg, A _{sv,}	A _{sv} /S/(n _{leg} +	-n _{leg,t}) + A _s	_{v,t} /S _t /n _{leg,t}	0.22 0 0.00	mm ² mm ² /mm	ОК
Area provi Tried A _{sv,pr}	sign shear Provide sin ided by sing prov,t/n _{leg,t} /S _t	r and torsion utilisate of the second	on links link leg > , ink leg, A _{sv,}	A _{sv} /S/(n _{leg} +	-n _{leg,t}) + A _s	v,t/St/n _{leg,t}	0.22 0 0.00	mm ² mm ² /mm	ОК
Area provi Tried A _{sv,pr}	sign shear Provide sin ided by sing prov,t/n _{leg,t} /S _t	r and torsion utilisate of the second	on links link leg > , ink leg, A _{sv,}	A _{sv} /S/(n _{leg} +	-n _{leg,t}) + A _s	v,t/St/n _{leg,t}	0.22 0 0.00	mm ² mm ² /mm	ОК
Area provi Tried A _{sv,pr}	sign shear Provide sin ided by sing prov,t/n _{leg,t} /S _t	r and torsion utilisate of the second	on links link leg > , ink leg, A _{sv,}	A _{sv} /S/(n _{leg} +	-n _{leg,t}) + A _s	_{vv,t} /S _t /n _{leg,t}	0.22 0 0.00	mm ² mm ² /mm	ОК
Area provi Tried A _{sv,pr}	sign shear Provide sin ided by sing prov,t/n _{leg,t} /S _t	r and torsion utilisate of the second	on links link leg > , ink leg, A _{sv,}	A _{sv} /S/(n _{leg} +	-n _{leg,t}) + A _s	v,t/St/n _{leg,t}	0.22 0 0.00	mm ² mm ² /mm	ОК
Area provi Tried A _{sv,pr}	sign shear Provide sin ided by sing prov,t/n _{leg,t} /S _t	r and torsion utilisate of the second	on links link leg > , ink leg, A _{sv,}	A _{sv} /S/(n _{leg} +	-n _{leg,t}) + A _s	v,t/St/n _{leg,t}	0.22 0 0.00	mm ² mm ² /mm	ОК
Area provi Tried A _{sv,pr}	sign shear Provide sin ided by sing prov,t/n _{leg,t} /S _t	r and torsion utilisate of the second	on links link leg > , ink leg, A _{sv,}	A _{sv} /S/(n _{leg} +	-n _{leg,t}) + A _s	v,t/St/n _{leg,t}	0.22 0 0.00	mm ² mm ² /mm	ОК
Area provi Tried A _{sv,pr}	sign shear Provide sin ided by sing prov,t/n _{leg,t} /S _t	r and torsion utilisate of the second	on links link leg > , ink leg, A _{sv,}	A _{sv} /S/(n _{leg} +	-n _{leg,t}) + A _s	_{w,t} /S _t /n _{leg,t}	0.22 0 0.00	mm ² mm ² /mm	ОК
Area provi Tried A _{sv,pr}	sign shear Provide sin ided by sing prov,t/n _{leg,t} /S _t	r and torsion utilisate of the second	on links link leg > , ink leg, A _{sv,}	A _{sv} /S/(n _{leg} +	-n _{leg,t}) + A _s	w,t/St/n _{leg,t}	0.22 0 0.00	mm ² mm ² /mm	ОК
Area provi Tried A _{sv,pr}	sign shear Provide sin ided by sing prov,t/n _{leg,t} /S _t	r and torsion utilisate of the second	on links link leg > , ink leg, A _{sv,}	A _{sv} /S/(n _{leg} +	-n _{leg,t}) + A _s	v,t/St/n _{leg,t}	0.22 0 0.00	mm ² mm ² /mm	ОК
Area provi Tried A _{sv,pr}	sign shear Provide sin ided by sing prov,t/n _{leg,t} /S _t	r and torsion utilisate of the second	on links link leg > , ink leg, A _{sv,}	A _{sv} /S/(n _{leg} +	-n _{leg,t}) + A _s	v,t/St/n _{leg,t}	0.22 0 0.00	mm ² mm ² /mm	ОК

GON						Job No.	Sheet No.		Rev.
		Engineerin Consulting		on Sheet				8	
ENGI	NEEKS	Consulting	Liigineers			jXXX	1	.0	
						Member/Location			
Job Title	Member D	esign - Reir	nforced Cor	ncrete Bear	n BS8110,	Drg. Ref.			
Member D	esign - RC	Beam				Made by XX	Date 1	6/1/2024	Chd.
									<u>ACI318</u>
		r Beam (A							
Note that	this design	check is pe	rformed fo	r both recta	angular and	flanged se	ctions, ado	pting	
rectangula	ar section e	quations in	the case of	f flanged se	ections;				
		ectangular		-			1000		
		rectangula	r section, h	$n_{\min} = MIN$ ((h, b _w)			mm	
	rsion mome							kNm	
		$v_{t} = T^{*}.2.0$						N/mm ²	cl.22.7.7.1
		ngth, φ(0.66		(0.75, 10)	f _c '≤70N/mn	n ⁻		N/mm ²	cl.22.5.5.1
Design ulti	imate torsio	on stress ut	ilisation				0%		OK
Chl- T	1 IT 6		!! !				\/A!		
спеск і <		o torsion		10.0024	/6 L (I- I-	2/12 //-	VALID	LaNian	7.4.41.22
	Concrete t	orsion resis						kNm	7.4.1, cl.22
Chack T	 AT			C, 0.75 LW	L }	Normal	weight ▼		
CHECK I >		esign tors		nk v - h	- 2 4 6040	r - h	N/A	mm	
		dimension mension of					+	mm	-
		rsion links <i>A</i>						mm mm²/mm	cl.22.7.6.1
		rsion longiti			/ ₁ .ι _{yv}), φ=υ.	75, 8=40-,		mm ²	7.6.1, cl.9
					V) > A	f < 420			
Area provi	ided by all t	ire A _{s,t} > (A corsion links	$\frac{1}{sv,t}/\frac{3}{t}/(1)$	_{/v} /I _y)(X ₁ + -section A	y ₁) > A _{I,mi}	n, 1 _y ≥4201 	N/111111 , 1 _{yv}		/.0.1, Cl.9
	rov,t/St value		111 4 61033	Section, As	sv,prov,t			mm²/mm	
		nce utilisat	ion				0.00	1111111 /1111111	ОК
Design to	31011 1 € 31316	ince utilisat	1011				0 70		OK
Combine	d Shear an	d Torsion	Rectangu	lar Ream ((ACT318)				
		check is pe				∣ I flanged se	ctions ado	ntina	
		quations in				Harigea se		pang	
rectungula	T Section et		the case of	nangea se					
Ultimate s	hear and to	rsion stress	ses [v² +	v. ² 1 ^{1/2} (< d	(0.66+0.17	<u> </u> 7λ)√f'	2.55	N/mm ²	cl.22.7.7.1
		rsion stren						N/mm ²	5.5.1, cl.22
		rsion stress			γ σινση ι		77%	-	OK
Oreninace 5		101011 001 000	Jes atmout						<u> </u>
Check de	sian shear	and torsic	on links						
		ngle torsion		A _{sv} /S/(n _{lea} +	$+n_{leq,t}) + A_s$	$\frac{1}{\sqrt{t}}/S_t/n_{leg.t}$	0.50	mm²/mm	
		ngle torsion						mm²/mm	cl.9.6.4.2
Area provi		le torsion li				- w yv yv		mm ²	
	rov,t/n _{leg,t} /S _t		3, 30	,prov,o ieg,c				mm²/mm	
Design she			nce utilisati	ion					ОК
	ear and tors	sion resistaı					0%		
	ear and tors	sion resistai	Tree atmour				0%		
	ear and tors	sion resista	The dimse				0%		
	ear and tors	sion resista	The demode				0%		
	ear and tors	sion resistar	The defination				0%		
	ear and tors	sion resista	The demode				0%		
	ear and tors	sion resista					0%		
	ear and tors	sion resista	Tee dimsu.				0%		
	ear and tors	sion resista					0%		
	ear and tors	sion resista					0%		
	ear and tors	sion resista					0%		
	ear and tors	sion resista					0%		
	ear and tors	sion resista					0%		
	ear and tors	sion resista					0%		
	ear and tors	sion resista					0%		
	ear and tors	sion resista					0%		
	ear and tors	sion resista					0%		
	ear and tors	sion resista					0%		
	ear and tors	sion resista					0%		

CON	SULTING	Enginoorin	a Calculatio	on Choot		Job No.	Sheet No.		Rev.
	NEERS			JII SHEEL		jXXX	1	.9	
						Member/Location			
Job Title	Member D	 esian - Reir	forced Cor	ncrete Beam	BS8110	Drg. Ref.			
	esign - RC		moreca cor	icrete Bear	1 000110,	Made by XX	Date 1	6/1/2024	1 Chd.
									BS8110
Detailing	Requirem	ents Recta	angular or	Flanged E	Beam				
All detailin	g requirem	ents met ?					OK		
Min tensio	n steel rein	forcement (diameter #	 _t (>=12mm	<u> </u>		32	mm	OK
								mm	OK
						_{k,t})–φ _t)/(n _t /r		mm	ОК
Note that i	max pitch a	assumes no	moment re	edistributio	n in beam,	if less than	20% mom	ent	
redistribut	ion then pit	ch to be le	ss than 175	5mm for G2	50 and les	s than 150r	nm for G46	50;	
Min somen	ession stoo	Lucinfoucon	nant diama	ton 1 (>)	12		NI/A		NI / A
				ter, ϕ_c (>=:		 X(φ _{link} ,φ _{link,t}		mm mm	N/A N/A
				$(b_w \text{ or } b-2.6)$				mm	N/A
						STHIR THIR,	,		
	link diamet						10	mm	OK
	n link diame							mm	N/A
						nm, 50+12.		mm	OK
				=300mm, > G460; >0		0mm, 50+1	N/A 0.63	mm	N/A OK
	$(S_{w},S) + A_{sv,p}$ $(S_{w},S) + A_{sv,p}$.17 /0 0230		0.63		OK
• • • • • • • • • • • • • • • • • • • •	.,				uditional res	training linl			_
\ \	pattern which o	overlaps links a	s shown below	v should not be	used.				
				on using 'L' hook cking link is also		th of			
124			75 minim						
	wn below.	a for forsion the b	ы зпаре ээ snou	ld be used to desc	ence the shape				
Note lacer	bars of 16i	mm are req	uired at th	e sides of b	eams more	than 750r	nm deep at	250mm p	pitch;



CON	SULTING	Enginos	ring Cal	sulation	n Shoot			Job N	lo.	Sheet N	0.		Rev.
	NEERS	_	_		1 Sheet	L		jΧ	ΧX		21		
								Member/	Location				
Job Title	Member D	esign - R	einforce	d Conc	rete Be	eam BS81	10, 1	Drg. Ref.		1			
Member D	esign - RC	Beam						Made by	XX	Date	16/1	/2024	Chd.
													BS8110
Span										10.0	00 m		
Span / eff	ective depth	ratio								10	.9		
	n / effective		atio crite	ria						26			-12.46.5
Multiplier	C _{1,rect or flange} C _{1,span more or}	d				Include			_	1.	00		cl.3.4.6.3
Modification	on factor for	tension	$\frac{m_{-} }{C_{2}}$			melade							C1.5.4.0.4
	M/(b _w or b									4.	40 N/r	nm²	cl.3.4.6.2
	$f_{z} = \frac{2f_{y}A_{z}}{3A_{z}}$	$\frac{1}{\rho_{\text{rov}}} \times \frac{1}{\beta_{\text{b}}}$								2	87 N/r	nm²	
			400	<i>4</i>)		7							
	Modificatio	0.55 t	$+\frac{(477)}{120(0.9)}$	-15) M`	_ ≤ 2.0					0.8	35		T.3.10
			120 (0.8	bd^2)	<u> </u>							110120
Modification	on factor for												
	100A _{s,prov} '/	((b _w or b)).d							N	/A		cl.3.4.6.2
	Modificatio	<u> </u>	100A', pro	v.(100A',	<u>prov</u>) ≤ 1.5	\vdash			1.0	00		T.3.11
	Modificatio	1+-	bd	-/(3+	bd) ≤ 1.5					50		1.3.11
Modified s	pan / effect	ive depth	h ratio c	riteria						22	.11		
Deflection	utilisation									49	%		ОК
		Table 3.1	0 — Mod	ificatio	n facto	r for tensio	n ro	inforc	omon	•		\neg	
Se	rvice stress	1 4010 0.1		incatio	n nacto	M/bd ²	1110	more	cincin			٦⊢	
$\dashv dash$	100	0.50 2.00	0.75 2.00	1.00 2.00	1.5	0 2.00 1.63	1.36	6 1	4.00	5.00 1.08	1.01	╛	
	150	2.00	2.00	1.98	1.69	1.49	1.23		.11	1.01	0.94		
(f _y = 2	250) 167	2.00	2.00	1.91	1.63	1.44	1.21	- 1	.08	0.99	0.92		
	200 250	2.00 1.90	1.95 1.70	1.76 1.55	1.51	1.35	1.14		.02	0.94	0.88 0.82		
	300	1.60	1.44	1.33	1.16	1.06	0.98		.85	0.80	0.76		
	460) 307	1.56	1.41	1.30	1,14	1.04	0.93	1 0	.84	0.79	0.76		
	dification factor =												
		120	$\left(0.9 + \frac{M}{bd^2}\right)$								equatio	n 7	
where				- C 12	6								
	s the design ultin 2 The design so			-					om the	equation:			
f _a :	$= \frac{2f_3A_{s \text{ roq}}}{3A_{s \text{ prov}}} \times \frac{1}{\beta_b}$										equatio	n 8	
NOTE	3 For a continu	ous beam, if									nid-span	is	
000300	isly the same as o	e greater tha	n the clastic	utumate	moment, t	ne stress j _a m t	nis tai	Die may	эе тике	1 iis 2/3/y.		<u> </u>	
⊢_	Ta			cation f	factor f	or compres	sion			ent		_ ⊢	
		$100 \frac{A'_{sp}}{bd}$	irov.					F	actor			┈	
0.00						1.00						╗	
0.00						1.05 1.08							
0.00 0.15 0.25						1.10							
0.15 0.25 0.35						1,14							
0.15 0.25 0.35 0.50						1.20							
0.15 0.25 0.35 0.50 0.75 1.0						1.25							
0.15 0.25 0.35 0.50 0.75 1.0						1,25 1,33							
0.15 0.25 0.35 0.50 0.75 1.0 1.5 2.0						1,25 1,33 1,40							
0.15 0.25 0.35 0.50 0.75 1.0						1.25 1.33 1.40 1.45 1.50							
0.15 0.25 0.35 0.50 0.75 1.0 1.5 2.0 2.5 ≥ 3.0 NOTE	1 The values in				lowing eq	1.25 1.33 1.40 1.45 1.50 mation:							
0.15 0.25 0.35 0.50 0.75 1.0 1.5 2.0 2.5 ≥ 3.0 NOTE	1 The values in				lowing eq	1.25 1.33 1.40 1.45 1.50 mation:	prov) :	≤ 1.5			equati	on 9	
0.15 0.25 0.35 0.50 0.75 1.0 1.5 2.0 2.5 ≥ 3.0 NOTE Modifi		compression :	reinforcemen	it = 1 + -	lowing equipment of the second	1.25 1.33 1.40 1.45 1.50 tation: $\sqrt{(3 + \frac{100A'_s}{bd})}$			compres	sion zone, ev	-	Ⅱ	

	Jala Na	Chart Na		Davi
CONSULTING Engineering Calculation Sheet	Job No.	Sheet No.		Rev.
ENGINEERS Consulting Engineers	jXXX	2	2	
	Member/Location			
Job Title Member Design - Reinforced Concrete Beam BS8110,	Drg. Ref.	Data		Ch d
Member Design - RC Beam	Made by XX	Date 10	5/1/2024	
				<u>BS8110</u>
Crack Width Estimation Rectangular Beam				
Note that this design check is performed for both rectangular and	flanged se	ctions, ado	pting	
rectangular section equations in the case of flanged sections;				
Maximum crack width criteria, Standard concrete BS8110 (0.30mm)	▼	0.30	mm	
Load factor, LF = 1.4 conservatively		1.4		
SLS bending moment, M _{sls} = M / LF		1321	kNm	
SLS axial force (tension +ve and compression -ve), $F_{sls} = -F / LF$		0	kN	
Uncracked elastic modulus, $E_{uncracked} = 20 + 0.2f_{cu}$		27	GPa	
Cracked elastic modulus, $E_{cracked} = E_{uncracked} / 2$		14	GPa	
Steel elastic modulus, E _s		200	GPa	
Modulus ratio, $\alpha_e = E_s / E_{cracked}$		14.8		
Reinforcement ratio, $\rho_w = A_{s,prov}/b_w d$		0.01		
Factor, α_{e} . ρ_{w}		0.21		
Depth of neutral axis, $x = \alpha_e \cdot \rho_w \cdot [(1+2/(\alpha_e \rho_w))^{1/2} - 1].d$		431	mm	
Lever arm, $z = d-x/3$		773	mm	
Steel tensile service stress (flexural), $f_{s1} = M_{sls}/z / A_{s,prov}$		265	N/mm ²	
Steel tensile (tensile +ve and compressive -ve) service stress (ax	ial), f _{s2}		N/mm ²	
Note if $F_{sls} > 0$, $f_{s2} = F_{sls}/(A_{s,prov} + A_{s,prov}')$,			,	
else $f_{s2} = \alpha_e.(A_{s,prov} + A_{s,prov}')/[\alpha_e.(A_{s,prov} + A_{s,prov}') + (b_w.h-A_{s,prov}')]$	rov -A _{s.prov} ')	$].F_{sls}/(A_{s.pl})$	$f_{ov} + A_{s,prov}'$);
Steel tensile service stress utilisation, $(f_{s1}+f_{s2})/(0.8f_y) < 1.00$	5,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	66%	σ,μ.σ	OK
Concrete compressive service stress (flexural and axial), fc		16	N/mm ²	
Note if $F_{sls} > 0$, $f_c = 2(M_{sls}/z)/(b_w x)$, else $f_c = 2(M_{sls}/z)/(b_w x)$	+		,	
$(b_w.h-A_{s,prov}-A_{s,prov}')/[\alpha_e.(A_{s,prov}+A_{s,prov}')+(b_w.h-A_{s,prov}-A_{s,prov})]$)/(b _w .h-A	s.prov +A s.pro	, ');
Concrete compressive service stress utilisation, f_c / (0.45 f_{cu}) < 1.0		101%	-, -, -, -, -, -, -, -, -, -, -, -, -, -	NOT OK
Strain at tension face, $\varepsilon_1 = (h-x)/(d-x).(f_{s1}+f_{s2})/E_s$		1.55	x10 ⁻³	
Strain stiffening, $\varepsilon_2 = b_w(h-x)^2/[3E_sA_{s,prov}(d-x)]$			x10 ⁻³	
Mean strain, $\varepsilon_{\rm m} = \varepsilon_1 - \varepsilon_2$			x10 ⁻³	
Distance to face of extreme rebar, $c_f = cover + MAX(\phi_{link}, \phi_{link,t})$		35	mm	
Distance to centroid of extreme rebar, $c = c_f + \phi_t/2$			mm	
Distance, $s = (b_w-2.cover-2.MAX(\phi_{link}, \phi_{link}, t)-\phi_t)/(n_t/n_{layers,tens}-1)$			mm	
Distance, $a_{c1} = [c^2 + c^2]^{1/2} - \phi_b/2$			mm	
Distance, $a_{c2} = [c^2 + (s/2)^2]^{1/2} - \phi_t/2$		t	mm	
Distance, $a_{cr} = MAX(a_{c1}, a_{c2})$			mm	
Note a $_{c1}$ is not applicable for continuous width sections, i.e. slabs	or walls:			
$a_{c1}a_{c2}$				
Maximum crack width, $w_{max} = 3a_{cr} \varepsilon_m / [1+2.(a_{cr}-c_f)/(h-x)]$		0.27	mm	
Maximum crack width utilisation, $w_{max} / w_{allow} < 1.00$		89%		OK
Note for a particular section and force / moment, crack widths can	n be reduc		asina steel	
reducing spacing between rebars and reducing concrete cover (lin				
employment of smaller diameter bars at closer centres is thus pre				
centres. There should be a provision for longitudinal steels at the				
provision for longitudinal steels at the	Side idees	or bearing 0	. moderate	асриіз,
Crack width utilisation		101%		NOT OK
Crack with delisation		10170		NOT OK
		<u> </u>		

CON	SULTING	Engineerin	a Calculatio	on Sheet		Job No.	Sheet No.		Rev.
	NEERS			on onecc		jXXX	2	23	
				I	I				
				_		Member/Location			
ob Title	1	esign - Reir	nforced Cor	icrete Bean	n BS8110,	Drg. Ref.	Data		Obd
1ember D	esign - RC	Beam	1	ı	ı	Made by XX	Date 1	6/1/2024	
				_	_				<u>EC2</u>
	inal Shear								
	this check i	-			and flange	d section d	esigns, alth	ough	
heoretica	lly only app	licable in th	ne latter cas	se;					
								2	
ongitudir.	nal shear sti			. =				N/mm ²	
		al shear str		$_{id} = \Delta F_{d}/(h_{f})$				N/mm ²	cl.6.2.
		normal for							<u> </u>
	Note conse	ervatively fa	$actor, K_B =$	= 0.5(b _{eff} – l	b _w)/b _{eff} er	nployed ev	en if neutra		in web;
		Lever arm	•			L	0.763	m	
			ıtral axis w		or simplicit	zy, z = d-h	· · · · · · · · · · · · · · · · · · ·		
	Thickness	of the flang	ge at the ju	nctions, h _f			200	mm	
	_	der conside					2500	!	
	Note the n	naximum va	alue that m	ay be assu	med for Δz	x is half the	e distance b	etween	cl.6.2.
	the section	n where the	moment is	0 and the	section wh	ere the mo	ment is ma	aximum.	
	However,	since ΔF_d	is also calci	ulated over	∆x based	on a variat	ion of mom	ent of	
	1		-				ance betwee		
							nt is maxim	um	
	based on a	a variation (of moment	of M –0 an	d factored	by K_S .			
		ss distribut					1.33		
	For UDLs,	K_S may be	taken as 2	2.00 for sim	ply suppor	ted beams,	1.33 for co	ontinuous	
		d 2.00 for c							
	Effective w	$idth, b_{eff} =$	$MIN(b_w +$	function (s	oan, section	n, structure	1000	mm	
	Note for re	ectangular s	sections, b	_{eff} equivaler	nt to that o	f T-section	s assumed;		
	Width (rec	tangular) o	r web widtl	n (flanged),	, b _w		500	mm	
ongitudir	nal shear sti	ress limit to	prevent cr	ushing,	$v f_{cd} \sin \theta_1$	$\cos \theta_{\rm f}$	4.97	N/mm ²	cl.6.2.
	Design cor	mpressive s		l			19	N/mm ²	
		$f_{\rm cd} = \alpha_{\rm cc}$	$f_{\rm ck}$ / $\gamma_{\rm C}$	with	$\alpha_{cc}=1.0$, γ_{c}	=1.5			cl.3.1.
	Strength r	eduction fa	ctor for cor	crete crack	ced in shea	r, ν	0.533		
		$\nu = 0.6 \left[1 - \frac{1}{2} \right]$	f _{ck}						cl.6.2
		V = 0,0	250						
ongitudir	nal shear sti	ess limit to	prevent cr	ushing utili	sation, (K_S)	.v _{Ed})/(vf _{cd} si	32%		ОК
ongitudir	nal shear sti	ess limit fo	r no transv	erse reinfo	rcement, 0	.4f _{ctd}	0.52	N/mm ²	cl.6.2.
	Design ter	sile strengt	th, f _{ctd}				1.29	N/mm ²	
		$f_{\rm ctd} = \alpha_{\rm ct}$	f _{ctk,0,05} / γ	with	$\alpha_{ct}=1.0$, γ_{c}	=1.5			cl.3.1.
		$f_{\text{ctk};0,05} = 0,7$	$7 \times f_{ctm}$				1.94	N/mm ²	T.3.1
		$f_{ctm}=0,30\times f_{ct}$	^(2/3) ≤C50/60	$f_{ctm}=2,12$	·In(1+(f _{cm} /1	0)) > C50/	60 2.77	N/mm ²	T.3.1
		$f_{cm} = f_{ck} + 8$	B(MPa)					N/mm ²	T.3.1
			stic cylinde	r strength o	of concrete	, f _{ck}		N/mm ²	T.3.1
		Characteri	stic cube st	rength of c	oncrete, f _{cu}	J		N/mm ²	T.3.1
						ilication (k			NOT O
ongitudir	nal shear sti	ress limit fo	r no transv	erse reinfo	rcement ut	iiisauoii, (r	312%		
ongitudir	nal shear sti	ess limit fo	r no transv	erse reinfo	rcement ut	ilisation, (r	312%		
	design trans	sverse reinf	orcement p					mm²/m	
	design trans	sverse reinf ≥ v _{Ed} · h _f / co	forcement p	per unit leng	gth, A _{sf} /s _f >	>	741	mm²/m	
	design trans (A _{sf} f _{yd} /s _f) Note area	sverse reinf ≥ v _{Ed} · h _f / co of transver	forcement point θ_f respectively.	per unit leng	gth, A _{sf} /s _f >	the greate	741 er of 1.0A _{sf} ,	mm²/m /s _f and	
	design trans $(A_{sf}f_{yd}/s_f) = 0.5A_{sf}/s_f$	sverse reinf ≥ v _{Ed} · h _f / co of transver + area requ	forcement point θ_f are steel to uired for sla	per unit leng be provided ab bending;	gth, A _{sf} /s _f > d should be Note K _S f	the greate	741 er of 1.0A $_{sf}$, to v_{Ed} here	mm²/m /s _f and in;	cl.6.2.
	design trans $(A_{sf}f_{yd}/s_f) = Note area$ $0.5A_{sf}/s_f$ Design yie	sverse reinf ≥ v _{Ed} · h _f / co of transver + area requ Id strength	forcement p t θ_f se steel to uired for sla of reinforce	ber unit leng be provided ab bending; ement, f _{yd} =	gth, A _{sf} /s _f > d should be Note K _S f	the greate	741 er of 1.0A $_{sf}$, to v_{Ed} here 435	mm²/m /s f and in; N/mm²	cl.6.2.
	design trans $(A_{sf}f_{yd}/s_f) \ge Note area$ $0.5A_{sf}/s_f$ Design yie Thickness	sverse reinf ≥ v _{Ed} · h _f / co of transver + area requ	forcement p t θ_f se steel to uired for sla of reinforce	ber unit leng be provided ab bending; ement, f _{yd} =	gth, A _{sf} /s _f > d should be Note K _S f	the greate	741 er of 1.0A _{sf,} to v _{Ed} here 435 200	mm²/m /s f and in; N/mm² mm	cl.6.2.
	design trans $(A_{sf}f_{yd}/s_f) \gtrsim Note area$ $0.5A_{sf}/s_f$ Design yie Thickness Angle, θ_f	sverse reinf ≥ v _{Ed} · h _t / co of transver + area requ ld strength of the flang	forcement processes steel to uired for slate of reinforce ge at the ju	ber unit leng be provided ab bending; ement, f _{yd} = nctions, h _f	gth, $A_{sf}/s_f > d$ d should be where K_S f = f_y/γ_S , $\gamma_S = 1$	the greate factored on 1.15, f _y ≤60	741 er of 1.0A _{sf,} to v _{Ed} here 435 200	mm²/m /s f and in; N/mm²	cl.6.2.4
	design trans $(A_{sf}f_{yd}/s_f) = 0$ $Note area$ $0.5A_{sf}/s_f$ Design yie $Thickness$ $Angle, \theta_f$ $1,0 \le cot$	sverse reinf $v_{Ed} \cdot h_f / co$ of transver $+ area required $	forcement property θ_f and θ_f are steel to control of reinforce θ_f at the juntary for compression θ_f	be provided ab bending, ement, f _{yd} = nctions, h _f	gth, $A_{sf}/s_f > d$ should be Note K_S $f = f_y/\gamma_S$, $\gamma_S = \frac{1}{2}$ ges $(45^\circ \ge \theta)$	the greater than the factored on 1.15 , $f_y \le 60$	741 er of 1.0A _{sf,} to v _{Ed} here 435 200	mm²/m /s f and in; N/mm² mm	cl.6.2.
	design trans $(A_{sf}f_{yd}/s_f) \ge Note \ area$ $0.5A_{sf}/s_f$ Design yie Thickness Angle, θ_f $1,0 \le \cot \theta$ $1,0 \le \cot \theta$	sverse reinf $\geq v_{\text{Ed}} \cdot h_{\text{f}} / \text{ co}$ of transver. $+ \text{ area requ}$ Id strength of the flance $\theta_{\text{f}} \leq 2.0$ $\theta_{\text{f}} \leq 1.25$	forcement processes steel to uired for slage at the justing for compression for tension	be provided be provided be bending; ement, f _{yd} = nctions, h _f ession flang	gth, $A_{sf}/s_f > d$ should be Note K_S if f_y/γ_S , $f_y = f_y/\gamma_S$, $f_y = f_y/\gamma_S$ ges $f_y \ge \theta$	the greater than the factored on 1.15 , $f_y \le 60$	741 er of 1.0A _{sf,} to v _{Ed} here 435 200 45.0	mm²/m /s f and in; N/mm² mm degrees	cl.6.2.4
equired (design trans $(A_{sf}f_{yd}/s_f) \ge Note area$ $0.5A_{sf}/s_f$ Design yie Thickness Angle, θ_f $1,0 \le \cot$ Provided t	sverse reinf $\geq v_{\text{Ed}} \cdot h_{\text{f}} / \text{ co}$ of transverse $+ \text{ area requ}$ Id strength of the flance $\theta_{\text{f}} \leq 2.0$ $\theta_{\text{f}} \leq 1.25$ ransverse r	forcement processes steel to uired for sla of reinforcement processes at the justification for compression tension einforcement processes at the processes at t	be provided be provided be bending; ement, f _{yd} = nctions, h _f ession flange flanges (4 nt per unit	gth, $A_{sf}/s_f > d$ should be Note K_s $f = f_y/\gamma_s$, $\gamma_s = d$ ges $(45^\circ \ge \theta_f \ge 3)$ length, A_e	the greater factored on 1.15, $f_y \le 60$ $0 \le 26,5^\circ$ $0 \le 8,6^\circ$	741 er of 1.0A sf, to v _{Ed} here 435 200 45.0	mm²/m /s f and in; N/mm² mm degrees mm²/m	cl.6.2.4, cl cl.6.2.4
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l		•	•		· · · · · ·		_								\neg
	Table	31 — Ultim	ate longitu	dinal	shear st	ress, ı	υ ₁ , a	nd val	ues o	$\mathbf{f} k_1$ for	con	nposite	men	nbers	
	Table			dinal			_			of k_1 for			men		
	Table	31 — Ultim		dinal	Lo ₁	ngitudi	nal s	hear str 25	ress fo	r concret	te gra	de or more	men	abers	
		Type of she		dinal	Lor	ngitudi	nal s	hear str	ress fo	r concret	te gra	de	men		
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		Type of she		dinal	Lo ₁	ngitudi 2	nal s	hear str 25	ress fo	r concret	te gra	de or more //mm ²	0.15	k ₁	
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	Monolith construc Surface	Type of she nic tion type 1 type 2	ar plane		N/mm ² 0.90 0.50 0.30	2 0. 0. 0.	N/n .90 .63	hear str 25 mm ²	1.25 0.75 0.45	r concret	1.25 0.80	de or more I/mm ²	0.15 0.15 0.09	k ₁	
	Monolith construct Surface Surface NOTE Fo	Type of she nic tion type 1 type 2 or construction v	ar plane with lightweight	t aggreg	0.90 0.50 0.30	2 0. 0. 0.	N/n .90 .63	hear str 25 mm ²	1.25 0.75 0.45	r concrete 30 (1.25 0.80 0.50 be rec	de or more [/mm ²))) duced by 2	0.15 0.15 0.09	k ₁	
	Monolith construct Surface Surface NOTE Fo	Type of she nic tion type 1 type 2 or construction v	ar plane with lightweight	t aggreg	0.90 0.50 0.30	2 0. 0. 0.	N/n .90 .63	hear str 25 mm ²	1.25 0.75 0.45	r concrete 30 (1.25 0.80 0.50 be rec	de or more I/mm ²	0.15 0.15 0.09	k ₁	
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Required r	Monolith construct Surface Surface NOTE For Concrete the Ultimate low Length of Provided to Note reinforcrossing the Characterial shear for cominal transport to the component transport to the component transport to the construction to the construction of the construction to the construction of t	Type of she nic tion type 1 type 2 pond construction v pond construction v pond type 2 pond construction v pond type and	with lightweight ant, k ₁ shear stres pe e, L _s = h _f reinforceme rovided for ane, provid ed; ch of reinfor r unit lengt	ss limi Monolit ent pe coexi ed to h utili	N/mm ² 0.90 0.50 0.30 ate concrete it, v_1 chic construit r unit len istent be resist ve ent, $f_y \leq$ isation, v_1 unit leng	uction ngth, ending ertical 460N V ₁ /V _{1,1} tth, 0.	N/m .90 .63 .38 allues A _e g effl she	given in the sear, minutes are sear sear sear sear sear sear sea	1.25 0.75 0.45 this tal	r concrete 30 / mm² ble should (1) / mear receinclude 6	1.25 0.80 0.500 be received a series of the	nm mm²/n mm²/n cement	0.15 0.15 0.09 55 %.	T.3. T.3. Cl.7.4.	2.3
Required r	Monolith construct Surface Surface NOTE For Concrete the Ultimate low Length of Provided to Note reinforcrossing the Characterial shear for cominal transport to the component transport to the component transport to the construction to the construction of the construction to the construction of t	Type of she nic tion type 1 type 2 pond construction v pond construction v pond type 2 pond construction v pond type and	with lightweight ant, k ₁ shear stres pe e, L _s = h _f reinforceme rovided for ane, provid ed; ch of reinfor r unit lengt	ss limi Monolit ent pe coexi ed to h utili	N/mm ² 0.90 0.50 0.30 ate concrete it, v_1 chic construit r unit len istent be resist ve ent, $f_y \leq$ isation, v_1 unit leng	uction ngth, ending ertical 460N V ₁ /V _{1,1} tth, 0.	N/m .90 .63 .38 allues A _e g effl she	given in the sear, minutes are sear sear sear sear sear sear sea	1.25 0.75 0.45 this tal	r concrete 30 / mm² ble should (1) / mear receinclude 6	1.25 0.80 0.500 be received a series of the	nm mm²/n mm²/n cement	0.15 0.15 0.09 55 %.	T.3. T.3. Cl.7.4.	2.3

		<u> </u>				7-1-61	Cl. · · ·		Тъ
CON	SULTING	Engineerin	g Calculatio	n Sheet	_	Job No.	Sheet No.		Rev.
	NEERS			000	•	jXXX] -	25	
						Member/Location			
Job Title	Member D	esign - Reir	nforced Con	crete Be	eam BS8110,	Drg. Ref.			
Member D	esign - RC	Beam				Made by XX	Date 1	6/1/2024	1 Chd.
									<u>EC2</u>
Longitud	inal Shear	Within W	eb Rectang	gular or	· Flanged Be	am (EC2)			
l onaitudir	ial shear str	ess. Ve	$_{di} = \beta V_{Ed} /$	$(z b_i)$			1.53	N/mm ²	cl.6.2.5
	Ratio, $\beta =$. ,	, ,			1.0		cl.6.2.5
			ce (average	d) V=	= \/ .*/2		585		cl.6.2.5
	Lever arm		c (average	u), VEd -	- V _d /2		0.763		cl.6.2.5
			ithin wah f	or simpl	city, z = d - i	h /2:	0.703	111	C1.0.2.3
	!	ne interface		ui siiripi	$\frac{1000}{1}$		F00	no no	0.625
	Width of th		ε, D _i – D _w				500	mm	cl.6.2.5
La caracter altra	-1 -1						2.40	2	
Longituair	al shear str) = 0.F. f	1	3.10	N/mm ²	
					α) \leq 0,5 ν f_{cd}	<u></u>			cl.6.2.5
			σ_n is negat	ive (ten:	sion);				cl.6.2.5
	-	coefficient	-		Indented	▼	0.500		cl.6.2.5
		coefficient			Indented		0.9		cl.6.2.5
				teel, plas	tic or specially p	orepared wood	en moulds:		
		o 0,10 and μ		face or a	free surface lef	t without furth	or treatment		
		ion: <i>c</i> = 0,20		iace, or a	iree suriace iei	t without further	er treatment		
	Rough: a s	urface with a	t least 3 mm r		at about 40 mr				
			egate or othe	r methods	s giving an equi	valent behavio	ur: <i>c</i> = 0,40		
	and $\mu = 0.7$ Indented: a		indentations	complying	g with Figure 6.9	9: c = 0.50 an	$d \mu = 0.9$		
		sile strengt		,,	,	1		N/mm ²	
	Design ten	_		ماهندد	1 0		1.29	IN/ MM	-1216
			$f_{\text{ctk},0,05} / \gamma_{\text{C}}$	with	$\alpha_{\rm ct}$ =1.0, γ	/ _c =1.5	1 0 1	2	cl.3.1.6
		$f_{\text{ctk};0,05} = 0,$		1	101 /11/6	1011 > 050/		N/mm ²	T.3.1
				$f_{ctm}=2$	12·In(1+(f _{cm} /	10)) > C50/		N/mm ²	T.3.1
		$f_{\rm cm} = f_{\rm ck} + 8$						N/mm ²	T.3.1
					th of concrete			N/mm ²	T.3.1
					of concrete, f		35	N/mm ²	T.3.1
				l shear i	nterface, σ_n =	= 0	0.00	N/mm ²	
	Reinforcen	nent ratio,	$\rho = A_s / A_i$				0.006		cl.6.2.5
				$A_s = A$	sv,prov/S + Asv	,,prov,t/St	3142	mm ² /m	
		Note that	the area of	reinforc	ement crossii	ng the shear	interface i	may	cl.6.2.5
		include ord	dinary shear	r reinfor	cement with	adequate ar	nchorage at	both	
			e interface;						
			e joint, $A_i =$				500000	mm²/m	
	Design vie				$f_{yd} = f_{yv}/\gamma_S, \gamma_S$			N/mm ²	.2.4, cl.3
			$\alpha = 90.0$		yd — Tyv/ YS/ YS	1.10, 1 _{yv} 20		degrees	cl.6.2.5
									u.u.2.3
	Design cor		trength, f _{cd}		. 10	1 5	19	N/mm ²	-1216
	Ct	$f_{\rm cd} = \alpha_{\rm cc}$		with				-	cl.3.1.6
	Strength r	_	_	crete cr	acked in shea	ar, v	0.533		<u> </u>
		$\nu = 0.6 \int 1 -$	<u>f_{ck}</u>						cl.6.2.2
		_	_						
Longitudir	al shear str	ess limit ut	tilisation, $v_{\scriptscriptstyle E}$	_{di} /v _{Rdi}			49%		OK
_				_					
								1	
								1	
	1	I	1		1	1	I .	I .	1

CON	SULTING	Engineerin	n Calcula	tion Sheet	<u> </u>	Job No.	Sheet No.		Rev.
		Consulting				jXXX		26	
ENGI	HEEKS	Consulting	Linginiee			J^^X			
						Member/Location			_
Job Title	Member D	esian - Reir	forced C	oncrete Bean	n BS8110.	Drg. Ref.	l .		
	esign - RC					Made by XX	Date 1	6/1/2024	Chd.
MCMBCI D	CSIGIT IXC	Deam					_	7 1 2 2 2 4	
1		\\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	. l. D			/DC01/			<u>BS8110</u>
Longitua	nai Snear	within we	ed Kecta	ngular or Fl	апдец веа	m (p291)	LU)		
Longitudin	al shear sti	ress, $v_h = K$	$L_{\rm S}$. $\Delta F_{\rm c}$ /	(b _w .∆x)			2.58	N/mm ²	cl.5.4.7.2
	Change of	total comp	ression fo	orce over Δx ,	$\Delta F_c = (M-0)$)/z	2423	kN	cl.5.4.7.1
		Lever arm,	, Z				0.763	m	
				within web, f	for simplicity	z = d - h	_ε /2:		
	Lenath un	der conside			ı í	,	2500	mm	
	_			etween the po	oint of mayi	mum desic		!	cl.5.4.7.2
				tween the po	Jiii Oi Illaxii	mum uesig		anu T	CI.3.4.7.2
	-	of zero mon							
		ss distribut					1.33		
	The average	ge design si	hear stre	ss should the	n be distribi	uted in pro	portion to	the	cl.5.4.7.2
	vertical de	sign shear i	force dia	gram to give	the horizont	tal shear si	tress at an	y point	
	along the	length of th	e membe	er. For UDLs,	K _s maybe	taken as 2	.00 for sim	ply	
				ntinuous bean					
				dth (flanged),				mm	
					, ~ vv		300	1	
Longitudia	al choos ct.	occ limit fo	r no nom	inal / docier	vortical rain	forcomast	2-25	N/ 2	1
Longituain		1	i iio iiom	ninal / design			2.35	N/mm ²	
	Surface ty	pe		Wash	ned to remove I	aitance etc			T.5.5
		Table 5	5 — Doeig	n ultimate hori	izontal choor	etrosene at i	interface		ጎ
		Precast unit	3 — Desig						
		rrecast unit		Surface	type	25	le of in-situ cor	40 and over	
	1					N/mm ²	N/mm ²	N/mm ²	
	Without li	nks		cast or as-extrud		0.4	0.55	0.65	
	+			ished, screeded o	~ .		0.65	0.75	
	-			shed to remove la sted with retards		0.7	0.75	0.80	
	With nom:	inal links proje		cast or as-extrud		1.2	1.8	2.0	
	into in-sit	u concrete	Bru	ished, screeded o	r rough-tampe	d 1.8	2.0	2.2	
				shed to remove la sted with retards		2.1	2.2	2.5	
	NOTE 1 Th	ne description "as-		108e cases where the		and vibrated leav	ving a rough finis	h. The surface	
				s to be applied direct cial roughening had		er finishing scree	ed but not as rou	zh as would be	
	NOTE 2 Th	-		ers those cases in wh	-	ed surface is pro	duced direct fron	an extruding	
	machine.	a decomination 90		d td"			of dollhousts ou		
				d or rough-tamped" o stent of exposing the		where some form	or deliberate su	riace	
	NOTE 4 Fo	r structural asses	sment purpos	es, it may be assume	d that the appropr	iate value of $\gamma_{ m m}$	included in the t	able is 1.5.	
									Ţ
	al shear sti	ress limit fo	r no nom	inal / design	vertical rein	iforcement	110%	<u> </u>	NOT OK
.2(3)									
Required r	nominal ver	tical reinfor	cement p	oer unit lengt	h, 0.15%b _w		750	mm ² /m	cl.5.4.7.3
	Provided v	ertical reinf	orcemen	t per unit len	gth, A _e		3142	mm²/m	
		A _{sv,prov} / S						<u> </u>	
Required r				per unit lengt	h utilisation	0.15%h	24%		OK
-			•	ress limit for					
NOLE UT SE	- LU U70 II	origituulildi	siicai St	I COO IIIIIIL IUI	no nominal	vertical 18	iiiioi ceiiiei	T UI <= 10	7070,
D ' '	!	1 1 - 1						7.	<u> </u>
kequired o			ement pe	er unit length,	, A _h		2949	mm²/m	
	$A_1 = \frac{10}{100}$	95f _y						cl.5.	4.7.4, Fore
	1	· ·		≤460N/mm²					
Required of	lesign verti			er unit length		A _h /A _e	94%		OK
Note UT se	et to 0% if	longitudinal	shear st	ress limit for	no design v	ertical rein	forcement	UT <= 100)%;
		_							
									†
								 	1
									<u> </u>
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									1
	1	1			1		ĺ	1	1

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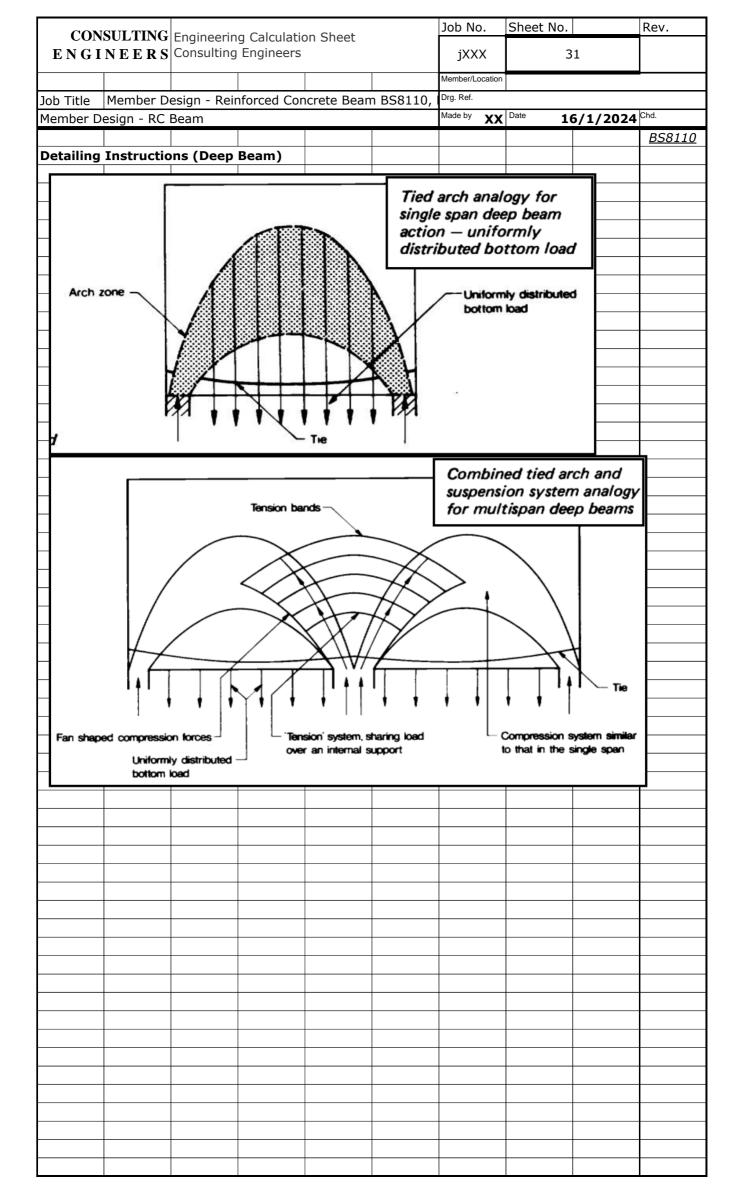
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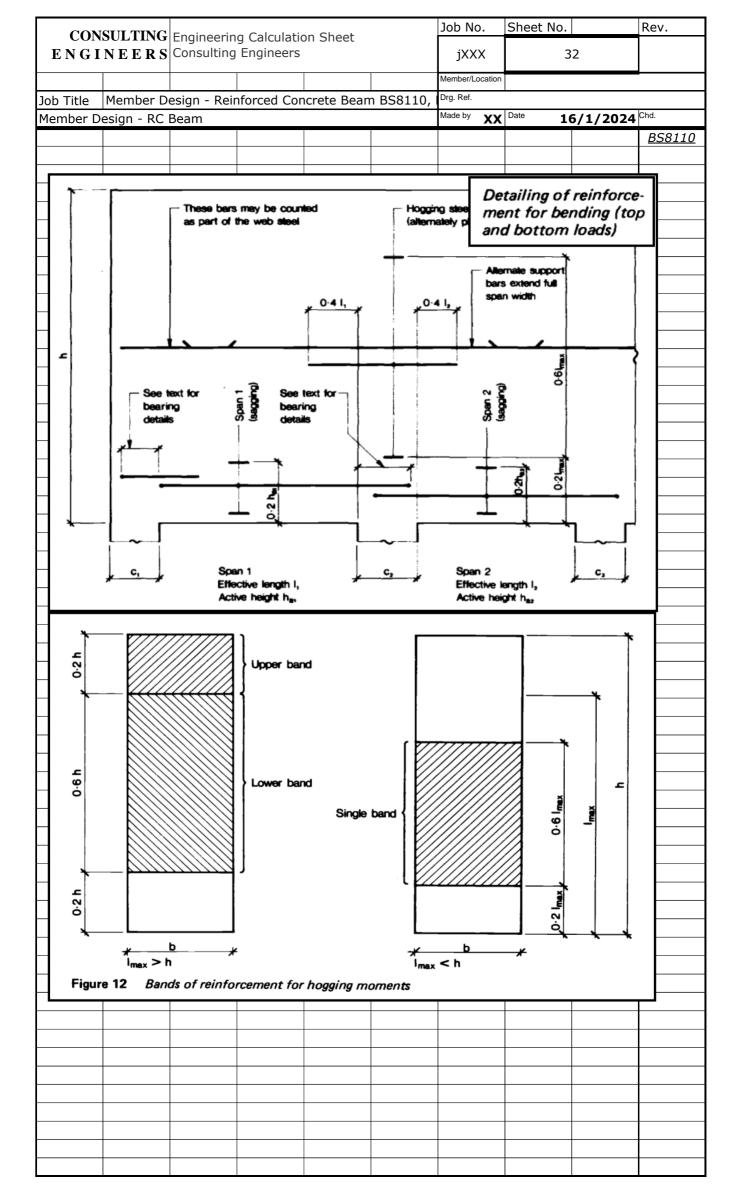
CON	SULTING	Engineerin	g Calculation	on Sh	eet			Job N	0.	Sheet	No.			Rev.	
		Consulting						jXX	ίχ		2	.7			
								Member/L							
					_	5004			ocation						
Job Title			nforced Cor	icrete	Beam	1 BS81	10,	Drg. Ref.		D-4-				Ob at	
Member D	esign - RC	Beam	ı					Made by	XX	Date	10	6/1/20)24		
														<u>BS540</u>	<u>0-4</u>
Longitudi	nal Shear	Within We	eb Rectan	gular	or Fla	anged	Bea	am (B	S540	00-4)					
Longitudin			length, V ₁					<u> </u>				kN/m			
	Change of	total comp	ression for	ce ove	er ∆x,	$\Delta F_c =$	(M-C)))/z			423				
		Lever arm									763	m			
		Note if neu	ıtral axis w	ithin 1	web, f	or sim	plicit	y, z =	<u>d – h</u>	_f /2;					
		der conside										mm			
	Note ∆x is	the beam	length betv	veen	the po	int of	max	imum	desig	n mon	ent	and			
	the point o	of zero mon	nent;												
			ion factor,								33				
	The longitu	udinal shea	r should be	calcu	ılated	per ur	it le	ngth. F	or U	DLs, K	_s m	ay be		cl.7.4.	2.3
	taken as 2	.00 for sim	ply support	ed be	eams,	1.33 f	or co	ntinuo	us be	eams a	nd 2	2.00			
		ver beams;													
	Width (rec	tangular) o	r web width	n (flar	nged),	b_w					500	mm			
Longitudin	al shear foi	ce limit per	r unit lengtl	h, V _{1,1}	limit					10	637	kN/m			
	V. should	not excee	d the lesse	r of th	he foll	owine	,.								
			u tile lesse.	r or u	ne ion	OWINE	,-	(a)		2	625	kN/m		cl.7.4.	2.3
	a) k ₁ f _c							(b)		1	637	kN/m		cl.7.4.	2.3
	b) $v_1 L_s$	$+0.7A_{ m e}f_{ m y}$													
	Table	31 — Ultim	ate longitue	dinal	shear	stress,	v_1 , a	nd val	ues o	$\mathbf{f} k_1 \mathbf{for}$	con	nposite	men	nbers	
		Type of she	ar plane		I	Longitu	linal s	shear str	ess for	r concret	e gra	de		k_1	
		-,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			20	0		25		30	40 0	or more			\bot
					N/m	ım²	N/	mm^2	N/	mm ²	N	l/mm ²			
	Monolith	_			0.90		0.90		1.25		1.25		0.15		
	Surface				0.50		0.63		0.75		0.80		0.15		
	Surface				0.30		0.38		0.45		0.50		0.09		
			vith lightweight	aggreg				given in		ole should					+
	Concrete b	ond consta	int, k ₁							().15			T.3	1
	Ultimate lo	ngitudinal	shear stres	s limi	t, ν ₁					1	25	N/mm	2	T.3	1
		Surface ty	pe N	/lonolit	hic cons	struction	ı				▼			T.3	1
	Length of	shear plane	e_{s} , $L_{s} = b_{w}$								500	mm			
	Provided v	ertical reinf	forcement p	er ur	nit leng	gth, A	<u>.</u>			3	142	mm²/r	n		
	Note $A_e =$	A sv,prov / S	$S + A_{sv,prov,t}$	$/S_t$;										
	Note reinfo	orcement p	rovided for	coexi	stent	bendir	ig ef	fects a	nd st	near re	infor	cemen	t	cl.7.4.	2.3
	crossing th	ne shear pla	ane, provide	ed to	resist	vertica	al sh	ear, m	ay be	e includ	led p	orovide	d		
	they are fu	ılly anchore	ed;												
			h of reinfor					ım²			460	N/mm	2		
Longitudin	al shear foi	ce limit pe	r unit lengtl	h utili	sation	, V ₁ /V	1,limit			7	9%			ОК	
			cement per									mm ² /r	n	cl.7.4.	
Required r	ominal ver	tical reinfor	cement per	r unit	length	n utilis	atior	າ, 0.15	$%L_{s}/$	2	4%			ОК	
Note UT se	et to 0% if	longitudina	shear forc	e limi	t per u	ınit lei	ngth	for no	nom	inal ve	rtica	l reinfo	rcer	nent	
UT <= 100)%;														
						_									
						_					_		_		

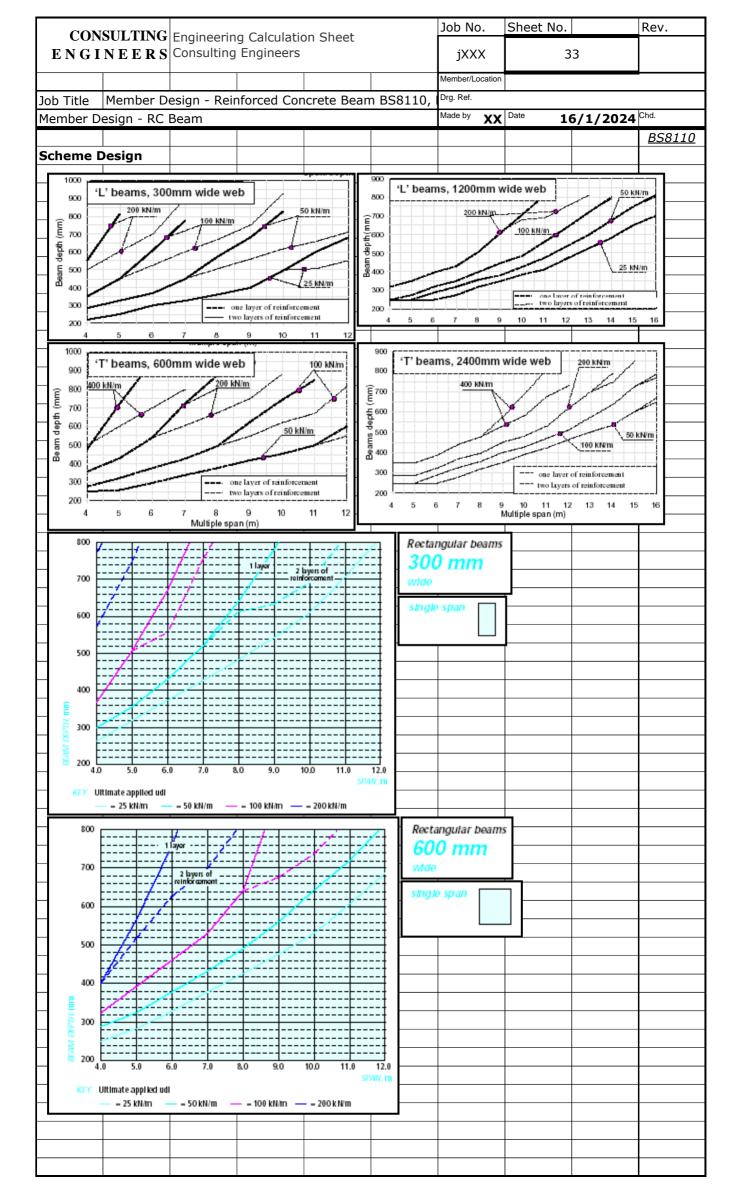
CON	SHLTING	Engineerin	a Calculatio	on Shoot		Job No.	Sheet No.		Rev.
		Consulting		JII SHEEL		jXXX	2	8	
21, 01						Member/Location			
					DC0110	Drg. Ref.			
Job Title		esign - Reir	iforced Con	icrete Bean	1 BS8110,	Made by XX	Date •	. /4 /2024	Chd
Member De	esign - RC	Beam				Wilder by XX	10	5/1/2024	
Deen Rea	m Pectan	 gular Bear	n						<u>BS8110</u>
-		check is pe		r hoth recta	ngular and	l I flanged se	ctions ado	ntina	
		quations in					-		
		o web ope							
		onally rest					•		
	Guide 2 cl							,	
		,,							
Span to de	pth ratio, s	span / h					10.00		
Applicabilit	y of deep b	eam desig	n			Not A	Applicable		ОК
Note deep	beam desig	gn is applic	able for {1.	0 ≤ span /	′ h ≤ 2.0 s/	s; 1.0 ≤ sp	$an / h \le 2$.	5 cont;	
0.5 ≤ spar	$h/h \leq 1.0$	cant} (Rey	nolds cl.21.	4.1 and CI	RIA Guide 2	2 cl.1.3);			
Concrete to	уре					Normal	weight v		
		diameter, ϕ					None T	mm	
		shear links					N/A		
		norizontal s		n a horizon	tal section,	$A_{sv,prov,h} =$		mm ²	
		ear links, S						mm	
		(b _w .(S or S			0.25% G25	50)	N/A		N/A
$2.\pi.\phi_{link,h}^2/4$	4 / (b _w .S _h)	(>0.20% G	i460; >0.2!	5% G250)			N/A	%	N/A
							21/2	2	67074
		ovided (dee	-				-	mm ²	CIRIA
		cement (de		(0.52.1	(0.056	C + 450N/	N/A	%	Guide 2
		cement (de			$c_{cu}/0.95t_{y}$	<i>T_y ≤460N/I</i> 			cl.2.6.2
% Min tens	sion reinfor	cement (de	ep beam) (utilisation			N/A		N/A
All dotailin	l g requirem	onto mot 2					N/A		
All detailin	g requirem	ents met :					N/A		
]

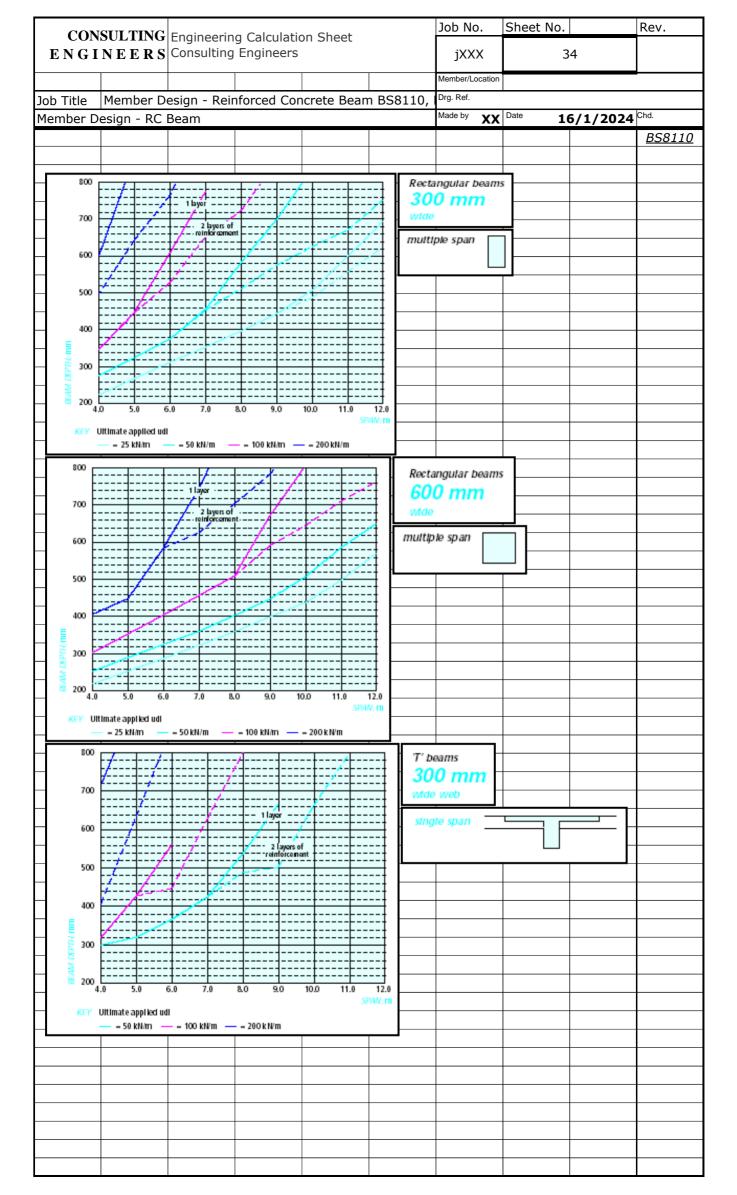
						Job No.	Sheet No.		Rev.
		Engineerin		on Sheet					ICV.
ENGI	NEERS	Consulting	Engineers			jXXX	2	.9	
						Member/Location			
Job Title	Member D	esign - Reir	nforced Cor	ncrete Bean	n BS8110,	Drg. Ref.			
Member De					•	Made by XX	Date 1	6/1/2024	Chd.
									BS8110
Deep Bea	m Bendin	g							Reynolds
Design ber	nding mom	ent, M					N/A	kNm	
Toncion ct	nal (daan h	l eam), A _{s,db}	_ 1 75M /	[f h] f < 1	60N/mm ²		N/A	mm ²	T.148
						6 v materi	ial factor 0.		cl.21.4.1
		epth, T _{zone} (:		•		.o x materi	N/A		cl.21.4.1
		epth, T _{zone} (N/A		CHETTIT
		ibuted over		_{zone} from to	ension face	;			cl.21.4.1
Note T	= (5h - si	pan _{(im}) / 20) s/s sag ai	nd cont sag	, (5h – 2)	(span _{lim}) ,	/ 20 cant ho	pa; cl.	21.4.1 / SI
20116	(/				, (-	-1 111177		, , ,	
Tension ste	eel area pro	ovided (dee	p beam)				N/A	mm ²	
		ovided (dee	-	tilisation			N/A		N/A
	50. u. 6u p.		p 200) u.						,
Deep Bea	m Shear								Reynolds
									,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
Design she	ar force, V	, d					N/A	kN	
		-	nit is b w.h.i	f _c '/10 γ _m w	here f ' is	the cylinde	er comp stre		cl.21.4.1
Ultimate sh			νν	. , , , , , , , , , , , , , , , , , , ,	, -	, , , ,	N/A		N/A
Area of ten	sion steel	reinforceme	ent provide	d, A _{s prov}			N/A	mm ²	
		dge of load			DL @ mid	0.625h ▼		mm	T.148
				• • • •			from the s	l	T.148
Ratio a ₁ /h				,,			N/A		N/A
	re a 1/h is r	not greatly	outside ran	ae of 0.23	to 0.70;				T.148
		ntal bar an				∟ ¹ (h/a₁)	N/A	degrees	T.148
		$k_1 = \{0.70$, 0	(, 41)	N/A		T.148
		$k_2 = \{100 \mid$			deformed b	ars}	,	N/mm ²	T.148
		sile strength						N/mm ²	T.148
		deep beam			/ /[k₁.(h-0.3		N/A		N/A
		orizontal she					N/A		,
							i.e. (h –T _{zon}		
		s shear cap				1	N/A		T.148
						•	ect the diag		772.0
							horizontal		!
	2 10 0010010		(= // = .						
Check Va	< 1.0V ₁ fo	r no horiz	ontal links	s (minor e	lements)		N/A		T.148
		shear capac					N/A		T.148
		MAX[0,k ₁).f. h 1+1	13.A. d	sin ² A/h·	N//A		T.148
		, ,, ,, ₁	.,,, 0.5541)	z ., · s,prov · u	0/11,			,,,,,,
Check V.	> 0.0 for (⊥ design hor	izontal lin	ıks			N/A		T.148
		and design l			capacity V	+ V ₁	N/A		T.148
	33	30019111		Silvar (- Spacity Vr	1			
Design she	ar resistan	ce (deep be	eam) utilisa	ation			N/A		N/A
							1		
							1		
									ļ
							1		<u> </u>

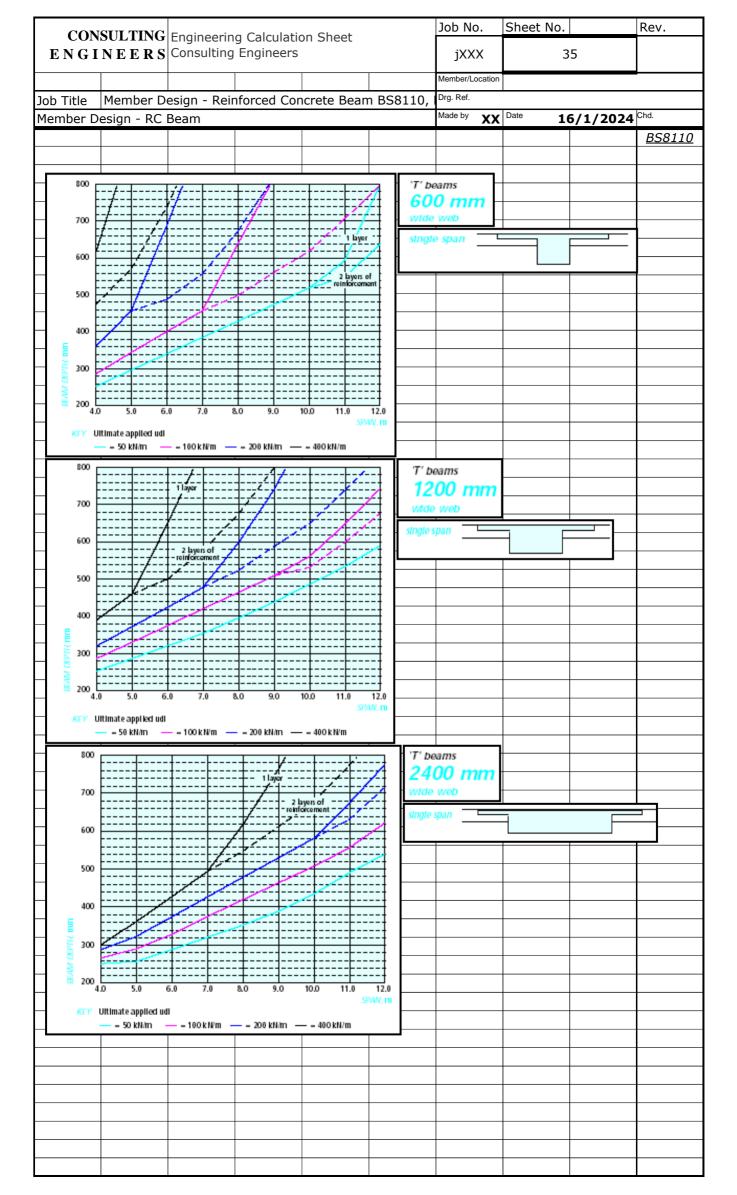
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CON	SULTING	Engineerin	a Calculatio	on Sheet		Job N	0.	Sheet No.		Rev.
						jXX	X	3	0	
	NGINEERS Consulting Engineers									
						Member/L	ocation			
Job Title	Member D	esign - Reir	nforced Cor	ncrete Bean	n BS8110,	Drg. Ref.				
Member D	esign - RC	Beam				Made by	XX	Date 10	6/1/2024	Chd.
										BS8110
Deep Bea	m Bendin	g								CIRIA
-										Guide 2
Design be	nding mom	ent. M						N/A	kNm	
	ıltimate ben		nt limit is i	0 12f h k	2.					cl.2.4.1
	ending mor			cu = w ·	,			N/A		N/A
Offirmate B		Tierre demod						Ν/Λ		N/A
Toncion ct	eel (deep b	oam) A	- M / [0 0	5f →1 f < ⁄1	60N/mm ²			N/A	mm ²	cl.2.4.1
	at which th								mm	cl.2.4.1
Lever arm					o, Z			-		
, –	!	oported, z =				1			mm	cl.2.4.1
LF		z = 0.2 x							mm	cl.2.4.1
-		z = 0.4 x				-			mm	SELF
	eel zone de				cant)			N/A		cl.2.4.1
	eel zone de						N/A	N/A		cl.2.4.1
	eel zone de					_	N/A	N/A	mm	cl.2.4.1
	to be distri				ension face	?;				cl.2.4.1
	= 0.2h s/s									cl.2.4.1
Note T _{zone}	= 0.2h coi	nt hog uppe	er band 0.5	(span _{lim} /h-	-1)A _{s,db} , 0.	2h-0.8	h co	nt hog lowe	er band ren	nainder;
Tension st	eel area pro	ovided (dee	ep beam)					N/A	mm ²	
Tension st	eel area pro	ovided (dee	p beam) ut	tilisation				N/A		N/A
Deep Bea	m Shear									CIRIA
-										Guide 2
Design she	ear force, V	, d						N/A	kN	
	ıltimate she		ı nit is min{h	h. v2h	$\dots h^2 v_a k_a$	/х.} и	ihere	-		cl.2.4.2
concrete s	hear streng	th from CP	110 T.6 ar	nd T.26 ren	laced by m	in{0.8	f 0.5	.{5.0.7.0}	N/mm ² }	0
	the design									
	= 1.0 for h					1	. 00.	N/A	1	cl.2.4.2
	hear force i		0.0			1		N/A		N/A
Oitiiiiate s								N/A		N/A
Aroa of to	ncion stool	roinforcom	ont provide	d /				NI/A	2	
	nsion steel				51.0.11	0.6051			mm ²	-12.42
	nce from e								mm	cl.2.4.2
	DLs, concei	ntrate total	UDL at {sp	pan/4 s/s al	nd cont, sp	pan/2 c	ant}			cl.2.4.2
Ratio x _e /h								N/A		N/A
	re x _e /h is r					<u> </u>				cl.3.4.2
	veen horizo				\mathbf{k} , $\theta = tan$	¹ (h/x _e)	N/A	degrees	cl.2.4.2
Empirical of	coefficient,	$\lambda_1 = \{0.44$	NWC, 0.32	LWC}				N/A		cl.3.4.2
Empirical of	coefficient,	$\lambda_2 = \{0.85$	plain round	d bars, 1.95	deformed	bars}		N/A	N/mm ²	cl.3.4.2
Number of	frows of ho	rizontal sh	ear links in	a vertical c	ross-sectio	n, n		N/A		
Note the n	o. of rows	of horizonta	al shear link	ks reduced	to account	for T z	one, i	e. (h – T _{zon}	_e)/S _h ;	
Design ho	rizontal link	s shear cap	pacity, V _r =	$100\lambda_2\Sigma A_{sv.}$	_{prov,h} .y _r .sin	² θ/h		N/A	kN	cl.3.4.2
	ummation (terse			
	r is calculat									•
-										
Check V.	< 1.0V for	r no horizo	ntal links	(minor el	ements)			N/A		cl.3.4.2
a	1	shear capac						N/A		cl.3.4.2
	l	$MAX[0, \lambda_1]$				d c	sin ²			cl.3.4.2
		re [100 λ_2 .				prov .u.s	,,,,	N/A		N/A
	ivole requi	ις [100 λ2.	A _{S,prov} .u.SII	U VIII / V	_ 0.20,			N/A		N/A
Check V	> 0.0 for a	docian ba	izontal li-	ke				BI / A		0212
CHECK Vd	> 0.0 for (consolt: . \ '	1 37 7	- 1	N/A		cl.3.4.2
	<u> </u>	and design		mks snear (capacity V _r	+ V (<u></u>	≥ λ ₁ .\	N/A	KIN	cl.3.4.2
		$= 1.3\sqrt{f_{cu}}$,		<u> </u>				T.5
	Note requi	re [V _r + 10	$UU \lambda_2.A_{s,pro}$	_v .d.sin² θ/I	h]/[V _r +	<i>V</i> ∫ ≥ 0	.20;	N/A		N/A
Design she	ear resistan	ce (deep b	eam) utilisa	ation				N/A		N/A
ĺ										1

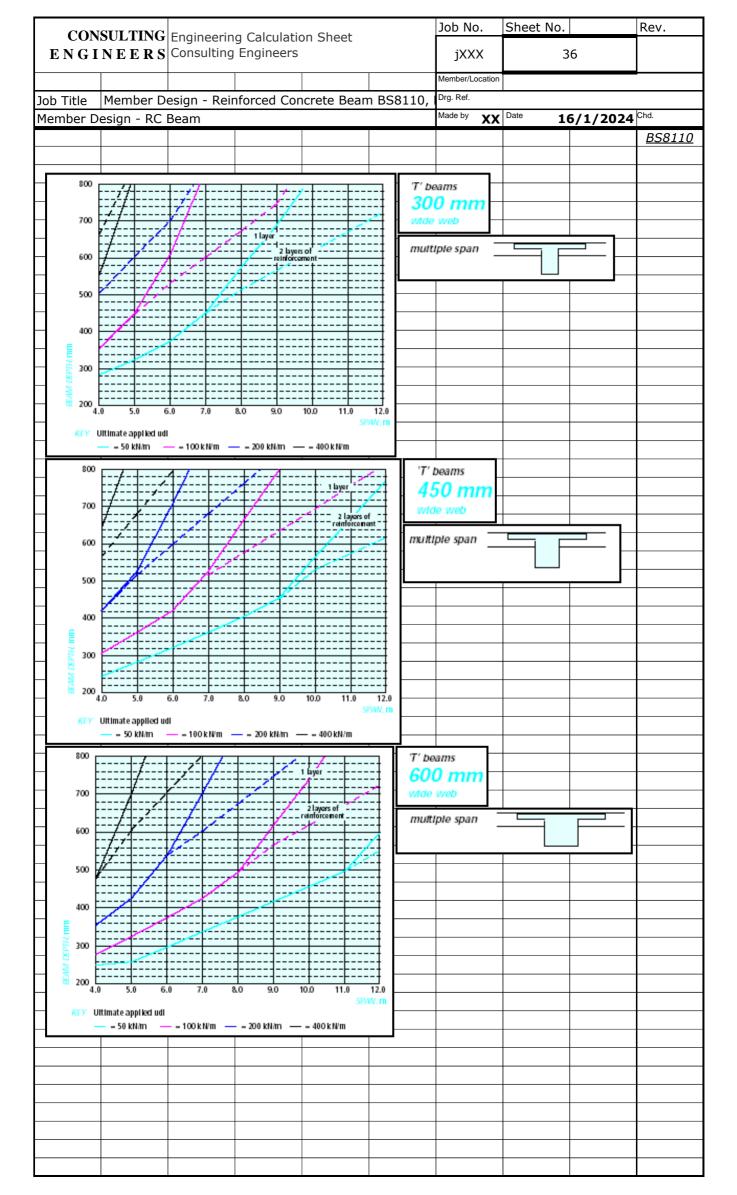


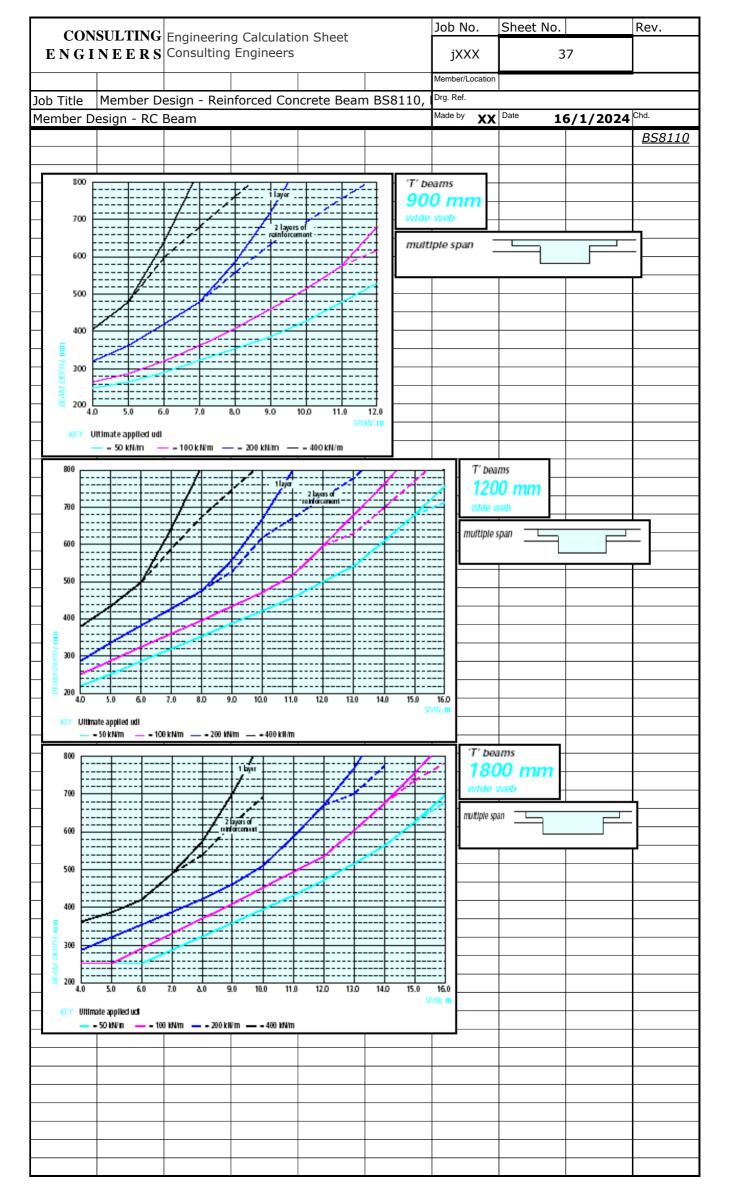


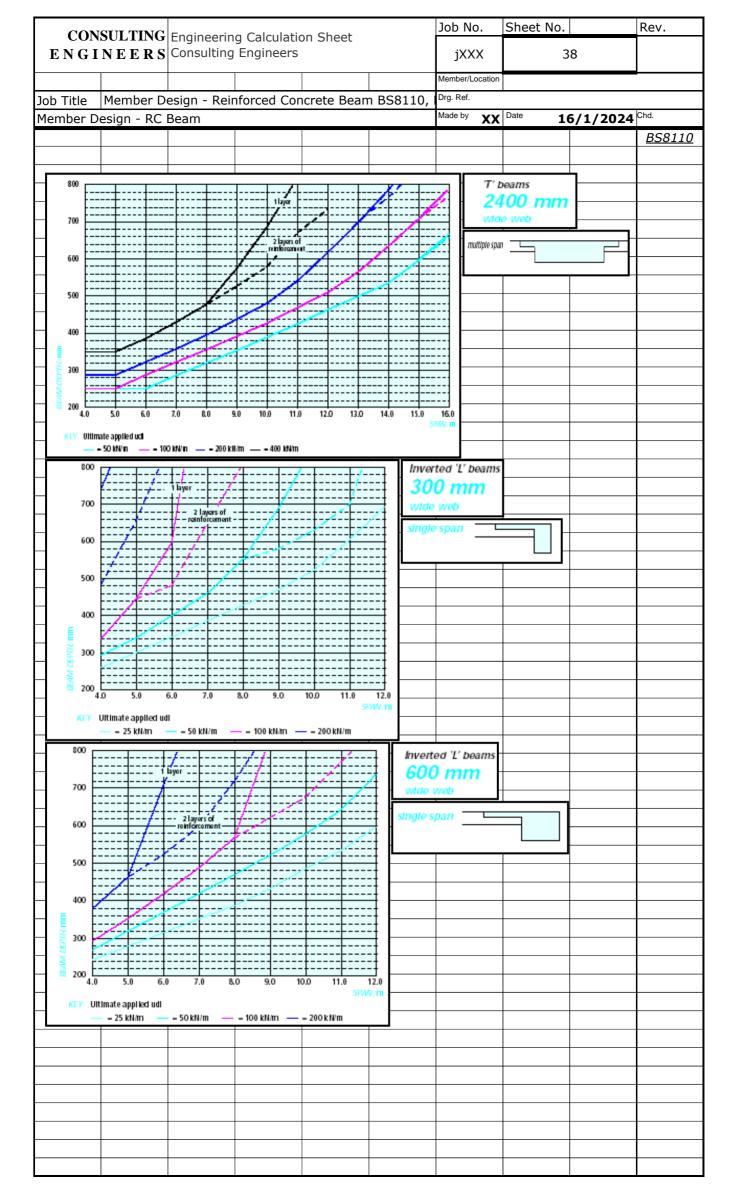


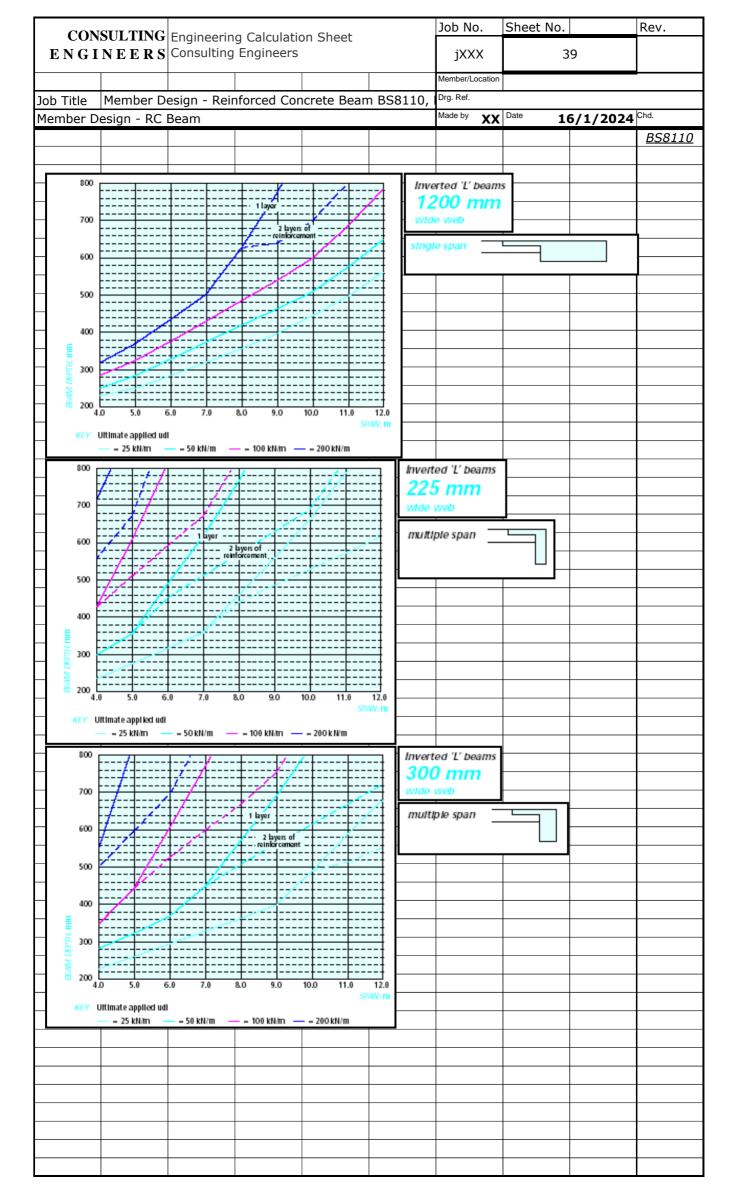


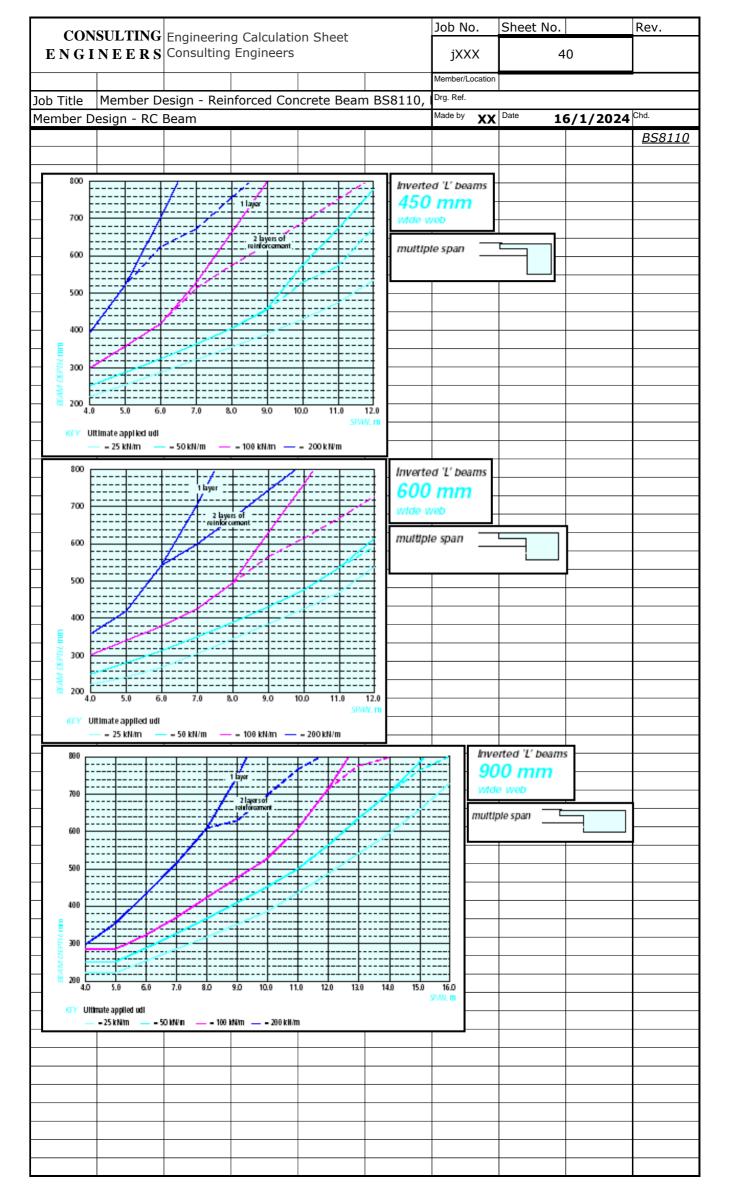


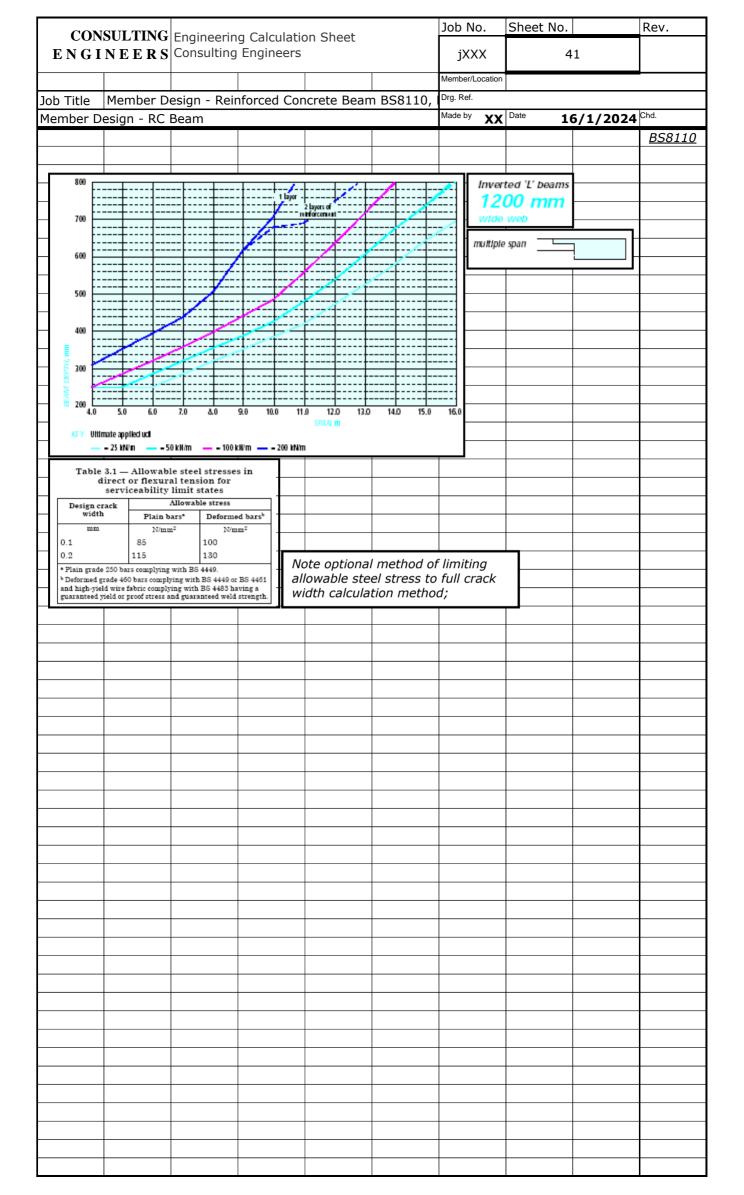












	CONSULTING Engineering Calculation Sheet							Job No.		Sheet No.			Rev.		
]			Consulting		311 3110			jΧ	jXXX 42						
								Member/I	ocation						
_	Title		esign - Reir	nforced Cor	ncrete	Beam	BS8110	-		Data		,,,,		Chd	
Ме	mber D	esign - RC	Beam					Made by XX Date 16/1/202				2024	BS8110		
Ту	pical Ir	itial Spar	ı / Effectiv	e Depth R	atios									<u>D301</u>	<u>.10</u>
Н	Span-to	-depth rat	ios for bean	ns											
Н	Condi	tion				2	pan-to-	depth r	atio					▮	
	Simply	supported					15								
4	End-ba	y					17								
H	Cantile	ver					6								
	Trans	fer bea	ams												
	merely the government of the	by using sperning critically exceed with short of the shalf it's decided where V is a droom under column. Each of the design.	pth ratios fo	h tables — inforced cors 5 N/mm ement it is N/mm². I re rearrang My for sh A N/mm² My should to nd flexural rinsitu con	careful oncrete ² (whice advise f we alse the content near strenge crete I	l consider transichever able to ssume express of cked a gth sho	deration fer bear is small o limit v a well sion abo 2 N/mr	is need m. From er). If th to 2 N. proporti ve so th m ² sideration be cor	led. S BS : e sec /mm oned at: on giv nsider	hear st 8110, v tion is i 2. Howe beam ten to t red bec	rengt = V not to ever, has a the co ause	th is of the connection on the	often n no come ay be th, b, ction may	ner's H	<i>landl</i>
		. , .												_	
		Continu			22				17				_		
		Cantile	ver			9					7				
	Table (6: Estimate	ed depths of	insitu conc	rete si	ngle sp	an T-be	ams (60	Omn	wide)					
		Spar	า	4m	4m		5m		6m		7m		8m		
		50 kN/m	UDL	250n	250mm)mm	350r	350mm		400mm		500mm		
		100 kN/m	UDL	275m	nm	325	imm	400r	400mm 450mm			575mm			
		200 kN/m	n UDL	325m	nm	375	imm	450r	nm	52	:5mm		650	Omm	
	Table 7	7: Estimate	d depths of	insitu conci	rete sii	ngle sp	an band	-beams	(240	0mm w	ide)				
Ц		Span	1	6m		7	m	8n	1		9m		10)m	
\mathbb{H}		50 kN/m	UDL	250m	nm	300	300mm		350mm		400mm		475	imm	
		100 kN/m	UDL	300m	300mm		350mm		425mm		500mm		575	imm	
\mathbb{H}		200 kN/m	UDL	350m	350mm 40		00mm 4		75mm 575mm		\top	675mm		\top	
-L															_

CON	CIII TING	En ala ancia	- Calaulati	Clarat		Job No.	Sheet No.		Rev.
ENGI	NEERS	Consulting	g Calculation	on Sheet		jXXX	4	13	
						Member/Location			
Job Title	Mambar D	osian Doi	oforced Con	oroto Poon	DC0110	Drg. Ref.			
	esign - RC		nforced Con	icrete bean	1 058110,	1	Date 1	6/1/2024	Chd.
Member D	esign - NC	Deam					1	0/1/2024	BS8110
Notes on	Applicatio	n to Upsta	and Beams	<u> </u>					
		-							
Rect - s/s		N/A					N/A		
Rect - cont	tinuous	Hog in con	tinuous bea	am with pre	ecast slab			s irrelevant	
Rect - can	tilever		tilever bear	m with pred	ast slab		Deflections	s relevant	
T - s/s		N/A					N/A	<u> </u>	
T - continu		_	tinuous inte					s irrelevant	1
T - cantile	ver		tilever inte	rior beam v	vith insitu s	slab 	Deflections	s relevant 	
L - s/s L - continu	IOUS	N/A	 ntinuous edg	ge heam wi	th incitu cl	<u> </u>	N/A Deflections	 s irrelevant	
L - cantille			itilever edge				Deflections		
Rect - s/s		_	beam with				Deflections		
Rect - cont	tinuous		tinuous bea			itu slab	Deflections		
				r					
ook)									
ate line loa	d 100 kN/m	1							
10									
10		\dashv \sqsubseteq							
12		\square							
5		 							
		_							
0	40								
9m	10m								
575mm	675mm								
675mm	800mm				-				
		\dashv							
775mm	925mm								
		=							
11m	12m								
	12/11								
550mm	650mm								
650mm	750mm								
		- $ $ $ $ $ $							
775mm	875mm								