The RC Desktop Toolkit



SH



BS 8110 Design – Shear

Table 3 Form and area of shear	Form and area of snear reinforcements in beams						
Value of v N/mm ²	Form of shear reinforcement to be provided	Area of shear reinforcement to be provided					
Less than 0.5 $v_{ m c}$ throughout the beam	See NOTE 1	-					
$0.5 v_c < v < (v_c + 0.4)$	Minimum links for whole length of beam	$A_{sv} \ge 0.4 b_v s_v / 0.87 f_{yv}$ (see NOTE 2)					
$(v_c + 0.4) < v < 0.8 \sqrt{f_{cv}} \text{ or } 5 \text{ N/mm}^2$	Links or links combined with bent-up bars. Not more than 50% of the shear resistance provided by the steel may be in the form of bent-up bars (see NOTE 3)	Where links only provided: $A_{sv} \ge b_v s_v \{v - v_c\}/0.87 f_{vv}$ Where links and bent-up bars provided: see 3.4.5.6 of BS 8110					

NOTE 1 While minimum links should be provided in all beams of structural importance, it will be satisfactory to omit them in members of minor structural importance such as lintels or where the maximum design shear stress is less than half v_c .

NOTE 2 Minimum links provide a design shear resistance of 0.4 N/mm².

NOTE 3 See 3.4.5.5 of BS 8110 for guidance on spacing of links and bent-up bars.

Based on Table 3.7 of BS 8110

Values of v_c design concrete shear stress 100As Effective depth b_vd mm 200 250 125 150 175 225 300 400 N/mm² N/mm² N/mm² N/mm² N/mm² N/mm² N/mm² N/mm² ≤ 0.15 0.45 0.43 0.41 0.40 0.39 0.38 0.36 0.34 0.25 0.53 0.51 0.49 0.47 0.46 0.45 0.43 0.40 0 50 0.67 0.64 0.62 0.60 0 58 0 56 0 54 0.50 0.75 0.77 0.73 0.71 0.68 0.66 0.65 0.62 0.57 1.00 0.84 0.81 0.78 0.75 0.73 0.71 0.68 0.63 1.50 0.97 0.92 0.89 0.86 0.83 0.81 0.78 0.72 2.00 1.06 1.02 0.98 0.95 0.92 0.89 0.86 0.80 ≥ 3.00 1.22 1.16 1.12 0.91 1.08 1.05 1.02 0.98

NOTE 1 Allowance has been made in these figures for a γm of 1.25.

NOTE 2 For characteristic concrete strength greater than 25 N/mm², the values in this table may be multiplied by $[f_{cu}/25]^{1/3}$, the value of f_{cu} should not be taken as greater than 40.

Based on Table 3.8 of BS 8110

BS 8110 Design – Flexure



Table 1	Design for bea	ultimate bendi ms	ing moments a	nd shear force	
	At outer	Near middle of	At first interior	At middle of	Δt ir

	At outer	Near mudule of	At Inst Interior	At midule of	At Interior
	support	end span	support	interior spans	supports
Moment	0	0.09 <i>Fl</i>	-0.11 <i>Fl</i>	0.07 <i>Fl</i>	-0.08 <i>Fl</i>
Shear	0.45 <i>F</i>	_	0.6 <i>F</i>	_	0.55 <i>F</i>

NOTE

l is the effective span;

F is the total design ultimate load $(1.4G_{k} + 1.6Q_{k})$.

No redistribution of the moments calculated from this table should be made.

Characteristic imposed load Qk may not exceed characteristic dead load Gk; Loads should be substantially uniformaly distributed over three or more spans; Variations in span length should not exceed 15% of longest.

To be used for BS8110 design only. For EC2 design, please refer to Table 1 on page 6.

Based on Table 3.5 of BS 8110

Table 2	z/	z/d for singly reinforced rectangular sections							
К		z/d		K	z/d				
0.05		0.94		0.11	0.86				
0.06		0.93		0.12	0.84				
0.07		0.91		0.13	0.82				
0.08		0.90		0.14	0.81				
0.09		0.89		0.15	0.79				
0.10		0.87		0.156	0.78				

BS 8110 Design – Axial





Column design chart for circular column $h_s/h = 0$.



Based on figures C.4d and C.5b of "Concrete Buildings Scheme Design Manual."

BS 8110 Design – Deflection

Service M/bd^2 0.50 0.75 2.00 3.00 4.00 5.00 stress 1.00 1.50 6.00 100 2 00 2 00 2.00 1 86 1.63 1.36 1.19 1 08 1.01 150 2.00 2.00 1.98 1.69 1.49 1.25 1.11 1.01 0.94 $[f_v = 250] 167$ 2.00 2.00 1.91 1.63 1.44 1.21 1.08 0.99 0.92 0.88 200 2 00 1 95 1.76 1.51 1.35 1.14 1 02 0 94 0.82 250 1.90 1.70 1.55 1.34 1.20 1.04 0.94 0.87 300 1.60 1.44 1.33 1.16 1.06 0.93 0.85 0.80 0.76 $[f_v = 500] 333$ 141 1.28 1.18 0.75 0 72 1 05 0.96 0.86 0 79

NOTE 1 The values in the table derive from the equation:

Modification factor = $0.55 + \frac{(477 - f_s)}{120(0.9 + M)} \le 2.0$

where

M is the design ultimate moment at the centre of the span or, for a cantilever, at the support.

NOTE 2 The design service stress in the tension reinforcement in a member may be estimated from the equation:

 $f_{s} = \frac{2f_{y}A_{s req}}{3A_{s prov}} \times \frac{1}{B_{b}}$

NOTE 3 For a continuous beam, if the percentage of redistribution is not known but the design ultimate moment at mid-span is obviously the same as or greater than the elastic ultimate moment, the stress f_s in this table may be taken as $2/3 f_{b}$.

Based on Table 3.10 of BS 8110

Table 6Modification factor for co	mpression reinforcement	
100 <u>A's prov</u> bd	Factor	
0.00	1.00	NOTE 1 The area of
0.15	1.05	compression reinforcement A
0.25	1.08	all bars in the compression
0.35	1.10	zone, even those not effectively
0.50	1.14	tied with links.
0.75	1.20	Based on Table 3.11 of BS 8110
1.0	1.25	
1.5	1.33	
2.0	1.40	
2.5	1.45	
>3.0	1 50	

	Table 7 Basic spa or flange	n/effective depth ratio d beams	for rectangular		
Support conditions		Rectangular section	Flanged beams with $\frac{b_{W}}{b} \le 0.3$		
	Cantilever	7	5.6		
	Simply supported	20	16.0		
	Continuous	26	20.8		

NOTE 1 For spans exceeding 10m, Table 7 should be used only if it is not necessary to limit the increase in deflection after the construction of partitions and finishes. Where limitation is necessary, the values in Table 7 should be multiplied by 10/span except for cantilevers where the design should be justified by calculation.

Based on Table 3.9 of BS 8110

EC2 Design – Flexure

Table 2 z/d for singly reinforced rectangular sections							
К	z/d	К	z/d				
0.01	0.950a	0.11	0.891				
0.02	0.950a	0.12	0.880				
0.03	0.950a	0.13	0.868				
0.04	0.950a	0.14	0.856				
0.05	0.950a	0.15	0.843				
0.06	0.944	0.16	0.830				
0.07	0.934	0.17	0.816				
0.08	0.924	0.18	0.802				
0.09	0.913	0.19	0.787				
0.10	0.902	0.20	0.771				

KEY

a Limiting z to 0.95d is not a requirement of Eurocode 2, but is considered to be good practice.

EC2 Design – Shear

Procedure for determining vertical shear reinforcemen

Determine v_{Ed} where: v_{Ed} = design shear stress [$v_{Ed} = v_{Ed} (b_w z) = v_{Ed} / (0.9 b_w d)$]



able 3 Minimum and maximum concrete strut capacity in terms of stress

f _{ck}	$V_{Rd, \max \cot \Theta} = 2.5$	V_{Rd} , max cot θ = 1.0
20	2.54	3.68
25	3.10	4.50
28	3.43	4.97
30	3.64	5.28
32	3.84	5.58
35	4.15	6.02
40	4.63	6.72
45	5.08	7.38
50	5.51	8.00

Based on guidance in "How to Design Concrete Structures Using Eurocode 2" by The Concrete Centre.



EC2 Design – Flexure



Table 1 Bending moment and shear coefficients for beams							
	Moment	Shear					
Outer support	25% of span moment	0.45 (<i>G + Q</i>)					
Near middle of end span	0.090 <i>Gl</i> + 0.100 <i>Ql</i>						
At first interior support	– 0.094 (<i>G</i> + <i>Q</i>) <i>l</i>	0.63 [<i>G</i> + <i>Q</i>] ^a					
At middle of interior spans	0.066 <i>Gl</i> + 0.086 <i>Ql</i>						
At interior supports	– 0.075 (<i>G + Q</i>) <i>l</i>	0.50 (<i>G</i> + <i>Q</i>)					

KEY

a 0.55 (G + Q) may be used adjacent to the interior span.

NOTES

Design

complete

- 1 Redistribution of support moments by 15% has been included.
- **2** Applicable to 3 or more spans only and where $Q_k \ge G_k$.
- 3 Minimum span ≥ 0.85 longest span.
- 4 *l* is the span, *G* is the total of the ULS permanent actions, *Q* is the total of the ULS variable actions.

Based on guidance in "How to Design Concrete Structures Using Eurocode 2" by The Concrete Centre.

EC2 Design – Axial

1.3 Ratio $d_2/h=0.10$ 1.2 b As fra / 6hf an 1.0 1.1 d₂ . 1.0 h 0.8 1.9 0.8 0,5 N/bhf_{ck} 0.3 0.2 n 0.5 0.4 0.3 0.2 0.1 Ω 0.05 0.10 0.15 0.20 0.25 0.30 0.35 0.40 0.45 Ω $M/bh^2 f_{ck}$

Column design chart 2



Further column charts can be found at www.eurocode2.info



EC2 Design – Deflection

deflection Check complete Determine basic l/d and k from Figure 1 Yes Determine Factor 1 (F1) For Flanged sections < Actual I/d? $F1 = 1 - 0.1 \left[\left(\frac{b_i}{b_{in}} \right) - 1 \right] \ge 0.8^{+1}$ (b_f is flange breadth and b_w is rib breadth) Otherwise F1 = 1.0F3 = $310/\sigma_{s}$ Determine Factor 2 (F2) Where the slab span exceeds 7m and it supports brittle partitions, $F_2 = 7/l_{off} < 10$ Otherwise F2 = 1.0

Is basic l/d x K x F1 x F2 x F3 No Determine Factor 3 (F3) Where σ_s = Stress in reinforcement at serviceability limit state σ_s may Increase As. prov assumed to be 310 MPa (i.e. F3 = 1.0) or f_{ck} where $A_{s, prov} = A_{s, regid}$ Note: As prov ≤1.5 As regid (UK National Annex)



Percentage of tension reinforcement $[A_{sreq'd}/bd]$

NOTES

1 This graph assumes simply supported span condition [K = 1.0] K = 1.5 for interior span condition K = 1.3 for end span condition K = 1.2 for flat slabs K = 0.4 for cantilevers

 ${\bf 2}$ Compression reinforcement, ρ ', has been taken as 0.

3 Curves based on the following expressions:



where $\rho \leq \rho_0$



where $\rho > \rho_0$

Based on guidance in "How to Design Concrete Structures Using Eurocode 2" by The Concrete Centre.



[†] The Eurocode is ambiguous regarding linear interpolation. It is understood that it was the intention of the drafting committee that linear interpolation be used and this is in line with current UK practice.

Notation of steel reinforcement

Type of steel reinforcement	Notatio
For diameters ≤ 12mm, Grade B500A, Grade B500B or Grade B500C conforming to BS 4449:2005	Н
For diameters > 12mm, Grade B500B or Grade B500C conforming to BS 4449:2005	
Grade B500A conforming to BS 4449:2005	А
Grade B500B or Grade B500C conforming to BS 4449:2005	В
Grade B500C conforming to BS 4449:2005	С
A specified grade and type of ribbed stainless steel conforming to BS 6744:2001	S
Reinforcement of a type not included in the above list having material properties that are defined in the design or contract specification	Х

NOTE: In the Grade description B500A, etc., "B" indicates reinforcing steel.

BS5400 Ultimate anchorage bond lengths and lap lengths as a multiple bar size (for grade 500, type 2 deformed bars)

Condition	Tension for Values of f_{cu} (N/mm ²)				Compression for Values of <i>f_{cu}</i> (N/mm ²)				
	20	25	30	≥ 40	20	25	30	≥ 40	
Anchorage length	50	44	39	33	41	35	31	27	
Lap length (α_1 =1.0)	50	44	39	33	41	35	31	27	
Lap length ($\alpha_1 = 1.4$)	70	62	55	47	57	49	44	37	
Lap length (α_1 =2.0)	100	88	78	66	81	70	62	53	

NOTE: 1. \propto = 1.0 for lapped bars in the corner of a section where the cover to both faces is at least 2ϕ and, for sets of bars in the same layer, the gaps between the sets are at least 150mm.

2. \propto = 2.0 if either or both of the conditions above are not satisfied and the bars are at the top of a section as cast. 3. \propto = 1.4 for all other conditions.

Sectional ar	eas pei	r metre	width	for var	ious ba	ir spaci	ngs (m	m²/m)		
Bar Size (mm) Number of Bars										
	1	2	3	4	5	6	7	8	9	10
6*	28.3	56.6	84.9	113	142	170	198	226	255	283
8	50.3	101	151	201	252	302	352	402	453	503

8	50.3	101	151	201	252	302	352	402	453	503
10	78.5	157	236	314	393	471	550	628	707	785
12	113	226	339	452	566	679	792	905	1020	1130
16	201	402	603	804	1010	1210	1410	1610	1810	2010
20	314	628	943	1260	1570	1890	2200	2510	2830	3140
25	491	982	1470	1960	2450	2950	3440	3930	4420	4910
32	804	1610	2410	3220	4020	4830	5630	6430	7240	8040
40	1260	2510	3770	5030	6280	7540	8800	10100	11300	12600
50	1960	3930	5890	7850	9820	11800	13700	15700	17700	19600

Sectional areas of groups of bars (mm²)

Bar Size (mm)					Spacing	of Bars				
	75	100	125	150	175	200	225	250	275	300
6*	377	283	226	189	162	142	126	113	103	94.3
8	671	503	402	335	287	252	224	201	183	168
10	1050	785	628	523	449	393	349	314	285	262
12	1510	1130	905	754	646	566	503	452	411	377
16	2680	2010	1610	1340	1150	1010	894	804	731	670
20	4190	3140	2510	2090	1800	1570	1400	1260	1140	1050
25	6550	4910	3930	3270	2810	2450	2180	1960	1790	1640
32	10700	8040	6430	5360	4600	4020	3570	3220	2920	2680
40	16800	12600	10100	8380	7180	6280	5580	5030	4570	4190
50	26200	19600	15700	13100	11200	9820	8730	7850	7140	6540

NOTE: The above Tables have been calculated to three significant figures according to the B.S.I. recommendations. * Denotes non-preferred sizes.

Rebar Tables BS 8666:2005 User Guide

BS 8110 Ultimate anchorage	bond	length	s and la	ip lengt	ths C20	-30				BS 8110 Ultimate anchorage	bond l	engths	and la	ip lengi	ths C28	-40			
				Bar size										Bar size	;				
	8	10	12	16	20	25	32	40	50		8	10	12	16	20	25	32	40	50
		C	Concrete	strength	class C2	0/25						C	concrete	strength	n class C	28/35			
Lap lengths or tension anchorage	360	440	530	710	880	1100	1410	1760	2200	Lap lengths or tension anchorage	310	380	460	610	760	950	1220	1520	1900
1.4 _ tension lap	500	620	750	1000	1240	1550	1990	2480	3100	1.4 _ tension lap	420	520	630	840	1040	1300	1670	2080	2600
2.0 _ tension lap	ap 500 620 750 1000 1240 1550 1990 2460 3 ap 710 880 1060 1410 1760 2200 2820 3520 4								4400	2.0 _ tension lap	600	750	900	1200	1500	1880	2400	3000	3750
Compression anchorage length	280	350	420	560	700	880	1120	1400	1750	Compression anchorage length	240	300	360	480	600	750	960	1200	1500
		(Concrete	strength	class C2	5/30						C	oncrete	strength	class C	32/40			
Lap lengths or tension anchorage	320	400	480	640	800	1000	1280	1600	2000	Lap lengths or tension anchorage	280	350	420	560	700	880	1120	1400	1750
1.4 _ tension lap	450	560	680	900	1120	1400	1800	2240	2800	1.4 _ tension lap	400	490	590	790	980	1230	1570	1960	2450
2.0 _ tension lap	640	800	960	1280	1600	2000	2560	3200	4000	2.0 _ tension lap	560	700	840	1120	1400	1750	2240	2800	3500
Compression anchorage length	260	320	390	520	640	800	1030	1280	1600	Compression anchorage length	230	280	340	450	560	700	900	1120	1400

EC2 Ultimate anchorage bond lengths and lap lengths

		Bond condition			Re	einforcer bar dian	ment in neter, ϕ	tensior (mm)	Ι,			Reinforcement in compression
			8	10	12	16	20	25	32	40	50	
Anchorage length, $I_{ m bd}$	Straight bars only	Good	230	320	410	600	780	1010	1300	1760	2020	40
		Poor	330	450	580	850	1120	1450	1850	2510	2890	58
	Other bars	Good	320	410	490	650	810	1010	1300	1760	2020	40
		Poor	460	580	700	930	1160	1450	1850	2510	2890	58
Lap length, I_{o}	Half the bars lapped	Good	320	440	570	830	1090	1420	1810	2460	2830	57
	in one location	Poor	460	630	820	1190	1560	2020	2590	3520	4040	81
	Third of the bars lapped	Good	270	360	470	690	900	1170	1490	2020	2330	66
	in one location	Poor	380	520	670	980	1280	1660	2130	2890	3320	46

NOTES

1. Cover to all sides and distance between bars ≥ 25 mm (i.e. $\alpha_2 < 1$)

2. $\alpha_1 = \alpha_3 = \alpha_4 = \alpha_5 = 1.0$

3. Design stress has been taken as 435 MPa. Where the design stress in the bar at the position from the where the anchorage is measured, σ_{sd} is less than 435 the figures in this table can be factored by $\sigma_{sd}/435$

4. The anchorage and lap lengths have been rounded up to the nearest 10 mm

5. Where all the bars are lapped in one location, increase the lap lengths for 'Half the bars lapped in one location' by a factor of 1.07

 The figures in this table have been prepared for concrete class C25/30; the following factors may be used for other concrete classes

Concrete class	C20/25	C28/35	C30/37	C32/40
Factor	1.16	0.93	0.89	0.85
Concrete class	C35/45	C40/50	C45/50	C50/60
Factor	0.80	0.73	0.68	0.63

Rebar Tables BS 8666:2005 User Guide

Minimum over	all dept	h of vari	ous U-bars					
British Standard	Lon	gitudinal w	/ires	(Cross wire	S		Mass
Reference	size	pitch	area	size	pitch	area		
	mm	mm	mm²/m	mm	mm	mm²/m	kg/m²	kg/sheet
			Squar	re Mesh F	abric			
A 393	10	200	393	10	200	393	6.16	70.96
A 252	8	200	252	8	200	252	3.95	45.50
A 193	7	200	193	7	200	193	3.02	34.79
A 142	6	200	142	6	200	142	2.22	25.57
			Stru	ictural Fal	bric			
B1131	12	100	1131	8	200	252	10.9	125.57
B 785	10	100	785	8	200	252	8.14	93.77
B 503	8	100	503	8	200	252	5.93	68.31
B 385	7	100	385	7	200	193	4.53	52.19
B 283	6	100	283	7	200	193	3.73	42.97
			Long	g Mesh Fa	bric			
C 785	10	100	785	6	400	70.8	6.72	77.41
C 636	9	100	636	6	400	70.8	5.55	63.94
C 503	8	100	503	6	400	70.8	4.51	50.00
C 385	7	100	385	6	400	70.8	3.58	39.28
C 283	6	100	283	6	400	70.8	2.78	30.07
			Wrapp	ing Mesh	Fabric			
D 98	5	200	98	5	200	98	1.54	17.74
D 49	2.5	100	49	2.5	100	49	0.77	8.87

Fabric to BS 4483 – Preferred meshes in stock size sheets 4.8m long 2.4m wide



Minimum L bar dimensions										
Bar Size (mm)	6	8	10	12	16	20	25	32	40	50
Minimum radius for scheduling (mm)	12	16	20	24	32	70	87	112	140	175
Minimum end projection [C] (mm)	110	115	120	125	130	190	240	305	380	475



Rebar Tables BS 8666:2005 User Guide

Mass of groups of bars (kg per metre run)

Bar Size (mm)				Numb	er of Bar	`s				
	1	2	3	4	5	6	7	8	9	10
6*	0.222	0.444	0.666	0.888	1.110	1.332	1.554	1.776	1.998	2.220
8	0.395	0.790	1.185	1.580	1.975	2.370	2.765	3.160	3.555	3.950
10	0.616	1.232	1.848	2.464	3.080	3.696	4.312	4.928	5.544	6.160
12	0.888	1.776	2.664	3.552	4.440	5.328	6.216	7.104	7.992	8.880
16	1.579	3.158	4.737	6.316	7.895	9.474	11.053	12.632	14.211	15.790
20	2.466	4.932	7.398	9.864	12.330	14.796	17.262	19.728	22.194	24.660
25	3.854	7.708	11.562	15.416	19.270	23.124	26.970	30.832	34.686	38.540
32	6.313	12.626	18.939	25.252	31.565	37.878	44.191	50.504	56.817	63.130
40	9.864	19.728	29.592	39.456	49.320	59.184	69.048	78.912	88.776	98.640
50	15.413	30.826	46.239	61.652	77.065	92.478	107.891	123.304	138.717	154.130

NOTE: The weights in the Table for groups of bars are the B.S.I. exact values. *Denotes non-preferred sizes.

Mass in kg p	oer sq r	netre f	or vario	us spa	cings					
Bar Size (mm)				Spacin	g of Ba	rs (millin	netres)			
	75	100	125	150	175	200	225	250	275	300
6*	2.960	2.220	1.776	1.480	1.269	1.110	0.987	0.888	0.807	0.740
8	5.267	3.950	3.160	2.633	2.257	1.975	1.756	1.580	1.436	1.317
10	8.213	6.160	4.928	4.107	3.520	3.080	2.738	2.464	2.240	2.053
12	11.840	8.880	7.104	5.920	5.074	4.440	3.947	3.552	3.229	2.960
16	21.053	15.790	12.632	10.527	9.023	7.895	7.018	6.316	5.742	5.263
20	32.880	24.660	19.728	16.440	14.091	12.330	10.960	9.864	8.967	8.220
25	51.387	38.540	30.832	25.693	22.023	19.270	17.129	15.416	14.015	12.647
32	84.173	63.130	50.504	42.087	36.074	31.565	28.058	25.252	22.956	21.043
40	131.520	98.640	78.912	65.760	56.366	49.320	43.840	39.456	35.869	32.880
50	205.507	154.130	123.304	102.753	88.074	77.065	68.502	61.652	56.047	51.377



BS 8666:2005 Standard Shapes 33 - 99

Total length (L) = 2A + 1.7B + 2(C) - 4d













Total length (L) = A + B + C + (D) - r - 2d





Note: Some shape codes with 3 or more bends may have health & safety implications during manufacture.

For more information and advice on the production of BS8666 shape codes, please contact BAR.



Total length (L) = A + B + C + D + (E) - 2r - 4d



Total length (L) = A + 2B + C + (E)



Total length (L) = 2A + B + 2C + 1.5r - 3d



Total length (L) = 2(A + B + (C)) - 2.5r - 5d



Total length (L) = A + B + C + (D) + 2(E)- 2.5r - 5d



Total length (L) = 2A + 3B + 2(C) - 3r - 6d







Total length (L) = π (A - d) + (B)



Committee of turns

Total length (L) = $C.\pi$. (A - d)



Total length (L) = A + 2B + C + (D) - 2r - 4d

All other shapes where standard shapes cannot be used. No other shape code number, form of designation or abbreviation shall be used in scheduling. A dimensioned sketch shall be drawn over the dimension columns A to E. Every dimension shall be specified and the dimension that is to allow for permissible deviations shall be indicated in parenthesis, otherwise the fabricator is free to choose which dimension shall allow for tolerance.









BS 8666:2005 Standard Shapes 00 - 32

Note: Some shape codes with 3 or more bends may have health & safety implications during manufacture. For more information and advice on the production of BS8666 shape codes, please contact BAR.







Total length (L) = A + (C)



Total length (L) = A, stock lengths



Total length (L) = A + (B) - 0.5r - d















Total length (L) = A + B + (C)



Total length (L) = A + B + (E)



Total length (L) = A + B + (C)



Total length (L) = A + B + (C) - 0.5r - d



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Total length (L) = A + B + (C) - r - 2d



Total length (L) = A + B + (C) - 0.5r - d



Total length (L) = A + B + (C) - r - 2d

Total length (L) = A + B + (C) - r - 2d





Total length (L) = A + B + C + (D) - 1.5r - 3d

Total length (L) = A + B + C + (D) - 1.5r - 3d













Total length (L) = A + B + C + (D) - 1.5r - 3d

Modex

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Modular Reinforcement Solutions.....revolutionising RC construction



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Modular Reinforcement Solutions.....revolutionising RC construction

Core benefits

Speed

Optimisation

Safety

The way in which reinforcing steel is detailed, fabricated, delivered to and fixed on-site is changing. With the development of 3D modeling software and the latest in-house production techniques, reinforcing steel can now be delivered and placed almost entirely in pre-fabricated modular elements that can dramatically...

Increase:

- Speed of construction
- Accuracy of rebar placement
- Speed and extent of the checking process
- Buildability
- Early identification of errors
- Site tidiness

And decrease:

- Site accidents/incidents
- Required skill level of labourers
- Number of fixers required
- Extent of consultant/contractor detailing
- Setting out time
- Construction complexity
- Clashes
- Costs

Other capabilities:

- Carpet reinforcement
- Piling cages
- Diaphragm wall cages
- Detailed cost analysis
- Project management
- Programme optimisation



Advanced 3D modeling capabilities



Specialist suppliers of construction accessories

SHEARTECH®

Punching shear system for slab construction:

- Faster fixing as it eliminates loose links
- Produced from grade C reinforcement
- CARES Technical Approval
- Meets EC2 design criteria
- Calculation programme available



STARTABOX ®

Reinforcement continuity system:

- Simplifies formwork design for wall/ slab connections
- Improved safety by eliminating protruding bars
- Multiple arrangements available
- CARES Technical Approval
- Larger diameter bars can be supplied using the couplerbox

For more details, or to explore Engineering Solutions, please contact us for a discussion at: www.rfa-tech.co.uk

Advanced Prefabricated Elements

www.rebar-solutions.com

Innovative Reinforcement Solutions......optimising performance and value

Structural Fabrics

Due to recent advances in reinforcing steel and mesh production, it is now possible to supply a wide range of high ductile (grade 500C) fabrics. This enables the fast and high quality fabrication of sheets of bespoke reinforcing steel layouts, that can then be placed quickly and simply on site.

The re-detailing of loose bar arrangements into structural fabric layouts can be carried out by the rebar fabricator and supplied to your site, with colour-coded drawings, for immediate placement.





Carpet Reinforcement

Carpet reinforcement is a one directional mat of prefabricated reinforcement supplied to site, ready to be installed. Since its conception as a reinforcement solution, it has been widely adopted and acknowledged as a fundamental element in flat slab modularization, and it has a number of inherent benefits including:



Speed of construction Enhanced Health & Safety Pour synchronised delivery Reduced setting out





What is responsible sourcing?

The Responsible Sourcing of Construction Products provides a holistic approach to managing a product from the point at which constituent materials are harvested / recovered through manufacture and fabrication, through use, re-use and recycling.

Within Eco-Reinforcement, the Responsible Sourcing of reinforcing steel products is demonstrated through an ethos of supply chain management and product stewardship and encompasses social, economic and environmental dimensions.

Requirements

The requirements of the Eco-Reinforcement standard can be categorised under three main headings:

Organisational Management

- Commitment to implement Responsible Sourcing throughout the organisation.
- Demonstrate compliance with all applicable legislation
- Provide evidence of Quality Management System to ISO 9001 or equivalent.
- Demonstrate due diligence in relation to supply chain compliance with human rights legislation and international agreements.

Supply Chain Management

- Demonstrate material traceability through the entire supply chain through QMS which follows the principles of ISO 9001.
- Demonstrate material traceability through the entire supply chain through EMS which follows the principles of ISO 14001.

• Demonstrate material traceability through the entire supply chain through Health & Safety Management System which follows the principles of OHSAS 18001.

Environmental and Social Issues

- Green house gas emissions
- Resource use
- Waste management
- Water extraction
- Life cycle assessment
- Transport
- Employment and skills
- Local communities
- Stakeholder engagement

Rating

To meet the Eco-Reinforcement Standard, organisations must satisfy certain compulsory elements. In addition, there are higher levels of compliance that can result in a higher performance rating being awarded. This Standard will also provide a route to obtaining credits under the BREEAM family of certification schemes and the Code for Sustainable Homes.

















Overview

Eco-reinforcement is a third party certification scheme which assesses and recognises responsibly sourced reinforcing steel products. It has been developed as a sector specific standard which complies fully with the requirements of BRE's BES 6001 Framework Standard for the Responsible Sourcing of Construction Products.

History

Launched in May 2009, the Eco-Reinforcement standard was developed by a consortium of reinforcing steel producers and fabricators, in collaboration with BRE Global and a wide range of external stakeholders, to identify the priority areas of the sector and work towards consistent performance.

Benefits

- Provides a route to obtaining credits within the materials sections of BREEAM and the Code for Sustainable Homes.
- Consistent with the UK strategy for Sustainable Construction target of 25% responsibly sourced construction products by 2012.
- Provides enhanced supply chain transparency by encouraging the adoption of responsible sourcing principles from product level up through the supply chain.
- Green book live recognition.
- Provides clients, specifiers and contractors with the confidence that reinforced steel products are responsibly sourced.
- Rating system facilitates sector and cross sector comparison.



















The Concrete Centre MART OF THE MINERAL PRODUCTS ASSOCIATION

Concrete information

The Concrete Centre is the central development organisation for the UK concrete industry. Its aim is to assist all those involved in design and construction to realise the full potential of concrete. In particular, The Concrete Centre offers a comprehensive range of publications, seminars, courses and online resources. For further information visit: www.concretecentre.com

The Concrete Centre has published a number of titles that can assist designers in achieving optimum structural solutions. Downloads or ordering details of all of the publications are available online: www.concretecentre.com/publications

Concise Eurocode 2

This publication summarises the reference material that will commonly be used in the design of reinforced concrete framed buildings to Eurocode 2. With extensive clause referencing, readers are guided through Eurocode 2 and other relevant Eurocodes. The publication, which includes design aids, aims to help designers with the transition to design to Eurocodes.

How to Design Concrete Structures to Eurocode 2



This publication draws together in one place key information and commentary required for the design of typical concrete elements to Eurocode 2 Design of Concrete Structures. Chapters are based on the successful series of I low to guides and include beams, columns, slabs, fire design, foundations and flat slabs.

Economic Concrete Frame Elements to Eurocode 2



This publication acts as a pre-scheme design handbook for the rapid sizing and selection of reinforced concrete frame elements in multi-storey buildings designed to Eurocode 2. The handbook is intended to give designers safe, robust and useful charts and data on which to base their scheme designs. The methodology behind the new charts and data is fully explained.

Concise Eurocode 2 for Bridges



This publication summarises the material that will be commonly used in the design of reinforced and prestressed concrete bridges using Eurocode 2. With extensive clause referencing, readers are guided through Eurocode 2, other relevant European standards and non-contradictory complementary information.

Properties of Concrete for use in Eurocode 2



In the design of concrete structures to Eurocode 2 engineers, have the flexibility to specify particular concrete types and properties. This guide provides engineers with a greater knowledge of concrete behaviour, allowing them to optimise the material aspects of concrete in their design.

Concrete Buildings Scheme Design Manual



This invaluable handbook is intended to be a quick reference guide for candidates taking the Institution of Structural Engineer's Chartered Membership Examination. It will also form an essential reference source in the design office. It gives guidance on initial sizing selecting an option, design calculations, producing drawings and programmes. It is packed with useful design data and charts.

Celsa Steel UK



certified steel manufacturer









Celsa Steel UK is a member of the Celsa Group, one of the largest steel manufacturers in Europe. Based in Cardiff, Celsa Steel UK provides the UK construction industry with over 60% of its reinforcing requirements, making them the largest producer of reinforcing products.



At Celsa, the need to manufacture quality products in a safe and sustainable manner is paramount. Certifications to ISO 9001, ISO 14001 OHSAS 18001 and the Eco-Reinforcement Responsible Sourcing Standard help us to achieve this goal, while conformance with British Standards is guaranteed via UK Cares product approval.



Celsa Steel UK recycles over 1.3 million tonnes of scrap metal annually. Our steel products are manufactured from 98% scrap metal, sourced from within the UK and Ireland.



Celsa Steel UK only produces Grade B500C reinforcing steel. This is high ductility reinforcement: the highest quality that can be specified in current British Standards. Grade B500C is over 50% more ductile than standard grade 500B material, a characteristic reflected in its extended load carrying capacity following yield.



Celsa use the Electric Arc Furnace (EAF) method of steel production, which uses electricity to melt scrap metal. This is the most sustainable method of steel production available, performing significantly better in terms of embodied energy and CO2 emissions when compared to other steel making processes.



Celsa is committed to innovation, be it through internal development or academic research. This commitment has led to Celsa being the first UK mill to supply only Grade 500C reinforcing steel, in bar and in Celsamax coil, a unique rib pattern developed to improve coil handling and processing speeds. In 2009, Celsa became the only mill to supply 50mm Grade 500C.





Health and Safety Matters

BAR and its members actively encourage good health and safety practice. Part of this commitment is the publication of health and safety industry guidance.

BAR has published the **Code for Safe Off-loading of Reinforcement Fabric**.Endorsed by the Health and Safety Executive(HSE), the code is aimed at all those

involved in the off-loading of reinforcement from delivery vehicles. It highlights potential hazards and provides guidance on safe working practice.

The code is followed by the **Safe Off-loading of Cut and Bent Reinforcement**. The primary objective of this code is to provide information and guidance to ensure the safe removal of bundles of cut and bent reinforcement from delivery vehicles. It covers planning for safe off-loading via the delivery plan and the preparation of the load for off-loading. The safety procedures outlined in the code have been drawn up in consultation with representatives from the HSE.

A further document is the **BAR Shape Code** leaflet. This will provide a risk assessment for the manufacture of each of the BS8666 shape codes and will inform designers and specifiers as to what constitutes a high risk shape. It will also prove useful for BAR members' production management teams.

Copies of the Code for Safe Off-loading of Reinforcement Fabric, Code for Safe Off-loading of Cut and Bent Reinforcement and the BAR Shape Code leaflets can be downloaded from BAR's website: www.uk-bar.org

The Safe off-loading of Reinforcement Fabric



A code of practice for users, hauliers and suppliers





Members



ArcelorMittal Kent Wire www.arcelormittalkentwire.co.uk



BRC Reinforcement www.brc.ltd.uk

Cannon Steels Ltd www.cannonsteelsltd.co.uk

Celsa Steel (UK) Limited www.celsauk.com

Collins Reinforcements Ltd

Collins Reinforcements Ltd www.rebar.uk.com

Express

Express Reinforcements Ltd www.expressreinforcements. co.uk Stated Bar Sales Fixing Centre Ltd fixingcentre@btconnect.com

R

ROE Group www.theroegroup.com

ROM

ROM Limited www.rom.co.uk



RSJ Steels (Lincoln) Ltd www.rsj-steels.co.uk

//// Stainless UK

Lemon Groundwork Supplies Stainless UK Limited www.lemon-gs.co.uk Stainless-uk-co.uk

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www.hv-ten.co.uk

Kierheck Limited

www.kierbeck.com

Thamesteel Limited Thamesteel Ltd www.thamesteel.co.uk

www.Improducts.co.uk



Midland Steel Reinforcement Supplies Ltd www.midlandsteelsupplied.ie





British Association of Reinforcement

The British Association of Reinforcement (BAR) is the trade association representing UK manufacturers and fabricators of steel reinforcement products, including cut and bent, coil, mesh and reinforcement accessories.

BAR aims to develop and add value to the concrete reinforcement industry through market development, product innovation, provision of technical support and the promotion of good industry practice, including health and safety and sustainability. It does this through the work of its working committees: Health and Safety; Technical; Business Development and Marketing.

The membership of BAR represents approximately 95% of the reinforcement delivered to construction sites within the UK. BAR members are chosen for their:

- Commitment to health and safety
- Commitment to sustainability
- Technical expertise
- Provision of added-value
- Product innovation and development
- Quality products and service.

BAR is represented on CARES committees and all BAR members are CARES approved. For further information visit: www.uk-bar.org



FOR REINFORCED SUCCESS CHOOSE A MEMBER OF THE BRITISH ASSOCIATION OF REINFORCEMENT FOR:



2011 Calendar

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enquiries@eco-reinforcement.org www.eco-reinforcement.org Tel: 01923 664312 Bucknalls Lane, Watford WD25 9XX BRE Global

with current British and European Standards. guidance, but should always be viewed in accordance prilies for scheme design and standard detailing fo and to be used by engineers and technicians of detailing of reinforced concrete structures. It is This document contains information on the design and

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