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BS 8666:2005 Scheduling, dimensioning, bending and cutting of steel reinforcement for concrete

Table 1 - Notation of steel reinforcement

Type of Steel reinforcement	Notation
Grade B500A, Grade B500B or Grade B500C conforming to BS 4449:2005	H
Grade B500A conforming to BS 4449:2005	A
Grade B500B or Grade B500C conforming to BS 4449:2005	B
Grade B500C conforming to BS 4449:2005	C
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.	X
NOTE In the Grade description B500A, etc., "B" indicates reinforcing steel.	

Extract 8.7 When dimensioning an acute angle the tangential lines shown in Figure 4 shall be used.

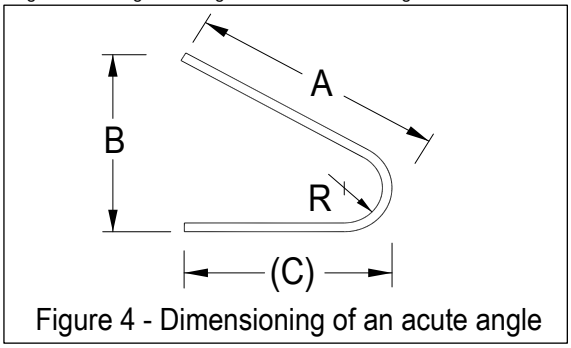
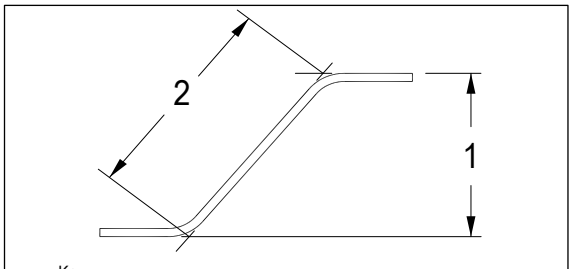


Figure 4 - Dimensioning of an acute angle

Extract 8.9 The overall offset dimensions of a crank shall be not less than twice the size of the bar. The angled length (see Figure 5) shall be not less than:

a) 10*d* for bars not exceeding a nominal size of 16 mm;
b) 13*d* for nominal sizes greater than 16 mm.



Key
1 = Offset dimension 2 = Angle length

Figure 5 - Dimensioning of cranked bars

Extract 8.10 For all shapes with two or more bends in the same or opposite directions (whetherin the same plane or not), the overall dimension given on the schedule shall always include a minimum straight of 4d between the curved portion of the bends, as shown in Figure 6. The value of x in Figure 6 shall be not less than the following:

a) 10*d* for bars not exceeding a nominal size of 16 mm;
b) 13*d* for nominal sizes greater than 16 mm.

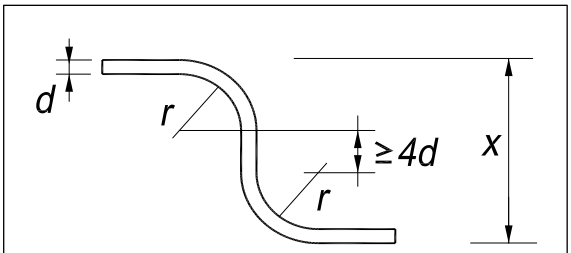


Figure 6 - Example of bar with more than one bend

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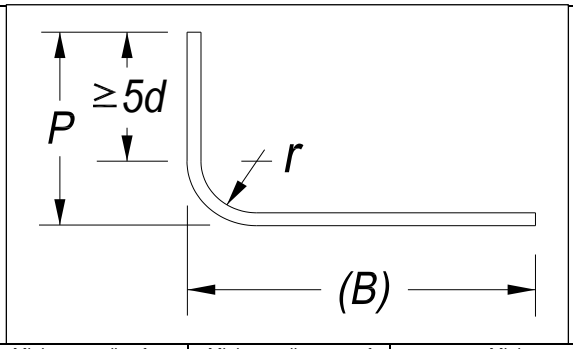
Table 2 - Minimum scheduling radii, former diameters and bend allowances



Nominal size of bar, d.	Minimum radius for scheduling, r.	Minimum diameter of bending former, M.	Minimum end projection, P	
			General (min 5d straight), including links where bend ≥150º	Links where bend ‹150º (min 10d straight)
mm	mm	mm	mm	mm
6	12	24	110[a]	110[a]
8	16	32	115[a]	115[a]
10	20	40	120[a]	130
12	24	48	125[a]	160
16	32	64	130	210
20	70	140	190	290
25	87	175	240	365
32	112	224	305	465
40	140	280	380	580
50	175	350	475	725

[a] The minimum end projections for smaller bars is governed by the practicalities of bending bars.

NOTE 1 Due to "spring back" the actual radius of bend will be slightly greater than half the diameter of the former.

NOTE 2 BS 4449:2005 grade B500A in sizes below 8mm does not conform to BS EN 1992-1.1:2004.

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Table 3 - Standard shapes, their method of measurement and calculation of length

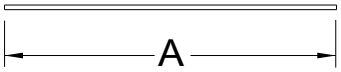
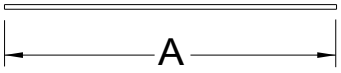
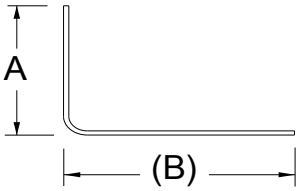
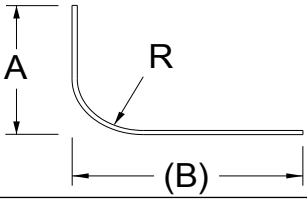
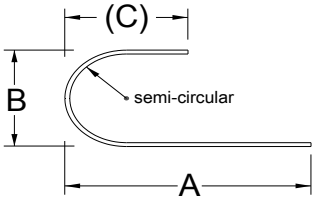
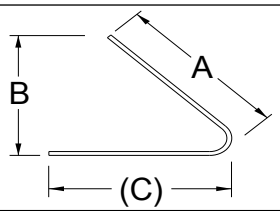
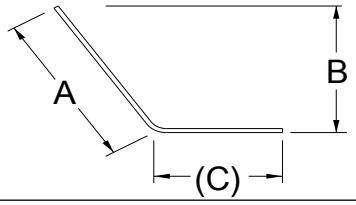
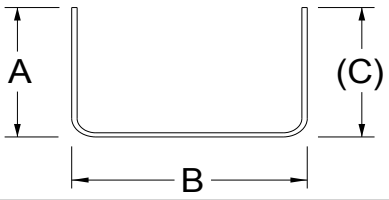
Shape Code	Shape Diagram	Total Length of Bar, L measured along centre line
00		*A*
01 **New**		*A* Stock Lengths See Note 4.
11		*A+(B)-0.5r-d* Neither *A* nor *B* shall be less than *P* in Table 2.
12		*A+(B)-0.43R-1.2d* Neither *A* nor *B* shall be less than *P* in Table 2 nor less than *(R+6d)*.
13		*A+0.57B+(C)-1.6d* *B* shall not be less than *2(r+d)*. Neither *A* nor *C* shall be less than *P* in Table 2 nor less than *(B/2+5d)* See Note 3.
14 **New**		*A+(C)-4d* Neither A nor *(C)* shall be less than *P* in Table 2. See Note 1.
15		*A+(C)* Neither *A* nor *(C)* shall be less than *P* in Table 2. See Note 1.
21		*A+B+(C)-r-2d* Neither *A* nor *(C)* shall be less than *P* in Table 2.

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Table 3 - Standard shapes, their method of measurement and calculation of length

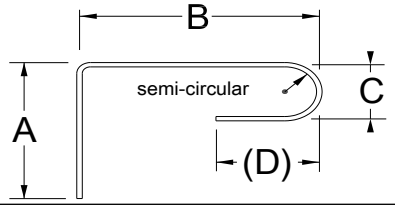
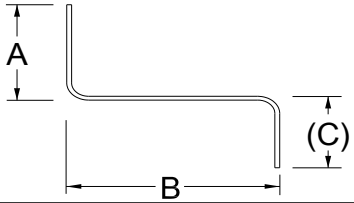
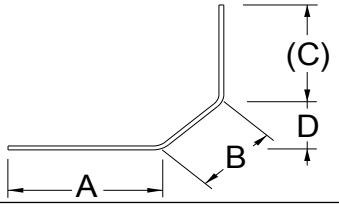
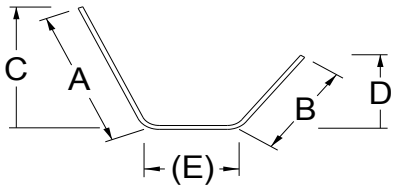
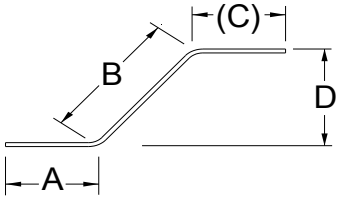
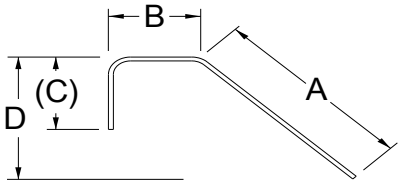
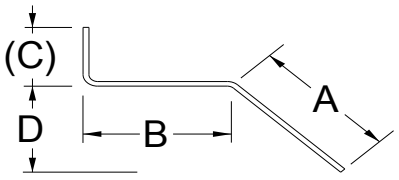
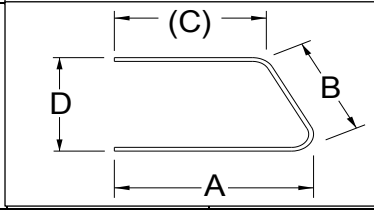
Shape Code	Shape Diagram	Total Length of Bar, L measured along centre line
22 **New**		*A+B+C+(D)-1.5r-3d* *C* shall not be less than *2(r+d)*. Neither *A* nor *(D)* shall be less than *P* in Table 2. *D* shall not be less than *C/2+5d*.
23 **New**		*A+B+(C)-r-2d* Neither *A* nor *B* shall be less than *P* in Table 2.
24 **New**		*A+B+(C)* *A* and *(C)* are at **90°** to one another.
25		*A+B+(E)* Neither *A* nor *B* shall be less than *P* in Table 2. If *E* is the critical dimension, schedule a **99** and specify *A* or *B* as the free dimension. See Note 1.
26		*A+B+(C)* Neither *A* nor *(C)* shall be less than *P* in Table 2. See Note 1.
27 **New**		*A+B+(C)-0.5r-d* Neither *A* nor *(C)* shall be less than *P* in Table 2. See Note 1.
28 **New**		*A+B+(C)-0.5r-d* Neither *A* nor *(C)* shall be less than *P* in Table 2. See Note 1.
29 **New**		*A+B+(C)-r-2d* Neither *A* nor *(C)* shall be less than *P* in Table 2. See Note 1.

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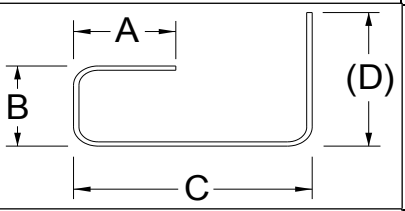
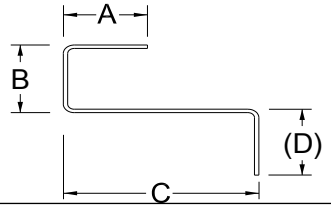
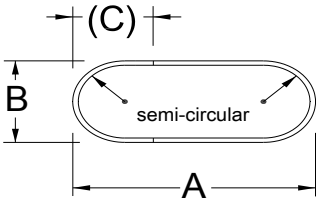
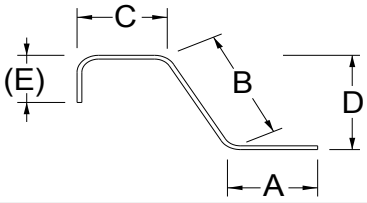
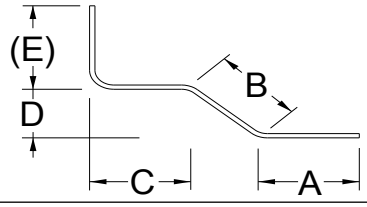
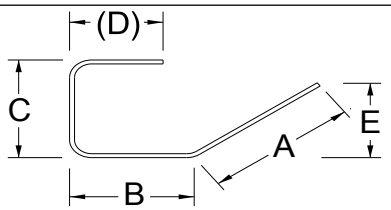
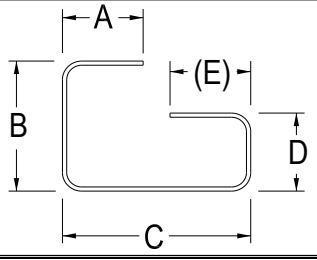
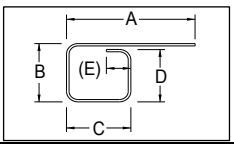
Table 3 - Standard shapes, their method of measurement and calculation of length

Shape Code	Shape Diagram	Total Length of Bar, L measured along centre line
31		*A+B+C+(D)-1.5r-3d* Neither *A* nor *(D)* shall be less than *P* in Table 2.
32 **New**		*A+B+C+(D)-1.5r-3d* Neither *A* nor *(D)* shall be less than *P* in Table 2.
33		*2A+1.7B+2(C)-4d* *A* shall not be less than *12d+30 mm.* *B* shall not be less than *2(r+d).* *(C)* shall not be less than *P* in Table 2, nor less than *B/2+5d.* See Note 3.
34 **New**		*A+B+C+(E)-0.5r-d* Neither *A* nor *(E)* shall be less than *P* in Table 2. See Note 1.
35 **New**		*A+B+C+(E)-0.5r-d* Neither *A* nor *(E)* shall be less than *P* in Table 2. See Note 1.
36 **New**		*A+B+C+(D)-r-2d* Neither *A* nor *(D)* shall be less than *P* in Table 2. See Note 1.
41		*A+B+C+D+(E)-r-2d* Neither *A* nor *(E)* shall be less than *P* in Table 2. May also be used for flag link: 

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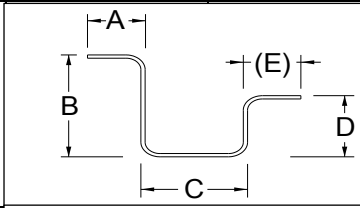
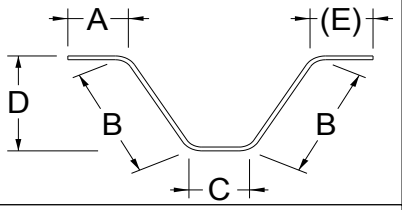
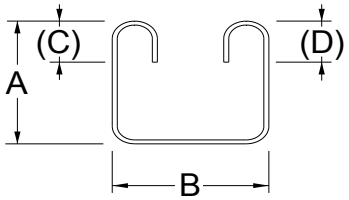
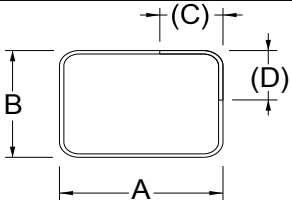
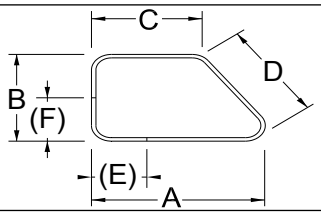
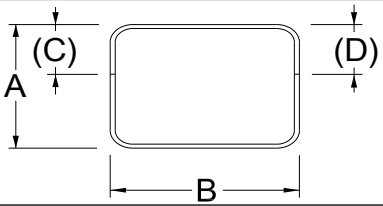
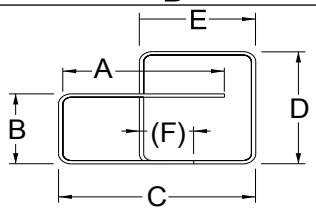
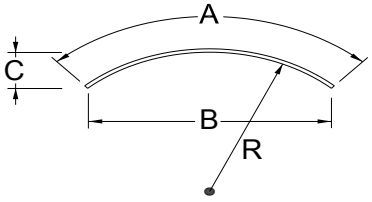
44		*A+B+C+D+(E)-2r-4d* Neither *A* nor *(E)* shall be less than *P* in Table 2.
46		*A+2B+C+(E)* Neither *A* nor *(E)* shall be less than *P* in Table 2. See Note 1.
47 **New**		*2A+B+2C+1.5r-3d* *(C)* and *(D)* shall be equal and not more than *A* nor less than *P* in Table 2. Where *(C)* and *(D)* are to be minimised the following formula may be used: *L=2A+B+max(21d, 240)*
51		*2(A+B+(C))-2.5r-5d* *(C)* and *(D)* shall be equal and not more than *A* or *B* nor less than *P* in Table 2. Where *(C)* and *(D)* are to be minimised the following formula may be used: *L=2A+2B+max(16d, 160)*
56 **New**		*A+B+C+(D)+2(E)-2.5r-5d* *(E)* and *(F)* shall be equal and not more than *B* or *C*, nor less than *P* in Table 2.
63 **New**		*2A+3B+2(C)-3r-6d* *(C)* and *(D)* shall be equal and not more than *A* or *B* nor less than *P* in Table 2. Where *(C)* and *(D)* are to be minimised the following formula may be used: *L=2A+3B+max(14d, 150)*
64 **New**		*A+B+C+2D+E+(F)-3r-6d* Neither *A* nor *(F)* shall be less than *P* in Table 2. See Note 2.
67		*A* See Clause **10**.

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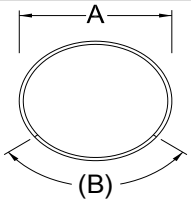
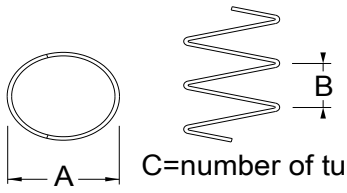
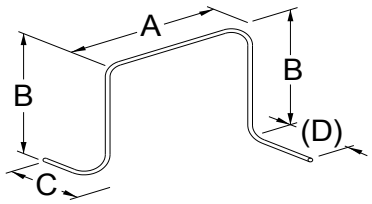
75 **New**		$\pi(A-d)+B$ Where *B* is the lap
77		$C\pi(A-d)$ Where *B* is greater than *A/5* this equation no longer applies, in which case the following formula may be used: $L=C((\pi(A-d))^2+B^2)^{0.5}$
98 **New**		$A+2B+C+(D)-2r-4d$ Isometric Sketch. Neither *C* nor *(D)* shall be less than *P* in Table 2.
99	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 parentheses, otherwise the fabricator is free to choose which dimension shall allow for tolerance.	To be calculated. See Note 2.

The values for minimum radius and end projection, *r* and *P* respectively, as specified in Table 2, shall apply to all shape codes (see 7.6).
The dimensions in parentheses are the free dimensions. If the shape given in the table is required but a different dimension is to allow for possible deviations, the shape shall be drawn out and given the shape code 99 and the free dimension shall be indicated in parentheses.
The straight length between two bends shall be at least 4d, see figure 6.
NOTE 1 The length equations for shape codes 14, 15, 25, 26, 27, 28, 29, 34, 35, 36 and 46 are approximate and where the bend angle is greater than 45º, the length should be calculated more accurately allowing for the difference between the specified overall dimensions and the true length measured along the central axis of the bar. When the bending angles approach 90º, it is preferable to specify shape code 99 with a fully dimensioned sketch.
NOTE 2 Five bends or more might be impractical within permitted tolerances.
NOTE 3 For shapes with straight and curved lengths (e.g. shape codes 12, 13, 22, 33 and 47) the largest practical mandrel size for the production of a continuous curve is 400 mm. See also Clause 10.
NOTE 4 Stock lengths are available in a limited number of lengths (e.g. 6 m, 12 m).
Dimension A for shape code 01 should be regarded as indicative and used for the purpose of calculating total length.
Actual delivery lengths should be by agreement with the supplier. See also the footnote to Table 5.

Tolerances on cutting and bending dimensions

The tolerances for cutting and / or bending dimensions shall be in accordance with Table 5 and shall be taken into account when completing the schedule. The end anchorage or the dimension in parentheses in the shape codes specified in Table 3 shall be used to allow for any permissible deviations resulting from cuttin and bending.

Table 5 Tolerances

Cutting and bending processes	Tolerances mm
Cutting of straight lengths (including reinforcement for subsequent bending)[a]	+25, -25
Bending:	
≤1000 mm	+5, -5
>1000 mm to ≤2000 mm	+5, -10
>2000 mm	+5, -25
Length of bars in fabric	±25 or 0.5% of the length (whichever is greater)

[a] Tolerances for shape code 01, stock lengths, shall be subject to the relevant product standard, e.g. BS 4449:2005

Radius of Bending

Reinforcement to be formed to a radius exceeding that specified in Table 6 shall be supplied straight.

Table 6 - Maximum limit for which a preformed radius is required

Bar Size mm	Radius m
6	2.5
8	2.75
10	3.5
12	4.25
16	7.5
20	14
25	30
32	43
40	58
50	?

NOTE 1 The required curvature maybe obtained during placing.
NOTE 2 For shapes with straight and curved lengths (e.g. shape codes 12, 13, 22 and 33) the largest practical radius for the production of continuous curves is 200mm, and for larger radii the curve may be produced by a series of straight sections.