

RAWL® Rawlbolt® Shield Anchor Loose Bolt

Design Data

Concrete

Loads shown are for 30N/mm² (C20/25) concrete. For other grades of concrete between 20 and 50N/mm² where the anchor is in tension the load can be calculated using the following empirical formula:

$$\text{Tensile SWL in } 30\text{N/mm}^2 \text{ Concrete} \times \sqrt{\frac{\text{Actual Concrete Strength}}{30}}$$

This calculation is not valid for shear.

By using spacers the anchor can be set at increased depths which will generally improve the tensile performance. This option should be considered for substrates of lower strength than 25N/mm².

Brickwork

Loads shown are for 20.5N/mm² brick. The anchor should be positioned a minimum of 300mm from the vertical edge of the wall and four courses down from the top of an unrestrained wall. Installing the anchor into mortar joints should be avoided.

Edge and Spacing Distances (concrete only)

The loads shown are applicable to characteristic edge and spacing distances. For reduced edge and spacing distances, reduction factors must be calculated from the appropriate tables below.

Combined Load (concrete only)

When selecting an anchor which will carry a combined load, ensure that the bolt size selected satisfies the following equation:

$$\frac{\text{Applied Tensile Load}}{\text{Safe Static Tensile Load}} + \frac{\text{Applied Shear Load}}{\text{Safe Static Shear Load}} \leq 1.2$$

(Edge and spacing reduction factors, if applicable, should be applied to the safe tensile and safe shear loads).

Performance Data at Standard Embedment Depth

SIZE	CONCRETE 30N/mm ² (C20/25)						BRICKWORK 20.5N/mm ²		
	SAFE WORKING LOAD (kN)		FAILURE LOAD (kN)		CHARACTERISTIC EDGE DISTANCE (mm)			CHARACTERISTIC SPACING DISTANCE (mm)	SAFE WORKING LOAD (kN) Tension & Shear
	Tension	Shear	Tension	Shear	Tension	Shear			
M6	3.3	6.8	12.2	14.9	80	100	120	1.8	
M8	4.8	8.7	15.4	19.0	100	120	150	2.3	
M10	6.2	13.7	21.2	30.2	120	160	180	2.9	
M12	9.7	19.9	30.9	43.8	160	180	250	4.3	
M16	21.3	36.9	73.1	81.3	190	260	290	Bolts above M12 are not recommended in brickwork	
M20	31.2	60.0	100.5	132.0	250	300	330		
M24	38.0	86.6	125.5	190.5	280	350	420		

Reduction Factors - Edge and Spacing Distances for Bolt Projecting and Loose Bolt

The characteristic edge and spacing distances quoted in the table above are the minimum allowable for the quoted safe loads to apply.

Where the design dictates reduced edge and spacing distances, the appropriate reduction factor/s from the tables below must be applied to the safe working load.

Choose the required bolt diameter across the top of the table

and read down the left hand column until actual edge or spacing distance is found. Read off the reduction factor where the two lines intersect (interpolate as required). Multiply this factor by the safe working load quoted in the table. On the occasion that multiple close edge and/or spacing distances occur, the appropriate reduction factors must be applied.

Edge Distance for 8.8 Grade Bolts (Concrete)

EDGE (mm)	TENSILE - EDGE REDUCTION FACTORS								EDGE (mm)	SHEAR - EDGE REDUCTION FACTORS							
	M6	M8	M10	M12	M16	M20	M24			M6	M8	M10	M12	M16	M20	M24	
30	0.70							60	0.50								
60	0.80	0.70						70	0.64								
70	0.90	0.80	0.70					80	0.76	0.50							
80	1.0	0.90	0.80	0.70				100	1.0	0.75	0.50						
100		1.0	0.90	0.78	0.70			120		1.0	0.69	0.50					
120			1.0	0.85	0.78	0.70		160			1.0	0.85					
140				0.93	0.85	0.76	0.70	170				0.93	0.50				
160				1.0	0.93	0.82	0.76	180				1.0	0.55				
190					1.0	0.88	0.82	220					0.76	0.50			
220						0.94	0.88	260					1.0	0.75	0.50		
250							1.0	0.94						1.0	0.75		
280								1.0							1.0		

Spacing (Concrete)

SPACING (mm)	TENSILE & SHEAR REDUCTION FACTORS							
	M6	M8	M10	M12	M16	M20	M24	
60	0.70							
80	0.80	0.70						
100	0.90	0.80	0.70					
120	1.0	0.90	0.80	0.70				
150		1.0	0.90	0.78	0.70			
180			1.0	0.85	0.78	0.70		
210				0.93	0.85	0.78	0.70	
250				1.0	0.93	0.85	0.76	
290					1.0	0.93	0.82	
330						1.0	0.88	
370							0.94	
420								1.0