## Design Data

### Concrete

Loads shown are for 30N/mm$^2$ (C20/25) concrete.
For other grades of concrete between 20 and 50N/mm$^2$ where the anchor is in tension the load can be calculated using the following empirical formula:

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

This calculation is not valid for shear.

### Edge and Spacing Distances

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: Standard and Reduced Embedment Depth

| SIZE | CONCRETE 30N/mm$^2$ (C20/25) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | STANDARD EMBEDMENT DEPTH | | | | REDUCED EMBEDMENT DEPTH | | | | CHARACTERISTIC EDGE DISTANCE (mm) | | CHARACTERISTIC SPACING (mm) Tension & Shear |
| | SAFE WORKING LOAD (kN) | | FAILURE LOAD (kN) | | SAFE WORKING LOAD (kN) | | FAILURE LOAD (kN) | | | | |
| | Tension | Shear | Tension | Shear | Tension | Shear | Tension | Shear | Tension | Shear | |
| M8 | 4.0 | 4.4 | 14.1 | 16.6 | 2.5 | 3.0 | 11.8 | 13.1 | 80 | 80 | 100 |
| M10 | 6.5 | 6.6 | 22.2 | 22.8 | 3.4 | 4.7 | 14.3 | 21.0 | 100 | 100 | 120 |
| M12 | 10.6 | 10.5 | 33.1 | 32.2 | 5.7 | 7.0 | 22.0 | 31.9 | 120 | 120 | 150 |
| M16 | 16.1 | 16.3 | 54.3 | 61.4 | 8.0 | 13.4 | 32.8 | 60.3 | 160 | 160 | 180 |
| M20 | 23.2 | 24.0 | 76.3 | 90.0 | 16.3 | 21.3 | 60.4 | 90.0 | 190 | 190 | 260 |

### Reduction Factors - Edge and Spacing Distances

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 (Concrete)

| EDGE (mm) | TENSILE : EDGE REDUCTION FACTORS | | | | | SHEAR : EDGE REDUCTION FACTORS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | M8 | M10 | M12 | M16 | M20 | M8 | M10 | M12 | M16 | M20 |
| 40 | 0.60 | | | | | | | | | |
| 50 | 0.73 | | | | | 0.62 | | | | |
| 60 | 0.87 | 0.65 | | | | 0.74 | 0.60 | | | |
| 80 | 1.0 | 0.83 | 0.65 | | | 1.0 | 0.80 | 0.67 | | |
| 100 | | 1.0 | 0.83 | 0.65 | | | 1.0 | 0.84 | 0.62 | |
| 120 | | | 1.0 | 0.77 | 0.65 | | | 1.0 | 0.74 | 0.58 |
| 140 | | | | 0.88 | 0.77 | | | | 0.87 | 0.73 |
| 160 | | | | 1.0 | 0.88 | | | | 1.0 | 0.82 |
| 190 | | | | | 1.0 | | | | | 1.0 |
| 220 | | | | | | | | | | |

## Spacing (Concrete)

| SPACING (mm) | TENSILE & SHEAR REDUCTION FACTORS | | | | |
|---|---|---|---|---|---|
| | M8 | M10 | M12 | M16 | M20 |
| 40 | | | | | |
| 50 | 0.65 | | | | |
| 60 | 0.77 | 0.65 | | | |
| 80 | 0.88 | 0.77 | 0.65 | | |
| 100 | 1.0 | 0.88 | 0.77 | 0.65 | |
| 120 | | 1.0 | 0.88 | 0.77 | |
| 150 | | | 1.0 | 0.88 | 0.74 |
| 180 | | | | 1.0 | 0.83 |
| 220 | | | | | 0.91 |
| 260 | | | | | 1.0 |



RAWL FIXINGS
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