

Bolt Anchor – FBA

Admissible loads for C.L.P.T. Fixing inserts

C.L.P.T. made over the last years extensive tests to give exact load-capability for all the C.L.P.T. inserts. Many facts, such as **strength** and the **concrete quality** can influence the load-capacity of the inserts.

The admissible static loads for the C.L.P.T. fixing inserts, embedded completely into the concrete, are valid to pull out or shear load and have a safety factor of 3x – 4x to the average breaking load.

When the CLPT insert is in a recessed position, an adapted filling is necessary to prevent loading the concrete (**picture 1**). We recommend the use of a torque wrench (*values in table 1*) to prevent unexpected loads on the fixing inserts.

Thread	Torque (Md)	Force (F)
M 12	8 Nm	ca 3,30 Kn
M 16	17 Nm	ca 5,30 Kn
M 20	35 Nm	ca 8,70 Kn
M 24	53 Nm	ca 11,00 Kn
M 30	96 Nm	ca 16,00 Kn

Table 1

Fixing Applications (edge and centre distance)

The C.L.P.T. fixing inserts are divided into 4 major groups:

1. C.L.P.T. Fixing inserts without cross-pin type: FIF (except for the stress area type FIB).
2. C.L.P.T. Fixing inserts with cross-pin type: FICB and bolt anchor type: FBP
3. C.L.P.T. Fixing bolt anchors type: FBA
4. C.L.P.T. Fixing – lifting sockets type: LWS/LWL/LSA

Group 1 & 2

The admissible pullout load (Nsd) can be used with a minimum (picture 2)

Edge distance of: 1,5 x total length of the anchor,
Centre to centre distance of: 3,0 x total length of the anchor

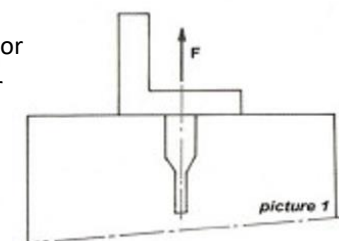
The admissible shear load (Vsd) can be used with a minimum (picture 2)

Edge distance of: 2,5 x total length of the anchor
Centre to centre distance of: 5 x total length of the anchor

Reduction factors for small edge distances:

Edge distance	Nrd	Edge distance	Vrd	Y = 1,2	Y = 1,4
2,5 x L	100%	2,5 x L	100%	100%	100%
2,0 x L	100%	2,0 x L	85%	100%	100%
1,5 x L	100%	1,5 x L	65%	78%	91%
1,0 x L	75%	1,0 x L	40%	48%	56%
0,5 x L	50%	0,5 x L	15%	18%	21%

Table 2



Nrd = admissible pull out load

Vrd = admissible shear load

Nsd = pull out load

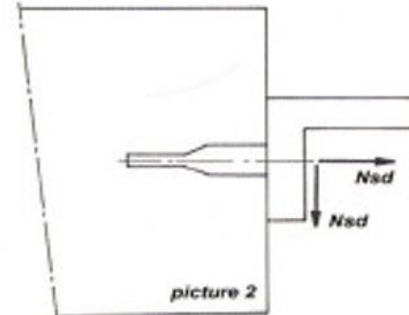
Vsd = Shear Load

The reduced admissible shear loads (V_{rd}) in the direction of the edge can be increased by using additional reinforcement.

$Y = 1,2$ x for straight reinforcement

$Y = 1,4$ x for hairpins (U-bended reinforcement)

Extra shear reinforcement has to be used if the appeared shear load is higher than the reduced admissible load. The mentioned loads for inserts are valid for concrete **quality B25**, for higher quality of concrete the pull out load you can use the factor (*table 3*).



Concrete Quality	B25	B35	B45	B55	B65
Factor	1,00	1,18	1,34	1,48	1,61

Table 3

Group 3

The new international standard (CEB Bulletin 233 and the Technical Approval of Metal Anchors for Use in Concrete 1997) is valid for the concrete qualities B25-B65.

The C.L.P.T. Bolt anchor FBA-Z and FBA-S4 meet the requirements mentioned in the standards and can be calculated without any additional tests.

Group 4

The Fixing Sockets are especially suited for use in thin prefab panels and where anchors have to take high pull out loads. The minimum edge distance is equal to the minimum required concrete covering.