

Allowable loads summary chart

for fixings with M12 to M24 bolts

Introduction

This summary chart shows the allowable loads for the main channel types in a basic, at-a-glance format. Details are given for the most common bolt sizes, M12 to M24. For a full material description of both channels and bolts, see page 6. Full data for all channel and bolt sizes are given on pages 10 to 19.

Edge distance

This chart gives the most advantageous situation for designers, i.e. channel cast in at a minimal edge distance, in reinforced concrete.

Optimum selections

In this and the following charts the optimum combinations of channel and bolt are highlighted in red for quick selection of preferred specifications.

Long lengths of channel

For the purposes of this guide a long length of channel is taken to be any length over 550 mm. Channels are assumed to have single T-head bolts at nominal 250 mm centres.

Short lengths of channel/channel with two anchors

A typical channel 150 mm long is assumed to have two anchors and a single T-head bolt working at the allowable load. If required, this load can also be spread over two bolts.

Channels with 3 or 4 anchors

A typical channel 350 to 450 mm long is assumed to have 3 or 4 anchors and two bolts, in which case each bolt can be worked up to the allowable loads shown.

Channel pairs

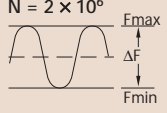
A pair of channels can be designed close together, see illustration opposite. Halfen will fabricate the assembly as a pair, if required.

Four-bolt connection

Because channels can be fixed close together, they are ideal for four-bolt fixing, i.e. two pairs of bolts. These can be safely fixed close together, see illustration opposite.

Dynamic loads

Halfen hot-rolled cast-in channels are suitable for supporting high dynamic loads. The chart below gives examples of the stress cycles (N) and loads that can be achieved. For further details, please consult Halfen Limited.

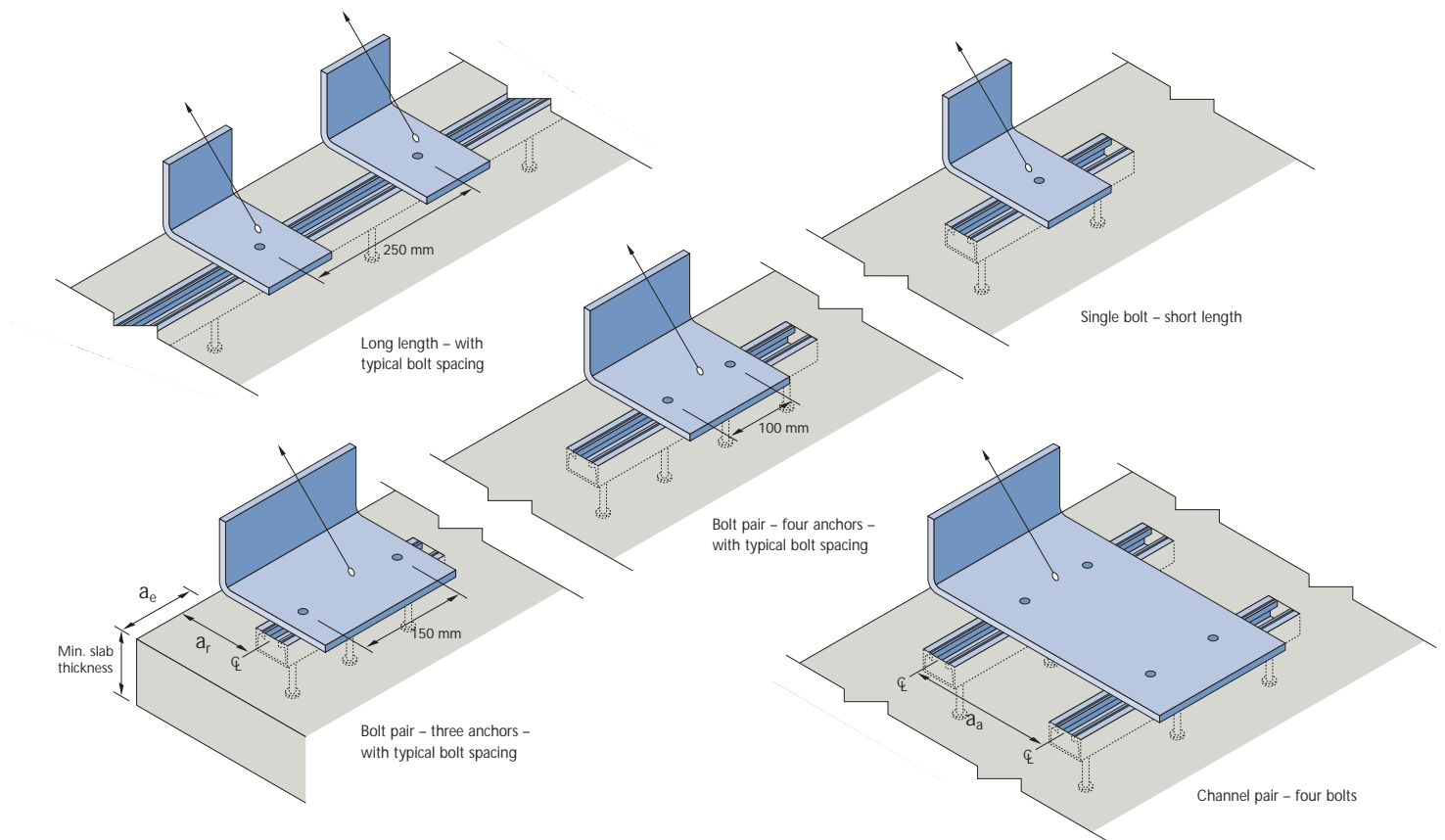
T-head bolt diameter	Channel size	anchor	process	Details page no.	Dynamic range ΔF (kN)	Channel material	T-head bolt material		
							carbon steel	carbon steel	stainless steel
					Carbon steel only $N = 2 \times 10^6$		4.6	8.8	
									
M24	72/48	HTA	hot rolled	10	7.0	hdg or stainless	✓	✓	✓
M20	72/48	HTA	hot rolled	10	7.0	hdg or stainless	✓	✓	–
	52/34	HTA	hot rolled	12	7.0	hdg or stainless	✓	✓	✓
	50/30	HTA	hot rolled	12	2.4	hdg or stainless	✓	✓	✓
M16	52/34	HTA	hot rolled	12	7.0	hdg or stainless	✓	✓	✓
	50/30	HTA	hot rolled	12	2.4	hdg or stainless	✓	✓	✓
	40/22	HTA	hot rolled	14	2.0	hdg or stainless	✓	✓	✓

Notes:

Optimum channel/bolt combinations are highlighted in red.

hdg = hot dip galvanised

For longitudinal loads, see Halfen toothed channel, page 18. For metal deck details, see page 20.



T-head bolt diameter	Channel size	Allowable loads in reinforced concrete (kN) (pull-out, transverse shear or resultant loads)			Allowable spacing in reinforced concrete (mm)				Min. slab thickness
		Long length or single bolt	Short channel with bolt pair	4-anchor	Channel spacing – min. dimensions	Extreme bolt position			
			3-anchor		Normal pair	Parallel edge*	End edge	eb	
M24	72/48	32.0	54.0	64.0	200	130 (200)	90	40	200
M20	72/48	27.0	54.0	54.0	200	130 (200)	75	40	200
	52/34	25.0	40.0	50.0	150	100 (150)	75	30	200
	54/33	25.0	40.0	50.0	150	100 (150)	75	30	200
	50/30	12.5	22.0	25.0	125	85 (110)	60	25	125
M16	49/30	12.5	22.0	25.0	125	85 (110)	60	25	125
	52/34	17.3	34.6	34.6	125	100 (120)	60	30	200
	54/33	17.3	34.6	34.6	125	100 (120)	60	30	200
	50/30	12.5	22.0	25.0	125	85 (110)	60	25	125
	49/30	12.5	22.0	25.0	125	85 (110)	60	25	125
M12	40/22	8.0	16.0	20.0	100	75 (100)	50	20	115
	40/25	8.0	16.0	20.0	100	75 (100)	50	20	115
M12	40/25	8.0	16.0	18.6	100	75 (100)	50	20	115
	38/17	6.0	12.0	14.0	100	75 (100)	50	18	100

Notes:

* Parallel edge – two dimensions are given: the first applies to pull-out loads, the second (in brackets) applies to transverse shear loads.

Allowable loads quoted are after application of a Safety Factor of approximately 2.5 on test in reinforced concrete.

Minimum slab thickness assumes standard anchor length. For short anchors, please consult Halfen Limited.

For 3 or 4 bolts on a short length of channel, please consult Halfen Limited.