



FIXING INSERTS TECHNICAL MANUAL

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Fixing Insert

The fixing inserts EV, EVF are economic lifting sockets for lifting and transporting for precast concrete. These sockets are specifically used for lifting and not for fixing.

The key benefits and features of Threaded Lifting system as below:

- The socket anchored in concrete with the cross-pin.
- Available in plain steel, stainless steel.
- In EV, Reinforcement bar is inserted through the cross hole to transfer the load into the concrete.
- Cost effective fixing insert.

1. Introduction

EV Insert consists of inner thread insert tube with cross-pin for anchoring into concrete element. It is designed for installation of precast elements on site. They are also available in stainless steel.

EVF fixing insert with flat end must always be used with a steel re-bar. On lateral tension, lifting sockets with flat end have just the half load bearing capacity compared to axial tension. Fixing insert are also available in stainless steel. Various sizes are available. Additional reinforcement must be provided through the hole for transfer the forces into the concrete.



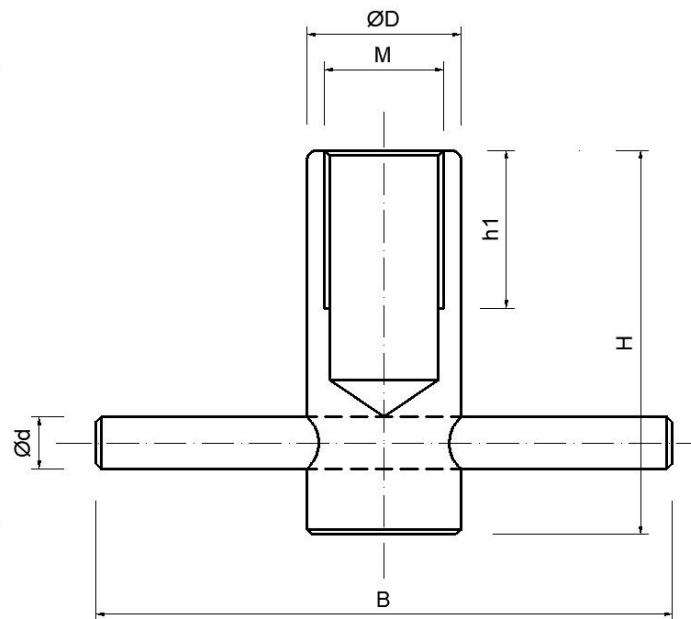
EV



EVF

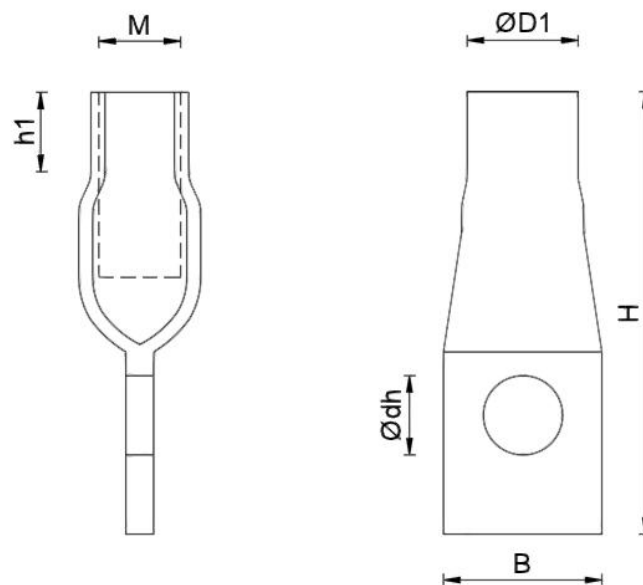
2. Product Dimensions

2.1 EV Fixing Insert Dimensions



Insert Size	M	H	h1	$\varnothing D$	$\varnothing d$	B
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
M 10x45	10	45	20	15	6	50
M 10x50	10	50	20	15	8	60
M 10x60	10	60	20	15	8	60
M 12x50	12	50	24	18	8	60
M 12x70	12	70	24	18	10	75
M 16x50	16	50	28	24	8	60
M 16x70	16	70	32	24	10	75
M 16x90	16	90	32	24	10	75
M 20x100	20	100	35	28	12	85
M 24x120	24	120	45	34	15	110
M 24x150	24	150	45	34	15	110

2.2 EVF Fixing Insert Dimensions



Fixing Insert (mm)	H (mm)	ØD (mm)	M (mm)	B (mm)	h1 (mm)	dh (mm)
M6x35	35	8.5	6	13	5	6.3
M6x40	40	8.5	6	13	5	6.3
M6x50	50	8.5	6	13	5	6.3
M8x40	40	12	8	17	8	8.3
M10x45	45	14	10	20	9	10.3
M10x57	57	15	10	21	9	10.3
M12x55	55	17	12	24	11	12.1
M12x65	65	17	12	24	11	12.1
M16x80	80	22	16	32	15	12.1
M16x100	100	22	16	32	15	12.1
M20x95	95	28	20	40	17	14.2
M20x100	100	28	20	40	17	14.2
M20x120	120	28	20	40	17	14.2
M24x120	120	32	24	46	20	14.2
M30x150	150	40	30	57	28	16.0

EV Lifting Anchors are available in following materials.

Lifting	Material	Material Type	Standard
Socket (EV), EVF	S355J0	Electro Zinced	EN 10025
Socket (EVs), EVFs	1.4301	Stainless Steel	EN 10088
EVFa	1.4401	Stainless Steel	EN 10088
Cross Pin	S355J0	Electro Zinced	EN 10025

3. Design Load Capacity (Safe Working Loads)

EV Inserts are designed for uncracked concrete and for ultimate limit state design. It had been designed in such a way that the anchor pin orientation does not affect the capacity of the insert. Under no circumstances should the inserts be used for lifting purposes.

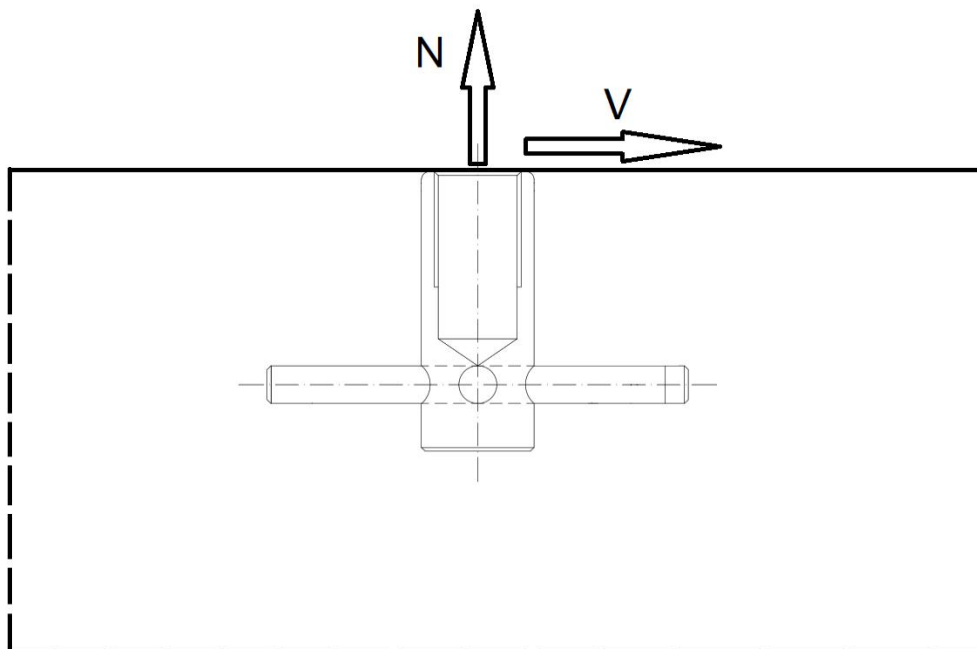


Table 1. Resistance for Tension, N (EV Insert)

Insert Size	C16/20	C20/25	C25/30	C30/37	C35/45	C40/50
	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]
M 10x45	4.07	4.07	4.07	4.07	4.07	4.07
M 10x50	7.42	8.30	9.28	10.16	10.98	11.20
M 10x60	8.84	9.50	10.01	10.54	10.99	11.20
M 12x50	7.72	8.64	9.66	10.54	10.99	11.20
M 12x70	12.91	14.43	15.64	16.47	16.49	16.49
M 16x50	8.35	9.33	10.01	10.54	10.99	11.20
M 16x70	13.69	14.85	15.64	16.28	16.28	16.28
M 16x90	13.81	14.85	15.64	16.47	17.17	17.51
M 20x100	19.88	21.38	22.53	23.72	24.72	25.21
M 24x120	31.07	33.41	35.20	37.07	38.62	39.39
M 24x150	31.07	33.41	35.20	37.07	38.62	39.39

Table 2. Resistance for Shear, V (EV Insert)

Insert Size	C16/20	C20/25	C25/30	C30/37	C35/45	C40/50
	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]
M 10x45	5.36	5.99	6.70	7.34	7.93	8.47
M 10x50	6.55	7.32	8.19	8.97	9.69	10.36
M 10x60	9.50	10.62	11.87	13.00	13.32	13.32
M 12x50	7.49	8.37	9.36	10.25	11.08	11.84
M 12x70	12.04	13.46	15.05	16.49	17.81	19.04
M 16x50	7.72	8.63	9.65	10.57	11.41	12.20
M 16x70	13.13	14.68	16.41	17.98	19.42	20.76
M 16x90	18.60	20.80	23.25	25.47	27.51	29.41
M 20x100	20.91	23.38	26.14	28.64	30.93	33.07
M 24x120	27.63	30.89	34.54	37.83	40.86	43.69
M 24x150	39.41	44.06	49.26	53.96	58.28	61.81

Table 3. Safe Working Load (SWL) for EVF Fixing Insert

Insert Size	Design Load Capacity (Safe Working Load), kN
M6x35	2.0
M6x40	2.0
M6x50	2.0
M8x40	3.0
M10x45	3.0
M10x57	3.0
M12x55	5.0
M12x65	5.0
M16x80	12.0
M16x100	12.0
M20x95	20.0
M20x100	20.0
M20x120	20.0
M24x120	25.0
M30x150	40.0

4. Minimum Element Thickness and Spacing of Inserts

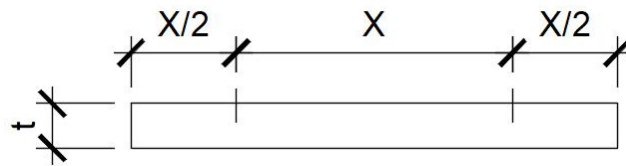


Table 4. Minimum distances for Tension Resistance

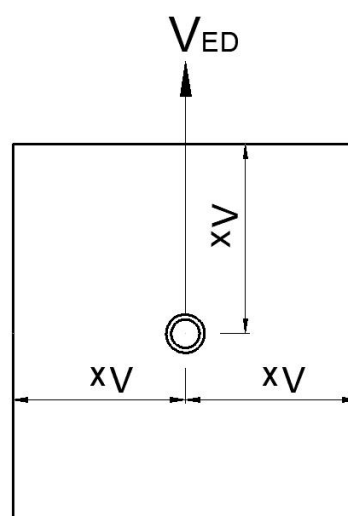
Insert Size	Edge Distance	Center Distance	Thickness
	$X/2$, [mm]	X , [mm]	t , [mm]
M 10x45	90	180	80
M 10x50	100	200	80
M 10x60	120	240	95
M 12x50	100	200	80
M 12x70	140	280	110
M 16x50	100	200	80
M 16x70	140	280	120
M 16x90	180	360	150
M 20x100	200	400	150
M 24x120	240	480	180
M 24x150	300	600	240

Table 5. Minimum distances for Shear Resistance

Insert Size	Edge Distance	Center Distance	Thickness
	$X/2$, [mm]	X , [mm]	t , [mm]
M 10x45	135	270	80
M 10x50	150	300	80
M 10x60	180	360	95
M 12x50	150	300	80
M 12x70	210	420	110
M 16x50	150	300	80
M 16x70	210	420	120
M 16x90	270	540	150
M 20x100	300	600	150
M 24x120	360	720	180
M 24x150	450	900	240

Table 6. Minimum element thickness and minimum distance for Shear Resistance EVF Fixing Insert

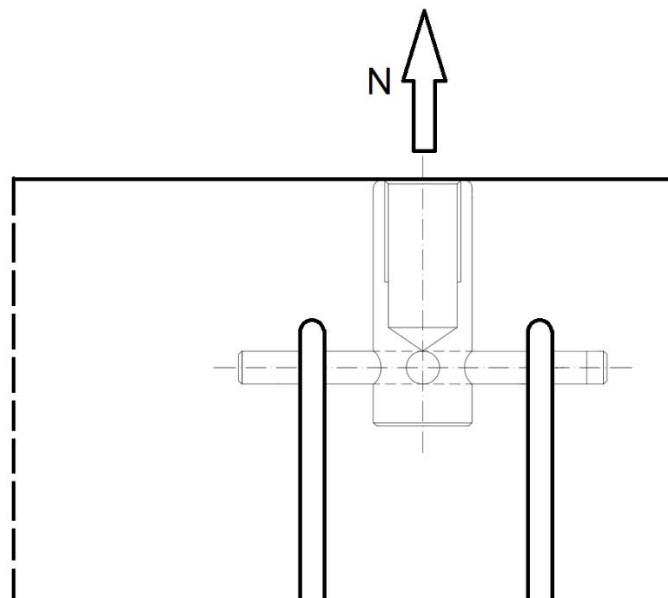
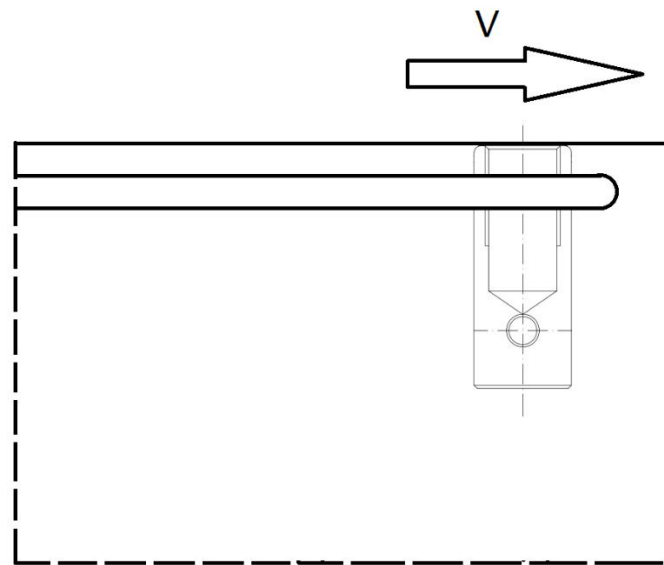
Lifting Anchor	Thickness	Edge Distance	Center Distance
	t, [mm]	X/2, [mm]	X, [mm]
M6x35	50	55	110
M6x40	50	60	120
M6x50	50	75	150
M8x40	60	60	120
M10x45	60	70	140
M10x57	60	90	180
M12x55	60	85	170
M12x65	60	100	200
M16x80	80	120	240
M16x100	80	150	300
M20x95	100	145	290
M20x100	100	150	300
M20x120	100	180	360
M24x120	120	180	360
M30x150	140	225	450



5. Reinforcement

The inserts are designed to be used without additional reinforcement if conditions for minimum edge distances are followed. If the edge distances are less than mentioned in the table given in Clause 4, then additional reinforcement needs to provide as shown in the image below.

The reinforcement provided for the case of shear resistance should be equal to the full capacity of the insert and should be designed as such. For tensions resistance, the value of resistance becomes 0kN at 50mm from the edge. The remaining values of resistances can be calculated by interpolation and reinforcement provided for the same.



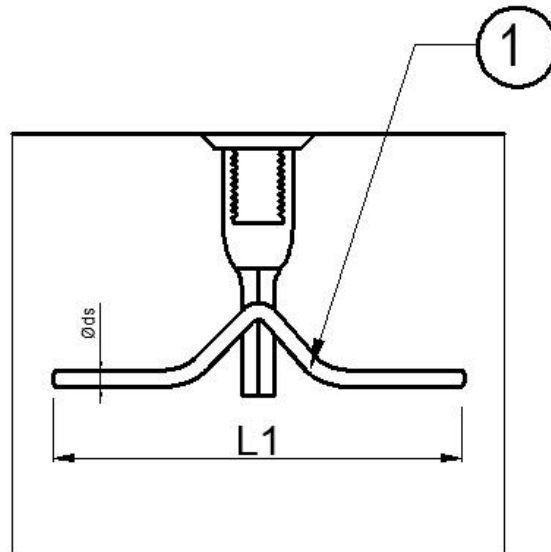


Table: 7.Diagonal Reinforcement for EVF lifting Insert :

Lifting Anchor	Anchor Reinforcement, 1 ($\varnothing - L1$)
M6x35	6 - 200
M6x40	6 - 200
M6x50	6 - 200
M8x40	6 - 280
M10x45	6 - 280
M10x57	6 - 280
M12x55	8 - 340
M12x65	8 - 340
M16x80	10 - 660
M16x100	10 - 660
M20x95	12 - 900
M20x100	12 - 900
M20x120	12 - 900
M24x120	14 - 980
M30x150	20 - 1080

