MCS and MCSr Concrete Screw

Concrete screw of sizes 6, 8, 10, 12 and 14 mm for use in concrete made of galvanized steel (MCS) or stainless steel A4 (MCSr)

Option 1

1 SPECIFICATIONS OF INTENDED USE

Anchorages subject to:
- Static and quasi-static loading
- Seismic load, category C1 loads, sizes 8-14 for maximum embedment depth

Base materials:
-Cracked and non-cracked concrete
-Reinforced or unreinforced normal weight concrete of strength classes C20/25 to C50/60 according to EN 206-1:2000-12

Approvals:
- European Technical Approval Option 1 for cracked and non cracked concrete
- Fire resistance test certification up to F120
- Seismic performance category C1

Reaction to fire:
- Anchorages satisfy requirements for Class A1

Resistance to fire:
- Fire resistance test certification up to F120 for all sizes (for fire design see ETA-16/0296, Annex C 5)

Installation:
- Hole drilling by hammer drilling only
- Anchor may be adjusted maximum two times while the anchor may turn back at most 10 mm. The final embedment depth after adjustment process must be equal or larger than h_{nom}
- For further information see ETA-16/0296, Annex B1 to B4

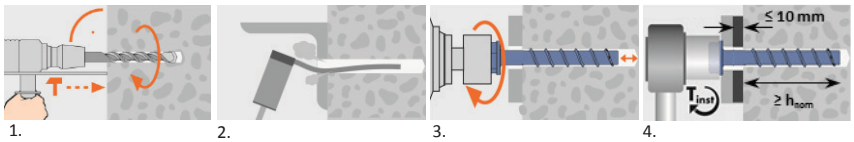
2 PRODUCT DESCRIPTION - MATERIALS

Product	Designation	Material	Nominal characteristic steel yield strength f_{yk} [N/mm^2]	Nominal characteristic steel ultimate strength f_{uk} [N/mm^2]	Elongation at rupture A_5 [%]
1	MCS-S	Steel EN 10263-4 zinc flake coating acc. to EN ISO 10683 (≥ 5µm)	560	700	≤ 8
2	MCS-SK, MCS-P, MCS-PG and MCS-	Steel EN 10263-4 galvanized acc. to EN ISO 4042 (≥ 5µm)	560	700	≤ 8
3	MCSr-S, MCSr-SK and MCSr-P	Steinless steel A4/316 (1.4571)	560	700	≤ 8

3 INSTALATION INSTRUCTIONS

1. Drilling the hole (by hammer drilling only)
2. Cleaning the hole (see ETA-16/0296, Annex B1 to B4)
3. Bring in position plug and attachment, screw in the plug with an impact screwdriver (for max. impact torque of the screwdriver, see the table Installation Parameters). The head of the concrete screw must be flush with the attachment.
4. After adjustment with shims, the anchor must be tightened with a torque wrench to the specified T_{inst} value. The anchor may be adjusted for a maximum two times.

Graphic installation instruction for MCS and MCSr



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4 PRODUCT INFORMATION MCS

MCS-S Concrete Screw with hexagon head with washer, zinc flake-coated steel

Article code	Dimensions [mm]	Drill hole diameter in substrate [mm] d_0	Length [mm] L	Length of screw in building material [mm] h_{nom}	Usable length [mm] t_{fix}	Head- Ø [mm] d_h
5500605	6 x 50	6	50	40/-	10/-	15
5500606	6 x 60	6	60	40/55	20/5	15
5500608	6 x 80	6	80	40/55	40/25	15
5500610	6 x 100	6	100	40/55	60/45	15
5500805	8 x 50	8	50	45/-/-	5/-/-	16
5500806	8 x 60	8	60	45/55/-	15/5/-	16
5500807	8 x 70	8	70	45/55/65	25/15/5	16
5500808	8 x 80	8	80	45/55/65	35/25/15	16
5500809	8 x 90	8	90	45/55/65	45/35/25	16
5500810	8 x 100	8	100	45/55/65	55/45/35	16
5500812	8 x 120	8	120	45/55/65	75/65/55	16
5500814	8 x 140	8	140	45/55/65	95/85/75	16
5501006	10 x 60	10	60	55/-/-	5/-/-	20
5501007	10 x 70	10	70	55/-/-	15/-/-	20
5501008	10 x 80	10	80	55/75/-	25/5/-	20
5501009	10 x 90	10	90	55/75/85	35/15/5	20
5501010	10 x 100	10	100	55/75/85	45/25/15	20
5501012	10 x 120	10	120	55/75/85	65/45/35	20
5501014	10 x 140	10	140	55/75/85	85/65/55	20
5501015	10 x 150	10	150	55/75/85	95/75/65	20
5501016	10 x 160	10	160	55/75/85	105/85/75	20
[1)]5501018	10 x 180	10	180	55/75/85	125/105/95	20
[1)]5501020	10 x 200	10	200	55/75/85	145/125/115	20
[1)]5501024	10 x 240	10	240	55/75/85	185/165/155	20
[1)]5501028	10 x 280	10	280	55/75/85	225/205/195	20
[1)]5501032	10 x 320	10	320	55/75/85	265/245/235	20
[1)]5501036	10 x 360	10	360	55/75/85	305/285/275	20
[1)]5501208	12 x 80	12	80	65/-/-	15/-/-	23,5
5501211	12 x 110	12	110	65/85/100	45/25/10	23,5
5501213	12 x 130	12	130	65/85/100	65/45/30	23,5
5501215	12 x 150	12	150	65/85/100	85/65/50	23,5
5501408	14 x 80	14	80	75/-/-	5/-/-	28,25
5501411	14 x 110	14	110	75/100/-	35/10/-	28,25
5501413	14 x 130	14	130	75/100/115	55/30/15	28,25
5501415	14 x 150	14	150	75/100/115	75/50/35	28,3

[1)] Washer DIN440

MCS-SK Concrete Screw with countersunk head

Article code	Dimensions [mm]	Drill hole diameter in substrate [mm] d_0	Length [mm] L	Length of screw in building material [mm] h_{nom}	Usable length [mm] t_{fix}	Head- Ø [mm] d_h
5510605	6 x 50	6	50	40/-	10/-	13
5510606	6 x 60	6	60	40/55	20/5	13
5510608	6 x 80	6	80	40/55	40/25	13
5510610	6 x 100	6	100	40/55	60/45	13
5510612	6 x 120	6	120	40/55	80/65	13
5510614	6 x 140	6	140	40/55	100/85	13
5510808	8 x 80	8	80	45/55/65	35/25/15	19,5
5511009	10 x 90	10	90	55/75/85	35/15/5	21,5

MCS-P Concrete Screw with pan head

Article code	Dimensions [mm]	Drill hole diameter in substrate [mm] d_0	Length [mm] L	Length of screw in building material [mm] h_{nom}	Usable length [mm] t_{fix}	Head- Ø [mm] d_h
5520605	6 x 50	6	50	40/-	10/-	14,4
5520606	6 x 60	6	60	40/55	20/5	14,4
5520608	6 x 80	6	80	40/55	40/25	14,4
5520610	6 x 100	6	100	40/55	60/45	14,4

MCS-PG Concrete Screw with large pan head

Article code	Dimensions [mm]	Drill hole diameter in substrate [mm] d_0	Length [mm] L	Length of screw in building material [mm] h_{nom}	Usable length [mm] t_{fix}	Head- Ø [mm] d_h
5530606	6 x 60	6	60	40/55	20/5	18

MCS-PG Concrete Screw with large pan head

Article code	Dimensions [mm]	Drill hole diameter in substrate [mm] d_0	Length [mm] L	Length of screw in building material [mm] h_{nom}	Usable length [mm] t_{fix}	Head- Ø [mm] d_h
5540605	6 x 55	6	55	40/55	20/15	25

5 PRODUCT INFORMATION MCSr

MCSr-S Concrete Screw with hexagon head with washer, stainless steel A4/316

Article code	Dimensions [mm]	Drill hole diameter in substrate [mm] d_0	Length [mm] L	Length of screw in building material [mm] h_{nom}	Usable length [mm] t_{fix}	Head- Ø [mm] d_h
5600605	6 x 50	6	50	40/-	10/-	15
5600606	6 x 60	6	60	40/55	20/5	15
5600807	8 x 70	8	70	45/55/65	25/15/5	16
5600808	8 x 80	8	80	45/55/65	35/25/15	16
5601009	10 x 90	10	90	55/75/85	35/15/5	20
5601010	10 x 100	10	100	55/75/85	45/25/15	20
5601012	10 x 120	10	100	55/75/85	65/45/35	20

MCSr-SK Concrete Screw with countersunk head, stainless steel A4/316

Article code	Dimensions [mm]	Drill hole diameter in substrate [mm] d_0	Length [mm] L	Length of screw in building material [mm] h_{nom}	Usable length [mm] t_{fix}	Head- Ø [mm] d_h
5610605	6 x 50	6	50	40/-	10/-	13
5610606	6 x 65	6	65	40/55	25/10	13
5610608	6 x 85	6	85	40/55	45/30	13
5610610	6 x 105	6	105	40/55	65/50	13
5610808	8 x 80	8	80	45/55/65	35/25/15	19
5611009	10 x 90	10	90	55/75/85	35/15/5	21,5

MCSr-P Concrete Screw with pan head, stainless steel A4/316

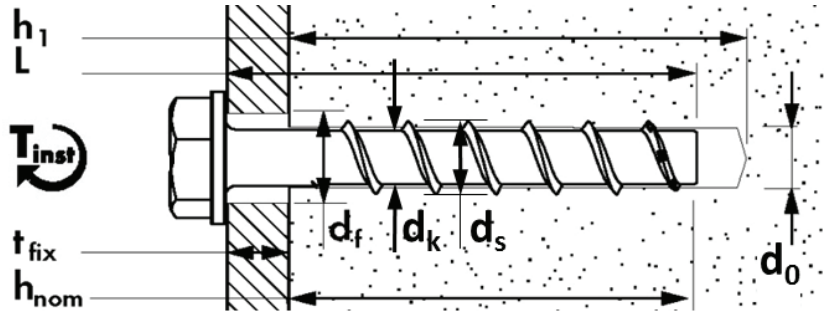
Article code	Dimensions [mm]	Drill hole diameter in substrate [mm] d_0	Length [mm] L	Length of screw in building material [mm] h_{nom}	Usable length [mm] t_{fix}	Head- Ø [mm] d_h
5620605	6 x 50	6	50	40/-	10/-	15
5620606	6 x 60	6	60	40/55	20/5	15
5620608	6 x 80	6	80	40/55	40/25	15
5620610	6 x 100	6	100	40/55	60/45	15

6 INSTALATION DATA MCS AND MCSr

Installation parameters for Mungo MCS and MCSr Concrete Screw

FASTENER SIZE MCS and MCSr			6		8			10			12			14		
Diameter of thread	d_s	[mm]	7,5		10,6			12,6			14,6			16,6		
Diameter of shaft	d_k	[mm]	5,1		7,1			9,1			11,1			13,1		
Diameter of clearence hole in the fixture	$d_f \leq$	[mm]	8		12			14			16			18		
INSTALLATION PARAMETERS																
Installation torque	T_{inst}	[Nm]	10		20			40			60			80		
Max. torque for installation with an impact screwdriver		[Nm]	150		300*			300*			450*			450*		
Drill hole diameter in substrate	d_0	[mm]	6		8			10			12			14		
Max. cutting diameter (max. drill diameter)	$d_{cut,max}$	[mm]	6,40		8,45			10,45			12,50			14,50		
Dept of drill hole in substrate	$h_1 \geq$	[mm]	45	60	55	65	75	65	85	95	75	95	110	85	110	125
Nominal embedment depth	h_{nom}	[mm]	40	55	45	55	65	55	75	85	65	85	100	75	100	115
Effective anchorage depth	h_{ef}	[mm]	31	44	35	43	52	43	60	68	50	67	80	58	79	92
Minimum thickness of concrete memeber	h_{min}	[mm]	100		100		120	100	130		120	130	150	130	150	170
Minimum edge distane	c_{min}	[mm]	40		40	50		50			50		70	50	70	
Minimum spacing	s_{min}	[mm]	40		40	50		50			50		70	50	70	

* Not decisive in ETA-16/0296



7 BASIC PERFORMANCE DATA FOR MCS AND MCSr

Basic performance data for MCS and MCSr in cracked and non-cracked concrete C20/25 without influence of edge distance, spacing and splitting failure due to dimensions of concrete member

Basic performance data for MCS and MCSr

FASTENER SIZE MCS and MCSr				6		8			10			12			14		
Effective anchorage depth		$\geq h_{ef}$	[mm]	31	44	35	43	52	43	60	68	50	67	80	58	79	92
CHARACTERISTIC RESISTANCE																	
Tension load	non-cracked	$N_{Rk,ucr}$	[kN]	4.00	9.00	7.50	12.00	16.00	12.00	20.00	25.00	16.00	22.70[2]	36.14[2]	22.31[2]	35.46[2]	44.56[2]
	cracked	$N_{Rk,cr}$	[kN]	2.00	4.00	5.00	9.00	12.00	9.00	16.73[2]	20.19[2]	12.00	19.74[2]	25.76[2]	15.90[2]	25.28[2]	31.77[2]
Shear load	non-cracked	$V_{Rk,ucr}$	[kN]	7.00[1]	7.00[1]	10.46[3]	14.24[3]	17.00[1]	14.24[3]	34.00[1]	34.00[1]	17.85[3]	40.00[1]	40.00[1]	22.31[3]	56.00[1]	56.00[1]
	cracked	$V_{Rk,cr}$	[kN]	6.21[3]	7.00[1]	7.45[3]	10.15[3]	13.50[3]	10.15[3]	33.45[3]	40.37[3]	12.73[3]	39.49[3]	40.00[1]	15.90[3]	50.56[3]	56.00[1]
Bending moment, steel failure		$M^0_{Rk,s}$	[Nm]	10.0		26.0			56.0			113.0			185.0		
DESIGN RESISTANCE																	
Tension load	non-cracked	$N_{Rd,ucr}$	[kN]	2.67	6.00	5.00	8.00	10.67	8.00	13.33	16.67	10.67	18.47[2]	24.09[2]	14.87[2]	23.64[2]	29.71[2]
	cracked	$N_{Rd,cr}$	[kN]	1.33	2.67	3.33	6.00	8.00	6.00	11.15[2]	13.46[2]	8.00	13.16[2]	17.17[2]	10.60[2]	16.85[2]	21.18[2]
Shear load	non-cracked	$V_{Rd,ucr}$	[kN]	5.60[1]	5.60[1]	6.97[3]	9.49[3]	12.62[3]	9.49[3]	27.20[1]	27.20[1]	11.90[3]	32.00[1]	32.00[1]	14.87[3]	44.80[1]	44.80[1]
	cracked	$V_{Rd,cr}$	[kN]	4.14[3]	5.60[1]	4.97[3]	6.77[3]	9.00[3]	6.77[3]	22.31[3]	26.92[3]	8.49[3]	26.32[3]	32.00[1]	10.60[3]	33.70[3]	42.36[3]
Bending moment, steel failure		$M^0_{Rd,s}$	[Nm]	8.0		20.8			44.8			90.4			148.0		
RECOMENDED RESISTANCE																	
Tension load (safety factor 1,4)	non-cracked	$N_{rec,ucr}$	[kN]	1.91	4.29	3.57	5.71	7.62	5.71	9.52	11.91	7.62	13.19[2]	17.21[2]	10.62[2]	16.89[2]	21.22[2]
	cracked	$N_{rec,cr}$	[kN]	0.95	1.91	2.38	4.29	5.71	4.29	7.96[2]	9.61[2]	5.71	9.40[2]	12.26[2]	7.57[2]	12.04[2]	15.13[2]
Shear load (safety factor 1,4)	non-cracked	$V_{rec,ucr}$	[kN]	4.00[1]	4.00[1]	4.98[3]	6.78[3]	9.01[3]	6.78[3]	19.43[1]	19.43[1]	8.50[3]	22.86[1]	22.86[1]	10.62[3]	32.00[1]	32.00[1]
	cracked	$V_{rec,cr}$	[kN]	2.96[3]	4.00[1]	3.55[3]	4.84[3]	6.43[3]	4.84[3]	15.94[3]	19.23[3]	6.06[3]	18.80[3]	22.86[1]	7.57[3]	24.07[3]	30.26[3]
Bending moment, steel failure (safety fac. 1,4)		$M^0_{rec,s}$	[Nm]	5.7		14.9			32.0			64.6			105.7		

1) Steel failure

2) Concrete cone failure

3) Pry-out failure

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8 IMPORTANT NOTICE

Values given above are valid under the assumptions of sufficient cleaning of the drill hole and anchoring in cracked or non-cracked concrete. For the design the complete European Technical Assessment ETA-16/0296 has to be considered. In recommended resistance the partial safety factor for material as regulated in the ETA, as well as a partial safety factor for load action γ_L = 1.4 are considered. For combination of tensile loads, shear loads, bending moments as well as reduced edge distances or spacing's (anchor groups) see ETA-16/0296 or Mungo design software. The data must be checked by the user under the responsibility of an engineer experienced in anchorage and concrete work. This is to ensure there are no errors and all data is complete and accurate and complies with all rules and regulations for the actual conditions and application. Anchor design is performed according to the ETAG 001 in combination with European Technical Assessment ETA-16/0296 of 10 May 2016.