Leistungserklärung

1404–CPR-3110

1. Eindeutiger Kenncode des Produkttyps: Kraftkontrolliert spreizender Dübel Mungo MSL aus galvanisch verzinktem Stahl zur Verankerung im gerissenen und ungerissenen Beton

2. Hersteller: Mungo Befestigungstechnik AG, Bornfeldstrasse 2, CH-4603 Olten/Schweiz

3. AVCP System/s: System 1

4. Verwendungszweck/e:

Produkt	**Vorgesehener Verwendungszweck**
Kraftkontrolliert Metalldübel zur Verwendung in Beton	Zur Befestigung und/oder Verankerung von Tragwerkteilen aus Beton oder schweren Elementen, z.B. Bekleidungen und abgehängten Decken

5. Europäische Bewertungsdokument: EAD 330232-00-0601, Ausgabe Oktober 2016
Europäische Technische Bewertung: ETA-18/0653 vom 25.09.2018
Technische Bewertungsstelle: ZAG
Notifizierte Stellen: NB 1404

6. Erklärte Leistungen:
Mechanische Tragfähigkeit und Standsicherheit (BWR 1)

Wesentliche Merkmale	**Leistung**
Charakteristische Werte bei Zugbeanspruchung gem. EOTA TR 055	Siehe Anhang C1
Charakteristische Werte bei Querbeanspruchung gem. EOTA TR 055	Siehe Anhang C2
Charakteristische Werte bei Zugbeanspruchung gem. CEN/TS 1992-4	Siehe Anhang C1
Charakteristische Werte bei Querbeanspruchung gem. CEN/TS 1992-4	Siehe Anhang C2
Charakteristische Werte bei seismischer Beanspruchung, Kat. C1 gem. TR045	Siehe Anhang C3
Charakteristische Werte bei seismischer Beanspruchung, Kat. C2 gem. TR045	Siehe Anhang C4

Brandschutz (BWR 2)

Wesentliche Merkmale	**Leistung**
Charakteristische Werte (Zugbeanspruchung) unter Brandeinwirkung gem. TR020	Siehe Anhang C5
Charakteristische Werte (Querbeanspruchung) unter Brandeinwirkung gem. TR020	Siehe Anhang C5

Die Leistungen des oben spezifizierten Produktes sind in Einklang mit den deklarierten Leistungen. Diese Leistungserklärung ist ausgestellt in Übereinstimmung mit der Regulierung (EU) Nr. 305/2011 und unter alleiniger Verantwortung des oben identifizierten Herstellers.

Unterzeichnet für den Hersteller und im Namen des Herstellers von:

Massimo Pirozzi, Dipl.-Ing.
Leiter Technik

p.p.a. Massimo Pirozzi

Olten, 2019-08-03

Diese Leistungserklärung (DoP) wurde in verschiedenen Sprachen verfasst. Im Falle von Unklarheiten bei der Interpretation der Leistungserklärung hat jeweils die englische Version Vorrang.
Der Anhang enthält freiwillige und ergänzende Informationen in Englisch, welche über die gesetzlichen Anforderungen hinausgehen.

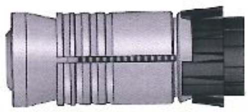
Type **S** with screw

(SH)

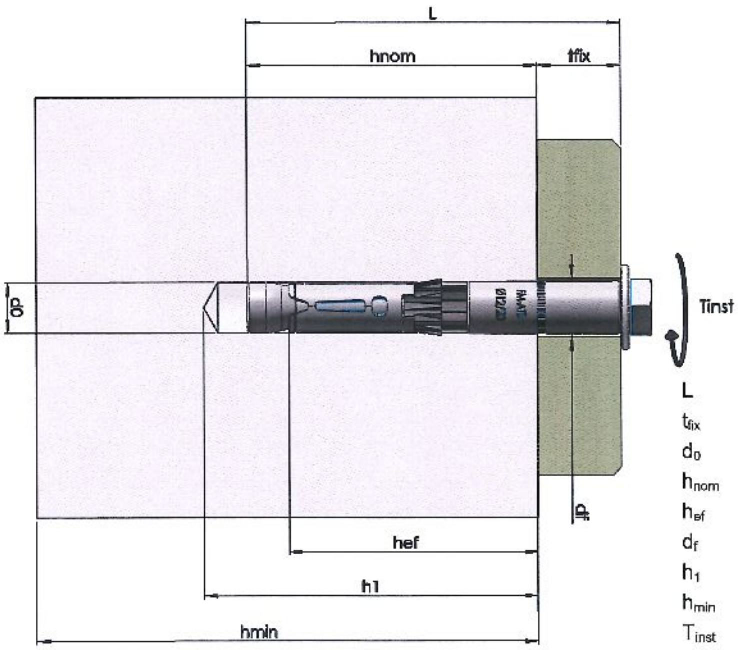
Marking: Identification mark of the producer - trade name of the anchor
nominal drill hole diameter / max thickness of fixture
(and line for minimum embedment and max thickness of fixture)
e.g.: FM-ATS
Ø15/20

Type **B** with threaded bar

Type **SK** with countersunk screw



Sleeve for size M16 – M24



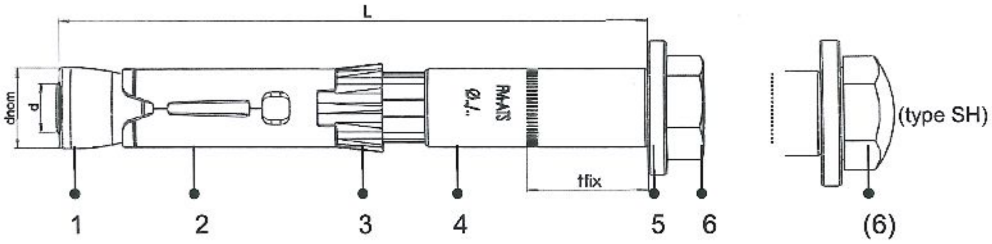
L	=	length of the anchor (mm)
t_{fix}	=	thickness of fixture (mm)
d_0	=	nominal drill hole diameter (mm)
h_{nom}	=	minimum installation depth (mm)
h_{ef}	=	effective anchorage depth (mm)
d_f	=	diameter of clearance hole in the fixture (mm)
h_1	=	depth of drill hole (mm)
h_{min}	=	minimum thickness of the concrete member (mm)
T_{inst}	=	torque moment (Nm)

MUNGO MSL

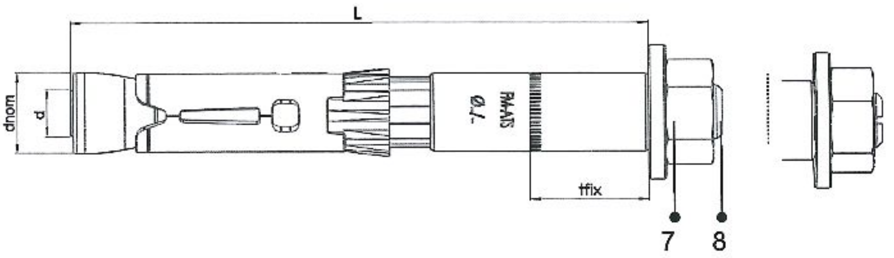
Product description
Product and intended use

Annex A1

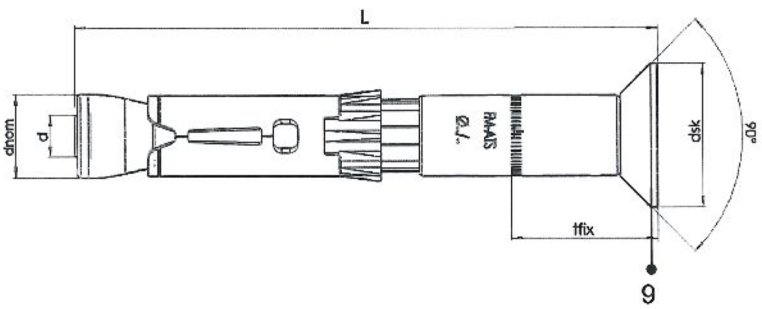
MUNGO
MSL -S



MUNGO
MSL -B



MUNGO
MSL -SK



1 Cone
2 Expansion sleeve
3 Plastic sleeve
4 Distance sleeve
5 Washer
6 Hexagonal screw
7 Hexagonal nut
8 Threaded bar
9 Countersunk screw

MUNGO MSL	**Annex A2**
Product description Product and components	

Table A1: Materials

Part of anchor		Material
1	Cone	hardened steel EN 10087 (EN 10277) [1]
2	Expansion sleeve	M6 - M12 hardened steel acc. to EN 10132 [1] M16 - M24 steel acc. to EN 10087 (EN 10277) [1]
3	Plastic sleeve	Pa6 acc. to ISO 1874/1
4	Distance sleeve	Steel acc. to EN 10025 [1]
5	Washer	Steel acc. to EN 10139 [1]
6	Hexagon screw	Steel grade 8.8 acc. to EN ISO 898/1[1] (DIN 931 -DIN 933 - type SH= large head) [1]
7	Hexagonal nut	Steel grade 8 acc. to EN ISO 898/2 (DIN 934) [1]
8	Threaded bar	Steel grade acc. to 8.8 EN ISO 898/1 [1]
9	Countersunk screw	Steel grade acc. to 8.8 EN ISO 898/1 [1]

[1] Zinc plated 5µm according to EN ISO 4042

MUNGO MSL	**Annex A3**
Product description Materials	

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Specifications of intended use

Anchorages subjected to:

- Static, quasi static, seismic load and fire.

Base materials:

- Cracked and non-cracked concrete.
- Reinforced and unreinforced normal weight concrete of strength class C20/25 at minimum and C50/60 at maximum according to EN 206.

Use conditions (Environmental conditions):

- Structures subjected to dry internal conditions.

Design:

- Anchorages are designed under the responsibility of an engineer experienced in anchorages and concrete work.
- Anchorages under static and quasi-static actions are designed in accordance with EOTA TR 055, Edition December 2016 or CEN/TS 1992-4.
- For seismic application the anchorages are designed in accordance with TR 045 “Design of metal anchors for use in concrete under seismic actions”.
- For application with resistance under fire exposure the anchorages are designed in accordance with method given in TR 020 “Evaluation of anchorage in concrete concerning resistance to fire”.
- Verifiable calculation notes and drawings are prepared taking into account of the load to be anchored. The position of the anchor is indicated on the design drawings (e.g. position of the anchor relative to reinforcement or to supports, etc.).

Installation:

- Anchor installation carried out by appropriately qualified personnel and under supervision of the person responsible for technical matters of the site.
- Use of the anchor only supplied by the manufacturer without exchanging the components of an anchor.
- Anchor installation in accordance with the manufacturer’s specification and drawings and using the appropriate tools.
- Checks before placing the anchor to ensure that the strength class of the concrete in which the anchor is to be placed is in the rang given and is not lower that of the concrete to which the characteristic loads apply for.
- Check of concrete being well compacted, e.g. without significant voids.
- Effective anchorage depth, edge distances and spacing not less than the specified values without minus tolerances.
- Hole drilling by hammer drill.
- Cleaning of the hole of drilling dust.
- Positioning of the drill holes without damaging the reinforcement.
- Application of specified torque moment using a calibrated torque wrench.
- In case of aborted hole, drilling of new hole at a minimum distance of twice the depth of the aborted hole, or smaller distance provided the aborted drill hole is filled with high strength mortar and no shear or oblique tension loads in the direction of aborted hole.

MUNGO MSL	**Annex B1**
Intended use Specification	

Table B1: Dimensions

Anchor size		M6	M8	M10	M12	M16	M20	M24
Nominal diameter of anchor	d_{nom} [mm]	10	12	15	18	24	28	32
Minimum installation depth	$h_{nom} \geq$ [mm]	60	70	80	100	115	145	165
Length of the anchor	L [mm]	t_{fix} + 60	t_{fix} + 70	t_{fix} + 80	t_{fix} + 100	t_{fix} + 115	t_{fix} + 145	t_{fix} + 165
Thickness of the fixture	Type S (SH) /B $t_{fix,min}$ [mm]	0	0	0	0	0	0	0
	Type SK $t_{fix,min}$ [mm]	5	6	6	8	-	-	-
	Type S (SH)/B/SK $t_{fix,max}$ [mm]	200	250	300	350	400	450	500
Nominal diameter of the head of the countersunk screw	Type SK d_{sk} [mm]	17	21	26	31	-	-	-

MUNGO MSL

Intended use
Dimensions of the anchors

Annex B2

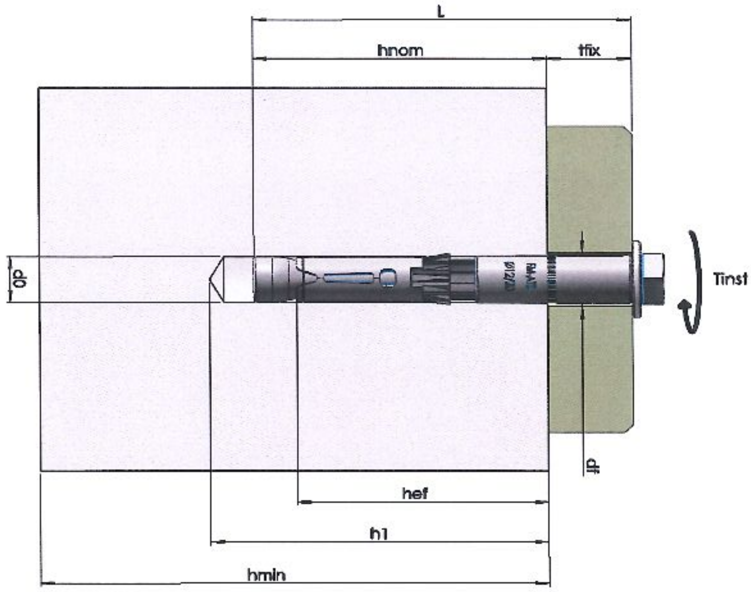

Table B2: Installation data

Anchor size		M6	M8	M10	M12	M16	M20	M24
Nominal drill hole diameter	d_0 [mm]	10	12	15	18	24	28	32
Cutting diameter of drill bit	$d_{cut} \leq$ [mm]	10,45	12,50	15,50	18,50	24,55	28,55	32,55
Depth of drill hole	$h_1 \geq$ [mm]	75	85	95	115	130	160	180
Minimum installation depth	$h_{nom} \geq$ [mm]	60	70	80	100	115	145	165
Effective anchorage depth	h_{ef} [mm]	49	59	67	88	99	125	150
Diameter of clearance hole in the fixture	$d_f \leq$ [mm]	12	14	17	20	26	31	35
Length of the anchor	L [mm]	t_{fix} + 60	t_{fix} + 70	t_{fix} + 80	t_{fix} + 100	t_{fix} + 115	t_{fix} + 145	t_{fix} + 165
Torque moment	T_{inst} [Nm]	10	20	45	80	150	170	200

Table B3: Minimum thickness of concrete member spacing, and edge distances

Anchor size		M6	M8	M10	M12	M16	M20	M24
Minimum thickness of the concrete member	h_{min} [mm]	100	120	140	180	200	250	300
Minimum spacing	s_{min} [mm]	50	60	70	80	100	125	150
	for c [mm] $\geq$	75	90	100	150	200	250	300
Minimum edge distance	c_{min} [mm]	50	60	70	80	100	125	150
	for s $\geq$ [mm]	75	90	100	150	200	250	300

MUNGO MSL

Intended use
Installation parameters

Annex B3

Table C1: **Characteristic values for Tension loads in case of static and quasi-static loading for design according to EOTA TR 055 or CEN/TS1992-4**

Essential characteristics			Performance						
			M6	**M8**	**M10**	**M12**	**M16**	**M20**	**M24**
Installation parameters									
d_0	Nominal diameter of drill bit	[mm]	10	12	15	18	24	28	32
h_{nom}	Anchorage depth	[mm]	60	70	80	100	115	145	165
h_{ef}	Effective anchorage depth	[mm]	49	59	67	88	99	125	150
h_{min}	Minimum thickness of concrete member	[mm]	100	120	140	180	200	250	300
T_{inst}	Torque moment	[Nm]	10	20	45	80	150	170	200
s_{min}	Minimum spacing	[mm]	50	60	70	80	100	125	150
for $c \geq$	Edge distance	[mm]	75	90	100	150	200	250	300
c_{min}	Minimum edge distance	[mm]	50	60	70	80	100	125	150
for $s \geq$	Spacing	[mm]	75	90	100	150	200	250	300
Tension steel failure mode									
$N_{Rk,s}$	Characteristic tension steel failure	[kN]	16	29	46	67	126	203	293
γ_{MsN}	Partial safety factor	[-]	1,5						
Pull-out failure mode									
$N_{Rk,p}$	Characteristic pull-out failure in non-cracked concrete	[kN]	-1)	-1)	-1)	-1)	-1)	-1)	-1)
$N_{Rk,p}$	Characteristic pull-out failure in cracked concrete	[kN]	9	12	16	25	-1)	-1)	-1)
γ_2	Partial safety factor	[-]	1,0						
γ_{Mp}		[-]	1,5						
$s_{cr,N}$	Characteristic spacing	[mm]	3 x h_{ef}						
$c_{cr,N}$	Characteristic edge distance	[mm]	1,5 x h_{ef}						
ψ_C C30/37	Increasing factor for $N_{Rk,p}$ for concrete	[-]	1,22						
ψ_C C40/50		[-]	1,41						
ψ_C C50/60		[-]	1,55						
Concrete Cone failure mode									
k_{cr}	Factor for cracked concrete CEN/TS 1992-4-4 §. 6.2.1.4	[-]	7,2						
k_{ucr}	Factor for un-cracked concrete CEN/TS 1992-4-4 §. 6.2.1.4	[-]	10,1						
γ_{Mc}	Partial safety factor	[-]	1,5						
Splitting failure mode									
$s_{cr,sp}$	Characteristic spacing	[mm]	3 x h_{ef}						
$c_{cr,sp}$	Characteristic edge distance	[mm]	1,5 x h_{ef}						
γ_{Msp}	Partial safety factor	[-]	1,5						
Displacement under tension load									
Non-cracked concrete C20/25									
N	Service tension load	[kN]	7,7	10,9	13,2	19,8	23,6	33,6	44,2
δ_{N0}	Short term displacement	[mm]	0,47	0,81	0,30	0,25	0,20	2,08	2,45
$\delta_{N\infty}$	Long term displacement	[mm]	2,38	2,49	1,99	1,12	2,15	2,08	2,45
Cracked concrete C20/25									
N	Service tension load	[kN]	4,3	5,7	7,6	11,9	16,9	23,9	31,5
δ_{N0}	Short term displacement	[mm]	1,21	0,83	1,25	0,98	0,96	0,99	1,41
$\delta_{N\infty}$	Long term displacement	[mm]	2,38	2,49	1,99	1,12	2,15	0,99	1,41

1) The pull-out is not decisive

MUNGO MSL

Design acc. to EOTA TR 055 or CEN/TS 1992-4
Characteristic resistance under Tension loads – BWR 1

Annex C1

Table C2: **Characteristic values for Shear loads in case of static and quasi-static loading for design according to EOTA TR 055 or CEN/TS 1992-4**

Essential characteristics			Performance						
			M6	M8	M10	M12	M16	M20	M24
Shear steel failure mode									
$V_{Rk,s}$	Characteristic shear steel failure	[kN]	14	26	42	50	97	125	151
$M^0_{Rk,s}$	Bending moment characteristic failure	[Nm]	12	30	60	105	266	542	932
γ_{MsV}	Partial safety factor	[-]	1,25						
Shear concrete pry-out and edge failure									
K_3	Factor in equation (16) of CEN/TS 1992-4 § 6.2.2.3	[-]	1,0		2,0				
l_{ef}	Effective anchorage depth	[mm]	46	59	67	88	99	125	150
d_{nom}	Diameter of anchor	[mm]	10	12	15	18	24	28	32
Displacement under tension load									
Non-cracked concrete C20/25									
V	Service shar load	[kN]	8,0	14,9	24,0	28,6	55,4	71,4	86,3
δ_{V0}	Short term displacement	[mm]	1,39	1,94	2,71	1,69	2,69	7,84	8,87
$\delta_{V\infty}$	Long term displacement	[mm]	2,09	2,91	4,07	2,54	4,04	11,76	13,31

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Design acc. to EOTA TR 055 or CEN/TS 1992-4
Characteristic resistance under Shear loads – BWR 1

Annex C2

Table C3: **Characteristic values for resistance in case of Seismic performance category C1 acc. TR045 "Design of Metal anchor under Seismic Actions"**

Essential characteristics			Performance						
			M6	M8	M10	M12	M16	M20	M24
Tension steel failure									
$N_{Rk,s,seis\ C1}$	Characteristic tension steel failure	[kN]	16	29	46	67	126	203	293
$\gamma_{MsN,seis}$ 2)	Partial safety factor	[-]	1,5						
Pull-out failure mode $N_{Rk,p,seis} = \psi_C \times N^0_{Rk,p,seis}$									
$N_{Rk,p,seis\ C1}$	Characteristic pull-out failure in concrete C20/25	[kN]	6,8	12	16	25	35,5 1)	50,2 1	66,1 1
$\gamma_{Mp,seis}$ 2)	Partial safety factor	[-]	1,5						
Shear steel failure									
$V_{Rk,s,seisC1}$	Characteristic shear steel failure	[kN]	9,8	13	20	20	48,5	87,5	105,7
$\gamma_{MsV,seis}$ 2)	Partial safety factor	[-]	1,25						

1) The pull-out is not decisive

2) The recommended partial safety factors under seismic action ($\gamma_{M,seis}$) are the same as for static loading

MUNGO MSL	**Annex C3**
Design according to TR 045 Characteristic resistance under Seismic actions – BWR 1	

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Table C4: **Characteristic values for resistance in case of Seismic performance category C2 acc. TR045 "Design of Metal anchor under Seismic Actions"**

Essential characteristics			Performance						
			M6	M8	M10	M12	M16	M20	M24
Tension steel failure									
$N_{Rk,s,seis\ C2}$ [2)]	Characteristic tension steel failure	[kN]	16	29	46	67	126	203	293
γ_{MsN} [3)]	Partial safety factor	[-]	1,5						
Pull-out failure $N_{Rk,p,seis} = \psi_C \times N^0_{Rk,seis}$									
$N_{Rk,p,seis\ C2}$ [2)]	Characteristic pull-out failure in concrete C20/25	[kN]	-	3,9	7,8	15,3	28,8	32,8	41,3
γ_{MpN} [3)]	Partial safety factor	[-]	1,5						
$\delta_{N,sei(DSL)}$ [1)2)]	Displacement at DSL	[mm]	-	2,7	4,9	3,6	3,1	7,0	7,0
$\delta_{N,sei(USL)}$ [1)2)]	Displacement at USL	[mm]	-	12,8	15,2	14,0	11,5	18,4	16,2
Shear steel failure									
$V_{Rk,s,seis\ C2}$ [2)]	Characteristic shear failure	[kN]	-	10,2	17,0	17,0	43,9	72,9	74,6
γ_{MsV} [3)]	Partial safety factor	[-]	1,25						
$\delta_{V,sei(DSL)}$ [1)2)]	Displacement at DSL	[mm]	-	3,5	2,7	2,5	2,7	7,0	7,0
$\delta_{V,sei(USL)}$ [1)2)]	Displacement at USL	[mm]	-	6,8	6,3	5,8	6,1	20,9	18,6

1) The listed displacement represent mean values

2) A smaller displacement may be required in the design in the case of displacement sensitive fastenings or "rigid" supports. The characteristic resistance associated with such smaller displacement may be determined by linear interpolation or proportional reduction.

3) The recommended partial safety factors under seismic action ($\gamma_{M,seis}$) are the same as for static loading

MUNGO MSL	**Annex C4**
Design according to TR 045 Characteristic resistance under Seismic actions - BWR 1	

Table C5: **Characteristic resistance under Fire exposure for design acc. to TR020**

Essential characteristics			Performance						
			M6	M8	M10	M12	M16	M20	M24
Tension steel failure mode									
$N_{Rk,s,fi,30}$	Duration = 30 minutes	[kN]	0,20	0,37	0,87	1,69	3,14	4,90	7,06
$N_{Rk,s,fi,60}$	Duration = 60 minutes	[kN]	0,18	0,33	0,75	1,26	2,36	3,68	5,30
$N_{Rk,s,fi,90}$	Duration = 90 minutes	[kN]	0,14	0,26	0,58	1,10	2,04	3,19	4,59
$N_{Rk,s,fi,120}$	Duration = 120 minutes	[kN]	0,10	0,18	0,46	0,84	1,57	2,45	3,53
Pull-out failure mode									
$N_{Rk,p,fi,30}$	Duration = 30 minutes	[kN]	2,25	3,00	4,00	6,25	8,88	12,58	16,54
$N_{Rk,p,fi,60}$	Duration = 60 minutes	[kN]	2,25	3,00	4,00	6,25	8,88	12,58	16,54
$N_{Rk,p,fi,90}$	Duration = 90 minutes	[kN]	2,25	3,00	4,00	6,25	8,88	12,58	16,54
$N_{Rk,p,fi,120}$	Duration = 120 minutes	[kN]	1,80	2,40	3,20	5,00	7,10	10,06	13,23
Concrete cone failure mode									
$N_{Rk,c,fi,30}$	Duration = 30 minutes	[kN]	3,03	4,81	6,61	13,08	17,55	31,44	49,61
$N_{Rk,c,fi,60}$	Duration = 60 minutes	[kN]	3,03	4,81	6,61	13,08	17,55	31,44	49,61
$N_{Rk,c,fi,90}$	Duration = 90 minutes	[kN]	3,03	4,81	6,61	13,08	17,55	31,44	49,61
$N_{Rk,c,fi,120}$	Duration = 120 minutes	[kN]	2,42	3,85	5,29	10,46	14,04	25,16	39,68
$s_{cr,N}$	Characteristic spacing	[mm]	4 x h_{ef}						
$c_{cr,N}$	Characteristic edge distance	[mm]	2 x h_{ef}						
s_{min}	Minimum spacing	[mm]	50	60	70	80	100	125	150
c_{min}	Minimum edge distance	[mm]	c_{min} = 2 h_{ef}; if fire attack from more than one side, the edge distance of the anchor has to be ≥ 300mm and ≥ 2 h_{ef}						
$\gamma_{M,fi}$	Partial safety factor	[-]	1,0[1)]						
Shear steel failure without lever arm									
$V_{Rk,s,fi,30}$	Duration = 30 minutes	[kN]	0,20	0,37	0,87	1,69	3,14	4,9	7,06
$V_{Rk,s,fi,60}$	Duration = 60 minutes	[kN]	0,18	0,33	0,75	1,26	2,36	3,68	5,30
$V_{Rk,s,fi,90}$	Duration = 90 minutes	[kN]	0,14	0,26	0,58	1,10	2,04	3,19	4,59
$V_{Rk,s,fi,120}$	Duration = 120 minutes	[kN]	0,10	0,18	0,46	0,84	1,57	2,45	3,53
Shear steel failure with lever arm									
$M^0_{Rk,s,fi,30}$	Duration = 30 minutes	[Nm]	0,15	0,37	1,12	2,62	6,66	13,07	22,45
$M^0_{Rk,s,fi,60}$	Duration = 60 minutes	[Nm]	0,14	0,34	0,97	1,96	5,00	9,80	16,84
$M^0_{Rk,s,fi,90}$	Duration = 90 minutes	[Nm]	0,11	0,26	0,75	1,70	4,33	8,49	14,59
$M^0_{Rk,s,fi,120}$	Duration = 120 minutes	[Nm]	0,08	0,19	0,60	1,31	3,33	5,44	9,35
Shear concrete pry-out failure									
K3	Factor in equation (16) of CEN/TS 1992-4 § 6.2.2.3	[mm]	1,0		2,0				
Shear concrete edge failure									
The characteristic resistance $V^0_{Rk,c,fi}$ in C 20/25 to C5 0/60 concrete is determined by: $V^0_{Rk,c,fi} = 0{,}25 \times V^0_{Rk,c}$ (≤ R90) and $V^0_{Rk,c,fi} = 0{,}20 \times V^0_{Rk,c}$ (R120) with $V^0_{Rk,c}$ initial value of the characteristic resistance in cracked concrete C20/25 under normal temperature.									

1) In absence of other national regulations

MUNGO MSL	**Annex C5**
Design according to TR020 Characteristic resistance under Fire exposure - BWR 2	