



**INSTITUTO DE CIENCIAS
DE LA CONSTRUCCIÓN
EDUARDO TORROJA**

C/ Serrano Galvache, 4. 28033 Madrid (Spain)
Tel.: (+34) 91 302 0440 www.ietcc.csic.es
gestiondit@ietcc.csic.es dit.ietcc.csic.es



European Technical Assessment

ETA 12/0397
of 03/09/2026

General Part

Technical Assessment Body issuing the European Technical Assessment:
Instituto de Ciencias de la Construcción Eduardo Torroja (IETcc)

**Trade name of the construction
product**

Anchors MTP

Torque controlled expansion anchor made of galvanized steel, sherardized steel or stainless steel of sizes M8, M10, M12, M16, M20 and M24 for use in cracked or uncracked concrete

**Product family to which the
construction product belongs**

FIXINGS

Product Area Code (PAC): 33

Manufacturer

INDEX - Técnicas Expansivas S.L.

Segador 13
26006 Logroño (La Rioja) Spain.
website: www.indexfix.com

Manufacturing plant

Index plant 2

**This European Technical
Assessment contains**

21 pages,
including annexes 1-3, which form an integral part of this assessment.

**This European Technical
Assessment is issued in accordance
with Regulation (EU) No 305/2011,
on the basis of**

European Assessment Document EAD 330232-02-0601
“Mechanical Fasteners for use in concrete”,
ed. September 2024.

This ETA replaces

ETA 12/0397 revision 7 dated 10/06/2025

Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document and should be identified as such.

Communication of this European Technical Assessment, including transmission by electronic means, shall be in full (excepted the confidential Annex(es) referred to above). However, partial reproduction may be made, with the written consent of the issuing Technical Assessment Body. Any partial reproduction has to be identified as such.

CSV : GEN-bfe6-9a53-3add-7579-1e1c-dbc-b-a1bd-add4

DIRECCIÓN DE VALIDACIÓN : <https://run.gob.es/hsbIF8yLcR>

FIRMANTE(1) : ANGEL CASTILLO TALAVERA | FECHA : 10/09/2026 11:13 | Sin acción específica



SPECIFIC PART

1. Technical description of the product

The INDEX MTP range wedge anchors are torque-controlled, mechanical expansion anchors consisting of an anchor body, expansion clip, nut, and washer. The anchor body has a tapered mandrel formed on the installed end of the anchor and a threaded section at the opposite end. The taper of the mandrel increases in diameter towards the installed end of the anchor. The three-segment expansion clip wraps around the tapered mandrel. Before installation, this expansion clip is free to rotate about the mandrel. The anchor is set by applying torque to the hex nut; the mandrel is drawn into the expansion clip, which engages the drilled hole and transfers the load to the base material. The anchorage is characterized by friction between expansion clip and concrete.

The INDEX MTP wedge anchor in the range of M8, M10, M12, M16, M20 and M24 is an anchor made of galvanised steel. The INDEX MTP-AT wedge anchor in the range of M8, M10, M12, M16 and M20 is an anchor coated in zinc-nickel. The INDEX MTP-G wedge anchor in the range of M8, M10, M12, M16 and M20 is an anchor made of sherardized steel. The INDEX MTP-X wedge anchor in the range of M8, M10, M12, M16 and M20 is an anchor made of galvanized steel. The INDEX MTP-A4 wedge anchor in the range of M8, M10, M12, M16 and M20 is an anchor made of stainless steel.

Product and installation descriptions are given in annexes A1 and A2.

2. Specification of the intended use in accordance with the applicable European Assessment Document.

2.1 Intended use

This ETA covers fasteners to be used in compacted, reinforced or unreinforced, normal weight, cracked or uncracked concrete with strength classes in the range of C20/25 to C50/60 all in accordance with EN 206, for static or quasi-static or under seismic actions (categories C1 and C2) and with requirements related to fire exposure, loaded in tension, shear or combined tension and shear.

The performances given in section 3 are only valid if the anchor is used in compliance with the specifications and conditions given in annex B.

2.2 Relevant general conditions for the use of the product

The assessment methods included or referred to in this EAD have been written based on the manufacturer's request to take into account a working life of the fastener for the intended use of 50 years when installed in the works (provided that the fastener is subject to appropriate installation). These provisions are based upon the current state of the art and the available knowledge and experience.

When assessing the product, the intended use as foreseen by the manufacturer shall be taken into account. The real working life may be, in normal use conditions, considerably longer without major degradation affecting the basic requirements for works.

The indications given as to the working life of the construction product cannot be interpreted as a guarantee neither given by the product manufacturer or its representative nor by EOTA when drafting the EAD nor by the Technical Assessment Body issuing an ETA based on this EAD, but are regarded only as a mean for expressing the expected economically reasonable working life of the product.

This ETA covers fasteners for installation in pre-drilled holes in compacted reinforced or unreinforced normal weight concrete considering annexes B and C.



3. Performance of the product and references to the methods used for its assessment

The identification tests and the assessment for the intended use of this product according to the Basic Work Requirements (BWR) were carried out in compliance with EAD 330232-02-0601. The

characteristics of each system shall correspond to the respective values laid down in following tables of this ETA, checked by IETcc.

Methods of verification and of assessing and judging are listed afterwards.

3.1 Mechanical resistance and stability (BWR 1)

Essential characteristic	Relevant clause in EAD	Performance	Annex
Resistance to steel failure	2.2.1	$N_{Rk,s}$ [kN]	C3, C4
Resistance to pull-out failure	2.2.2	$N_{Rk,p}$ [kN] ψ_c [-]	C3, C4
Resistance to concrete cone failure	2.2.3	$k_{cr,N}$, $k_{ucr,N}$ [-] h_{ef} , $c_{cr,N}$ [mm]	C3, C4
Robustness	2.2.4	γ_{inst} [-]	C3, C4
Minimum edge distance and spacing	2.2.5	c_{min} , s_{min} , h_{min} [mm]	C1
Edge distance to prevent splitting under load	2.2.6	$N^0_{Rk,sp}$ [kN], $c_{cr,sp}$ [mm]	C3, C4
Resistance to steel failure under shear load	2.2.7	$V^0_{Rk,s}$ [kN], $M^0_{Rk,s}$ [Nm], k_7 [-]	C5
Resistance to pry-out failure	2.2.8	k_8 [-]	C5
Displacement under static and quasi-static loading	2.2.10	δ_{N0} , $\delta_{N\infty}$, δ_{V0} , $\delta_{V\infty}$ [mm]	C6
Stiffness in the elastic range under tension loading	2.2.11.1	NPD	--
Stiffness characteristics for tension loading for non-linear spring models	2.2.11.2	NPD	--
Resistance to tension load for seismic performances category C1	2.2.12	$N_{Rk,s,C1}$ [kN], $N_{Rk,p,C1}$ [kN]	C7
Resistance to shear load for seismic performances category C1, factor for annular gap	2.2.13	$V_{Rk,s,C1}$ [kN]	C7
Resistance to tension load and displacements for seismic performances category C2	2.2.14	$N_{Rk,s,C2}$, $N_{Rk,p,C2}$ [kN], $\delta_{N,C2(0.5)}$ [mm], $\delta_{N,C2(0.8)}$ [mm]	C8
Resistance to shear load and displacements for seismic performances category C2, factor for annular gap	2.2.15	$V_{Rk,s,C2}$ [kN], $\delta_{V,C2(0.5)}$ [mm], $\delta_{V,C2(0.8)}$ [mm]	C8



3.2 Safety in case of fire (BWR 2)

Essential characteristic	Relevant clause in EAD	Performance	Annex
Reaction to fire	2.2.16	Anchorage satisfy requirements for class A1 according to EN 13501-1	--
Fire resistance to steel failure, tension load	2.2.17	$N_{Rk,s,fi}$ [kN]	C11, C12
Fire resistance to pull out failure, tension load	2.2.18	$N_{Rk,p,fi}$ [kN]	C11, C12
Fire resistance to steel failure, shear load	2.2.19	$V_{Rk,s,fi}$ [kN] $M^0_{Rk,s,fi}$ [Nm]	C11, C12

3.3 Durability

Essential characteristic	Relevant clause in EAD	Performance	Annex
Durability: MTP, MTP-X MTP-AT MTP-G MTP-A4	2.2.20	Coated in zinc plated Coated in zinc nickel Sherardized A4 stainless steel	A2

4. Assessment and Verification of Constancy of Performance (hereinafter AVCP) system applied, with reference to its legal base

The applicable European legal act for the system of Assessment and Verification of Constancy of Performance (see annex V to Regulation (EU) No 305/2011) is 96/582/EC.

The system to be applied is 1.

5. Technical details necessary for the implementation of the AVCP system, as provided for in the applicable European Assessment Document.

Technical details necessary for the implementation of the AVCP system are laid down in the quality plan which is deposited at IETcc⁽¹⁾.

Issued in Madrid on 03th of September 2026

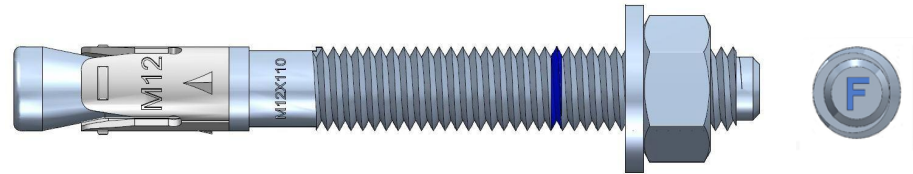
Director
on behalf of Instituto de Ciencias de la Construcción Eduardo Torroja (IETcc – CSIC)

⁽¹⁾ The Quality Plan is a confidential part of the ETA and only handed over to the notified certification body involved in the assessment and verification of constancy of performance.



Product and installed condition

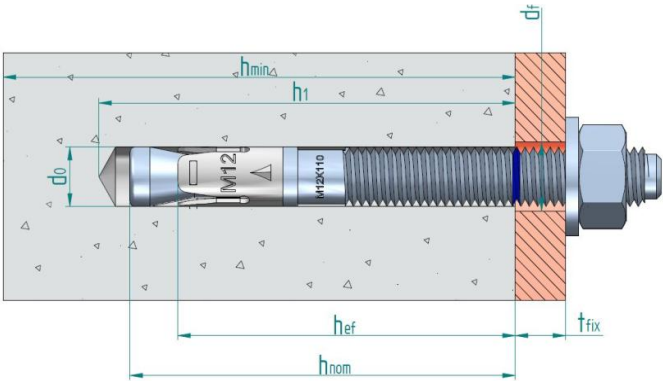
MTP, MTP-AT, MTP-G, MTP-X. MTP-A4 anchor



Identification on anchor:

- Expansion clip:
 - Anchor MTP: Company logo + "MTP" + Metric.
 - Anchor MTP-AT: Company logo + "MTP-AT" + Metric.
 - Anchor MTP-G: Company logo + "MTP-G" + Metric.
 - Anchor MTP-X: Company logo + "MTP-X" + Metric.
 - Anchor MTP-A4: Company logo + "MTP-A4" + Metric.
- Anchor body: Metric x Length
- Blue ring mark to show embedment depth
- Length letter code on head:

Letter on head	Length [mm]	Letter on head	Length [mm]	Letter on head	Length [mm]
C	68 ÷ 75	I	140 ÷ 151	O	216 ÷ 228
D	76 ÷ 88	J	152 ÷ 164	P	229 ÷ 240
E	89 ÷ 101	K	165 ÷ 177	Q	241 ÷ 253
F	102 ÷ 113	L	178 ÷ 190	R	254 ÷ 266
G	114 ÷ 126	M	191 ÷ 202	S	267 ÷ 304
H	127 ÷ 139	N	203 ÷ 215	T	305 ÷ 329
				U	330 ÷ 366



- d_0 : Nominal diameter of drill bit
 d_f : Fixture clearance hole diameter
 h_{ef} : Effective anchorage depth
 h_1 : Depth of drilled hole
 h_{nom} : Overall anchor embedment depth in the concrete
 h_{min} : Minimum thickness of concrete member
 t_{fix} : Fixture thickness

MTP anchors

Product description

Installed condition

Annex A1



Table A1: materials

Item	Designation	Material for MTP	Material for MTP-AT
1	Anchor body	M8 to M20: carbon steel wire rod, galvanized $\geq 5 \mu\text{m}$ ISO 4042 Zn5/An/T0 with antifriction coating M24: machined carbon steel, galvanized $\geq 5 \mu\text{m}$ ISO 4042 Zn5/An/T0 with antifriction coating	Carbon steel wire rod, zinc nickel $\geq 8 \mu\text{m}$, sealed, ISO 4042 ZnNi8/An/T2, with antifriction coating
2	Washer	DIN 125, DIN 9021, DIN 440 galvanized $\geq 5 \mu\text{m}$ ISO 4042 Zn5/An/T0	DIN 125, DIN 9021 or DIN 440 zinc nickel $\geq 8 \mu\text{m}$, sealed, ISO 4042 ZnNi8/An/T2
3	Nut	DIN 934 class 6, galvanized $\geq 5 \mu\text{m}$ ISO 4042 Zn5/An/T0	DIN 934 class 6 zinc nickel $\geq 8 \mu\text{m}$, sealed, ISO 4042 ZnNi8/An/T2, class 6
4	Expansion clip	Stainless steel	Stainless steel

Item	Designation	Material for MTP-G	Material for MTP-X
1	Anchor body	Carbon steel wire rod, sherardized $\geq 50 \mu\text{m}$ EN 13811	Carbon steel wire rod, galvanized $\geq 5 \mu\text{m}$ ISO 4042 Zn5/An/T0 with antifriction coating
2	Washer	DIN 125, DIN 9021, DIN 440 sherardized $\geq 50 \mu\text{m}$ EN 13811	DIN 125, DIN 9021, DIN 440 galvanized $\geq 5 \mu\text{m}$ ISO 4042 Zn5/An/T0
3	Nut	DIN 934 class 6, sherardized $\geq 50 \mu\text{m}$ EN 13811	DIN 934 class 6 galvanized $\geq 5 \mu\text{m}$ ISO 4042 Zn5/An/T0
4	Expansion clip	Stainless steel	Carbon steel strip, sherardized $\geq 15 \mu\text{m}$ EN 13811

Item	Designation	Material for MTP-A4
1	Anchor body	Stainless steel, grade A4
2	Washer	DIN 125, DIN 9021, DIN 440 stainless steel, grade A4
3	Nut	Stainless steel, grade A4 with antifriction coating
4	Expansion clip	Stainless steel, grade A4, galvanized $\geq 5 \mu\text{m}$ ISO 4042 Zn5/An/T0

MTP anchors

Product description

Materials

Annex A2



Specifications of intended use

Version	Intended use	M8	M10	M12	M16	M20	M24
MTP	Static or quasi static loads	✓	✓	✓	✓	✓	✓
	Seismic loads category C1		✓	✓	✓		
	Seismic loads category C2			✓	✓		
	Resistance to fire exposure	✓	✓	✓	✓	✓	✓
MTP-AT	Static or quasi static loads	✓	✓	✓	✓	✓	
	Seismic loads category C1		✓	✓	✓		
	Seismic loads category C2			✓	✓		
	Resistance to fire exposure	✓	✓	✓	✓	✓	
MTP-G	Static or quasi static loads	✓	✓	✓	✓	✓	
	Seismic loads category C1	✓	✓	✓	✓	✓	
	Seismic loads category C2			✓	✓	✓	
	Resistance to fire exposure	✓	✓	✓	✓	✓	
MTP-X	Static or quasi static loads	✓	✓	✓	✓	✓	
	Seismic loads category C1	✓	✓	✓	✓	✓	
	Seismic loads category C2		✓	✓		✓	
	Resistance to fire exposure	✓	✓	✓	✓	✓	
MTP-A4	Static or quasi static loads	✓	✓	✓	✓	✓	
	Seismic loads category C1		✓	✓	✓	✓	
	Seismic loads category C2		✓	✓	✓	✓	
	Resistance to fire exposure	✓	✓	✓	✓	✓	

Base materials:

- Reinforced or unreinforced normal weight concrete with or without fibres (MTP, MTP-AT, MTP-G, MTP-X) or in concrete without fibres (MTP-A4) according to EN 206:2013+A2:2021
- Strength classes C20/25 to C50/60 according to EN 206:2013+A2:2021
- Cracked or uncracked concrete

Use conditions (environmental conditions):

- Temperature range of the anchorage base material during the working life: -40 °C to +80 °C.
- MTP, MTP-AT, MTP-X: anchorages subjected to dry internal conditions.
- MTP-G:
 - Anchorage in cracked concrete: dry internal conditions
 - Anchorage in uncracked concrete: durability depending on the following environmental corrosivity categories according to ISO 9223:2012:

Corrosivity category	Corrosivity level	Durability [years]
C1	Very low	50 ¹⁾
C2	Low	50 ¹⁾
C3	Medium	47
C4	High	21
C5	Very high	9
CX	Extreme	2

1) Working life of fastener limited to 50 years according to EAD 330232-02-0601 section 1.2.2

MTP anchors

Intended use

Specifications

Annex B1



- MTP-A4: anchorages subjected to dry internal conditions, to external atmospheric exposure (including industrial and marine environment) or to permanent internal damp conditions if no particular aggressive conditions exist. Such particular aggressive conditions are e.g., permanent, alternating immersion in seawater or the splash zone of seawater, chloride atmosphere of indoor swimming pools or atmosphere with extreme chemical pollution (e.g., in desulphurization plants or road tunnels where de-icing materials are used). Atmospheres under Corrosion Resistance Class CRC III according to EN 1993-1-4:2006+A1:2015 annex A.

Corrosivity category	Corrosivity level	Typical environments – Examples	
		Indoor	Outdoor
C1	Very low	Heated spaces with low relative humidity and insignificant pollution; e.g., offices, schools, museums.	Dry or cold zone, atmospheric environment with very low pollution and time of wetness; e.g., certain deserts, Central Arctic/Antarctic.
C2	Low	Unheated spaces with varying temperature and relative humidity. Low frequency of condensation and low pollution; e.g., storage, sport halls.	Temperate zone, atmospheric environment with low pollution ($SO_2 < 5 \mu g/m^3$); e.g., rural areas, small towns. Dry or cold zone, atmospheric environment with short time or wetness, e.g., deserts, subarctic areas.
C3	Medium	Spaces with moderate frequency of condensation and moderate pollution from production process; e.g., food-processing plants, laundries, breweries, dairies.	Temperate zone, atmospheric environment with medium pollution ($SO_2 5 \mu g/m^3$ to $30 \mu g/m^3$), or some effect of chlorides, e.g., urban areas, coastal areas with low deposition of chlorides. Subtropical and tropical zone, atmosphere with low pollution.
C4	High	Spaces with high frequency of condensation and high pollution from production process; e.g., industrial processing plants.	Temperate zone, atmospheric environment with high pollution ($SO_2 30 \mu g/m^3$ to $90 \mu g/m^3$), or substantial effect of chlorides; e.g., polluted urban areas, industrial areas, coastal areas without spray of salt water or exposure to strong effect of de-icing salts. Subtropical and tropical zone, atmosphere with medium pollution.
C5	Very High	Spaces with very high frequency of condensation and/or high pollution from production process; e.g., mines, caverns for industrial purposes, unventilated sheds in subtropical and tropical zones	Temperate zone, atmospheric environment with very high pollution ($SO_2 90 \mu g/m^3$ to $250 \mu g/m^3$), or significant effect of chlorides; e.g., industrial areas, coastal areas, sheltered positions on coastline. Subtropical and tropical zone, atmosphere with medium pollution.
CX	Extreme	Spaces with almost permanent condensation or extensive periods of exposure to extreme humidity effects and/or high pollution from production process; e.g., unventilated sheds in humid tropical zones with penetration of outdoor pollution including airborne chlorides and corrosion-stimulating particulate matter	Subtropical and tropical zone (very high time of wetness), atmospheric environment with very high SO_2 pollution (higher than $250 \mu g/m^3$) including accompanying and production factors and/or strong effect of chlorides; e.g., extreme industrial areas, coastal and offshore areas, occasional contact with salt spray.

Design:

- Anchorages are designed under the responsibility of an engineer experienced in anchorages and concrete.
- Verifiable calculation rules and drawings are prepared taking into account of the loads 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.).
- Anchorages under static or quasi-static actions are designed for design method A in accordance with EN 1992-4:2018
- Anchorages under seismic actions are designed in accordance with EN 1992-4:2018. Anchorages shall be positioned outside of critical regions (e.g. plastic hinges) of the concrete structure. Fastening in stand-off installation or with grout layer are not allowed.
- Anchorages under fire exposure are designed in accordance with EN 1992-4:2018. It must be ensured that local spalling of the concrete cover does not occur.

MTP anchors	Annex B2
Intended use	
Specifications	



Installation:

- Hole drilling by rotary plus hammer mode.
- Anchor installation carried out by appropriately qualified personal and under the supervision of the person responsible for technical matters of the site.
- In case of aborted hole: new drilling at a minimum distance away of twice the depth of aborted hole or smaller distance if the aborted hole is filled with high strength mortar and if under shear or oblique tension load it is not the direction of the load application.

MTP anchors	Annex B3
Intended use	
Specifications	



Table C1: Installation parameters for MTP, MTP-AT, MTP-G, MTP-X anchors

Installation parameters			Performances					
			M8	M10	M12	M16	M20	M24
d ₀	Nominal diameter of drill bit:	[mm]	8	10	12	16	20	24
d _f	Fixture clearance hole diameter:	[mm]	9	12	14	18	22	26
T _{inst}	Nominal installation torque:	[Nm]	20 / 15 ¹⁾	40	60	100	200	250
L _{min}	Minimum total length of the bolt:	[mm]	68	82	98	119	140	175
h ₁	Depth of drilled hole:	[mm]	60	75	85	105	125	155
h _{nom}	Overall anchor embedment depth in the concrete:	[mm]	55	68	80	97	114	143
h _{ef}	Effective anchorage depth:	[mm]	48	60	70	85	100	125
t _{fix}	Thickness of fixture for washer DIN 125 ≤ ²⁾	[mm]	L - 66	L - 80	L - 96	L - 117	L - 138	L - 170
t _{fix}	Thickness of fixture for washers DIN 9021, DIN 440 ≤ ²⁾	[mm]	L - 67	L - 81	L - 97	L - 118	L - 139	L - 171
S _{min}	Minimum allowable spacing:	[mm]	40	40	60	65	95	125
	for edge distance c ≥	[mm]	55	70	75	95	105	125
C _{min}	Minimum allowable distance:	[mm]	45	45	55	70	95	125
	for spacing s ≥	[mm]	55	90	110	115	105	125
h _{min}	Minimum thickness of concrete member: MTP, MTP-AT, MTP-G	[mm]	100	120	140	170	200	250
h _{min}	Minimum thickness of concrete member: MTP-X	[mm]	80	90	105	130	150	--

¹⁾ Respective values for anchors MTP, MTP-AT / MTP-G, MTP-X

²⁾ L = total anchor length,

Table C2: Installation parameters for MTP-A4 anchor

Installation parameters			Performances				
			M8	M10	M12	M16	M20
d ₀	Nominal diameter of drill bit:	[mm]	8	10	12	16	20
d _f	Fixture clearance hole diameter:	[mm]	9	12	14	18	22
T _{inst}	Nominal installation torque:	[Nm]	15	30	60	100	200
L _{min}	Minimum total length of the bolt:	[mm]	68	82	98	119	140
h ₁	Depth of drilled hole:	[mm]	60	75	85	105	125
h _{nom}	Overall anchor embedment depth in the concrete:	[mm]	55	68	80	97	114
h _{ef}	Effective anchorage depth:	[mm]	48	60	70	85	100
t _{fix}	Thickness of fixture for washer DIN 125 ≤ ¹⁾	[mm]	L - 66	L - 80	L - 96	L - 117	L - 138
t _{fix}	Thickness of fixture for washers DIN 9021, DIN 440 ≤ ¹⁾	[mm]	L - 67	L - 81	L - 97	L - 118	L - 139
S _{min}	Minimum allowable spacing:	[mm]	42	47	57	75	100
C _{min}	Minimum allowable distance:	[mm]	47	52	62	75	90
h _{min}	Minimum thickness of concrete member:	[mm]	100	120	140	170	200

¹⁾ L = total anchor length

MTP anchors

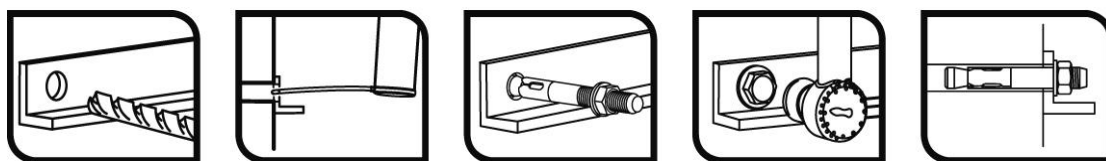
Performances

Installation parameters

Annex C1



Installation process



MTP anchors

Performances

Installation procedure

Annex C2



Table C3: Characteristic values to tension loads of design method A according to EN 1992-4 for MTP, MTP-AT, MTP-G, MTP-X anchors

Characteristic values of resistance to tension loads of design according to design method A			Performances					
			M8	M10	M12	M16	M20	M24
Resistance to steel failure								
N _{Rk,s}	Characteristic resistance:	[kN]	18.1	31.4	40.4	74.9	120.0	179.2
γ _{Ms}	Partial safety factor ¹⁾ :	[-]	1.5	1.5	1.5	1.5	1.5	1.5
Resistance to pull-out failure								
MTP, MTP-AT anchor								
N _{Rk,p,ucr}	Characteristic resistance in C20/25 uncracked concrete:	[kN]	9	18	20	36	48	55
N _{Rk,p,cr}	Characteristic resistance in C20/25 cracked concrete:	[kN]	5	9.5	12	25	32	35
MTP-G anchor								
N _{Rk,p,ucr}	Characteristic resistance in C20/25 uncracked concrete:	[kN]	10	18	≥N ⁰ _{Rk,c²⁾}	36	≥N ⁰ _{Rk,c²⁾}	--
N _{Rk,p,cr}	Characteristic resistance in C20/25 cracked concrete:	[kN]	6	10	16	≥N ⁰ _{Rk,c²⁾}	30	--
MTP-X anchor								
N _{Rk,p,ucr}	Characteristic resistance in C20/25 uncracked concrete:	[kN]	10	18	28	34	≥N ⁰ _{Rk,c²⁾}	--
N _{Rk,p,cr}	Characteristic resistance in C20/25 cracked concrete:	[kN]	7	11	15	≥N ⁰ _{Rk,c²⁾}	≥N ⁰ _{Rk,c²⁾}	--
γ _{inst}	Robustness:	[-]	1.2	1.0	1.0	1.0	1.0	1.2
Ψ _{c,ucr} Ψ _{c,cr}	Increasing factor for concrete	C30/37	1.22	1.17	1.22	1.22	1.17	1.22
		C40/50	1.41	1.31	1.41	1.41	1.31	1.41
		C50/60	1.58	1.43	1.58	1.58	1.43	1.58
Resistance to concrete cone and splitting failure								
h _{ef}	Effective embedment depth:	[mm]	48	60	70	85	100	125
k _{ucr,N}	Factor for uncracked concrete:	[-]	11.0					
k _{cr,N}	Factor for cracked concrete:	[-]	7,7					
γ _{inst}	Robustness:	[-]	1.2	1.0	1.0	1.0	1.0	1.2
s _{cr,N}	Spacing, edge distance for	[mm]	3 x h _{ef}					
c _{cr,N}	concrete cone failure:	[mm]	1.5 x h _{ef}					
N ⁰ _{Rk,sp}	Characteristic splitting resistance:	[kN]	min (N _{Rk,p} ; N ⁰ _{Rk,c})					
s _{cr,sp}	Spacing, edge distance for	[mm]	288	300	350	425/510 ³⁾	500/600 ³⁾	560
c _{cr,sp}	splitting failure:	[mm]	144	150	175	213/255 ³⁾	250/300 ³⁾	280

- 1) In absence of other national regulations
- 2) $N_{Rk,c}^{(0)}$ calculated according to EN 1992-4
- 3) Respective values for anchors MTP, MTP-AT / MTP-G, MTP-X

MTP anchors	Annex C3
Performances	
Characteristic values to tension loads	



Table C4: Characteristic values to tension loads of design method A according to EN 1992-4 for for MTP-A4 anchor

Characteristic values of resistance to tension loads of design according to design method A			Performances				
			M8	M10	M12	M16	M20
Resistance to steel failure							
$N_{Rk,s}$	Characteristic resistance:	[kN]	18.5	30.9	45.5	71.5	122.5
γ_{Ms}	Partial safety factor ¹⁾ :	[-]	1.4	1.4	1.4	1.4	1.4
Resistance to pull-out failure							
$N_{Rk,p,ucr}$	Characteristic resistance in C20/25 uncracked concrete:	[kN]	12	16	22	$\geq N_{Rk,c}^{0,2)}$	$\geq N_{Rk,c}^{0,2)}$
$\Psi_{c,ucr}$ $\Psi_{c,cr}$	Increasing factor for concrete	C30/37	[-]	1.22	1.22	1.22	1.09
		C40/50	[-]	1.41	1.41	1.41	1.16
		C50/60	[-]	1.58	1.58	1.58	1.22
$N_{Rk,p,cr}$	Characteristic resistance in C20/25 cracked concrete:	[kN]	8.5	14	19	$\geq N_{Rk,c}^{0,2)}$	$\geq N_{Rk,c}^{0,2)}$
$\Psi_{c,ucr}$ $\Psi_{c,cr}$	Increasing factor for concrete	C30/37	[-]	1.01	1.00	1.09	1.17
		C40/50	[-]	1.02	1.00	1.15	1.32
		C50/60	[-]	1.02	1.00	1.20	1.44
γ_{inst}	Robustness:	[-]	1.0	1.0	1.2	1.2	1.2
Resistance to concrete cone and splitting failure							
h_{ef}	Effective embedment depth:	[mm]	48	60	70	85	100
$k_{ucr,N}$	Factor for uncracked concrete:	[-]	11.0				
$k_{cr,N}$	Factor for cracked concrete:	[-]	7,7				
γ_{inst}	Robustness:	[-]	1.0	1.0	1.2	1.2	1.2
$S_{cr,N}$	Spacing, edge distance for concrete cone failure	[mm]	$3 \times h_{ef}$				
$C_{cr,N}$	Spacing, edge distance for concrete cone failure	[mm]	$1.5 \times h_{ef}$				
$N_{Rk,sp}^0$	Characteristic splitting resistance:	[kN]	$\min(N_{Rk,p}; N_{Rk,c}^0)$				
$S_{cr,sp}$	Spacing, edge distance for splitting failure:	[mm]	164	204	238	290	380
$C_{cr,sp}$	Spacing, edge distance for splitting failure:	[mm]	82	102	119	145	190

- 1) In absence of other national regulations
2) $N_{Rk,c}^0$ calculated according to EN 1992-4

MTP anchors	Annex C4
Performances	
Characteristic values to tension loads	



Table C5: Characteristic values to shear loads of design method A according to EN 1992-4 for MTP, MTP-AT, MTP-G, MTP-X anchors

Characteristic values of resistance to shear loads of design according to design method A			Performances					
			M8	M10	M12	M16	M20	M24
Resistance to steel failure under shear loads								
V _{Rk,s}	Characteristic resistance:	[kN]	11.9	20.3	29.5	54.9	85.7	84.7
k ₇	Ductility factor:	[-]	1.00					
M _{Rk,s} ⁰	Characteristic bending moment:	[Nm]	26.2	52.3	91.7	233.1	454.4	673.5
γ _{Ms}	Partial safety factor ¹⁾ :	[-]	1.25	1.25	1.25	1.25	1.25	1.25
Resistance to pry-out failure								
k ₈	Pryout factor:	[-]	1	2	2	2	2	2
γ _{inst}	Robustness:	[-]	1.00					
Resistance to concrete edge failure								
ℓ _f	Effective length of anchor under shear loads:	[mm]	48	60	70	85	100	125
d _{nom}	Outside anchor diameter:	[mm]	8	10	12	16	20	24
γ _{inst}	Robustness:	[-]	1.00					

1) In absence of other national regulations

Table C6: Characteristic values to shear loads of design method A according to EN 1992-4 for MTP-A4 anchor

Characteristic values of resistance to shear loads of design according to design method A			Performances				
			M8	M10	M12	M16	M20
Resistance to steel failure under shear loads							
V _{Rk,s}	Characteristic resistance:	[kN]	11.9	18.9	27.4	55.0	85.9
k ₇	Ductility factor:	[-]	1.00				
M ⁰ _{Rk,s}	Characteristic bending moment:	[Nm]	26.2	52.3	91.7	233.1	454.3
γ _{Ms}	Partial safety factor ¹⁾ :	[-]	1.25	1.25	1.25	1.25	1.25
Resistance to pry-out failure							
k ₈	Pryout factor:	[-]	1	2	2	2	2
γ _{inst}	Robustness:	[-]	1.00				
Resistance to concrete edge failure							
l _f	Effective length of anchor under shear loads:	[mm]	48	60	70	85	100
d _{nom}	Outside anchor diameter:	[mm]	8	10	12	16	20
γ _{inst}	Robustness:	[-]	1.00				

1) In absence of other national regulations

MTP anchors**Performances**

Characteristic values to shear loads

Annex C5

Table C7: Displacements under tension loads for MTP, MTP-AT, MTP-G, MTP-X, MTP-A4 anchors

Displacements under tension loads			Performances					
			M8	M10	M12	M16	M20	M24
MTP, MTP-AT anchor								
N	Service tension load:	[kN]	3.6	8.6	9.5	17.1	22.9	21.8
δ_{N0}	Short term displacement:	[mm]	1.1	0.7	1.0	0.4	1.6	0.4
$\delta_{N50 \text{ years}}$	Long term displacement:	[mm]	1.9	1.9	1.9	1.9	1.9	2.0
MTP-G anchor								
N	Service tension load:	[kN]	4.0	8.6	13.7	17.1	23.4	--
δ_{N0}	Short term displacement:	[mm]	1.0	1.1	0.9	1.5	1.2	--
$\delta_{N50 \text{ years}}$	Long term displacement:	[mm]	1.9	1.9	1.9	1.9	1.9	--
MTP-X anchor								
N	Service tension load:	[kN]	4.0	8.5	13.3	16.2	23.4	--
δ_{N0}	Short term displacement:	[mm]	1.0	1.1	0.9	1.5	1.3	--
$\delta_{N50 \text{ years}}$	Long term displacement:	[mm]	1.6	1.6	1.6	1.6	1.6	--
MTP-A4 anchor								
N	Service tension load in non cracked concrete:	[kN]	5.7	7.6	8.7	15.3	19.5	--
δ_{N0}	Short term displacement:	[mm]	1.4	1.4	1.4	1.8	1.8	--
$\delta_{N50 \text{ years}}$	Long term displacement:	[mm]	1.9	1.9	1.9	1.9	1.9	--
MTP-A4 anchor								
N	Service tension load in cracked concrete:	[kN]	4.0	6.7	7.5	10.7	13.7	--
δ_{N0}	Short term displacement:	[mm]	1.2	1.3	1.3	1.3	1.3	--
$\delta_{N50 \text{ years}}$	Long term displacement:	[mm]	1.7	1.7	1.7	1.7	1.7	--

Table C8: Displacements under shear load for MTP, MTP-AT, MTP-G, MTP-X, MTP-A4 anchors

Displacements under shear loads			Performances					
			M8	M10	M12	M16	M20	M24
MTP, MTP-AT anchor								
V	Service shear load:	[kN]	6.8	11.6	16.9	31.4	46.9	48.4
δ_{V0}	Short term displacement:	[mm]	1.0	1.5	1.8	1.9	3.1	1.4
$\delta_{V\infty}$	Long term displacement:	[mm]	1.5	2.3	2.7	2.9	4.7	2.1
MTP-G anchor								
V	Service shear load:	[kN]	6.8	11.6	16.9	31.4	46.9	-
δ_{V0}	Short term displacement:	[mm]	1.0	1.5	1.8	1.9	3.1	--
$\delta_{V\infty}$	Long term displacement:	[mm]	1.5	2.3	2.7	2.9	4.7	--
MTP-X anchor								
V	Service shear load:	[kN]	6.8	11.6	16.9	31.4	46.9	--
δ_{V0}	Short term displacement:	[mm]	1.0	1.5	1.8	1.9	3.1	--
$\delta_{V\infty}$	Long term displacement:	[mm]	1.5	2.3	2.7	2.9	4.7	--
MTP-A4 anchor								
V	Service shear load:	[kN]	6.8	10.8	15.7	31.4	46.9	--
δ_{V0}	Short term displacement:	[mm]	1.9	1.6	1.6	2.2	2.2	--
$\delta_{V\infty}$	Long term displacement:	[mm]	2.4	2.4	2.4	3.3	3.3	--

MTP anchors

Performances

Displacements under static or quasi-static tension and shear loads

Annex C6



Table C9: Characteristic values for seismic performance category C1 for MTP, MTP-AT, MTP-G, MTP-X anchors

Characteristic values for seismic performance category C1			Performances					
			M8	M10	M12	M16	M20	M24
Resistance to steel failure under tension loads								
$N_{Rk,s,C1}$	Characteristic tension steel failure:	[kN]	18.1	31.4	40.4	72.7	116.6	--
γ_{Ms}	Partial safety factor: ¹⁾	[-]	1.5	1.5	1.5	1.5	1.5	--
Resistance to steel failure under shear loads								
MTP, MTP-AT anchor								
$V_{Rk,s,C1}$	Characteristic shear steel failure:	[kN]	--	12.2	17.8	33.0	--	--
MTP-G anchor								
$V_{Rk,s,C1}$	Characteristic shear steel failure:	[kN]	6.6	12.5	18.9	35.4	54.8	--
MTP-X anchor								
$V_{Rk,s,C1}$	Characteristic shear steel failure:	[kN]	7.7	12.2	17.8	33.0	58.5	--
γ_{Ms}	Partial safety factor: ¹⁾	[-]	1.25	1.25	1.25	1.25	1.25	--
Resistance to pull-out failure								
MTP, MTP-AT anchor								
$N_{Rk,p,C1}$	Characteristic pull out failure:	[kN]	--	5.3	8.4	17.5	--	--
MTP-G anchor								
$N_{Rk,p,C1}$	Characteristic pull out failure:	[kN]	6.0	9.0	16.0	25.0	30.0	--
MTP-X anchor								
$N_{Rk,p,C1}$	Characteristic pull out failure:	[kN]	5.9	8.9	16.0	25.0	30.0	--
γ_{inst}	Robustness:	[-]	1.2	1.0	1.0	1.0	1.0	--
Resistance to concrete cone failure								
h_{ef}	Effective embedment depth:	[mm]	48	60	70	85	100	--
$S_{cr,N}$	Spacing:	[mm]	3 x h_{ef}					--
$C_{cr,N}$	Edge distance:	[mm]	1.5 x h_{ef}					--
γ_{inst}	Robustness:	[-]	1.2	1.0	1.0	1.0	1.0	--

¹⁾ In absence of other national regulations

MTP anchors	Annex C7
Performances	
Characteristic values for seismic performance category C1	



Table C10: Characteristic values for seismic performance category C1 for MTP-A4 anchors							
Characteristic values for seismic performance category C1			Performances				
			M8	M10	M12	M16	M20
Resistance to steel failure under tension loads							
N _{Rk,s,C1}	Characteristic tension steel failure:	[kN]	--	30.9	45.5	71.5	122.5
γ _{Ms}	Partial safety factor: ¹⁾	[-]	--	1.4	1.4	1.4	1.4
Resistance to steel failure under shear loads							
V _{Rk,s,C1}	Characteristic shear steel failure:	[kN]	--	10.6	19.2	40.2	45.5
γ _{Ms}	Partial safety factor: ¹⁾	[-]	--	1.25	1.25	1.25	1.25
Resistance to pull-out failure							
N _{Rk,p,C1}	Characteristic pull out failure:	[kN]	--	6.4	11.8	17.5	20.6
γ _{inst}	Robustness:	[-]	--	1.0	1.2	1.2	1.2
Resistance to concrete cone failure							
h _{ef}	Effective embedment depth:	[mm]	--	60	70	85	100
S _{cr,N}	Spacing:	[mm]	--	3 x h _{ef}			
C _{cr,N}	Edge distance:	[mm]	--	1.5 x h _{ef}			
γ _{inst}	Robustness:	[-]	--	1.0	1.2	1.2	1.2
¹⁾ In absence of other national regulations							
MTP anchors						Annex C8	
Performances							
Characteristic values for seismic performance category C1							



Table C11: Characteristic values for seismic performance category C2 for MTP, MTP-AT, MTP-G, MTP-X anchors

Characteristic values for seismic performance category C2			Performances					
			M8	M10	M12	M16	M20	M24
Resistance to steel failure under tension loads								
$N_{Rk,s,C2}$	Characteristic tension steel failure:	[kN]	--	31.4	40.4	72.7	116.6	--
γ_{Ms}	Partial safety factor: ¹⁾	[-]	--	1.5	1.5	1.5	1.5	--
Resistance to steel failure under shear loads								
$V_{Rk,s,C2}$	Characteristic shear steel failure:	[kN]	--	12.2	17.8	33.0	58.5	--
γ_{Ms}	Partial safety factor: ¹⁾	[-]	--	1.25	1.25	1.25	1.25	--
Resistance to pull-out failure								
MTP, MTP-AT anchor								
$N_{Rk,p,C2}$	Characteristic pull out failure:	[kN]	--	--	5.2	8.9	--	--
MTP-G anchor								
$N_{Rk,p,C2}$	Characteristic pull out failure:	[kN]	--	--	5.9	16.3	17.2	--
MTP-X anchor								
$N_{Rk,p,C2}$	Characteristic pull out failure:	[kN]	--	3.9	9.1	--	21.0	--
γ_{inst}	Robustness:	[-]	--	1.0	1.0	1.0	1.0	--
Resistance to concrete cone failure								
h_{ef}	Effective embedment depth:	[mm]	--	60	70	85	100	--
$s_{cr,N}$	Spacing:	[mm]	--	3 x h_{ef}				--
$c_{cr,N}$	Edge distance:	[mm]	--	1.5 x h_{ef}				--
γ_{inst}	Robustness:	[-]	--	1.0	1.0	1.0	1.0	--
Displacements								
MTP, MTP-AT anchor								
$\delta_{N,C2(0.5)}$	Displacement Damage Limitation State: ^{2) 3)}	[mm]	--	--	2.34	3.99	--	--
$\delta_{V,C2(0.5)}$	Displacement Damage Limitation State: ^{2) 3)}	[mm]	--	--	5.53	5.96	--	--
$\delta_{N,C2(0.8)}$	Displacement Ultimate Limit State: ²⁾	[mm]	--	--	9.54	10.17	--	--
$\delta_{V,C2(0.8)}$	Displacement Ultimate Limit State: ²⁾	[mm]	--	--	9.08	10.66	--	--
MTP-G anchor								
$\delta_{N,C2(0.5)}$	Displacement Damage Limitation State: ^{2) 3)}	[mm]	--	--	6.79	5.21	5.72	--
$\delta_{V,C2(0.5)}$	Displacement Damage Limitation State: ^{2) 3)}	[mm]	--	--	5.53	5.96	6.37	--
$\delta_{N,C2(0.8)}$	Displacement Ultimate Limit State: ²⁾	[mm]	--	--	24.70	19.58	17.20	--
$\delta_{V,C2(0.8)}$	Displacement Ultimate Limit State: ²⁾	[mm]	--	--	9.08	10.66	12.32	--
MTP-X anchor								
$\delta_{N,C2(0.5)}$	Displacement Damage Limitation State: ^{2) 3)}	[mm]	--	3.15	5.57	--	6.82	--
$\delta_{V,C2(0.5)}$	Displacement Damage Limitation State: ^{2) 3)}	[mm]	--	5.61	5.53	--	6.37	--
$\delta_{N,C2(0.8)}$	Displacement Ultimate Limit State: ²⁾	[mm]	--	14.77	20.31	--	29.12	--
$\delta_{V,C2(0.8)}$	Displacement Ultimate Limit State: ²⁾	[mm]	--	8.68	9.08	--	12.32	--

¹⁾ In absence of other national regulations

²⁾ The listed displacements represent mean values

³⁾ A small displacement may be required in the design in the case of displacements sensitive fastening of "rigid" supports. The characteristics resistance associated with such small displacements may be determined by linear interpolation or proportional reduction.

MTP anchors

Performances

Characteristic values for seismic performance category C2

Annex C9



Table C12: Characteristic values for seismic performance category C2 for MTP-A4 anchors							
Characteristic values for seismic performance category C2			Performances				
			M8	M10	M12	M16	M20
Resistance to steel failure under tension loads							
N _{Rk,s,C2}	Characteristic tension steel failure:	[kN]	--	30.9	45.5	71.5	122.5
γ _{Ms}	Partial safety factor: ¹⁾	[-]	--	1.4	1.4	1.4	1.4
Resistance to steel failure under shear loads							
V _{Rk,s,C2}	Characteristic shear steel failure:	[kN]	--	10.6	19.2	40.2	45.5
γ _{Ms}	Partial safety factor: ¹⁾	[-]	--	1.25	1.25	1.25	1.25
Resistance to pull-out failure							
N _{Rk,p,C2}	Characteristic pull out failure:	[kN]	--	3.0	4.0	15.8	15.7
γ _{inst}	Robustness:	[-]	--	1.0	1.2	1.2	1.2
Resistance to concrete cone failure							
h _{ef}	Effective embedment depth:	[mm]	--	60	70	85	100
s _{cr,N}	Spacing:	[mm]	--	3 x h _{ef}			
c _{cr,N}	Edge distance:	[mm]	--	1.5 x h _{ef}			
γ _{inst}	Robustness:	[-]	--	1.0	1.2	1.2	1.2
Displacements							
δ _{N,C2(0.5)}	Displacement Damage	[mm]	--	2.6	4.9	5.2	5.5
δ _{V,C2(0.5)}	Limitation State: ^{2) 3)}	[mm]	--	4.5	4.5	5.2	5.6
δ _{N,C2(0.8)}	Displacement Ultimate Limit	[mm]	--	9.3	15.2	13.2	15.7
δ _{V,C2(0.8)}	State: ²⁾	[mm]	--	6.9	7.2	8.3	7.9
¹⁾ In absence of other national regulations							
²⁾ The listed displacements represent mean values							
³⁾ A small displacement may be required in the design in the case of displacements sensitive fastening of "rigid" supports. The characteristics resistance associated with such small displacements may be determined by linear interpolation or proportional reduction.							
MTP anchors						Annex C10	
Performances							
Characteristic values for seismic performance category C2							



Table C13: Characteristic values for resistance under fire exposure for MTP, MTP-AT, MTP-G, MTP-X anchors

Characteristic values under fire exposure				Performances					
				M8	M10	M12	M16	M20	M24
Fire resistance to steel failure									
N _{Rk,s,fi}	Characteristic tension resistance:	R30	[kN]	1.11	2.22	3.90	7.26	11.32	16.32
		R60	[kN]	0.92	1.70	2.82	5.25	8.19	11.80
		R90	[kN]	0.73	1.18	1.74	3.24	5.05	7.29
		R120	[kN]	0.64	0.83	1.20	2.23	3.49	5.02
V _{Rk,s,fi}	Characteristic shear resistance:	R30	[kN]	1.11	2.22	3.90	7.26	11.32	16.32
		R60	[kN]	0.92	1.70	2.82	5.25	8.19	11.80
		R90	[kN]	0.73	1.18	1.74	3.24	5.05	7.29
		R120	[kN]	0.64	0.83	1.20	2.23	3.49	5.02
M ⁰ _{Rk,s,fi}	Characteristic bending resistance:	R30	[Nm]	1.14	2.87	6.05	15.39	30.00	51.88
		R60	[Nm]	0.94	2.20	4.38	11.13	21.70	37.52
		R90	[Nm]	0.75	1.52	2.70	6.87	13.39	23.16
		R120	[Nm]	0.65	1.06	1.86	4.74	9.24	15.98
Fire resistance to pull-out failure									
N _{Rk,p,fi}	Characteristic resistance:	R30	[kN]	1.3/1.5 ¹⁾	2.3	3.0/4.0 ¹⁾	6.3	7.5	7.5
		R60							
		R90	[kN]	1.0/1.2 ¹⁾	1.8	2.4/3.2 ¹⁾	5.0	6.0	6.0
		R120							
Fire resistance to concrete cone failure ²⁾									
N _{Rk,c,fi}	Characteristic resistance:	R30	[kN]	2.9	5.0	7.4	12.0	18.0	31.4
		R60							
		R90	[kN]	2.3	4.0	5.9	9.6	14.4	25.2
		R120							
S _{cr,N,fi}	Spacing:	R30 to R120	[mm]	4 x h _{ef}					
S _{min,fi}	Minimum spacing:	R30 to R120	[mm]	50	60	70	85/128 ¹⁾	100/150 ¹⁾	125
C _{cr,N,fi}	Edge distance:	R30 to R120	[mm]	2 x h _{ef}					
C _{min,fi}	Minimum edge distance:	R30 to R120	[mm]	c _{min} = 2 x h _{ef} ; if fire attack comes from more than one side, the edge distance of the anchor has to be ≥ 300 mm and ≥ 2 x h _{ef}					
Fire resistance to concrete pry-out failure									
k ₈	Pryout factor:	R30 to R120	[-]	1	2	2	2	2	2

¹⁾ Respective values for anchors MTP, MTP-AT / MTP-G, MTP-X

²⁾ As a rule, splitting failure can be neglected since cracked concrete and reinforcement is assumed.

In absence of other national regulations, the partial safety factor for resistance under fire exposure $\gamma_{m,fi} = 1,0$ is recommended

MTP anchors	Annex C11
Performances	
Characteristic values under fire exposure	



Characteristic values under fire exposure					Performances				
					M8	M10	M12	M16	M20
Fire resistance to steel failure									
N _{Rk,s,fi}	Characteristic tension resistance:	R30	[kN]	4,20	7,11	11,00	20,49	31,97	
		R60	[kN]	2,96	5,84	10,16	18,93	29,53	
		R90	[kN]	1,73	3,47	6,10	11,37	17,74	
		R120	[kN]	1,11	2,28	4,08	7,59	11,85	
V _{Rk,s,fi}	Characteristic shear resistance:	R30	[kN]	4,20	7,11	11,00	20,49	31,97	
		R60	[kN]	2,96	5,84	10,16	18,93	29,53	
		R90	[kN]	1,73	3,47	6,10	11,37	17,74	
		R120	[kN]	1,11	2,28	4,08	7,59	11,85	
M ⁰ _{Rk,s,fi}	Characteristic bending resistance:	R30	[Nm]	4,30	9,16	17,09	43,45	84,70	
		R60	[Nm]	3,03	7,53	15,79	40,14	78,24	
		R90	[Nm]	1,77	4,47	9,49	24,12	47,01	
		R120	[Nm]	1,14	2,95	6,34	16,10	31,39	
Fire resistance to pull-out failure									
N _{Rk,p,fi}	Characteristic resistance:	R30	[kN]	2,1	3,5	4,8	6,74	8,60	
		R60							
		R90							
		R120	[kN]	1,7	2,8	3,8	5,39	6,88	
Fire resistance to concrete cone failure ¹⁾									
N _{Rk,c,fi}	Characteristic resistance:	R30	[kN]	2,7	4,8	7,1	11,5	17,2	
		R60							
		R90							
		R120	[kN]	2,2	43,8	5,6	9,2	13,8	
S _{cr,N,fi}	Spacing:	R30 to R120	[mm]	4 x h _{ef}					
S _{min,fi}	Minimum spacing:	R30 to R120	[mm]	42	47	57	75	100	
C _{cr,N,fi}	Edge distance:	R30 to R120	[mm]	2 x h _{ef}					
C _{min,fi}	Minimum edge distance:	R30 to R120	[mm]	c _{min} = 2 x h _{ef} ; if fire attack comes from more than one side, the edge distance of the anchor has to be ≥ 300 mm and ≥ 2 x h _{ef}					
Fire resistance to concrete pry-out failure									
k ₈	Pryout factor:	R30 to R120	[-]	1	2	2	2	2	

¹⁾ As a rule, splitting failure can be neglected since cracked concrete and reinforcement is assumed.
In absence of other national regulations the partial safety factor for resistance under fire exposure γ_{m,fi} = 1,0 is recommended

MTP anchors	Annex C12
Performances	
Characteristic values under fire exposure	

