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European Technical Assessment

ETA 21/0063 of 21/02/2021

English translation prepared by IETcc. Original version in Spanish language

General Part

Technical Assessment Body issuing the ETA designated according to Art. 29 of Regulation (EU) 305/2011:

Instituto de Ciencias de la Construcción Eduardo Torroja (IETcc)

Trade name of the construction product:

TGDIA / TGDIAF / TGDIASS

Product family to which the construction product belongs:

Deformation controlled anchor made of galvanized steel or stainless steel of sizes M6, M8, M10, M12, M16 and M20 for use in concrete for redundant non-structural systems

Manufacturer:

Tembo Global Industries Ltd
Plot No.D- 146/147, Turbhe MIDC,
TTC Industrial Estate,
Opp. Balmer Lawrie Vaan Leer,
Turbhe, Navi Mumbai -400705.
India
Website: <https://www.nut-clamps.com/certificate>

Manufacturing plant:

Tembo plant 1

This European Technical Assessment contains:

10 pages including 3 annexes 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 330747-00-0601, "Fasteners for use in concrete for redundant non-structural systems", ed. May 2018.

English translation prepared by IETcc

This European Technical Assessment is issued by the Technical Assessment Body in its official language. Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document and should be identified as such.

This European Technical Assessment may be withdrawn by the issuing Technical Assessment Body, in particular pursuant to information by the Commission according to article 25 (3) of Regulation (EU) No 305/2011.

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SPECIFIC PART

1. Technical description of the product

The Tembo TGDIA / TGDIAF, in the range of M6 to M20, is an anchor made of galvanised steel. The Tembo TGDIASS, in the range of M6 to M20, is an anchor made of stainless steel. They are placed into a drilled hole and anchored by deformation-controlled expansion. The anchorage is characterised by friction between the sleeve and concrete.

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

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.

The verifications and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of the anchor of at least 50 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer, but are to be regarded only as a mean to choosing the right products in relation to the expected economically reasonable working life of the works.

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

3.1 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Anchorage satisfies requirements for class A1 according to EN13501-1
Resistance to fire	See annex C3

3.2 Safety in use (BWR 4)

Essential characteristic	Performance
Characteristic resistance under static or quasi static loading	See annex C2

4. Assessment and Verification of Constancy of Performances (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 Performances (see annex V to Regulation (EU) No 305/2011) is 97/161/EC.

The system to be applied is 2+.

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

The technical details necessary for the implementation of the AVCP system are laid down in the quality plan deposited at Instituto de Ciencias de la Construcción Eduardo Torroja.



Instituto de Ciencias de la Construcción Eduardo Torroja
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On behalf of the Instituto de Ciencias de la Construcción Eduardo Torroja
Madrid, 21st of February 2021



Director IETcc - CSIC

Product

TGDIA, TGDIAF, TGDIASS anchor



TGDIA anchor

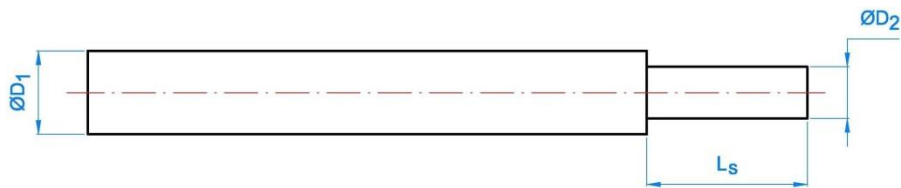
TGDIAF anchor

TGDIASS anchor

Identification on sleeve: Tembo logo + “TGDIA (TGDIAF / TGDIASS)” + Metric

Anchor dimensions	M6	M8	M10	M12	M12D	M16	M20
ØD: External diameter [mm]	8	10	12	15	16	20	25
Ød: internal diameter [mm]	M6	M8	M10	M12	M12	M16	M20
L: total length [mm]	25	30	40	50	50	65	80

Setting tool

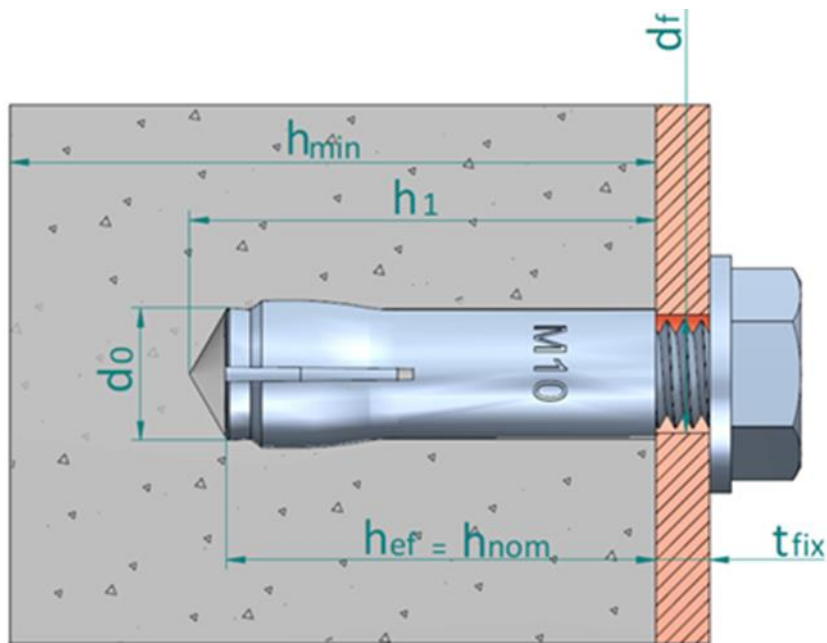


Setting tool dimensions	M6	M8	M10	M12	M16	M20
Ø D ₁ [mm]	7,5	9,5	11,5	14,5	18,0	22,0
Ø D ₂ [mm]	5,0	6,5	8,0	10,2	13,5	16,5
L _s [mm]	15	18	24	30	36	50

Setting tool can be assembled with a plastic handle for hand protection purposes

TGDIA, TGDIAF, TGDIASS anchor	Annex A1
Product description	
Product	

Installed condition



- 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} : Thickness of fixture
- d_0 : Nominal diameter of drill bit
- d_f : Fixture clearance hole diameter

Table A1: Materials

Item	Designation	Material for TGDIA / TGDIAF	Material for TGDIASS
1	Sleeve	Carbon steel, zinc plated $\geq 5 \mu\text{m}$ ISO 4042 Zn5/An/T0	Stainless steel, grade A4
2	Cone	Carbon steel, zinc plated $\geq 5 \mu\text{m}$ ISO 4042 Zn5/An/T0	Stainless steel, grade A4
3	Retention disc	Plastic	Plastic

TGDIA, TGDIAF, TGDIASS anchor

Product description

Installed condition and materials

Annex A2

Specifications of intended use

Anchorage subjected to:

- Static or quasi static loads for redundant non-structural systems
- Fire exposure
- The anchor may only be used if in the design and installation specifications for the fixture the excessive slip or failure of one anchor will not result in a significant violation of the requirements on the fixture in the serviceability and ultimate state.

Base materials:

- Reinforced or unreinforced normal weight concrete according to EN 206:2013
- Strength classes C12/15 to C50/60 according to EN 206:2013: TGDIA / TGDIAF anchors
- Strength classes C20/25 to C50/60 according to EN 206:2013: TGDIASS anchors
- Cracked or uncracked concrete

Use conditions (environmental conditions):

- TGDIA / TGDIAF: anchorages subjected to dry internal conditions.
- TGDIASS: 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 exists. 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.

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 B in accordance with EN 1992-4:2018
- Anchorages under fire exposure are designed in accordance to EN 1992-4:2018. It must be ensured that local spalling of the concrete cover does not occur.

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.
- TGDIA, TGDIAF: the bolt or threaded rod to be used shall be property class 4.6, 5.6, 5.8, 6.8 or 8.8 according to ISO 898-1.
- TGDIASS: the bolt or threaded rod to be used shall be property class A4-50, A4-70 or A4-80 according to EN 3506-1:2009
- The length of the bolt shall be determined as:
 - Minimum bolt length = $t_{fix} + l_{s,min}$
 - Maximum bolt length = $t_{fix} + l_{s,max}$

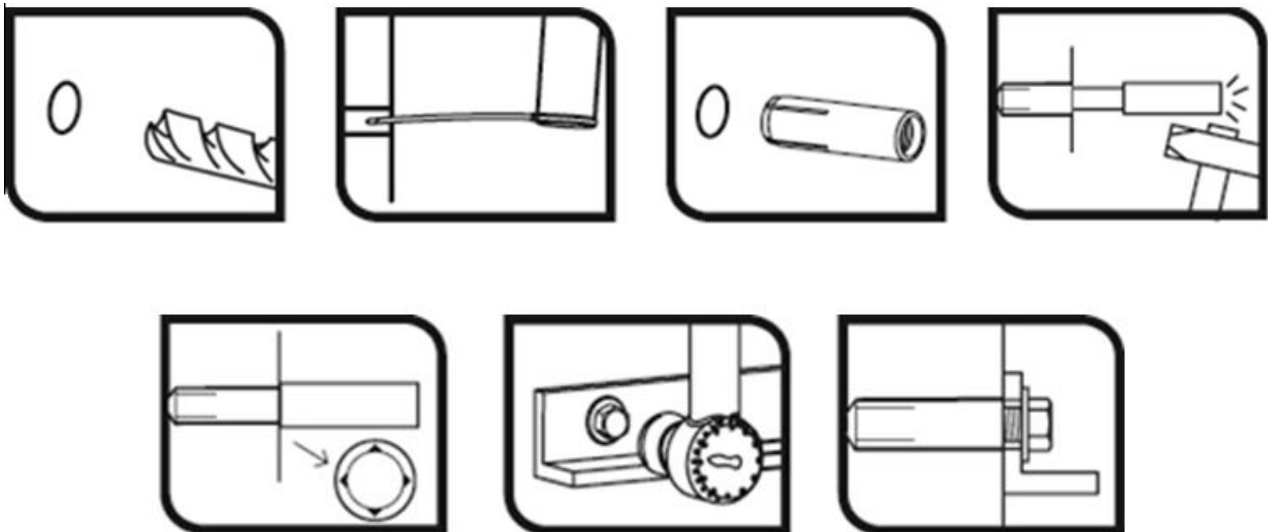
TGDIA, TGDIAF, TGDIASS anchor	Annex B1
Intended use	
Specifications	

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Table C1: Installation parameters for TGDIA, TGDIAF, TGDIASS anchor

Installation parameters			Performances						
			M6	M8	M10	M12	M12D	M16	M20
d_o	Nominal diameter of drill bit:	[mm]	8	10	12	15	16	20	25
D	Thread diameter:	[mm]	M6	M8	M12	M12	M12	M16	M20
d_f	Fixture clearance hole diameter \leq	[mm]	7	9	12	14	14	18	22
T_{inst}	Maximum installation torque:	[Nm]	4	11	17	38	38	60	100
$l_{s,min}$	Minimum screwing depth:	[mm]	6	8	10	12	12	16	20
$l_{s,max}$	Maximum screwing depth:	[mm]	10	13	17	21	21	27	34
h_1	Depth of drilled hole:	[mm]	27	33	43	54	54	70	86
h_{nom}	Overall anchor embedment depth:	[mm]	25	30	40	50	50	65	80
h_{ef}	Effective anchorage depth:	[mm]	25	30	40	50	50	65	80
TGDIA / TGDIAF									
h_{min}	Minimum thickness of concrete member:	[mm]	100	100	100	100	100	130	160
s_{min}	Minimum allowable spacing:	[mm]	60	60	80	100	100	130	160
c_{min}	Minimum allowable distance:	[mm]	105	105	140	175	130	230	280
TGDIASS									
h_{min}	Minimum thickness of concrete member:	[mm]	80	80	80	100	--	130	160
s_{min}	Minimum allowable spacing:	[mm]	60	60	100	100	--	130	160
c_{min}	Minimum allowable distance:	[mm]	65	80	100	130	--	175	210

Installation process



TGDIA, TGDIAF, TGDIASS anchor

Performances

Installation parameters and installation procedure

Annex C1

English translation prepared by IETcc

Table C2: Characteristic values to loads of design method B according to EN 1992-4 for TG DIA, TG DIAF anchor

Characteristic values of resistance to loads of design method B			Performances						
			M6	M8	M10	M12	M12D	M16	M20
All load direction									
F_{Rk}^0	Characteristic resistance in C12/15 concrete:	[kN]	1.5	3.0	4.0	6.0	--	9.0	16.0
F_{Rk}^0	Characteristic resistance in C20/25 to C50/60 concrete:	[kN]	2.0	3.0	5.0	7.5	6.0	12.0	20.0
γ_{ins}	Installation safety factor:	[-]	1.2	1.2	1.4	1.4	1.4	1.4	1.4
S_{cr}	Characteristic spacing:	[mm]	75	90	120	150	200	195	240
C_{cr}	Characteristic edge distance:	[mm]	40	45	60	75	150	100	120
Shear loads: steel failure with lever arm									
$M_{Rk,s}^0$	Characteristic bending moment, steel class 4.6	[Nm]	6.1	15.0	29.9	52.4	52.4	133.3	259.8
$\gamma_{Ms}^{1)}$	Partial safety factor:	[-]	1.67						
$M_{Rk,s}^0$	Characteristic bending moment, steel class 4.8	[Nm]	6.1	15.0	29.9	52.4	52.4	133.3	259.8
$\gamma_{Ms}^{1)}$	Partial safety factor:	[-]	1.25						
$M_{Rk,s}^0$	Characteristic bending moment, steel class 5.6	[Nm]	7.6	18.8	37.4	65.5	65.5	166.6	324.8
$\gamma_{Ms}^{1)}$	Partial safety factor:	[-]	1.67						
$M_{Rk,s}^0$	Characteristic bending moment, steel class 5.8	[Nm]	7.6	18.8	37.4	65.5	65.5	166.6	324.8
$\gamma_{Ms}^{1)}$	Partial safety factor:	[-]	1.25						
$M_{Rk,s}^0$	Characteristic bending moment, steel class 6.8	[Nm]	9.2	22.5	44.9	78.7	78.7	199.9	389.7
$\gamma_{Ms}^{1)}$	Partial safety factor:	[-]	1.25						
$M_{Rk,s}^0$	Characteristic bending moment, steel class 8.8	[Nm]	12.2	30.0	59.9	104.9	104.9	266.6	519.7
$\gamma_{Ms}^{1)}$	Partial safety factor:	[-]	1.25						

1) In absence of other national regulations

Table C3: Characteristic values to loads of design method B according to EN 1992-4 for TG DIASS anchor

Characteristic values of resistance to loads of design method B			Performances					
			M6	M8	M10	M12	M16	M20
All load direction								
F_{Rk}^0	Characteristic resistance in C20/25 to C50/60 concrete:	[kN]	2.50	3.50	3.50	6.50	12.50	16.50
γ_{ins}	Installation safety factor:	[-]	1.4					
S_{cr}	Characteristic spacing:	[mm]	200	200	200	200	260	320
C_{cr}	Characteristic edge distance:	[mm]	150	150	150	150	195	240
Shear loads: steel failure with lever arm								
$M_{Rk,s}^0$	Characteristic bending moment, steel class A4-50	[Nm]	7.6	18.8	37.4	65.6	166.6	324.8
$\gamma_{Ms}^{1)}$	Partial safety factor:	[-]	2.38					
$M_{Rk,s}^0$	Characteristic bending moment, steel class A4-70	[Nm]	10.6	6.3	52.4	91.8	233.1	454.7
$\gamma_{Ms}^{1)}$	Partial safety factor:	[-]	1.56					
$M_{Rk,s}^0$	Characteristic bending moment, steel class A4-80	[Nm]	12.2	30.0	59.9	104.9	266.6	519.7
$\gamma_{Ms}^{1)}$	Partial safety factor:	[-]	1.34					

1) In absence of other national regulations

TG DIA, TG DIAF, TG DIASS anchor	Annex C2
Performances	
Characteristic resistances	

English translation prepared by IETcc

Table C4: Characteristic resistance under fire exposure in concrete C20/25 to C50/50 in any load direction according to EN 1992-4 for TGDIA, TGDIAF anchor

Characteristic resistance under fire exposure in concrete C20/25 to C50/60 in any load direction for use in concrete			Performances						
			M6	M8	M10	M12	M12D	M16	M20
R30	Characteristic resistance: $F_{Rk,fi30}^{0,1)}$	[kN]	--	0.4	0.9	1.7	1.6	3.1	4.9
R60	Characteristic resistance: $F_{Rk,fi60}^{0,1)}$	[kN]	--	0.3	0.8	1.3	1.3	2.4	3.7
R90	Characteristic resistance: $F_{Rk,fi90}^{0,1)}$	[kN]	--	0.3	0.6	1.1	1.1	2.0	3.2
R120	Characteristic resistance: $F_{Rk,fi120}^{0,1)}$	[kN]	--	0.2	0.5	0.8	0.8	1.6	2.5
R30 to	Spacing	$S_{cr,fi}$	[mm]	4 x hef					
R120	Edge distance	$C_{cr,fi}$	[mm]	2 x hef					

¹⁾ in absence of other national regulations the partial safety factor for resistance under fire exposure $\gamma_{M,fi} = 1.0$ is recommended
If fire attack is from more than one side, the design method may be taken if edge distance of the anchor is $c \geq 300$ mm

Table C5: Characteristic resistance under fire exposure in concrete C20/25 to C50/50 in any load direction according to EN 1992-4 for HE4 anchor

Characteristic resistance under fire exposure in concrete C20/25 to C50/60 in any load direction for use in concrete			Performances						
			M6	M8	M10	M12	M16	M20	
R30	Characteristic resistance: $F_{Rk,fi30}^{0,1)}$	[kN]	0,20	0,73	0,87	1,63	3,19	4,12	
R60	Characteristic resistance: $F_{Rk,fi60}^{0,1)}$	[kN]	0,18	0,59	0,87	1,63	3,19	4,12	
R90	Characteristic resistance: $F_{Rk,fi90}^{0,1)}$	[kN]	0,14	0,44	0,87	1,63	3,14	4,12	
R120	Characteristic resistance: $F_{Rk,fi120}^{0,1)}$	[kN]	0,10	0,37	0,69	1,30	2,51	3,30	
R30 to	Spacing	$S_{cr,fi}$	[mm]	4 x hef					
R120	Edge distance	$C_{cr,fi}$	[mm]	2 x hef					

¹⁾ in absence of other national regulations the partial safety factor for resistance under fire exposure $\gamma_{M,fi} = 1.0$ is recommended
If fire attack is from more than one side, the design method may be taken if edge distance of the anchor is $c \geq 300$ mm

TGDIA, TGDIAF, TGDIASS anchor	Annex C3
Performances	
Resistances under fire exposure	