



Designated according to The Construction Products (Amendment etc.) (EU Exit) Regulations 2020

UK Technical Assessment	UKTA-0836-23/6668 of 03/02/2023
Technical Assessment Body issuing the UK Technical Assessment:	British Board of Agrément
Trade name of the construction product:	TT G Throughbolt
Product family to which the construction product belongs:	Torque controlled expansion anchor of sizes M8, M10, M12, M16 and M20 for use in uncracked concrete
Manufacturer:	Trutek Fasteners Polska Al. Krakowska 38, Janki 05-090 Raszyn, Warsaw Poland
Manufacturing plant(s):	Plant no. 7
This UK Technical Assessment contains:	15 Pages including 3 Annexes
This UK Technical Assessment is issued in accordance with The Construction Products (Amendment etc.) (EU Exit) Regulations 2020 on the basis of:	UKAD 330232-00-0601: "Mechanical fasteners for use in concrete"

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1. Technical description of the product

TT G Throughbolt anchor of sizes M8, M10, M12, M16 and M20 is made of hot-dip galvanised steel. The anchor is placed into drilled hole on uncracked concrete by torque-controlled expansion.

The product description is given in Annex A.

2. Specification of the intended use(s) in accordance with the applicable UK Assessment Document (hereinafter UKAD)

The performance given in Annex C are only valid if the anchor is used in compliance with the specifications and conditions given in Annex B.

The provisions made in this UK Technical Assessment are based on assumed working life of the anchor of 50 years. The indications given on working life cannot be interpreted as a guarantee given by the produced or the British Board of Agrément, but are to be regarded only as a means for 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. Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Characteristic resistance to tension load (static or quasi-static loading)	Annex C1
Characteristic resistance to shear load (static or quasi-static loading)	Annex C3
Displacements	Annex C2, C3

3.2. Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Class A1
Resistance to fire	Annex C4, C5

3.3. Health, hygiene and the environment (BWR 3)

Essential characteristic	Performance
Durability	Annex B1

3.4. Safety and accessibility in use (BWR 4)

Not relevant.

3.5. Protection against noise (BWR 5)

Not relevant.

3.6. Energy economy and heat retention (BWR 6)

Not relevant.

3.7. Sustainable use of natural resources (BWR 7)

No performance assessed.

4. Assessment and verification of constancy of performance (hereinafter AVCP) system applied

4.1. System of assessment and verification of constancy of performance

According to UKAD No. 330232-00-0601 and Annex V of the Construction Products Regulation (Regulation (EU) 305/2011) as brought into UK law and amended, the system of assessment and verification of constancy of performance (AVCP) 1 applies.

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

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited with the British Board of Agrément and made available to the UK Approved Bodies involved in the conformity attestation process.

5.1. UKCA marking for the product/ system must contain the following information:

- Identification number of the Approved Body
- Name/address of the manufacturer of the product/ system
- Marking with intention of clarification of intended use
- Date of marking
- Number of certificate of constancy of performance (where applicable)
- UKTA number.

On behalf of the British Board of Agrément



Date of Issue: 3 February 2023

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ANNEX A1
Product description / Dimension and Marking

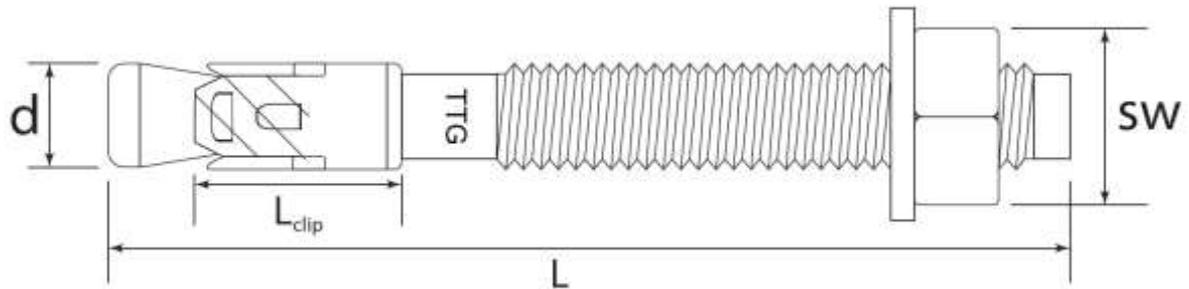


Table A1: TT G Throughbolt anchor dimensions

Type of anchor				d [mm]	L [mm]	L _{clip} [mm]	SW [mm]
Size	Marking	t _{fix,STD} ¹⁾ [mm]	t _{fix,RED} ²⁾ [mm]				
M8	TTG08	1-135	1-145	8	60-200	14.90	13
M10	TTG10	1-185	1-185	10	65-250	17.30	17
M12	TTG12	1-200	1-220	12	80-300	21.70	19
M16	TTG16	1-280	1-300	16	105-400	24.10	24
M20	TTG20	1-260	1-280	20	130-400	30.10	30

1) thickness of the fixed element for standard effective anchorage depth
 2) thickness of the fixed element for reduced effective anchorage depth

Marking:

Marking on the bolt: “TTG”

ANNEX A2
Product description / Materials

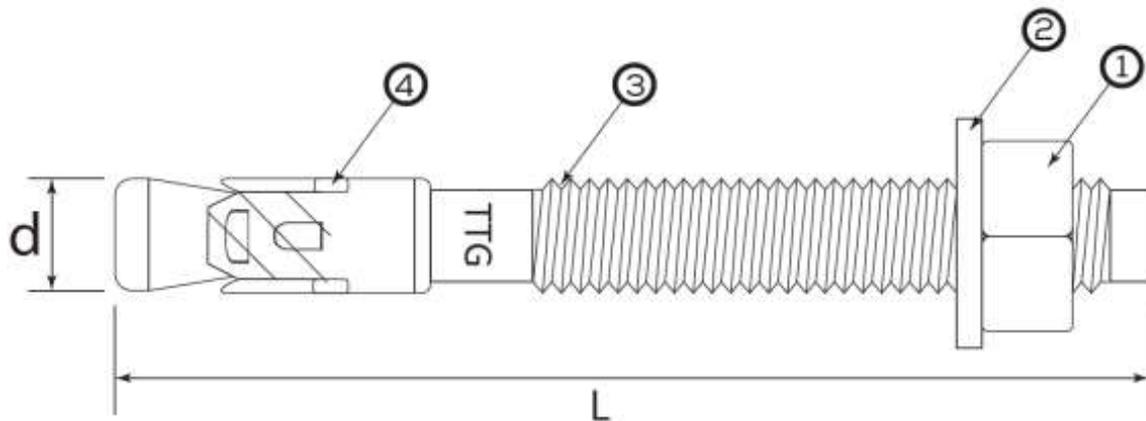


Table A2: Materials

Part	Designation	Material	Coating
1	Hexagonal nut	carbon steel, class 5, EN ISO 898-2, DIN 934	hot dip galvanized \geq 40 μ m
2	Washer	DIN 125	
3	Bolt	C1008 $f_{uk} \geq 400$ MPa, $f_{yk} \geq 320$ MPa	EN ISO 1461
4	Expansion clip	Stainless steel 304	-

ANNEX B1

Intended Use / Specifications

Anchorage subject to:

- Static and quasi-static loads.
- Anchorages with requirements related to resistance to fire.

Base material:

- Reinforced or unreinforced normal weight concrete of strength class C20/25 at minimum to C50/60 at maximum according to EN 206.
- Uncracked concrete.

Use conditions (environmental conditions):

- Structures subject to dry internal conditions.

Design:

- The anchorages under static loads and quasi-static loads are designed in accordance with EN 1992-4:2018 and EOTA Technical Report TR 055, under the responsibility of an engineer experienced in anchorages and concrete work.
- The position of the anchor is indicated on the design drawings.
- Verifiable calculation notes and drawings are taking account of the loads to be transmitted.

Installation:

- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.
- Use of the anchor only as supplied by the manufacturer without exchanging any component of the 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 range given and is not lower than that of the concrete to which the characteristic loads apply.
- Check of concrete being well compacted, eg. without significant voids.
- Effective anchorage depth, edge distance and spacing not less than the specified values without minus tolerances.
- Positioning of the drill holes without damaging the reinforcement.
- Hole drilling by hammer drill.
- Cleaning of the hole of drilling dust.
- Application of the torque moment using a calibrated torque wrench.
In case of aborted hole: new drilling at a minimum distance away of twice the depth of the aborted hole or smaller distance if the aborted drill hole is filled with high strength mortar and if under shear or oblique tension load it is not in the direction of load application.

ANNEX B2
Intended Use / Installation parameters

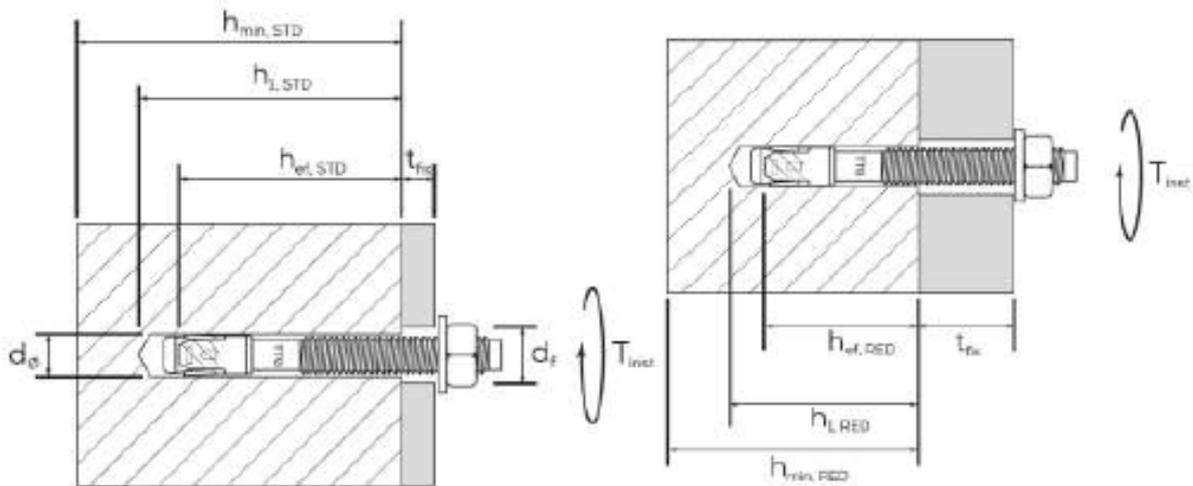
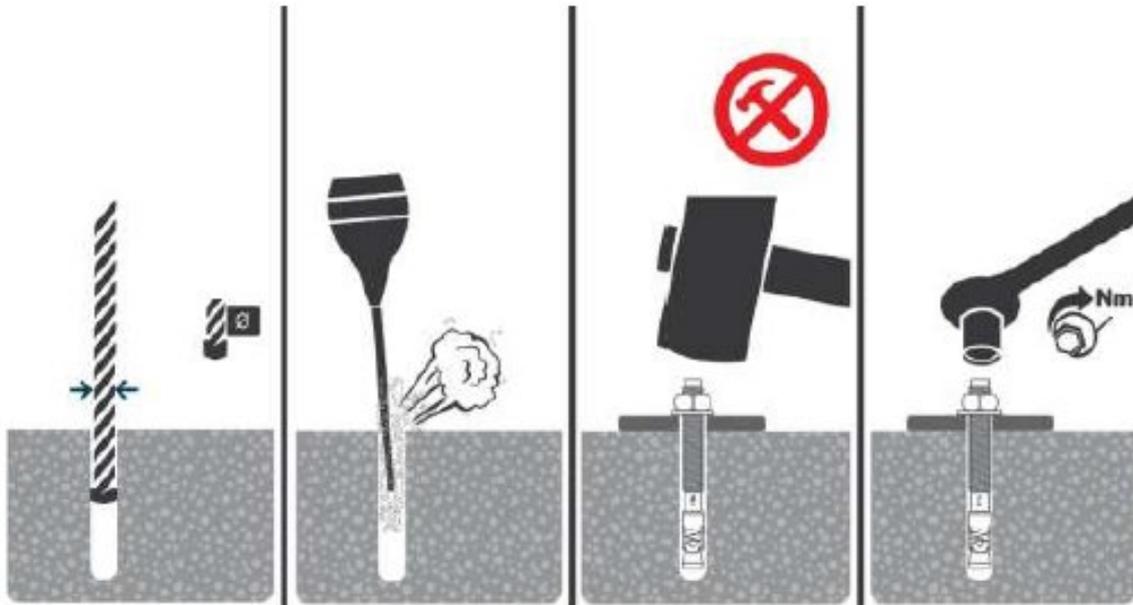


Table B1: Installation parameters

Anchor size		M8	M10	M12	M16	M20
Effective embedment depth (standard) h_{ef}	mm	45	50	70	85	100
Nominal embedment depth (standard) h_{nom}	mm	53	58	80	99	110
Depth of drill hole (standard) $h_0 \geq$	mm	60	65	90	110	120
Effective embedment depth (reduced) h_{ef}	mm	35	40	50	65	80
Nominal embedment depth (reduced) h_{nom}	mm	43	48	60	79	90
Depth of drill hole (reduced) h_1	mm	50	55	70	90	100
Nominal diameter of drill hole (reduced) d_0	mm	8	10	12	16	20
Diameter of clearance hole in the fixture d_f	mm	9	12	14	18	22
Installation torque T_{inst}	Nm	25	34	60	120	200
Minimum thickness of member (standard embedment depth) h_{min}	mm	100	100	140	170	200
Minimum thickness of member (reduced embedment depth) h_{min}	mm	100	100	100	130	160
Minimum spacing s_{min}	mm	35	40	50	65	80
Minimum edge distance c_{min}	mm	35	40	50	65	80

ANNEX B3
Intended Use / Installation instructions



ANNEX C1

Performances / Characteristic values for tension loads, design method A

Table C1: Characteristic values for tension loads, design method A

Anchor size			M8	M10	M12	M16	M20
Steel failure							
Characteristic resistance	$N_{Rk,s}$	kN	14.6	23.2	33.7	62.8	98.0
Partial safety factor	$\gamma_{Ms}^{1)}$	-	1.5				
Pull out failure							
Characteristic resistance in uncracked concrete C20/25 (standard depth)	$N_{Rk,p,STD}$	kN	9.5	16.0	28.0	28.0	48.0
Characteristic resistance in uncracked concrete C20/25 (reduced depth)	$N_{Rk,p,RED}$	kN	9.5	12.0	12.0	24.0	34.0
Installation safety factor	$\gamma_{ins}^{2)}$	-	1.0	1.0	1.0	1.0	1.2
Increasing factor for concrete C30/37	ψ_c	-	1.0	1.0	1.0	1.0	1.0
Increasing factor for concrete C40/50			1.0	1.0	1.0	1.0	1.0
Increasing factor for concrete C50/60			1.0	1.0	1.0	1.0	1.0
Increasing factor for concrete C50/60			1.0	1.0	1.0	1.0	1.0
Concrete cone failure and splitting failure							
Effective anchorage depth (standard)	$h_{ef,STD}$	mm	45	50	70	85	100
Effective anchorage depth (reduced)	$h_{ef,RED}$	mm	35	40	50	65	80
Factor for uncracked concrete	$k_{1,2}) = k_{ucr,N2)}$	-	11.0	11.0	11.0	11.0	11.0
Spacing (standard depth)	$s_{cr,N,STD}$	mm	135	150	210	255	300
Edge distance (standard depth)	$c_{cr,N,STD}$	mm	67.5	75	105	127.5	150
Spacing (reduced depth)	$s_{cr,N,RED}$	mm	105	120	150	195	240
Edge distance (reduced depth)	$c_{cr,N,RED}$	mm	52.5	60	75	97.5	120
Characteristic resistance for splitting (standard depth)	$N^0_{Rk,sp,STD,2)}$	kN	9.5	16.0	28.0	28.0	48.0
Characteristic resistance for splitting (reduced depth)	$N^0_{Rk,sp,RED,2)}$	kN	9.5	12.0	12.0	24.0	34.0
Spacing (standard depth)	$s_{cr,sp,STD}$	mm	135	150	210	255	300
Edge distance (standard depth)	$c_{cr,sp,STD}$	mm	67.5	75	105	127.5	150
Spacing (reduced depth)	$s_{cr,sp,RED}$	mm	105	120	150	195	240
Edge distance (reduced depth)	$c_{cr,sp,RED}$	mm	52.5	60	75	97.5	120
Installation safety factor	$\gamma_{ins}^{2)}$	-	1.0	1.0	1.0	1.0	1.2

¹⁾ in the absence of other national regulations

²⁾ parameter for design according to EN 1992-4:2018

ANNEX C2
Performances / Displacement under tension loads

Table C2: Characteristic values for tension loads, design method A

Anchor size			M8	M10	M12	M16	M20
Tension load	N	kN	4.5	7.1	6.0	11.9	17.3
Displacement	δ_{NO}	mm	1.3	1.3	1.3	1.3	1.4
	$\delta_{N\infty}$	mm	1.6	1.6	1.6	1.6	1.6

ANNEX C3

Performances / Characteristic values for shear loads, design method A, displacements

Table C3: Characteristic values for shear loads, design method A

Anchor size			M8	M10	M12	M16	M20
Steel failure							
Characteristic resistance	$V^{0}_{Rk,s^{3)}$	kN	7.3	11.6	16.9	31.4	49.0
Ductility factor	$k_7^{3)}$	-	1.0				
Partial safety factor	$\gamma_{Ms}^{2)}$	-	1.25				
Steel failure with lever arm							
Characteristic bending resistance	$M^{0}_{Rk,s}$	Nm	15.0	29.9	52.4	133.2	259.6
Partial safety factor	$\gamma_{Ms}^{2)}$	-	1.25				
Concrete pry-out failure¹⁾							
Concrete pry-out failure factor	$k_8^{3)}$		1.0	1.0	2.0	2.0	2.0
Partial safety factor	$\gamma_{Ms}^{2)}$	-	1.5	1.5	1.5	1.5	1.8
Concrete edge failure							
Effective length of anchor under shear loading (standard depth)	$l_{f,STD}$	mm	45	50	70	85	100
Effective length of anchor under shear loading (reduced depth)	$l_{f,RED}$	mm	35	40	50	65	80
Effective diameter of anchor	d_{nom}	mm	8	10	12	16	20
Partial safety factor	$\gamma_{Ms}^{2)}$	-	1.5	1.5	1.5	1.5	1.8

¹⁾ the pry-out failure is not decisive

²⁾ in the absence of other national regulations

³⁾ parameter for design according to EN 1992-4:2018

Table C4: Displacement under shear loads

Anchor size			M8	M10	M12	M16	M20
Shear load	V	kN	4.1	6.8	11.5	13.8	29.4
Displacement	δ_{NO}	mm	0.8	1.1	1.1	1.1	2.5
	$\delta_{N\infty}$	mm	1.2	1.7	1.7	1.7	3.8

ANNEX C4

Performances / Characteristic resistance for tension loads under fire exposure

Table C5: Characteristic values for tension loads under fire exposure

Anchor size			M8	M10	M12	M16	M20
Steel failure							
Characteristic resistance [kN]	R30	$N_{Rk,s,fi}$	0.4	0.9	1.7	3.1	4.9
	R60	$N_{Rk,s,fi}$	0.3	0.8	1.3	2.4	3.7
	R90	$N_{Rk,s,fi}$	0.3	0.6	1.1	2.0	3.2
	R120	$N_{Rk,s,fi}$	0.2	0.5	0.8	1.6	2.5
Pull out failure							
Characteristic resistance [kN]	R30	$N_{Rk,s,fi}$	2.4	3.1	3.1	6.2	8.8
	R60	$N_{Rk,s,fi}$	2.4	3.1	3.1	6.2	8.8
	R90	$N_{Rk,s,fi}$	2.4	3.1	3.1	6.2	8.8
	R120	$N_{Rk,s,fi}$	1.9	2.5	2.5	5.0	7.0
Concrete cone failure							
Characteristic resistance [kN]	R30	$N_{Rk,s,fi}$	1.8	2.6	4.5	8.6	14.5
	R60	$N_{Rk,s,fi}$	1.8	2.6	4.5	8.6	14.5
	R90	$N_{Rk,s,fi}$	1.8	2.6	4.5	8.6	14.5
	R120	$N_{Rk,s,fi}$	1.5	2.0	3.6	6.9	11.6
Edge distance [mm]							
	R30	$C_{cr,N,fi}$	2 x h_{ef}				
	R60	$C_{cr,N,fi}$					
	R90	$C_{cr,N,fi}$					
	R120	$C_{cr,N,fi}$					
In case of fire attack from more than one side minimum edge distance shall be ≥ 300 mm							
Spacing [mm]							
	R30	$S_{cr,N,fi}$	4 x h_{ef}				
	R60	$S_{cr,N,fi}$					
	R90	$S_{cr,N,fi}$					
	R120	$S_{cr,N,fi}$					

ANNEX C5**Performances / Characteristic resistance for shear loads under fire exposure**

Table C6: Characteristic values for shear loads under fire exposure

Anchor size			M8	M10	M12	M16	M20
Steel failure without lever arm							
Characteristic resistance [kN]	R30	$V_{Rk,s,fi}$	0.4	0.9	1.7	3.1	4.9
	R60	$V_{Rk,s,fi}$	0.3	0.8	1.3	2.4	3.7
	R90	$V_{Rk,s,fi}$	0.3	0.6	1.1	2.0	3.2
	R120	$V_{Rk,s,fi}$	0.2	0.5	0.8	1.6	2.5
Steel failure with lever arm							
Characteristic bending resistance [kN]	R30	$M^{oRk,s,fi}$	0.6	1.7	3.9	9.3	18.3
	R60	$M^{oRk,s,fi}$	0.5	1.4	2.9	7.0	13.7
	R90	$M^{oRk,s,fi}$	0.4	1.1	2.5	6.0	11.9
	R120	$M^{oRk,s,fi}$	0.3	0.9	1.9	4.6	9.1



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