DECLARATION OF PERFORMANCE
**DoP No. 2873-CPR-401-15 / 01.21-EN**

1. Unique identification code of the product-type: **Toge concrete screw TSM ECO**
2. Type, batch or serial number or any other element allowing identification of the construction product as required pursuant to Article 11(4):

**Annex A 2**
**Batch number: see packaging of the product.**

3. Intended use or uses of the construction product, in accordance with the applicable harmonised technical specification, as foreseen by the manufacturer:

| | |
|---|---|
| **generic type** | concrete screw |
| **for use in** | Cracked and non-cracked concrete C 20/25-C 50/60 (EN 206)<br>covered sizes: 8,10 |
| | |
| **option / category** | Option 1 |
| **loading** | static or quasi-static |
| **material** | zinc-plated steel, steel with zinc flake coating:<br>dry internal conditions only<br>covered sizes: 8,10 |

4. Name, registered trade name or registered trade mark and contact address of the manufacturer as required pursuant to Article 11(5):

**Toge Dübel GmbH & Co. KG, Illesheimer Strasse 10, 90431 Nuernberg**

5. Where applicable, name and contact address of the authorised representative whose mandate covers the tasks specified in Article 12(2): --
6. System or systems of assessment and verification of constancy of performance of the construction product as set out in Annex V: **System 1**
7. In case of the declaration of performance concerning a construction product covered by a harmonised standard: --
8. In case of the declaration of performance concerning a construction product for which a European Technical Assessment has been issued:

**Deutsches Institut für Bautechnik, Berlin**

has issued the following:

**ETA-23/0693**

on the basis of

EAD 330232-01-0601, Edition 05/2021

The notified body **2873-CPR** performed
i) determination of the product-type on the basis of type testing (including sampling ), type calculation, tabulated values or descriptive documentation of the product ;
ii) factory production control.
iii ) testing of samples taken at the factory in accordance with a prescribed test plan.
**and has issued the following:** certificate of conformity 2873-CPR-401-7-15

9. Declared performance:

| Essential Characteristics | Design Method | Performance | Harmonized Technical Specification |
|---|---|---|---|
| Characteristic resistance for tension load | CEN/TS 1992-4:2009 | Annex C1, C2 | EAD 330232-01-0601<br>EAD 330011-00-0601 |
| Characteristic resistance for shear load | CEN/TS 1992-4:2009 | Annex C1, C2 | |
| Minimum thickness of concrete member, Minimum spacing and minimum edge distance | CEN/TS 1992-4:2009 | Annex B3 | |
| Displacement for serviceability limit state | CEN/TS 1992-4:2009 | Annex C4 | |
| Characteristic resistance under fire exposure | CEN/TS 1992-4:2009 | Annex C6 | |

Where pursuant to Article 37 or 38 in the Specific Technical Documentation has been used, the requirements with which the product complies: --

This declaration of performance is issued under the sole responsibility of the manufacturer identified in point 9.

Signed for and on behalf of the manufacturer by:

**Waldemar Gunkel**
Dipl.-Wirtsch.-Ing. (FH).
Application engeeniring and technical documents

**Nuernberg, 2024-02-08**

**Andreas Gerhard**
CEO

**Nuernberg, 2024-02-08**

Table 4: Minimum thickness of member, minimum edge distance and minimum spacing

| TSM concrete screw size | | | 8 | | | 10 | | |
|---|---|---|---|---|---|---|---|---|
| Nominal embedment depth | | $h_{nom}$ | $h_{nom1}$ | $h_{nom2}$ | $h_{nom3}$ | $h_{nom1}$ | $h_{nom2}$ | $h_{nom3}$ |
| | | [mm] | 45 | 55 | 65 | 55 | 75 | 85 |
| Minimum thickness of member | $h_{min}$ | [mm] | 80 | 100 | 120 | 100 | 130 | 130 |
| Minimum edge distance | $c_{min}$ | [mm] | 35 | 35 | 35 | 40 | 40 | 40 |
| Minimum spacing | $s_{min}$ | [mm] | 35 | 35 | 35 | 40 | 40 | 40 |

| | |
|---|---|
| **TOGE concrete screw TSM E** | **Annex B3** |
| **Intended use**<br>Minimum thickness of member, minimum edge distance and minimum spacing | |

## Table 5: Characteristic values for static and quasi-static loading

| TSM concrete screw size | | | 8 | | | 10 | | |
|---|---|---|---|---|---|---|---|---|
| Nominal embedment depth | | $h_{nom}$ | $h_{nom1}$ | $h_{nom2}$ | $h_{nom3}$ | $h_{nom1}$ | $h_{nom2}$ | $h_{nom3}$ |
| | | [mm] | 45 | 55 | 65 | 55 | 75 | 85 |
| **Steel failure for tension and shear loading** | | | | | | | | |
| Characteristic resistance | | $N_{Rk,s}$ | [kN] | 27,0 | | 45,0 | | |
| Partial factor | | $\gamma_{Ms,N}$ | [-] | 1,5 | | | | |
| Characteristic resistance | | $V^0_{Rk,s}$ | [kN] | 13,5 | 17,0 | 22,5 | 34,0 | |
| Partial factor | | $\gamma_{Ms,V}$ | [-] | 1,25 | | | | |
| Ductility factor | | $k_7$ | [-] | 0,8 | | | | |
| Characteristic bending moment | | $M^0_{Rk,s}$ | [Nm] | 26,0 | | 56,0 | | |
| **Pull-out failure in uncracked concrete** | | | | | | | | |
| Characteristic resistance to tension load in C20/25 | | $N_{Rk,p}$ | [kN] | 9,0 | 12,0 | 17,0 | 11,0 | 19,0 | 25,0 |
| Increasing factor for $N_{Rk,p} = N_{Rk,p\,(C20/25)} \cdot \psi_c$ with $\psi_c = \left(\frac{f_{ck}}{20}\right)^m$ | C25/30 | m | [-] | 0,41 | 0,33 | | 0,5 | 0,39 | |
| | C30/37 | | | | | | | | |
| | C40/50 | | | | | | | | |
| | C50/60 | | | | | | | | |
| **Pull-out failure in cracked concrete** | | | | | | | | |
| Characteristic resistance to tension load in C20/25 | | $N_{Rk,p}$ | [kN] | 3,0 | 5,5 | 8,0 | 6,0 | 13,0 | 17,0 |
| Increasing factor for $N_{Rk,p} = N_{Rk,p\,(C20/25)} \cdot \psi_c$ with $\psi_c = \left(\frac{f_{ck}}{20}\right)^m$ | C25/30 | m | [-] | 0,49 | 0,39 | | 0,42 | 0,27 | |
| | C30/37 | | | | | | | | |
| | C40/50 | | | | | | | | |
| | C50/60 | | | | | | | | |
| Installation factor | | $\gamma_{inst}$ | [-] | 1,0 | | | | | |

**TOGE concrete screw TSM E**

**Performances**
Characteristic values for static and quasi-static loading

**Annex C1**

## Table 6: Characteristic values for static and quasi-static loading continuation

| TSM concrete screw size | | | | 8 | | | 10 | | |
|---|---|---|---|---|---|---|---|---|---|
| Nominal embedment depth | | | $h_{nom}$ | $h_{nom1}$ | $h_{nom2}$ | $h_{nom3}$ | $h_{nom1}$ | $h_{nom2}$ | $h_{nom3}$ |
| | | | [mm] | 45 | 55 | 65 | 55 | 75 | 85 |
| **Concrete failure: concrete cone failure and splitting failure** | | | | | | | | | |
| Effective embedment depth | | $h_{ef}$ | [mm] | 35 | 44 | 52 | 43 | 60 | 69 |
| k-factor | cracked | $k_{cr}$ | [-] | 7,7 | | | | | |
| | uncracked | $k_{ucr}$ | [-] | 11,0 | | | | | |
| Concrete cone failure | spacing | $s_{cr,N}$ | [mm] | $3 \times h_{ef}$ | | | | | |
| | edge distance | $c_{cr,N}$ | [mm] | $1,5 \times h_{ef}$ | | | | | |
| Splitting failure case 1 | resistance | $N^0_{Rk,sp}$ | [kN] | 9,0 | 12,0 | 17,0 | 11,0 | 19,0 | 25,0 |
| | spacing | $s_{cr,sp}$ | [mm] | 200 | 240 | 290 | 230 | 280 | 320 |
| | edge distance | $c_{cr,sp}$ | [mm] | 100 | 120 | 145 | 115 | 140 | 160 |
| Splitting failure case 2 | resistance | $N^0_{Rk,sp}$ | [kN] | 5,5 | 8,0 | 11,0 | 7,0 | 15,0 | 20,0 |
| | spacing | $s_{cr,sp}$ | [mm] | 128 | 164 | 196 | 160 | 224 | 260 |
| | edge distance | $c_{cr,sp}$ | [mm] | 64 | 82 | 98 | 80 | 114 | 130 |
| Installation factor | | $\gamma_{inst}$ | [-] | 1,0 | | | | | |
| **Pry-out failure** | | | | | | | | | |
| Factor for pry-out failure | | $k_8$ | [-] | 2,1 | 2,8 | | 2,5 | | |
| Installation factor | | $\gamma_{inst}$ | [-] | 1,0 | | | | | |
| **Concrete edge failure** | | | | | | | | | |
| Effective length in concrete | | $l_f$ | [mm] | 45 | 55 | 65 | 55 | 75 | 85 |
| Nominal outer diameter of screw | | $d_{nom}$ | [mm] | 8 | | | 10 | | |

**TOGE concrete screw TSM E**

**Performances**
Characteristic values for static and quasi-static loading continuation

**Annex C2**

## Table 7: Fire exposure – characteristic values of resistance

| TSM concrete screw size | | | | 8 | | | 10 | | |
|---|---|---|---|---|---|---|---|---|---|
| Nominal embedment depth | | | $h_{nom}$ | 1 | 2 | 3 | 1 | 2 | 3 |
| | | | [mm] | 45 | 55 | 65 | 55 | 75 | 85 |
| Steel failure for tension and shear load | | | | | | | | | |
| Characteristic Resistance | R30 | $N_{Rk,s,fi30}$ | [kN] | 2,4 | | | 4,4 | | |
| | R60 | $N_{Rk,s,fi60}$ | [kN] | 1,7 | | | 3,3 | | |
| | R90 | $N_{Rk,s,fi90}$ | [kN] | 1,1 | | | 2,3 | | |
| | R120 | $N_{Rk,s,fi120}$ | [kN] | 0,7 | | | 1,7 | | |
| | R30 | $V_{Rk,s,fi30}$ | [kN] | 2,4 | | | 4,4 | | |
| | R60 | $V_{Rk,s,fi60}$ | [kN] | 1,7 | | | 3,3 | | |
| | R90 | $V_{Rk,s,fi90}$ | [kN] | 1,1 | | | 2,3 | | |
| | R120 | $V_{Rk,s,fi120}$ | [kN] | 0,7 | | | 1,7 | | |
| | R30 | $M^0_{Rk,s,fi30}$ | [Nm] | 2,4 | | | 5,9 | | |
| | R60 | $M^0_{Rk,s,fi60}$ | [Nm] | 1,8 | | | 4,5 | | |
| | R90 | $M^0_{Rk,s,fi90}$ | [Nm] | 1,2 | | | 3,0 | | |
| | R120 | $M^0_{Rk,s,fi120}$ | [Nm] | 0,9 | | | 2,3 | | |
| Pull-out failure | | | | | | | | | |
| Characteristic Resistance | R30-90 | $N_{Rk,p,fi}$ | [kN] | 0,8 | 1,4 | 2,0 | 1,5 | 3,3 | 4,3 |
| | R120 | $N_{Rk,p,fi}$ | [kN] | 0,6 | 1,1 | 1,6 | 1,2 | 2,6 | 3,4 |
| Concrete cone failure | | | | | | | | | |
| Characteristic Resistance | R30-90 | $N^0_{Rk,c,fi}$ | [kN] | 1,0 | 1,9 | 2,9 | 1,7 | 4,2 | 5,9 |
| | R120 | $N^0_{Rk,c,fi}$ | [kN] | 0,8 | 1,5 | 2,3 | 1,4 | 3,4 | 4,7 |
| Edge distance | | | | | | | | | |
| R30 - R120 | | $c_{cr,fi}$ | [mm] | $2 \times h_{ef}$ | | | | | |
| In case of fire attack from more than one side, the minimum edge distance shall be ≥300mm. | | | | | | | | | |
| Spacing | | | | | | | | | |
| R30 - R120 | | $s_{cr,fi}$ | [mm] | $4 \times h_{ef}$ | | | | | |
| The anchorage depth has to be increased for wet concrete by at least 30 mm compared to the given value. | | | | | | | | | |