Deutsches Institut für Bautechnik

Public-law institution jointly founded by the federal states and the Federation

European Technical Assessment Body for construction products

Member of EOTA www.eota.eu

Designated according to Article 29 of Regulation (EU) No 305/2011 and member of EOTA (European Organisation for Technical Assessment)

# European Technical Assessment ETA-24/1251 of 14 January 2025

English translation prepared by DIBt - Original version in German language

**General Part**

| | |
|---|---|
| Technical Assessment Body issuing the European Technical Assessment: | Deutsches Institut für Bautechnik |
| Trade name of the construction product | TOX Sumo Max 1 Speed |
| Product family to which the construction product belongs | Fasteners for use in concrete for redundant non-structural systems |
| Manufacturer | TOX-Dübel-Technik GmbH<br>Brunnenstraße 31<br>72505 Krauchenwies<br>GERMANY |
| Manufacturing plant | Werk II |
| This European Technical Assessment contains | 12 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 | EAD 330747-00-0601, Edition 06/2018 |

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## Specific Part

### 1 Technical description of the product

The concrete screw TOX Sumo Max 1 Speed in size of 6 mm is an anchor made of galvanized steel respectively steel with zinc flake coating, made of stainless or high corrosion resistant steel. The anchor is screwed into a predrilled cylindrical drill hole. The special thread of the anchor cuts an internal thread into the member while setting. The anchorage is characterised by mechanical interlock in the special thread.

The product description is given in Annex A.

### 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 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 Safety in case of fire (BWR 2)

| Essential characteristic | Performance |
|---|---|
| Reaction to fire | Class A1 |
| Resistance to fire | See Annex C2 |

#### 3.2 Safety in use (BWR 4)

| Essential characteristic | Performance |
|---|---|
| Characteristic resistance to tension load (static and quasi-static loading) | See Annex B2 and C1 |
| Characteristic resistance to shear load (static and quasi-static loading) | See Annex C1 |
| Durability | See Annex B1 |

### 4 Assessment and verification of constancy of performance (AVCP) system applied, with reference to its legal base

In accordance with European Assessment Document EAD No. 330747-00-0601, the applicable European legal act is: [97/161/EC].

The system to be applied is: 2+

## 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 control plan deposited at Deutsches Institut für Bautechnik.

Issued in Berlin on 14 January 2025 by Deutsches Institut für Bautechnik

Dipl.-Ing. Beatrix Wittstock
Head of Section

*beglaubigt:*
Tempel

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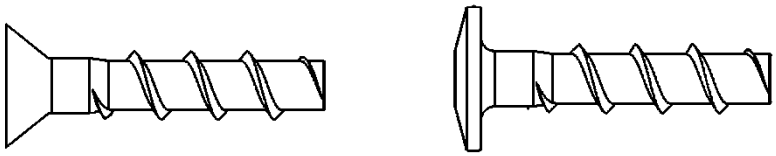
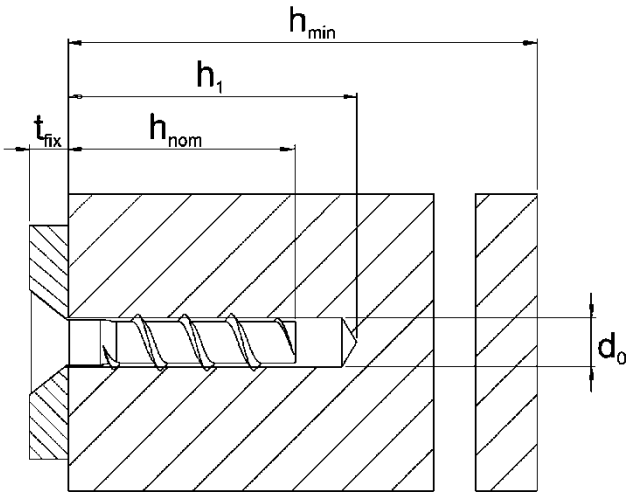
# Product in installed condition

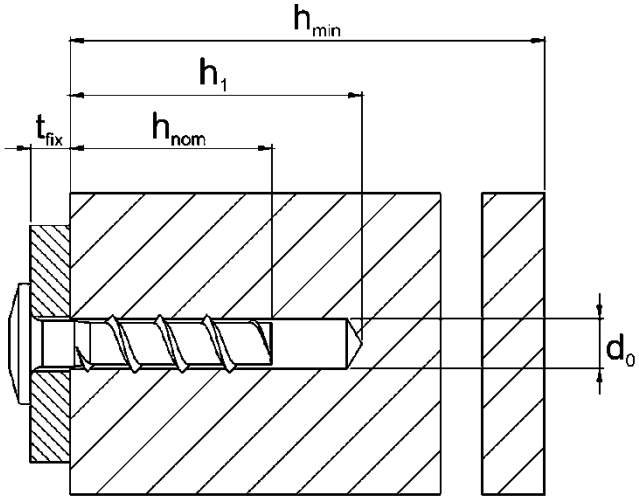
## TOX Sumo Max 1 Speed

- Galvanized carbon steel
- Zinc flakes coated carbon steel
- Stainless steel A4
- High corrosion resistant steel HCR



e.g. TOX Sumo Max 1 Speed, configuration with countersunk head and TORX drive




$d_0$ = nominal drill hole diameter
$t_{fix}$ = thickness of fixture
$h_1$ = drill hole depth

$h_{min}$ = minimum thickness of member
$h_{nom}$ = nominal embedment depth

| TOX Sumo Max 1 Speed | Annex A1 |
|---|---|
| **Product description**<br>Product in installed condition | |

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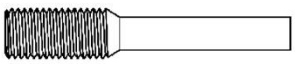
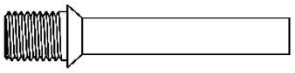
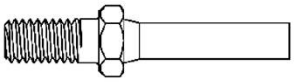


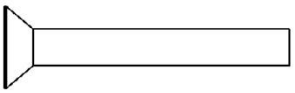

Configuration with metric connection threat and TORX drive e.g. Sumo Max 1 AG Speed 6x30 M10




Configuration with countersunk head and metric connection threat e.g. Sumo Max 1 AG Speed 6x30 M8

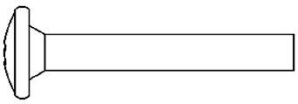



Configuration with hexagon drive and metric connection threat e.g. Sumo Max 1 AG Speed 6x30 M8



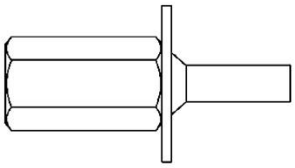
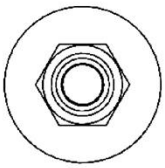


Configuration with countersunk head and TORX drive e.g. Sumo Max 1 SK Speed 6x30





Configuration with pan head and TORX drive e.g. Sumo Max 1 FK Speed 6x30

Configuration with internal thread and hexagon drive e.g. Sumo Max 1 IG Speed 6x30 IM M8/10

## Table 1: Material

| Part | Product name | Material |
|---|---|---|
| all types | Sumo Max 1 Speed | - Steel EN 10263-4:2017 galvanized acc. to EN ISO 4042:2018<br>- Zinc flake coating according to EN ISO 10683:2018 (≥5µm) |
| | Sumo Max 1 Speed A4 | 1.4401; 1.4404; 1.4571; 1.4578 |
| | Sumo Max 1 Speed HCR | 1.4529 |

| Part | Product name | Nominal characteristic steel | | Rupture elongation $A_5$ [%] |
|---|---|---|---|---|
| | | Yield strength $f_{yk}$ [N/mm²] | Ultimate strength $f_{uk}$ [N/mm²] | |
| all types | Sumo Max 1 Speed | 400 | 600 | ≤ 8 |
| | Sumo Max 1 Speed A4 | | | |
| | Sumo Max 1 Speed HCR | | | |

| **TOX Sumo Max 1 Speed** | **Annex A2** |
|---|---|
| **Product description**<br>Screw types and material | |

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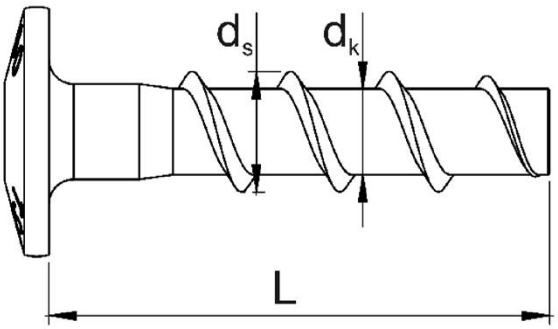
## Table 2: Dimensions

| Anchor size | | | 6 |
|---|---|---|---|
| Screw length | L ≥ | [mm] | 26 |
| Thread outer diameter | $d_s$ | [mm] | 7,0 |
| Core diameter | $d_k$ | [mm] | 5,4 |




**Marking:**

**Sumo Max 1 Speed**

| | |
|---|---|
| Screw type: | TSM L |
| Screw size: | 6 |
| Screw length: | 30 |


**Sumo Max 1 Speed A4**

| | |
|---|---|
| Screw type: | TSM L |
| Screw size: | 6 |
| Screw length: | 30 |
| Material: | A4 |


**Sumo Max 1 Speed HCR**

| | |
|---|---|
| Screw type: | TSM L |
| Screw size: | 6 |
| Screw length: | 30 |
| Material: | HCR |


**TOX Sumo Max 1 Speed**

**Product description**
Dimensions and markings

**Annex A3**

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# Specification of Intended use

**Anchorages subject to:**

- Static and quasi-static loads.
- Used only for multiple use for non-structural application according to EN 1992-4:2018.
- Fire exposure

**Base materials:**

- Compacted reinforced and compacted unreinforced concrete without fibers according to EN 206:2013.
- Strength classes C20/25 to C50/60 according to EN 206:2013.
- Cracked and uncracked concrete.

**Use conditions (Environmental conditions):**

- Concrete screws subject to dry internal conditions: all screw types with $h_{nom1}$ and $h_{nom2}$
- For all other conditions corresponding to corrosion resistance classes CRC according to EN 1993-1-4:2006 + A1:2015
  - Stainless steel according to Annex A2, screw type Sumo Max 1 Speed A4 with marking A4, only embedment depth $h_{nom2}$: CRC III
  - High corrosion resistant steel according to Annex A2, screw type Sumo Max 1 Speed HCR with marking HCR, only embedment depth $h_{nom2}$: CRC V

**Design:**

- Anchorages are to be designed under the responsibility of an engineer experienced in anchorages and concrete work.
- Verifiable calculation notes and drawings are to be prepared taking 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 are designed according to EN 1992-4:2018 and EOTA Technical Report TR 055, Edition February 2018.
  The design for shear load according to EN 1992-4:2018, Section 6.2.2 applies for all specified diameters $d_f$ of clearance hole in the fixture in Annex B2, Table 3.

**Installation:**

- Only hammer drilling.
- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters on site.
- In case of aborted hole: new drilling must be drilled at a minimum distance of twice the depth of aborted hole or closer, if the aborted hole is filled with high strength mortar and only if the hole is not in the direction of the oblique tensile or shear load.
- After installation further turning of the anchor must not be possible. The head of the anchor is supported in the fixture and is not damaged.

| TOX Sumo Max 1 Speed | |
|---|---|
| **Intended use**<br>Specification | **Annex B1** |

## Table 3: Installation parameters

| TOX Sumo Max 1 Speed | | | 6 | |
|---|---|---|---|---|
| Nominal embedment depth | | $h_{nom}$ | $h_{nom1}$ [1)] | $h_{nom2}$ |
| | | [mm] | 25 | 35 |
| Nominal drill hole diameter | $d_0$ | [mm] | 6,0 | |
| Cutting diameter of drill bit | $d_{cut} \leq$ | [mm] | 6,35 | |
| Drill hole depth | $h_1 \geq$ | [mm] | 28 | 38 |
| Clearance hole diameter | $d_f \leq$ | [mm] | 8 | |
| Installation torque (version with connection thread) | $T_{inst}$ | [Nm] | 10 | |

1) only subject to dry internal conditions

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

| TOX Sumo Max 1 Speed | | | 6 | |
|---|---|---|---|---|
| Nominal embedment depth | | $h_{nom}$ | $h_{nom1}$ [1)] | $h_{nom2}$ |
| | | [mm] | 25 | 35 |
| Minimum thickness of member | $h_{min}$ | [mm] | 80 | |
| Minimum edge distance | $c_{min}$ | [mm] | 30 | |
| Minimum spacing | $s_{min}$ | [mm] | 30 | |

1) only subject to dry internal conditions

**TOX Sumo Max 1 Speed**

**Intended use**
Installation parameters
Minimum thickness of member, minimum edge distance and minimum spacing

**Annex B2**

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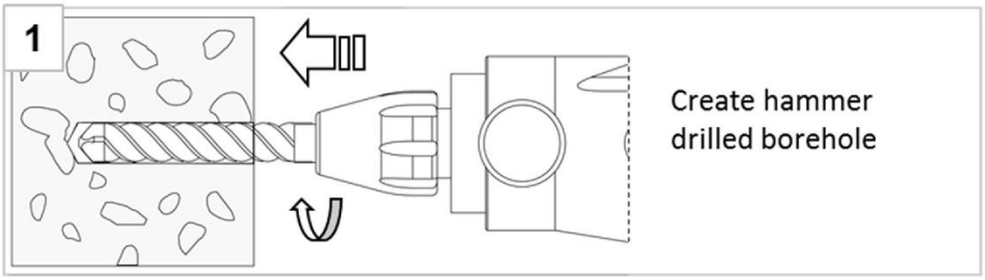
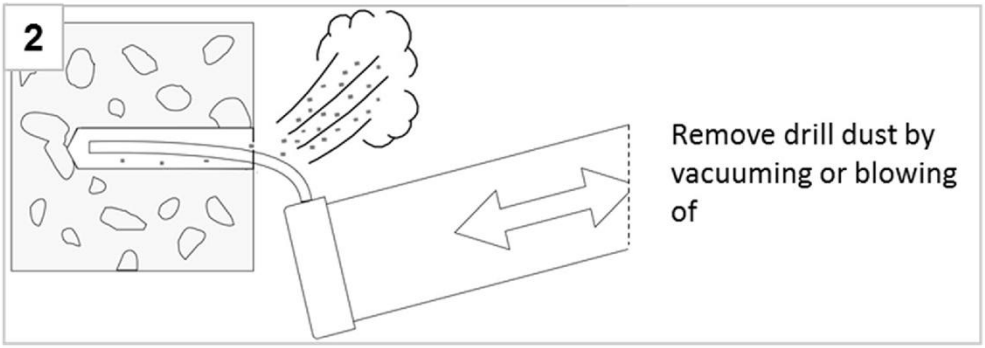
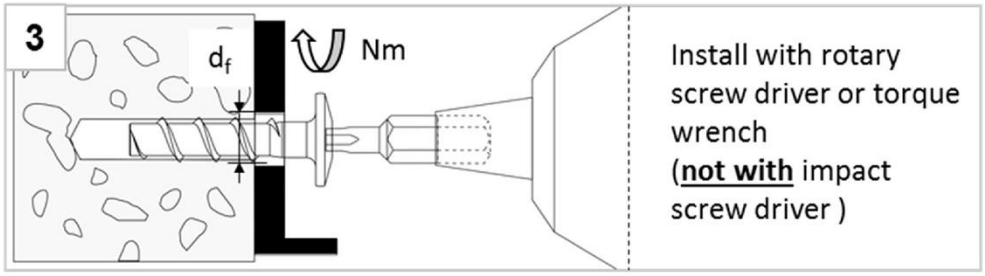
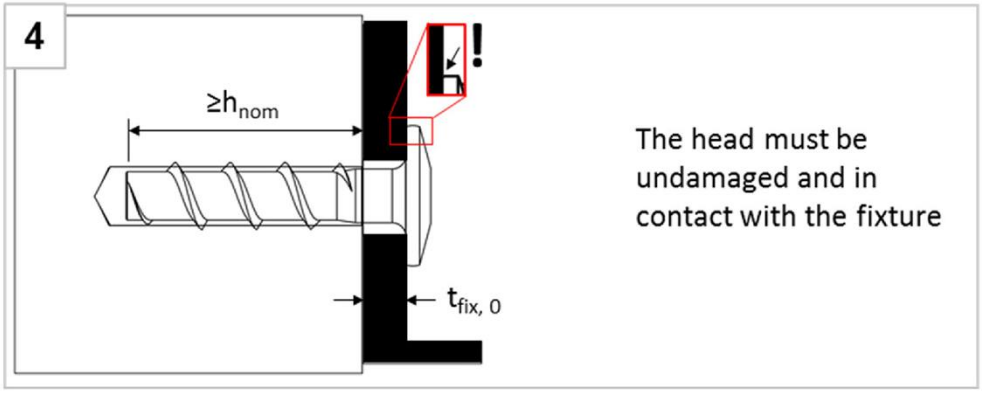
## Installation Instructions




**The use of impact screw driver is not allowed.**
**The anchor is correctly installed if the head is supported on the fixture.**
**Further turning of the anchor is not possible.**

| | |
|---|---|
| **TOX Sumo Max 1 Speed** | |
| **Intended use**<br>Installation instructions | **Annex B3** |

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

| TOX Sumo Max 1 Speed | | | | 6 | |
|---|---|---|---|---|---|
| Nominal embedment depth | | $h_{nom}$ | | $h_{nom1}$ [1)] | $h_{nom2}$ |
| | | [mm] | | 25 | 35 |
| **Steel failure for tension and shear loading** | | | | | |
| Characteristic resistance | | $N_{Rk,s}$ | [kN] | 13,7 | |
| Partial factor | | $\gamma_{Ms,N}$ | [-] | 1,5 | |
| Characteristic resistance | | $V_{Rk,s}$ | [kN] | 6,9 | |
| Partial factor | | $\gamma_{Ms,V}$ | [-] | 1,25 | |
| Ductility factor | | $k_7$ | [-] | 0,8 | |
| Characteristic bending moment | | $M^0_{Rk,s}$ | [Nm] | 11,1 | |
| **Pull-out failure** | | | | | |
| Characteristic resistance in C20/25 | cracked | $N_{Rk,p}$ | [kN] | 0,9 | 2,0 |
| | uncracked | $N_{Rk,p}$ | [kN] | 2,0 | 4,0 |
| Increasing factor for $N_{Rk,p} = N_{Rk,p\,(C20/25)} \cdot \psi_c$ | C25/30 | $\Psi_c$ | [-] | 1,12 | |
| | C30/37 | | | 1,22 | |
| | C40/50 | | | 1,41 | |
| | C50/60 | | | 1,58 | |
| **Concrete failure: splitting failure, concrete cone failure and pry-out failure** | | | | | |
| Effective embedment depth | | $h_{ef}$ | [mm] | 19 | 27 |
| k-factor | cracked | $k_{cr}$ | [-] | 7,7 | |
| | uncracked | $k_{ucr}$ | [-] | 11,0 | |
| Concrete cone failure | spacing | $s_{cr,N}$ | [mm] | 3 x $h_{ef}$ | |
| | edge distance | $c_{cr,N}$ | [mm] | 1,5 x $h_{ef}$ | |
| Splitting failure | resistance | $N^0_{Rk,Sp}$ | [kN] | 0,9 | |
| | spacing | $s_{cr,Sp}$ | [mm] | 3 x $h_{ef}$ | |
| | edge distance | $c_{cr,Sp}$ | [mm] | 1,5 x $h_{ef}$ | |
| Factor for pry-out failure | | $k_8$ | [-] | 1,0 | |
| Installation factor | | $\gamma_{inst}$ | [-] | 1,0 | |
| **Concrete edge failure** | | | | | |
| Effective length in concrete | | $l_f = h_{ef}$ | [mm] | 19 | 27 |
| Nominal outer diameter of screw | | $d_{nom}$ | [mm] | 6 | |

[1)] only subject to dry internal conditions

| **TOX Sumo Max 1 Speed** | |
|---|---|
| **Performances**<br>Characteristic values for static and quasi-static loading | **Annex C1** |

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## Table 6: Fire exposure – characteristic values of resistance

| TOX Sumo Max 1 Speed | | | | TSM 6 | |
|---|---|---|---|---|---|
| Nominal embedment depth | | $h_{nom}$ | | $h_{nom1}$ [1)] | $h_{nom2}$ |
| | | [mm] | | 25 | 35 |
| Steel failure for tension and shear load | | | | | |
| Characteristic Resistance | R30 | $N_{Rk,s,fi30}$ | [kN] | 0,27 | |
| | R60 | $N_{Rk,s,fi60}$ | [kN] | 0,27 | |
| | R90 | $N_{Rk,s,fi90}$ | [kN] | 0,22 | |
| | R120 | $N_{Rk,s,fi120}$ | [kN] | 0,17 | |
| | R30 | $V_{Rk,s,fi30}$ | [kN] | 0,27 | |
| | R60 | $V_{Rk,s,fi60}$ | [kN] | 0,27 | |
| | R90 | $V_{Rk,s,fi90}$ | [kN] | 0,22 | |
| | R120 | $V_{Rk,s,fi120}$ | [kN] | 0,17 | |
| | R30 | $M^0_{Rk,s,fi30}$ | [Nm] | 0,22 | |
| | R60 | $M^0_{Rk,s,fi60}$ | [Nm] | 0,22 | |
| | R90 | $M^0_{Rk,s,fi90}$ | [Nm] | 0,18 | |
| | R120 | $M^0_{Rk,s,fi120}$ | [Nm] | 0,14 | |
| Pull-out failure | | | | | |
| Characteristic Resistance | R30-R90 | $N_{Rk,p,fi}$ | [kN] | 0,23 | 0,50 |
| | R120 | $N_{Rk,p,fi}$ | [kN] | 0,18 | 0,40 |
| Concrete cone failure | | | | | |
| Characteristic Resistance | R30-R90 | $N^0_{Rk,c,fi}$ | [kN] | 0,27 | 0,65 |
| | R120 | $N^0_{Rk,c,fi}$ | [kN] | 0,22 | 0,52 |
| 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. | | | | | |

[1)] only subject to dry internal condition

| **TOX Sumo Max 1 Speed** | |
|---|---|
| **Performances**<br>Fire exposure – characteristic values of resistance | **Annex C2** |