Deutsches Institut für Bautechnik

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Approval body for construction products and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and Laender Governments

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

# European Technical Assessment ETA-13/0502 of 14 May 2018

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 | Würth Powder-actuated fastener ZEBRA W-PN, W-PNS, W-PN G8 |
| Product family to which the construction product belongs | Power-actuated fastener for multiple use in concrete for non-structural applications |
| Manufacturer | Adolf Würth GmbH & Co. KG<br>Reinhold-Würth-Straße 12-17<br>74653 Künzelsau<br>DEUTSCHLAND |
| Manufacturing plant | Würth Werk 23 |
| This European Technical Assessment contains | 11 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 330083-02-0601 |

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## Specific Part

### 1 Technical description of the product

The power-actuated fasteners Würth ZEBRA W-PN made of cold formed galvanised steel or mechanical galvanised steel are driven in a pre-drilled hole in the concrete by using a bolt setting tool and a cartridge as propellant charge. They are anchored in the concrete by sintering and mechanical interlock.

The power-actuated fasteners Würth ZEBRA W-PN consists of the power-actuated fastener with nail head and a plastic washer. The power-actuated fasteners Würth ZEBRA W-PNS consists of the power-actuated fastener with nail head, a plastic washer and a steel washer. The power-actuated fasteners Würth ZEBRA W-PN G8 consists of the power-actuated fastener with threaded part and plastic washer.

The product description is given in Annex A.

The characteristic material values, dimensions and tolerances of the fastener not given in Annex A correspond to the respective values laid down in the technical documentation[1] of this European Technical Assessment.

### 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 fastener 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 fastener 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 Mechanical resistance and stability (BWR 1)

| Essential characteristic | Performance |
|---|---|
| Characteristic values of resistance and displacements | See Annex C1 |
| Durability | Durability is ensured if the specifications of intended use according to Annex B are taken into account. |

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

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



[1] The technical documentation of this ETA is deposited at the Deutsches Institut für Bautechnik and, as far as relevant for the tasks of the notifies bodies involved in the attestation of conformity procedure, is handed over to the notified bodies.

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

In accordance with EAD No. 330083-02-0601, the applicable European legal act is: 1997/463/EC (EU).

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 with Deutsches Institut für Bautechnik.

Issued in Berlin on 14 May 2018 by Deutsches Institut für Bautechnik

BD Dipl.-Ing. Andreas Kummerow
Head of Department

*beglaubigt:*
Baderschneider

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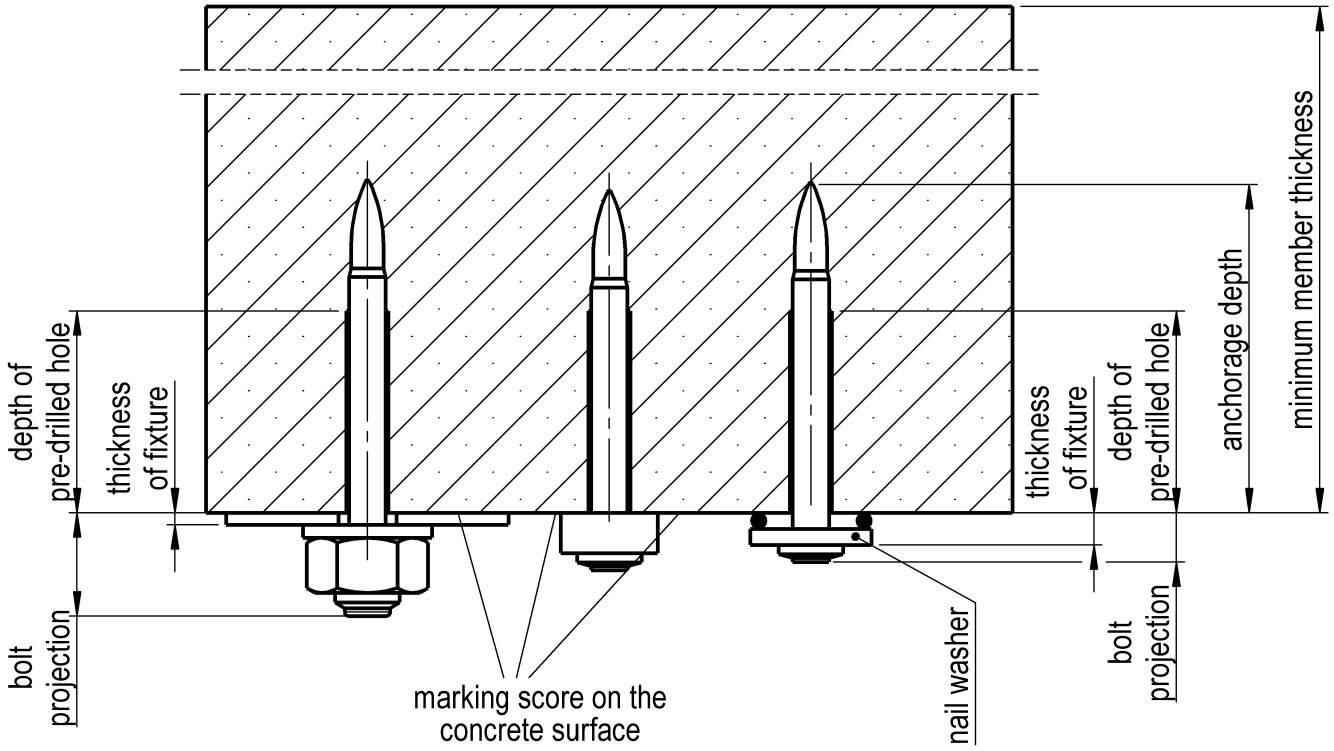
## Powder-actuated fastener in the installed condition

## Anchorage in concrete






| **Würth Powder actuated fastener ZEBRA W-PN, W-PN S, W-PN G8** | Annex A1 |
|---|---|
| **Product description**<br>Powder-actuated fastener in the installed condition | |

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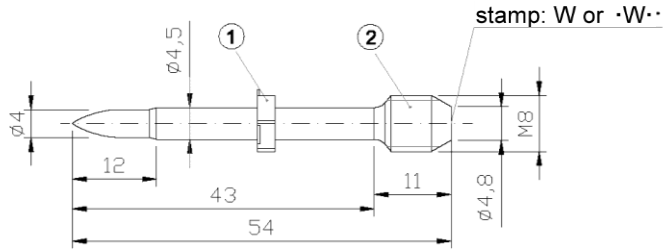
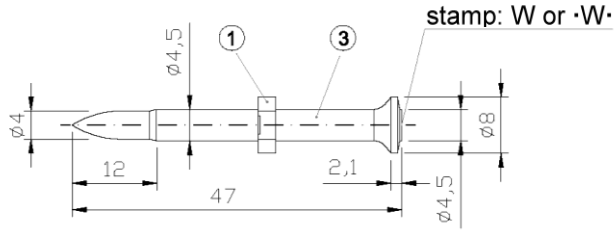
## Powder-actuated faster

### W-PN G8



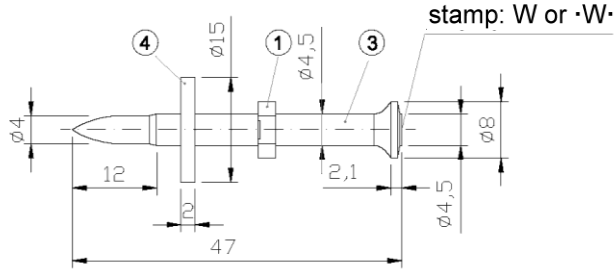

① plastic washer
② threaded sleeve

### W-PN




① plastic washer
③ nail
④ steel washer

### W-PNS




Dimensions in mm

## Table A1: Material

| Component | Designation | Material |
|---|---|---|
| 1 | Washer | Plastics |
| 2 | Threaded Part | Steel CK67, Material-N° 1.1231, EN 10 132-4 |
| 3 | Nail | Stahl CK67, Material-N° 1.1231, EN 10 132-4 |
| 4 | Steel washer with marking: WÜRTH-PN80 | S250 GD+Z nach DIN EN 10 147 |
| 2 – 4 | Zinc plating | mechanical galvanised steel MZN, zinc layer thickness ≥ 8µ<br>Galvanised steel, zinc layer thickness ≥ 8µ |



| **Würth Powder actuated fastener ZEBRA W-PN, W-PN S, W-PN G8** | Annex A2 |
|---|---|
| **Product description**<br>Sizes of Powder-actuated fasteners, Dimensions, Materials | |

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## Specifications of intended use

**Anchorages subject to:**

- Static and quasi-static loads.
- Fire exposure

**Base Materials:**

- Reinforced or unreinforced normal weight concrete according to EN 206-1:2000.
- For cracked and non-cracked concrete.
- Anchorages in two-dimensional load-bearing structures (slabs & walls).
- Strength classes C12/15 to C50/60 according to EN 206-1:2000.

**Use conditions (Environmental conditions):**

- Structures subject to dry conditions.

**Design:**

- Verifiable calculation notes and drawings shall be prepared taking account of the loads to be anchored. The position of the anchor is indicated on the drawings (e.g. position of the fastener relative to reinforcement or to supports etc.).
- The anchorages are designed under the responsibility of an engineer experienced in anchorages and concrete work.
- The anchorages are designed in accordance with ETAG 001, Annex C, Design Method C, August 2010 or in accordance with CEN/TS 1992-4-4:2009, Design Method C.
- The anchorages under fire exposure are designed in accordance with EOTA TR 020, May 2004 or in accordance with CEN/TS 1992-4:2009, Annex D. It must be ensured that local spalling of the concrete cover does not occur.
- The fastener is to be used only for multiple use for non-structural applications with following definition:

  Number of fixing points $n_1 \geq 4$,

  Number of fasteners per fixing point $n_2 \geq 1$

  Design value of actions $N_{Ed}$ per fixing point $n_3 \leq 3.0$ kN

  or

  Number of fixing points $n_1 \geq 3$,

  Number of fasteners per fixing point $n_2 \geq 1$

  Design value of actions $N_{Ed}$ per fixing point $n_3 \leq 2.0$ kN
- The design of the fixture is such that in the case of excessive slip or failure of one fastener the load can be transmitted to neighboring fasteners without significantly violating the requirements on the fixture in the serviceability and ultimate limit state.

**Installation:**

- Fastener installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters on the site



| **Würth Powder actuated fastener ZEBRA W-PN, W-PN S, W-PN G8** | Annex B1 |
|---|---|
| **Intended Use**<br>Specifications | |

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## Table B1: Installation Parameters

| **Powder-actuated fastener** | | | **W-PN** | **W-PNS** | **W-PN G8** [1] |
|---|---|---|---|---|---|
| Anchorage depth | | [mm] | 31-43 | | |
| Thickness of fixture [2] | $t_{fix} \leq$ | [mm] | 7 | 5 | 7 |
| Nominal diameter of the drill hole | $d_0 =$ | [mm] | 4.8 | | |
| Cutting diameter of the drill hole | $d_{cut} \leq$ | [mm] | 5.14 | | |
| Depth of the drilling hole | $h_0 =$ | [mm] | 20 | | |
| Diameter of clearance hole in the fixture | $d_f \leq$ | [mm] | 5.5 | 5.5 | 9 |
| Installation torque moment | $T_{inst} \leq$ | [Nm] | - | | 5 |
| Bolt projection | $l_p$ | [mm] | - | | 11-23 |
| Minimum member thickness | $h_{min}$ | [mm] | 80 | | |
| Minimum spacing | $s_{min} = s_{cr}$ | | 200 | | |
| Minimum edge distance | $c_{min} = c_{cr}$ | | 150 | | |

[1] W-PN G8 also for the connection of internal threaded sleeves and threaded sockets

[2] The fixture shall be tightened against the concrete surface

### Installation Instructions:

- Fastener installation in accordance with the manufacturer's specifications and drawings and using the specified installation device.
- Fastener to be installed perpendicular to the surface of the base material.
- Holes to be drilled perpendicular to the surface of the base material by using the corresponding stop drill. The depth of the drill hole is reached when the drill bit cut a visible mark in the surface of the concrete.
- Positioning of the drill holes without damaging the reinforcement. In case of aborted drill hole a new drill hole shall be at the distance of 2 x depth of the aborted hole at minimum.
- During the installation of the Powder-actuated faster W-PN G8 shall be ensured that the bolt projection according Table B1 is kept.
- During the installation of the Powder-actuated faster W-PN and W-PNS shall be ensured that the fixture (maximum thickness of fixture according to Table B1) is tightened against the concrete surface.
- Use of setting tools according to Annex B3. The setting tool shall be complied with EN 15859-1:2011.



| **Würth Powder actuated fastener ZEBRA W-PN, W-PN S, W-PN G8** | Annex B2 |
|---|---|
| **Intended Use**<br>Installation parameters<br>Installation instructions | |

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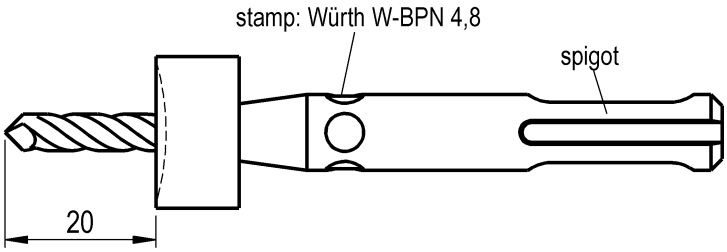
## Table B2: Assignment of the bolt setting tools, cartridges and the corresponding stop drill

| Setting tool | Nail | | Cartridge propellant charge | corresponding stop drill |
|---|---|---|---|---|
| Powder-actuated tool DIVA®1 Premium | W-PN, W-PNS | W-PN G8 | Kal. 6.8/11M<br><br>- yellow – strong charge<br><br>- red – very strong charge | W-BPN 4.8 |
| Powder-actuated tool BST MA-75 with single shot device | | | | |

## Stop drill




## Setting tools

Powder-actuated tool DIVA®1 Premium

Powder-actuated tool BST MA-75 with single shot device



| **Würth Powder actuated fastener ZEBRA W-PN, W-PN S, W-PN G8** | Annex B3 |
|---|---|
| **Intended Use**<br>Assignment of setting tools, stop drill, setting tools | |

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## Table C1: Characteristic values and design values of load-bearing capacity

| **Powder-actuated fastener** | | | **W-PN** | **W-PNS** | **W-PN G8** [1] |
|---|---|---|---|---|---|
| **All load directions** | | | | | |
| Characteristic load-bearing capacity in concrete C20/25 to C50/60 | $F_{Rk}$ | [kN] | 1.6 | | |
| Characteristic load-bearing capacity in concrete C12/15 to C16/20 | $F_{Rk}$ | [kN] | 1.2 | | |
| Partial safety factor | $\gamma_M$ | [-] | 1.5 [2] | | |
| Design value of load-bearing capacity in concrete C20/25 to C50/60 | $F_{Rd}$ | [kN] | 1.1 | | |
| Design value of load-bearing capacity in concrete C12/15 to C16/20 | $F_{Rd}$ | [kN] | 0.8 | | |

[1] W-PN G8 also for the connection of internal threaded sleeves and threaded sockets

[2] The partial safety factor $\gamma_2$ = 1.0 is included

## Table C2: Displacements

| **Powder-actuated fastener** | **N** | $\delta_{N0}$ | $\delta_{N\infty}$ | **V** | $\delta_{V0}$ | $\delta_{V\infty}$ |
|---|---|---|---|---|---|---|
| | [kN] | [mm] | [mm] | [kN] | [mm] | [mm] |
| W-PN<br>W-PNS<br>W-PN G8 | 0.76 | 0.5 | 0.7 | 0.91 | 2.1 | 3.2 |

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## Table C3: Characteristic values under fire exposure in all load directions for concrete classes C20/25 to C50/60

| **Powder-actuated fasteners** | | | | **W-PN** | **W-PNS** | **W-PN G8** |
|---|---|---|---|---|---|---|
| **Fire resistance class** | **For all load directions** | | | | | |
| R30 | Characteristic load-bearing capacity | $F_{Rk,fi\ (30)}$ | [kN] | 0.4 | | |
| R60 | Characteristic load-bearing capacity | $F_{Rk,fi\ (60)}$ | [kN] | 0.4 | | |
| R90 | Characteristic load-bearing capacity | $F_{Rk,fi\ (90)}$ | [kN] | 0.4 | | |
| R120 | Characteristic load-bearing capacity | $F_{Rk,fi\ (120)}$ | [kN] | 0.3 | | |
| R30 bis R120 | Spacing | $s_{cr} = s_{min}$ | [mm] | 200 | | |
| | Edge distance for fire attack from one side | $c_{cr} = c_{min}$ | [mm] | 150 | | |
| | If the fire attack is from more than one side, the edge distance of the Powder-actuated faster shall be $c \geq 300$ mm. | | | | | |

## Spacing and edge distances