

European Technical Approval ETA-13/0502

English translation prepared by DIBt - Original version in German language

Handelsbezeichnung <i>Trade name</i>	Würth Setzbolzen ZEBRA W-PN, W-PNS, W-PN G8 <i>Würth power-actuated fastener ZEBRA W-PN, W-PNS, W-PN G8</i>
Zulassungsinhaber <i>Holder of approval</i>	Adolf Würth GmbH & Co. KG Reinhold-Würth-Straße 12-17 74653 Künzelsau DEUTSCHLAND
Zulassungsgegenstand und Verwendungszweck <i>Generic type and use of construction product</i>	Setzbolzen als Mehrfachbefestigung von nichttragenden Systemen zur Verankerung im Beton <i>Power-actuated fastener for multiple use in concrete for non-structural applications</i>
Geltungsdauer: <i>Validity:</i>	vom <i>from</i> 5 June 2013 bis <i>to</i> 5 June 2018
Herstellwerk <i>Manufacturing plant</i>	Würth Werk 23

Diese Zulassung umfasst
This Approval contains

13 Seiten einschließlich 5 Anhänge
13 pages including 5 annexes

I LEGAL BASES AND GENERAL CONDITIONS

- 1 This European technical approval is issued by Deutsches Institut für Bautechnik in accordance with:
- Council Directive 89/106/EEC of 21 December 1988 on the approximation of laws, regulations and administrative provisions of Member States relating to construction products¹, modified by Council Directive 93/68/EEC² and Regulation (EC) N° 1882/2003 of the European Parliament and of the Council³;
 - *Gesetz über das In-Verkehr-Bringen von und den freien Warenverkehr mit Bauprodukten zur Umsetzung der Richtlinie 89/106/EWG des Rates vom 21. Dezember 1988 zur Angleichung der Rechts- und Verwaltungsvorschriften der Mitgliedstaaten über Bauprodukte und anderer Rechtsakte der Europäischen Gemeinschaften (Bauproduktengesetz - BauPG) vom 28. April 1998⁴, as amended by Article 2 of the law of 8 November 2011⁵;*
 - Common Procedural Rules for Requesting, Preparing and the Granting of European technical approvals set out in the Annex to Commission Decision 94/23/EC⁶.
- 2 Deutsches Institut für Bautechnik is authorized to check whether the provisions of this European technical approval are met. Checking may take place in the manufacturing plant. Nevertheless, the responsibility for the conformity of the products to the European technical approval and for their fitness for the intended use remains with the holder of the European technical approval.
- 3 This European technical approval is not to be transferred to manufacturers or agents of manufacturers other than those indicated on page 1, or manufacturing plants other than those indicated on page 1 of this European technical approval.
- 4 This European technical approval may be withdrawn by Deutsches Institut für Bautechnik, in particular pursuant to information by the Commission according to Article 5(1) of Council Directive 89/106/EEC.
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- 6 The European technical approval is issued by the approval body in its official language. This version corresponds fully to the version circulated within EOTA. Translations into other languages have to be designated as such.

¹ Official Journal of the European Communities L 40, 11 February 1989, p. 12

² Official Journal of the European Communities L 220, 30 August 1993, p. 1

³ Official Journal of the European Union L 284, 31 October 2003, p. 25

⁴ *Bundesgesetzblatt Teil I* 1998, p. 812

⁵ *Bundesgesetzblatt Teil I* 2011, p. 2178

⁶ Official Journal of the European Communities L 17, 20 January 1994, p. 34

II SPECIFIC CONDITIONS OF THE EUROPEAN TECHNICAL APPROVAL

1 Definition of the product and intended use

1.1 Definition of the construction product

The power-actuated fasteners Würth ZEBRA W-PN made of cold formed 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.

An illustration of the product and intended use is given in Annex 1.

1.2 Intended use

The fastener is intended to be used for anchorages for which requirements for safety in use in the sense of the Essential Requirements N° 4 of Council Directive 89/106 EEC shall be fulfilled and failure of the fixture represents an immediate risk to human life. The fastener is to be used only for multiple use for non-structural applications. The definition of multiple use is given in Section 4.2.

The fastener may be used for anchorages with requirements related to resistance to fire.

The fastener is to be used only for anchorages subject to static or quasi-static loading in reinforced or unreinforced normal weight concrete of strength classes C12/15 at minimum and C50/60 according to EN 206-1:2000-12 at most.

It may be anchored in cracked or non-cracked concrete.

The fastener is only to be used for anchorages in two-dimensional load-bearing structures (slabs and walls).

It may only be used in structures subject to dry internal conditions.

The provisions made in this European technical approval are based on an assumed working life of the fastener of 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.

2 Characteristics of the product and methods of verification

2.1 Characteristics of the product

The fastener corresponds to the drawings and provisions given in Annex 2. The characteristic material values, dimensions and tolerances of the fastener not given in Annex 2 shall correspond to the respective values laid down in the technical documentation⁷ of this European technical approval.

The fastener is considered to satisfy the requirements for performance class A1 of the characteristic reaction to fire, in accordance with the provisions of EC decision 96/603/EC (as amended 2000/605/EC).

The characteristic values for the design of anchorages are given in Annex 4, Table 5. Regarding resistance to fire the characteristic values for the design of the anchorages are given in Annex 5, Table 6. They are valid for use in a system that is required to provide a specific fire resistance class.

Each head of the fastener is marked with the identifying mark of the producer according to Annex 2. The commercial name, the intended use, the nail type and the minimum anchorage depth are given in the accompanying documents.

The fastener shall only be supplied as a complete unit.

2.2 Methods of verification

The assessment of fitness of the fastener for the intended use in relation to the requirement for safety in use in the sense of the Essential requirement N°4 of Council Directive 89/106/EEC has been made based on the following tests:

- (1) Axial tension tests
- (2) Shear tests
- (3) Tests on functioning in non-cracked high strength concrete
- (4) Setting tests
- (5) Installation safety tests - contact with reinforcement
- (6) Tests on functioning in cracked low strength concrete
- (7) Tests on functioning under repeated loads
- (8) Tests on sensitivity to brittle failure
- (9) Checking durability.

The assessment of the fastener for the intended use in relation to the requirements for resistance to fire has been made in accordance with the Technical Report TR 020 "Evaluation of anchorages in concrete concerning resistance to fire".

In addition to the specific clauses relating to dangerous substances contained in this European technical approval, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the Construction Products Directive, these requirements need also to be complied with, when and where they apply.

⁷ The technical documentation of this European technical approval is deposited at the Deutsches Institut für Bautechnik and, as far as relevant for the tasks of the approved bodies involved in the attestation of conformity procedure, is handed over to the approved bodies.

3 Evaluation and attestation of conformity and CE marking

3.1 System of attestation of conformity

According to the communication of the European Commission⁸ system 2+ of the attestation of conformity applies.

This system of attestation of conformity is defined as follows:

System 2+: Declaration of conformity of the product by the manufacturer on the basis of:

- (a) Tasks for the manufacturer:
 - (1) initial type-testing of the product;
 - (2) factory production control;
 - (3) testing of samples taken at the factory in accordance with a control plan.
- (b) Tasks for the approved body:
 - (4) certification of factory production control on the basis of:
 - initial inspection of factory and of factory production control;
 - continuous surveillance, assessment and approval of factory production control.

Note: Approved bodies are also referred to as "notified bodies".

3.2 Responsibilities

3.2.1 Tasks for the manufacturer

3.2.1.1 Factory production control

The manufacturer shall exercise permanent internal control of production. All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic manner in the form of written policies and procedures, including records of results performed. This production control system shall insure that the product is in conformity with this European technical approval.

The manufacturer may only use initial / raw / constituent materials stated in the technical documentation of this European technical approval.

The factory production control shall be in accordance with the control plan which is part of the technical documentation of this European technical approval. The control plan is laid down in the context of the factory production control system operated by the manufacturer and deposited with Deutsches Institut für Bautechnik.⁹

The results of factory production control shall be recorded and evaluated in accordance with the provisions of the control plan.

3.2.1.2 Other tasks for the manufacturer

The manufacturer shall, on the basis of a contract, involve a body which is approved for the tasks referred to in section 3.1 in the field of anchors in order to undertake the actions laid down in section 3.2.2. For this purpose, the control plan referred to in sections 3.2.1.1 and 3.2.2 shall be handed over by the manufacturer to the approved body involved.

The manufacturer shall make a declaration of conformity, stating that the construction product is in conformity with the provisions of this European technical approval.

⁸ Letter of the European Commission of 15/10/2008 to EOTA

⁹ The control plan is a confidential part of the European technical approval and only handed over to the approved body involved in the procedure of attestation of conformity. See section 3.2.2.

3.2.2 Tasks for the approved bodies

The approved body shall perform the

- initial inspection of factory and of factory production control,
 - continuous surveillance, assessment and approval of factory production control,
- in accordance with the provisions laid down in the control plan.

The approved body shall retain the essential points of its actions referred to above and state the results obtained and conclusions drawn in a written report.

The approved certification body involved by the manufacturer shall issue an EC certificate of conformity of the factory production control stating the conformity with the provisions of this European technical approval.

In cases where the provisions of the European technical approval and its control plan are no longer fulfilled the certification body shall withdraw the certificate of conformity and inform Deutsches Institut für Bautechnik without delay.

3.3 CE marking

The CE marking shall be affixed on each packaging of the fastener / accompanying commercial document. The letters "CE" shall be followed by the identification number of the approved certification body, where relevant, and be accompanied by the following additional information:

- the name and address of the producer (legal entity responsible for the manufacture),
- the last two digits of the year in which the CE marking was affixed,
- the number of the EC certificate for the factory production control,
- the number of the European technical approval,
- the nail type (W-PN G8, W-PN or W-PNS).

4 Assumptions under which the fitness of the product for the intended use was favourably assessed

4.1 Manufacturing

The European technical approval is issued for the product on the basis of agreed data/information, deposited with Deutsches Institut für Bautechnik, which identifies the product that has been assessed and judged. Changes to the product or production process, which could result in this deposited data/information being incorrect, should be notified to Deutsches Institut für Bautechnik before the changes are introduced. Deutsches Institut für Bautechnik will decide whether or not such changes affect the approval and consequently the validity of the CE marking on the basis of the approval and if so whether further assessment or alterations to the approval shall be necessary.

4.2 Design of anchorages

The fitness of the fastener for the intended use is given under the following conditions:

The anchorages are designed in accordance with the "Guideline for European technical approval of Metal Anchors for Use in Concrete", Annex C, Method C under the responsibility of an engineer experienced in anchorages and concrete work.

The relevant characteristic values of the fastener are given in Annex 4.

It is to be ensured that the strength class of the concrete in which the fastener is to be placed is not lower or higher than the strength class which the characteristic loads apply for.

The fastener is to be used only for multiple use for non-structural applications with following definition of multiple use:

- number of fixing points $n_1 \geq 4$, number of fasteners per fixing point $n_2 = 1$ and design value of actions F_{sd} on fixing point $n_3 \leq 3,0$ kN or
- number of fixing points $n_1 \geq 3$, number of fasteners per fixing point $n_2 = 1$ and design value of actions F_{sd} on fixing point $n_3 \leq 2,0$ kN or

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 neighbouring fasteners without significantly violating the requirements on the fixture in the serviceability and ultimate limit state.

Verifiable calculation notes and drawings are prepared taking account of the loads to be anchored. The position of the fastener is indicated on the design drawings (e.g. position of the fastener relative to reinforcement or to supports).

The design of anchorages under fire exposure has to consider the conditions given in the Technical Report TR 020 "Evaluation of anchorages in concrete concerning resistance to fire". The relevant characteristic values are given in Annex 5, Table 6. It must be ensured that local spalling of the concrete cover does not occur. The design method covers anchors with a fire attack from one side only. If the fire attack is from more than one side, the design method may be taken only, if the edge distance of the fastener is $c \geq 300$ mm.

4.3 Installation of anchors

The fitness for use of the fastener can only be assumed if the fastener is installed as follows:

- Fastener installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.
- Use of the fastener only as supplied by the manufacturer without exchanging the components of a fastener.
- Fastener installation in accordance with the manufacturer's specifications and drawings and using the specified stop drills and setting tools.
- Check of concrete being well compacted, e.g. without significant voids.
- The installation parameters according to Annex 4 are kept.
- The edge distance and spacing to be kept to the specified values, no minus tolerances.
- 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.
- Fasteners to be installed perpendicular to the surface of the base material.
- During the installation of the power-actuated faster W-PN G8 shall be ensured that the bolt projection according to Annex 4, Table 3 is kept.

- During the installation of the power-actuated faster W-PN and W-PNS shall be ensured that the fixture (maximum thickness of fixture according to Annex 4, Table 3) is tightened against the concrete surface.
- The anchorage depth according to Annex 4, Table 3 is kept.
- Use of setting tools according to Annex 3. The setting tool shall be complied with EN 15859-1:2011.

5 Indications to the manufacturer

The manufacturer is responsible to ensure that the information on the specific conditions according to 1 and 2 including Annexes referred to as well as sections 4.2 and 4.3 is given to those who are concerned. This information may be made by reproduction of the respective parts of the European technical approval. In addition all installation data shall be shown clearly on the package and/or on an enclosed instruction sheet, preferably using illustration(s).

The minimum data required are:

- minimum effective anchorage depth,
- reference to any special installation equipment needed,
- identification of the manufacturing batch.

The information on the installation procedure, preferably by means of illustrations, shall be shown with the installation device.

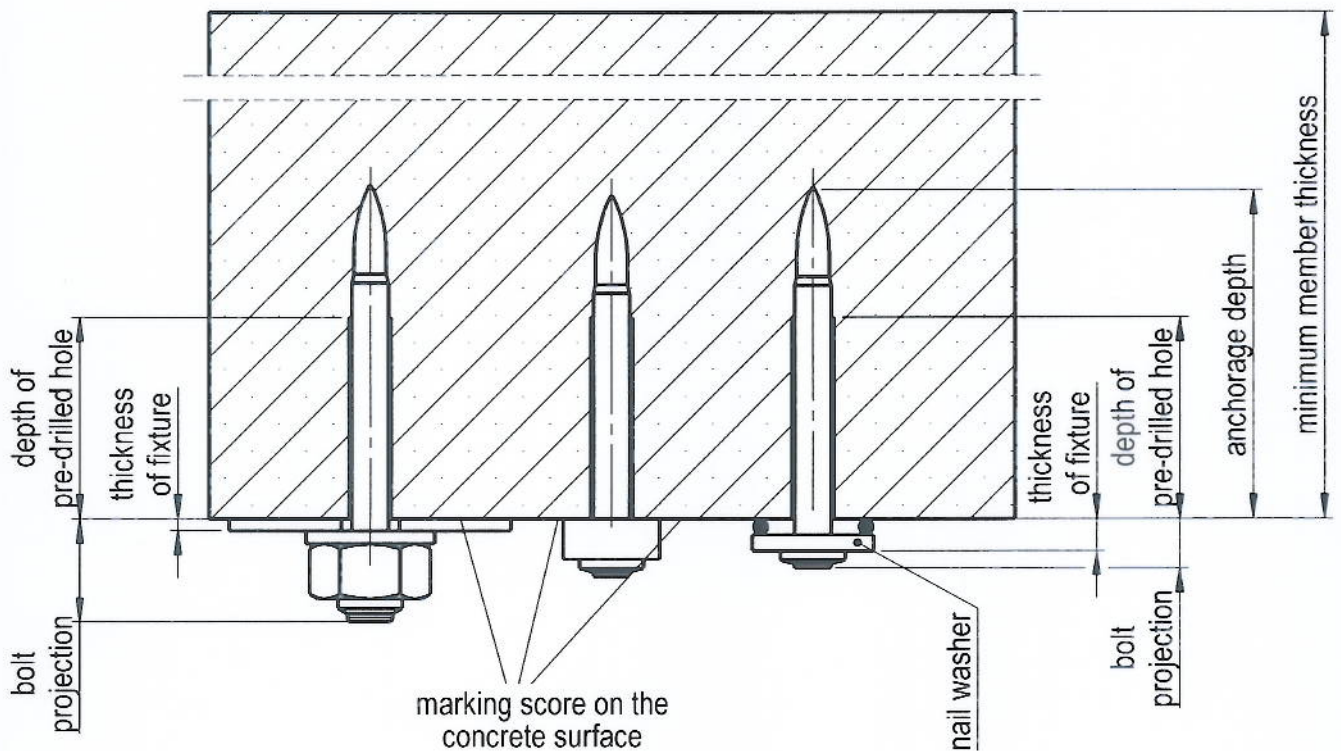
All data shall be presented in a clear and explicit form.

Andreas Kummerow
p. p. Head of Department

beglaubigt:
Wittstock

Power-actuated fastener in the installed condition

Anchorage in concrete



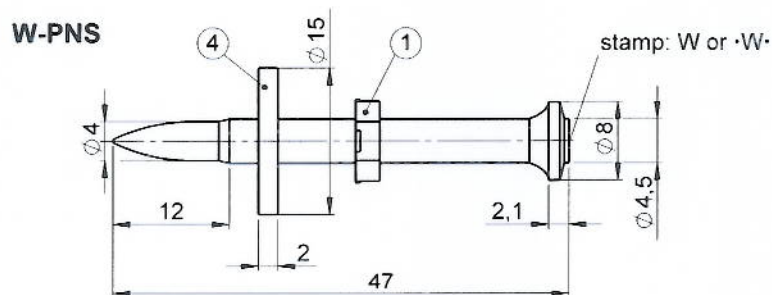
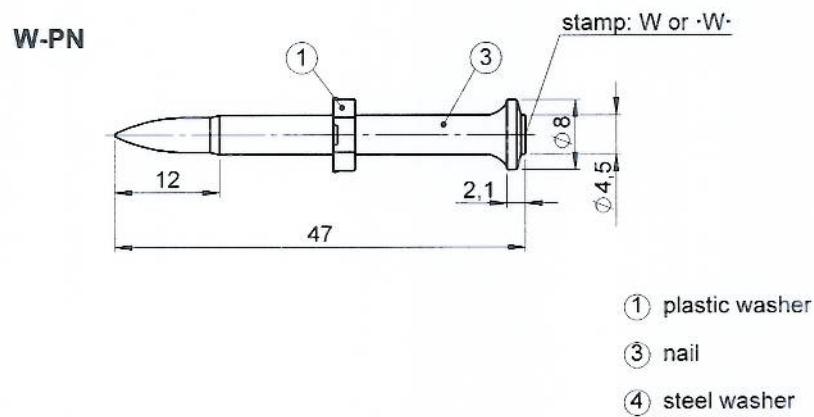
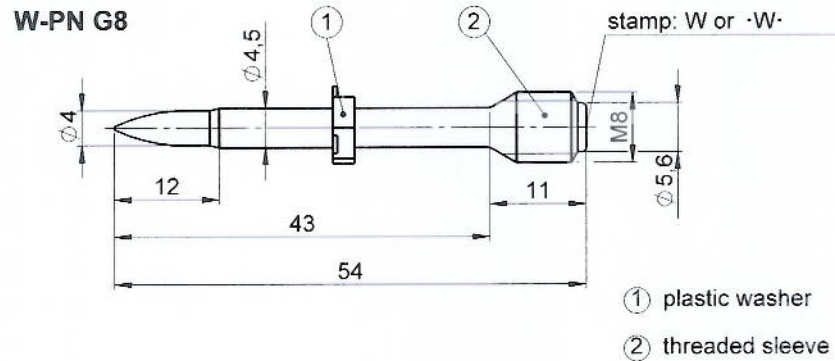
The fastener is to be used only for multiple use for non-structural applications, the definition of multiple use is given in Section 4.2 of the approval.

Würth Power-actuated fastener ZEBRA W-PN, W-PNS, W-PN G8

Product and intended use

Annex 1

Power-actuated faster made of galvanised steel



Dimensions in mm

Table 1: Material of power-actuated fasteners W-PN, W-PNS und W-PN G8 made of galvanised steel, zinc layer thickness $\geq 8\mu$

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

Würth Power-actuated fastener ZEBRA W-PN, W-PNS, W-PN G8

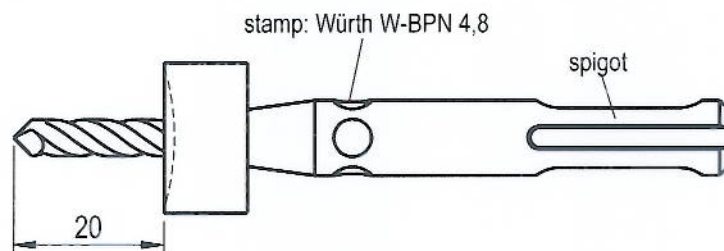
Sizes of power-actuated fasteners, Dimensions, Materials

Annex 2

Table 2: Assignment of the bolt setting tools, cartridges and the corresponding stop drill

Setting tool	Nail		Cartridge propellant charge	corresponding stop drill
Power-actuated tool DIVA [®] 1 Premium	W-PN, W-PNS	W-PN G8	Kal. 6,8/11M	W-BPN 4,8
Power-actuated tool BST MA-75 with single shot device			- yellow – strong charge - red – very strong charge	

Stop drill



Setting tools

Power-actuated tool
DIVA[®]1 Premium



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



Würth Power-actuated fastener ZEBRA W-PN, W-PNS, W-PN G8

Assignment of setting tools, stop drill, setting tools

Annex 3

Table 3: Installation parameter

Power-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]	-		
Bolt projection	l_p [mm]	-		
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

Table 4: Design method C – Characteristic values and design values of load-bearing capacity

Power-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	γ_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 5: Design method C – Characteristic values of displacements

Power-actuated fastener	N	δ_{N0}	$\delta_{N\infty}$	V	δ_{V0}	$\delta_{V\infty}$
	[kN]	[mm]	[mm]	[kN]	[mm]	[mm]
W-PN						
W-PNS	0.76	0.5	0.7	0.91	2.1	3.2
W-PN G8						

Würth Power-actuated fastener ZEBRA W-PN, W-PNS, W-PN G8

Installation parameter, characteristic values and design values of load-bearing capacity, characteristic values of displacements

Annex 4

Spacing and edge distances

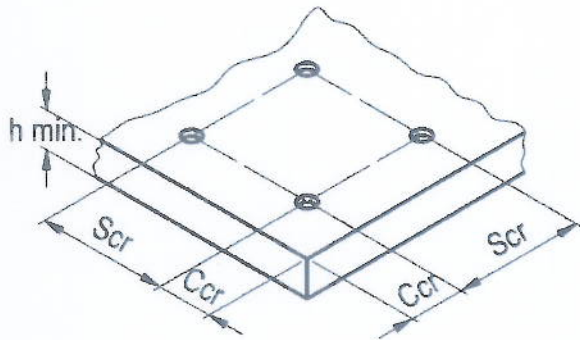


Table 6: Characteristic values under fire exposure in all load directions for concrete classes $\geq C20/25$ und $\leq C50/60$

Power-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 power-actuated faster shall be $c \geq 300$ mm.					
The partial safety factor for the load-bearing capacity under fire exposure $\gamma_{M,fi}$ is to be set at 1.0.						

Würth Power-actuated fastener ZEBRA W-PN, W-PNS, W-PN G8

Spacing and edge distances, characteristic values under fire exposure

Annex 5