

# Versuchsanstalt für Stahl, Holz und Steine

(Amtliche Materialprüfungsanstalt) Karlsruher Institut für Technologie (KIT)

Leitung: Univ.-Prof. Dr.-Ing. H. J. Blaß und Univ.-Prof. Dr.-Ing. T. Ummenhofer

# National technical test certificate Translation

No.: P-BWU02-178006

Subject: Dri	lling screws

JT4-2/5-5,0x25-VARIO JT9-2/5-5,0x25-VARIO JT3-2/5-5,0x30-VARIO JT6-2/5-5,0x30-VARIO

Intended use: Connections of wall holders made of aluminum or

stainless steel on substructures made of aluminum support profiles for external wall cladding, ventilated at

rear according to DIN 18516-1

Applicant: EJOT Baubefestigungen GmbH

In der Stockwiese 35 57334 Bad Laasphe

Date of issue: December 04, 2017

Period of validity until: December 31, 2022

Based on this national technical test certificate, the above mentioned subject is applicable according to the state building regulations. This national technical test certificate substitutes the national technical test certificate P-BWU02-178002 dated March 15, 2017.

This national technical test certificate includes 8 pages and 10 attachments.

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of the national technical test certificate
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# I. General provisions

- 1. The national technical test certificate does not substitute the approvals, agreements and certificates prescribed by law for performing building projects.
- 2. The national technical test certificate is granted without prejudice to the rights of a third party, especially private property rights.
- 3. Manufacturers and distributors of the building product / construction type must provide copies of the national technical test certificate for the user of the building product / construction type without prejudice to further regulations in the "special provisions" and he must point out to the fact that the national technical test certificate has to be available at the point of use. The authorities involved must be provided with copies of the national technical test certificate upon request.
- 4. The national technical test certificate may only be completely reproduced. A publication in extracts needs the written approval of the Versuchsanstalt für Stahl, Holz und Steine. Texts and drawings of advertising leaflets may not contradict the national technical test certificate. Translations of the national technical test certificate must include the note "translation of the German original version not examined by the Versuchsanstalt für Stahl, Holz und Steine.
- 5. The national technical test certificate is granted revocably. The provisions of the national technical test certificate may be subsequently amended or modified, especially if technical knowledge necessitates this.
- 6. Contraction against this notification is admissible. An appeal must be made within a month after receipt of this notification in writing or for record at the Versuchsanstalt für Stahl, Holz und Steine, Kaiserstraße 12, 76128 Karlsruhe. The date of receipt of the notice of opposition at the Versuchsanstalt für Stahl, Holz und Steine is relevant for the timeliness of the opposition.

# II. Special provisions

#### 1 Subject and field of application

#### 1.1 Subject

Subject of the national technical test certificate are the drilling screws JT4-2/5-5,0x25-VARIO, JT9-2/5-5,0x25-VARIO, JT3-2/5-5,0x30-VARIO, JT6-2/5-5,0x30-VARIO for the connection of wall holders made of aluminum or stainless steels with aluminum support profiles manufactured and distributed by the company EJOT Baubefestigungen GmbH.

## 1.2 Field of application

The above subject is envisaged for the application according to DIN 18516-1:2010-06.

# 2 Requirements of the building product

#### 2.1 Properties and composition

The specifications in the attachments apply with regard to the dimensions, materials and corrosion protection.

# 2.2 Provisions for design and dimensioning

#### 2.2.1 Preface

In the following and in the attachments, the component on which the screw head abuts (wall holder) is designated as component I and the components on the side averted to the screw head (support profile) component II.

#### 2.2.2 Load-bearing capacity

The verification concept given in DIN 18516-1:2010-06 applies. According to DIN 18516:2010-06, the design values of the load-bearing capacity result from the characteristic values of the load-bearing capacity with a partial safety factor of  $\gamma_M = 2,0$ . The characteristic values of the load-bearing capacity for connections are given in Attachment 2. The following applies.

F<sub>Q,Rk</sub> characteristic value of the transverse load-bearing capacity (load direction rectangular to the axis of the screws)

F<sub>Z,A,Rk</sub> characteristic value of the pull-out bearing capacity (load direction parallel to the axis of the screws)

For considering a possible failure of component I for a tensile load of the connection (load direction parallel to the axis of the screws), the characteristic pull-through bearing capacity of the screw through component I can be calculated by means of DIN EN 1999-1-4:2010-05, equation (8.13).

For a combined load through transverse forces  $F_{Q,i,Ed}$  from dead weight and wind suction, proof is to be provided for each screw of the connection with the resulting impact  $F_{Q,Ed}$ . For a combined load from tensile forces  $F_Z$  and transverse forces  $F_Q$  from wind suction (WS) and dead weight (EG), the following interaction proof is to be provided:

$$\frac{F_{Z,Ed}}{\min(F_{Z,A,Bd};F_{Z,D,Bd})} + \frac{F_{Q,WS,Ed}}{F_{Q,Bd}} + \frac{F_{Q,EG,Ed}}{F_{Q,Bd}} \le 1,0$$

with F<sub>7 Ed</sub> Design values of the interacting tensile forces

F<sub>Q,WS,Ed</sub> Design value of the interacting transverse forces based on wind suction load

F<sub>Q,EG,Ed</sub> Design value of the interacting transverse forces based on load from dead weight

F<sub>Z,A,Rd</sub> Design values form the pull-out bearing capacity

F<sub>Z,D,Rd</sub> Design value of the pull-through bearing capacity

F<sub>Q.Rd</sub> Design value of the transverse force bearing capacity

The characteristic values apply for components I made of aluminum alloys with a minimum tensile strength  $R_m = 190 \text{ N/mm}^2$  to  $R_m = 245 \text{ N/mm}^2$  or made of stainless steel 1.4301, 1.4401 or 1.4404 with a minimum tensile strength of  $R_m = 550 \text{ N/mm}^2$  and for components II made of aluminum alloys with a tensile strength of  $R_m = 190 \text{ N/mm}^2$  to  $R_m = 245 \text{ N/mm}^2$ . Linear interpolation may be performed for intermediate values of the tensile strength.

For intermediate values of the component thickness, the characteristic value for the lower component thickness must be used.

## 2.2.3 Edge distances and hole diameters

The minimum value of the distance to the longitudinal edge of the bearing profile is  $e_1 = 10$  mm. The minimum value of the distance to the transverse edge of the support profile is  $e_2 = 10$  mm at the fixed point and  $e_2 = 50$  mm at the sliding point.

The mean values of the distances of the fasteners to the edge of the wall holder can be seen in Attachment 3.1 and 3.2. The hole diameters can be seen in Attachment 3.1 and 3.2.

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#### 2.2.4 Temperature-related restraint load

The application of fasteners for non-restraint-free connections is only allowable with a proof of constraint stress due to temperature (transverse load), cf. DIN 18516-1:2010-06, section 5.2.2. Without this proof, the fasteners may only be applied for restraint-free connections. This restriction, however, do not apply for connections with long holes, where no or only negligibly small temperature-related restraint loads may develop because of the displacement of the screws in the long hole.

# 2.3 Provisions for the design

Connections corresponding to section 1 may only be produced by firms having the necessary experience, unless a training of the assembling staff through skilled persons is ensured being experienced in this field.

Upon scheduled lateral force load the components to be connected must directly lie on one another and the shear joint must be located on the contact point of component I with component II so that the connecting element does not undergo any additional bending.

The fasteners are to be attached rectangular to the component surface in order to secure a faultless bearing connection.

Visually, the screws are to be bolted with a depth stop and the pull-out moment is to be controlled in a way that the EPDM slightly protrudes over the metallic area of the sealing washer (see Attachment 4.1).

For all screws, bolting is performed by means of a drill driver or a driver with depth stop. The use of impact drivers is non-admissible.

#### 3 Verification of conformity

#### 3.1 General

The confirmation of the conformity of the fasteners with the provisions of this national technical test certificate must be made for each manufacturing plant through a declaration of conformity of the producers on the basis of a factory production control and a first inspection of the fasteners performed through an approved inspection body.

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#### 3.2 Factory production control

In each manufacturing plant, a factory production control according to the principles of the Deutsches Institut für Bautechnik (German Institute for Building Technology) for the "proof of conformity for fasteners in lightweight metal construction" (see number 6/1999 of the "DIBt Mitteilungen") is to be established and performed. Factory production control is understood as the continuous monitoring of the production performed by the manufacturer with which he secures that his building products correspond to the provisions of this national technical test certificate.

Within the scope of the factory production control the following is to be checked:

- Form and dimensions of the fasteners
- their mechanical properties and
- the base material applied

The results of the factory production control are to be recorded and evaluated. The records must include the following information at least:

- designation of the building product, the base material and the components
- type of control or test
- date of production and control / test of the building product or base material or components
- Results of tests / controls and comparison with the requirements
- Signature of the person responsible for the factory production control

The records have to be kept five years at least. Upon request, they have to be submitted to the German Institute for Building Technology (DIBt), to the appropriate highest building authority and to the issuing inspection body.

In case of test results that do not meet the requirements of the standard technical specifications, the manufacturer must immediately take the necessary measures in order to remedy shortcomings. Within the scope of factory production control it must be secured that those building products that do not meet the requirements are not provided with the conformity mark (Ü mark) and confusions with conforming ones are excluded. For proving the remedy of defects, the relevant test must be repeated immediately after removal of the defects.

## 3.3 First inspection of the fasteners

Within the scope of the first inspection, the requirements imposed in section 2.1 of this national technical test certificate are to be checked. Sampling and tests are incumbent on the respective approved body.

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4 Conformity mark

The building product is to be provided with the conformity mark (Ü mark) by the manufacturer ...

according to the Regulations for conformity marks (ÜZVO) of the countries.

According to the regional building regulation of the countries, the Ü mark must be attached to

the building project, the dispatch note or to its packaging or, in case of difficulties, to the deliv-

ery note or to an attachment to the delivery note together with the compulsory information.

Labeling with the Ü mark in consideration of number of this national technical test certificate

may only be done if the prerequisite according to section 3 are fulfilled.

5 Legal basis

This national technical test certificate is granted on the basis of §19 and §22 of the regional

building codes for Baden-Wurttemberg (LBO) in the version of March 5, 2010 (last amendment

on November 21, 2017), in conjunction with the Building Rules List A, part 2, ser. no. 2.17,

edition 2016/2.

A granted national technical test certificate applies in all countries of the Federal Republic of

Germany according to §19, section 7 of the Model Building Regulation (MBO) and the corre-

sponding provisions of the respective regional building codes. The stipulation of the character-

istic forces given in the attachments is based upon test results that are documented in report

no. 168001 and 178005 of the Versuchsanstalt für Stahl, Holz und Steine.

Karlsruhe, December 06, 2017

cf/dr

Official in charge

Head of the Inspection Body

Dipl.-Ing. C. Fauth

Dr.-Ing. D. Ruff

# Versuchsanstalt für Stahl, Holz und Steine

Karlsruher Institut für Technologie (KIT)

Attachment 1.1

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# Overview of the attachments:

Fastener and wall holder	Component I (wall holder)	Component II (substructure)	Attachment
JT4-2/5-5,0x25-VARIO, JT9-2/5-5,0x25-VARIO,	aluminum R <sub>m</sub> ≥ 190N/mm²	aluminum R <sub>m</sub> ≥ 190N/mm²	2.1
JT3-2/5-5,0x30-VARIO, JT6-2/5-5,0x30-VARIO	aluminum R <sub>m</sub> ≥ 215N/mm²	aluminum R <sub>m</sub> ≥ 215N/mm²	2.2
Wall holder Attachment 3.1	aluminum R <sub>m</sub> ≥ 245N/mm²	aluminum R <sub>m</sub> ≥ 245N/mm²	2.3
JT4-2/5-5,0x25-VARIO, JT9-2/5-5,0x25-VARIO,	-4	aluminum R <sub>m</sub> ≥ 190N/mm²	2.4
JT3-2/5-5,0x30-VARIO, JT6-2/5-5,0x30-VARIO	stainless steel 1.4301, 1.4401 or 1.4404	aluminum R <sub>m</sub> ≥ 215N/mm²	2.5
Wall holder Attachment 3.2	$R_m \ge 550N/mm^2$	aluminum R <sub>m</sub> ≥ 245N/mm²	2.6

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Screw		Component I		Component II		
JT4-2/5-5,0x25-VARIO JT9-2/5-5,0x25-VARIO JT3-2/5-5,0x30-VARIO JT6-2/5-5,0x30-VARIO		Wall holder according to Attachment 3.1, t ≥ 3,0 mm, R <sub>m</sub> ≥ 190 N/mm²		Support section for ex. L- or T- section, R <sub>m</sub> ≥ 190 N/mm <sup>2</sup>		
Materials: JT4-2/5-5,0x25-VARIO stainless steel, DIN EN 10088, material no. 1.4301 (A2), 1.4567 (A2)  JT9-2/5-5,0x25-VARIO stainless steel, DIN EN 10088, material no. 1.4401 (A4), 1.4578 (A4)  JT3-2/5-5,0x30-VARIO stainless steel, DIN EN 10088, material no. 1.4301 (A2) with drill bit made of- case-hardened steel  JT6-2/5-5,0x30-VARIO stainless steel,		Ø 14 Ø 13 Ø 13 Ø 13 Ø 13 Ø 13 Ø 13 Ø 13 Ø 13		J6 8MS 8MS		
DIN EN 10088, material no 1.4401 (A4) with drill bit made of- case-hardened steel						
0		lue of the transver		apacity F <sub>Q,Rk</sub> in [KN	NJ	
`	according to	2.0 mm	Component II	2.0 mm		
	nent 3.1)	2,0 mm	2,5 mm	3,0 mm	I 🖂	
Sliding point wind suction	2,0 mm	1,94	1,94	1,94	<b>→</b> II <b>→</b>	
Fixed point	3,0 mm	2,88	2,88	2,88	, v	
dead weight /	2,0 mm	2,60	2,60	2,60		
wind suction	3,0 mm	3,21	3,21	3,21		
	Characteristic	c value of the pull-	out bearing capaci	ty F <sub>Z,A,Rk</sub> in [kN]		
Compo		Component II			<b>A</b>	
(wall holder according to Attachment 3.1)  Fixed point		2,0 mm	2,5 mm	3,0 mm	I 🛱	
		1,46	2,14	2,82	II #	
Transverse edge distance support section:  Sliding point: 50 mm  Fixed point: 10 mm  Longitudinal edge distance support section:  10 mm						

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Screw		Component I		Component II	
JT4-2/5-5,0x25-VARIO JT9-2/5-5,0x25-VARIO JT3-2/5-5,0x30-VARIO JT6-2/5-5,0x30-VARIO		Wall holder according to Attachment 3.1, t ≥ 3,0 mm, R <sub>m</sub> ≥ 215 N/mm <sup>2</sup>		Support section, for ex. L- or T- section, R <sub>m</sub> ≥ 215 N/mm <sup>2</sup>	
Materials: JT4-2/5-5,0x25-\ stainless stee DIN EN 1008 material no. 1 1.4567 (A2)  JT9-2/5-5,0x25-\ stainless stee DIN EN 1008 material no. 1 1.4578 (A4)  JT3-2/5-5,0x30-\ stainless stee DIN EN 1008 material no. 1 with drill bit m hardened stee DIN EN 1008 material no. 1 with drill bit m hardened stee DIN EN 1008 material no. 1 with drill bit m hardened stee DIN EN 1008 material no. 1 with drill bit m hardened stee DIN EN 1008	VARIO el, 8, 1.4301 (A2), VARIO el, 8, 1.4401 (A4), VARIO el, 8, 1.4301 (A2) el ded of case-el vARIO el, 8, 1.4401 (A4) el de of case-el vario el de		\$\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\		8MS 8MS 8MS
		lue of the transve	rse force bearing ca	apacity F <sub>Q,Rk</sub> in [kl	N]
Compo (wall holder) attachm	according to	2,0 mm	Component II 2,5 mm	3,0 mm	_
	2,0 mm	2,19	2,19	2,19	I 🚃 📥
Sliding point wind suction	3,0 mm	3,26	3,26	3,26	II
Fixed point	2,0 mm	2,94	2,94	2,94	-
dead weight / wind suction	3,0 mm	3,63	3,63	3,63	
		c value of the pull	-out bearing capaci	ty F <sub>Z,A,Rk</sub> in [kN]	
Compo (wall holder ac			Component II		<b>A</b>
tachment 3.1)		2,0 mm	2,5 mm	3,0 mm	I T
taciiiic	Fixed point				I 11 ∄

10 mm

Longitudinal edge distance support section:

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Screw		Comp	onent I	Comp	onent II
JT9-2/5-5,0 JT3-2/5-5,0	Attachment 3.1, sect		n, for ex. L- or T- ction, 15 N/mm²		
Materials: JT4-2/5-5,0x25-1 stainless stee DIN EN 1008 material no. 1 1.4567 (A2)  JT9-2/5-5,0x25-1 stainless stee DIN EN 1008 material no. 1 1.4578 (A4)  JT3-2/5-5,0x30-1 stainless stee DIN EN 1008 material no. 1 with drill bit m hardened stee DIN EN 1008 material no. 1 with drill bit m hardened stee DIN EN 1008 material no. 1 with drill bit m hardened stee DIN EN 1008 material no. 1 with drill bit m hardened stee	el, 8, 1.4301 (A2), VARIO el, 8, 1.4401 (A4), VARIO el, 8, 1.4301 (A2) nade of case- el VARIO el, 8, 1.4401 (A4) nade of case- el		\$\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\		
		iue of the transver		apacity FQ,Rk III [KI	<b>V</b> J
Compo (wall holder) attachm	according to	2,0 mm	Component II 2,5 mm	3,0 mm	
Sliding point	2,0 mm	2,50	2,50	2,50	I →
wind suction	3,0 mm	3,71	3,71	3,71	II #
Fixed point	2,0 mm	3,35	3,35	3,35	
dead weight / wind suction	3,0 mm	4,00	4,00	4,00	
* 4		value of the pull-	out bearing capaci	ty F <sub>Z,A,Rk</sub> in [kN]	
Compo			Component II		
(wall holder	according to	2.0 mm	2.5 mm	3.0 mm	<sub>T</sub>

Transverse edge distance support section : Sliding point: 50 mm Fixed point: 10 mm

2,0 mm

1,66

Longitudinal edge distance support section: 10 mm

attachment 3.1)

Fixed point

2,5 mm

2,47

3,0 mm

3,27

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Screw		onent I	Comp	onent II	
JT4-2/5-5,0x25-VARIO JT9-2/5-5,0x25-VARIO JT3-2/5-5,0x30-VARIO JT6-2/5-5,0x30-VARIO	to attach	r according ment 3.2, <sub>n</sub> ≥ 550 N/mm²	sec	n, for ex. L- or T- ction, 00 N/mm²	
Materials: JT4-2/5-5,0x25-VARIO stainless steel, DIN EN 10088, material no. 1.4301 (A2), 1.4567 (A2)  JT9-2/5-5,0x25-VARIO stainless steel, DIN EN 10088, material no. 1.4401 (A4), 1.4578 (A4)  JT3-2/5-5,0x30-VARIO stainless steel, DIN EN 10088, material no. 1.4301 (A2) with drill bit made of case-hardened steel  JT6-2/5-5,0x30-VARIO stainless steel, DIN EN 10088, material no. 1.4401 (A4) with drill bit made of case-hardened steel		6 8MS 8MS 8MS			
Characteristic val	lue of the transver	se force bearing ca	apacity F <sub>Q,Rk</sub> in [kN	<b>1</b> ]	
Component I (wall holder according to attachment 3.2)	2,0 mm	Component II 2,5 mm	3,0 mm	I .	
Sliding point wind suction	2,29	2,29	2,29	TII ₩	
Fixed point dead weight / wind suction	2,56	2,56	2,56		
Oh avend - visiti	value of the most		4. E : FLAD		
Component I	value of the pull-	out bearing capaci	ty r <sub>z,A,Rk</sub> in [KN]		
(wall holder according to attachment 3.2)	2,0 mm	Component II 2,5 mm	3,0 mm	<b>∳</b> I <u> </u>	
Fixed point	1,46	2,14	2,82	II #	
Transverse edge distance support section : Sliding point: 50 mm Fixed point: 10 mm  Longitudinal edge distance support section: 10 mm					

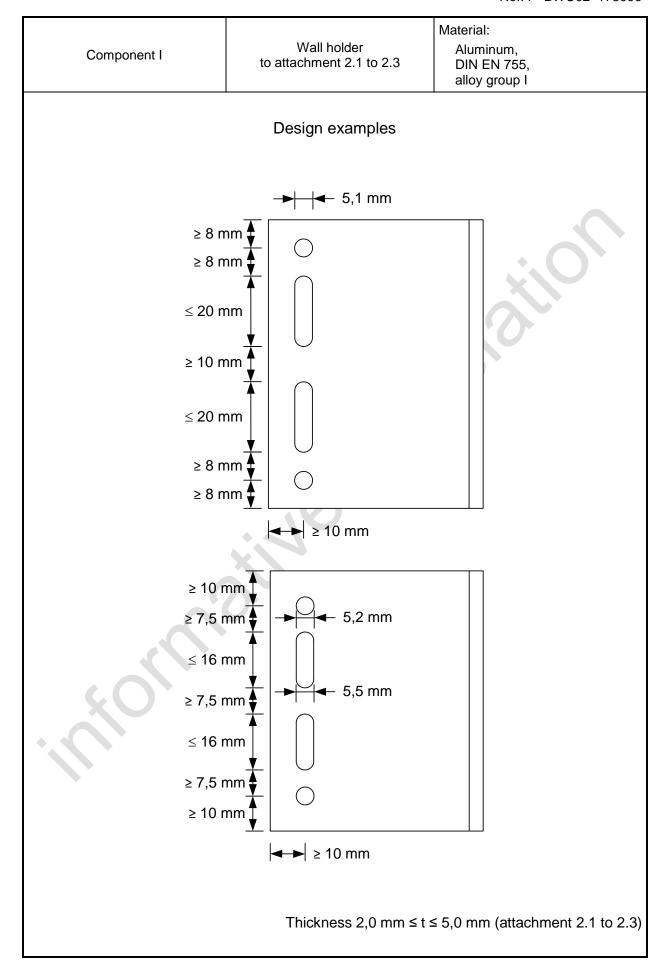
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Screw	Comp	onent I	Comp	onent II	
JT4-2/5-5,0x25-VARIO JT9-2/5-5,0x25-VARIO JT3-2/5-5,0x30-VARIO JT6-2/5-5,0x30-VARIO	attachm	according to nent 3.2, <sub>n</sub> ≥ 550 N/mm²	sec	n, for ex. L- or T- ction, I5 N/mm²	
Materials: JT4-2/5-5,0x25-VARIO stainless steel, DIN EN 10088, material no. 1.4301 (A2), 1.4567 (A2) JT9-2/5-5,0x25-VARIO stainless steel, DIN EN 10088, material no. 1.4401 (A4), 1.4578 (A4) JT3-2/5-5,0x30-VARIO stainless steel, DIN EN 10088, material no. 1.4301 (A2) with drill bit made of case-hardened steel  JT6-2/5-5,0x30-VARIO stainless steel, DIN EN 10088, material no. 1.4401 (A4) with drill bit made of case-hardened steel	Ø14 Ø13 Ø15 Ø5 Ø5 Ø5 Ø5 Ø5				
Characteristic va	lue of the transver	se force bearing ca	apacity F <sub>Q,Rk</sub> in [kN	l]	
Component I (wall holder according to		Component II			
attachment 3.2)	2,0 mm	2,5 mm	3,0 mm	I_ᡎ ͺ	
Sliding point wind suction	2,59	2,59	2,59	II	
Fixed point dead weight / wind suction	2,89	2,89	2,89		
Oh avasta da da	a value of the	out booring conse	4v E : [1-b]]		
	value of the pull-		ty F <sub>Z,A,Rk</sub> IN [KN]		
Component I (wall holder according to		Component II		<b> </b>	
attachment 3.2)	2,0 mm	2,5 mm	3,0 mm	I T	
Fixed point	1,66	2,43	3,19	II ∯	
Transverse edge distance support section : Sliding point: 50 mm Fixed point: 10 mm  Longitudinal edge distance support section: 10 mm					

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Screw	Compo	onent II	Comp	onent II		
JT4-2/5-5,0x25-VARIO JT9-2/5-5,0x25-VARIO JT3-2/5-5,0x30-VARIO JT6-2/5-5,0x30-VARIO	attachm	according to nent 3.2, <sub>n</sub> ≥ 550 N/mm²	sec	n, for ex. L- or T- ction, I5 N/mm²		
Materials: JT4-2/5-5,0x25-VARIO stainless steel, DIN EN 10088, material no. 1.4301 (A2), 1.4567 (A2)  JT9-2/5-5,0x25-VARIO stainless steel, DIN EN 10088, material no. 1.4401 (A4), 1.4578 (A4)  JT3-2/5-5,0x30-VARIO stainless steel, DIN EN 10088, material no. 1.4301 (A2) with drill bit made of case- hardened steel  JT6-2/5-5,0x30-VARIO stainless steel, DIN EN 10088, material no. 1.4401 (A4) with drill bit made of case- hardened steel	\$\frac{\psi_14}{\psi_13}\$\$\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\					
Characteristic va	lue of the transver	se force bearing ca	apacity F <sub>Q,Rk</sub> in [kN	ıj		
Component I (wall holder according to		Component II				
attachment 3.2)	2,0 mm	2,5 mm	3,0 mm	I		
Sliding point wind suction	2,69	2,69	2,69	II		
Fixed point dead weight /wind suction	3,19	3,19	3,19			
Characteristic	c value of the pull-	out hearing canaci	ty Fanctin [kN]			
Component I	value of the pull-		Ly I Z,A,RK III [KIN]			
(wall holder according to attachment 3.2)	2,0 mm	Component II 2,5 mm	3,0 mm	I The		
Fixed point	1,66	2,47	2,47 3,27 II			
Transverse edge distance support section : Sliding point: 50 mm Fixed point: 10 mm Longitudinal edge distance support section: 10 mm						

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