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European Technical Assessment

ETA-21/0809
of 20 September 2022

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	Varifix® power knob 41
Product family to which the construction product belongs	Products for installation systems for supporting technical building equipment
Manufacturer	Adolf Würth GmbH & Co. KG Reinhold-Würth-Straße 12-17 74653 Künzelsau DEUTSCHLAND
Manufacturing plant	Würth manufacturing plants
This European Technical Assessment contains	14 pages including 10 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 280016-00-0602

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Specific Part

1 Technical description of the product

Object of this European Technical Assessment are the Varifix® power knob 41.

The Varifix® power knob 41 is a channel connector which consists of a threaded plate, holding plate, hexagon screw, hull and a spring element used to connect angle connectors or base connectors to the channel. The threaded plate of the channel connector is positioned in the continuous slot of the channel and tightened by turning the hexagon screw.

The components and the system setup of the product are given in Annex A.

2 Specification of the intended use in accordance with the applicable European Assessment Document (EAD)

The performance given in Section 3 can only be assumed if the Varifix® power knob 41 are used in compliance with the specifications and under boundary conditions set out in Annex B.

The test and assessment methods on which this European Technical Assessment is based lead to an assumption of a working life of the Varifix® power knob 41 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.

In accordance with the European Assessment Document EAD 280016-00-0602, the product is intended to be used in dry indoor conditions for supporting:

- pipes for the transport of water not intended for human consumption,
- pipes for the transport of gas/fuel intended for the supply of building heating/cooling systems,
- technical building equipment in general,
- components of fixed fire-fighting systems.

The product is intended to be used where failure or excessive deformation of the installation systems would

- compromise safety in case of fire (BWR 2) or
- would lead to an unacceptable risk of accidents or damage in service or in operation (BWR 4).

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: - Steel - Plastic parts	 Class A1 not relevant for fire growth based on TR021 and therefore do not need to be classified
Pull-out resistance under fire exposure	see Annex D1
Shear resistance under fire exposure	see Annex D1

3.2 Safety and accessibility in use (BWR 4)

Essential characteristic	Performance
Characteristic pull-out resistance	see Annex C1
Characteristic shear resistance	see Annex C1

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

In accordance with the European Assessment Document EAD 280016-00-0602 the applicable European legal act is:

For products for installation systems intended to be used for supporting pipes for the transport of water not intended for human consumption the applicable European legal act is Commission Decision 1999/472/EC, as amended by Commission Decision 2001/596/EC.

The system to be applied is 4.

This includes uses that are subject to regulations on reaction to fire performance because the performance of the product is class A1 without the need to be tested for reaction to fire.

For products for installation systems intended to be used for supporting pipes for the transport of gas/fuel intended for the supply of building heating/cooling systems the applicable European legal act is Commission Decision 1999/472/EC, as amended by Commission Decision 2001/596/EC.

The system to be applied is 3.

For products for installation systems intended to be used for supporting technical building equipment in general the applicable European legal act is Commission Decision 97/161/EC.

The system to be applied is 2+.

For products for installation systems intended to be used for supporting components of fixed fire-fighting systems the applicable European legal act is Commission Decision 96/577/EC, as amended by Commission Decision 2002/592/EC.

The system to be applied is 1.

5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable Earopean Assessment Document
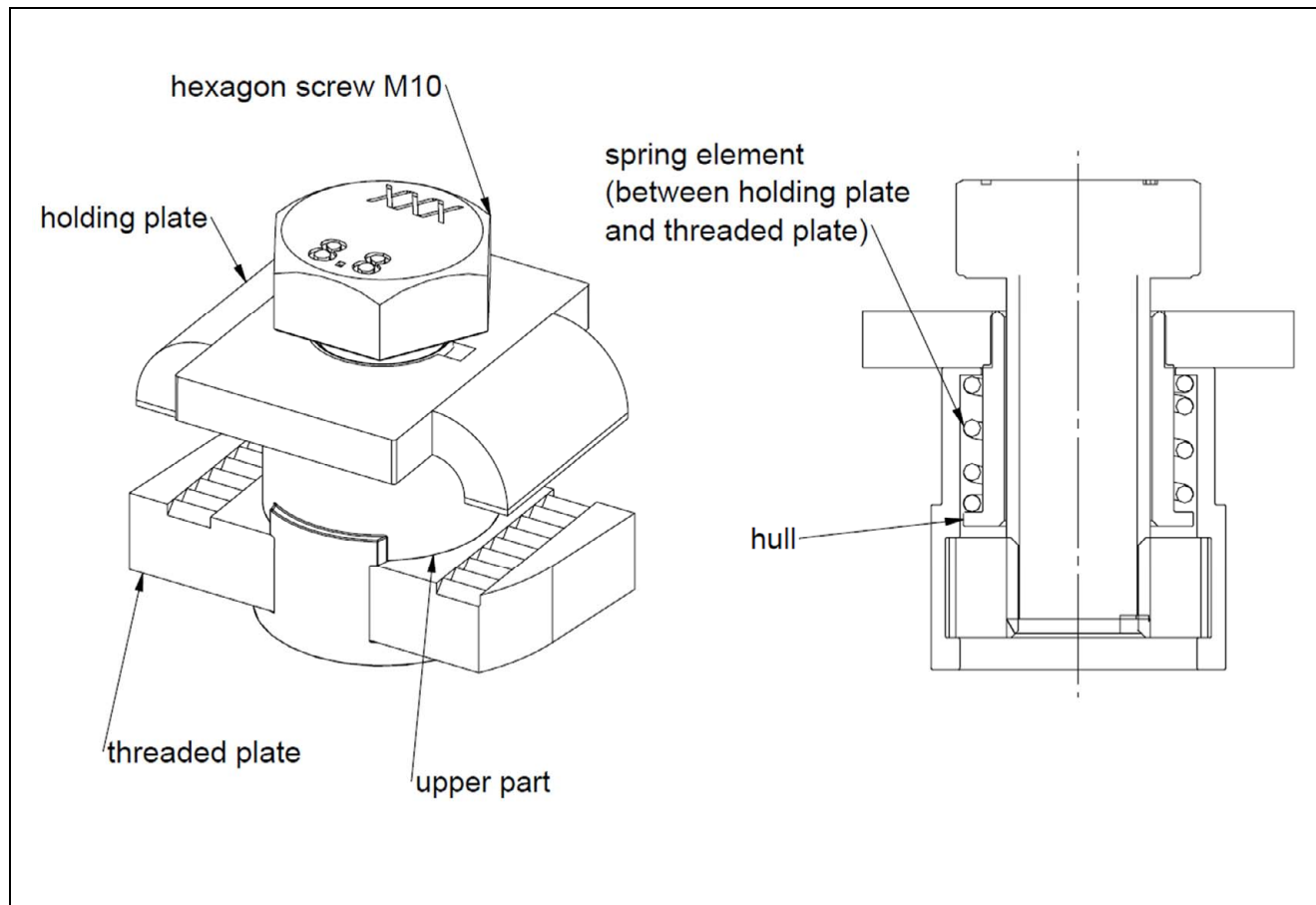
Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at Deutsches Institut für Bautechnik.

Issued in Berlin on 20 September 2022 by Deutsches Institut für Bautechnik

Dr.-Ing. Ronald Schwuchow
Head of Section

beglaubigt:

Stiller

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Table A1:   System setup and materials of the Varifix® power knob 41

hexagon screw M10

holding plate

spring element
(between holding plate
and threaded plate)

hull

threaded plate

upper part

Article number	Title	Material
0862104050	Varifix® power knob 41	**upper part:** PA 66, colour red RAL 3020 **spring element:** spring steel, zinc-plated 5 µm **holding plate:** S 235 JR (1.0037), zinc-plated 5 µm **threaded plate:** S 235 JR (1.0037), zinc-plated 5 µm **hexagon screw:** DIN EN ISO 4017, M10x25, strength 8.8 **hull:** S 235 JR (1.0037), zinc-plated 5 µm

Varifix® power knob 41

Product description
System setup and materials

Annex A1

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Prerequisite for the performance rating of the Varifix® power knob 41

- Through the Varifix® power knob 41, the loads of components of technical building equipment such as lines and equipment for sprinkler, water, heating, cooling, ventilation, electrical and other installations are transferred.

- The Varifix® power knob 41 is used to fasten metal connection elements such as angle connectors/corner connectors/frame brackets or profile feet to channels. With the holding plate and threaded plate, the channel or the accessories is form-fit and force-locked connected by tightening the screw.

- The performance of the Varifix® power knob 41 results when connected to the Varifix® C-assembly rail according to Table B1. The channels are cut centrally of the hole pattern at the markings, the cut end of the channel is measured within the tolerance of 2 mm from both sides of the marking.

- The assembly notes according to Figure B1 are the basis for the performance in Annex C1 and D1.

- During installation, the longitudinal axis of the holding plate of the Varifix® power knob 41 and the rail must be positioned vertical to each other, and the screw must also be centrally located between the parallel flanges of the channel.

- The characteristic pull-out and shear resistance according to Annex C1 apply to static and centric actions.

- The pull-out and shear resistance under fire exposure apply only in connection with the Varifix® C-assembly rail 41/41/2,5 (see Annex D1).

- The attachment/accessory to the rail for determining the shear resistance of the Varifix® power knob 41 corresponds to a steel grade S235JR (1.0037) 5 µm according to EN 10025 in 6 mm thickness with an opening for the threaded plate of the connection knob to pass through according to Figure B2.

Varifix® power knob 41	
Intended use Prerequisite for the performance rating	**Annex B1**

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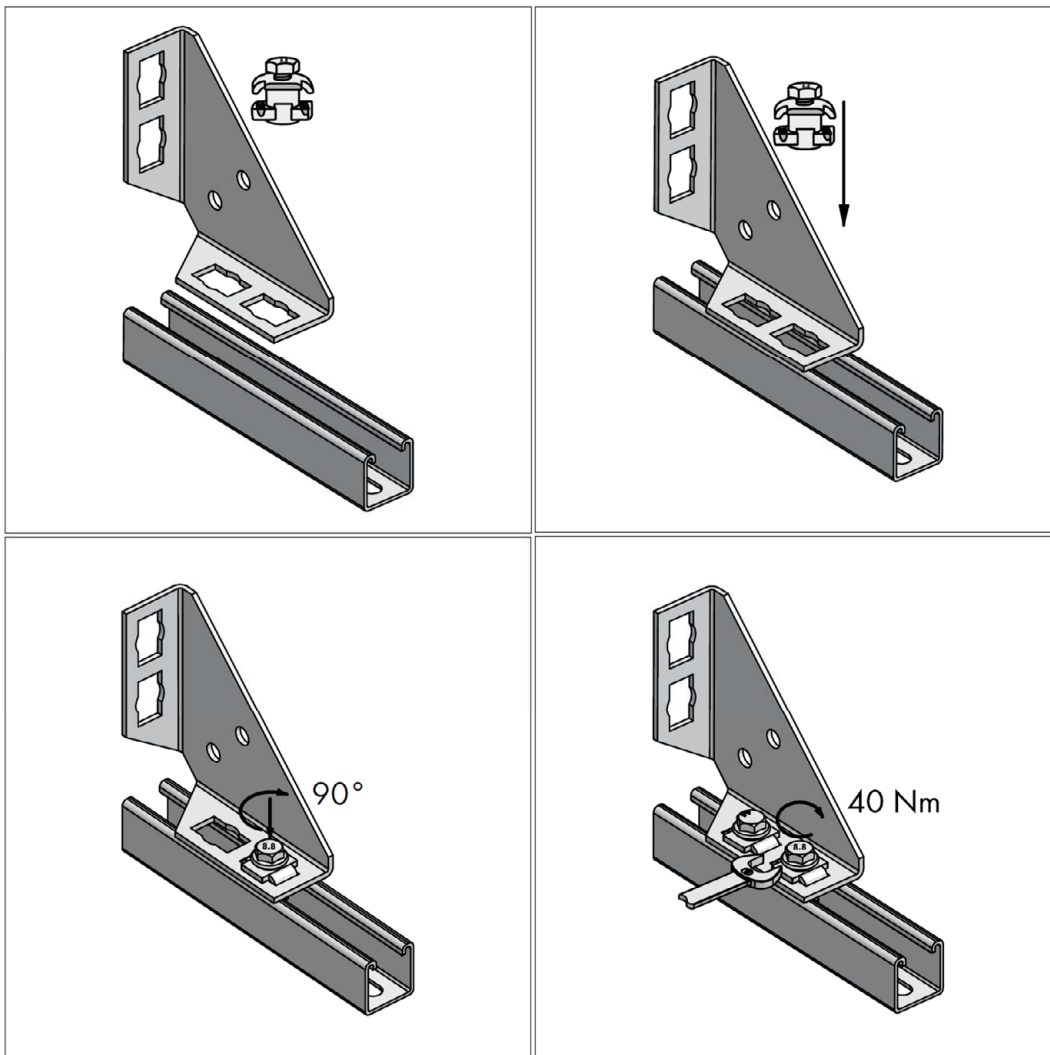Institut
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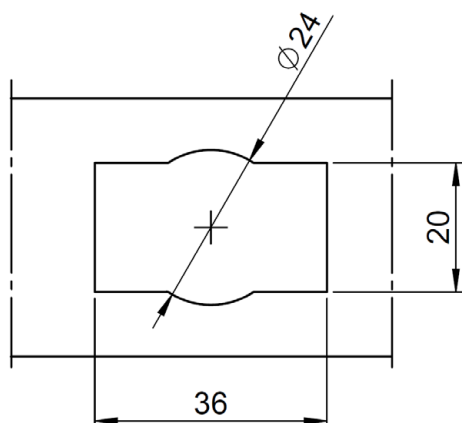
Installation

Figure B1: Installation instruction

Figure B2: Dimensions of the opening of the attachment part for passing through the threaded plate of the Varifix® power knob 41 (Dimensions in mm)

Varifix® power knob 41	
Intended use Installation	**Annex B2**

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Illustration (Dimension in mm)	Article number	Designation	Length [m]	Material
Table B1: Dimensions and material of channels for the use with the Varifix® power knob 41				
	0862001233	Varifix® C-assembly rail 41/22/1,8 3M	3	S280GD + Z140-M-A-C according to EN 10346
	0862001235	Varifix® C-assembly rail 41/22/1,8 6M	6	
	0862001005	Varifix® C-assembly rail 41/22/2,5 2M	2	S280GD + Z140-M-A-C according to EN 10346
	0862001225	Varifix® C-assembly rail 41/22/2,5 3M	3	
	0862001229	Varifix® C-assembly rail 41/22/2,5 6M	6	
	0862001007	Varifix® C-assembly rail 41/41/1,8 2M	2	S280GD + Z140-M-A-C according to EN 10346
	0862001227	Varifix® C-assembly rail 41/41/1,8 3M	3	
	0862001237	Varifix® C-assembly rail 41/41/1,8 6M	6	

Varifix® power knob 41

Intended Use
Dimensions and material of channels

Annex B3

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Table B1: continued

Illustration (Dimension in mm)	Article number	Designation	Length [m]	Material
	0862001006	Varifix® C-assembly rail 41/41/2,5 2M	2	S280GD + Z140-M-A-C according to EN 10346
	0862001226	Varifix® C-assembly rail 41/41/2,5 3M	3	
	0862001231	Varifix® C-assembly rail 41/41/2,5 6M	6	
	0862001242	Varifix® C-assembly rail 41/62/3 3M	3	S280GD + Z140-M-A-C according to EN 10346
	0862001232	Varifix® C-assembly rail 41/62/3 6M	6	
	0862001300	Varifix® C-assembly rail 41/86/2 D 3M	3	S320GD + Z140-Z275-M-A-C according to EN 10346
	0862001305	Varifix® C-assembly rail 41/86/2 D 6M	6	

Varifix® power knob 41	
Intended Use Dimensions and material of channels	**Annex B4**

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Table B1: continued

Illustration (Dimension in mm)	Article number	Designation	Length [m]	Material
	0862001310	Varifix® C-assembly rail 41/86/2 D unperforated 6M	6	S320GD + Z140-Z275-M-A-C according to EN 10346
	0862001330	Varifix® C-assembly rail 41/128/2,5 D 3M	3	S320GD + Z140-Z275-M-A-C according to EN 10346
	0862001335	Varifix® C-assembly rail 41/128/2,5 D 6M	6	
	0862001340	Varifix® C-assembly rail 41/128/2,5 D unperforated 6M	6	S320GD + Z140-Z275-M-A-C according to EN 10346

Varifix® power knob 41	
Intended Use Dimensions and material of channels	**Annex B5**

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Table B2: Cross-section values of the Varifix® C-assembly rail

Description	Symbol	41/22/1,8	41/22/2,5	41/41/1,8	41/41/2,5	41/62/3,0	Unite
Cross-section class acc. EN 1993-1-1	-	3	3	3	3	3	-
Cross-sectional area	A	175,21	230,34	237,54	321,66	501,35	mm²
	A_{geom}	175,21	230,34	237,54	321,66	501,35	mm²
Shear areas	A_y	36,46	50,67	32,94	45,22	45,28	mm²
	A_z	51,33	69,05	119,11	163,16	317,16	mm²
Centroid position	$y_{C,0}$	20,65	20,65	20,50	20,50	20,65	mm
	$z_{C,0}$	12,09	12,28	21,74	21,89	32,69	mm
Moments of inertia	I_y	11604,95	13997,46	51897,89	67608,80	223517,92	mm⁴
	I_z	45335,75	58051,01	68944,85	91135,91	153809,41	mm⁴
Inclination of principal axes	a	0,00	0,00	0,00	0,00	0,00	°
Polar moments of inertia	I_p	56940,70	72048,47	120842,75	158740,00	377327,33	mm⁴
	$I_{p,M}$	142284,64	170770,00	532691,54	683810,00	2,203E+06	mm⁴
Radii of gyration	i_y	8,14	7,80	14,78	14,50	21,11	mm
	i_z	16,09	15,88	17,04	16,83	17,52	mm
Polar radii of gyration	i_p	18,03	17,69	22,56	22,22	27,43	mm
	$r_{p,M}$	28,50	27,23	47,36	46,11	66,29	mm
Warping radius of gyration	$i_{\omega,M}$	7,13	6,71	7,46	7,16	6,92	mm
Cross-section weight	G	1,37	1,81	1,86	2,52	3,94	kg/m
Cross-section perimeter	U	212,16	203,85	281,65	277,15	358,33	mm
Torsional constant	I_t	148,63	351,29	201,94	520,90	1234,12	mm⁴
Secondary torsional constant	$I_{t,s}$	32778,26	41348,41	72092,07	91982,58	162923,28	mm⁴
Location of the shear centre	$y_{M,0}$	20,65	20,65	20,50	20,50	20,65	mm
	$z_{M,0}$	34,16	32,98	63,38	62,29	93,03	mm
	y_M	0,00	0,00	0,00	0,00	0,00	mm
	z_M	22,07	20,70	41,64	40,40	60,34	mm
Warping constants	$I_{\omega,S}$	2,933E+07	3,26E+07	1,493E+08	1,84E+08	6,665E+08	mm⁶
	$I_{\omega,M}$	7,234E+06	7,70E+06	2,967E+07	3,50E+07	1,054E+08	mm⁶
Auxiliary value for warp rotation	$r_{\omega,M}$	0,000	0,00	0,000	0,00	0,004	
Section moduli	$W_{y,max}$	1171,29	1439,44	2695,11	3537,34	7626,56	mm³
	$W_{y,min}$	-959,71	-1140,25	-2386,80	-3088,98	-6837,05	mm³
	$W_{z,max}$	2195,44	2811,19	3363,16	4445,65	7448,40	mm³
	$W_{z,min}$	-2195,44	-2811,19	-3363,16	-4445,65	-7448,40	mm³
Warping section moduli	$W_{\omega,M,max}$	18876,86	22520,44	39389,31	49987,19	99684,11	mm⁴
	$W_{\omega,M,min}$	-18887,31	-22536,00	-39412,61	-50015,00	-99724,72	mm⁴
Torsional section modulus	W_t	82,57	140,51	112,19	208,36	411,37	mm³
Buckling curve	BC_y	c	c	c	c	c	-
	BC_z	c	c	c	c	c	-

Varifix® power knob 41

Intended use
Cross-section values of the channels

Annex B6

Table B2: continued

Description	Symbol	41/86/2,0 perforated	41/86/2,0 non-perforated	41/128/2,5 perforated	41/128/2,5 non-perforated	Unite
Cross-section class acc. EN 1993-1-1	-	3	3	3	3	-
Cross-sectional area	A	516,47	547,36	776,54	869,91	mm^2
	A_{geom}	516,47	547,36	776,54	869,91	mm^2
Shear areas	A_y	81,57	85,05	71,34	79,84	mm^2
	A_z	190,45	213,37	394,98	476,25	mm^2
Centroid position	$y_{C,0}$	20,50	20,50	20,50	20,50	mm
	$z_{C,0}$	43,00	43,00	64,00	64,00	mm
Moments of inertia	I_y	3,925E+05	3,989E+05	1,38E+06	1,45E+06	mm^4
	I_z	29270,75	31966,28	46035,65	50621,47	mm^4
Inclination of principal axes	a	0,00	0,00	0,00	0,00	°
Polar moments of inertia	I_p	4,218E+05	4,309E+05	1,43E+06	1,50E+06	mm^4
	$I_{p,M}$	4,218E+05	4,309E+05	1,43E+06	1,50E+06	mm^4
Radii of gyration	i_y	27,57	27,00	42,18	40,86	mm
	i_z	7,53	7,64	7,70	7,63	mm
Polar radii of gyration	i_p	28,58	28,06	42,87	41,56	mm
	$r_{p,M}$	28,58	28,06	42,87	41,56	mm
Warping radius of gyration	$i_{\omega,M}$	6,34	6,27	7,40	7,23	mm
Cross-section weight	G	4,1	4,3	6,10	6,80	kg/m
Cross-section perimeter	U	556,51	481,31	707,79	705,43	mm
Torsional constant	I_t	453,03	538,17	960,35	1384,74	mm^4
Secondary torsional constant	$I_{t,s}$	13879,19	15539,32	9792,70	11785,10	mm^4
Location of the shear centre	$y_{M,0}$	20,50	20,50	20,50	20,50	mm
	$z_{M,0}$	43,00	43,00	64,00	64,00	mm
	y_M	0,00	0,00	0,00	0,00	mm
	z_M	0,00	0,00	0,00	0,00	mm
Warping constants	$I_{\omega,S}$	1,694E+07	1,696E+07	7,82E+07	7,85E+07	mm^6
	$I_{\omega,M}$	1,694E+07	1,696E+07	7,82E+07	7,85E+07	mm^6
Auxiliary value for warp rotation	$r_{\omega,M}$	0,000E+00	0,000E+00	0,00	0,00	
Section moduli	$W_{y,max}$	9,128E+03	9,277E+03	21582,74	22690,30	mm^3
	$W_{y,min}$	-9128,310	-9276,660	-21582,74	-22690,30	mm^3
	$W_{z,max}$	1427,84	1559,33	2245,64	2,47E+03	mm^3
	$W_{z,min}$	-1427,84	-1559,33	-2245,64	-2469,34	mm^3
Warping section moduli	$W_{\omega,M,max}$	24936,03	24959,09	58784,62	58995,50	mm^4
	$W_{\omega,M,min}$	-24936,03	-24959,09	-58784,61	-58995,48	mm^4
Torsional section modulus	W_t	226,51	269,08	384,14	553,90	mm^3
Buckling curve	BC_y	c	c	c	c	-
	BC_z	c	c	c	c	-

Varifix® power knob 41

Intended use
Cross-section values of the channels

Annex B7

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Table C1: Characteristic pull-out resistance

Connector	Varifix® C-assembly rail	Characteristic pull-out resistance $F_{Rk,y}$ [kN]	Partial safety factor [1] γ_M [-]
Varifix® power knob 41	41/22/1,8	11,55	1,25
	41/22/2,5	13,85	1,25
	41/41/1,8	10,17	1,25
	41/41/2,5	11,39	1,25
	41/62/3,0	14,94	1,25
	41/86/2,0 perforated	11,26	1,25
	41/86/2,0 non-perforated		
	41/128/2,5 perforated	14,60	1,25
	41/128/2,5 non-perforated		

[1] in absence of other national regulations

Table C2: Characteristic shear resistance

Connector	Varifix® C-assembly rail	Characteristic shear resistance $F_{Rk,x}$ [kN]	Partial safety factor [1] γ_M [-]
Varifix® power knob 41	41/22/1,8	6,45	1,64
	41/22/2,5	5,19	2,36
	41/41/1,8	5,41	1,54
	41/41/2,5	5,47	1,65
	41/62/3,0	6,54	1,59
	41/86/2,0 perforated	6,90	1,61
	41/86/2,0 non-perforated		
	41/128/2,5 perforated	8,04	1,36
	41/128/2,5 non-perforated		

[1] in absence of other national regulations
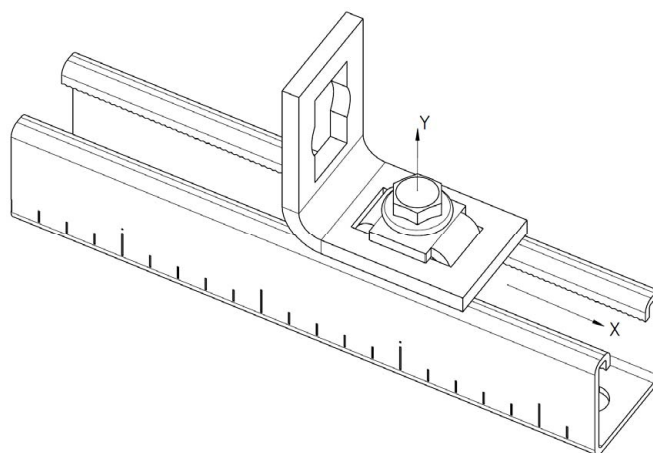
Figure C1: Axes for pull-out and shear resistance

Varifix® power knob 41	
Performance Characteristic pull-out and shear resistance	**Annex C1**

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Table D1: Pull-out resistance under fire exposure, $F_{Rk,y}$ [N]

Connector	Varifix® C-assembly rail	Fire exposure duration [min]			
		30	60	90	120
Varifix® power knob 41	41/41/2,5	652,9	433,8	360,8	324,2

Table D2: Shear resistance under fire exposure, $F_{Rk,x}$ [N]

Connector	Varifix® C-assembly rail	Fire exposure duration [min]			
		30	60	90	120
Varifix® power knob 41	41/41/2,5	350,2	248,1	214,1	197,1

Varifix® power knob 41

Performance
Pull-out and shear resistance under fire exposure

Annex D1