

Institute of Building Materials, Engineering Materials Concrete Construction Testing Institute and Fire Safety

Braunschweig Civil

with

Statement on fire safety

- Translation -

Document number: MPABS-2401512 - CM dated 06/02/2025 Client: Adolf Würth GmbH & Co. KG Approvals and Technical Data Reinhold-Würth-Straße 12-17 74653 Künzelszau Order date: 04/07/2024 Aybike.Elverdi_Sahin@wuerth.com Order ref.: Assessment of loaded Würth VARIFIX® 41 C-assembly rails Subject: combined with threaded rods and fastened in solid structural elements, with regard to their load-bearing capacity and deformation under exposure to fire along the standard temperature-time curve (ETK) in accordance DIN EN 1363-1 Basis for assessment: See Section 1

This statement on fire safety consists of 8 pages including cover sheet, and 5 Annexes.

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Niedersachsen



1 General

With letter of 04/07/2024, Adolf Würth GmbH & Co. KG, 74653 Künzelsau, placed an order with MPA Braunschweig for the preparation of a fire-safety-related statement for assessing loaded Würth VARIFIX[®] 41 C-assembly rails combined with threaded rods and fastened in solid structural elements, with regard to their load-bearing capacity and deformation under exposure to fire along the standard temperature-time curve (ETK) in accordance with DIN EN 1363-1.

2 Documents serving as basis for the statement on fire safety

The statement on fire safety for the construction to be assessed is made on the basis of the following documents:

- [1] DIN EN 1363-1 : 2020-05, Fire resistance tests Part 1: General Requirements;
- [2] Specimen guideline on fire protection requirements pertaining to conduits (Specimen Conduit Guideline [German designation: MLAR]), edition of 10/02/2015,
- [3] Test Report No. (3176/176/13) CM dated 14/08/2014, issued for Adolf Würth GmbH & Co. KG, 74653 Künzelsau; and
- [4] Technical Data Sheets for Würth VARIFIX[®] 41 C-assembly rails from Adolf Würth GmbH & Co.
 KG, 74653 Künzelsau.

The assessment for Würth C-assembly rails combined with threaded rods was conducted on the basis of the fire tests carried out. According to Adolf Würth GmbH & Co. KG, 74653 Künzelsau, there is currently no complete building authority certificate (e.g., ETA) for Würth VARIFIX[®] 41 C-assembly rails in conjunction with the components that lays down the regulations to be met by the construction described here in the event of fire.

3 Description of the construction

The description of the design details to be assessed is based on the data from Adolf Würth GmbH & Co. KG, 74653 Künzelsau. In the following, only those details are described that are important with regard to fire safety.

Würth C-assembly rails (mounting rails) are used for fastening conduit systems. The loads are applied via the Würth C-assembly rail combined with suitable fasteners into the anchoring base. These fasteners must be executed in accordance with Section 5.7.



According to the client, the related technical specifications for Würth C-assembly rails (mounting rails) – for the normal purpose of use – can be taken from the respective technical data sheets (e.g., mounting instructions) from Adolf Würth GmbH & Co. KG, 74653 Künzelsau.

For structural design details, reference is made to the Annexes.

3.1 Description of the construction

The mounting rails (Würth C-assembly rails) are made of steel (see also Annex 1).

Nodes between the rails and the fastening to the underground must be realized using Varifix[®] retaining clips \geq HK M10 combined with related nuts. The distance for the lateral rail projection, measured from the central axis of the vertical fastening (threaded rod, threaded bolt), is a \geq 50 mm. Fixing to the rail is via the existing through-hole of the mounting rail. The maximum projection of the nuts and treaded rods below the rails shall not exceed $\ddot{u} = 30$ mm.

The conduit systems are fastened from below in the Würth C-assembly rails combined with Würth VARIFIX® Systemfix $41 \ge M10$ clamp fittings.

The table below and the annexes summarize the structural design data (manufacturer data) for the Würth C-assembly rails. Further information can be taken from the technical data sheets (e.g., mounting instructions) from Adolf Würth GmbH & Co. KG, 74653 Künzelsau.

Designation ²⁾	Installation	Maximum span	Clamp fitting ¹⁾
"Direct assembly"	Type of installation / connection to the rail	[mm]	Combined with
Würth C-assembly rail VARIFIX [®] 41/22/1,80 "M _{Ro} "	<u>Ceiling installation,</u> fixed in the solid	450	VARIFIX® Systemfix 41 with nuts and threaded bolts ≥ M10
Würth C- assembly rail VARIFIX [®] 41/22/2,50 "M _{Ro} "	underground using anchors / threaded rods ≥ M10 (4.8) /	450	
Würth C- assembly rail VARIFIX [®] 41/41/2,50 "M _{Ro"}	Varifix [®] retaining clips HK and nuts	450	

Table 1: Product range of Würth C-assembly rail ("direct assembly")

¹⁾ The execution depends on the individual mounting system, the maximal load, and the arrangement of the conduit system.

 $^{2)}$ "MRo": Slotted side to the bottom, rail back upwards.



4 Assessment with regard to fire safety

4.1 General

The subject matter of this statement on fire safety are Würth VARIFIX[®] 41 C-assembly rails combined with threaded rods and fastened in solid structural elements, with regard to their load-bearing capacity and deformation under exposure to fire along the standard temperature-time curve (ETK) in accordance with DIN EN 1363-1 (see also Section 3).

Independent of the fire-safety-related statement, the suitability of Würth C-assembly rails combined with threaded rods, fasteners and the underground must also be proved for the cold as-installed condition. If for the normal purpose of use, smaller loads apply according to the Technical Data Sheets [4] from Adolf Würth GmbH & Co. KG, 74653 Künzelsau, these shall be binding.

If the conduit systems or their fasteners (e.g., pipe clamps) to be fixed in the mounting rails allow lower loads, these shall be binding for the load connection to the rail.

The fire-safety-related statement is limited to mainly static (non-moving) loads combined with solid structural elements the fire resistance class of which must be at least the same as the one of the fastening systems.

The following will not be considered for the deformations stated in the annexes:

- Protrusions below the mounting rail with ü > 30 mm (e.g., nuts and washers of the fastening to the underground),
- Deformations of the conduit systems (e.g., pipes, cable routes, ...); and
- Deformations of the raw ceiling.

The fire-safety-related statement excludes an application for structures, which, as a total system (e.g., for cable systems designed to maintain circuit integrity and cable trunking/ducts in accordance with DIN 4102-12: 1998-11) are required to meet the requirements of a fire resistance class or for functional integrity. For these types of applications, further assessments and tests of the system as a whole are necessary.

For single loads, the following boundary conditions are to be fulfilled, in addition to the data in the tables:

 The indicated single loads P₁ shall be arranged centrally (distance to the suspension = 1/2 of the span) on the mounting rail.



- 2. The stated loads for the individual single loads are the maximum loads per fastening point on the rail.
- 3. For symmetric/asymmetric arrangement of the single load according to item 1, the loads must be dimensioned in such a way that the maximum permissible steel stresses in the threaded rods of the suspension are adhered to. The maximum load for the suspension of the mounting rail corresponds to half of the stated maximum single load (max $N_{AH} = P_1/2$)

For multiple loads (single loads P₂ arranged next to each other), the following boundary conditions are to be fulfilled:

- The indicated single loads P₁ may be distributed to any number of single loads P₂ ("multiple loads") and arranged next to each other, provided the total load resulting from the indicated single loads P₁ is not exceeded.
- 2. For a symmetric/asymmetric arrangement of the multiple loads acc. to item 1 (arrangement next to each other), the loads must be dimensioned in such a way that the maximum permissible steel stresses in the threaded rods of the suspension system are adhered to. The maximum load for the suspension of the mounting rail corresponds to half of the single loads P₁ indicated. The maximum permissible steel stress (bending stress) in the mounting rails results from the arrangement acc. to item 1 and must not be exceeded.

Where multiple-span systems are installed (continuous beams), the intermediate supports must be executed with M12 threaded rods. The intermediate suspension (M12) may only be loaded with the admissible normal force N_{ZAH} = single load P_1 .

4.2 Requirements to be fulfilled by fasteners and mounting systems

Requirements to be fulfilled by fasteners and mounting systems (e.g., pipe clamps, mounting rails, etc.) with regard to the load-bearing capacity $F_{fire(t)}$ and the deformation $f_{(t)}$ are imposed in conjunction with conduit systems (see, for example, MLAR [2], Sections 2.1 and 3.5). According to MLAR [2], fasteners are part of the conduit system; special requirements may result in conjunction with suspended ceilings (MLAR [2], Section 3.5). In conjunction with penetration seals, too, requirements to be fulfilled by the fastening of conduit systems may result from the building authority certificate.

The individually required minimum distance (min. a) can be determined on the basis of the deformations stated in the annexes. These deformations only refer to Würth C-assembly rails under exposure to fire. Additional deformations from the conduit systems (e.g., the deformation of a pipe) or possibly relevant deformations of the raw ceiling must be taken into account separately.



Necessary minimum distance min $a \ge w(t)$





Figure 1: Installation situation of the mounting rail

The figure is an example representation of mounting rail systems in the ceiling plenum of suspended ceiling constructions in accordance with MLAR [2], Section 3.5.3.

Minimum distance min. $a \Rightarrow$ minimum distance between topside of a suspended ceiling and underside of the mounting rail.

For combined installations consisting of mounting rails and pipe clamps suspended downwards, the necessary minimum distances min. a of the individual mounting elements must be added to a **total minimum distance** min. a_{total}.

min. $a_{total} = min. a_{rail} + min. a_{clamp}$

- min. atotal: total distance
- min. a_{rail}: minimum distance based on the deformation "w(t)" of the mounting rail according to the following sections
- min. a_{clamp}: minimum distance for pipe clamps based on the deformation "w(t)" according to a firesafety-related certificate

4.3 Assessment of Würth VARIFIX[®] 41 C-assembly rails

The design proposals for Würth C-assembly rails under tensile load and one-side exposure to fire in accordance with DIN EN 1363-1 can be taken from the annexes.

With regard to the load-bearing capacity under exposure to fire in accordance with DIN EN 1363-1, steel failure and underground failure can be distinguished.



For the Würth C-assembly rails assessed here, the failure of the Würth C-assembly rails combined with threaded rods (steel failure) was decisive. The proof of the fastening system to the underground is to be furnished separately.

 $F_{fire(t)} \Rightarrow$ load as a function of fire resistance, centric tensile load referred to the threaded rod.

For the Würth C-assembly rails combined with threaded rods, the load-depending maximum deformations under exposure to fire in accordance with DIN EN 1363-1 can be specified as a function of the fire resistance time.

 $w(t) \Rightarrow$ deformations as a function of the load and the time

4.3.1 Statement with regard to the maximum load and maximum deformation of Würth C-assembly rails as a function of the fire resistance time

The annexes contain design proposals with regard to the maximal loads and maximal deformations as a function of the fire resistance time for Würth C-assembly rails combined with threaded rods under exposure to fire in accordance with DIN EN 1363-1.

max. $F_{fire(t)}$ \Rightarrow design values for the load-bearing capacity as a function of the fire resistance time, corresponding to the individually indicated single loads P_1 / P_2 ,

 $w_{max(t)}$ \Rightarrow maximal deformations as a function of the load, the time and the suspension height

5 Special notes

- 5.1 This Statement on Fire Safety is not subject to notification and is no substitute for a classification report.
- 5.2 This Statement on Fire Safety is no proof of usability for use in a building control procedure. The statement on fire safety can, for example, serve for general preliminary planning or support in the assessment of the principle of execution / the construction. The manufacturer/erector of the construction is obliged to furnish the respective proof.
- 5.3 When applying for a project-related design approval (vBG), the preparation of a project-related expert opinion will be required, taking the individually prevailing boundary conditions for planning into account.
- 5.4 This Statement on Fire Safety applies only in conjunction with the documents specified in Section 2 and cannot be transferred to other constructions without further verification.



- 5.5 This Statement on Fire Safety applies only in terms of fire protection. Further requirements may result from the technical building regulations applicable for conduit systems and the individual state building code and regulations for special constructions, e.g., with regard to building physics, statics, electrical engineering, ventilation engineering, and similar.
- 5.6 This Statement on Fire Safety applies to Würth C-assembly rails taking the boundary conditions from the technical datasheets from Adolf Würth GmbH & Co. KG, 74653 Künzelsau, into account.
- 5.7 The assessment applies only for Würth C-assembly rails fastened in solid structural elements. The underground and the fastening to the underground must have at least the same fire resistance as the related mounting systems.
- 5.8 Modifications of and supplements to design details (derived from this Statement on Fire Safety) shall only be possible after consultation with Materialprüfanstalt für das Bauwesen (MPA).
- 5.9 The executing company shall be exclusively responsible for the proper execution.
- 5.10 The design details as shown in the annexes shall be binding for the above assessment. Only the details relevant for the fire-safety-related assessment have been verified.
- 5.11 The validity of Statement on Fire Safety No. MPABS-2401512 CM dated 06/02/2025 ends on 06/02/2030 at the latest. The validity can be extended as a function of the state of the art.

This document is the translated version of Brandschutztechnische Aussage Nr. MPABS-2401512 – CM dated 06/02/2025. The legally binding text is the aforementioned German Brandschutztechnische Aussage.

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Technical data and design examples

Table 1: Product range of Würth C-assembly rails VARIFIX® 41 (materials table)

Line	Designation	Remark	Würth article no.	Material / surface	Strength class
1	Varifix [®] 41/22/1,8	Assembly rail	0862001233 0862001235	Steel Surface: galvanized	-
2	Varifix [®] 41/22/2,5	Assembly rail	0862001005 0862001225 0862001229	Steel Surface: galvanized	-
3	Varifix [®] 41/41/2,5	Assembly rail	0862001006 0862001226 0862001231	Steel Surface: galvanized	-
4	M10 threaded rod	Suspension / load connection	0958 10	Steel Surface: galvanized	4.8
5	M10 nuts	Node / load connection	0317 10	Steel DIN 934 Surface: galvanized	8
6	Retaining clip	Retaining clip	0862005152	Steel Surface: galvanized	No data from the manufacturer
7	Systemfix 41	Sliding nut	0862104002	Steel Surface: galvanized	No data from the manufacturer



Technical data and design examples

Table 2: Product range of Würth C-assembly rails VARIFIX® 41





Technical data and design examples

Fastening to the underground must be made using proven fasteners.



Examples for installation of Würth C-assembly rails VARIFIX® 411)



¹⁾ The installations shown (e.g., pipe clamps) are not part of the assessment.



Design proposal for Würth C-assembly rails VARIFIX® 41 in conjunction with VARIFIX® Systemfix 41 under exposure to fire in accordance with DIN EN 1363-1 – <u>"Direct assembly" / "Single load"</u>

The maximum single load as indicated in the tables may be distributed to any number of single loads as "multiple loads". The sum of the single loads must not exceed the maximum load indicated in the tables.

The maximum load for the suspension of the mounting rail corresponds to half of the admissible single load max. F_{fire} (max $N_{AH} = P_1/2$).

Where multiple-span systems are installed with an intermediate suspension (M12), the intermediate suspension (M12) may only be loaded with the admissible normal force N_{ZAHfir} , with the maximum load corresponding to the single load P₁ indicated.

Table 2:	Design proposal for Würth C-assembly rails in conjunction with related threaded rods as a
	function of the fire resistance time – single load

Würth C-assembly rail VARIFIX [®] 41		41	Würth C-assembly rails VARIFIX [®] 41/22/1,80 /. VARIFIX [®] 41/22/2,50 in conjunction with threaded rods "Direct assembly" (acc. to Section 2)	
Span	l₅ in mm	≤	450	
Time t in minutes			Maximum load "max F _{fire} " Load suspension ≥ M10 – single loads, centrally	
30			0.90	
60	P₁ in kN	≤	0.46	
90			0.30	

 Table 3:
 Design proposal for Würth C-assembly rails in conjunction with related threaded rods as a function of the fire resistance time – single load

Würth C-assembly rail VARIFIX [®] 41			Würth C-assembly rails VARIFIX [®] 41/41/2,50 in conjunction with threaded rods "Direct assembly" (acc. to Section 2)	
Span	l₅ in mm	≤	450	
Time t in minutes			Maximum load "max F _{fire} " Load suspension ≥ M10 – single loads, centrally	
30	P1 in kN	N	0.90	
60			0.47	
90			0.31	
120			0.23	



Deformations ($w_{max}(t)$) for Würth C-assembly rails under tensile load and exposure to fire in accordance with DIN EN 1363-1 – <u>"Direct assembly" / "Single load"</u>

The tables show the deformation for Würth C-assembly rails VARIFIX® 41. Further deformations (e.g., of pipe clamps, conduit systems) must be considered separately.

Table 4:Deformations for Würth C-assembly rails in conjunction with related threaded rods as a
function of the time, the span and the load (single load, centrally)

Deformation as a function of the fire resistance time and the maximum load for Würth C-assembly rails VARIFIX [®] 41/22/1,80 / VARIFIX [®] 41/22/2,50					
Span [mm]		Max. load	Deformation		
	450	F [kN]	w _{max} [mm]		
Fire resistance time	30 min	0.90	70		
	60 min	0.46	88		
	90 min	0.30	88		

Table 5:Deformations for Würth C-assembly rails in conjunction with related threaded rods as a
function of the time, the span and the load (single load, centrally)

Minimum distance as a function of the fire resistance time and the maximum load for Würth C-assembly rails VARIFIX [®] 41/41/2,50					
Span [mm] 450		Max. load	Deformation w _{max} [mm]		
		F [kN]			
Fire resistance time	30 min	0.87	48		
	60 min	0.47	65		
	90 min	0.31	68		
	120 min	0.23	68		