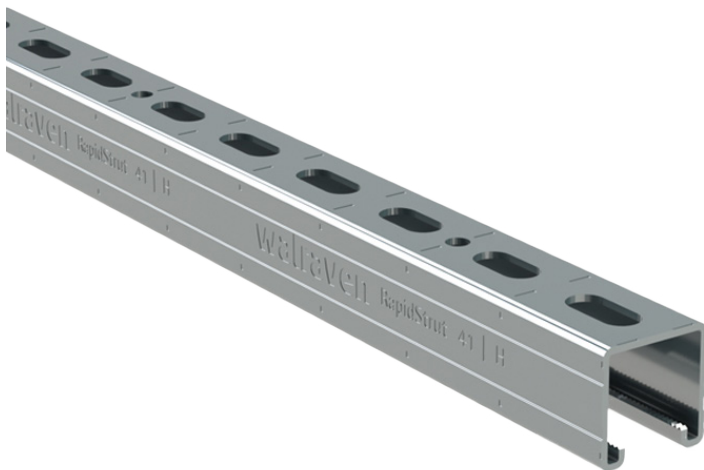
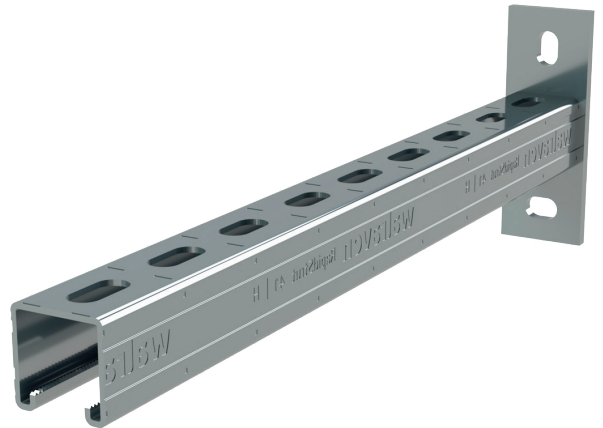


Technical information Walraven RapidStrut® fire tested fixing



Expert Opinion 2103/523/21-CM

- Fire behaviour test to determine the fire resistance duration -

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Expert Opinion

– Translation –

Document number: (2103/523/21) – CM dated 13/03/2024

Client: J. van Walraven Holding B.V
Industrieweg 5
93641 RK Mijdrecht
The Netherlands

Order date: 16/11/2021

Order ref.: Produktmarketing / Fire Test - PM Bernd Schoberth

Order received: 16/11/2021

Subject: Assessment of loaded Walraven RapidStrut® rail systems combined with threaded rods fixed to solid structural elements, with regard to loadbearing capacity and deformation under exposure to fire along the standard temperature-time curve (ETK) in accordance with DIN EN 1363-1

Basis for assessment: See Section 1

This expert opinion comprises 12 pages including cover sheet and 29 annexes.



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1 General

With letter of 16/11/2021, J. van Walraven Holding B.V, 93641 RK Mijdrecht, commissioned the preparation of an expert opinion on the assessment of loaded Walraven RapidStrut® rail systems combined with threaded rods fixed to solid structural elements with regard to loadbearing capacity and deformation under exposure to fire along the standard temperature-time curve (ETK) in accordance with DIN EN 1363-1.

The documents serving as basis for the Expert Opinion on the constructions to be assessed are listed as follows:

- [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. (2102/709/20)-CM dated 17/09//2021, issued for J. van Walraven Holding B.V, 93641 RK Mijdrecht; and
- [4] Technical Data Sheets for Walraven RapidStrut® rail systems from J. van Walraven Holding B.V, 93641 RK Mijdrecht.

The assessment for the rail systems was conducted on the basis of the fire tests carried out. Existing technical regulations and technical specifications, which regulate products for the installation of electrical conduits when exposed to fire, currently provide no complete design concept for the fastening systems described in the following. According to J. van Walraven Holding B.V, 93641 RK Mijdrecht, there is currently no complete building authority certificate (e.g., ETA) for Walraven RapidStrut® rail systems that lays down the regulations to be met by the execution described here in the event of fire.

2 Description of the constructions

The description of the design details to be assessed is based on the data from J. van Walraven Holding B.V, 93641 RK Mijdrecht. In the following, only the fire-safety-relevant details will be described.

Walraven RapidStrut® rail systems (fixing rails) are used for fixing conduit systems. The loads are applied via the Walraven RapidStrut® rail systems (fixing rails) combined with suitable fasteners into the anchoring base. The fastenings in the underground must be executed in accordance with Section 4.7.

According to the client, the related technical information for Walraven RapidStrut® rail systems (fixing rails) for the normal purpose of use can be taken from the technical data sheets (e.g., mounting instructions) from J. van Walraven Holding B.V, 93641 RK Mijdrecht.

The annexes show the individual structural design details.

2.1 Description of the construction

Walraven RapidStrut® rail systems (fixing rails) are made of steel (galvanized or stainless steel, in accordance with Annexes 1 and 2).

The fixing rails must be suspended using threaded rods of size M10 / M12 (strength class ≥ 4.8 / $\geq A70$). Where multiple-span systems are installed (continuous beams), the intermediate supports must be executed using M12 threaded rods (strength class ≥ 4.8 / $\geq A70$).

Nodes between the rails and the threaded rods are realized using Walraven Strut washer U-shaped $\varnothing 11$ / $\varnothing 13$, positioned on both sides, in conjunction with the corresponding nuts (strength class 8). The distance for the lateral rail projection, measured from the central axis of the vertical fastening (threaded rod, threaded bolt), is $a \geq 25$ mm. Fixing to the rail is via the existing through-hole of the fixing rail. The maximum projection of the nuts and treaded rods below the rails shall not exceed $\ddot{u} = 30$ mm. In case of larger projections ($\ddot{u}_{act} > 30$ mm) of the threaded rods, the amount of $\ddot{u}_{act} - 30$ mm is to be added to the minimum distance determined (min. a).

The conduit systems are fastened on the Walraven RapidStrut® rail systems combined with threaded bolts $\geq M10$. The position of conduit systems that are placed onto must be secured.

The suspension of installations is possible, if the threaded rods are laid through the through-hole of the suspended fixing rails, while fixing is done on both sides using Walraven Strut washers U-shaped and nuts.

The tables below and the annexes summarize the structural design data (manufacturer data) for the Walraven RapidStrut® rail systems. Further information can be taken from the technical data sheets (e.g., mounting instructions) from J. van Walraven Holding B.V, 93641 RK Mijdrecht.

Table 1: Product range of Walraven RapidStrut® rail systems (“suspended assembly”)

Designation ²⁾	Installation	Maximum span	Clamp fitting ¹⁾
“Suspended assembly”	Type of installation / suspension / connection to the rail	[mm]	Combined with
Walraven RapidStrut® 41 I H (41x41x2.5) “MR _U ” / 62 I H (41x62x2.5) “MR _U ”	<u>Ceiling installation</u> , fixed in the solid underground using anchors / threaded rods ≥ M10 (4.8) / Walraven Strut Washer U-shaped and nuts, on both sides	800	Walraven RapidStrut® Hammerfix ≥ M10 or Walraven RapidStrut® slide nut ≥ M10 with nuts and threaded bolts ≥ M10, or Walraven Strut slide nut ≥ M10 with Walraven Strut washers U-shaped with nuts and threaded bolts ≥ M10, or Walraven RapidStrut® wing nut ≥ M10 with Walraven Strut washer U-shaped with nuts and threaded bolts ≥ M10, or Walraven Strut washer U-shaped with nuts (on both sides) and threaded bolts ≥ M10

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

2) MR_U: Slotted side at the top, rail back downwards.

Table 2: Product range of Walraven RapidStrut® rail systems (“direct assembly”)

Designation ²⁾	Installation	Maximum span	Clamp fitting ¹⁾
“Direct assembly”	Type of installation / suspension / connection to the rail	[mm]	Combined with
Walraven RapidStrut® 41 I H (41x41x2.5) „MR _O ”	Ceiling installation, fixed in the solid underground using anchors / threaded rods ≥ M10 (4.8) / Walraven Strut washers U-shaped and nuts	400	Walraven Strut slide nut ≥ M10 with Walraven Strut washers U-shaped, with nuts and threaded bolts ≥ M10, or Walraven RapidStrut® wing nut ≥ M10 with Walraven Strut washers U-shaped, with nuts and threaded bolts ≥ M10

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

2) MR_O: Slotted side at the bottom, rail back at the top.

Table 3: Product range of Walraven RapidStrut® rail systems (brackets)

Designation ²⁾	Installation	Maximum span	Clamp fitting ¹⁾
“Suspended assembly”	Type of installation / suspension / connection to the rail	[mm]	Combined with
Walraven RapidStrut® Wall bracket 41 I H (41x41x2.5) “MR _U ”	<u>Ceiling installation,</u> fixed in the solid underground using anchors / threaded rods ≥ M10 (4.8) / Walraven Strut washers U-shaped and nuts <u>Wall installation,</u> fixed in the solid underground using anchors / threaded rods ≥ M10 (4.8) / washers and nuts	700	Walraven RapidStrut® Hammerfix ≥ M10; or Walraven RapidStrut® slide nut ≥ M10 with nuts and threaded bolts ≥ M10; or <hr/> Walraven Strut slide nut ≥ M10 with Walraven Strut washers U-shaped, with nuts and threaded bolts ≥ M10; or
Walraven RapidStrut® rail foot and/or Walraven Strut rail foot with Walraven RapidStrut® 41 I H (41x41x2.5) “MR _U ” / 62 I H (41x62x2.5) “MR _U ”	<u>Ceiling installation,</u> fixed in the solid underground using anchors / threaded rods ≥ M10 (4.8) / Walraven Strut washers U-shaped and nuts, on both sides <u>Wall installation,</u> fixed in the solid underground using anchors, washers and nuts	700	Walraven RapidStrut® wing nut ≥ M10 with Walraven Strut washers U-shaped with nuts and threaded bolts ≥ M10; or Walraven Strut washers U-shaped with nuts (on both sides) and threaded bolts ≥ M10

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

2) MR_U: Slotted side at the top, rail back downwards.

3 Assessment of the constructions

3.1 General

This fire-safety assessment was made for Walraven RapidStrut® rail systems combined with threaded rods that are fixed in solid structural elements with regard to the loadbearing capacity and deformation under exposure to fire along the standard temperature-time curve (ETK) in accordance with DIN EN 1363-1.

Independent of the fire-safety-related assessment, the suitability of Walraven RapidStrut® rail systems 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 J. van Walraven Holding B.V, 93641 RK Mijdrecht, these shall be binding.

The fire-safety assessment according to the following sections and Annexes 16 to 29 also applies for the related products made of stainless steel A4 or of higher-grade steel, provided the structural

dimensions are identical and the steel strength (yield strength/strength) of the steel components corresponds at the least to the assessed galvanized products.

This fire-safety assessment is restricted to mainly static (non-moving) loads combined with solid structural elements that must be classified in at least the same fire resistance class as the fixing systems.

The following will not be considered for the deformations stated in Section 3.2:

- Protrusions below the fixing rail with $\ddot{u} > 30$ mm (e.g., nuts and washers of the suspension);
- “Kinking” of the mounted conduit systems (e.g., elevations with threaded rods) due to fire load;
- Deformations of the conduit systems (e.g., pipes, cable routes, ...); and
- Deformations of the raw ceiling.

The fire-safety assessment 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 the installation of multiple-span systems (continuous beams), the intermediate supports must be executed with threaded rods M12. Intermediate suspension (M12) may only be loaded with the admissible normal force N_{ZAH} .

3.1.1 Single loads

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

1. The indicated single loads P_1 shall be arranged centrally (distance to the suspension = 1/2 of the span) on the fixing rail.
2. The stated loads for the individual single loads are the maximum loads per fastening point on the rail. This means that the stated maximum single load, with simultaneous elevation and suspension at one point on the rail must not be exceeded.
3. For symmetric/asymmetric arrangement of the single load according 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 are adhered to. The maximum load for the suspension of the fixing rail corresponds to half of the stated maximum single load ($\max N_{AH} = P_1/2$).

3.1.2 Multiple loads

For multiple loads (single loads P_2 arranged next to each other), the following boundary conditions are to be fulfilled, in addition to the data in the tables:

1. The indicated multiple loads P_2 are symmetrically distributed (minimum distance of load application points among each other = $a \geq 100$ mm) on the fixing rail.
2. The indicated multiple loads may be distributed to any number of further single loads, provided the total load resulting from the indicated multiple loads P_2 is not exceeded.
3. The load data indicated for the individual single loads are the maximum loads at a fixing point on the rail. This means that the indicated maximum single load P_2 must not be exceeded in any point of the rail with simultaneous elevation and suspension.
4. For a symmetric/asymmetric arrangement of the multiple loads acc. to item 2 (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 fixing rail corresponds to half of the sum of the multiples loads acc. to item 2. The maximum permissible steel stress (bending stress) in the fixing rails results from the arrangement acc. to item 1 and must not be exceeded.

Uniformly distributed loads are loads that are continuously and evenly applied over the entire span of the fixing rail.

3.2 Requirements to be fulfilled by fasteners and mounting systems

Requirements to be fulfilled by fasteners and mounting systems (e.g., pipe clamps, fixing rails, etc.) with regard to the load-bearing capacity $F_{\text{fire}(t)}$ and the deformation $f_{(t)}$ are imposed in conjunction with conduit systems (see, for example, Specimen Guideline on fire protection requirements pertaining to conduits – Specimen Conduit Guideline [German designation: MLAR], edition of 10/02/2015, Sections 2.1 and 3.5). According to MLAR, fasteners are part of the conduit system; special requirements may result in conjunction with suspended ceilings (MLAR, 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. The deformations stated in the following only refer to the fixing rails combined with threaded rods under exposure to fire. Additional deformations from the conduit systems (e.g., the deformation of a pipe) must be taken into account separately.

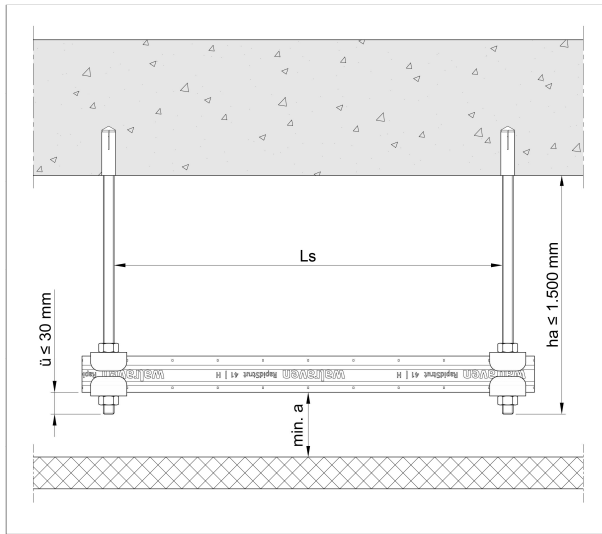


Figure 1: Installation situation of the fixing rail

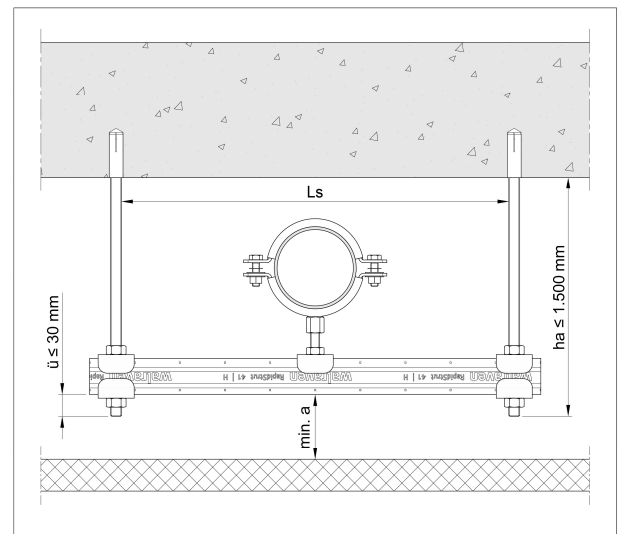


Figure 2: Installation situation with pipe clamp

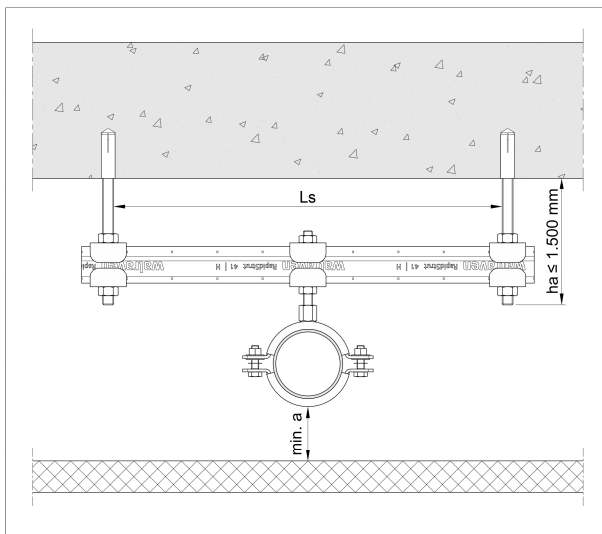


Figure 3: Installation situation with pipe clamp

Figures 1 – 3 are example representations of fixing rail systems in the ceiling plenum of suspended ceiling constructions in accordance with the specimen guideline on fire protection requirements pertaining to conduits (Specimen Conduit Guideline [German designation: MLAR]), edition of 10/02/2015, Section 3.5.3.

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

For combined installations consisting of fixing rails and pipe clamps suspended downwards (Fig. 3), the necessary minimum distances min. a of the individual mounting elements must be added to a **total minimum distance** min. a_{total}.

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

$\min. a_{\text{total}}$: total distance

$\min. a_{\text{rail}}$: minimum distance based on the deformation " $f_{(t)}$ " of the fixing rail according to the following sections

$\min. a_{\text{clamp}}$: minimum distance for pipe clamps based on the deformation " $f_{(t)}$ " according to the related test report or expert opinion

3.3 Assessment of Walraven RapidStrut® rail systems combined with threaded rods

The design proposals for Walraven RapidStrut® rail systems under tensile load and one-side exposure to fire in accordance with DIN EN 1363-1 can be taken from the annexes.

Steel failure

With regard to the load-bearing capacity under exposure to fire, steel failure and underground failure can be distinguished.

For the Walraven RapidStrut® rail systems assessed here, the failure of the Walraven RapidStrut® rail systems combined with threaded rods (steel failure) was decisive. The proof of the fastening system to the underground is to be furnished separately.

The following sections contain design proposals for Walraven RapidStrut® rail systems with regard to the loading of the fixing rails combined with threaded rods as a function of the fire resistance time.

$F_{\text{fire}(t)}$ ⇒ loadbearing capacity under exposure to fire as a function of the time

Deformation

From the fire-safety-related point of view for Walraven RapidStrut® rail systems, and provided the respective minimum distance $\min. a$ (see Fig. 1 and 2) is observed and the deformation $f_{(t)}$ of the rail systems is taken into account, an impairment of parts arranged on the underside (e.g., a suspended ceiling) by the fixing rails combined with threaded rods can be excluded.

The following sections contain design proposals for Walraven RapidStrut® rail systems with regard to the deformation of the fixing rails combined with threaded rods as a function of the fire resistance time and the suspension height.

$f_{(t)}$ ⇒ deformations as a function of the load, the time and the suspension height

3.3.1 Assessment with regard to maximal loading and maximal deformation of Walraven RapidStrut® rail systems as a function of the fire resistance

The annexes contain design proposals with regard to the maximal loads and maximal deformations as a function of the fire resistance time for Walraven RapidStrut® rail systems combined with threaded rods under exposure to fire in accordance with DIN EN 1363-1. The deformation corresponds to the sum of the deflection and the change in length of the fixing rail combined with the threaded rods that occur during exposure to fire. The values for the deformations are indicated as a function of the suspension height.

max. $F_{\text{fire}(t)}$ ⇒ 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 , and the uniformly distributed load q

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

3.3.2 Design proposal for Walraven RapidStrut® rail systems under tensile load and exposure to fire in accordance with DIN EN 1363-1 (“suspended assembly”) – MLAR application with reduced load

The annexes contain design proposals with regard to the maximal loads and maximal deformations $a \leq 50$ mm for a fire resistance time of 30 minutes for Walraven RapidStrut® rail systems combined with threaded rods under exposure to fire in accordance with DIN EN 1363-1. The deformation corresponds to the sum of the deflection and the change in length of the fixing rail combined with the threaded rods that occur during exposure to fire. The values for the deformations are indicated for a suspension height of $h_a \leq 500$ mm.

red. $F_{\text{fire}(30)}$ ⇒ 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 .

$f_{\text{max}(30)}$ ⇒ maximal deformations as a function of the load, the time and the suspension height

The assessments for the individual systems can be taken from the annexes:

Annexes 16 to 19: Design proposal on load-bearing capacity and deformations for Walraven RapidStrut® rail systems – “Suspended assembly” / “Single loads”

Annexes 20 to 21: Design proposal on load-bearing capacity (max. $F_{\text{fire}(t)}$) for Walraven RapidStrut® rail systems – “Suspended assembly” / “Multiple loads”

- Annexes 22 to 25: Design proposal on load-bearing capacity (max. $F_{\text{fire}(t)}$) and deformations ($f_{\text{max}(t)}$) for Walraven RapidStrut® rail systems – “Suspended assembly” / “Uniformly distributed loads”
- Annexes 26 to 27: Design proposal on load-bearing capacity (max. $F_{\text{fire}(t)}$) and deformations ($f_{\text{max}(t)}$) for Walraven RapidStrut® rail systems – “Suspended assembly with brackets”
- Annex 28: Design proposal for Walraven RapidStrut® rail systems under tensile load under exposure to fire in accordance with DIN EN 1363-1 “Suspended assembly”) – MLAR application with reduced load
- Annex 29: Design proposal on load-bearing capacity (max. $F_{\text{fire}(t)}$) and deformations ($f_{\text{max}(t)}$) for Walraven RapidStrut® rail systems – “Direct assembly”

4 Special notes

- 4.1 This Expert Opinion is not subject to notification and is no substitute for a classification report.
- 4.2 This Expert Opinion is no proof of usability for use in a building control procedure. The expert opinion 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.
- 4.3 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.
- 4.4 This Expert Opinion applies only in conjunction with the documents and basics as listed in Section 2 and cannot be transferred to other constructions without further verification.
- 4.5 This Expert Opinion applies only in terms of fire protection. Further requirements may result from the applicable technical building regulations 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.
- 4.6 The above assessment applies only for Walraven RapidStrut® rail systems, while taking the boundary conditions of the technical data sheets from J. van Walraven Holding B.V, 93641 RK Mijdrecht, into account.
- 4.7 The assessment applies only for Walraven RapidStrut® rail systems 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.

- 4.8 Modifications of and supplements to design details (derived from this Expert Opinion) shall only be possible after consultation with Materialprüfanstalt für das Bauwesen (MPA).
- 4.9 The executing company shall be exclusively responsible for the proper execution.
- 4.10 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.
- 4.11 The validity of Expert Opinion No. (2103/523/21) – CM dated 13/03/2024 ends on 13/03/2029 at the latest. The validity can be extended as a function of the state of the art.

This document is the translated version of Gutachterliche Stellungnahme Nr. 2103/523/21 – CM dated 13/03/2024. The legally binding text is the aforementioned German Gutachterliche Stellungnahme.


i.A.
Dipl.-Ing. Gary Blume
Head of Department




i.A.
Dipl.-Ing. (FH) Christian. Maertins
Engineer/Official in Charge

Product overview: Walraven RapidStrut® Rail Systems

Table 4: Product overview (Table of materials), galvanized finish

No.	Description	Item no.	Material
1	Walraven RapidStrut® Fixing Rail 41 H (41x41x2,5 mm) (pg) 62 H (41x62x2,5 mm) (pg)	6505x45 6505x65	Steel 1.0242 (pre-galvanized)
	Walraven RapidStrut® Fixing Rail 41 H (41x41x2,5 mm) (BUP) 62 H (41x62x2,5 mm) (BUP)	65018x47 65018x67	Steel 1.0242 (BIS UltraProtect® 1000)
2	Walraven RapidStrut® Cantilever Arm 41 H (41x41x2,5 mm) (BUP)	660841xx	Steel 1.0045 / 1.0038 (BIS UltraProtect® 1000)
3	Walraven RapidStrut® Base Plate (BUP)	665885400	Steel 1.0332 (BIS UltraProtect® 1000)
	Walraven Strut Base Plate (zp)	66583804	Steel 1.0332 (zinc plated)
4	Walraven Strut Washer U-shaped Ø 11 mm (BUP)	66588010	Steel 1.0332 (BIS UltraProtect® 1000)
	Walraven Strut Washer U-shaped Ø 13 mm (BUP)	66588012	Steel 1.0332 (BIS UltraProtect® 1000)
5	Walraven RapidStrut® Hammerfix M10 oder M12 (BUP)	65278500x 65278520x	Steel 1.0332 (BIS UltraProtect® 1000)
	Walraven RapidStrut® Slide Nut M10 oder M12 (BUP)	665185110 665185112	Steel 1.0332 (BIS UltraProtect® 1000)
6	Walraven Hexagonal Nut M10 oder M12 (zp)	6123010 6123012	DIN 934 (ISO 4032), FK 8 (zinc plated)
	Walraven Hexagonal Nut M10 oder M12 (BUP)	61281010 61281012	DIN 934 (ISO 4032), FK 8 (BIS UltraProtect® 1000)
7	Walraven Threaded Rod M10 oder M12 (zp)	6303x10 6303x12	DIN 976-1, FK ≥ 4.8 (zinc plated)
	Walraven Threaded Rod M10 oder M12 (BUP)	6308x010 6308x012	DIN 976-1, FK ≥ 4.8 (BIS UltraProtect® 1000)
8	Walraven Strut Slide Nut M10 oder M12 (zp)	6517010 6517012	Steel 1.0332 (zinc plated)
	Walraven Strut Slide Nut M10 oder M12 (BUP)	65188010 65188012	Steel 1.0332 (BIS UltraProtect® 1000)
9	Walraven RapidStrut® Slide Nut with Plastic Tabs M10 oder M12 (zp)	6518610 6518612	Steel 1.0332 (zinc plated)
	Walraven RapidStrut® Slide Nut with Plastic Tabs M10 oder M12 (BUP)	651868010 651868012	Steel 1.0332 (BIS UltraProtect® 1000)
10	Pipe Clamp	---	Exemplary illustration for pipe clamps with fire protection certificate
11	Anchor	---	Exemplary illustration for anchors with fire protection certificate

Product overview: Walraven RapidStrut® Rail Systems

Table 5: Product overview (Table of materials), stainless steel finish

No.	Description	Item no.	Material
1	Walraven RapidStrut® Stainless Steel Fixing Rail 41x41x2,5 mm (A4)	6507x47	Stainless Steel 1.4404 (AISI 316L)
2	Walraven RapidStrut® Stainless Steel Cantilever Arm 41x41x2,5 mm (A4)	660786x 660787x	Stainless Steel 1.4404 (AISI 316L)
3	Walraven RapidStrut® Stainless Steel Base Plate (A4)	665875400	Stainless steel 1.4404/1.4401 (AISI 316L / AISI 316)
4	Walraven Strut Stainless Steel Washer U-shaped Ø 11 mm (A4)	6571010	Stainless Steel 1.4401 (AISI 316)
	Walraven Strut Stainless Steel Washer U-shaped Ø 13 mm (A4)	6571012	Stainless Steel 1.4401 (AISI 316)
5	Walraven Strut Stainless Steel Tee-Bolt M10 oder M12 (A4)	6527744 6527754	Stainless Steel 1.4401 (AISI 316)
	Walraven RapidStrut® Stainless Steel Slide Nut M10 (A4)	665175110	Stainless Steel 1.4401 (AISI 316)
6	Walraven Stainless Steel Hexagonal Nut M10 oder M12 (A4)	6127010 6127012	Stainless Steel 1.4401 (AISI 316)
7	WIS Edelstahl Stainless Steel Threaded Rod M10 oder M12 (A4)	63079110 63079112	Stainless Steel 1.4401 (AISI 316)
8	Walraven Strut Stainless Steel Slide Nut M10 oder M12 (A4)	6517710 6517712	Stainless Steel 1.4401 (AISI 316)
9	Walraven RapidStrut® Stainless Steel Slide Nut with Plastic Tabs M10 oder M12 (A4)	651867010 651867012	Stainless Steel 1.4401 (AISI 316)
10	Pipe Clamp	---	Exemplary illustration for pipe clamps with fire protection certificate
11	Anchor	---	Exemplary illustration for anchors with fire protection certificate

Installation drawings for Walraven RapidStrut® rail systems

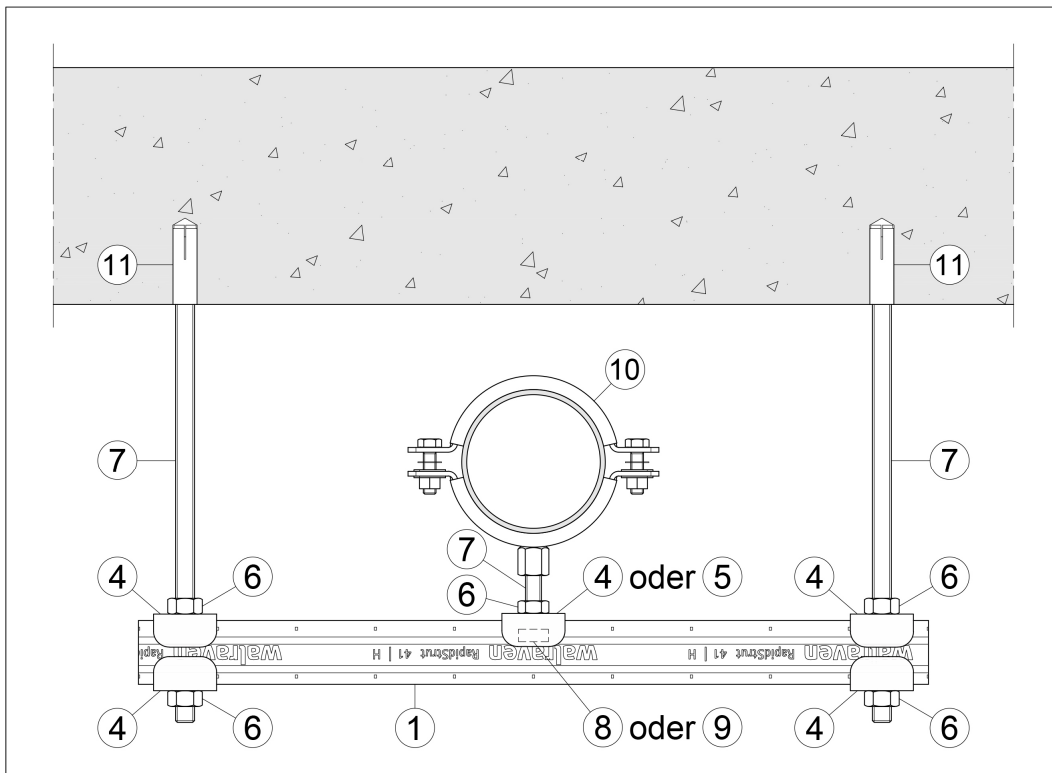


Figure 4: Execution as suspended assembly (products acc. to Annexes 1 and 2)

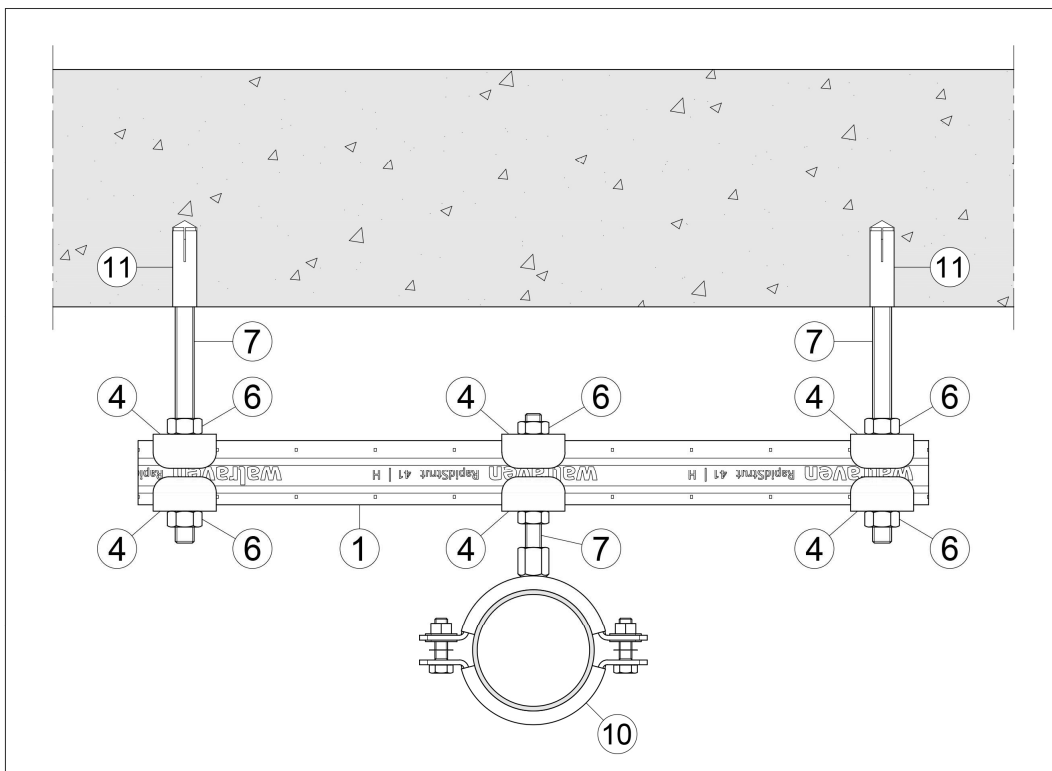


Figure 5: Execution as suspended assembly (products acc. to Annexes 1 and 2)

Installation drawings for Walraven RapidStrut® rail systems

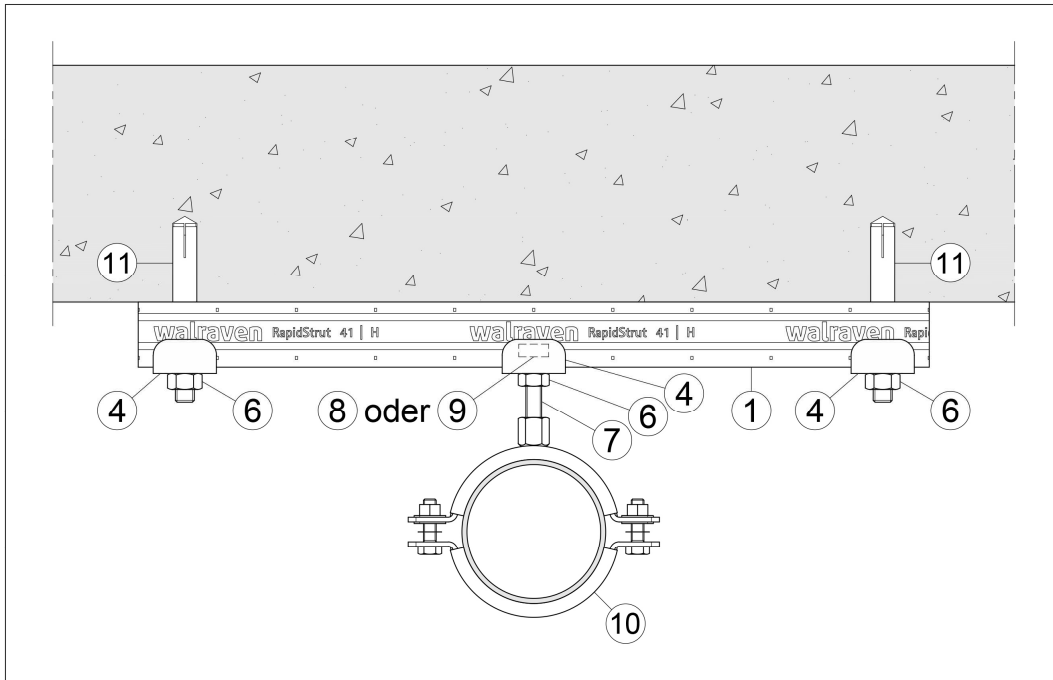


Figure 6: Execution as direct assembly (products acc. to Annexes 1 and 2)

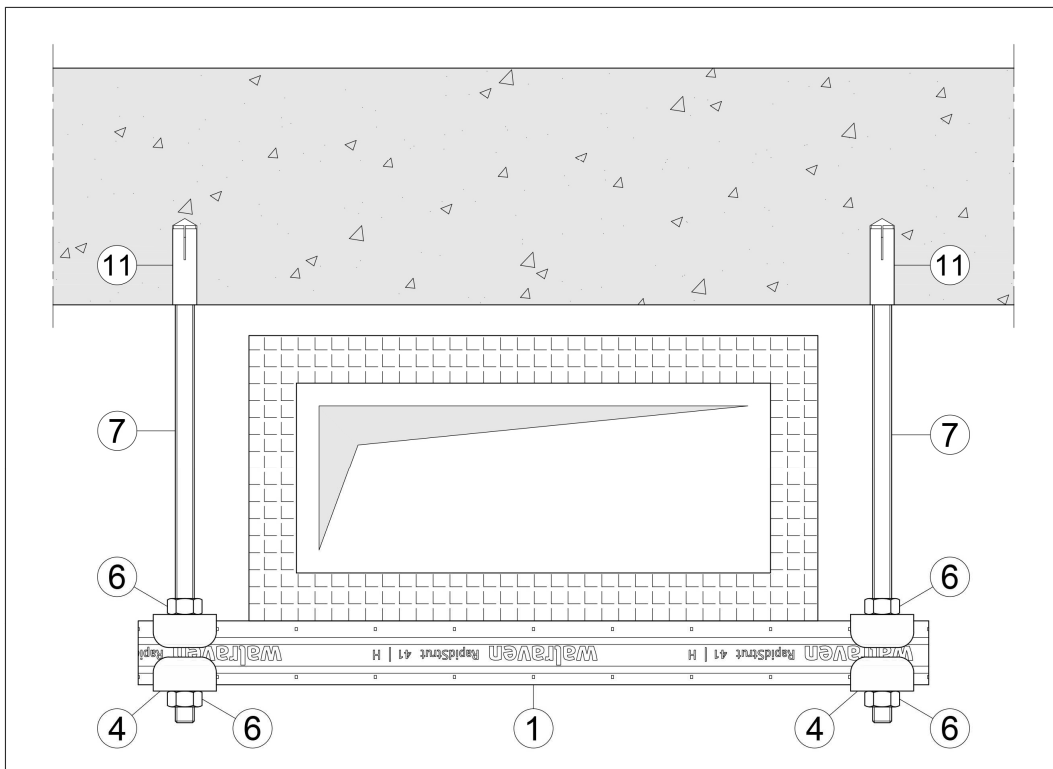


Figure 7: Execution as suspended assembly with uniformly distributed load (products acc. to Annexes 1 and 2)

Installation drawings for Walraven RapidStrut® rail systems

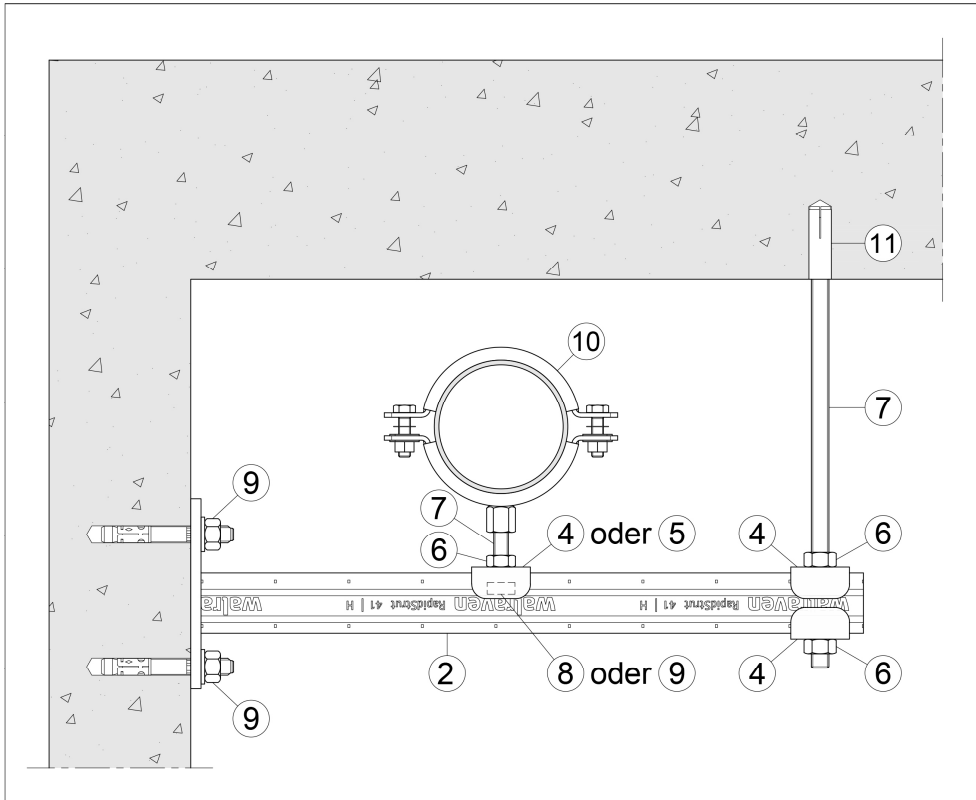


Figure 8: Execution as suspended assembly combined with brackets (products acc. to Annexes 1 and 2)

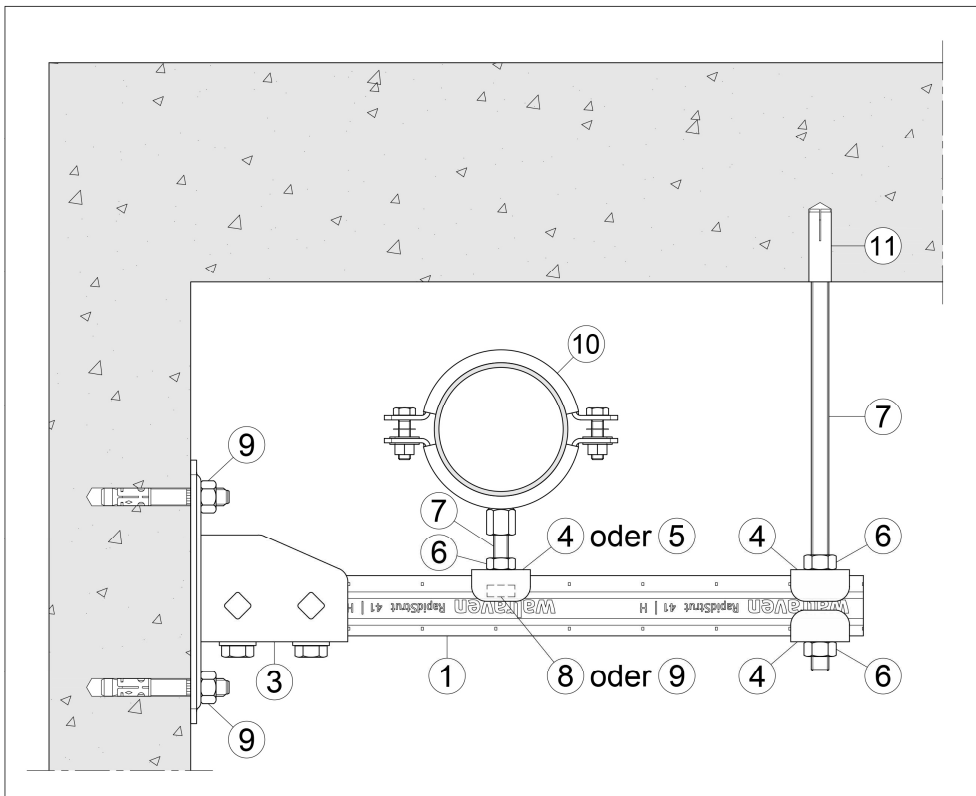


Figure 9: Execution as suspended assembly combined with brackets (products acc. to Annexes 1 and 2)

Data sheets for Walraven RapidStrut® rail systems (manufacturer's information)

Walraven RapidStrut® Fixing Rail (pg)

for medium weight fixing applications



6505645

6505665

Features and benefits

- universal rail system
- distance between rail end and first hole is always equal
- inward formed flanges with serrated profile for extra grip
- with continuous smart hole pattern including round anchor holes
- with sawing marks each 50 mm on all 3 sides of the profile
- pre-galvanized
- for more information about the max. allowed load ($F_{a,z}$) please refer to the loading tables or our online datasheet 'Walraven RapidStrut® Data Sheet'
- material: steel 1.0242 (S250GD)
- Walraven RapidStrut® channel support systems (type 21|L, 21|H, 41|L, 41|H) conform to BS 6946:1988, the British Standard Specification for metal channel cable support systems for electrical installations

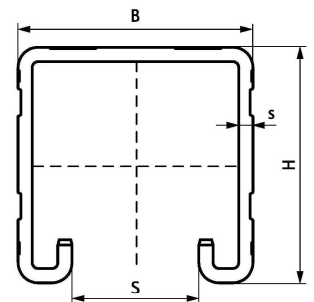
Part No.	Type	L	B	H	s	S	RAL	BndS	BndL	App.
			(mm)	(mm)	(mm)	(mm)				
6505245	41 H	2 m	41	41	2.50	22	RAL ¹	20	100	m.
6505345	41 H	3 m	41	41	2.50	22	RAL ¹	30	150	m.
6505645	41 H	6 m	41	41	2.50	22	RAL ¹	60	300	m.
6505365	62 H	3 m	41	62	2.50	22	-	30	90	m.
6505665	62 H	6 m	41	62	2.50	22	-	60	180	m.
6505640	41 H	6 m	41	41	2.50	22	-	60	300	m. *

RAL¹ = tested, certified and monitored by a third party according to RAL-GZ 655/C.

* Unslotted

For detailed technical information about our RAL marked products, please see the RAL datasheet in our web catalogue.

For more information about the max. allowed load ($F_{a,z}$) please refer to the loading tables or our online datasheet 'Walraven RapidStrut® Data Sheet'.



Manufacturer's information

Data sheets for Walraven RapidStrut® rail systems (manufacturer's information)

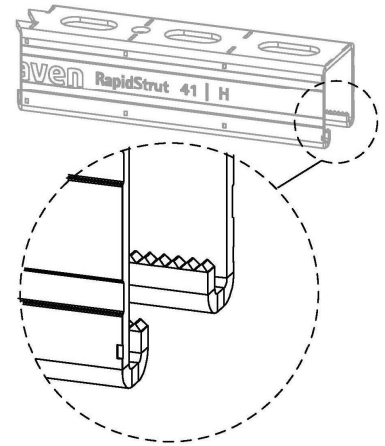
Walraven RapidStrut® Fixing Rail (BUP1000)

for medium weight fixing applications



65018647

65018667

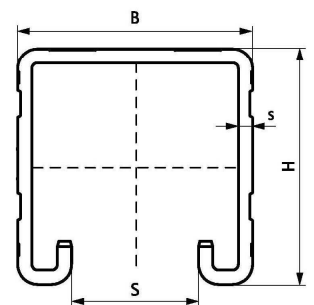


Features and benefits

- universal rail system
- corrosion protection remains intact after cutting
- distance between rail end and first hole is always equal
- surface protection:
 - product is part of the Walraven BIS UltraProtect® 1000 system
 - suitable for in- and outdoor applications
 - stands min. 1,000 hours salt spray test (max. 5% red rust) according to ISO 9227
- inward formed flanges with serrated profile for extra grip
- with continuous smart hole pattern including round anchor holes
- with sawing marks each 50 mm on all 3 sides of the profile
- material: steel 1.0242 (S250GD)
- Walraven RapidStrut® channel support systems (type 21|L, 21|H, 41|L, 41|H) conform to BS 6946:1988, the British Standard Specification for metal channel cable support systems for electrical installations

Part No.	Type	L	B	H	s	S	RAL	BndS	BndL	App.
			(mm)	(mm)	(mm)	(mm)				
65018247	41 H	2 m	41	41	2.50	22	RAL ¹	20	100	m.
65018347	41 H	3 m	41	41	2.50	22	RAL ¹	30	150	m.
65018647	41 H	6 m	41	41	2.50	22	RAL ¹	60	300	m.
65018667	62 H	6 m	41	62	2.50	22	-	60	180	m.

*RAL¹ = tested, certified and monitored by a third party according to RAL-GZ 655/C.
For detailed technical information about our RAL marked products, please see the RAL datasheet in our web catalogue.
For more information about the max. allowed load (F_{a,z}) please refer to the loading tables or our online datasheet 'Walraven RapidStrut® Data Sheet'.*



Manufacturer's information

Data sheets for Walraven RapidStrut® rail systems (manufacturer's information)

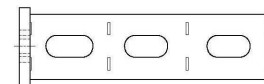
Walraven RapidStrut® Cantilever Arm (BUP1000)

fixing to wall, floor or ceiling



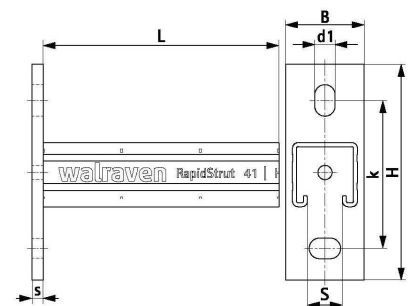
Features and benefits

- base plate with welded C-profile
- for quick and adjustable fixing of one or multiple pipes
- CO₂ welded
- with continuous perforation
- with sawing marks each 50 mm on all 3 sides of the profile
- well balanced relation between base plate and profile for optimal use of load performance
- material: profiles made of steel 1.0038 (S235JR)
- material: base plate type 21 | H made of steel 1.0044 (S275JR)
- material: base plate type 41 | M and 41 | H made of steel 1.0045 (S355JR)
- surface protection:
 - product is part of the Walraven BIS UltraProtect® 1000 system
 - suitable for in- and outdoor applications
 - stands min. 1,000 hours salt spray test (max. 5% red rust) according to ISO 9227
- for more information about the max. allowed load ($F_{a,z}$) please refer to the loading tables or our online datasheet 'Walraven RapidStrut® Data Sheet'



Part No.	Type	L	B	H	s	d1	S	k	Pack 1
			(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	
66084115	41 H	150 mm	50	137.5	7.0	20 x 13	22	95	10
66084120	41 H	200 mm	50	137.5	7.0	20 x 13	22	95	10
66084130	41 H	300 mm	50	137.5	7.0	20 x 13	22	95	10
66084140	41 H	400 mm	50	137.5	7.0	20 x 13	22	95	10
66084145	41 H	450 mm	50	137.5	7.0	20 x 13	22	95	10
66084150	41 H	500 mm	50	137.5	7.0	20 x 13	22	95	10
66084160	41 H	600 mm	50	137.5	7.0	20 x 13	22	95	8
66084175	41 H	750 mm	50	137.5	7.0	20 x 13	22	95	8
66084198	41 H	1,000 mm	50	137.5	7.0	20 x 13	22	95	1
66084199	41 H	1,200 mm	50	137.5	7.0	20 x 13	22	95	1

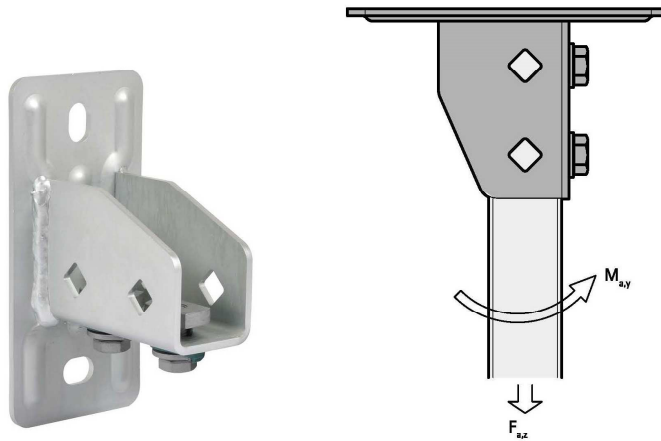
For more information about the max. allowed load ($F_{a,z}$) please refer to the loading tables or our online datasheet 'Walraven RapidStrut® Data Sheet'.



Manufacturer's information

Data sheets for Walraven RapidStrut® rail systems (manufacturer's information)

Walraven RapidStrut® Base Plate G2 (BUP1000)

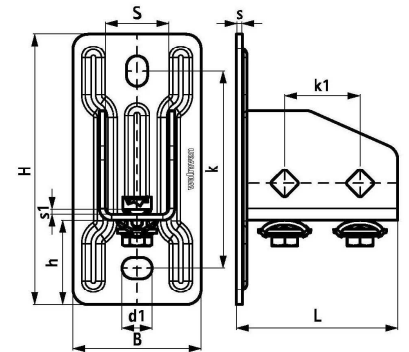


Features and benefits

- flexible base plate for Strut rails
- suitable for all Strut rail up to 82mm height
- open side of rails 41x41 can be turned to all sides
- at high loads we advise to install with throughbolts
- timesaving with pre-assembled fasteners
- material: metal parts made of steel 1.0332; spring(s) made of POM (polyoxymethylene), green
- surface protection:
 - product is part of the Walraven BIS UltraProtect® 1000 system
 - suitable for in- and outdoor applications
 - stands min. 1,000 hours salt spray test (max. 5% red rust) according to ISO 9227

Part No.	L	B	H	h	s	d1	S	k	k1	F _{a,z}	F _{a,z 2}	M _{a,y}	Pack 1
	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(N)	(N)	(Nm)	
665885400	107 mm	85	180	56	4.0	20 x 14	42	130.5	50	3,636	5,151	485.0	10

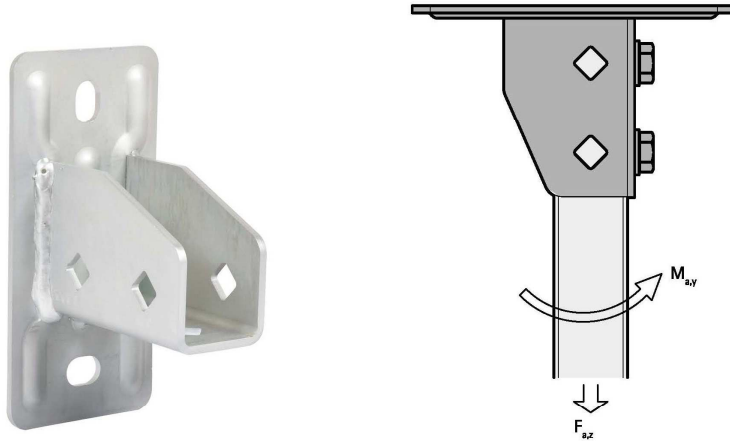
F_{a,z}: max. allowed load in combination with 2 slide nuts M10, tightened with 40 Nm.
F_{a,z 2}: max. allowed load in combination with 2 throughbolts M10, tightened with 40 Nm.
M_{a,y}: max. moment in combination with 2 throughbolts M10, tightened with 40 Nm.



Manufacturer's information

Data sheets for Walraven RapidStrut® rail systems (manufacturer's information)

Walraven Strut Base Plate G2 (zp)

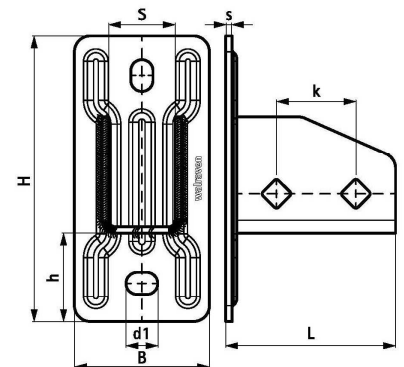


Features and benefits

- flexible base plate for Strut rails
- suitable for all Strut rail up to 82mm height
- open side of rails 41x41 can be turned to all sides
- at high loads we advise to install with throughbolts
- material: steel
- zinc plated

Part No.	L	B	H	h	s	d1	S	k	F _{a,z}	F _{a,z 2}	M _{a,y}	Pack 1
		(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(N)	(N)	(Nm)	
66583804	107 mm	85	180	56	4.0	20 x 14	42	50	3,636	5,151	485.0	10

F_{a,z}: max. allowed load in combination with 2 slide nuts M10, tightened with 40 Nm.
F_{a,z 2}: max. allowed load in combination with 2 throughbolts M10, tightened with 40 Nm.
M_{a,y}: max. moment in combination with 2 throughbolts M10, tightened with 40 Nm.



Manufacturer's information

Data sheets for Walraven RapidStrut® rail systems (manufacturer's information)

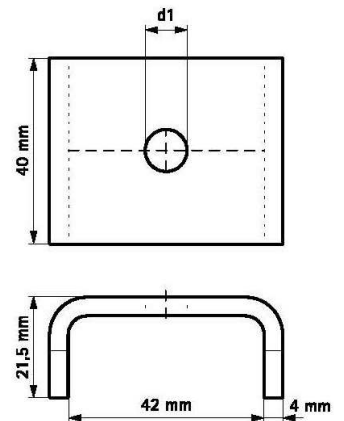
Walraven Strut Washer - U-shaped (BUP1000)

to make Strut rail fabrications



Features and benefits

- U-shaped washer
- U-shaped for extra stability
- material: steel 1.0332
- surface protection:
 - product is part of the Walraven BIS UltraProtect® 1000 system
 - suitable for in- and outdoor applications
 - stands min. 1,000 hours salt spray test (max. 5% red rust) according to ISO 9227



Part No.	d1 (mm)	For Rail	Pack 1
66588010	Ø 11.0	Strut	50
66588012	Ø 13.0	Strut	50

Manufacturer's information

Data sheets for Walraven RapidStrut® rail systems (manufacturer's information)

Walraven RapidStrut® Hammerfix G2 (BUP1000)

fixing to Strut rail

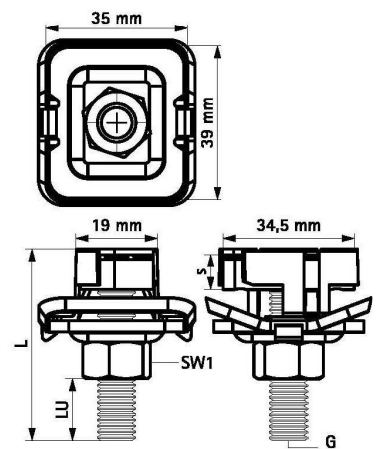


Features and benefits

- slide nut with stud bolt, washer and BIS RapidStrut® spring
- ready-to-use pre-assembled for a quick fixing, and retains assembly in place before final tightening
- material: metal parts made of steel 1.0332; spring(s) made of POM (polyoxymethylene), green
- surface protection:
 - product is part of the Walraven BIS UltraProtect® 1000 system
 - suitable for in- and outdoor applications
 - stands min. 1,000 hours salt spray test (max. 5% red rust) according to ISO 9227

Part No.	G	L	LU (mm)	s (mm)	SW1 (mm)	T _(inst.) (Nm)	F _{a,z} (N)	F _{a,x} (N)	Pack 1	Pack 2
652785004	M10	40 mm	12	8.0	17	15.0	5,000	1,250	15	150
652785006	M10	60 mm	32	8.0	17	15.0	5,000	1,250	5	100
652785008	M10	80 mm	52	8.0	17	15.0	5,000	1,250	5	100
652785204	M12	40 mm	10	9.0	19	22.0	5,000	2,440	5	100
652785206	M12	60 mm	30	9.0	19	22.0	5,000	2,440	5	100

Tested values in combination with BIS RapidStrut® Rail 41x41x2.5mm.

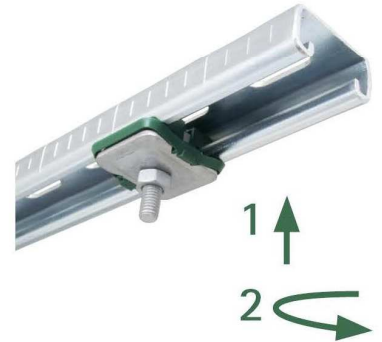


Manufacturer's information

Data sheets for Walraven RapidStrut® rail systems (manufacturer's information)

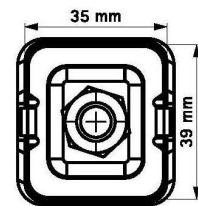
Walraven RapidStrut® Slide Nut G2 (BUP1000)

fixing to Strut rail



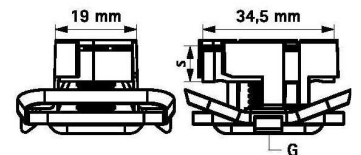
Features and benefits

- slide nut with washer and BIS RapidStrut® spring
- ready-to-use pre-assembled for a quick fixing, and retains assembly in place before final tightening
- material: metal parts made of steel 1.0332; spring(s) made of POM (polyoxymethylene), green
- surface protection:
 - product is part of the Walraven BIS UltraProtect® 1000 system
 - suitable for in- and outdoor applications
 - stands min. 1,000 hours salt spray test (max. 5% red rust) according to ISO 9227



Part No.	G	s (mm)	T _{inst} (Nm)	For Rail	F _{a,z} (N)	F _{a,x} (N)	Pack 1	Pack 2
665185110	M10	8.0	15	Strut	5,000	1,250	20	200
665185112	M12	9.0	22	Strut	5,000	2,440	20	200

*Tested values in combination with BIS RapidStrut® Rail 41x41x2.5mm.
More details can be found on the Technical Datasheet.*



Manufacturer's information

Data sheets for Walraven RapidStrut® rail systems (manufacturer's information)

Walraven Strut Slide Nut (zp)

fixing to Strut rail

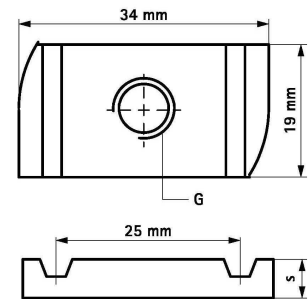


Features and benefits

- material: steel 1.0332
- zinc plated

Part No.	G	L	s (mm)	T _(inst.) (Nm)	For Rail	F _{a,z} (N)	F _{a,x} (N)	Pack 1	Pack 2
6517010	M10	-	9.0	40.0	Strut	5,000	2,550	100	600
6517012	M12	-	9.0	50.0	Strut	5,000	2,950	100	600

*Tested values in combination with BIS RapidStrut® Rail 41x41x2.5mm.
More details can be found on the Technical Datasheet.*



Walraven Strut Slide Nut (BUP1000)

fixing to Strut rail

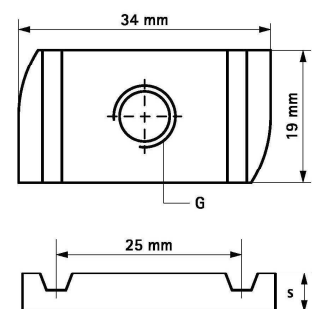


Features and benefits

- for all types of Strut Rail
- for tight fixing of accessories (e.g. connectors) on rail
- material: steel 1.0332
- surface protection:
 - product is part of the Walraven BIS UltraProtect® 1000 system
 - suitable for in- and outdoor applications
 - stands min. 1,000 hours salt spray test (max. 5% red rust) according to ISO 9227

Part No.	G	s (mm)	T _(inst.) (Nm)	For Rail	F _{a,z} (N)	F _{a,x} (N)	Pack 1	Pack 2
65188010	M10	9.0	40.0	Strut	5,000	2,550	100	500
65188012	M12	9.0	50.0	Strut	5,000	2,950	100	500

*Tested values in combination with BIS RapidStrut® Rail 41x41x2.5mm.
More details can be found on the Technical Datasheet.*



Manufacturer's information

Data sheets for Walraven RapidStrut® rail systems (manufacturer's information)

Walraven RapidStrut® Slide Nut with Plastic Tabs (zp)

fixing to Strut rail

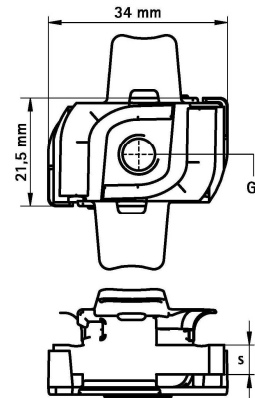


Features and benefits

- slide nut with plastic 'tabs'
- for all types of Strut Rail
- for tight fixing of accessories (e.g. connectors) on rail
- with plastic tabs which simplifies inserting and positioning
- material: slide nut made of steel 1.0332; tabs made of PP (polypropylene), green
- zinc plated

Part No.	G	s (mm)	T _(inst.) (Nm)	For Rail	F _{a,z} (N)	F _{a,x} (N)	Pack 1
6518610	M10	9.0	40.0	Strut	5,000	2,550	100
6518612	M12	9.0	50.0	Strut	5,000	2,950	100

*Tested values in combination with BIS RapidStrut® Rail 41x41x2.5mm.
More details can be found on the Technical Datasheet.*



Walraven RapidStrut® Slide Nut with Plastic Tabs (BUP1000)

fixing to Strut rail

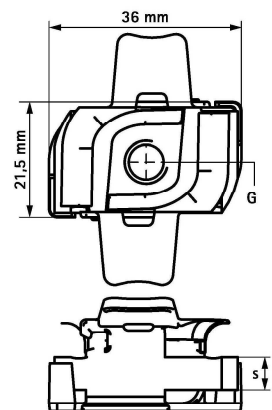


Features and benefits

- slide nut with plastic 'tabs'
- for all types of Strut Rail
- for tight fixing of accessories (e.g. connectors) on rail
- with plastic tabs which simplifies inserting and positioning
- material: slide nut made of steel 1.0332; tabs made of PP (polypropylene), green
- surface protection:
 - product is part of the Walraven BIS UltraProtect® 1000 system
 - suitable for in- and outdoor applications
 - stands min. 1,000 hours salt spray test (max. 5% red rust) according to ISO 9227

Part No.	G	s (mm)	T _(inst.) (Nm)	For Rail	F _{a,z} (N)	F _{a,x} (N)	Pack 1
651868010	M10	8.0	40.0	Strut	5,000	2,550	100
651868012	M12	9.0	50.0	Strut	5,000	2,950	100

*Tested values in combination with BIS RapidStrut® Rail 41x41x2.5mm.
More details can be found on the Technical Datasheet.*



Manufacturer's information

Design proposal for Walraven RapidStrut® rail systems under tensile load and exposure to fire in accordance with DIN EN 1363-1 – Suspended assembly

The maximum single load stated in the tables can be split into any number of single loads (as multiple load). The sum of the single loads must not exceed the maximum load stated in the tables.

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

When executing as multiple-span system with intermediate suspension (M12), the intermediate suspension (M12) may be loaded with the admissible normal force N_{ZAHfire} according to Table 7.

Table 6: Design proposal for Walraven RapidStrut® rail systems combined with threaded rods as a function of the fire resistance time – single load

Walraven RapidStrut® fixing rail			Walraven RapidStrut® 41 I H (41x41x2.5) / 62 I H (41x62x2.5) combined with threaded rods “Suspended assembly” (acc. to Section 2)
Span	l_s in mm	\leq	800
Time t in minutes			Maximum load “max F_{fire} ” Load suspension \geq M10 – single loads, centrally
30	P ₁ in kN	\leq	1.10
60			0.70
90			0.55
120			0.45

Table 7: Design proposal for Walraven RapidStrut® rail systems combined with threaded rods as a function of the fire resistance time – Suspension M12 “Continuous beam”

Walraven RapidStrut® fixing rail			Walraven RapidStrut® 41 I H (41x41x2.5) / 62 I H (41x62x2.5) combined with threaded rods “Suspended assembly” (acc. to Section 2)
Time t in minutes			Maximum load N_{ZAH} Suspension M12 “Continuous beam”
30	N in kN	\leq	2.30
60			1.40
90			1.00
120			0.80

Deformations (f_{max}) for Walraven RapidStrut® rail systems under tensile load and exposure to fire in accordance with DIN EN 1363-1 – Suspended assembly / single load

Table 8: Deformations (f_{max}) for Walraven RapidStrut® rail systems combined with threaded rods as a function of the time, the span, the suspension height, and the load (single load, centrally)

Deformation: 30 to 120 minutes			Walraven RapidStrut® 41 I H (41x41x2.5) / 62 I H (41x62x2.5) combined with threaded rods "Suspended assembly"											
Span	l_s in mm	≤	400											
Suspension height	h_a in mm	≤	500				1000				1500			
Single load	P_1 in kN	≤	1.10	0.70	0.55	0.45	1.10	0.70	0.55	0.45	1.10	0.70	0.55	0.45
Time t in minutes			Deformations (f_{max}) in mm											
30			190	40	40	40	195	45	45	45	200	50	50	50
60				160	50	40		165	55	45		170	60	50
90			---		150	110	---		155	115	---		160	120
120				---	---	210		---	---	215		---	---	220

Table 9: Deformations (f_{max}) for Walraven RapidStrut® rail systems combined with threaded rods as a function of the time, the span, the suspension height, and the load (single load, centrally)

Deformation: 30 to 120 minutes			Walraven RapidStrut® 41 I H (41x41x2.5) / 62 I H (41x62x2.5) combined with threaded rods "Suspended assembly"											
Span	l_s in mm	≤	500											
Suspension height	h_a in mm	≤	500				1000				1500			
Single load	P_1 in kN	≤	1.10	0.70	0.55	0.45	1.10	0.70	0.55	0.45	1.10	0.70	0.55	0.45
Time t in minutes			Deformations (f_{max}) in mm											
30			230	70	40	40	235	75	45	45	240	80	50	50
60				190	80	60		195	85	65		200	90	70
90			---		180	140	---		185	145	---		190	150
120				---	---	220		---	---	225		---	---	230

Deformations (f_{max}) for Walraven RapidStrut® rail systems under tensile load and exposure to fire in accordance with DIN EN 1363-1 – Suspended assembly / single load

Table 10: Deformations (f_{max}) for Walraven RapidStrut® rail systems combined with threaded rods as a function of the time, the span, the suspension height, and the load (single load, centrally)

Deformation: 30 to 120 minutes			Walraven RapidStrut® 41 I H (41x41x2.5) / 62 I H (41x62x2.5) combined with threaded rods "Suspended assembly"											
Span	l_s in mm	≤	600											
Suspension height	h_a in mm	≤	500				1000				1500			
<u>Single load</u>	P_1 in kN	≤	1.10	0.70	0.55	0.45	1.10	0.70	0.55	0.45	1.10	0.70	0.55	0.45
Time t in minutes			Deformations (f_{max}) in mm											
30			270	180	150	60	275	185	155	65	280	190	160	70
60				225	185	160		230	190	165		235	195	170
90		---			215	200	---		220	205	---		225	210
120				---	---	240		---	---	245		---	---	250

Table 11: Deformations (f_{max}) for Walraven RapidStrut® rail systems combined with threaded rods as a function of the time, the span, the suspension height, and the load (single load, centrally)

Deformation: 30 to 120 minutes			Walraven RapidStrut® 41 I H (41x41x2.5) / 62 I H (41x62x2.5) combined with threaded rods "Suspended assembly"											
Span	l_s in mm	≤	700											
Suspension height	h_a in mm	≤	500				1000				1500			
<u>Single load</u>	P_1 in kN	≤	1.10	0.70	0.55	0.45	1.10	0.70	0.55	0.45	1.10	0.70	0.55	0.45
Time t in minutes			Deformations (f_{max}) in mm											
30			330	250	240	170	335	255	245	175	340	260	250	180
60				270	250	230		275	255	235		280	260	240
90		---			260	250	---		265	255	---		270	260
120				---	---	270		---	---	275		---	---	280

Deformations (f_{max}) for Walraven RapidStrut® rail systems under tensile load and exposure to fire in accordance with DIN EN 1363-1 – Suspended assembly / single load

Table 12: Deformations (f_{max}) for Walraven RapidStrut® rail systems combined with threaded rods as a function of the time, the span, the suspension height, and the load (single load, centrally)

Deformation: 30 to 120 minutes			Walraven RapidStrut® 41 I H (41x41x2,5) / 62 I H (41x62x2,5) combined with threaded rods “Suspended assembly”											
Span	I_s in mm	≤	800											
Suspension height	h_a in mm	≤	500				1000				1500			
Single load	P_1 in kN	≤	1.10	0.70	0.55	0.45	1.10	0.70	0.55	0.45	1.10	0.70	0.55	0.45
Time t in minutes		Deformations (f_{max}) in mm												
30		400	300	250	190	405	305	255	195	410	310	260	200	
60			320	290	280		325	295	285		330	300	290	
90		---		300	290	---		305	295	---		310	300	
120			---	---	310		---	---	315		---	---	320	

Design proposal for Walraven RapidStrut® rail systems under tensile load and exposure to fire in accordance with DIN EN 1363-1 – Suspended assembly/ multiple load

The maximum load for the suspension of the fixing rail corresponds to half of the admissible single loads F_{fire} ($\max N_{AH} = n \times P_2/2$).

When executing as multiple-span system with intermediate suspension (M12), the intermediate suspension (M12) may be maximally loaded with the tensile load N_{ZAH} according to Table 7.

Equal distances are to be used and the loads are symmetrically arranged. The individual distance of the loads to each other and to the suspensions results from the span and the number of load application points.

Table 13: Design proposal for Walraven RapidStrut® rail systems combined with threaded rods as a function of the fire resistance time (30 minutes)

Fire resistance: 30 minutes			Walraven RapidStrut® 41 I H (41x41x2.5) / 62 I H (41x62x2.5) combined with threaded rods "Suspended assembly"				
Span	l_s in mm	≤	400	500	600	700	800
Load case			Maximum load " F_{fire} " Load suspension ≥ M10 – multiple loads, symmetrical				
2 single loads à	P_2 in kN	≤	0.79	0.72	0.68	0.65	0.63
3 single loads à			0.55	0.55	0.55	0.51	0.48
4 single loads à			-	0.46	0.45	0.45	0.41
5 single loads à				-	0.37	0.37	0.36
6 single loads à			-		-	-	0.32
7 single loads à			-	-	-	-	0.29

Table 14: Design proposal for Walraven RapidStrut® rail systems combined with threaded rods as a function of the fire resistance time (60 minutes)

Fire resistance: 60 minutes			Walraven RapidStrut® 41 I H (41x41x2.5) / 62 I H (41x62x2.5) combined with threaded rods "Suspended assembly"				
Span	l_s in mm	≤	400	500	600	700	800
Load case			Maximum load " F_{fire} " Load suspension ≥ M10 – multiple loads, symmetrical				
2 single loads à	P_2 in kN	≤	0.49	0.45	0.42	0.40	0.39
3 single loads à			0.36	0.35	0.34	0.31	0.29
4 single loads à			-	0.29	0.29	0.27	0.24
5 single loads à				-	0.23	0.23	0.22
6 single loads à			-		-	-	0.21
7 single loads à			-	-	-	-	0.19

Design proposal for Walraven RapidStrut® rail systems under tensile load and exposure to fire in accordance with DIN EN 1363-1 – Suspended assembly/ multiple load

Table 15: Design proposal for Walraven RapidStrut® rail systems combined with threaded rods as a function of the fire resistance time (90 minutes)

Fire resistance: 90 minutes			Walraven RapidStrut® 41 I H (41x41x2.5) / 62 I H (41x62x2.5) combined with threaded rods "Suspended assembly"				
Span	I_s in mm	\leq	400	500	600	700	800
Load case			Maximum load " F_{fire} " Load suspension \geq M10 – multiple loads, symmetrical				
2 single loads à	P_2 in kN	\leq	0.38	0.34	0.33	0.31	0.30
3 single loads à			0.34	0.27	0.26	0.24	0.22
4 single loads à			-	0.23	0.23	0.20	0.18
5 single loads à				0.19	0.18	0.16	
6 single loads à			-	0.16	0.15		
7 single loads à				-	-	0.14	

Table 16: Design proposal for Walraven RapidStrut® rail systems combined with threaded rods as a function of the fire resistance time (120 minutes)

Fire resistance: 120 minutes			Walraven RapidStrut® 41 I H (41x41x2.5) / 62 I H (41x62x2.5) combined with threaded rods "Suspended assembly"				
Span	I_s in mm	\leq	400	500	600	700	800
Load case			Maximum load " F_{fire} " Load suspension \geq M10 – multiple loads, symmetrical				
2 single loads à	P_2 in kN	\leq	0.33	0.28	0.26	0.24	0.24
3 single loads à			0.23	0.23	0.21	0.18	0.18
4 single loads à			-	0.19	0.18	0.14	0.14
5 single loads à				0.15	0.13	0.13	
6 single loads à			-	0.11	0.11		
7 single loads à				-	-	0.10	

Design proposal for Walraven RapidStrut® rail systems under tensile load and exposure to fire in accordance with DIN EN 1363-1 – Suspended assembly / uniformly distributed load

The uniformly distributed load stated in the tables is equally distributed over the span. The distance of the outer loads to the suspension (axis centre of the threaded rod) must be 50^{25} mm.

The maximum load for the suspension of the fixing rail corresponds to half of the admissible total load max. F_{fire} (max $N_{AH} = q/2$) or half of the sum of the uniformly distributed load.

When executing as multiple-span system with intermediate suspension (M12), the intermediate suspension (M12) may be maximally loaded with the normal force $N_{ZAHfire}$ according to Table 18.

Table 17: Design proposal for Walraven RapidStrut® rail systems combined with threaded rods as a function of the fire resistance time – uniformly distributed load

Walraven RapidStrut® fixing rail			Walraven RapidStrut® 41 I H (41x41x2.5) / 62 I H (41x62x2.5) combined with threaded rods \geq M10 "Suspended assembly"				
Span	l_s in mm	\leq	400	500	600	700	800
Time t in minutes			Maximum load "max F_{fire} " ¹⁾ Load suspension \geq M10 – uniformly distributed load				
30	q in kN/l	\leq	2.70	2.70	2.70	2.70	2.70
60			1.50	1.50	1.50	1.50	1.50
90			1.10	1.10	1.10	1.10	1.10
120			0.90	0.90	0.90	0.90	0.90

¹⁾ The load is evenly distributed as line load over the span, the distance to suspension is a ≤ 50 mm.

Table 18: Design proposal for Walraven RapidStrut® rail systems combined with threaded rods as a function of the fire resistance time – suspension M12 "Continuous beam"

Walraven RapidStrut® fixing rail			Walraven RapidStrut® 41 I H (41x41x2.5) / 62 I H (41x62x2.5) combined with threaded rods \geq M10 "Suspended assembly"	
Time t in minutes			Maximum load N_{ZAH} Intermediate suspension M12 "Continuous beam"	
30	q in kN/l	\leq	2.30	
60			1.40	
90			1.00	
120			0.80	

Deformations (f_{max}) for Walraven RapidStrut® rail systems under tensile load and exposure to fire in accordance with DIN EN 1363-1 – Suspended assembly / uniformly distributed load

Table 19: Deformations (f_{max}) for Walraven RapidStrut® rail systems combined with threaded rods as a function of the time, the span, the suspension height, and the load (uniformly distributed load)

Deformation: 30 to 120 minutes			Walraven RapidStrut® 41 I H (41x41x2.5) / 62 I H (41x62x2.5) combined with threaded rods "Suspended assembly"											
Span	l_s in mm	≤	400											
Suspension height	h_a in mm	≤	500				1000				1500			
<u>Uniformly distributed load</u>	q in kN/l	≤	2.70	1.50	1.10	0.90	2.70	1.50	1.10	0.90	2.70	1.50	1.10	0.90
Time t in minutes			Deformations (f_{max}) in mm											
30			110	60	40	40	115	65	45	45	120	70	50	50
60				125	80	40		130	85	45		135	90	50
90			---		100	65	---		105	70	---		110	75
120						90				95				100

Table 20: Deformations (f_{max}) for Walraven RapidStrut® rail systems combined with threaded rods as a function of the time, the span, the suspension height, and the load (uniformly distributed load)

Deformation: 30 to 120 minutes			Walraven RapidStrut® 41 I H (41x41x2.5) / 62 I H (41x62x2.5) combined with threaded rods "Suspended assembly"											
Span	l_s in mm	≤	500											
Suspension height	h_a in mm	≤	500				1000				1500			
<u>Uniformly distributed load</u>	q in kN/l	≤	2.70	1.50	1.10	0.90	2.70	1.50	1.10	0.90	2.70	1.50	1.10	0.90
Time t in minutes			Deformations (f_{max}) in mm											
30			150	70	40	40	155	75	45	45	160	80	50	50
60				150	95	50		155	100	55		160	105	60
90			---		125	80	---		130	85	---		135	90
120						115				120				125

Deformations (f_{max}) for Walraven RapidStrut® rail systems under tensile load and exposure to fire in accordance with DIN EN 1363-1 – Suspended assembly / uniformly distributed load

Table 21: Deformations (f_{max}) for Walraven RapidStrut® rail systems combined with threaded rods as a function of the time, the span, the suspension height, and the load (uniformly distributed load)

Deformation: 30 to 120 minutes			Walraven RapidStrut® 41 I H (41x41x2.5) / 62 I H (41x62x2.5) combined with threaded rods "Suspended assembly"											
Span	l_s in mm	\leq	600											
Suspension height	h_a in mm	\leq	500				1000				1500			
<u>Uniformly distributed load</u>	q in kN/l	\leq	2.70	1.50	1.10	0.90	2.70	1.50	1.10	0.90	2.70	1.50	1.10	0.90
Time t in minutes			Deformations (f_{max}) in mm											
30			200	85	50	40	205	90	55	45	210	95	60	50
60				170	115	80		175	120	85		180	125	90
90			---		155	115	---		160	120	---		165	125
120				---		145		---		150		---		155

Table 22: Deformations (f_{max}) for Walraven RapidStrut® rail systems combined with threaded rods as a function of the time, the span, the suspension height, and the load (uniformly distributed load)

Deformation: 30 to 120 minutes			Walraven RapidStrut® 41 I H (41x41x2.5) / 62 I H (41x62x2.5) combined with threaded rods "Suspended assembly"											
Span	l_s in mm	\leq	700											
Suspension height	h_a in mm	\leq	500				1000				1500			
<u>Uniformly distributed load</u>	q in kN/l	\leq	2.70	1.50	1.10	0.90	2.70	1.50	1.10	0.90	2.70	1.50	1.10	0.90
Time t in minutes			Deformations (f_{max}) in mm											
30			260	110	50	40	265	115	55	45	270	120	60	50
60				200	145	120		205	150	125		210	155	130
90			---		190	150	---		195	155	---		200	160
120				---		180		---		185		---		190

Deformations (f_{max}) for Walraven RapidStrut® rail systems under tensile load and exposure to fire in accordance with DIN EN 1363-1 – Suspended assembly / uniformly distributed load

Table 23: Deformations (f_{max}) for Walraven RapidStrut® rail systems combined with threaded rods as a function of the time, the span, the suspension height, and the load (uniformly distributed load)

Deformation: 30 to 120 minutes			Walraven RapidStrut® 41 I H (41x41x2.5) / 62 I H (41x62x2.5) combined with threaded rods "Suspended assembly"											
Span	l_s in mm	\leq	800											
Suspension height	h_a in mm	\leq	500				1000				1500			
<u>Uniformly distributed load</u>	q in kN/ls	\leq	2.70	1.50	1.10	0.90	2.70	1.50	1.10	0.90	2.70	1.50	1.10	0.90
Time t in minutes			Deformations (f_{max}) in mm											
30			330	150	50	40	335	155	55	45	340	160	60	50
60				230	180	150		235	185	155		240	190	160
90			---		230	190	---		235	195	---		240	200
120				---		230		---		235		---		240

Design proposal for Walraven RapidStrut® rail systems under tensile load and exposure to fire in accordance with DIN EN 1363-1 – Suspended assembly with brackets

The maximum load for the suspension of the fixing rail corresponds to half of the sum of the admissible single loads F_{fire} ($\max N_{AH} = n \times P_2/2$).

When executing as multiple-span system with intermediate suspension (M12), the intermediate suspension (M12) may be maximally loaded with the tensile load N_{ZAH} according to Table 7.

Equal distances are to be used and the loads are symmetrically arranged. The individual distance of the loads to each other and to the suspensions results from the span and the number of load application points.

Table 24: Design proposal for Walraven RapidStrut® rail systems combined with threaded rods as a function of the time, the span at suspension height $h_a \leq 500$ mm, and the load (single load, centrally, and with multiple loading)

Fire resistance: 30 to 120 minutes			Walraven RapidStrut® wall bracket 41 I H (41x41x2.5) / rail foot / Walraven Strut rail foot with Walraven RapidStrut® 41 I H (41x41x2.5) / 62 I H (41x62x2.5) combined with anchors/threaded rods "Suspended assembly with brackets"				
Span	l_s in mm	\leq	700				
Time	t in min	\leq	30	60	90	120	
Load case			Maximum load "max. F_{fire} " Wall fixing / bracket suspension \geq M10				
1 single load	\hat{a}	P_1 in kN	\leq	0.60	0.39	0.30	0.25
2 single loads	\hat{a}	P_2 in kN		0.34	0.22	0.17	0.14
3 single loads	\hat{a}			0.25	0.16	0.12	0.09
4 single loads	\hat{a}			0.19	0.12	0.08	0.07
5 single loads	\hat{a}			0.15	0.09	0.07	0.06
6 single loads	\hat{a}			0.12	0.08	0.06	0.05

Deformations for Walraven RapidStrut® rail systems under tensile load and exposure to fire in accordance with DIN EN 1363-1 – Suspended assembly with brackets

Table 25: Deformations (f_{max}) for Walraven RapidStrut® rail systems with brackets combined with threaded rods as a function of the time, the span at a suspension height of 500 mm, and the load (single load, centrally)

Deformation: 30 to 120 minutes			Walraven RapidStrut® wall bracket 41 I H (41x41x2.5) / rail foot / Walraven Strut rail foot with Walraven RapidStrut® 41 I H (41x41x2.5) / 62 I H (41x62x2.5) combined with anchors/threaded rods “Suspended assembly with bracket”			
Span	l_s in mm	≤	700			
Suspension height	h_a in mm	≤	500			
<u>Single load</u>	P_1 in kN	≤	0.60	0.39	0.30	0.25
Time t in minutes			Deformations (f_{max}) in mm			
30			180	130	100	80
60			---	180	150	120
90				---	180	150
120				---	---	180

At a suspension height of more than 500 mm, the deformation can be calculated, taking the thermal change in length of the system into account, up to a maximum suspension height of 1500 mm.

Design proposal for Walraven RapidStrut® rail systems under tensile load and exposure to fire in accordance with DIN EN 1363-1 – MLAR application with reduced load

Equal distances are to be chosen and the loads are symmetrically arranged. The individual distance of the loads among each other and of the loads to the suspensions results from the span and the number of load application points.

Table 26: Design proposal for Walraven RapidStrut® rail systems combined with threaded rods as a function of a fire resistance time of 30 minutes – MLAR application with reduced load

Walraven RapidStrut® fixing rail			Walraven RapidStrut® 41 I H (41x41x2,5) / 62 I H (41x62x2,5) combined with threaded rods “Suspended assembly”
Span	l_s in mm	\leq	800
Suspension height	h_a in mm	\leq	500
Load case			Maximum load red. $F_{fire(30)}$ with deformation $f_{max(30)} \leq 50$ mm Fire resistance time of 30 minutes
1 single load	P_1 in kN	\leq	0.25
2 single loads à	P_2 in kN		0.15
3 single loads à			0.13
4 single loads à			0.10

Design proposal for Walraven RapidStrut® rail systems under tensile load and exposure to fire in accordance with DIN EN 1363-1 – Direct assembly

The maximum single load stated in the tables can be split into any number of single loads (as multiple loads), provided the sum of the single loads does not exceed the maximum load stated in the tables.

The maximum load for the fastening of the fixing rail (push-through installation) corresponds to half of the admissible single load F_{fire} ($\max N_{AH} = n \times P/2$).

Table 27: Design proposal for Walraven RapidStrut® rail systems combined with threaded steel rods as a function of the fire resistance time

Fire resistance: 30 to 120 minutes			Walraven RapidStrut® 41 I H (41x41x2,5) / 62 I H (41x62x2,5) ¹⁾ combined with anchors/threaded rods “Direct assembly”			
Span	l_s in mm	≤	400			
Time	t in min	≤	30	60	90	120
Load case			Maximum load “max. F_{fire}” Load suspension ≥ M10			
1 single load	à	P_1 in kN ≤	0.80	0.60	0.45	0.35
2 single loads	à	P_2 in kN ≤	0.58	0.35	0.28	0.20
3 single loads	à	P_2 in kN ≤	0.42	0.24	0.20	0.17

¹⁾ The fixing rails are mounted without distance to the ceiling.

Deformation for Walraven RapidStrut® rail systems under tensile load and exposure to fire in accordance with DIN EN 1363-1 – Direct assembly

Table 28: Deformations (f_{max}) for Walraven RapidStrut® rail systems as a function of the time, the span and the load (single load, centrally)

Deformation: 30 to 120 minutes			Walraven RapidStrut® 41 I H (41x41x2,5) / 62 I H (41x62x2,5) ¹⁾ combined with anchors/threaded rods “Direct assembly”			
Span	l_s in mm	≤	400			
Single load		P_1 in kN ≤	0.80	0.60	0.45	0.35
Time t in minutes			Deformations (f_{max}) in mm			
30			40	40	40	40
60			---	50	40	40
90				---	50	40
120					---	---

¹⁾ The fixing rails are mounted without distance to the ceiling.