

## Technical Information Walraven Expansion Device and Ball Swivel Hanger – fire tested fixing



### Expert Opinion 2103/524/21-CM

- Fire behaviour test to determine the fire resistance duration -

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## Expert Opinion

– Translation –

Document number: (2103/524/21) – CM dated 29/03/2022

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 expansion devices and Walraven ball swivel hangers installed in solid structural elements with regard to their loadbearing capacity 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 7 pages including cover sheet and 11 annexes.



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## 1 General

With letter of 16/11/2021, Walraven Holding B.V, 93641 RK Mijdrecht commissioned the preparation of an expert opinion including an assessment of loaded Walraven expansion devices and Walraven ball swivel hangers combined with threaded rods and installed in solid structural elements with regard to their loadbearing capacity under exposure to fire along the standard temperature-time curve (ETK) in accordance with DIN EN 1363-1.

The expert opinion for the constructions to be assessed was prepared 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. (2102/677/20)-CM dated 17/09/2021, issued for J. van Walraven Holding B.V, 93641 RK Mijdrecht;
- [4] Technical data sheets for Walraven expansion devices from J. van Walraven Holding B.V, 93641 RK Mijdrecht; and
- [5] Technical data sheets for Walraven ball swivel hangers from J. van Walraven Holding B.V, 93641 RK Mijdrecht.

The assessment for the mounting systems was conducted on the basis of the fire tests carried out. Currently, the existing technical directives and specifications, which regulate products for installation of conduits in cases of fire, do not provide a complete design concept for the mounting systems described below. According to J. van Walraven Holding B.V, 93641 RK Mijdrecht, there is currently no complete building authority certificate (e.g., ETA) for Walraven expansion devices and Walraven ball swivel hangers combined with threaded rods that lays down the regulations to be met by the execution described here in the event of fire

## 2 Description of the constructions

Walraven mounting systems (ball swivel hangers, expansion devices) are used for fastening conduit systems. The loads applied are guided into the anchoring base via Walraven mounting systems combined with appropriate fasteners. The fastening in the anchoring base must be executed in accordance with Section 4.7.

According to the client, the related technical specifications for Walraven mounting systems can be taken – for the normal purpose of use – from the respective technical data sheets (e.g., mounting instructions) from J. van Walraven Holding B.V, 93641 RK Mijdrecht.

## 2.1 Description of Walraven expansion devices

Walraven expansion devices are made of galvanized steel. The loads applied are guided into the anchoring base via the pipe clamps, the connected threaded rods (strength class  $\geq 4.8$ ) and Walraven expansion devices combined with suitable fasteners.

Walraven expansion devices consist of the base body with connection holes for fastening to the underground, and the sliding body. The sliding body can move inside the base body on a plastic sliding surface along an axis. The sliding body is equipped with a screwed-in connection head (M12) with metric M8/M10 to M16 inside threads. Walraven expansion devices can be moved  $\Delta s = \pm 50$  mm in longitudinal direction.

The table below and the annexes summarize the design data (manufacturer data) of Walraven expansion devices.

Table 1: Product overview of Walraven expansion devices

Walraven expansion device	Connection		Fastening to the underground	Article number
	Connection thread	Threaded rod		
Expansion device M8/M10	M8/M10	M8	2 x M10	6668310
		M10	2 x M10	
Expansion device M10/M12	M10/M12	M10	2 x M10	6668312
		M12	2 x M10	
Expansion device M16	M16	M16	2 x M10	6668316

For a more detailed description of the construction, reference is made to the annexes and [4].

## 2.2 Description of Walraven ball swivel hangers

Walraven ball swivel hangers are made of galvanized steel. The loads applied are normally guided into the anchoring base via the connected pipe clamps, the threaded rods (strength class  $\geq 4.8$ ) and the Walraven ball swivel hangers that are arranged in pairs combined with appropriate fasteners.

Walraven ball swivel hangers are equipped with a ball joint connection, an inside thread and an outside thread for connection of the second ball swivel hanger or other mounting elements.

The table below and the annexes summarize the design data (manufacturer data) of Walraven ball swivel hangers.

Table 2: Product overview of Walraven ball swivel hangers

Walraven ball swivel hangers	Connection		Article number
	Execution	Connection thread (AG) External thread	
BIS ball joint M8, L = 49 mm	M8	M8	6642008
BIS ball joint M8, L = 74 mm	M8	M8	6642108
BIS ball joint M10, L = 49 mm	M10	M10	6642010
BIS ball joint M10, L = 64 mm	M10	M10	6644010
BIS ball joint M10, L = 74 mm	M10	M10	6642110
BIS RapidStrut® ball joint kit M8, L = 80 mm	-	M8	66530805
BIS RapidStrut® ball joint kit M10, L = 80 mm	-	M10	66530005

For a more detailed description of the construction, reference is made to the annexes and [5].

### 3 Assessment of the construction

#### 3.1 General

The subject matter of this fire-safety-related assessment are the Walraven mounting systems described in Section 2.

The fire-safety-related assessment is limited to mainly static (dead) loads combined with solid structural elements of at least the same fire resistance class as the fastening systems.

The fire-safety-related assessment excludes the use for constructions that are tested and classified as a whole, e.g., ventilations ducts in accordance with MLÜAR (e.g. L90), or cable systems assigned to maintain circuit integrity and cable trunking/ducts in accordance with MLAR (e.g. E90 in accordance with DIN 4102-12 : 1998-11). For these types of applications, further assessments and tests of the system as a whole are necessary.

Independent of the fire-safety-related assessment, the suitability of Walraven mounting 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 [4] and [5], these shall be binding.

Requirements to be fulfilled by fasteners and mounting systems (e.g., pipe clamps, mounting rails, ...) with regard to the loadbearing capacity  $N_{\text{fire}(t)}$  and the deformation  $f_{(t)}$  are imposed in conjunction with conduits (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, the fastening is part of the conduit system; special requirements may result in conjunction with ceilings (MLAR, Section 3.5). In conjunction with penetration seals, too, requirements to be fulfilled by the fastening of conduits may result from the building authority certificate.

The individually required minimum distance (min. a) can be determined for the described Walraven mounting systems on the basis of the deformations  $f_{\text{max}(t)}$  stated in the annexes. The deformations stated only refer to the Walraven mounting systems under exposure to fire. Additional deformations from the suspension and the conduit systems (e.g., the deformation of a pipe) must be taken into account separately.

### **3.2 Assessment of Walraven expansion devices and Walraven ball swivel hangers – steel failure**

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

For the Walraven mounting systems assessed here, the failure of Walraven mounting systems combined with threaded rods (steel failure) was decisive. The proof of the fastening to the ground must be furnished separately.

The load can be applied as centric tensile load  $N_{\text{fire}(t)}$  (referred to the threaded rods) on the Walraven expansion devices and the Walraven ball swivel hangers combined with threaded rods.

$N_{\text{fire}(t)}$        $\Rightarrow$  design value of load-bearing capacity under exposure to fire as a function of time

The design proposal for Walraven Gleit expansion devices according to Table 1 under one-side exposure to fire in accordance with DIN EN 1363-1 can be taken from Annex 10.

The design proposal for Walraven ball swivel hangers according to Table 2 under one-side exposure to fire in accordance with DIN EN 1363-1 can be taken from Annex 11.

#### **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 certificate of suitability for use in a building control procedure. The expert opinion can be used, for example, for general preliminary planning or to support in the assessment of the principles 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 stated in Section 1 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 mounting systems, taking the boundary conditions from the technical datasheets from J. van Walraven Holding B.V, 93641 RK Mijdrecht, into account.
- 4.7 The assessment applies for Walraven mounting systems installed/fastened in solid structural elements. The underground and the fastening must have at least the same fire resistance as the individual mounting system.
- 4.8 Modifications and supplements of structural details (derived from this Expert Opinion) may only be made after prior consultation with MPA Braunschweig.
- 4.9 The proper execution is exclusively within the responsibility of the executing companies.
- 4.10 The structural details as shown in the annexes shall be binding for the above assessment. Only those details were verified that are relevant for the fire safety assessment.

4.11 The validity of this Expert Opinion No. (2103/524/21) – CM dated 29/03/2022 ends on 29/03/2027 at the latest. The validity can be extended as a function of the state of the art.

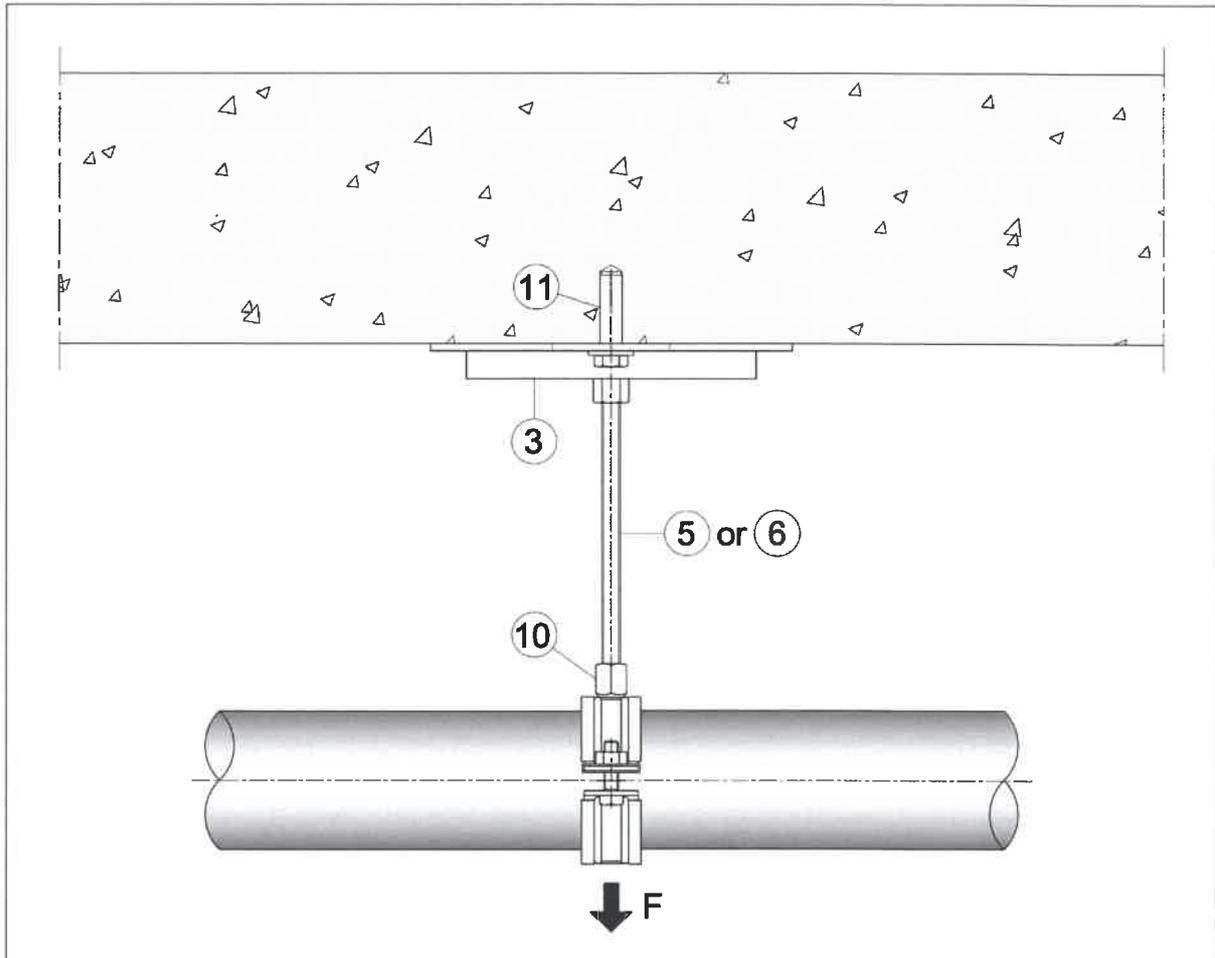
*This document is the translated version of Expert Opinion No. 2103/524/21 – CM dated 29/03/2022. The legally binding text is the aforementioned German Expert Opinion.*

  
i.A.  
ORR Dr.-Ing. Gary Blume  
Head of Department



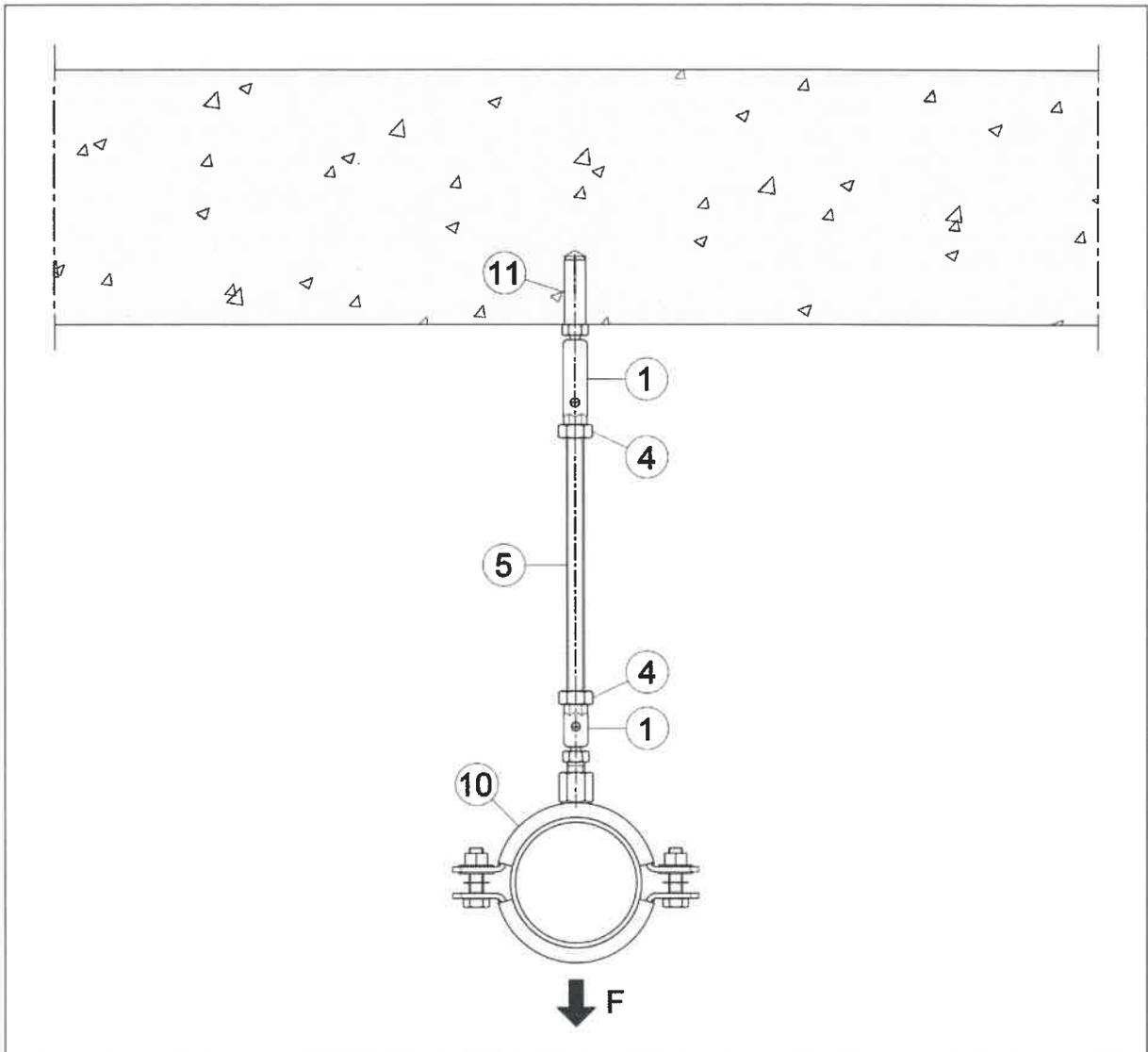
  
i.A.  
Dipl.-Ing. Christian Maertins  
Engineer/official in charge

**Example for installation: Walraven expansion devices (manufacturer data)**



The fire-safety-related assessment refers to the Walraven expansion devices (item 3) according to Table 1. The assessment for items 5, 6, 10, 11 with regard to load-bearing capacity and deformation must be made separately.

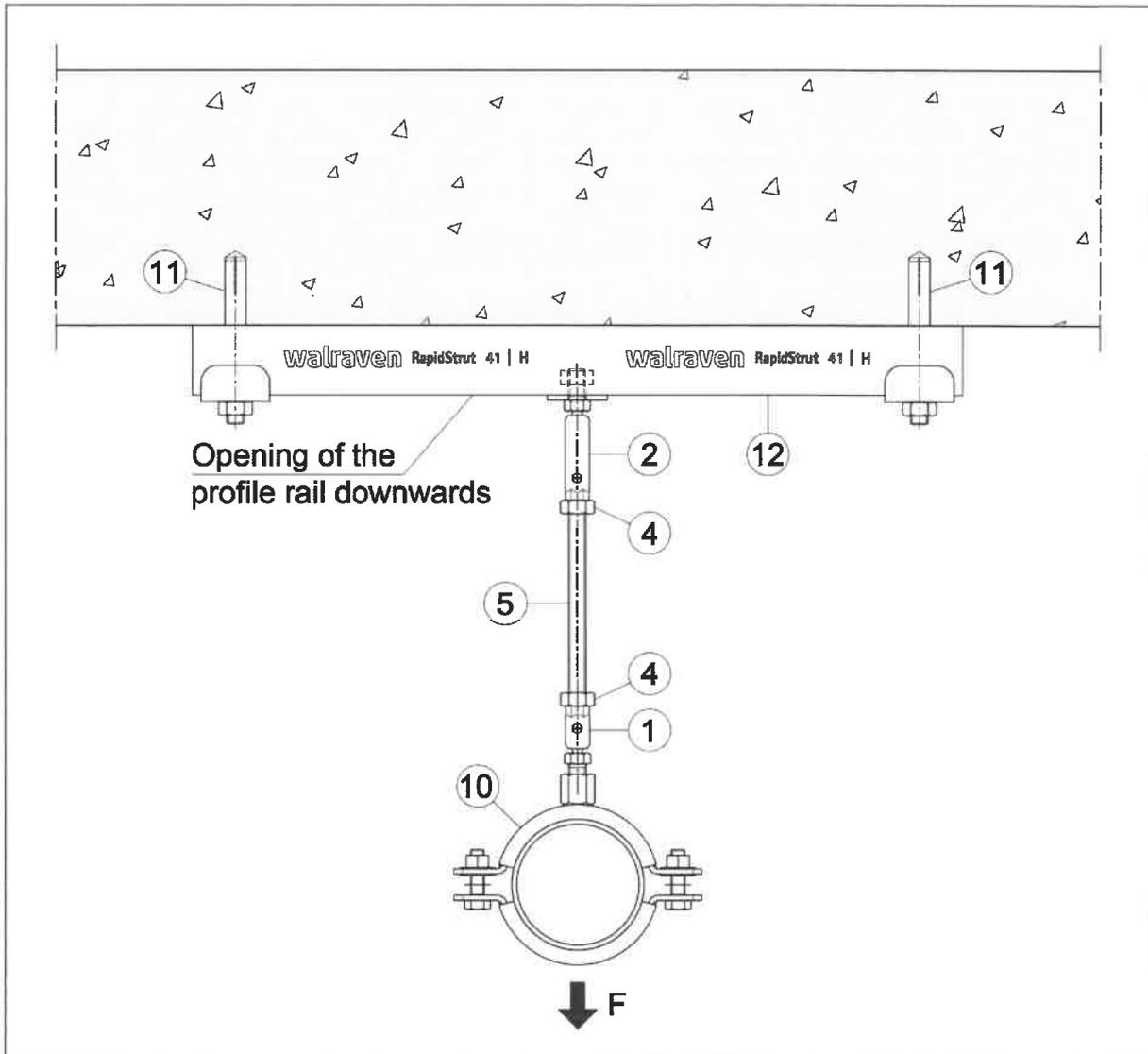
**Example for installation: Walraven ball swivel hanger (manufacturer data)**



The fire-safety-related assessment refers to the Walraven ball swivel hangers (item 1) according to Table 2.

The assessment for items 5, 10, 11 with regard to load-bearing capacity and deformation must be made separately.

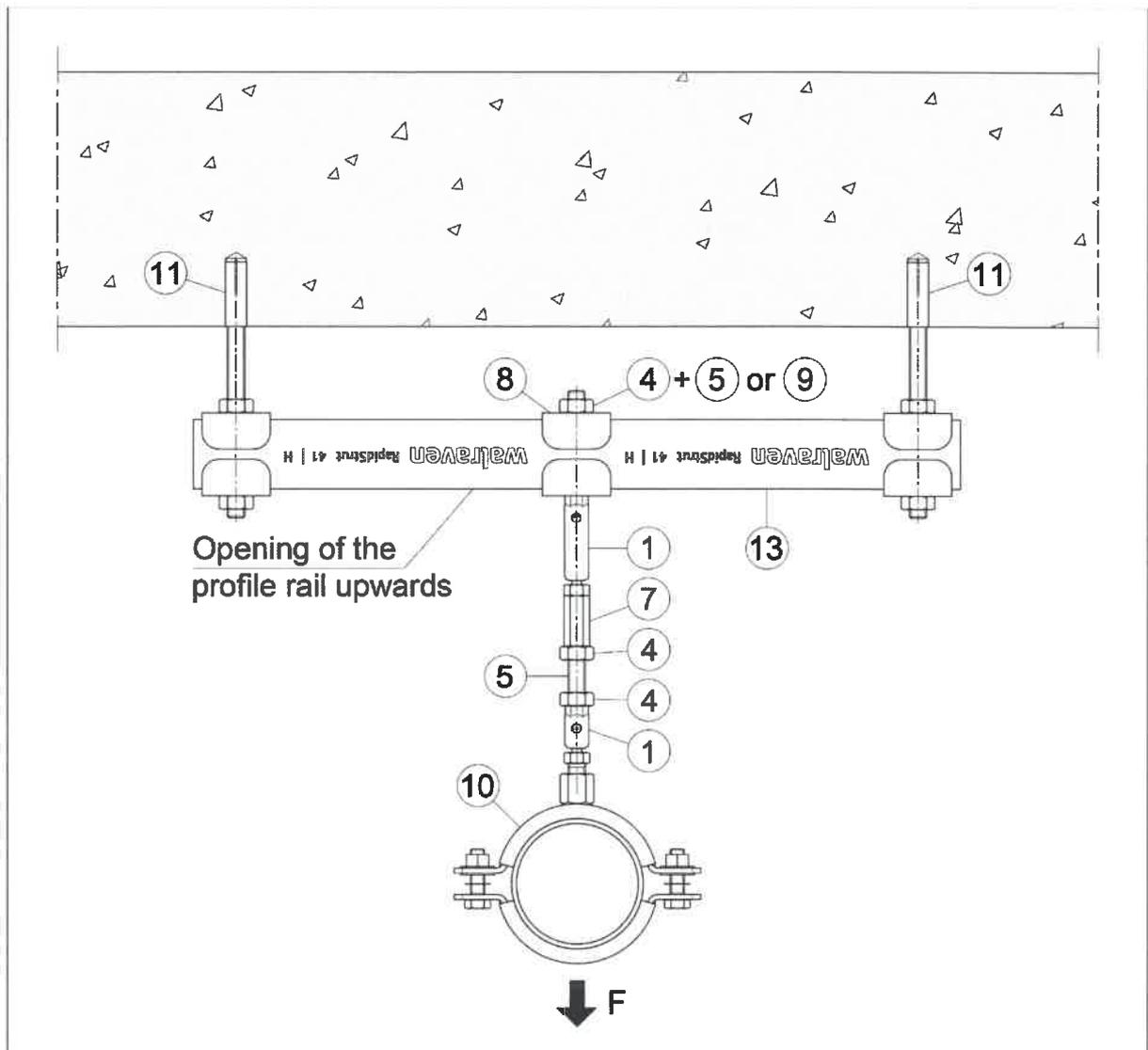
### Example for installation: Walraven ball swivel hanger (manufacturer data)



The fire-safety-related assessment refers to the Walraven ball swivel hangers (items 1 and 2) according to Table 2.

The assessment for items 5, 10, 11, and 12 with regard to load-bearing capacity and deformation must be made separately.

**Example for installation: Walraven ball swivel hanger (manufacturer data)**



The fire-safety-related assessment refers to the Walraven ball swivel hangers (item 1) according to Table 2.

The assessment for items 5, 10, 11, and 13 with regard to load-bearing capacity and deformation must be made separately.

## Technical data: Walraven expansions device (manufacturer data)

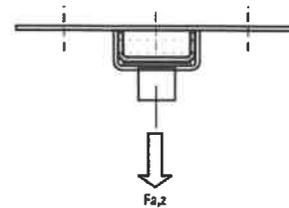
E BIS Fixing Points and Sliding Devices

walraven

### BIS Expansion Device (BUP1000)

(E 10 35)

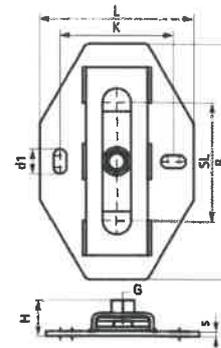
fixing with sliding assemblies



#### Features and Benefits

- single support for pipe expansion
- secure parts ensure mechanism will not slide out
- fix directly on the building structure or in combination with rail systems
- suitable for ceiling mounting (suspended) and floor mounting (standing mounted)
- very low installation height, useful in small spaces
- a variety of connection possibilities, can be combined with Bifix® G2 or HD1501 Pipe Clamps
- material: metal parts made of steel; plastic parts made of POM (polyoxymethylene)
- friction coefficient  $\mu = 0.18$ ;  
Sliding friction coefficient  $\mu = 0.14$
- surface protection:
  - product is part of the 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
  - temperature resistance up to +120 °C

Part No.	Model	G	L	B	H	s	d1	k	SL (max.)
			(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)
6668310	Single	M8/10	130 mm	200	30.5	4.0	21 x 11	96	100
6668312	Single	M10/12	130 mm	200	32.5	4.0	21 x 11	96	100
6668316	Single	M16	130 mm	200	30.5	4.0	21 x 11	96	100



#### Complementary

BIS Stud Bolt  
BIS Threaded Rod  
WTB1 Throughbolt Anchor

#### Alternative

BIS Expansion Guide Assembly (BUP1000)

## Technical data: Walraven ball swivel hanger (manufacturer data)

E BIS Fixing Points and Sliding Devices

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### BIS Ball Swivel Hanger

(E 10 05)

hinging fixing point



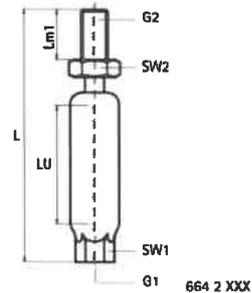
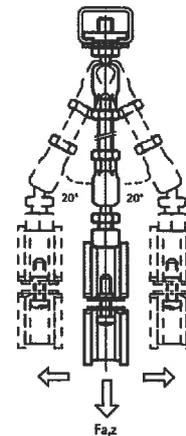
6642008 6642010 6644010 6642108 6642110

#### Features and Benefits

- for fastening hanging pipes with thermal expansion
- allows axial and radial pipe movements
- particularly suitable for larger distances to the ceiling
- with inspection hole to check screw-in depth (attention: when the threaded rod is screwed-in too deep, the ball swivel is blocked)
- screw-in depth is continuously variable (see LU)
- material: steel
- zinc plated

Part No.	L	LU	G1	G2	Lm1	SW1	SW2
		[mm]			[mm]	[mm]	[mm]
6642008	49 mm	7	M8	M8	15	13	10
6642010	49 mm	7	M10	M10	15	13	12
6644010	64 mm	7	M10	M10	30	13	12
6642108	74 mm	32	M8	M8	15	13	10
6642110	74 mm	32	M10	M10	15	13	12

Please note: Always use 2 ball swivel hangers and secure by additional hexagon nut (see application picture). The maximum length change that can be dealt with, depends on the fixing distance (ceiling - pipe). The height difference that occurs as a result, needs to be taken into consideration. To be used in combination with BIS RapidRail® or BIS RapidStrut® Ball Swivel Hangers. Product can be found on page G 30 60 / H 24 75.



#### Complementary

- BIS Fastenings
- BIS RapidRail® Ball Swivel Hanger
- BIS RapidStrut® Ball Swivel Hanger

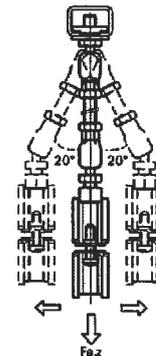
**Technical data: Walraven ball swivel hanger kits (manufacturer data)**



**BIS RapidStrut® Ball Swivel Hanger**

(H 24 75)

fixing to Strut rail

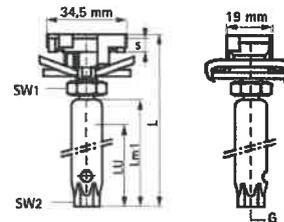
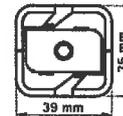


**Features and Benefits**

- slide nut with ball swivel hanger, washer and BIS RapidStrut® spring
- recommended for metal pipes up to DN 50, plastic pipes up to DN 100
- ready-to-use pre-assembled for a quick fixing, and retains assembly in place before final tightening
- with inspection hole to check screw-in depth (attention: when the threaded rod is screwed-in too deep, the ball swivel is blocked)
- screw-in depth is continuously variable (see LU)
- material: metal parts made of steel 1.0332; spring(s) made of POM (polyoxymethylene), green
- zinc plated

Part No.	G	L	LU	s	Lm1	SW1	SW2	T <sub>(max.)</sub>	For Rail
			(mm)	(mm)	(mm)	(mm)	(mm)	(N)	
66530805	M8	80 mm	43	6.0	50	13	10	15.0	Strut
66530005	M10	80 mm	43	8.0	50	13	12	15.0	Strut

*Please note. Always use 2 ball swivel hangers and secure by additional hexagon nut (see application picture). The maximum length change that can be dealt with, depends on the fixing distance (ceiling - pipe). The height difference that occurs as a result, needs to be taken into consideration. To be used in combination with BIS Ball Swivel Hangers. Product can be found on page E 10 05.*



**Complementary**

- BIS Ball Swivel Hanger
- BIS RapidStrut® Cantilever Arm (BUP1000)
- BIS RapidStrut® Fixing Rail DS 5 (BUP1000)

## Technical data: Product overview (manufacturer data)

**Table 1: Product overview (material table)**

No.	Description	Part no.	Material
1	BIS Ball Swivel Hanger (zp) M8, L = 49 mm	6642008	Ball Joint Hanger: Steel 1.0718 Ball Joint Body: Steel 1.0332
	BIS Ball Swivel Hanger (zp) M10, L = 49 mm	6642010	
	BIS Ball Swivel Hanger (zp) M10, L = 64 mm	6644010	
	BIS Ball Swivel Hanger (zp) M8, L = 74 / 79 mm	6642108	
	BIS Ball Swivel Hanger (zp) M10, L = 74 / 79 mm	6642110	
2	BIS RapidStrut® Ball Swivel Hanger (zp) M8, L = 80 mm	66530805	BIS RapidStrut® Slide Nut Steel 1.0332 (BUP1000) Ball Joint Hanger: Steel 1.0718 Ball Joint Body: Steel 1.0332
	BIS RapidStrut® Ball Swivel Hanger (zp) M10, L = 80 mm	66530005	
3	BIS Expansion Device M8/10, (BUP1000)	6668310	Base Plate: Steel 1.0332 U-Profile: Steel 1.0332 Sliding Plate: Steel 1.0332 Cover Sliding Plate: POM Thread Adaptor: Steel 1.0503
	BIS Expansion Device M10/12, (BUP1000)	6668312	
	BIS Expansion Device M16, (BUP1000)	6668316	
4	BIS Hexagon Nut M8 or M10 (zp)	6123008 6123010	DIN 934 ( ISO 4032 ), FK 8 (zinc plated)
	BIS Hexagon Nut M8 or M10 (BUP1000)	61281008 61281010	DIN 934 ( ISO 4032 ), FK 8 (BIS UltraProtect® 1000)
5	BIS Threaded rod M8 or M10 (zp)	6303x08 6303x10	DIN 976-1, FK ≥ 4.8 (zinc plated)
	BIS Threaded rod M8 or M10 (BUP1000)	6308x008 6308x010	DIN 976-1, FK ≥ 4.8 (BIS UltraProtect® 1000)
6	BIS Threaded rod M12 or M16 (zp)	6303x12 6303x16	DIN 976-1, FK ≥ 4.8 (zinc plated)
	BIS Threaded rod M12 or M16 (BUP1000)	6308x012 6308x016	DIN 976-1, FK ≥ 4.8 (BIS UltraProtect® 1000)
7	BIS Stud Connector M8 or M10 (zp)	6453830 64539x0	Steel 1.0332 (zinc plated)
	BIS Stud Connector M8 or M10 (BUP1000)	6458830 6458940	Steel 1.0332 (BIS UltraProtect® 1000)

No.	Description	Part no.	Material
8	BIS Strut Washer U-shaped Ø 9 mm (BUP1000)	66588008	Steel 1.0332 (BIS UltraProtect® 1000)
	BIS Strut Washer U-shaped Ø 11 mm (BUP1000)	66588010	Steel 1.0332 (BIS UltraProtect® 1000)
9	BIS Hexagonal Screw M8 or M10 Length ≥ 60 mm (zp)	61438x0 61439x0	DIN 933, FK 8.8 (zinc plated)
	BIS Hexagonal Screw M8 or M10 Length ≥ 60 mm (BUP1000)	614808x0 614810x0	DIN 933, FK 8.8 (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	
12	BIS RapidStrut® Fixing Rail System, Design: Directly mounted rail	The fixing rails have to be installed in accordance with the boundary conditions of the expert opinions No. 3184/198/12-CM resp. No. 2103/523/21-CM	
13	BIS RapidStrut® Fixing Rail System, Design: Suspended mounted rail	The fixing rails have to be installed in accordance with the boundary conditions of the expert opinions No. 3184/198/12-CM resp. No. 2103/523/21-CM	

## Design proposals for Walraven expansion devices under exposure to fire in accordance with DIN EN 1363-1

Table 3: Design proposal for Walraven expansion devices made of galvanized steel as a function of the fire resistance

Walraven expansion device	Expansion device M8/M10		Expansion device M10/M12		Expansion device M16
	M8	M10	M10	M12	
Threaded rod (strength class $\geq 4.8$ )					
Fire resistance time in minutes	Maximum tensile load max. $N_{\text{fire}(t)}$ <sup>1)</sup> in kN				
30	0.50				
60	0.50				
90	0.50				
120	0.30				

<sup>1)</sup> Deflection of Walraven expansion devices of  $\frac{\Delta l}{2} = \pm 50 \text{ mm}$  from the central axis is admissible (see also [4]).

Table 4: Deformations ( $f_{\text{max}}$ )<sup>1)</sup> for Walraven expansion devices as a function of time and load

Walraven expansion device				Expansion device M8/M10 Expansion device M10/M12 Expansion device M16	
Single load	$N_{\text{fire}(t)}$	$\leq$	[ kN ]	0.50	0.30
Time in minutes				Deformations ( $f_{\text{max}}$ ) in mm	
30				10	10
60				32	25
90				34	30
120				-	32

<sup>1)</sup> The change in length of the connected fastener/threaded rods is to be determined separately.

## Design proposals for Walraven ball swivel hangers under exposure to fire in accordance with DIN EN 1363-1

Table 5: Design proposal for Walraven ball swivel hangers combined with related threaded rods<sup>1)</sup> made of galvanized steel as a function of the fire resistance

Walraven ball swivel hangers	Ball swivel hangers M8 and M10	
Threaded rod (strength class $\geq 4.8$ )	M8	M10
Fire resistance time in minutes	Maximum tensile load $N_{\text{fire}(t)}$ <sup>1)</sup> in [kN]	
30	0.67	0.70
60	0.36	0.38
90	0.26	0.26
120	0.20	0.20

<sup>1)</sup> Deflection of the swivel hangers of  $\alpha \leq 20^\circ$  is admissible (see also [5]).

Table 6: Deformations ( $f_{\text{max}}$ )<sup>1)</sup> for some Walraven ball swivel hangers as a function of time and load

Walraven ball swivel hanger				Ball swivel hangers M8 and M10			
Single load	$N_{\text{fire}(t)}$	$\leq$	[ kN ]	0.70	0.38	0.26	0.20
Time in minutes				Deformations ( $f_{\text{max}}$ ) in mm			
30				7.0	2.0	1.8	1.6
60				-	7.0	3.5	3.0
90				-	-	7.5	4.0
120				-	-	-	7.5

<sup>1)</sup> The change in length of the connected fastener/threaded rods is to be determined separately.