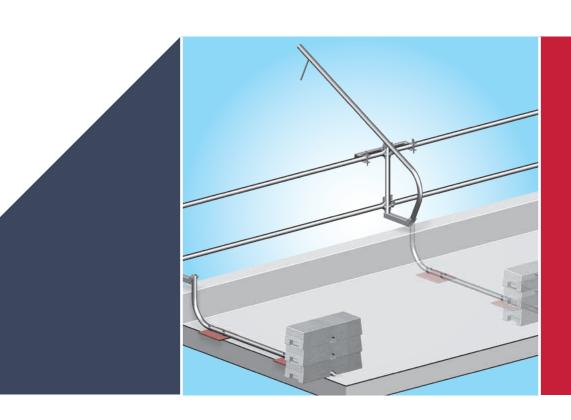


ALLROUND FLAT ROOF GUARDRAIL INSTRUCTIONS FOR ASSEMBLY AND USE



Edition 11.2018 Ref. No. 8116.238

Quality management certified as per **DIN EN ISO 9001**











CONTENTS

1.	Introduction	4
2 .	Installation situations	8
3.	Assembling the flat roof guardrail	9
3.1.	Bay assembly	9
3.2.	Ballasting1	0
3.3.	Stiffening1	0
3.4.	Corner construction	1
3.5.	Shift preventer1	1
4.	Use in roof work1	2
5.	Ballasting1	3
5.1.	Number of ballast blocks per flat roof guardrail post1	4
6.	Dismantling1	8
7.	Palletizing and transport1	8
8.	Components 1	9

NOTE

The products and assembly variants shown in these instructions for assembly and use may be subject to country-specific regulations. The user of the products bears the responsibility for compliance with these regulations. Subject to local regulations, we reserve the right not to supply all the products illustrated here. Your Layher partner on the spot will be happy to provide advice and answers to all questions relating to the products, to their use and approvals, or to specific assembly regulations.

The contents of this document relate exclusively to original Layher scaffolding components. Layher has prepared these contents, in particular the specifications, representations, images, directions and recommendations, with the utmost care. Nevertheless, Layher cannot accept any liability for the correctness, completeness and currentness of the contents. Where legally permissible, liability shall be excluded unless Layher is acting with intent. This applies in particular for obvious mistakes, typing errors, calculation errors and printing errors. Use of the contents shall be at the user's own risk. The scaffolding designs as shown, the detailed solutions and the intended uses must be understood only as non-binding examples.

For some assembly conditions, Layher has prepared the structural verification for the Allround flat roof guardrail to the best of its knowledge and belief on the basis of the European dimensioning regulations applicable at the time of going to print. Depending on the country-specific and relevant requirements, provisions and regulations applying at the respective place of use, it must be checked on the users' own responsibility whether the information and the verifications for ballasting are applicable to the respective guardrail version. If necessary, the users of the Allround flat roof guardrail must prepare and document their own structural strength calculations, taking into account the design, local conditions and local requirements.

If components from other manufacturers are used in scaffolding structures, these instructions for assembly and use are not applicable.

These instructions for assembly and use must be available to the scaffolding erector assembling or dismantling the Allround flat roof guardrail and to the user at the place of use and when such work starts.

1. INTRODUCTION

General

These instructions for assembly and use relate to assembly, modification and dismantling of the Allround flat roof guardrail from Wilhelm Layher GmbH & Co KG, of Gueglingen-Eibensbach, Germany. These instructions cannot cover all the possible applications. General information is provided.

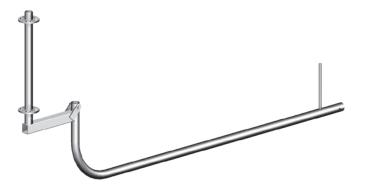
The Allround flat roof guardrail is a modular-designed side protection which can, depending on the geometry of the roof area, be expanded

using scaffolding components from the Layher Allround modular system. The components of the Layher flat roof guardrail can be quickly connected to one another using the proven wedge-head connection. For roof work in the setup area of the flat roof guardrail, only one ballast tube at once can be swung up. The flat roof guardrail may be used on roof with a maximum 10° roof angle. The required ballast weights have been determined for assembly heights of up to 100 metres above ground level.

These instructions for assembly and use apply exclusively to original Layher scaffolding components and for the following two Allround flat roof guardrail posts:

Flat roof guardrail post

Ref. No.: 2666.010



Flat roof guardrail post, offset

Ref. No.: 2666.011



Original Layher scaffolding components for the Layher Allround modular system are identified with the conformity mark $\langle \ddot{U} \rangle$ and the abbreviated approval number in accordance with the requirements of the building authority approvals Z-8.22-64, Z-8.22-64.1, Z-8.22-939 and Z-8.22-949.

The following four design variants of the Layher Allround modular system are distinguished:

	Steel		Aluminium						
Modular system Layher Allround LW according to general building authority approval No. Z-8.22-939	Allround LW Allround coording to general building authority according to general building authority								
Variant LW	Variant K2000+	Variant II	approval No. Z-8.22-64.1						
H Layber & A Co									
Manufacture starting in 2013	Manufacture starting in 2000	Manufactured until 1999	Manufacture starting in 1989						

All connector variants have different load-bearing capacities, which are specified in the respective general building authority approvals. The use of a mixture of components of the connector variants LW, K2000+ and II is regulated in the general building authority approval No. Z-8.22-949 'Modular system Layher Allround LWv'. If module components of the variant Allround Aluminium are connected to the flat roof guardrail posts, the key values for the Allround Aluminium connector variant must be used for verification of the load-bearing capacity.

If verification of the stability of the Layher Allround flat roof guardrail is not furnished with these instructions (see section 5), stability must

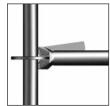
be verified and assured at all times, including during the assembly state. Signs, tarpaulins or nets may only be attached to the Allround flat roof guardrail if each individual case has been structurally verified.

Visually check all components prior to installation to ensure that they are in flawless condition. Do not use damaged components. Components must not be thrown; instead they must be passed along in such a way that they cannot slip or be dropped. The use of lifting gear must be checked.

Function principle of Allround wedge head connection

- 1. Push wedge-head over the rosette
- Insert the wedge into a hole. The component is secure against shifting and falling out.
- 3. Hammer the wedge home to secure a non-positive connection. (Use metal hammer of min. 500 g until the blow bounces off)







WARNING

Wedges must be hammered home immediately after assembly of the components using a metal hammer of at least 500 g until the blow bounces off.

The flat roof guardrail may only be set up on a surface with sufficient load-bearing capacity. Before the Layher flat roof guardrail is assembled, the surface must be checked for sufficient load-bearing capacity.

The stability of the flat roof guardrail must be verified and assured at all times, including in all assembly states.

Inadvertent removal of wedges can lead to a collapse of the flat roof guardrail structure and the risk of serious injuries or fatalities.

Safety instructions for assembling, putting into service and dismantling of the Allround flat roof guardrail

The Allround flat roof guardrail may only be assembled, modified and dismantled by personnel familiar with these instructions for assembly and use and with those for Layher Allround Scaffolding. This also applies for personnel using the Allround flat roof guardrail.

The contractors responsible for assembly and use must ensure that all reasonably predictable risks to health and safety are recognized during assembly, use and dismantling of the flat roof guardrail. If any risks are detected, suitable preventive measures must be taken and checked by the contractor. The present instructions for assembly and use do not release the contractor from the obligation to conduct his own risk assessment for the respective location and for the respective working method.

Before work starts, the contractor must ascertain whether the intended work area contains any site-related risks arising from equipment, overhead cables, other work in progress, falling parts, road traffic or other risks due to burying or sinking etc., that might endanger employees.

Splitting off / airborne parts	Safety glasses
Falling parts	Hard hat
Sharp edges	Gloves
Weather effects	Weather-appropriate clothing
Stubbing / pointed objects / twisted ankles	S3 safety shoes
Dust	Dust mask
Noise	Ear protectors
Falls	Personal safety apparatus against falls (PSAaf)

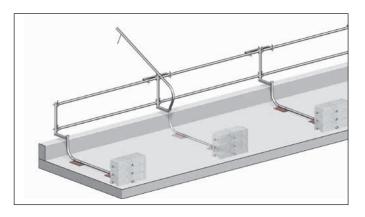
Assembly, modification and dismantling of the flat roof guardrail involves risk from falls. Perform the work in such a way that the risk of falls is avoided as far as possible and that the residual risk is minimized. Further directions on assembly can be found in the instructions for assembly and use of Allround Scaffolding.

Assembly, modification and dismantling of the Layher flat roof guardrail may only be performed with appropriate protective equipment.

Before every first use at an assembly location, the contractor responsible for assembly and use must have the stability and the function of the Allround flat roof guardrail checked by a person qualified to do so. The contractor using the flat roof guardrail must also have it checked by a person qualified to do so after any unusual events that might have damaging effects on the Allround flat roof guardrail.

2. INSTALLATION SITUATIONS

Flat roof with fascia



In the case of a flat roof with low fascia height, the flat roof guardrail post (Ref. No. 2666.010) is used.

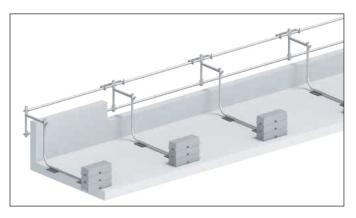
Flat roof without fascia





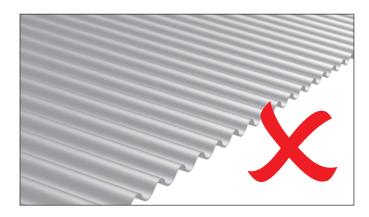
In the case of a flat roof without fascia, both flat roof guardrail posts (Ref. Nos. 2666.010 and 2666.011) are used. It must however be ensured that the 3-piece side protection (handrail, knee rail and toe board) is provided without fail. With the flat roof toe board holder, the guardrail posts (slide preventers) can be supplemented by Speedy toe boards if there is no roof upstand.

Flat roof with high fascia



In the case of a flat roof with a fascia height of up to 880 m, the flat roof guardrail post, offset (Ref. No. 2666.011) can be used. Alternatively, the flat roof guardrail post (Ref. No. 2666.010) can be fitted in front of the fascia if no work has to be done on the latter.

Use of sheet metal roofs

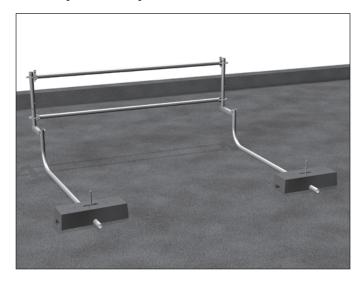


Use of the Allround flat roof guardrail on sheet metal roofs of any type is not envisaged by the manufacturer, since the frictional force necessary to prevent slippage would require too many ballast weights.

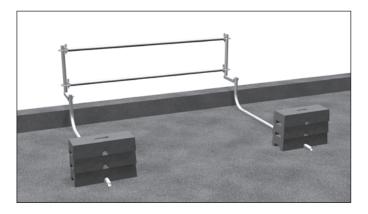
3. ASSEMBLING THE FLAT ROOF GUARDRAIL

The flat roof guardrail can in its standard version be used for buildings of up to 100 metres high, provided the guardrail posts are ballasted in accordance with section 5 and the conditions set forth therein apply. In the case of slightly inclined roofs, the roof angle must not exceed 10°. Section 3.5 "Shift preventer" must be complied with.

3.1. Bay assembly



The guardrail bays must be preassembled at a safe distance from the edge of the roof (min. 3 metres). The flat roof guardrail posts are laid out on the roof to match the bay configuration, placed upright in pairs, provided first with a ballast weight and then connected up with two ledgers (up to 3.07 m long).



Then the assembled guardrail bay is pushed to the roof edge so that it is flush with its outer edge. The ballast must now be increased to the required total weight as per section 5 at each guardrail post.

The complete guardrail is mounted in the same way, bay by bay, at all edges where there is a risk of falls.

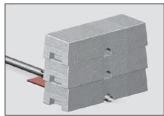
Alternatively, the flat roof guardrail can be assembled directly at the roof edge. This requires the use of PSAaf to protect against falls, and the presence of suitable attachment points.

MARNING

Nothing must be attached to the Allround flat roof guardrail.

3.2. Ballasting





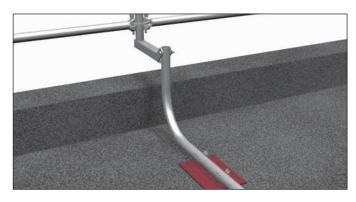
Ballast weights safeguard the flat roof guardrail against sliding and tipping over and must be mounted on the pins of the ballast tubes provided on the guardrail posts.

Each guardrail post requires at least 53 kg of ballast (three ballast weights of plastic at 19 kg each or four ballast weights of concrete at 15 kg each)!

Concrete ballast weights of 15 kg each are no longer in production but can still be used.

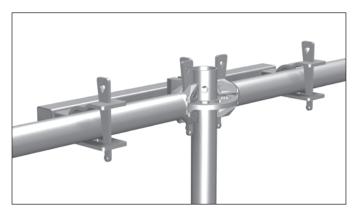
The ballast weights for the guardrail versions verified by the manufacturer are specified in section 5.

Pad (for load distribution)



If required, load-distributing pads can be arranged underneath the ballasting tubes in the front and / or rear areas of the flat roof guardrail.

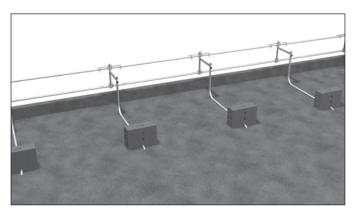
3.3. Stiffening



The post stiffener strengthens the ledger joint at the guardrail post. It is connected to the upper rosette of the guardrail post from the outside and then wedged in place with the ledgers.

Post stiffeners must be installed at all upper rosettes in the ledger joint along the same axis.

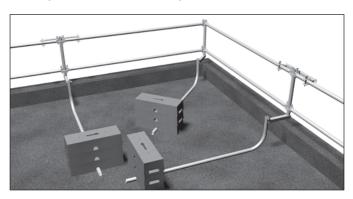
They are not required at corner posts.



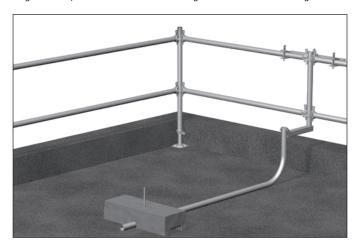
3.4. Corner construction

There are two options for constructing the corner:

1. In the corner area a flat roof guardrail post rotated by 45° is arranged and ballasted accordingly.

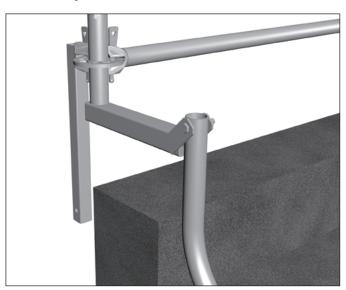


2. A 1.0 metre-long Allround standard with base plate is positioned directly at the corner. It is then connected to the adjacent flat roof guardrail posts with 0-Allround ledgers of max. 3.07 m length.



Note: The corner version with standard is only possible in the position in front of the fascia.

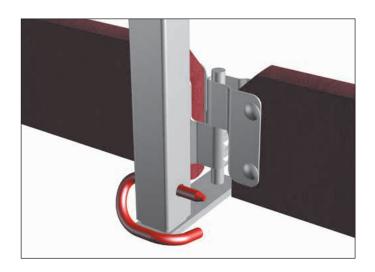
3.5. Shift preventer



If the flat roof guardrail is not designed as a closed rectangle, a shift preventer must be installed at the lower rosette of each of the two outer guardrail posts. It provides the contact with the fascia. For greater side lengths, it is recommended that a shift preventer be used about every 10 metres.

If there is no fascia, attachments to the roof edge (e.g. edge planks) must always be provided, or equivalent measures must be taken to prevent it from slipping off the roof in high winds!

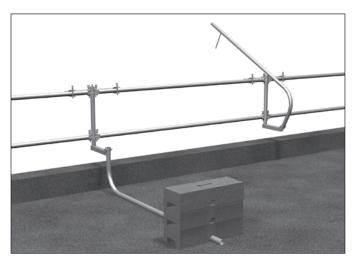
If toe boards are required, the shift preventer doubles as a mounting for the toe board holder (see page 12).



Toe board holder for Speedy toe boards

If toe boards are required, toe board holders must be fastened to the shift preventers. They are inserted from underneath into the shift preventer and then secured with a pin or locking pin.

4. USE IN ROOF WORK

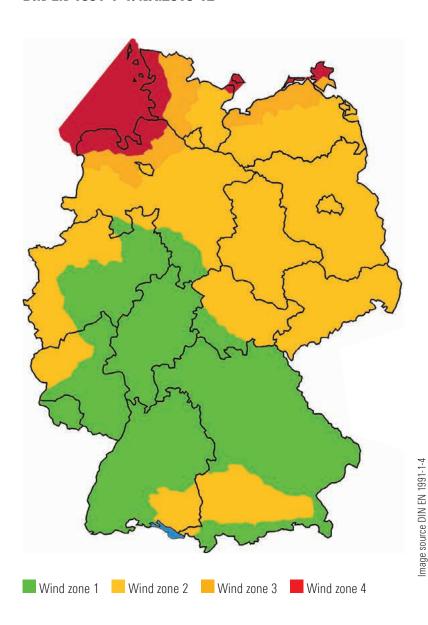


For work on the roof, only one ballast tube may be swung upwards at a time! To do so, the ballast on the tube to be swung upwards must first be removed.

Immediately after completing the work on the roof at that point, and before swinging the next ballast tube upwards, the ballast tube in the up position must be swung down and ballasted again.

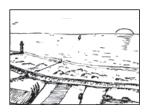
5. BALLASTING

Wind zone map acc. to Annex NA-A DIN EN 1991-1-4/NA:2010-12



Terrain categories acc. to Annex NA-B DIN EN 1991-1-4/NA:2010-12

Terrain category I



Open sea; lakes with at least 5 km of unobstructed area in the wind direction; smooth and flat country without obstacles

Terrain category II



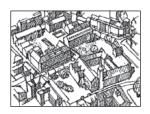
Terrain width edges, isolated farms, houses or trees, e.g. agricultural area

Terrain category III



Suburbs, industrial or commercial areas; forests

Terrain category IV



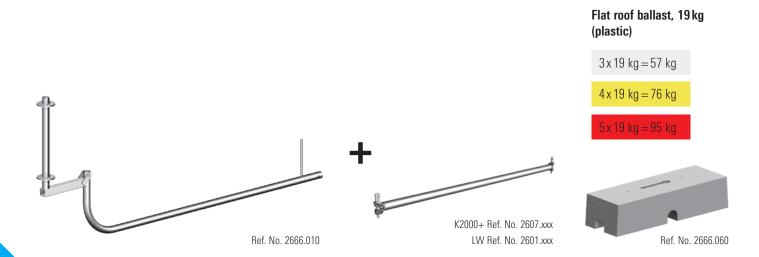
Urban areas where at least 15% of the land is covered by buildings with a mean height exceeding 15 metres

5.1. Number of ballast blocks per flat roof guardrail post

On the basis of DIN EN 1991-1-4:2010-12 and DIN EN 1991-1-4/NA:2010-12, Layher has prepared the structural verification of the Layher Allround flat roof guardrail for assembly heights up to 100 metres above ground level, assembly locations in Wind zones 1 to 4 and Terrain categories I to IV.

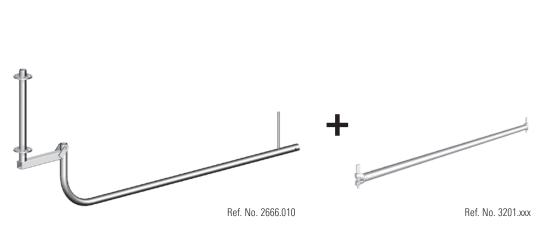
Flat roof guardrail post, Ref. No. 2666.010: Use of steel ledger 0.73 – 3.07 m (Duration ≤ 2 years; friction coefficient $\mu \geq 0.75$)

Ballast weight per guardrail post [kg]	T	errain o	ategor	y I	To	errain c	ategory	· II	Te	errain ca	ategory	Ш	Terrain category IV				
Wind zone Height above ground level	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	
10 m	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	
20 m	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	
30 m	53	53	53	58	53	53	53	53	53	53	53	53	53	53	53	53	
40 m	53	53	53	64	53	53	53	53	53	53	53	53	53	53	53	53	
50 m	53	53	53	68	53	53	53	55	53	53	53	53	53	53	53	53	
60 m	53	53	54	72	53	53	53	59	53	53	53	53	53	53	53	53	
70 m	53	53	57	76	53	53	53	63	53	53	53	53	53	53	53	53	
80 m	53	53	59	79	53	53	53	66	53	53	53	53	53	53	53	53	
90 m	53	53	62	81	53	53	53	69	53	53	53	57	53	53	53	53	
100 m	53	53	64	84	53	53	54	72	53	53	53	60	53	53	53	53	



Flat roof guardrail post, Ref. No. 2666.010: Use of aluminium ledger 0.73 – 3.07 m (Duration ≤ 2 years; friction coefficient $\mu \geq 0.75$)

Ballast weight per guardrail post [kg]	I Intrain category I					errain c	ategory	· II	Те	errain ca	ategory	Ш	Terrain category IV				
Wind zone																	
Height above ground level	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	
10 m	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	
20 m	53	53	53	64	53	53	53	53	53	53	53	53	53	53	53	53	
30 m	53	53	55	71	53	53	53	56	53	53	53	53	53	53	53	53	
40 m	53	53	60	77	53	53	53	63	53	53	53	53	53	53	53	53	
50 m	53	53	64	81	53	53	53	68	53	53	53	53	53	53	53	53	
60 m	53	53	67	85	53	53	56	72	53	53	53	58	53	53	53	53	
70 m	53	53	70	89	53	53	59	76	53	53	53	62	53	53	53	53	
80 m	53	55	72	92	53	53	62	79	53	53	53	66	53	53	53	53	
90 m	53	57	75	94	53	53	64	82	53	53	54	70	53	53	53	54	
100 m	53	59	77	97	53	53	67	85	53	53	57	73	53	53	53	57	



Flat roof ballast, 19 kg (plastic)

 $3 \times 19 \text{ kg} = 57 \text{ kg}$

 $4 \times 19 \text{ kg} = 76 \text{ kg}$

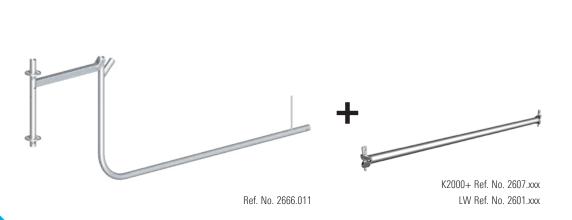
 $5 \times 19 \text{ kg} = 95 \text{ kg}$



Ref. No. 2666.060

Flat roof guardrail post, offset, Ref. No. 2666.011: Use of steel ledger 0.73 – 3.07 m (Duration \leq 2 years; friction coefficient $\mu \geq$ 0.75)

Ballast weight per guardrail post [kg]	Т	errain o	ategory	/ I	To	errain c	ategory	· II	Te	errain ca	ategory	Ш	Terrain category IV				
Wind zone																	
Height above ground level	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	
10 m	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	
20 m	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	
30 m	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	
40 m	65	65	65	69	65	65	65	65	65	65	65	65	65	65	65	65	
50 m	65	65	65	74	65	65	65	65	65	65	65	65	65	65	65	65	
60 m	65	65	65	78	65	65	65	65	65	65	65	65	65	65	65	65	
70 m	65	65	65	82	65	65	65	68	65	65	65	65	65	65	65	65	
80 m	65	65	65	85	65	65	65	72	65	65	65	65	65	65	65	65	
90 m	65	65	67	88	65	65	65	75	65	65	65	65	65	65	65	65	
100 m	65	65	69	91	65	65	65	78	65	65	65	65	65	65	65	65	



Flat roof ballast, 19 kg (plastic)

3x19 kg = 57 kg

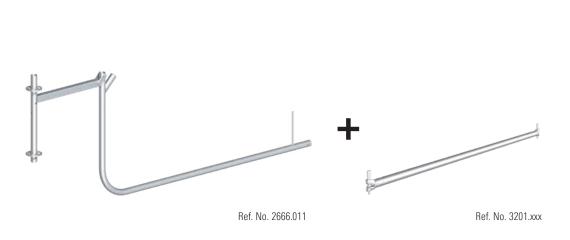
 $4 \times 19 \text{ kg} = 76 \text{ kg}$

 $5 \times 19 \text{ kg} = 95 \text{ kg}$



Flat roof guardrail post, offset, Ref. No. 2666.011: Use of aluminium ledger 0.73-3.07 m (Duration ≤ 2 years; friction coefficient $\mu \geq 0.75$)

Ballast weight per guardrail post [kg]	T	errain d	ategory	/ I	To	errain c	ategory	· II	Te	errain ca	ategory	III	Terrain category IV				
Wind zone Height above ground level	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	
10 m	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	
20 m	57	57	57	68	57	57	57	57	57	57	57	57	57	57	57	57	
30 m	57	57	59	76	57	57	57	61	57	57	57	57	57	57	57	57	
40 m	57	57	64	82	57	57	57	67	57	57	57	57	57	57	57	57	
50 m	57	57	68	87	57	57	57	73	57	57	57	57	57	57	57	57	
60 m	57	57	72	91	57	57	60	77	57	57	57	62	57	57	57	57	
70 m	57	57	75	95	57	57	63	81	57	57	57	67	57	57	57	57	
80 m	57	59	78	98	57	57	66	85	57	57	57	71	57	57	57	57	
90 m	57	61	80	101	57	57	69	88	57	57	58	75	57	57	57	58	
100 m	57	63	82	104	57	57	72	91	57	57	61	78	57	57	57	62	



Flat roof ballast, 19 kg (plastic)

 $3 \times 19 \text{ kg} = 57 \text{ kg}$

 $4 \times 19 \text{ kg} = 76 \text{ kg}$

 $5 \times 19 \text{ kg} = 95 \text{ kg}$



Ref. No. 2666.060

6. DISMANTLING

Dismantling is performed in the reverse order to assembly, in compliance with safety regulations. If the dismantled components are put down or temporarily stored on the roof, it must be ensured that these components are placed at least 3.0 metres away from the risk-of-fall edge.

Work begins at one corner and continues bay by bay towards the opposite side. First the stiffeners and ledgers are removed, then the ballast and the flat roof guardrail.

7. PALLETISING AND TRANSPORT

For transport and storage of the components of the Layher Allround flat roof guardrail, Layher module pallet 610 (Ref. No. 7042.004) and Layher module pallet 830 (Ref. No. 7042.002) are suitable. An additional wood deck (Ref. No. 6494.514) must be laid over it.





Flat roof guardrail posts 2666.010 on Allround O-ledgers

Ballast blocks in module pallet

When transporting components of the Layher Allround flat roof guardrail in a module pallet, secure both the components and pallets on the transporting vehicle with straps to prevent them from falling out or falling over.

8. COMPONENTS







Standard K2000+, steel, with press-in spigot Ref. No. 2603.xxx

Standard K2000+, steel, without spigot Ref. No. 2604.xxx

Standard, aluminium, with press-in spigot Ref. No. 3200.xxx

Standard, aluminium, without spigot Ref. No. 3209.xxx

Standard LW, steel, with integrally cast spigot Ref. No. 2617.xxx

Standard LW, steel, without spigot Ref. No. 2619.xxx



Base plate 60 Ref. No. 4001.060



Flat roof guardrail post Ref. No. 2666.010



Flat roof guardrail post, offset

Ref. No. 2666.011



Allround O-ledger K2000+, steel

Ref. No. 2607.xxx, 0.73-3.07 m



Allround O-ledger LW, steel

Ref. No. 2601.xxx, 0.73-3.07 m



Allround O-ledger, aluminium

Ref. No. 3201.xxx, 0.73-3.07 m



Double coupler EN 74-1

Coupler class BB Ref. Nos. 4700.019 / 4700.022

${\bf Quick-assembly-double\ coupler}$

Z-8.331-947, coupler class BB Ref. Nos. 4777.019/4777.022



Swivel coupler EN 74-1

Coupler class B Ref. Nos. 4702.019 / 4702.022

${\bf Quick-assembly-swivel\ coupler}$

Z-8.331-947, coupler class B Ref. Nos. 4778.019 / 4778.022



Flat roof post stiffener

Ref. No. 2666.030



Flat roof shift preventer

Ref. No. 2666.020



Pad for flat roof guardrail

Ref. No. 2666.050



Flat roof toe board holder

Ref. No. 2666.070

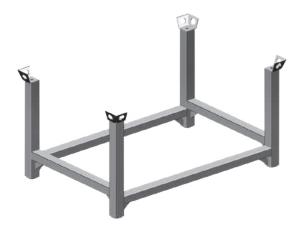


Locking pin, red

Ref. No. 4000.001



Flat roof ballast, plastic, 19 kg Ref. No. 2666.060



Module pallet 610 Ref. No. 7042.004

Module pallet 830 Ref. No. 7042.002



Wood deck Ref. No. 6494.514







More Possibilities. The Scaffolding System.

Wilhelm Layher GmbH & Co KG Scaffolding Grandstands ladders

Ochsenbacher Strasse 56 74363 Gueglingen-Eibensbach Germany

Post box 40 74361 Gueglingen-Eibensbach Germany Phone +49 (0)71 35 70-0 Fax +49 (0)71 35 70-2 65 E-Mail info@layher.com www.layher.com

