

Layher Allround Bridging System Instructions for Assembly and Use

Modular truss system
for wide spans

Certification according to
DIN ISO 9001/EN 29 001
by TÜV-CERT



Allround Scaffolding

Layher® 

More Possibilities. The Scaffolding System.

▶ CONTENT

1.	Introduction	3
2.	General	5
3.	Measures to prevent falls	7
4.	Important assembly instructions	7
5.	Assembly of the Allround Bridging System	8
6.	Verification of stability	12
7.	Bridge Variants	13
8.	Components	14

▶ NOTE

The products or assembly variants shown in these instructions for assembly and use may be subject to country-specific regulations. The user of the products is responsible for compliance with such 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 approvals for the products, to their use or to specific assembly regulations.

► 1. INTRODUCTION

General

These instructions for assembly and use relate to assembly, modification and dismantling of the main assembly variants of the Allround Bridging System from Wilhelm Layher GmbH & Co. KG, of Gueglingen-Eibensbach, Germany. The instructions cannot cover all the possible applications. If you have any questions about specific applications, please contact your Layher partner.

Caution: The stability of the Allround Bridging System must be verified and assured at all times, including in the assembly state. The Layher Allround Bridging System may only be assembled, modified and dismantled under the supervision of a qualified expert and by technically trained employees.

During assembly, only original Layher Allround Bridging System components and scaffolding components identified with the conformity mark <Ü> and the appropriate German approval number Z-8.22.64 may be used.



Fig. 1: A bay of the Allround Bridging System

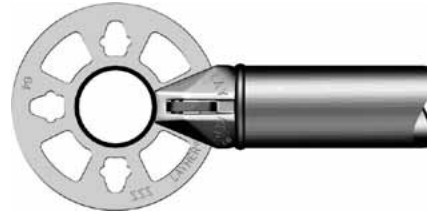


Fig. 2: Layher Allround steel acc. to Z-8.22-64



Fig. 3: Layher Allround steel acc. to Z-8.22-64

Visually check all scaffolding components prior to installation and before they are used to ensure that they are in flawless condition. Do not use damaged components.

Caution: Assembly, alteration and dismantling of the Layher Bridging System involves risk from falls. Perform scaffolding assembly work in such a way that the risk of falls is avoided as far as possible and that the residual risk is minimized. Assembly situations where there is a risk of falls are identified in these instructions with the following symbol inside the assembly pictures.



Fig. 4

The scaffolding erector must stipulate, on the basis of how he assesses the risk, suitable measures to prevent or minimize risks for the actual case and/or the respective activities involved.

The measures must be selected with due consideration of the actual risk, their usefulness and their practical possibilities, and also depending on

- the qualification of the employees
- the type and duration of the activity in the high-risk area
- the possible fall height
- the state of the surface onto which the employee might fall
- the state of the workplace and its access.

Technical, organisational and personnel-related measures can be applied during assembly, modification and dismantling. Possible measures can include, depending on the assembly situation, the use of qualified personnel specifically informed of the respective risk situation or the use of suitable personal safety apparatus against falls (PSAaF)

If PSAaF is required for assembly of the Layher Allround Bridging System or is specified by local regulations, the attachment points stated in section 3 must be used. The suitability of PSAaF for fall prevention must be checked, with particular attention being given here to compliance with the minimum distance between the attachment point and the possible impact point.

Before the start of scaffolding work, the contractor must check whether the planned working area contains equipment that might endanger the employees. Assembly, modification and dismantling may only be performed with appropriate protective equipment. scaffolding components must not be thrown; instead they must be handed over in such a way that they cannot slip or be dropped.

Every use of the structure must be preceded by a check that it is in good condition.

With regard to the following instructions for assembly and use of the Allround Bridging System, it must be pointed out that as a general principle scaffolding may only be assembled, modified or dismantled under the supervision of a qualified person and by technically trained employees adequately and specifically instructed in this work. To that extent, and with regard to use, we refer to the required conditions set forth in German Ordinance on Industrial Safety and Health (BetrSichV). In the following instructions for assembly and use, we provide the erector and the user, on the basis of our risk analysis, with advice on how to comply with the requirements of the Ordinance in the respective assembly situation.

The technical details set forth in the instructions for assembly and use are intended to help the erector and/or user to comply with the requirements of the Ordinance and are not mandatory specifications for them. The erector/user must take the measures needed on the basis of the risk assessment, prepared according to the preconditions of the Ordinance, at his own discretion and exercising all due care and diligence. The specific features of the individual case must be taken into account here.

It is essential that the following instructions for assembly and use are complied with in every case. It is pointed out that all information, particularly that regarding stability in the assembly variants, applies only when original Layher components identified with the approval numbers stated above are used. The installation of non-Layher parts can lead to safety defects and insufficient stability.

The present instructions for assembly and use must be available to the supervisor and to the employees involved.

During assembly, modification and dismantling, as well as during use of the scaffolding, the legal regulations of the German Ordinance on Industrial Safety and Health (BetrSichV) and the explanatory German Technical Rules for Industrial Safety (TRBS 2121) must be complied with.

Inspection and use

The scaffolding - in particular the Allround Bridging System - must, whenever it has been assembled and before it is put into service, be inspected by persons qualified to do so.

The scaffolding user must check that the Allround Bridging System is suitable and safe to use for its respective application. If defects are found during this check, the scaffolding or bridge must not be used until these defects have been eliminated by the scaffolding erector. Subsequent alterations to the scaffolding or bridge are deemed as assembly, modification or dismantling and may only be performed by technically trained employees. The changes must be inspected and approved by the scaffolding erector.

The legal regulations of the German Ordinance on Industrial Safety and Health (BetrSichV) must be complied with.

The basis for Allround equipment approval in Germany are German and European standards. Allround scaffolding has been approved in many other countries.

Caution: Differing and supplementary local regulations are not taken into account in these instructions, but must be complied with.

A detailed list of articles can be found in our catalogue. Information on structural strength values of the Allround equipment can be found in the technical documents and in the approval Z-8.22-64. The Allround Bridging System itself is not regulated in this approval. The load-bearing capacities of the individual parts of the Allround Bridging System are available from your Layher partner.

▶ 2. GENERAL

The Allround Bridging System is a modular truss system that can be adapted to the respective application. The posts of the Allround Bridging Systems have wedge heads welded to the side, to which standards of the Allround equipment can be fastened. As a result, the Allround Bridging System can be combined with Allround equipment, offering a wide range of possible uses. A complete integration into an Allround scaffolding structure (e.g. to transfer high loads or for bridging of wide spans) is also possible. The individual components of the Layher Allround Bridging System are connected in a time-saving way using bolts of diameter 30 mm. The connection to the Allround equipment is made using the proven Allround wedge head connection. The following two variants of this connection must be distinguished:

a. Variant II
Made until 1999

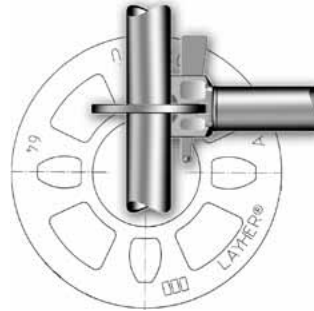


Fig. 5

b. K2000+
Made starting 2000

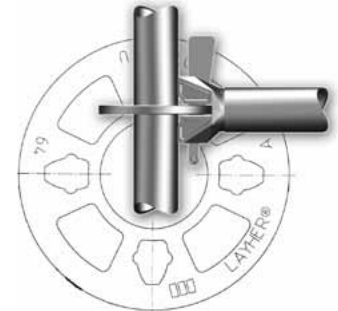


Fig. 6

Both variants have different load-bearing capacities, but can be used interchangeably. In the case of these mixed structures, the lower load-bearing capacities of variant II are applicable.

Function principle of Allround wedge head connection

1. Slide the wedge head over the rosette.
2. Insert the wedge into a hole. The component is secure against shifting and falling out.
3. Hammer down the wedge to provide a non-positive connection (use 500 g metal hammer until the blow bounces off).

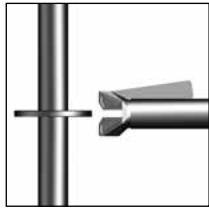


Fig. 7

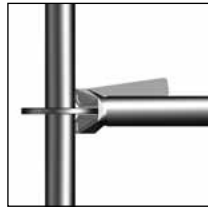


Fig. 8

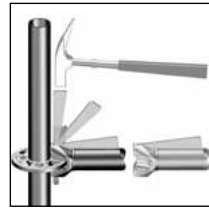


Fig. 9

The rosette allows up to 8 components to be connected. When the small holes are used, the components are automatically connected at right angles to one another. In the large holes, the connection angles are variable.



Fig. 10

WARNING

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

Supplementing the Allround scaffolding with tubes and couplers

The Allround Bridging System or the Allround Scaffolding can be supplemented with

- scaffolding tubes $\varnothing = 48.3$ mm, as per EN 39 Minimal wall thickness:
 - steel tubes 3.2 mm
 - aluminium tubes 4.0 mm
- scaffolding couplers as per EN 74

Scaffolding tubes can be connected using scaffolding couplers to standards, ledgers, brackets, lattice girders and other Allround components. Scaffolding tubes connected using scaffolding couplers can have both a structural function (e.g. as bracket bracing, as lattice girder bracing, as special anchoring) and be used for secondary purposes.

WARNING

Incorrectly fitted scaffolding couplers reduce the stability of the structure and can lead to its collapse.

The wedge couplers must be hammered tight using a 500 g metal hammer until the blow bounces off. Screw couplers must be tightened with a 50 Nm torque.

▶ 3. MEASURES TO PREVENT FALLS

Preventing falls during assembly, modification or dismantling of the Allround Bridging System

Allgemeines

In line with local regulations or as the result of a risk analysis performed by the scaffolding erector, personal safety apparatus against falls (PSAaF), an advance guard rail or a combination of the two may be necessary for assembly, modification or dismantling of the scaffolding.

Attachment points for the personal safety apparatus (PSAaF)

When PSAaF is used, only use the specified attachment points:

- a) For the Allround steel variant:
Attachment to the rosette (attachment in large and small hole of rosette possible).



Fig. 11a

For the Allround aluminium variant:
attachment to standard is only possible above the rosette



Fig. 11b

- b) Attachment to an O-ledger



Fig. 12

Attachment to scaffolding parts must not be done until the latter have been sufficiently fastened.

▶ 4. IMPORTANT ASSEMBLY INSTRUCTIONS

Work on the scaffolding should wherever possible be performed from a safe standing area.

⚠ WARNING

Scaffolding may only be erected on sufficiently strong surfaces. Before assembling Layher Allround structures, the surface must be checked for sufficient load-bearing capacity. Suitable load-distributing bases must be selected.

The maximum spindle extension lengths must not be exceeded. One-sided positioning of the base plate can cause excessive stresses in its cross-section and collapse of the scaffolding.

Anchoring must be installed continually as scaffolding assembly progresses. In the case of free-standing structures, the maximum ratios of height to width must not be exceeded. If necessary, stability must be assured by ballasting or bracing.

Decks must be prevented from being lifted out by lift-off preventers. Only the temporary boards intended for this purpose may be used here, in compliance with their maximum span and loading capacity.

► 5. ASSEMBLY OF THE ALLROUND BRIDGING SYSTEM

General

In view of the flexibility of the Allround Bridging System, it is not possible to provide assembly instructions for every application. The following describes the assembly of the Layher Allround Bridging System when it is used as a pedestrian bridge without intermediate supports (single-span beam).

A standard Layher bridge structure mainly comprises two load-transferring Allround Bridging Systems which are arranged parallel to one another at a defined distance, depending on the required bridge width. A stable bridge supporting structure is obtained with an internal Allround scaffolding structure fastened between the two Allround Bridging Systems. The stiffening in the transverse direction and hence the stabilisation of the Allround Bridging Systems is achieved with horizontally arranged bracing in the Allround structure. The bridge decking and the guard rails are fastened to the internal Allround scaffolding structure.

The entire bridge structure - both bridging units in combination with internal Allround Scaffolding - is finally supported at the bridge ends. What this support looks like in detail depends on the parameters of the project. The support can for example be on individual Layher heavy-duty supports integrated into a separate stairway access. In some cases, it is also possible to support the end posts of the bridge directly on existing foundations, steel beams or walls.

The bridge can be assembled in different ways. If a crane or similar lifting gear is available, the bridge can be assembled on the ground, making the work considerably easier in most cases. To do so, the structure is temporarily mounted on spindles or wooden supports directly above the ground and then moved to its final position using the crane.

Alternatively to assembly on the ground, temporary scaffolding can be erected underneath the bridge and then removed once the bridge is completed.

The following assembly steps relate to assembly on the ground. When assembling using auxiliary scaffolding, the same steps must be performed in similar fashion.



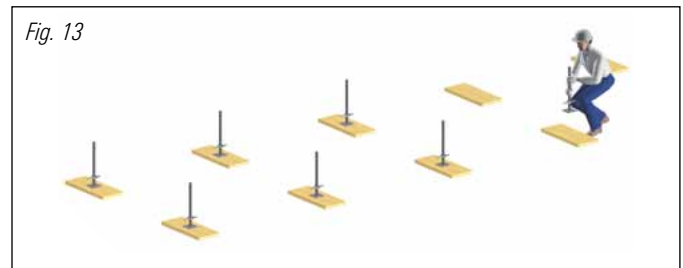
Caution: When assembling with auxiliary scaffolding, there is a risk of falls. Suitable safety measures (e.g. PSAaF) must be used.

Assembly of bridge on the ground

The following describes the assembly sequence for a pedestrian bridge on the ground for later movement by crane to the final position. The assembly surface should be largely flat and easily accessible. The assembly location must be selected so that transport to the final position after completion is still possible (pay attention to crane capacity and working radius).

First the internal scaffolding structure is completed:

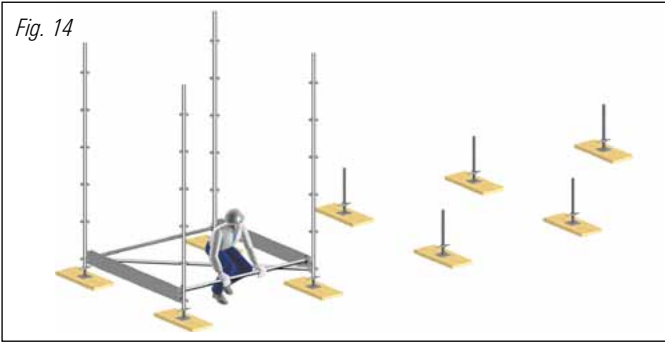
1. Laying out of wooden boards, setting up of baseplates
Caution: When using steel decks, there must be put short tubes (approx. 5 – 10 cm) on the base plates to mount the couplers of the horizontal bracing.



2. Fitting of upside-down Allround standards onto the spindles and installation of ledgers / crosspieces and horizontal diagonal braces in the first bay

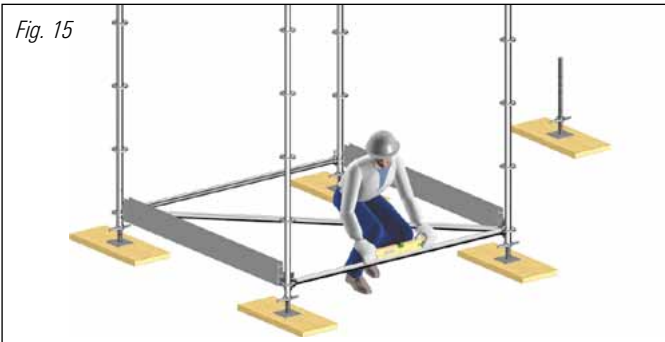
Caution: The standards must be installed "upside-down", meaning that the first rosette from below is about 10 cm above the end of the standard.

Fig. 14



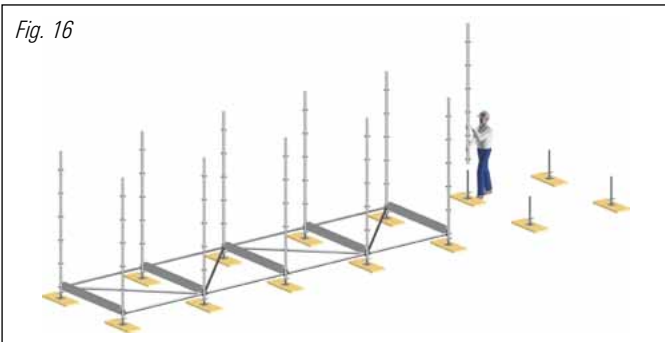
3. Alignment of first bay

Fig. 15



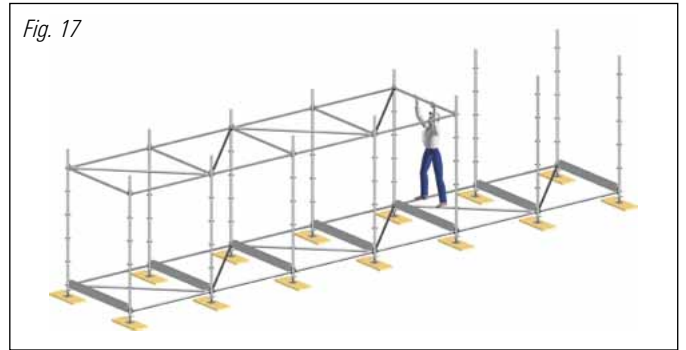
4. Fitting of standards and installation of ledgers, crosspieces and horizontal diagonal braces in the remaining bays

Fig. 16



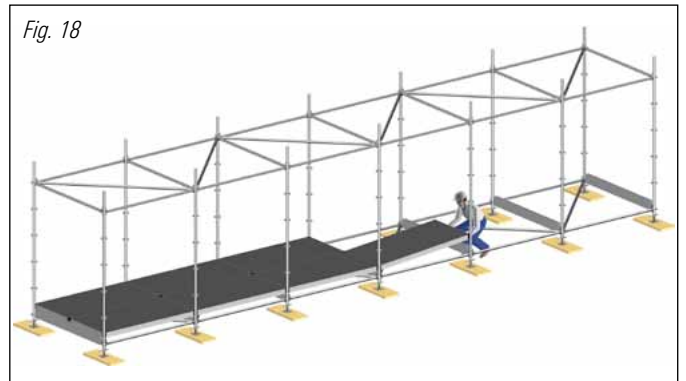
5. Installation of upper horizontal bracing comprising ledgers and horizontal diagonal braces

Fig. 17



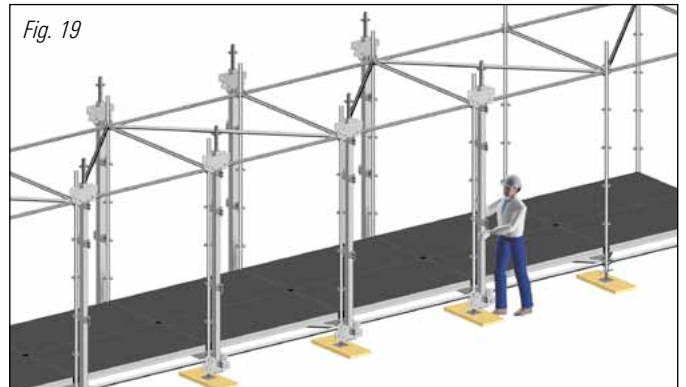
6. Installation of decks (install or close lift-off preventers)

Fig. 18

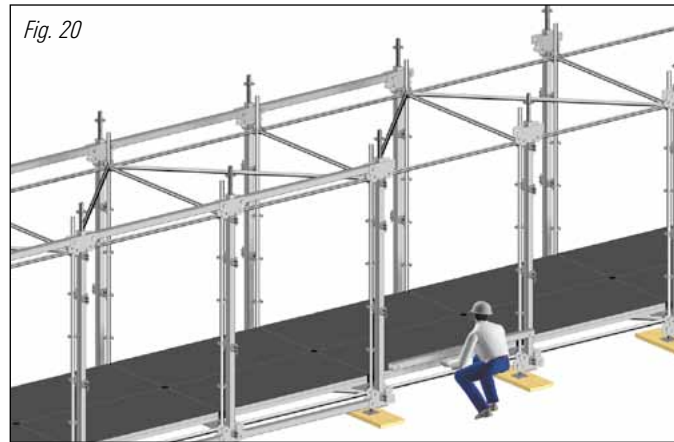


7. Assembly of truss posts and knocking home of wedges.

Fig. 19



8. Assembly of chord ledgers and fixing with pins



9. Preassembly of diagonal rods

- Screwing on of lock nuts (short nut $L=30\text{ mm}$) at both ends of the rods
- Screwing of threaded rods into the upper anchoring until the rod projects behind the anchoring nut. Tightening of lock nuts at the top.
- Installation of lower anchoring (with tensioning device) and screwing on of tensioning nuts (long nut $L=70\text{ mm}$)

Caution: The anchoring and the load transmission of the rods may only be made by the long nut (tensioning nut).

10. Assembly of preassembled diagonal rods and installation of bolts. The diagonal rods must first be installed slack, i.e. the tensioning nuts must not be in contact.

Caution: If there is too little play in the diagonal rods, later alignment is no longer possible.

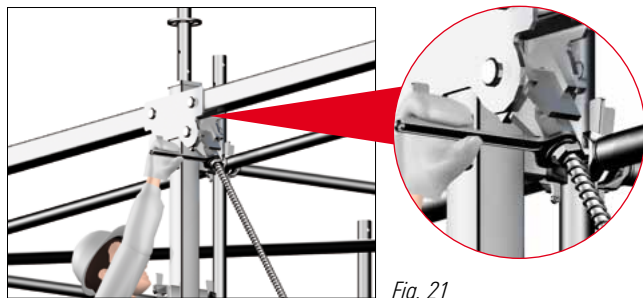
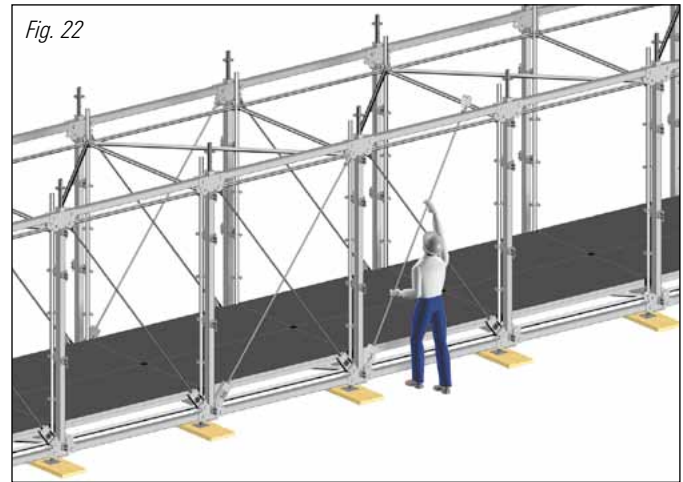


Fig. 21



- ## 11. Tensioning of diagonal rods starting with the middle bay (or with one of the two middle bays when there are an even number of bays). The middle bays are as a rule constructed with crossed diagonal rods, meaning that tensioning and alignment must be done with particular care.

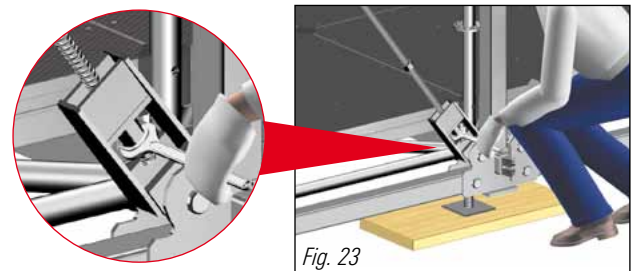


Fig. 23

The bay is initially aligned by adjustment of the diagonal rods. A diagonal rod can only be shortened when the diagonal rod crossing it is slightly loosened beforehand. Otherwise, a conflicting pretension is created which in extreme cases can cause overloading of the rods.

Caution: If the bay cannot be aligned despite loosening of the crossed diagonal rod, it may be that another diagonal rod of the adjacent bays is under tension. In this case, the rods must be immediately loosened.

When the middle bay is aligned, the tensioning nuts are slightly tightened (by hand) so that a slight conflicting pretension is generated. Then the lock nuts are tightened.

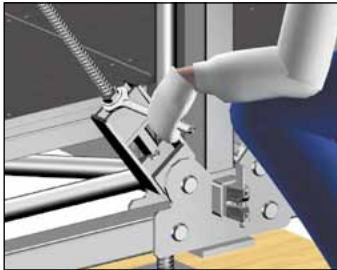


Fig. 24

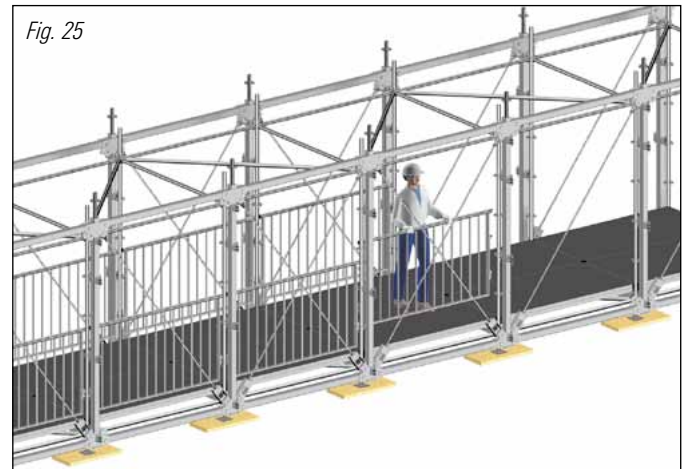
The opposite bay is aligned on the same principle.

12. Tensioning of the diagonal rods and tightening of the lock nuts in the remaining bays. Starting from the aligned bay in the middle, work evenly towards both sides to the end of the bridge.

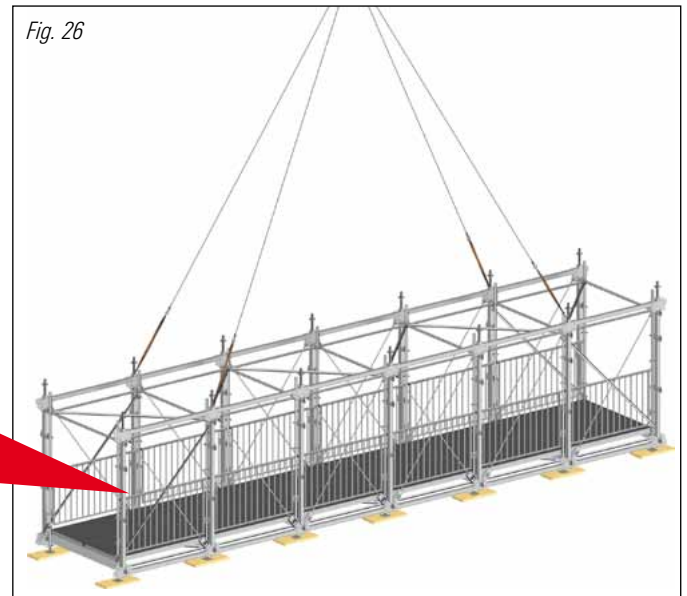
Caution: The tensioning nuts of the diagonal rods must be tightened only lightly. For bays with only one diagonal rod, excessive tightening causes distortion of the bays. When diagonal rods are crossed, excessive tightening can cause extreme pretensioning of the rods and possibly overload them.



13. Installation of guardrails (can also be done after movement by crane)

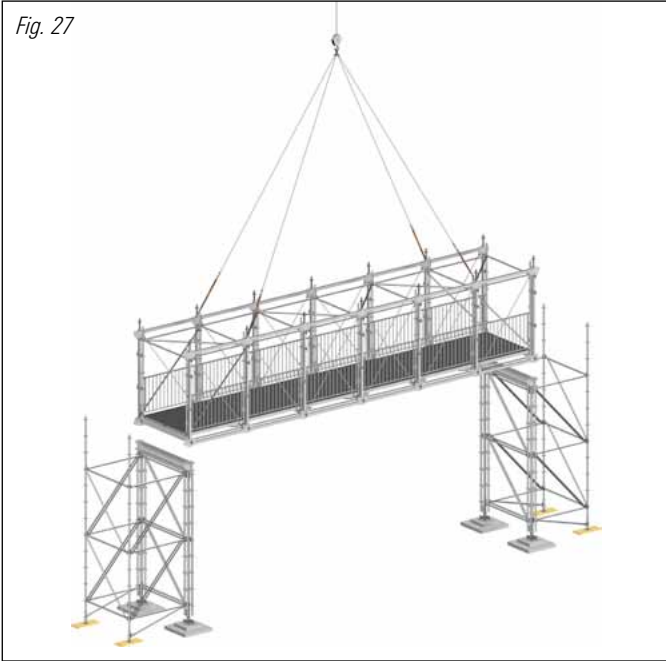


14. Determining the attachment points for the crane movement and installation of temporary Allround diagonal braces (or tubes and couplers) in the bays between attachment point and bridge end, provided only one diagonal brace is installed in these bays.



15. Movement by crane onto the preassembled supports.

Fig. 27



Dismantling the Allround Bridging System

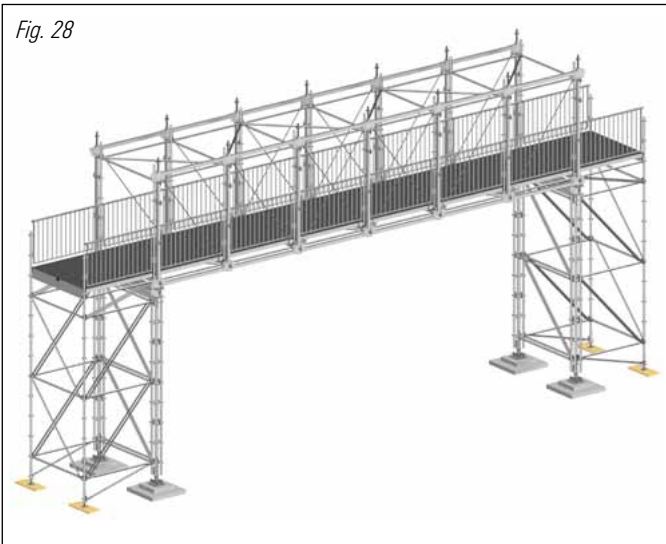
To dismantle the bridge, the sequence of working steps described for assembly must be reversed. Components of which the connectors have been released must be removed immediately. The components must not be thrown, and must be stored properly. To prevent any risk of tripping, components must not be stored on walkways.

► 6. VERIFICATION OF STABILITY

A project-related verification of stability is required for the Layher Allround Bridging System. The load-bearing capacities of the individual components of the Bridging System, plus further technical documents, are available from your local Layher partner.

16. Completion of the access areas

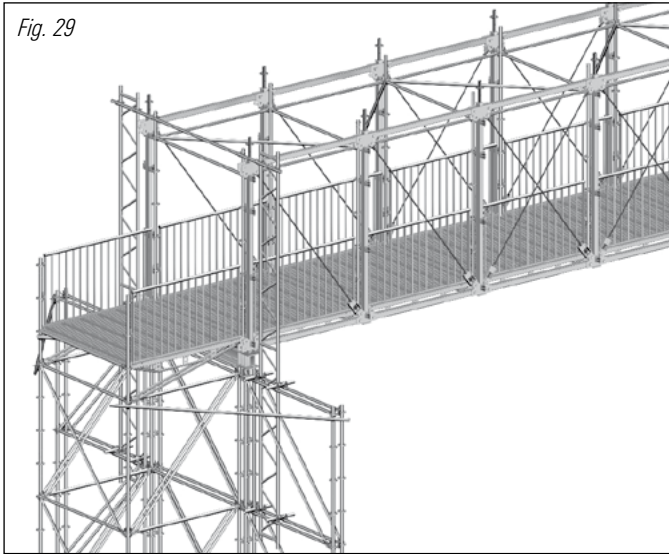
Fig. 28



► 7. BRIDGE VARIANTS

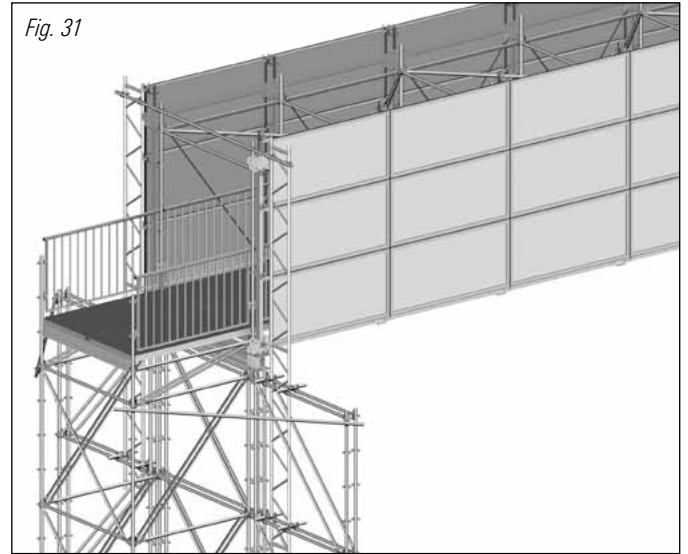
Open bridge with steel decks

Fig. 29



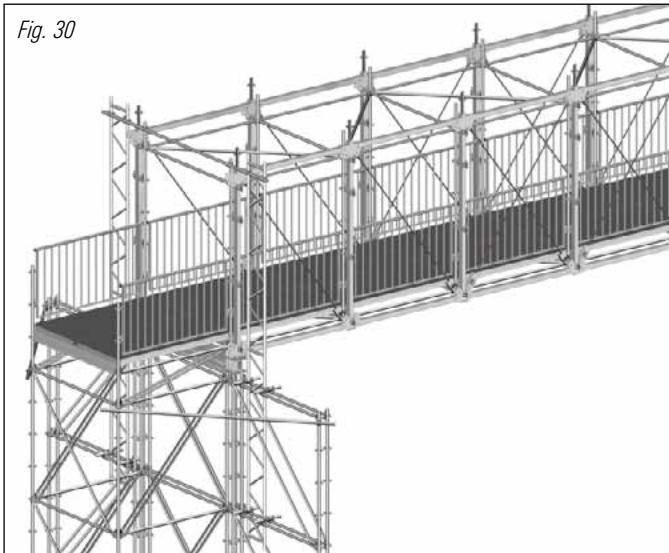
Laterally panelled bridge with Protect cassettes

Fig. 31



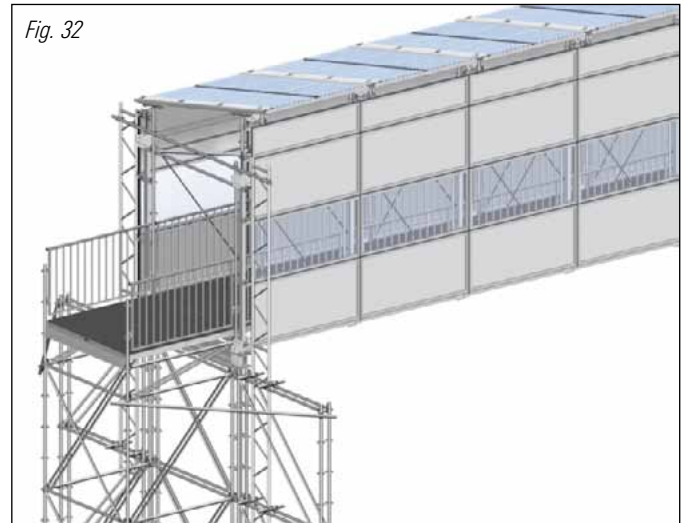
Open bridge with Event decks

Fig. 30



Completely closed bridge with lightweight cassette roof and light cassette strip

Fig. 32



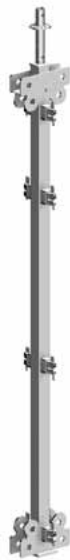
► 8. COMPONENTS

Allround Bridging System

Post, 3.22 m

Ref.-No. 2671.000

Weight 56.0 kg



Chord

for 2.07 m bay

Ref.-No. 2671.010

Weight 20.8 kg

for 2.57 m bay

Ref.-No. 2671.020

Weight 25.8 kg



Diagonal rod

for 2.07 m bay

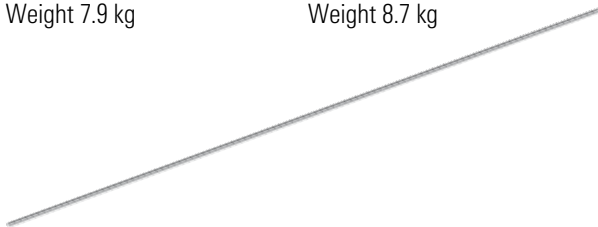
Ref.-No. 2671.030

Weight 7.9 kg

for 2.57 m bay

Ref.-No. 2671.040

Weight 8.7 kg



Diagonal anchoring element

with tensioning device

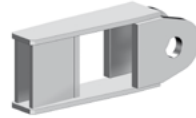
Ref.-No. 2671.050

Weight 5.5 kg

w/o tensioning device

Ref.-No. 2671.060

Weight 2.9 kg



Nuts for diagonal rod

Tensioning nut WS 36

Ref.-No. 2671.120

Weight 0.4 kg

Lock nut WS 36

Ref.-No. 2671.130

Weight 0.2 kg



Bolt Ø 30 mm

Ref.-No. 2671.070

Weight 0.9 kg



Securing pin 4,0 mm

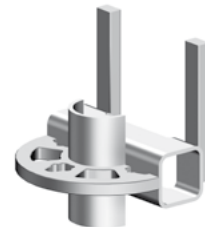
Ref.-No. 5905.000

Weight 0.03 kg

Protect holder with rosette

Ref.-No. 2671.110

Weight 1.0 kg



Support beam

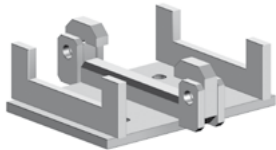
for 2,07 m bay
Ref.-No. 2671.100
Weight 145.8 kg

for 2,57 m bay
Ref.-No. 2671.105
Weight 167.0kg



Support element

Ref.-No. 2671.080
Weight 4.8 kg



Adapter for Heavy-Duty Support

Ref.-No. 2671.090
Weight 5.5 kg



Allround Standard Equipment

Standard, steel, without spigot

L=2.00 m, Ref.-No. 2604.200, Weight 9.0 kg
L=2.50 m, Ref.-No. 2604.250, Weight 11.7 kg
L=3.00 m, Ref.-No. 2604.300, Weight 13.7 kg
L=4.00 m, Ref.-No. 2604.400, Weight 18.4 kg

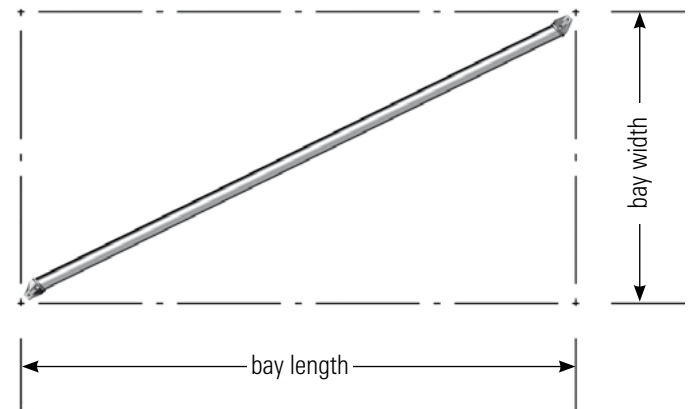


O-Ledger, steel



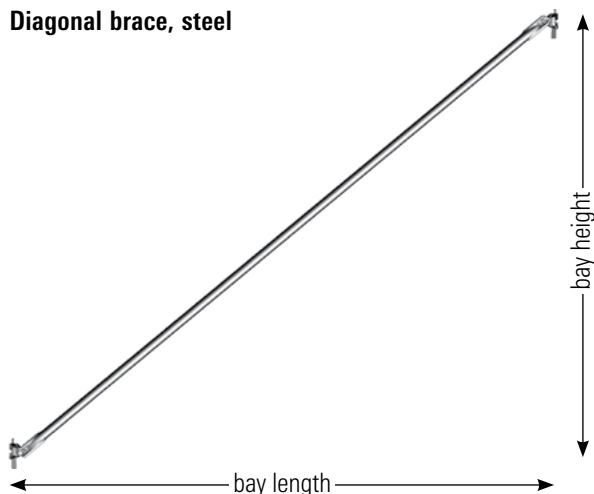
L=1.09 m, Ref.-No. 2607.109, Weight 4.3 kg
L=1.57 m, Ref.-No. 2607.157, Weight 5.9 kg
L=2.07 m, Ref.-No. 2607.207, Weight 7.8 kg
L=2.57 m, Ref.-No. 2607.257, Weight 9.7 kg
L=3.07 m, Ref.-No. 2607.307, Weight 11.4 kg

O-Ledger as horizontal diagonal brace, steel



Length = 2.07 m, Width = 2.07 m, Ref.-No. 2608.207, Weight 11.5 kg
Length = 2.07 m, Width = 2.57 m, Ref.-No. 0700.807, Weight 12.5 kg
Length = 2.57 m, Width = 2.57 m, Ref.-No. 2608.257, Weight 14.0 kg

Diagonal brace, steel



Length = 2.07 m, Height = 0.50 m, Ref.-No. 5609.050, Weight 7.2 kg
Length = 2.07 m, Height = 1.00 m, Ref.-No. 5609.100, Weight 7.4 kg
Length = 2.07 m, Height = 2.00 m, Ref.-No. 2620.207, Weight 9.2 kg

Length = 2.57 m, Height = 0.50 m, Ref.-No. 5607.050, Weight 8.4 kg
Length = 2.57 m, Height = 1.00 m, Ref.-No. 5607.100, Weight 8.8 kg
Length = 2.57 m, Height = 2.00 m, Ref.-No. 2620.257, Weight 10.3 kg

U-Bridging ledger



L=2.07 m, Ref.-No. 2624.207, Weight 12.4 kg
L=2.57 m, Ref.-No. 2624.257, Weight 15.2 kg

U-Lift off preventer T9



L=2.07 m, Ref.-No. 2658.207, Weight 7.5 kg
L=2.57 m, Ref.-No. 2658.257, Weight 8.9 kg

U-steel deck T4, 0.32 m wide



L=2.07 m, Ref.-No. 3812.207, Weight 15.0 kg
L=2.57 m, Ref.-No. 3812.257, Weight 18.2 kg

U-steel deck T4, 0.19 m wide



L=2.07 m, Ref.-No. 3801.207, Weight 10.2 kg
L=2.57 m, Ref.-No. 3801.257, Weight 13.2 kg

Event-deck T7



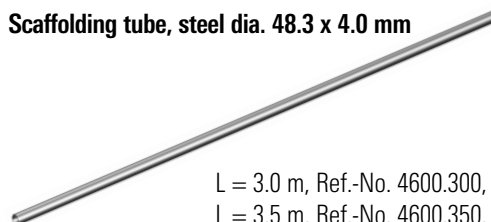
1.04 x 2.07 m, Ref.-No. 5402.081, Weight 30.0 kg
0.86 x 2.07 m, Ref.-No. 5402.091, Weight 24.0 kg
0.86 x 2.57 m, Ref.-No. 5402.092, Weight 32.0 kg

Event Transom



L=2.07 m, Ref.-No. 5400.050, Weight 12.0 kg
L=2.57 m, Ref.-No. 5400.070, Weight 14.6 kg

Scaffolding tube, steel dia. 48.3 x 4.0 mm



L = 3.0 m, Ref.-No. 4600.300, Weight 13.5 kg
L = 3.5 m, Ref.-No. 4600.350, Weight 15.8 kg
L = 4.0 m, Ref.-No. 4600.400, Weight 18.0 kg

Twin wedge coupler

Ref.-No. 2628.000

Weight 1.1 kg



Double coupler

Class BB, EN 74-1

WS 19 Ref.-No. 4700.019

WS 22 Ref.-No. 4700.022

Weight 1.3 kg



Swivel coupler

Class B, EN 74-1

WS 19 Ref.-No. 4702.019

WS 22 Ref.-No. 4702.022

Weight 1.5 kg



Assembly accessories

Open-ended wrench WS 36

Ref.-No. 0724.175

Weight 0.5 kg



Base plate 60

Ref.-No. 4001.060

Weight 3.6 kg



Base plate 80, reinforced

Ref.-No. 4002.080

Weight 4.9 kg



PSA safety harness AX 60 S with extension

Ref.-No. 5969.150

Weight 1.5 kg



PSA safety Rope BFD

with snap hook FS 90,
as per EN 354/EN 355

Rope 1,50 m

Ref.-No. 5969.400

Weight 1.1 kg



PSA-Flex safety rope BFD Flex-rope 2.0 m

with snap hook FS 90,
as per EN 354/EN 355

Ref.-No. 5969.501

Weight 1.1 kg



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