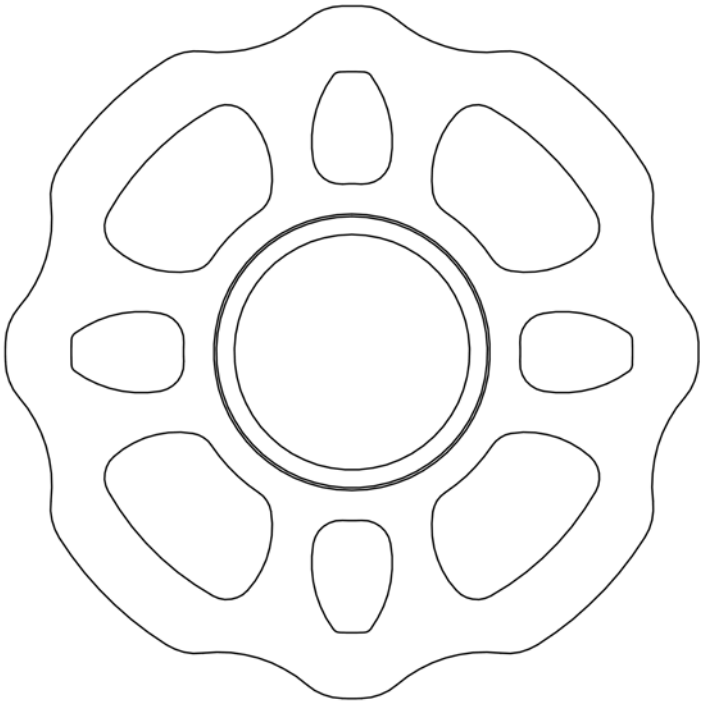


MODULAR SCAFFOLDING ASSCO FUTURO

ASSEMBLY GUIDE

PLETTAC
ASSCO
GERÜSTE
SCAFFOLDING

ALTRAD

STATUS 12/2011

Index

ASSEMBLY GUIDE

New dimensions in the environment of professional and cost-effective scaffolding. The fully approved modular scaffold system modular scaffolding assco futuro meets all requirements of EN 12810 and EN 12811.

The key success

The futuro junction contains the socket plate with eight specially formed openings to employ up to eight wedge connection heads. Both socket plate and connection head are optimised by FEM (finite-element-method). Doing this, both shape and material thickness of socket plate and connection heads are improved with the result that with less weight of components load capacity and rigidity of the system are increased.

Industrial scaffolding

A most flexible assembly even in areas where access is restricted because of pipe work or cables.

Renovation & restoration works

An optimised multi purpose adaption to historic buildings, churches and sculptures with their irregularities is possible.

Maintenance and assembly on ships and aircrafts

Effective work at the convex shape of ships in an economic way also using suspended scaffoldings or independent scaffoldings.

Other Applications for modular scaffolding assco futuro

Stair Towers
Birdcage Scaffold
Extended Working Platforms
Independent Scaffold
Emergency Support
Public Events
Flood-Protection

Quality and Safety

Tremendous high quality standards characterise the whole modular system. In house inspection, third party supervision and the requirements of DIN EN ISO 9001, latest standard, guarantee best performance in advantage for the customer.

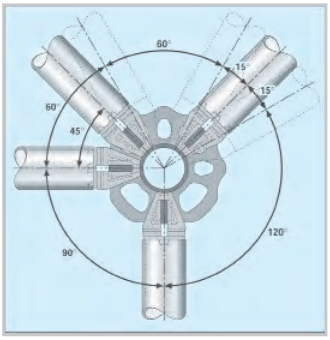
For a long durability all steel items are produced with a hot-dip galvanised finish.

The relevant individual regulations and generally recognised codes of practice must always be observed. These are in particular:

- The German Approval
- EN12811-1
- Industrial safety regulations as well as further regulations

Scaffolding parts should be checked before use.

Eight Holes - But no handicap



- Up to eight connections per joint
- Option to attach horizontals at right angles with high accuracy at the required level
- Free choice of angles between horizontals using large or small connection openings.
- Load transfer aligned to axes with positive connections
- The flat shape of the connection plate means no mortar, dirt, ice, grit, blasting debris etc. can accumulate
- High joint load capacity and stiffness
- Can be adapted to suit any plan shape and form of construction by using the variable connection options the choice of spans available and freely selectable scaffold height increments of 500mm

Right angles – if you want them

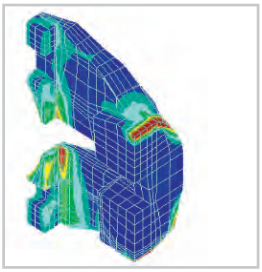
The use of the small connection openings for connecting horizontals allows a 90° angle to be created between them – essential for certain users. The larger gaps allow angles between 30° and 60°. These options allow practically any angle to be set and shape form of construction to be scaffolded.

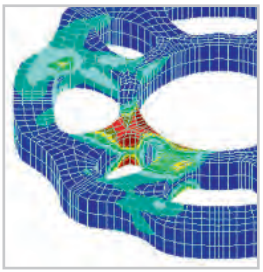
Our measure:

Bay width: 730 mm, 1.09 m, 1.40 m

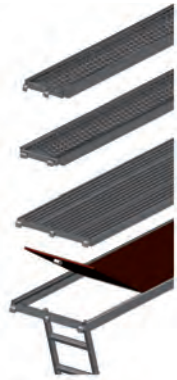
Bay length: 730 mm, 1.09 m, 1.40 m, 1.57 m, 2.07 m, 2.57 m, 3.07 m, 4.14 m

More mathematics for less weight.
The use of finite element methods (FEM) on a three dimensional model allows material shapes and thicknesses to be optimised to meet the required applied loads. This produced the sinusoidal shape and weight savings of 10% as well as clear advantages in erection, safety in use, joint stiffness and storage space requirements.





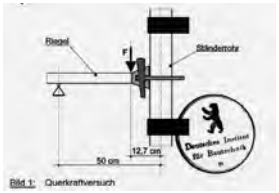
Increase in bending moment and shear length.
Using FEM analysis, the height of connection heads as well as the shape and thicknesses are optimised to produce higher reserves of safety. This higher load capacity pays off particularly for scaffolds used under demanding conditions.



Functional versatility
Modular scaffolding assco futuro has the right type of decking available for every job. Tough hot-dipped galvanised steel and, full aluminium decks perfect for construction and heavy industry.

PLETTAC ASSCO GERÜSTE SCAFFOLDING

ASSEMBLY GUIDE

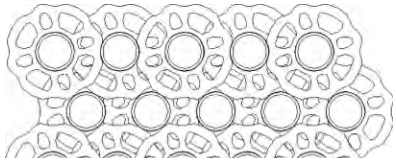


Quality is our best product

In addition to third party inspection of manufacturing by a named test-laboratory, our in-house supervision guarantees a sustainable high standard of quality and with that, the safety of the owners and users, through extensive load capacity tests, using our own testing facilities.

U-Double ledger for use with U-Support

Double ledger for use with Tubular-Support



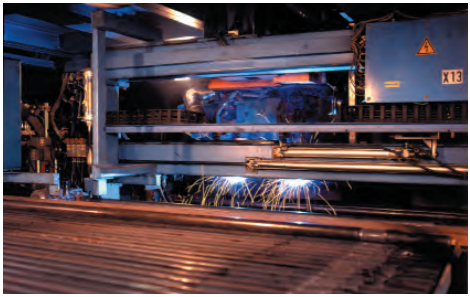
Simpler Storage

As well as the advantages during assembly and its high reserves of safety, the new shape of the socket plates also has storage benefits. The stacked volume of the standards is about 5% smaller and the higher resistance to rolling makes storage more secure.

Two approvals for one knot

Modular scaffolding assco futuro is the innovative Modular scaffolding system with two knot approvals from the German Institut für Bautechnik, Berlin. The approval Z-8.22-841 commits the erection of the exclusive modular scaffolding assco futuro; the approval Z-8.22.855 regulates the erection in combination with elements approved by 8.22-64. The Modular scaffolding assco futuro is approved in several European countries and meets all requirements of EN 12810.

You can't test quality into a product; it has to be produced. A high automated production with modern welding robots assures a production at the highest level.



ALTRAD PLETTAC ASSCO GERÜSTE SCAFFOLDING

1.0 General

1.1 Preliminary Notes

The Modular scaffolding assco futuro should only be assembled, dismantled and refitted by competent, appropriately trained persons. Reference is made to the requirements of the national Health and Safety at Work Legislation, Construction Regulations regarding Health and Safety and further local rules. Within the framework of this user guide the erector and the user will receive the requirements based on the German Health and Safety regulations.

A suitable and sufficient risk assessment of the assembly situation is necessary prior to erection based on the prerequisites of the local regulations. The special features of each individual case are to be taken into consideration during this process.

A basic prerequisite is that the following instructions are taken into consideration. Reference is made to the fact that all instructions, in particular those relating to stability, are only applicable when using original Modular scaffolding assco futuro components identified in accordance with approval Z-8.22-841. The assembly of external brands may lead to safety defects and inadequate stability.

A plan is to be drafted by the contractors of the scaffold construction work for assembly depending on the complexity, for assembly, conversion and dismantling (assembly instructions) or drafted by a qualified person appointed by him. These assembly and use instructions may be used for this purpose, supplemented by detailed information for the respective scaffolding.

Comments are made throughout the User Guide to provide the user with key information.

Information

Important note or warning

Risk of falling

Assembly of the Modular scaffolding system assco futuro only:

- Under the supervision of a qualified person
- By trained employees
- On the basis of the risk assessment
- In consideration of this user guide
- With components marked in accordance with approval Z-8.22-841

1.2 Scaffold System

The Modular scaffolding system assco futuro is made of hot dip galvanised steel standards and transoms. The standard tubes are equipped with welded perforated disks spaced at a distance of 500mm whilst the transoms have connecting heads at their ends with a wedge. The span lengths and widths are 0.73m, 1.09m, 1.57m, 2.07m, 2.57m and 3.07m. The vertical distance of the deck level is 2.00m where by the requirements of height class H1 in accordance with DIN EN 12811-1 are fulfilled. The junction of the standards takes place by tube connectors arranged at the top of a standard.

The stiffening of the scaffolds takes place by vertical and horizontal diagonals.

The manufacturing and marking of the components is governed in the general technical approval Z-8.22-841.

The Modular scaffolding system assco futuro is to be checked before commissioning. Testing is to be documented.

1.3 General Site Safety

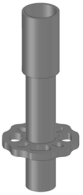
- It is the responsibility of the user to check the Modular scaffolding system assco futuro before use for any apparent defects. The user is responsible for use in conformity with conditions and maintenance of operational safety of the scaffold. Scaffolds are required to be inspected in regular intervals by the user and records kept.
- Before erection of a scaffold all ground must be inspected. The ground should be level and supporting using base plates and/or sole boards.
- Defects which occur during use as a result of severe weather or construction work etc. are to be notified immediately to the scaffold contractor.
- Safe access and egress to and from the scaffold must be ensured using the most appropriate method. Ladders used should be properly secured, positioned at an angle of 4 to 1. Ladders should extend no less than 1m above the working platform. A ladder access trap door or handrail safety gate should always be employed.
- The user of the scaffold should prevent access by unauthorised persons.
- Trapdoors of access decks are to be kept closed during work on the scaffold.
- Work at several levels is to be avoided. There is an increased risk of accident as a result of falling objects.
- Scaffolds must be tied and adequately braced in line with the recommendations in this guide.
- All working platforms require double handrails and toe boards. Additional protection such as debris netting, brick guards, sheeting and protection fans may be required.
- The Modular scaffolding system assco futuro, in the standard design, may be loaded as a façade scaffold in accordance with the approval with a maximum useful load of p = 2.0 kN/m² on one platform layer. Larger surface loads are possible, however must be individually verified. The scaffold or parts thereof could collapse in the event of overloading.
- When using as trap or roof scaffolds no materials should be stored on the platform or equipment deposited. The risk of injury of falling persons is increased.
- Never add sheeting, hoarding or netting unless the structure has been specifically designed for that purpose.
- The user of the scaffold may not dismantle side protection parts or scaffold couplers or change anything on the basic structure. Care should be taken to ensure that this does not take place by other persons involved in the construction. Any missing scaffold couplers or inadequate foundation for the scaffold standards may lead to collapse of the whole scaffold. If changes are made during the course of construction, then these are to be performed by the qualified scaffold erectors.
- The Modular scaffolding system assco futuro may only be changed by the qualified scaffold erectors.

Modifications to the Modular scaffolding system assco futuro should only be carried out by the scaffold construction contractor.

1.4 Principle Components

Vertical Standard

Code	Length	Weight
5FMPP01000	0,50m	3,9kg
5FMPP01001	1,00m	6,5kg
5FMPP01002	1,50m	8,7kg
5FMPP01003	2,00m	11,0kg
5FMPP01004	2,50m	13,2kg
5FMPP01005	3,00m	15,4kg
5FMPP01006	4,00m	19,9kg



Starting Collar

Code	Length	Weight
5F00319000	0,3m	1,5kg

Intermediate Transom

Code	Length	Weight
5F00309073	0,73m	3,9kg
5F00309109	1,09m	5,1kg
5F00309140	1.40m	6,2kg
5F00309157	1,57m	6,8kg

6 Ton Adjustable Base

Code	Weight
5FS0G59007	4,3kg

Suspended Scaffold Connector

Code	Length	Weight
5FMPP23000	0,50m	3,0kg

Adjustable Bracket Futuro, Tubular-Support 1/2 decks

Code	Length	Weight
5FMPP36500	0,41 x 0,75m	5,6kg

1.4 Principle Components

Ledger

Code	Length	Weight
5F00304073	0,73m	3,0kg

For stair towers with steel staircases W=750mm and landing with 0,75 x 2,07m bay.

5F00304109	1,09m	4,1kg
5FMPP02520	1,29m	5,0kg
5F00304157	1,57m	5,6kg

For stair tower with heavy load staircase and stair tread 1,25m.

5F00304207	2,07m	7,2kg
5F00304257	2,57m	8,8kg
5F00304307	3,07m	10,3kg

Double Ledger, Tubular-Support

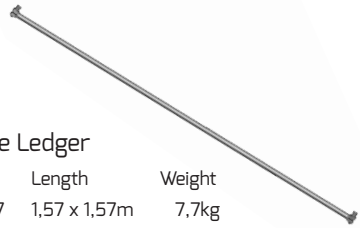
Code	Length	Weight
5F00307014	1,40m	8,9kg
5F00307015	1,57m	9,9kg
5F00307020	2,07m	13,1kg
5F00307025	2,57m	16,2kg
5F00307030	3,07m	19,4kg

Face Brace Futuro H150

Code	Length	Weight
5F00311206	1,57m	8,1kg
5F00311243	2,07m	9,2kg
5F00311285	2,57m	10,5kg
5F00311328	3,07m	11,8kg

Reinforced Ledger

Code	Length	Weight
5F00305109	1,09m	7,0kg
5F00305129	1,29m	8,0kg
5F00305140	1,40m	8,7kg



Plan Brace Ledger

Code	Length	Weight
5F00314257	1,57 x 1,57m	7,7kg
5F00314207	2,07 x 2,07m	10,0kg
5F00314257	2,57 x 2,57m	12,2kg
5F00304434	3,07 x 3,07m	14,5kg

Face Brace Futuro H200

Code	Length	Weight
5F00310073	0,73m	8,2kg
5F00310109	1,09m	8,5kg
5F00310140	1,40m	9,0kg
5F00310157	1,57m	9,3kg
5F00310207	2,07m	10.,kg
5F00310257	2,57m	11,4kg
5F00310307	3,07m	12,6kg

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Horizontal Brace Futuro

Code	Length	Weight
5F00313400	1,09 x 2,07m	8,1kg
5F00313401	1,57 x 2,07m	8,9kg
5F00313402	0,73 x 2,57m	9,2kg
5F00313403	1,09 x 2,07m	9,6kg
5F00313404	1,57 x 2,57m	10,3kg
5F00313405	2,07 x 2,57m	11,2kg
5F00313406	0,73 x 3,07m	10,8kg
5F00313407	1,09 x 3,07m	11,1kg
5F00313408	1,57 x 3,07m	11,7kg
5F00313409	2,07 x 3,07m	12,5kg
5F00313410	2,57 x 3,07m	13,4kg

Timber Toeboard for Futuro Decks

Code	Length	Weight
5F00315073	0,15 x 0,73m	1,6kg
5F00315109	0,15 x 1,09m	2,3kg
5F00315140	0,15 x 1,40m	2,8kg
5F00315157	0,15 x 1,57m	3,1kg
5F00315207	0,15 x 2,07m	4,1kg
5F00315257	0,15 x 2,57m	5,0kg
5F00315307	0,15 x 3,07m	5,9kg
5F00315414	0,15 x 4,14m	7,9kg

Steel Ledger Deck W190mm Tubular Support

Code	Length	Weight
5F00732109	1,09m	7,3kg
5F00732157	1,57m	9,5kg
5F00732207	2,07m	11,7kg
5F00732257	2,57m	14,1kg
5F00732307	3,07m	16,4kg

Steel Ledger Deck W320mm Tubular Support

Code	Length	Weight
5F00734073	0,73m	7,2kg
5F00734109	1,09m	9,3kg
5F00734140	1,40m	11,2kg
5F00734157	1,57m	12,3kg
5F00734207	2.07m	15,3kg
5F00734257	2,57m	18,3kg
5F00734307	3,07m	21,3kg

Alu Access Deck Futuro W640mm w. Alu Surface and Ladder

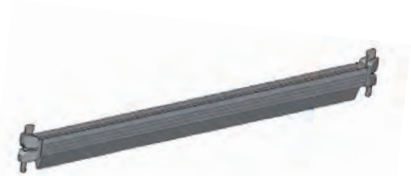
Code	Length	Weight
5F00703610	2,07m	17,0kg
5F00703612	3,07m	27,0kg

PLETTAC ASSCO GERÜSTE SCAFFOLDING

1.5 U-support Components

Double Transom, U-Support

Code	Length	Weight
5F00307157	1,57m	9,8kg
5F00307207	2,07m	13,0kg
5F00307257	2,57m	16,1kg
5F00307307	3,07m	19,2kg

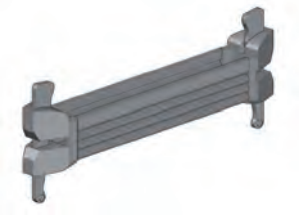


Reinforced Transom, U-Support

Code	Length	Weight
5F00306104	1,04m	6,3kg
5F00306109	1,09m	6,6kg
5F00306129	1,29m	7,7kg
5F00306140	1,40m	8,3kg
5F00306154	1,54m	9,0kg

Deck Retainer, U-Support

Code	Length	Weight
5F00308036	0,39m	0,7kg
5F00308073	0,73m	1,3kg
5F00308109	1,09m	1,9kg
5F00308140	1,40m	5,4kg
5F00308154	1,54m	6,1kg
5F00308157	1,57m	6,1kg
5F00308207	2,07m	8,1kg
5F00308257	2,57m	10,2kg
5F00308307	3,07m	12,2kg



Transom, U-Support

Code	Length	Weight
5F00306042	0,42m	2,2kg
5F00306073	0,73m	3,1kg

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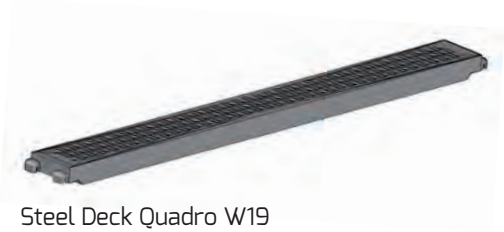


Steel Deck Quadro W19

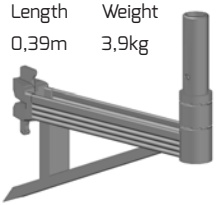
Code	Length	Weight
5F00702100	1,09m	6,6kg
5F00702101	1,57m	8,8kg
5F00702102	2,07m	11,1kg
5F00702103	2,57m	13,4kg
5F00702104	3,07m	15,7kg

Steel Deck Quadro W32

Code	Length	Weight
5F00701088	0,73m	5,9kg
5F00701089	1,09m	8,1kg
5F00701094	1,40m	10,0kg
5F00701090	1,57m	11,0kg
5F00701091	2,07m	14,0kg
5F00701092	2,57m	17,1kg
5F00701093	3,07m	20,1kg
5F00702094	4,14m	29,3kg

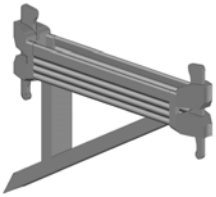
Hop-Up Side Bracket, U-Support, w. connecting Spigot

Code	Length	Weight
5F00317036	0,39m	3,9kg



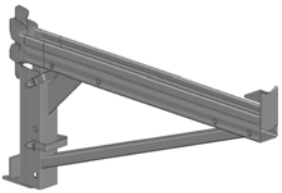
Hop-Up Side Bracket, U-Support

Code	Length	Weight
5F00317136	0,42m	2,6kg
5F00317150	0,50m	3,0kg
5F00317173	0,73m	5,2kg



Adjustable Bracket, U-Support. 1/2 decks

Code	Length	Weight
5F00317473	0,39 x 0,73m	5,4kg



1.6 Assembly of Joint Connection

The wedge lock principle was selected as a joint connection (transom – standard tube). This relates to the positive locking of the scaffold with a loosely inserted wedge. A definite frictional connection is achieved with a hammer. The head is pressed on the upper and lower contact surface against the standard tube (figure 1) which produces an extremely deflection-resistant connection.

The transom head piece is pushed sideways over the perforated disk. The wedge lies horizontal on the transom tube (figure 2) held by a rivet on the top.

By lifting the wedge and inserting, the transom is locked in position, by hitting with a 500g hammer until the rebound blow it is positive connected with the standard (figure 3).

The perforated disk (figure 4) has four small holes which are placed at 90º. The transoms are connected if a precise right angle is achieved in the horizontal plan. This automatically sets itself when wedged.

There are slits between the small holes which facilitate a variable transom connection of ± 15º. As a result horizontal plans can be formed which do not lie in the 90º screen.

The recesses on the outer edge of the perforated disk not only represent the special appearance of the Futuro scaffold joint but also save weight and ensure a better stackability of the standards in the pallet. Due to the shape they cannot roll away on an uneven surface.

Wedges are to be hit immediately after assembly of the components, with a 500g hammer until the rebound blow.

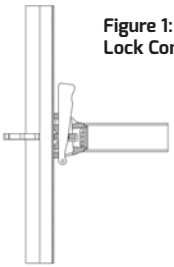


Figure 1: Wedge Lock Connection

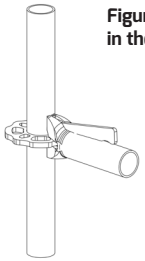


Figure 2: Pushing in the head piece.

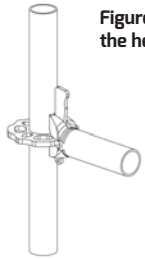


Figure 3: Wedging the head piece.

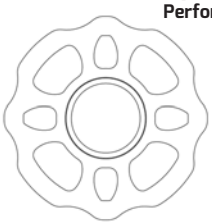


Figure 4: Perforated Disk.

2.0 Modular scaffolding assco futuro

2.1 Standard Design

The assembly and dismantling of the standard design as façade scaffold in accordance with approval Z-8.22-841 is described in chapter 2. The Modular scaffolding system assco futuro may be used in the standard design for work scaffold of load class 3 according to EN 12811, and as trap or roof scaffold.

The scaffold decks used in the trap and roof scaffold may be taken from table 1 (page 19).

If the scaffold with a bay width of 1.09m is used without any side brackets the maximum deck length is 3.07m. Wall ties are to be fixed to every standard every 4m in height. In this case the maximum standing height is 24.5m as to EN 12811.

If the scaffold with a bay width of 1.09m is used with side brackets 0.43m. The side brackets loaded with LC 1 (75kg/m^2) the maximum deck length is 2.57m. Wall ties are to be fixed every standard every 4m in height. In this case the maximum standing height is 24.5m as to EN 12811.

If the Modular scaffolding system assco futuro is used for scaffolds which deviate from the standard design as façade scaffold, these must be evaluated on the basis of the planning and building law, in accordance with technical building specifications and the stipulations of relevant guidance notes and where necessary, calculated.

These assembly and use instructions only apply in conjunction with the use of original plettac assco components which are identified in accordance with approval Z-8.22-841. All scaffold components are to be checked before assembly and use by a visual inspection for any defects.

The assembly of the Modular system scaffolding assco futuro as façade scaffold is to be carried out in the sequence of order of the following sections.

For the Modular scaffolding system assco futuro as façade scaffold the following applies:

- Regulation in approval Z-8.22-841
- Load class 3
- Useful loads: LC 3 = 2.0 kN/m2
- Max. standing height = 24m as standard design
- In the event of deviations from the standard design additional proof is required.

2.2 Assembly of the First Scaffold Bay

2.2.1 Basic Scaffold

The basic scaffold consists of adjustable bases, starting collars and horizontal transoms parallel and transverse to the façade (figure 5).

First of all, the starting collars are placed on the adjustable bases and connected with the horizontal transoms in accordance with figure 5. The wedges are inserted loose and the transoms are aligned with the aid of a horizontal spirit level. Positive wedging should then take place. The precise scaffold layout is given. Due to the low weight the basic scaffold can be easily moved and placed into the correct position to the façade. The distance should be selected in such a way that the internal edge of the deck to be subsequently connected should not be further than the distance required by the applicable law from the façade.

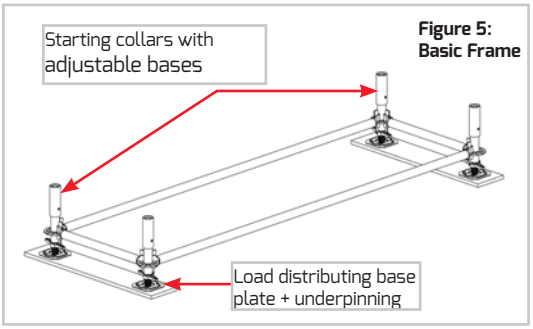


Figure 5: Basic Frame

2.2.2 Load Distributing Base Plate

The Modular scaffolding assco futuro may only be fitted on an adequately firm foundation. If the foundation is not suitably firm, load distributing sole plates are to be provided e.g. a scaffold board as shown in figure 5. Where necessary, single part plates can be arranged under each post (figure 6).

With suitable foundation, the substructures are to be secured against sliding. If possible, the base should be balanced out accordingly, so that a horizontal support surface is available.

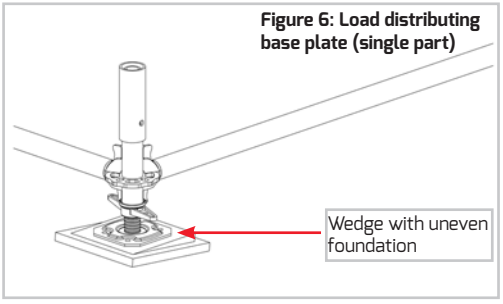


Figure 6: Load distributing base plate (single part)

2.2.3 Adjustable Bases

An adjustable base is to be fitted under each modular standard (figure 5). Adjustable bases may be extended, as a rule, up to 250mm.

The possible threaded system extension lengths W (lower side of base plate up to adjustable nut) are as follows with the scaffold thread.

Total Length L1 (mm)	Jack Extraction Length W (mm)
400	255
600	455
800	605

The thread of the bases is limited at the corresponding points so that further turning is not possible.

2.2.4 Vertical Standards

The vertical posts are placed in the starting collars. Façade side 4.0m long and outside 3.0m long posts are to be fitted (see figure 16, page 27). 500mm above the basic transom a further transom may be required transverse to the facade (see structure variants).

730mm or 1.09m system lengths are to be used as transverse transoms.

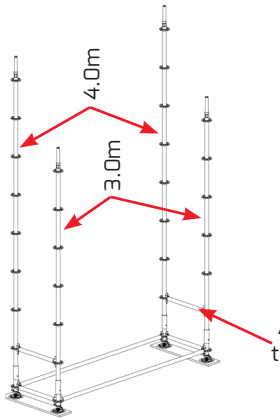


Figure 7: Assembly of the vertical standards

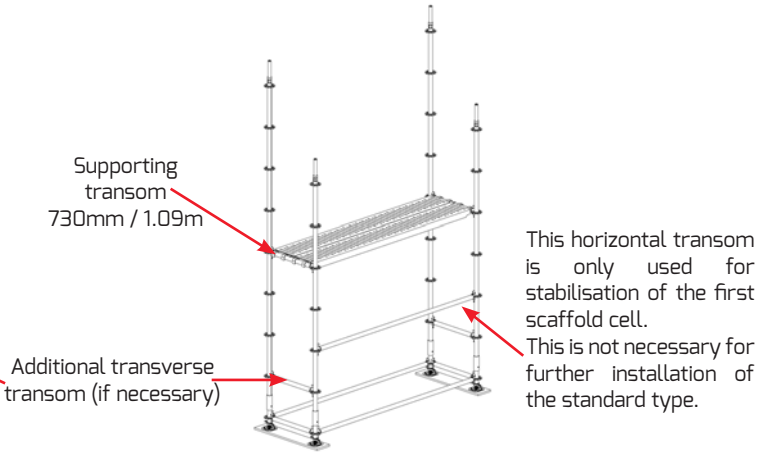


Figure 8: Assembly of the deck

2.2.5 Assembly of the Decks

Only decks in accordance with table 1 below have been considered for the standard designs.

Decks for U-Support

The transoms for U-Support with 730mm system length are to be used for the decks with U support. The claws on the heads of the deck are placed on the sides of the U profile. The floors thus form a horizontal rigid panel and stabilise the scaffold. Depending on the span, two 320mm wide steel panels or one 610mm wide frame plate and/or one 640mm wide are necessary. In order to secure the decks, the deck retainer is to be fitted over the access deck claws on the transom.

Decks for Tube Support

In order to support the tube support decks horizontal transoms are to be used with 730mm system length. The panels are placed with claws over the transoms and pushed in the correct position. The deck retainers automatically lock (check). Depending on the span, two 320mm wide steel panels or one 640mm wide access deck are to be fitted.

Table 1: Standard design deck elements

Description	Use in trap and roof scaffold	Span Length (m)	Load Class (max)
Steel deck W 32 U support and Tube support	Permissible	< 2.07 2.57 3.07	6 5 4
Steel deck W 19 U support and Tube support	Permissible	< 3.07	4
Aluminium access deck U support	Permissible	2.57 3.07	3
Aluminium access deck with aluminium cover U support and tube support	Permissible	2.57 3.07	4 3

Detailed information relating to load capacity of the decks, see table 7 in chapter 5.6, page 69.

All scaffold levels must be laid out in full. Levels with only a 320mm wide deck cannot stiffen the scaffold.

With decks for tube support it should be checked after assembly, whether the deck retainers are locked. Where necessary, these are to be manually locked. It should be ensured that the retainer lever can always be moved in the mounting (see also chapter 3.2.9).

2.3 Assembly of Further Scaffold Bays

2.3.1 Standard Range

Assembly of further scaffold bays takes place as described in the previous section. The longitudinal transoms at the base are to be arranged continuously (figure 9). A access deck is to be fitted in the ascent bay span in place of the steel decks.

Steel decks are to be placed on the bottom transverse transoms for correct support of the ladders.

These horizontal transoms can be removed after assembling the side protection in the deck level + 2m

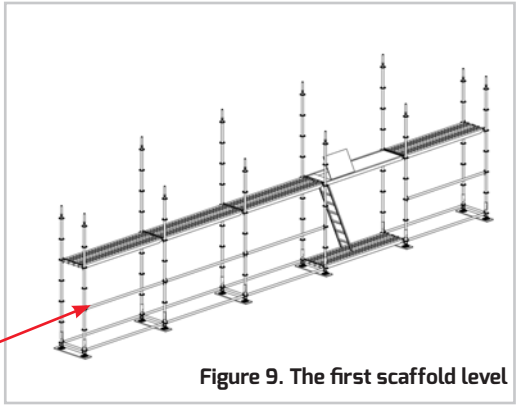


Figure 9. The first scaffold level

2.3.2 Uneven Ground

In the event of inclined ground and when reaching certain layer heights, correspondingly longer vertical posts are to be fitted. These are to be stiffened longitudinally and transverse with transoms and where necessary with diagonals.

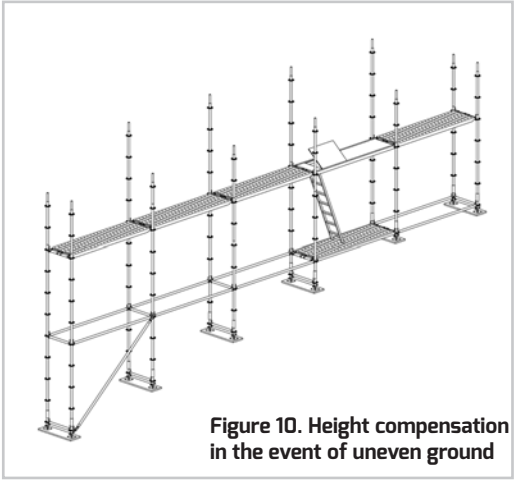
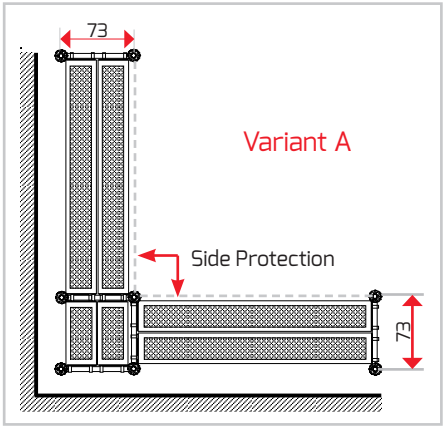


Figure 10. Height compensation in the event of uneven ground

2.3.3 Corner Formation

The possible corner formations with the Modular scaffolding system assco futuro are multitude. It can be chosen between internal and external corners. It is important that with the selected design at the façade side, brackets can be used and on the external face the three part side protection is installed. Figure 11 shows the possibilities of an internal corner, variant A without brackets and variant B with brackets towards the façade. Variant A can also be used on an external corner. All variants can be fitted with tube support and with U support (the tube support is shown).

Figure 11: Scaffold at internal corners.



The variants which are shown can be fitted with tube support and with U support.

Select the design so that the three part side protection can be properly fitted wherever the distance to the structure is more than 300 mm.

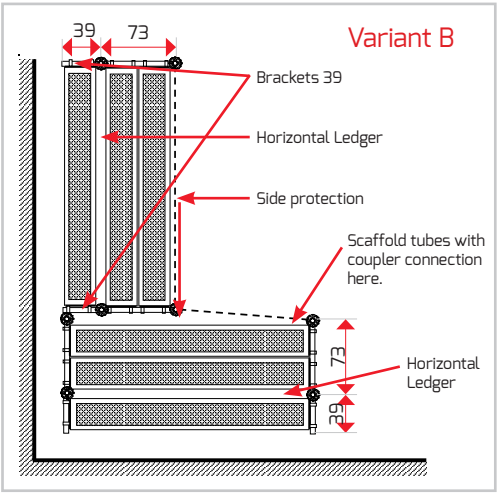


Figure 12 shows the various possible arrangements for an external corner. Variant C (without brackets) and D (with brackets in front of the façade) are variable with regard to the position of the scaffolds. Variant E reveals the optimum with the lowest number of posts. A horizontal transom (tube support) and a U double transom are necessary here as support.

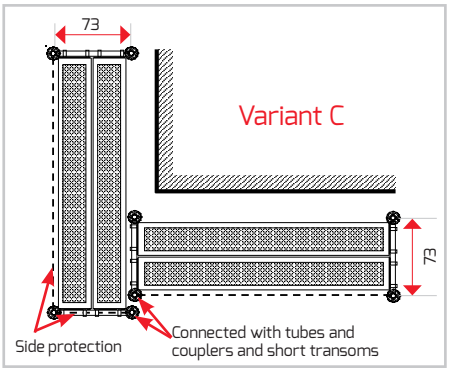
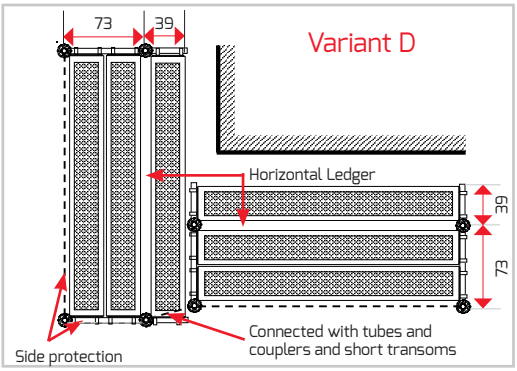
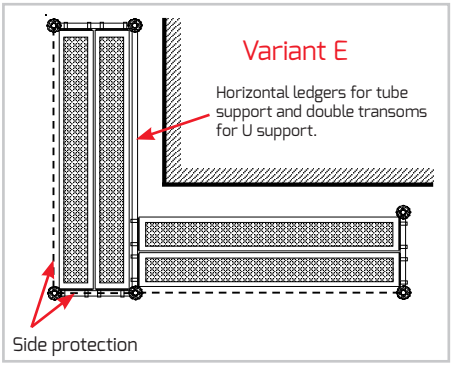


Figure 12: Equipping external corners

Choose a design so that the three part side protection can be properly fitted wherever the distance to the structure is more than 300 mm.

All varients which are shown can be fitted with tube support and U suport





2.4 Assembling Further Scaffold Lifts

2.4.1 General

When assembling, refitting and dismantling further lifts of the Modular scaffolding system assco futuro, there is a risk of falling. The scaffold construction work must be carried out in such a way that the risk of falling is avoided where possible or the risk is as low as possible. The contractor (scaffold erector) must define suitable measures for avoiding risk or minimising hazards on the basis of his risk assessment in each individual case and/or for the respective activities. ALTRAD plettac assco GmbH recommend the use of fall protection methods as detailed in national Health and Safety regulations where protection can be achieved.

Measures are to be selected based on the actual risk present, the purpose and practical possibilities are depending on the following basic conditions:

- Qualification of the employees
- Nature and duration of the activity in the hazardous area
- Possible falling height
- Appearance of the surface on which the employee may fall
- Appearance of the workplace and access

Technical and personal related measures are used for avoiding the risk of falling during assembly, refitting and dismantling of the Modular scaffolding system assco futuro. Possible measures for avoiding risks can be:

- use of an assembly safety guard rail (AGR); or
- use of personal protective equipment against falling (Health and Safety Equipment, Safety Harnesses); or
- a combination of both of the above-mentioned.

Use of AGR or Harnesses may be dispensed in individual cases if the AGR and Harnesses do not offer adequate protection based on structural and scaffold specific circumstances.

There is a risk of falling when assembling, refitting or dismantling the futuro scaffold.

Define measures against the risk of falling by means of a risk assessment.

Temporary tilt protection of the first scaffold layer

There is a risk of tilting of non-tied scaffold when assembling/dismantling the scaffold especially in the scaffold bay, where the material transport is carried out. This can be prohibited if the scaffold is tied properly to the wall structure at the decks level of 2 m or temporary support is installed.

2.4.2 Scaffold Assembly

2.4.2.1 Vertical Transport of scaffold components

According to the German health and safety rules the transport of scaffold components over more than 8m standing height has to be carried out by means of hoists. Hoists may also be pulleys with ropes enabling to transport the equipment vertically without touching it in every lift. This rule may be ignored if the longitudinal dimension of the scaffold is less than 10 m and the max. standing height is less than 14 m. It is recommended that bays, being used for vertical transport carried out manually are at least equipped with hand rail and mid rail. The manual transport has to be carried out with one person at every lift handing the goods further up (figures 13 and 14).

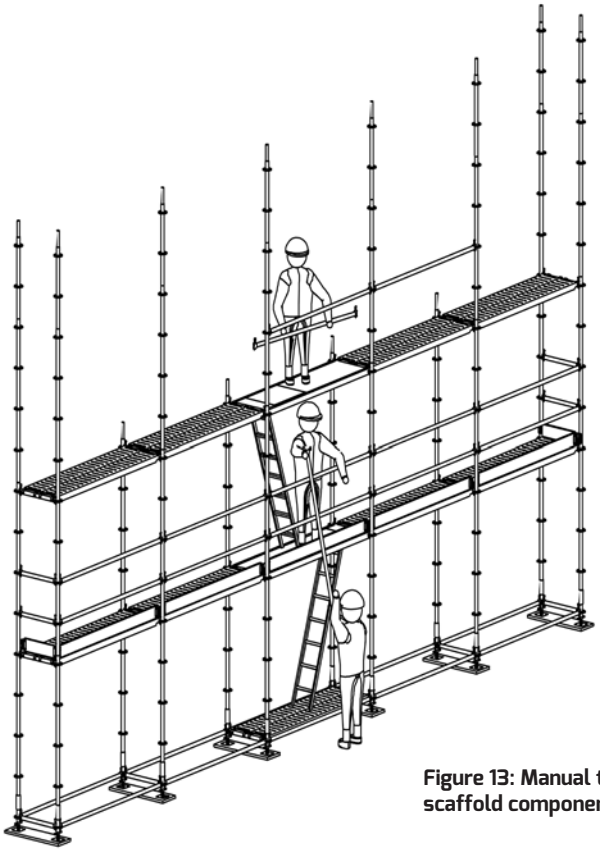


Figure 13: Manual transport of the scaffold components

2.4.2.2 Assembly of the Vertical Standards and Horizontal Transoms

Depending on the height, the posts should be chosen so that they protrude either min. 1 m or 3 m in the top level wherever fall protection is required. Horizontal transoms are fitted as side protection 1m in height along the whole scaffold length and on the end faces, as the first measure. The end façade side posts (figure 14) and/or the external posts extending beyond 1m are then lengthened in accordance with the requirements of the planned scaffold height and the support transoms fitted at a height of 2m above the decked level below (figure 14).

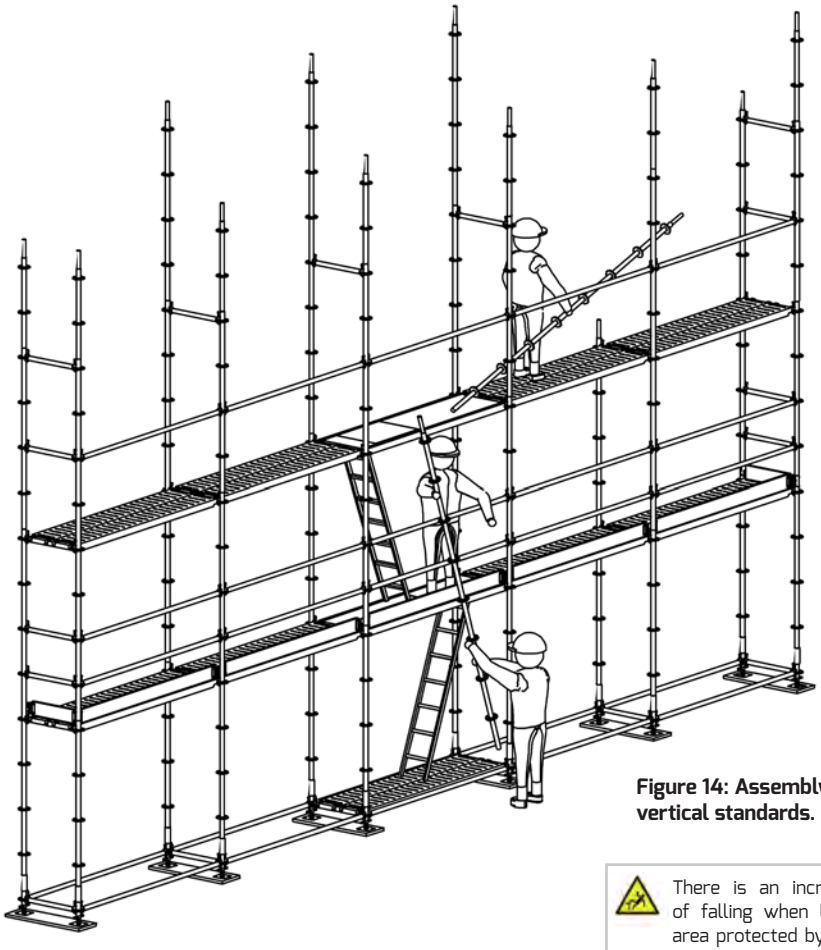


Figure 14: Assembly of the vertical standards.

There is an increased risk of falling when leaving the area protected by horizontal transoms.

In the next step, horizontal transoms are to be assembled as mid-rails for the side protection. Since these stabilise the scaffold parallel to the facade together with the hand rails, both must be fitted in the upper level before leaving the site. Finally, the scaffold level is to be provided with toe boards and decks are to be placed over head.

As a rule, 4m or 2m long standards are to be fitted (see figure 16, page 27) except at the base of the scaffold. The lengths of the standards are to be selected corresponding to the planned scaffold height at the top of the scaffold.

Assemble mid rails shortly after the hand rails. The scaffold is stabilised as a result.

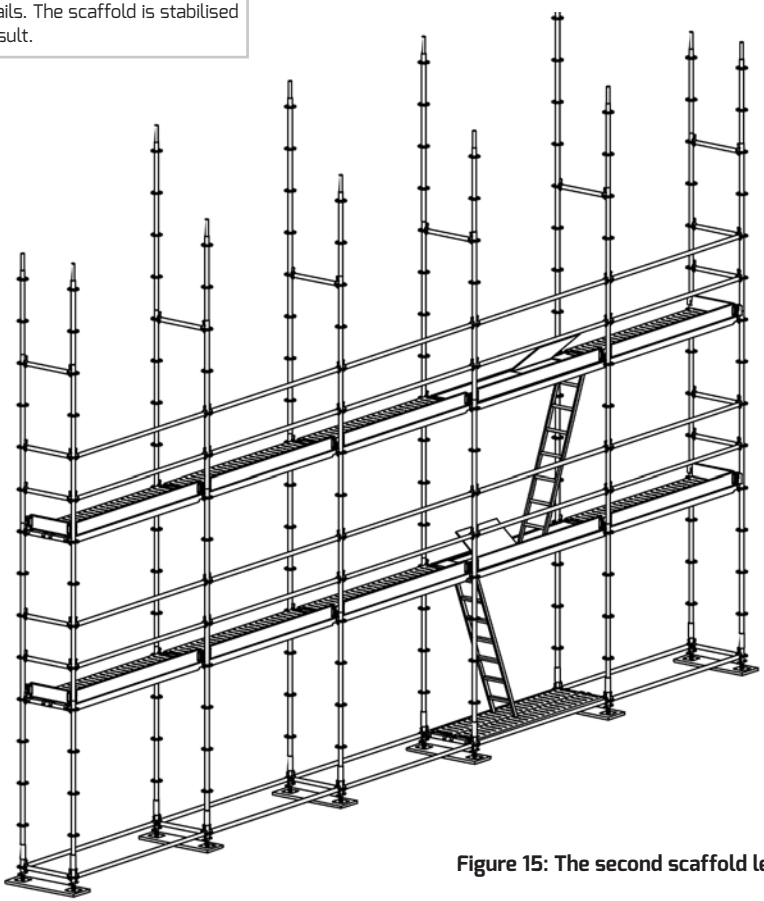
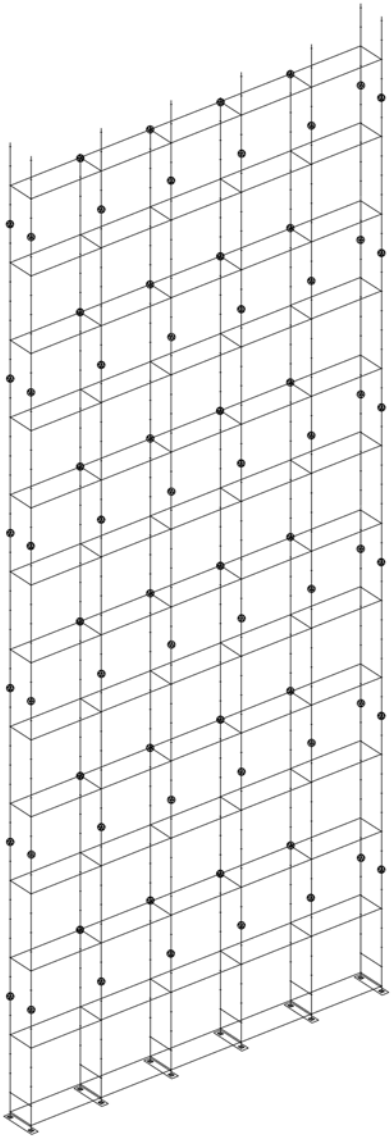


Figure 15: The second scaffold level.



The post butt joints are arranged on the façade side at the height of the deck, on the outside and on the end faces they are arranged 1m above the decks.

- = Post butt joint

(Deck and side protection are not shown in figure 16. No longitudinal transoms are necessary at the level of the deck if guard rails are assembled).

Figure 16: Position of the post butt joints

2.4.2.2 Assembly of the Decks

The decks are to be fitted corresponding to section 2.2.5.

2.4.2.3 Scaffold Access

Before starting the work on the first scaffold lift, the scaffold access should be fitted (see section 2.3.1 and figure 9). This is an internal ladder of the Modular scaffolding system assco futuro, which is made out of aluminium access deck with integrated ladder. When assembling the access decks, the hatches are to be arranged offset (figure 15) and they are to be closed each time after stepping through. Under no circumstances may the trap doors be raised or locked by over bending the opening angle or other measure. If the hatches are not closed after stepping through, there is a risk of falling into the opening.

2.4.2.4 Braces

Bracing (vertical diagonals) are not required for the standard type. Stiffening of the scaffold parallel to the façade takes place exclusively by the horizontal ledgers of the side protection.

2.4.2.5 Completing the Side Protection

Missing side protection ledgers, toe boards and the complete side protection on the end faces of the futuro scaffold are to be fitted in all scaffold layers which are not only used for the assembly of the scaffold. Double longitudinal ledgers in each level are always necessary, even at levels which are not planned for work.

The toe boards are resting on the side of the steel decks. The end fittings of the toeboard are positioned between the wedge and standard tube.

2.4.3 Safe assembly

2.4.3.1 Advanced Guard Rail (AGR)

General

There is a risk of falling, when ascending to the top scaffold layer and during subsequent assembly of the posts and ledgers in the access bay.

As a measure to avoid risks when ascending to the top scaffold lift, it is recommended to use the advanced Guard rail (AGR) as protection in the area of ascent. If a post coming from below, is not available in the area then the fitter can hold onto the AGR posts. The telescopic guard rail offers local side protection until the first posts and the horizontal ledger are assembled.

The AGR's are assembled before accessing the upper level from the level below. In order to exclude a risk of falling during installation of the AGR, the complete 3 part side protection is to be fitted in this bay beforehand.

Recommendation

Use Advanced Guard Rail (AGR) in the area of ascent.

Description of the Advanced Guard Rail

The design is described with lockable posts and telescopic guard rail.

The AGR's consist of individual posts and telescopic guard rails (see figure 17). Two posts and one rail are required for the first bay, for each further bay, one post and one rail.

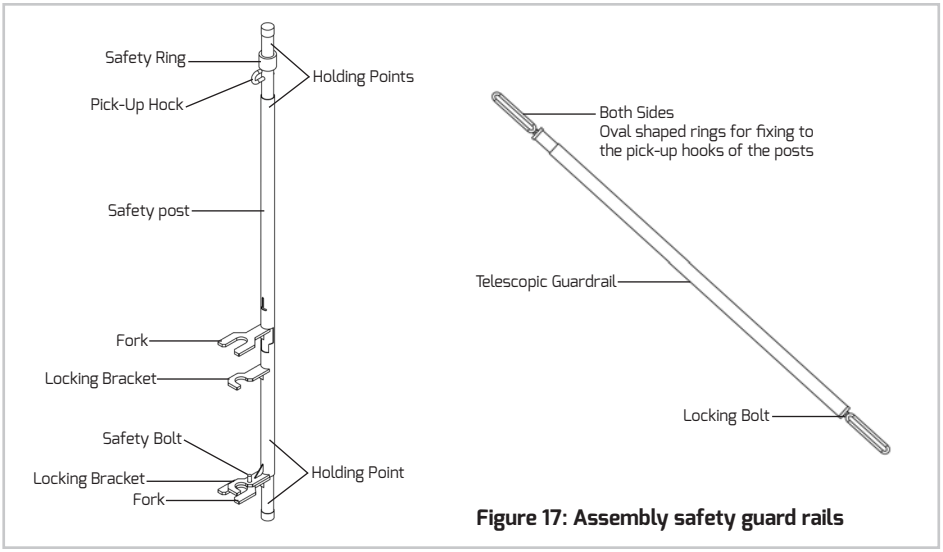


Figure 17: Assembly safety guard rails

The posts consist of an outer and inner tube. The forks and hooks for the guard rail posts are fixed to the inner tube, the locking bracket to the outer tube. The safety ring is freely moveable and pushed over the inner tube (see figure 17). The lower locking bracket has a hole, which sits on the bottom fork in the locked position via a safety bolt.

Assembly of the Advanced Guardrails

The posts are assembled external side of the scaffold. They may be handled from above and below. In the event of assembly at height, they are released above by lifting (unlocking the locking bracket) and turning the outer tube clockwise (figure 18, step 1 and 2) and fitted 2m higher so that the bottom fork is on the wedges of the horizontal ledger at approx. 1m height above the standing level.

For closing, the outer tube is turned anti-clockwise and lowered so that the bottom locking bracket is pushed over the safety bolt (figure 18, steps 3 and 4).

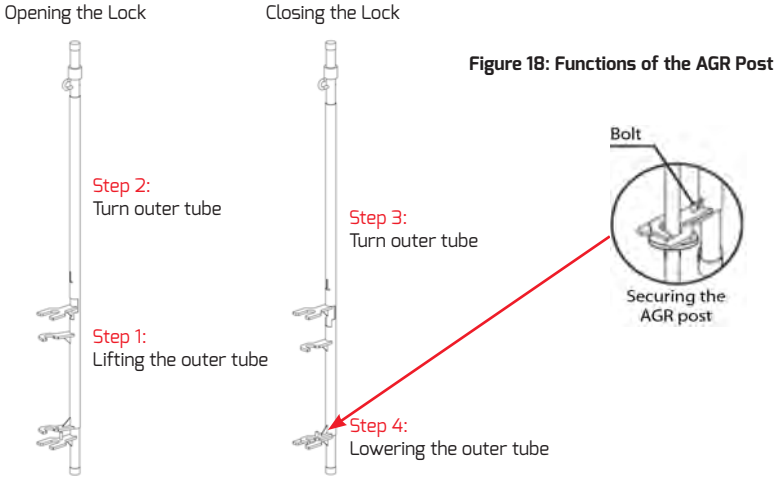


Figure 18: Functions of the AGR Post

Before initial assembly of the posts, the telescopic guard rail is pushed over the hooks where they remain until the end of use. The safety ring prevents this from unintentionally falling out.

The telescopic guard rail is placed in position with the posts, from one level to the next. Both the horizontal and diagonal length of the ascending bay are covered (figures 19 and 20, page 31).

Whilst assembling the Advanced guardrail there is an increased risk of falling.

The complete 3 part side protection is to be fitted in this area.

Figure 19: Assembling the first post at height.

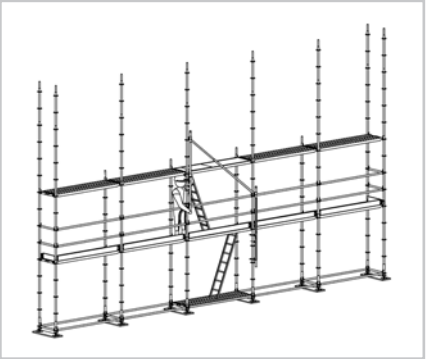
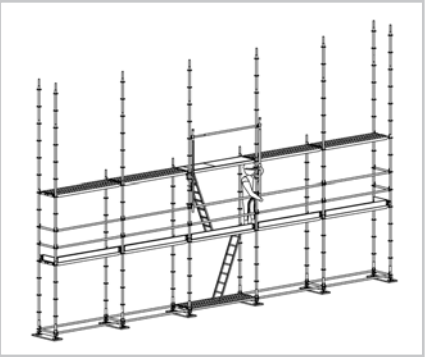


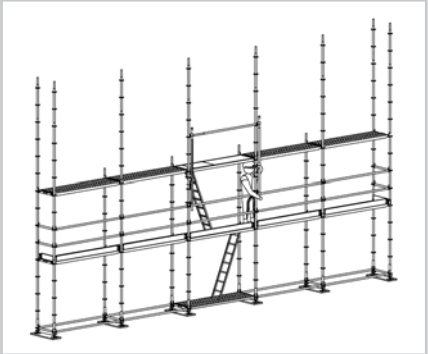
Figure 20: Adjoining the second post at height.



Advanced guardrail at the whole length

When assembling the top scaffold layer it can be temporarily secured with the AGR (figure 21a).

Figure 21a: Temporary securing of the upper layer with advanced guardrail.



2.4.3.2 Personnel safety equipment (PSE)

Should special assembly situations require the use of personnel safety equipment (harness with safety lanyard) then this equipment may be fixed to tested positions of the scaffolding system assco futuro that are described in pictures 22 and 23.

For connecting the PSE to the scaffolding system fittings approved according to EN 362 should be used e.g. snap links with openings wider than 50 mm. The applicability of a PSE has to be checked.

The reasonable use of PSE is adequate for assembly (falling) heights higher than 4 m with attachment points for the lanyard more than 6 m above ground. For attachment points chosen below this level, the risk of touching the ground cannot be eliminated completely.

The ascent to the unprotected top level should be secured by means of AGR (Chapter 2.4.3.1). The assembly procedure besides the area protected by the AGR can be secured by PSE. Attaching points for the PSE may be chosen amongst the following options:

- Standards 2 m above the working lift at +4 m (at least 6 m above ground) that are connected by one ledger or transom. Either the big hole of the futuro disk at this height or the ledger / transom may be chosen for attaching the snap links.

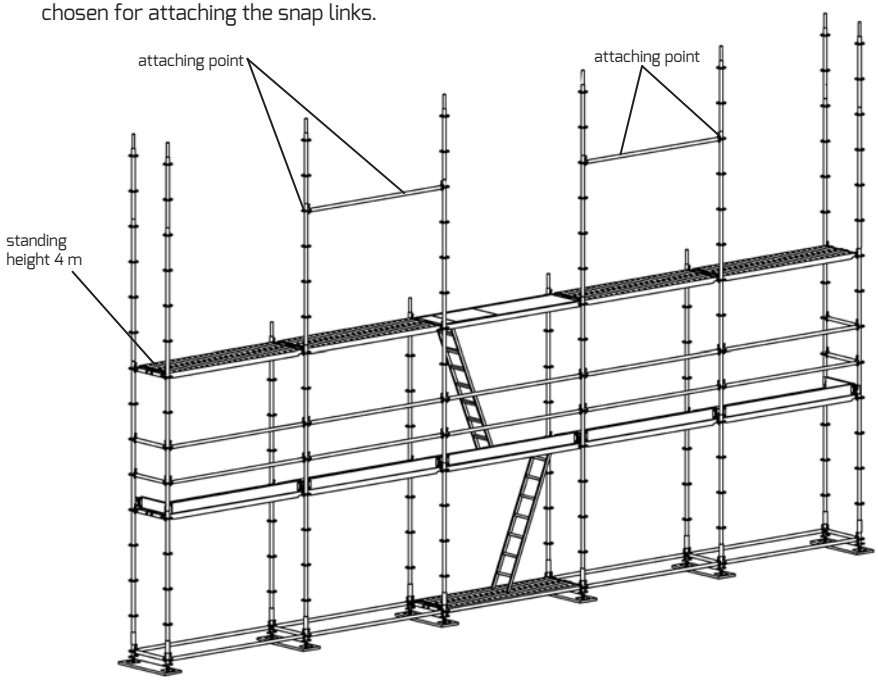


Figure 22

- Standards protruding 1 m from the working lift may be used if the attaching point is at least 6 m above the ground (see figure 23). These standards must not be connected to the standard below at the working lift level but have to continue through to the level below. The snap lock may be connected into one of the big holes or around the tube of the standard so that it is lying on top of the disk at 1 m above decking level. In this case the standard must contain at least one more disk above this disk. (It is not allowed to fix the snap lock around the tube connector or the top end of the standard without securing it against slipping off).
- Ledgers or transoms at 1 m above working lift (at least 6 m above ground).

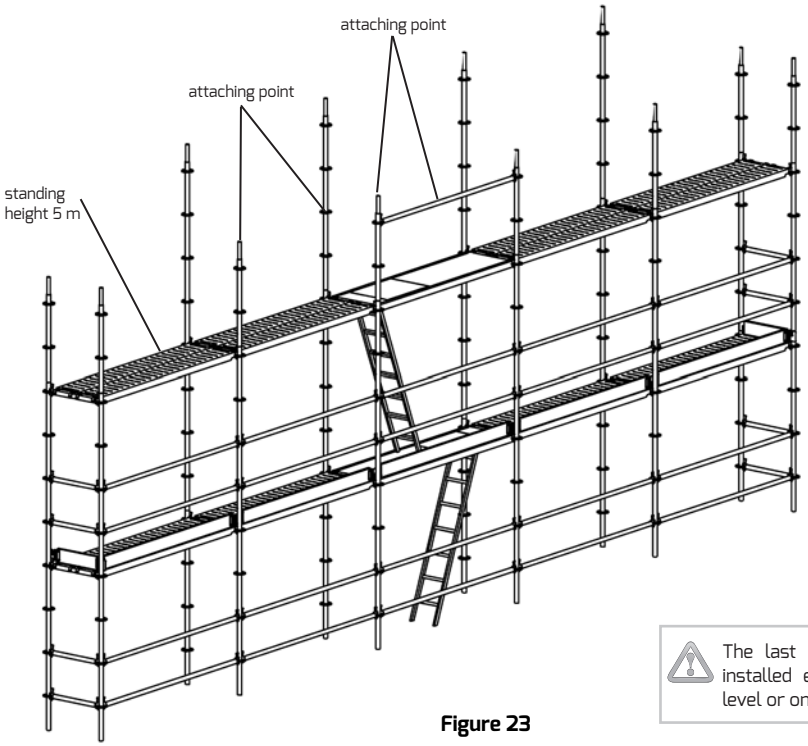


Figure 23

The last anchor must be installed either in the top level or one level below.

The independent scaffold has to be tied at the height of the last lift or two metres below.

2.4.4 Anchoring / Ties

2.4.4.1 Anchor Grid and Anchoring Force

The anchoring forces are shown for each assembly variant separately.
They represent “safe working loads”.
The loads at right angles to the facade (⊥) are given for each tie; the loads parallel to the facade (II) are given for each triangular tie (in general one every 5 bays).
Anchors are to be continuously fitted throughout the scaffold assembly. Screws are to be used of at least 12mm in diameter or similar design as fasteners.

The tying brackets are to be designed in accordance with section 2.4.4.2. All scaffold brackets are to be connected by standard couplers diameter 48mm. These must be marked with a test symbol or in accordance with EN 74: 1988-12 and EN 74-1:2005-12 and fulfil the requirements of coupler class B.

The anchoring force is revealed as “working loads”.

These are to be multiplied by 1.5 for proof of the force applied to other components.

2.4.4.2 Wall Ties

Short wall ties (figure 24) are only linking the vertical standard to the facade by the single tube. They transfer the anchoring force at right angles to the façade.

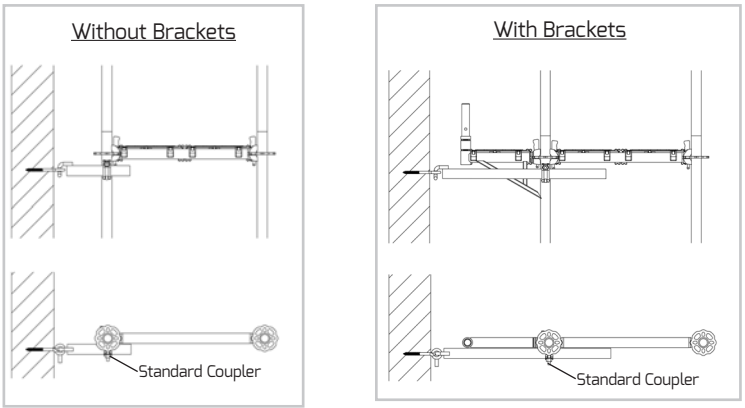


Figure 24: Short Wall Ties

Triangular (V) wall ties (figure 25) are linking the vertical standard to the facade by two tubes at 90° angle. They absorb the anchoring force at right angles and parallel to the façade.

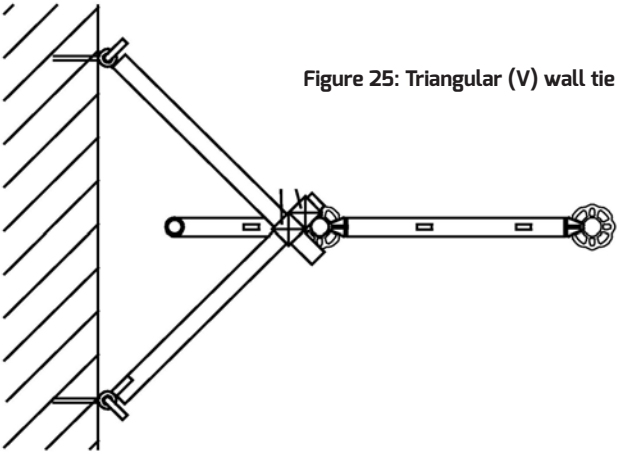


Figure 25: Triangular (V) wall tie

The picture applies to the U support and for tubular supports.

2.4.5 Applying the Anchoring Forces into the Foundation

2.4.5.1 The anchoring forces must be initiated via scaffolding ties (section 2.4.4.2) and fasteners into an adequate load bearing anchoring base (e.g. masonry).

Suitable fasteners can be fasteners according to DIN 4426 ,safety equipment for maintenance of constructions, fall protection.

Not suitable fasteners are e.g. wires or ropes.

An adequate load bearing anchoring base is e.g.

- a reinforced concrete slab, walls, columns
- load bearing masonry according to the relevant rules

Not adequate load bearing anchoring base is e.g.

Snow guard, lightning rod, rainwater pipe, window frame.

2.4.5.2 The load bearing capacity of the fasteners between scaffold tie and anchoring base has to be proven for the required loads. Proof can be carried out by:

- Approval by relevant authority (e.g. Deutsches Institut für Bautechnik)
- Statically calculation or
- Pull out test according to section 2.4.6.

2.4.5.3 If fasteners with approval by relevant authority shall be used then the settings of the approval have to be respected in total.

Settings are e.g.

- conformity of the anchoring base
- demanded minimal dimension of the structure min. clear distance to the sides and special application instructions.

2.4.5.4 Proof according to section 2.4.5.2 may be ignored if sufficient load bearing capacity can be assessed by a competent person and

- The demanded anchoring force perpendicular to the facade is not exceeding $F_{\perp} < 1.5$ kN or
- The anchoring force perpendicular to the facade is not exceeding $F_{\perp} < 6.0$ kN if the anchoring base is reinforced concrete slab.

2.4.6 Pull out tests of wall anchors

2.4.6.1 Pull out tests according to section 2.4.5.2, if required, have to be carried out at the anchoring position.

2.4.6.2 Pull out tests have to be performed using appropriate testing equipment.

Appropriate testing equipment shall be proven by a responsible local organization (e.g. Fachausschuss „Bau“ der Zentralstelle für Unfallverhütung und Arbeitsmedizin (ZefU) des Hauptverbandes der gewerblichen Berufsgenossenschaften e.V.).

2.4.6.3 Anchoring points and the number and positions of the pull-out test are to determined by a competent person.

2.4.6.4 Pull out tests are to be carried out to the following criteria:

- The test load has to be 1.2-times higher than the determined max. tie load $F_{\perp}$.
- The quantity of tests has to be:
  - if concrete is the foundation 10 %
  - with all other construction materials 30 %

  of all used wall plugs but at least 5 tests.

2.4.6.5 Should single or several connecting points not be able to support the test load, then the competent person has to:
- determine the reason
- procure a better foundation and
- increase the number of tests if necessary.

2.4.6.6 The test results have to be recorded and stored for the utilization time of the scaffolding at least.

2.5 Assembly Variants & Installation of Additional Components

2.5.1 General

The calculated assembly variants and assembly of supplementary components such as brackets, roofer fall arrest scaffold and bridging girders of the Modular scaffolding assco futuro as façade scaffold are described in this section. The maximum standing height is 24m plus the adjustable length of the threaded base plates. The standard design is proven for working on just one scaffold level.

The necessary anchor distances are dependent on the wind permeability of the façade. They are shown as regular grids. The standards at the beginning and end of the independent scaffolding should always be anchored at a vertical distance of max. 4m.

Basically, a distinction is made between a “closed” and a “partly open” façade. The following applies to the design variants shown:

A “closed” façade does not reveal any openings whilst the “partly open” façade may consist of up to 60% of the surface area being open. With a larger open section, the anchoring must be proven in individual cases. For standard renovation work (windows remain in place) a “closed” façade” can be assumed. In the event of major conversion work (windows replaced) and new builds, a “partly open” facade is to be expected.

The decks act as stiffening elements of the Modular scaffolding assco futuro as façade scaffold. All work levels must be completely covered with system decks (see 2.2.5). Levels on which work is not carried out can be stabilised with internal and external horizontal ledgers and at least one horizontal diagonal for every 5 scaffold bays.

2.5.2 Assembly Variants

Basic configuration (generic design - without brackets or other accessories), Bay lenght L ≤ 3.07m

Bracket configuration (generic design with side brackets), L ≤ 3.07m

U Support and Tubular Support	figure 26
Basic Configuration and Bracket Configuration with roofers protection, L ≤ 3.07m (U support and tubular support)	figure 27
Scaffold with bridging girder L ≤ 6.14m (U support and tubular support)	figure 28

Scaffold in front of Closed or Partly Open Façade

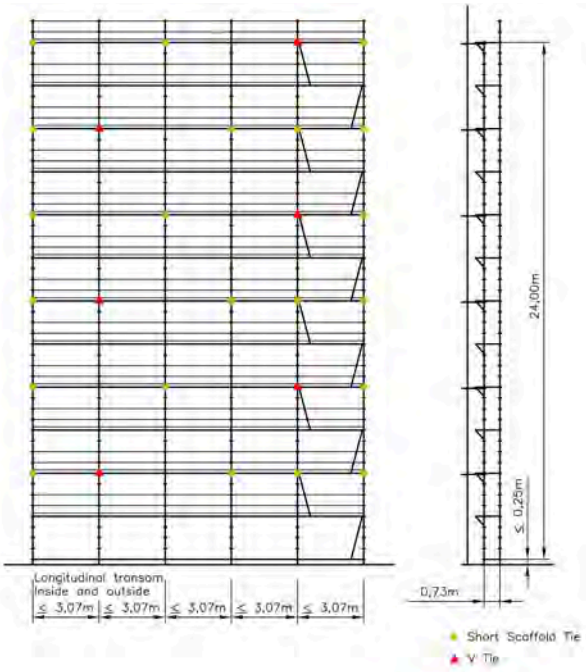
Basic Configuration

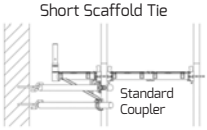
- Without brackets

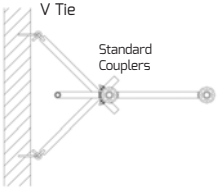
Bracket Configuration

- With brackets 0.36m inside in each layer

Figure 26







Facade				Closed		Partly Open	
Anchor Grid				8.0m staggered		8.0m staggered	
Additional Anchor				---		---	
Max. adjustable base extension length (mm)				250		250	
Anchoring Force (kN)	Anchor height (m)			H ≤ 20	H = 24	H ≤ 20	H = 24
	⊥ to the façade		F⊥	1,4	1,1	4,0	3,2
	V-tie	II to the façade	FII	5,5		5,5	
		Angular load	Fa	3,9		3,9	
Foundation load (kN)		Inner post	Fi	15,5		15,5	
		Outer post	Fa	12,0		12,0	

Scaffold in front of Closed or Partly Open Façade

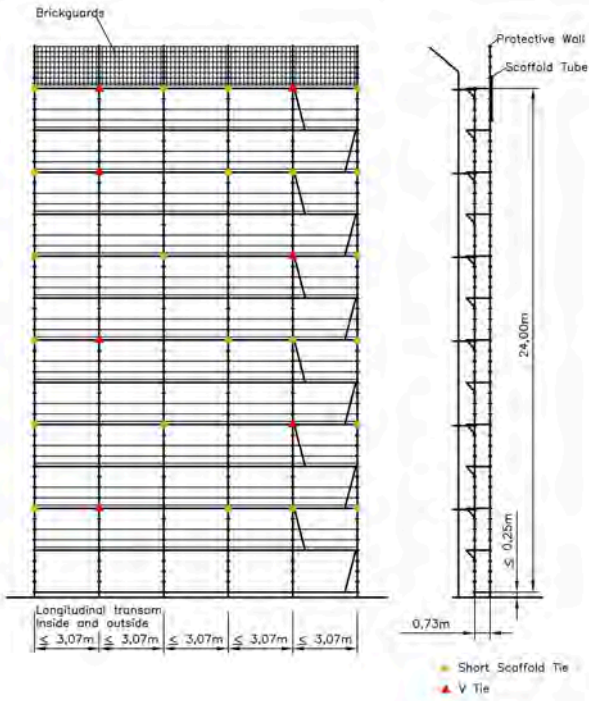
Basic Configuration

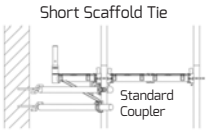
- Without brackets
- With protective wall

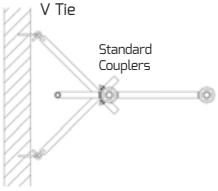
Bracket Configuration

- With brackets 0.36m inside in each layer
- With protective wall

Figure 27







Facade				Closed		Partly Open	
Anchor Grid				8.0m staggered		8.0m staggered	
Additional Anchor				①		①	
Max. adjustable base extension length (mm)				250		250	
Anchoring Force (kN)	Anchor height (m)			H ≤ 20	H = 24	H ≤ 20	H = 24
	⊥ to the façade		F⊥	1,4	2,2	4,0	3,4
	V-tie	ll to the façade	Fll	5,5		5,5	
		Angular load	Fα	3,9		3,9	
Foundation load (kN)		Inner post	Fi	15,5		15,5	
		Outer post	Φα	12,0		12,0	

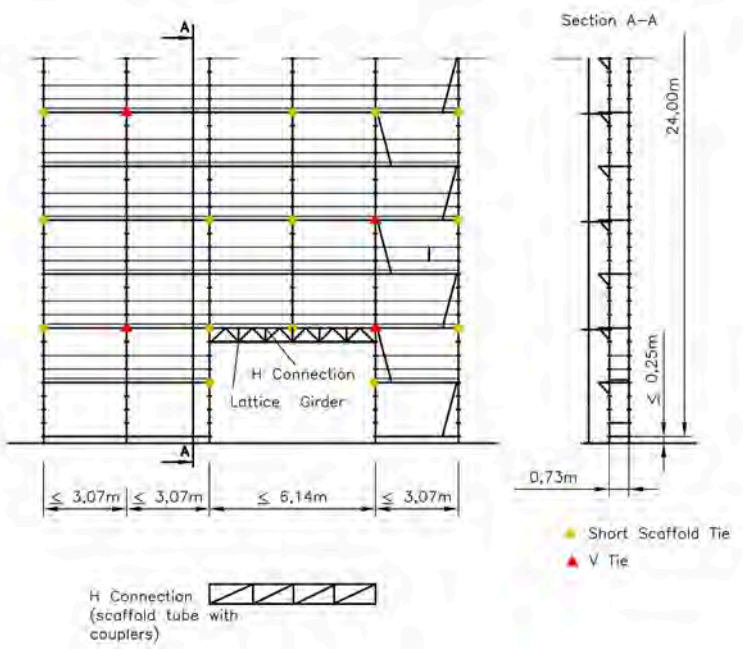
Scaffold with Bridging ≤ 6.14 m

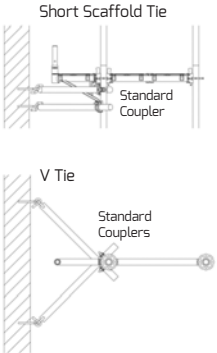
Lattice girder H50 or bridging girder (L ≤ 6.14 m)

Basic or Bracket Configuration

Assembly, see corresponding variant

Figure 28





Facade				Closed	Partly Open
Anchor Grid				8.0m staggered	8.0m staggered
Additional Anchor				①	①
Max. adjustable base extension length (mm)				250	250
Anchoring Force (kN)	Anchor height (m)			See Corresponding Configuarion	
	⊥to the façade		F⊥		
	V-tie	II to the façade	FII		
		Angular load	Fα		
Foundation load (kN)		Inner post	Fi	22.1	22.1
		Outer post	Fa	18.6	18.6

2.5.3 Assembly of Supplementary Components

2.5.3.1 Side Brackets

The extension brackets 39 or 42 (chapter 3.2.5 / 3.2.11) may be fitted towards the façade respecting the bracket configuration at any level. This applies to U support and to the tubular support. They bear a 320mm wide scaffold deck which is to be fitted from the level below. If brackets are installed but not decked, then there is a risk of falling.

The gaps between the scaffold deck in the main bay and bracket deck is to be closed with a horizontal ledger (see figures 11 & 12).

2.5.3.2 Roofers protection scaffold

The roofers protection scaffolding consists of a line of standards protruding 2 m above the last decked level and a protective fence according to 2.5.3.3. The standards are to be reinforced by additional scaffold tubes that are connected to the standards by means of wedge head couplers according to Fig. 28.

The distance between protective fence and the eaves has to be wider than 700 mm. With the height of the fencing given to be 2 m the decked level has to be not more than 1.2 m below the eaves.

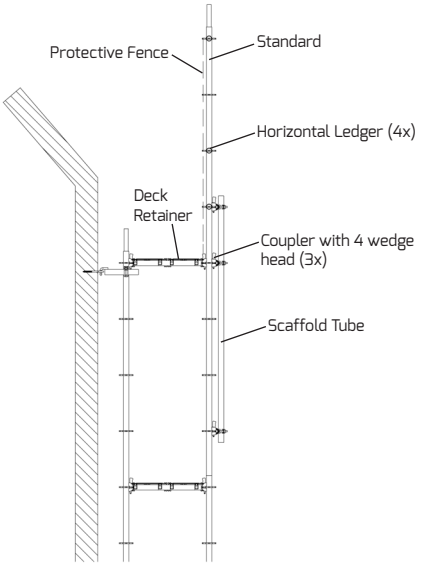


Figure 29: Upper Area of the Roofers Protection Scaffolding

2.5.3.3 Protective Fence

The protective fence consists of nets according to EN 1263-1 with a mesh width of not more than 100 mm. The nets have to be connected to the ledgers by threading them mesh by mesh at decking level and 2 m above decking level (Choice A) or by strap fasteners (Choice B). The strap fasteners need to be equipped with an approval issued by the manufacturer, that they are fit for use in roofers protection scaffolds (see figure 29).

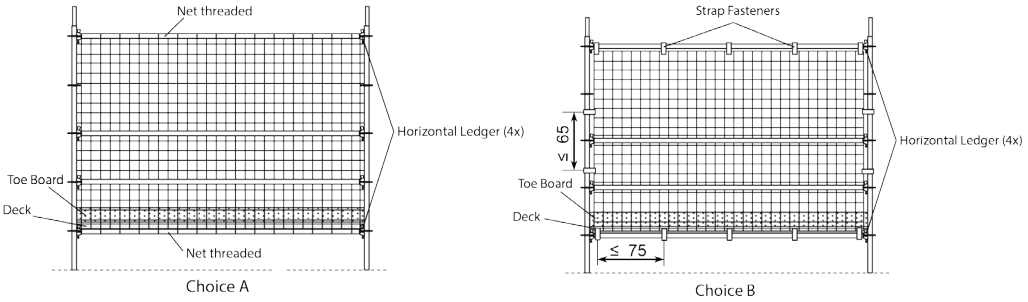


Figure 30: Protective Fence

2.6 Dismantling the Modular scaffolding assco futuro

The sequence of order of the work stages described in section 2.2 to 2.5 is to be reversed for dismantling the futuro scaffold.

Anchoring may only be removed if the scaffold layer is completely dismantled. Components, the connection of which is loosened are to be immediately dismantled.

Dismantled scaffold components should not be stored on circulation routes to avoid the risk of persons tripping up.

Dismantled scaffold components may not be thrown off the scaffold.

2.7 Use of the Modular scaffolding assco futuro as Façade Scaffold

The futuro scaffold as façade scaffold in accordance with approval Z-8.22-841 may be used corresponding to load class 3 in consideration of this user guide and in accordance with the stipulations of the national or local Health and Safety Regulations as work and protective scaffold without further proof. Other configurations with other load classes are possible. The stability is to be proven in individual cases on the basis of the approval.

The user of the scaffold must check the suitability of the selected assembly variant of the futuro scaffolding for the work to be performed and the safe function. He has to ensure that the scaffold is inspected before use to determine any apparent defects. If defects are noted when checking, the scaffold should not be used in areas with defects until these have been remedied by the scaffold contractor. Subsequent changes to this scaffold are considered to be installation, conversion or dismantling and may only be carried out by suitably qualified employees. They are to be checked and approved by the scaffold contractor.

Inspections are to be repeated in extraordinary circumstances e.g. long period of non-use, accidents or acts of God having an effect on the scaffold.

It is recommended to record the results of these inspections and to store them for at least 3 months longer then the scaffold is assembled.

2.8 Check report for working scaffolding

Here modular scaffolding assco futuro (according to EN 12810 and EN 12811, amendments might be necessary depending on local rules)

Contractor: _____ Date: _____

Scaffolding company: _____

Construction site: _____

Type of scaffolding:

Working Scaffolding ☐ Head Fan ☐
Protection scaffolding ☐ Roofers protection scaffolding ☐

Scaffold classification:

Load Class		Width Class
1 ☐	4 ☐	W06 ☐
2 ☐	5 ☐	W09 ☐
3 ☐	6 ☐	___ ☐

Sheeting: Nets ☐ Canvas ☐ _____ ☐

Purpose of the scaffolding: _____

Scaffolding components: apparently undamaged ☐*

Structural stability:

- Capacity of the supporting surface (Chapter 2.2.2 of the guide) ☐*
- Extension of the base jacks (Chapter 2.2.3 of the guide) ☐*
- Staggering standard connections (Chapter 2.2.4 of the guide) ☐*
- Decks secured against lifting (Chapter 2.2.5 of the guide) ☐*
- Height adjustment (Chapter 2.3.2 of the guide) ☐*
- Bridgings (Fig. 27 of the guide) ☐*

Decks:

System decks (according to Table 1 of the guide) ☐*

ASSEMBLY GUIDE

Work safety:

- Guard Rails (Chapter 2.4.2.5 of the guide) ☐*
- Distance to the wall ≤ 30 cm (where no side protection installed) ☐*
- Scaffolding access (Chapter 2.4.2.3 of the guide) ☐*
- Corner design (Chapter 2.3.3 of the guide) ☐*
- Side brackets (Chapter 2.5.3.1 of the guide) ☐*
- Gaps between decks on main bay and side bracket ≤ 80 mm or covered ☐*
- Fencing for roofers protection (Chapter 2.5.3.2 of the guide) ☐*
- Traffic management, Lighting ☐*
- Plan for utilization handed over to the customer ☐*

*** Mark if checked and O.K.**

Check of futuro scaffolding finished, scaffold tag completed as shown and fixed at the scaffold.

Working scaffolding according to EN 12811-1
Width Class W06
Load Class 3
Uniformly distributed load max. 2.00 kN/m²
Date of the check

Scaffolding company: Anybody
12345 Anywhere · Phone. 1234-123 456

Remarks:

_____

_____

_____

_____

Date Signature by the competent person of the scaffolding company

_____

Date Signature on behalf of the customer

Amendments to the scaffolding may only be carried out by the scaffolding company.

PLETTAC ASSCO GERÜSTE SCAFFOLDING

2.9 Check list for the scaffold user to check working and protection scaffolds

here: modular system assco futuro used as a facade scaffolding

Scaffold user: _____ Date: _____

Scaffolding company: _____

Construction site: _____

To be checked	**Without defect**	**Defect (specify)**
Purpose of the scaffolding (e.g. brick layers work, plastering, painting)		
Has the scaffolding been marked at a good visible place (e.g. access bay) with the following content? Working scaffolding and / or protective scaffolding according to EN 12811-1 Load Class and Working Load, Width Class, Scaffolding company		
Have last check by the assembler and passing of the test been stated (e.g. by check report according to 2.8 or signature on scaffold tag)		
Structural integrity		
Has the structural integrity for the time and the purpose of the utilization of the scaffolding been confirmed by the contractor?		
Work safety		
Is a safe ascent existing (e.g. access decks with ladders and trap doors or stair cases adjacent to the scaffolding)?		
Has every scaffolding level been fully decked out (two decks with a width of 320 mm or one deck of 610 mm or 640 mm)?		
Are the decks secured against lifting?		
Are existing gaps (e.g. between decks on main scaffold and side bracket) closed (e.g. by a ledger) unless they are less wide than 80 mm or have they been boarded over?		
Has the working platform in case of corners been continued around structure in full width?		

ASSEMBLY GUIDE

To be checked	Without defect	Defect (specify)
Are all decks free of any damage?		
Are all working levels that are enabling a free fall of more than 2 m equipped with three part side protection (Hand rail; mid rail; toe board)?		
Is the three part side protection also assembled to the ends of the scaffolding and at other leading edges?		
Is the max. acceptable distance of 300 mm between the working platform and walls or other solid structures being respected that could avoid the risk of fall (if the distance is bigger, then also in this direction a side protection is required)?		
Requirements for Roofers Fall Arrest and Protection Scaffolds		
Is the platform of the roofers fall arrest scaffolding fully boarded?		
Is the min. horizontal distance 0.7 m between the eaves and the fall arrest fence respected? (The platform has to be ≤ 1.20 m below the eaves).		
Is the max. distance 1.5 m between the platform of the roofers fall arrest and the eaves respected? (The horizontal distance between eaves and fall arrest fence has to be at least 1.0 m.)		
Is the fence consisting from nets or wire mesh?		
Is the platform of the protection scaffold boarded with decks of at least 320 mm width?		
Is the platform of the protection scaffold located not more than 2.0 m below the leading edge to be secured?		
Other requirements		
Are live cables and / or devices that could be dangerous for people on the scaffolding switched off, covered or cordoned off?		
Is lighting installed to secure public traffic?		
Is a head fan required e.g. scaffold close to public traffic? (If so, is it assembled?)		

_____

Date Signature (competent person)

Distance between wall and working platform ≤ 30 cm ! If distance is bigger inside guard rail required

PLETTAC ASSCO GERÜSTE SCAFFOLDING

3.0 Modular scaffold assco futuro assembled as a birdcage scaffold

3.1 General

The details in chapters 2.2 to 2.4.3 are in principle also applicable for the design of a birdcage scaffold. Since birdcage scaffolds are generally not assembled in front of a façade, they are not held horizontally by a standard anchor grid. Provided an anchoring facility exists, it will be concentrated points on the building or constructions to be scaffolded or structures nearby. Based on the mostly large footprint area, birdcage scaffolds can also be designed self-stabilized without any ties. In all cases vertical diagonals are necessary in two crosswise directions for stabilization (figure 30). Under certain circumstances, horizontal diagonals must be arranged as well. With the design shown in figure 30 this may be dispensed with. The deck level designed as a horizontal reinforcing plate takes over the stiffening of the scaffold in this case.

A proven and tested standard design (see chapter 2.1) is revealed for the facade scaffold type which is shown in approval Z-8.22-841, Appendix C and in these assembly instructions for use, figures 25 to 27. The definition of a standard design is not however possible for birdcage scaffolds. It is therefore necessary to check the stability for each scaffold separately (see also chapter 2.1, paragraph 5).

Simple statistical calculations can be carried out with the aid of the capacities on safe working load level in chapter 5. With larger and complicated scaffold constructions, the design capacities revealed in approval Z-8.22-841 chapter 3 and appendix A are to be taken into consideration.

The work levels of the modular scaffolding system assco futuro can be formed using system decks of the façade scaffold quadro 70 or decks for tubular support. Furthermore, working platforms build from wooden boards are possible. The various designs with the associated components are described in the following chapters in detail.

Also the components not belonging to the standard design as façade scaffold are included in appendix B of the approval Z-8.22-841.

Their manufacture is governed in this approval.

Content of German Construction Approval Z-8.22-841

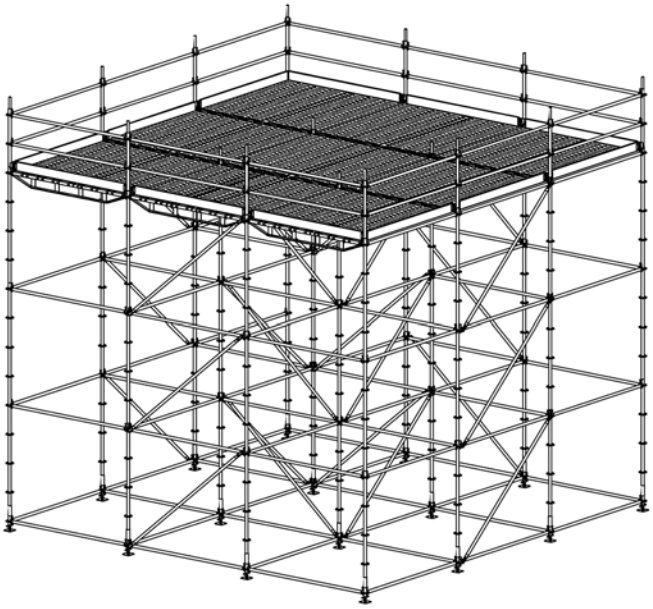
Appendix A - Calculation rules and loading data for system scaffolding.

Appendix B – Design data for individual components

Appendix C - Façade scaffolding solution (73cm wide).

Appedicies available on request from ALTRAD plettac assco GmbH Design Dept.

Figure 31: Typical Bird Cage Scaffold (ascent not shown).



3.2 Design with Series Quadro Decks for U-Support

3.2.1 General

In order to be able to use the decks of the façade scaffold quadro 70 the associated support transoms and brackets are provided with U profiles. The claws on the head parts of the decks are fit over the sides of the U-channels. The floor panels can be shoved horizontally to the desired position. The components are to be secured against unintended lifting by deck retainers in accordance with appendix B Page 32 + 33. These deck retainers are available for all transoms up to 3.07 m.

Appendix B - German Construction Approval Z-8.22-841

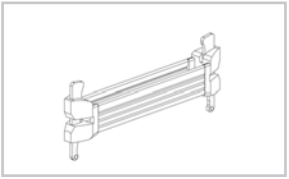
Appedicies available on request from ALTRAD plettac assco GmbH Design Dept.

3.2.2 Transom U-Support

The U support transoms are used for one to four deck wide bays.

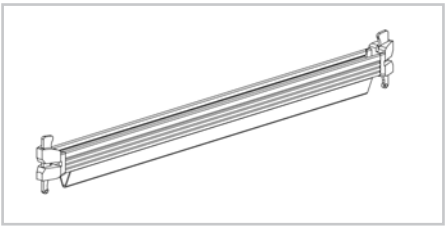
Axial dimension 1 deck = 0,42 m

Code: 5F00306042

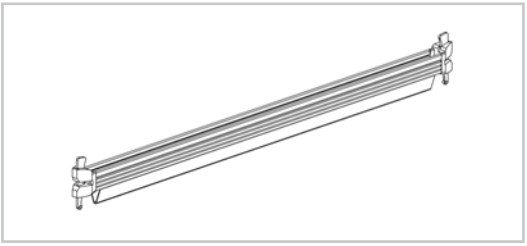


Axial dimension 2 decks = 0,73 m
Corresponds to the width of
The vertical frame quadro 70
Code: 5F00306073

Axial dimension 3 decks = 1.09m
Corresponds to the width of
The vertical frame quadro 100
Code: 5F00306109



Axial dimension 4 decks = 1.40m
Code: 5F00306140



3.2.3 Double Transom U-Support

190mm wide decks are to be fitted as infill decks on U support double transoms. The arrangement of the system decks for the individual bay width is shown on the following pages in detail.

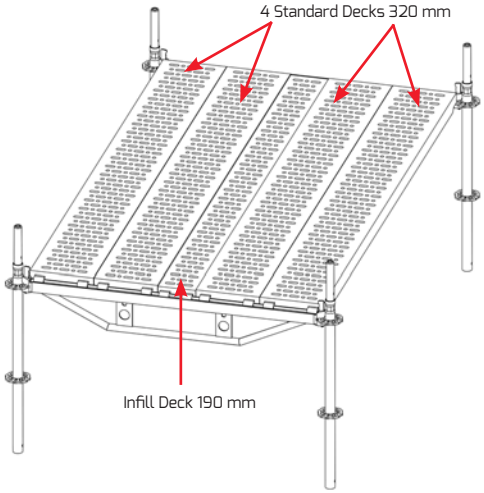


Figure 32: The 1.57 m wide bay

The 1.57m wide bay consists of 4 standard decks 320mm and a 190mm wide deck. This may not be assembled to the edge. It must be arranged between the 320 mm wide decks due to the small edge distance of the claws.

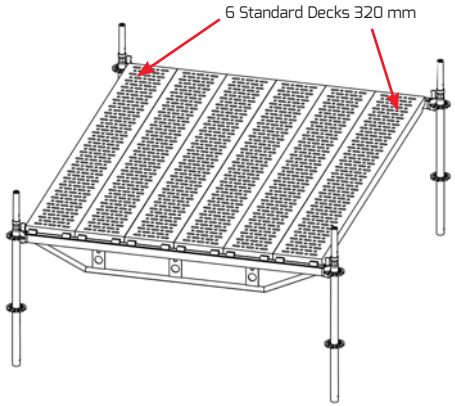


Figure 33: The 2.07 m wide bay

The 2.07m wide bay consists of 6 standard decks 320mm.

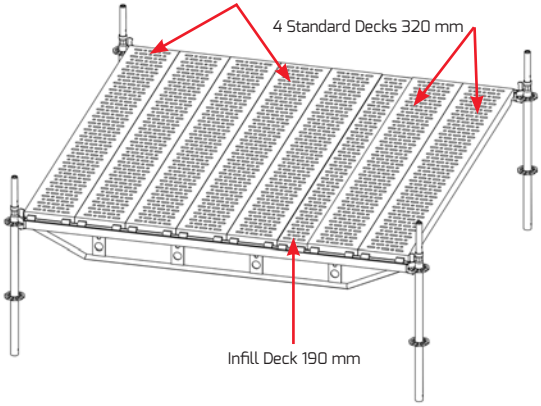
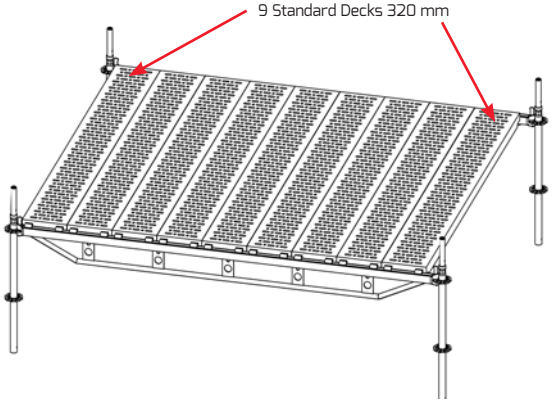


Figure 34: The 2.57 m wide bay

The 2.57m wide bay consists of 7 standard decks 320mm and a 190mm wide deck. This may be arranged in this bay at any point.



The 3.07m wide bay consists of 9 standard decks 320mm.

Figure 35: The 3.07 m wide bay

3.2.4 U-Lattice Girder with 4 Wedge Heads

The U-lattice girders with 4 wedge heads have a chord distance of 500mm. As a result both chords can be connected to the socket plates. The top chord consists of a U profile, the bottom chord of a round tube diameter 48.3mm. Based on the double connection on each side of the girder, the scaffold design in the plane of the girder is in general stable enough so that further stiffening measures are generally not required.

Figure 36: Lattice Girder for U Support.

The covering of the lattice girder is the similar to as the double transoms with standard decks 320 mm and infill decks 190 mm (see point 3.2.3). Their quantity is given in table 2. The 190 mm wide decks can be fitted at any point

Table 2: Covering of the U lattice girder

Girder Length (m)	Steel Deck 32 (part)	Steel Deck 19 (part)
2.07	6	0
2.57	7	1
3.07	9	0
4.14	12	1
5.14	15	1
6.14	18	1

3.2.5 Brackets for U-Support

Brackets for U-Support are available for one, two and three steel decks. The deck supports consist of the same U profile as the U-transoms. The brackets are designed in such a way that they can be applied horizontally with an angle of 90º to a standard (corner solution).

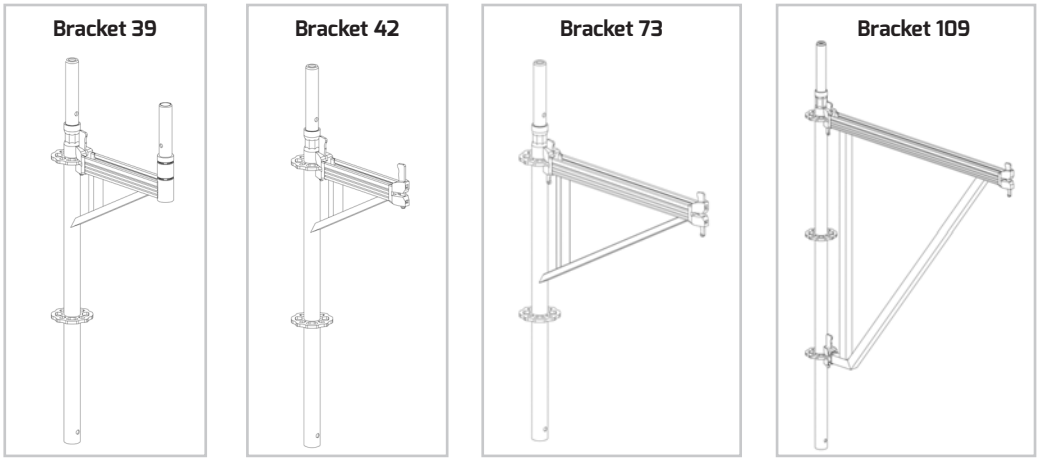


Figure 37: Brackets for U-Support

Bracket 39 contains a welded tube connector. A vertical standard can be connected directly as a rail post. Brackets 42, 73 and 109 are provided with a connection head on the top at the side opposite to the supporting standards to which a vertical standard can be connected if required. Vertical standard L150 is recommended as the rail post.

If higher loads needs to be supported on bracket 73 or 109, up to two vertical diagonals can be used for bracing.

One or two steel decks can be used for the adjustable bracket. The wedge head is to be reset with the welded tubular part from one U profile to another and fixed with spring pin bolts. Figure 37 on the left shows the arrangement for one deck (bracket 39) and on the right for two decks (bracket 73).

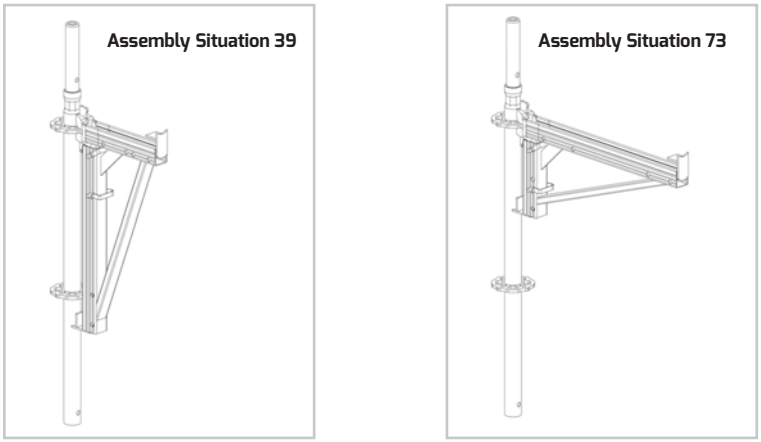


Figure 38: Adjustable Bracket 39/73 (U Support)

3.2.6 Deck Retainer and Toe Board

Deck retainers only have to be be fitted if lifting wind loads arise or the scaffold is to be stabilised by the decks.

Figure 39: Deck Retainer

The deck retainers are provided with two hooks which are pushed from above through the holes existing for this purpose in the U-transoms. The hooks grip below the U profile. After lifting up the securing flap, the deck retainer is fixed between both standard tubes and can not be released.

The toe boards for the U-Support are identical to those of the tube support. Assembly is therefore described in chapter 3.2.12.

3.2.7 Transoms for tubular support

The tubular transoms can be used up to a length of 1.57m as support transoms. The permissible load is given in chapter 5, table 9.

Figure 40: Tubular Transoms

Transoms of a length 1.09m and 1.40m are produced for higher capacities with reinforcement made out of a T profile. Locking of the deck retainers is not hindered in this way. An as large as possible head room is enabled based on the structural height of only 88mm.

Figure 41: Tubular Transom, 109, Reinforced

Transom lengths 1.57m, 2.07m, 2.57m and 3.07m are designed as double transoms. The design is adapted to the higher loading requirements (see chapter 5).

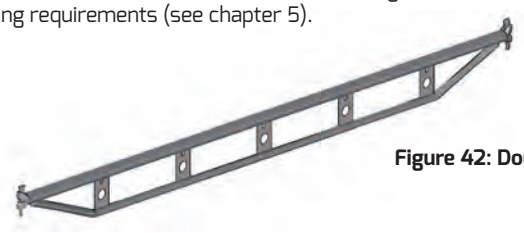


Figure 42: Double Transom for Tubular Support

3.2.8 Lattice Girder with 4 Wedge Heads

The lattice girders for tube support have a system height of 500mm and are connected to the disks of the standard tubes with the top and bottom chords. The scaffold construction is very stable in the plane of the lattice girder. Further stiffening measures are generelly not necessary.

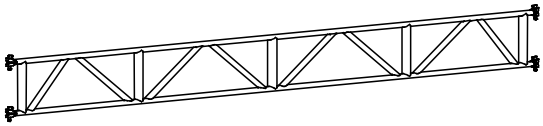


Figure 43: Lattice girder for tubular support.

Lengths of 4.14m, 5.14m and 6.14m are produced. Three 320 mm decks per complete metre length are fitted. In addition, one infill deck 190 mm is required per girder.

3.2.9 Decks for tubular support

Only Decks with welded claws that are offset are used. Decks equipped to the same transom from both sides do not show any misalignment. At the time being the decks are equipped with forged claws. Older decks may also be equipped with cold formed claws made from sheet steel. Similar to the decks for U-Support the favourable system width of the decks is 320 mm (Figure 43). The infill decks to compensate gaps at the decked levels are 190 mm wide (Figure 44). Tilting preventers are avoiding that the not loaded decks are tilting in the case that somebody is stepping onto the corner with the widest span to the claw.

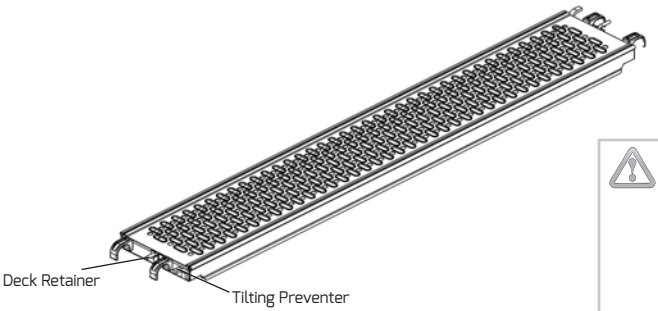


Figure 44: Steel deck 320 mm wide with forged claws

The latest deck retainers are self-locking by action of the securing lever falling into locking position by self weight once the deck is placed on the transom. For safety reasons the good securing function always has to be monitored. The locking position of the securing lever can easily be checked from above or below the deck by inspecting the position of the lever.

The integrated deck retainer is securing the deck against unintended lifting and keeps it on the tubular transom. Unintentional lifting might also be caused by wind. The latest deck retainers are self-locking by action of the securing lever falling into locking position by self weight once the deck is placed on the transom. For safety reasons the securing function always has to be monitored. The locking position of the securing lever can easily be checked from above or below the deck by inspecting the position of the lever. All decks 320 mm wide with cold formed claws and the infill decks 190mm wide are equipped with twisting handles bolted underneath the head fittings of the decks. These decks have to be secured by manual twisting of the handles.

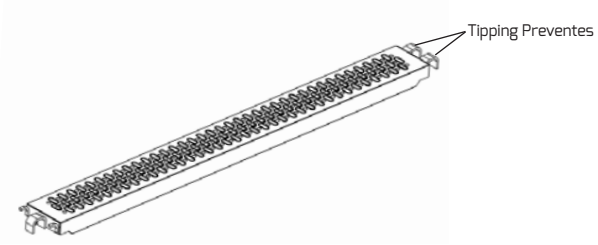


Figure 45: Infill Deck 190 mm wide with cold formed claws

3.2.10 Arrangement of the Decks

The arrangement of the decks for tubular support takes place as with the U-support-decks depending on the length of the transom in accordance with table 3.

Table 3: Covering of the support transoms and lattice girders

Transom Length (m)	Deck Plate 320 mm	Deck Plate 190 mm
0.42	1	0
0.73	2	0
1.09	3	0
1.40	4	0
1.57	4	1
2.07	6	0
2.57	7	1
3.07	9	0
4.14	12	1
5.14	15	1
6.14	18	1

3.2.11 Brackets for tubular support

Brackets for tubular support are available with 1, 2 and 3 deck system width (figure 45). The brackets are designed in such a way that they can be applied horizontally with an angle of 90º to a standard (corner solution).

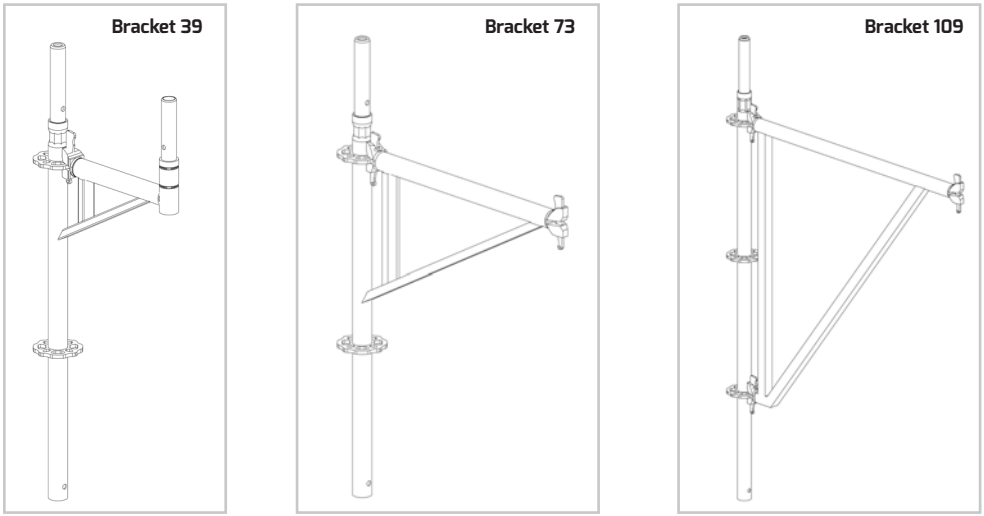


Figure 46: Brackets for tubular support

Bracket 39 contains a welded tube connector. A vertical standard can be connected directly as a rail post. Brackets 73 and 109 are provided with a connection head on the top opposite to the supporting standard to which a vertical standard can be connected if required. Vertical standard L150 is recommended as the rail post.

If one wishes to support higher loads by the bracket 73 or 109, one or two vertical diagonals can be used for bracing in addition.

One or two steel decks can be used for the variable bracket. The wedge head is to be reset with the welded tubular part from one support tube to another and fixed with bolts. Figure 46 on the left shows the arrangement for one deck (bracket 39) and on the right for two decks (bracket 73).

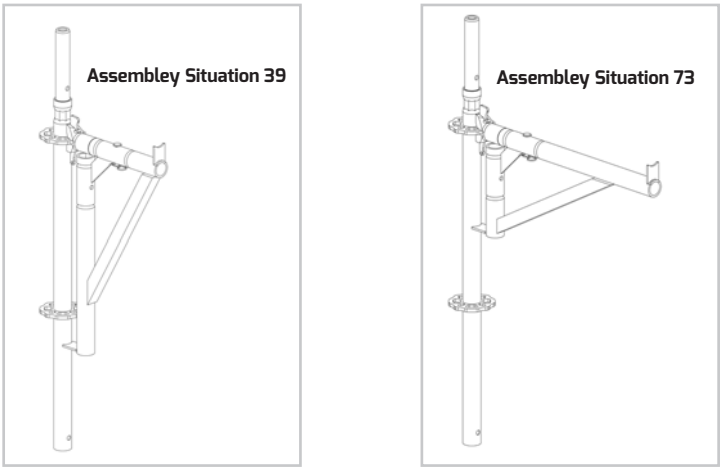


Figure 47: Adjustable bracket 39/73 (tube support)

3.2.12 Toe boards futuro

Toe boards are available for all relevant bay sizes and are 150 mm high. They are made from timber, steel or aluminium. All types of toe boards are equipped with head connectors that enable the use of the same items in combination with U- or tubular support. Figure 47 shows the different types of toe boards.

Figure 48

The toe boards are assembled to the scaffolding by pushing them between the standard and the wedge of the transom. The design of the head fittings is providing form fit for both longitudinally assembled configurations and corner solutions. Figure 48 shows both assembly situations for U- and for tubular support.

Figure 49

For the use with U- support platforms the protrusion of the head fitting has to be positioned to the lower side and for the use with tubular platforms to the upper side. In any case the metal or wooden part of the main toe board has to be positioned towards the working platform.

4.0 Modular scaffolding assco futuro as Round Scaffolding

4.1 General

Basically, the details in chapters 2.2 to 2.4.3 are applicable to round scaffolding as well. Based on 8 possible connections to the disk in large and small holes, round surfaces can be fitted with scaffolding without a problem. A distinction is to be made between “small” and “large” diameters.

“Small” diameters (< 3.00m) can have e.g. piers or chimney stacks. A square design is chosen here (see chapter 4.2).

“Large” diameters have e.g. oil tanks. Fitting of the curvature takes place horizontally (see chapter 4.3)

4.2 Objects with Small Diameter

The round structure is surrounded by a square scaffold so that the working platform is at < 300mm distance from the outer surface (figure 49). The transoms are connected to small holes so that they form a right angle (see junction detail).

The open internal corners are covered with system-free plates. These are to be secured against lifting and sliding. Provided no fire protection conditions are to be observed, corresponding wooden boards can be used.

All four external levels are to be stiffened with face bracing.

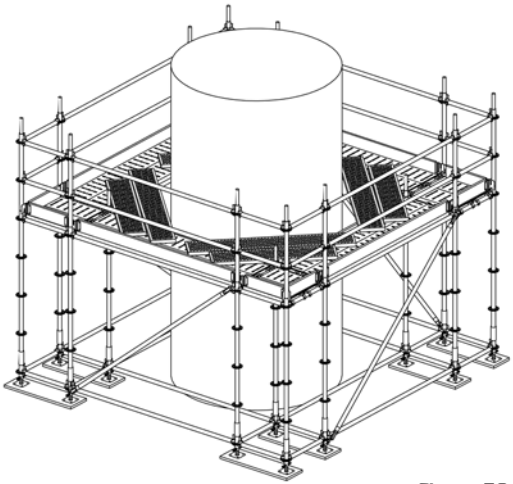
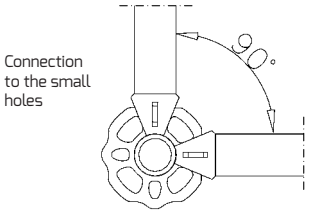


Figure 50

The system free plates are to be protected against lifting and sliding.

Junction detail

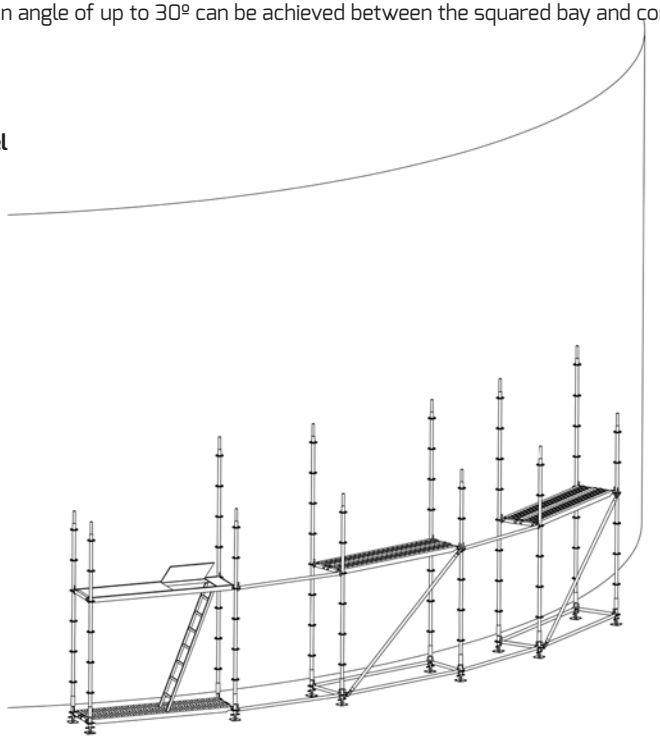


The scaffold cell is automatically aligned so that it is square when connecting the transoms to the small holes.

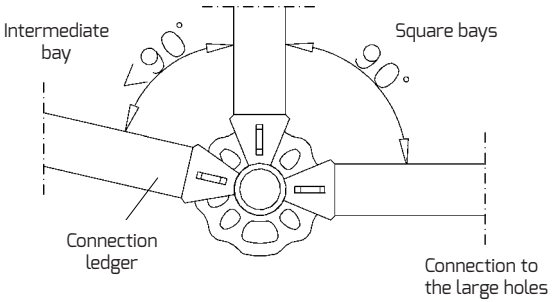
4.3 Objects with Large Diameter

With larger diameters the scaffold must follow the curvature. Square bays are fitted and arranged at such a distance that the outer standards can be connected with system ledgers (figure 50). Since the connecting ledgers cannot form right angles with the square bays, the posts are to be turned so that all transoms are connected to the large holes. An angle of up to 30º can be achieved between the squared bay and connection ledger (see junction detail).

Figure 51: Lower scaffold level



When connecting the transoms to the large holes deviating angles from 90º can be achieved between the transoms. Since the squared bays are no longer automatically aligned, perpendicularity must be ensured by other measures e.g. by aligning the diagonal dimensions.

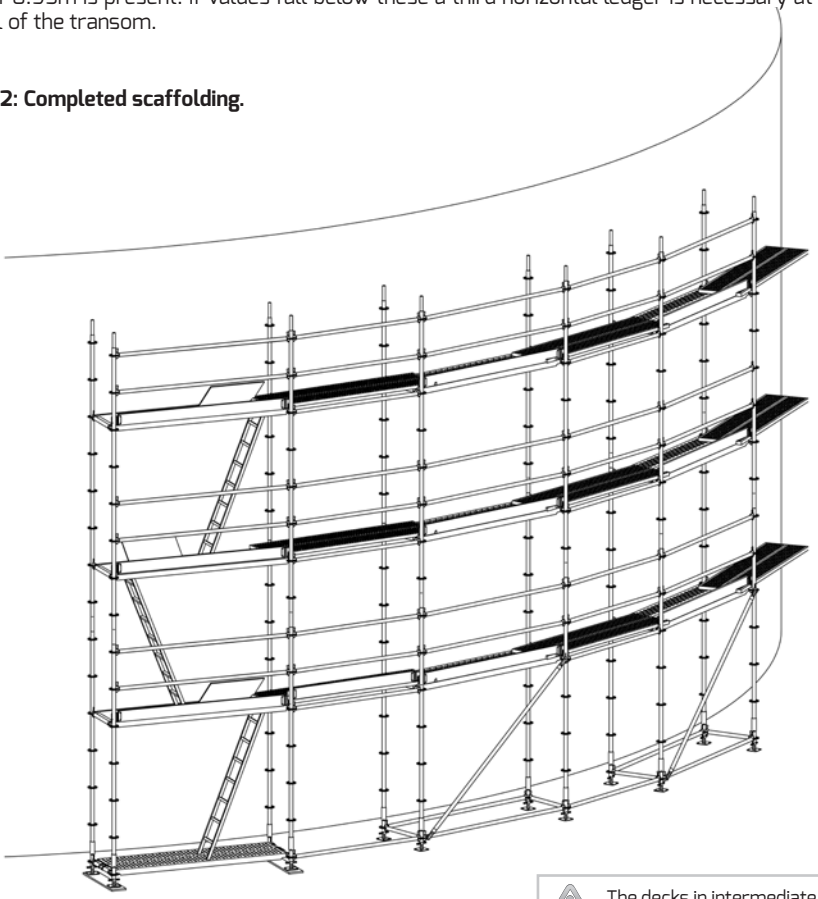


Junction detail

Stiffening needs to be installed least every 2nd scaffold bay (see text relating to figure 51) by means of vertical diagonals. The intermediate spaces are to be covered with system-free steel decks or where necessary with wooden boards (protected against lifting and sliding).

The description of the façade scaffold design (chapter 2) is to be observed for safe assembly. The anchoring is to be continuous in accordance with figures 24 and 25. It should be checked whether overall the minimum rail height of 0.95m is present. If values fall below these a third horizontal ledger is necessary at +1.50m above the level of the transom.

Figure 52: Completed scaffolding.



The decks in intermediate bays are to be protected against lifting up and sliding.

Values for handrail height should not fall below the minimum of 0.95m.

A third ledger is then necessary.

5.0 Capacity of Items

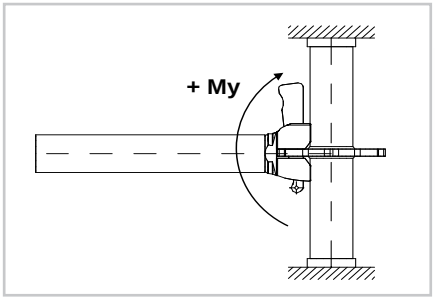
5.1 General

Loads mentioned in this chapter are safe working loads. That means that these loads may be aplied without any further reduction. They shall give reference to the user to be able to roughly estimate the capabilities of a scaffold set up. The loads given are applicable for the components of “Version II” design.

For more detailed calculation the detailed loading data supplied separately by the manufacturer shall be taken into account. The detailed loading data contains the complete set of loading and spring stiffness of the components. They are third party controlled and stated in the German approval Z-8.22-841.

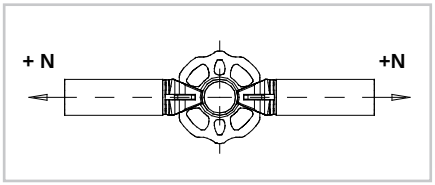
5.2 Ledgerhead / Disk

The most often used loading values are shown by little sketches. They shall only be taken into account in case that the junction is loaded without any other interaction.



The bending moment My is the vertical cantilevering moment (Load * Distance).

allowed My = ± 63.0 kNcm

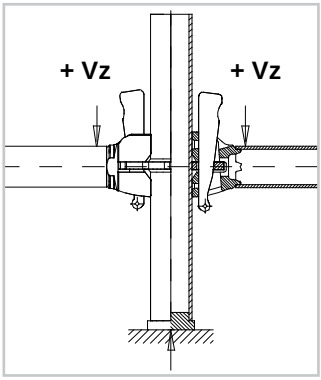


The normal load N is a tensile or compressive load along the axis of he ledger.

allowed N = ± 20.2 kN

Attention!
Safe Working Loads !

ASSEMBLY GUIDE

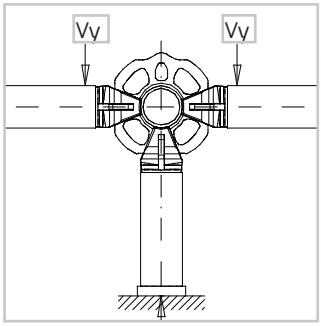


The vertical load Vz represents the load to be transferred vertically by the ledgerhead into the disk. The full value is only applicable in case that the load is applied just behind the head without any further influence from additional bending moments.

allowable Vz = ± 17.3 kN

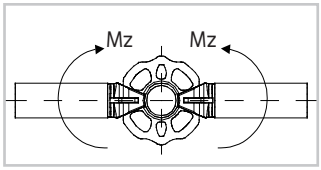
In case that several ledgers are transferring loads into the same disk, The sum may not exceed:

allowable ΣVz = ± 48.8 kN



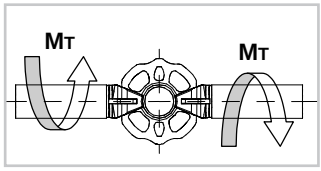
The horizontal load Vy represtents loads from wind or other means to be transferred horizontally from ledgerhead into the disk.

allowable Vy = ± 6.2 kN



The bending moment Mz is he horizontal cantilevering moment (Load * Distance).

allowable Mz = ± 14.5 kNcm

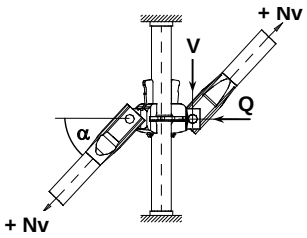


The twisting moment MT represents resistance against twisting for ledgers connected into the junction.

allowable M_T = ± 38.7 kNcm

Attention!
Safe Working Loads !

5.3 Vertical Braces



Vertical barces are reinforcing the scaffolding and are the key component for the stability of the entire scaffolding The load to be transferred from brace to disk may not exceed:

allowable Nv = ± 16.3 kN

In the case that this load is applied by tension all vertical braces will be able to transfer this load regardless of the length.

In the case that the load is applied by compression the axial stiffness of the tube becomes relevant. Table 4 contains the safe working loads for a single brace loaded by tension or compression (Nv). Also the horizontal (Q) and vertical (V) components of this load are shown.

Note: In case that several braces are used to support a certain load the addition of the capacities is only allowed if all braces have the same length and all are loaded in the same way (all with compression or all with tension). In case that different braces are used or that the loading is differing (compression / tension) the max. capacity of the system has to be calculated by taking the resistance of the single components into account (⇨ Engineering office). Relevant data is available from the ALTRAD plettac assco GmbH or on the basis of the German approval.

Table 4: Capacity of vertical braces (safe working load)

Bay Length (m)	α (°)	Loading by Tension			Loading by Compression		
		all. Nv (kN)	all. Q (kN)	all. V (kN)	all. Nv (kN)	all. Q (kN)	all. V (kN)
Bay Height H = 2.00m							
3.07	34.4	+16.30	13.5	9.2	-4.98	4.1	2.8
2.57	39.6		12.6	10.4	-6.01	4.6	3.8
2.07	46.2		11.3	11.8	-7.39	5.1	5.3
1.57	54.7		9.4	13.3	-9.29	5.4	7.6
1.40	58.1		8.6	13.9	-10.10	5.3	8.6
1.09	65.0		6.9	14.8	-11.80	5.0	10.7
0.73	73.9		4.5	15.7	-13.87	3.9	13.3
Bay Height H = 1.50m							
3.07	27.2	+16.30	14.5	7.5	-5.26	4.7	2.4
2.57	31.8		13.9	8.6	-6.32	5.4	3.3
2.07	38.0		12.9	10.1	-7.82	6.2	4.8
1.57	46.6		11.2	11.9	-10.01	6.9	7.3
Bay Height H = 1.00m							
3.07	18.9	+16.30	15.5	5.3	-5.42	5.1	1.8
2.57	22.5		15.1	6.3	-6.46	6.0	2.5
2.07	27.5		14.5	7.6	-7.58	6.7	3.5
1.57	35.2		13.4	9.4	-8.67	7.1	5.0
1.54	35.9		13.2	9.6	-9.40	7.6	5.5
1.29	41.5		12.2	10.8	-9.87	7.4	6.5
1.09	47.0		11.1	11.9	-11.23	7.7	8.2

Table 4: (continued) Capacity of vertical braces (safe working load)

Bay Length (m)	α (o)	Loading by Tension			Loading by Compression		
		all. Nv (kN)	all. Q (kN)	all. V (kN)	all. Nv (kN)	all. Q (kN)	all. V (kN)
Bay Height H = 0.50m							
3.07	9.7	+16.30	16.1	2.8	-5.43	5.4	0.9
2.57	11.7		16.0	3.3	-6.39	6.3	1.3
2.07	14.6		15.8	4.1	-6.63	6.4	1.7
1.57	19.4		15.4	5.4	-7.03	6.6	2.3

5.4 Horizontal Braces and Bracing Ledgers

For the horizontal braces with two ledger heads of non-symmetric bays the welding connection between the angled tube and the head is the limiting factor. The allowable capacity is shown below:

L = 2.07 * 1.09 m to 3.07 * 1.57 m: all. N = 7.33 kN
L = 3.07 * 2.07 m: all. N = 7.07 kN
L = 3.07 * 2.57 m: all. N = 6.00 kN

Bracing ledgers for symmetric bays are designed similar to common ledgers. The capacity can be taken from the loading data of a ledger taking the rigidity of the compressed tube into account. Table 5 contains safe working loads for bracing ledgers.

Table 5: Capacity of Bracing Ledgers

Bay Size (m*m)	Length (m)	all. Tension (kN)	all. Compression (kN)
1.57 * 1.57	2.223	20.2	20.2
2.07 * 2.07	2.930	20.2	12.7
2.57 * 2.57	3.637	20.2	8.5
3.07 * 3.07	4.344	20.2	6.1

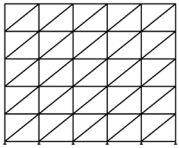
Horizontal braces with pins at the ends (former design) do all have the same capacity:

allowable N = ± 2.71 kN

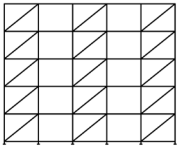
5.5 Standards

The given values for allowable loading of vertical standards are just applicable for preliminary estimations. Supporting base jacks should not be extended more than 0.1 m. Should the extension of base jacks be more or for the application of ledger distances of H = 1.5 m and H = 1.0 m the basis of the scaffold becomes critical. The precise calculation by a skilled person is inevitable in these cases at least.

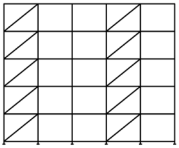
„Buckling Load“ applicable in case that standards are directly fixed to a rigid construction
„Dia 1/1, 1/2, 1/3“ For reinforcing braces assembled every bay, every 2nd bay, every 3rd bay



Dia 1/1 = every bay



Dia 1/2 = every 2nd bay



Dia 1/3 = every 3rd bay

Table 6: Capacity of Standards

System Width (m)	Centre Standards				Perimeter Standards			
	Buckling Load (kN)	Dia 1/1 (kN)	Dia 1/2 (kN)	Dia 1/3 (kN)	Buckling Load (kN)	Dia 1/1 (kN)	Dia 1/2 (kN)	Dia 1/3 (kN)
Bay Height H = 2.00m								
0.73	50.3	47.9	42.1	36.9	38.5	38.1	36.0	34.6
1.09	49.3	48.2	46.1	43.2	38.3	38.3	37.7	36.8
1.57	48.0	47.3	46.2	46.1	38.2	38.2	37.7	37.2
2.07	46.8	46.5	45.8	45.3	37.7	37.7	37.7	37.0
2.57	45.9	45.6	44.9	44.5	37.2	37.2	37.2	36.7
3.07	44.5	44.4	44.0	43.7	36.7	36.7	36.7	36.3
Bay Height H = 1.50m								
0.73	65.6	61.1	56.4	50.0	55.1	54.0	50.9	46.9
1.09	64.3	63.0	61.0	56.5	54.7	54.6	53.5	53.5
1.57	62.9	62.1	61.1	58.7	54.0	54.0	53.6	53.5
2.07	61.6	61.1	60.4	58.5	53.6	53.6	53.1	52.9
2.57	60.5	60.0	59.5	58.0	52.8	52.8	52.6	52.3
3.07	59.2	57.5	57.0	56.1	52.2	51.2	50.6	49.7
Bay Height H = 1.00m								
0.73	74.7	70.1	68.4	66.7	71.0	70.1	68.4	66.7
1.09	74.9	71.9	69.8	67.6	70.5	70.3	69.4	67.6
1.57	74.0	73.2	72.1	68.0	70.0	69.9	69.2	68.0
2.07	73.2	72.7	71.9	69.2	69.6	69.3	68.7	68.1
2.57	72.6	72.1	71.4	69.5	69.2	68.8	68.3	67.7
3.07	72.0	71.4	70.7	69.2	68.8	68.3	67.8	67.2

5.6 Decks

Table 7 contains the classification of system decks in reference to the load classes stated in EN 12811-1. Additionally the max. allowable uniformly distributed load as well as the max. concentrated (single point) load are mentioned. The max. concentraded load has to be applied to an area of min. 0.5*0.5m. due to the fact that the decks are sometimes smaller it is reduced according to he width ratio. The lowest value allowed is 1.50 kN. This is applicable for decks of 0.19 m width. Single point load means that the area to apply this load may not be smaller than 0.5*0.5m. In case that the deck is not of sufficient width the length of the area has to be min. 0.5 m the width may be reduced to the width of the deck.

Table 7: Capacity of assco decks

Type of Deck	Length (m)	Load Class	Uniformly Distributed Load (kN/m²)	Single Point Load (kN)
System deck steel 32 U-support	3.07	4	5.0	1.92
	2.57	5	7.5	1.92
	≤ 2.07	6	10.0	1.92
System deck steel 32 Tubular support	3.07	4	5.0	1.92
	2.57	5	7.5	1.92
	≤ 2.07	6	10.0	1.92
System deck steel 19 U-support	3.07	4	5.0	1.50
	2.57	5	7.5	1.50
	≤ 2.07	6	10.0	1.50
System deck steel 19 Tubular support	3.07	4	5.0	1.50
	2.57	5	7.5	1.50
	≤ 2.07	6	10.0	1.50
Alu-Access Deck with Plywood surface, U-Support	3.07	3	2.0	1.50
	2.57	3	2.0	1.50
Alu-Access Deck Alu-surface, SL-Support Alu-surface, Tubular Support	3.07	3	2.0	1.50
	2.57	4	3.0	3.00
Steel Site Stair 75 Steel Site Stair 95	2.57	3	2.0	1.50
	2.57	3	2.0	1.50
Alu-Stair U-Support Alu-Stair Tubular Support	3.07	3	2.0	1.50
	2.57	3	2.0	1.50
Alu-Deck protec U-Support (width = 61 cm)	3.07	4	3.0	3.00
	2.57	5	4.5	3.00
	≤ 2.07	6	6.0	3.00

5.7 Transoms and Ledgers

The following chapter contains the capacities of transoms and ledgers. The data refers to the latest state of design at the time of writing this manual. The following transoms and or ledgers are regarded separately:

Table 8: Single and Double Transoms U-Support

Table 9: Single Transoms / Ledgers; Tubular Support

Table 10: Reinforced and Double Transoms Tubular Support

Table 11: Lattice Girders with 4 wedge heads; U-Support

Table 12: Intermediate Transoms

For evaluating the capacity the elastic reaction between ledger and standard has been taken into account (not relevant for intermediate transoms). The self weight of decks has been considered (Steel decks 0.23 kN/m^2). The separate columns of the following tables are giving the data as described:

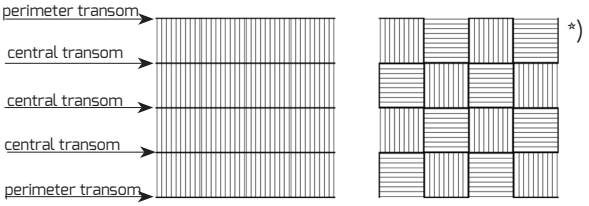
Allow. q: allowable uniformly distributed load along the transom / ledger.

Deck Length: Bay size to be supported by the transom.

Allow. p: Allowable safe working load for the area to be supported by the transom. Should this value be bigger than the capacity of decks the decks need to be reinforced.

Load Class: Classification according to EN 12811 considering concentrated loads (for steel decks according to table 7) 1st column central transom, 2nd column perimetre transom *)

Allow. P: 1xP = allowable single point load in the centre of the transom
2x P = allowable single point loads equally spaced deviding the transom into three similar distances



*) At Birdcage scaffolds every transom may be considered as a perimeter transom if the deck's orientation is changed every bay.

Table 8: Capacity of single and double transoms; U-Support

Transom Length (m)	allow. q (kN/m)	Deck Length (m)	allow. p*) central transom (kN/m²)	allow. p*) perimeter transom (kN/m²)	Load Class		allow. P (kN)
0.73 (2-board)	23.2	3.07	7.3	14.9	4	4	1 x 7.4
		2.57	8.8	17.8	5	5	
		2.07	11.0	22.2	6	6	
		1.57	14.5	29.3	6	6	
1.09 (3-board)	19.0	3.07	6.0	12.1	4	4	1 x 9.7
		2.57	7.2	14.6	5	5	
		2.07	8.9	18.1	6	6	
		1.57	11.9	24.0	6	6	
1.40 (4-board)	11.5	3.07	3.5	7.3	4	4	1 x 7.6
		2.57	4.2	8.7	4	5	
		2.07	5.3	10.9	5	6	
		1.57	7.1	14.4	5	6	
1.57	16.3	3.07	5.1	10.4	4	4	1 x 9.6 2 x 9.3
		2.57	6.1	12.5	5	5	
		2.07	7.6	15.5	5	6	
		1.57	10.2	20.5	6	6	
2.07	9.7	3.07	2.9	6.1	3	4	1 x 8.9 2 x 6.9
		2.57	3.5	7.3	4	5	
		2.07	4.5	9.1	4	6	
		1.57	5.9	12.1	5	6	
2.57	5.7	3.07	1.6	3.5	2	3	1 x 6.2 2 x 4.9
		2.57	2.0	4.2	3	4	
		2.07	2.5	5.3	3	4	
		1.57	3.4	7.0	4	5	
3.07	4.0	3.07	1.1	2.4	1	3	1 x 5.3 2 x 3.7
		2.57	1.3	2.9	1	3	
		2.07	1.7	3.6	2	4	
		1.57	2.3	4.9	3	4	

*) see note on page 70

Table 9: Capacity of Single Transoms / Ledgers; Tubular Support

Transom Length (m)	allow. q (kN/m)	Deck Length (m)	allow. p*) central transom (kN/m²)	allow. p*) perimeter transom (kN/m²)	Load Class		allow. P (kN)
0.73	22.5	3.07	7.1	14.4	4	4	7.1
		2.57	8.5	17.3	5	5	
		2.07	10.6	21.5	6	6	
		1.57	14.1	28.4	6	6	
1.09	11.5	3.07	3.5	7.3	4	4	5.6
		2.57	4.2	8.7	4	5	
		2.07	5.3	10.9	5	6	
		1.57	7.1	14.4	5	6	
1.40	6.4	3.07	1.9	3.9	2	4	4.0
		2.57	2.3	4.8	3	4	
		2.07	2.9	6.0	3	5	
		1.57	3.8	7.9	4	5	
1.57	5.2	3.07	1.5	3.2	1	3	3.6
		2.57	1.8	3.8	2	4	
		2.07	2.3	4.8	3	4	
		1.57	3.1	6.4	3	5	
2.07	3.1	3.07	0.8	1.8	1	2	2.8
		2.57	1.0	2.2	1	3	
		2.07	1.3	2.8	1	3	
		1.57	1.7	3.7	2	4	
2.57	2.0	3.07	0.4	1.1	-	1	2.3
		2.57	0.5	1.3	-	1	
		2.07	0.7	1.7	1	2	
		1.57	1.0	2.3	1	3	
3.07	1.4	3.07	0.2	0.7	-	-	2.0
		2.57	0.3	0.9	-	1	
		2.07	0.4	1.1	-	1	
		1.57	0.7	1.6	-	2	

*) see note on page 70

Table 10: Capacity of Reinforced and Double Transoms; Tubular Support

Transom Length (m)	allow. q (kN/m)	Deck Length (m)	allow. p*) central transom (kN/m²)	allow. p*) perimeter transom (kN/m²)	Load Class		allow. P (kN)
1.09 (reinforced)	21.8	3.07	6.9	14.0	4	4	1 x 11.2
		2.57	8.3	16.7	5	5	
		2.07	10.3	20.8	6	6	
		1.57	13.7	27.5	6	6	
1.29 (reinforced)	15.6	3.07	4.9	9.9	4	4	1 x 9.5
		2.57	5.8	11.9	5	5	
		2.07	7.3	14.8	5	6	
		1.57	9.7	19.6	6	6	
1.57	27.6	3.07	8.8	17.8	4	4	1 x 15.3 2 x 16.3
		2.57	10.5	21.2	5	5	
		2.07	13.1	26.4	6	6	
		1.57	17.3	34.9	6	6	
2.07	13.9	3.07	4.3	8.8	4	4	1 x 11.5 2 x 8.5
		2.57	5.2	10.6	5	5	
		2.07	6.5	13.2	5	6	
		1.57	8.6	17.5	6	6	
2.57	8.0	3.07	2.4	5.0	3	4	1 x 7.2 2 x 6.3
		2.57	2.9	6.0	3	5	
		2.07	3.6	7.5	4	5	
		1.57	4.9	10.0	5	6	
3.07	4.3	3.07	1.2	2.6	1	3	1 x 6.0 2 x 5.1
		2.57	1.4	3.1	1	3	
		2.07	1.8	3.9	2	4	
		1.57	2.5	5.2	3	5	

*) see note on page 70

Table 11: Lattice Girders with 4 wedge heads; U-Support

Beam Length (m)	allow. q (kN/m)	Deck Length (m)	allow. p*) central transom (kN/m²)	allow. p*) perimeter transom (kN/m²)	Load Class		allow. P (kN)
3.07	14.5	3.07	4.5	9.2	4	4	1 x 28.6
		2.57	5.4	11.1	5	5	
		2.07	6.8	13.8	5	6	
		1.57	9.0	18.2	6	6	
4.14	10.6	3.07	3.2	6.7	4	4	1 x 25.1
		2.57	3.9	8.0	4	5	
		2.07	4.9	10.0	5	6	
		1.57	6.5	13.3	5	6	
5.14	8.4	3.07	2.5	5.2	3	4	1 x 21.1
		2.57	3.0	6.3	3	5	
		2.07	3.8	7.9	4	5	
		1.57	5.1	10.5	5	6	
6.14	6.9	3.07	2.0	4.3	3	4	2.0
		2.57	2.5	5.1	3	4	
		2.07	3.1	6.4	3	5	
		1.57	4.2	8.6	4	6	

*) see note on page 70

The upper chords of he lattice girders have to be reinforced to avoid buckling. This may be done by tube and fitting equipment connected to the vertical members as close to the decking level as possible.

Wherever system independent timber shall be used to board working platforms intermediate transoms are required to achieve the demanded max. supporting distances according to table 13.

Table 12: Capacity of Intermediate Transoms

Ledger Length (m)	allow. q (kN/m)	allow. p (kN)
0.73	18.9	6.9
1.09	8.5	4.6
1.40	5.1	3.6
1.57	4.1	3.2
2.07	2.3	2.4
2.57	1.5	2.0
3.07	1.0	1.6

Table 13: Max. allowable supporting distance for system independent timber boards

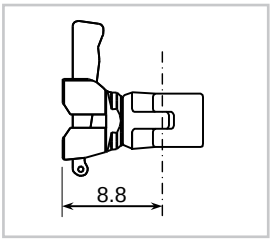
Load class	Board width (cm)	Board thickness (cm)				
		3.0	3.5	4.0	4.5	5.0
1,2,3	20	1.25	1.50	1.75	2.25	2.50
	24 and 28	1.25	1.75	2.25	2.50	2.75
4	20	1.25	1.50	1.75	2.25	2.50
	24 and 28	1.25	1.75	2.00	2.25	2.50
5	20, 24, 28	1.25	1.25	1.50	1.75	2.00
6	20, 24, 28	1.00	1.25	1.25	1.50	1.75

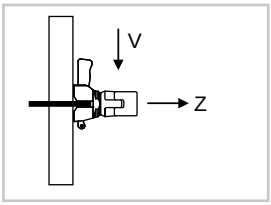
Table 13 is valid for timber graded according to scaffolding demands

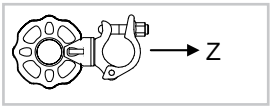
5.8 Wedge Head Couplers

The capacity of wedge head coupler is set by the approval Z-8.22-841. The capacity is valid for both designs 'parallel' and 'right angle'. The allowable safe working load is shown in sketches below. Elastic reinforcing data and spring capacities are to be taken from the approval directly.

Design 'Parallel'

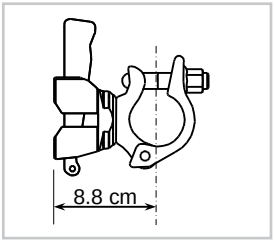


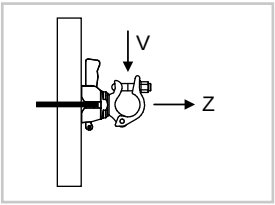


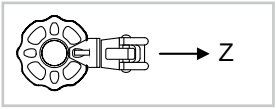


allow. V = 5.1kN

Design 'Right Angle'



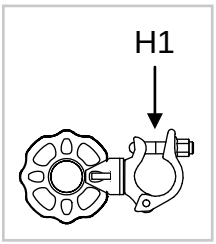


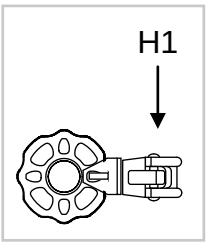


allow. Z = 18.2kN

The safe working loads mentioned above are also valid for the wedge head swivel couplers. These capacities are not covered by the approval but supported by additional tests. Spring capacities for these couplers are available on demand.

The horizontal capacity of wedge head couplers may be taken from the data for Vy = ± 6.2 kN and Mz = ± 14.5 kNcm (see chapter 6.2).

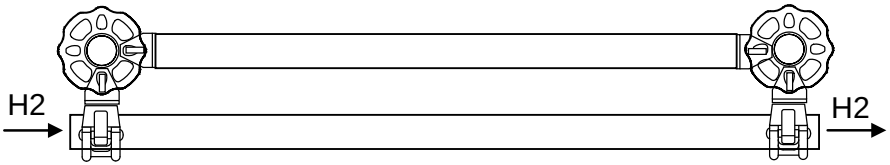




A single wedge head coupler will be able to support the following safe working load:

allow. H1 = 14.5 / 8.8 = 1.7 kN

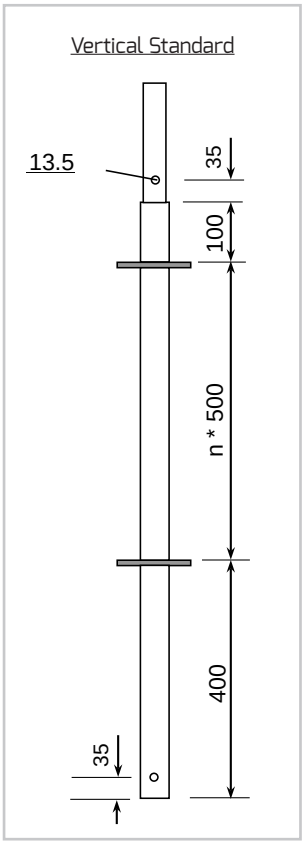
Should at least two wedger head couplers be connected by a separate tube then the full load capacity for the horizontal load Vy can be activated.

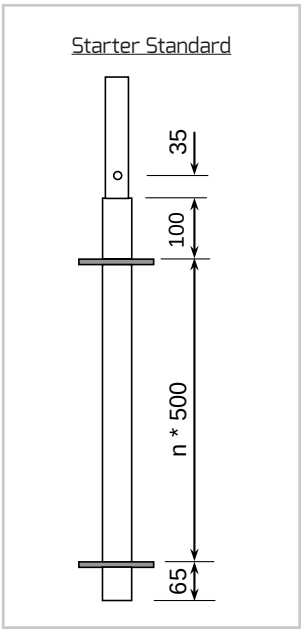


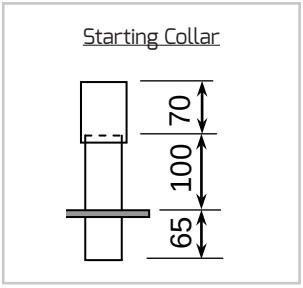
For each wedge head: allow. H2 = 6.2 kN

6.0 Design Details

6.1 Standards



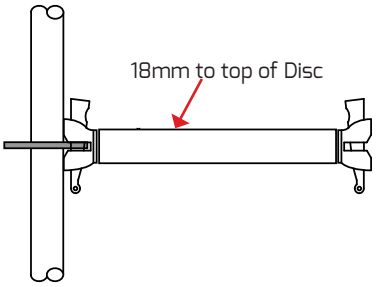


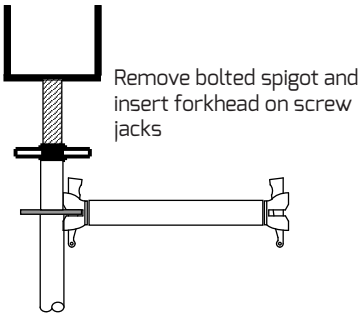


6.2 Ledgers + Decks

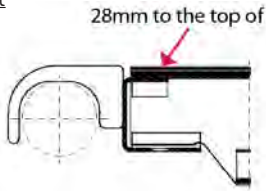
Specified in relation to the top of the discs.

Tubular Ledger

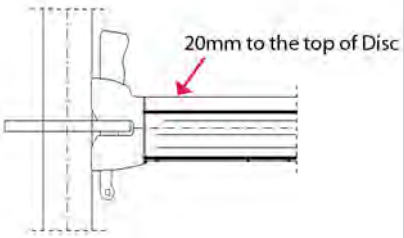




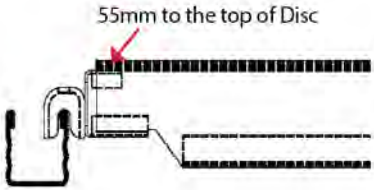
Steel Deck for Tubular Support



U-Transom



Steel Deck on U-Transom



7.0 Rescue Plan

The modular scaffolding system assco futuro is a fast and simple system which when erected by suitably trained and skilled person, improve levels of safety over traditional methods. Automatic positioning of all components including handrails without the need for levelling ensures safety whilst erecting. The system with handleable components is easily erected safely and efficiently.

However, erectors need to be mindful of the risks and plan to work as safely as possible. In accordance with the national Fall from Heights Regulations, every attempt should be made to "minimize the risk of falls by using personal safety equipment or other measures to prevent falling.

ALTRAD plettac assco GmbH recommend the use of collective measures such as Advanced Guardrail systems, Hop-Ups and Steps where structural parts and handrails can be installed from a place of safety during the erection process. Alternatively the use of personal safety equipment to restrain and limit any falls has to be considered. Harnesses should be worn and used at all stages of erection of the modular scaffolding system assco futuro.

The Work at Height Regulations generally specifically require every employer to take account of the need for an easy and timely evacuation in the event of an emergency where scaffolders or operatives suffer disability or fall when suspended in a harness.

A site specific Risk Assessment and Method Statement is essential in determining the plan required for the recovery of a disabled or incapacitated person. ALTRAD plettac assco GmbH recommend that contractors, employers develop their own rescue plan in accordance with the recommendations of the national Health and Safety board.

All erectors should be trained in the use of special rescue equipment and ensure all equipment for rescue is available and is fit for use at all times.

NB: Legislation is consistently being updated and users are responsible to ensure that the latest and most appropriate is used at the time.

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