



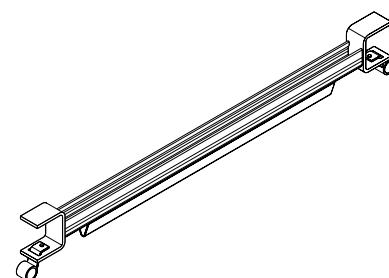
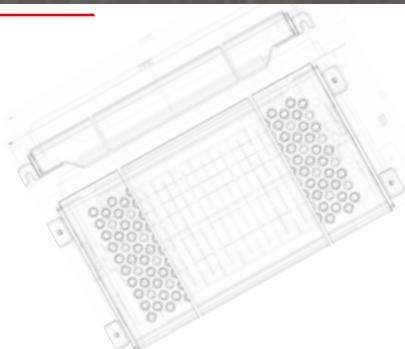
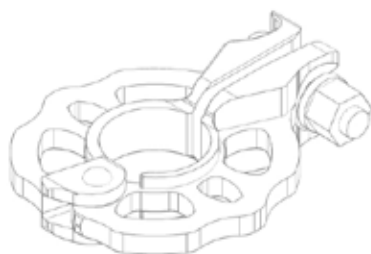
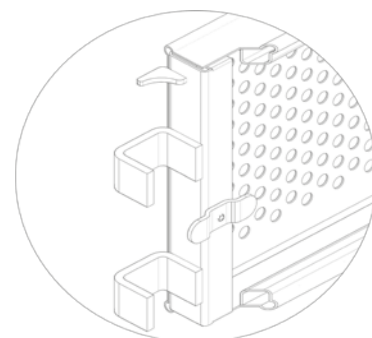
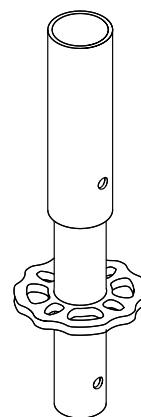
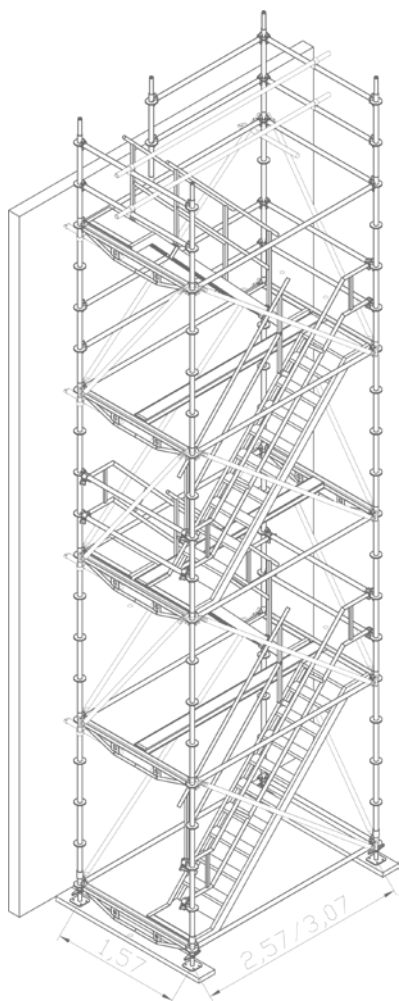
MOSTOSTAL
SCAFFOLDING
FORMWORK

OVER 20 YEARS OF ALTRAD MOSTOSTAL – **STRENGTH, MODERNITY, STABILITY**



ASSEMBLY MANUAL – **ROTAX Plus MODULAR SCAFFOLDING**

ROTAX Plus MODULAR SCAFFOLDING



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TABLE OF CONTENTS

1	TECHNICAL OVERVIEW OF ROTAX PLUS MODULAR SCAFFOLDING	4
	1.1. Scaffolding characteristics	4
	1.2. List of scaffolding standards and rules	4
2	GENERAL RULES	5
	2.1. Component evaluation criteria	5
	2.2. General assembly rules	5
	2.3. General safety rules for the scaffolding assembly and use	7
3	SCAFFOLDING ASSEMBLY	8
	3.1. Basic elements assembly (partial examples)	8
	3.1.1. ROTAX Plus node	8
	3.1.2. Assembly hints for safer use	9
	3.1.3. Main ROTAX Plus system components	11
	3.1.4. Platform assembly	12
	3.1.5. Fitting the transoms with platforms	12
	3.1.6. Side protections	13
	3.1.7. Corner assembly	13
	3.1.8. Expansion consoles	14
	3.1.9. Anchors	14
	3.1.10. Span beams – gate crossings and cross-beams	15
	3.1.11. Pathways beneath scaffolding	16
	3.1.12. Scaffolding entrances	17
	3.1.13. Scaffolding near eaves	17
	3.1.14. Platform openings and adjustment	18
	3.1.15. Changing stands spacing	18
	3.1.16. Additional components	19
	3.2. Scaffolding assembly in a facade set-up	19
	3.3. Tower scaffolding	23
	3.4. Building ceiling platforms	24
	3.5. Building stage platforms	24
	3.6. Load-bearing scaffolding	25
	3.7. Scaffolding for round facilities	26
	3.8. Suspended scaffolding	26
	3.9. Mobile scaffolding	28
	3.10. External staircases	29
	3.11. Vertical material handling	31
4	EXAMPLES OF STRUCTURES WITH THE ROTAX Plus SCAFFOLDING COMPONENTS	31
5	ASSEMBLY DIAGRAMS FOR TYPICAL SCAFFOLDING IN A FACADE SET-UP	32
6	PRODUCT MARKING SYSTEM	36
7	ROTAX POLE SCAFFOLDING COMPONENTS LIST	37
8	STAND COMPONENTS LIST	48
9	ANNEX NO. 1 – TECHNICAL ACCEPTANCE RECORD	51

TECHNICAL OVERVIEW OF ROTAX Plus SCAFFOLDING

1.1. Scaffolding characteristics

ROTAX Plus scaffolding is a system scaffolding with the following bay dimensions: 0.73 m; 1.09 m, 1.57 m, 2.07 m; 2.57 m, 3.07 m. The net can be expanded in all directions so that the pole scaffolding can be optimally adjusted to the surfaces of complex shapes and its potential can be utilised better when compared to other scaffolding types. The vertical component position can be adjusted every 0.5 m.

The system allows you to build large platforms (e.g. ceiling platforms, stages) and support, and load-bearing structures for billboards, racks, television camera stations etc.

The scaffolding is built of steel working platforms with the load capacity of 3 kN/m² - 6 kN/m² depending on the platform length and their set-up as well as aluminium and plywood or wooden platforms with the load capacity of 2 kN/m².

It is possible to load one scaffolding level.

Depending on your needs you can use the ROTAX Plus system with platforms with two catch types:

- O catches for the o-transom,
- U catches for the u-transom.

The entire scaffolding assembly system is based on the possibilities provided by the specific structural node which allows you to connect cross-bars, stringers, horizontal and vertical braces.



Criterion no. K/0812-721/1/08 of the Institute of Mechanised Construction and Rock Mining in Warsaw differentiates the concept of a board (single component) and a platform (built of boards). The practice used in this manual uses the term PLATFORM for both concepts.

1.2. List of scaffolding standards and rules

When designing, installing, disassembling and using the scaffolding you should observe the rules and requirements included in:

- This manual.
- Regulation of the Minister of Labour and Social Policy of 26 September 1997 on general occupational health and safety rules – unified text – Journal of Laws No. 169/03 item 1650 as further amended.
- Regulation of the Minister of Economy of 30 October 2002 on minimum requirements for occupational health and safety regarding usage by the employees of the machinery during work (Journal of Laws No. 191/02, item 1596) as further amended. Unified text - Journal of Laws No. 178/2003 item 1745.
- Regulation of the Minister of Infrastructure of 6 February 2003 on occupational health and safety during construction works (Journal of Laws No. 47/03 item 401).
- PM-M-47900-1:1996 “Steel, standing scaffoldings. Definitions, division and main parameters.”
- PM-M-47900-2:1996 “Steel, standing scaffoldings. Pole scaffoldings made of pipes.”
- PM-M-47900-3:1996 “Steel, standing scaffoldings. Frame scaffoldings.”
- PN-EN 12811-1:2004 “Provisional structures used at a construction site. Scaffoldings. Conditions for the production and general design rules.”
- PN-EN 12810-1:2004 “Facade scaffolding made of prefabricated elements. Products’ technical specifications.”
- PN-EN 12810-2:2004 “Facade scaffolding made of prefabricated elements. Particular design and construction methods.”
- PN-EN 74:2002 “Couplings, centring plungers and foot sets used in working and load-bearing scaffoldings made of steel pipes. Requirements and examination procedures.”
- PN-EN 39:2003 “Steel pipes for scaffolding construction - Technical regulations for the delivery process.”
- PN-EN 1004 “Movable working platforms made of prefabricated elements, materials, scaffolding components, dimensions, force take-over and occupational health and safety requirements.”

GENERAL RULES

2.1. Component evaluation criteria

During the scaffolding assembly you should only use components in a perfect condition. Components with visible signs of damage cannot be used. You cannot use the following:

- components with signs of corrosion localised at the connection areas (welds),
 - load-bearing stands with visible signs of damage in the form of pipe twists, section deformation,
 - steel platforms with damaged sheathing or damaged and bent catches,
 - aluminium and plywood platforms with damaged plywood sheathing: delaminated, cracked, expanded, with missing parts or bent platform load-bearing beams,
 - screw base jacks with damaged threads, twisted plungers or resistive nuts. Damaged components should be replaced with defect-free components and damaged components which cannot be repaired on site should be returned for repair. The components can be straightened only when their circular section is not deformed.
- Repairing structure load-bearing components i.e. stands, braces and base jacks is prohibited.

2.2. General assembly rules

- 2.2.1.** Thoroughly read the assembly manual.
- 2.2.2.** Before commencing the assembly the scaffolding ground base needs to be checked for transferring the loads of scaffolding and vertical forces present on the scaffolding. In the case of the structural bases and base reinforcement the scaffolding placement has to meet the requirements of PN-M-47900-2 section 4.4.
- 2.2.3.** During the scaffolding assembly you should use a level, 500 g hammer to wedge the individual system components together, 19/21 spanner to tighten the clamps, connections and anchors.
- 2.2.4.** During the assembly you should use only original components which are not damaged and which are included in the Mostostal Plus scaffolding system.
- 2.2.5.** A scaffolding should be placed on the stable and graded base which allows rainwater to flow. To protect the base jack from driving into the base and puncturing it you should use wooden beams. At least 2 base jacks should be located on one beam.
- 2.2.6.** The base jack plunger should be at least 150 mm in the stand pipe.
- 2.2.7.** Install the initial components on the screw base jacks. The base jack and initial component sets should be connected with transoms which serve as stringers or crossbars.
- 2.2.8.** The scaffolding structure allows you to secure the stands with securing pins which is not absolutely necessary as the pilot length exceeds the minimum standard requirements.
- 2.2.9.** The wall scaffolding should be placed so that there is max. 0.2 m between the scaffolding platforms and the building facade. When the distance from the building exceeds 0.2 m or when the scaffolding is a free-standing structure you should install on its internal side additional railings and toe boards.
- 2.2.10.** A wall scaffolding is braced on the scaffolding external plane parallel to the wall face by performing multiplane or tower bracing. Vertical braces should be installed at every fifth scaffolding net bay (2.57 m) and every fourth bay (3.07 m). Each level should have at least two braces installed which should be positioned opposite to each other. The braced bays should be fitted with the longitudinal transoms acting as horizontal braces. The maximum distance between the braces is 10 m.
- 2.2.11.** Lower stand disks should be clamped crosswise with the transoms.
- 2.2.12.** The extreme platform endings should be protected with railings and toe boards to block access to the bays without the platforms.
- 2.2.13.** A scaffolding should be provided with circulation paths. The paths should be provided when erecting the scaffolding structure. The distance between the circulation paths cannot exceed 40 m. The greatest distance of the work station from the circulation path cannot exceed 20 m. The circulation paths are created inside the scaffolding by installing the aluminium platforms with the access hatch and the aluminium ladder, and the steel platforms with the access hatch or as staircases provided in the scaffolding structure.
- 2.2.14.** The bay where the circulation path is to be created with the hatch platforms should be fitted with the U-tran-

soms and then you should install the platforms for vertical circulation.

- 2.2.15.** All connections of the scaffolding pipes should be made with normal or rotary couplings compliant with PN-EN 74:2002. The coupling screws should be torque-tightened to 50 Nm.
- 2.2.16.** Steel platforms should be laid so that the gap between two platform parts on one level does not exceed 25 mm. When the working platform expansion consoles are installed the resulting gap should be filled with a longitudinal transom or planks.
- 2.2.17.** It is acceptable to expand the scaffolding platforms with the crossbars (transoms) and stands supported with the vertical braces. The platforms can be expanded on the external scaffolding side or on its last level or on any level providing that they are anchored to the expanded level wall and to the wall located one level above and below the expanded level.
- 2.2.18.** When loading the scaffolding platforms you should observe the following rules:
- scaffolding load should be evenly distributed on its entire surface;
 - assume 80 kg (0.8 kN) for each person working on the scaffolding;
 - to analyse the structure increase the weight of the components delivered with the hoist by 20%;
 - dynamic platform loading, e.g. jumping, throwing heavy objects etc. is prohibited;
 - platforms fixed on the consoles must be of the same load class as the basic scaffolding platforms.
- 2.2.19.** The rules concerning installation of the facade scaffoldings presented in this manual are specified for the scaffoldings of the maximum height of $H_{max} = 34$ m and more than 10 m long after erection. When the erected scaffolding is shorter than 10 m you should perform the safety analysis or prepare an individual design.
- 2.2.20.** To protect people against objects falling from the scaffolding you should use the protective nets or canvases. You should remember that the wind suction and pressure forces acting on the net or canvas are a significant load for the scaffolding structure.
- 2.2.21.** The scaffolding may be used in all wind zones acc. to PN-77/8-02011.



For the scaffoldings intended for use in III wind zone and in places located more than 1500 m a.s.l. you should perform the additional structural analyses concerning wind.

- 2.2.22.** If the scaffolding is anchored it should be anchored as the assembly progresses. The anchoring points should be located max. 0.2 m from the scaffolding node. When the scaffolding has to be anchored at a larger distance from the node you should prepare a design for this scaffolding.
- 2.2.23.** The scaffolding may be disassembled when all works performed from this scaffolding are complete and all tools and materials are removed. It is acceptable to gradually disassemble the scaffolding from the top platform as the works progress. Throwing the components down when disassembling the scaffolding is prohibited. When disassembled all scaffolding components should be cleaned, checked and grouped into those which can be used again and those which must be repaired or replaced.
- 2.2.24.** If the scaffolding is anchored the anchorage should be disassembled when disassembling the scaffolding structure. Disassembly of more than one anchor set below the disassembled scaffolding level is prohibited. Examples of solutions are presented later in the manual.
- 2.2.25.** The scaffolding components should be stored and transported according to the provisions of PN-M-47900-2:1996 "Steel, standing scaffoldings. Pole scaffoldings made of pipes."

2.3. General safety rules for the scaffolding assembly and use

- 2.3.1. The employees hired for the scaffolding assembly and disassembly should be trained and authorised by a training centre approved by the Institute of Mechanised Construction and Rock Mining in Warsaw.
- 2.3.2. When assembling and disassembling the scaffolding you should use the personal protective equipment.
- 2.3.3. When assembling and disassembling the scaffolding you should establish a danger zone and secure it with the proper markings and railings min. 1.5 m high. The danger zone cannot be smaller than 1/10 of the scaffolding height and not smaller than 6 m. In a city compact settlement the danger zone may be smaller providing that other protections are used.

The scaffolding cannot be assembled, disassembled or used during:

- a) sunset of no proper lighting has been provided;
 - b) heavy fog, rain, snow and glazed frost;
 - c) storm and wind that exceeds 10 m/s.
- 2.3.4. The scaffolding assembly and disassembly area should be marked with the warning plates provided in the visible locations at the height of 2.5 m from the ground level. The text on the plates should be readable at least from 10 m.
 - 2.3.5. The scaffoldings located directly at the circulation roads should be provided with the protective canopies which comply with § 22 of the Regulation of Minister of Infrastructure of 6 February 2003, Journal of Laws No. 47 item 401.
 - 2.3.6. The stands located at the gates, clearances and passages used for the vehicle traffic should be protected with the bumping posts which are not connected with the scaffolding structure.
 - 2.3.7. When the passage is blocked during the scaffolding assembly (against the local authority consent) you should place a barrier in the passage along with a red shield with a text that warns of the closed or blocked passage and install a red light on the barrier that will be used at night.
 - 2.3.8. The scaffolding cannot be assembled, disassembled or used nearby the live overhead power lines if the distance between the scaffolding and the extreme power lines is smaller than:
 - a) 3 m for the lines with the maximum rated voltage of 1 kV;
 - b) 5 m for the lines with the rated voltage between 1 kV and 15 kV;
 - c) 10 m for the lines with the rated voltage between 15 kV and 30 kV;
 - d) 15 m for the lines with the rated voltage between 30 kV and 110 kV;
 - e) 30 m for the lines with the rated voltage exceeding 110 kV.
 When the scaffolding is assembled or disassembled under the overhead power lines or at a distance smaller than those specified above during the works the voltage should be cut-off.
 - 2.3.9. The scaffolding structure should be equipped with the lightning protection equipment according to PN-M-47900-2:1996 "Steel, standing scaffoldings. Pole scaffoldings made of pipes," section 4.8. "Lightning protection equipment."
 - 2.3.10. The scaffolding may be used when it is accepted by the technical supervisor or other authorised person. During the acceptance you should test the scaffolding according to section 7.3. of PN-M-47900-2:1996 "Steel, standing scaffoldings. Pole scaffoldings made of pipes." The scaffolding acceptance is confirmed with a log according to annex no. 1 to this manual or a record in the construction logbook.
 - 2.3.11. The scaffolding should be provided with a plate which informs of the permissible platform load. It is prohibited to load the scaffolding platforms with materials which are heavier than its load capacity and to gather people on the platforms.
 - 2.3.12. The scaffolding may be equipped with a device used for transporting materials with the jibs secured to the scaffolding structure. The jibs may be made of the pipes secured to the scaffolding with the couplings. You can use the typical and block offered by the manufacturer - E552100. Maximum weight of the lifted materials cannot exceed 150 kg. When using jibs with a higher lift capacity which are secured to the scaffolding you should carry out the structural analyses for this scaffolding. The transport jib must be additionally anchored at least in two points. Distance between the jibs cannot exceed 30 m. Distance of the block axis from the furthest scaffolding point on the lifting plane cannot exceed 0.5 m. Height from the block attachment point to the platform level cannot be smaller than 1.6 m. For vertical transport it is recommended to use the hoisting winches with attachment that can be installed on the scaffolding, such as GEDA winches. This equipment must have the approval certificate issued by the Office of Technical Inspection. The hoisting winches should be installed in strict accordance with the manual prepared by the hoisting winch manufacturer.

2.3.13. Before each use the scaffolding should be checked for the proper and complete structure and you should also check if there are no environmental changes that affect the safe use. In particular you should check if the foundation is intact. These checks should be performed by the foreman who uses the scaffolding.

2.3.14. The scaffolding should be inspected: after strong wind, heavy rain, hailstorm, lightning stroke or when it was affected by other dangerous factors and when no works have been carried out on the scaffolding for 10 days, and the inspection should be performed at least once a month.

During the inspections check:

- condition of the base where the scaffolding is placed,
- protection condition (railings, toe boards),
- platform condition (gaps between platforms, damage, platform loading method), circulation paths (ladder fastening, proper opening and closing of hatches),
- method used for protecting the upper platforms and platforms supported on the consoles against falling out,
- rotary coupling condition,
- anchorage force,
- condition of the hoisting winches and the supporting structure,
- lightning protection system condition.

The inspection is carried out by the construction manager or other authorised person.

Each inspection should be documented with a memo or recorded in the construction logbook.

2.3.15. Before work in Winter you should remove snow from the Scaffolding.

3

SCAFFOLDING ASSEMBLY

3.1. Basic elements assembly (partial examples)

3.1.1. ROTAX Plus node

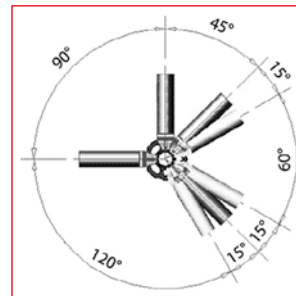
The node allows you to connect the basic elements: stands, transoms and vertical braces. The ROTAX Plus node disk is fitted with 8 fastening sockets (4 large and 4 small sockets) which connect up to 8 elements. Small sockets should be fitted with the transoms to form a rectangular scaffolding net. You can smoothly screw the elements mounted in large sockets up to 30°. The disks are welded to the stand pipe every 500 mm. It allows you to gradually change the working platform position and develop the auxiliary working surfaces. The elements are installed by driving the head wedge into the disk socket with the 500 g hammer (see figures below).

SCAFFOLDING ASSEMBLY

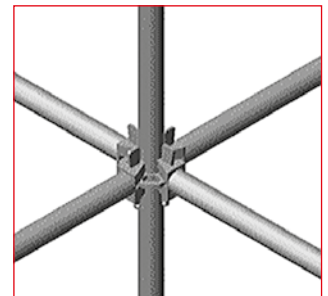
Rys. 3.1 i 3.2
ROTAX Plus node

Rys. 3.3, 3.4 i 3.5
steps connected with fastening the transoms
and braces to the disks.

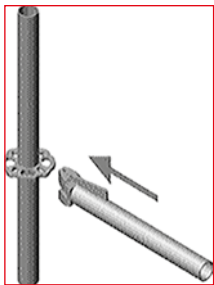
Rys. 3.6 i 3.7
example of a finished node



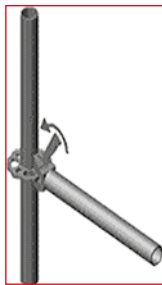
Rys. 3.1



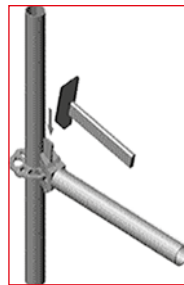
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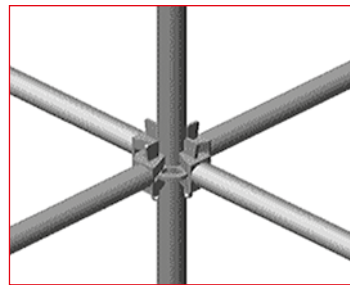
Rys. 3.3



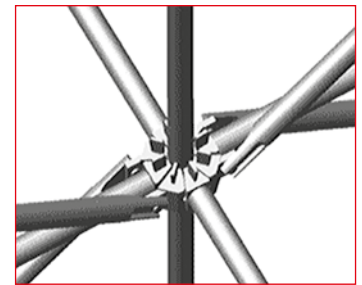
Rys. 3.4



Rys. 3.5



Rys. 3.6



Rys. 3.7

3.1.2. Assembly hints for safer use

Personal protection

Personal protective equipment (helmet, safety braces, protective shoes, safety cord) must be used during the scaffolding assembly, disassembly and use. For greater safety of the service the below figures present the examples of the above-mentioned protective equipment attachment points.



Rys. 3.8 – Personnel Protection Equipment attachment points



Rys. 3.9 – Attachment to the transom



Rys. 3.10 – Attachment to the disk

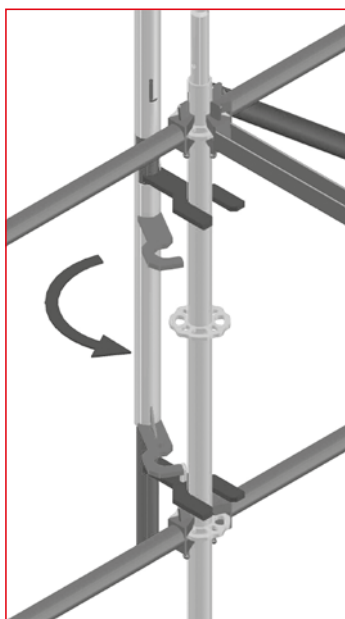
The cords must be attached to the transoms and disks located above the level you are standing on. When the stands of the assembled level are not connected with each other the safety cords should be attached to the disks at the height of 1 m. It is acceptable to attach the cord to the components of the level you are standing on only when there is no other possibility. When erecting the wall scaffolding you should attach the individual safety cord to the scaffolding components located on the facade side. It is acceptable to attach the safety cord directly to the structure surrounded by the scaffolding. The protection is provided separately for each facility.

Safety Kit

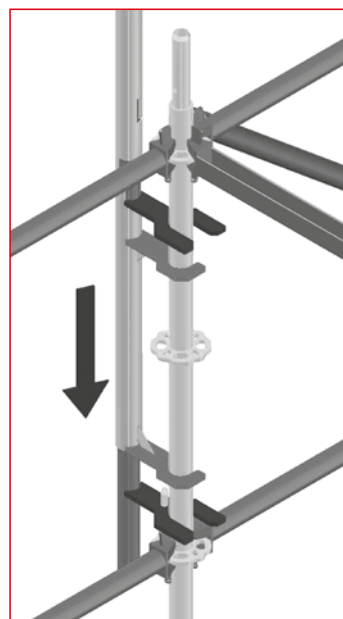
An Assembly Safety Kit is a temporary safety precaution for the fitter used when entering the next level before the stands and transoms are installed. The Kit consists of 2 assembly posts and a telescopic railing. When the Safety Kit is assembled the railing is one meter above the platform of the level which the post is assembled on. The telescopic railing allows for moving the post to the next levels without disassembling the railing and adjust the set length within 1.5 m to 2.07 m, or 2.07 m to 3.7 m. Small weight of the structure allows for convenient moving of the set to the next scaffolding level.

Safety Kit assembly stages:

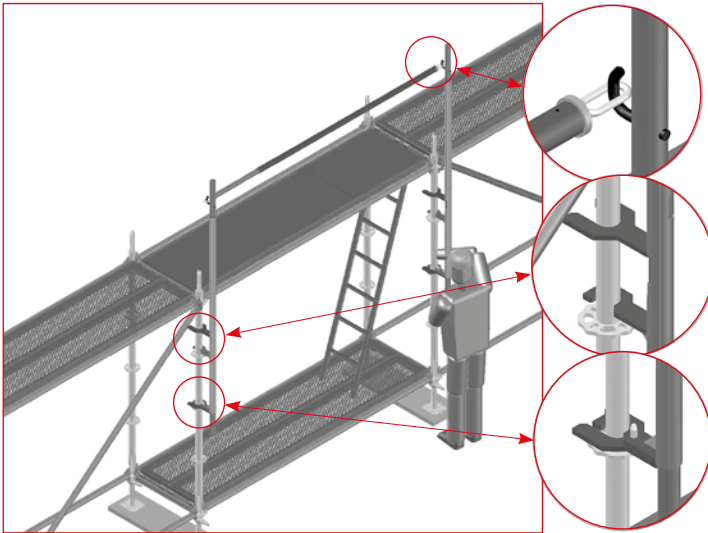
1. An assembly post consists of two pipes which can be rotated and moved along a joint axis. This allows opening and closing the catch. When the post is properly installed the bolt in the bottom catch enters the opening in the closing sheet (fig. 3.11).
2. By lifting and rotating the post external pipe attach the post to the stand so that the bottom catch leans on the upper railing of the scaffolding (transom) (fig. 3.12).
3. Attach the telescopic railing to the eye of the installed post.
4. Attach the other telescopic railing end to the post eye before the post installation.
5. Install the other post in the same manner as the first (section 2) on the other end of the scaffolding bay.
6. When the stands and transoms are installed on the higher scaffolding level the Safety Kit can be moved to the next level by opening the railing post catches, lifting the post and installing it on the higher level. This procedure does not require the telescopic railing to be disassembled.



Rys. 3.11



Rys. 3.12



Rys. 3.13

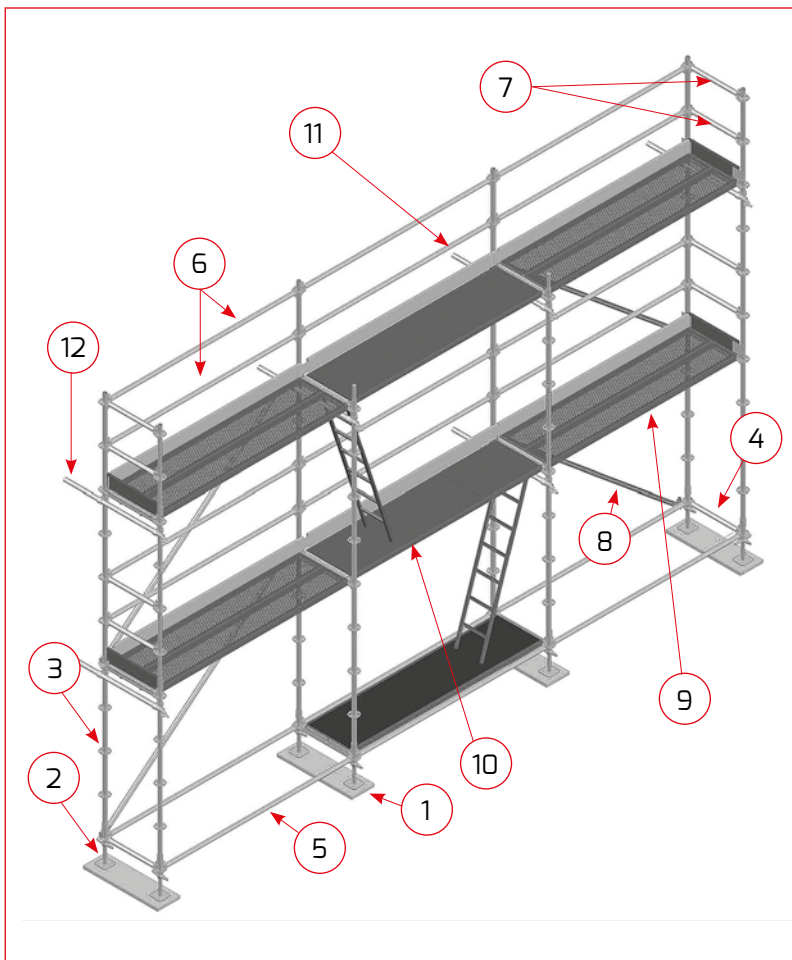


Rys. 3.14



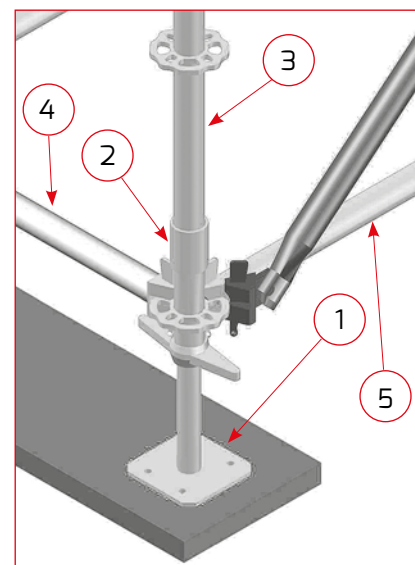
The Assembly Safety Kit does not substitute the safety cord and other personal protective equipment.

3.1.3. Main ROTAX Plus system components



Rys. 3.15

1. Steel adjustable footing
2. Initial component
3. Stand
4. O or U transverse transom
5. Horizontal O-transom
6. Longitudinal railing (horizontal O-transom)
7. Front railing (horizontal O-transom)
8. Vertical brace
9. Working platform
10. Circulation path platform
11. Toe board
12. Anchoring

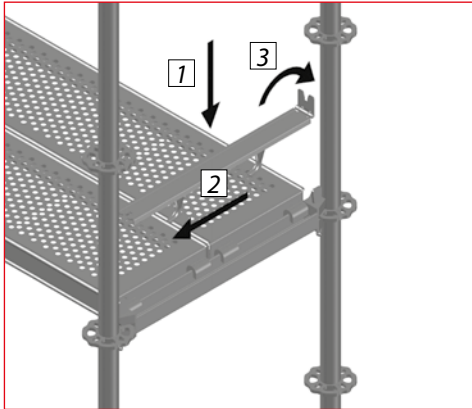


Rys. 3.16

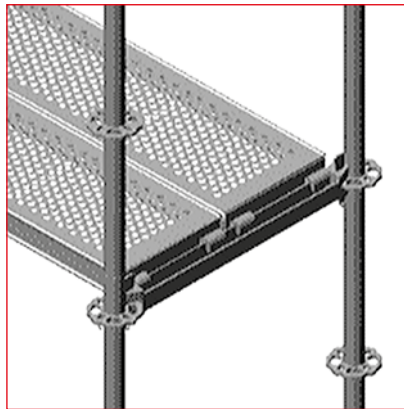
3.1.4. Platform assembly

The platforms installed with the U-section are not protected from being torn off by wind. They are protected with a specific components (platform protection) as shown in the following figures.

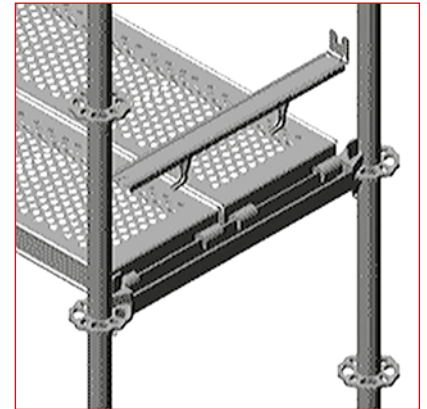
Assembly of platforms with the U-transom – steps:



Rys. 3.17 – Example showing assembly of the platforms with the U-transoms



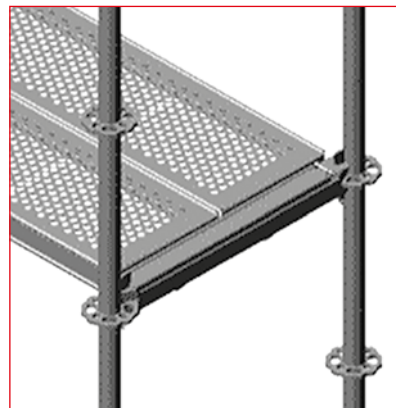
Rys. 3.18 – Step 1 - Lay the platforms



Rys. 3.19 – Step 2 - Place the protection



Rys. 3.20 – Step 3 - Close the protection

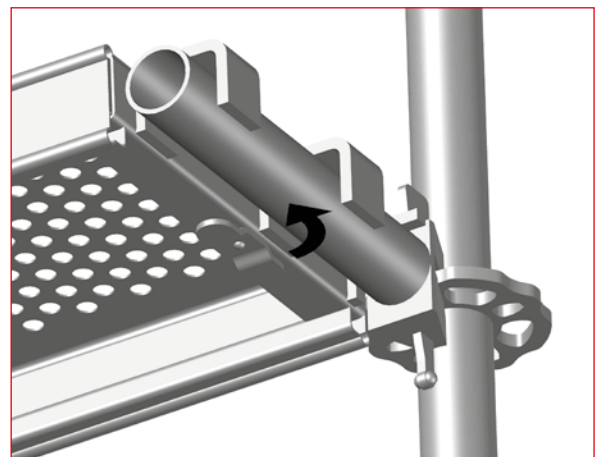


Rys. 3.21 – Step 4 - Tighten

3.1.5. Fitting the transoms with platforms

Assembly of platforms with the O-transom

The platforms installed with the O-transom have factory fitted protections that protect them from being torn off by wind. The installed platforms are protected by rotating the platform protection as shown in figure 3.22.



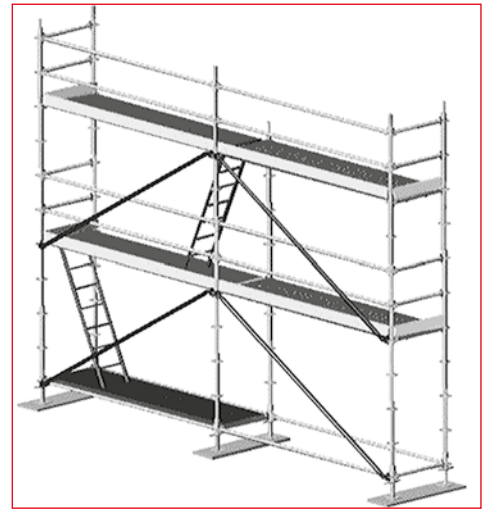
Rys. 3.22 – Example showing assembly of the platforms with the O-transoms

3.1.6. Side protections

Each platform located more than 1 m above the ground level should be protected with a rail consisted of two railings and a toe boards. The protection does not need to be provided on the wall side if the distance between the platform edge and the wall does not exceed 20 cm.

Rules for forming side protections:

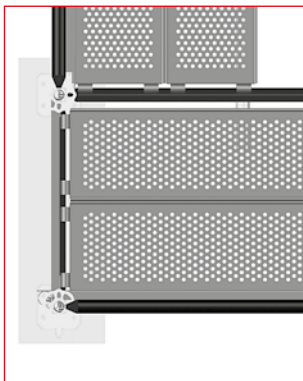
- railings should be fastened in the stand disks - 0.5 m and 1 m above the platform level;
- the system includes the toe boards and transoms adapted to all platform lengths and widths (from 0.73 up to 3.07 m);
- protect the platforms on each side;
- the platforms can be protected in other manner, e.g. with the net railings;
- standing on the railings is prohibited.



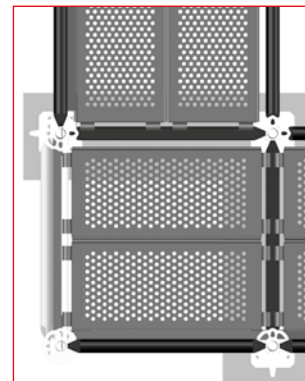
Rys. 3.23 – Example of the scaffolding with the side protection

3.1.7. Corner assembly

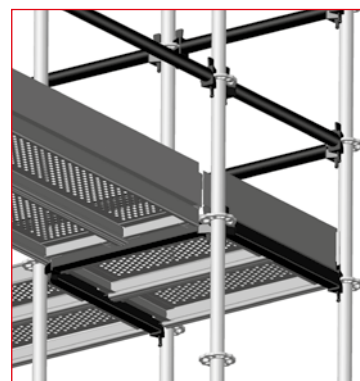
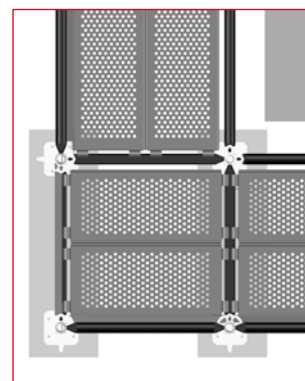
The system allows you to easily and clearly form different kinds of corners. Below are a few examples.



Rys. 3.24 – Corner formed of two stands



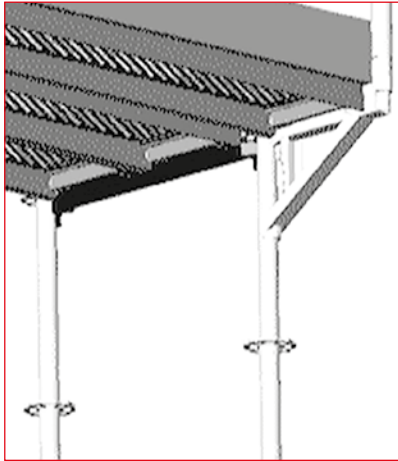
Rys. 3.25 – Corner formed of three stands, console and brace (see fig. 3.28)



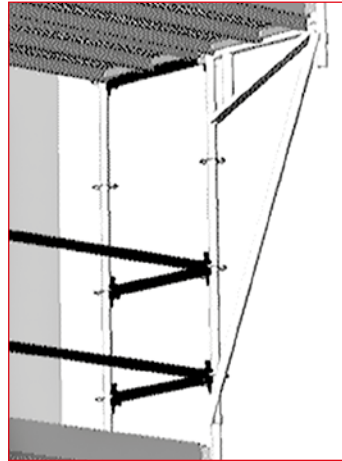
Rys. 3.26 – Corner formed of four stands

3.1.8. Expansion consoles

If you need a larger working platform surface the platform can be expanded with the consoles or transoms and braces. When the platform is expanded with the 0.73 m wide console you must fix the supporting brace (pipe with two connections) to the console



Rys. 3.27 – Platform expanded with the 0.36 m console



Rys. 3.28 – Platform expanded with the 0.73 m console and brace



Rys. 3.29 – Platform expanded with the transoms and braces



Please remember that transoms are the bracing and safety components. The platforms are not laid on the 0.73 m transoms. When a bay exceeds 1.09 m you should lay the platforms only on the double transoms.

3.1.9. Anchors

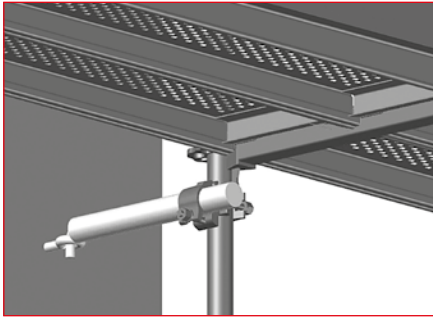
You should anchor the scaffolding while it is erected to the fixed structure components. You should use the anchoring connectors, standard and rotating connectors as well as the anchoring screws. The following present the examples of anchoring.

Basic anchoring rules

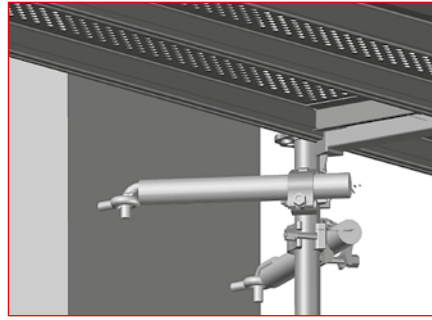
- Anchoring starts from the second level; anchor using coupling anchor and two normal connectors,
- Anchors must be placed symmetrically over the entire surface,
- The distance between horizontal anchors should not exceed 6m (anchor every second field in the case of 3,07 m field).
- The distance between the rows of vertical anchors should not exceed 4m (anchor every second level), the anchors in the rows should be shifted horizontally in relation to each other,
- Each row of anchors should end at the edge of the scaffolding,
- In the communication fields, you should also anchor the field from both sides in the row of anchors,
- Anchoring 30 cm below or above the working platform level is permitted,

In the case of scaffolding covered with tarpaulins or fences, with gate girders, passing frames and protective hoods installed, additional anchors are required. The location and number of the anchors of these scaffoldings are shown in the pictures in the following part of this instruction.

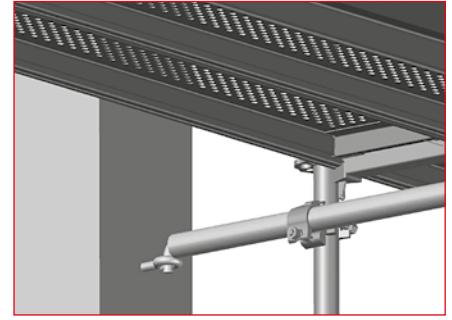
In the case of anchoring of scaffoldings with one coupler to the inner stand, 20% of the total number of anchors shall be made double (Figure 3.31). These anchors should be evenly placed over the entire surface, keeping the assembly rule of minimum two V-type anchors on each anchored storey.



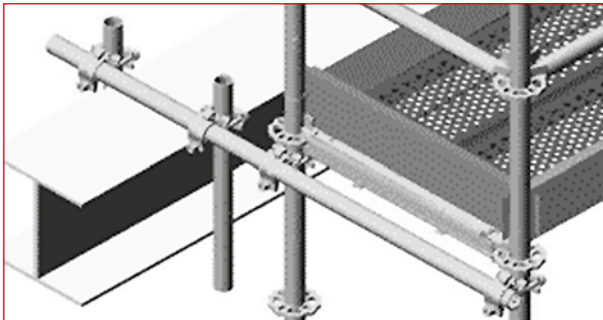
Rys. 3.30 – Internal stands anchored with a single anchor



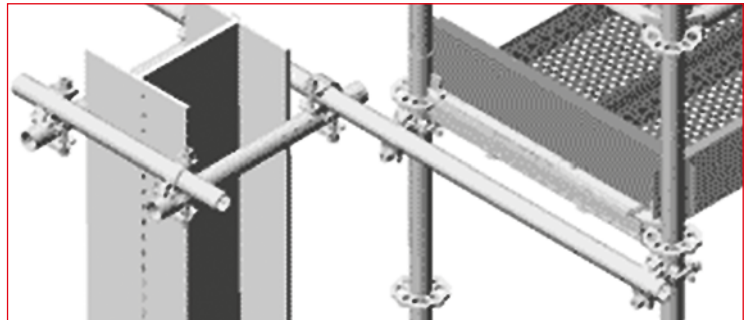
Rys. 3.31 – Internal stands anchored with the V anchor



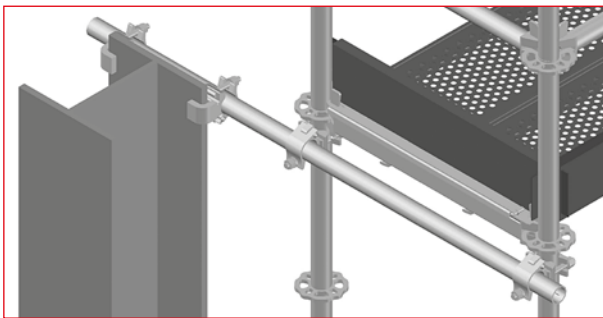
Rys. 3.32 – Two stands anchored with one anchor



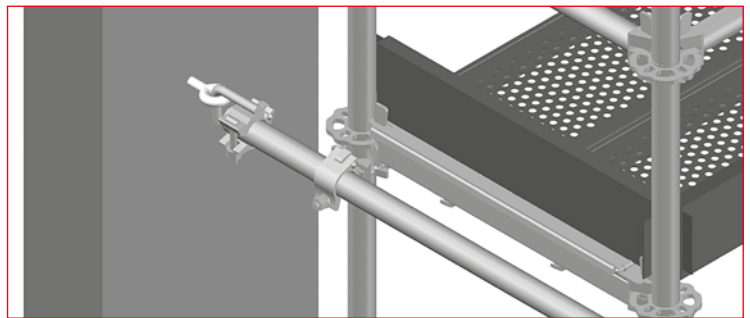
Rys. 3.33 – Anchors fastened to horizontal beams



Rys. 3.34 – Anchors fastened to vertical posts



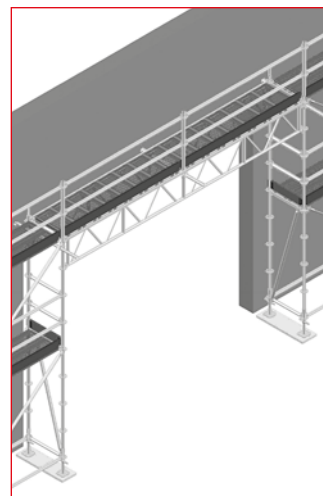
Rys. 3.34a – Anchors fastened to vertical posts



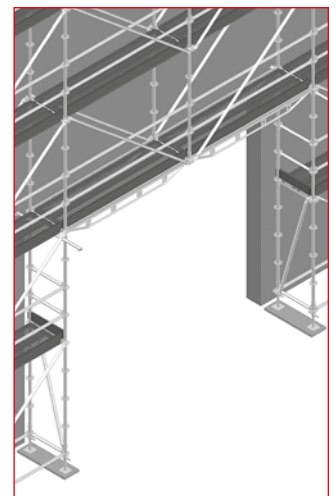
Rys. 3.34b – Anchors fastened to vertical posts

3.1.10. Span beams - gate crossings and cross-beams

When a building is repaired you often must provide access to it. The crossings can be made with the girders or double transoms. They require a protection hood which is not presented in the figures.

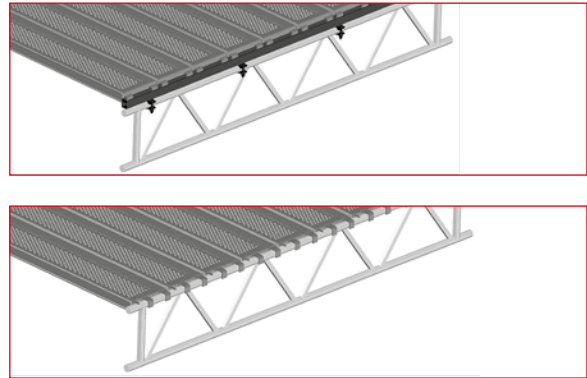


Rys. 3.35 – Gate crossing supported on girders



Rys. 3.36 – Gate crossing supported on double transoms

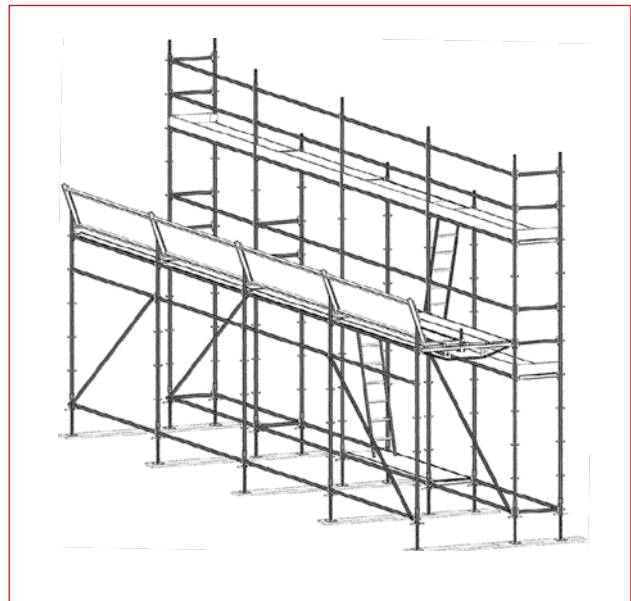
When the working platforms are constructed with the E50xxxx series girders a cross-beam is installed on the girders. Installation is shown in fig. 3.37. Alternatively, instead of using the platforms with the "U" catch you can use the platforms with the „O" catches. They do not require any cross-beam. Example, see fig. 3.37.



Rys. 3.37 – Cross-beam installed on a girder

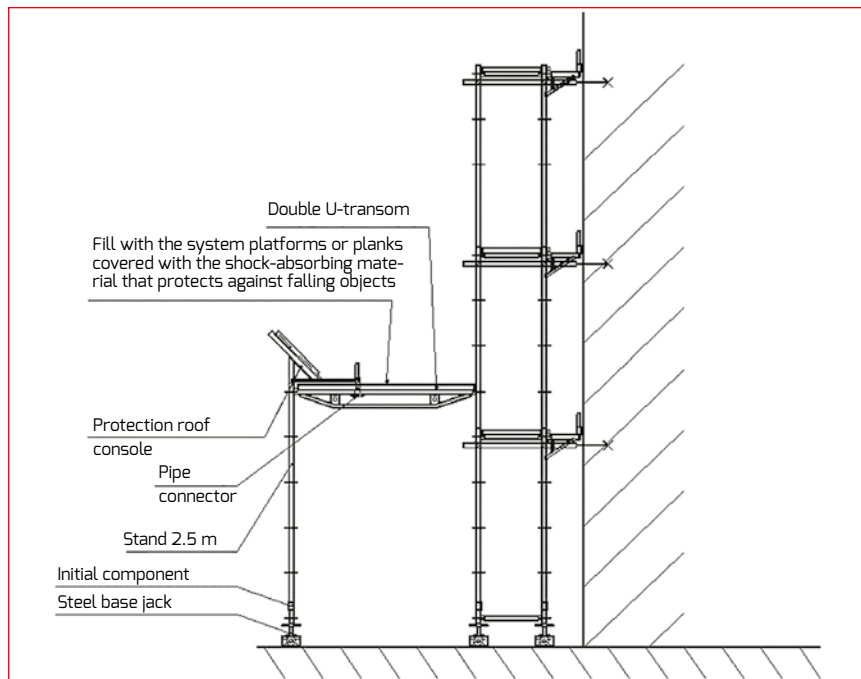
3.1.11. Pathways beneath scaffolding

When performing repair and construction works along the public footways you often have to maintain a safe circulation path for the pedestrians. Figure 3.38 shows an example of this solution.



Rys. 3.38 – Example of a circulation path for pedestrians

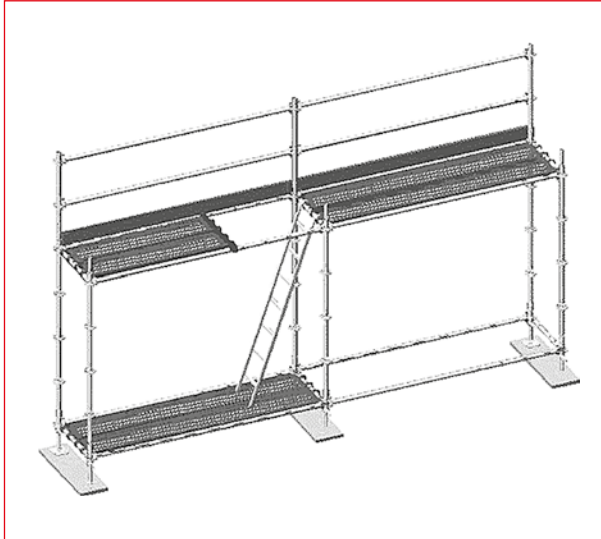
The system solution should be based on the scheme below. The system platforms provided on the hood should be fixed to the U-transoms with the wire rope. The scaffolding must be anchored where the platforms are provided below and above the protection hood.



Rys. 3.39 – Crossing made by expanding the scaffolding base and the roof consoles

3.1.12. Scaffolding entrances

For the vertical communication on the scaffolding you must use system inter-level ladders or aluminium and plywood platforms and staircases - see fig. 3.75, 3.76, 3.77 and 3.78, chapter 3.8.



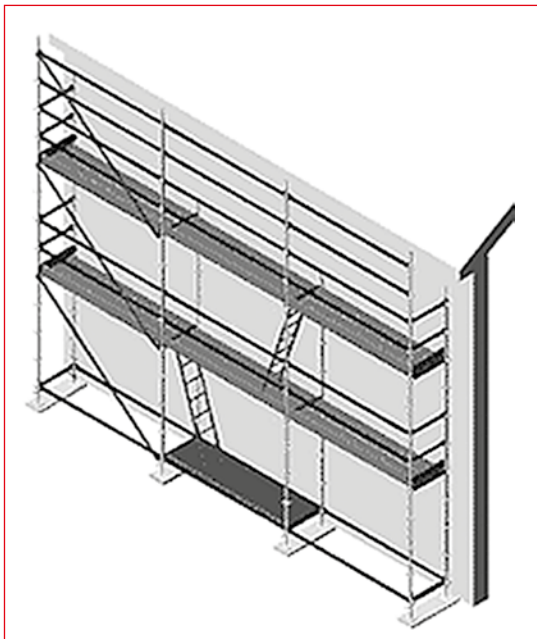
Rys. 3.40 – Scaffolding entrance with a steel inter-level ladder and an overlay transom



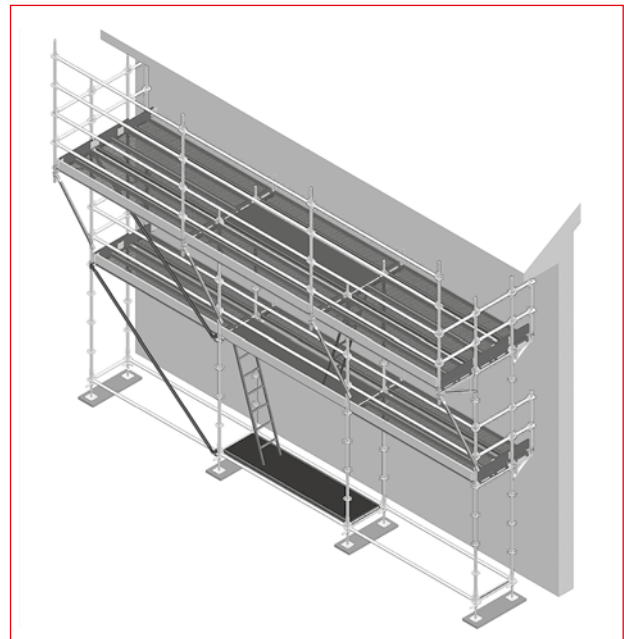
Rys. 3.41 – Scaffolding entrance with passing aluminium platforms fitted with the aluminium ladders

3.1.13. Scaffolding near eaves

When performing repair and construction works at the roof edge you should install 4 rows of horizontal transoms on 2-metre stands, over the entire working platform level length. By installing the protection net or canvas between the working platform level stands you can avoid falling the components rolling off the roof outside the scaffolding.



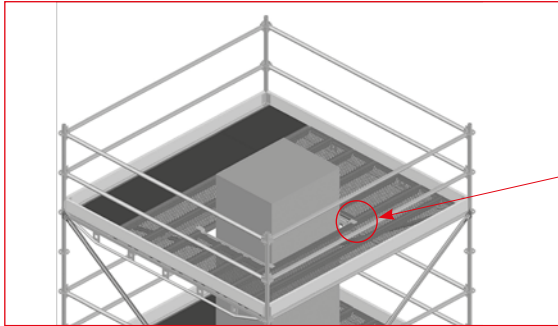
Rys. 3.42 – Example 1



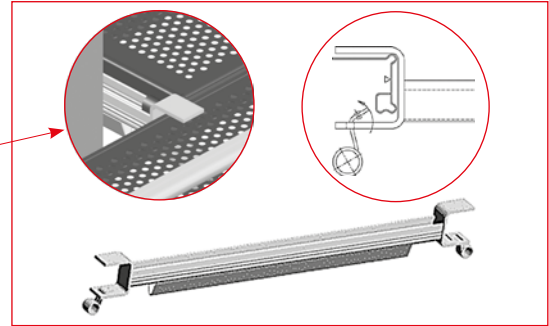
Rys. 3.43 – Example 2

3.1.14. Platform openings and adjustment

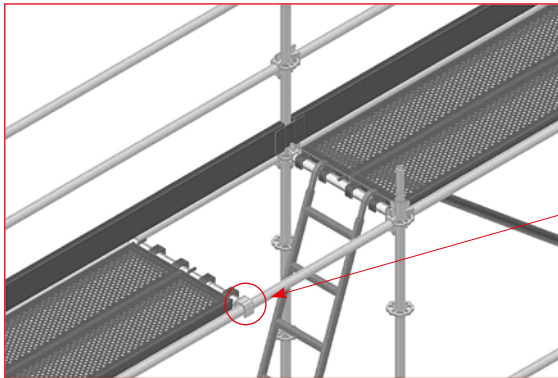
To bypass the components which go through the platform surfaces use the transoms laid as shown in the figures below.



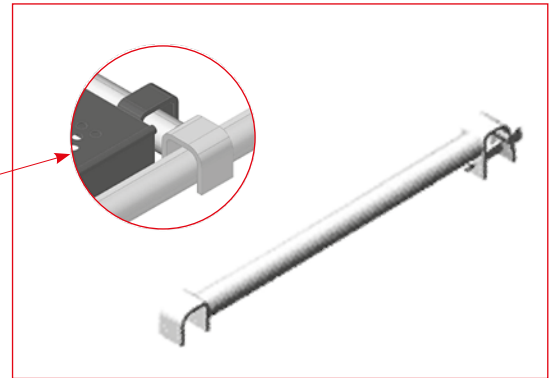
Rys. 3.44



Rys. 3.45 – Special U-transom



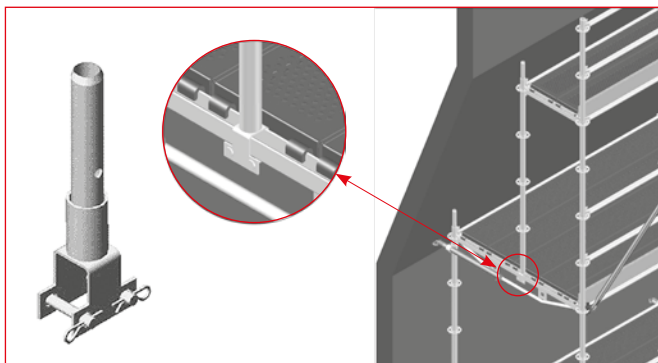
Rys. 3.46



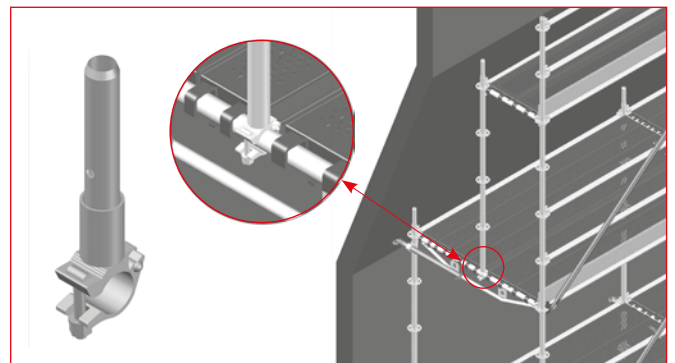
Rys. 3.47 – Overlay O-transom installed on a pipe

3.1.15. Changing stands spacing

To bypass the protrusions, balconies or other architectural elements you can reduce the scaffolding bay width by using the girder pipe connector. When using the platforms with pipe catches reduce the bay width by using the pipe connector with a catch.



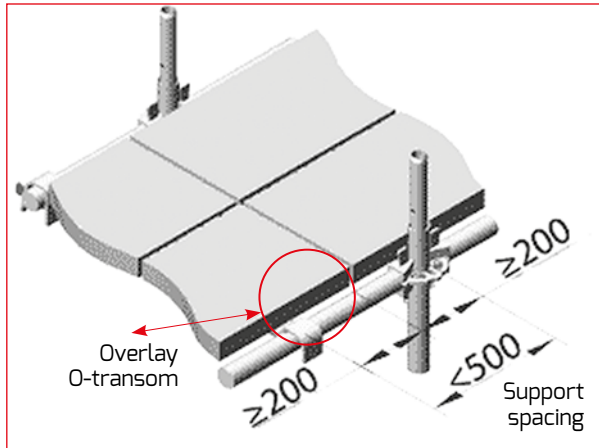
Rys. 3.48 – Using a girder connector



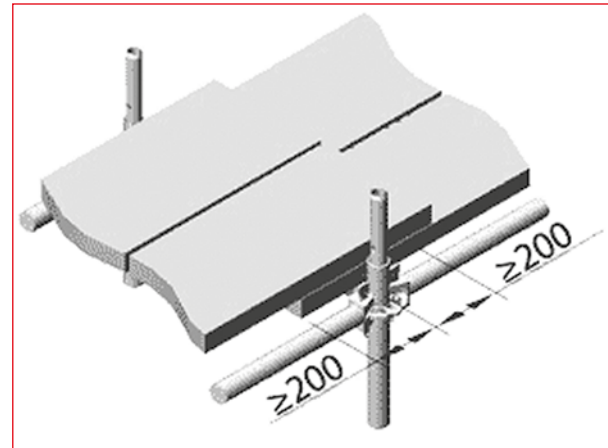
Rys. 3.49 – Girder pipe connector

3.1.16. Additional components

The additional surfaces of the ROTAX Plus system can be lined with wooden planks while ensuring safe use. Below are the examples showing the installation of the additional components with the overlapping transom. Follow the guidelines included in table 3.1 when building the working platforms with the planks. Ensure that the plank support spacing does not exceed 500 mm, the gap between the butt planks does not exceed 20 mm and that the planks overlap by at least 200 mm.



Rys. 3.50 – Butt planks



Rys. 3.51 – Overlapping planks

Table 3.1

Permissible spacing for the moveable platforms made of wood or planks (acc. to tab. 8, DIN 4420, T1)						
Loading class	Platform or plank width [cm]	Platform or plank thickness [cm]				
		3,00	3,50	4,00	4,50	5,00
1, 2, 3	20	1,25	1,50	1,75	2,25	2,50
	24 i 28	1,25	1,75	2,25	2,50	2,75
4	20	1,25	1,50	1,75	2,25	2,50
	24 i 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

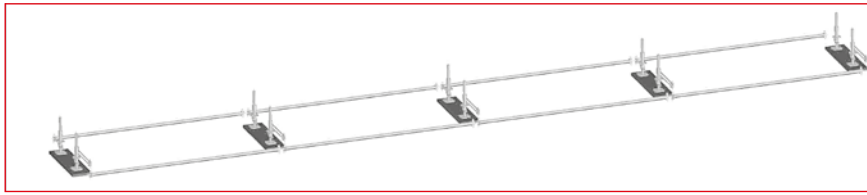
3.2. Scaffolding assembly in a facade set-up

3.2.1. Start the scaffolding assembly at the highest area point by placing the wooden footings for the adjustable stand base jacks. The spacing should correspond to the bay length. There should be at least two base jacks on each footing.



Rys. 3.52 – Step 1 – Footing assembly

3.2.2. Put the initial components on the footings.



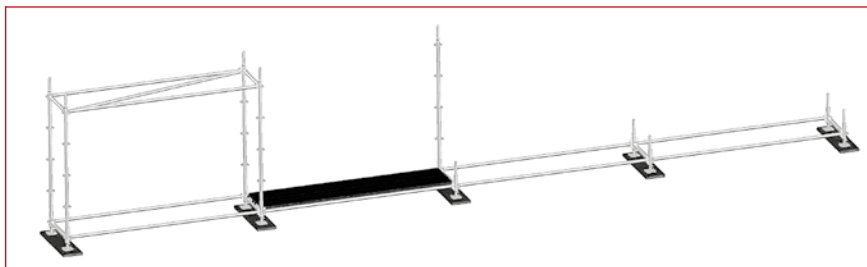
Rys. 3.53 – Step 2 – Putting the initial components

3.2.3. Tie the initial components with the crossbars (horizontal 0.73 m or 1.09 m transom) and the stringers (horizontal 1.57 m, 2.07 m, 2.57 m, 3.07 m transom) and level. Install the transom driving the head wedge located in the initial component disk hole with the 500 g hammer.

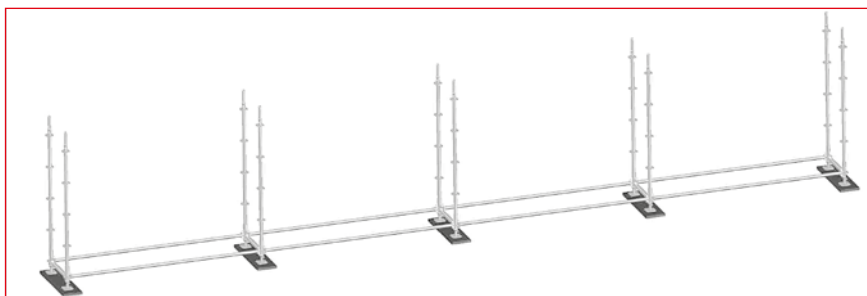


Rys. 3.54 – Step 3 - Tying the initial components

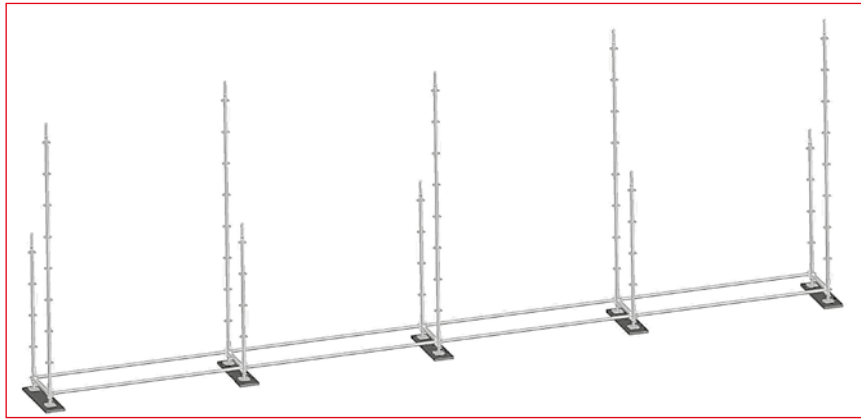
3.2.4. Put the stands of the desired length on the basic level prepared as described above. Use the basic stand lengths i.e. 2 m or 4 m. When using the 2 m and 4 m stands put them alternately i.e. the 2 m stand should be adjacent to the 4 m stand (fig. 3.57).



Rys. 3.55 – Installed stand

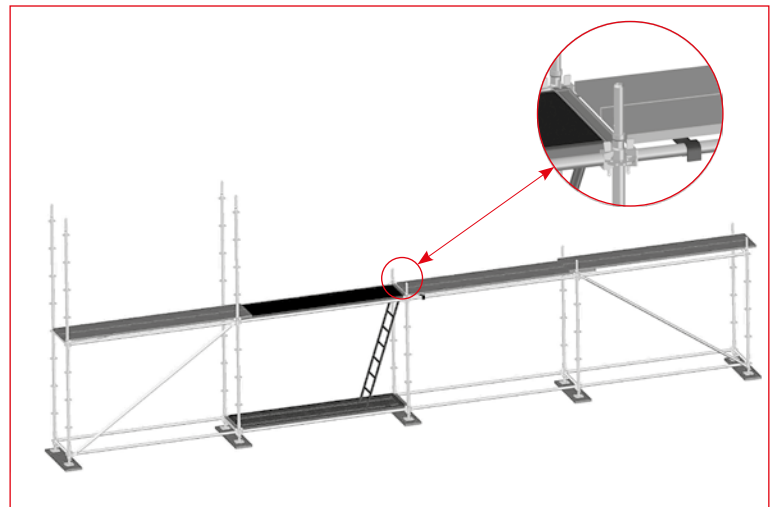


Rys. 3.56 – Example showing the use of stands of the same length



Rys. 3.57 – Example showing the use of stands of different length

3.2.5. Install the crossbars, stringers and circulation path platforms 2 m from the initial component. To install the higher levels use the assembly planks as the temporary auxiliary platforms. The platforms should be installed when the scaffolding is low. Remember that you can use the O-transom platforms or the U-transom platforms, if applicable. Each platform should be protected (see section 3.1.4). The bays without the system working platforms installed should be braced with the horizontal brace where the vertical braces are installed.

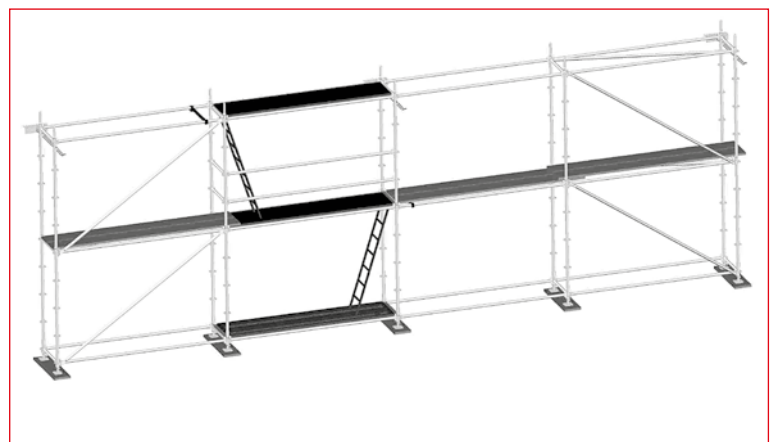


Rys. 3.58 – Assembly stage depicted



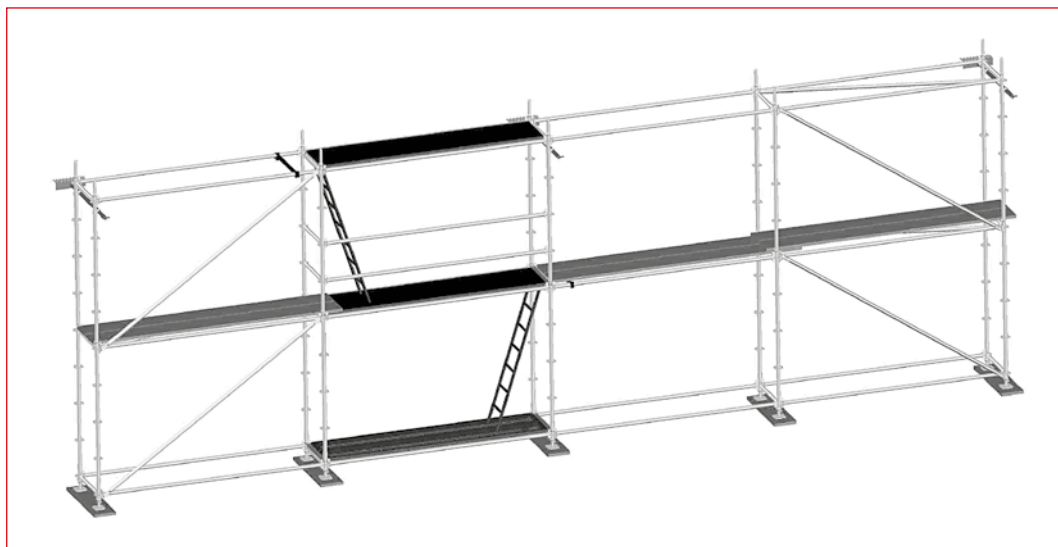
Install the anchors while erecting the scaffolding.

3.2.6. Anchor the scaffolding to the facade starting from the second assembly platform (at the height of 4 m) by using the anchoring connectors, standard connectors and anchoring eyebolts. Install the vertical braces on the structural net or scaffolding as shown in the design or this manual. Each level should have at least the alternate braces. When the scaffolding is anchored install the railings and toe boards on the installed platforms. During the installation ensure that the bays with the vertical brace and without the platform are fitted with the horizontal brace.



Rys. 3.59 – Example showing the scaffolding anchored to the facade

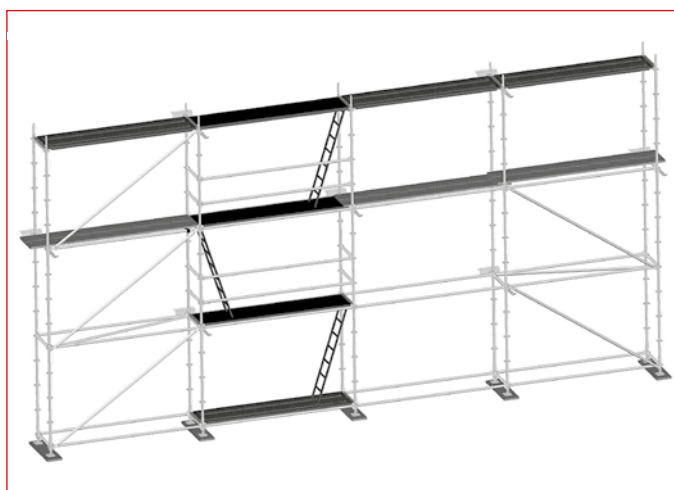
- 3.2.7.** The protection hoods can be installed at the height of the first platform level by expanding the platform and installing the protection roof console according to section 3.1.11.
- 3.2.8.** Install the stringers, crossbars and higher level platforms when standing on the previous level platforms. Before you put the higher level platforms brace the stands of the erected level. Fasten all components to the stands by driving the head wedge into the disks. Drive the wedges from top to bottom.



Rys. 3.60 – Scaffolding with the platforms installed

During the assembly use the stands of the height that allows you to connect them at the scaffolding nodes. Protect the working and safety platforms with the toe boards and two horizontal O-transoms which also serve as protection railings.

- 3.2.9.** When the bay has to be expanded you can install the 0.36 m steel console from the inside of the scaffolding or the 0.73 m or 0.36 m steel console from the outside of the scaffolding in the facade set-up according to section 3.1.7. The scaffolding can be expanded from the outside only on one level at the entire scaffolding height. When the gap between the platforms exceeds 25 mm install the plank filling and when the gap between the adjacent platforms exceeds 80 mm install the horizontal transom or plank filling.

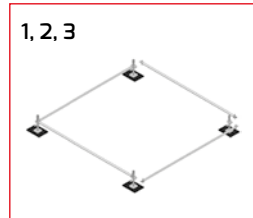


Rys. 3.61 – Working and safety platforms with braces

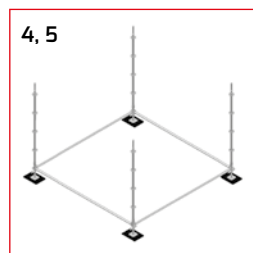
- 3.2.10.** The working platform can be lined with the wooden planks according to the rules specified in section 3.1.15. In this case install the horizontal braces over the planks.

3.3. Tower scaffolding

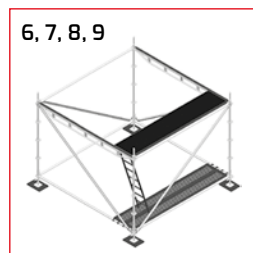
This type of scaffolding is often used as an inspection scaffolding or a light-duty installation scaffolding. It is also used as a supporting structure for camera stations or as a load-bearing structure for speaker sets during public events. The scaffolding fitted with the road wheels can serve as a mobile scaffolding. Before the assembly ensure that the load capacity of the ground is sufficient.



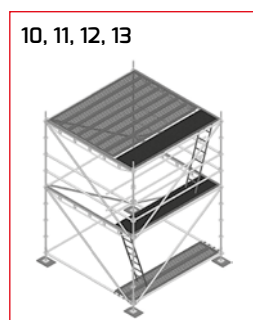
1. Space the steel base jacks according to the desired dimension.
2. Put a wooden footing under each base jack to distribute the scaffolding pressure over the ground.
3. Put the initial components on the base jacks.



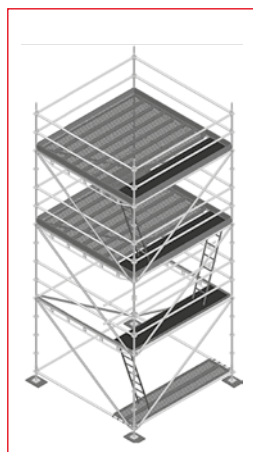
4. Install the horizontal transoms and level the resulting base frame.
5. Install the stands.



6. Install the platform in the entrance area.
7. Install the O-transoms and double transoms.
8. Brace each wall.
9. Install the communication passing platform.



10. Install the next scaffolding level in the manner described in sections 5, 6, 7.
11. Install the railings in the communication area (internal railing can be made of connectors and standard pipes).
12. Install the next scaffolding level.
13. Install all platforms, toe boards and railings on the main and safety platforms.

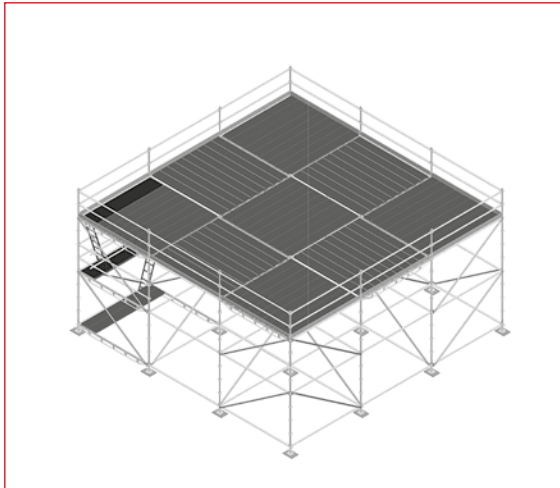


Observe the following when erecting the tower scaffolding:

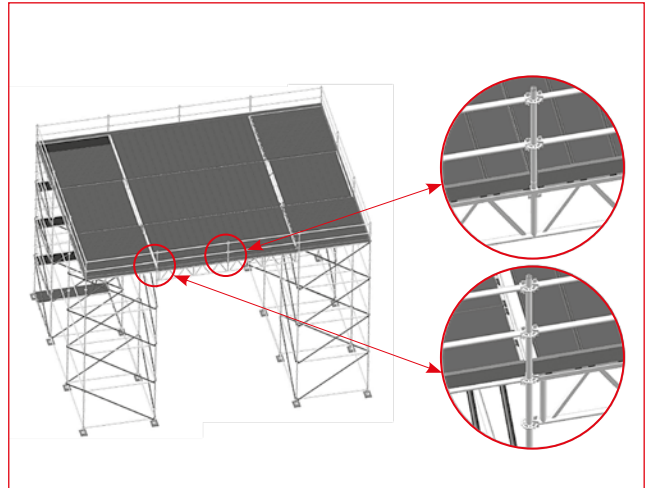
- When the scaffolding is erected outside the buildings the ratio of the scaffolding height H to the smallest base dimension B must be lower than or equal to 3.
- When the scaffolding is erected inside the buildings the ratio of the scaffolding height H to the smallest base dimension B must be lower than or equal to 4.
- When erecting a higher scaffolding you should perform a structural analysis.

3.4. Building ceiling platforms

The ceiling platforms are installed similarly to the tower scaffolding. The individual towers are connected with the girders and transoms to increase the desired platform dimension. When building the platforms use the same ratio of height to the base dimension as specified for the tower scaffolding.



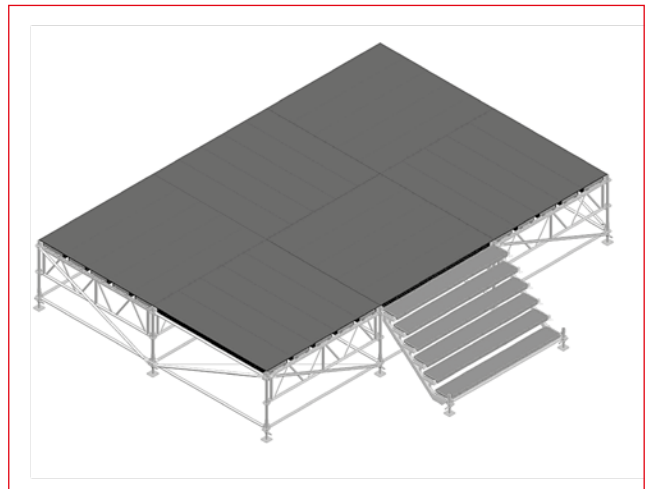
Rys. 3.61



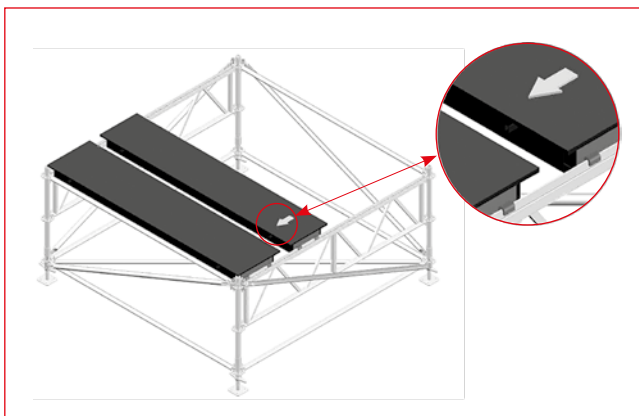
Rys. 3.62

3.5. Building stage platforms

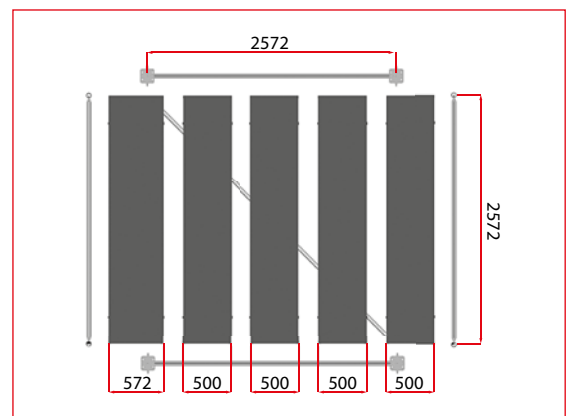
Versatile components of the Rotax system allow you to build stage platforms. These structures are filled with the stage platforms 0.5 m wide and fitted with the additional platforms 0.57 m wide. The platform structure eliminates the risk of „curling” to improve the comfortable use of the entire platform. The permissible load of the stage platforms is 5 kN/m². The stage platforms can be expanded with the railings and roofs.



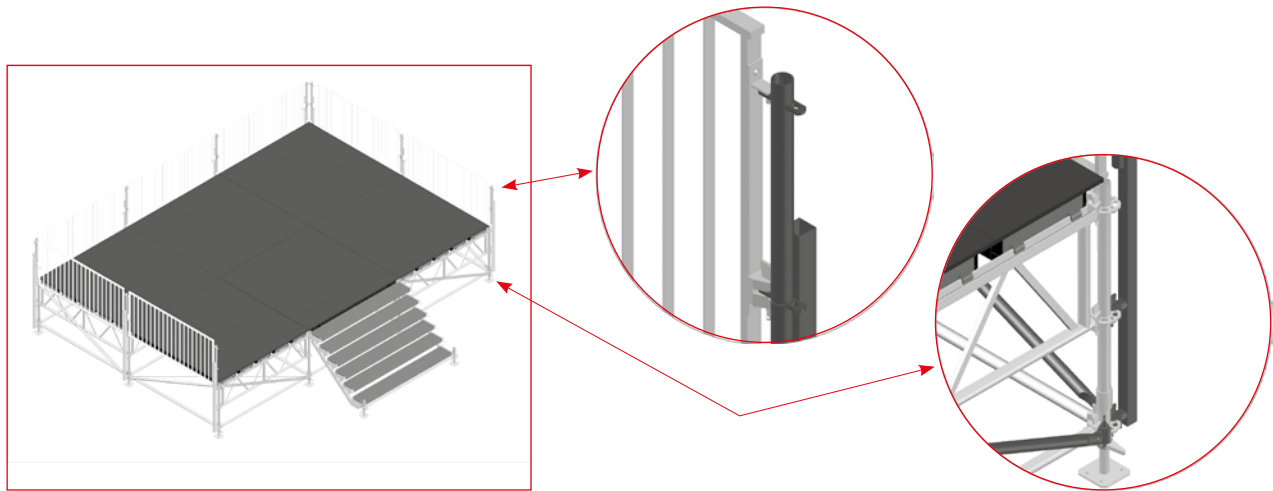
Rys. 3.63



Rys. 3.63



Rys. 3.64



Rys. 3.64

3.6. Load-bearing scaffolding

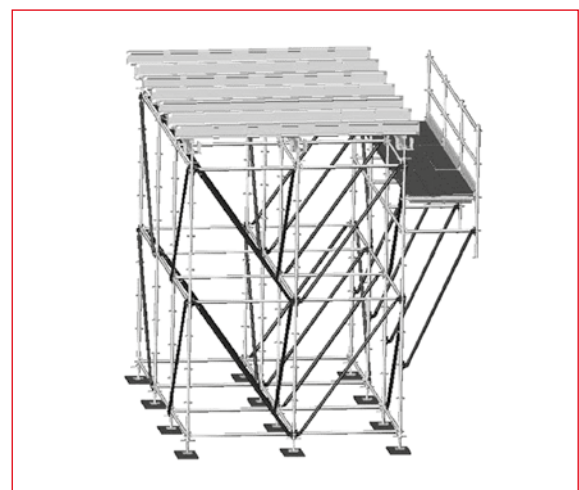
The spatial load-bearing scaffolding is a supporting structure that transmits huge loads and are perfect for supporting the ceilings. They are built in the similar manner as the tower scaffolding but you should pay more attention to stiffen the structure, ground load capacity and the distribution of the loads of the supported parts, e.g. ceilings. Put wooden planks under each foot of this scaffolding to distribute the load over the ground. The horizontal and vertical braces are important for such set-ups. The braces should be located so that the loaded scaffolding net cannot move in any direction.

To install the upper row of stands of the load-bearing scaffolding use the stands without the pilot pipe – connector. The upper row of stands is fitted with the threaded heads to support the wooden girders. Install the heads so that the threaded screw is appropriately moved to lower the head and disassemble the formwork and scaffolding components. The screw base jacks should have the minimum height to smoothly adjust and subsequently disassemble the scaffolding.

The loads of the supported parts should be directed centrally on the screw base jacks and the threaded heads. Protect the formwork girders, installed on the heads, against falling.



Rys. 3.64 – ROTAX Plus scaffolding in a tower set-up



Rys. 3.65 – ROTAX Plus scaffolding in a ceiling set-up



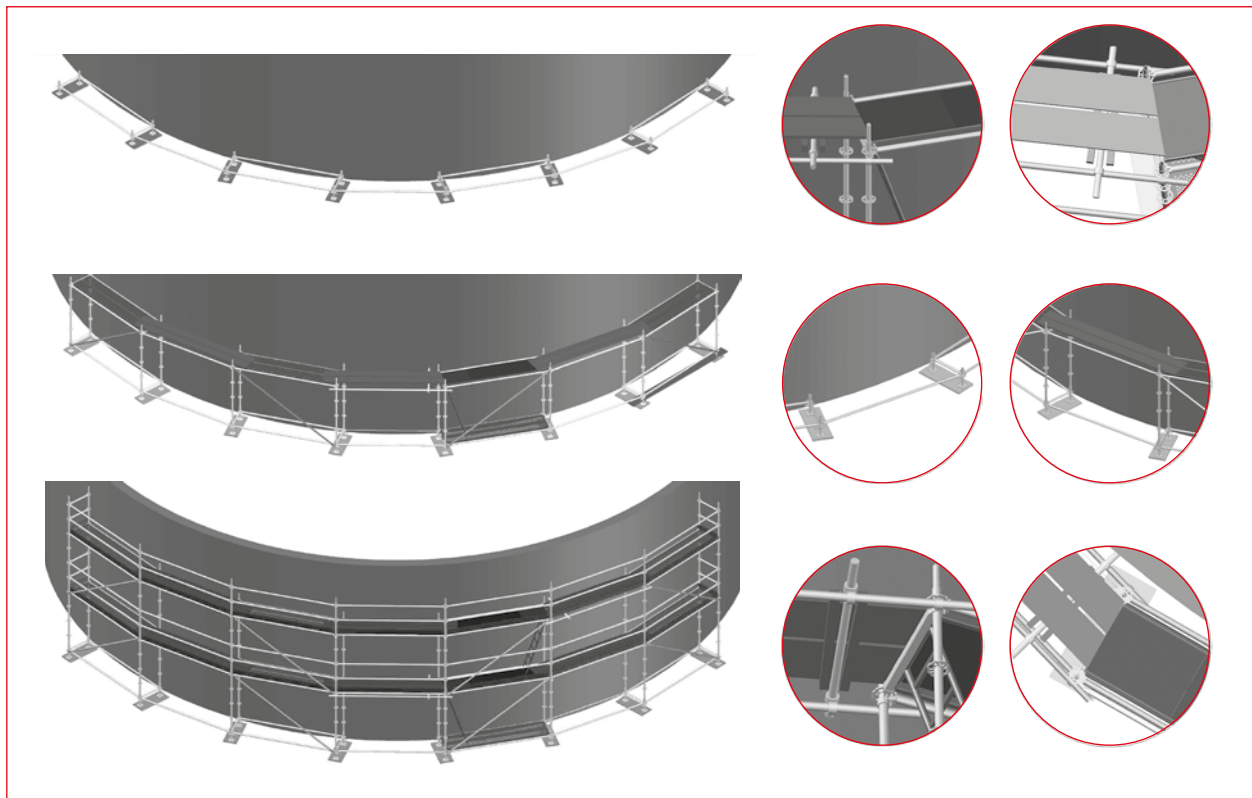
Analyse the structure safety.

3.7. Scaffolding for round facilities

The structure of the ROTAX Plus system allows you to erect it around the arched facilities. The general rules for erecting the scaffolding for round facilities are similar to those of the scaffolding for straight wall. The difference is that the external stands must be rotated by 45° and that the transoms must be installed in the large disk sockets. Rotating the transom in the socket allows you to obtain a trapezoid bay.

The long (external) sides of the trapezoid bay should be fitted with the system transoms and the short (internal) sides should be fitted with the standard pipes fastened with the standard connections. It is recommended that each rectangular bay was braced with the vertical braces.

Fill the trapezoid bay with the wooden plank or additional platforms.



Rys. 3.66 – Examples showing the scaffolding for round facilities.



Analyse the structure safety.

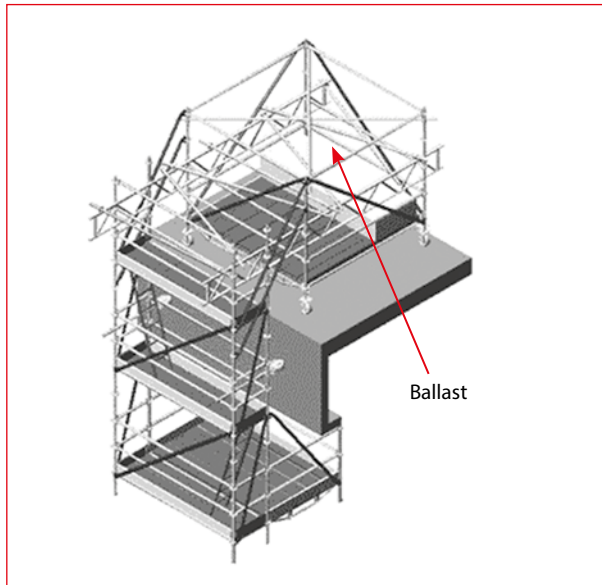
3.8. Suspended scaffolding

The suspended scaffolding is used at a huge height when the scaffolding cannot be erected on the ground because e.g. its load capacity is not sufficient, in the case of bridge structures, when the process traffic under the structure is high and for other reasons..

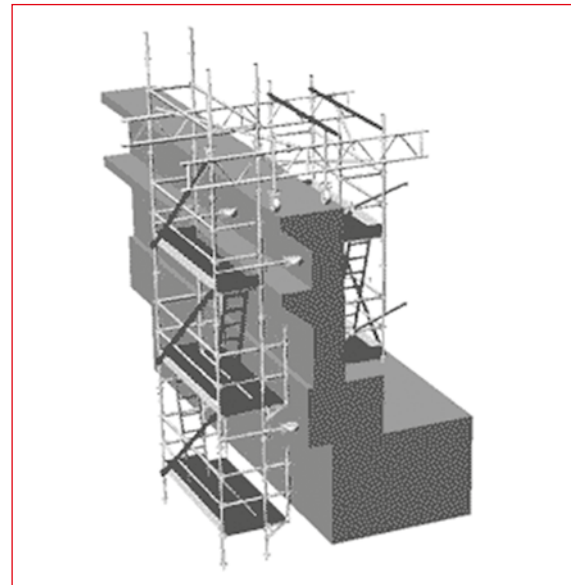


When erecting the suspended scaffolding use the stands with the screwed pipe connector to effectively transmit the tensile forces. Using the stands connected with a safety pin on the suspended scaffolding is prohibited.

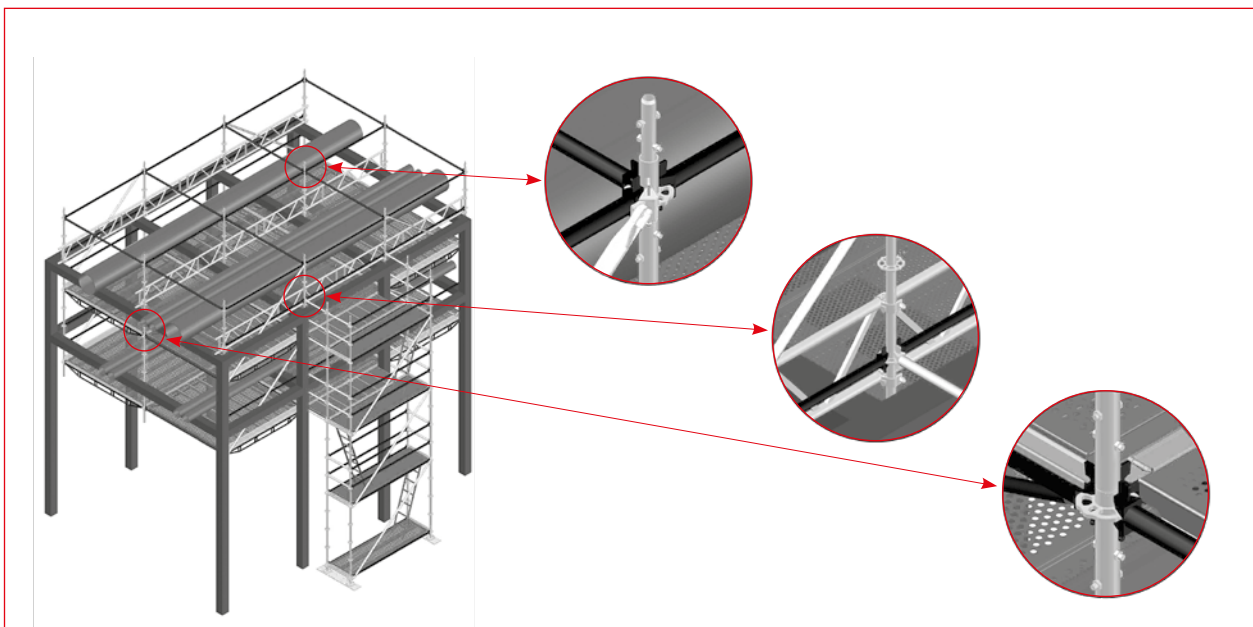
When you start installing the suspended part we recommend that you install the stands with the connector pointed downwards to facilitate suspending next stands. The part that is installed on top of the suspended part can be assembled on the ground and lifted to the installation site with a crane. The suspended scaffolding should be installed so that the duration of works performed at height is as short as possible. The following figures 3.68, 3.69 and 3.70 show the suspended scaffolding where the grate girders act as the load-bearing components for the part installed on top of the suspended part. To ensure works are performed safely ballast this scaffolding to obtain appropriate counterbalance in relation to the expected load of the suspended part working platforms.



Rys. 3.68 – Installation method for the suspended scaffolding



Rys. 3.69 – Installation method for the suspended scaffolding

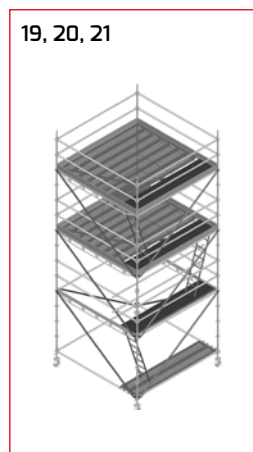
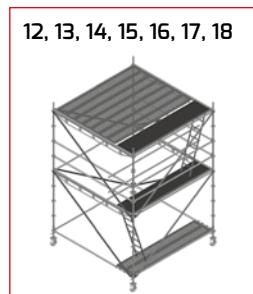
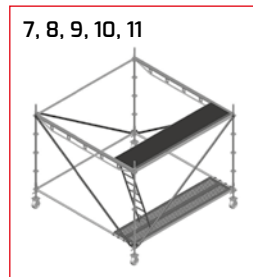
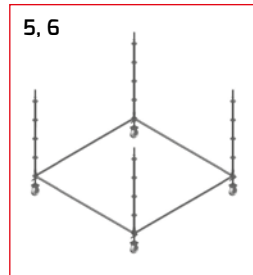
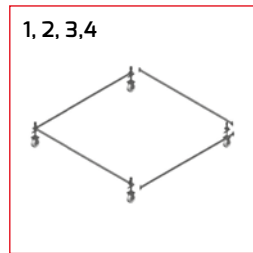


Rys. 3.70 - Suspended scaffolding without the ballast



Analyse the structure safety.

3.9. Mobile scaffolding



When the construction, assembly and inspection works are performed in places where it is not advisable to erect a scaffolding for a longer time you can use a mobile scaffolding based on the ROTAX Plus system. The mobile scaffolding is assembled according to the general rules for the assembly of the tower ROTAX Plus scaffolding. The difference is that the base is equipped with the road wheels. Observe the following rules when erecting the mobile scaffolding:

- outside the buildings, the ratio of the scaffolding height H to the smallest base dimension B must be lower than or equal to 3,
- inside the buildings, the ratio of the scaffolding height H to the smallest base dimension B must be lower than or equal to 4,
- higher scaffolding must to anchored to the building,
- when the scaffolding is put in the final location lock the road wheels with the brake (to protect them from rolling and rotating),
- move the scaffolding along the flat ground of sufficient load capacity,
- when the scaffolding is moved no employees or materials, tools etc. can be present on the scaffolding.

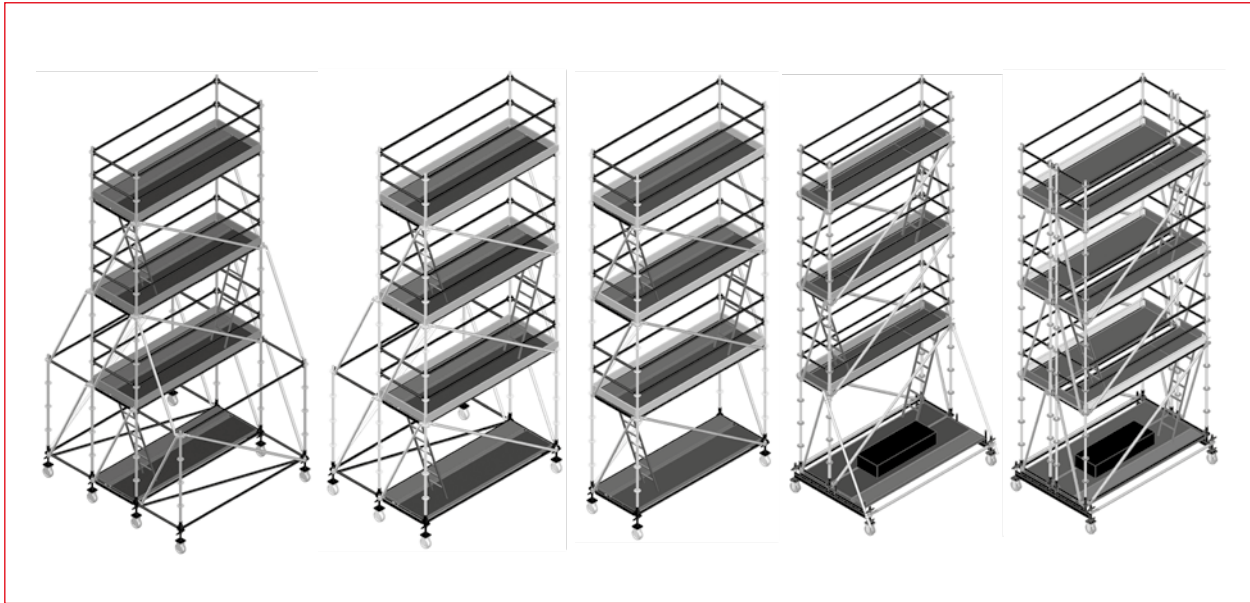
1. Install the road wheels with the steel base jacks (MP 116).
2. Install the initial components on the base jacks.
3. Install the horizontal transoms.
4. Level the assembled base.
5. Install the stands in the corners.
6. Lock the wheel brakes before proceeding with the assembly.

7. Install the bottom platform.
8. Install the double transoms.
9. Install the horizontal transoms.
10. Brace each wall.
11. Install the passing platform.

12. Install the erected level stands.
13. Install the double transoms.
14. Install the horizontal transoms.
15. Install the internal circulation path railings (pipes + standard clamps).
16. Brace each wall.
17. Install the steel platforms.
18. Install the passing platform.

19. Install the stands, braces, transoms, passing platform and the steel platform for the next level.
20. Install the safety platform with all railings and toe boards.
21. Install the working platform with all railings and toe boards.

During work lock all road wheel brakes. Below are the examples of other configurations.



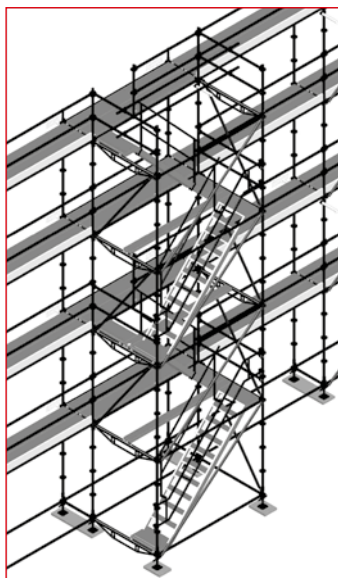
Rys. 3.71 - Different configurations of the mobile scaffolding



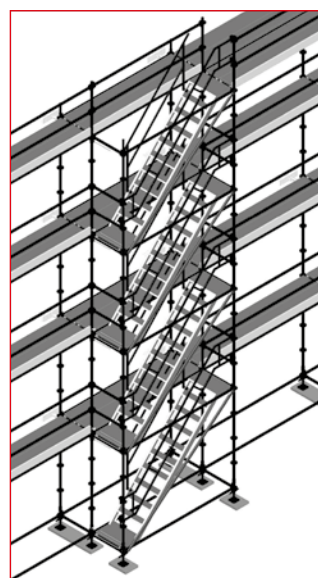
Analyse the structure safety.

3.10. External staircases

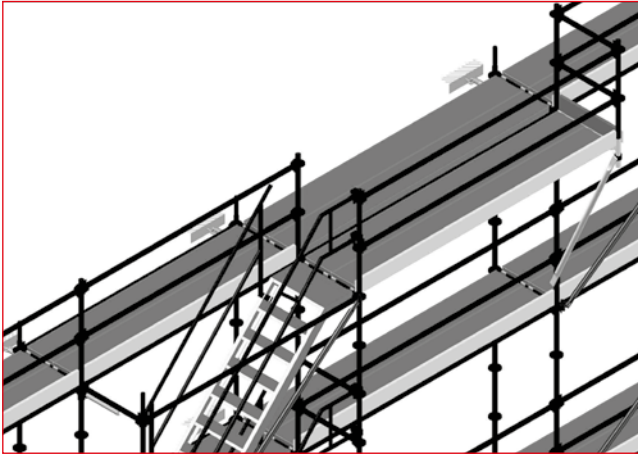
Staircases are used to ensure comfortable vertical communication on the scaffolding. A staircase is made of the system aluminium stairs, external and internal railings. The stair panels are installed instead of the passing platforms, the stair railings are installed instead of individual railings. Below are the examples of staircases.



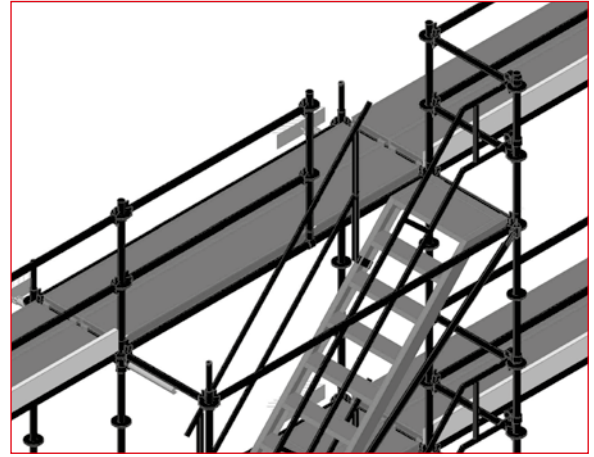
Rys. 3.75 - External double staircase



Rys. 3.76 - External single staircase



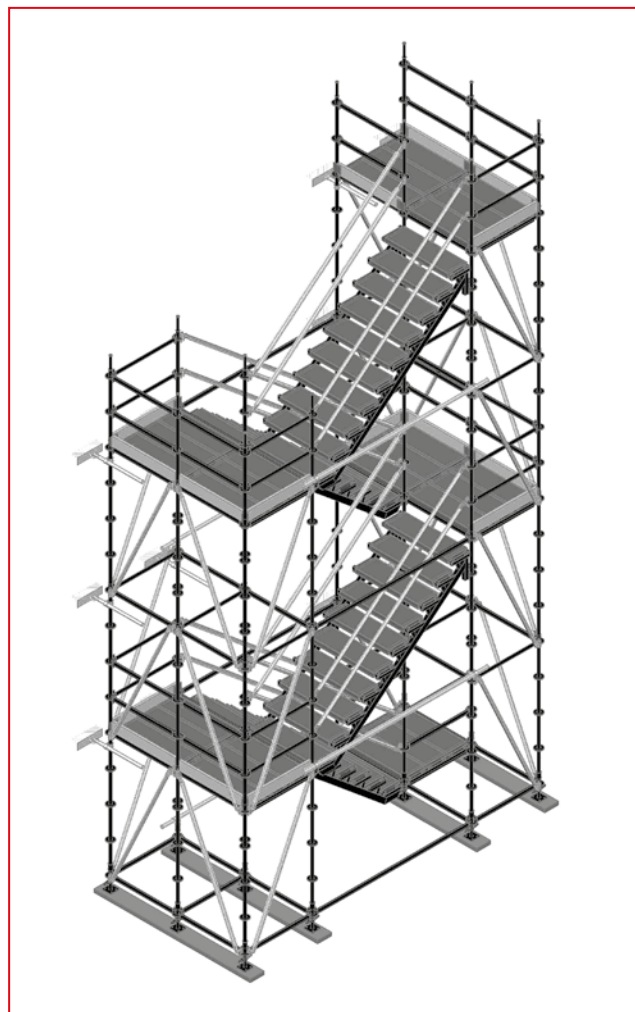
Rys. 3.77 – Staircase exit, example no. 1



Rys. 3.78 – Staircase exit, example no. 2

Example no. 1 shows the staircase exit to the working platform extension made of the 0.73 m console supported by the brace and the steel platforms.

Example no. 2 shows the staircase exit to the working platform where the pipe connector, post and railings are used within the staircase.



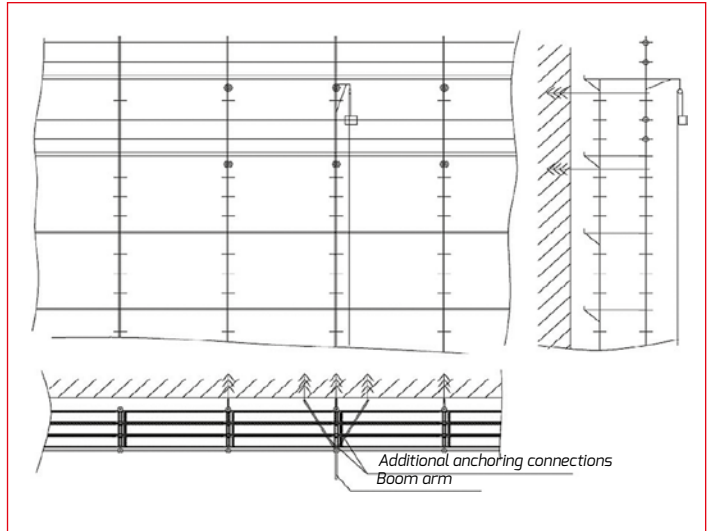
Rys. 3.79 – Staircase exit, example no. 2

3.11. Vertical material handling

The materials required to work can be delivered on the scaffolding with a block boom, block and a winch, e.g. GEDA. Install these components on the scaffolding as well as anchor the scaffolding according to the rules described in chapter 2, section 2.3.13. The maximum weight of lifted loads cannot exceed 150 kg. Below is a scheme that presents the installed winch.



Rys. 3.79 – Scaffolding with the winch



Rys. 3.80



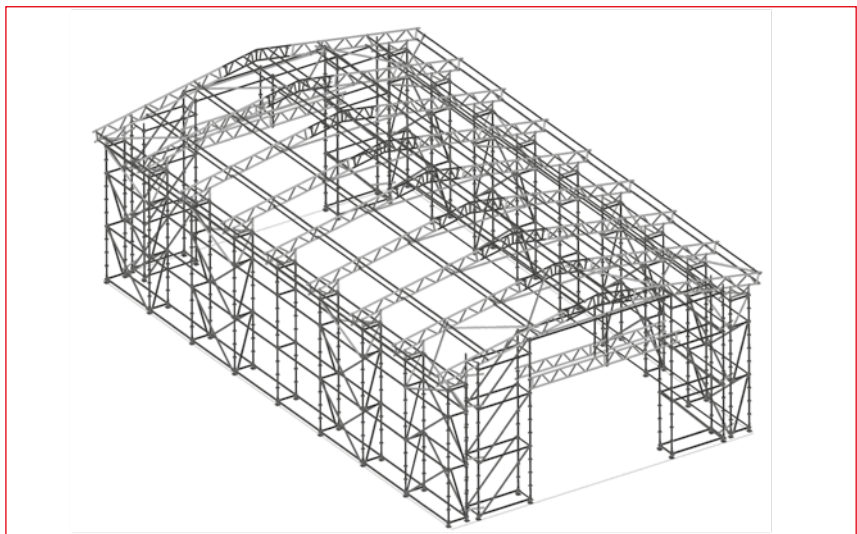
You should also anchor two adjacent stands on each boom side at the storey level and one level over and below the storey level.

EXAMPLES OF STRUCTURES WITH THE ROTAX PLUS SCAFFOLDING COMPONENTS

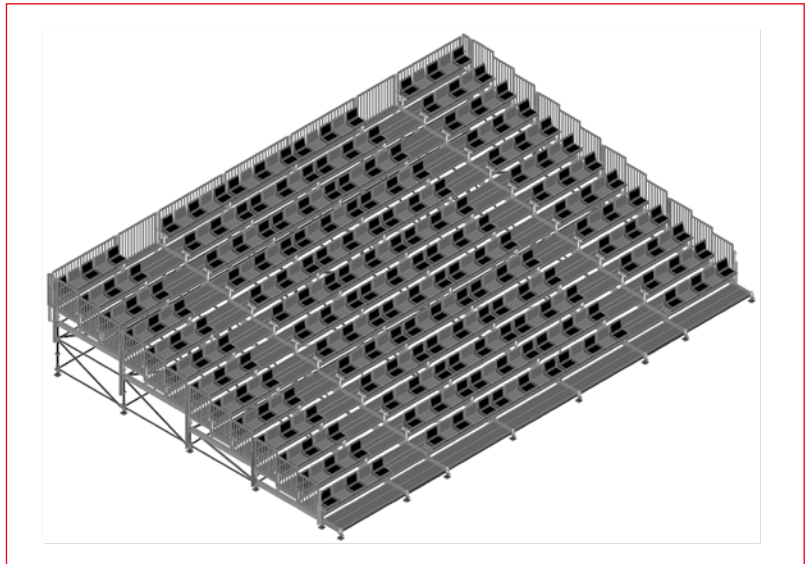
4

Example – Rotax hall with the roof

You can use the scaffolding structure components to construct the temporary halls and roofs.



Example – stand with the Rotax components



Example – free-standing billboard



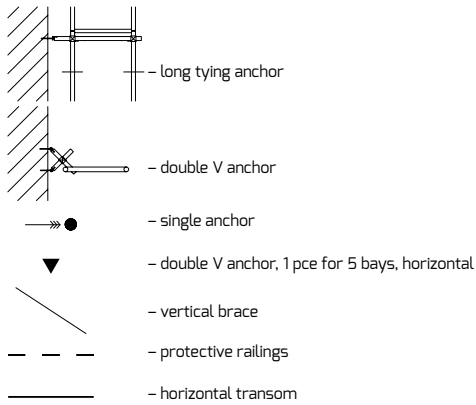
5

ASSEMBLY DIAGRAMS FOR TYPICAL SCAFFOLDING IN A FACADE SET-UP

The structural analyses of the set-up options that are presented in the schemes were made on the basis of the loads compliant with PN-EN 1004. The set-up options where a net is used consider the loads compliant with EN12811:1999. The component dimensions were determined according to PN-B-03200. The forces specified in the below schemes were calculated and include the safety coefficients.

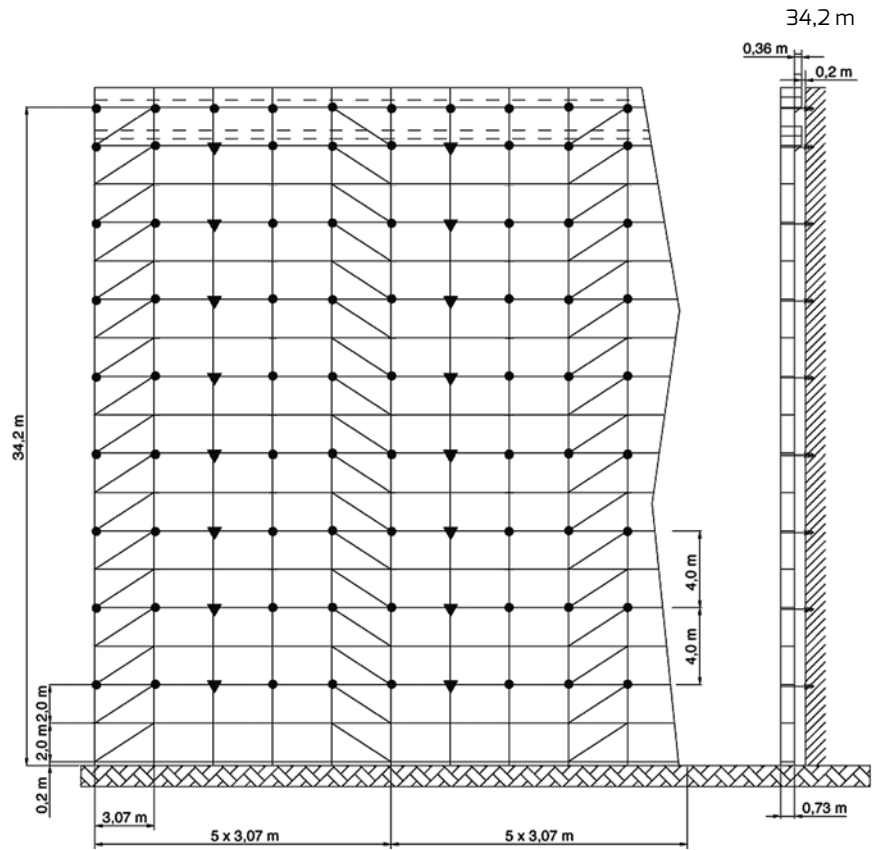
Scaffolding without a cover, open facade*

Consoles 0.36 m from the internal side
 Permissible effective load of 2 kN/m²
 Permissible base jack unscrewing: 0.2 m



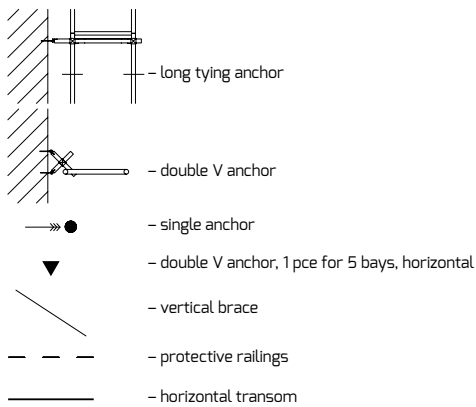
Facade filling type	Open facade		
Vertical anchor spacing	4 m		
Horizontal anchor spacing	in each bay		
Maximum anchor force [kN]		1,55	01
	⊥	6,92	
Maximum foot force [kN]	Internal stand	17,1	01
	External stand	17,1	

* facade is open when the number of holes is more than 60% of the facade surface



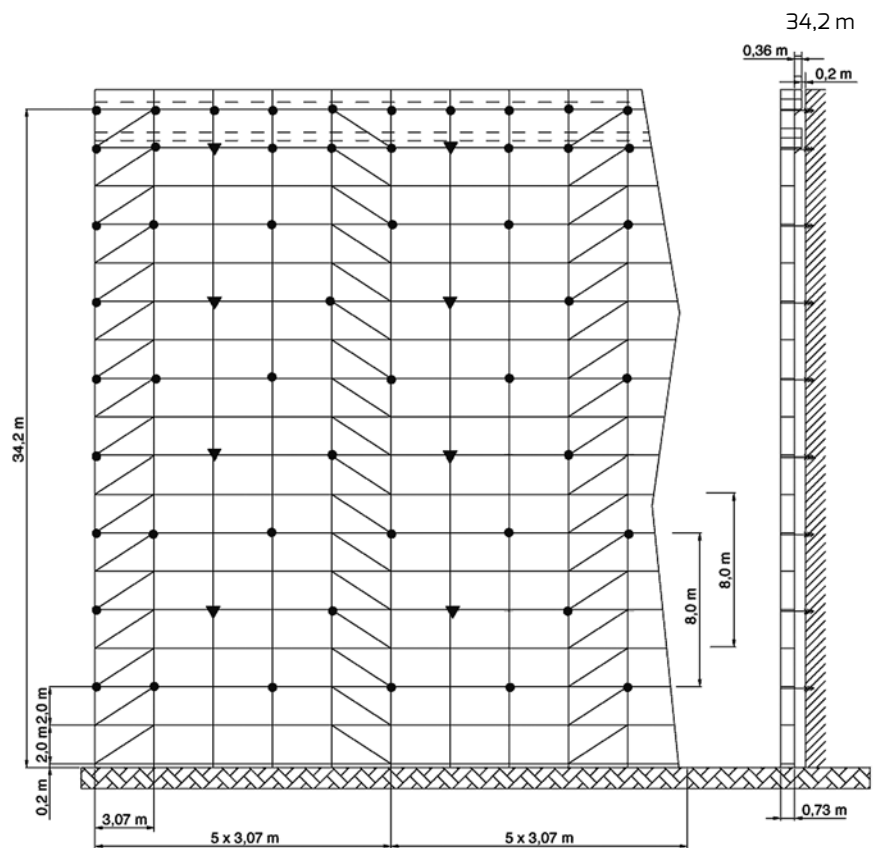
Scaffolding without a cover, closed facade*

Consoles 0.36 m from the internal side
 Permissible effective load of 2 kN/m²
 Permissible base jack unscrewing: 0.2 m



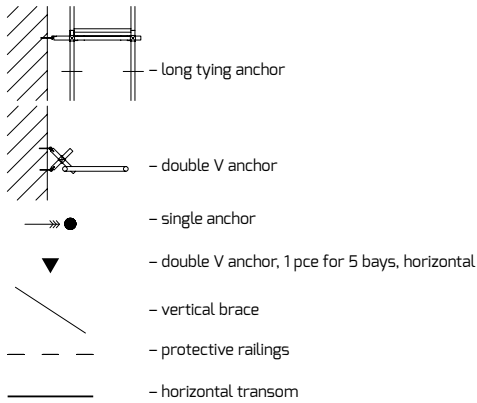
Facade filling type	Open facade		
Vertical anchor spacing	8 m		
Horizontal anchor spacing	every second bay		
Maximum anchor force [kN]		2,54	02
	⊥	5,66	
Maximum foot force [kN]	Internal stand	17,1	02
	External stand	17,1	

* facade is closed when the number of holes is less than 20% of the facade surface



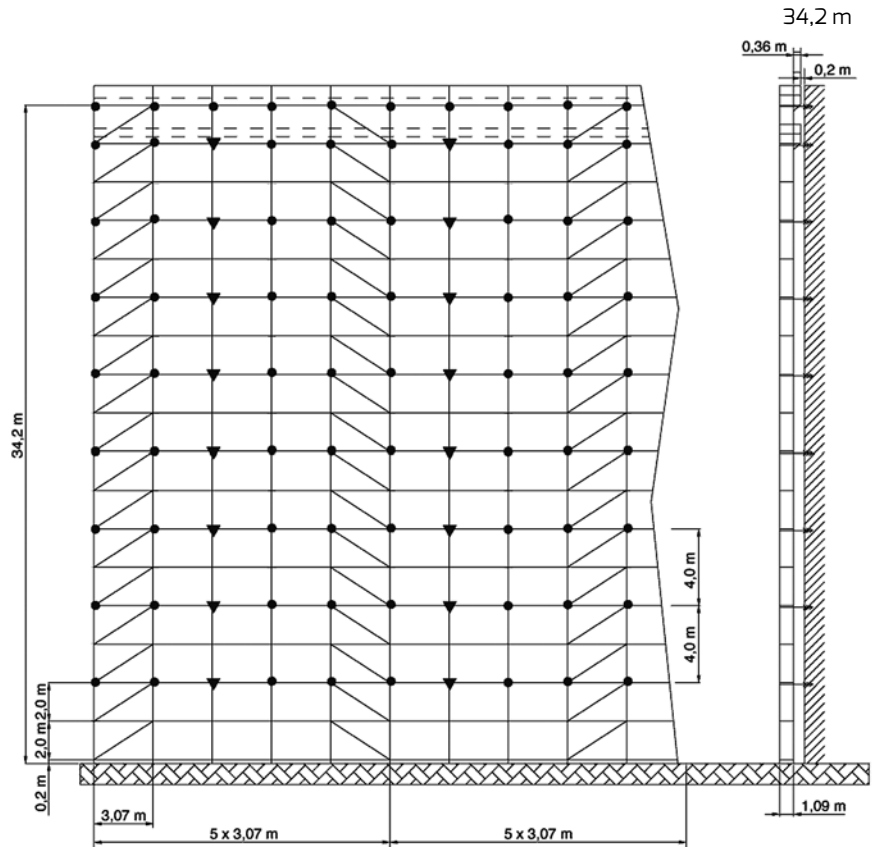
Scaffolding without a cover, open facade*

Consoles 0.36 m from the internal side
 Permissible effective load of 2 kN/m²
 Permissible base jack unscrewing: 0.2 m



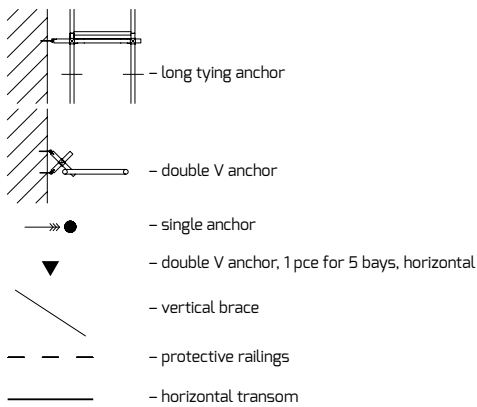
Facade filling type	Open facade		
Vertical anchor spacing	4 m		
Horizontal anchor spacing	in each bay		
Maximum anchor force [kN]	II	1,50	03
	I	6,73	
Maximum foot force [kN]	Internal stand	26,9	03
	External stand	26,9	

* facade is open when the number of holes is more than 60% of the facade surface



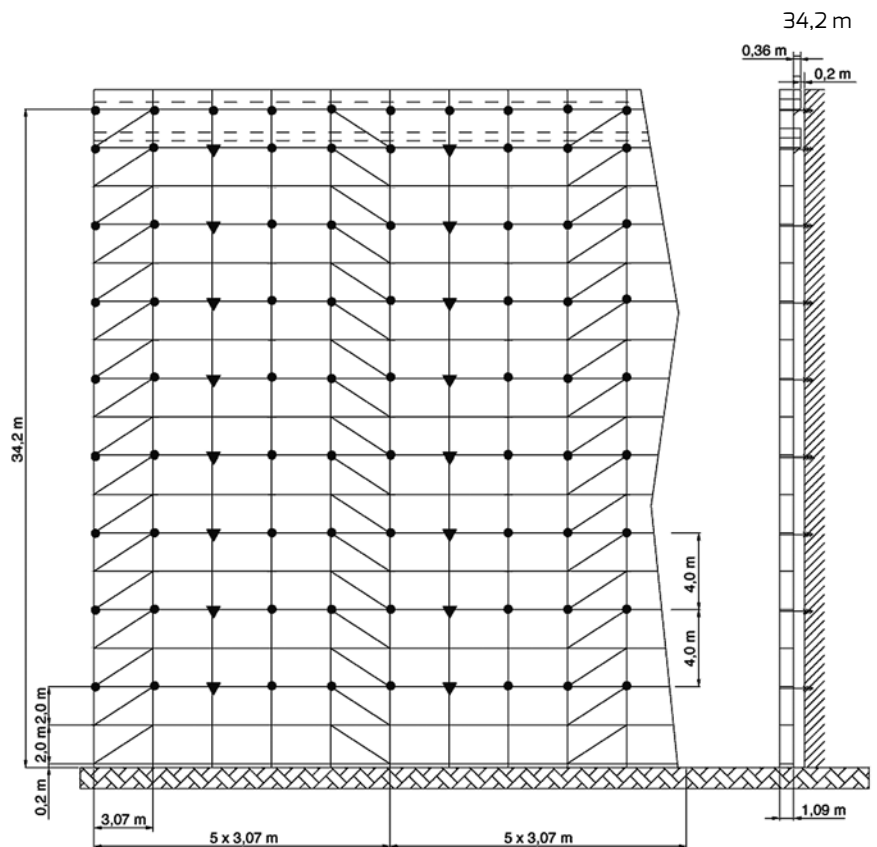
Scaffolding without a cover, closed facade*

Consoles 0.36 m from the internal side
 Permissible effective load of 2 kN/m²
 Permissible base jack unscrewing: 0.2 m



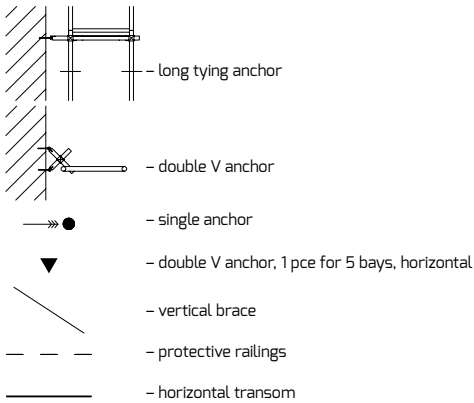
Facade filling type	Closed facade		
Vertical anchor spacing	4 m		
Horizontal anchor spacing	in each bay		
Maximum anchor force [kN]	II	1,50	04
	I	3,34	
Maximum foot force [kN]	Internal stand	26,9	04
	External stand	26,9	

* facade is closed when the number of holes is less than 20% of the facade surface



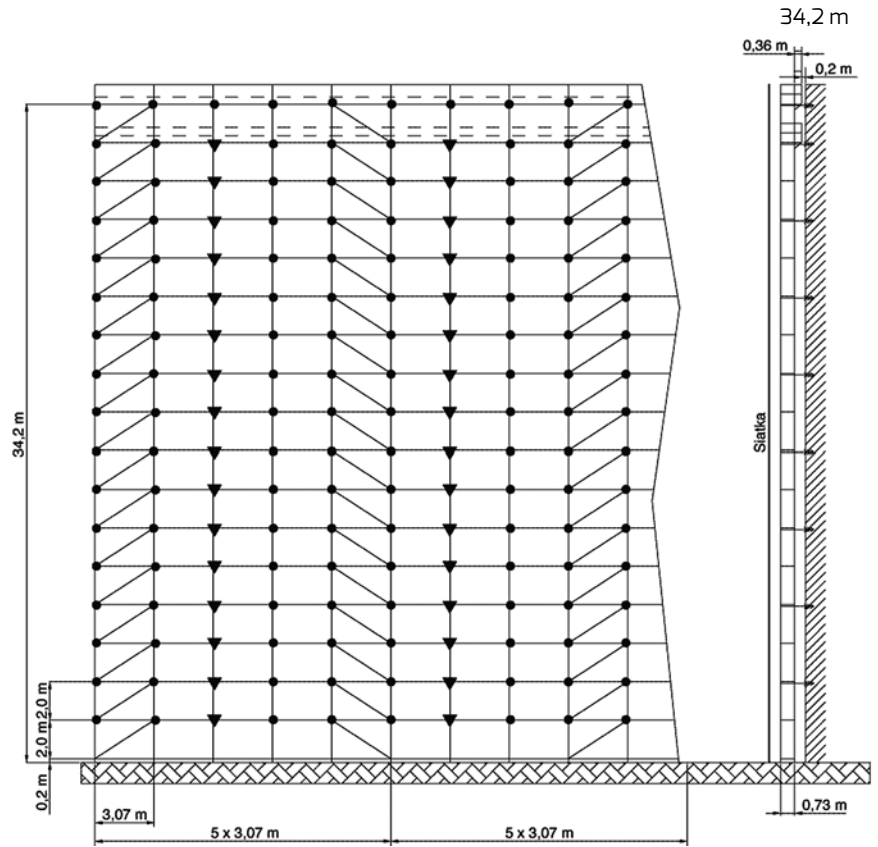
Scaffolding with a net, closed facade*

Consoles 0.36 m from the internal side
 Permissible effective load of 2 kN/m²
 Permissible base jack unscrewing: 0.2 m



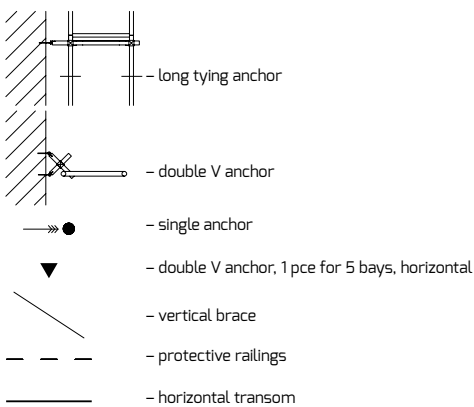
Facade filling type	Closed facade		
Vertical anchor spacing	2 m		
Horizontal anchor spacing	in each bay		
Maximum anchor force [kN]	II	2,28	05
	I	8,85	
Maximum foot force [kN]	Internal stand	13,6	05
	External stand	13,6	

* facade is closed when the number of holes is less than 20% of the facade surface



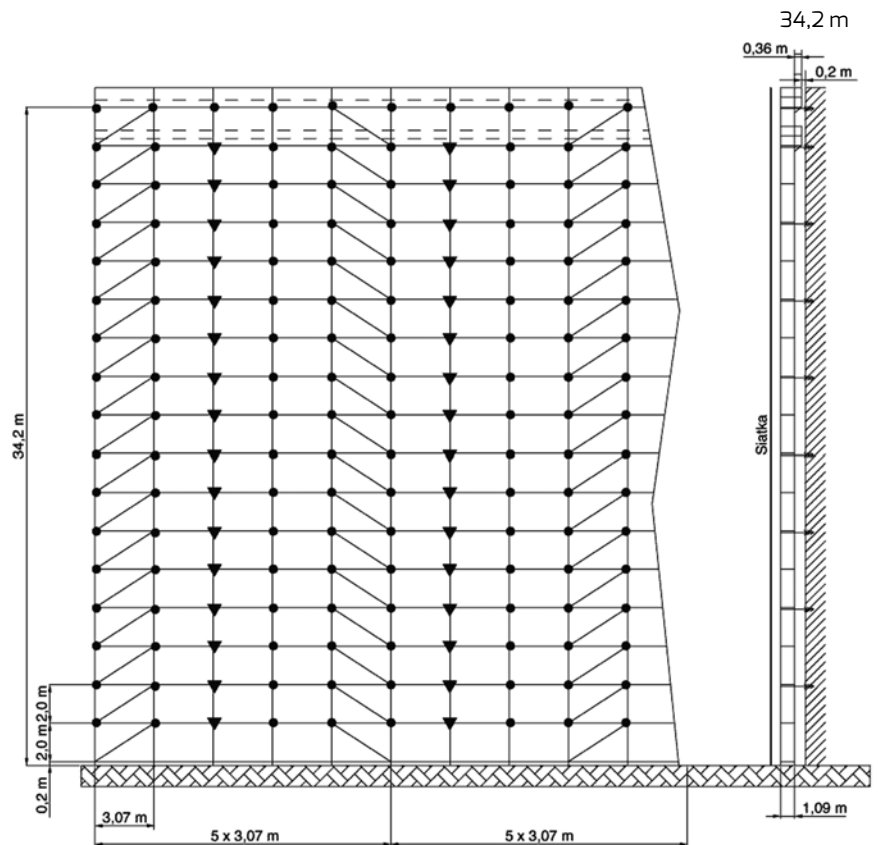
Scaffolding with a net, closed facade*

Consoles 0.36 m from the internal side
 Permissible effective load of 3 kN/m²
 Permissible base jack unscrewing: 0.2 m

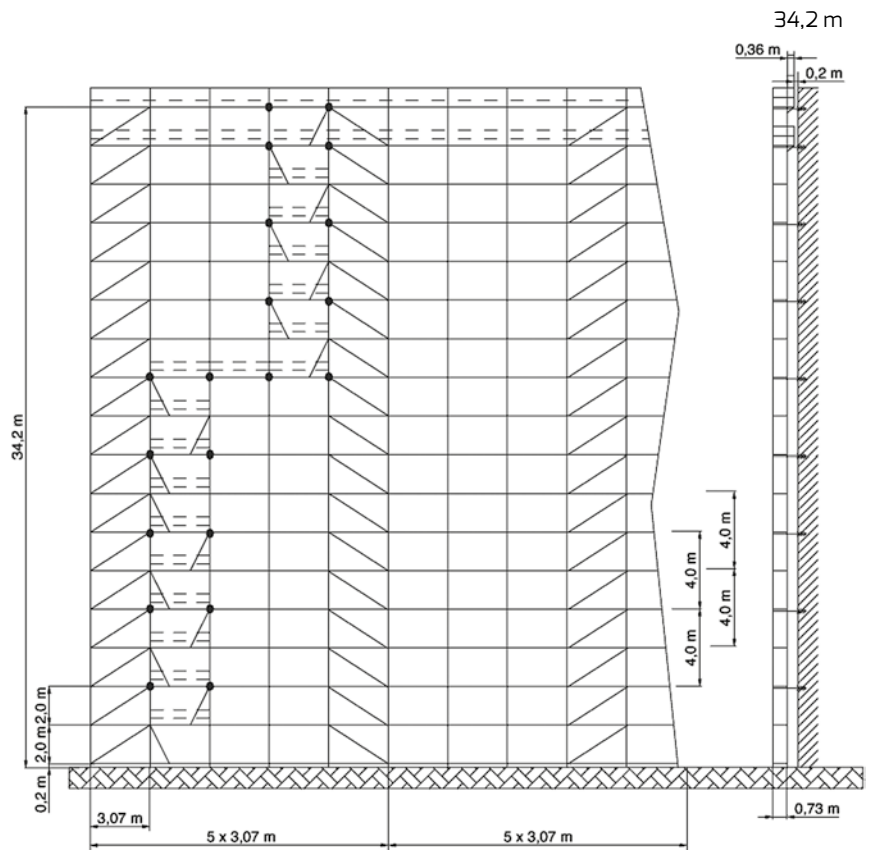
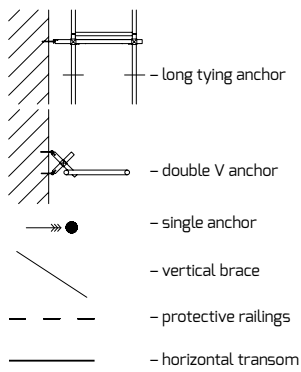


Facade filling type	Open facade		
Vertical anchor spacing	2 m		
Horizontal anchor spacing	in each bay		
Maximum anchor force [kN]	II	2,32	06
	I	9,98	
Maximum foot force [kN]	Internal stand	25,4	06
	External stand	25,4	

* facade is closed when the number of holes is less than 20% of the facade surface



Circulation path anchoring system



6

PRODUCT MARKING SYSTEM

All products manufactured by ALTRAD-Mostostal according to the existing ISO 9001 quality system are marked with the permanent marks (stamp ~ 0.7 mm deep) located as specified in the technical documentation. Additionally, the manufacturer and/or customer labels are used acc. to the individual agreements.

A 75 RRM - general mark view

A 75 – permanent mark of the manufacturer - ALTRAD-MOSTOSTAL in Siedlce

M – letter of the month of manufacture (variable mark)

RR – digit of the year of manufacture (variable mark)

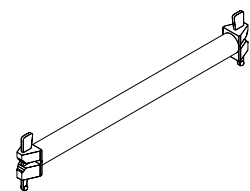
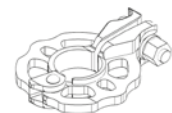
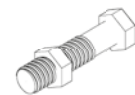
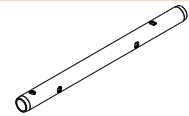
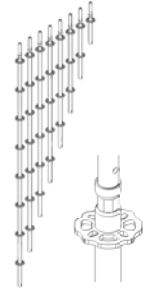
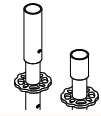
Year symbol RR		Month symbol M	
01 = 1995	20 = 2014	A - January	G - July
.....	21 = 2015	B - February	H - August
16 = 2010	22 = 2016	C - March	I - September
17 = 2011	23 = 2017	D - April	J - October
18 = 2012	E - May	K - November
19 = 2013	95 = 2089	F - June	L - December

Additionally, it is possible to mark the products with the approval number appropriate for the individual domestic markets, e.g. Ü 190, Ü 846, Ü 887. Additional marking is placed at the end of the basic mark. The mark location is specified in the product design drawings.

ROTAX POLE SCAFFOLDING

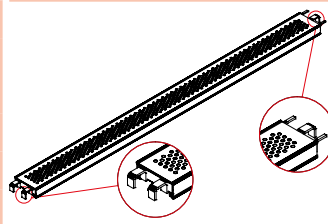
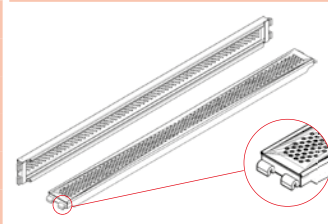
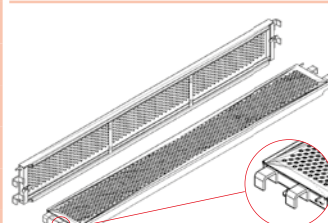
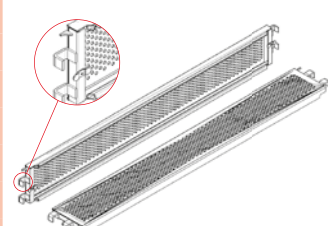
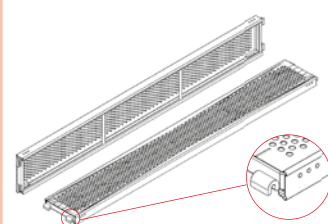
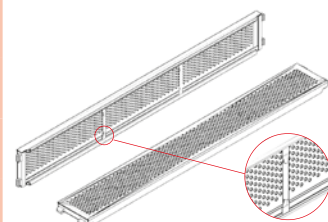
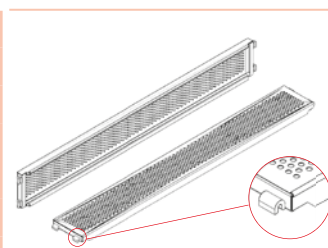
COMPONENTS LIST

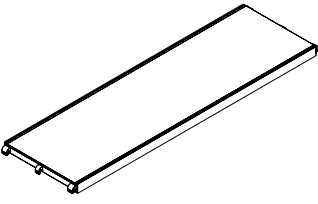
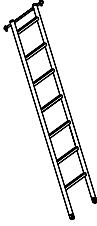
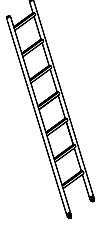
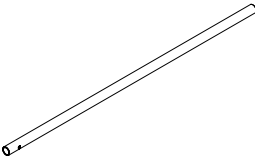

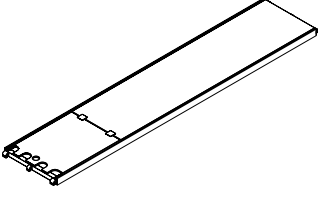
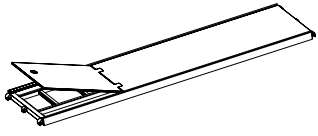
Component name	Index	Weight [kg]
Initial component, ROTAX, ST.	E371300	1,59
Initial component, L=43, ST.	E371302	2,50
Stand ROTAX 0,5 m ST.	E371405	3,18
Stand ROTAX 1,0 m ST.	E371410	5,45
Stand ROTAX 1,5 m ST.	E371415	7,72
Stand ROTAX 2,0 m ST.	E371420	10,00
Stand ROTAX 2,5 m ST.	E371425	12,20
Stand ROTAX 3,0 m ST.	E371430	14,54
Stand ROTAX 3,5 m ST.	E371435	16,78
Stand ROTAX 4,0 m ST.	E371440	19,00
Stand 0,5 m without pin connector, ST.	E371505	2,27
Stand 1,0 m without pin connector, ST.	E371510	4,54
Stand 1,5 m without pin connector, ST.	E371515	6,81
Stand 2,0 m without pin connector, ST.	E371520	9,07
Stand 2,5 m without pin connector, ST.	E371525	11,30
Stand 3,0 m without pin connector, ST.	E371530	13,60
Stand 4,0 m without pin connector, ST.	E371540	18,15
Pin connector	E371600	1,77
Screw	SRUX26000	0,04
Nut, M12, DIN 985, A2, self	NAK120000	0,01
Stand with connector and screw, ST.	E371605	4,43
Stand 1,0 m with covered connector, ST.	E371610	6,71
Stand 1,5 m with covered connector, ST.	E371615	8,98
Stand 2,0 m with covered connector, ST.	E371620	11,20
Stand 2,5 m with covered connector, ST.	E371625	13,50
Stand 3,0 m with covered connector, ST.	E371630	15,70
Stand 3,5 m with covered connector, ST.	E371635	18,00
Stand 4,0 m with covered connector, ST.	E371640	20,30
Disk connection, ROTAX, ST.	E371200	1,15
Horizontal transom, ROTAX, 0,39 m ST.	E371804	2,06
Horizontal transom, ROTAX, 0,73 m ST.	E371807	3,29
Horizontal transom, ROTAX, 1,09 m ST.	E371810	4,56
Horizontal transom, ROTAX, 1,40 m ST.	E371814	5,68
Horizontal transom, ROTAX, 1,57 m ST.	E371815	5,56
Horizontal transom, ROTAX, 2,07 m ST.	E371820	7,08
Horizontal transom, ROTAX, 2,57 m ST.	E371825	9,07
Horizontal transom, ROTAX, 3,07 m ST.	E371830	10,10

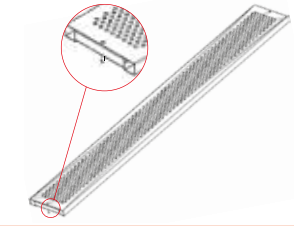
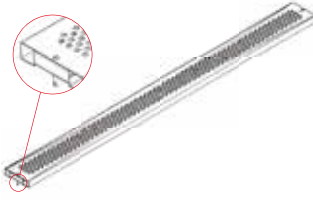
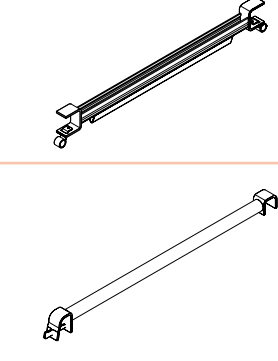
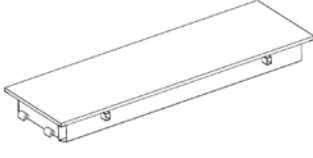
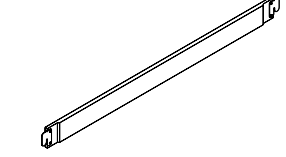
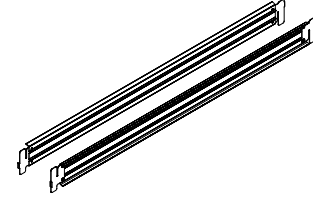


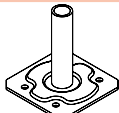
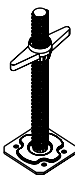
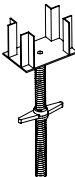
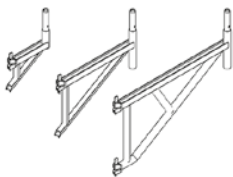
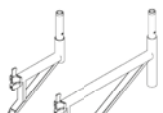

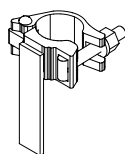
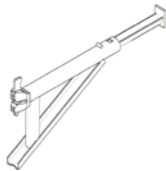

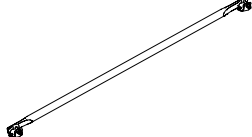
Component name	Index	Weight [kg]	
Transverse U-transom 0,45 m ST.	E372404	2,22	
Transverse U-transom 0,73 m ST.	E372407	3,16	
U-transom, transverse, reinforced, 1,09 m, ST.	E372410	6,21	
U-transom, reinforced, 1,40 m	E372414	7,94	
U-transom, double, 1,57m ST.	E373515	9,75	
U-transom, double, 2,07 m ST.	E373520	12,80	
U-transom, double, 2,57 m ST.	E373525	15,90	
U-transom, double, 3,07 m ST.	E373530	18,90	
Platform protection, 0,39 m ST.	E374503	0,61	
Platform protection, 0,73 m ROTAX	E374507	1,33	
Platform protection, 1,09 m ST.	E374510	1,96	
Platform protection, 1,4 m ST.	E374514	2,74	
Platform protection, 1,57 m ST.	E374515	3,00	
Platform protection, 2,07 m ST.	E374520	4,00	
Platform protection, 2,57 m ST.	E374525	4,93	
Platform protection, 3,07 m ST.	E374530	5,87	
Transom, reinforced, 1,09 m ST.	E372210	6,46	
O-transom, double, 1,57 m ST.	E373615	10,17	
O-transom, double, 2,07 m ST.	E373620	13,37	
O-transom, double, 2,57 m ST.	E373625	16,50	
O-transom, double, 3,07 m ST.	E373630	19,78	
Brace, vertical, 0,73x2,0 m ST.	E373107	7,88	
Brace, vertical, 1,09x2,0 m ST.	E373110	8,26	
Brace, vertical, 1,40x2,0 m ST.	E373114	8,69	
Brace, vertical, 1,57x2,0 m ST.	E373115	8,97	
Brace, vertical, 2,07x2,0 m ST.	E373120	9,92	
Brace, vertical, 2,57x2,0 m ST.	E373125	10,99	
Brace, vertical, 3,07x2,0 m ST.	E373130	12,10	
Brace, vertical, 0,73x1,0 m ST.	E373207	5,15	
Brace, vertical, 1,57x1,0 m ST.	E373215	6,86	
Brace, vertical, 2,07x1,0 m ST.	E373220	8,12	
Brace, vertical, 2,07x0,5 m ST.	E373221	7,59	
Brace, vertical, 2,57x1,0 m ST.	E373225	9,46	
Brace, vertical, 3,07x1,0 m ST.	E373230	10,83	
Brace, vertical, 2,07x1,09 m ST.	E373320	6,53	
Brace, vertical, 2,57x1,09 m ST.	E373325	7,75	
Brace, vertical, 3,07x1,09 m ST.	E373330	10,80	
Brace, vertical, 2,09x1,09 m ST.	E373410	4,20	
Brace, vertical, 2,57x0,73 m ST.	E373425	7,45	
Brace, vertical, 3,07x0,73 m ST.	E373430	8,75	

Component name	Index	Weight [kg]
Platform, 0,32x0,73m-U (P) ST.	E491307	5,89
Platform, 0,32x1,09m-U (P) ST.	E491310	8,19
Platform, 0,32x1,40m-U (P) ST.	E491314	10,31
Platform, 0,32x1,57m-U (P) ST.	E491315	11,31
Platform, 0,32x2,07m-U (P) ST.	E491320	14,55
Platform, 0,32x2,57m-U (P) ST.	E491325	17,77
Platform, 0,32x3,07m-U (P) ST.	E491330	21,00
Platform with crossbars, 0,32x1,57 m -U(BM) ST.	E491415	12,04
Platform with crossbars, 0,32x2,07 m -U(BM) ST.	E491420	15,74
Platform with crossbars, 0,32x2,57 m -U(BM) ST.	E491425	19,10
Platform with crossbars, 0,32x3,07 m -U(BM) ST.	E491430	22,56
Platform, 0,32x2,57 m, U, with crossbars, ECO ST.	E491625	16,15
Platform, 0,32x3,07 m, U, with crossbars, ECO ST.	E491630	18,85
Platform, 0,32x0,73 m, O, ST. (BM)	E495607	6,72
Platform, 0,32x1,09 m, O, ST. (BM)	E495610	9,17
Platform, 0,32x1,40 m, O, ST. (BM)	E495614	11,19
Platform, 0,32x1,57 m, O, ST. (BM)	E495615	12,47
Platform, 0,32x2,07 m, O, ST. (BM)	E495620	15,96
Platform, 0,32x2,57 m, O, ST. (BM)	E495625	19,32
Platform, 0,32x3,07 m, O, ST. (BM)	E495630	22,76
Platform, with crossbars, 0,32x0,73 m-O ST.	E495507	6,72
Platform, with crossbars, 0,32x1,09 m-O ST.	E495510	9,38
Platform, with crossbars, 0,32x1,57 m-O ST.	E495515	12,68
Platform, with crossbars, 0,32x2,07 m-O ST.	E495520	16,39
Platform, with crossbars, 0,32x2,57 m-O ST.	E495525	19,74
Platform, with crossbars, 0,32x3,07 m-O ST.	E495530	23,18
Platform, 0,19x0,73 m-U ST.(BM)	E491807	4,63
Platform, 0,19x1,09 m-U ST.(BM)	E491810	6,57
Platform, 0,19x1,57 m-U ST.(BM)	E491815	9,29
Platform, 0,19x2,07 m-U ST.(BM)	E491820	11,92
Platform, 0,19x2,57 m-U ST.(BM)	E491825	14,64
Platform, 0,19x3,07 m-U ST.(BM)	E491830	17,37
Platform, steel, 0,19x0,73 m -O(BM)	E491707	5,05
Platform, steel, 0,19x1,09 m -O(BM)	E491710	7,00
Platform, steel, 0,19x1,57 m -O(BM)	E491715	9,73
Platform, steel, 0,19x2,07 m -O(BM)	E491720	12,36
Platform, steel, 0,19x2,57 m -O(BM)	E491725	15,08
Platform, steel, 0,19x3,07 m -O(BM)	E491730	17,80

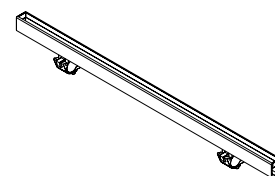
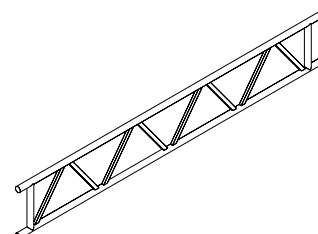
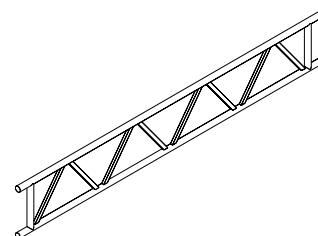
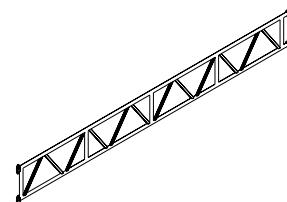
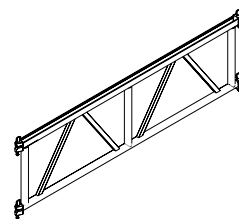


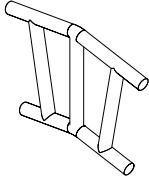
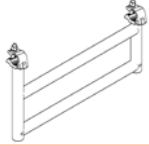

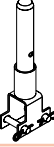
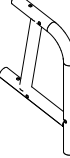
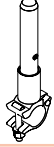
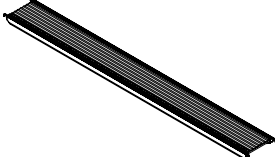
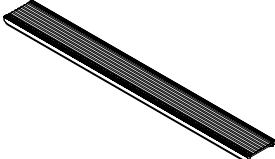


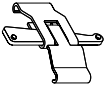
Component name	Index	Weight [kg]	
Platform, complete, 0,61x0,73 m PLUS AL.	E491907	6,07	
Platform, complete, 0,61x1,09 m PLUS AL.	E491910	8,75	
Platform, complete, 0,61x1,57 m PLUS AL.	E491915	11,92	
Platform, complete, 0,61x2,07 m PLUS AL.	E491920	15,53	
Platform, complete, 0,61x2,57 m PLUS AL.	E491925	18,80	
Platform, complete, 0,61x3,07 m PLUS AL.	E491930	24,06	
Platform ladder with pin and washers (replacement)	E492601	4,60	
Alu. ladder for passing platforms	E492600	4,25	
Pin	E492603	0,33	
Ladder, inter-level, 2,14x0,34 m ST.	E511600	11,68	
Platform, passing, 0,61x2,07 m PLUS	E492020	15,96	
Platform, passing, 0,61x3,07 m PLUS	E492030	24,30	
Platform, passing, with ladder, 0,61x2,57 m PLUS	E492125	23,80	
Platform, passing, with ladder, 0,61x3,07 m PLUS	E492130	29,10	

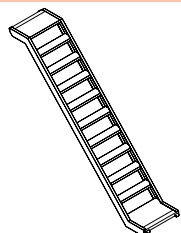
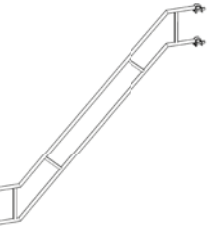
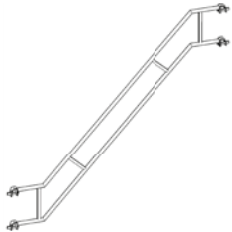
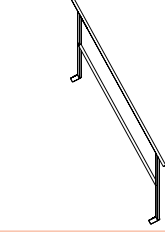
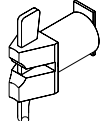
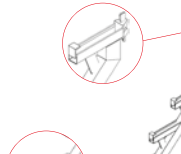
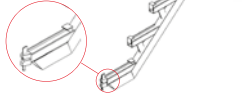
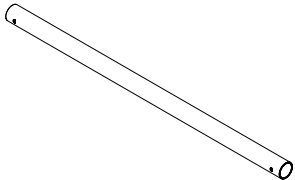
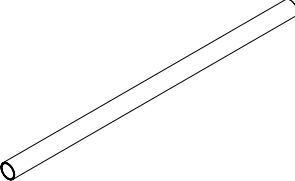
Component name	Index	Weight (kg)	
Additional platform, 0,30x1,0 m	E494310	5,14	
Additional platform, 0,30x1,5 m	E494315	7,39	
Additional platform, 0,30x2,0 m	E494320	9,65	
Additional platform, 0,30x2,5 m	E494325	11,90	
Additional platform, 0,19x0,7 m	E494407	2,84	
Additional platform, 0,19x1,0 m	E494410	3,92	
Additional platform, 0,19x1,5 m	E494415	5,70	
Additional platform, 0,19x2,0 m	E494420	7,49	
Additional platform, 0,19x2,5 m	E494425	9,27	
Additional platform, 0,19x 3,0 m	E494430	11,06	
U-transom, special (1 platform) ST.	E372503	3,27	
U-transom, special (2 platforms), ST.	E372507	4,29	
U-transom, special (3 platforms), ST.	E372510	7,11	
Overlay transom, 0,39 m ST.	E372603	2,68	
Overlay transom, 0,73 m ST.	E372607	4,00	
Overlay transom, 1,09 m ST.	E372610	5,17	
Stage platform, 0,5x1,57 m AL.	E499115	17,90	
Stage platform, 0,5x2,07 m AL.	E499120	23,10	
Stage platform, 0,5x2,57 m AL.	E499125	28,20	
Stage platform, 0,5x3,07 m AL.	E499130	35,50	
Stage platform, 0,57x1,57 m AL.	E499215	19,50	
Stage platform, 0,57x2,57 m AL.	E499225	30,90	
Platform, corner, adjustable, 45-90°	E493700	19,08	
Toe board, ROTAX, 0,73x0,15 m WOOD	E375107	1,97	
Toe board, ROTAX, 1,09x0,15 m WOOD	E375110	2,85	
Toe board, ROTAX, 1,57x0,15 m WOOD	E375115	4,05	
Toe board, ROTAX, 2,07x0,15 m WOOD	E375120	5,29	
Toe board, ROTAX, 2,57x0,15 m WOOD	E375125	6,53	
Toe board, ROTAX, 3,07x0,15 m WOOD	E375130	7,76	
Toe board, steel, 0,15x0,73 m	E375607	2,26	
Toe board, steel, 0,15x1,09 m	E375610	3,18	
Toe board, steel, 0,15x1,57 m	E375615	4,43	
Toe board, steel, 0,15x2,07 m	E375620	5,73	
Toe board, steel, 0,15x2,57 m	E375625	7,02	
Toe board, steel, 0,15x3,07 m	E375630	8,32	

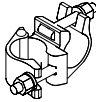

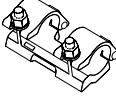
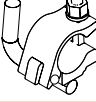

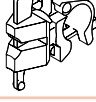


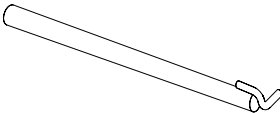


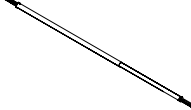
Component name	Index	Weight [kg]	
Base jack, standard, ST.	E511200	1,38	
Base jack, adjustable, 0,40 m ST.	E511204	3,39	
Base jack, adjustable, 0,60 m ST.	E511206	4,28	
Base jack, adjustable, 0,80 m ST.	E511208	5,20	
Base jack, adjustable, 1,50 m ST.	E511313	9,52	
Base jack, adjustable, screw + nut, 0,6 m	E511506	4,20	
Base jack, tilted, 0,80 m ST.	E511408	7,81	
Head, threaded, cross, 0,6 m	E642210	10,10	
Console, ROTAX, 0,36 m ST.	E374103	3,90	
Console, ROTAX, 0,73 m ST.	E374107	6,42	
Console, ROTAX, 1,09 m ST.	E374110	13,05	
Console, steel, 0,36 m -0	E374203	3,98	
Console, ROTAX, 0,73 m ST. 0	E374207	6,78	
Handle of a curb	E375900	0,78	
Console, adjustable, steel	E374100	4,43	
Console brace, vertical, 0,73 m ST.	E372907	7,62	
Brace, transverse, 1,75 m ST.	E285179	4,99	
Brace, transverse, 1,95 m ST.	E285119	5,52	

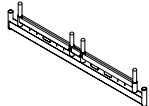

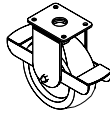
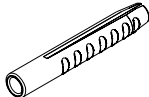
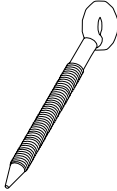
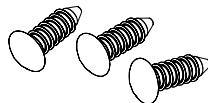
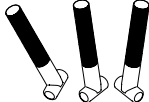




Component name	Index	Weight [kg]
Girder, with U-section, 2,07 m ST.	E376720	23,78
Girder, with U-section, 2,57 m ST.	E376725	28,70
Girder, with U-section, 3,07 m ST.	E376730	33,70
Girder, with U-section, 4,14 m ST.	E376741	42,86
Girder, with U-section, 5,14 m ST.	E376751	54,90
Girder, with U-section, 6,14 m ST.	E376761	64,80
Girder, with O-section, 5,14 m ST.	E376851	56,40
Girder, 3,0x0,4 m ST.	E503330	29,22
Girder, 3,24x0,4 m ST.	E503332	31,14
Girder, 4,0x0,4 m ST.	E503340	39,28
Girder, 4,24x0,4 m ST.	E503342	39,67
Girder, 5,24x0,4m ST.	E503352	48,55
Girder, 6,0x0,4 m ST.	E503360	57,42
Girder, 6,24x0,4 m ST.	E503362	58,03
Girder, 3,24x0,5 m ST.	E503230	36,40
Girder, 4,24x0,5 m ST.	E503240	45,60
Girder, 5,24x0,5 m ST.	E503250	52,33
Girder, 6,24x0,5 m ST.	E503260	61,12
Girder, 3,0x0,4 m AL.	E501230	12,70
Girder, 4,0x0,4 m AL.	E501240	17,00
Girder, 5,24x0,4 m AL.	E501252	20,96
Girder, 6,0x0,4 m AL.	E501260	24,70
Girder, 6,24x0,4 m AL.	E501262	25,12
Girder, 8,0x0,4 m AL.	E501280	32,40
Girder, 3,24x0,5 m AL.	E501330	14,97
Girder, 4,24x0,5 m AL.	E501340	18,79
Girder, 5,24x0,5 m AL.	E501350	22,60
Girder, 6,24x0,5 m AL.	E501360	26,43
Girder, 8,24x0,5 m AL.	E501380	34,03
Cross-beam, 0,6 m (2 pomosty) AL.	E501006	2,70
Cross-beam, 0,9 m (3 pomosty) AL.	E501009	3,30
Cross-beam, 1,2 m (4 pomosty) AL.	E501012	3,80
Cross-beam, 1,6 m (5 pomostów) AL.	E501016	5,20
Cross-beam, 1,9 m (6 pomostów) AL.	E501019	5,80
Girder cross-beam, 3,0 m AL.	E501030	8,50
Girder cross-beam, 4,0 m AL.	E501040	10,20
Girder cross-beam, 5,0 m AL.	E501050	12,70
Girder cross-beam, 6,0 m AL.	E501060	15,20


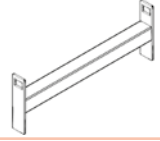
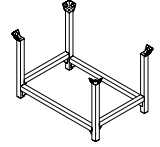
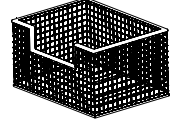
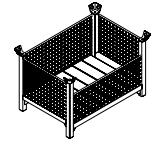


Component name	Index	Weight [kg]	
Roof girder	E502140	8,20	
Girder console, 0,73 m	E503507	5,99	
Girder connector, with couplings	E502000	2,20	
Girder pipe connector, ST.	E376700	1,87	
Roof ending beam	E501940	5,59	
Pipe connector, ST.	E581701	1,60	
Platform, alu., 4.0 m, with catches	E490940	33,64	
Platform, alu., 6.0 m, with catches	E490960	48,13	
Platform, 4,2 m AL	E491042	32,70	
Platform, 5,2 m AL	E491052	39,00	
Platform, 6,15 m AL	E491061	46,00	
Platform, 7,1 m AL	E491071	52,50	
Post, for alu. railing	E491001	2,50	
Railing clamp, steel	E491002	0,30	
Clamp, for alu. platform	E491003	0,30	

Component name	Index	Weight [kg]	
Stairs, 2,57 m AL.	E286225	25,23	
Stairs, 3,07 m AL.	E286230	30,00	
Railing, external, for stairs, 2,57 m ST	E374925	18,60	
Railing, external, for stairs, 3,07 m ST	E374930	20,60	
Railing, internal, for stairs, ST.	E286300	11,97	
Railing handle, ST.	E374800	0,89	
Beam, for stairs, H-1,0; L-1,57 m	E377015	19,60	
Beam, for stairs, H-2,0; L-2,57 m	E377025	32,00	
Pipe, standard (Ø 48,3) -1,0 m ST.	E440510	3,58	
Pipe, standard (Ø 48,3) -2,0 m ST.	E440520	7,16	
Pipe, standard (Ø 48,3) -3,0 m ST.	E440530	10,70	
Pipe, standard (Ø 48,3) -4,0 m ST.	E440540	14,30	
Pipe, standard (Ø 48,3) -5,0 m ST.	E440550	17,90	
Pipe, standard (Ø 48,3) -6,0 m ST.	E440560	21,50	
Pipe, standard 1,0 m AL.	E440610	1,50	
Pipe, standard 2,0 m AL.	E440620	3,00	
Pipe, standard 3,0 m AL.	E440630	4,51	
Pipe, standard 4,0 m AL.	E440640	6,01	
Pipe, standard 5,0 m AL.	E440650	7,51	
Pipe, standard 6,0 m AL.	E440660	9,02	

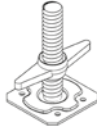
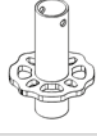
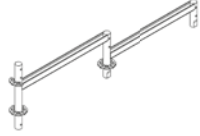


Component name	Index	Weight [kg]	
Connector, standard, ST.	E581119	1,25	
Connector, standard, ST.	E581319	1,20	
Connector, longitudinal, ST.	E581419	1,50	
Connector, anchoring, ST.	E284610	0,99	
Wedge connector, double, ST.	E373900	1,36	
Wedge connector, standard, ST.	E373901	1,21	
Wedge connector, rotating, ST.	E373001	1,22	
Wedge connector, clamp, ST.	E284620	1,06	
Anchoring connector, 0,40 m, ST.	E286504	1,66	
Anchoring connector, 0,80 m ST.	E286508	2,96	
Anchoring connector, 1,30 m ST.	E286513	4,58	
Anchoring connector, 1,50 m ST.	E286515	5,20	
Protection cotter pin, ST.	E511100	0,10	
Assembly post	E206600	6,82	
Railing, telescopic, 2,07 - 3,70	E206700	4,23	
Railing, telescopic, 1,57 - 2,07	E206800	3,45	

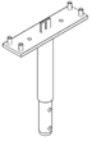

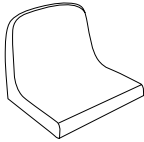
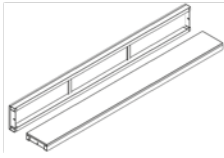




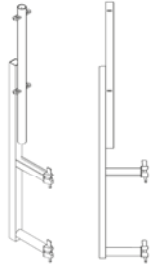
Component name	Index	Weight [kg]	
Mobile scaffolding guide beam, 1,09 m ST.	E571110	37,60	
Mobile scaffolding guide beam, 0,73 m ST.	E571173	26,30	
Base jack, with two nuts, 0,40 m ST.	E571175	4,10	
Road wheel	MP-116	4,00	
Expansion pin-sleeve, 14/70	E511907	0,03	
Expansion pin-sleeve, 14/100	E511910	0,03	
Anchoring screw, with eye, 120 ST.	E511012	0,20	
Anchoring screw, with eye, 160 ST.	E511016	0,25	
Anchoring screw, with eye, 190 ST.	E511019	0,30	
Anchoring screw, with eye, 230 ST.	E511023	0,40	
Anchoring screw, with eye, 280 ST.	E511028	0,50	
Anchoring screw, with eye, 300 ST.	E511030	0,55	
Anchoring screw, with eye, 350 ST.	E511035	0,60	
Cap, PVC	E511800	0,01	
Tee bolt, ST.	E581301	0,10	
Flange nut, M14 /s = 19/ ST	E581302	0,04	
Scaffolding net 2,50x10 m	E732025	0,05	
Scaffolding net 3,00x10 m	E732030	0,06	
Scaffolding canvas, 2,60x10-180g/m ²	E733725	0,18	
Scaffolding canvas, 3,10x10-180g/m ²	E733730	0,18	
Scaffolding palette, 800x1500x1408 ST.	E824301	53,00	

Component name	Index	Weight [kg]	
Scaffolding palette, 650x1500x1408 ST.	E824302	52,00	
Transportation transom, for platforms	E826701	4,28	
Module pallet. The main profile of the wall 3 mm	E822800	40,20	
Module light pallet. The main profile of the wall 2 mm	E823800	29,00	
Module basket	E822900	30,40	
Grid palette	E822808	69,70	
Grid palette	E823808	58,50	

8

STAND COMPONENTS LIST

Component name	Index	Weight [kg]	
Base jack, steel, adjustable	E378001	2,70	
Initial component, without guiding pipe	E378002	1,12	
Stepping beam, for load-bearing transom	E378010	10,58	
Load-bearing transom, 2,57 m	E378011	34,42	
Overlay, for double transom, 2,57 m	E378018	12,50	

Component name	Index	Weight [kg]	
Seat stand	E378020	3,51	
Seat stand, 0.45 m, with initial component	E378021	4,20	
Bucket seat, PVC	E378035	1,50	
Seat, aluminium and plywood	E378030	16,37	
Brace, horizontal	E378040	9,91	
Brace, vertical	E378041	9,02	
Stand, 0.5 m, for railing	E378050	3,04	
Post, for railing, 1.1, steel	E378051	6,52	
Post, for railing, 1.6, steel	E378052	8,78	
Post, for railing, 2.1, steel	E378053	10,66	
Post, for railing, 1.6, rear, steel	E378054	10,27	

Component name	Index	Weight [kg]	
Stepping railing, 2.57 m	E378060	35,60	
Railing, rear, 2.57 m, st.	E378061	31,56	
Railing, rear, 1.57 m, st.	E378062	21,05	
Railing, corner, ST.	E378063	7,12	
Support, for platform, st.	E378070	0,48	
Protection, for platform, 0.86 m	E378071	1,82	
Cap, for platforms	E378072	0,15	
Platform, alu. and plywood, 0.86 x 1.57 m	E499315	26,90	
Platform, alu. and plywood, 0.86 x 2.57 m	E499325	42,35	



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