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İşin Adı : Mersin-Adana-Osmaniye-Gaziantep Yüksek Standartlı Demiryolu Hattı
The Name of the Job : İnşaatı ile Elektromekanik Sistemlerinin Temini
Construction of Mersin-Adana-Osmaniye-Gaziantep Hight Standard Railway Line With Supply Of Electromechanical Systems

Rapor Adı : **SCAFFOLD SAFETY PROCEDURE**
Report Name

Doküman Kodu : MAOG-RECU-GN-GNL-IS-GNL-PRG-0016-0
Document Code

Revizyon Revision	Tarih Date	Rapor Adı : SCAFFOLD SAFETY PROCEDURE Report Name		
0	17/09/2021	Açıklama / Remarks :		
		Hazırlayan / Prepared by	Kontrol eden / Checked by	Onaylayan / Authorized by
		Onur GÜL HSE Supervisor	Hasan TAŞKAN HSE Manager	Kayserşah ERDEM Project Manager
		Açıklama / Remarks :		
		Hazırlayan / Prepared by	Kontrol eden / Checked by	Onaylayan / Authorized by
		Açıklama / Remarks :		
		Hazırlayan / Prepared by	Kontrol eden / Checked by	Onaylayan / Authorized by



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1. PURPOSE

To ensure the safe management and control of the works carried out on the scaffolding during the execution of the activities carried out in the Mersin-Adana-Osmaniye-Gaziantep High Standard Railway Project.

2. SCOPE

It includes all consultants, consultants, intermediary persons and companies and subcontractor employees operating in the project.

The content of this document has been developed to determine the minimum requirements for Ronasans Holding and all affiliated Group Companies; It can be developed according to the legal regulations of the working area, employer expectations and international standards.

3. IMPROVEMENT

Persons who detect ambiguity and inconsistency in this document can report their requests and suggestions using the "User Feedback Form" in APPENDIX 1.

4. REFERENCES

MAOG-RECU-GN-GNL-IS-GNL-PRG-0002-0 Hazard and Risk Management Procedure

TG20:13 Good Practice Guidance for Tube and Fitting Scaffolding – National Access and Scaffolding Confederation

SG4:15 Preventing Falls in Scaffolding Operations – National Access and Scaffolding Confederation

TS EN 12810 – 1 Front scaffolding consisting of pre-built components - Section 1: Finished product properties

TS EN 12810 – 1 Front scaffolding consisting of pre-built components - Part 1: Special structural design methods

TS EN 12811 – 1 Temporary work equipment - Part 1: Scaffolding - Performance requirements and overall design

TS EN 12811 – 2 Temporary work equipment - Part 2: Material Information

TS EN 12811 – 3 Temporary work equipment - Part 3: Installation tests

TS EN 12811 – 4 Temporary work equipment - Part 4: Protection curtains for scaffolding – Performance requirements and finished design

TS EN 1004 Mobile access and work towers made of prefabricated elements - Materials, dimensions, design loads, safety and performance requirements

TS EN 74 – 1 Scaffoldings - Consisting of tubes and coupling elements - Joining elements, loose-fit guides and base plates used in scaffolding and formwork scaffoldings - Part 1: Necessary conditions and test procedures

TS EN 74 – 2 Scaffoldings - Consisting of tube and joining elements - Joining elements used in work scaffolding and mold scaffolding, loose-pass guides and base plates - Part 2: Special joining elements - Requirements and experimental processes

TS EN 74 – 3 Scaffoldings – Consisting of tube and joining elements - Joining elements used in work scaffolding and mold scaffolding, loose-pass guides and base plates – Part 3: Flatbed plates and pin guides - Required conditions and testing procedures



TS 8481 EN 39 Scaffoldings - Consisting of tubes and coupling elements-Easy plug-in steel tubes-Technical delivery conditions

TS EN 131 – 1 – Ladders – Part 1: Terms, dates, types, functional dimensions

BS 2037:1994 – Specification for portable aluminum ladders, steps, trestles and lightweight stagings

SG25:14 – Access Egress from Scaffolding via Ladders and Ladder Towers etc. / Access to the scaffolding via mobile and cascading ladders.

Occupational health and safety regulations in construction works

Regulation on Health and Safety Conditions in Usage of Work Equipment

5. RESPONSIBILITY

5.1. Project Management

MAOG Project Management is responsible for the implementation of this document in all worksite / activities and ensuring that the subcontractors it works with work in accordance with this document.

MAOG Project Management establishes the organizational structure that will fulfill the following requirements in order to manage the dangers and risks related to the Scaffolding. This structure is created independently of the OHS - O unit.

MAOG Project Management appoints a sufficient number of scaffolders to be responsible for scaffolding establishment, dismantling and alteration works in the project and a Scaffolding Officer / Supervisor to ensure the management and coordination of scaffolding processes.

MAOG Project Management; In addition to the Scaffolding Officer / Supervisor, a Scaffolding Inspector and other scaffolding professionals with appropriate competencies can be assigned by evaluating the project requirements, scope, size, scaffolding variety used (system, tube clamp scaffolding systems, etc.) and density. This process is the responsibility of MAOG Project Management. In the project, it is obligatory to detail the necessary organization responsible with the competence, experience and number to meet the needs of the MAOG Project.

MAOG Project Management is also responsible for;

- Harmonizing the scaffolding activities with the national legislation and international standards at the site of the project,
- Providing adequate resources to implement the requirements set out in this document,
- subject to project size parameters responsible for appointing a sufficient number of competent persons under the conditions specified in the article 7.2 for managing and maintaining the requirements of this document.

5.2. Project HSE Manager / Chief

Project HSE Manager / Chief is responsible for the coordination and monitoring of this document for its implementation in all sites and activities.

5.3. Scaffolding Responsible (Supervisor)

Scaffolding Supervisor, duties and responsibilities:

- Choosing the right safe working methods to prevent falling,
- Identifying and reducing as much as possible the hazards in scaffolding works,

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- Preparing the installation plans of the scaffoldings and making the durability calculations when necessary, or evaluating and approving the installation plan and durability calculations prepared by other parties,
- Preparing risk assessments for the assembly, replacement, storage, dismantling and use of scaffolding and ladders,
- Informing all employees working on scaffoldings and work platforms about risk assessment requirements, working conditions and hazards and risks related to scaffoldings,
- Identifying scaffolding material storage areas and making these areas safe for storage,
- Checking and supervising that the scaffolding works are implemented in accordance with the document,
- Establishment of scaffolding installation and inspection team, their dispatch and administration.

5.4. Scaffolding Inspector¹

The responsibilities of the Scaffolding Inspectors regarding this procedure are as follows;

- Detailed on-site evaluation of the conformity of the erected scaffoldings with the legal requirements, the requirements of this document, the scaffolding equipment installation and user manuals and the installation plan, again on site according to the frequency and situations defined in this document, placing the approval labels according to the conformity,
- Keeping records of the audits carried out,
- Providing detailed information to the Scaffolding Supervisor and/or HSE unit regarding the inspection results,
- By making observations especially during the installation of high and complex scaffoldings, preventing non-conformities that cannot be corrected later and reporting these situations to the Scaffolding Supervisor,
- Actively participating in risk assessments related to scaffolding works,
- Inspection of scaffolding equipment at regular intervals.

5.5. Scaffolders

Scaffolders duties and responsibilities:

- Complying with the requirements of this document while working,
- Monitoring the warnings given by the scaffolding foreman, if available, and the scaffolding supervisors, if applicable, regarding the scaffolding installation sequence and fall prevention requirements,
- Reporting situations that may endanger the safety of himself or another person during the scaffolding works to the scaffolding foreman, if not, to the scaffolding supervisor,
- Participating in risk assessment studies for scaffolding,

¹It has been added to indicate minimum duties and responsibilities if defined within the relevant organization by the MAOG Project Management.



5.6. Headquarter E&S Manager:

Responsible for managing infrastructure and superstructure projects regarding environmental and social governance issues and member of the Executive E&S Committee on behalf of the REC.

5.7. PIU (Project Implementation Unit)

- **PIU Department Manager (Superstructure / Civil Engineer)** will be responsible for overseeing the implementation of all health, safety and social measures, as specified within the disclosure package of the Project, and regular reporting to AYGM PIU.
- **PIU Physics Engineer** who is responsible for supervising health and safety for the Project.

5.8. Executive Environmental and Social Management Committee

- **Executive E&S Committee Project Manager (Department Head / Branch Manager /Head of Department)** will be ultimately responsible for overseeing the activities undertaken by the AYGM/TCDD specialists (listed below), overseeing the implementation of mitigation measures and management procedures specified within the disclosure package of the Project, and overseeing the preparation and implementation of a CESMP, which will be based on this ESMP.
- **Executive E&S Committee Environmental, Health and Safety, and Social (EHSS) Manager (Specialist / Engineer)** will be responsible for overseeing all matters that relate to environment, health, safety and social aspects of the Project. Also, s/he will be appointed to be responsible for supporting the implementation of the SEP, by conducting regular consultation with affected communities on any concern regarding the Project. CLOs will also have responsibility for disseminating the Project disclosure package as described in the SEP. They will also conduct regular inspections of records relating to grievances received and their resolution. S/He will report regularly to AYGM PIU.

Further technical staff may be required during the course of the Project, who will be assigned internally by the AYGM, either by means of permanent or temporary basis until the completion of relevant tasks under the Project whilst they undertake their current responsibilities

6. DEFINITION AND ABBREVIATIONS

Anchor: Element that is inserted or attached to the structure to secure a bond element.

Anchor tie: They are the elements that provide the connection of the scaffolding with the anchor point and complement the anchor structure.

Head distance: Clear distance between a platform and the tubular assembly of the floor above.

Tube clamp scaffolding: They are scaffoldings, each component of which is individually designed, dimensioned and certified, consisting of scaffolding tubes and connection apparatus, and a holistic installation configuration is not defined by the manufacturer.

Facade scaffolding: It is a set of pylons that are perpendicular to the building in plan view, and fixed scaffoldings consisting of more than 2 struts parallel to the building, established along the façade of a building in the long direction in plan view.



Facade cross: They are the cross members applied on the facade in the long direction of the scaffolding in the facade scaffoldings. In tower scaffoldings and lattice scaffoldings , the crosses applied to each facade of the scaffoldings are called facade crosses.

Cross: Support that provides a diagonal connection between the horizontal and vertical members of the scaffold.

Steel beam clamp: It is the connecting element used to connect the scaffolding tube to the steel wide-faced beam (I beam). It provides protection when applied to the two foreheads of the beam together.

Stabilizer: Elements used to increase the base width of a mobile scaffolding to provide its support and inertia.

Post: Vertical scaffolding tube that transfers the vertical forces acting on the scaffolding to the ground.

Upright clamp (fixed clamp): Fastener used to join two tubes perpendicular to each other.

Joint: The theoretical point where two or more elements join together.

Transverse cross: They are the crosses applied between the scaffolding sets in the short direction of the scaffolding in facade scaffoldings or between long horizontals in the same direction.

Mobile scaffolding: These are the scaffoldings with wheels and locking mechanisms, which rise on four struts and are designed for jobs that require more frequent relocations.

Scaffolding Manager/Supervisor:A competent, trained and qualified person with the necessary experience to ensure that all scaffolding is safely erected, dismantled and modified and is fit for its intended use.

Scaffolding Inspector: Trained and documented person authorized by the project / enterprise, who has sufficient technical knowledge and experience to inspect the scaffoldings.

Scaffolder: Person with sufficient experience and training authorized by the project / business management to install, dismantle and modify scaffoldings.

Scaffolding Board: Component made of wood, steel, aluminum or composite material that functions as one of the floor units of a platform.

Inner board: It is a board placed between the facade of the building and the inner scaffolding of the scaffolding in order to work closer to the structure.

Scaffolding: Temporary construction structure necessary to provide a safe working environment and safe access to the construction, maintenance, repair and demolition of buildings and other structures.

Scaffolding work: It is the work that covers the installation, dismantling or modification of scaffoldings.

Lattice scaffolding: The plan is apparently scaffolding, consisting of more than 2 struts in both directions, designed for jobs that require wider platforms at height.

Case anchor: It is a type of anchorage based on friction force, by compressing a tube to the inner edges of spaces such as windows and doors without destroying the facade of the building.

Floor:The planar level formed by the long horizontal and the short horizontal. It resembles the floors in the building.

Floor height: The vertical distance between a platform surface and a platform surface on an upper floor.

Clamp:They are the elements used to join two tubes.



Short horizontal (transverse interconnect): They are horizontal scaffolding tubes that support the platform units (boards) extending in the short direction of the scaffolding in plan and transfer the forces acting on them to the long horizontals.

Control clamp (safety clamp): It is a single clamp applied to the slide path to provide additional security against slipping of the clamp carrying the load.

Guardrail system (side protection): A set of components that form a barrier to protect people from the risk of falling and to hold materials.

Tower Scaffolding: They are fixed scaffoldings rising on four pillars.

Box anchor: It is the type of anchor applied by going around a column or a different carrier on the façade without destroying the façade of the building.

Joint clamp: Joining element used to join two tubes at any angle to each other.

Coupling clamp: Joining element used to join two tubes end to end with their longitudinal axes coinciding.

Ladders: Vehicle used to climb vertically between levels, including:

- **Sliding stepladder:** It is a portable ladder with adjustable length that can be used by being fixed to a support structure. It consists of two sections arranged to allow length adjustment.
- **Portable ladder:** It is a portable ladder consisting of a section that determines its total length. It can be used by being fixed to a support structure and cannot be adjusted in length.
- **Step ladder:** Temporary ladder structures consisting of steps, railings and landings, supported by fixed or temporary structures.
- **Fixed ladder:** permanent ladder structures, consisting of steps, railings and landings, supported by fixed structures.

Strut: Inclined scaffolding tube that connects the scaffolding to the ground and provides support for the scaffolding from the ground.

Parallel clamp: Element used to join two parallel tubes.

Plan cross: They are the crosses applied between two uprights or long horizontals in the plane of the plan view of the scaffoldings.

Platform: Structure consisting of one or more platform units at the same level within an overhang.

Platform unit: A pre-constructed or otherwise manufactured unit that bears the load on itself, forms the platform or part of the platform, and can also be a structural part of the scaffolding.

System scaffolding: These are the scaffoldings whose apparatus at the node points are formed from pre-built components, designed as a systematic whole by the manufacturer, dimensioned, certified, installation configurations are created and durability calculations are made.

Baseplate It is the plate attached to the place where the strut meets the ground, which is used to spread the load transferred by the strut over a wider area. There are fixing holes on the floor.

Butt splice pin: An extensible fastener inserted into the holes of a scaffolding uprights for butt-joining one upright to another. This connector is used to connect uprights vertically but without axial tensile strength.

Long horizontal (longitudinal interconnect): They are horizontal scaffolding tubes, extending from vertical to vertical in the long direction of the scaffold, to which short horizontals transfer loads.



Sheet clamp: They are clamps with very weak shear strength on the short horizontal, which are used for fastening the short horizontals on the long horizontals at a right angle.

Floor board: Spreader board used to distribute the load from the uprights from the base plate to the floor.

7. IMPLEMENTATION

7.1. Competency Requirements and Acceptance of Competence

In the MAOG Project, only employees with the competency specified in this document can take part in works related to the erection, dismantling, inspection or modification of the scaffold. The minimum competency requirements for the designated tasks are defined in Table 1.

Table Competency Matrix

Position	Professional competence	Experience	Technical Training
Scaffolding Manager (Supervisor)	Graduated from civil engineering, mechanical engineering, civil engineering or mechanical technician departments of universities.	At least 5 years of experience in scaffolding.	The project covers the subjects of safe installation, dismantling, modification of scaffolding types used in the project, fall protection at the scaffold, manual handling – lifting in scaffolding works, risk assessment in scaffolding works, scaffolding construction method and installation plan preparation and durability calculation, scaffolding hazards and control methods. / Scaffolding Supervisor Training of at least 3 days, repeated every 2 years, including at least 1 day of practical application from an instructor or institution approved by the enterprise Risk assessment training lasting at least 1 day.
Scaffolder	Having the "Level 3 Scaffolding Installer" certificate of the Vocational Qualifications Authority in Turkey, He has a professional qualification document defined for working abroad in scaffolding erection, dismantling or modification of	At least 3 years of experience in scaffolding. Age lower limit: 21	Covering the issues of safe installation, dismantling, modification of scaffolding types used in the project, fall protection on the scaffold, manual handling – lifting in scaffolding works, scaffolding hazards and control methods, including at least 1 day of practical application obtained from an instructor or institution approved by the Project / Enterprise, At least 2 days of Scaffolding Training, repeated every 2 years

	scaffolding in the country of work.		
Scaffolding Inspector ²	Graduated from civil engineering, mechanical engineering, civil engineering or mechanical technician departments of universities.	At least 2 years of experience in scaffolding inspection.	Safe installation, dismantling, modification of scaffolding types used in the project, fall protection at scaffolding, scaffolding structural design requirements, scaffolding equipment specifications, risk assessment in scaffolding work, scaffolding construction method and preparation plan, scaffolding hazards and control methods, scaffolding inspection and labeling. At least 3 days of Scaffolding Inspection Training, repeated every 2 years, including at least 1 day of practical application, received from an instructor or institution approved by the Project / Business

7.2. Scaffolding Crew Organization

The MAOG Project scaffolding team is formed organizationally by the MAOG Project Management to employ at least one scaffolding Supervisor.

Scaffolding organization in the project; By evaluating the project requirements, scope, size, variety of scaffolding (system, tube clamp scaffolding systems, etc.) and density, it can be expanded with the employment of Scaffolding Supervisor and other scaffolding professionals who will work with the Scaffolding Supervisor / Supervisor. MAOG Project Management performs this assessment and assignments.

The organization other than the Scaffolding Manager / Supervisor may also consist of Subcontractor employees.

7.3. Assessment of Scaffolding Risks

In scaffolding studies, a risk management tool (JHA, TRIC, PTW, etc.) is determined and applied according to the MAOG-RECU-GN-GNL-IS-GNL-PRG-0002-0 Hazard and Risk Management Procedure. Within the specified risk management tools, the installation, dismantling, modification of scaffolding, control of the hazards and risks arising from the control are explained in a comprehensive way.

The determined risk assessment method is applied under the leadership of the Scaffolding Manager (Supervisor) specific to each activity and the risk assessment results are conveyed to all scaffoldings by the Scaffolding Supervisor.

Added to indicate competency requirements if defined within the relevant organization by MAOG Project Management.

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7.4. Scaffolding Load Classes

During the planning phase of scaffolding works, the load class is determined according to the intended use of the scaffold. There are 6 load classes in scaffoldings according to TS EN 12811-1. These are;

Load class 1: Very light scaffolding: These are scaffoldings with a uniformly distributed load resistance of 75 kg/m², designed for inspection and control purposes only at access and access points.

Load class 2: Light duty scaffolding: These are works designed for light cleaning works without any storage on the scaffold, with a uniformly distributed load strength of 150 kg/m², access, inspection and control.

Load class 3: General scaffolding: Scaffolding that has 200 kg/m² evenly distributed load resistance, does not require heavy load storage, and works such as plastering, cleaning, painting, insulation, sandblasting, welding are carried out.

Load class 4: Heavy duty scaffolding: Scaffolding with a uniformly distributed load resistance of 300 kg/m², requiring controlled storage of loads of a certain weight such as facing stones, bricks, fitting materials on the scaffold.

Load class 5, 6: Very heavy duty scaffolding: They are highly durable scaffoldings with a uniformly distributed load resistance of 450 and 600 kg/m², requiring heavy loads such as tubes and spools to be stored on the scaffold.

TG20:13 deals with 4 load classes in total and general information about these load classes is given in Appendix 2 – Table 2.

Platform loadings in facade scaffoldings vary according to scaffolding types. Information on how much loading can be done on which platforms on the system scaffoldings is obtained from the user guides and applied.

In tube clamp scaffoldings, 100% loading on one floor and 50% on another floor can be made according to TG20:13.

E.g; A tube clamp facade scaffolding in load class 4 can be loaded with 300 kg/m² and another 150 kg/m². It is not possible to load any floor other than these two floors. If it will be necessary to load on a different floor, durability calculation is made before installation.

7.5. Under Formwork Scaffolding Systems

Scaffolding systems under formwork have not been evaluated within the scope of this document, and the scaffoldings to be used for this purpose are designed and produced according to the TS EN 12812 standard. Formwork scaffolding systems are installed, used, dismantled, transported and stored in accordance with the manufacturer's user manuals and the drawings to be prepared specifically for the project / business.

7.6. Scaffolding Equipment

Scaffoldings are examined in two main sections as system scaffoldings and tube clamp scaffoldings according to equipment features. System scaffoldings are scaffoldings whose apparatus at the joint points are formed from pre-made components, designed as a systemic whole by the manufacturer, dimensioned, certified installation configurations and durability calculations. Such scaffoldings have the EN 12810 Facade Scaffoldings Consisting of Pre-built Components standard. Scaffoldings that do not have this standard are not used in the Renaissance.

System scaffoldings are solved by the manufacturer as a whole and all installation and usage requirements are communicated to the users in the installation and user manuals and product manuals.

System scaffoldings that do not have an installation and user manual and a product manual prepared by the supplier in the user's language cannot be used in the project.

The dimensions and technical specifications of all components of the system scaffoldings are specified in the product manuals.

Tube clamp scaffoldings are scaffoldings, each component of which is individually designed, dimensioned, certified, and a holistic installation configuration is not defined by the manufacturer, consisting of scaffolding tubes and connection apparatus.

The equipment components of the scaffoldings are as follows:

7.6.1. Tubes

The technical specifications of the tubes in the system scaffoldings and the sub-standard they are produced are specified in the product manuals prepared by the manufacturer.

3 types of tubes are used in tube clamp scaffolding.

Steel tubes with an outer diameter of 48.3 mm:

Nominal wall thicknesses and yield stresses of steel tubes with an outer diameter of 48.3 mm are given in Annex 2 – Table 3.

Aluminum tubes with an outer diameter of 48.3 mm:

Nominal wall thicknesses and yield stresses of aluminum tubes with an outer diameter of 48.3 mm are given in Annex 2 – Table 4.

EN 39 type 4 tubes with an external diameter of 48.3 mm:

The wall thickness of such tubes is 4 mm and the minimum yield stress is 235 N/mm².

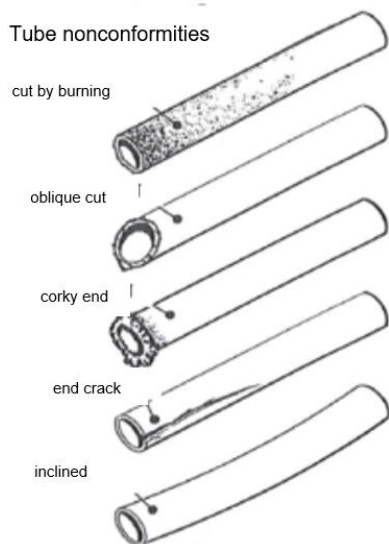
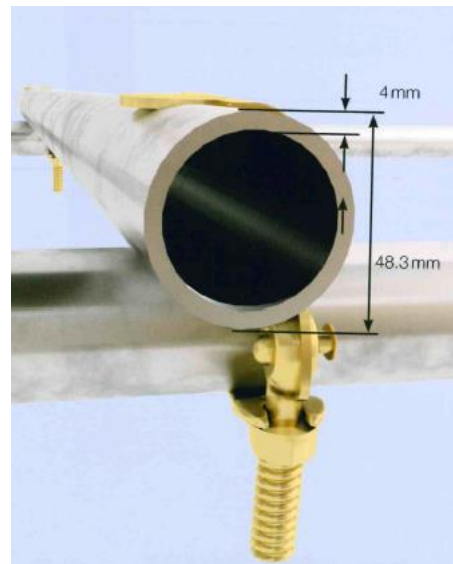


Figure : EN 39 type 4 tubes with 48.3 mm outer diameter Figure : Nonconformities seen in scaffolding tubes

All types of scaffolding tubes; straight, not bent, bent, free of cracks, cracks, holes, cavities, rust-free and straight and angular cut from both ends. The use of damaged scaffolding tubes is not suJHAbLe.

The strength of scaffolding tubes is directly related to their physical properties. For this reason, scaffolding tubes that have been corroded, exposed to heat treatment and have the above-mentioned damages do not meet the design strength and cannot be used in scaffoldings.

Aluminum scaffolding tubes are lighter than steel tubes and provide advantages in manual handling and lifting. However, due to its structural features, it has a lower bearing capacity compared to steel tubes.

7.6.2. Boards

Scaffolding boards can be produced from steel, aluminum, wood or composite materials in system scaffoldings. However, the scaffolding board used is selected from the products that the manufacturer approves within the system that is considered holistically.

In tube clamp scaffoldings, scaffolding boards are selected from 5X20 or 5X15 wooden materials. Where applicable, BS 2482 standard 38mmX225mm or 63mmX225mm boards can be used. Where boards in accordance with BS 2482 standards cannot be obtained, 50X200 boards are used.

Curved, cracked, burned, partially cut, painted, nailed and knotted boards cannot be used on scaffoldings. The boards can be fired and the ends clamped so that they can be used without damage for a longer period of time.

Where applicable, special chemicals can be applied to the boards for fire resistance.

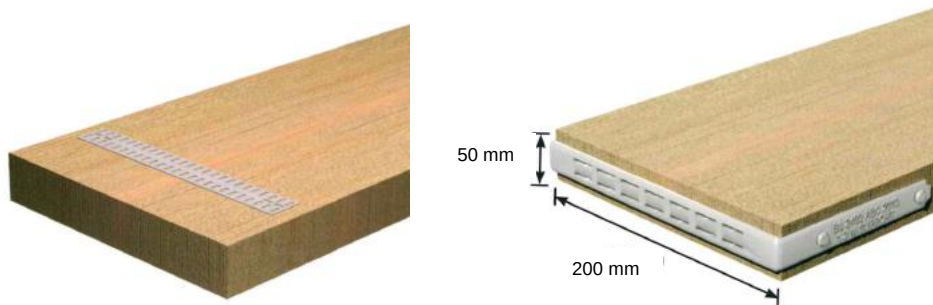


Figure1: Wooden board samples

In system scaffolding, the boards are supported along their length only by short horizontals at their ends. In tube clamp scaffolding, the boards are supported with 120 cm intervals except for heavy-duty scaffoldings, and 90 cm intervals in heavy-duty scaffoldings with short horizontals.³

Wooden boards are stacked in a dry and sun-free area so that they do not touch the ground.

The boards are not thrown from a height, vehicles are not allowed to pass over them and are not used as a walking ramp.

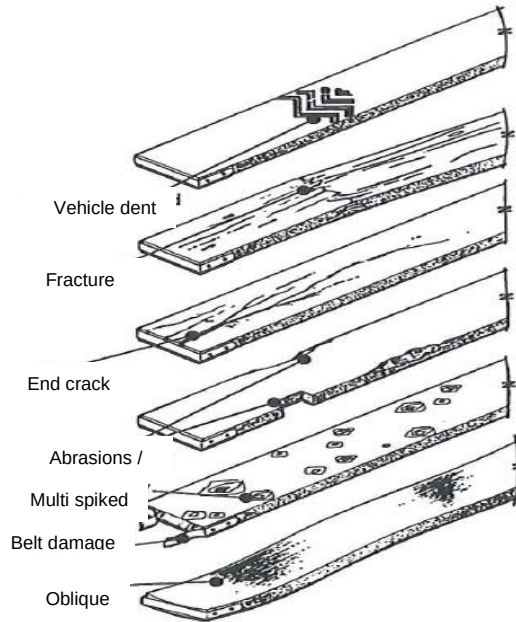


Figure2: Wood board defects

7.6.3. Clamps

Tube connections in system scaffoldings are performed with pre-made flanges and apparatus attached to the tubes without the need for an external connection element or clamp.

In tube clamp scaffoldings, different types of clamps are used to connect the tubes to each other. These clamps and their shear strength are given below.

Upright clamp (fixed clamp): It is the element used to join two tubes perpendicular to each other. According to EN 74-1, there are two types as Class A and Class B.

Class A vertical clamps have a shear strength of 6.1 kN, while class B vertical clamps have a shear strength of 9.1 kN.



Figure3: Upright (fixed) clamp

Joint clamp: It is a joining element used to join two tubes to form any angle with each other. According to EN 74-1, there are two types as Class A and Class B.

Class A joint clamps have a shear strength of 6.1 kN, while Class B joint clamps have a shear strength of 9.1 kN.



Figure4: Joint clamp:

Sheet clamp: They are clamps with very weak shear strength on the short horizontal, which are used for fastening the short horizontals on the long horizontals at a right angle.

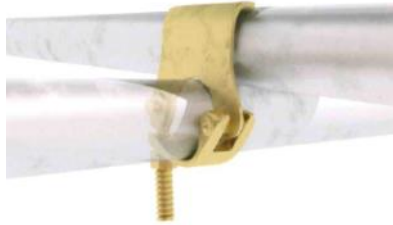


Figure5: Sheet clamp:

Parallel clamp: Tube clamp is used to hold the uprights together in cases where two uprights should be used side by side in scaffolding. It is divided into two classes as A and B class according to its shear strength.



Figure6:Parallel clamp:

Coupling clamp:They are clamps used for joining two scaffolding tubes end-to-end. It provides the connection with a sleeve that wraps both tubes from the outside. It is divided into two classes as A and B class according to its shear strength.



Figure7: Coupling clamp:

Internal link pin: They are clamps used for joining two scaffolding tubes end-to-end. The connection is joined with the help of a pin that grips the two tubes from the inside and expands by tightening. It is not used for horizontal tube joints. It has no slip resistance.



Figure8: Internal link pin:

Double wedge clamp: The system is the clamps that connect two parallel uprights adjacent to each other on the scaffoldings from the flanges. For durability information, refer to the manufacturer's manuals.

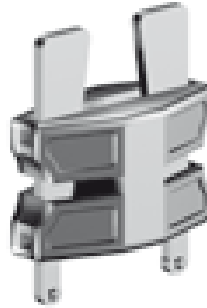


Figure9: Double wedge clamp

The shear strengths of the clamps in tube clamp scaffoldings are given in Annex 2 – Table 5 below;

7.6.4. Prefabricated Beams

Prefabricated beams are used in scaffoldings to increase the carrying capacity of the platform in special cases or to transfer the loads of the pillars that cannot be lowered to the ground in bridge and span crossings. Prefabricated beams can be designed in system scaffoldings by the manufacturer and can be sized in different ways.

The prefabricated beams specified in TG20:13 consist of the following two types;

Steel ladder beams: They are called by this name because they look like ladders. Steel ladder beams are made of EN 39 type 4 tubes with a diameter of 48.3 mm and a wall thickness of 4.0 mm.

Horizontally, the height of the beam is 305 mm between the axes of the lower and upper tubes, and the distance of the vertical tubes is 305 mm from the axis to the axis.



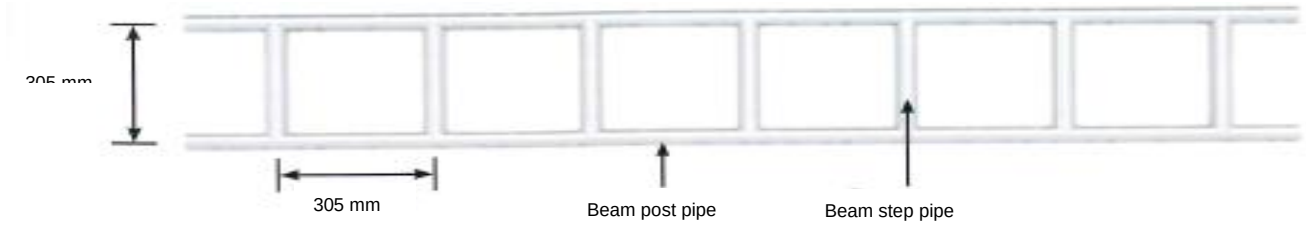


Figure10: Steel ladder beams

Steel truss beams: Beam stand tubes are typically made from EN 39, type 4 tubes with 48.3 mm diameter and 4.0 mm wall thickness. Diagonal and vertical intermediate tubes can be made from tubes of different sizes. In order to ensure the TG20:13 strength, the distance between the beam strut tubes axes is at least 610 mm and the beam provides the strength specified in Table 7.



Figure11: Steel truss beams

Moment and shear strengths of prefabricated beams can be seen in Annex 2 – Table 6.

7.6.5. Portable ladders

In system scaffolding, the use of portable ladders is not allowed, except for the ladders produced by the manufacturer or approved in writing, for inter-floor access.

Two different types of ladders are used in the project where tube clamp scaffoldings are used. These ladders are EN 131 compliant or BS 2037 Class 1 aluminum ladders. The features of these ladders are given in APPENDIX 2 – Table 7;

It is not allowed to use on-site ladders and wooden ladders in the project.

Except for special cases, the use of extension ladders on scaffolding is not allowed.



When it is necessary to use fiberglass ladders in special cases, for the prevention of electric shocks, these ladders are selected in accordance with EN 131 and EN 61478 standards.

7.7. Installation Plans and Endurance Calculations

7.7.1. Installation plans

The plan of erection, use and dismantling of all scaffoldings to be built in the MAOG Project, regardless of whether they are system scaffolding or tube clamp scaffolding; It is done by the civil engineer, construction technician or high technician working in the scaffolding installation team / subcontractor. This plan can be in the form of a standard form containing detailed information about the scaffolding.

7.7.2. Endurance Calculations

The durability calculation of the scaffoldings to be built in the MAOG Project is made based on the following conditions and the prepared installation plans;

The system is on the scaffoldings;

- In cases where the scaffoldings are out of the installation configurations specified in the installation and user manual prepared by the manufacturer,
- In case the vertical components do not have continuity and/or the scaffolding transfers loads to a different structure (platform, beam, column, cladding, etc.),
- when the max. height specified in manufacturer's user manual is exceeded,

Tube clamp scaffolding:

- When the standard equipment and standard scaffolding types and configurations defined by TG20:13 are deviated,
- In case the height of the scaffolding exceeds 25 m,
- In case the vertical components do not have continuity and/or the scaffolding transfers loads to a different structure (platform, beam, column, cladding, etc.),
- In every installation if the scaffolding equipment used does not meet the specifications specified in TG20:13.

When the loads are applied according to the load class to be determined by considering the design loads of the scaffolding to be built, the durability calculations will confirm the durability of the ground, all the scaffolding components separately and the scaffolding system consisting of all components, including the predicted safety coefficients. is specified.

Durability calculations are made by the scaffolding team / subcontractor. Only competent persons with the title of Civil Engineer will make this account.

7.8. Scaffolding Floor

The bearing capacity of the ground on which the scaffolding will be built is inspected by the scaffolding team / subcontractor authorized civil engineer in terms of its suitability for the scaffolding to be built. Scaffolding cannot be built on snowy or icy ground with low bearing capacity, plastic moving under pressure, high water content, incompressible or uncompressed.

In case of encountering this type of ground, the ground is scraped at the appropriate depth, it can be compressed and the bearing capacity is made high.



7.8.1. Base Plates

Base plates are used at the points where all scaffolding pillars meet the ground. Base plates are used in tube clamp scaffoldings with dimensions of 150 cm * 150 cm. In accordance with EN74-3, steel base plates must be at least 5 mm thick. If aluminum material is preferred instead of steel, the wall thickness is at least 7 cm.⁴

In system scaffoldings, in accordance with EN 12811, each of the base plates is produced with an area of at least 150 cm² and the short side is at least 120 mm.

The use of base plates is mandatory regardless of the floor type.

In system scaffoldings, the verticality of the base plates can be adjusted. In such base plates, the scaffolding tube passes over the base plate and the tube can be raised and lowered with the help of a spindle on the base plate. The amount of penetration of the scaffolding tube into the adjusting tube (overlay length) in the vertically adjustable base plates must be at least 1/4 of the total length of the adjusting tube.⁵

7.8.2. Floor Boards

In case the ground is not reinforced concrete in the scaffoldings to be built in the MAOG Project, it is ensured that the base plates press on the floor boards. In addition, floor boards are used on reinforced concrete slabs with low thickness and on concrete floors. The base plates are placed in the middle / axes of the base boards.

Floor boards are selected from 5 cm thick and 20 cm wide boards. In principle, it is preferred that the base boards support more than one strut along the long direction of the scaffolding. However, when a single board must be applied under each pillar, base board must be applied on an area of at least 0.1 m² for each pillar. This area is created as 50 cm * 20 cm.⁶

5 cm thick base board application is suitable for uprights under the scaffolding base plate up to 19.7 kN. However, if the pressure exerted by the strut on the ground is more than 19.7 kN, the thickness of the floor board must be at least 10 cm. This is done by stacking two boards on top of each other. If the pressure applied by the strut to the ground exceeds 22.0 kN, double strut application is started.⁷

In cases where the scaffolding is built on a reinforced concrete floor of sufficient thickness and quality, the base board may not be used. If there are fine workmanship and cosmetic concerns on such a floor, boards, plastic plates or similar materials can be used to protect the floor surface.

Reinforced concrete floor bearing capacity may decrease at ground edges and junctions. In such cases, on a reinforced concrete floor with a thickness of 100 mm, the distance to the edge will be at least 250 mm. Engineering assistance is requested when there is any doubt.⁸

NASC TG20:13 Chapter 5.1

EN 12811-2 Clause 5.7.3.

NASC TG20:13 Chapter 5.1

NASC TG20:13 Chapter 5.2

NASC TG20:13 Chapter 5.1



Figure12: Double board application

7.8.3. Scaffoldings Established Close to the Excavation Edge

If the scaffolding is installed on the edge of an excavation or a slope, the distance between the outside of the base board and the edge of the excavation shall not be less than 300 mm. The horizontal distance between the outer part of the base board under the pillar and the bottom of the excavation shall be at least 2 times the excavation height.

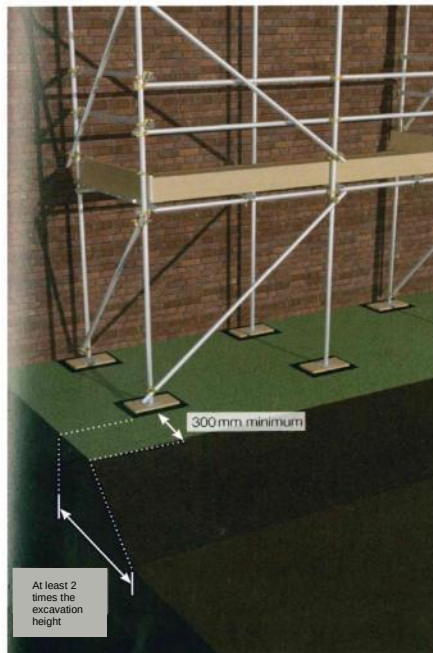


Figure13: Approach distance to the edge of the excavation

7.8.4. Strut Forces Acting on the Ground

In case the scaffolding pillars transfer loads to potentially risky surfaces such as slabs, consoles, platforms, beams or soft floors, the amount of load that will affect the floor of the pillars plays an important role in the durability calculation to be prepared. The manufacturer's manuals are consulted for the strut loads that will affect the ground on the system scaffoldings. According to TG:20, the strut forces that will act on the ground in tube clamp scaffoldings according to certain load classes are given in Tables 9, 10 and 11.

Table1 Heavy-duty (load class 4) tube clamp facade scaffoldings upright forces acting on the ground

Number of floors	2	3	4	5	6	8
Ground load(kN)	10,5	11,8	13,1	14,4	15,7	16,4

Access scaffolding:

Number of floors	2	3	4	5	6	8
Ground load(kN)	12,3	14,7	17,0	18,1	19,2	20,4

Loading floor:

Number of floors	2	3	4	5	6	8
Ground load(kN)	19,1	20,0	20,6	21,1	21,6	22,0

 A floor board measuring at least 500 x 200 x 50 mm is used.

 Between 19.8 – 22.0 kN Double floor boards are used, with dimensions of at least 500 x 200 x 50 mm.

Table : Strut forces acting on the ground for heavy duty scaffolding with bridges up to 8 stories

2 span bridge scaffolding maximum ground load:

Number of floors over the bridge 2 3 4 5 6 8

Ground load(kN)	14,0	17,6	18,7	19,9	22,2	24,5
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3 span bridge scaffolding maximum ground load:

Number of floors over the bridge 2 3 4 5 6 8

Ground load(kN)	17,0	22,3	24,0	25,7	29,2	32,7
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A floor board measuring at least 500 x 200 x 50 mm is used.



Between 19.8 – 22.0 kN Double floor boards are used, with dimensions of at least 500 x 200 x 50 mm.



Bridge struts over 22.0 kN are used in pairs, the base board is doubled.

Table2 Ground loads for simple scaffolding.

Tower perimeter lattice scaffolding:

Number of floors	1	2	3	4	5
Ground load(kN)	9,1	10,4	11,7	13,0	14,3

Independent tower scaffolding:

Number of floors	1	2	3	4	5
Ground load(kN)	3,5	4,8	9,9	13,0	16,5

In-shaft scaffolding*:

Number of floors	2	3	4	5	6
Ground load(kN)	15,2	19,7	22,0	25,3	28,7

* Since the in-shaft scaffoldings are generally built on reinforced concrete ground, floor boards are not required.

7.8.5. Double Seamed Application

In cases where bridges are used on the scaffoldings or the safe loading limit is exceeded, the scaffoldings are doubled to support the scaffolding. If a single floor board is used under double uprights, the dimensions of the floor board shall be at least 750 x 200 x 100 mm.

Alternatively, if the distance between the uprights is sufficient, a base board measuring 500 x 200 x 50 mm can be used under each upright. In this case, the plan dimensions of a pair of under-pillar boards will be 500 x 400 mm.



Figure14: Double strut boarding application.

7.9. Platform Width and Floor Height

The net width on the scaffolding platform surface is called the platform width and the net width should be at least 60 cm. The minimum width of 60 cm is achieved by mounting 3 boards side by side in tube clamp scaffolding.⁹

The width classes of the scaffoldings are given in Table 5.

Table Scaffolding width classes (EN 12811-1)

Genişlik sınıfı	W (m)
W06	$0,6 \leq w \leq 0,9$
W09	$0,9 \leq w \leq 1,2$
W12	$1,2 \leq w \leq 1,5$
W15	$1,5 \leq w \leq 1,8$
W18	$1,8 \leq w \leq 2,1$
W21	$2,1 \leq w \leq 2,4$
W24	$2,4 \leq w$

In scaffoldings with a width of 60 cm, no material or equipment can be stored on the platform, no floor access ladder can be applied from inside the platform.

If it is necessary to store material on the scaffolding platform or if an access ladder is applied from within the platform, the platform is formed with at least 4 adjacent boards and a width of at least 2 boards is left open for passages.

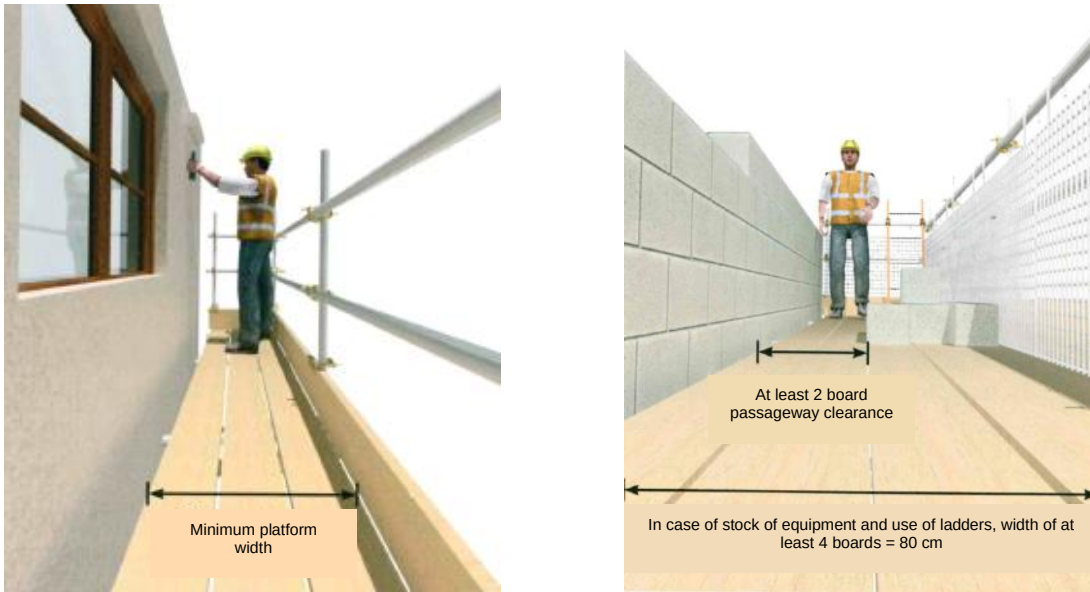


Figure15: Minimum platform widths (TG20:13)

In accordance with EN 12811, headroom should be at least 190 cm on scaffoldings. This is applied on scaffoldings where floor heights are 200 cm. According to the intended use, floor heights are arranged in different ways, provided that they are not less than 200 cm.

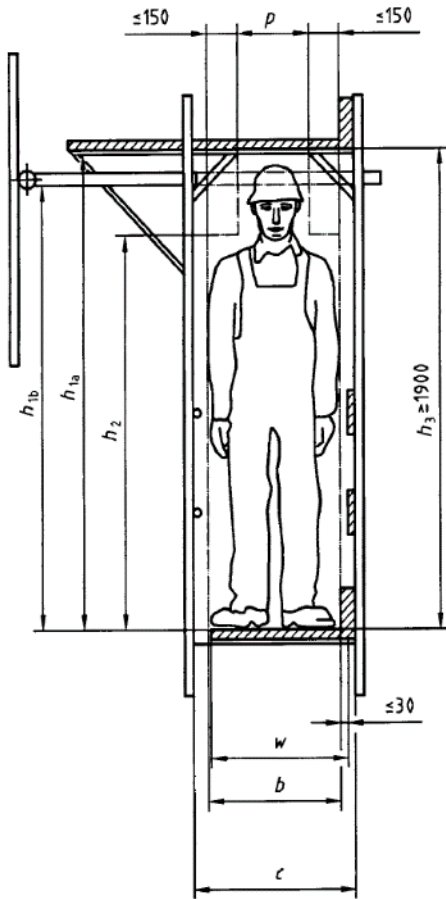
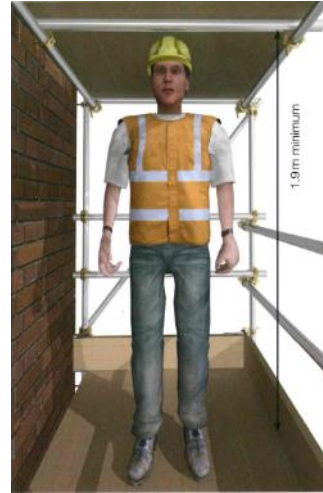


Figure16: Headroom and floor height displays.

7.10. Uprights and Long Horizontals

Props are the main bearing components of the scaffolding. It is used by absolutely plumbing (in a completely vertical position). Plumbing misalignment cannot be more than 2 cm in a 2 m strut and the distance between the highest point and the lowest point of a scaffolding on a scaffolding cannot be more than 5 cm.

Vertical continuity is essential in uprights. It is ensured that the struts transfer the load to the scaffolding foundation, except in very special cases. In order to reduce the risk of buckling of the struts, all struts are connected with the adjacent strut on the façade with appropriate methods, not less than 1 m.

In façade scaffoldings, interior props are installed as close to the structure as possible. This distance cannot exceed 30 cm. In case the distance between the structure and the inner pillar exceeds 30 cm, a railing is applied between the inner pillars or an inner board is applied between the structure and the scaffolding.

Long horizontals are connected to the struts in tube clamp scaffoldings with vertical clamps from the inside. All long horizontals must be level. Scale misalignment can be up to 2 cm in a 2 m section, as in uprights, and up to 5 cm along the entire scaffolding length.



Figure17: Post and long horizontal joint detail.

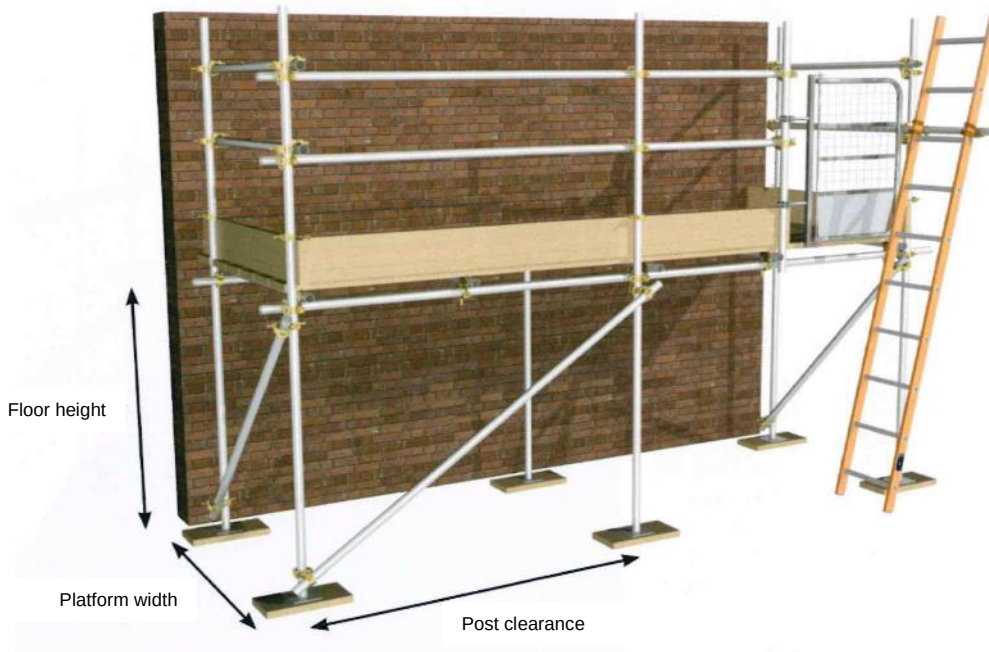


Figure18: Floor height, strut opening and platform width indications

In tube clamp scaffoldings, end-to-end splices can be made with sleeve clamps or internal connection pins. Internal connection pins cannot be used if there is an axial pulling force on the uprights (for example, if a part of the erected scaffolding is suspended with the help of a crane).

In the case of end-to-end jointing in tube clamp scaffoldings, end-to-end connection is not allowed in the adjacent strut on the same floor. It is ensured that end-to-end connections are made by staggering in system scaffoldings, taking into account the manufacturer's guides.

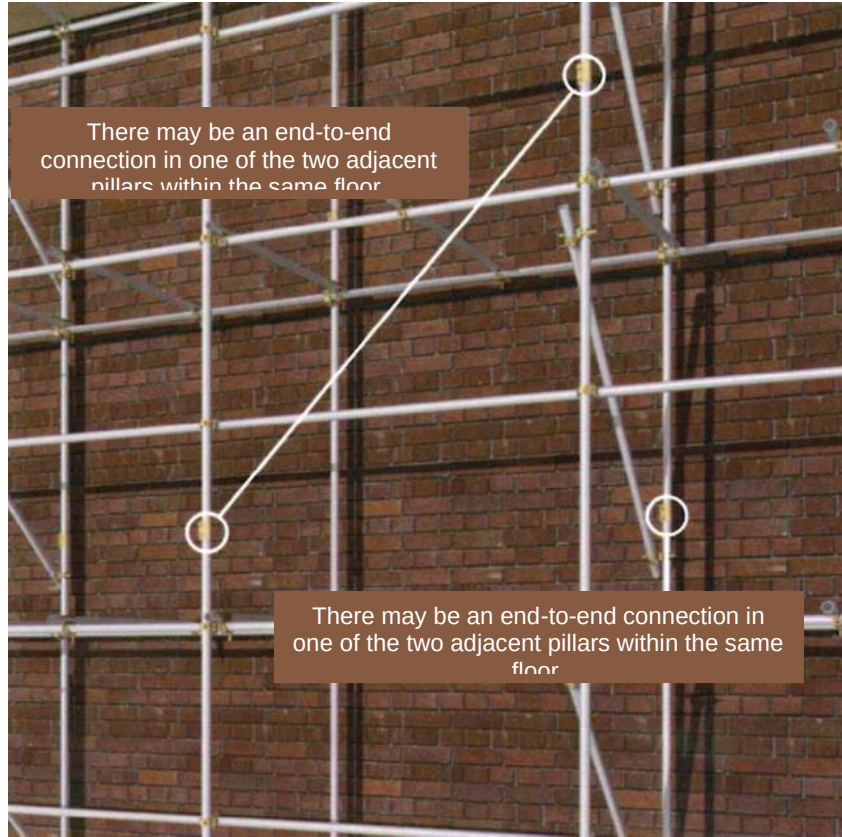


Figure19: Joining on the uprights at the same floor.

In tube clamp scaffolding, only sleeve clamps are used for end-to-end splicing of long horizontals. End-to-end splices of long horizontals are applied at a maximum distance of 30 cm from the nodal points.

In the end-to-end splicing of long horizontals, staggering is done in such a way that only one of the two adjacent long horizontals within the same strut spacing is made end-to-end.

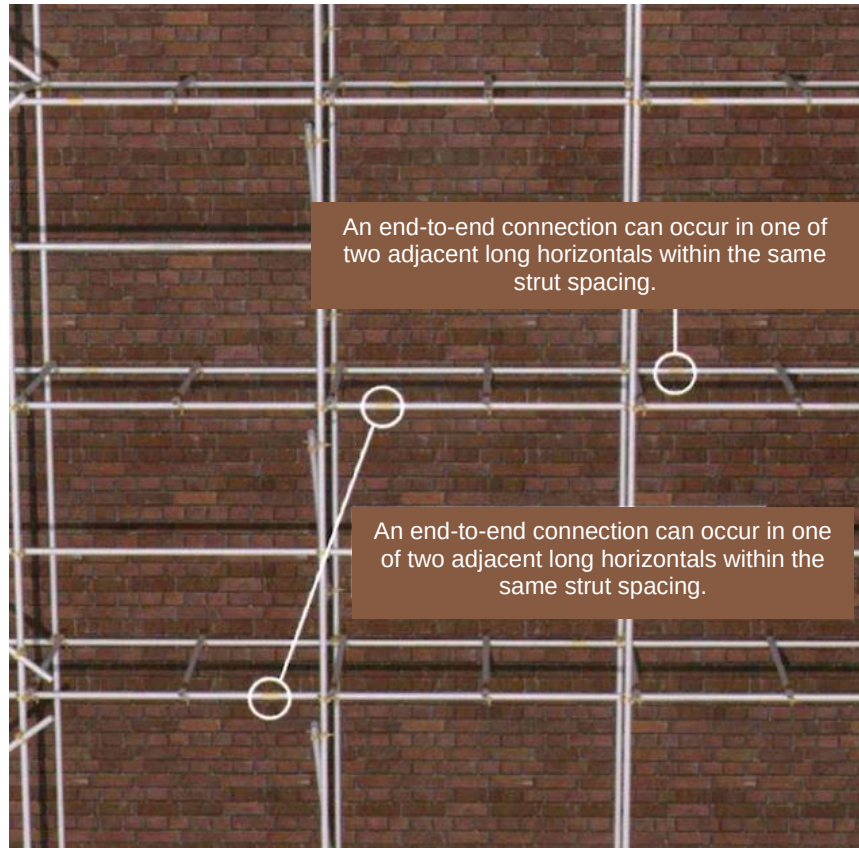


Figure20: End-to-end splicing in the same strut spacing on long horizontals.

For end-to-end splicing of guardrails, the requirements specified for long horizontals do not need to be applied.

The requirements for the installation of long horizontals in system scaffoldings are specified in the user manuals.

7.11. Short Horizontals

In tube clamp scaffoldings, short horizontals are fixed to long horizontals with leaf clamps from the top. It is desirable that the short horizontal protrudes at least 25 mm from the clamp.¹⁰

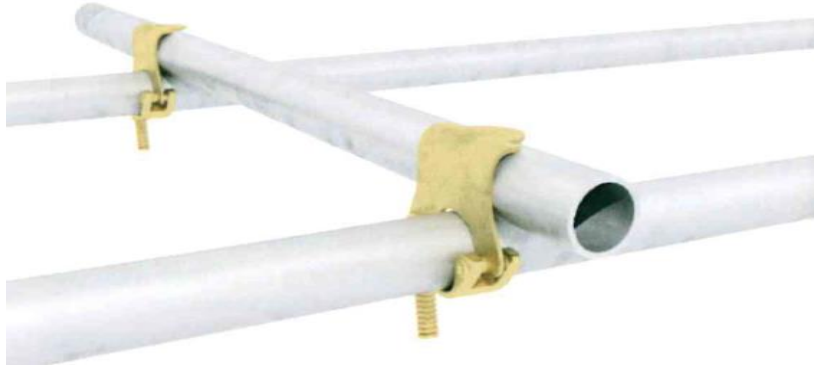


Figure21: Short horizontal mounting detail.

If the short horizontals are capable of supporting an inner board(s), the short horizontal length shall be of sufficient length to fully support the inner board(s).

Short horizontals; It is applied at certain intervals in the middle of the board so that the beginning of the board, the end of the board and additionally the interval is determined according to the load class. These intervals vary between 90 cm and 120 cm according to the scaffolding load class.

In un-boarded floors, short horizontals are placed in the same way as in boarded floors. These horizontals are needed for scaffolding and dismantling.

It can be extended to withstand the short horizontal structure where necessary.

If the short horizontals are used as a part of the anchor element by extending towards the structure or when the facade braces are attached to these elements, they are called as short horizontals of structural nature. In these cases, short – long horizontal connections are made with a vertical clamp instead of a leaf clamp. Short horizontals of this nature can be applied to vertical long horizontal joints at a maximum distance of 30 cm.¹¹

Structural short horizontals can also be connected from the underside of the long horizontal, as connecting short horizontals with fixed clamps and connecting other short horizontals with leaf clamps will create unsuitable conditions in boarding. In such cases, there may be insufficient headroom.

¹¹



Figure22: Structural short horizontal assembly detail

7.12. crosses

The braces applied on the scaffoldings are divided into two groups as front braces and transverse braces.

7.12.1. Facade Crosses

They are crosses applied to the plane of the facades of the scaffoldings. Facade braces can rise in a single opening or can be applied to cover more than one opening.

Facade braces are applied to tube clamp scaffoldings from erection to erection with joint clamps. In special cases, it may be possible to apply with short horizontal to short horizontal clamps. In this case, short horizontals are applied as structural short horizontals.

In both methods, the connections are applied at a maximum distance of 30 cm from the nodal points.

The diagonals can rise in the form of a zig-zag or can be applied in the same direction. In case it rises in the same direction, the facade diagonals applied in a different opening of the scaffolding will be in the direction of meeting the direction of the other opening.

The angle of the diagonals with the horizontal is between 35 and 55 degrees.

Installation details on system scaffoldings are found in the user manuals prepared by the manufacturer.



Figure23: Facade cross application



Figure24: Facade cross mounting detail.

In tube clamp scaffoldings installed in full compliance with TG20:13, the facade braces are applied in such a way that 1 opening is crossed in 6 openings along the facade. This application may differ in system scaffoldings. User guides are followed on system scaffoldings.

At least 2 spans of 7-12 span scaffoldings,

At least 3 spans of 13-18 span scaffoldings must be crossed.

In case the scaffolding floor consists of more than one level, crossovers are made separately for the floors at different levels (Figure 28.)

Crossing a single span across 6 spans is preferred for ease of installation. However, different crossover patterns can also be used.

MAOG Project Management can increase the frequency of frontal crosses as a result of the risk assessment it will make.

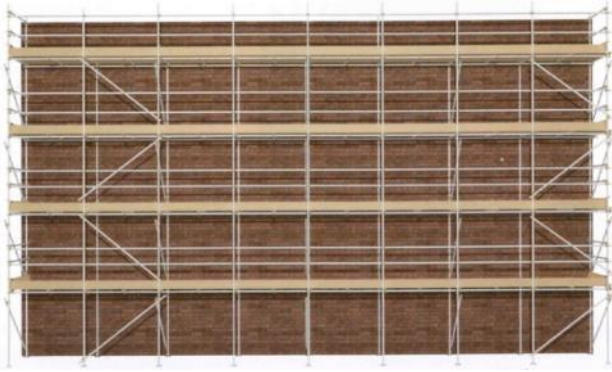
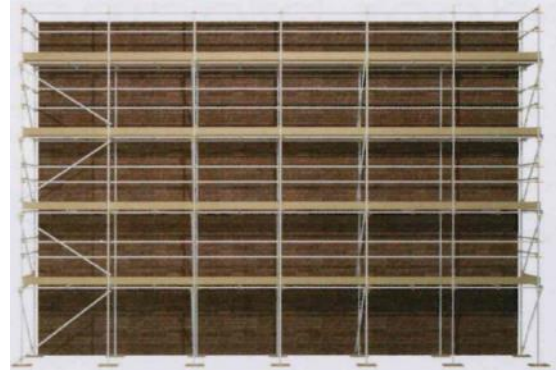


Figure25: Facade cross application



Figure26: Facade cross application in scaffoldings installed at different elevations.

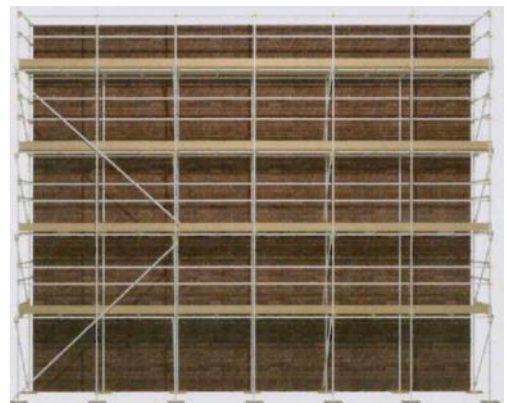




Figure27:Different diagonal patterns.

7.12.2. Transverse cross:

In tube clamp facade scaffoldings, transverse cross application is made in the first and last set of poles and additionally in one of the two sets of poles. In case the strut opening is shorter than 150 cm, it is sufficient to apply once in 3 strut sets. Cross braced strut sets create more rigid frames than other strut sets. For this reason, anchorage, façade cross and buttress applications are made to these strut sets as much as possible.

Transverse braces are made with fixed clamps from long horizontal to long horizontal or with joint clamps from stand to stand. In boarded floors, it is preferable to erecting rather than seaming in order to prevent kicking.

If there is a turn on the scaffoldings, the corner posts are not crossed transversely.



Figure28: Transverse cross application.



Figure29:Transverse cross link detail.



Figure30:Transverse cross application in turns.

In order not to obstruct the passage in the boarded floors, the transverse braces can be made from the upper railing as in Figure 33. In this case, a transverse cross is applied in each strut.

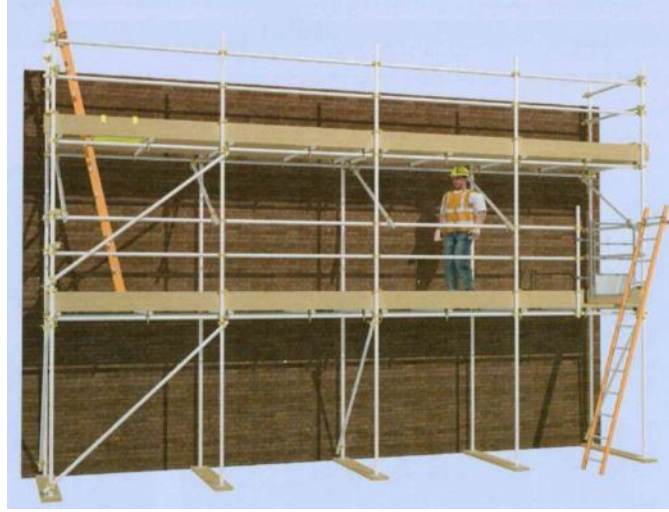


Figure31:Cross application alternative on boarded floors.

The transverse cross application is an application of tube clamp scaffoldings and there is no requirement for transverse cross in system scaffoldings.

7.13. Platform Boarding

Scaffolding platforms are constructed with boards and short horizontals supporting the boards. Platforms are completely closed with boards. In tube clamp scaffolding, the boards are mostly wood-based. System scaffoldings can have steel and composite boards. Wooden boards are supplied in 50 mm thick and 20 or 15 cm wide, unless there are different sizes of production and legal requirements in the country of operation. All boards used side by side on a platform are selected in the same size.

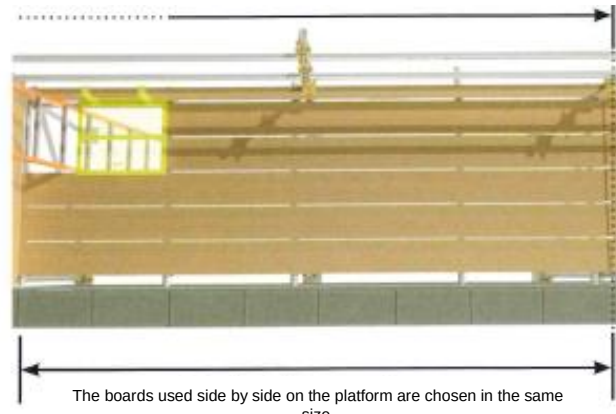


Figure32:Platform Boarding.

Platform boards cannot be overlapped. However, this is permissible on corner turns. It is essential that the boards are placed end-to-end. In end-to-end splices, the protrusion on the short horizontal is between 5 cm and 15 cm.

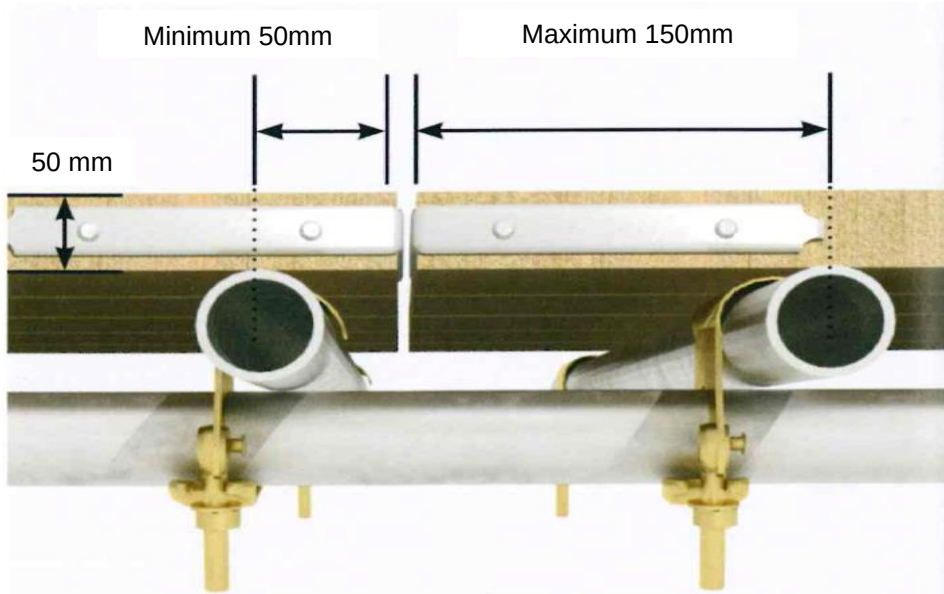


Figure33:Platform boards overlay lengths.

The platform boards are supported by short horizontals. These supports are applied at the head of the board, the middle of the board and the end of the board. The distance between two short horizontals is determined by the load class.

Table3 Short horizontal range for platform support purposes.

Load class	Board thickness	Maximum distance between horizontals	Minimum length overlap	Maximum overlay length
1, 2, 3	50 mm	120 cm	50 mm	150 mm
4, 5, 6	50 mm	90 cm	50 mm	150 mm

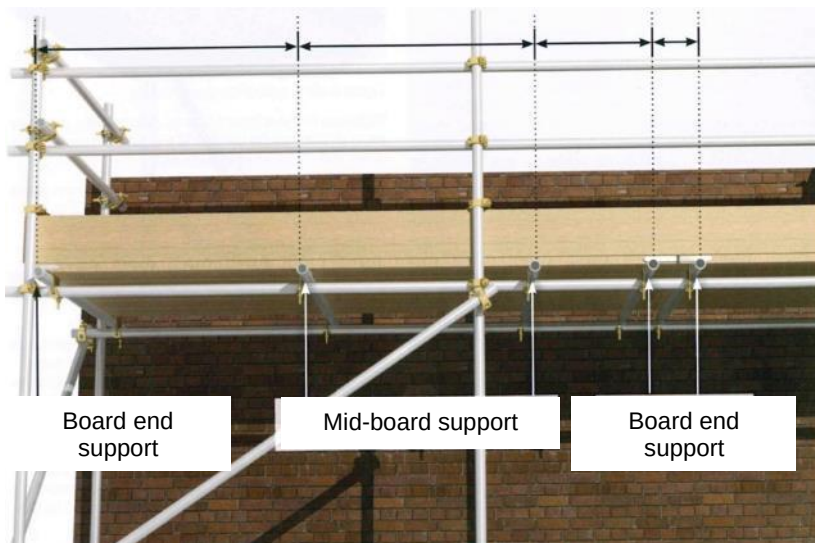


Figure34:Platform board supports.

Platform boards are secured against movement in any direction and end lift on both system scaffoldings and tube clamp scaffoldings. Specific clamps or fasteners can be used for fixing. Nails cannot be driven into wooden boards for any purpose.

In system scaffoldings and tube clamp scaffoldings, there cannot be a gap exceeding 2.5 cm between the platform boards.

In case of using inner board, there may be a gap of 5 cm, which is the approximate scaffolding tube distance, between the main platform board and the first inner board. No work can be done on the scaffolding until this gap is closed.

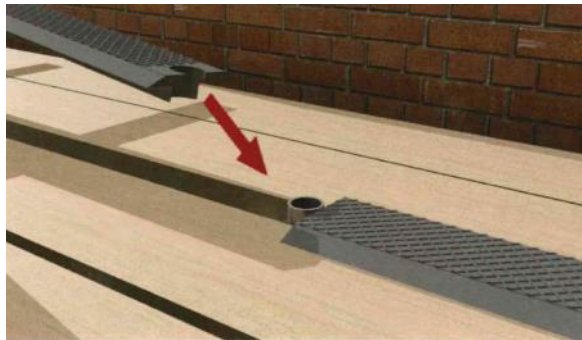


Figure35:Closing the gaps that occur in the presence of internal boards.

Inner boards are applied by extending the short horizontals towards the structure and placing the boards on the elongated short horizontals. The inner boards are fixed with leaf clamps at the short horizontal end.



Figure36:Internal board application and fixing.

7.14. Railings and Shin Guards

All work platforms are protected by a guardrail system. Railing dimensions are given in Figure 39.

These dimensions are also valid for system scaffoldings.

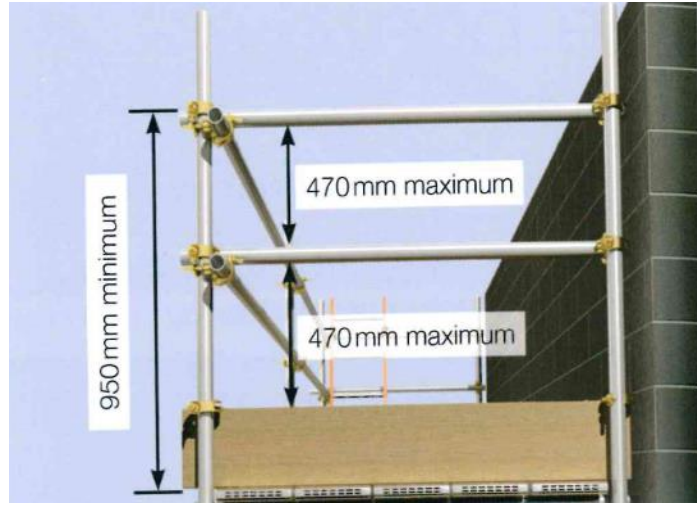


Figure37:Railing dimensions.

In tube clamp scaffoldings, the railings are fixed to the inside of the struts with fixed clamps. Each railing is clamped at at least 2 points.

If it is necessary to rise on the platform or if the ladder is located on the edge of the platform, additional guardrail is applied.

On the floors that are not boarded, there is 1 row of upper railings for soot removal.

The distance between the platform and the structure cannot exceed 30 cm. In these cases, there is no need for fall protection between the platform and the structure.

In cases where there is a gap of more than 30 cm between the platform and the structure or the structure does not prevent the employee from falling, fall protection is applied inside the platform, just as it is built to the outer edge. This practice also applies to system scaffoldings.

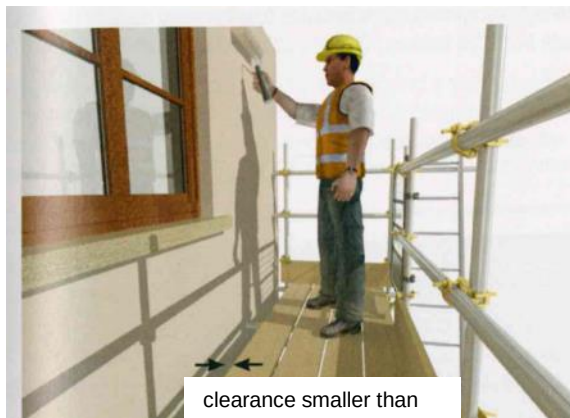


Figure38:The requirement for fall protection according to the distance from the structure.

There are toe boards on the platforms to prevent material from falling at least 15 cm high.

The slats are fixed in place. There cannot be a gap larger than 2.5 cm anywhere between the kick plate and the platform board or anywhere on the kick plate.

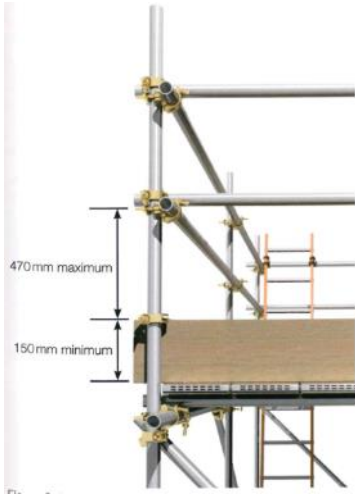


Figure39:Kick plate dimensions and fixing method.

7.15. Anchors and Buttresses

Anchors; These are the connections between the scaffolding and the structure that prevent the scaffoldings from approaching and/or moving away from the structure installed on its facade, and that ensure the vertical position of the pillars.

Anchors are applied to the bearing surfaces of the building (such as columns, beams, curtains, floors in reinforced concrete structures, steel columns and steel beams in steel structures). On the scaffold, it is applied to the struts, railings, long or short horizontals, provided that they are at a maximum distance of 30 cm from the nodal points.

7.15.1. Anchor Types

Non-Destructive Anchors;

Box Type Anchors

It is the type of anchorage taken by completely surrounding the building columns or other suitable places with tube and clamp materials.

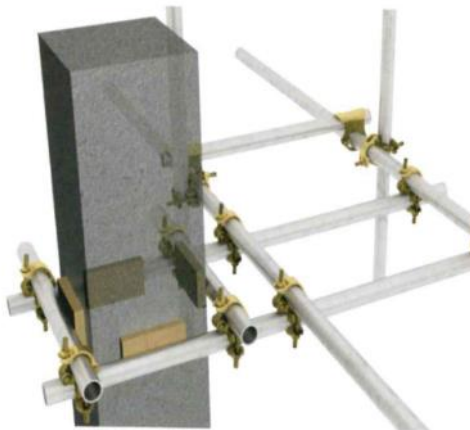


Figure40:Box Type Anchors

Jaw Type Anchors

It is the anchor taken from the 'L' shaped structures where it is not possible to wrap the structure completely.



Figure41:Jaw Type Anchors

Anchorage from within the structure

It is the anchor provided by long horizontals taken from inside and outside the openings such as windows or doors on the building facade.



Figure42:Anchorage from within the structure

Window Frame Anchor

It is the anchor used for 'light duty' scaffoldings taken from the inner surfaces of the building window or wall openings where anchorage from inside the building is not possible. It cannot form more than half of all anchors in the same scaffolding.



Figure43:Window Frame Anchor

Steel beam clamp:

Steel beam clamps are generally used as anchoring material in scaffoldings installed on steel structures in industrial, offshore or construction. An anchor point is always created using opposing clamps.

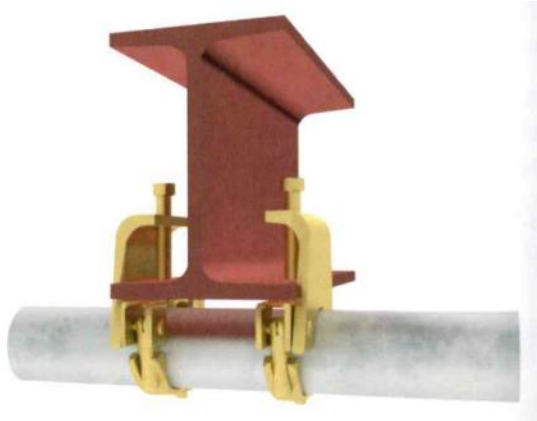


Figure44:Steel beam clamp

Destructive Anchors;

The most frequently applied method for fixing the scaffoldings to the structure is the anchorages made by embedding the anchor materials into the structure. For this process, different anchoring materials are used according to the type of building (reinforced concrete wall, brick wall, steel structure or wooden wall, etc.).

Anchoring between the structure and the scaffolding is provided by attaching the special and suJHable anchor material produced for this job to the scaffolding and the structure. Fastening by screwing eye bolts and ring bolts to the structure and passing the scaffolding tubes through the rings is the most commonly used method.



Figure45:Eyelet bolt

As an alternative to eyelets and eyebolts, metal plates welded to the scaffolding tube are also frequently used anchoring methods.

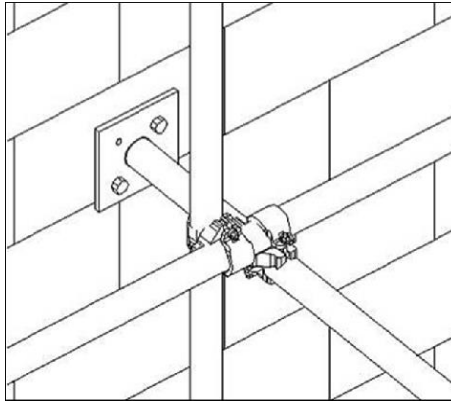


Figure46:Welded metal plate

50mm Eyelet

The eye size of the bolt fixed to the building facade is 50 mm. Anchorage is provided by passing the scaffolding tube horizontally through the eye.



Figure : 50mm eyelet

Narrow Eyelet

The diameter of the eye of the bolt fixed to the building facade is less than 50 mm. With this eye, the scaffolding tube or similar material with a hook at the end is fixed and anchorage is provided.



Figure47:Narrow Eyelet

Clamp or Plate Bolt

It is the anchor formed by fixing the steel plates fixed by welding to the end of the scaffolding tube to the building facade with bolts.



Figure48:Plate bolt

7.15.2. Anchor Distance Rules

Anchor distances vary depending on many factors such as the anchorage frequency and distance of the facade scaffoldings on the structure, the height of the scaffolding, its width, the purpose of use, the wind intensity in the area to be installed, or the use of add-ons such as scaffolding net.

If covering or net will be used on the scaffolding facade, all the posts on the last floor are additionally anchored.

Anchor frequency

With reference to TG20:13, an anchorage point is created every 16 m², including the 4th load class, on facade scaffoldings, this frequency is increased in case of use of net or cover in the scaffolding. In case of using a net, the wind forces due to the net are taken into account in the durability calculation and the anchoring frequency is determined in the durability calculation.

Anchor frequency indicates the minimum number of anchors to be cast, but for the most accurate application, an anchor point is created in two transverse crosslinks.

In the 5th and 6th load classes, it is appropriate to make an anchorage in 8 – 12 m².

System scaffoldings are installed in accordance with the manufacturer's manuals.

Example 1:

Strut range: 2 m

U. horizontal range: 2m

Two uprights and one horizontal anchor will cover an area of 16m².

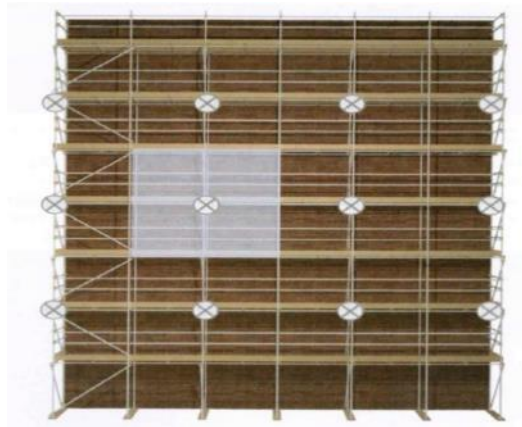


Figure49:Example 1:

Example 2:

Strut range: 2 m

U. horizontal range: 2m

Four struts and one horizontal anchor will cover an area of 32 m².

This application can be used when the anchorage requirement is 32 m². It is not suitable to be used in places with a requirement of 16 m², in the absence of double-strength anchor application.

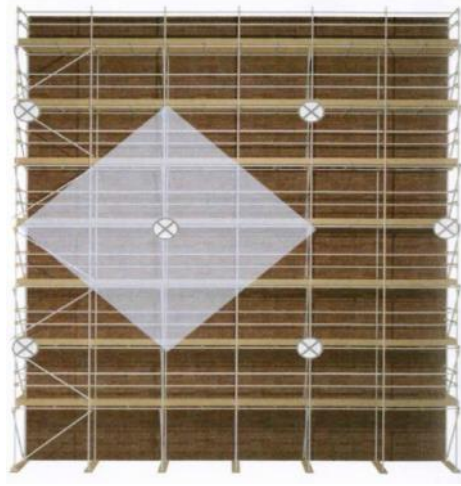


Figure50: Example 2:

Anchor distance

It is best practice to have a maximum distance of 4 meters between anchor points. In a scaffolding with a distance of 2 meters between the struts and horizontals, an anchor can be applied in both horizontals as well as in every horizontal.

If the scaffolding floor height is 3 meters, an application on two floors will exceed the maximum distance of 4 meters ($3 \times 2 = 6\text{m}$), so an anchor is applied on each floor.

Example 3: Staggered floor anchor

Strut and horizontal distance: 2 meters

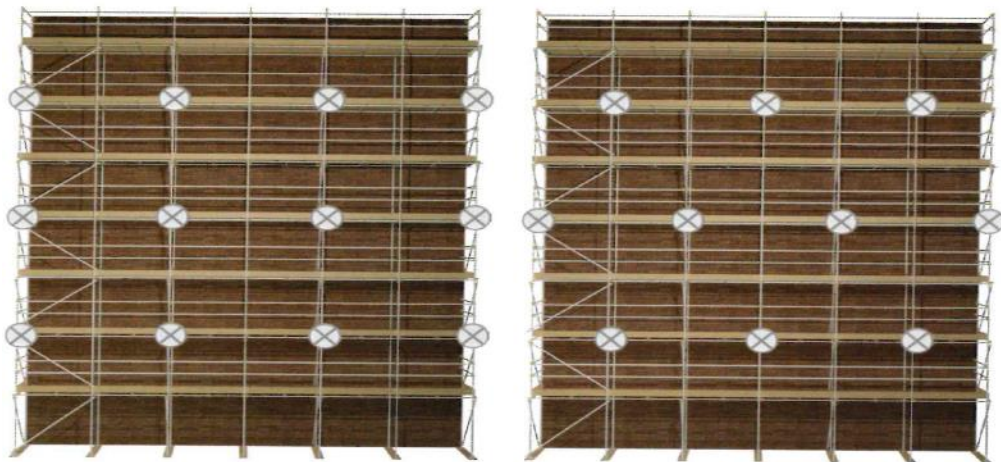
The distance between each anchorage does not exceed 4 meters. In this way, the effective area of an anchor becomes 16 m².

This type of anchoring is applied in standard facade scaffoldings.



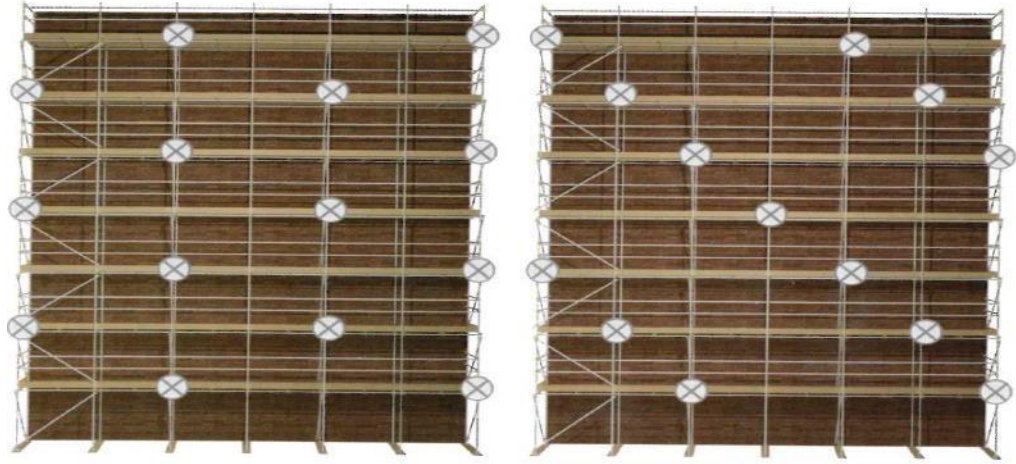
Figure51: Example 3:

Anchor Application Plans



a) 100% cross braced strut sets b) 50% cross braced strut sets

Figure 55 : 2.0 m floor high uncovered scaffolding anchorage plan



c) Every floor anchor d) Every floor anchor (50% of anchors are in transverse cross)

Figure :56 2,0 m floor high uncovered scaffolding anchorage plan

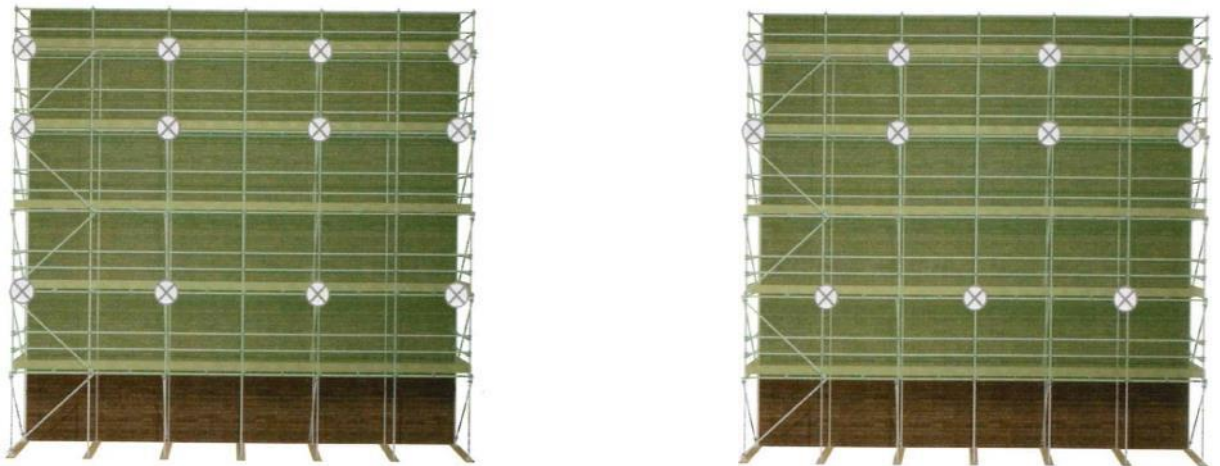


Figure 57 : 2.0 m floor high covered scaffolding anchorage plan

In case of using cover or net on the scaffold, anchorage is definitely applied on the top floor.

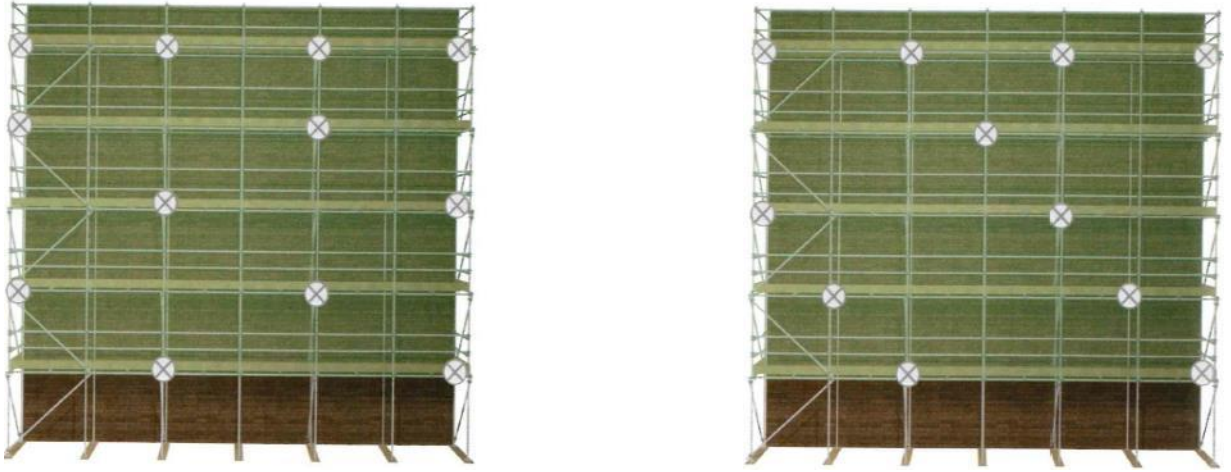


Figure 58: 2.0 m floor high covered scaffolding anchorage plan

Ideally, each transverse cross is anchored. However, it is ensured that more than 50% of the anchors are transversely.

7.15.3. turns

Two-turn scaffolding anchorage plan

In two-turn scaffoldings, the anchors on the turn start from the 2nd strut.

If the returning scaffolding is 3 modules and below, anchorage is not required on the turn.



Figure 59 : Anchor application in 3-span turns.

If the returning scaffolding is 4 modules, anchorage is applied on the 2nd row of posts.

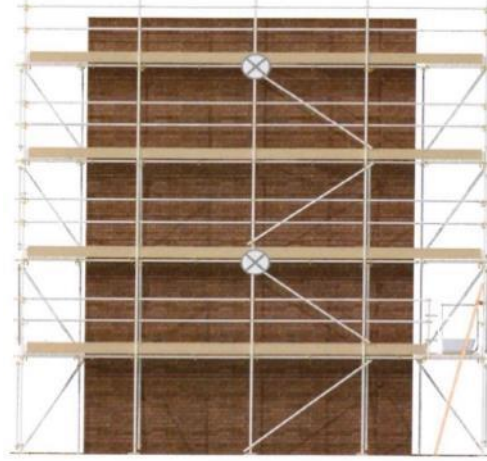


Figure 60: Anchor application in 4-span turns.

If the rotating scaffolding has 5 or 6 modules, two sets of anchors are applied and the anchorage starts from the 2nd row of scaffolding posts.

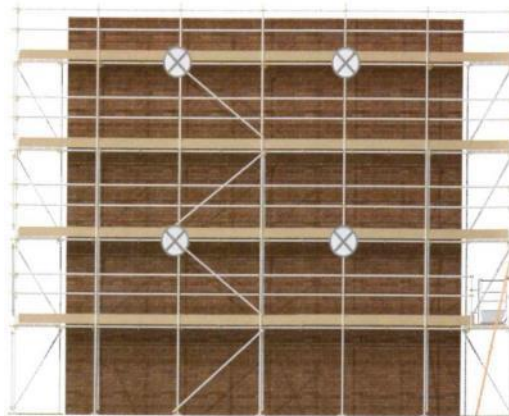


Figure 61 : Anchor application in 6-span turns.

7.15.4. Buttress

The Buttresses can provide stability by acting as anchors on scaffoldings erected at 6 meters or lower. For the first 3 floors of scaffoldings over 6 meters, scaffoldings can be applied instead of anchors. However, on the next floors, the anchoring application continues as it should.

The buttresses are applied at an angle of approximately 60 degrees (2 vertical 1 horizontal) from the horizontal, at a maximum distance of 30 cm from the buttress horizontal connections, every 2 sets of buttresses (also to strut sets with transverse posts).

The buttresses are preferably fixed to long horizontals with fixed angle upright clamps or to the uprights with joint clamps.

Short horizontals in the places where the buttress are located are extended towards the structure and contact the structure. This practice ensures that the scaffolding does not move towards the structure. This type of structural short horizontals are connected to long horizontals with a fixed angle vertical clamp.

The buttresses are fixed to the floor, the fixation takes place by running a tube vertically to the floor and clamping the buttresses to it. At the same time, the buttresses are connected to each other by a horizontal parallel to the façade.

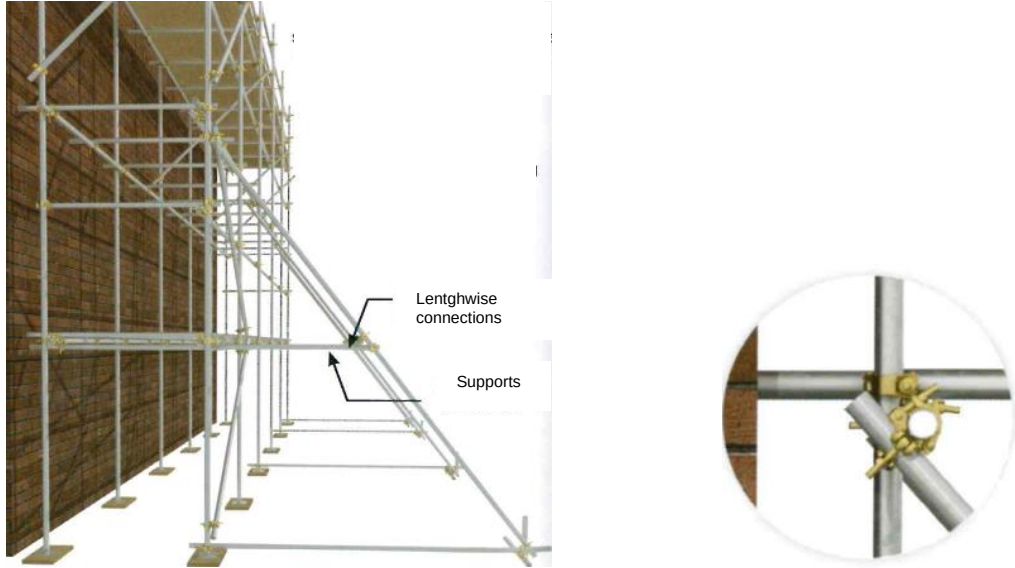


Figure52:Butresses and connection details

In case the buttresses are applied to the inner or outer facade of the scaffolding, it also undertakes the transverse cross function. Loading towers or access towers built outside the scaffolding also act as buttress for that area of the scaffolding.

Temporary butressing can be made for additional precautionary purposes during the installation and dismantling phases of scaffoldings.

7.16. Access to Scaffolding

7.16.1. Access Hierarchy

In order to determine the most appropriate method for employees to access the scaffold, the access hierarchy specified in Figure 74. is considered together with the risk assessment.

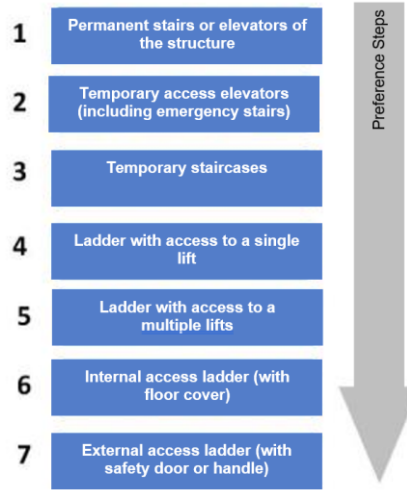


Figure53:Scaffolding access hierarchy

The following factors are taken into account when determining the method;

The height of the scaffolding; In high scaffoldings, temporary stepped ladder towers adjacent to the main scaffolding or mechanical elevators are preferred for the transmission of workers and materials.

The width of the scaffolding; The space to be allocated on the platform for interior access ladders is not a suitable method as it will restrict the working area, especially in narrow scaffoldings.

Number of employees who will use the scaffolding; large number of employees requires external access towers.

The work to be done at the scaffolding; situations where hands must be completely freed due to material handling.

Evacuation and emergency requirements; The first choice in the access hierarchy is to use step ladders in the structure, if possible. Temporary stepped ladders are the next step in the hierarchy. In cases where step ladders are not applicable, steep ladder access such as ladder towers or modules may be preferred. Access ladder made from outside the scaffolding is the last choice.

7.16.2. Mechanical Access

Temporary elevators are used to transfer personnel and cargo to the scaffolding floors. Since it cannot support itself, it is definitely anchored in accordance with the structure, design and assembly is done by authorized persons of the manufacturer. Alternative escape / evacuation ladder is provided in case of mechanical failure.

7.16.3. Stepped Ladder Towers

Step ladders are preferred when permanent structure ladders and their accesses are not suitable. Stepped ladder towers can be produced from tube clamp materials as well as from fabricated ready-made materials.



Figure54:Stepped Ladder Towers

Business Specific Step Ladder Towers

- The manufacturer's instructions are followed during installation and use.
- Criteria such as installation, dismantling, replacement, height, net use are determined according to the manufacturer's recommendation.
- The towers are installed as close as possible to the main scaffolding.
- Ladder passage height should be the same as the main scaffolding platform heights and level difference should be avoided.
- The towers must be physically connected to the permanent structure or to the main scaffolding structure with anchors.
- When connecting to the permanent structure or the main scaffolding, the manufacturer's instructions must be followed, and these towers are taken into account when preparing the scaffolding installation plan.

Tube and Clamp Ladder treads

- It is used for 1.5 meters and above reach.
- It is installed so that the angle of the ladder is 30° – 35°.
- 0.5 m open space is left at the entrances.
- The step depth is at least 125 mm, but according to EN 12811-1 it must be 165 mm.
- The horizontal distance between the initial projection of an upper step and the step can be 25 – 55 mm.
- The vertical distance to the next step can be between 175 mm and 225 mm.
- The relationship between the vertical and horizontal distance is adjusted for comfortable stride.

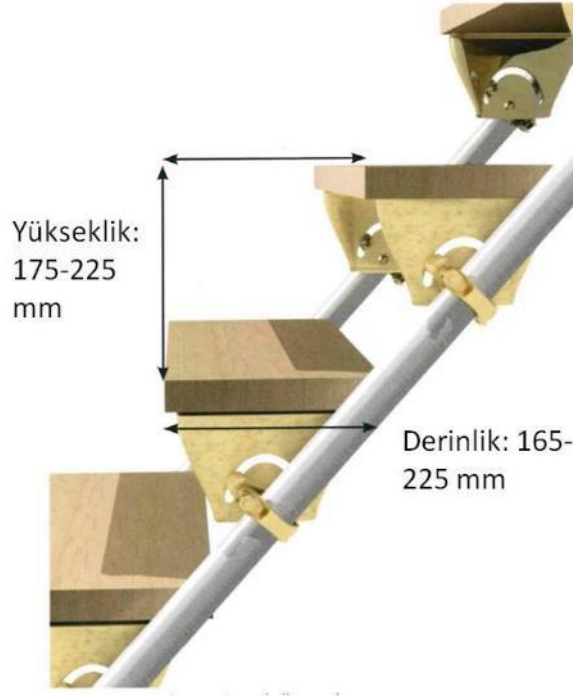


Figure55:Tube clamp ladders.

- Ladder towers reaching a height of 1.5 meters and more require special design and durability calculations.
- Access ladder towers are usually installed adjacent to one face of the façade scaffoldings.
- Transverse crosses are applied on both sides of the tower.
- Wing cross is applied for tower stability.

7.16.4. Steep Ladder Towers

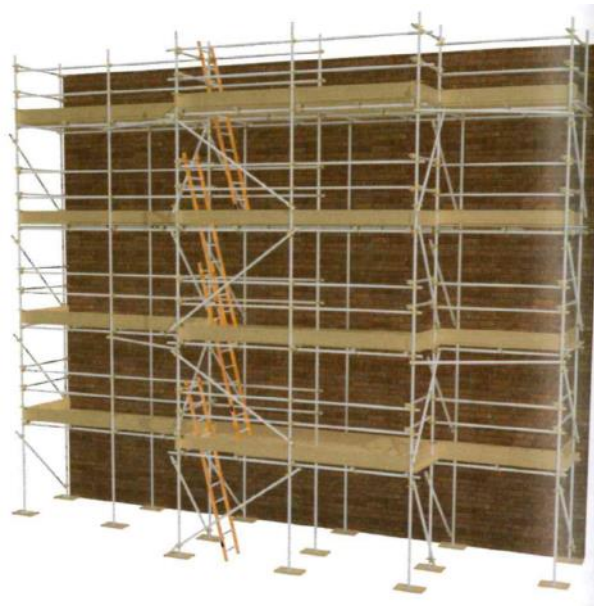


Figure56:Steep Ladder Towers

Steep ladders are used where step ladders are not applicable.

Installation

Steep ladder towers are usually installed adjacent to the outer surfaces of independent facade scaffoldings. Crosses are applied to the other three fronts.

Anchors

Steep ladder towers are anchored from both floors or from the baffling floors to the scaffolding façade without erection. Anchor tubes are connected together with upright clamps to the interior and exterior of the independent scaffolding.

Wing Crosses

It is applied to both sides of the tower in cases where the scaffolding is connected to the independent scaffolding façade floors in a staggered manner.

The wing braces are connected to the next façade scaffolding struts at a maximum distance of 300 mm from both outer struts of the tower. In plan view, the wing crosses are triangular.



Figure57:Wing cross application.

Ladders

In steep ladder towers, it is ideal to use a separate staircase at each floor transition. It can be used if the use of a staircase on more than one floor is also foreseen in the risk assessment. In this case, the maximum distance that a ladder can reach cannot exceed 9.0 meters.

Platforms

Each platform reached by the ladders is completely enclosed and surrounded by railings. If there is a possibility of material falling down, slats are mounted on the platforms, no material is left on the platforms.

7.16.5. Other Ladder Access Methods

As stated in the access hierarchy to the scaffoldings, the access ladder and the scaffoldings are separate from each other when applicable. Where this is not possible, the main platforms of the

scaffoldings can be used for scaffolding ladder access. In these cases, ladder crossing points are protected against the risks of falling and are surrounded by railings.

In the first method applied, the platform of the ladder crossing point is kept away from the work area as much as possible by extending it. By applying the staggered guardrail system, one guardrail protects the working platform and the other guards the opening. The wind load is taken into account, as the extended platform and its uprights are not connected.

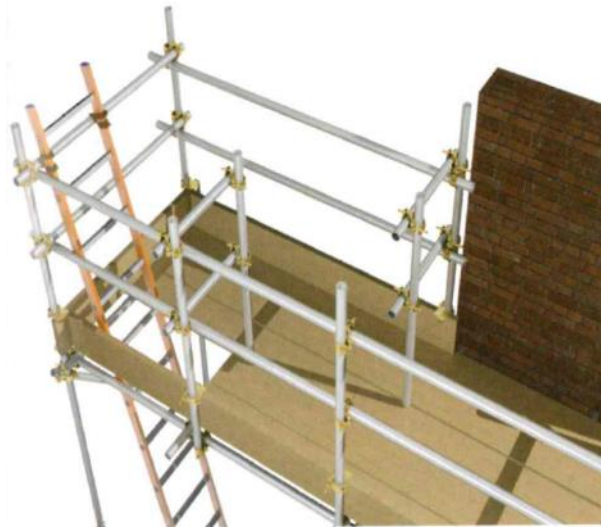


Figure58:Ladder platform applied to the end of the floor.

Enclosing the entire perimeter of the opening with guardrails and providing the passage with a revolving guardrail or a self-closing door will also work.



Figure59: Stairwell railing application.

Another alternative is the application of a ladder cover to the transition point of the platform. The floor door must be kept closed in all cases where the ladder is not used.



Figure60: Ladder cover application.

The last method that can be applied is to provide access by means of a steep ladder and door to be installed outside the scaffolding. It is recommended to apply this application only to the first floors of the scaffolding.



Figure61: External access application.

In this application, the ladders are kept 1.0 meters longer than the level to be climbed and must be fixed to the scaffolding railings.

Access Platforms

In cases where all scaffolding floors cannot be closed with a platform, intermediate floors can be closed. If a single staircase will reach more than one floor, the distance between the entrance and the last access floor should not exceed 9.0 meters. If the distance between the two access floors exceeds 9.0 meters, intermediate rest floors are created.¹²



Figure62:Access platforms limJHAtions.

Use of Portable Ladders

Portable ladders are positioned on a sufficiently tight and level ground, in such a way that only the uprights are in contact with the ground. Ladders are installed at 1 unit horizontally and 4 units vertically (1/4 ratio, 75°) and are fixed to the scaffolding at both uprights to prevent accidental movement.

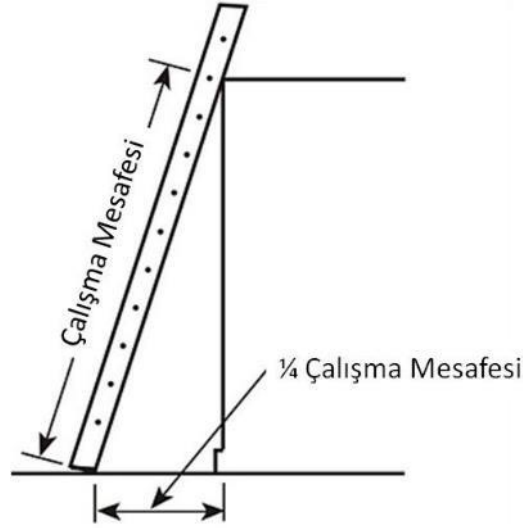


Figure63:The angle of use of the mobile ladder.

Many methods can be used to secure ladders to scaffoldings, such as using clamps, tethering, steel or plastic clamp strips.

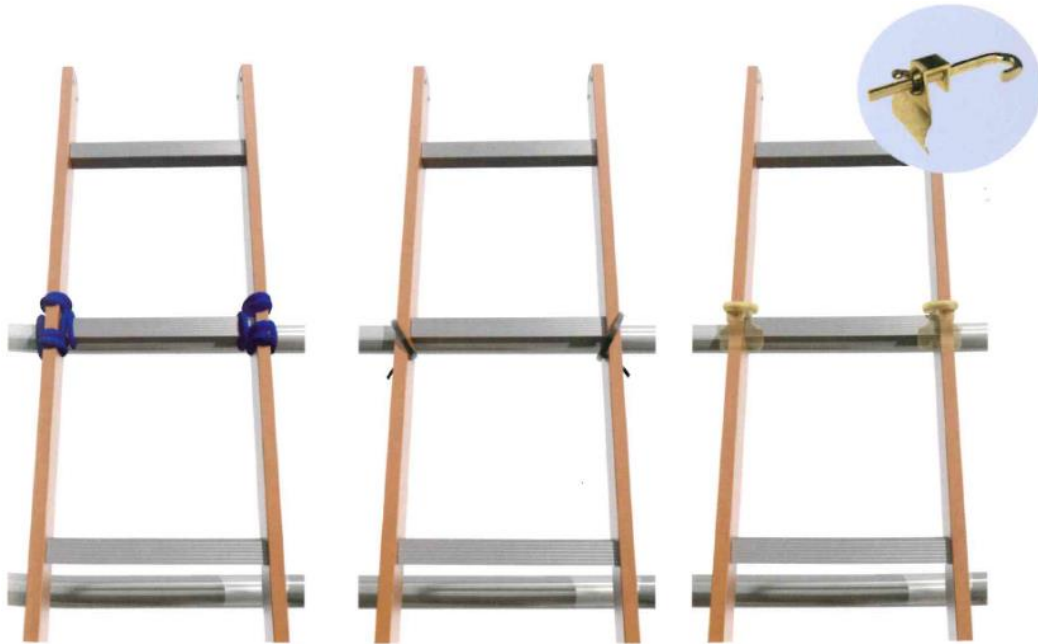


Figure64:Portable ladder fixing methods.

Ladders must be at least 1.0 m longer than the access platform, where this is not possible a suJHable guardrail may also be used.

The 3-point rule is always taken into account when using ladders. Steep ladders are not suJHable for carrying materials by hand, hand tools are carried to the work area by carrying them in a waist bag or similar bag.

Ladders are not suJHAbLe to be installed in areas where there is a risk of vehicle collision. Such areas are surrounded by suJHAbLe barriers.

Ladders are properly marked so that unauthorized persons cannot access them.

7.17. Tower and Mobile Scaffoldings

7.17.1. Connected Tower Scaffoldings

Tower scaffoldings;

- Tower scaffoldings are scaffolding structures that are supported by 4 struts and rise in proportion to their width and length.
- Connected tower scaffoldings are fixed to the permanent structure in which they will be used, using the same method as facade scaffolding. Tower scaffolding, which generally rises on a module, may consist of 2 modules for ladder access or material storage when necessary.

Crossover Pattern

In tower scaffoldings, the facade crossing is applied on all surfaces of the scaffolding structure, opposite to each other, along the height of the scaffolding.

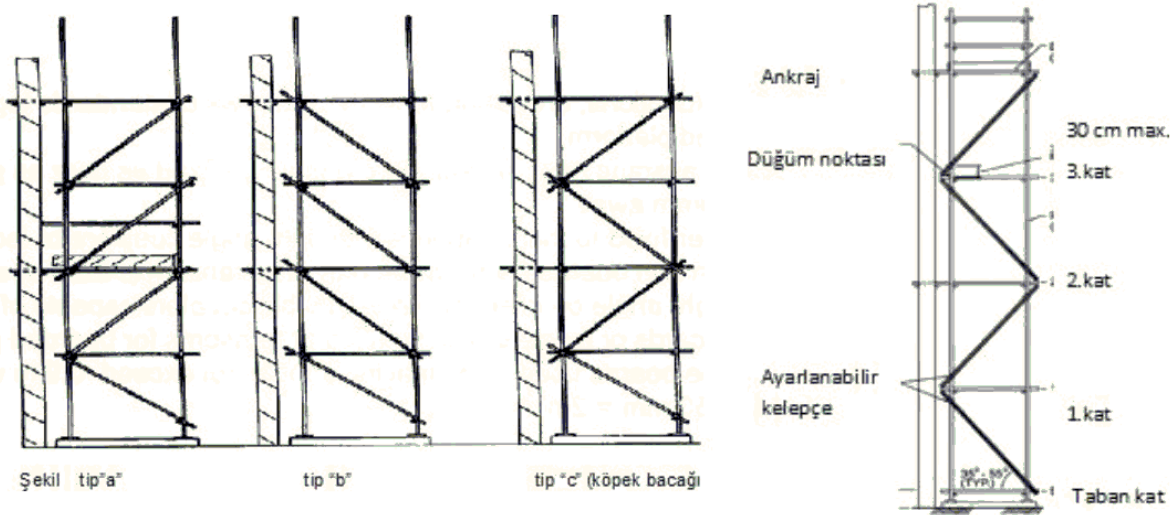


Figure65:Connected tower scaffoldings diagonal arrangements.

Connection Type

Link tower scaffoldings are fixed to the outer surface of the facade along the height of the scaffolding. In tower scaffoldings consisting of more than one module, the connection points can be applied on each floor by staggering each other, or they can be applied at 2 node points on both scaffolding floors.

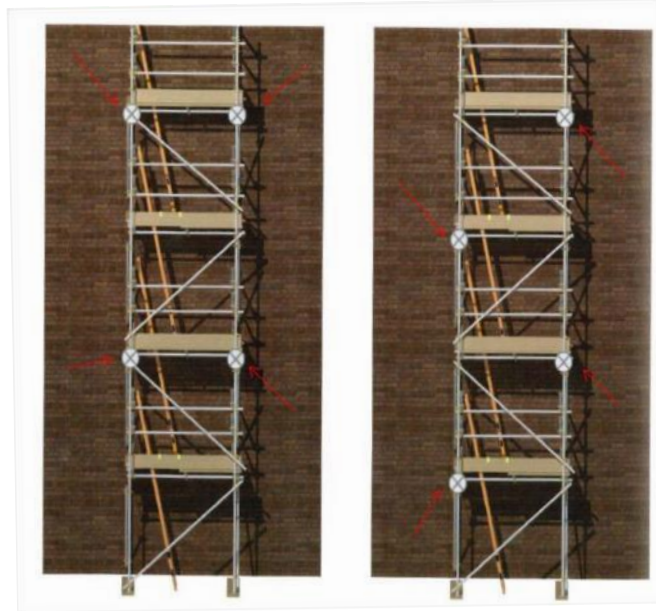


Figure66:Connected tower scaffoldings anchor patterns.

Net or similar coatings to be applied to the outer surface of the scaffolding may increase the number of anchor points depending on their situation.

Requirements for connected tower scaffoldings in system scaffoldings are specified in the user's manual. If it differs from the details mentioned in this procedure, the requirements specified in the user manual apply.

7.17.2. Independent Tower Scaffoldings

They are tower scaffoldings that can stand in balance without support from the surrounding structures. Connected tower can be installed by following the same methods as scaffolding installation methods.

Area of Use

Independent tower scaffoldings have 2 usage areas.

- Used indoors:

This type of scaffolding is protected from weather conditions due to the area in which it is used.

- Used in open areas:

This type of scaffoldings are scaffoldings that are exposed to wind and other weather conditions due to their location.

Independent tower scaffoldings used in open areas are not protected against the overturning effect of the wind. Where necessary, special design may be required using anchors, scaffoldings or similar methods to prevent the scaffolding from tipping over.

Working on stand-alone tower scaffoldings is not recommended when the wind speed exceeds 18 m/s.¹³

Installation

- Independent tower scaffoldings must be built on a solid foundation and plumb. If the scaffolding will be installed on a sloping ground, the ground must be compacted, leveled and slips must be prevented at the points where the base feet touch.
- When creating scaffolding floors, the long horizontals are joined to the scaffolding posts with the help of right-angle clamps. The short horizontals are then attached at the top of the long horizontals with leaf clamps. It is ensured that the module is in the square. Finally, cross connections are completed on all fronts. Cross connections are applied up to the top floor work platform.
- The scaffolding floor height is adjusted not to exceed 2 m.

Access to Scaffolding

Independent tower scaffoldings have their own access point for each floor. This tower can be inside the scaffolding, or it can be accessed from the outside with the help of an extra module. In tower scaffoldings with internal access, the ladder access point is closed with a secure access cover, ensuring integrity with the platform, so that there is no fall gap.



Figure67:Access gap closure in stand-alone tower scaffoldings.

Scaffolding ladders are applied inclined whenever possible, but in cases where the dimensions of the scaffolding are not suitable, ladders can also be applied vertically.

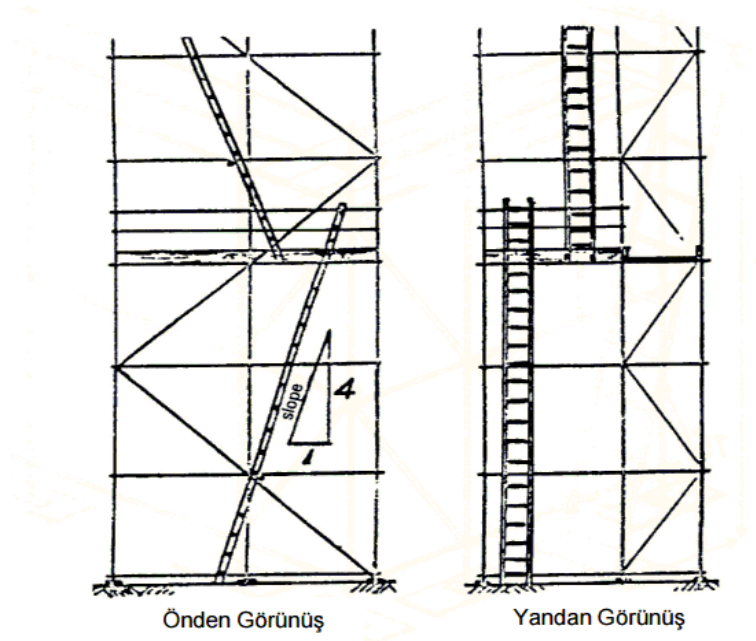


Figure 68: Access ladder applications in stand-alone tower scaffoldings.

Loading Classes

Only 3 load classes are applied for Independent Tower Scaffoldings. These 3 load classes are specified below.

Table 4 Load classes of independent tower scaffoldings.

Yük Sınıfı	Maksimum Yük	Kullanım Tipi
1	0.75 kN/m ²	Erişim, çok hafif yükle yapılan çalışmalar
2	1.5 kN/m ²	Hafif yükle yapılan çalışmalar
3	2.0 kN/m ²	Genel işler, kamera kuleleri, kaynak platformları

Maximum foundation dimensions

Minimum and maximum foundation dimensions are specified in Table 16.



Table 5 Foundation dimensions of stand-alone tower scaffoldings.

Yük Sınıfı	Minimum Boyutlar	Maksimum Boyutlar
1	1.2 m x 1.2 m	2.7 m x 2.7 m
2	1.2 m x 1.2 m	2.1 m x 2.1 m
3	1.2 m x 1.2 m	1.8 m x 1.8 m

Maximum Height

The floor height cannot be more than 2 m in tower scaffoldings. The maximum height for scaffoldings used in open areas is 8 m, and the maximum height for scaffoldings used indoors is 10.8 m. According to the inertia of the scaffold;

- In tower scaffoldings used in open areas, the ratio of width to height cannot be more than 1/3.
- In tower scaffoldings used in indoor areas, the ratio of width to height cannot be more than 1/4.

Coating

Independent tower scaffoldings can be covered with suJHable net covers when necessary. However, this coating can be applied in conditions that will not overturn the scaffolding due to the wind forces that may occur indoors and outdoors.

User-independent tower scaffoldings cannot be used under horizontal forces that may cause the scaffolding to tip over. If the weather is not suJHable for the work to be done, special design requirements are applied by an authorized person.

7.17.3. Mobile Scaffoldings

Mobile scaffoldings are lightweight structures that rise on movable base legs and consist of aluminum tubes and connections. In prefabricated mobile tower scaffolding installation, the manufacturer's installation guide and safe use instructions are followed (EN 1004, EN 12810, EN 12811).

In the selection of prefabricated mobile scaffolding, taking into account the type of workplace and the nature of the work done, it is ensured that light scaffoldings are not used for heavy works.

Mobile scaffoldings that do not have the following standards and document requirements are not accepted to the MAOG Project sites;

- TS EN 1004 / Mobile access and work towers made of prefabricated elements - Materials, dimensions, design loads, safety and performance characteristics
- Facade and plan view drawing, with the horizontal and vertical connections clearly visible, drawn according to the heights to be used, approved by the manufacturer.
- In the first installation and then in the weekly period, Civil Eng./Techn. Periodic control document to be made by (Green label is hung if deemed appropriate.)
- The daily control card to be filled in by the user or regional managers in a daily period and kept on the scaffolding.
- Instruction prepared specifically for the scaffolding used according to the project specifications. (The instruction is communicated to the employees and a copy is kept on the scaffold.)
- Installation and dismantling manual.



The application conditions for aluminum mobile scaffoldings are given below;

- Aluminum scaffoldings that do not have EN 1004 standard are not accepted to the MAOG Project sites.
- Installation, dismantling and revision operations are carried out by competent and trained personnel. After all parts are checked for deformation and corrosion, the installation begins.
- All employees (at least 2 people) who perform the installation / dismantling / revision processes work by being connected to independent lifelines and on the basis of one hundred percent loyalty.
- After the installation, the control form is checked by the scaffolding supervisor or other authorized employee and the conformity label is given. Scaffoldings without conformity label cannot be used.
- On the scaffolding, there is a drawing approved by the manufacturer, a green label with the control parts, instructions, unique numbering, daily control card, capacity plate.
- Aluminum scaffolding cannot be used at heights whose platform distance exceeds 4 m.
- Aluminum scaffolding cannot be used at a height exceeding 3 times the width of the base (1/3 rule).
- Material cannot be stacked on the scaffold, electrical / hydraulic / pneumatic driven machine / hand tools cannot be used.
- Aluminum scaffolding cannot be used in work areas with overhead power lines.
- Mobile scaffolding cannot be used in environments exceeding 36 km/h wind speed.
- Before climbing on top of it, the outriggers are opened and fixed. All wheels are locked. Scaffoldings with broken wheel locks cannot be used.
- Access to the platform is provided through the scaffolding. Outside transportation is not allowed. During transportation, the support is never pressed on the diagonal and horizontal parts.
- Platform boards are fixed and do not come off (locked system). There can be no gaps on the platform floor. The cover used for access to the platform is kept closed, in case of failure, the scaffolding cannot be used.
- It is not allowed to work by placing any material / ladder on the platform.
- It is strictly forbidden to stack materials on the aluminum scaffold. Only personnel and light tools are allowed.
- Aluminum scaffolding cannot be used on uneven (recessed, pitted) floors and sloping areas.
- It is not allowed to hang from the top of the aluminum scaffold, to pull the material by hanging, to pull the material with any lifting equipment anchored from the scaffold.
- The outrigger is used in all operating conditions by extending it to the end.
- fold edge and shaft edge etc. Before starting work in the area with a level difference, it is mandatory to make an obstacle (stopper) at a safe distance that the scaffolding wheel cannot cross.
- The scaffolding cannot be moved while there is an employee on it.
- Aluminum scaffoldings with a platform height exceeding 1.5 m must have a toe board that completely surrounds the platform.
- It is obligatory to have 2 horizontal railings, at least 1 m in length and 47 cm apart, completely surrounding the platform. The guardrails should be able to withstand a load of at least 125 kg from all directions.
- It is forbidden to remove or add a railing, cross or a part in the drawing specified by the manufacturer for any reason.



- Red labels are attached to the scaffoldings that are found to be deficient during the controls and are out of use. Scaffoldings whose deficiencies are corrected without the approval and application of the manufacturer cannot be used.
- Measures are taken to prevent unauthorized use on aluminum scaffoldings when not working.
- Aluminum scaffolding cannot be installed using scaffolding parts from different manufacturers.
- The working area around the scaffoldings is protected by using pontoons and/or marking strips where necessary.
- Aluminum scaffoldings cannot be transported by slinging when installed.

7.18. Fall Protection in Scaffolding Installation and Dismantling

7.18.1. Working at Height Planning

While working at height in scaffolding erection and dismantling, the following precautionary hierarchy is followed;

Avoid working at height

- Assembling and lifting / erecting scaffolding components on the ground as practicable. This method is generally not applicable in scaffolding erection and dismantling.

Prevent falling

- Taking measures to prevent falling while working at any height that may be damaged by falling.
- Continuation of scaffolding on floors designated as «Safe Area»

Reduce fall severity

- Taking measures to reduce the severity of a fall in cases where avoidance of work at height and fall prevention is not practicable, or in support of fall prevention measures

While applying all these hierarchy steps, collective protection measures are given priority.

7.18.2. «Safe Area» in Scaffolding Installation

The Safe Zone is created only for employees with scaffolding qualifications, with at least the following 2 conditions;

- A platform that is completely boarded, properly supported, and does not contain a gap in the size of the employees to fall,
- Single row main guardrail 950 mm high.

Scaffolders must create and work in a safe area while working at height.



Figure69:Safe area limitations.

The risk of falling cannot be eliminated until all floors are completely boarded and surrounded by standard guardrails. Even if a safe area has been created, scaffolders may need to work according to the 100% adherence rule during installation and dismantling, according to the decision to be taken as a result of the risk assessment carried out in the Project / Operation.

Scaffolders have to be constantly tied at points where there is no fully boarded platform or single row of guardrails.

When approaching 1 meter to the unprotected area, work is carried out by adhering to it, even if it is in the safe area.

Requirements for safe space;

- When there is a gap of more than 300 mm between the facade and the scaffolding, there is a single row of railings with a height of 950 mm on the facade side.
- There is a single row of railings with a height of 950 mm on every floor that exceeds 950 mm in height.
- The scaffolding must remain attached when bent to tighten a foot clamp.



Figure70: Safe area limitations.

- In order to give or receive materials from the scaffold, the work is carried out by adhering to the safe area or the completed platform is created.

The planing and dismantling of all floors is done from a subfloor.

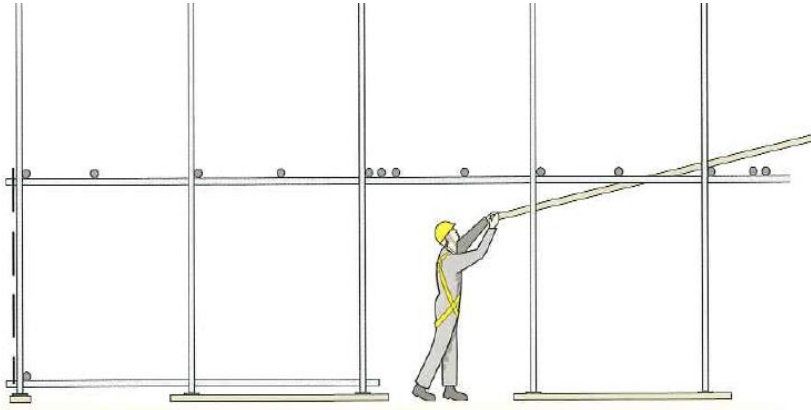


Figure71: Boarding from a lower floor.

Long and short horizontals are definitely created on floors that are not boarded, and overhead guards are kept ready to create a safe area. These components are necessary for the scaffolders to be able to work in a safe area on each floor during installation and dismantling.

7.18.3. Safe Working Practices in Scaffolding Installation and Dismantling

Temporary guardrail systems (Advanced guardrailing systems – AGS);

These are the temporary railings applied to the upper floor from the bottom after creating the platform of an upper floor, or the railing systems that are ready when the platform is climbed from the bottom. When the planed floor is reached, a platform with a railing is ready. In this way, it is ensured that scaffolders always work on the platform with guardrail.

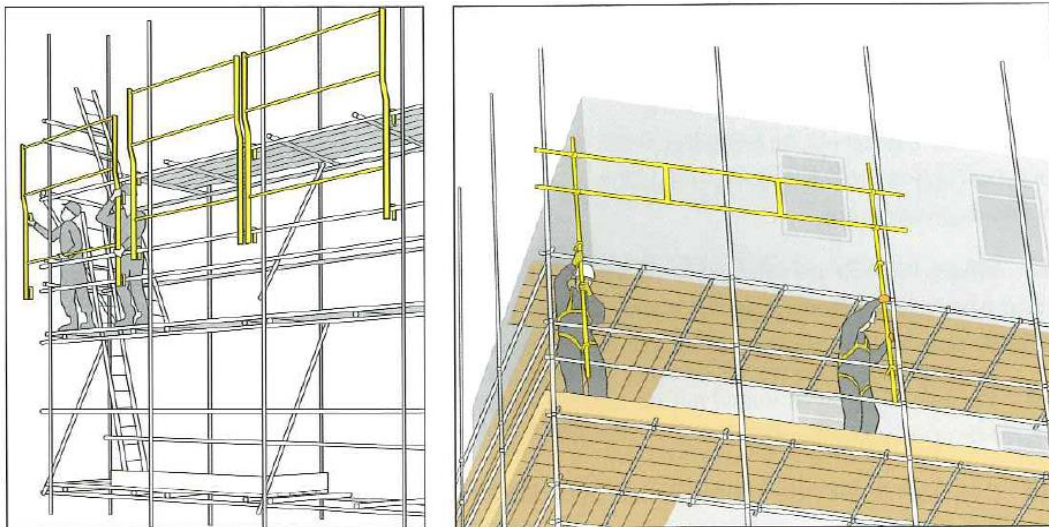


Figure72:Frame type temporary guardrail systems

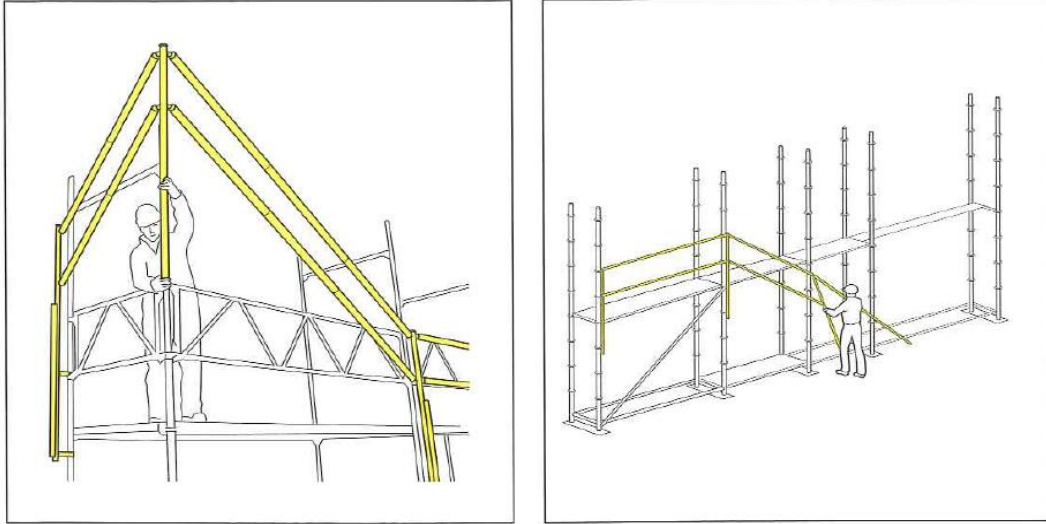


Figure73:Telescopic type temporary guardrail systems

Short lift system;

After applying the longitudinal horizontal elements of an upper floor (2 m high), a mezzanine floor is created 1 m above the existing floor. From this mezzanine floor, the handrails of an upper platform are connected. After that, when the first floor is reached, the necessary railings for the safe area are ready. It is ensured that scaffolders always work on platforms with guardrails.

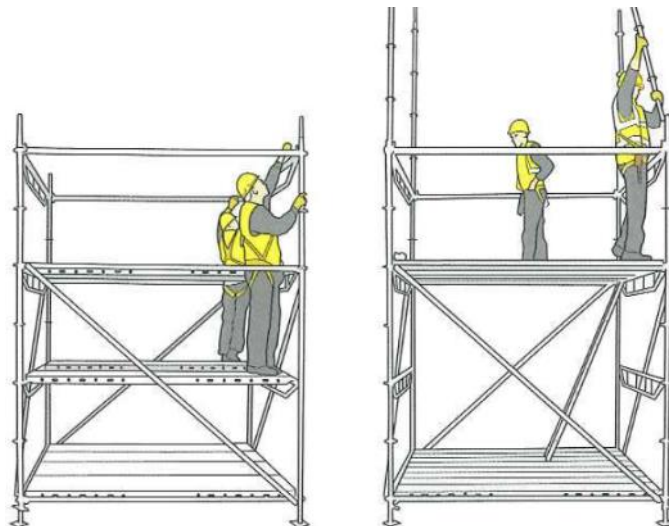


Figure74:Short floor method in tower scaffoldings

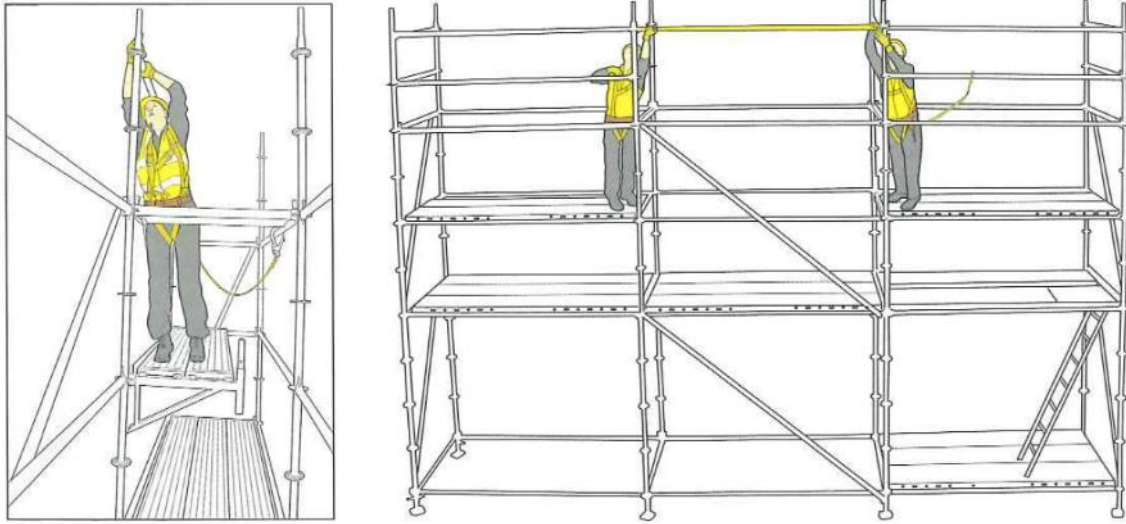


Figure 75: Short floor method in system scaffoldings

7.18.4. Reducing the Severity of a Fall on Scaffoldings

In the erection and dismantling of the scaffold, measures to reduce the severity of the fall are applied as the last step of the hierarchy among the measures of working at height. These measures are collective fall arresters and personal fall arresters. The usage area of collective fall arresters in scaffoldings is quite limited.

The principles of use of personal fall arresters are specified in the MAOG-RECU-GN-GNL-IS-GNL-PRG-00015-0 Procedure for Working at Height.

Appropriate anchor points to which fall arrest systems can be attached on scaffoldings;

System Scaffoldings

- It is supplied and installed in accordance with the EN 12811 standard.
- The points specified in the user manuals prepared by the manufacturer are used as anchors.

Tube clamp scaffolding:

- Horizontal elements (EN 39) in the short and long direction fixed with suJHable clamps (EN 74-1)
- Props (EN 39) provided that mobile anchors are used with anchor clamps or slings
- Railings fixed with vertical clamp (EN 74-1)

Inappropriate anchor points on scaffoldings;

- Horizontals in the short and long directions with an attachment on the opening
- Props with attachments on the floor
- Horizontals in the long direction below foot level
- Any crossover hardware
- All kinds of open-end horizontal tubes

Anchor points in light (up to 200 Kg/m²) Mobile Work Scaffoldings;

- It is not appropriate to connect personal fall arrest equipment to a point on the scaffold, since suJHable and stable anchor points cannot be defined on Lightweight Mobile Access Scaffoldings.



7.19. Inspection and Labeling

Inspections at the scaffoldings are examined in 2 different types as periodic inspections and daily inspections.

7.19.1. Periodic inspections

Provided that the scaffolding remains stable, at least once a week or any kind of jolt, strong wind, lightning, vehicle strike, etc., will be done by the scaffolding inspector. made after adverse conditions. It is definitely repeated when a revision is made on the scaffold. Periodic inspections are made by following a checklist and this list is kept as a scaffolding inspection form after the inspection.

As a result of the inspection, it is determined whether the scaffolding can be used and this is reported to the users with a label.

In scaffolding inspections, the user guide, EN 12810 and EN 12811 standards for system scaffoldings, and EN 12810 and EN 12811 for tube clamp scaffoldings, in addition to TG20:13 SG4:10 and the design of the erected scaffolding are taken into account.

Annex.3 Scaffolding Inspection Form can be used in scaffolding inspections.

In periodic inspections, the following sequence is followed;

- The stability of the scaffolding (stability, resistance to tipping or collapsing) is tested because the biggest risk is tipping/collapsing – multiple fatalities can occur.
- After testing the resistance against overturning, the adequacy of the measures taken against the fall of workers on the scaffolding is checked.
- Precautions against electric shock to those working on the scaffolding are supervised.
- Measures taken against objects falling over the scaffolding are inspected.
- Practices / measures for ergonomics of workers on scaffolding are inspected

Periodic inspections examine the following elements;

- Scaffolding ground,
- The points where the scaffolding pillars press on the ground,
- load distribution board requirement,
- Use of base plates (height adjustment),
- The plumb of the struts,
- Connections of uprights to each other at all node points,
- The tightness of the joining elements,
- Adequacy of diagonal and horizontal members in numbers,
- Buttress / anchor requirement according to 1/3 and ¼ rules,
- Adequacy and deformations of buttresses and anchors,
- General damage status of scaffolding components and units,
- Loading amount according to the load class of the scaffold,
- The probability of hitting the scaffolding with the construction equipment,
- Angle of scaffolding access ladders, fixation, damage to the steps, ease of access to the upper platform,
- All platforms are completely covered with platform units,



- Damage status of platform units, their thickness,
- Gaps between platform units,
- Presence of side guards, their height, strength, connections,
- Presence, height, thickness of the heel boards,
- Compliance of platform width and height with standards,
- If it is a scaffolding where side protection cannot be established, testing the protective measures against falling from height,
- Routine checks of all kinds of electrical tools and equipment used on the scaffold,
- The proximity of the scaffolding to the power lines,
- Scaffolding grounding,
- Arrangement and order of scaffolding platforms,
- Places where there is a possibility of water accumulation on the scaffolding platform,
- Icing on the platform,
- The safety of other teams working near the scaffolding.

7.19.2. Daily Controls

It can be done by any personnel working on and near the scaffolding. It is done before each shift without following a checklist and keeping records. It is done by transferring the deficiencies they see to the scaffolding team leader or the first supervisor. It is a visual control without going into technical details. During the control, the following points are taken into account;

- Presence of scaffolding tag,
- Presence, fixing of scaffolding access ladders,
- Presence of side guards
- Presence of slat boards,
- Complete closure of the platform with platform units,
- Icing on the platform,
- Surrounding the scaffold,
- Visible cracks / damages in scaffolding platform units.

7.19.3. Scaffolding Labeling

It is made by the scaffolding inspector, it is made or renewed after each periodic inspection.

The scaffolding label has the following features;

- It should not be erased, worn or broken off by being affected by external conditions.
- It is prepared in a language that employees can understand.
- It clearly expresses the current security status of the scaffolding.
- It includes the name, surname and signature of the auditor who made the labeling.
- The date and time of hanging are indicated.
- It is hung where it can be easily seen by the employee who wants to access the scaffold.
- Scaffolding load class and the distributed load it can carry (example: load class 3, 200 kg/m²),
- The scaffolding width class is specified.



- It is prepared in internationally valid colors and shapes for illiterate employees.

Types of scaffolding tags

Green Label : These are the scaffoldings that meet all the criteria as a result of the scaffolding inspector inspection and take precautions against all risks.

Green label criteria

- Platform units are undamaged, completely cover the platform, their thickness is in accordance with the standard.
- There is no more than 25 mm gap between platform units.
- The height, strength and connections of the side guards are suitable.
- The height and thickness of the shin guards are appropriate.
- Platform width and height are within standard limits.
- All kinds of electrical tools and equipment used on the scaffolding are routinely checked.
- The scaffolding is not close to the power lines (min 3.1 m for 50 kV).
- Scaffolding is grounded.
- The arrangement and order of the scaffolding platforms is sufficient.
- There is no place on the scaffolding platform where there is a possibility of water accumulation.
- There is no icing on the platform.
- Precautions have been taken for the elements that will endanger the safety of the employees around the scaffold.
- The scaffolding ground features are suitable.
- The points where the scaffolding uprights press into the ground are safe.
- The load distribution board requirement has been met.
- The base plates are used appropriately (height adjustment).
- Posts are upright.
- Connections of uprights to each other at all node points,
- All of the connectors are tight.
- Cross and horizontal members are sufficient according to the manufacturer's instructions.
- According to the 1/3 and 1/4 rule, anchorage and buttress requirements are met.
- The scaffoldings and anchors are undamaged and properly formed.
- Scaffolding components and units are undamaged.
- The scaffolding is loaded less than specified in the load class.
- The risk of construction equipment working on the scaffolding is minimized.
- A fall protection system has been established for the use of personnel who will climb onto the scaffolding for access to the scaffolding and working on the scaffold.
- A secure ladder system has been established for access to each working platform of the scaffolding.

Red Label : These are the scaffoldings where the criteria are not met as a result of the scaffolding inspector's inspection, the scaffolding is not resistant to overturning and collapse, and/or the dismantling works continue, on which work is prohibited.



8. MONITORING, ASSURANCE AND VERIFICATION

Key success indicators (KPIs) of this procedure will be monitored, verified and evaluated by the relevant parties in accordance with their responsibilities set forth in the E&S Governance document, within the scope of the MAOG-RECU-GB-GNL-IS-PRG-0007-0 HSE Monitoring, Assurance and Verification Procedure.

9. RELATED FORMS

APPENDIX 1– FEEDBACK FORM

APPENDIX 2 – Reference Tables

APPENDIX 3 – Scaffolding Inspection Checklist

APPENDIX 4 – Anchor Application Methods



APPENDIX 1 – FEEDBACK FORM

User Feedback Page			
When the user identifies an inaccuracy, error or uncertainty in the document, he notifies the person responsible for the document so that the necessary action can be taken. The user is asked to clearly state the changes he proposes and to return by filling out this page completely.			
User Name			
Document No		Date	
Page Ref.	Brief Description of Required Changes / Corrections and Reasons		
Submit this Page:	Person in Charge or Corporate OHS – E Management Department		