

Panomod®

Frame Type Scaffolding Systems

Version, 05.2020

Our Quality Management System

It has been certified by TÜRK LOYDU according to ISO 9001: 2015 standard.

Our Products

It has been certified by TSE according to TS EN 12810-1 standard.



Introduction Manual Configuration Handbook



TS EN ISO 9001



TS EN 12810-1



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PART I: PRODUCT HANDBOOK

1. INTRODUCTION

"Panomod Safe Scaffolding Product Handbook" is prepared by YAPEKSAN YAPI EKİPMANLARI A.Ş. for the purpose of providing information necessary for structural design and use of scaffolding system in accordance with TS EN 12810-1 Article-9.

Warranty

YAPEKSAN warrants the systems it has manufactured within the scope of the terms and conditions set forth below.

Provisions of Warranty:

1. Warranty period is 1 (one) year as of the date of acceptance of the products by the customer.
2. All parts of the products are covered by the guarantee of our firm.
3. YAPEKSAN unconditionally warrants replacement of manufacturing-induced defective products.
4. Our quality department examines defective or faulty products and issues a report regarding the causes of the failure. The reports specify whether or not the defect arises from the manufacturing or the use of the customer. If defective or faulty products arise from the manufacturing, YEPEKSAN shall unconditionally replace the product; if it is resulted from the user of the customer, then responsibility herein shall rest with the customer.
5. No fee shall be requested from the customer in replacement of manufacturing-induced defective products.
6. Where defective or faulty products arise from the user of the customer, the products are out of the warranty.
7. The products must be used in accordance with the instructions relating to assembly, storage, use and protection. Defects occurred as a result of use in contradiction with the instructions are excluded from the scope of the warranty.
8. Use of the products other than their intended purposes is excluded from the scope of the warranty.

General Information

Scaffolding systems are manufactured under the following six load classes based on Schedule 3, TS EN 12811-1 standard. Correct load class should be identified by considering potential loads required to be carried in line with intended purpose of the scaffold and an appropriate scaffold ensuring required conditions should be selected.

Load class	Uniformly distributed load q_1 kN/m ²	Single load on 500 mm x 500 mm area F_1 kN	Single load on 200 mm x 200 mm area F_2 kN	Partial area load	
				q_2 kN/m ²	Partial area coefficient a_p ¹
1	0,75 ²	1,50	1,00		
2	1,50	1,50	1,00		
3	2,00	1,50	1,00		
4	3,00	3,00	1,00	5,00	0,4
5	4,50	3,00	1,00	7,50	0,4
6	6,00	3,00	1,00	10,00	0,5

¹ Article 6.2.2.4 (TS EN 12811-1)
² Article 6.2.2.1 (TS EN 12811-1)

Table 1: Scaffolding Load Classes

Scaffolds to be used in facade works should be coated with **"hot dip galvanized"** against corrosion in nature appropriate with relevant standards. (TS EN 12811-2)

Should the scaffolds are used other than standard configurations approved by TSE, durability and robustness calculations and static calculations should be conducted or caused to be conducted in accordance with selected installation and use at all times.

Installation and dismantling works of scaffolds should be carried out by **"Scaffold Installation Personnel"** with professional competency certificate.

Periodic inspection and maintenance of scaffolds should be performed **once 6 months**.

2. PANOMOD SCAFFOLDING SYSTEM

Panomod Safe Scaffolding System has been designed and manufactured in compliance with TS EN 12810-1, TS EN 12810-2, TS EN 12811-1 and TS EN 12811-2 standards. The system is frame type safe scaffolding system generally used in facade applications. System width is 70 cm and the largest clearance is 250 cm. All parts are hot dipping galvanized coated. Panomod Scaffolding System durable up to **Load Class 4** pursuant to TS EN 12811-1 Schedule-3.

2.1. Panomod Scaffolding System View

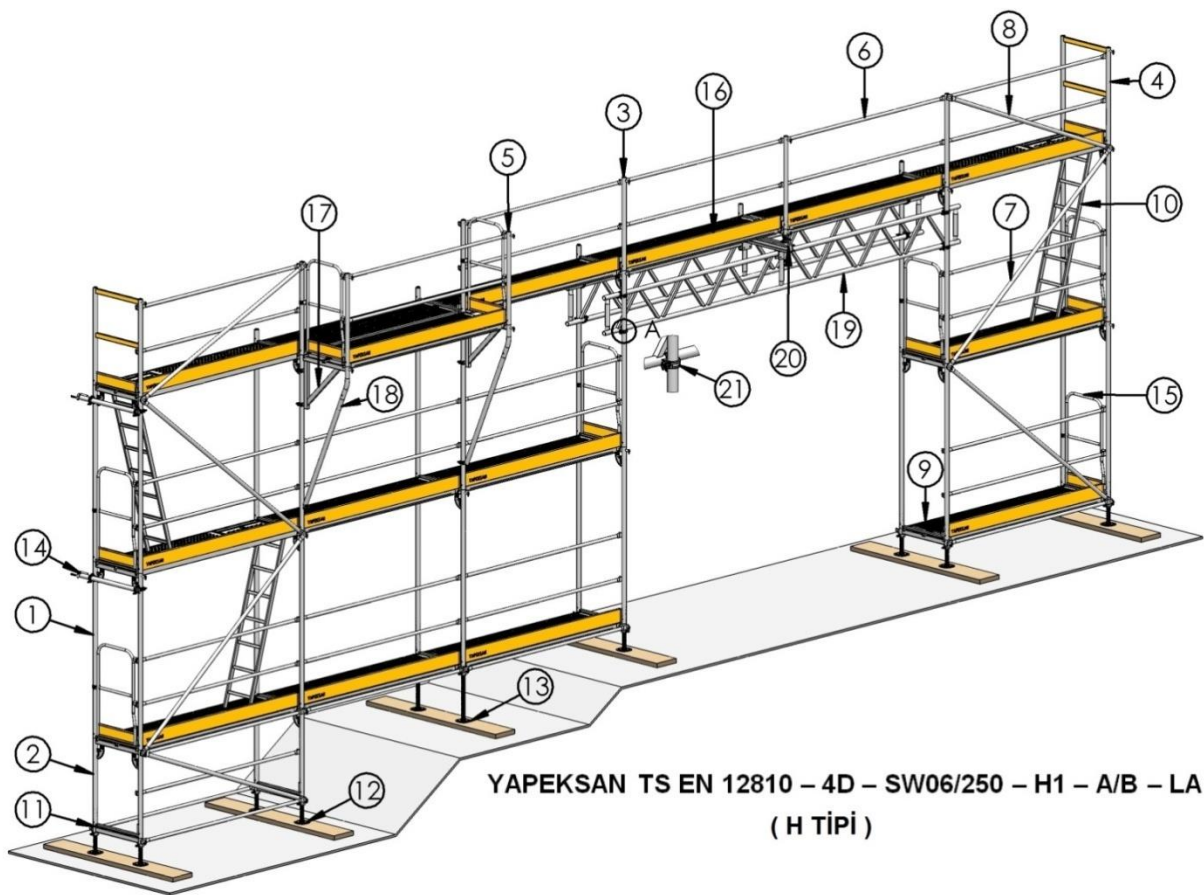


Figure 1: Panomod Scaffolding System View
(H TIPI : H TYPE)

System Elements

1. Steel Frame 200	8. Steel Diagonal Connection 269	15. Steel Side Guardrail
2. Steel Frame 100	9. Steel Platform 32	16. Steel Toeboard
3. Steel "L" Type Guardrail 105	10. Stairs Frame Platform 64	17. Steel Console
4. Steel Trailing Guardrail 110	11. Steel Starter Elements	18. Steel Console Strut
5. Steel Guardrail Post 110	12. Bottom adjusting spindle 50	19. Steel Case Beam
6. Steel Horizontal Guardrail	13. Bottom adjusting spindle 100	20. Case Beam Anchorage Apparatus
7. Steel Diagonal Connection 320	14. Facade Anchorage Set	21. Moving Clamp

2.2. Panomod Scaffolding Main Elements

1. Steel Frame	
	Vertical carrier of the system
2. Steel "L" Type Guardrail	
	Top level guardrail posts
3. Steel Horizontal Guardrail	
	Main guardrail and intermediate guardrail on horizontal level
4. Steel Diagonal Connection	
	Provides support to the system against horizontal loads

5. Adjustable Base Plate



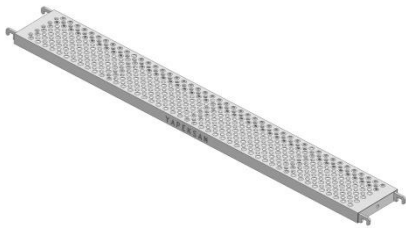
Used for taking the scaffold to scale and distributing the load from the system to the ground

6. Steel Starter Elements



Contains bottom diagonal pins

7. Steel Platform



Working and walking decks of the system

8. Stair Steel Platform



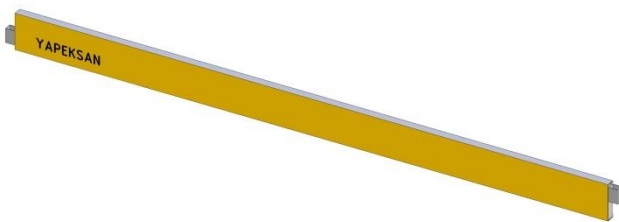
Access stairs between the decks

9. Side Guardrail



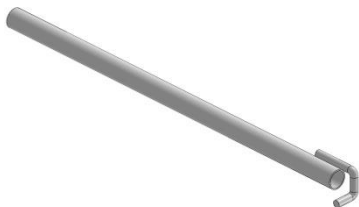
Side guardrail in outer axle frames

10. Steel Toe Gurdrail



Prevents material from falling down

11. Facade Connection



For fixing the scaffolds to the facade

12. Anchorage Set



For anchorage of the scaffolds to the facade

2.3. Material Properties

Industrial pipes and profiles manufactured from S235JR structural steel (min. Yield Strength =235 MPa) in accordance with DIN 2394, TS EN 10305-3, TS EN 10219-1/2 norms have been used in all scaffolding elements.

Frame posts in the system are manufactured from steel industrial pipes in Ø48,3x3 mm, horizontal elements in Ø34x2mm, diagonal elements in Ø42,4x2,5 mm cross-sections and steel platforms are manufactured from steel metal sheet with special shape in t=1.5 mm wall thickness.

Welded joints are made with gas metal arc welding by certified welders.

2.4. Load class

Panomod Scaffolding System has been designed and manufactured according to **Load Class 4** provided in TS EN 12811-1 standard, Schedule 3. Service load is accepted as 3 kN/m² (300 kg/m²) on the working area. Load more than 300 kg/m² may not be applied on scaffold platforms. In addition to this, no single load may be applied more than 300 kg on an area with measurements more than 50cmx50cm and more than 100 kg on an area with measurements smaller than 20cmx20cm. That the loads transferred to the system from the platforms can be carried safely by other elements should be verified by performing static calculation based on the configuration used.

Fall tests of steel platform used in scaffolding system have been conducted. Steel platforms can safely carry steel ball in 50 cm diameter and 100 kg weight dropped from 2.5 m height.

When single loads according to load class 4 to the steel apply uniformly distributed load and partial area load in the most ineligible location, maximum deflection amount performed by the platforms remains within the desired limits requested by the standard.

3. ASSEMBLY AND DISASSEMBLY OF SCAFFOLDING SYSTEM

3.1. Assembly of Scaffolding System

Assembly of Panomod scaffolding system is presented below in stages from starting from the first step until completion of installation.

Please check suitability of ground on which scaffolding is to be erected prior to commencing assembly of scaffolding. Take necessary measures against settlement and collapses. Use assembly safety guardrails and life lines at all times throughout assembly and disassembly.

3.1.1. Forming Main System

Start erection of scaffolding from the point with high elevation and proceed with the lower elevation.

Step 1: Fit base plates with adjustable height to the points where they should be located according to scaffolding plan (Figure 2).

****** If scaffolds are to be erected on any loose ground without carrier, use base fittings providing sufficient load distribution for distributing the load onto the ground.

Step 2: Fit steel starters to gear adjusting pipes (Figure 3).

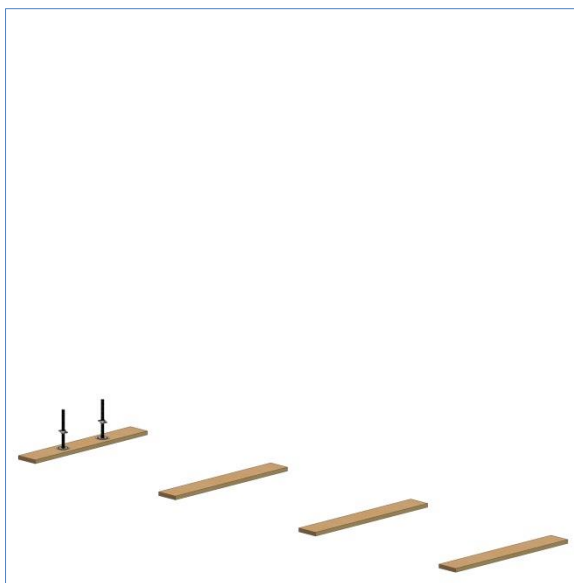


Figure 2: Fitting Base Plates

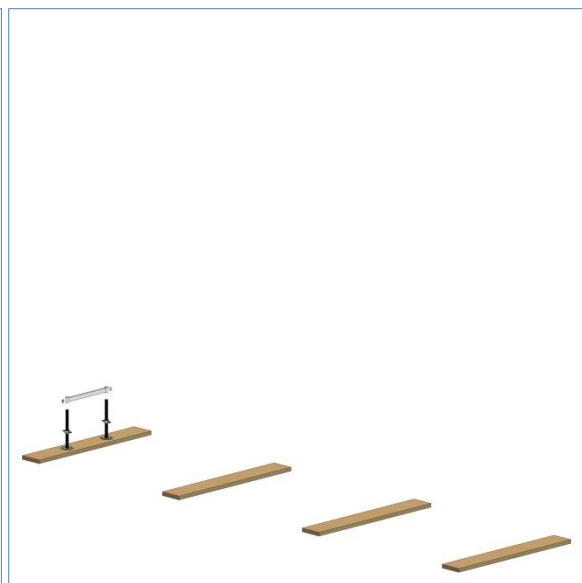


Figure 3: Fitting Steel Starters

** Transition length as 25% of total length of adjusting pipe or 15cm should be left minimum (whichever is greater) for fitting steel frames above steel starters (Figure 4).

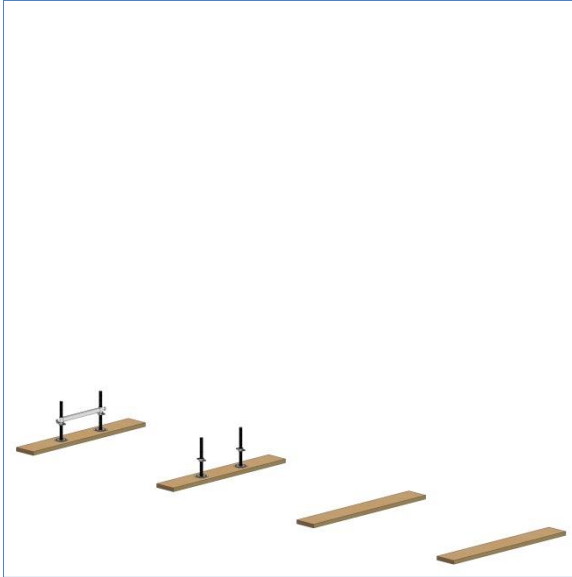


Figure 4: Leaving Overlapping Length

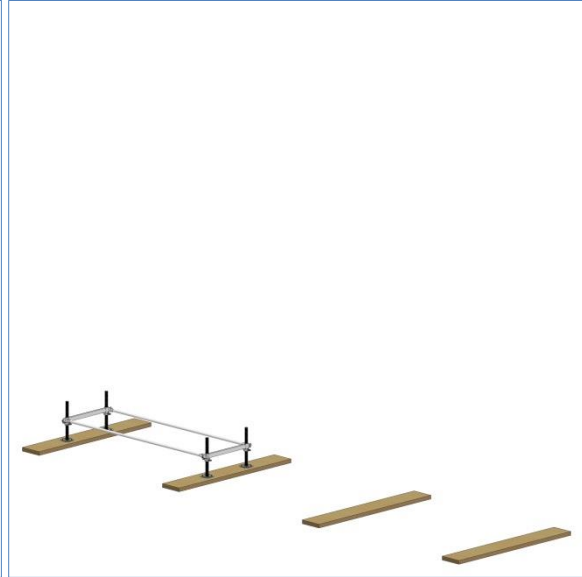


Figure 5: Fitting Steel Horizontal Connection

Step 3: Adjust scaffolding clearances by fitting horizontal rods to the pins over steel starters (Figure 5).

**Fit the horizontal and diagonal rods of the scaffolding to the pin as seen below and ensure that pin locks are closed (Figure 6-7).

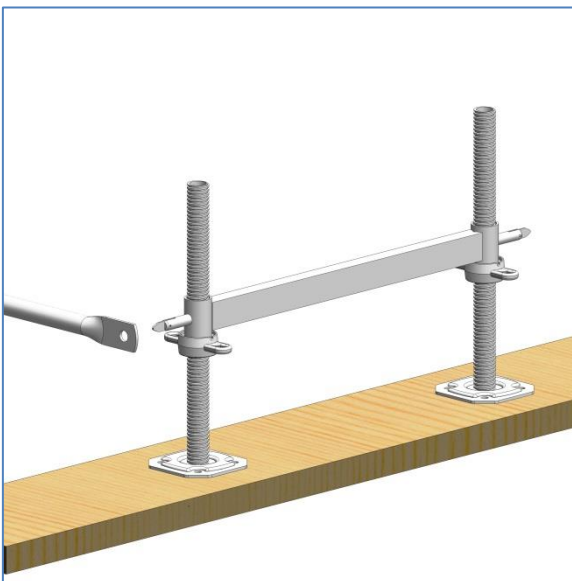


Figure 6: Fitting Rod Detail 1

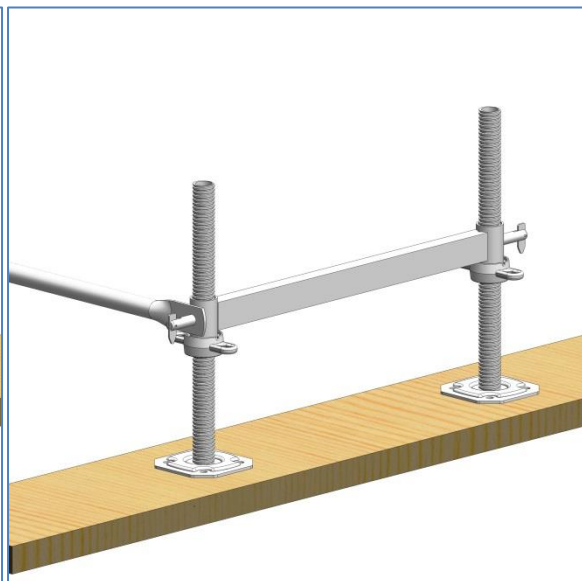


Figure 7: Fitting Rod Detail 2

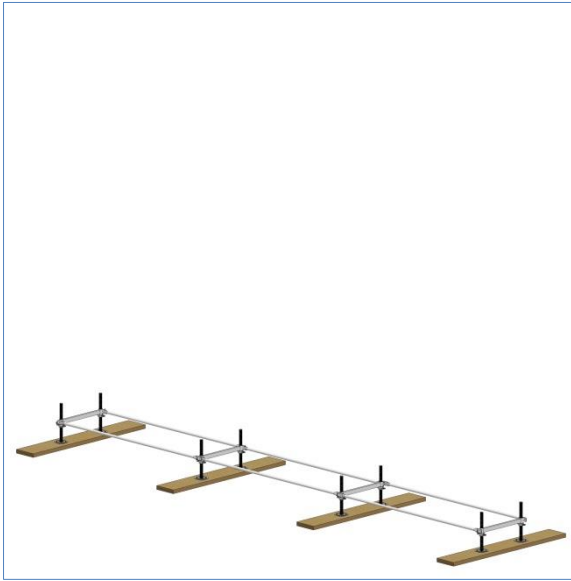


Figure 8:Forming Base

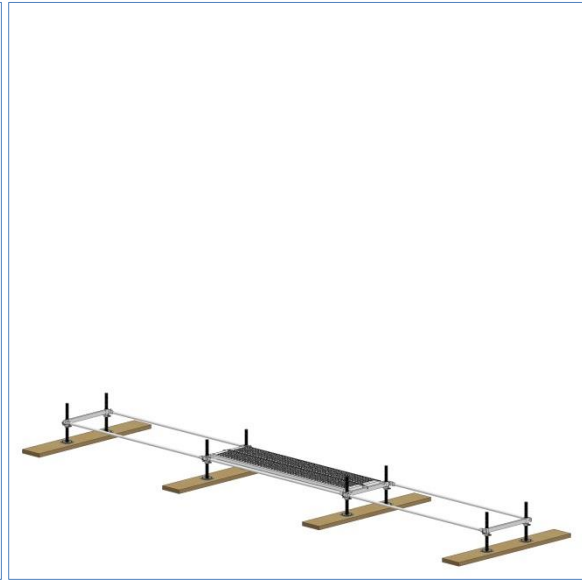


Figure 9: Fitting the First Platforms

Step 4: Ensure scaffolding plan is created by fitting all horizontal rods in starter elements level (Figure 8)

Step 5 : Fit 2 steel platforms only fitted by stairs system in the bottom level (Figure 9). Fit the steel platforms to the horizontal profiles as seen below (Figure 10-11).

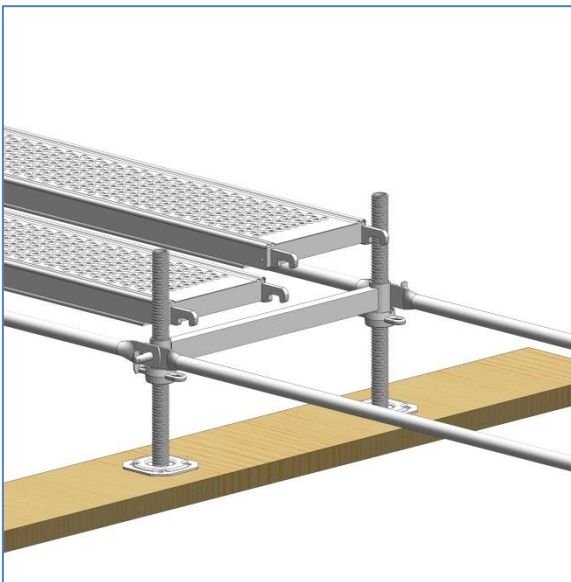


Figure 10:Fitting Platform Detail 1

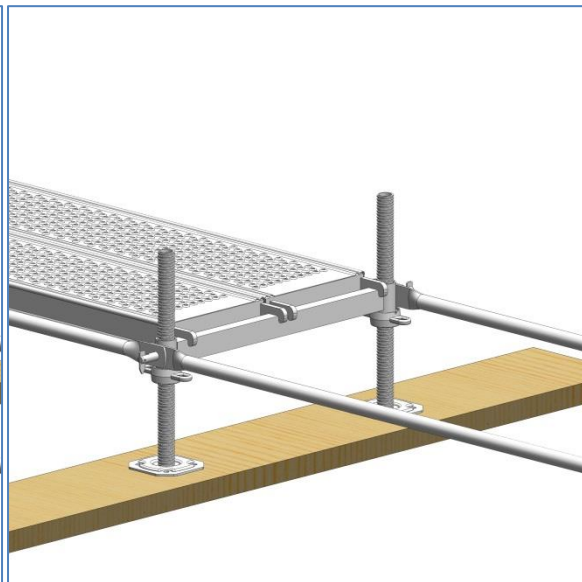


Figure 11:Fitting Platform Detail 2

**** Assembly can only proceed upwardly following creating the bottom scaffolding deck. No joint can be made on the horizontal position to the system following assembling the second scaffolding deck.**

Step 6: Take scaffolding base installation elements to the scales in vertical and parallel position to the facade (Figure 12-13).

** Use bottom adjusting spindles for taking to the scales. Do not perform any elevation adjustment with anything other than this.

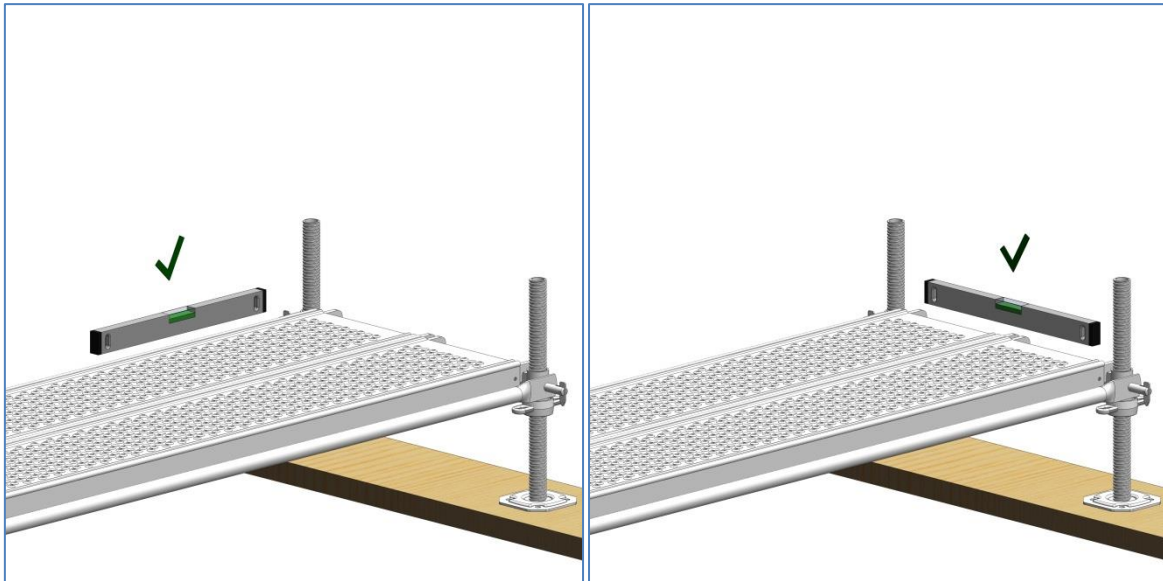


Figure 12: Taking to the Scale in Longitudinal Direction **Figure 13:** Taking to the Scale in Short Direction

Step 7: Fit the first row of steel frames to adjusting pipes by re-inspecting minimum overlapping length (Figure 14-15).

** Maintain this operation by way of accessing other clearance following completion of operations of a clearance.

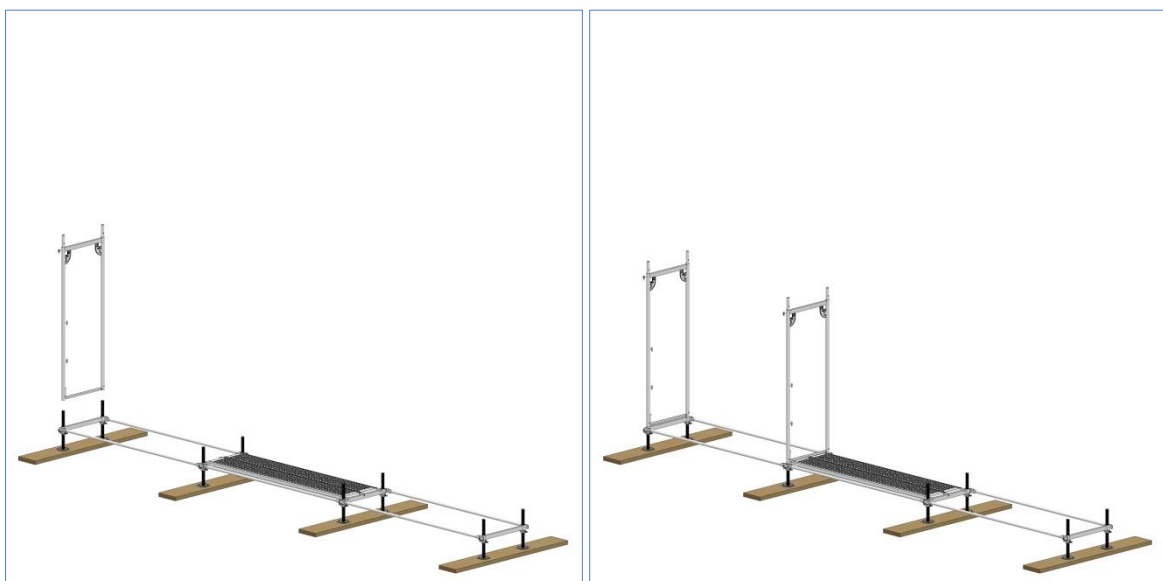


Figure 14: Fitting the First Frame

Figure 15: Fitting the Second Frame

Step 8: Firstly fit upper horizontal tie rod of a clearance (main guardrail) and then lower horizontal tie rod (intermediate guardrail) (Figure 16).

Step 9: Fit horizontal tie roads to the diagonal tie rod to the fitted clearance (Figure 17). Ensure that pins are locked after fitting each rod.



Figure 16: Fitting the Horizontal Connection

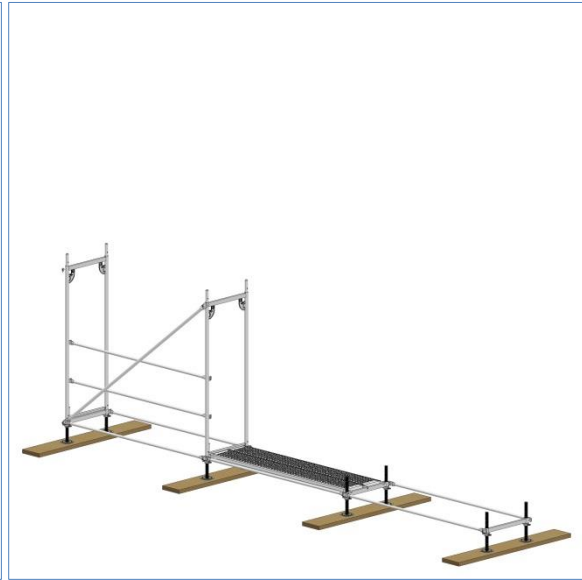


Figure 17: Fitting the First Diagonal Connection

****** Once new frame is fitted over the deck with attached steel platform, the steel platforms are locked to the system as shown below (Figure 18-19).

****** Steel platforms locked to the system may not be disassembled in place without fully dismantling the parts over its upper deck (Figure 19).

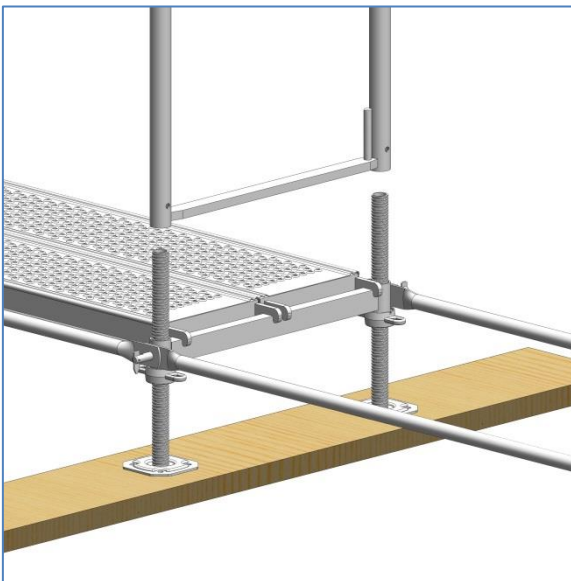


Figure 18: Platform Locking Detail 1

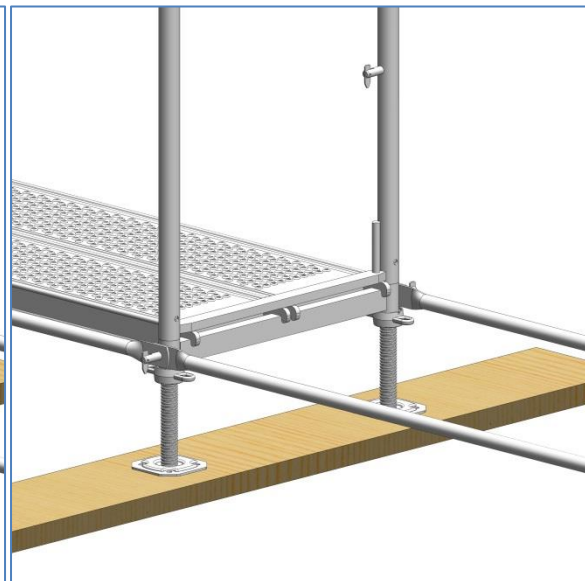


Figure 19: Platform Locking Detail 2



Figure 20: Completing the Horizontal Connections

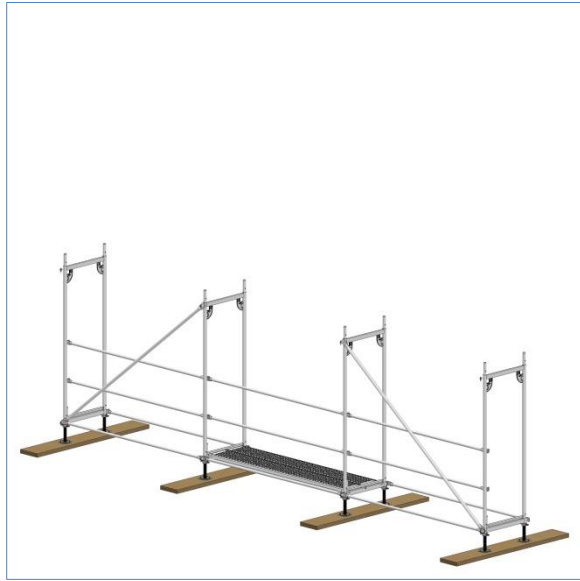


Figure 21: Completing the Diagonal Connections

Step 10: Complete the horizontal guardrail rods of the remaining clearances with firstly upper and then lower sequence (Figure 20).

Step 11: Fit the other diagonal tie rod/rods (Figure 21). Fit diagonal tie rods in missing number in direction shown in its static project and in the number specified.



Figure 22: Fitting Upper Deck Platforms



Figure 23: Fitting Stairs Platform

Step 12: Reassemble upper deck steel platforms and stairs steel platform after fitting the first deck all elements of the scaffolding (Figure 22-23).

Step 13: Reassemble one upper deck steel posts (Figure 24).



Figure 24: Fitting Upper Deck Frames



Figure 25: Fitting Upper Deck Horizontal Connections

Step 14: Fit the horizontal and diagonal connection rods to the pins appropriately according to the lower deck order (Figure 25, 26, 27).

** Remember to fasten your safety belt while installing on the upper decks to life ropes and to take required safety measures.

** Climbing down and up covers must be kept off after using Stairs Platforms.



Figure 26: Fitting Upper Diagonal Connections



Figure 27: Completing Upper Rods

Step 15: Fit accurately all toes and side guardrails of the scaffolding deck (Figure 28-29).

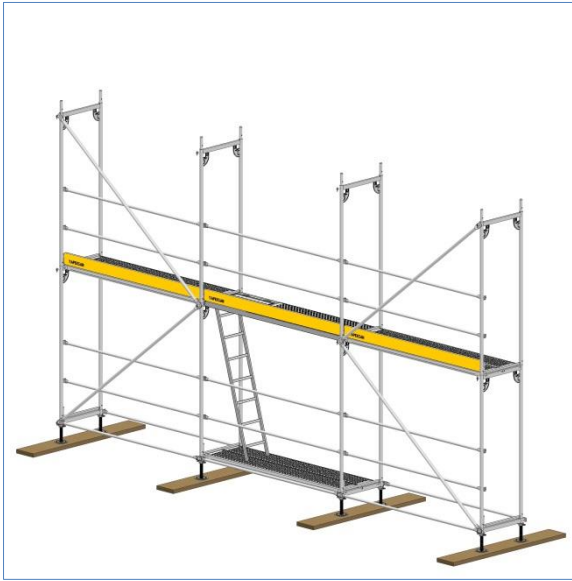


Figure 28: Complete Fitting of Toes

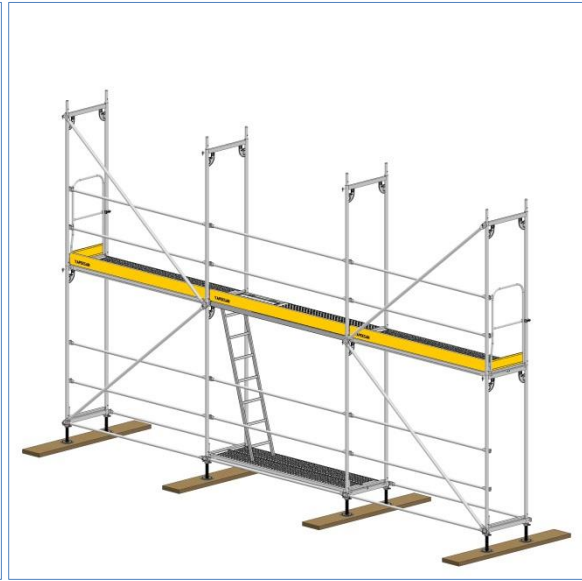


Figure 29: Fitting Side Guardrails

Step 16: Fit the toes of the scaffold to the nails located in the inner side of frames as seen below (Figure 30-31).

Step 17: Fit the toes from the corner clearance in a manner that shall respectively overlap the last clearance (Figure 31).

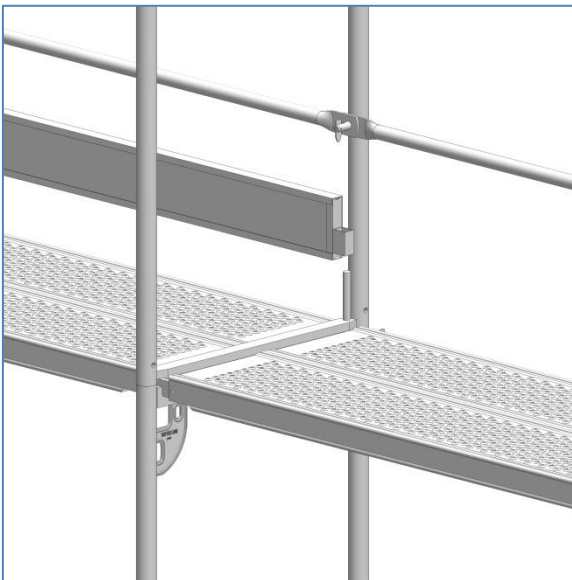


Figure 30: Fitting the Toes Detail 1

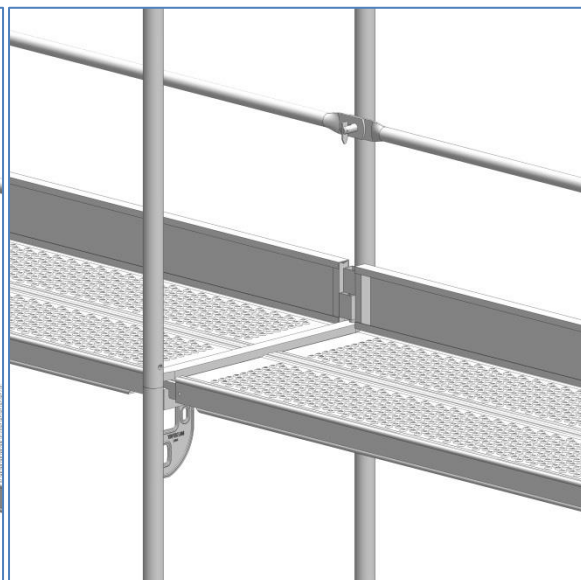
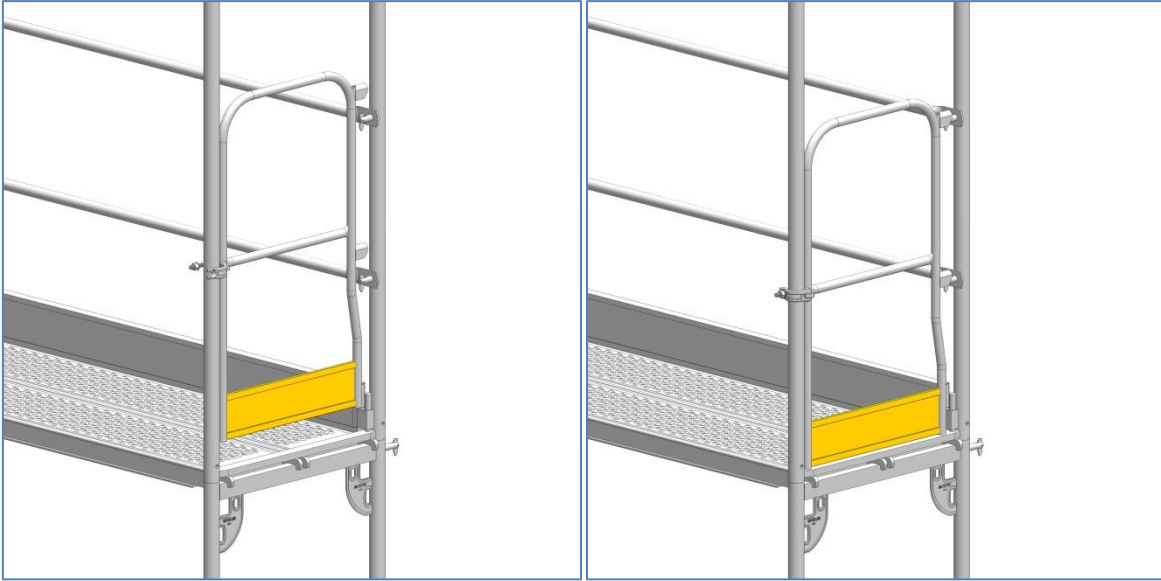


Figure 31: Fitting the Toes Detail 2

Step 18: Fit the side guardrails as seen below and tighten its clamp to frame inner post (Figure 32-33).



Şekil 32: Figure 32:Fitting Side Guardrails Detail1 **Figure 33:Fitting Side Guardrails Detail2**

Step 19: Reassemble upper deck steel platforms and stairs steel platforms after fitting side guardrails and toes (Figure 35).

** Use cover stairs in climbing up the upper decks.



Figure 34:Completing Side Guardrails and Toes **Figure 35:Fitting Last Deck Platforms**

Step 20: Fit steel trailing guardrails to the outer axles in the last decks and steel L guardrail toes to the inner axles (Figure 36).



Figure 36: Fitting the Upper Guardrail Toes



Figure 37: Fitting the Upper Guardrail Horizontal Connections

Step 21: Complete the horizontal rods of the upper deck (Figure 38-39).

Step 22: Fix the overlapping locations in the upper deck elements to the dislocation points (Figure 39).



Figure 38: Completing the Upper Guardrail Horizontal Connections



Figure 39: Completing the Upper Guardrails

Step 23: Complete the upper guardrail diagonal rods (Figure 40).

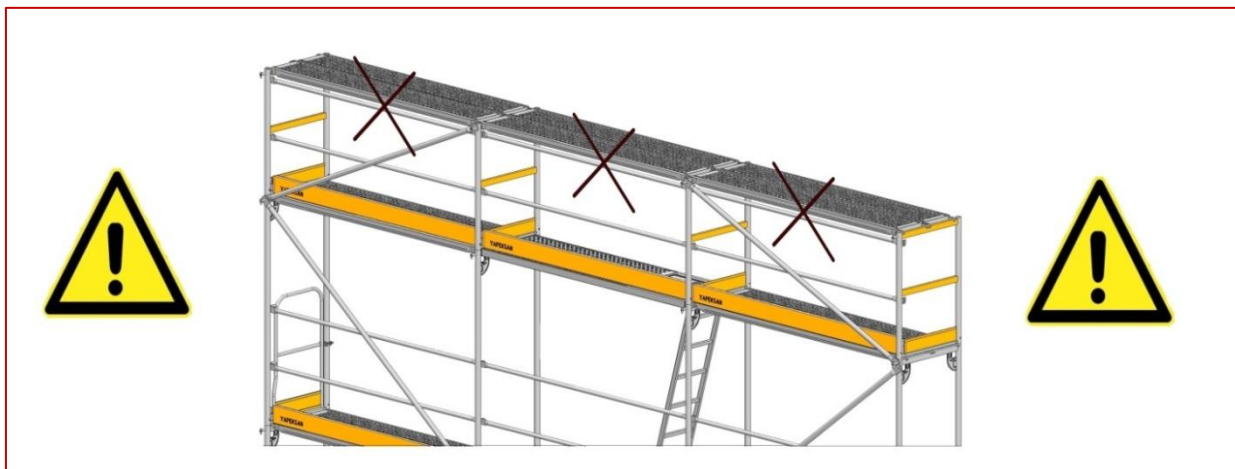
Step 24: Complete the upper deck steel toes (Figure 41).



Figure 40: Completing Upper Guardrail Diagonal Connections **Figure 41:** Fitting Upper Toes

Step 25: Fix the scaffolding system appropriately to the facade in compliance with its project as described in the handbook.

**** Do not form half scaffolding deck at the top deck of the scaffolding with half frames or trailing guardrail frames and do not place platforms over them. Do not work without forming guardrail system.**



3.1.2. Connecting the Scaffolding to the Facade

Use clamp fittings for connecting the scaffolding system to the facade. Make a hole in minimum 5cm depth except for coating and insulation thickness over the concrete with electric hand drill(Ø16 drilling bit) to the concrete areas on the facade (to columns, girder or flooring corners) for fixing the fittings to the facade. Place M12 percussion steel dowel to the hole. Ensure the dowel is squeezed into the hole by driving tapered pin inside steel dowel with the help of a stapling element and hammer. Fit the fitting rod to the dowel and connect the fitting clamp to the frame vertical pipe by squeezing from the bolt system.

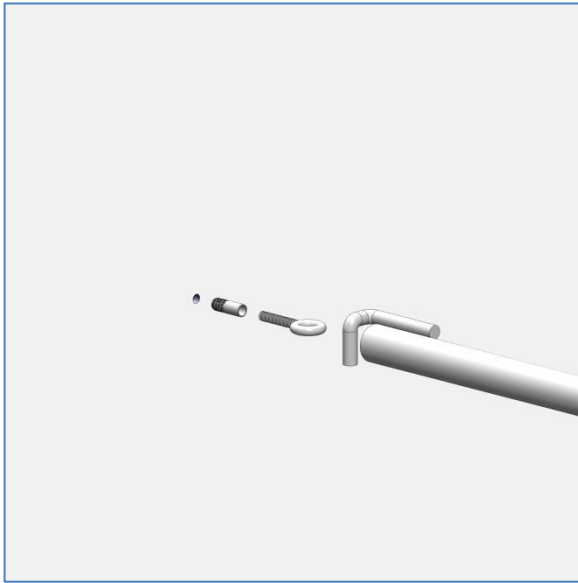


Figure 42: Anchoring Set

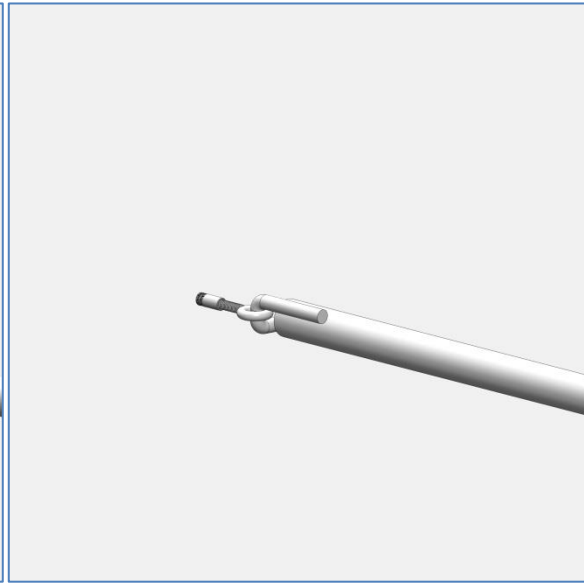


Figure 43: Facade Connection

Fix the scaffolding system to the facade by using the facade connection **in the number and range specified in its static project** similar to the typical anchor pattern samples in Figure 44. Where the scaffolding height exceeds 4m, it is mandatory to fix the scaffolding system to the facade.

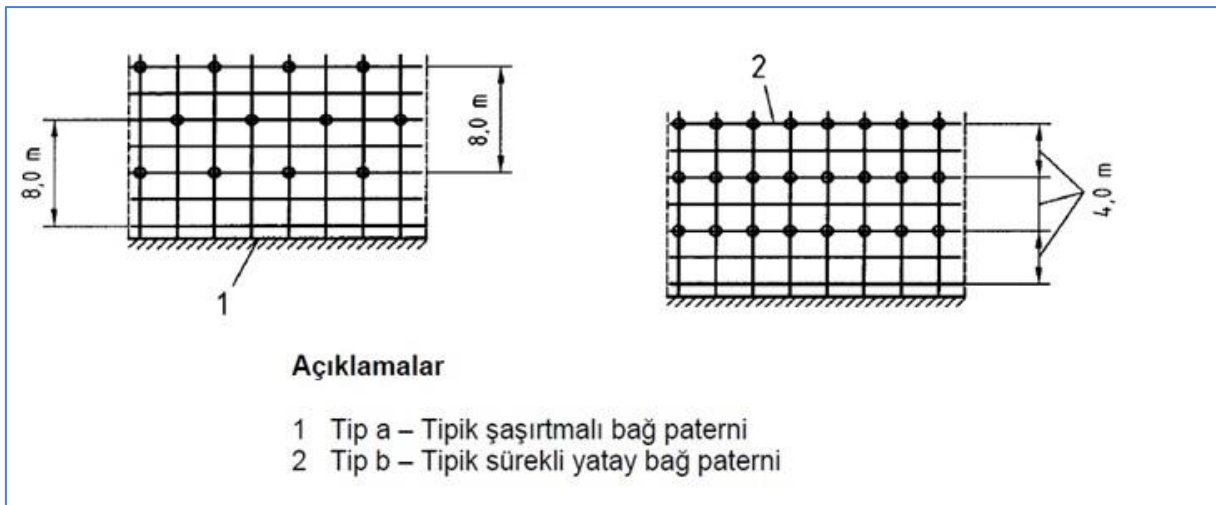


Figure 44: Typical Anchorage Pattern Samples

Descriptions

- Type a – Typical offset bond pattern
Type b – Tipik continuous horizontal bond pattern

** Facade connection types are as follows

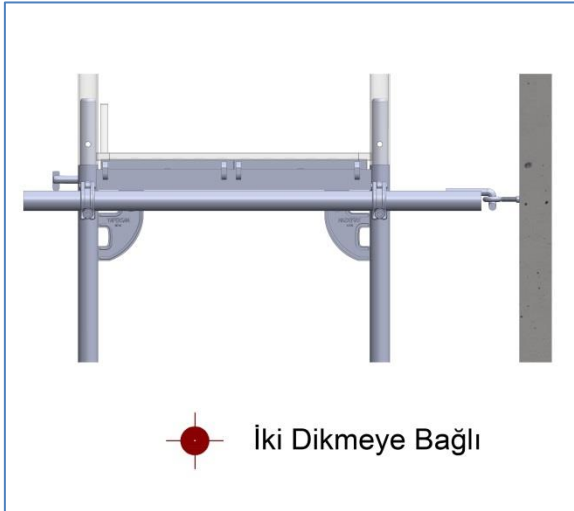


Figure 45: Side View of Connection to Two Posts

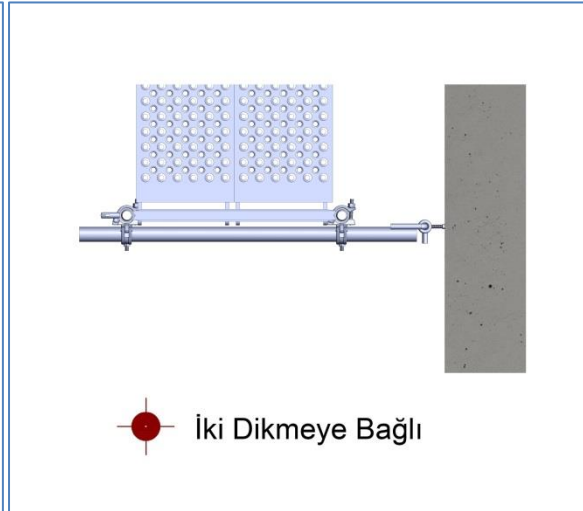


Figure 46: Top View of Connection to Two Posts

(İki dikmeye bağlı : Connected to Two Posts)

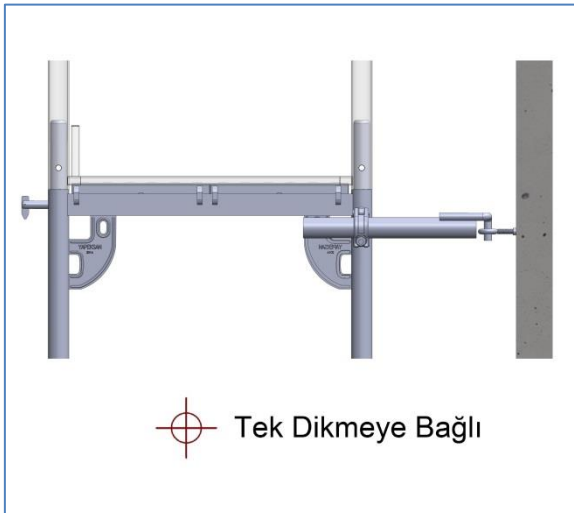


Figure 47: Side View of Connection to Single Post

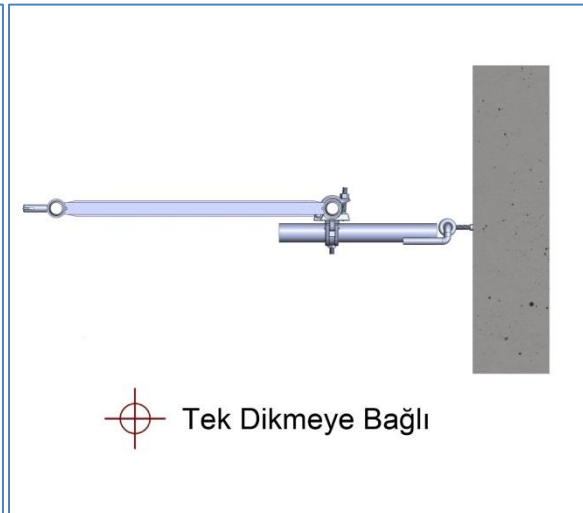


Figure 48: Top View of Connection to Single Post

(Tek dikmeye bağlı : Connected to Single Post)

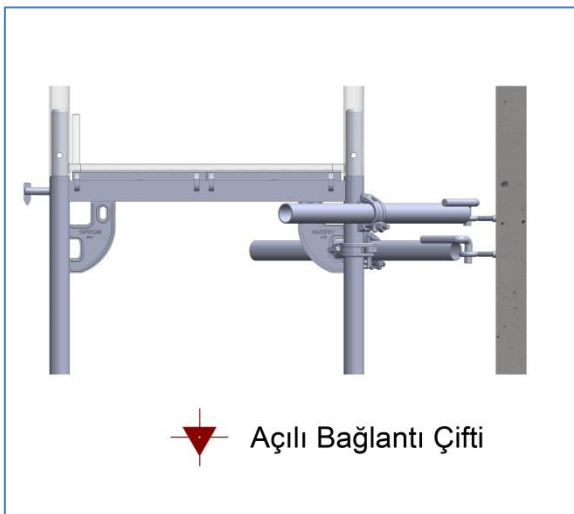


Figure 49: Side View of Angled Connection Pair

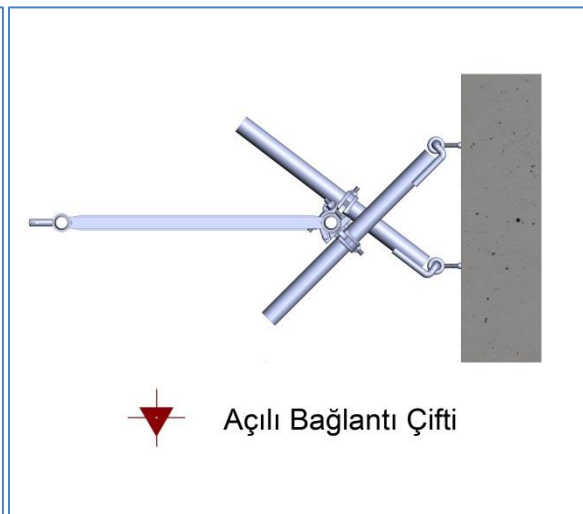


Figure 50: Top View of Angled Connection Pair

(Açılı bağlantı çifti : Angled Connection Pair)

** Which facade connection type shall be used in the system should be specified in the scaffolding project.

3.1.3. Sample Diagonal Uses

The following sample diagonal layouts can be used up to 25.5 m height in the standard system configurations. Diagonal connections in the number fewer than the minimum diagonal number specified in the drawing should not be used. Unless otherwise stated, diagonal connections should be fitted from the base to the ceiling without interrupting their continuity and as much as symmetrically. It is recommended to use one diagonal support in minimum 3 clearances in the scaffolds to be assembled wider than 3 clearances as a whole. (in one piece).

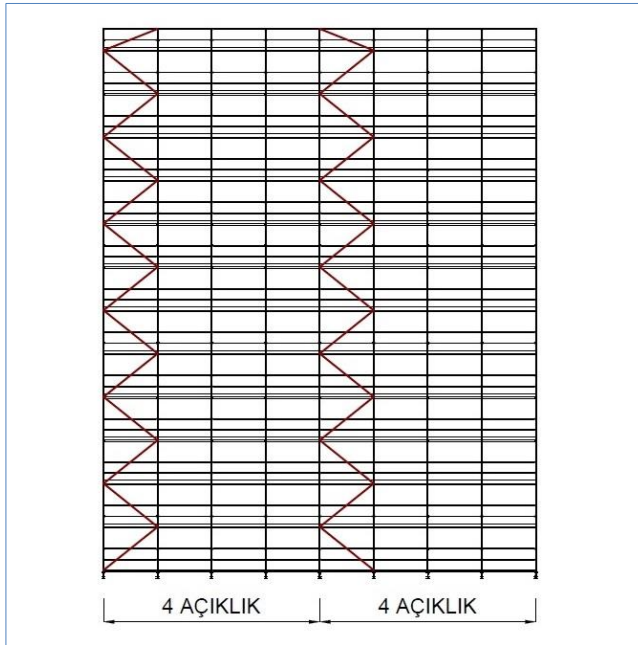


Figure 51: Minimum Diagonal Connection 1/4

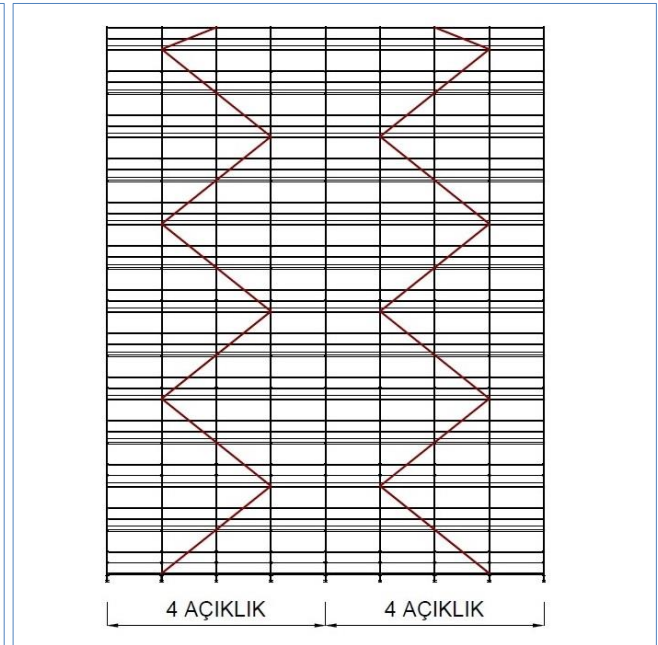


Figure 52: Minimum Diagonal Connection 1/4

(Açıklık : Clearance)

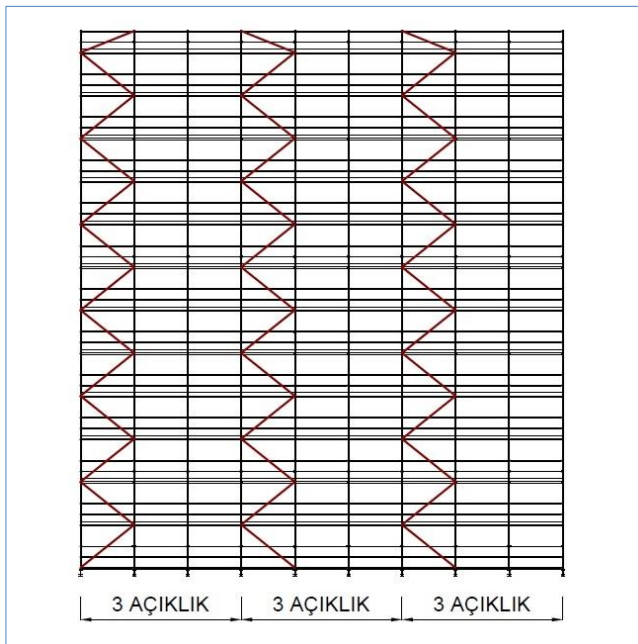


Figure 53: Recommended Diagonal Connection 1/3

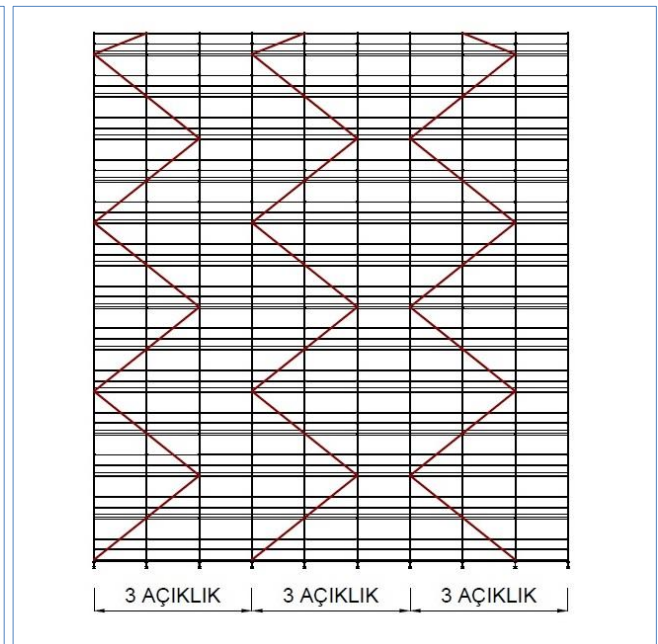


Figure 54: Recommended Diagonal Connection 1/3

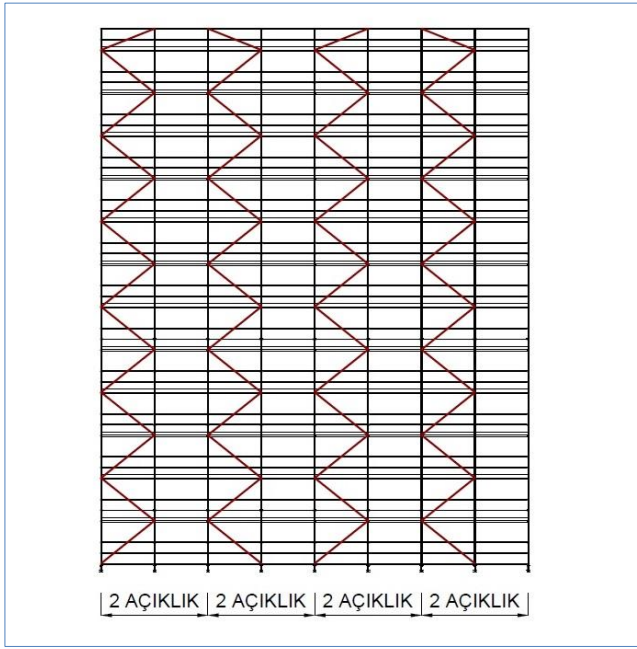


Figure 55:Standard Diagonal Connection 1/2
(Açıklık : Clearance)

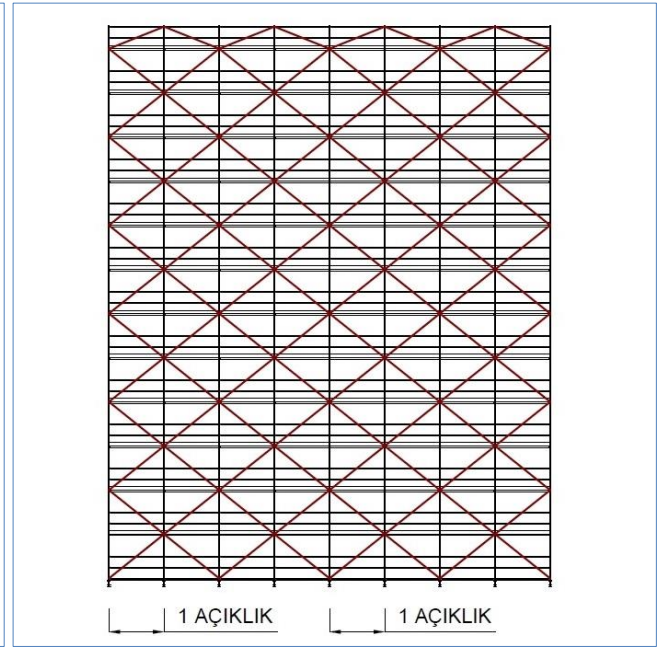


Figure 56:Maximum Diagonal Connection 1/1
(Açıklık : Clearance)

3.2. Disassembly of Scaffolding System

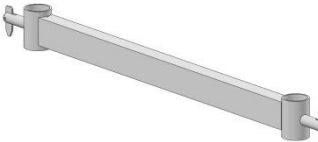
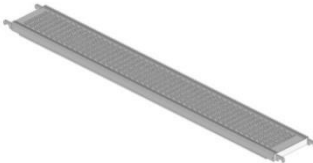
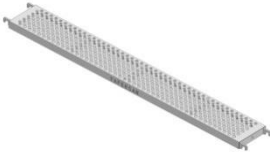
Start the disassembly of Panomod scaffolding system from the top level and continue from top to bottom. In each scaffolding deck, firstly disassemble facade connection and then respectively toes, diagonal connection, side guardrails, horizontal guardrails and posts. After climbing down the lower deck with the help of a ladder, disassemble steel platforms. Do not disassemble diagonal connections and facade connections in the lower decks without dismantling all pieces in the upper deck. Lower the disassembled pieces in such a manner that shall not be removed with rope and in a balanced manner. Stack the lowered materials properly.

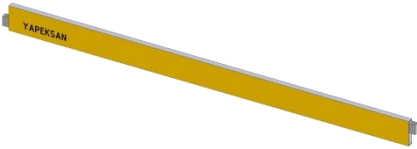
No scaffolding element should be thrown from the top to the bottom while the scaffolds are being dismantled.

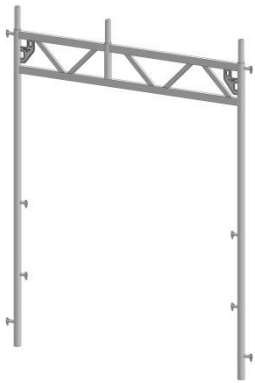
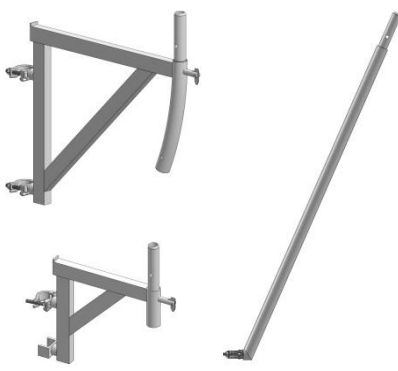
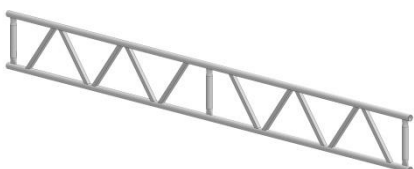
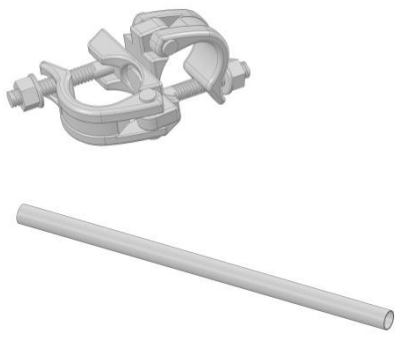
Throughout dismantling, parachute-type safety belts should be used by fitting them to life ropes and required measures should be adopted for vehicle and pedestrian traffic in the environment

4. PANOMOD SCAFFOLDING SYSTEM ELEMENT SPECIFICATIONS

Drawing	Product Description	Weight Kg	Height mm	Width mm	Length mm
	Steel Frame 2000	19,20	2000	700	
	Steel Frame 1500	15,97	1500	700	
	Steel Frame 1000	12,73	1000	700	
	Steel Frame 660	10,52	660	700	
	Steel L Guardrail 1050	5,90	1050	700	
	Steel Trailing Guardrail 1100	14,13	1100	700	
	Steel Horizontal Guardrail 700	1,42			700
	Steel Horizontal Guardrail 1000	1,98			1000
	Steel Horizontal Guardrail 1500	2,18			1500
	Steel Horizontal Guardrail 2000	2,91			2000
	Steel Horizontal Guardrail 2500	3,64			2500
	Steel Diagonal Connection 1000x1413	4,40			1413
	Steel Diagonal Connection 1500x1802	5,82			1802
	Steel Diagonal Connection 1000x2235	6,86			2235
	Steel Diagonal Connection 1500x2498	7,87			2498
	Steel Diagonal Connection 2500x2692	8,75			2692
	Steel Diagonal Connection 2000x2827	9,08			2827
	Steel Diagonal Connection 2500x3200	10,24			3200

Drawing	Product Description	Weight Kg	Height mm	Width mm	Length mm
	Steel Bottom Adjusting Spindle 500 Steel Bottom Adjusting Spindle 750 Steel Bottom Adjusting Spindle 1000	2,90 3,89 4,56	500 750 1000		
	Steel Starter Elements 70	2,55		700	
 	Steel Platform 320x700 Steel Platform 320x1000 Steel Platform 320x1500 Steel Platform 320x2000 Steel Platform 320x2500 Roll Form Steel Platform 320x700 Roll Form Steel Platform 320x1000 Roll Form Steel Platform 320x1500 Roll Form Steel Platform 320x2000 Roll Form Steel Platform 320x2500	6,23 9,29 11,73 15,70 18,22 6,28 9,35 12,40 16,06 19,60		320 320 320 320 320 320 320 320 320 320	700 1000 1500 2000 2500 700 1000 1500 2000 2500
	Stair Steel Platform	42,64		640	2500

Drawing	Product Description	Weight Kg	Height mm	Width mm	Length mm
	Steel Toe Side Guardrail	5,96	1065	610	
	Steel Toeboard 700 Steel Toeboard 1000 Steel Toeboard 1500 Steel Toeboard 2000 Steel Toeboard 2500	2,82 4,23 5,85 7,58 9,00	150 150 150 150 150		700 1000 1500 2000 2500
	Facade Fittings 250 Facade Fittings 500 Facade Fittings 1000 Facade Fittings 1500 Facade Fittings 2000 Facade Fittings 2500	1,20 1,98 3,59 5,15 6,80 8,32			250 500 1000 1500 2000 2500
	Anchorage Set	0,30			

Drawing	Product Description	Weight Kg	Height mm	Width mm	Length mm
	Steel Pedestrian Access 1730	30,98	2200	1730	--
	Steel Console 385 Steel Console 700 Steel Console Strut	5,29 8,68 6,12	380 590 --	385 700 --	-- -- 1580
	Steel Case Beam 4250 Steel Case Beam 5250	41,00 50,00	400 400		4250 5250
	Double Moving Clamp Connecting Pipe 250 Connecting Pipe 500 Connecting Pipe 1000 Connecting Pipe 1500 Connecting Pipe 2000 Connecting Pipe 2500 Connecting Pipe 3000	1,00 0,89 1,78 3,56 5,34 7,12 8,90 10,68			-- 250 500 1000 1500 2000 2500 3000

PART II: CONFIGURATION HANDBOOK

5. SCAFFOLDING SYSTEM CALCULATION REPORT

5.1. Subject

Evaluation of total 3 different static calculations prepared for three different cases as non-coated, coated with 50% wind permeable cover and coated with wind impermeable layer according to the material and cross-section details of safe steel external facade scaffolding in 4 different installations with facade width and height measurements shown in Figure 57.

5.2. Information relating to the System

Static calculations of the system have been conducted for the following installation type. The scaffolding so calculated is H type steel external facade scaffolding wherein access between the decks is provided by escalator with specifications as load class 4 according to TS EN 12811-1, system width 0.7m, climbing up length 2.5m and deck height 2m.

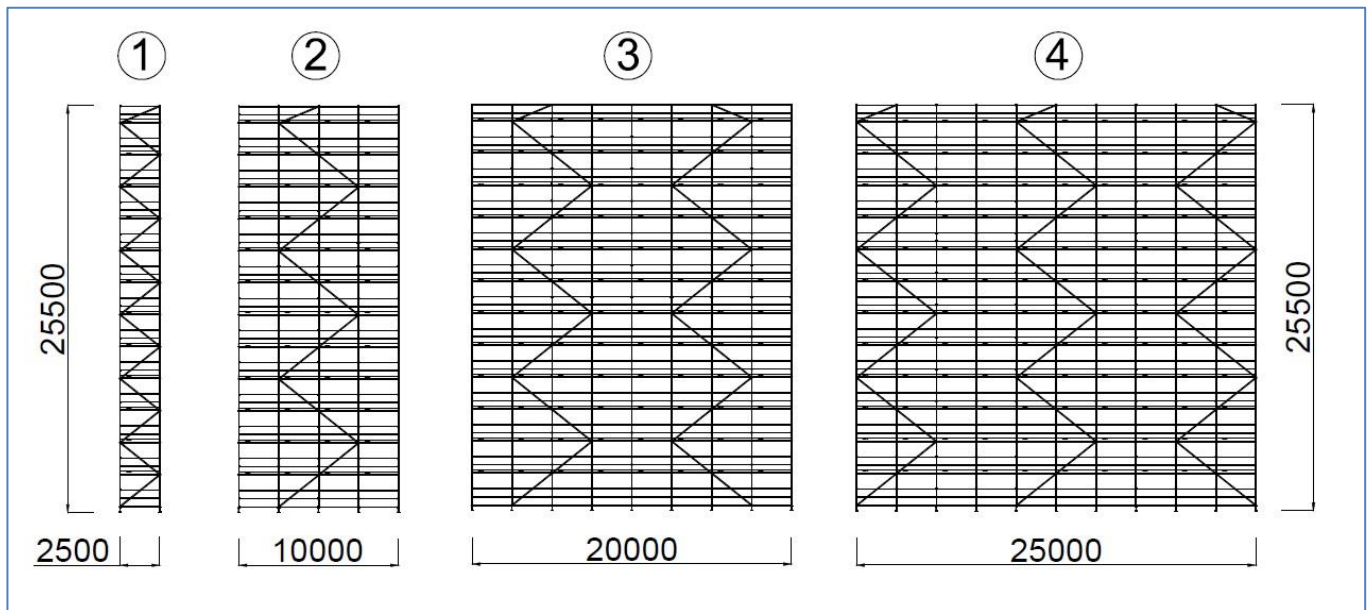


Figure 57: Facade Views of Calculated Scaffolds

5.3. Calculation Method and Standards

Bearing Capacity method has been used in calculation of the scaffolding. Analysis has been conducted in Sap2000 program and investigation of cross-section sufficiency has been conducted in accordance with AISC-LRFD99.

Required information for the scaffolding design has been obtained from the standards given below:

TS EN 12810-1, TS EN 12810-2, TS EN 12811-1, TS EN 12811-2

5.4. Cross-sections used in the Scaffolding System

The cross-sections used in the scaffolding system have been shown in on the system and provided below.

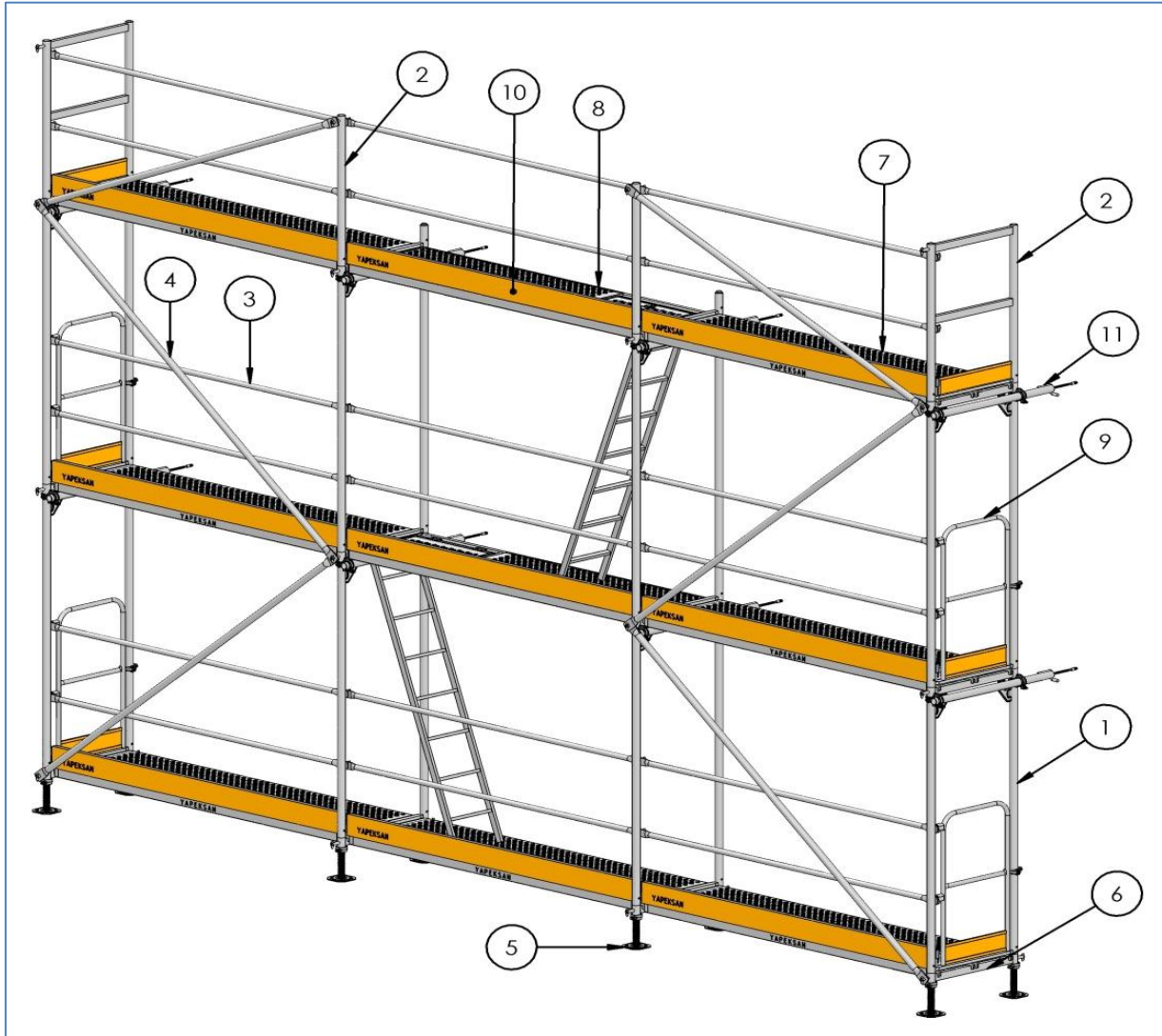


Figure 58: System Elements

- | | |
|---|--|
| 1. Steel Frame Post -Ø 48,3 x 3 mm | 7. Steel Platform Metal Sheet -320 x 2500 x 1,5 mm |
| 2. Steel Guardrail Post -Ø 48,3 x 3 mm | 8. Stairs Platform -30 x 60 x 1,5 mm |
| 3. Steel Horizontal Guardrail - Ø 33,7 x 2 mm | 9. Side Guardrail - Ø 26,9 x 2 mm |
| 4. Steel Diagonal Connection -Ø 42,4 x 2,5 mm | 10. Steel Toe Metal Sheet -150 x 2500 x 1,5 mm |
| 5. Adjusted Leg Pipe -Ø 38 x 4 mm | 11. Facade Connection -Ø 48,3 x 3,2 mm |
| 6. Steel Starter Profile -50x30x2,5 mm | |

****Material class of steel elements used in the model is St37(S235JR).**

5.5. Load Cases

- g : Self weight
 q_1 : Uniformly Distributed Service Load
 q_2 : Partial Area Load
 F_1 : Single Load on 500 mm x 500 mm
 F_2 : Single Load on 200 mm x 200 mm
 W_x : X Direction Wind Load
 W_y : Y Direction Wind Load

Scaffolding Load Class	4. Sınıf	Uniformly Distributed Service Load q_1 (kg/m ²)	300
Scaffolding Horizontal Weight (L_x)	2.50 m	Partial Area Load q_2 (kg/m ²)	500
Scaffolding Depth (L_y)	0.70 m	Single Load F_1 (kg) on 500 mm x 500 mm	300
Scaffolding Vertical Weight (L_z)	2.00 m		
If H = 0, Wind Load q=	80.00	Single Load F_2 (kg) on 200 mm x 200 mm	100
If H = 12, Wind Load q=	95.00		
If H = 24, Wind Load q=	110.00	Partial Area Coefficient	0.4

Table 2: Scaffolding Design Values

5.6. Loads Analysis

Uniformly distributed service load (**q₁**) has been provided on shell elements as 300 kg/m² distributed load.

Partial area load (**q₂**) is provided to the area as the area found by multiplying partial area coefficient with a scaffolding area in each clearance as 500 kg/m² distributed load.

F₁ : 75kg has been provided as a single load to four corners of 500x500 mm area.

F₂ : 25kg has been provided as a single load to four corners of 200x200 mm area.

** These loads have been provided to the top 3 decks of the scaffolding as half load to the top deck, full load to one lower deck and half load to two lower decks.

Wind loads have been provided in compliance with TS EN 12810 and TS EN 12811 in vertical and parallel direction. Design Wind Pressure values in Figure3, Part 8.3 of TS EN 12810-1 have been used in calculation of wind loads.

5.7. Load Combinations

14 combinations have been identified according to whether or not the scaffold is in use based on Part 6.2.9.2, TS EN 12811-1. Bearing capacity method has been used in the design and load factor has been taken as 1.5 for fixed and moving loads and as 1.0 for wind load.

$1.5 g$	$1.5 g + 1.0 W_x$	$1.5 g + 1.0 W_y$
$1.5 g + 1.5 q_1$	$1.5 g + 1.5 q_1 + 1.0 W_x$	$1.5 g + 1.5 q_1 + 1.0 W_y$
$1.5 g + 1.5 q_2$	$1.5 g + 1.5 q_2 + 1.0 W_x$	$1.5 g + 1.5 q_2 + 1.0 W_y$
$1.5 g + 1.5 F_1$	$1.5 g + 1.5 F_1 + 1.0 W_x$	$1.5 g + 1.5 F_1 + 1.0 W_y$
$1.5 g + 1.5 F_2$	$1.5 g + 1.5 F_2 + 1.0 W_x$	$1.5 g + 1.5 F_2 + 1.0 W_y$

5.8. Evaluation of Analysis Results

System designs analysed under the load given and modelled according to the measurements in installation manual have been conducted and it has been witnessed that the elements used in all total 12 separate analyses as 3 times according to coating cases for 4 installations are sufficient.

Given these 12 different analyses results, it has been witnessed that maximum load transferred to adjustable base plate (ground) in the most ineligible location from the scaffolding system is **1546 kg**.

Facade connection of the scaffolds have been made by using Type-a (Typical offset bond pattern) and Type-b (Typical continuous horizontal bond pattern) provided in TSE EN 12810-1, Figure 1. Vertical clearances of facade connections and the loads corresponding to these loads are provided in the following table.

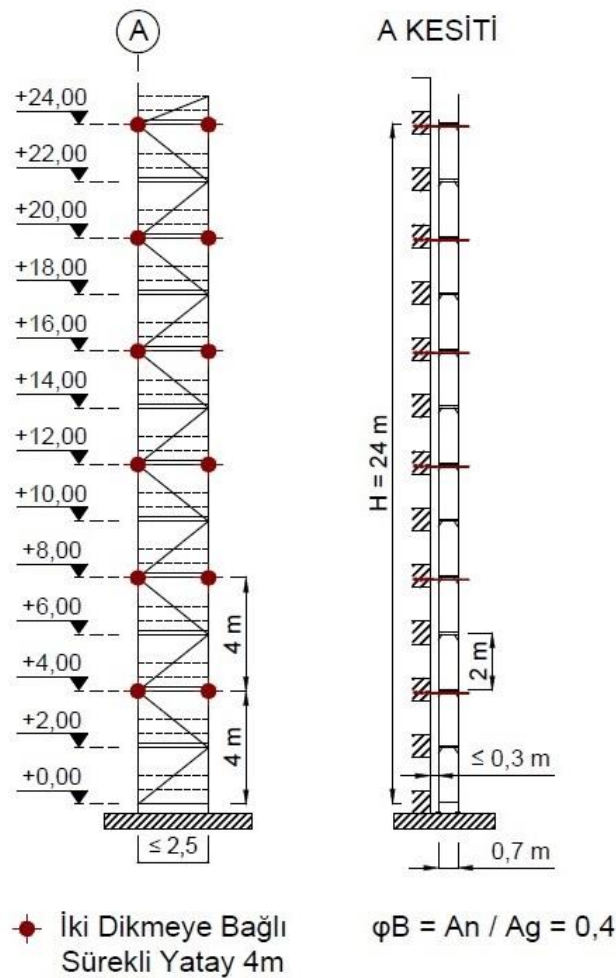
	SCAFFOLD 1	SCAFFOLD 2	SCAFFOLD 3	SCAFFOLD 4	
 Non-coated	4 m (Type-b)	8 m (Type-a)	8 m (Type-a)	8 m (Type-a)	Vertical Range
	88 kg	314 kg	354 kg	351 kg	Max. Load
Semi-Permeable Network Coated with Cover	4 m (Type -b)	4 m (Type -a)	4 m (Type -a)	4 m (Type -a)	Vertical Range
	363 kg	589 kg	618 kg	615 kg	Max. Load
Wind Impermeable Coated with Layer	2 m (Type -b)	2 m (Type -b)	2 m (Type -b)	2 m (Type -b)	Vertical Range
	490 kg	725 kg	726 kg	724 kg	Max. Load

Table 3 Maximum Loads Corresponding to Facade Connections

6. STANDARD CONFIGURATIONS

6.1. SCAFFOLDING CONFIGURATION 1/A

SYSTEM	: H TYPE FACADE SCAFFOLDING
LOAD CLASS	: 4 (FOUR) TS EN 12811-1 Schedule 3
COATING*	: NON-COATED
HEIGHT	: 25.5 m
WIDTH	: 2,5 m (SINGLE CLEARANCE)

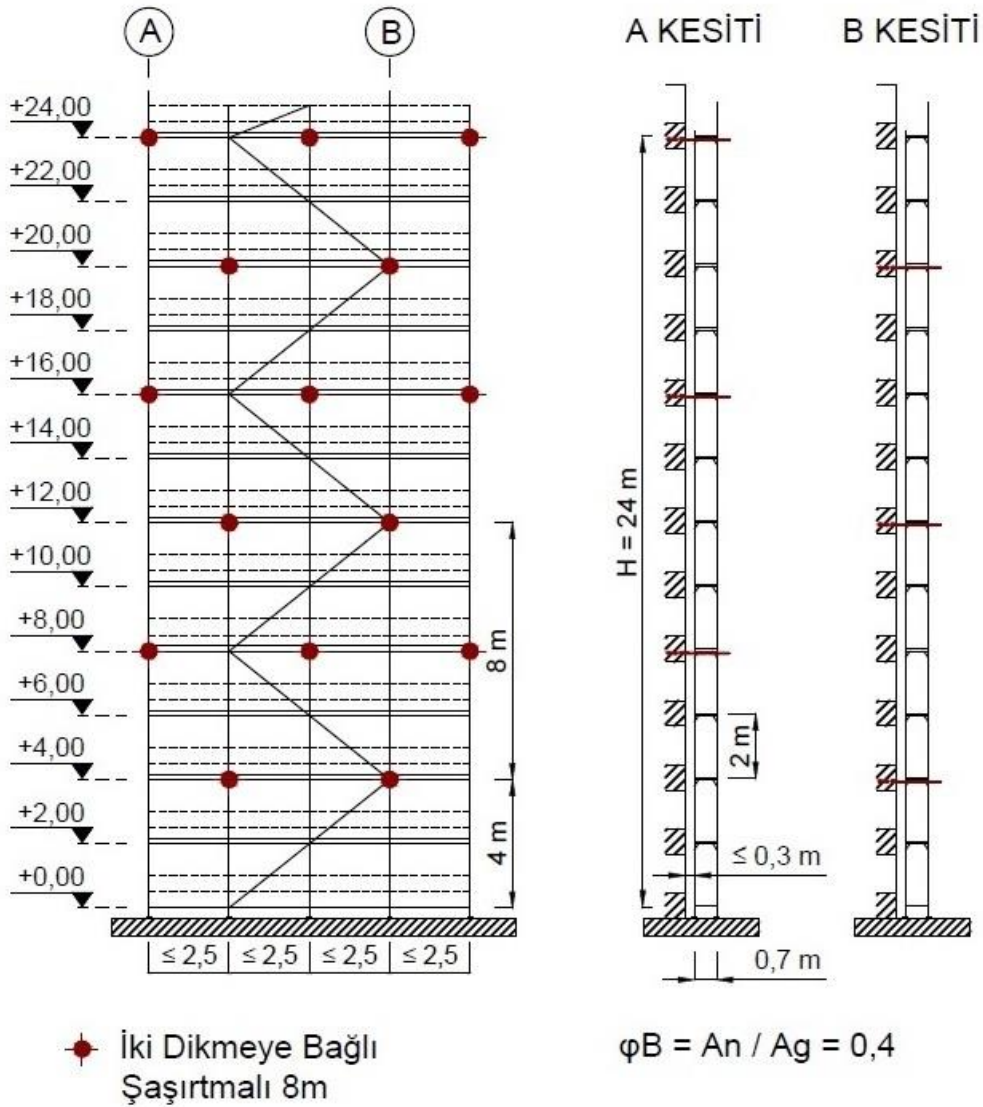


- 1) Maximum Force Corresponding to Facade Fittings : **0,88 kN** (≈ 88 kg)
- 2) Maximum Force Corresponding to Adjusted Base Legs : **8,58 kN** (≈ 858 kg)
- 3) Maximum Permitted Wind Speed: **15 m/sn** (54 km/s)

* Coating: Net coat (net) or impermeable layer coated over the scaffold along the facade area
(İki dikmeye bağlık sürekli yatay : Continuous horizontal connection to two posts 4m)

6.2. SCAFFOLDING CONFIGURATION 4/A

SYSTEM	: H TYPE FACADE SCAFFOLDING
LOAD CLASS	: 4 (FOUR) TS EN 12811-1 Schedule 3
COATING*	: NON-COATED
HEIGHT	: 25.5 m
WIDTH	: 10 m (4 CLEARANCE)

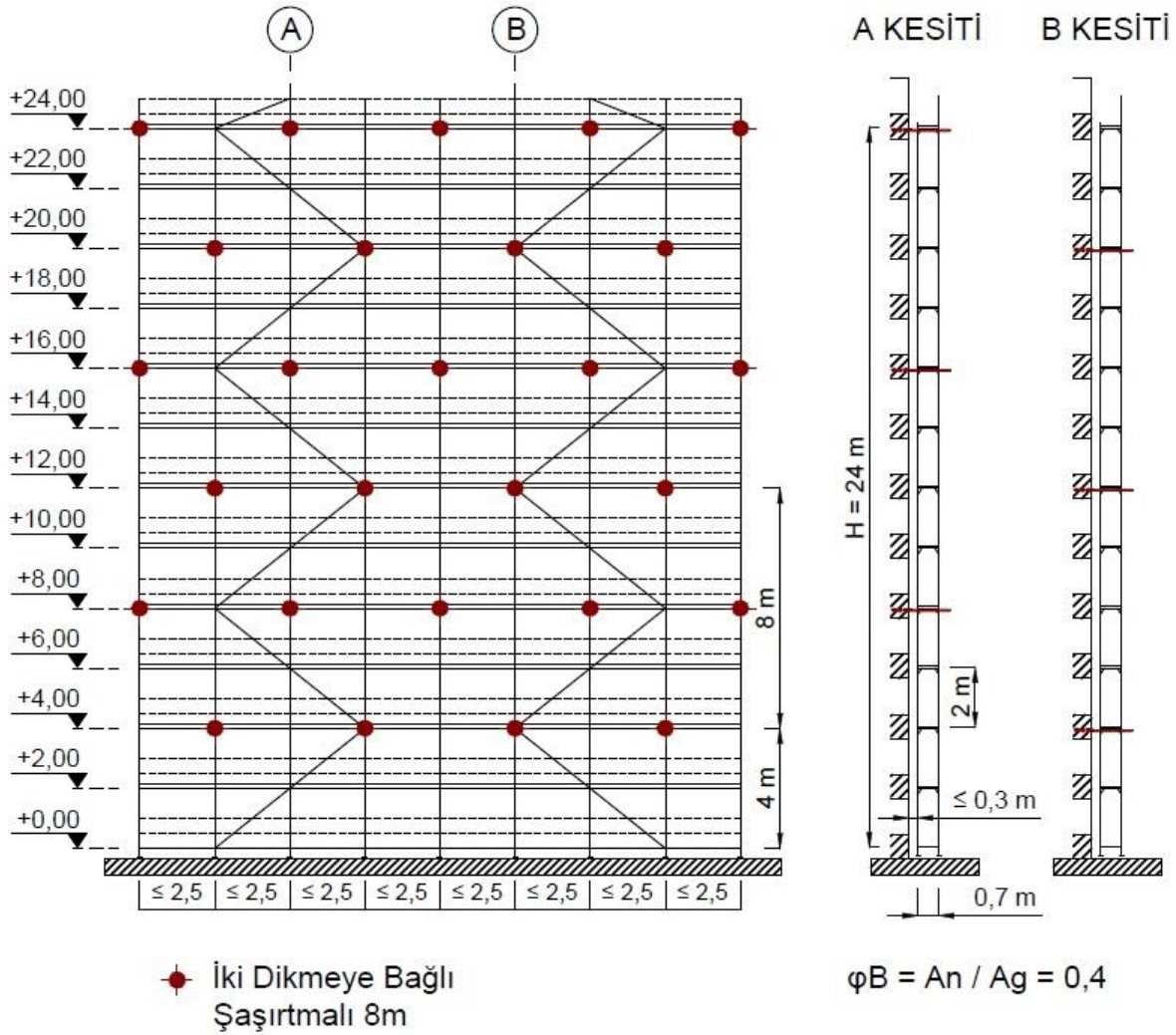


- 1) Cephe Bağlantı Elemanına Gelen Maksimum Kuvvet : **3,14kN** (≈ 314 kg)
- 2) Ayarlı Taban Ayaklarına Gelen Maksimum Kuvvet : **14,17kN** (≈ 1417 kg)
- 3) Çalışmaya İzin Verilen Maksimum Rüzgar Hızı : **15 m/sn** (54 km/s)

* Coating: Net coat (net) or impermeable layer coated over the scaffold along the facade area
(İki dikmeye bağlı şaşırtmalı 8 m : Two posts bond offset 8 m)

6.3. SCAFFOLDING CONFIGURATION 8/A

SYSTEM : H TYPE FACADE SCAFFOLDING
LOAD CLASS : 4 (FOUR) TS EN 12811-1 Schedule 3
COATING* : NON-COATED
HEIGHT : 25.5 m
WIDTH : 20 m (8 CLEARANCE)

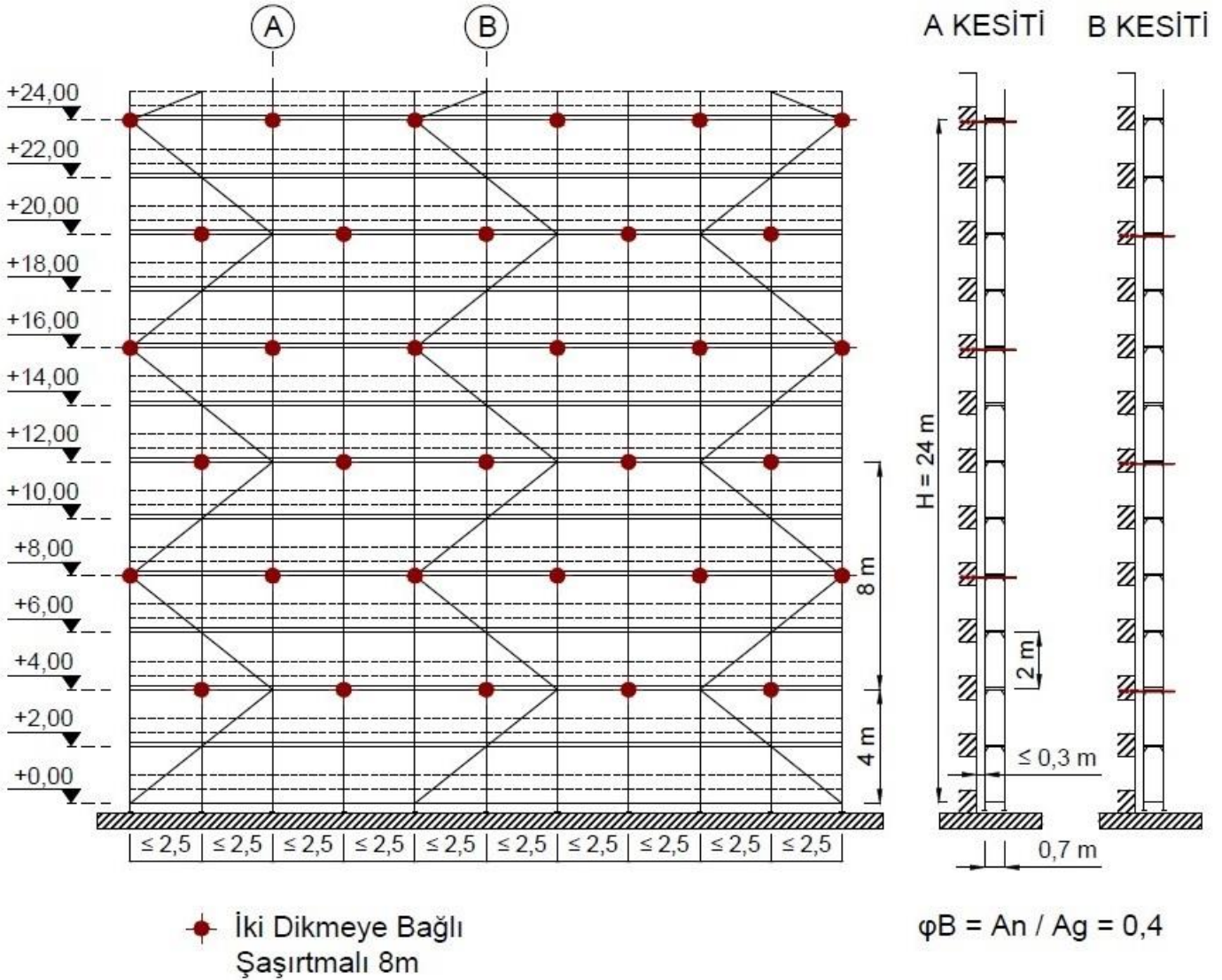


- 1) Maximum Force Corresponding to Facade Fittings: **3,54kN** (≈ 354 kg)
- 2) Maximum Force Corresponding to Adjusted Base Legs: **15,46kN** (≈ 1546 kg)
- 3) Maximum Permitted Wind Speed: **15 m/sn** (54 km/s)

* Coating: Net coat (net) or impermeable layer coated over the scaffold along the facade area
(İki dikmeye bağlık şaşırtmalı 8m : Two posts bond offset 8 m)

6.4. SCAFFOLDING CONFIGURATION 10/A

SYSTEM	: H TYPE FACADE SCAFFOLDING
LOAD CLASS	: 4 (FOUR) TS EN 12811-1 Schedule 3
COATING*	: NON-COATED
HEIGHT	: 25.5 m
WIDTH	: 25 m (10 CLEARANCE)

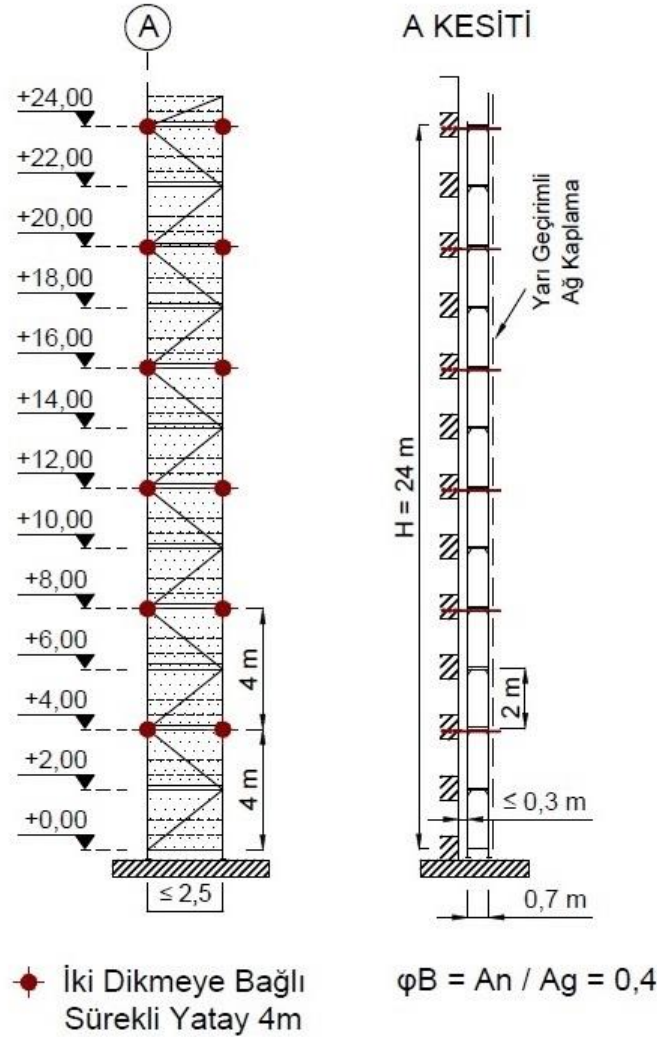


- 1) Maximum Force Corresponding to Facade Fittings : **3,51kN** (≈ 351 kg)
- 2) Maximum Force Corresponding to Adjusted Base Legs: **14,75kN** (≈ 1475 kg)
- 3) Maximum Permitted Wind Speed: **15 m/sn** (54 km/s)

* Coating: Net coat (net) or impermeable layer coated over the scaffold along the facade area
(İki dikmeye bağlık şaşırtmalı 8m : Two posts bond offset 8 m)

6.5. SCAFFOLDING CONFIGURATION 1/B1

SYSTEM	: H TYPE FACADE SCAFFOLDING
LOAD CLASS	: 4 (FOUR) TS EN 12811-1 Schedule 3
COATING*	: SEMI-PERMEABLE NET COVER COATED
HEIGHT	: 25.5 m
WIDTH	: 2,5 m (SINGLE CLEARANCE)

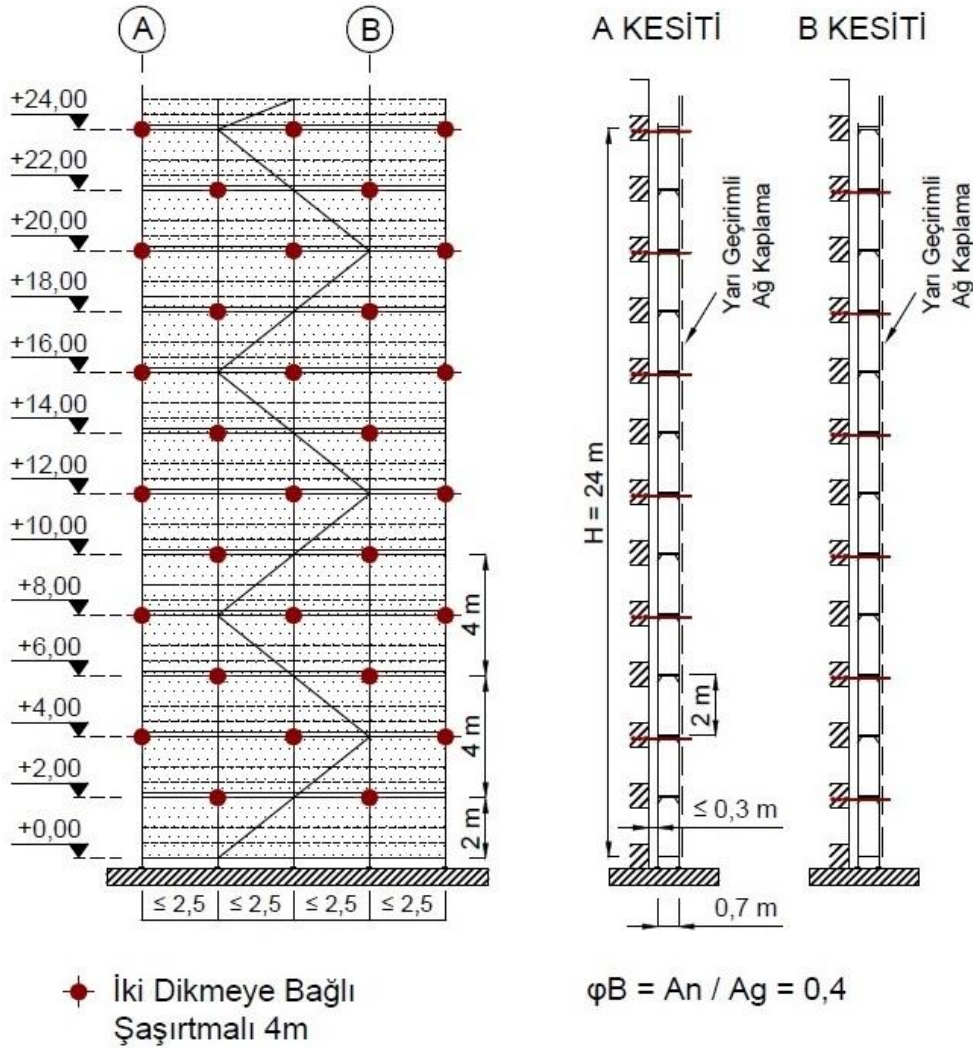


- 1) Maximum Force Corresponding to Facade Fittings : **3,63kN** (≈ 363 kg)
- 2) Maximum Force Corresponding to Adjusted Base Legs: **8,34kN** (≈ 834 kg)
- 3) Maximum Permitted Wind Speed: **15 m/sn** (54 km/s)

* Coating: Net coat (net) or impermeable layer coated over the scaffold along the facade area
(Yarı geçirimli ağ kaplama : Semi-Permeable Bond Coating)
(İki dikmeye bağlı sürekli yatay 4m : Continuous horizontal connection to two posts 4m)

6.6. SCAFFOLDING CONFIGURATION /B1

SYSTEM	: H TYPE FACADE SCAFFOLDING
LOAD CLASS	: 4 (FOUR) TS EN 12811-1 Schedule 3
COATING*	: SEMI-PERMEABLE NET COVER COATED
HEIGHT	: 25.5 m
WIDTH	: 10 m (4 CLEARANCE)

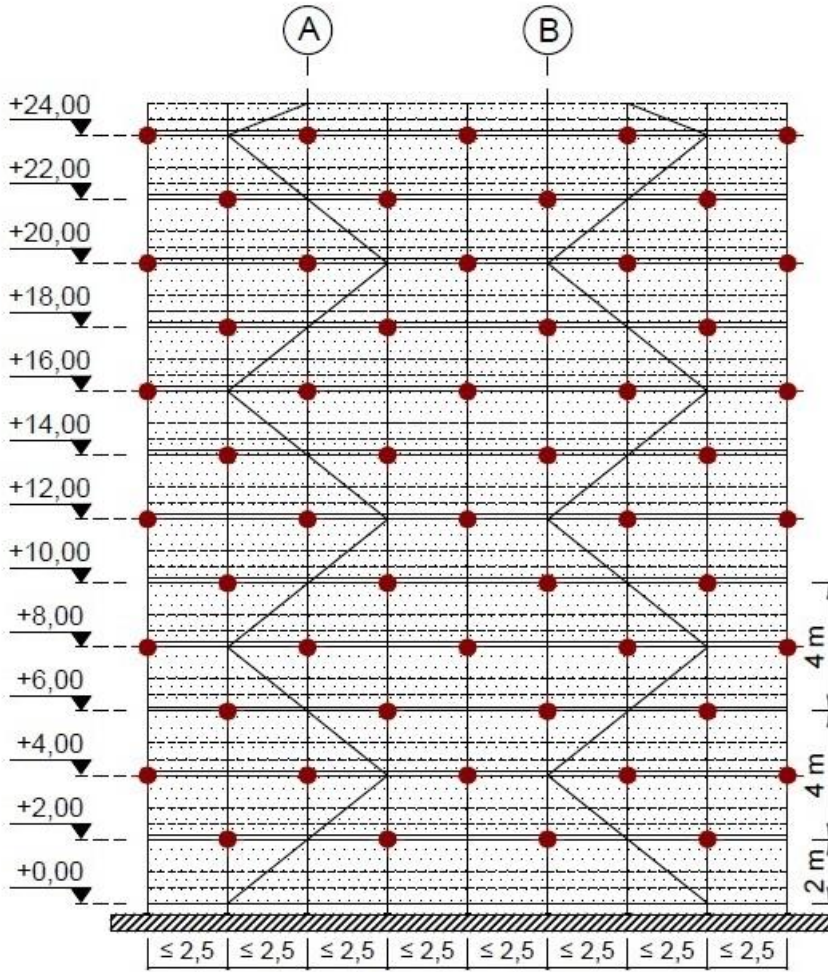


- 1) Maximum Force Corresponding to Facade Fittings : **5,89kN** (≈ 589 kg)
- 2) Maximum Force Corresponding to Adjusted Base Legs: **14,30kN** (≈ 1430 kg)
- 3) Maximum Permitted Wind Speed: **15 m/sn** (54 km/s)

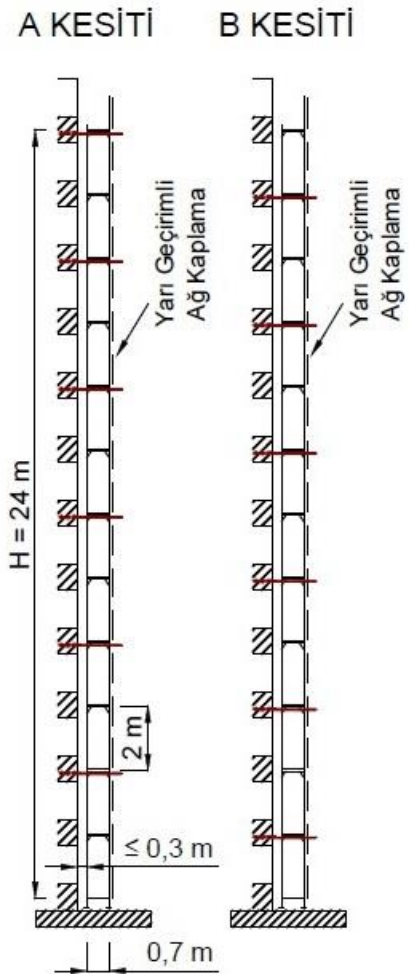
* Coating: Net coat (net) or impermeable layer coated over the scaffold along the facade area
(Yarı geçirimli ağ kaplama : Semi-Permeable Bond Coating)
(İki dikmeye bağlık şaşırtmalı 4 m : Semi-Permeable Bond Coating 4 m)

6.7. SCAFFOLDING CONFIGURATION /B1

SYSTEM	: H TYPE FACADE SCAFFOLDING
LOAD CLASS	: 4 (FOUR) TS EN 12811-1 Schedule 3
COATING*	: SEMI-PERMEABLE NET COVER COATED
HEIGHT	: 25.5 m
WIDTH	: 20 m (8 CLEARANCE)



• İki Dikmeye Bağlı
Şaşırtmalı 4m



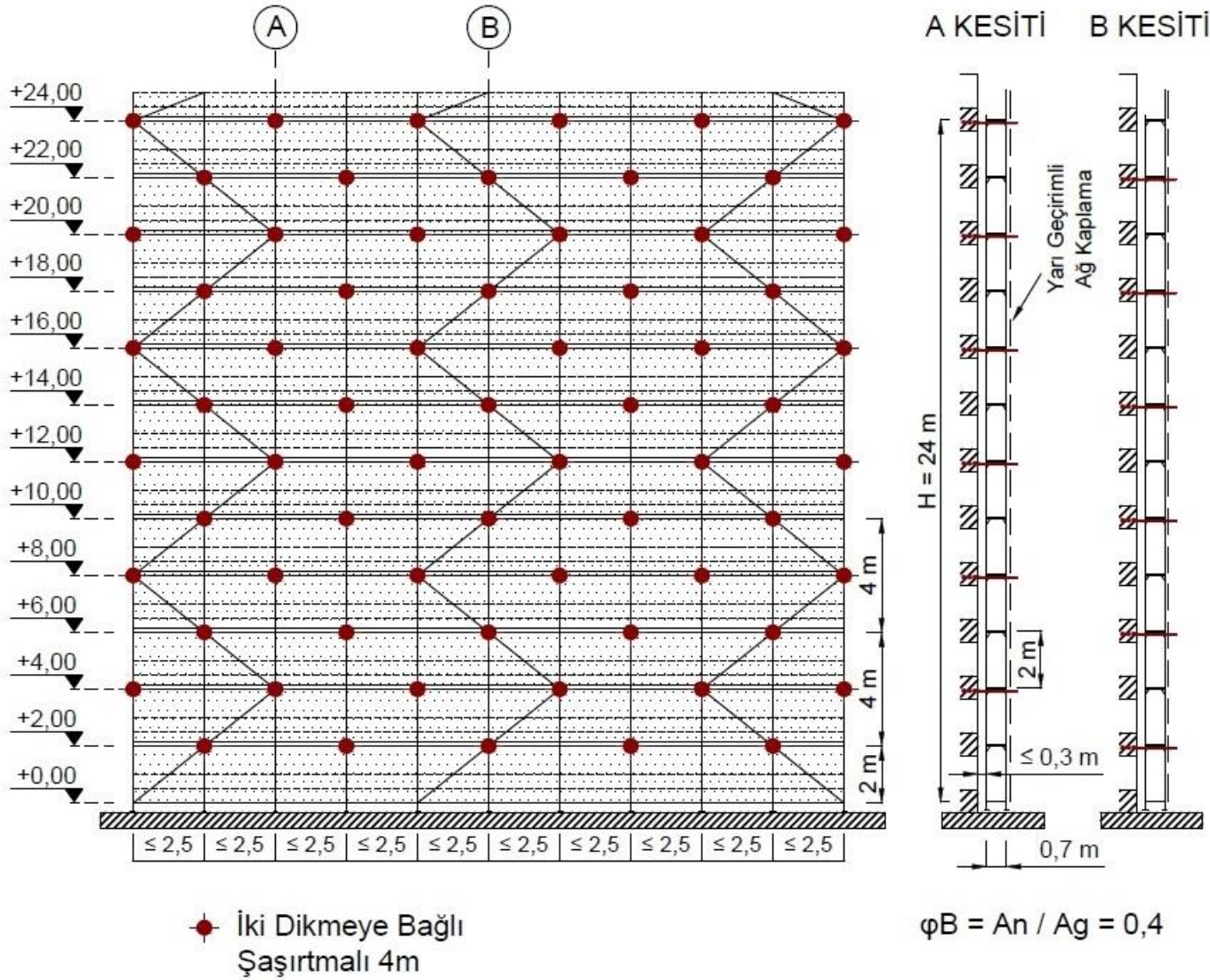
$$\phi B = A_n / A_g = 0,4$$

- 1) Maximum Force Corresponding to Facade Fittings : **6,18kN** (≈ 618 kg)
- 2) Maximum Force Corresponding to Adjusted Base Legs: **15,19kN** (≈ 1519 kg)
- 3) Maximum Permitted Wind Speed: **15 m/sn** (54 km/s)

* Coating: Net coat (net) or impermeable layer coated over the scaffold along the facade area
(Yarı geçirimli ağ kaplama : Semi-Permeable Bond Coating)
(İki dikmeye bağlı şaşırtmalı 4m : Semi-Permeable Bond Coating 4 m)

6.8. SCAFFOLDING CONFIGURATION 10/B1

SYSTEM : H TYPE FACADE SCAFFOLDING
LOAD CLASS : 4 (FOUR) TS EN 12811-1 Schedule 3
COATING* : SEMI-PERMEABLE NET COVER COATED
HEIGHT : 25.5 m
WIDTH : 25 m (10 CLEARANCE)

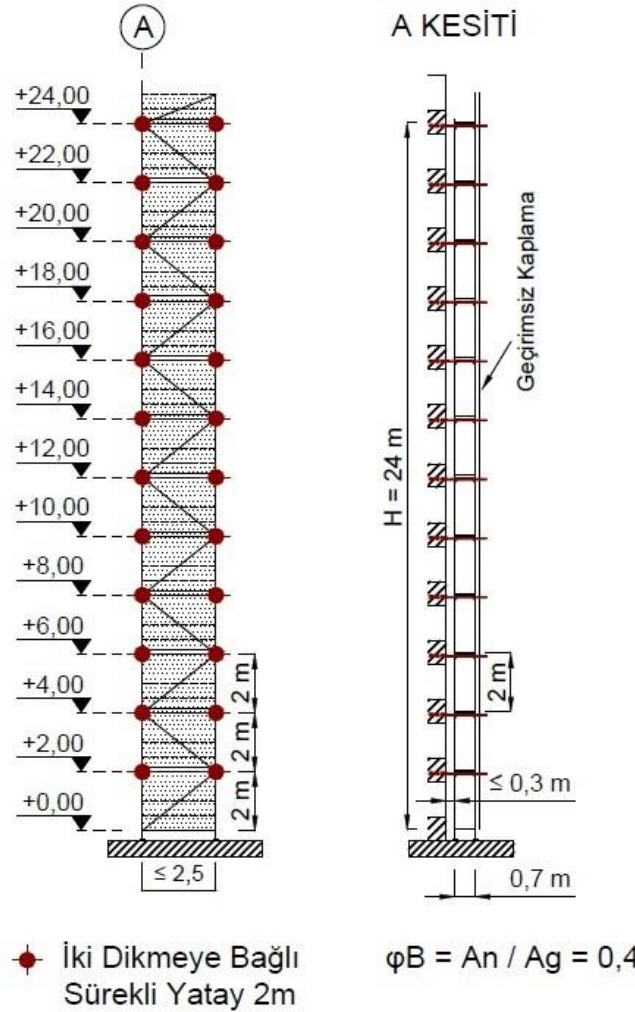


- 1) Maximum Force Corresponding to Facade Fittings : **6,15kN** (≈ 615 kg)
- 2) Maximum Force Corresponding to Adjusted Base Legs: **14,78kN** (≈ 1478 kg)
- 3) Maximum Permitted Wind Speed: **15 m/sn** (54 km/s)

* Coating: Net coat (net) or impermeable layer coated over the scaffold along the facade area
(Yarı geçirimli ağ kaplama : Semi-Permeable Bond Coating)
(İki dikmeye bağlı şaşırtmalı 4 m : Semi-Permeable Bond Coating 4 m)

6.9. SCAFFOLDING CONFIGURATION 1/B2

SYSTEM	: H TYPE FACADE SCAFFOLDING
LOAD CLASS	: 4 (FOUR) TS EN 12811-1 Schedule 3
COATING*	: COATED WITH IMPERMEABLE LAYER
HEIGHT	: 25.5 m
WIDTH	: 2,5 m (SINGLE CLEARANCE)

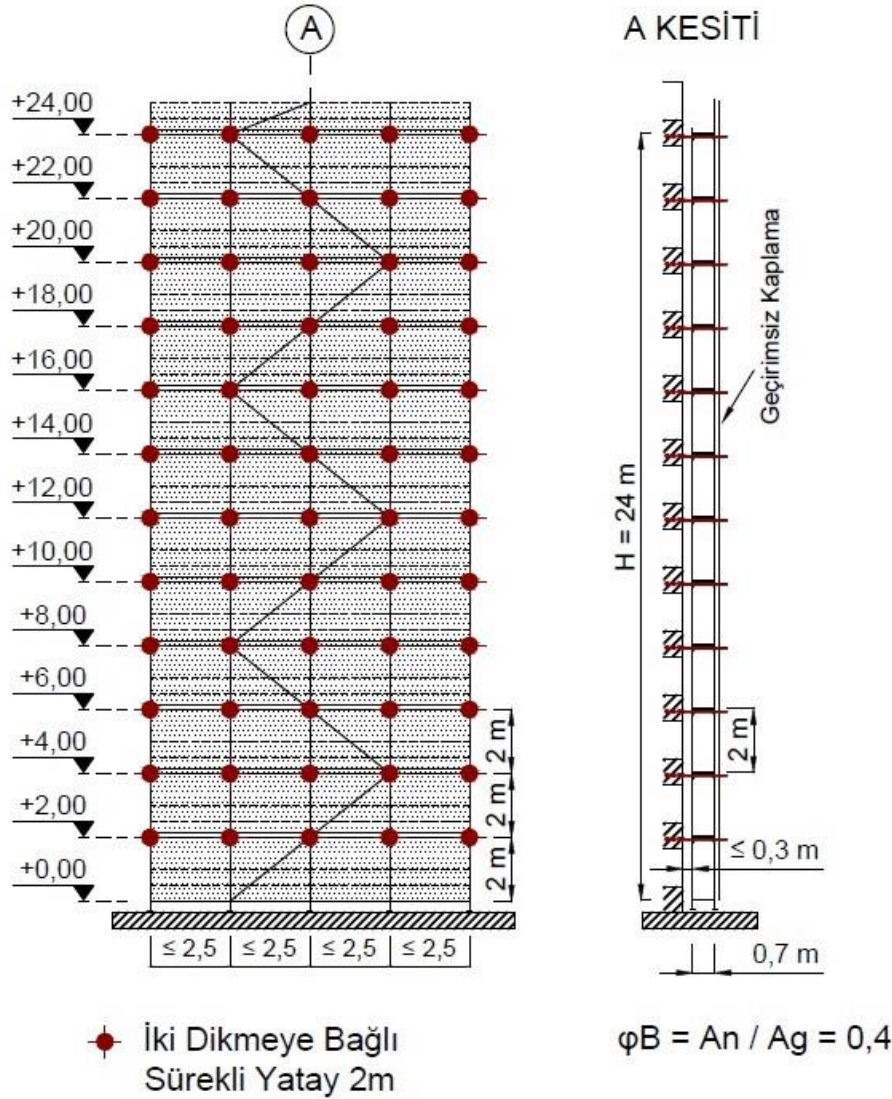


- 1) Maximum Force Corresponding to Facade Fittings : **4,90kN** (≈ 490 kg)
- 2) Maximum Force Corresponding to Adjusted Base Legs: **8,62kN** (≈ 862 kg)
- 3) Maximum Permitted Wind Speed: **15 m/sn** (54 km/s)

* Coating: Net coat (net) or impermeable layer coated over the scaffold along the facade area
(İki dikmeye bağlı sürekli yatay 2 m : Continuous horizontal connection to two posts 2m)

6.10. SCAFFOLDING CONFIGURATION 4/B2

SYSTEM	: FLANGED TYPE FACADE SCAFFOLDING
LOAD CLASS	: 4 (FOUR) <i>TS EN 12811-1 Schedule 3</i>
COATING*	: COATED WITH IMPERMEABLE LAYER
HEIGHT	: 25.5 m
WIDTH	: 10 m (4 CLEARANCE)

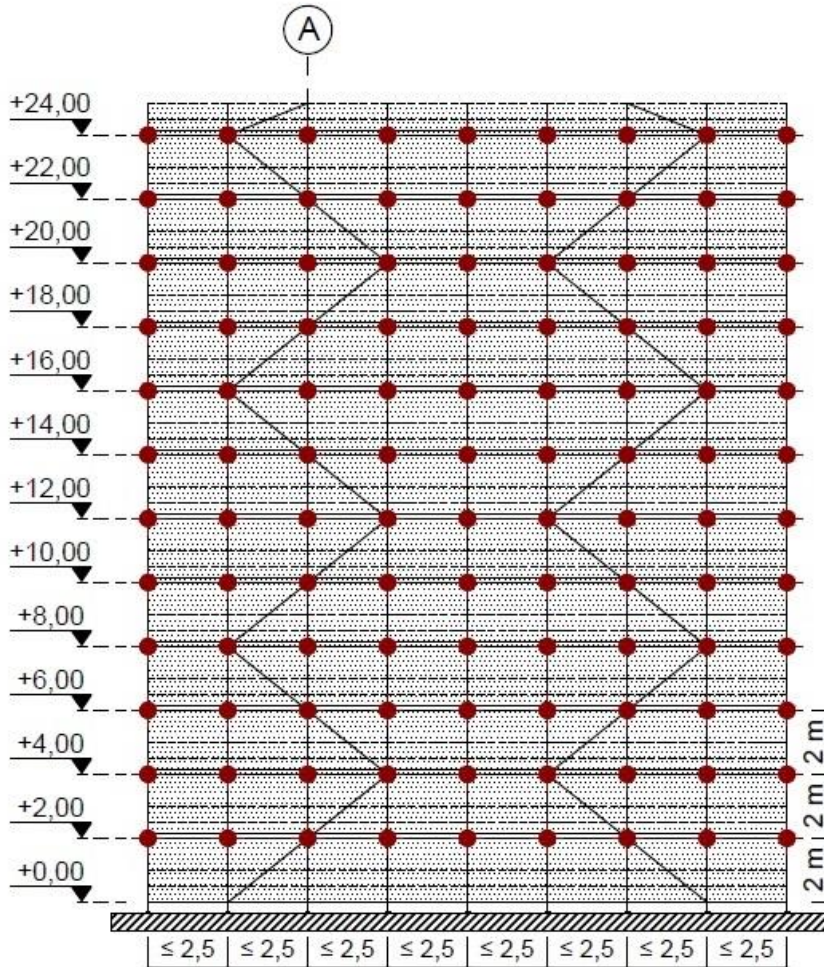


- 1) Maximum Force Corresponding to Facade Fittings : **7,25kN** (≈ 725 kg)
- 2) Maximum Force Corresponding to Adjusted Base Legs: **14,64kN** (≈ 1464 kg)
- 3) Maximum Permitted Wind Speed: **15 m/sn** (54 km/s)

* Coating: Net coat (net) or impermeable layer coated over the scaffold along the facade area
(İki dikmeye bağlı sürekli yatay 2 m : Continuous horizontal connection to two posts 2m)

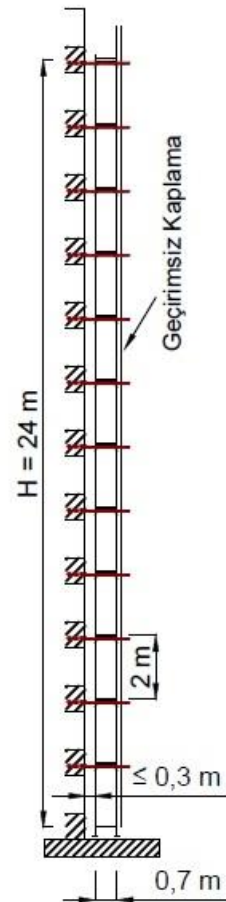
6.11. SCAFFOLDING CONFIGURATION 8/B2

SYSTEM	: H TYPE FACADE SCAFFOLDING
LOAD CLASS	: 4 (FOUR) TS EN 12811-1 Schedule 3
COATING*	: COATED WITH IMPERMEABLE LAYER
HEIGHT	: 25.5 m
WIDTH	: 20 m (8 CLEARANCE)



• İki Dikmeye Bağlı
Sürekli Yatay 2m

A KESİTİ



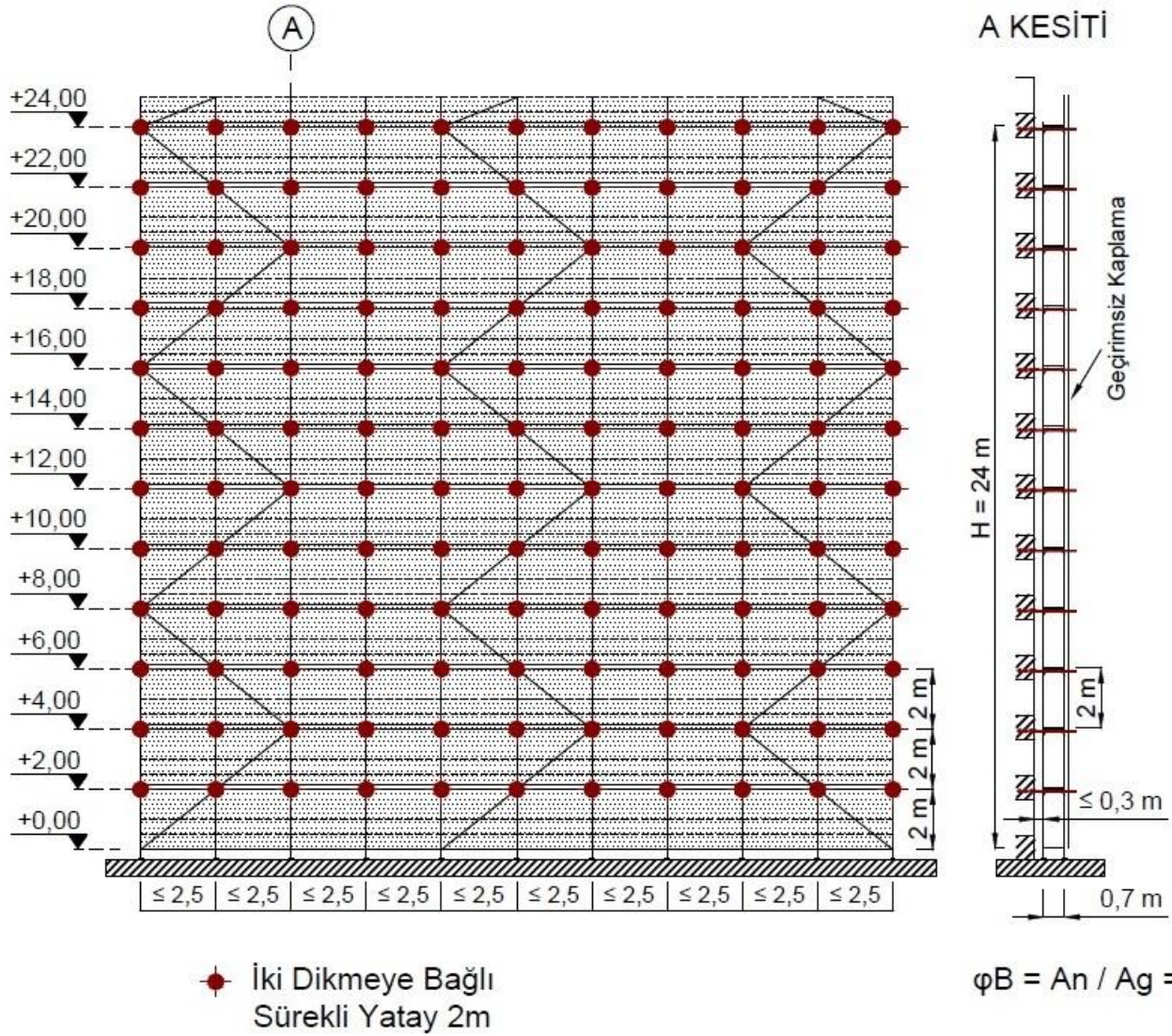
$$\phi B = A_n / A_g = 0,4$$

- 1) Maximum Force Corresponding to Facade Fittings : **7,26kN** (≈ 726 kg)
- 2) Maximum Force Corresponding to Adjusted Base Legs: **15,12kN** (≈ 1512 kg)
- 3) Maximum Permitted Wind Speed: **15 m/sn** (54 km/s)

* Coating: Net coat (net) or impermeable layer coated over the scaffold along the facade area
(İki dikmeye bağlı sürekli yatay 2 m : Continuous horizontal connection to two posts 2m)

6.12. SCAFFOLDING CONFIGURATION 10/B2

SYSTEM	: H TYPE FACADE SCAFFOLDING
LOAD CLASS	: 4 (FOUR) TS EN 12811-1 Schedule 3
COATING*	: COATED WITH IMPERMEABLE LAYER
HEIGHT	: 25.5 m
WIDTH	: 25 m (10 CLEARANCE)



- 1) Maximum Force Corresponding to Facade Fittings: **7,24kN** (≈ 724 kg)
- 2) Maximum Force Corresponding to Adjusted Base Legs: **14,81kN** (≈ 1481 kg)
- 3) Maximum Permitted Wind Speed: **15 m/sn** (54 km/s)

* Coating: Net coat (net) or impermeable layer coated over the scaffold along the facade area
(İki dikmeye bağlı sürekli yatay 2 m : Continuous horizontal connection to two posts 2m)

7. SAFETY MEASURES

7.1. General Safety Measures to be Taken in Scaffolds

Article 1: Structural scaffolds shall be assembled or disassembled under the supervision of the responsible and authorized technical personnel by "scaffolding installation personnel" holding occupational training certificate by considering the scaffold dimensions and the properties of the material.

Scaffolds shall be frequently inspected and checked minimum once a month and their results shall be written on the structural work book.

Scaffolds shall be inspected after each storm, adverse weather conditions and earthquakes that can affect the balance and force of the scaffolds.

Article 2: The maximum weight to be carried by the scaffolds shall be hung to the appropriate and visible locations of the scaffold by indicating them on the plates.

It is prohibited to impose a load more than these weights to the scaffolds.

Article 3: In case the scaffolds become slippery due to rain, snow, ice, dust, etc., then precautions preventing sliding must be taken

Article 4: Defects in the scaffolds shall be promptly remedied and weak areas shall be reinforced or replaced.

No material shall be left that shall obstruct access with debris and residuals on the scaffolds.

Article 5: Required measures shall be taken that shall prevent any accidents or damage or collapse of the scaffolding by fitting the loaded material to the scaffolding while using crane or similar machines.

Article 6: Safe scaffolding stairs shall be used for climbing up and down in the scaffolds.

Article 7: A toe in 15cm height shall be placed to outer area of flooring for preventing accidents by way of falling of tools and materials in the scaffolds. Maximum of one centimetre gap should be left between this toe and flooring.

Article 8: An interim guardrail shall be used in such a manner that a sphere in 47 cm diameter shall not access from the clearances between side protection elements between main guardrail and main guardrail in minimum 95cm height from flooring surface in all working platforms.

Article 9: Wooden planks to be used in the platforms, passages or similar points of the scaffolds shall be without joint in line with its length and shall be placed side by side and without any clearance.

Where plank edges protrude more than 1/10 of its own length in the scaffolding end, appropriate guardrails shall be constructed that shall prevent transitioning to that area.

Article 10: Passages that shall serve bridge in the scaffolds shall not be constructed without guardrail and narrower than 60 cm.

Article 11: Metal scaffolds shall not be erected closer than 3 meters to overhead electrical transmission lines. This distance should be increased according to the highest operating voltage of the line.

Article 12: Pipe or metal scaffolds shall be appropriately grounded against static electricity.

Article 13: To the extent the work continues in twilight and foggy weather, stairs and elevator and floorings where the work is performed in the scaffolds shall be appropriately illuminated.

Article 14: Scaffolds shall under no circumstances be lifted with the tools such as crane in erected state.

Article 15: Scaffolds shall not be used other than their intended purposes.

Article 16: All teams that shall work in the scaffold shall receive a training of "working at height" and they shall fill in permit form for working at height.

Article 17: Life lines in the areas of working at height shall be created and the workers shall be ensured to use personal protective equipment such as parachute type safety belt and helmet.

Article 18: Scaffolding disassembly shall be made according to the following principles.

1. Scaffolding disassembly shall be started from the top area.
2. After the building connection platforms of the scaffolds are taken, they shall be disassembled from top to bottom.
3. Disassembled materials shall not be directly thrown from any height onto the ground and shall be tied from its both points and shall be lowered in a balanced manner and shall be stacked in a convenient location.
4. Prior to commencing disassembly operations, no element can be taken from reinforcement or cross connections of the scaffold. However, after commencing disassembly operation, guardrails between two posts (axle) can be taken for lowering the scaffolding material

Article 19: This general safety measures shall be taken for all scaffolding systems.

7.2. Safety Measures to be Taken in Steel Pipe Facade Scaffolds

Article 1: The resistance and the other properties of all pipe and metal parts to be used in the steel piped scaffolds shall be in compliance with the norms according to the load to be carried.

Article 2: Pipe and other materials in the works other than scaffolding construction shall not be used in the scaffolding construction works.

Article 3: The scaffolds with steel pipes shall be sufficiently reinforced with cross pipes in a manner that shall not be shaken to the right and left directions and shall be fixed in a manner that shall not be separated from the building.

Article 4: Joints in vertical and horizontal pipes shall be made maximum in 6 meters.

Article 5: Specially designed metal head shall be used in order for preventing pipe heads are stuck in plank base plates placed on the base and these heads shall be attached to these base plates with nail or long screws.

Article 6: Safety net shall be extended under the scaffold during assembly-disassembly processes and the scaffolds are in use and warning-notice signs shall be placed in the vicinity such as "Warning! Men Working Above", "Entrance to working site is dangerous and prohibited", "Caution! Parts may fall off" and all required measures shall be taken for protection of local people.



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