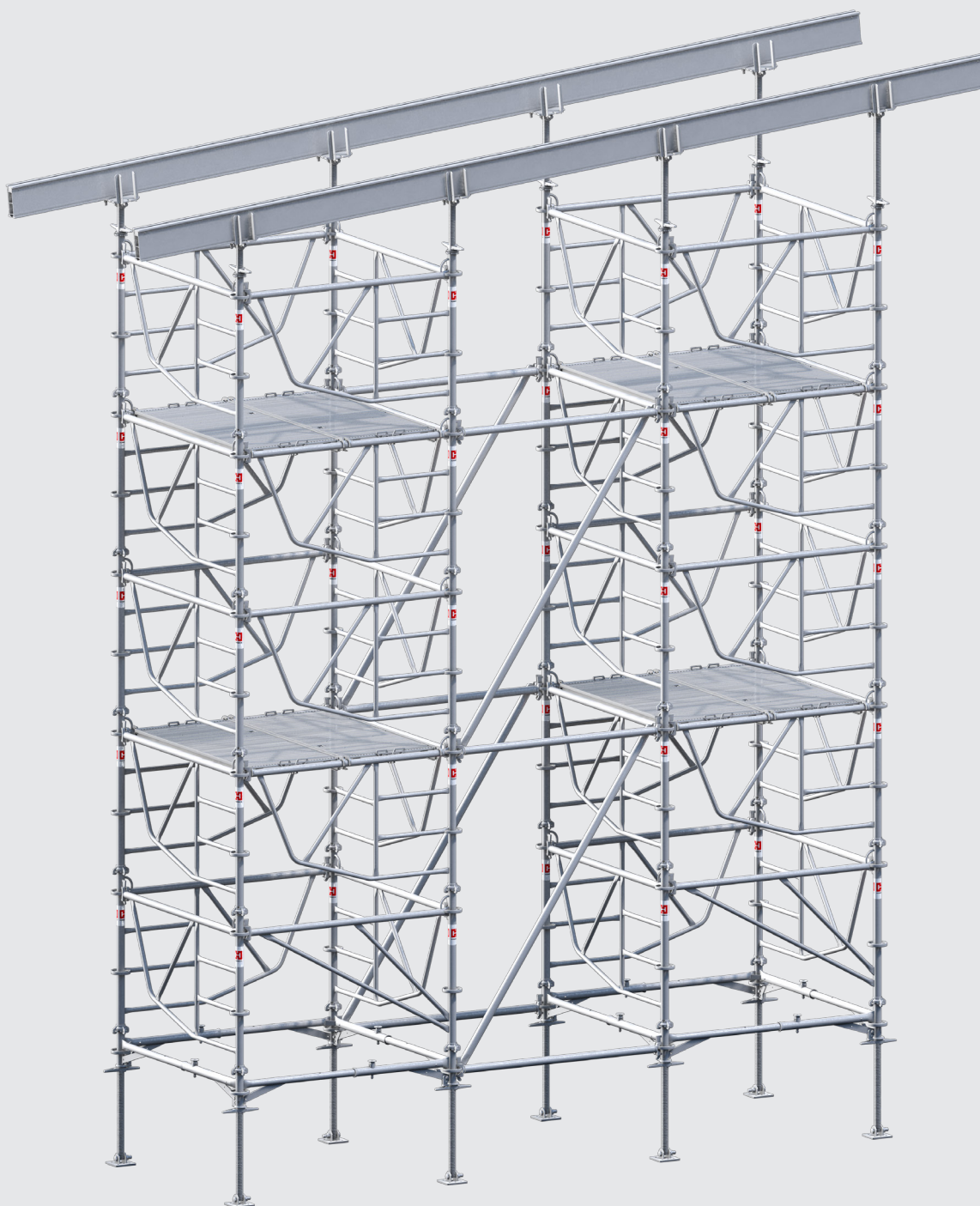


ST 60 Shoring Tower

User guide



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1 Product features

1.1 Introduction

The Hünnebeck ST 60 Shoring Tower is type-approved falsework used to erect formwork. It has only six basic components.

The modular design makes it easy to erect square or rectangular shoring towers with three different plan dimensions:

- 1.13 m x 1.13 m
- 1.50 m x 1.50 m
- 1.13 m x 1.50 m

The frames are made of welded, galvanised steel tubes.

Jacks at the top and bottom allow the height to be quickly adjusted to suit the respective structure.

Assembling the ST 60 Shoring Towers upright from the interior enables temporary side protection to be attached safely. The ST 60 Starter Frames L are equipped with automatic safety locks that snap onto the base jacks. The continuous ladder with non-slip steps, integrated into the standard frame, can be used to easily and safely access the next platform from the interior of the ST 60 Shoring Tower. The aluminium decks are self-locking. They have a passage lid and meet the requirements of load class 4 (300 kg/m²). Crosshead Jacks can safely and securely accommodate 1no. or 2no. primary beams.

ST 60 Shoring Towers can also be assembled while lying on the ground. ST 60 Shoring Towers assembled lying on the ground can be raised upright and then transported by crane to where they will be used.

Because the components weigh no more than 15 kg each and the decks can be repositioned ergonomically, working with the system is safe and does not cause fatigue.

The ST 60 Shoring Tower is compatible with the Hünnebeck MODEX modular scaffold. This means that, with the proper accessories, the ST 60 Shoring Towers can easily be expanded to form birdcage scaffolds without having to use complicated couplings.

1.2 Intended use

The standard assembly shown in this user guide is intended to be used to transfer vertical loads to the ground.

The ST 60 Shoring Tower is approved for use as falsework as specified by DIN EN 12812.

The integrated ladder for ascending the structure may be used only inside of the ST 60 Shoring Tower.

Always observe the permissible loads. Additional information can be found in the applicable technical approval Z-8.22-956.

In conjunction with the Hünnebeck MODEX system, the ST 60 Shoring Towers can be used as a working or birdcage scaffold. Additional information can be found in the user guide and in the applicable technical approval Z-8.22-67.

2 General information

2.1 About this document

This user guide contains important information on how to work safely and effectively with the ST 60 system. It is essential that you carefully read the entire user guide before erecting and using the ST 60 system. Keep the user guide nearby and save it as a reference.

This user guide is designed for commercial users with proper professional training. The information and procedures described here comply with the laws and the occupational health and safety regulations of Germany and Austria. Hünnebeck assumes no liability for deviations from the contents and processes described or for use outside this area of application.

2.2 Safety instructions

Notes on intended and safe use of falsework

The contractor is responsible for drawing up a comprehensive risk assessment and a set of assembly instructions. The latter is not usually identical to the user guide.

Risk assessment

The contractor is responsible for the compilation, documentation, implementation and revision of a risk assessment for each construction site. His/her employees are obliged to implement the resulting measures. The regulations contained in the German technical rules on operational safety TRBS 1111 apply.

Assembly instructions

The contractor is responsible for compiling a written set of assembly instructions. The user guide is a fundamental aspect of the assembly instructions.

User guide

Falsework is technical work equipment which is intended for commercial use only. The equipment may be used only by properly trained personnel under the authority of qualified supervisors.

All work on the scaffolding must be supervised by a properly qualified supervisor, specified by the contractor, who ensures that the work is carried out safely. The user guide is an essential component of the falsework. It contains, at a minimum, safety notes, information on the standard configuration, the intended use and a description of the system. Carefully follow the instructions on use and assembly of the equipment (standard configuration) contained in the user guide. Enhancements, deviations or changes represent a potential risk and therefore require separate verification (with the help of a risk assessment) or a set of assembly instructions which comply with the relevant laws, standards and safety regulations. The same applies in cases where falsework and accessory components are provided on site.

Availability of the user guide

The contractor has to ensure that site personnel are familiar with the user guide provided by the manufacturer and that it is readily accessible at all times. The user guide must be legible and complete. A replacement user guide can be obtained from Hünnebeck.

Illustrations

Some of the illustrations in the assembly instructions show various states of assembly and are various states of assembly and not always not always complete in terms of safety considerations. Safety devices may not always appear in the illustrations, but they are nevertheless mandatory.

Storage and transportation

The special requirements of the respective formwork constructions regarding transportation procedures as well as storage must be complied with. An example of such a requirement is the use of lifting gear.

Material check

Falsework material deliveries are to be checked on arrival at the construction site / destination as well as before each use to ensure that they are in serviceable condition and function correctly. Changes to the falsework material are not permitted.

Ongoing inspections

The scaffold must always be inspected by the responsible contractor to verify that it is complete before it is used for the first time, after extended work stoppage, when modifications have been made and when it has been exposed to extraordinary circumstances. The condition of the components, the structural integrity, and the occupational and operational safety of the equipment have to be verified.

The ST 60 Shoring Tower has to be secured against overturning during assembly. Devices used to secure the structure could be e.g. outriggers, stabilisers or braces attached to other towers. Commercially available scaffold tubes as well as MODEX components are suitable for this purpose. It is always a good idea to secure the tower being erected to an existing structure, allowing force transmission to the sturdy structure.

Spare parts and repairs

Only original components may be used as spare parts. Repairs may be performed only by the manufacturer or authorised facilities.

Miscellaneous

We explicitly reserve the right to make changes resulting from technical improvements. For the safety-related application and use of the products, all current country-specific laws, standards as well as other safety regulations are to be complied with, without exception. They form a part of the obligations of employers and employees regarding industrial safety. This results in, among other things, the responsibility of the contractor to ensure the stability of the formwork and falsework constructions as well as the structure during all stages of construction.

This also includes the basic assembly, dismantling and transport of the formwork and falsework along with their components. Inspect the entire structure during and upon completion of assembly.

2.3 About this user guide

This user guide contains important information regarding the assembly and use of Hünnebeck ST 60 shoring towers as well as safety procedures that are important for safe erection and use on site. This user guide is intended to serve as an aid to working effectively with ST 60 shoring towers. Read this user guide carefully prior to commencing work with the ST 60 shoring towers and save it for future reference.

This user guide is designed for commercial users with proper professional training. The information and procedures described here comply with the laws and the occupational health and safety regulations of Germany and Austria. Hünnebeck assumes no liability in the event of deviations from the information and procedures described in the user guide or in the event that the equipment is used outside of this area.

2.3.1 Warnings and notes



DANGER

Danger!

Danger indicates a hazardous situation that, if not avoided, will cause death or serious injury.



WARNING

Warning!

Warning indicates a hazardous situation that, if not avoided, can cause death or serious injury.



CAUTION

Caution!

Caution indicates a hazardous situation that, if not avoided, can cause minor or moderate injury.

NOTE

Note!

Note indicates a hazard that can cause property damage.



This note indicates that an additional inspection is required.



This note shares practical experience with the user, e.g. how to perform a task more easily or quickly.



This note indicates particularly important information, e.g. that a requirement has to be fulfilled.



This symbol indicates that additional information from other documents is required. These documents could be user guides or operating instructions for other products.

2.3.2 Instructions

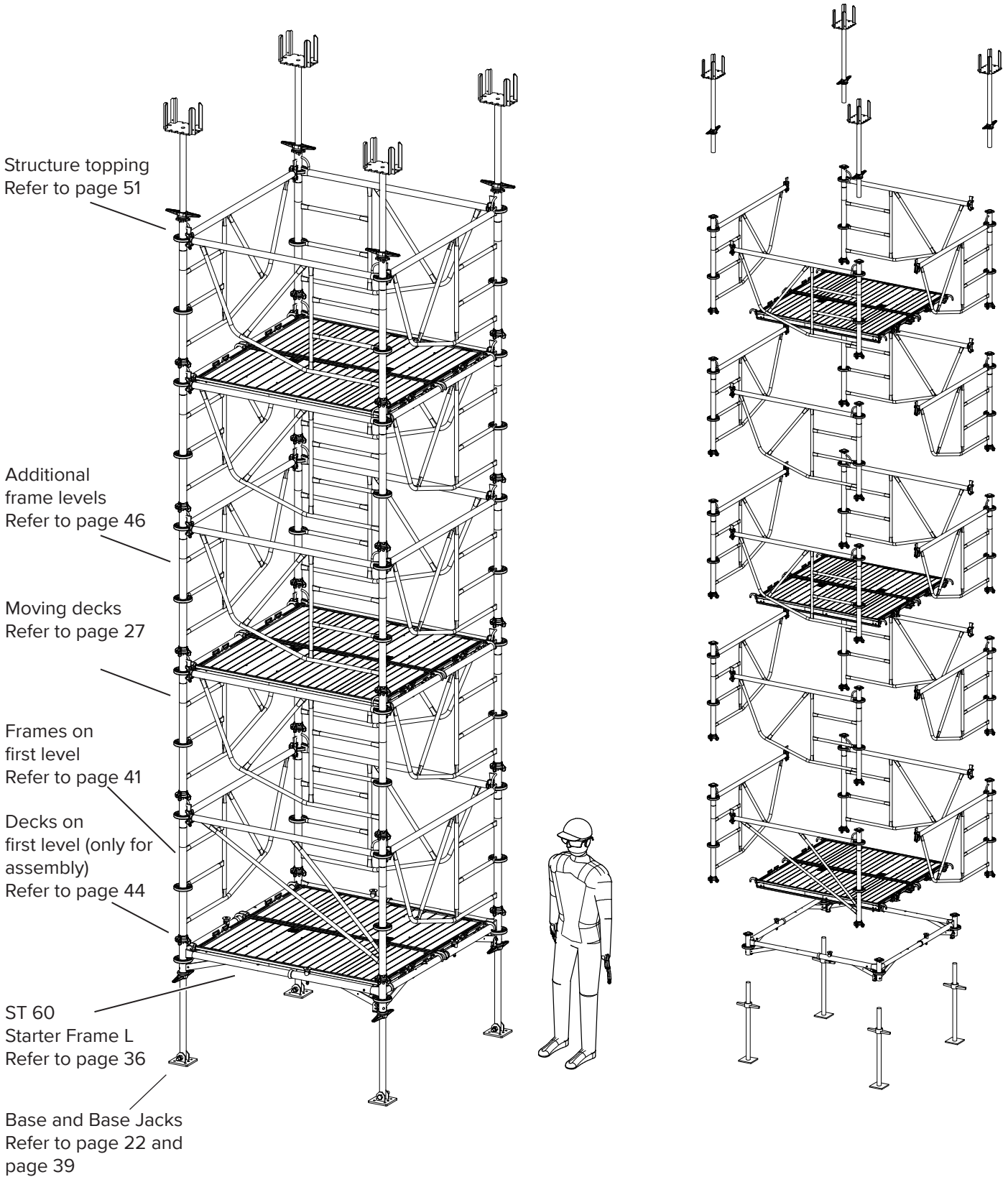
Instructions are always identified with the word **Step** e.g.

Step 1 Insert the locking bolt into the hole from the outside.

Step 2 Secure the pin with the spring cotter pin.

3 Overview

The illustrations show an ST 60 Shoring Tower with the dimensions 1.50 m x 1.50 m and an erection height of 6.20 m. Plan dimensions 1.13 m x 1.13 m as well as 1.13 m x 1.50 m are also possible.

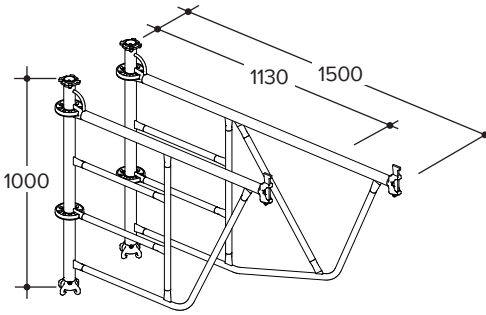
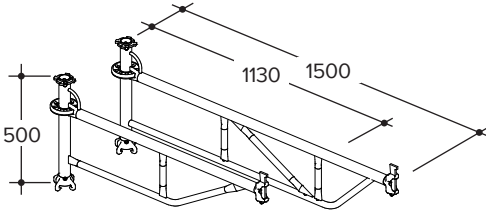
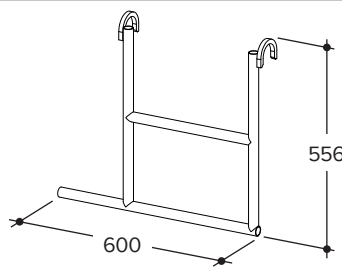
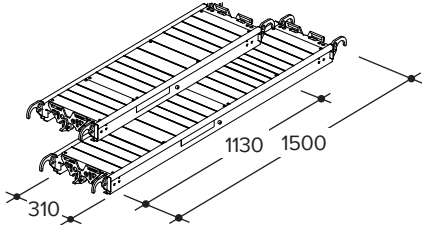
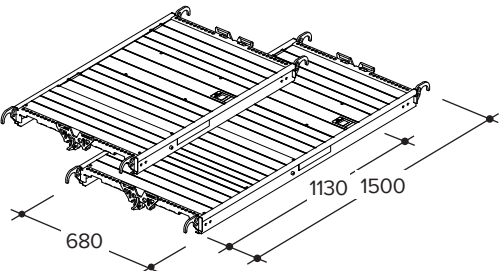
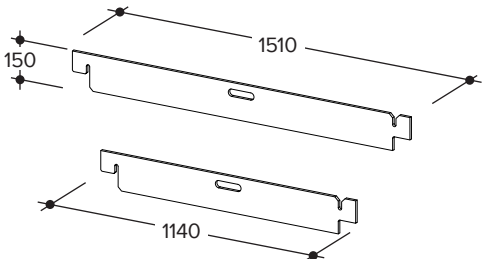


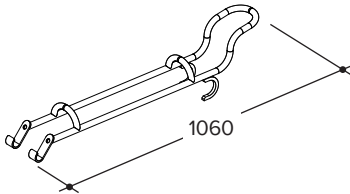
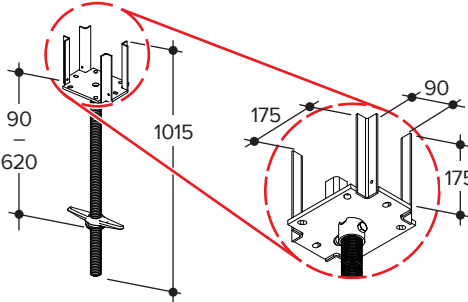
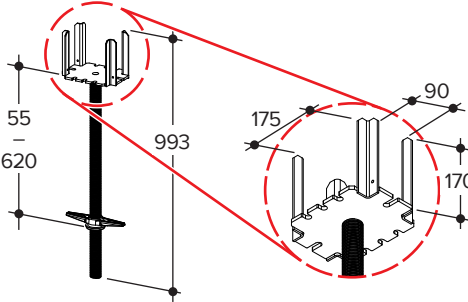
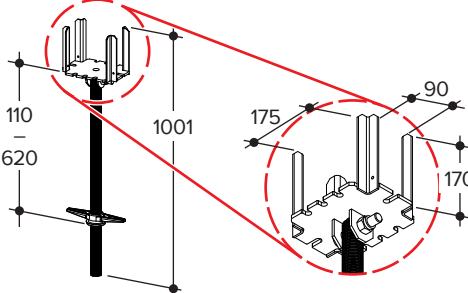

4 Quick reference guide

4.1 ST 60 components

	Component	Part code	Weight [kg]
	ST 60 Rigid Base Jack Used to properly align the ST 60 Shoring Tower. Refer to page 39.	652430	8.73
	ST 60 Flexible Base Jack Used to align the ST 60 Shoring Tower on inclines. Refer to page 23.	652995	9.32
	ST 60 Crosshead Adapter Used to convert a Base Jack to a Head Jack. Attached to the Base Jack with 2no. Countersunk Screws and Nuts (code:652847 and code:652879). Refer to page 52.	652845	3.48
	Countersunk Bolt M12x35 (100 pieces) Nylok Nut M12 (100 pieces) Used to attach the ST 60 Crosshead Adapter to a Base Jack.	652847 652879	3.90 2.10
	ST 60 Starter Frame L 4no. Starter Frames L form the base frame of the ST 60 Shoring Tower. Refer to page 36.	652450	8.61
	ST 60 Entry Frame 150/100 ST 60 Entry Frame 113/100 Facilitates access to the lowest frame level of the ST 60 Shoring Tower. Refer to page 41	652390 652380	12.71 10.18

Quick reference guide

	Component	Part code	Weight [kg]
	ST 60 Frame 150/100	652290	14.90
	ST 60 Frame 113/100	652350	12.73
Main component of the ST 60 Shoring Tower; used to construct the frame levels. Refer to page 41 ff.			
	ST 60 Frame 150/50	652410	10.24
	ST 60 Frame 113/50	652420	7.94
Main component of the ST 60 Shoring Tower; used to construct the frame levels. Refer to page 41 ff.			
	ST 60 Entry Ladder	652700	3.06
Makes it easier to ascend the ST 60 Shoring Tower when the Base Jack is greatly extended. It is hung on the base frame. Refer to page 40.			
	ST 60 Alu Deck 150/31	652540	9.47
	ST 60 Alu Deck 113/31	652520	7.79
Refer to page 44 ff.			
	ST 60 Alu Passage Deck 150/68	652500	14.90
	ST 60 Alu Passage Deck 113/68	652530	12.50
Refer to page 44.			
	ST 60 Toe Board 150	652985	1.89
	ST 60 Toe Board 113	652914	1.42
Refer to page 51			

	Component	Part code	Weight [kg]
	<p>ST 60 Deck Lifter Refer to page 27.</p>	<p>652366</p>	<p>3.47</p>
	<p>ST 60 Crosshead Jack 60 To attach beams. Can be tilted 3° in any direction. Refer to page 51.</p>	<p>652355</p>	<p>11.55</p>
	<p>ST 60 Rigid Crosshead Jack 60 To attach beams.</p>	<p>652929</p>	<p>10.77</p>
	<p>ST 60 Flexible Crosshead Jack 60 To attach beams. Pivots along one axis. Used to support tilted structures. Refer to page 72.</p>	<p>652965</p>	<p>11.37</p>
	<p>ST 60 Head Jack Retainer Prevents the Head Jack from falling out. Refer to page 51.</p>	<p>652419</p>	<p>0.09</p>

4.2 Bracing and supporting components

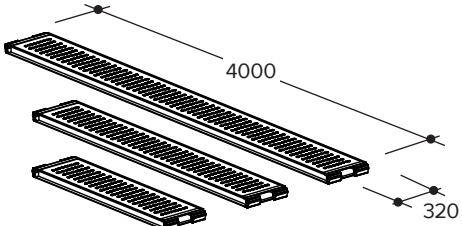
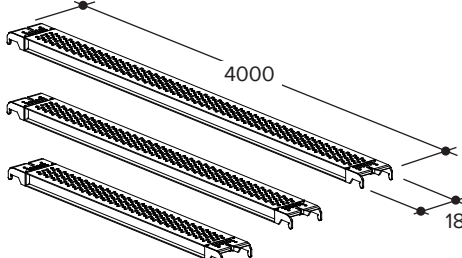
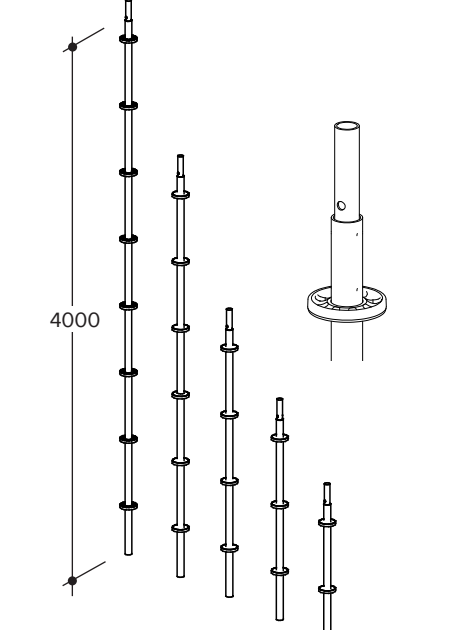
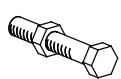
	Component	Part code	Weight [kg]
	Tube Ledger 400*	533470	15.79
	Tube Ledger 300	470951	12.03
	Tube Ledger 250	470940	10.15
	Tube Ledger 200	475781	8.27
	Tube Ledger 180*	489260	7.52
	Tube Ledger 168	651765	7.07
	Tube Ledger 150	475770	6.39
	Tube Ledger 125	484739	5.46
	Tube Ledger 113	475760	5.01
	Tube Ledger 101*	482020	4.56
	Tube Ledger 90*	489250	4.14
	Tube Ledger 82	470930	3.84
	Tube Ledger 74*	482019	3.54
	Tube Ledger 25	577863	1.70

Tube Ledgers made of a \varnothing 48.3 mm steel tube with welded-on joint connectors.
Can be used as a horizontal brace or as a guardrail (Special lengths available upon request).

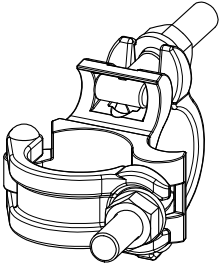
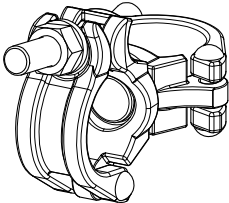
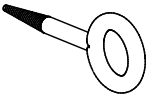
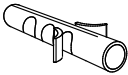
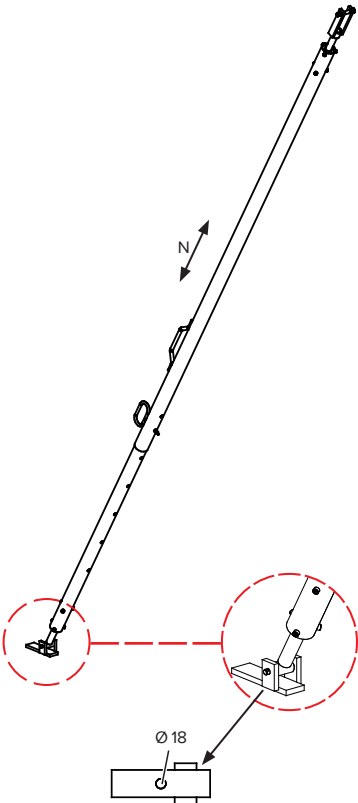
	length/width		
	H-diagonal 300/300*	651635	16.32
	H-diagonal 300/250	651634	15.05
	H-diagonal 300/200	651633	13.93
	H-diagonal 300/150	651632	13.00
	H-diagonal 300/125	651631	12.61
	H-diagonal 300/113	651630	12.45
	H-diagonal 250/250	484810	13.75
	H-diagonal 250/200	484809	12.39
	H-diagonal 250/150	651628	11.34
	H-diagonal 250/125*	651627	10.90
	H-diagonal 250/113	478785	10.77
	H-diagonal 200/200	651711	11.00
	H-diagonal 200/150	651626	9.77
	H-diagonal 200/125	651625	9.25
	H-diagonal 200/113	651624	9.02
	H-diagonal 150/150	651710	8.34
	H-diagonal 150/125	651622	7.71
	H-diagonal 150/113	651621	7.44
H-diagonal 125/125	651619	7.01	
H-diagonal 125/113	533506	6.69	
H-diagonal 113/113	651618	6.38	

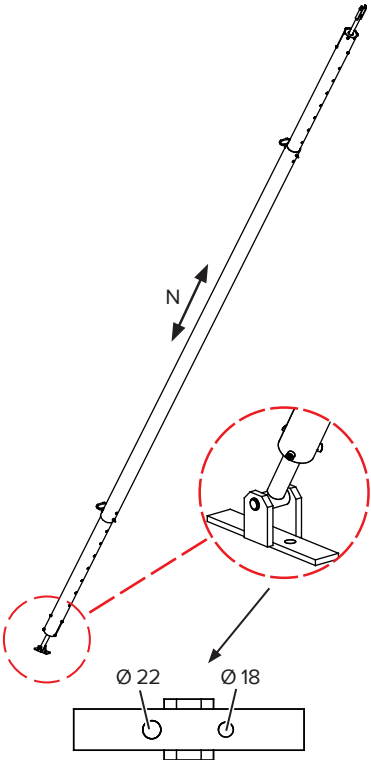
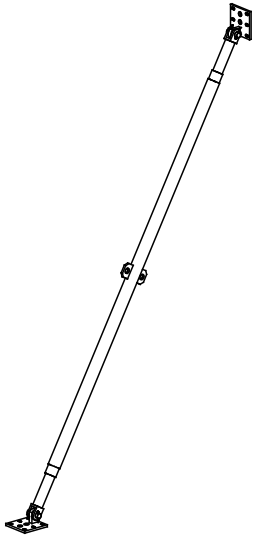
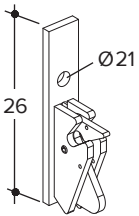
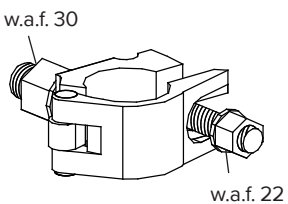
For horizontal bracing.

	Component	Part code	Weight [kg]	
	height/length			
	V-diagonal 200/300	470984	14.90	
	V-diagonal 200/250	470973	13.43	
	V-diagonal 200/200	475910	12.10	
	V-diagonal 200/150	475900	10.90	
	V-diagonal 200/125*	651656	10.44	
	V-diagonal 200/113	557676	10.34	
	V-diagonal 200/82	588511	9.80	
	V-diagonal 100/300	651657	13.19	
	V-diagonal 100/250	651658	11.44	
	V-diagonal 100/200	651659	9.75	
	V-diagonal 100/150	651660	8.16	
	V-diagonal 100/125	651661	7.43	
	V-diagonal 100/113	651662	7.11	
V-diagonal 100/82*	651663	6.39		
	For vertical bracing.			
	Transom 300/12.6 U	651774	25.90	
	Transom 250/12.6 U	651572	21.57	
	Transom 200/12.6 U	651571	17.24	
	Transom 150/12.6 U	651570	12.90	
	Transom 125/12.6 U	651775	10.73	
	Transom 113/12.6 U*	651776	7.10	
	Transom 82/12.6 U*	651777	7.03	
	Used to construct the platforms with MODEX decks between the towers.			
	Hollow Box Plank 300/32 (2.0 kN/m² LC 3)	531323	17.77	
	Hollow Box Plank 250/32 (3.0 kN/m² LC 4)	531334	15.27	
	Hollow Box Plank 200/32 (4.5 kN/m² LC 5)	531345	12.77	
	Hollow Box Plank 150/32 (4.5 kN/m² LC 5)	531356	10.27	
	Hollow Box Plank 125/32 (4.5 kN/m² LC 5)	531367	8.82	
	Hollow Box Plank 74/32 (4.5 kN/m² LC 5)	531687	6.27	
		Galvanised steel sheet design, extremely lightweight and sturdy. Corrugated non-slip surface.		

	Component	Part code	Weight [kg]
	Steel Plank 400/32 (2.0 kN/m² LC 3)	530307	30.21
	Steel Plank 300/32 (3.0 kN/m² LC 4)	427984	23.50
	Steel Plank 250/32 (4.5 kN/m² LC 5)	427973	19.93
	Steel Plank 200/32 (6.0 kN/m² LC 6)	430279	16.29
	Steel Plank 150/32 (6.0 kN/m² LC 6)	485858	12.20
	Steel Plank 125/32 (6.0 kN/m² LC 6)	430280	10.40
	Steel Plank 113/32 (6.0 kN/m² LC 6)	485869	9.60
	Steel Plank 82/32 (6.0 kN/m² LC 6)	485870	7.30
Hot-dip galvanised, sturdy non-slip surface.			
	Steel Plank 400/18 (3.0 kN/m² LC 4)	651595	21.78
	Steel Plank 300/18 (3.0 kN/m² LC 4)	550744	15.20
	Steel Plank 250/18 (4.5 kN/m² LC 5)	550733	13.88
	Steel Plank 200/18 (6.0 kN/m² LC 6)	550722	10.43
	Steel Plank 150/18 (6.0 kN/m² LC 6)	550711	8.03
	Steel Plank 125/18 (6.0 kN/m² LC 6)	651594	7.30
	Steel Plank 113/18 (6.0 kN/m² LC 6)	651593	6.66
	Steel Plank 82/18 (6.0 kN/m² LC 6)	651592	5.04
When these 18 cm wide Steel Planks are used along with 32 cm wide Steel Planks, the MODEX scaffold can be set up such that there are no gaps in the platforms.			
	Vertical Post 400	470918	20.21
	Vertical Post 300	470907	15.33
	Vertical Post 200	470892	10.45
	Vertical Post 150	470881	8.00
	Vertical Post 100	470870	5.60
	Steel tube Ø 48.3 mm with a rosette every 50 cm. Built-in spigots connect the tubes to one another. A Ø 48.3 mm tube with a wall thickness of 3.2 mm can also be connected.		
	M12x75 Joint Securing Bolt (with nut)	554710	0.10
Connects the vertical posts to one another such that they are resistant to tension.			

	Component	Part code	Weight [kg]
	Base Jack 45/3.8	551234	3.31
	Base Jack 70/3.8	540575	4.26
	Adjustable (jack extension) from 65 to 265 mm or 65 to 500 mm.		
	ID 15 Base Jack 38/52		
	Adjustable (jack extension) from 90 to 300 mm.	148552	8.34
<p>Do not use the Base Jack 45/3.8, the Base Jack 70/3.8 and the ID 15 Base Jack 38/52 with ST 60 components! They are intended to be used only with MODEX components!</p>			
	MODEX Rigid Base Plate	428533	1.20
	Similar to a Base Jack; serves to conduct the vertical loads into the load-bearing ground/floor.		
	Starting Piece	470929	1.99
	Makes setting up Vertical Posts easier.		
	Base Jack Securing Device	651762	2.05
	Secures the Base Jack to prevent it from falling out while being transported via crane.		
	Scaffold Retainer 350	467063	15.00
	l = 350 cm		
	Scaffold Retainer 250	467041	8.50
	l = 250 cm		
	Scaffold Retainer 223	467085	7.53
	l = 223 cm		
	Scaffold Retainer 180	116820	6.10
	l = 180 cm		
	Scaffold Retainer 140	116793	4.97
l = 140 cm			
Scaffold Retainer 110	116808	3.61	
l = 110 cm			
Scaffold Retainer 75	78940	2.54	
l = 75 cm			
Scaffold Retainer 45	78939	1.65	
l = 45 cm			
	Steel tube Ø 48.3 mm with hooks Ø 20 cm. Used to anchor ST 60 Shoring Towers.		
	Refer to page 61.		

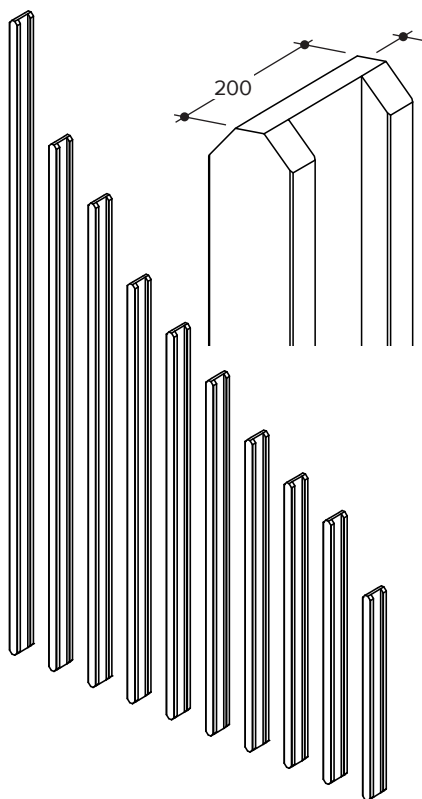
	Component	Part code	Weight [kg]
	<p>Rigid Coupler 48/48 w.a.f. 22</p> <p>Used to attach Scaffold Retainers or Scaffold Tubes 48.3 mm to ST 60 Frames.</p> <p>Torque 50 Nm.</p> <p>Refer to page 61.</p>	2514	1.18
	<p>Swivel Coupler 48/48 w.a.f. 22</p> <p>Used to attach Scaffold Retainers or Scaffold Tubes 48.3 mm to ST 60 Frames.</p> <p>Torque 50 Nm.</p> <p>Refer to page 61.</p>	2525	1.37
	<p>25no. Scaffold Eye Bolts GS 12x120</p> <p>25no. Scaffold Eye Bolts GS 12x160</p>	497864	4.60
	<p>25no. Plugs S14 ROE 100¹</p>	497842	0.18
	<p>Alignment Strut K440</p> <p>Minimum extension: 3.25 m: Safe Working Load (N): 20.00 kN.</p> <p>Maximum extension: 4.40 m: Safe Working Load (N): 11.00 kN.</p> <p>Alignment Strut K600</p> <p>Minimum extension: 4.80 m: Safe Working Load (N): 20.00 kN.</p> <p>Maximum extension: 6.00 m: Safe Working Load (N): 14.00 kN.</p> <p>Alignment Strut K760</p> <p>Minimum extension: 5.30 m: Safe Working Load (N): 20.00 kN.</p> <p>Maximum extension: 7.60 m: Safe Working Load (N): 15.00 kN.</p> <p>Refer to page 62.</p>	601208	22.61
601210	34.97	601212	50.47

	Component	Part code	Weight [kg]																		
	<p>Alignment Strut Super 10 Part code: 602095 Weight: 83.25</p> <p>Minimum extension: 7.05 m: Safe Working Load (N): 27.00 kN.</p> <p>Maximum extension: 10.25 m: Safe Working Load (N): 22.30 kN.</p> <p>Refer to page 62.</p>																				
	<p>Wall Strut with 2no. Articulated Plates, lacquered</p> <table border="1"> <tr> <td>Wall Strut, size 1 (1.70 – 2.40 m)</td> <td>506500</td> <td>19.50</td> </tr> <tr> <td>Wall Strut, size 2 (2.20 – 2.90 m)</td> <td>506420</td> <td>21.00</td> </tr> <tr> <td>Wall Strut, size 3 (2.70 – 3.40 m)</td> <td>506430</td> <td>22.00</td> </tr> <tr> <td>Wall Strut, size 4 (3.20 – 3.90 m)</td> <td>506463</td> <td>24.00</td> </tr> <tr> <td>Wall Strut, size 5 (4.20 – 4.90 m)</td> <td>506485</td> <td>27.00</td> </tr> <tr> <td>Wall Strut, size 6 (5.30 – 5.90 m)</td> <td>506555</td> <td>40.00</td> </tr> </table> <p>Used to brace ST 60 Shoring Towers. Refer to page 63.</p>	Wall Strut, size 1 (1.70 – 2.40 m)	506500	19.50	Wall Strut, size 2 (2.20 – 2.90 m)	506420	21.00	Wall Strut, size 3 (2.70 – 3.40 m)	506430	22.00	Wall Strut, size 4 (3.20 – 3.90 m)	506463	24.00	Wall Strut, size 5 (4.20 – 4.90 m)	506485	27.00	Wall Strut, size 6 (5.30 – 5.90 m)	506555	40.00		
Wall Strut, size 1 (1.70 – 2.40 m)	506500	19.50																			
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Wall Strut, size 4 (3.20 – 3.90 m)	506463	24.00																			
Wall Strut, size 5 (4.20 – 4.90 m)	506485	27.00																			
Wall Strut, size 6 (5.30 – 5.90 m)	506555	40.00																			
	<p>Quick fix ring nut and bolt Part code: 601385 Weight: 2.76</p> <p>Used to connect Alignment Struts to an ST 60 Shoring Tower. A Half Coupler 48/M is also needed Refer to page 62.</p>																				
	<p>Half Coupler 48/M 20x70 Part code: 39846 Weight: 0.96</p> <p>w.a.f. 22 / w.a.f 30 Used to connect Wall Struts to an ST 60 Shoring Tower. With an additional thread M 20×70 mm. Torque 50 Nm. Refer to page 62.</p>																				

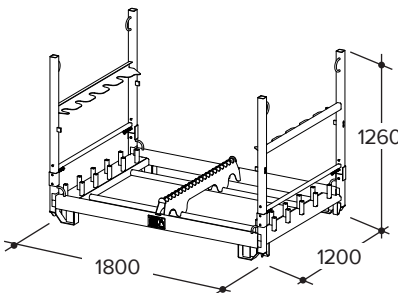
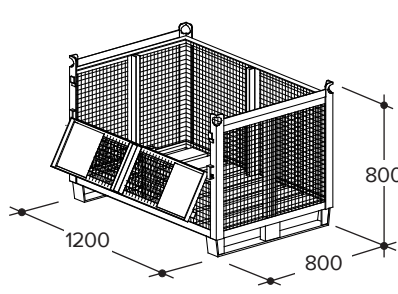
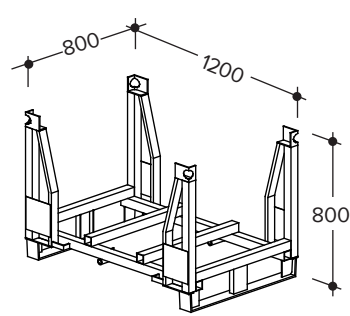
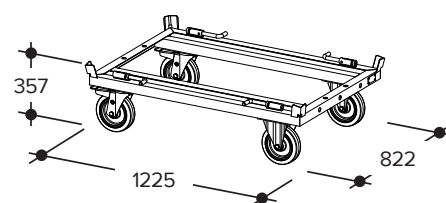
4.3 Beams and accessories

	Component	Part code	Weight [kg]
	DU-AL T200 aluminium beams		
	DU-AL T200 Beam 1.5 m	717215	11.37
	DU-AL T200 Beam 2.0 m	717220	15.15
	DU-AL T200 Beam 2.5 m	717225	18.93
	DU-AL T200 Beam 3.0 m	717230	22.71
	DU-AL T200 Beam 3.5 m	717235	26.50
	DU-AL T200 Beam 4.0 m	717240	30.28
	DU-AL T200 Beam 5.0 m	717250	37.84
	DU-AL T200 Beam 6.0 m	717260	45.41
	<p>The T200 Beam has a nailing strip to secure H 20 secondary beams or form sheets.</p>		
<p>The following stress resultants are permitted:</p>			
<p>$M_{perm} = 20.00 \text{ kNm}$</p>			
<p>$V_{perm} = 60.00 \text{ kN}$</p>			
<p>The stiffness is $E \times I = 954 \text{ kNm}^2$</p>			
<p>Refer to page 72.</p>			

	Component	Part code	Weight [kg]
	DU-AL T225 aluminium beams		
	DU-AL T225 Beam 1.00 m (a)	717410	9.00
	DU-AL T225 Beam 1.20 m	717412	10.80
	DU-AL T225 Beam 1.80 m	717418	16.20
	DU-AL T225 Beam 2.40 m	717424	21.60
	DU-AL T225 Beam 3.00 m	717430	27.00
	DU-AL T225 Beam 3.60 m	717436	32.40
	DU-AL T225 Beam 4.20 m	717442	37.80
	DU-AL T225 Beam 4.80 m	717448	43.20
	DU-AL T225 Beam 5.40 m	717454	48.60
	DU-AL T225 Beam 6.00 m	717460	54.00
	DU-AL T225 Beam 7.20 m	717472	64.80
	(a) upon request		
The following stress resultants are permitted:			
$M_{perm} = 30.40 \text{ kNm}$			
$V_{perm} = 90.00 \text{ kN}$			
The stiffness is $E \times I = 1549 \text{ kNm}^2$			
The T225 Beam can only be connected to DU-AL.			
Because of its width, only 1no. T225 Beam			
can be placed in a Crosshead Jack. It is			
impossible to place 2no. T225 Beams			
next to one another in a Crosshead Jack.			
	DU-AL Universal Clamp	443036	0.60
Used to connect 2no. DU-AL beams, one			
on top of the other.			
Refer to page 73.			
	DU-AL T Bolt	718099	0.10
with Hexagonal Nut and Washer			
Used to attach a DU-AL beam to a			
Crosshead Jack.			
Refer to page 72.			

	Component	Part code	Weight [kg]
	H 20 K Beam 190	603190	8.74
	H 20 K Beam 245	603191	11.27
	H 20 K Beam 265	603192	12.19
	H 20 K Beam 290	603193	13.34
	H 20 K Beam 330	603194	15.18
	H 20 K Beam 360	603195	16.56
	H 20 K Beam 390	603196	17.94
	H 20 K Beam 450	603197	20.70
	H 20 K Beam 490	603198	22.54
	H 20 K Beam 590	603199	27.14
	H 20 K Beam by m	603200	4.60
		Available in lengths up to 12.0 m upon request. Price calculated to the next full meter.	
	The following stress resultants are permitted:		
	$M_{perm} = 5.00 \text{ kNm}$		
	$V_{perm} = 11.00 \text{ kN}$		
	The stiffness is: $E \times I = 500 \text{ kNm}^2$		
	Meets the requirements of EN 13377:2002-11.		

4.4 Components for transportation and storage

	Component	Part code	Weight [kg]
	<p>ST 60 Frame Rack 180/120</p> <p>Used to store and transport 20no. ST 60 Frames. Working load: 300 kg. Refer to page 78.</p>	652480	104.40
	<p>Euro Lattice Box</p> <p>Used to store and transport small items. Can be moved using the Euro Trolley. Working load: 1200 kg.</p>	548480	68.79
	<p>Euro Stacking Frame 120/80</p> <p>Used to store and transport e.g. DU-AL beams, H 20 K beams. No more than 6no. can be stacked on top of one another! Can be moved using the Euro Trolley. Working load: 1200 kg. Refer to page 83.</p>	553689	54.47
	<p>Euro Trolley</p> <p>Can be used to manually transport only HÜNNEBECK Euro Lattice Boxes and Euro Stacking Frames 120/80. The Lattice Boxes and Stacking Frames can be secured to the Euro Trolley with the locks, allowing them to be moved by crane. Refer to page 84. The Euro Trolley has 2no. lockable swivel castors. Do not place any other transportation equipment or loads on the Euro Trolley!</p>	607610	39.57

5 Completing preparations and assembling base frame

5.1 Inspecting material

Before beginning erection, always verify that the materials to be used are in serviceable condition. Discard damaged materials and obtain replacements.



WARNING

Risk of injury from damaged material!

Using damaged materials can cause the falsework and the braced structure to collapse!

This can cause personal injury or death!

Never use damaged materials!

5.2 Preparing the ground

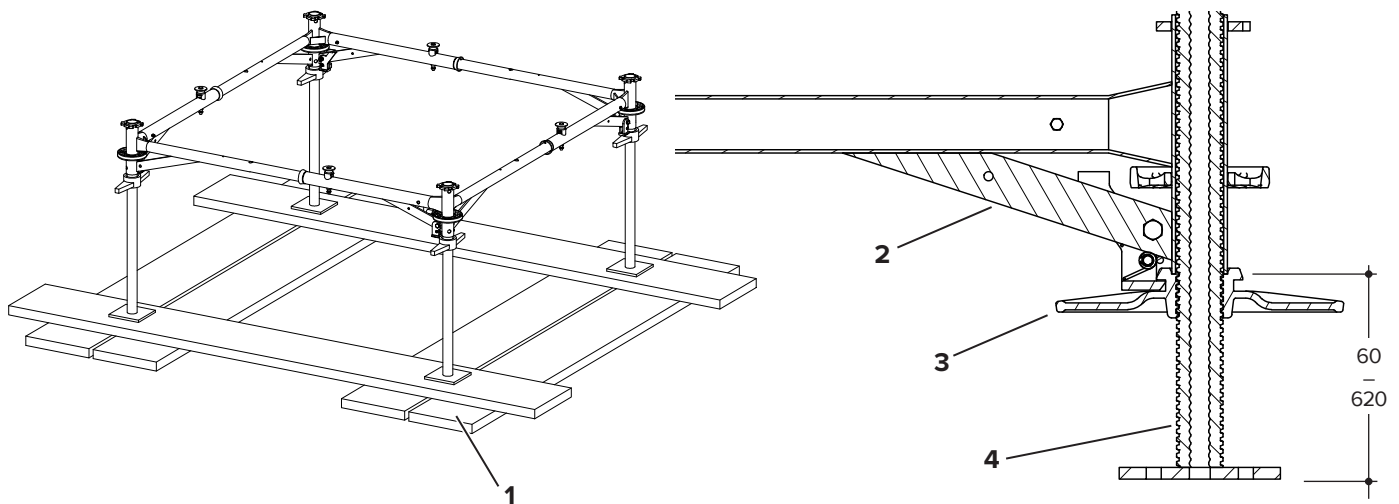
Before beginning assembly, always verify that the ground is suitable for erection of the ST 60 Shoring Tower and can accommodate the anticipated loads (Refer to DIN EN 12812).

5.3 Creating load-distributing base and using Base Jacks

If the ground/floor is not capable of bearing the load, the Base Jacks of the ST 60 Shoring Tower have to be placed e.g. on boards to distribute the load. The Base Jacks may need to be secured to prevent them from slipping when placed on an incline.

Begin assembly at the highest point of the erection surface. Turn the wing nuts to adjust the length of the Base Jacks. The Base Jacks can be adjusted within a range of 60 - 620 mm, measured from the lower edge of the tubes that make up the Starter Frame L.

A technical modification to the thread of the Base Jack prevents the wing nut from being turned any farther. If this safety feature does not function properly and the wing nut can be unscrewed more than 620 mm, the Base Jack may no longer be used.



- 1 Boards stacked in compliance with DIN EN 12812
- 2 Starter Frame L
- 3 Wing Nut
- 4 Base Jack

NOTE

Note the stripping clearance!

Always take into consideration the required stripping clearance!

5.3.1 Special features of Flexible Base Jacks

When the Flexible Base Jacks are used, an ST 60 Shoring Tower can be erected on an incline. The base plates of the Flexible Base Jacks can be pivoted $\pm 90^\circ$.



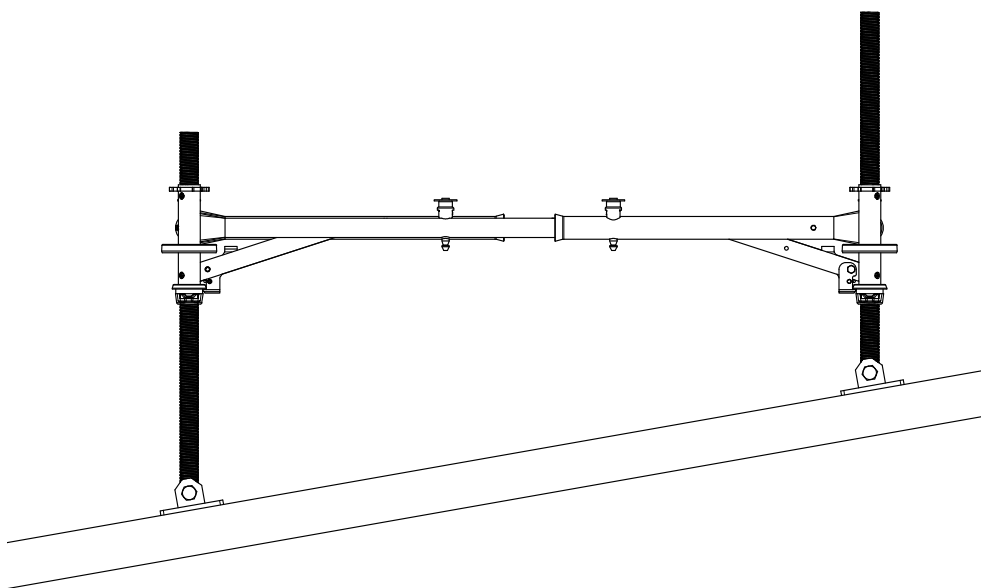
DANGER

The shoring tower can tip over!

The Base Jacks can slip on inclines.

This causes the ST 60 Shoring Tower to tip over, which can result in injury or death.

Secure the Base Jacks on inclines to prevent them from slipping, e.g. with a compression bearing or by screwing the Base Jacks into the ground!



5.4 Positioning the first deck level

The quantity and position of the decks are a factor of local conditions and the conditions on site. The decks do not act as stabilisers, they merely serve as access points to the ST 60 Shoring Tower. The provisions for the area of application of this user guide are indicated here.

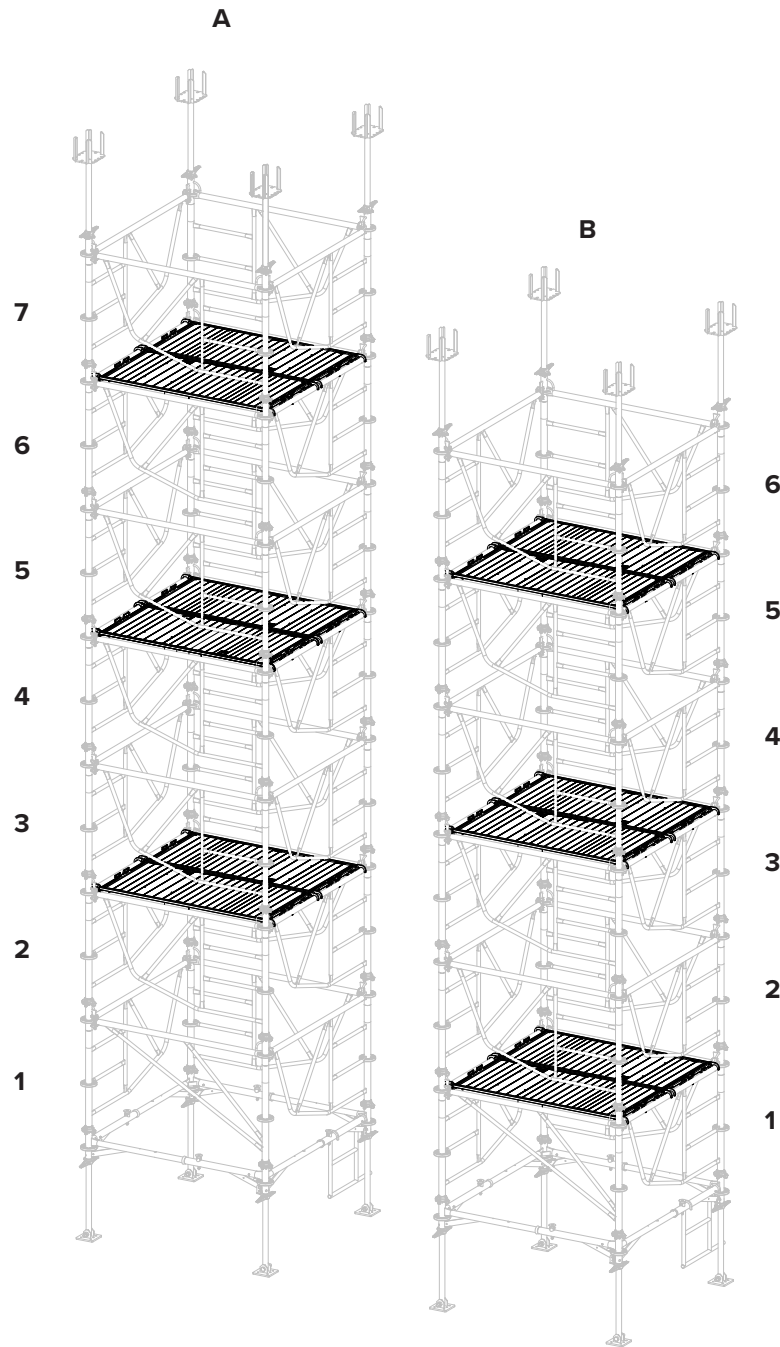
The position of the first (lowest) deck level depends on the number of frame levels. In general:

- The distance between the first deck level and the erection surface may not exceed 3.0 m.
- While the ST 60 Shoring Tower is being erected, there should be a deck every 2.0 m.
- If the ladder is used as an access point, the space between 2no. deck levels may not exceed 4.0 m.
- The top of the ST 60 Shoring Tower should consist of a deck level with a 1.0 m high ST 60 Frame on around it.

Regarding the position of the first deck level:

- With an odd number of frame levels, place the first deck on the second frame level (Fig. **A**, 7no. frame levels).
- With an even number of frame levels, place the first deck on the first frame level (Fig. **B**, 6no. frame levels).

Completing preparations and assembling base frame

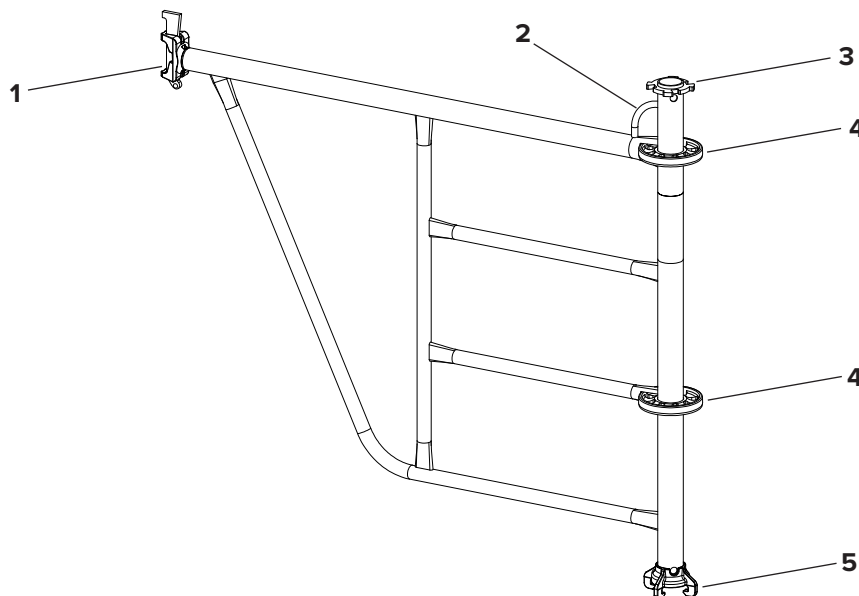


5.5 General operating principles of the ST 60 system

5.5.1 Assembling and disassembling frames

Each ST 60 Frame is equipped with 1no. or 2no. rosettes. Attach additional frames for the same level to the rosettes. Other components such as MODEX Tube Ledgers or MODEX Diagonals are also connected here.

Frames for the next-higher or next-lower level are attached with the aid of the upper or lower bayonet fasteners. This creates a tension-resistant connection that allows the towers to be transported by crane.

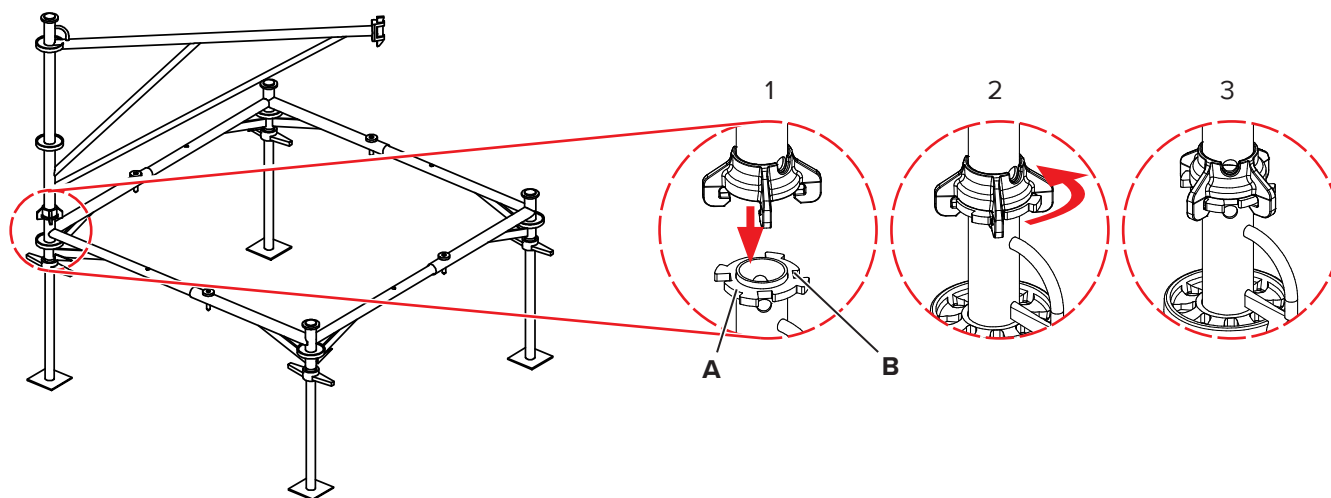



- 1 Rosette connection with captive fixing wedge
- 2 Attachment point for transport by crane
- 3 Upper bayonet fastener
- 4 Rosette
- 5 Lower bayonet fastener

Attaching ST 60 Frame to and detaching ST 60 Frame from next-lower frame

This section describes how to attach an ST 60 Entry Frame to a Starter Frame L. All of the frames in the ST 60 system are attached in the same way.

- Step 1** Turn the frame 45° to the inside of the tower and place it on the bayonet fastener (A) of the next-lower frame. The upper bayonet fastener locks into the recesses (B) of the lower bayonet fastener.
- Step 2** Turn the frame counterclockwise towards the outside of the tower. The bayonet fastener locks into place.



 Verify that each vertical post is correctly engaged!

Disassemble in the reverse order.

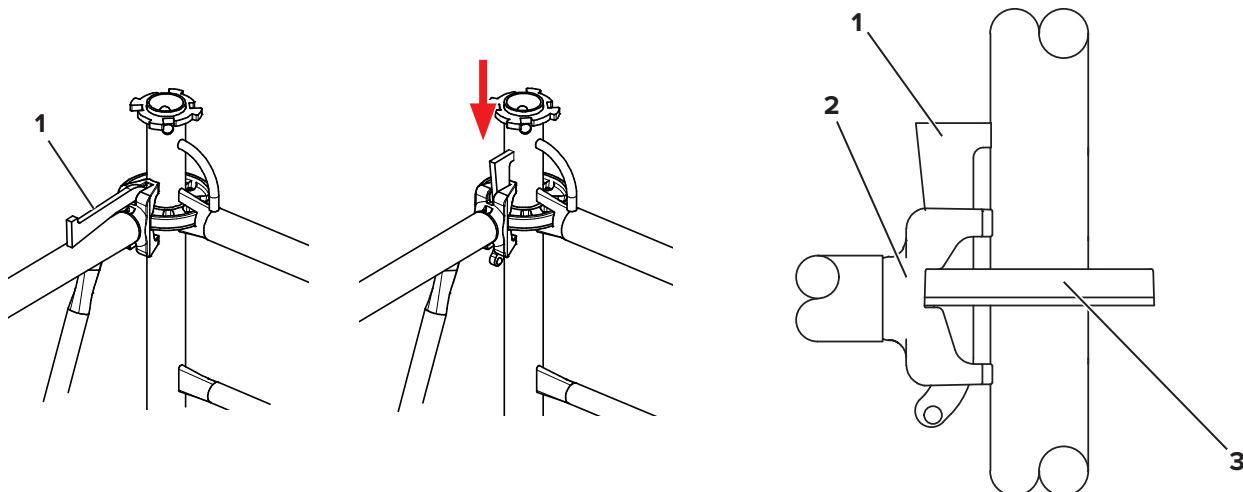
Completing preparations and assembling base frame

Attaching ST 60 Frame to and detaching ST 60 Frame from adjacent frame

Step 1 Guide the rosette connection of a frame over the rosette on the adjacent frame.

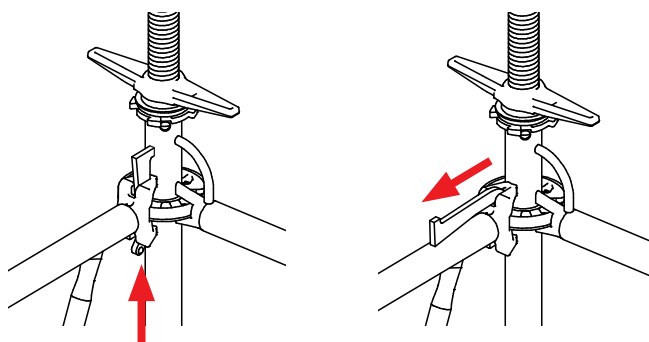
Step 2 Insert the captive wedge into an opening on the rosette.

Step 3 Use a 500 g hammer to knock the wedge into the opening from above until rebound is felt.



- 1 Fixing wedge
- 2 Rosette connection
- 3 Rosette

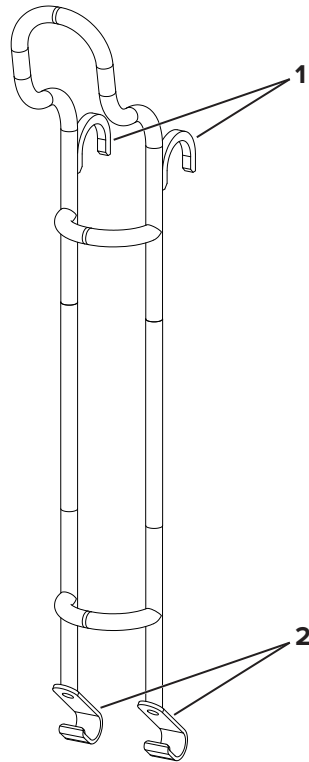
Disassemble in the reverse order. To release the connection, use a hammer to knock the wedge out, striking from below the connection.



5.5.2 Moving decks

As the ST 60 Shoring Tower is assembled, the decks have to be moved from one deck level to the next (higher or lower). Use the ST 60 Deck Lifter for this purpose.

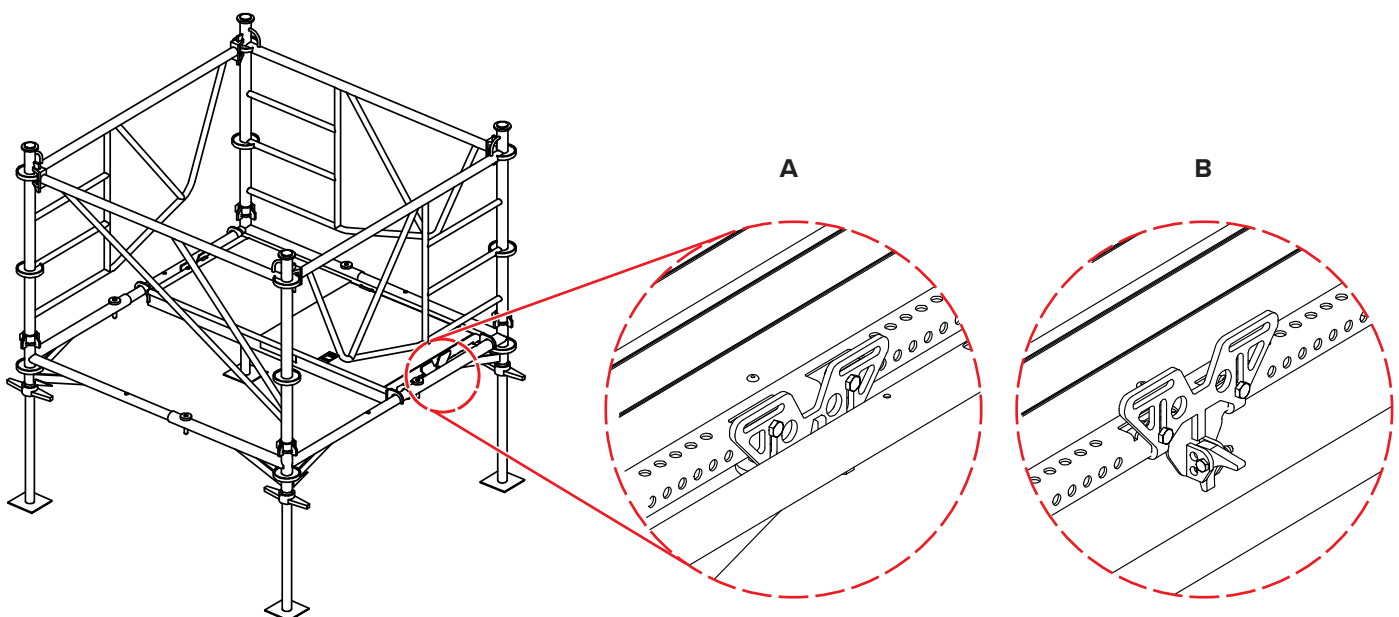
Deck Lifter



- 1** Insert the upper hooks into the ST 60 Frame.
- 2** Insert the lower hooks into the lift-off retainer securing the deck.

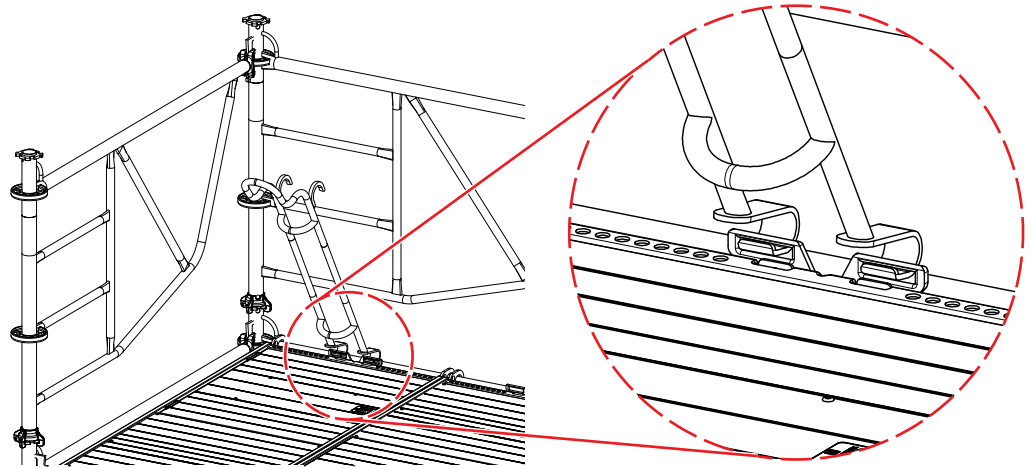
Using ST 60 Deck Lifter

The ST 60 Decks have lift-off retainers on the ends. The lift-off retainers close automatically when the decks are put into place **(A)**. To remove the decks, grasp the lift-off retainer and lift. The lift-off retainer then opens automatically **(B)**. The Deck Lifter also has to be inserted into the lift-off retainer.

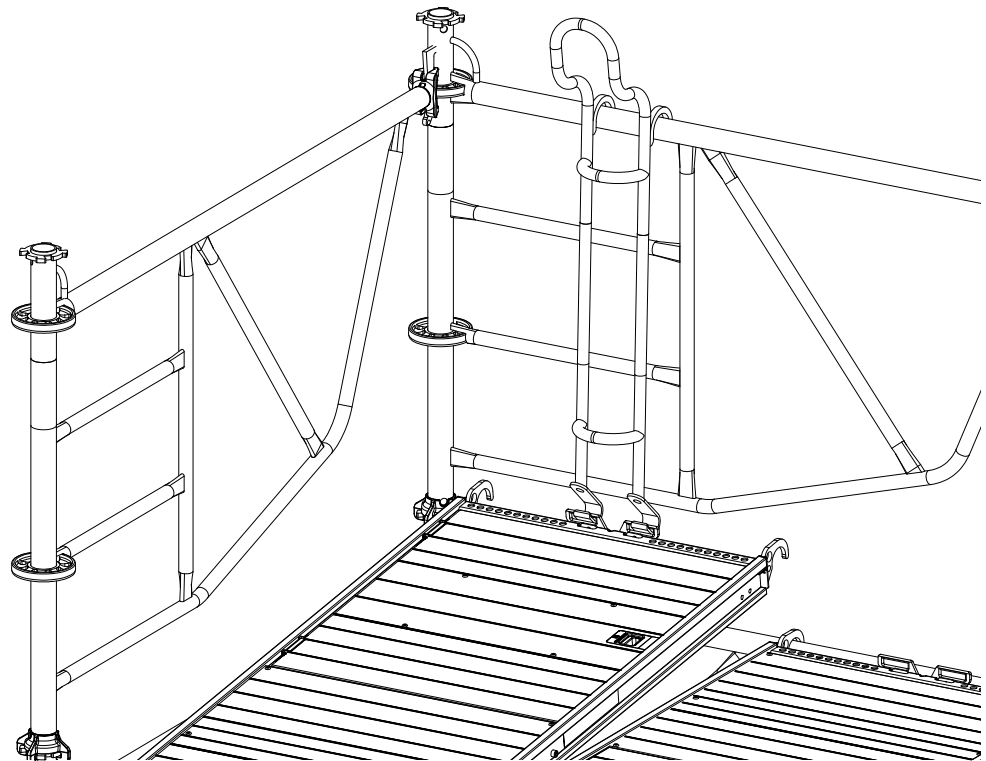


Completing preparations and assembling base frame

Step 1 Insert both lower hooks of the Deck Lifter into the lift-off retainer on a deck.

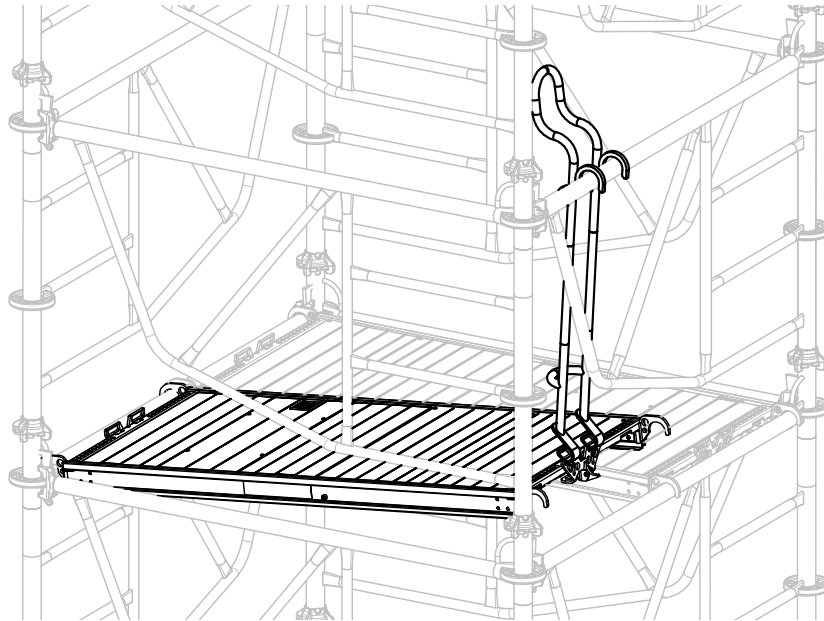


Step 2 Raise the Deck Lifter and then attach its upper hooks to the ST 60 Frame.

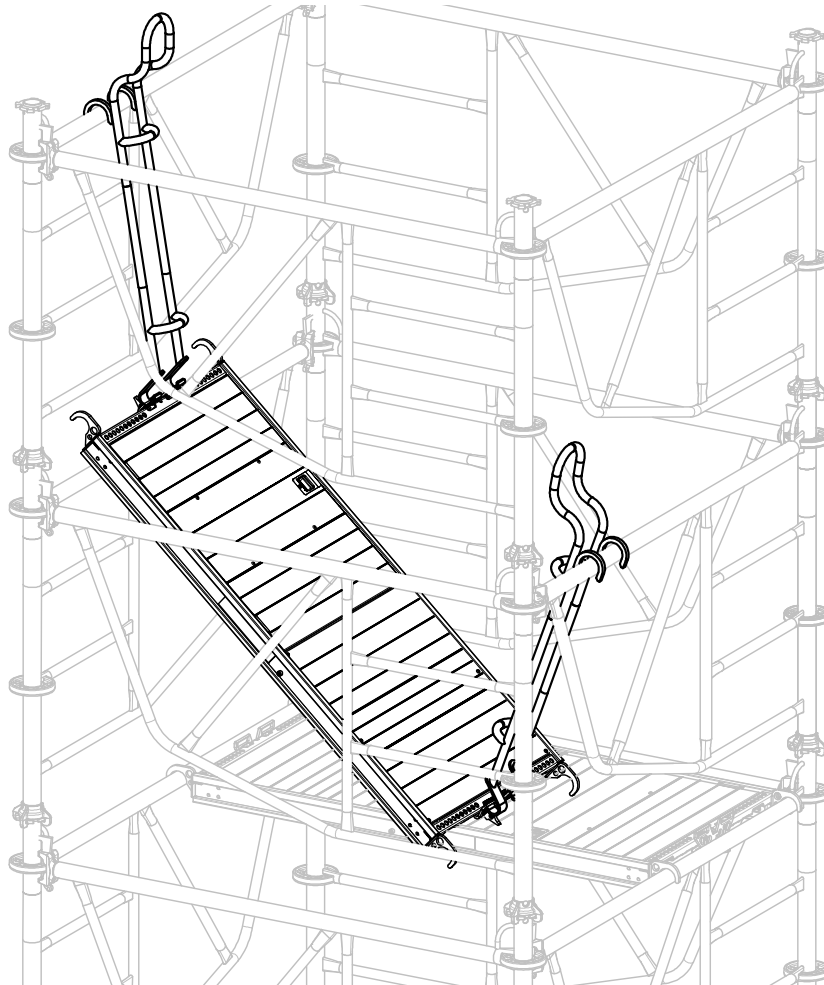


Moving decks higher

Step 1 Use the Deck Lifter to lift one end of the deck, then hook the Deck Lifter onto the frame at the same frame level.

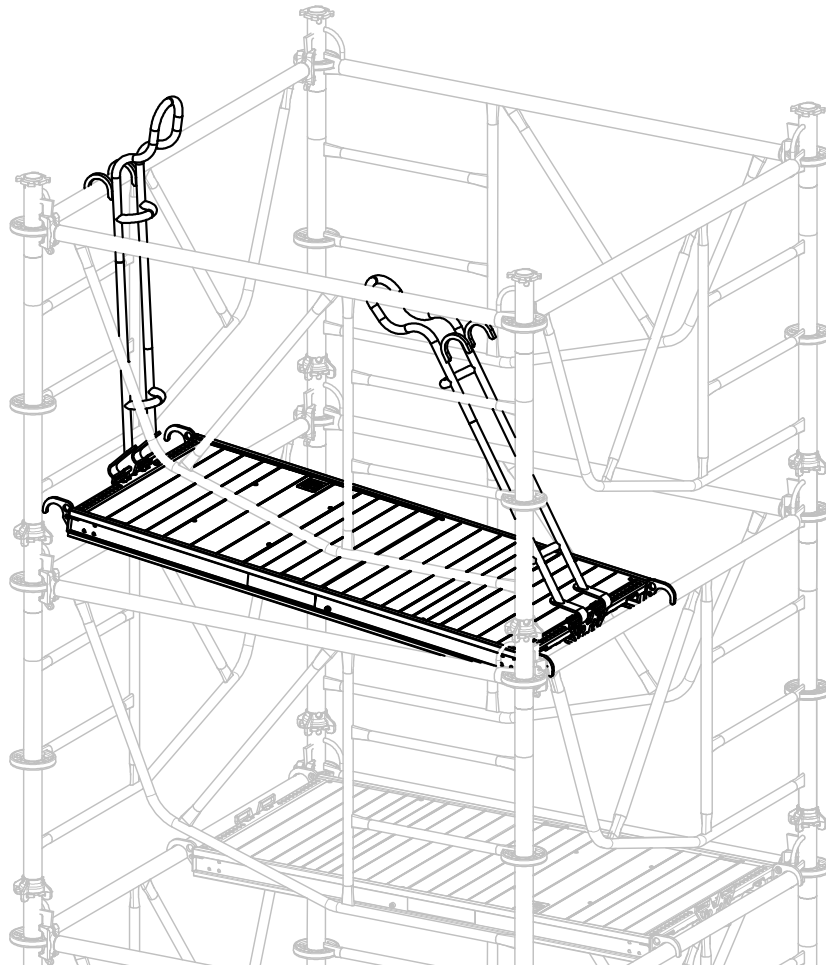


Step 2 Use the Deck Lifter to lift the other end of the deck, then hook the Deck Lifter onto the frame of the next-higher frame level.

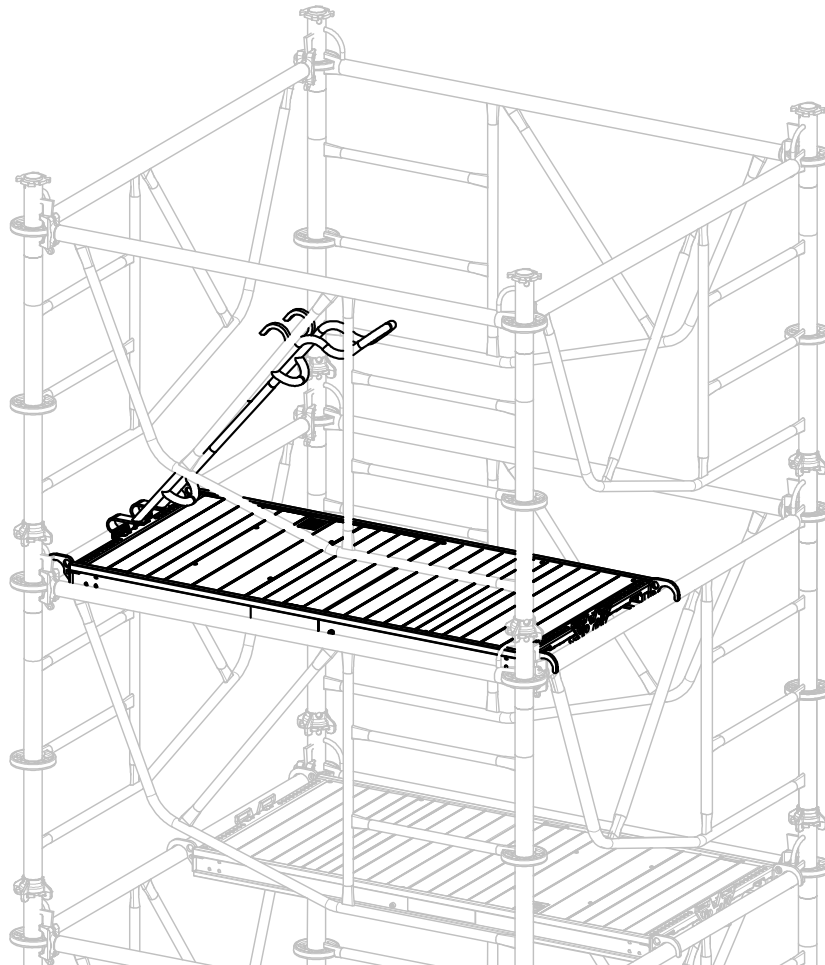


Completing preparations and assembling base frame

Step 3 Hang the first end of the deck on the frame. Verify that the lift-off retainer snaps into place. Remove the Deck Lifter.



Step 4 Hang the other end of the deck on the opposite frame. Verify that the lift-off retainer snaps into place. Remove the Deck Lifter.



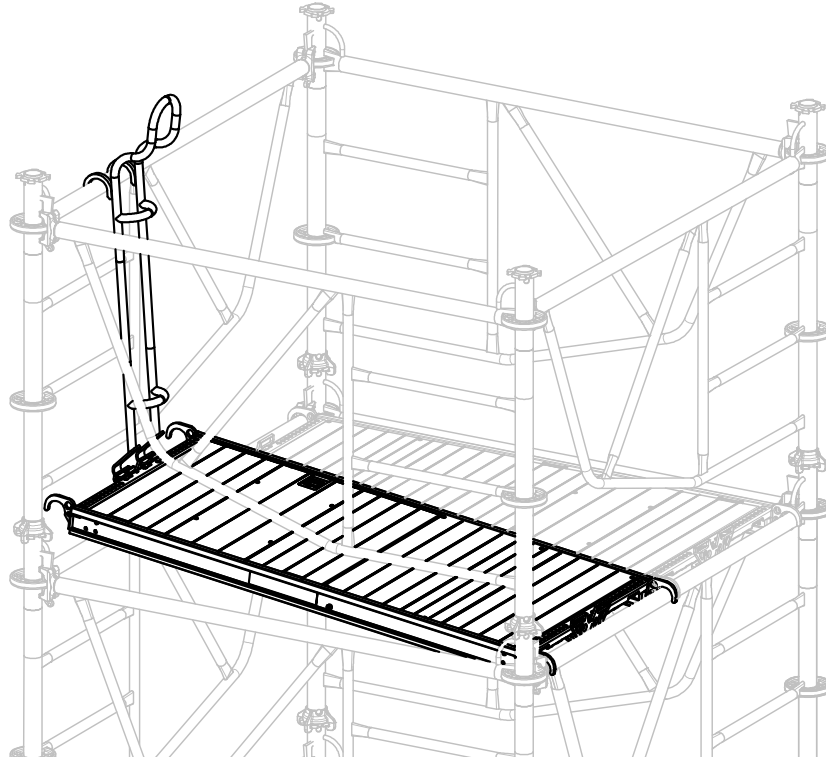
Confirm that the lift-off retainers on both ends of the deck are locked to the ST 60 Frame.

Step 5 Climb the integrated ladder to the upper deck and then move up the other deck in the same way.

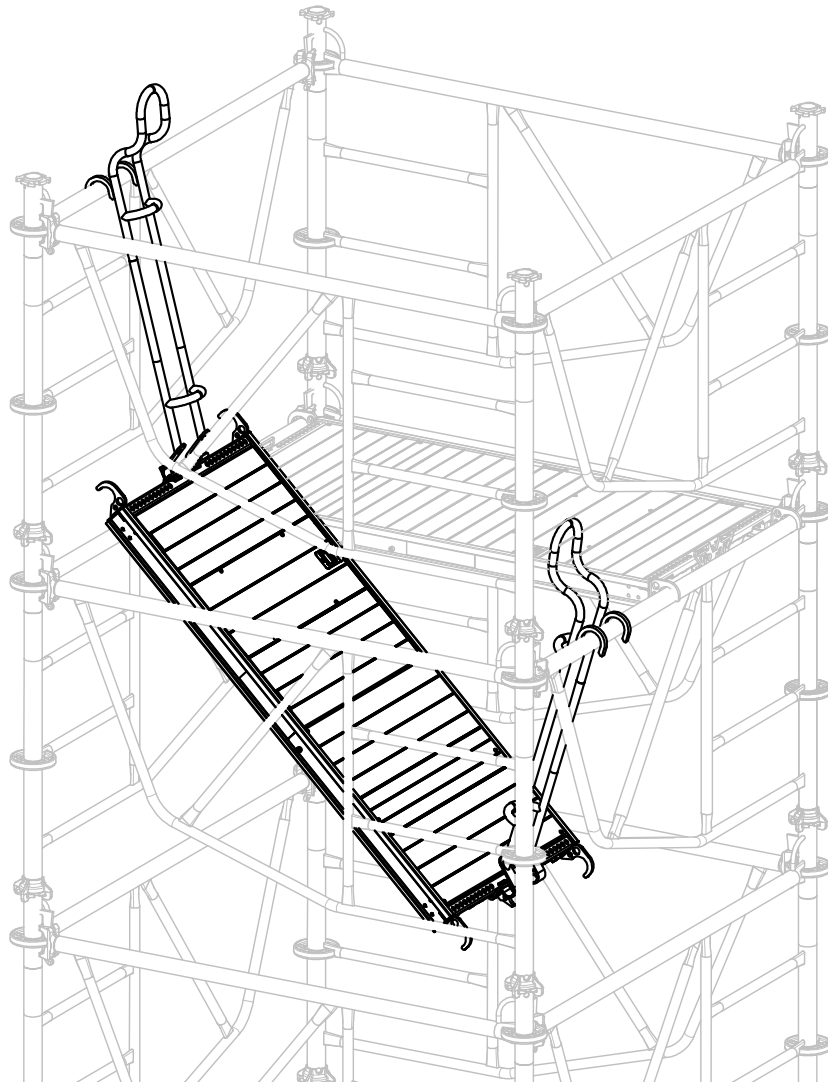
Completing preparations and assembling base frame

Moving decks lower

- Step 1** Use the Deck Lifter to lift one end of the deck, then hook the Deck Lifter onto the frame at the same frame level.

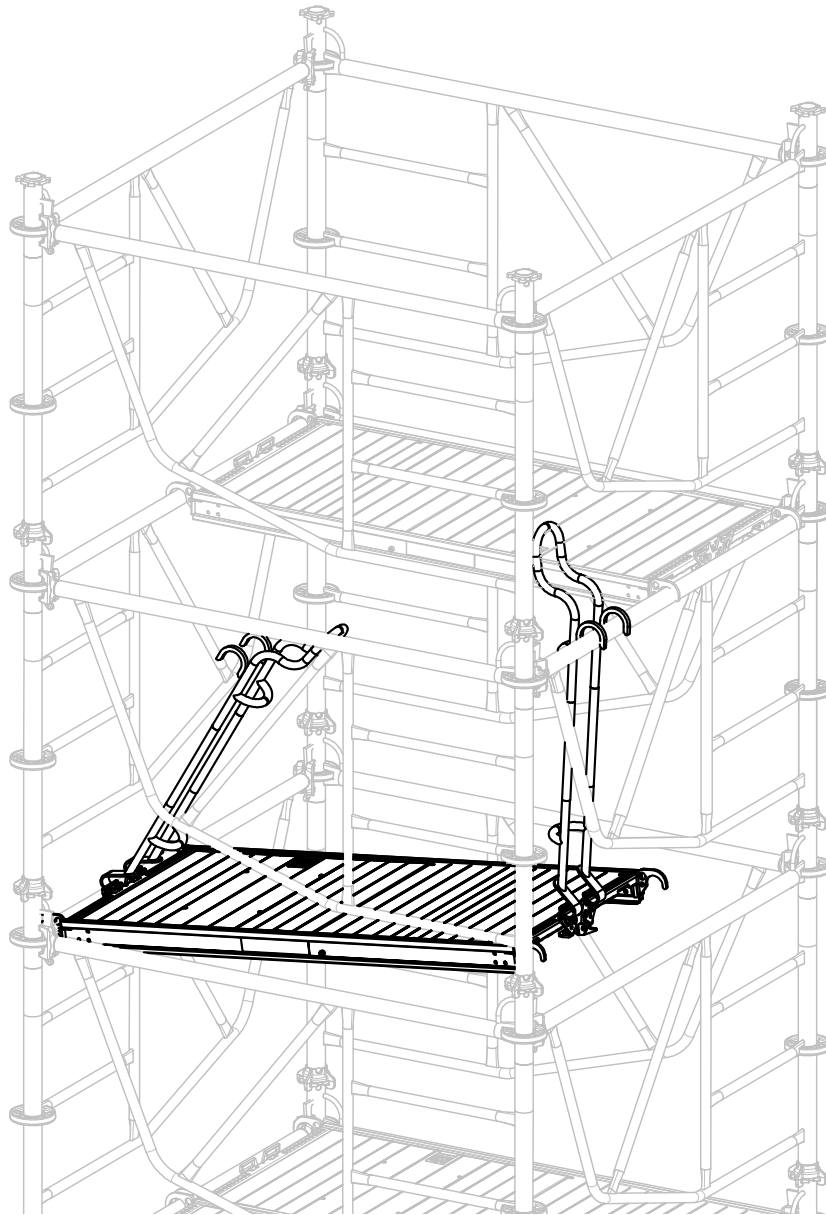


Step 2 Use the Deck Lifter to lift the other end of the deck, then hook the Deck Lifter onto the frame of the next-lower frame level.

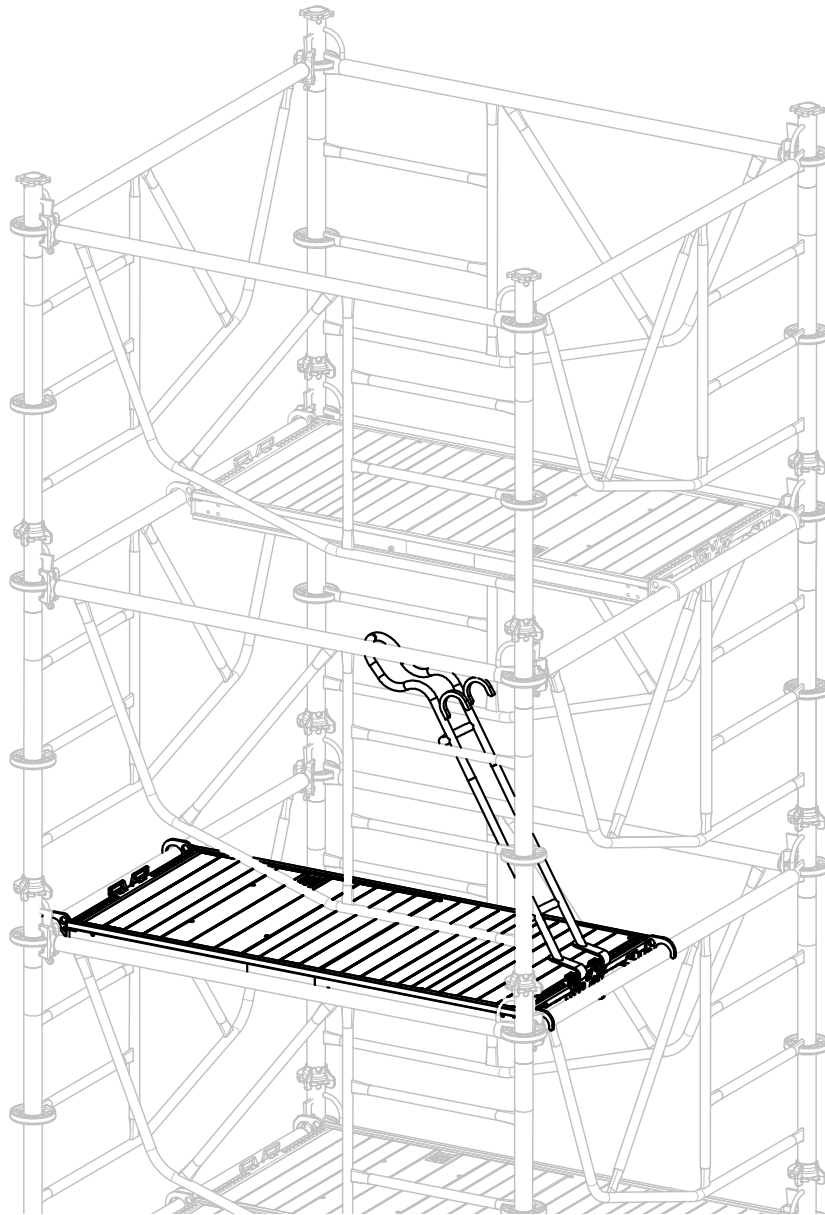


Completing preparations and assembling base frame

Step 3 Hang the first end of the deck on the frame. Verify that the lift-off retainer snaps into place. Remove the Deck Lifter.



Step 4 Hang the other end of the deck on the opposite frame. Verify that the lift-off retainer snaps into place. Remove the Deck Lifter.



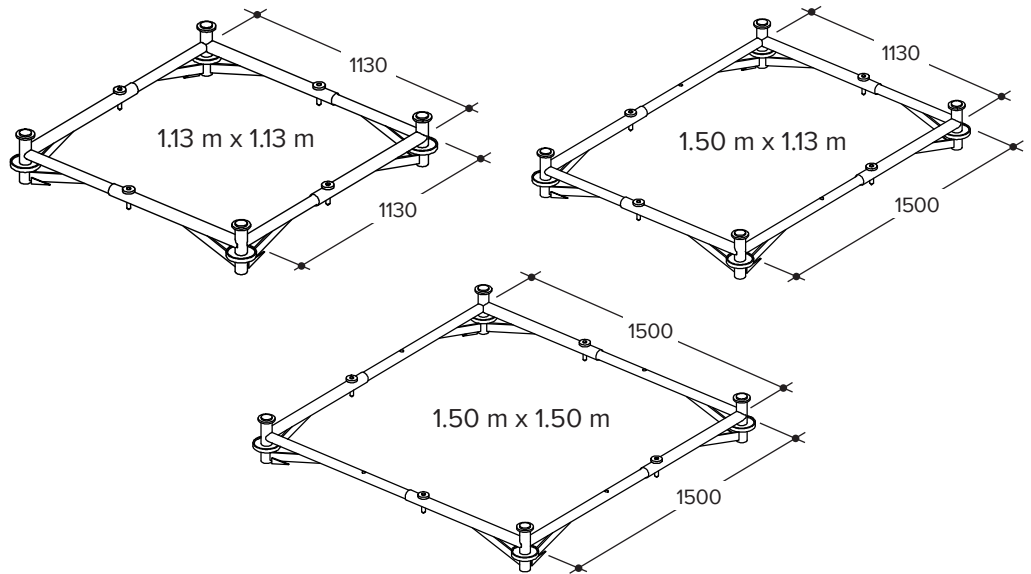
Confirm that the lift-off retainers on both ends of the deck are locked to the ST 60 Frame.

Step 5 Climb the integrated ladder to the lower deck and then move down the other deck in the same way.

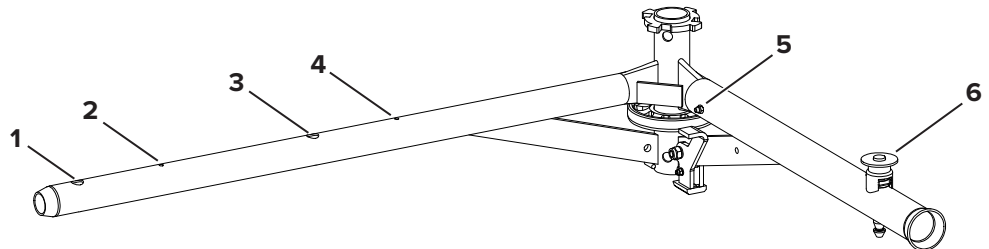
5.6 Assembling base frame

The base frame forms the bottom frame level of every ST 60 Shoring Tower. It consists of 4no. Starter Frames L. The tubes of the Starter Frame L have to be inserted into one another. Each Starter Frame L has 2no. positions with which to select the different dimensions that are possible. The following illustration shows the possible dimensions.

Possible sizes

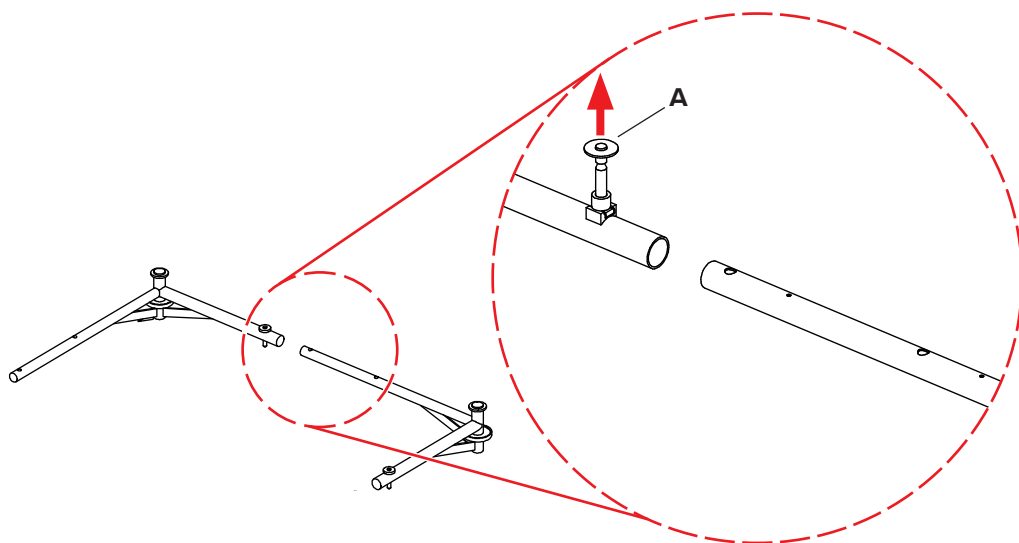


Starter Frame L

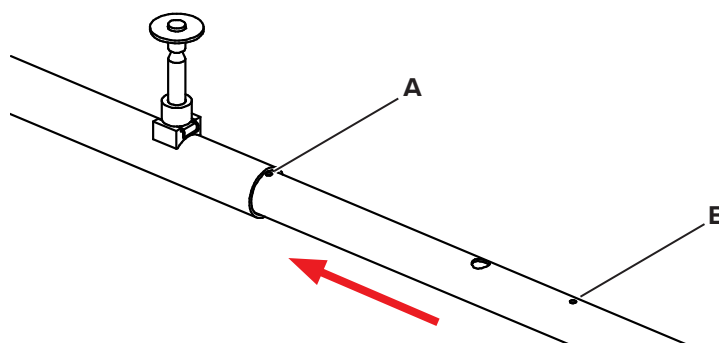


- 1 Pegging hole for side length 1.50 m
- 2 Marking hole for side length 1.50 m
- 3 Pegging hole for side length 1.13 m
- 4 Marking hole for side length 1.50 m
- 5 Stopper
- 6 Locking pin

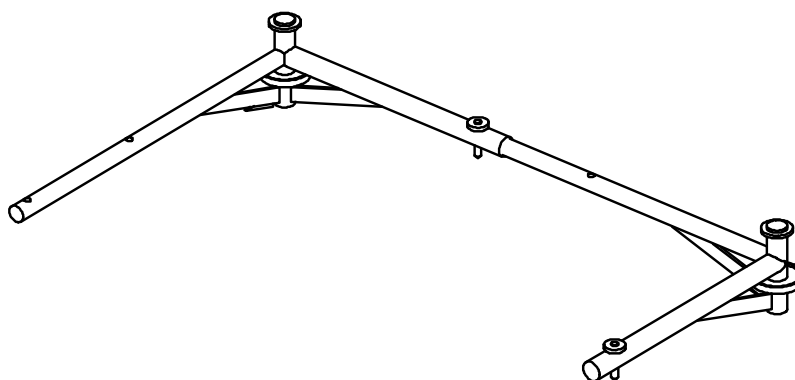
Step 1 Place 2no. Starter Frames L next to one another as shown. Pull out the locking bolt (A) on 1no. Starter Frame L. The bolt locks into the retracted position.



Step 2 Put together the Starter Frames L to create the desired side lengths. The corresponding marking hole (A 1.50 m) or (B 1.13 m) should only just be completely visible.

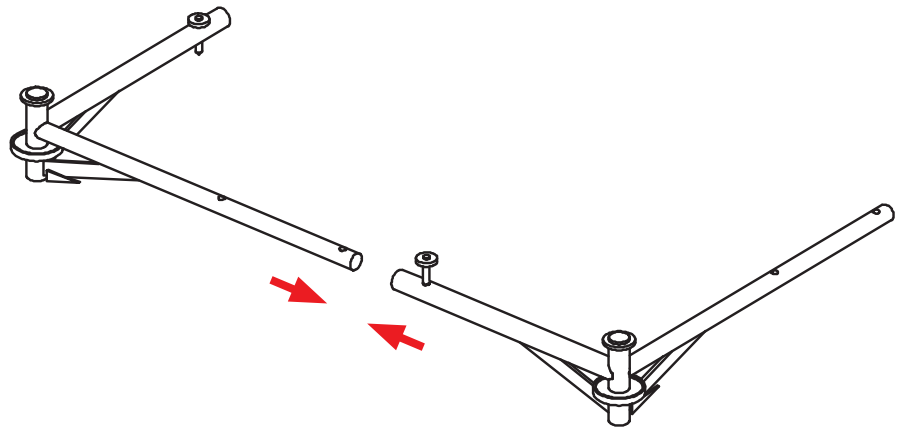


Step 3 Press down the locking bolt. The bolt must lock completely into place and protrude from the underside of the Starter Frame L.

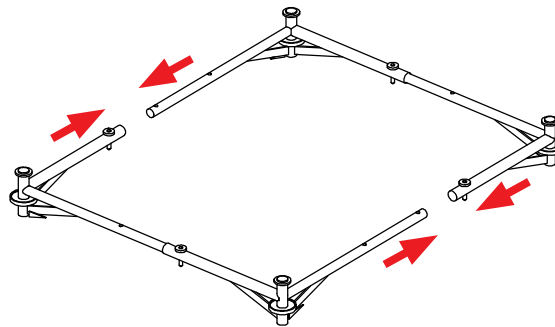


Completing preparations and assembling base frame

Step 4 Put together the other 2no. Starter Frames L in the same way.



Step 5 Put together the 2no. assembled halves of the base frame. Two persons are required to perform this task.



Confirm that all locking bolts are locked into place!

5.7 Attaching Base Jacks

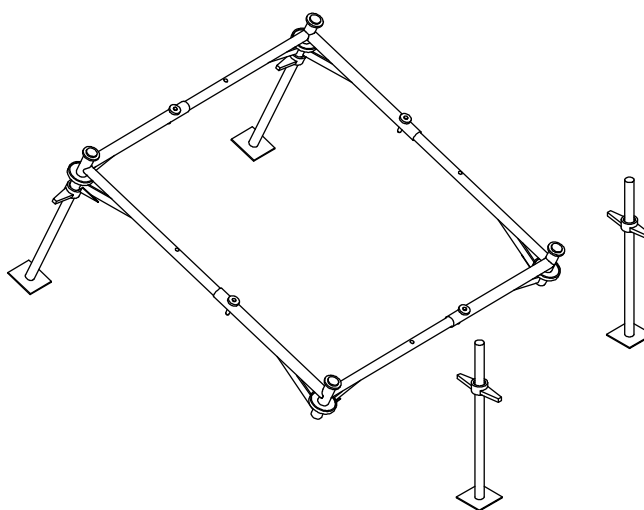
Once the base frame is assembled, the Base Jacks have to be attached. The load exerted by the ST 60 Shoring Tower is transferred to the ground through the Base Jacks. The Base Jacks also enable horizontal alignment of the ST 60 Shoring Tower, adjustment of the height and stripping.

NOTE

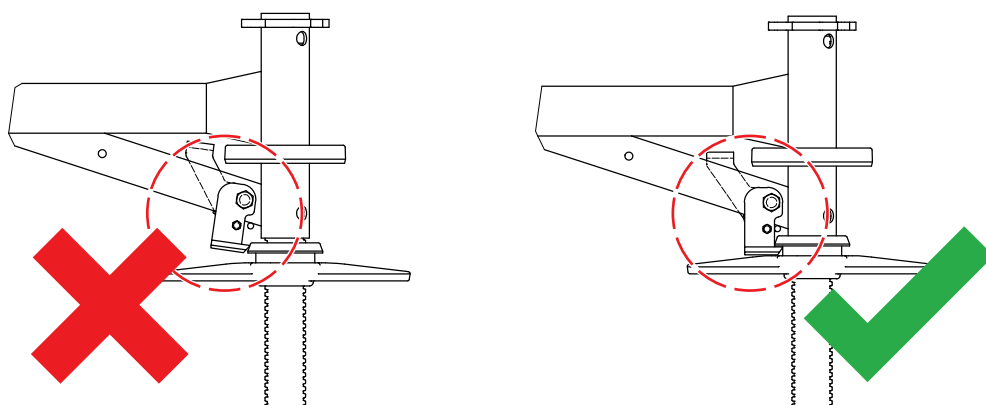
NOTE

Do not turn the Base Jack wing nuts all the way down. Take into consideration the stripping clearance.

- Step 1** Extend all of the Base Jacks to the required length.
- Step 2** Insert 2no. Base Jacks into the Starter Frame L on one side of the base frame. Two persons are required to perform this task.

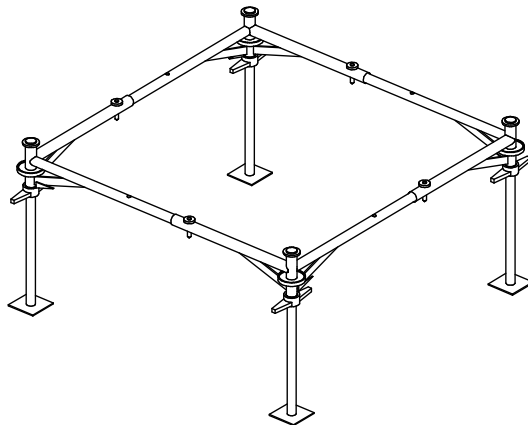


- Step 3** Verify that the Base Jack Securing Device on the Starter Frame L is locked into place.



Completing preparations and assembling base frame

Step 4 Attach the other 2no. Base Jacks to the base frame in the same way.



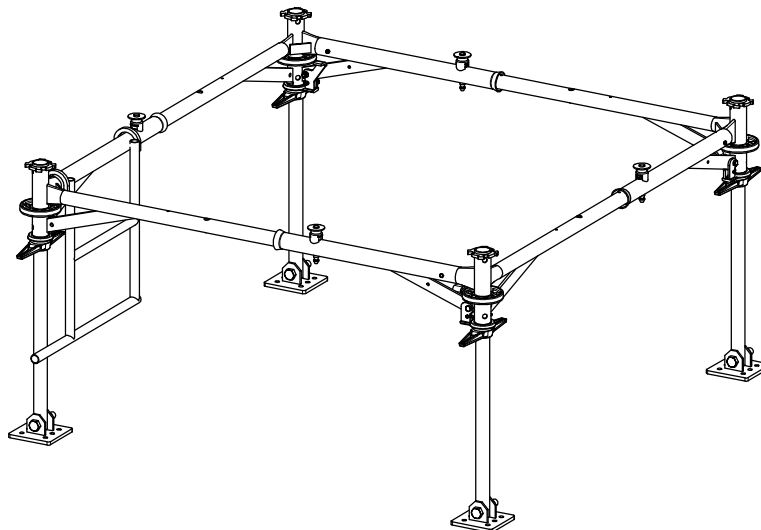
Verify that all safety locks are properly locked!

Step 5 Roughly align the base frame horizontally with the aid of the Base Jacks. If the tower is to be erected on an incline, a height difference of no more than 50 cm can be compensated for with the Base Jacks.

5.8 Attaching Entry Ladder

If the Base Jacks are greatly extended, the distance from the ground to the base frame is substantial. This makes it difficult to ascend into the ST 60 Shoring Tower. The Entry Ladder can be attached to facilitate ascent. Use the Entry Ladder only from the inside of the tower; otherwise the ladder will swing away from you.

Step 1 Hang the Entry Ladder on the inside of the base frame. The Entry Ladder is braced against a Base Jack.



5.9 Assembling first frame level

The first frame level is usually made up of 1no. ST 60 Entry Frame and 3no. ST 60 Frames. The ST 60 Entry Frame makes it easy to later access the inside of the ST 60 Shoring Tower. The section *Assembling and disassembling frames* on page 24 describes how to assemble and disassemble the ST 60 Frames. This section only specifies the sequence of the steps.

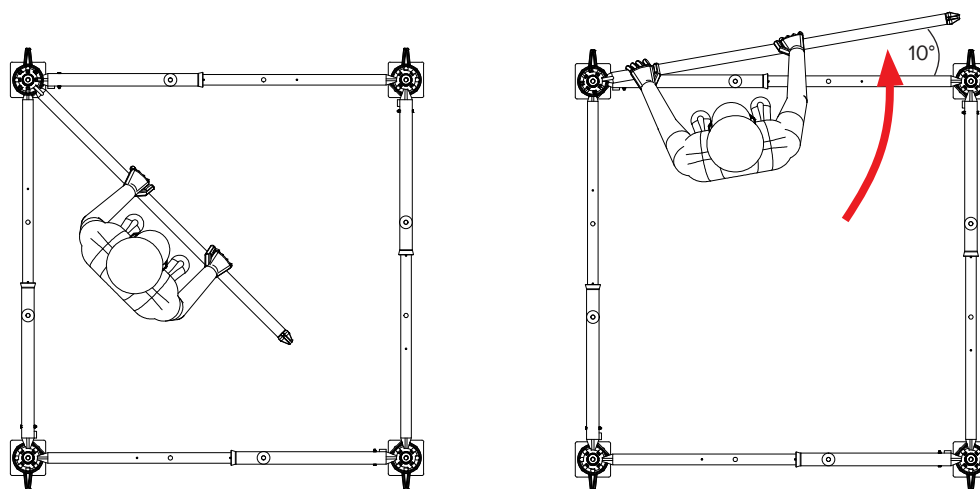
NOTE

Level the ST 60 Shoring Tower!

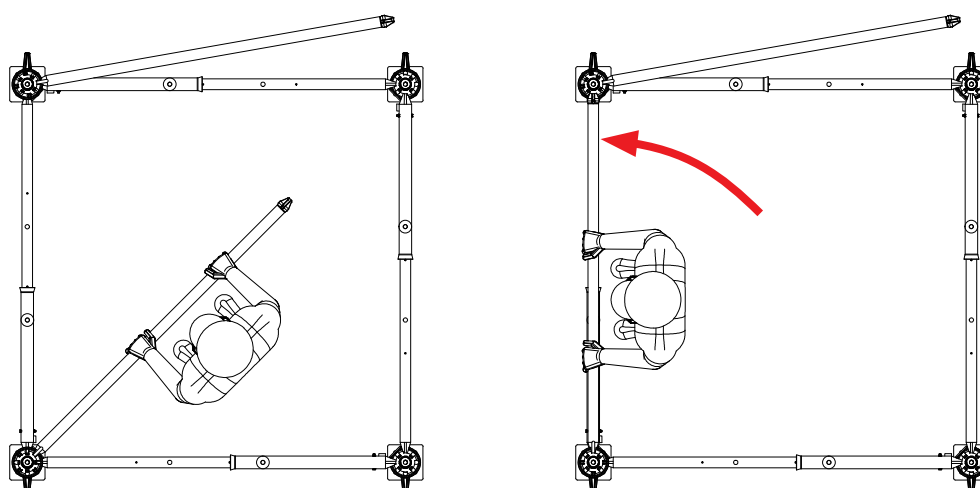
After assembling the first frame level, adjust Base Jacks to ensure that the frames are level.

Step 1 Place the ST 60 Entry Frame on one of the bayonet fasteners on the base frame at an angle of 45°.

Step 2 Pivot the Entry Frame out until it is about 10° past the base frame.



Step 3 Place the next frame on the indicated bayonet fastener on the base frame in the same way. Pivot the frame out far enough that the rosette connection on the frame grasps the rosette on the previously attached frame.

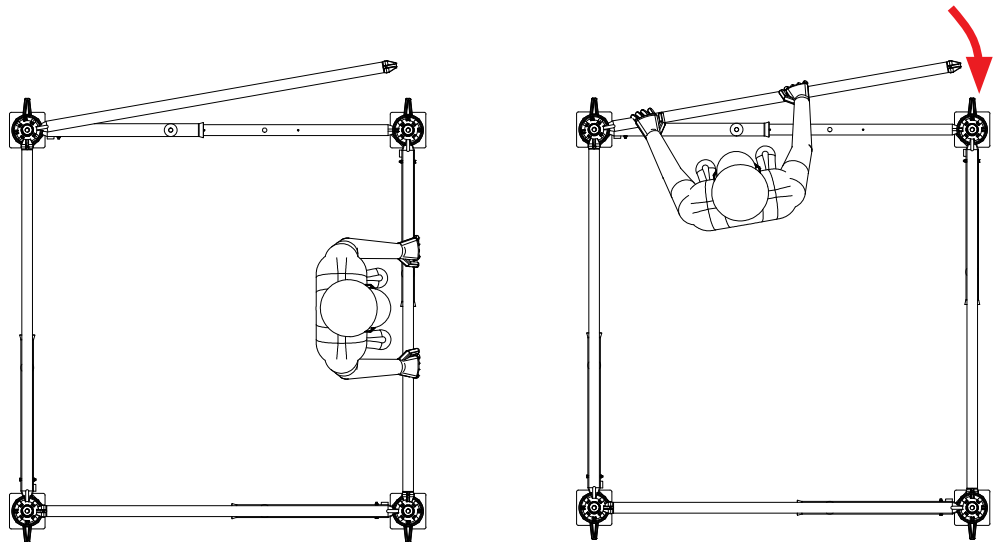


Step 4 Insert the rosette connection fixing wedge. Do not hammer in the wedge.

Step 5 Attach the 2no. remaining frames in the same way, working counterclockwise.

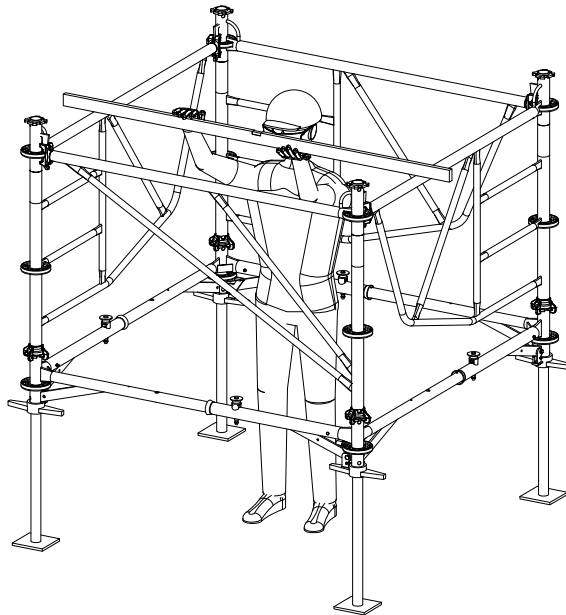
Completing preparations and assembling base frame

Step 6 Pivot in the frame attached first far enough that the rosette connection on the frame grasps the rosette on the frame attached last. Insert the rosette connection fixing wedge. Do not hammer in the wedge.



Step 7 Use a 500 g hammer to knock the wedges on all 4no. frames into place until rebound is felt (Refer to Section *Attaching ST 60 Frame to and detaching ST 60 Frame from next-lower frame* on page 25).

Step 8 Adjust the Base Jacks to level the ST 60 Shoring Tower (with the aid of a spirit level).

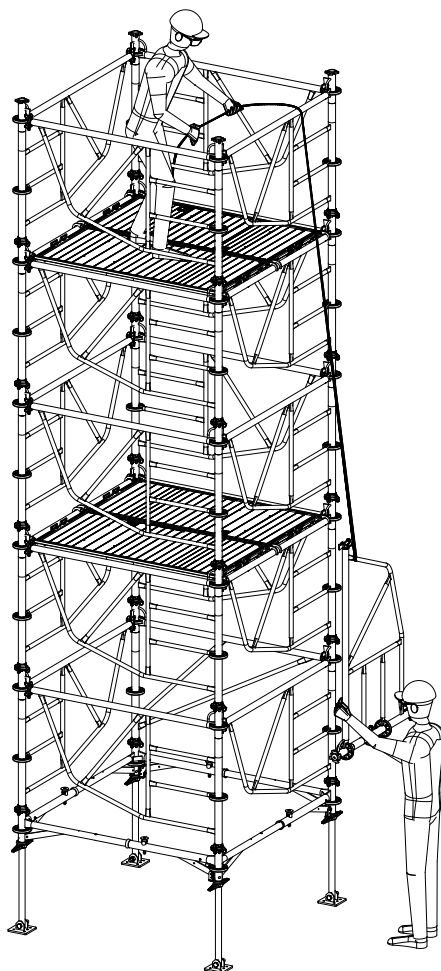


Confirm that all wedges are properly locked into place!

5.10 Vertical transportation of components

With a rope

Transporting ST 60 components with a rope is a job for two persons. A rope with a hook with integrated safety latch is essential. One person stands on the ground and connects the components to the hook on the rope. The other person stands on the highest deck level that is secured. He hoists the component and puts it into place.



! WARNING

Components falling to the ground can cause injury or death.

Never throw components off the ST 60 Shoring Tower!

! WARNING

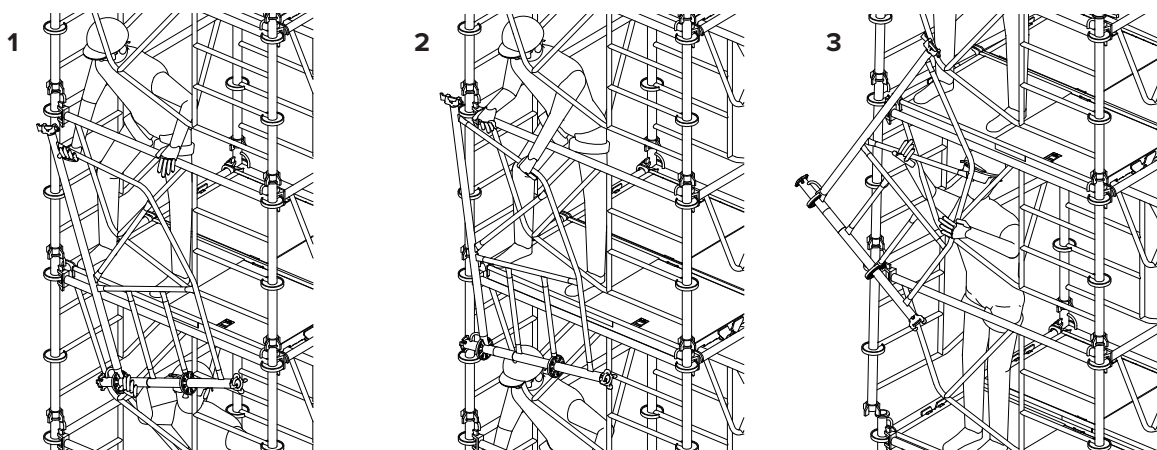
Components falling to the ground can cause injury or death to persons in/on the scaffold.

Immediately move out of the hazardous area once components have been handed off!

Step back into the tower when transporting components manually!

Manually

When transporting components manually, one person has to be on each level of the scaffold. The components can be moved up and down the outside of the ST 60 Shoring Tower simply by grasping them and handing them up or down to the next person. As soon as the person at the bottom has handed over the component, he has to retreat completely into the safe area.



6 Upright assembly of ST 60 Shoring Tower

Once all preparations have been completed and the base frame is assembled (Refer to Section 5 on page 22), the ST 60 Shoring Tower can be assembled in the upright position or lying on the ground. This section describes upright assembly. Assembly of the ST 60 Shoring Tower lying on the ground is described in Section 7 on page 54.



WARNING

The shoring tower can tip over!

Wind can cause free-standing ST 60 Shoring Towers to tip over.

The maximum erection height permitted for a free-standing ST 60 Shoring Tower at a wind speed up to 6 Beaufort (< 13.9 m/s; 50 km/h; 0.12 kN/m² velocity pressure) is:

For ST 60 Shoring Towers 1.13 m x 1.13 m: 5.00 m

For ST 60 Shoring Towers 1.13 m x 1.50 m: 5.00 m

For ST 60 Shoring Towers 1.50 m x 1.50 m: 8.00 m

Secure ST 60 Shoring Towers with appropriate means during erection to prevent them from tipping over!

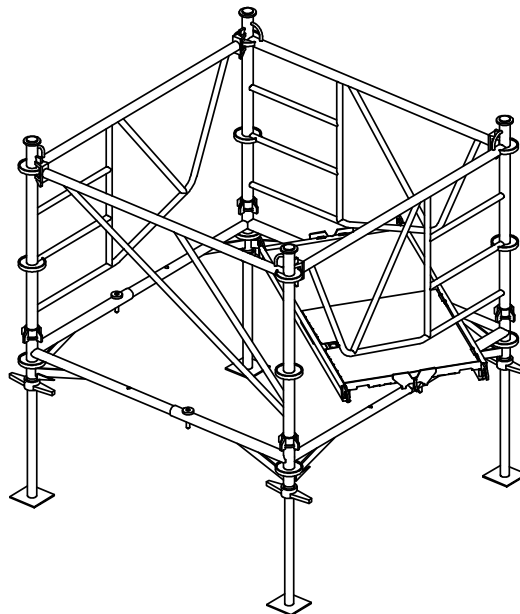
6.1 Decking first level

Install the decks on the first level from outside of the ST 60 Shoring Tower. Observe the following points regarding assembly:

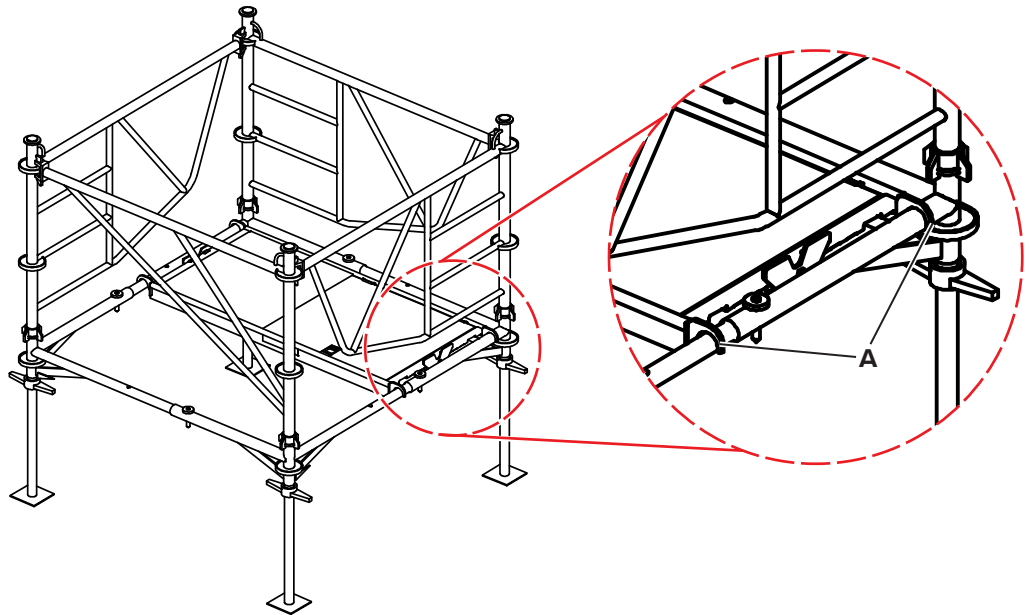
- Install all decks such that the access hatch opens to the outside.
- Always place the decks parallel to the Entry Frame.
- The end of the access hatch always has to be adjacent to a ladder.

All ST 60 decks meet the requirements of Load Class 4 (LC 4). Loads to which the decks are subjected must be taken into consideration when determining the Safe Working Load of the ST 60 Shoring Tower.

Step 1 Lay a deck diagonally across the corner of the base frame.

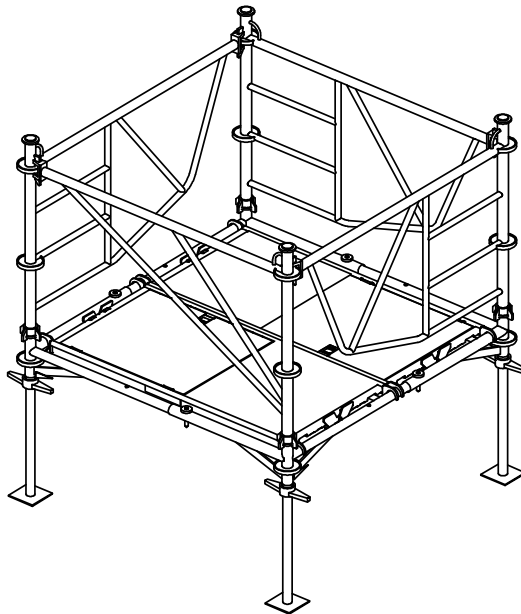


Step 2 Slide the deck over to the opposite side, lift the deck by grasping the lift-off retainer, and hook the deck claws (**A**) onto the base frame. The lift-off retainer has to lock into place.



Confirm that the lift-off retainers on both ends of the deck are locked to the ST 60 Frame.

Step 3 Install the second deck in the same way.



6.2 Assembling additional frame and deck levels

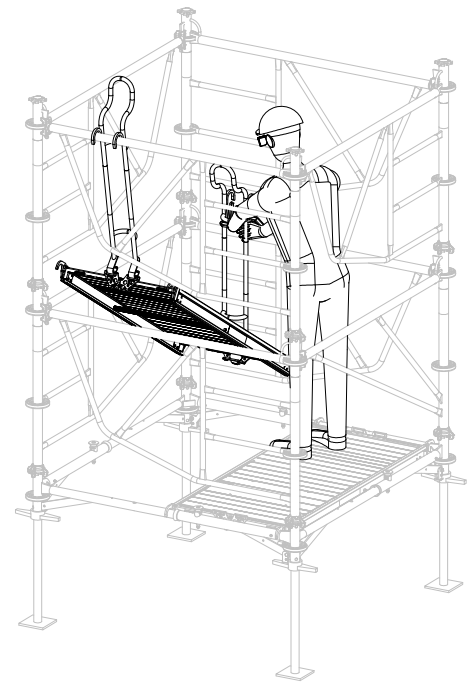
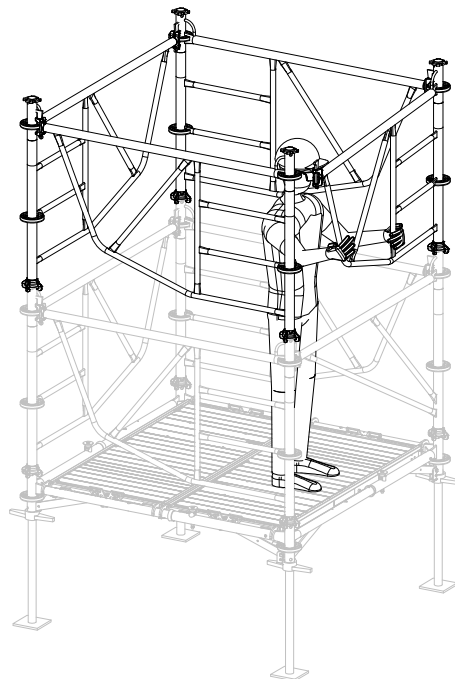
The next frame levels are made up of 4no. ST 60 Frames each. They are also always assembled from the inside of the tower. The procedure is the same as that described for the first frame level.

The ST 60 Shoring Tower has to be assembled by at least two persons. The components needed for erection should be transported along the outside of the ST 60 Shoring Tower. There are various ways to transport the material.

6.2.1 Assembling frame and deck levels

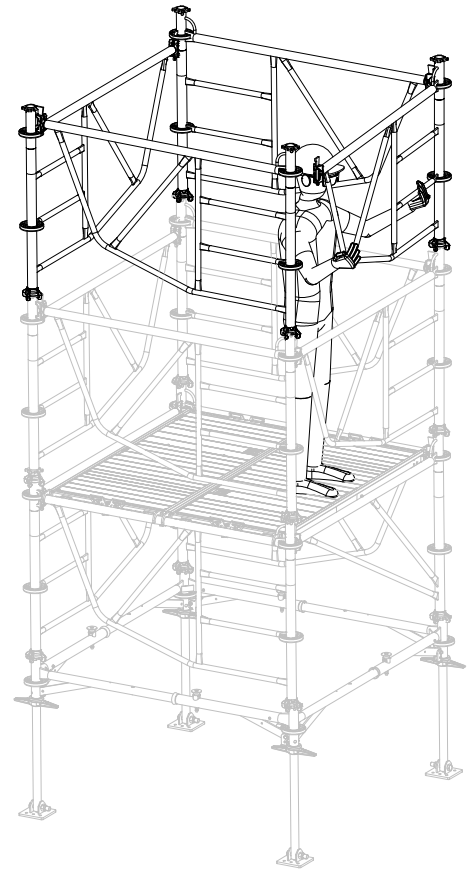
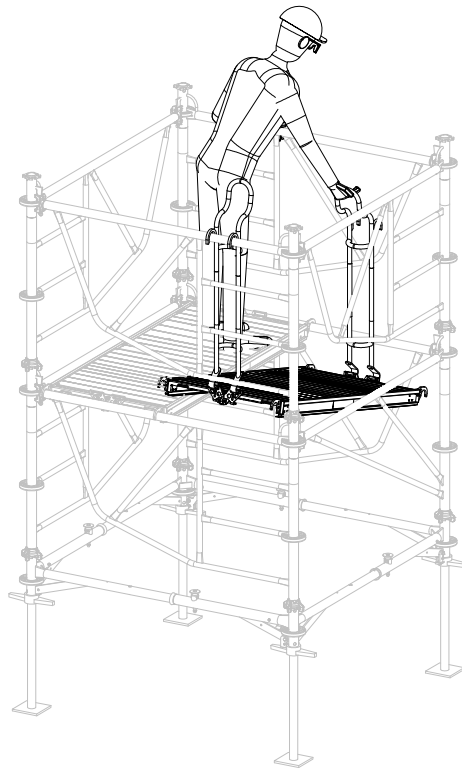
Step 1 Assemble the second frame level.

Step 2 Lift a deck from the first deck level onto the next frame level. Use the Deck Lifter to do this.



Step 3 Climb onto the higher deck and then lift the other deck onto that level. Use the Deck Lifter to do this.

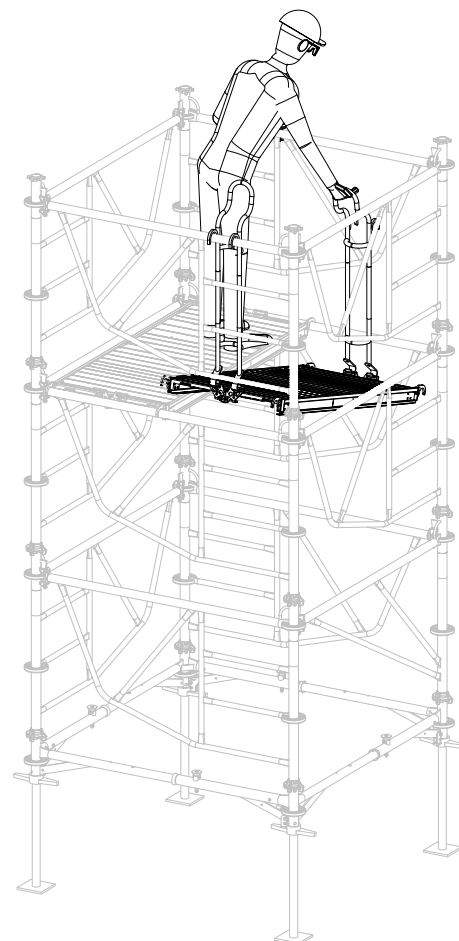
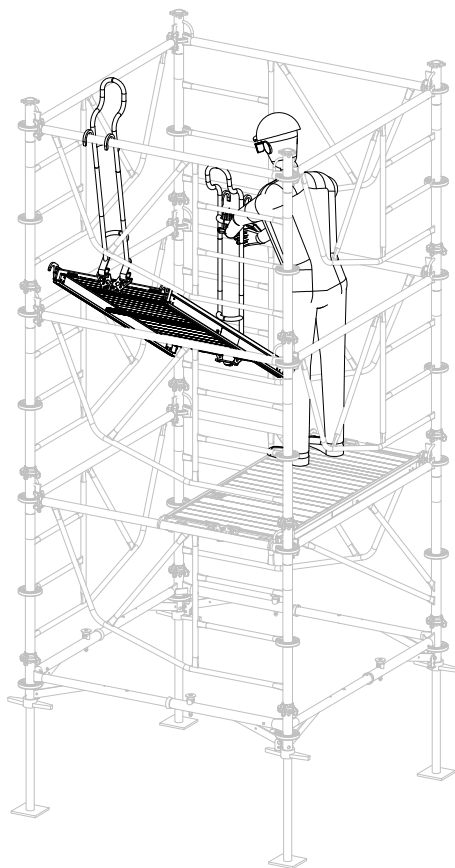
Step 4 Assemble the third frame level.



Upright assembly of ST 60 Shoring Tower

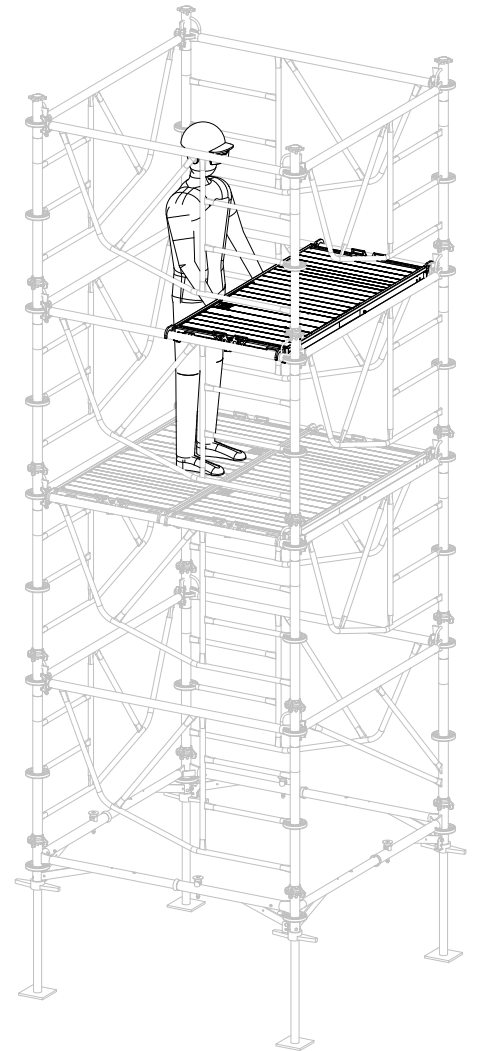
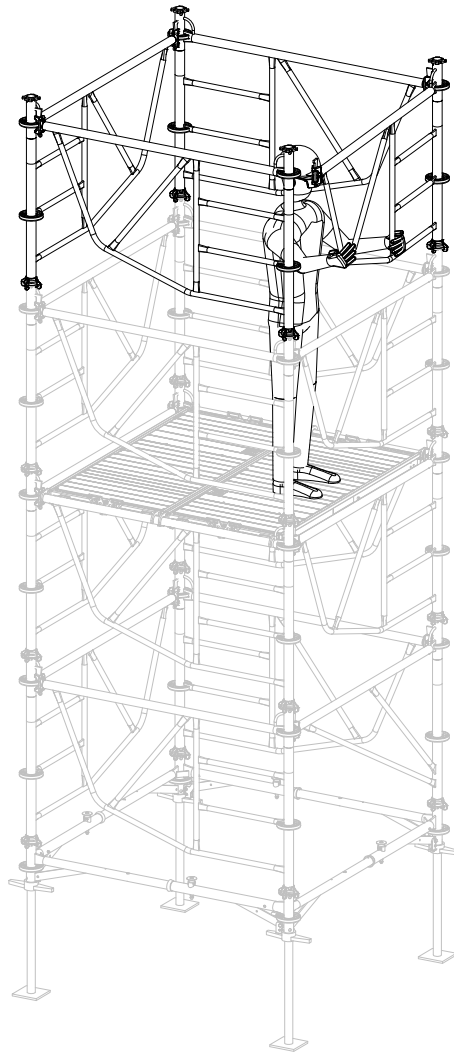
Step 5 Lift a deck from the first deck level onto the next frame level. Use the Deck Lifter to do this.

Step 6 Climb onto the higher deck and then lift the other deck onto that level. Use the Deck Lifter to do this.



Step 7 Assemble the fourth frame level.

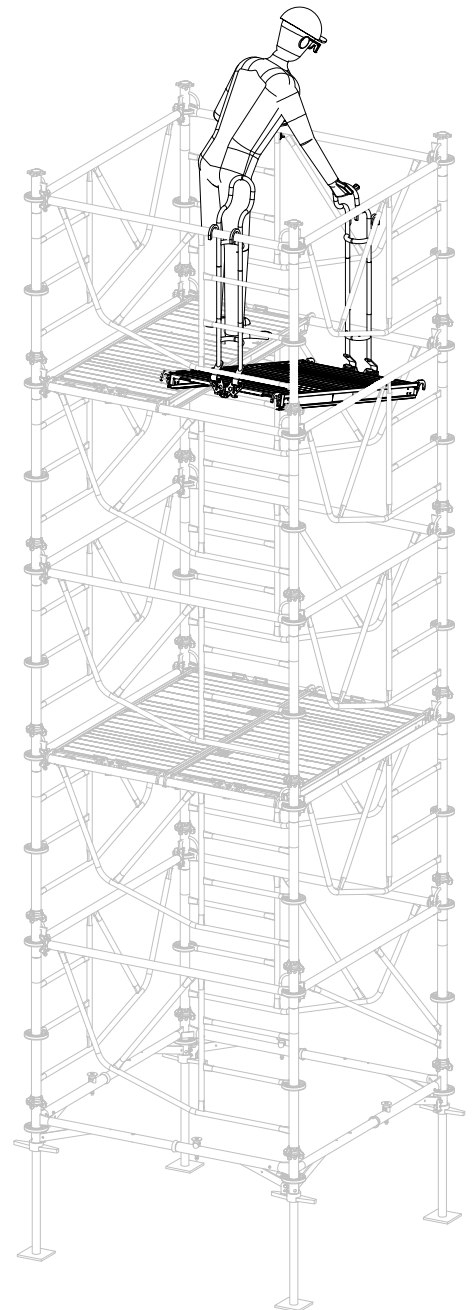
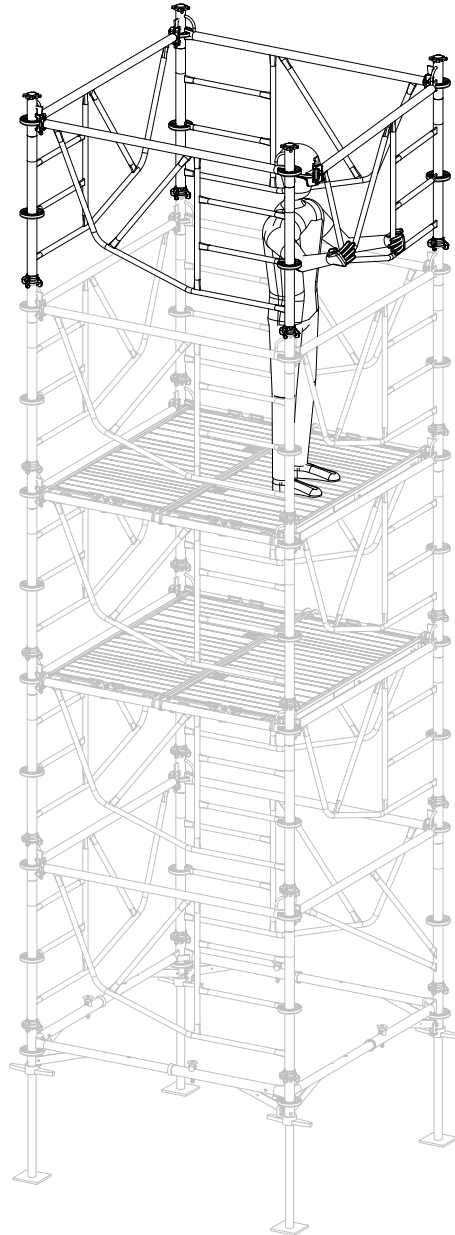
Step 8 Assemble the third deck level.



Upright assembly of ST 60 Shoring Tower

Step 9 Climb onto the third deck level and assemble the fifth frame level from there.

Step 10 Move the third deck level 1no. frame level higher.



Step 11 Continue to assemble frame levels and deck levels as described in this section, or assemble the structure topping as described in Section 6.3 on page 51.



It is possible to climb all the way up and down the tower with only 2no. decks.

Do this by raising a deck 1no. frame level higher.

Climb onto the deck that was just raised.

Raise the lower deck up 2no. frame levels.

Climb onto the deck that was just raised.

Raise the first deck 2no. frame levels higher.

Repeat these steps until you have reached the desired height.

6.3 Assembling structure topping

6.3.1 Attaching Crosshead Jacks

The Crosshead Jacks secure the primary beams or secondary beams to the ST 60 Shoring Tower. If it is possible for the Crosshead Jacks to slip out of the ST 60 Frames, the wing nuts on the Crosshead Jacks have to be secured with the Head Jack Retainers. The Crosshead Jacks always have to be secured when the ST 60 Shoring Tower is assembled lying on the ground or when it is transported by crane.

A technical modification to the thread of the Crosshead Jack prevents the wing nut from being turned down any farther. If this safety feature does not function properly and the wing nut can be unscrewed more than 620 mm, the Crosshead Jack may no longer be used.

NOTE

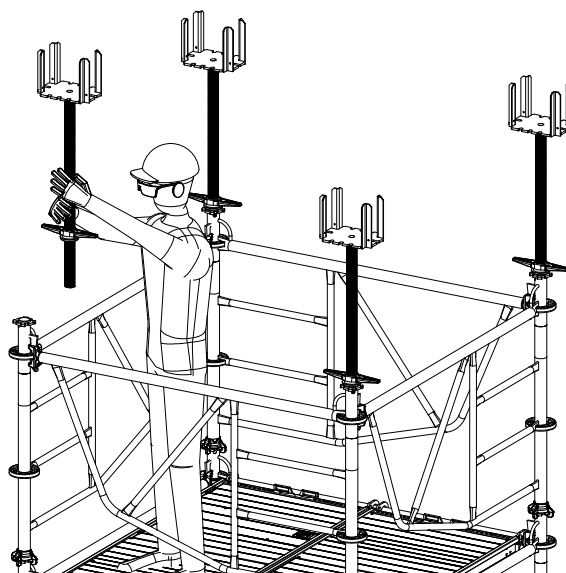
Take into consideration the stripping clearance!

Do not turn the Head Jack wing nuts all the way up.

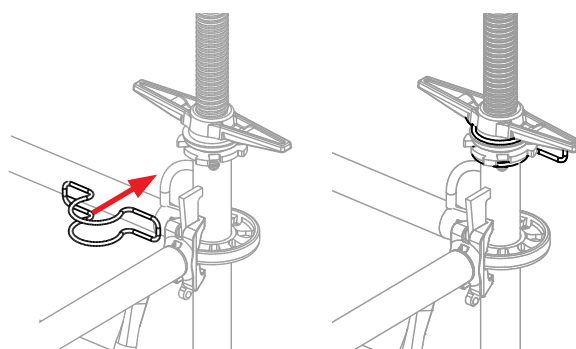
Maintain a stripping clearance of at least 50 mm!

Step 1 Use the wing nuts to set the Crosshead Jacks to the required length.

Step 2 Insert the Crosshead Jacks into the ST 60 Frames at the top frame level.



Step 3 Place 1no. Head Jack Retainer on each Crosshead Jack to secure them from falling out, if necessary.

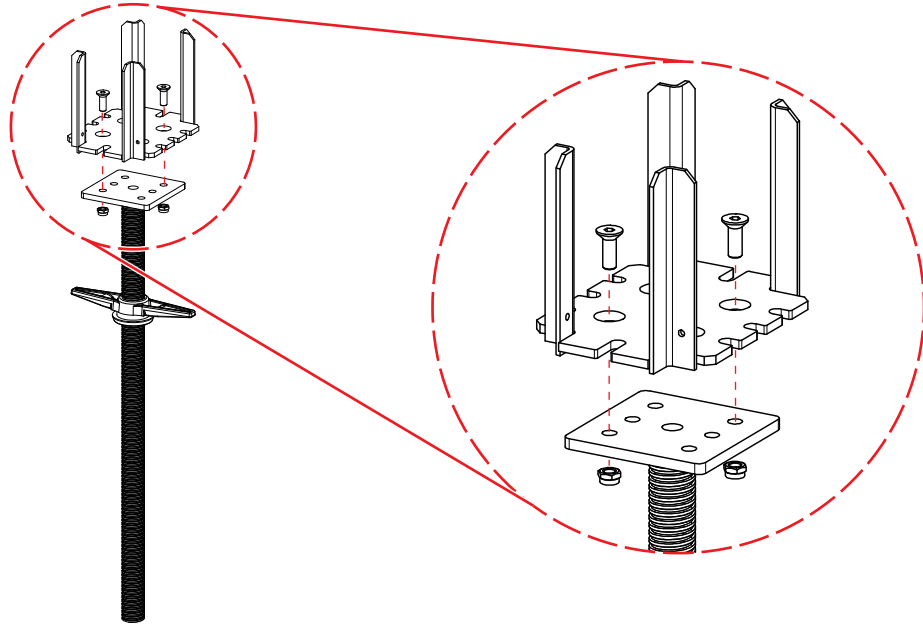


Upright assembly of ST 60 Shoring Tower

6.3.2 Converting Base Jack to Head Jack

A Base Jack can be converted to a Head Jack with the aid of a Crosshead Adapter. The Base Jack can be secured with the Head Jack Retainer as well to prevent it from falling out.

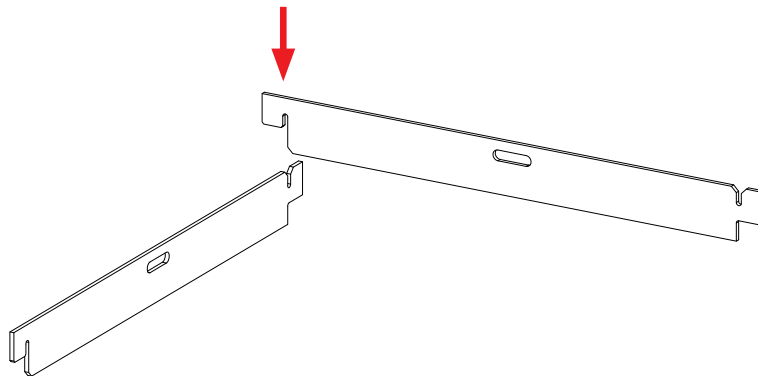
- Step 1** Secure the Crosshead Adapter to the Base Jack base plate using 2no. countersunk screws M12x35 and nuts.



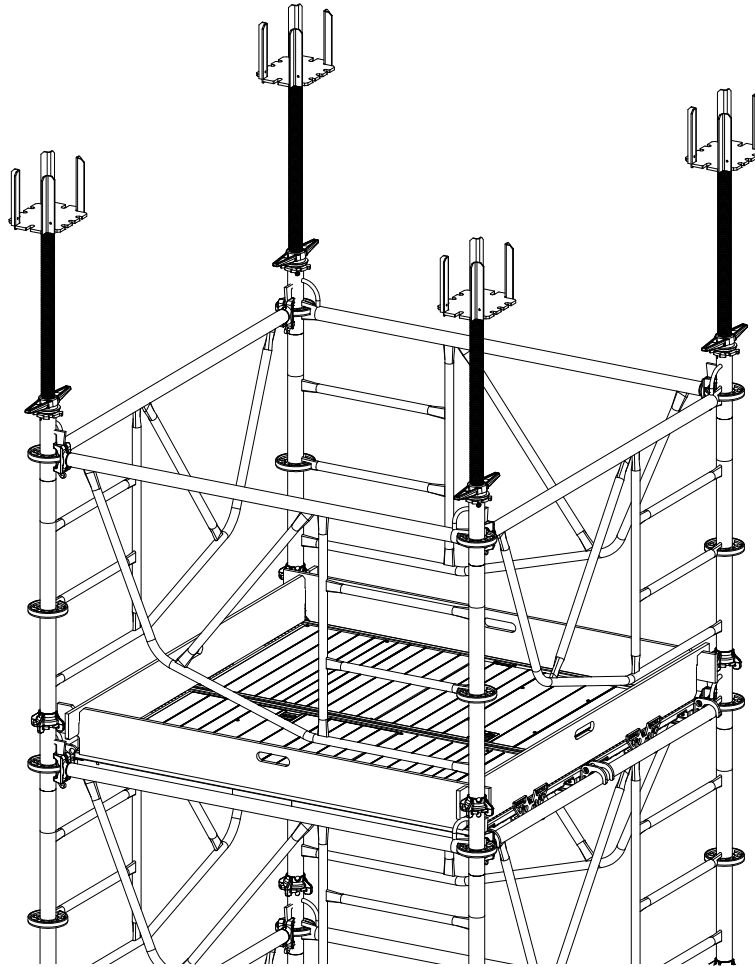
6.3.3 Attaching Toe Boards

If Toe Boards are needed on one or more deck levels, they can be put together by simply interlocking them. Four Toe Boards are needed for each deck level.

- Step 1** Connect a Toe Board to a second Toe Board on the desired deck level.



Step 2 Connect all of the Toe Boards to one another to form a frame.



7 Assembling ST 60 Shoring Tower lying on the ground

ST 60 Shoring Towers with up to 12no. frame levels can be assembled lying on the ground and then pulled upright with a crane. Ensure that the assembly surface is flat. Do not assemble the ST 60 Shoring Tower directly on the ground. Place a board under each frame level (at least 60 mm x 60 mm).

The first unit always has to be assembled upright. It consists of:

- Base frame with Base Jacks
- First frame level
- First deck level

Once the first unit is assembled, turn it on its side. Two persons are required to perform this task. Then continue assembling the other levels.



WARNING

Decks can fall out!

When the ST 60 Shoring Tower is assembled while lying on the ground or when it is transported by crane, decks can fall out.

This can cause personal injury or death!

Always properly secure the lift-off retainers of the decks to the frame, e.g. with cable ties.

7.1 Assembling first unit



CAUTION

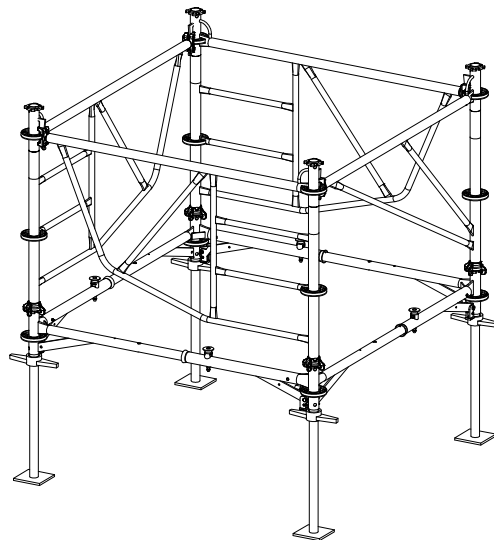
Risk of tripping!

When the first unit is turned on its side and resting on boards, it poses a tripping hazard!

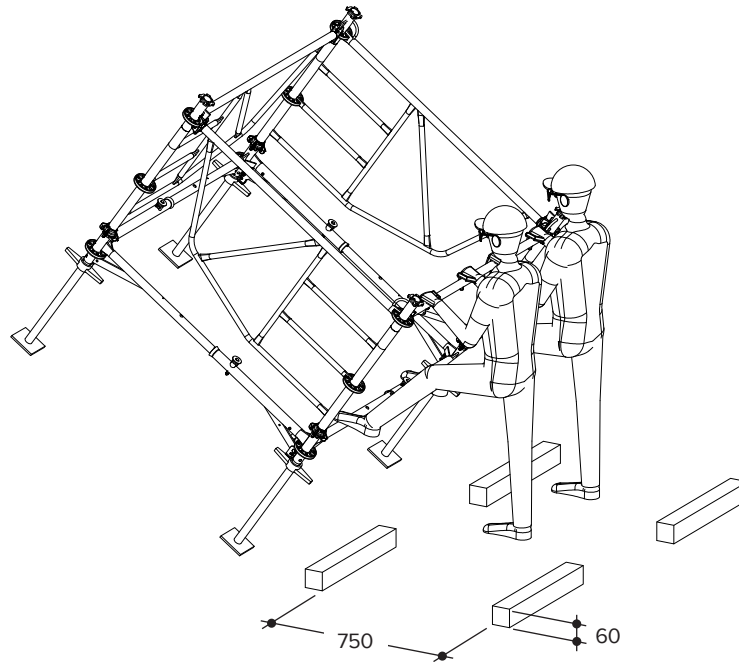
The first unit can fall onto persons and injure them.

When turning the first unit on its side, avoid stumbling over the boards on the ground.

- Step 1** Prepare the assembly surface. The surface must be flat.
- Step 2** Assemble the base frame (Refer to Section 5.6 on page 36).
- Step 3** Assemble the first frame level.



Step 4 Turn the first unit on its side, working with two persons, and place it on boards (at least 60 mm x 60 mm). The boards should be spaced 750 mm apart (inner dimension).

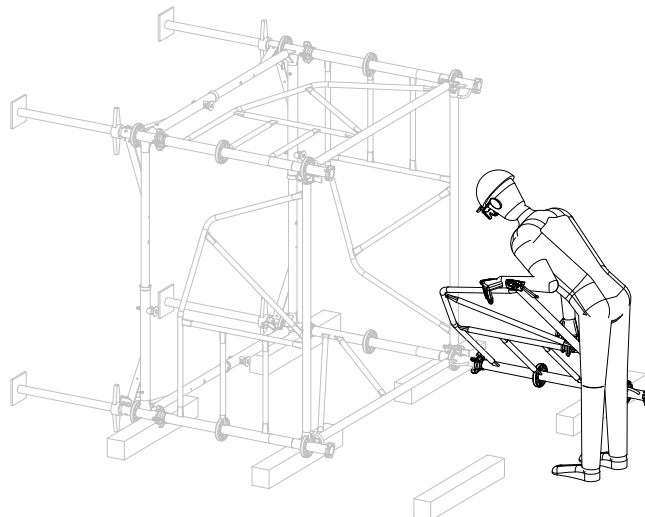


7.2 Assembling frame level lying on the ground

This section explains how to assemble the next frame level. The procedure is the same for all subsequent frame levels.

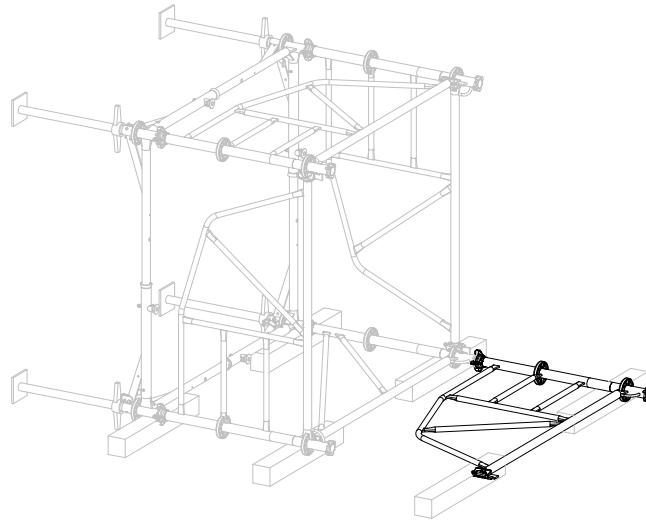
Step 1 Place additional boards on the ground, spaced the same distance, to accommodate the next frame level.

Step 2 Place the ST 60 Frame for the second level, shown in the illustration, on the bayonet fastener shown on the ST 60 Frame of the first level at an angle of 45°.

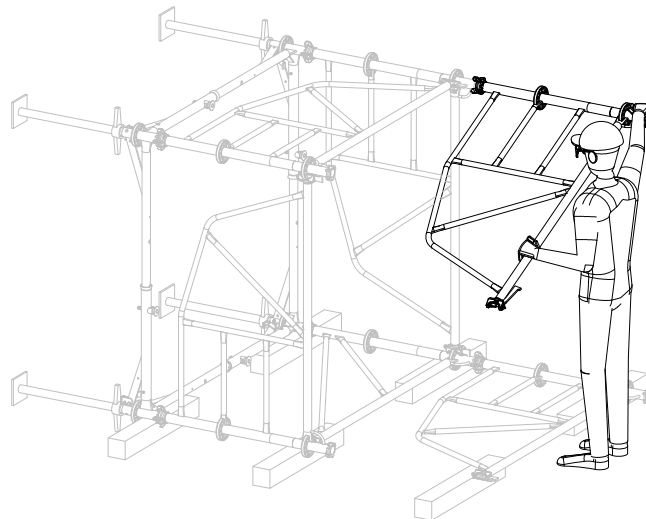


Assembling ST 60 Shoring Tower lying on the ground

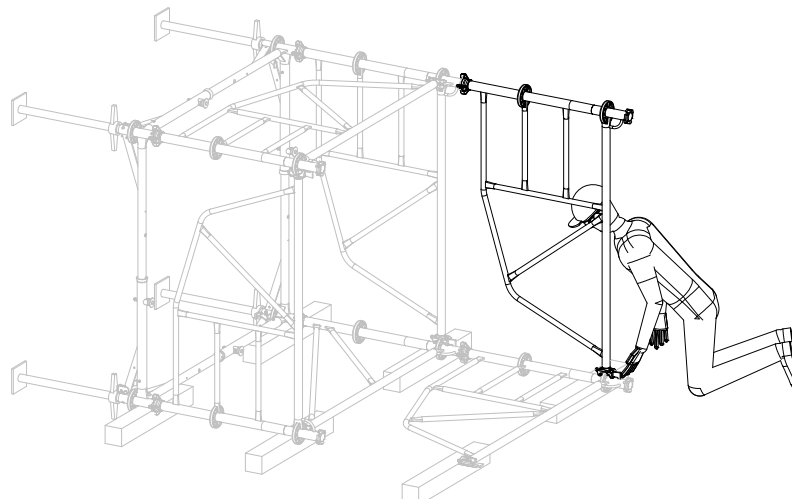
Step 3 Pivot the frame so it is horizontal to the ground. Check that the bayonet fastener closes properly.



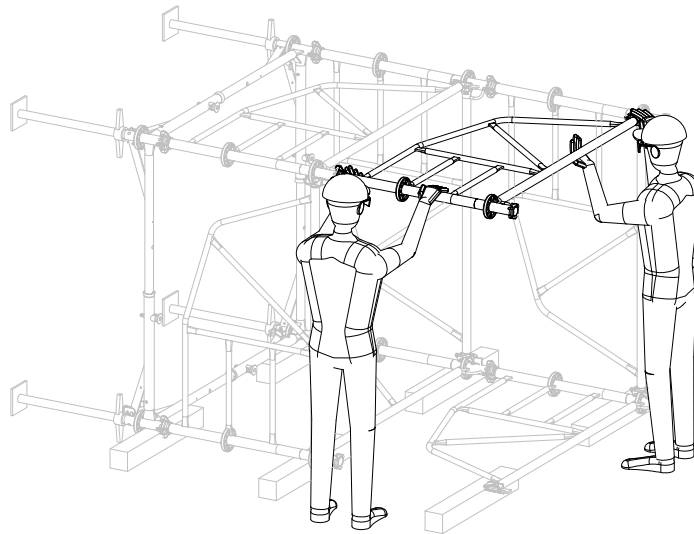
Step 4 Place the next ST 60 Frame on the bayonet fastener shown on the ST 60 Frame of the first level at an angle of 45°.



Step 5 Pivot the frame down vertically such that the rosette connection on the frame grasps the rosette on the previously attached frame. Insert the wedge.

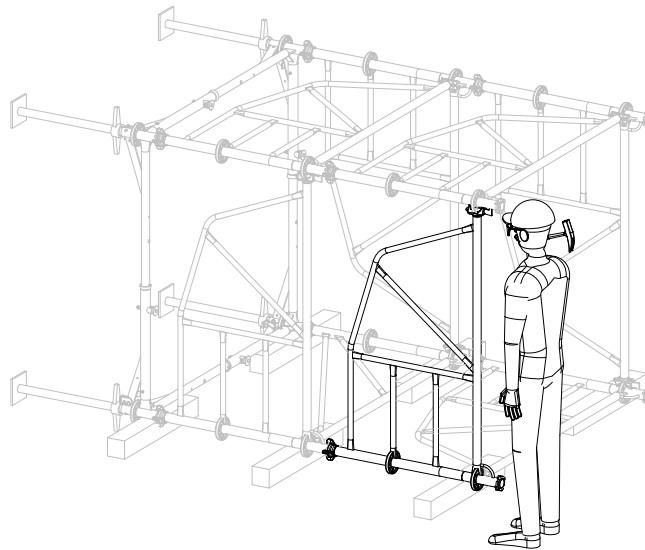


Step 6 Assemble the upper ST 60 Frame in the same way, always working with two persons.



Step 7 Assemble the remaining ST 60 Frames in the same way. Only one person is required for this step.

Step 8 Use a 500 g hammer to knock the wedges for the second frame level into place until rebound is felt.



Assembling ST 60 Shoring Tower lying on the ground

7.3 Assembling deck level lying on the ground

This section shows how to assemble the next deck level. The procedure is the same for all subsequent deck levels. When assembling the deck levels, ensure that the decks are facing the right way (Refer to Section 6.1 on page 44).



WARNING

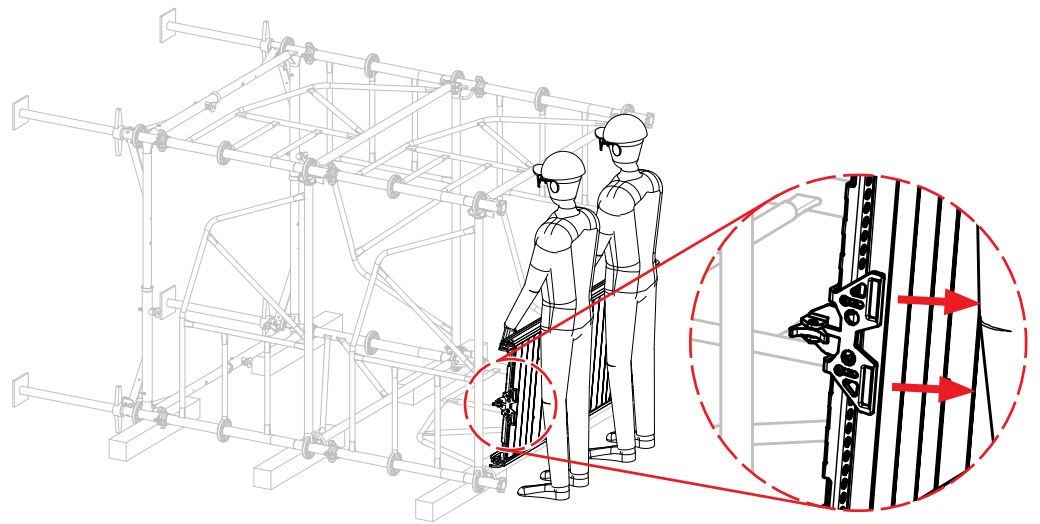
Decks can fall out!

When the ST 60 Shoring Tower is assembled while lying on the ground or when it is transported by crane, decks can fall out.

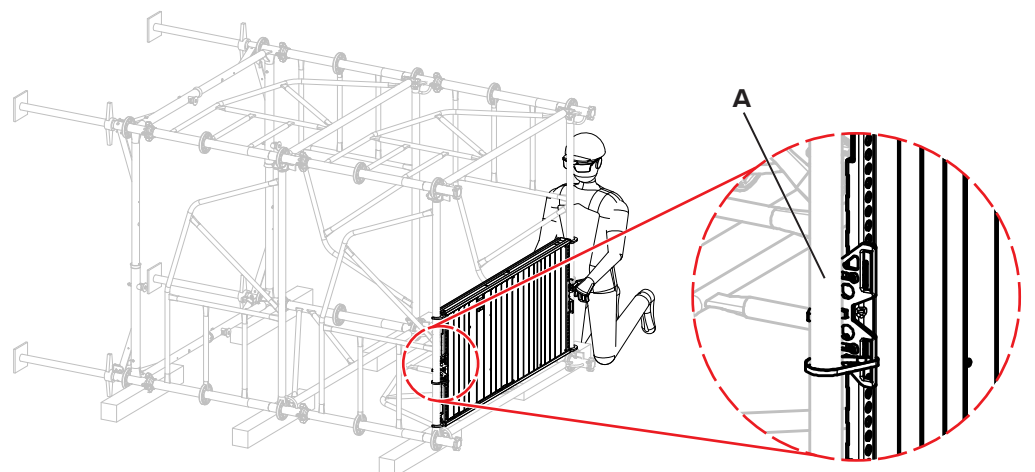
This can cause personal injury or death!

Always properly secure the lift-off retainers of the decks to the frame, e.g. with cable ties.

- Step 1** Insert the lower deck, working with two persons. First pull out the lift-off retainer plates on both sides of the deck. If necessary, adjust the rocker on the lift-off retainer.



- Step 2** Press in the lift-off retainer plate and secure it, e.g. with cable ties around the outside of the ST 60 Frames (A).



- Step 3** Install the upper deck in the same way. Secure the lift-off retainers to prevent them from being pulled out.
- Step 4** Assemble the remaining frame levels and deck levels in the same way.
- Step 5** Assemble the structure topping in the same way as for upright assembly; refer to Section *Assembling structure topping* on page 51. Secure the Crosshead Jacks with Head Jack Retainers to prevent them from falling out!

7.4 Raising and lowering ST 60 Shoring Towers by crane

ST 60 Shoring Towers with up to 12no. frame levels that are lying on the ground can be pulled upright with a crane.

Each ST 60 Frame is equipped with a lifting eye. To raise the ST 60 Shoring Tower with a crane, hang a 4-strand suspension in the lifting eyes on the uppermost frame level. The hooks on the 4-strand suspension have to be equipped with safety catches.



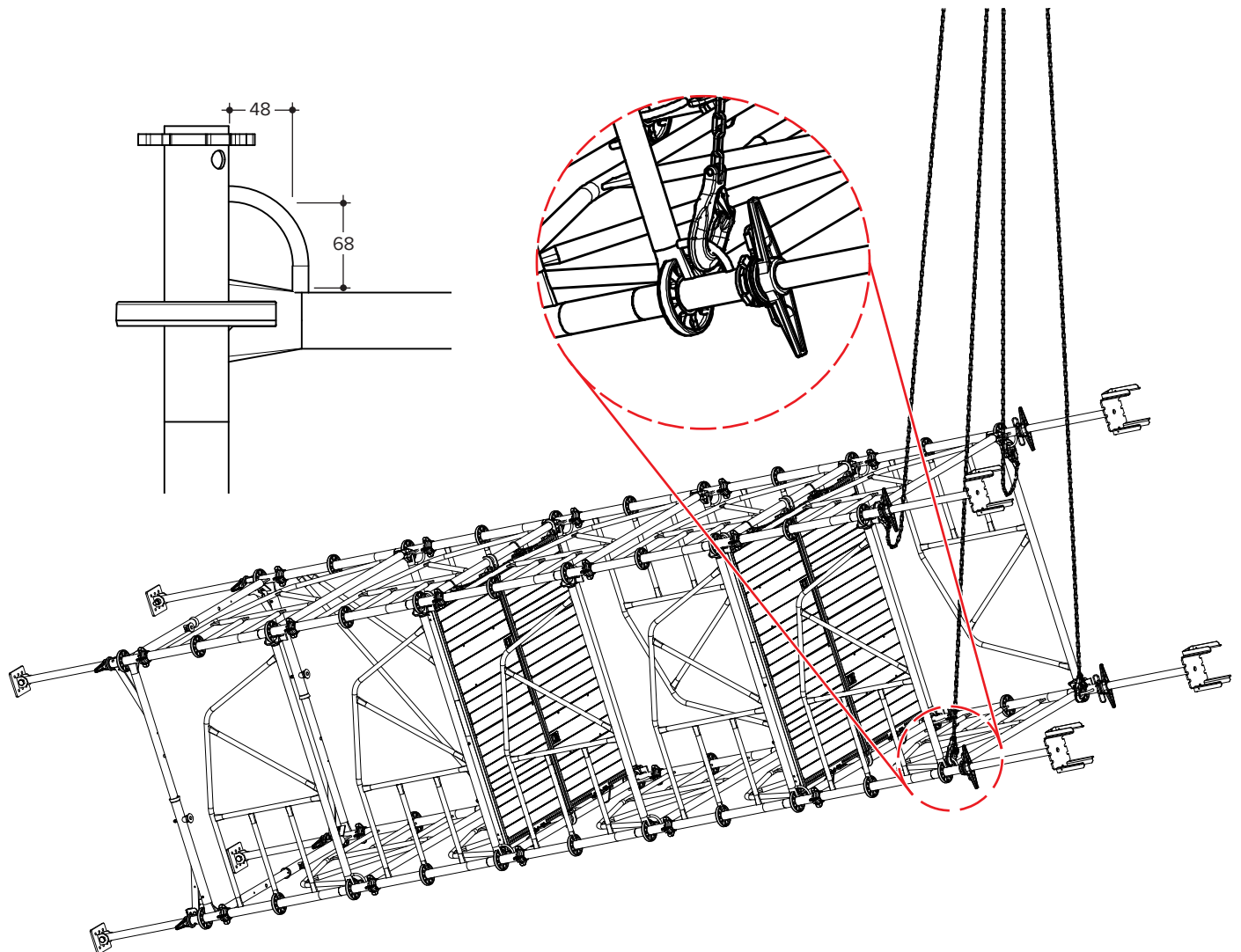
WARNING

Risk of injury from falling components!

Installed Toe Boards or decks can fall out when the structure is pulled upright!

This can cause personal injury or death!

Secure or remove Toe Boards and decks before transporting by crane.



8 Bracing ST 60 Shoring Tower

Single upright ST 60 Shoring Towers that are not secured can tip over. This is why ST 60 Shoring Towers have to be secured during assembly as well as during use to prevent them from tipping over. The following sections describe some of the ways in which this can be done.

The measures described here are intended only to protect ST 60 Shoring Towers from tipping over, e.g. because of wind or as a result of assembly work. They are not intended to absorb the load of a structure.



WARNING

The shoring tower can tip over!

The ST 60 Shoring Tower can tip over if it is not properly braced or supported! This can cause personal injury or death!

Proof of structural stability has to be provided for supports and bracing as well as the individual components thereof!

8.1 Bracing against other ST 60 Shoring Towers

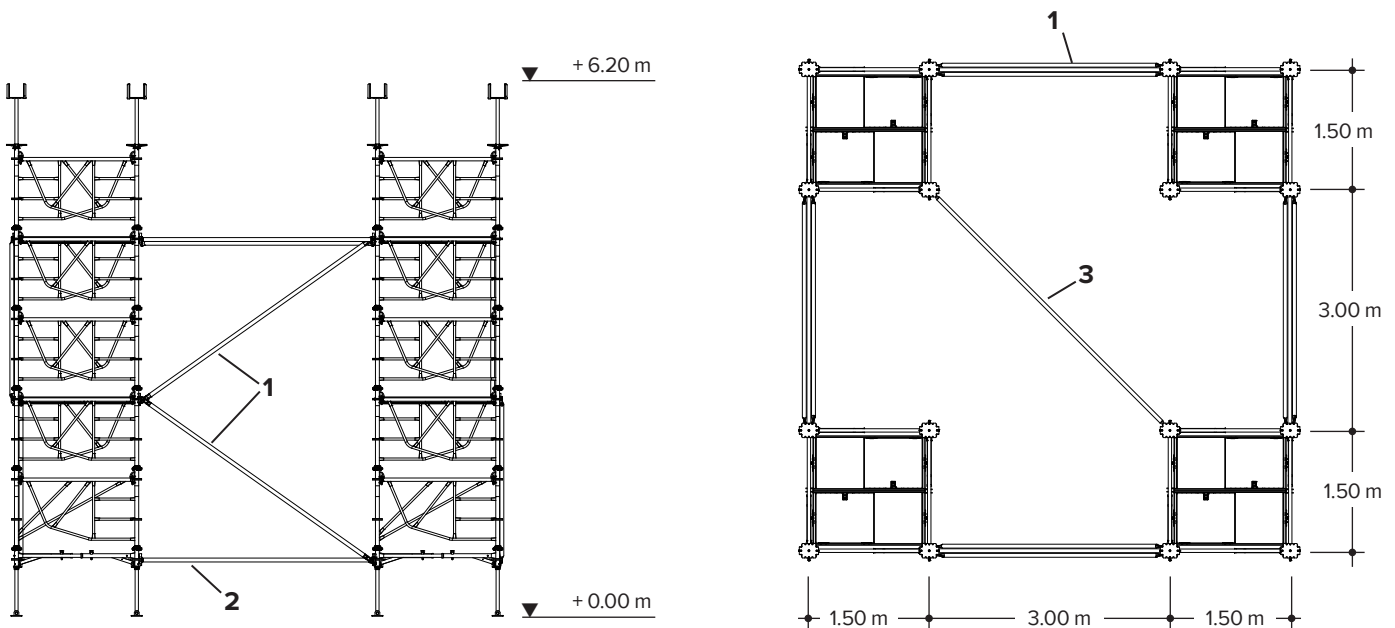
Using the following components from the MODEX system is recommended for bracing purposes:

- V-diagonals
- H-diagonals
- Tube Ledgers
- Transoms U



When using MODEX components, always follow the instructions in the user guide for the MODEX system!

Example: ST 60 Shoring Towers that brace one another



- 1 MODEX V-diagonal 300/200
- 2 MODEX Tube Ledger 300
- 3 MODEX H-diagonal 300/300

8.2 Tying to structures

ST 60 Shoring Towers can be tied to existing structures under the following conditions:

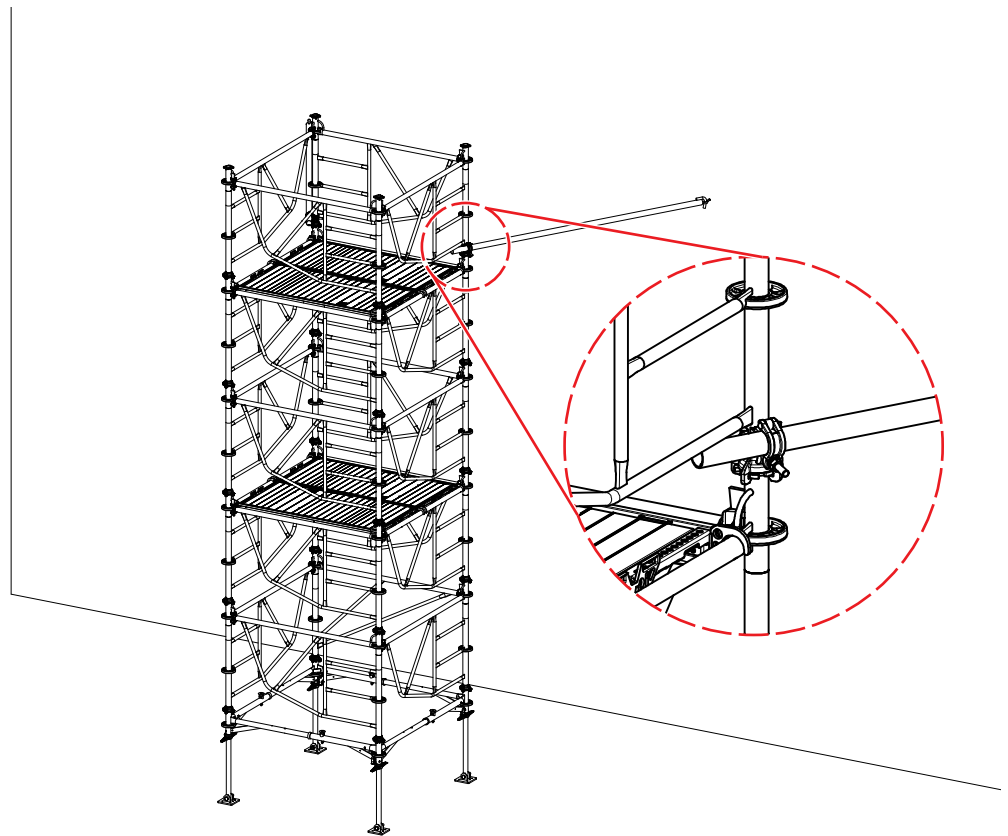
- The structure has to be sufficiently sturdy.
- The tying point has to be able to accommodate the load.

Use the following components from the Hünnebeck scaffolding range to tie:

- Scaffold Retainers of the appropriate length
- Scaffold Eye Bolts and Nylok Plug Anchors (e.g. code:497864 and code:497842)
- Rigid Couplers (e.g. code:2514)

Step 1 Screw the Scaffold Eye Bolts into the structure using a Nylok Plug Anchor.

Step 2 Hook the Scaffold Retainer in the Scaffold Eye Bolt and use a Rigid Coupler to fasten it to the ST 60 Shoring Tower.



8.3 Bracing to the ground

ST 60 Shoring Towers can be braced to the ground with the aid of various components, e.g. Alignment Struts, Wall Struts or outriggers made up of MODEX components. The following section briefly describes bracing with Alignment Struts and Wall Struts. Outriggers made of MODEX components are described in the MODEX user guide.

8.3.1 Bracing with Alignment Struts

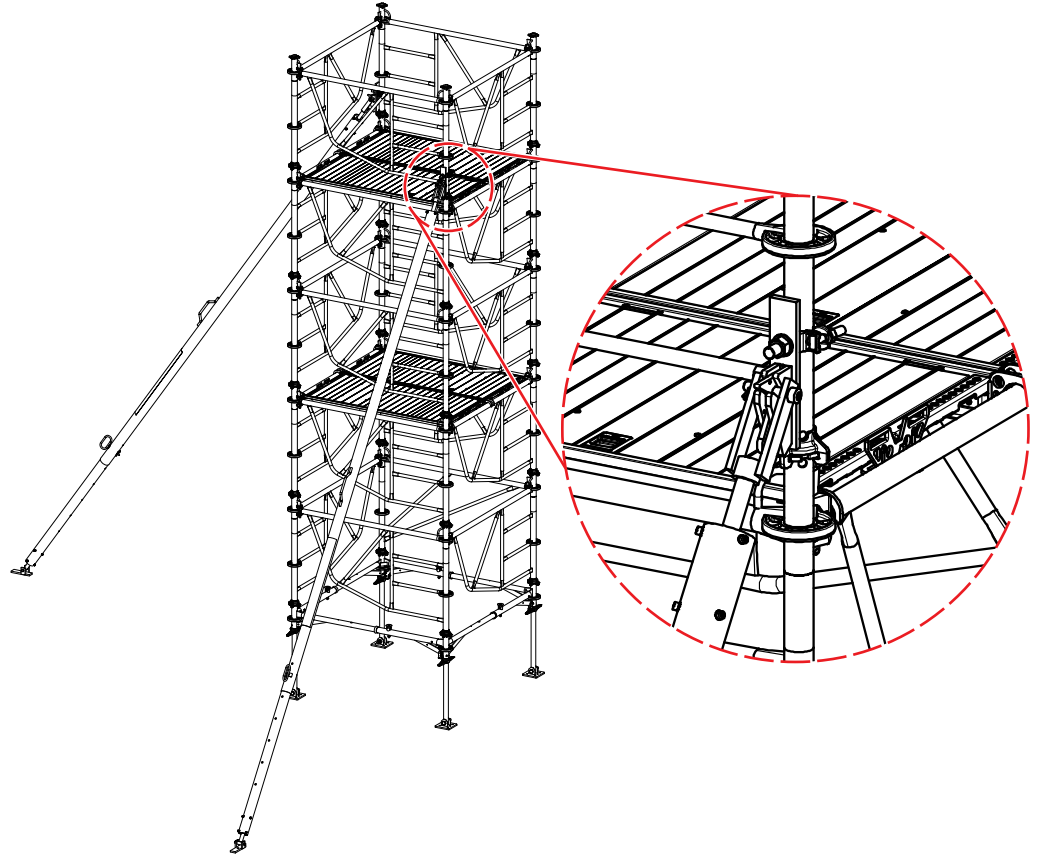
The following components are needed to brace an ST 60 Shoring Tower with Alignment Struts:

- Alignment Struts of the appropriate length
- Quick-action Fasteners (code:601385)
- Half Couplers 48/M20 × 70 (code:39846)

Step 1 Attach the Quick-action Fasteners to the ST 60 Frame with the aid of the Half Couplers.

Step 2 Hook the heads of the Alignment Struts into the Quick-action Fasteners.

Step 3 Anchor the Alignment Struts to the ground.



8.3.2 Bracing with Wall Struts

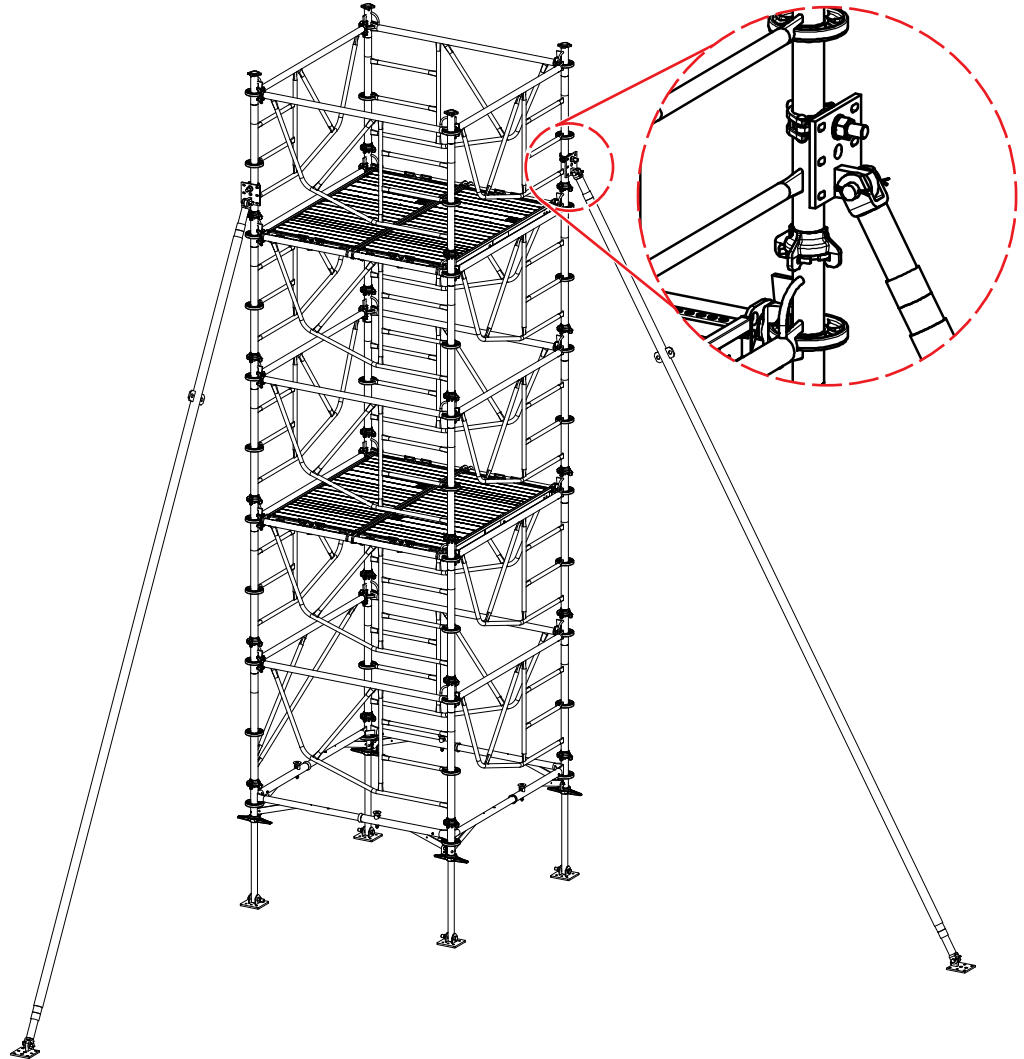
The following components are needed to brace an ST 60 Shoring Tower with Wall Struts:

- Wall Struts of the appropriate length
- Half Couplers 48/M20 × 70 (code:39846)

Step 1 Attach the Half Couplers to the ST 60 Frame.

Step 2 Screw the heads of the Wall Struts onto the Half Couplers.

Step 3 Anchor the Wall Struts in the the ground.



9 Bracing ST 60 Shoring Towers to accommodate structural load (birdcage scaffold)

Using the following components from the MODEX system is recommended for bracing purposes:

- V-diagonals
- H-diagonals
- Tube Ledgers
- Transoms U

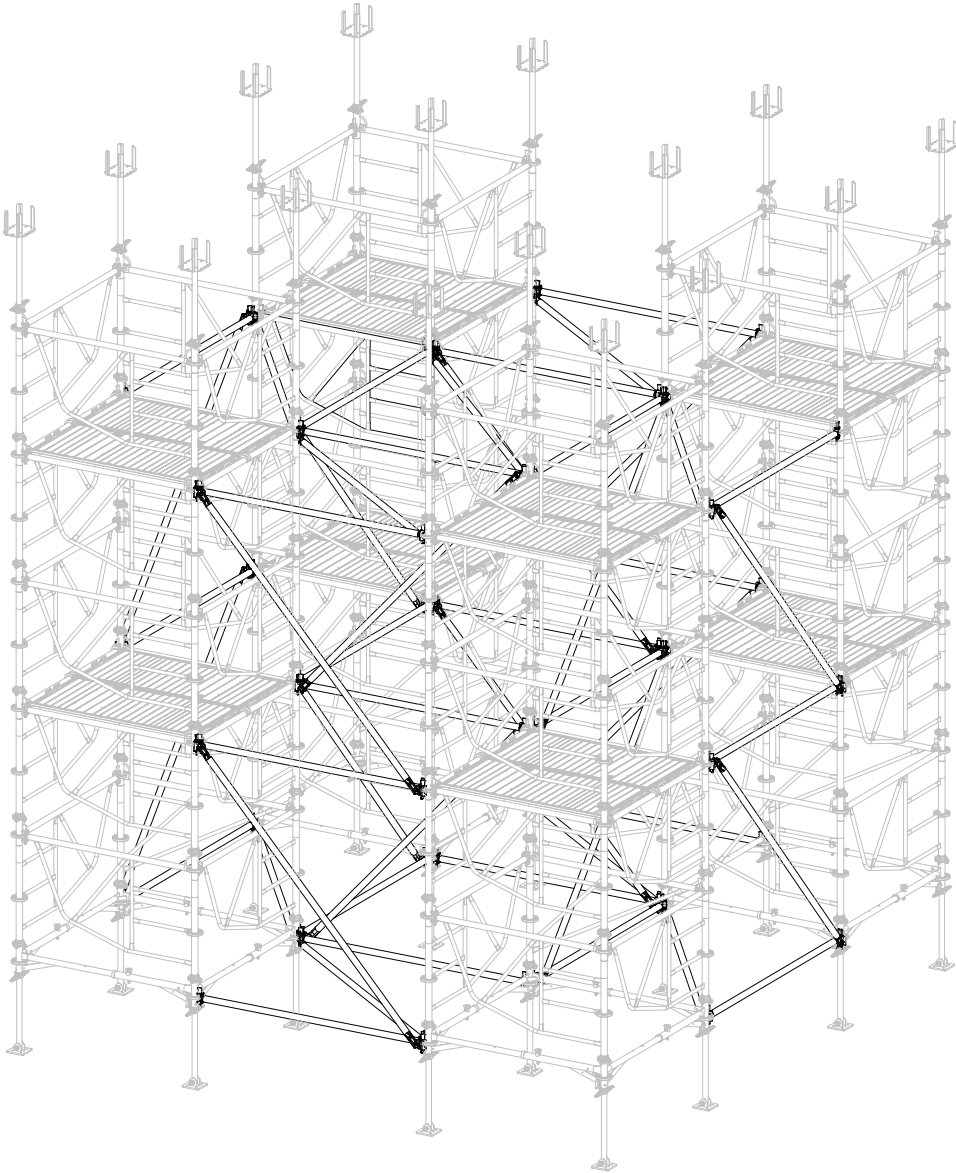


When using MODEX components, always follow the instructions in the user guide for the MODEX system!

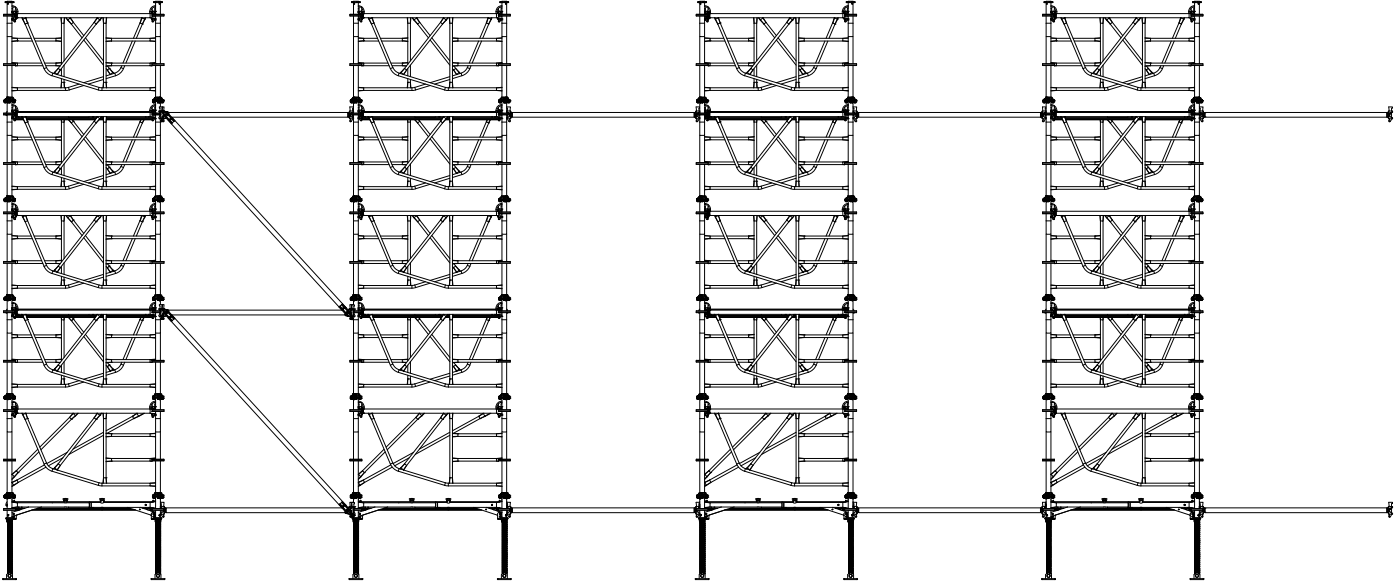
When erecting on an incline, ensure that the base frames of adjacent ST 60 Shoring Towers are at the same level. Otherwise it will not be possible to connect the bracing assemblies to the rosettes.

Always observe and comply with the information regarding structural integrity and that contained in the assembly instructions when assembling the equipment.

Example of birdcage scaffold



Example of birdcage scaffold with connected ST 60 Shoring Towers



10 Disassembling ST 60 Shoring Tower

10.1 Relieving load on ST 60 Shoring Towers

To prevent individual jacks or ST 60 Shoring Towers from being subjected to excessive strain during stripping, the jacks and ST 60 Shoring Towers have to be retracted/ lowered in a certain way. The procedure may need to be adapted to suit the anticipated deformation of the structure.

NOTE

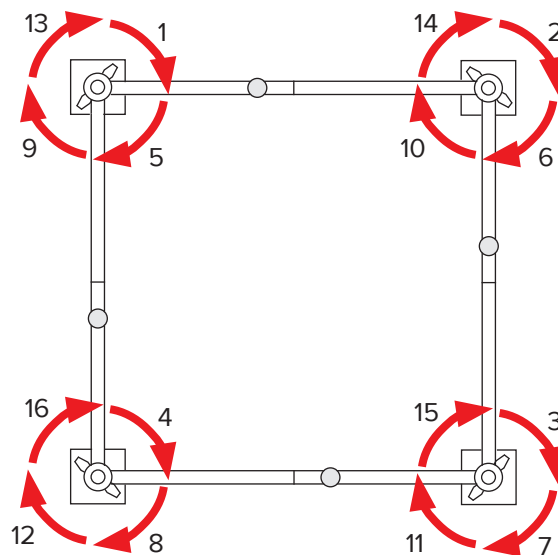
Shoring tower can sustain damage

If the load to the ST 60 Shoring Tower is relieved unevenly, individual ST 60 Shoring Towers or parts of ST 60 Shoring Towers can be overloaded! This causes damage to the ST 60 Shoring Tower!

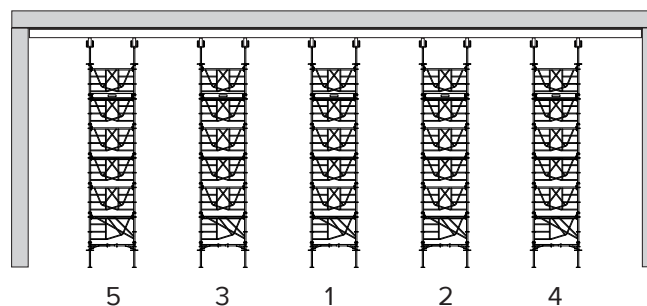
Always follow the specified procedure to relieve strain on the ST 60 Shoring Towers!

Sequence to lower a single ST 60 Shoring Tower

There is a specific procedure that has to be followed to relieve each individual tower of its load. Individual upright ST 60 Shoring Towers are relieved either at the Base Jacks or the Head Jacks. Braced ST 60 Shoring Towers should always be relieved at the Head Jacks.



Sequence to lower ST 60 Shoring Towers (example)



Step 1 Release the wing nuts on the jacks in the order shown, turning a quarter revolution each time. Repeat until all of the jacks have been completely relieved of load.

Step 2 Relieve the ST 60 Shoring Towers in the order shown here.

10.2 Disassembling upright ST 60 Shoring Towers



WARNING

Risk of falling

One frame level always has to remain in place above the highest deck level during disassembly. Never disassemble the frame level that belongs to the deck level. Otherwise there is a risk of falling!

NOTE

Components can be damaged!

Components can be damaged if they fall to the ground. Never throw scaffold components off of the scaffold!

NOTE

Loss of components!

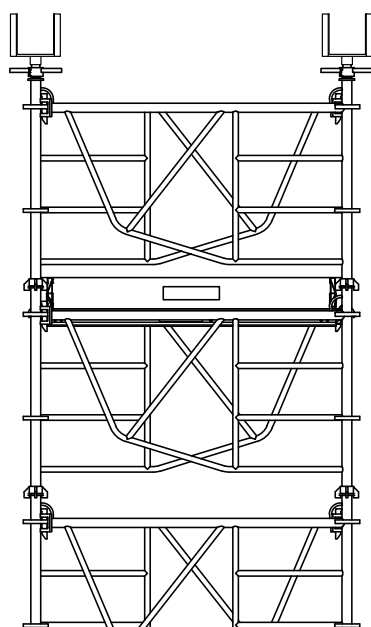
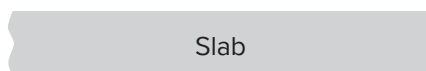
After removing the jack, immediately put the Head Jack Retainer back onto the jack nut.

This will prevent the Head Jack Retainer from being lost.

10.2.1 Disassembling structure topping

Disassembling uppermost frame level along with Crosshead Jacks

The Crosshead Jacks normally cannot be lifted out of the ST 60 Frames after lowering the ST 60 Shoring Towers. There is usually not enough clearance below the slab. In this case the ST 60 Frames of the uppermost frame level have to be detached along with the Crosshead Jacks.



CAUTION

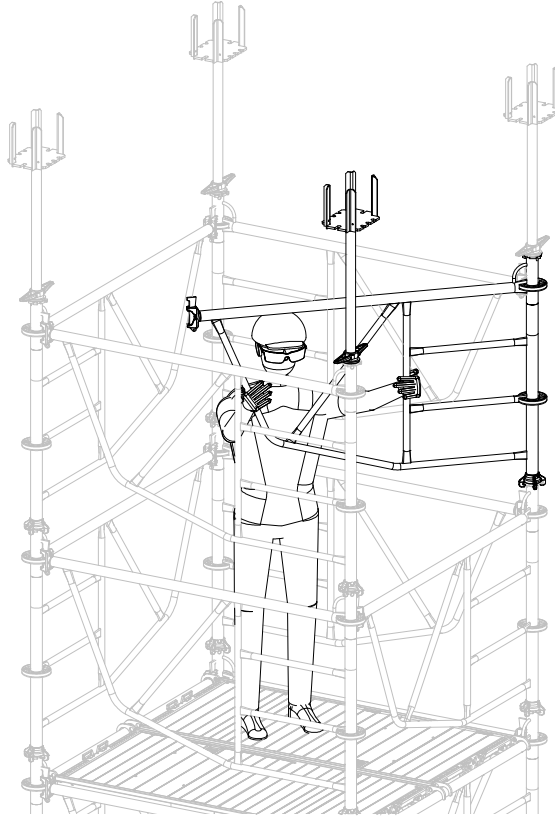
Components are heavy!

ST 60 Frames and Crosshead Jacks weigh a total of about 27 kg. The situation or local conditions may dictate that the following steps be performed by two persons.

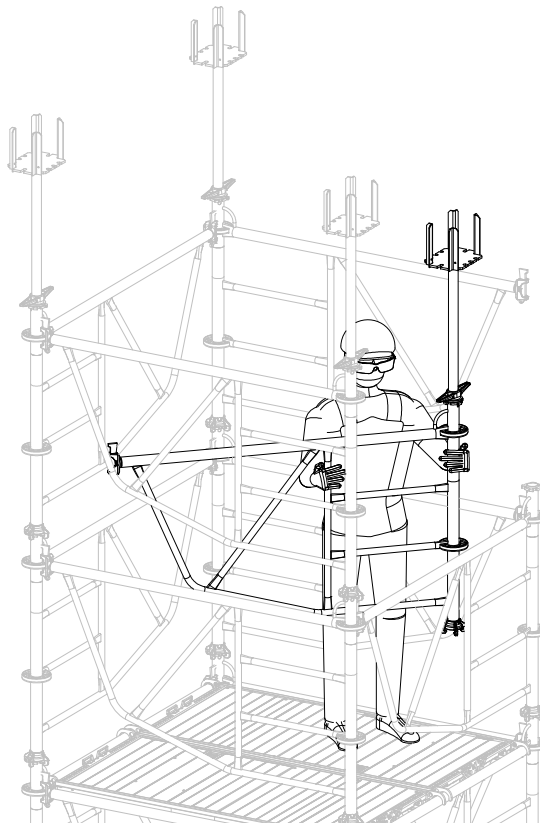
- Step 1** Remove the primary beams, secondary beams and formwork materials from the ST 60 Shoring Towers.
- Step 2** There should be 2no. frame levels above the uppermost deck level. If necessary, lower the uppermost deck level.

Disassembling ST 60 Shoring Tower

- Step 3** Strike the wedges in the frames at the uppermost frame level to release them and then pull the wedges up and out.
- Step 4** Remove the Head Jack Retainers if necessary.
- Step 5** Pivot one frame in by 45°.



- Step 6** Lower the frame onto the deck.



Step 7 Extract the Crosshead Jack from the frame and transport both components to the bottom of the ST 60 Shoring Tower.

Step 8 Detach the remaining frames and Crosshead Jacks in the same way and transport them to the bottom of the ST 60 Shoring Tower.

Disassembling uppermost frame level

If there is at least 1.02 m clearance above the ST 60 Shoring Tower, the Crosshead Jacks can be extracted from the frames before detaching the frames in the usual manner.

Step 1 Lower the ST 60 Shoring Tower

Step 2 Remove the Head Jack Retainers if necessary.

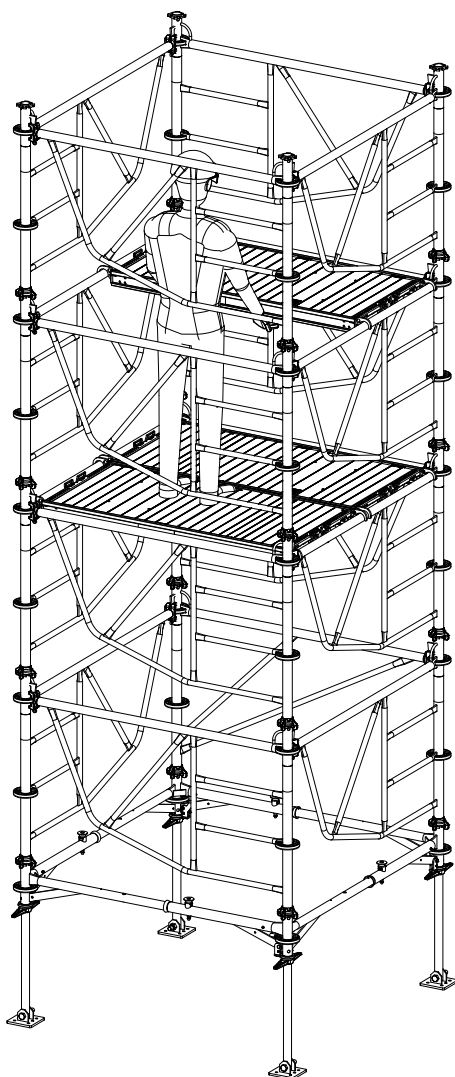
Step 3 Extract the Crosshead Jacks from the ST 60 Frame.

Step 4 Detach the ST 60 Frame.

10.2.2 Disassembling ST 60 Shoring Tower

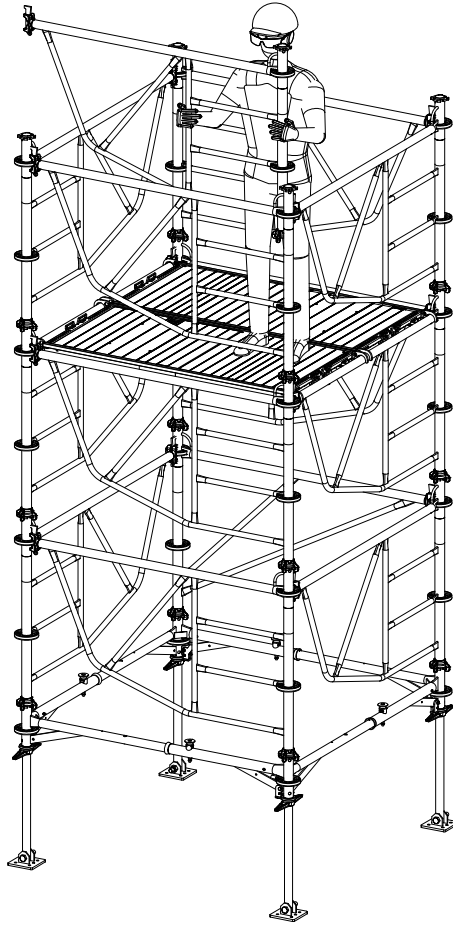
Disassemble the rest of the ST 60 Shoring Tower following the same procedure as for the structure topping. Always lower the uppermost deck level such that there are 2no. frame levels above the deck level. Then disassemble the uppermost frame level. Never disassemble the frame level that belongs to the deck level.

Step 1 Disassemble the uppermost deck level and transport it to the bottom of the tower.



Disassembling ST 60 Shoring Tower

Step 2 Disassemble the uppermost frame level.



Step 3 Disassemble the remaining frames and decks in the same way.

10.3 Disassembling ST 60 Shoring Towers lying on the ground

Depending on the situation and on the height of the ST 60 Shoring Tower, it may be necessary to first turn the ST 60 Shoring Tower on its side by crane and then disassemble it. Refer to Section *Moving ST 60 Shoring Tower by crane* on page 71 for instructions on how to transport the ST 60 Shoring Tower by crane and lay it on its side.

Reverse the assembly steps to disassemble the ST 60 Shoring Tower.

Step 1 Move the ST 60 Shoring Tower to a suitable location by crane and then carefully lower it to the ground.

Step 2 Disassemble the ST 60 Shoring Tower in the reverse order of erection.

11 Moving ST 60 Shoring Tower by crane

Each ST 60 Frame is equipped with a lifting eye. To transport the ST 60 Shoring Tower with a crane, hang a 4-strand suspension in the lifting eyes on the uppermost frame level. The hooks on the 4-strand suspension have to be equipped with safety catches.

ST 60 Shoring Towers up to 16,50 m tall can be moved by crane.



WARNING

Risk of injury from falling components!

Installed Toe Boards or decks can fall out when the structure is transported by crane!

This can cause personal injury or death!

Secure or remove Toe Boards and decks before transporting by crane.



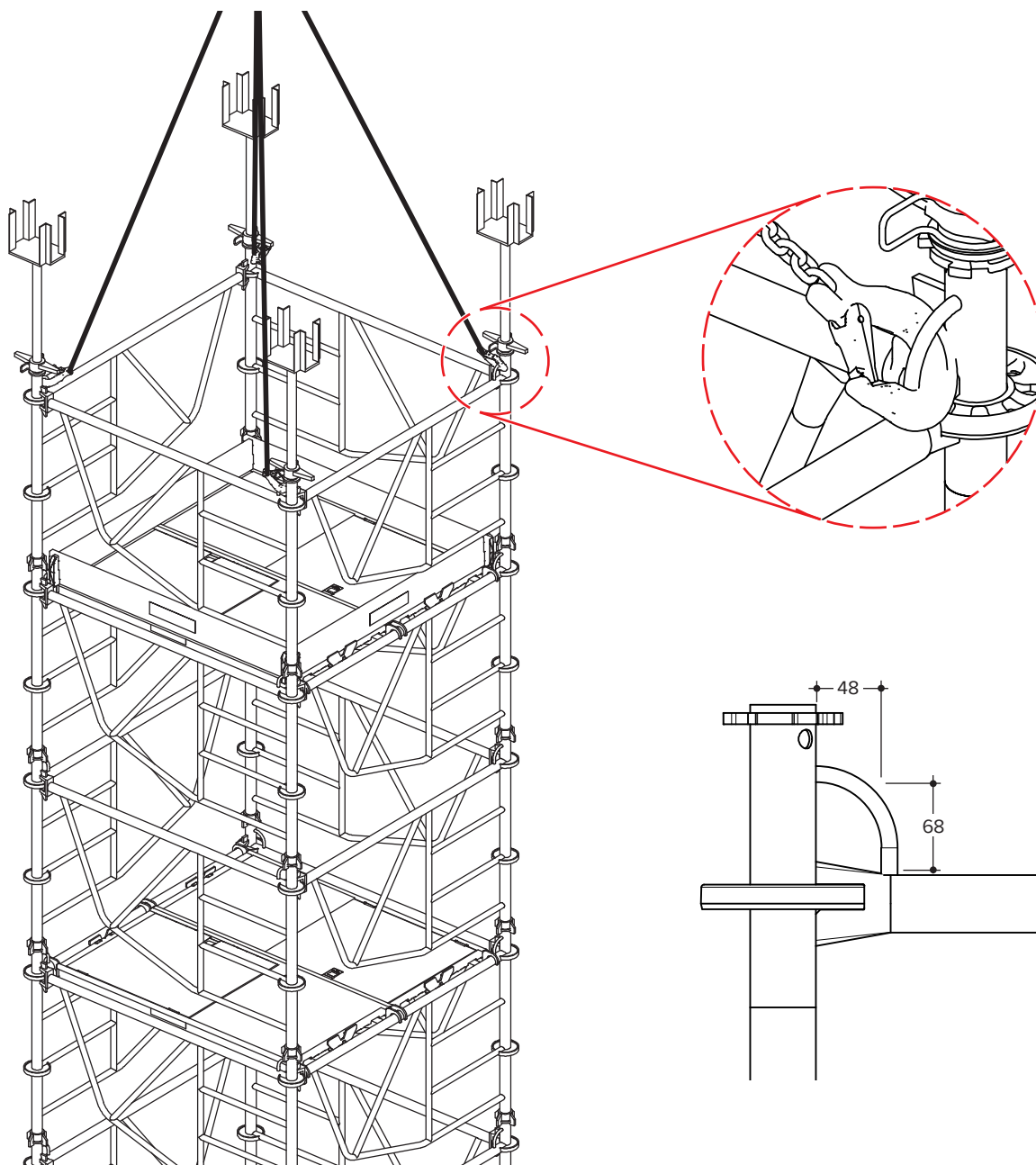
WARNING

ST 60 Shoring Tower collapses when raised from the ground!

If ST 60 Shoring Towers with more than 12no. frame levels are raised (from lying on the ground) or lowered, they will collapse!

This can cause personal injury or death!

Only raise or lower ST 60 Shoring Towers with no more than 12no. frame levels!



12 Placing primary beams and secondary beams

The primary beams and secondary beams serve as the base for the formwork, and they transfer into the ST 60 Shoring Towers the load when concrete is poured. Place the primary beams in the Crosshead Jacks on the ST 60 Shoring Towers. Place the secondary beams over the primary beams, laying them perpendicular to the primary beams. There are three types of beams available:

- H 20 K timber beams
- DU-AL T200 aluminium beams
- DU-AL T225 aluminium beams

Assembly differs as a factor of the beam selected. The various types of beams are generally compatible with one another. Specifically, the H 20 K beams and the DU-AL T200 beams have the same dimensions.

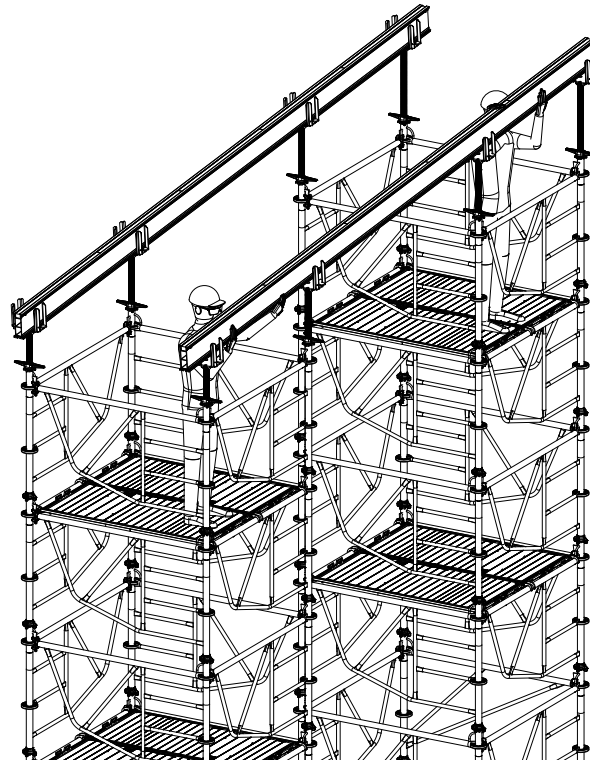
12.1 Installing DU-AL beams

12.1.1 Installing primary beams on Crosshead Jacks

If the ST 60 Crosshead Jack 60 or the ST 60 Rigid Crosshead Jack is being used, the primary beams can generally be placed on the Crosshead Jacks without any additional fasteners.

When using Flexible Crosshead Jacks, e.g. to create sloping soffits, the primary beams usually have to be secured to the Crosshead Jacks. Please note that T225 Beams cannot be fastened to ST 60 Crosshead Jacks 60.

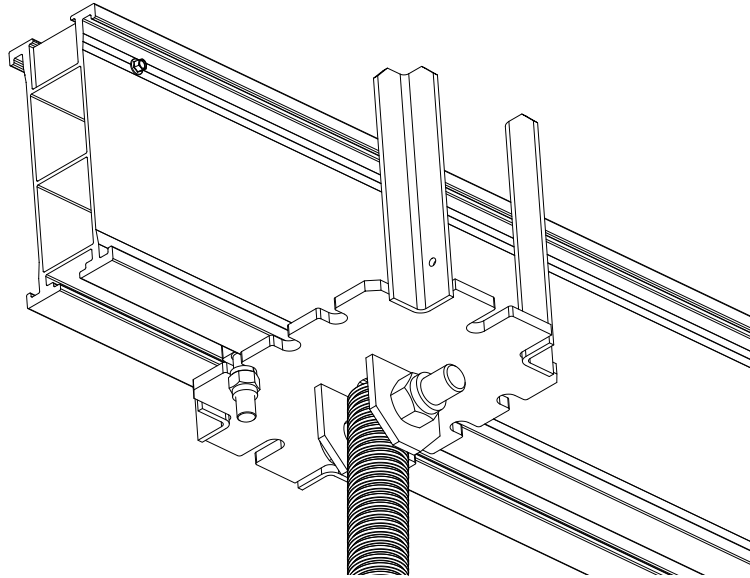
- Step 1** Place the primary beams on the Crosshead Jacks such that the wooden nailing strips are on top.



- Step 2** Remove the nut and washer from the T Bolt.

- Step 3** Insert the head of the T Bolt into the track on the beam and turn it 90°.

Step 4 Slide the T Bolt into the proper groove in the Crosshead Jack.

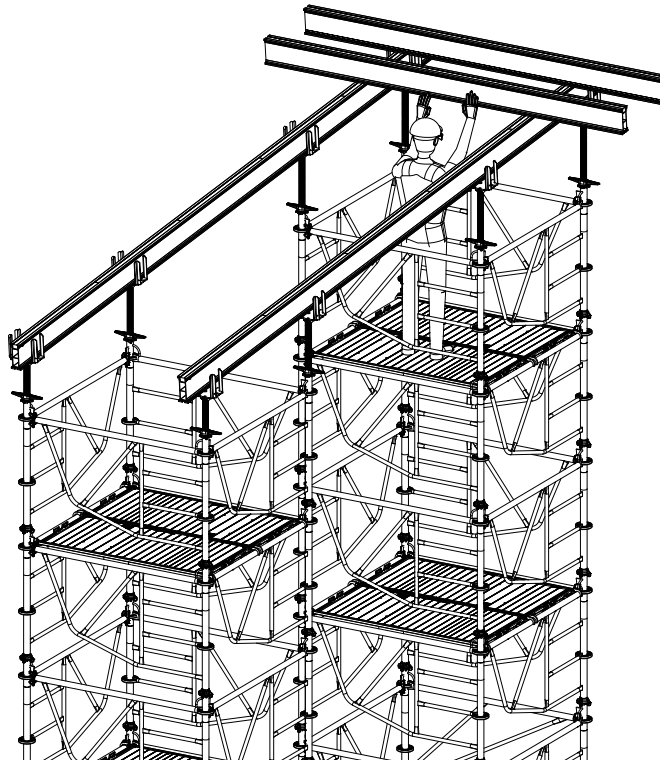


Step 5 Secure the T Bolt with the washer and nut.

12.1.2 Connecting DU-AL secondary beams and DU-AL primary beams to one another

Use the Universal Clamp to connect the DU-AL beams lying one on top of the other. Ensure that the nailing strip is on the top side of the secondary beam. Otherwise the shuttering panels cannot be nailed to the secondary beams.

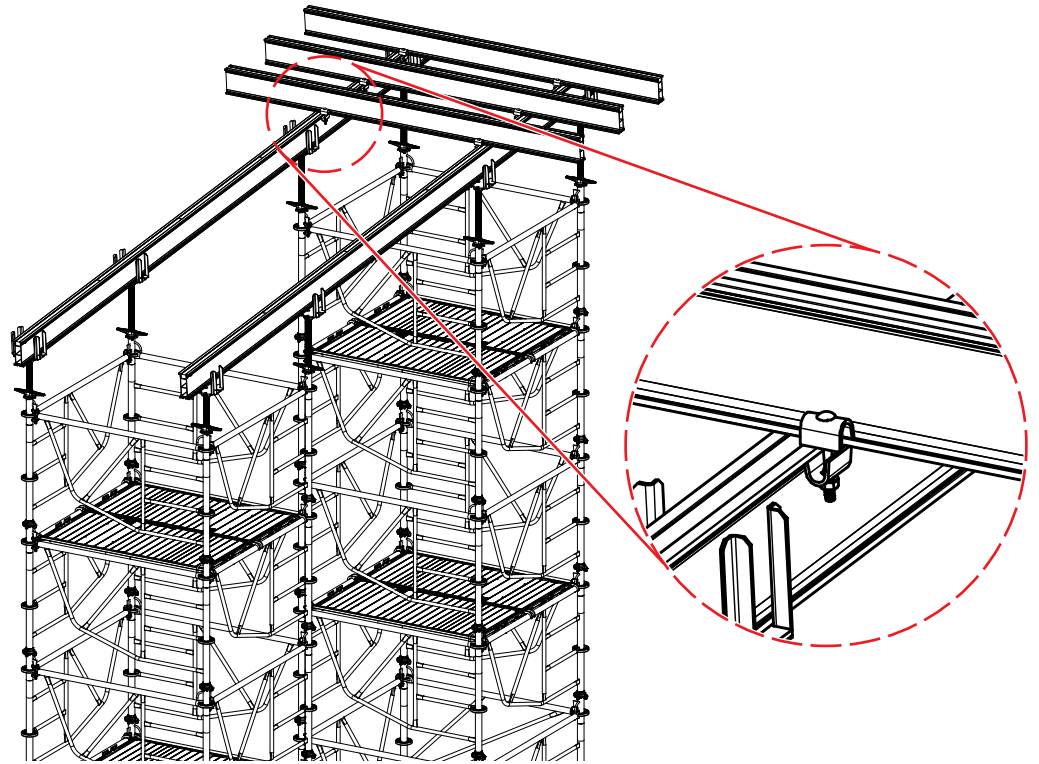
Step 1 Place the secondary beams on the primary beams.



Placing primary beams and secondary beams

Step 2 Screw the nuts as far as possible onto the Universal Clamps.

Step 3 Insert the upper and lower parts of the clamps into the grooves on the beams.



Step 4 Tighten the nuts.

12.1.3 Connecting H 20 K secondary beams to DU-AL primary beams

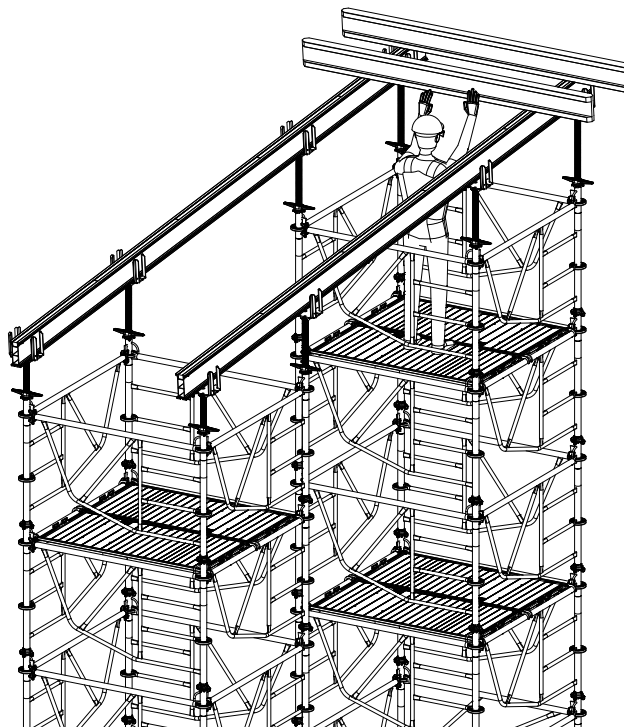
If H 20 K beams are to be used as secondary beams, they have to be nailed to the primary beam.

NOTE

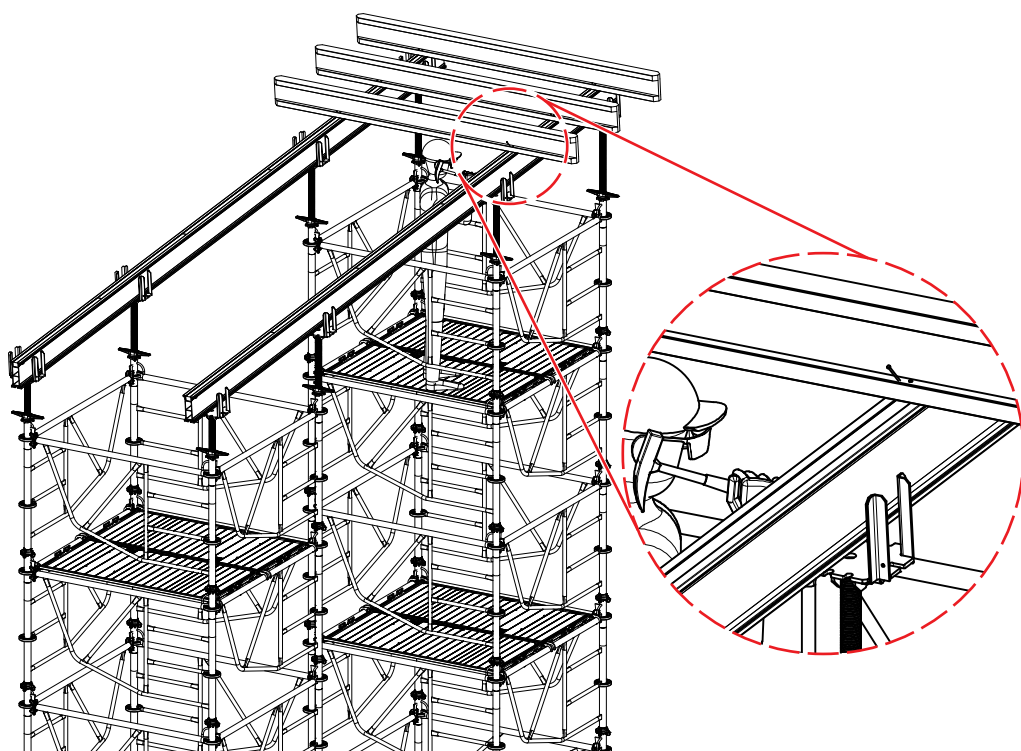
DU-AL beam can sustain damage!

If nails are used that are too long, they can protrude from the other side of the nailing strip and damage the beam! Do not use nails that are too long!

Step 1 Place the H 20 K beam on the primary beam.



Step 2 Strike a nail through the lower flange of the H 20 K beam and into the nailing strip on the DU-AL beam. Do not damage the DU-AL beam!



Placing primary beams and secondary beams

12.2 Installing H 20 K beams

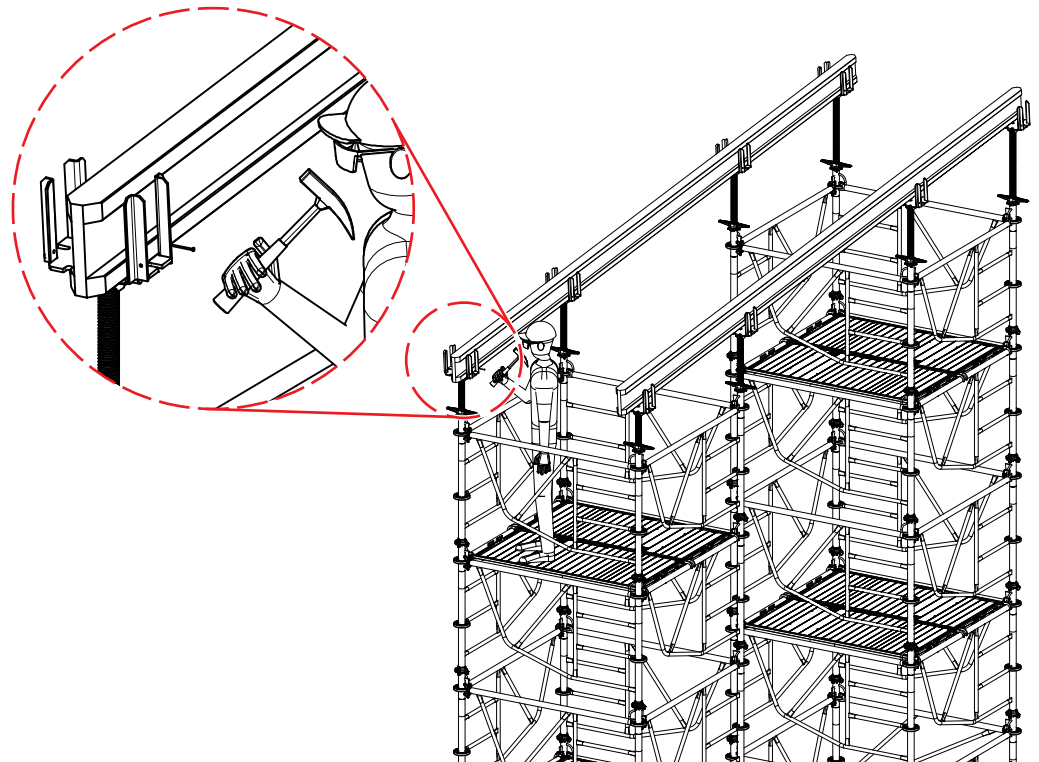
12.2.1 Attaching H 20 K beams to Crosshead Jacks

If the ST 60 Crosshead Jack 60 or the ST 60 Rigid Crosshead Jack is being used, the primary beams can generally be placed on the Crosshead Jacks without any additional fasteners.

When using Flexible Crosshead Jacks, e.g. to create sloping soffits, the primary beams usually have to be secured to the Crosshead Jacks.

Step 1 Place the primary beams on the Crosshead Jacks.

Step 2 Strike nails through the holes in the side of the Crosshead Jacks and into the H 20 K beam.

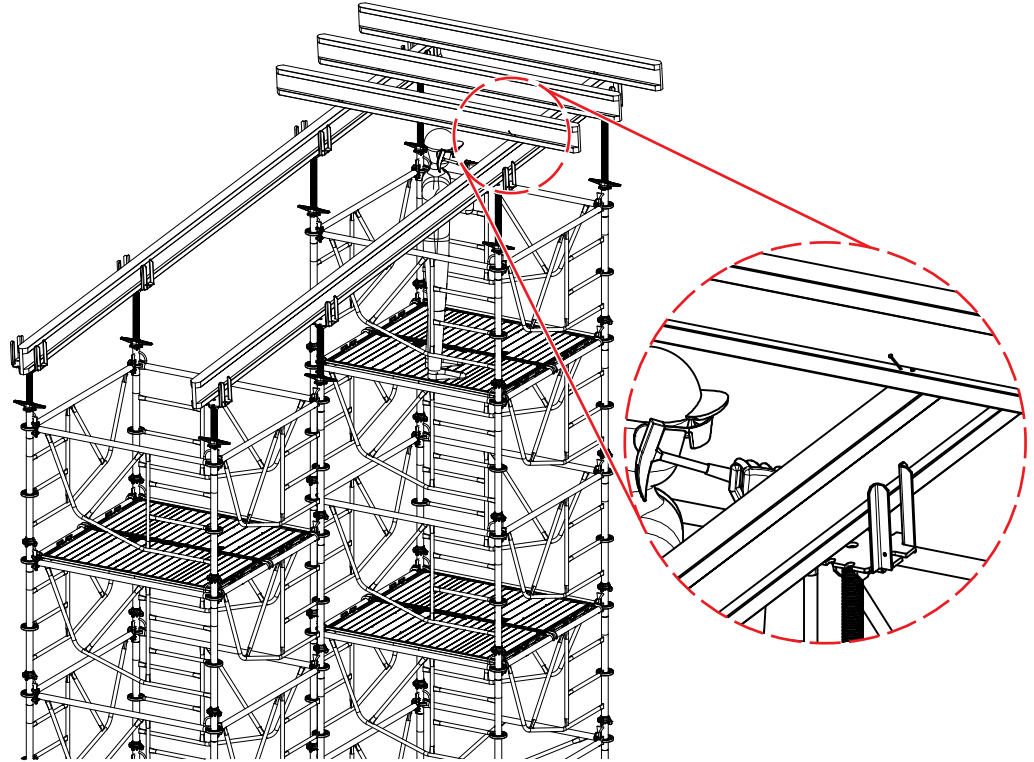


12.2.2 Connecting H 20 K beams to one another

Nail together the beams lying on top of each other.

Step 1 Place the secondary beams on the primary beams.

Step 2 Strike nails through the lower flange of the secondary beams and into the primary beams.

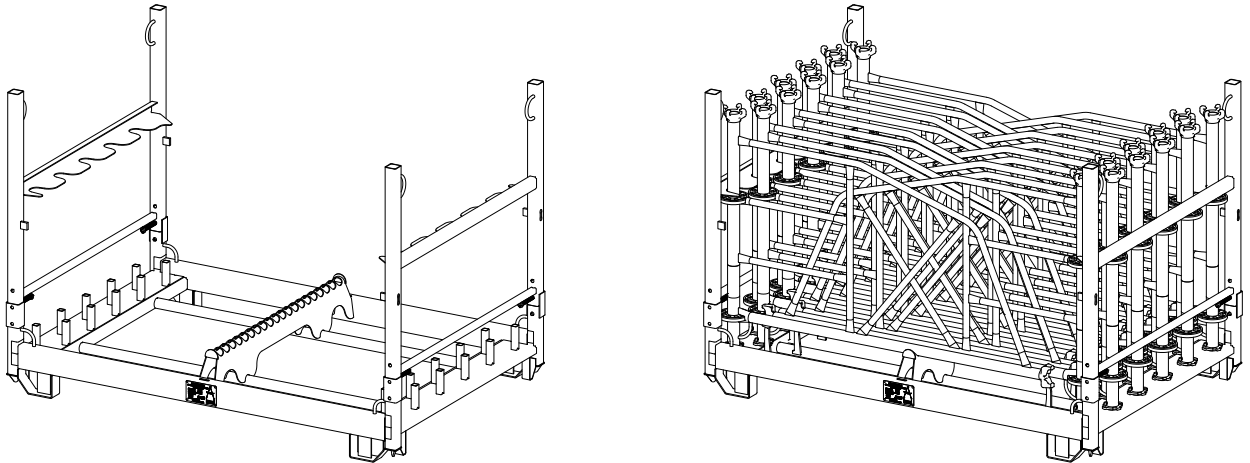


13 Storing and transporting components

There are various storage and transport containers available for the ST 60 components. Use the containers intended for this purpose whenever possible. This ensures safe transport and storage that does not damage the material.

All transport and storage equipment has to be inspected annually to verify that it is in serviceable condition! More information can be found on the respective nameplate.

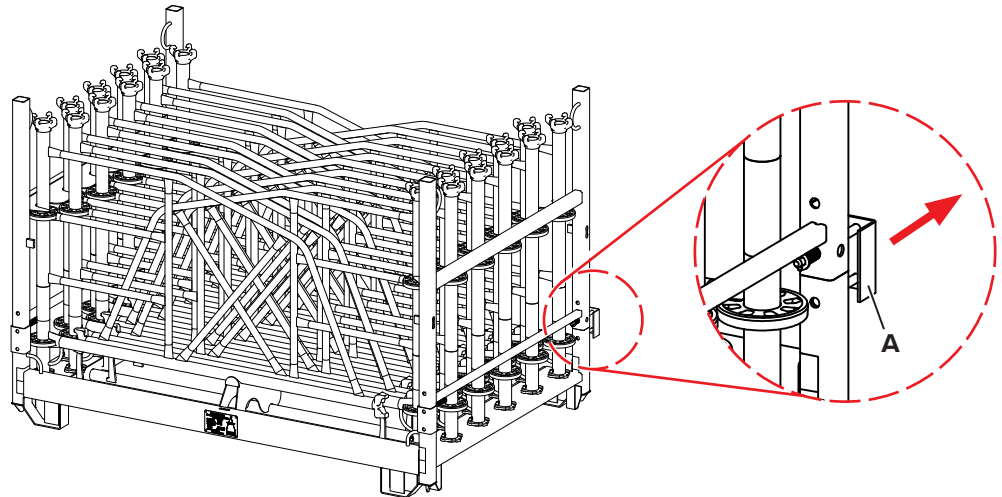
13.1 ST 60 Frames



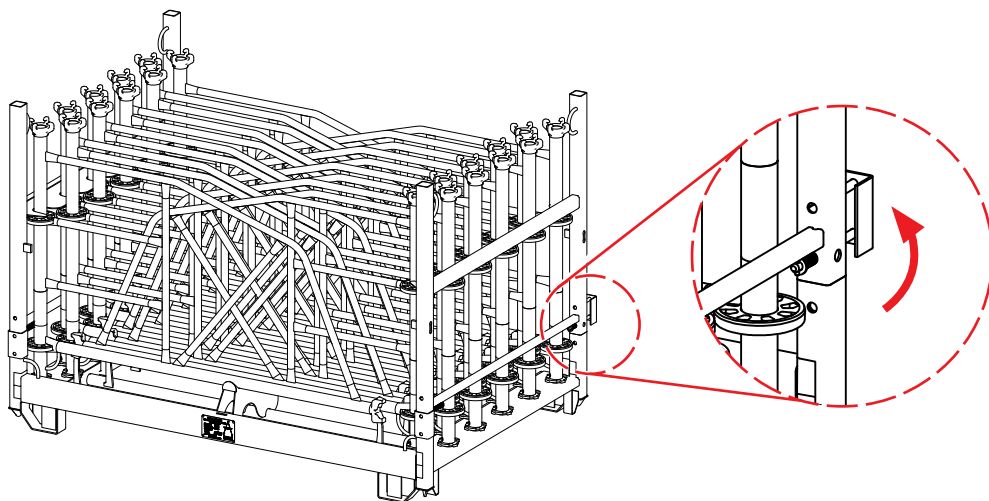
To easily remove and load the frames, the side panels of the Frame Rack 180/120 can be removed. There are safety pins on all 4no. corners of the Frame Rack.

13.1.1 Removing side panels and unloading ST 60 Frames

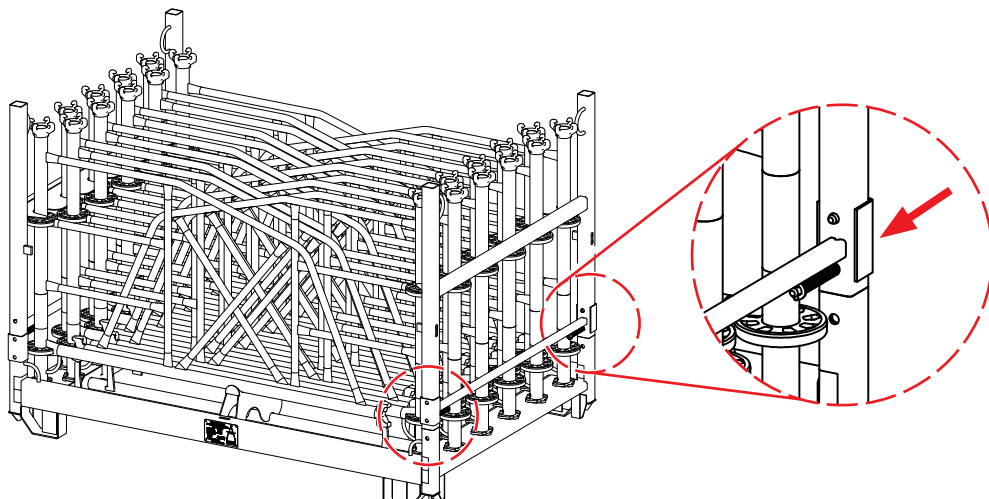
Step 1 Pull out the safety pin (A).



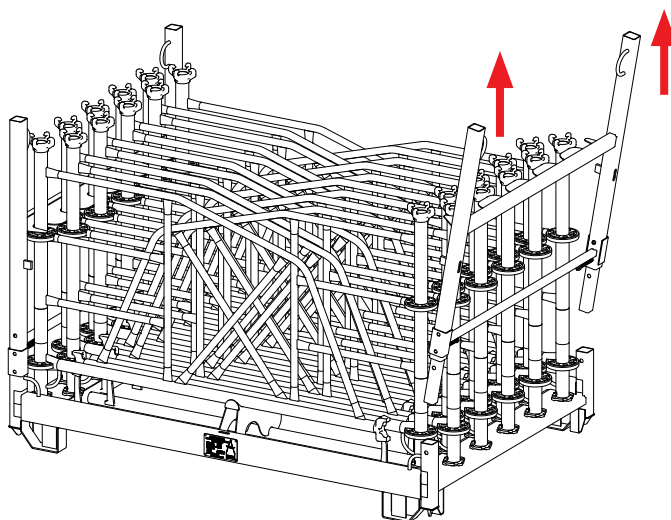
Step 2 Turn the safety pin up 180°.



Step 3 Push the safety pin back in. Release the other safety pins on the side panels in the same way.

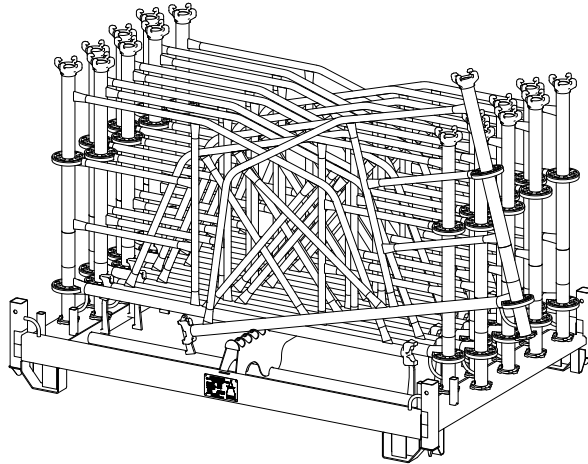


Step 4 Pull the side panel up and out.

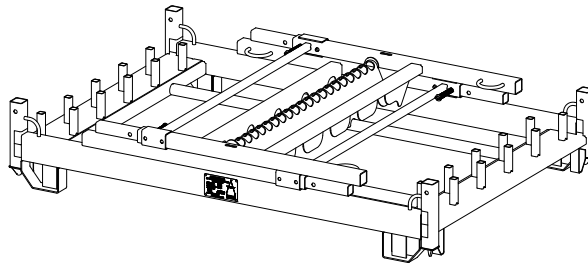


Step 5 Remove the other side panel in the same way.

Step 6 Take the ST 60 Frames out of the Frame Rack 180/120.



Step 7 After unloading the frames, place the side panels in the middle of the rack. Do not stack more than 12no. empty racks on top of one another.



Verify that the side panels rest properly on the bottom of the rack!

13.1.2 Loading ST 60 Frames and securing side panels

Load the ST 60 Frames and secure the side panels in the opposite order of unloading (Refer to Section 13.1.1 on page 78).

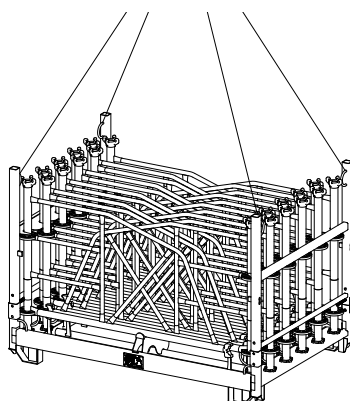
Transporting loaded Frame Racks 180/120 by crane

Single Frame Racks 180/120 with the side panels in place can be transported by crane. Always use a 4-strand suspension! Connect the suspension gear only to the attachment points on the Frame Rack 180/120!



Verify that the side panels are properly locked into place!

Step 1 Attach the 4-strand suspension to the upper attachment points on the side panels.



HÜNNEBECK		
ST 60 Transport Rack 180/120 Part code 652480		
Dead weight	100 kg	
Load capacity:	300 kg	
Max. stack load:	1600 kg	
Max. per stack:		
Loaded:	5 pcs (6.1 m)	
Folded:	12 pcs (3.1 m)	
Year of manufacture:		
Follow the manual!		

Crane load: 400 kg

Step 2 Transport the Frame Rack 180/120 by crane.

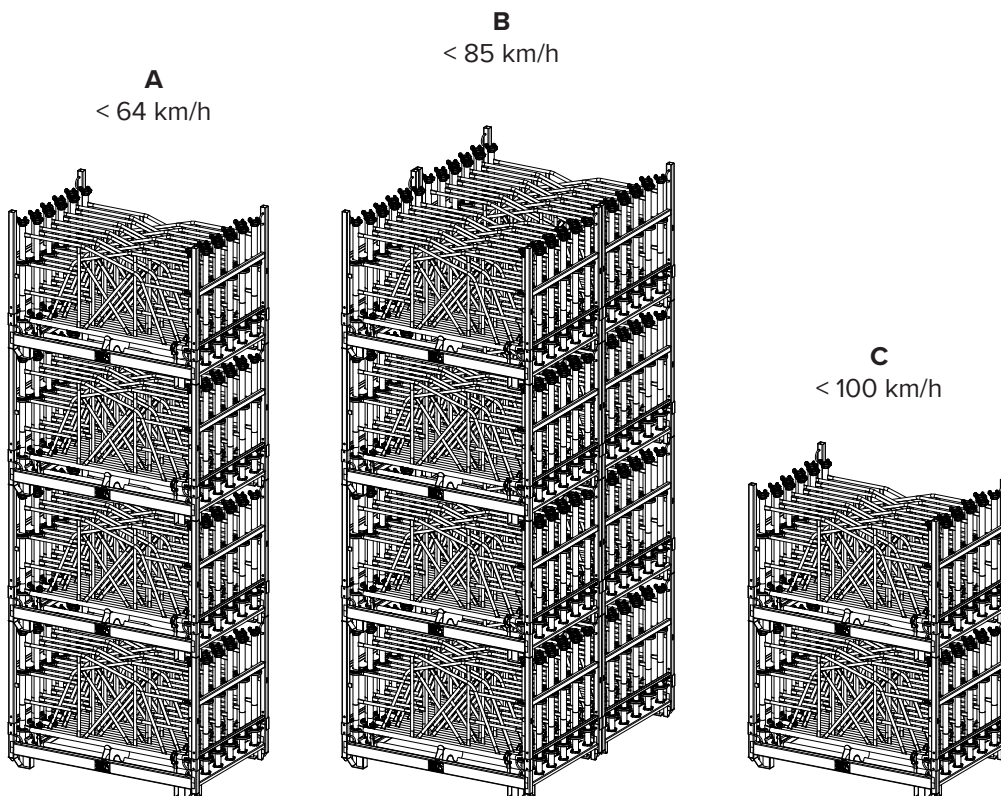
Transporting Frame Racks 180/120 by forklift or pallet truck

Do not transport more than 2no. Frame Racks 180/120 stacked on top of one another by forklift or pallet truck.

Stacking loaded Frame Racks 180/120

No more than 4no. Frame Racks 180/120 can be stacked on a flat surface. In working wind (wind speed < 64 km/h, **A**) stacks can stand alone. At wind speeds up to 85 km/h, the stacks have to be secured to prevent them from tipping over, e.g. by placing at least 2no. stacks next to one another, with the longer sides facing one another (**B**). At wind speeds up to 100 km/h, single stacks of no more than 2no. Frame Racks 180/120 are permitted (**C**).

The Frame Racks 180/120 may not be stacked at all when the wind speed exceeds 100 km/h.



Storing and transporting components

13.2 Decks

All ST 60 decks can also be transported, stacked and stored without Frame Racks. Place 80 mm x 60 mm boards under the edges of the stacks of decks.



CAUTION

Risk of injury from falling decks!

Unsecured decks can fall off of a stack!

This can lead to injury!

Always secure the stack with straps.

NOTE

Decks can sustain damage!

Straps can damage the decks!

Place boards 60 x 20 mm between the stack and the straps, on top of the stack as well as on the sides.

The boards 80 x 60 mm under the stack should be wrapped in the plastic straps as well, if possible.

If not, place boards 60 x 20 mm between the bottom of the stack and the straps.

13.2.1 ST 60 Decks 150/31 and 113/31

Up to 11no. ST 60 Alu Decks 150/31 and 113/31 can be placed on top of one another. This is how a stack is built (1).



WARNING

Stacks can tip over!

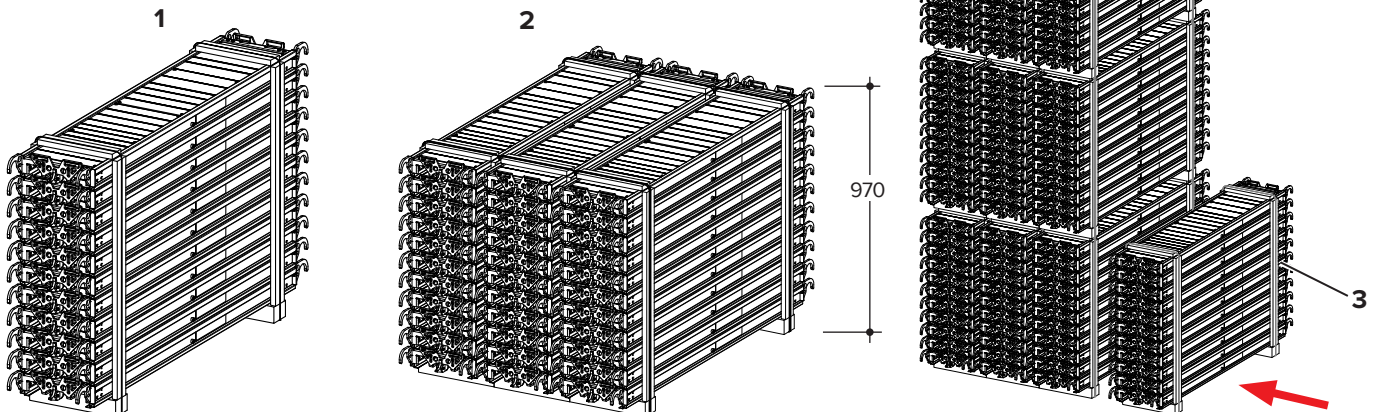
Single stacks of 31 cm wide ST 60 decks can tip over!

This can cause personal injury or death!

Always store at least 3no. stacks next to one another and strap the stacks together with plastic straps. This is how a package is built (2).

Up to 4no. packages can be stacked on top of one another.

Single stacks can be stored adjacent to packages as long as the stacks are placed along the longer side of the package (3).



13.2.2 ST 60 Passage Decks 150/68 and 113/68

Up to 25no. ST 60 Alu Decks 150/68 and 113/68 can be placed on top of one another. This is how a stack is built (4).

To place stacks on top of one another, 2no. stacks have to be strapped side-by-side to form a package (5). No more than 2no. packages may be stacked (6).

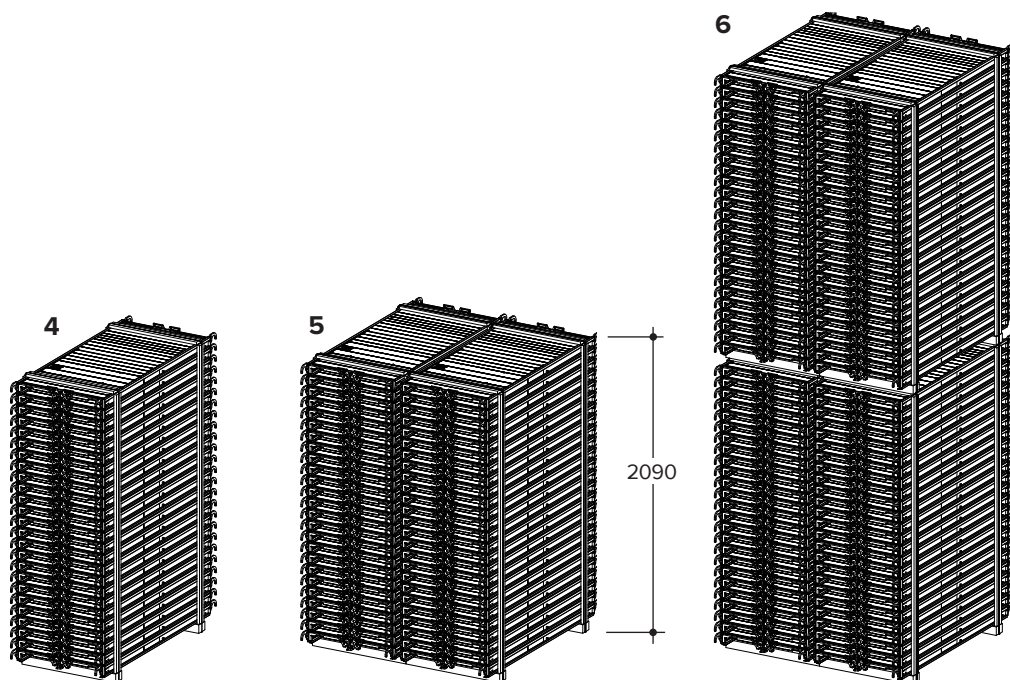
! WARNING

Stacks can tip over!

If stacks are not bound together to form a package, they can tip over when placed one on top of the other!

This can cause personal injury or death!

Stack only packages that are bound with straps.



13.3 Beams

Beams can best be stored and transported at construction sites when they are on Euro Stacking Frames. The Euro Stacking Frame is designed to accommodate a load of 1200 kg. It can be transported by crane, forklift or Euro Trolley.

! WARNING

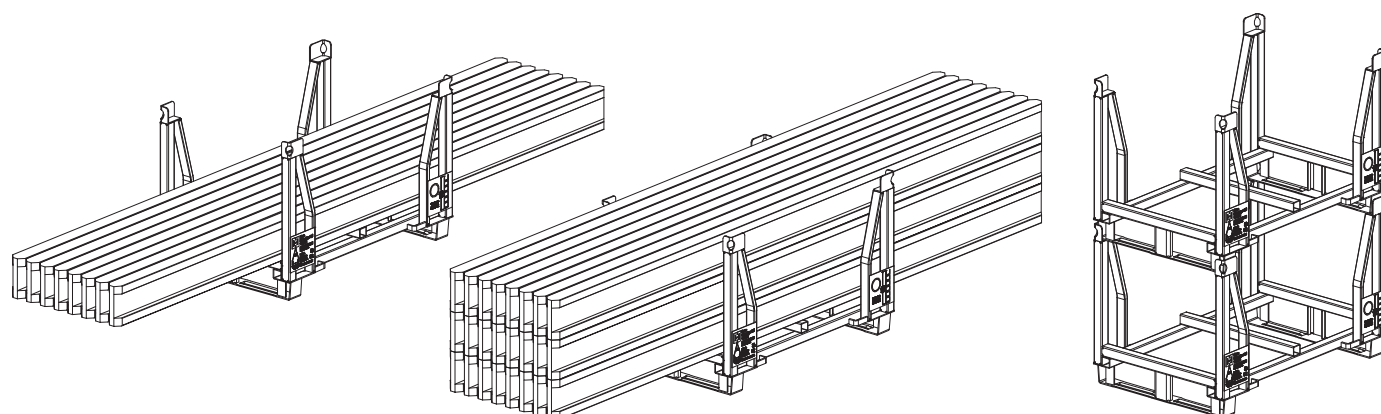
Warning!

Stacking of up to 6no. loaded Stacking Frames on the ground is permitted! Only 1no. Stacking Frame at a time may be transported with the Euro Trolley.

! WARNING

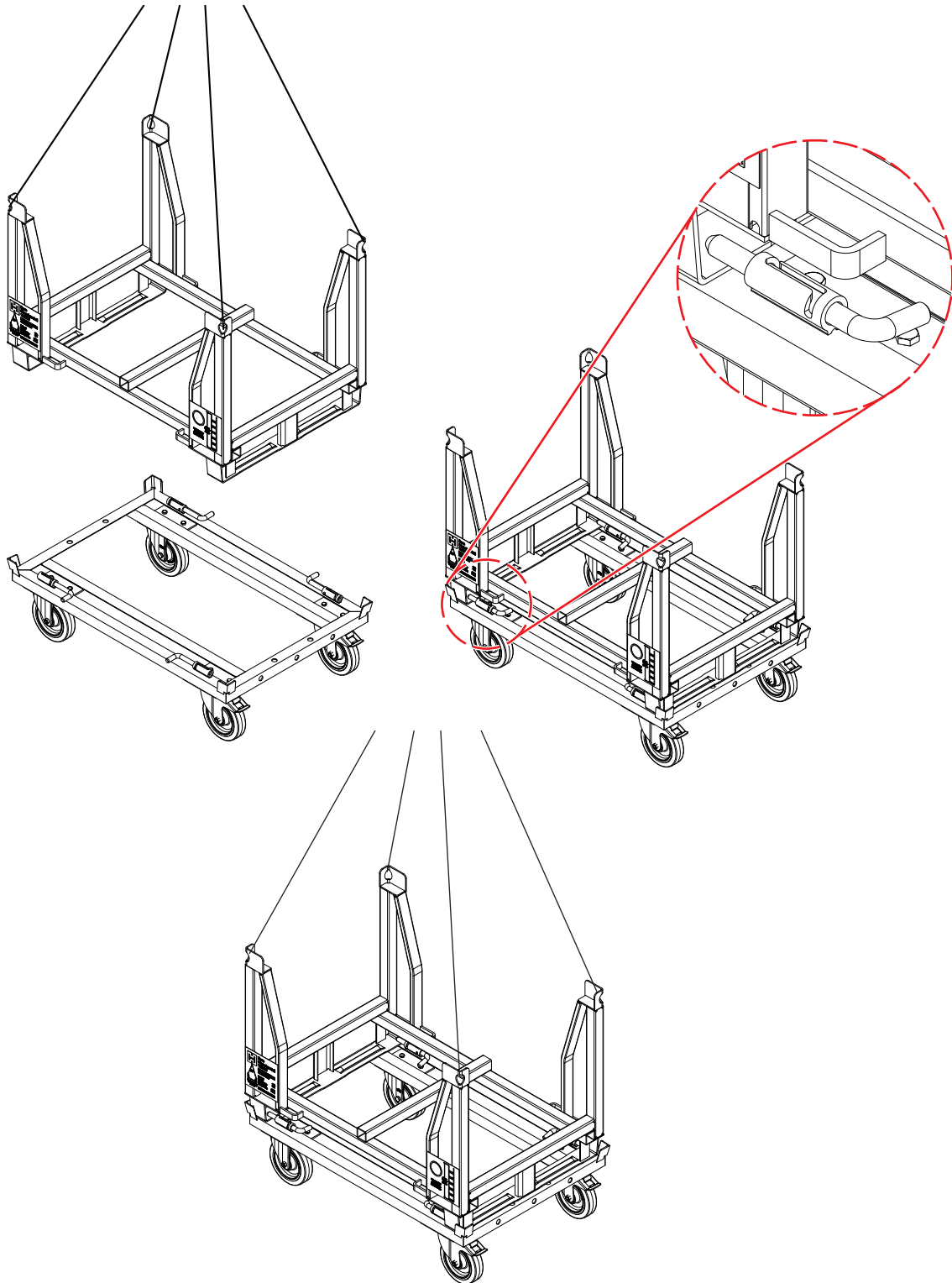
Warning!

Observe the information posted on the Euro Stacking Frame!



13.4 Euro Trolley

Single Frame Racks, Stacking Frames or Lattice Boxes can be transported with the Euro Trolley. The Euro Trolley along with a frame/box can be moved with a crane. To be able to move them together, the frame/box has to be secured by all 4no. safety pins on the Euro Trolley.



14 Determining material required

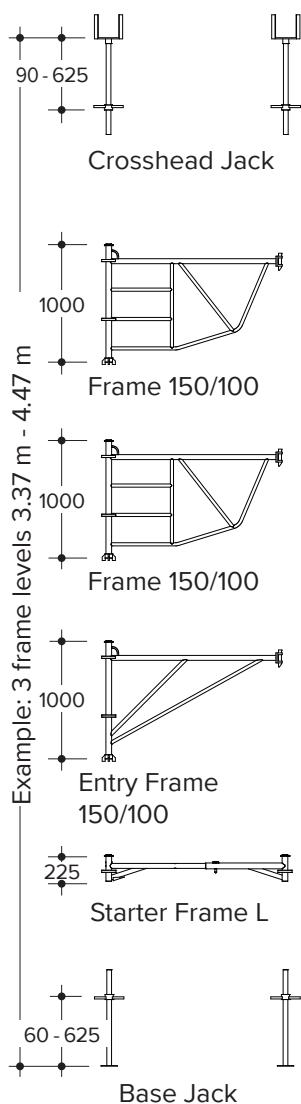
The following tables are intended to help plan ST 60 Shoring Towers.

NOTE	NOTE The heights stated here do not take into consideration the stripping clearance.
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NOTE	NOTE Keep in mind that the stated dimensions refer to the height of the ST 60 Shoring Tower! The clearance is the result of the height of the ST 60 Shoring Tower + primary beam + secondary beam + form sheet.
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14.4.1 For ST 60 Shoring Towers 150 cm x 150 cm

Bill of material

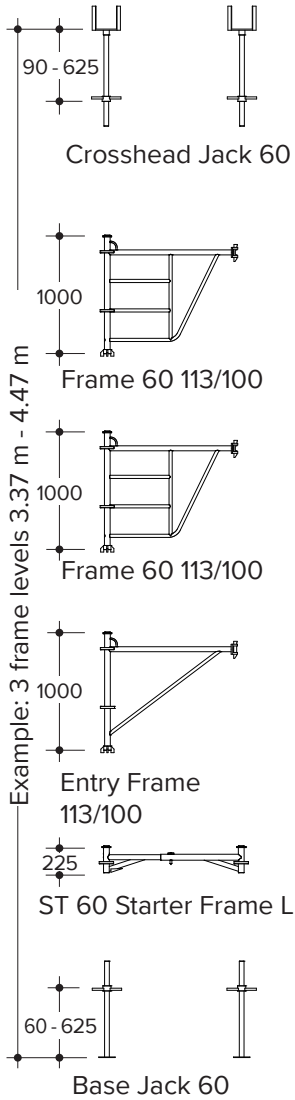


Height of ST 60 Shoring Tower [m] (Depending on head and base jacks used)	ST 60 Base Jack Part code:652430	ST 60 Starter Frame L e.g. code: 652450	ST 60 Head Jack Part code:652355	ST 60 Head Jack Retainer Part code:652419	ST 60 Entry Frame 150/100 Part code:652390	ST 60 Frame 150/100 Part code:652290	ST 60 Alu Passage Deck 150/68 Part code:652500	ST 60 Toe Board 150 Part code:652985	Weight of ST 60 Shoring Tower approx. [kg]
1.70 - 2.47	4	4	4	4	1	3	-	-	180
2.37 - 3.47	4	4	4	4	1	7	2	4	290
3.37 - 4.47	4	4	4	4	1	11	4	4	380
4.37 - 5.47	4	4	4	4	1	15	4	4	440
5.37 - 6.47	4	4	4	4	1	19	6	4	530
6.37 - 7.47	4	4	4	4	1	23	6	4	590
7.37 - 8.47	4	4	4	4	1	27	8	4	680
8.37 - 9.47	4	4	4	4	1	31	8	4	740
9.37 - 10.47	4	4	4	4	1	35	10	4	830
10.37 - 11.47	4	4	4	4	1	39	10	4	890
11.37 - 12.47	4	4	4	4	1	43	12	4	980
12.37 - 13.47	4	4	4	4	1	47	12	4	1040
13.37 - 14.47	4	4	4	4	1	51	14	4	1130

Determining material required

14.4.2 For ST 60 Shoring Towers 113 cm x 113 cm

Bill of material



Height of ST 60 Shoring Tower [m] (Depending on head and base jacks used)	ST 60 Base Jack Part code:652430	ST 60 Starter Frame L e.g. code: 652450	ST 60 Head Jack Part code:652355	ST 60 Head Jack Retainer Part code:652419	ST 60 Entry Frame 113/100 Part code:652380	ST 60 Frame 113/100 Part code:652350	ST 60 Alu Deck 113/31 Part code:652520	ST 60 Alu Passage Deck 113/68 Part code:652530	ST 60 Toe Board 113 Part code:652914	Weight of ST 60 Shoring Tower approx. [kg]
1.70 - 2.47	4	4	4	4	1	3	-	-	-	170
2.37 - 3.47	4	4	4	4	1	7	1	1	4	255
3.37 - 4.47	4	4	4	4	1	11	2	2	4	325
4.37 - 5.47	4	4	4	4	1	15	2	2	4	375
5.37 - 6.47	4	4	4	4	1	19	3	3	4	445
6.37 - 7.47	4	4	4	4	1	23	3	3	4	500
7.37 - 8.47	4	4	4	4	1	27	4	4	4	565
8.37 - 9.47	4	4	4	4	1	31	4	4	4	620
9.37 - 10.47	4	4	4	4	1	35	5	5	4	690
10.37 - 11.47	4	4	4	4	1	39	5	5	4	740
11.37 - 12.47	4	4	4	4	1	43	6	6	4	810
12.37 - 13.47	4	4	4	4	1	47	6	6	4	860
13.37 - 14.47	4	4	4	4	1	51	7	7	4	930

14.4.3 For ST 60 Shoring Towers 113 cm x 150 cm

Bill of material

Height of ST 60 Shoring Tower [m] (Depending on head and base jacks used)	ST 60 Base Jack e.g. code: 652430	ST 60 Starter Frame L Part code:652450	ST 60 Head Jack e.g. 652355	ST 60 Head Jack Retainer Part code:652419	ST 60 Entry Frame 150/100 Part code:652390	ST 60 Frame 113/100 Part code:652350	ST 60 Frame 150/100 Part code:652290	ST 60 Alu Deck 150/31 Part code:652540	ST 60 Alu Passage Deck 150/68 Part code:652500	ST 60 Toe Board 113 Part code:652914	ST 60 Toe Board 150 Part code:652985	Weight of ST 60 Shoring Tower approx. [kg]
1.70 - 2.47	4	4	4	4	1	2	1	-	-	-	-	175
2.37 - 3.47	4	4	4	4	1	4	3	1	1	2	2	270
3.37 - 4.47	4	4	4	4	1	6	5	2	2	2	2	350
4.37 - 5.47	4	4	4	4	1	8	7	2	2	2	2	405
5.37 - 6.47	4	4	4	4	1	10	9	3	3	2	2	485
6.37 - 7.47	4	4	4	4	1	12	11	3	3	2	2	540
7.37 - 8.47	4	4	4	4	1	14	13	4	4	2	2	620
8.37 - 9.47	4	4	4	4	1	16	15	4	4	2	2	675
9.37 - 10.47	4	4	4	4	1	18	17	5	5	2	2	755
10.37 - 11.47	4	4	4	4	1	20	19	5	5	2	2	810
11.37 - 12.47	4	4	4	4	1	22	21	6	6	2	2	890
12.37 - 13.47	4	4	4	4	1	24	23	6	6	2	2	945
13.37 - 14.47	4	4	4	4	1	26	25	7	7	2	2	1025

NOTE

NOTE

2no. Alu Passage Decks 113/68 can be used instead of the Alu Deck 150/31 and the Alu Passage Deck 150/68.

15 Safe Working Load (SWL)

The following pages show load diagrams for ST 60 Shoring Towers. There are two basic types:

- Tied at top
- Free-standing

The diagrams show the permitted leg loads for when the Head Jacks and Base Jacks are extended the same and when jack extension has been optimised. Interpolation can be applied to determine the intermediate values.

Example:

The example shown here is for an ST 60 Shoring Tower with six frames 1.50 x 1.50 m, 0.00 kN/m² velocity pressure and jack extension of 50.0 cm at the top and at the base (100 cm total) (6 x 1 m + 0.5 m + 0.5 m + 0.225 m = 7.23 m → 9.37 m > 7.23 > 6.47).

This intermediate height can be interpolated from the diagram: By following the dotted line, a permitted leg load of about 46.7 kN can be determined.



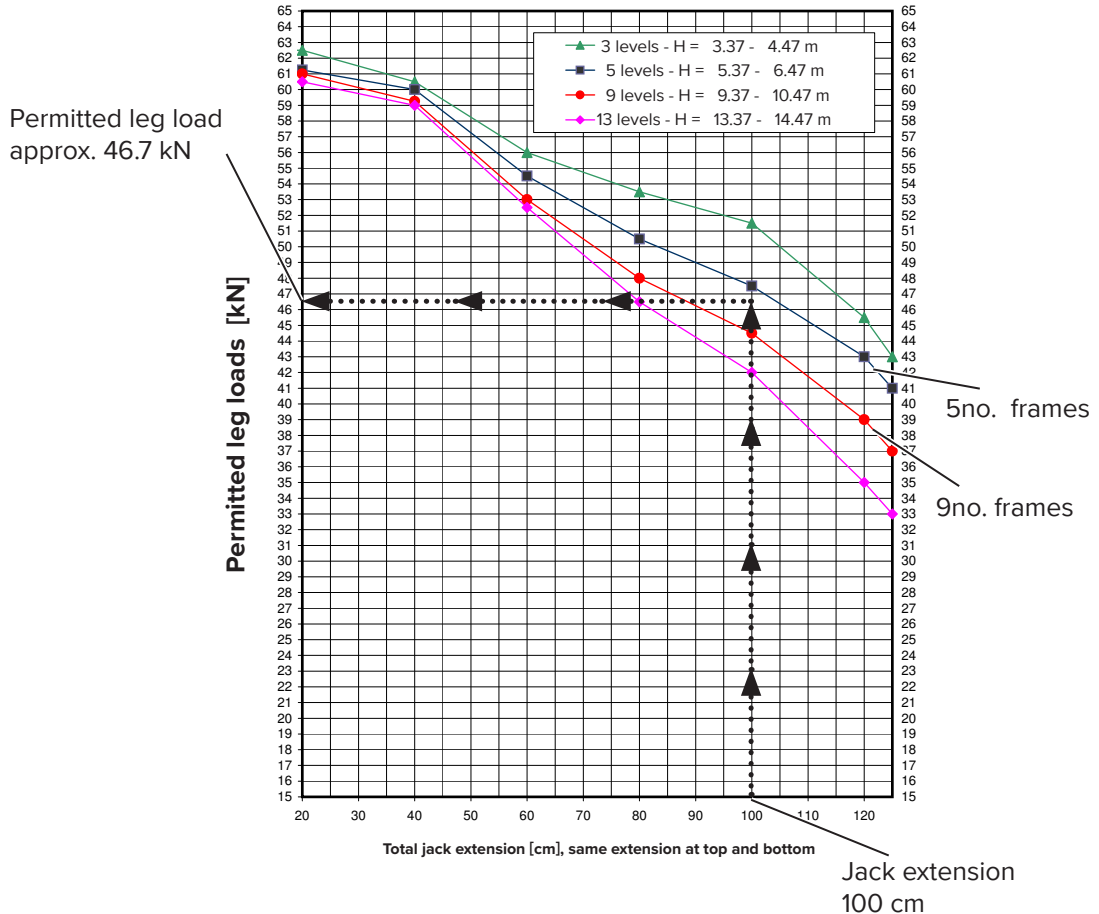
WARNING

Reduced Safe Working Load (SWL)!

The jack extension must comply with the specifications indicated in the diagrams! Otherwise the SWL will be much lower!

Example

ST 60 Shoring Tower 150 cm, wind: 0.00 kN/m²
ST 60 Shoring Tower tied at top!
Same jack extension



15.1 Overview of diagrams

The following tables provide an overview of the load diagrams shown on the following pages.

15.1.1 ST 60 Shoring Tower tied at top

Frame [cm]	Wind [kN/m ²]	Page
150	0.20 Working wind	90
	0.60	91
113	0.20 Working wind	92
	0.60	93

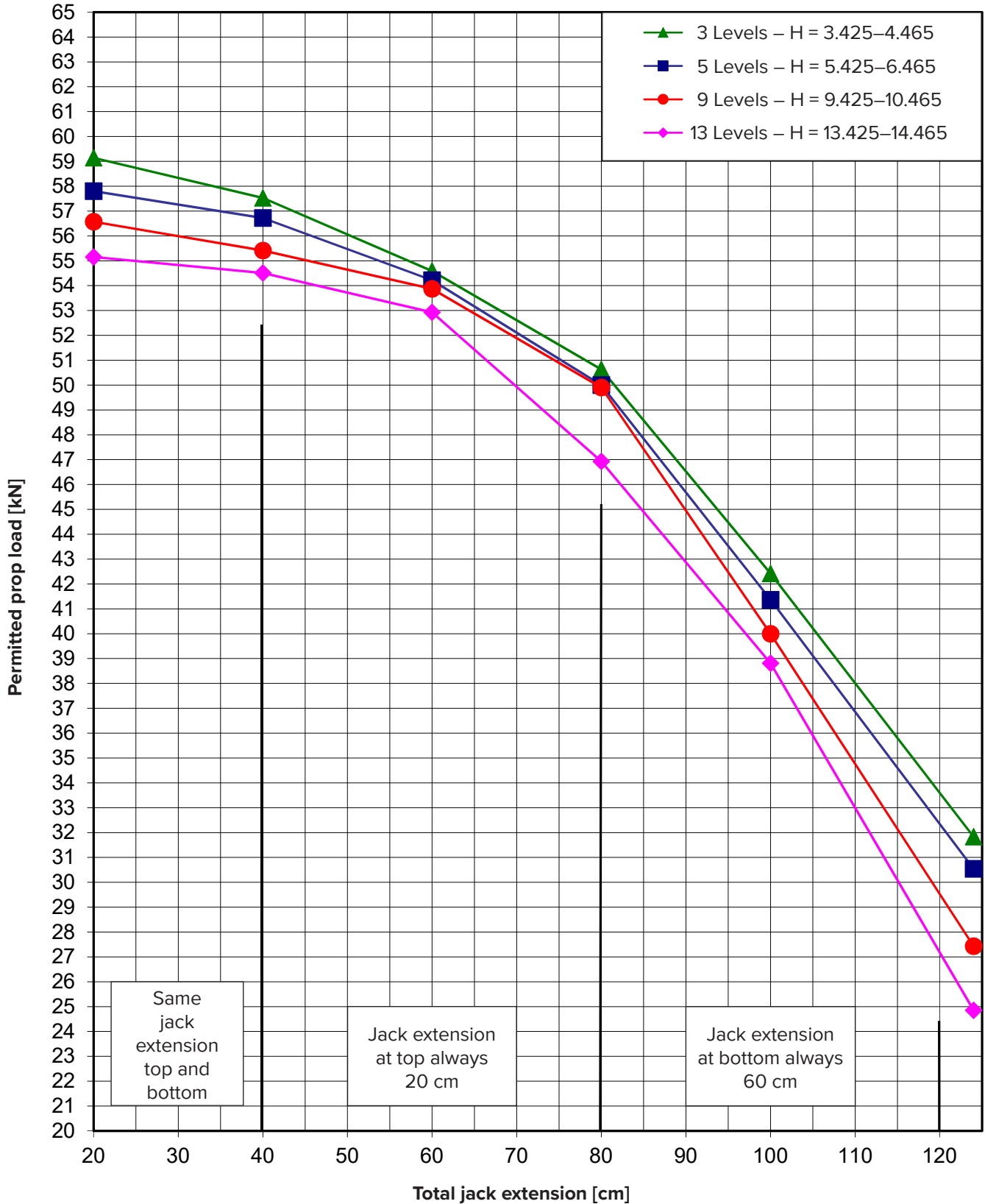
15.1.2 Free-standing ST 60 Shoring Tower

Frame [cm]	Wind [kN/m ²]	Height of ST 60 Shoring Tower [m]	Page
150	0.20 Working wind	3.425 - 4.465	94
	0.20 Working wind	5.425 - 6.465	95
113	0.20 Working wind	3.425 - 4.465	96
	0.20 Working wind	5.425 - 6.465	97

15.2 Load diagrams

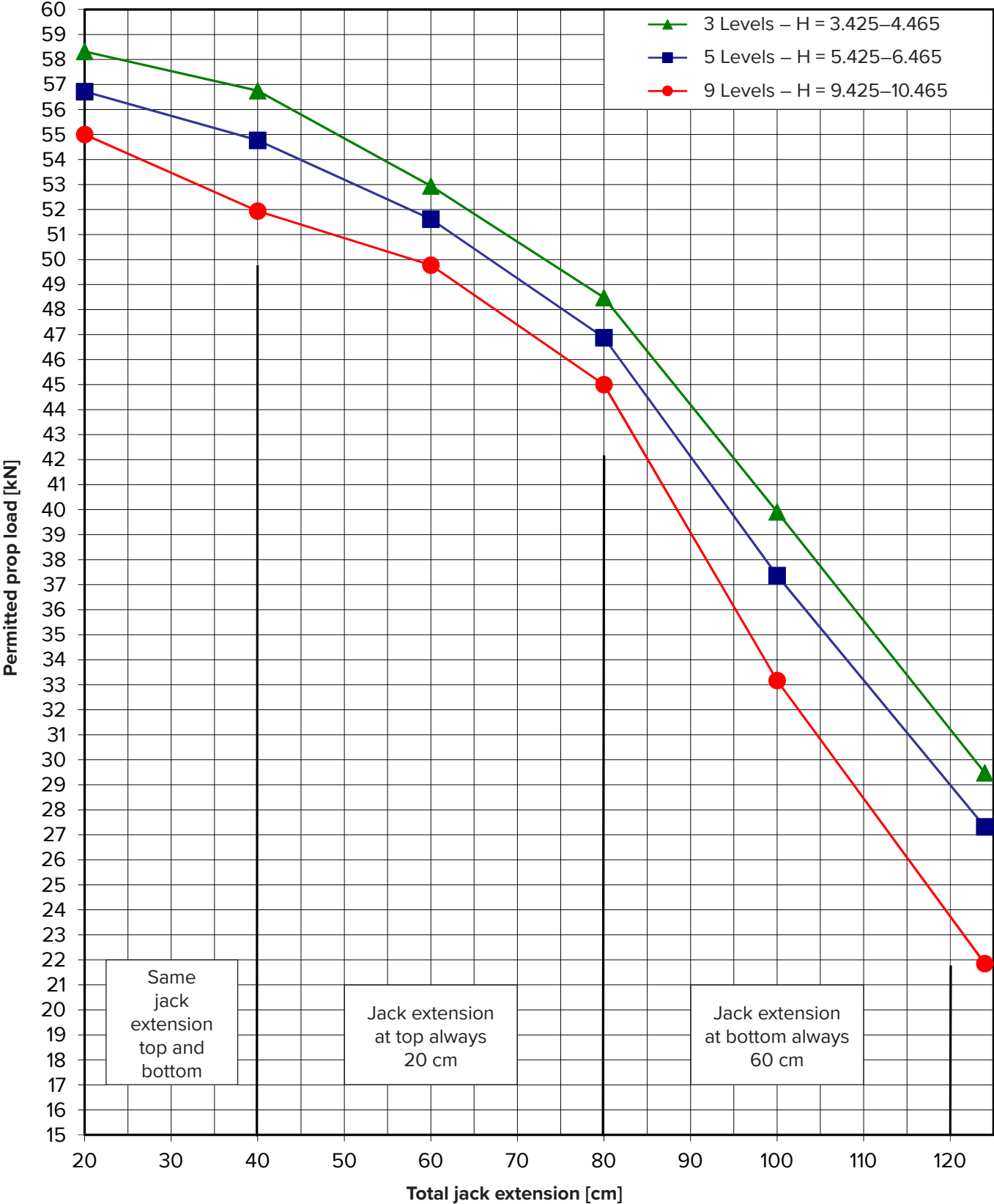
15.2.1 ST 60 Shoring Tower 150 cm, wind: 0.20 kN/m²

Shoring Tower tied at top!



15.2.2 ST 60 Shoring Tower 150 cm, wind: 0.60 kN/m²

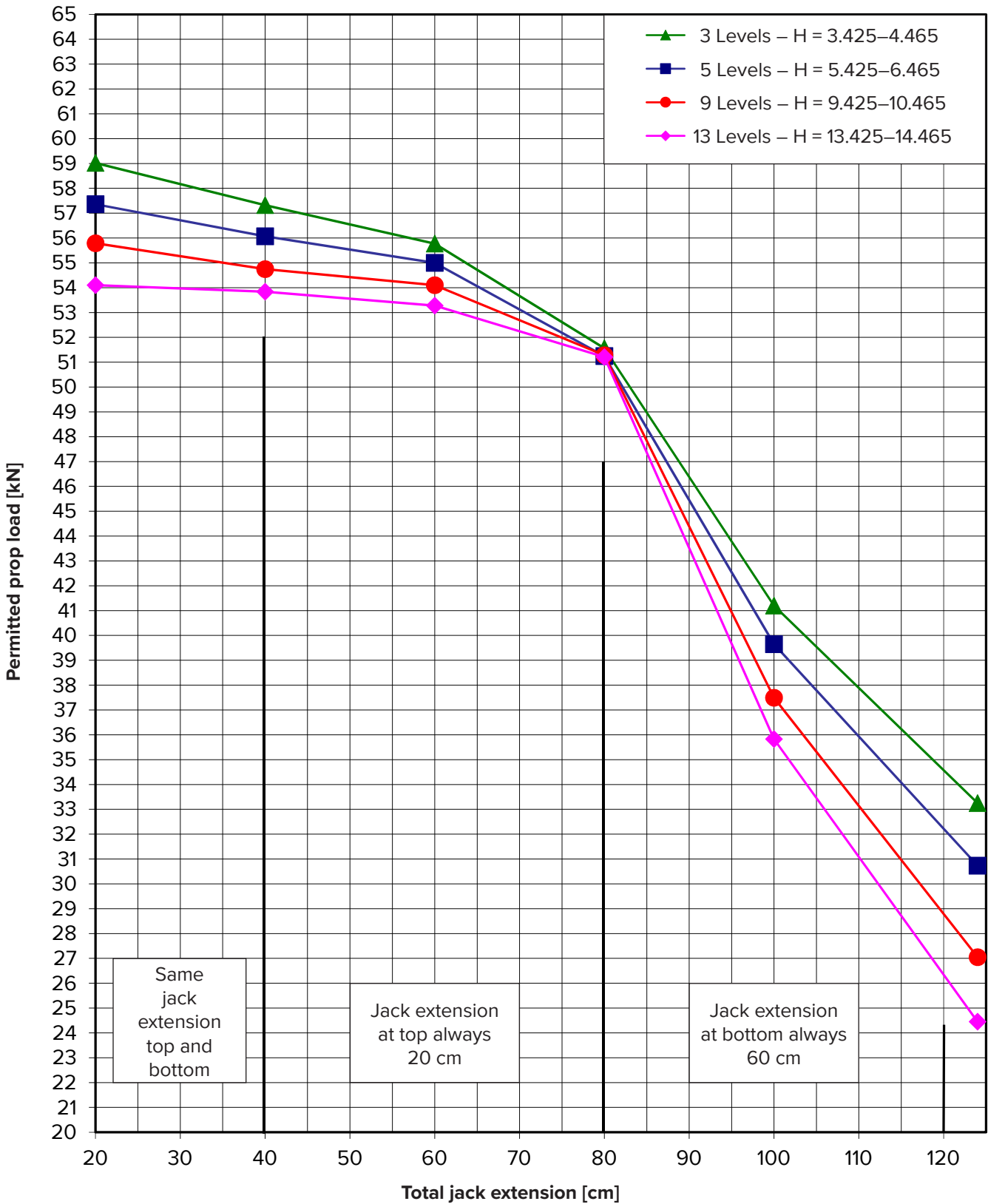
Shoring Tower tied at top!



Safe Working Load (SWL)

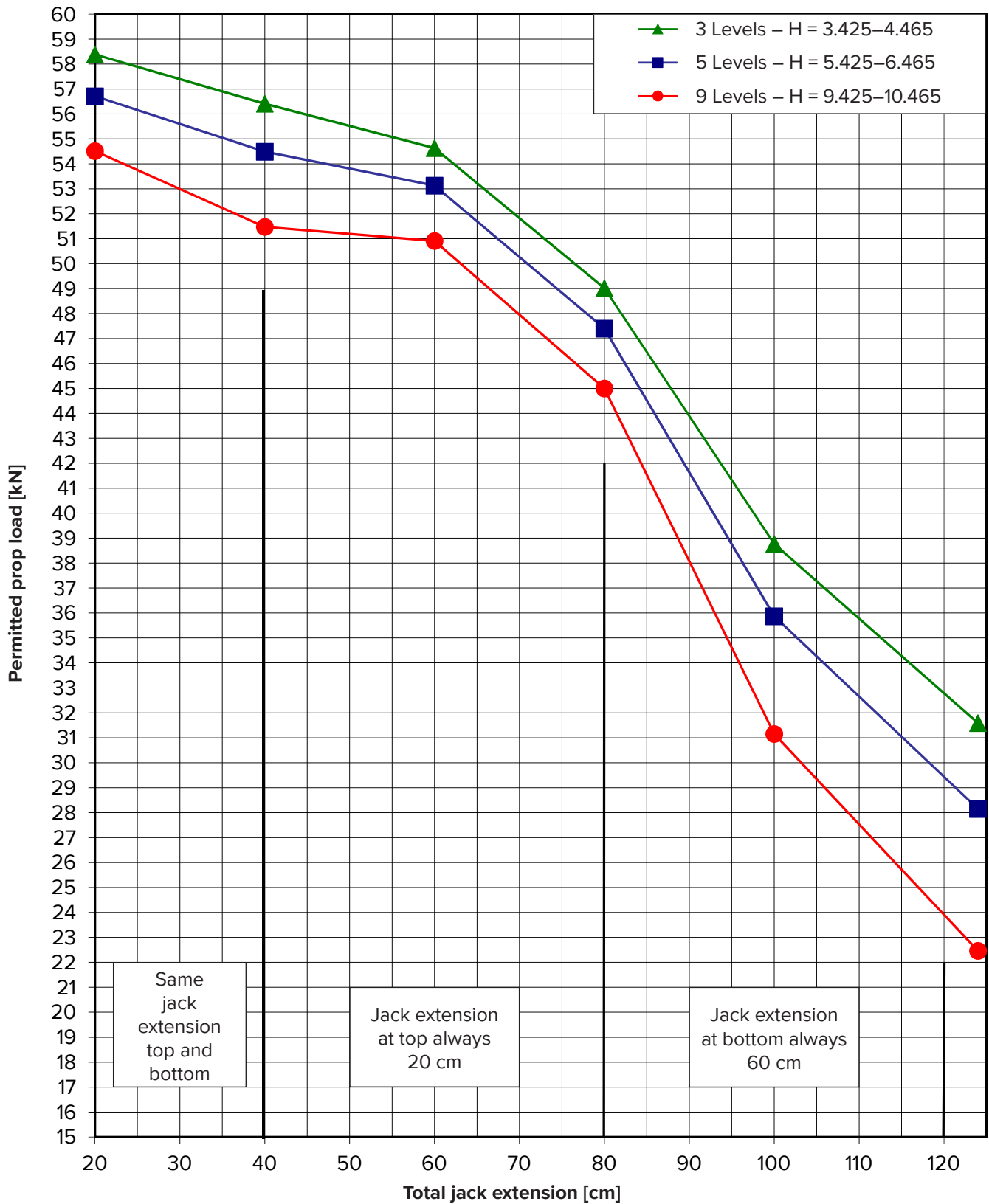
15.2.3 ST 60 Shoring Tower 113 cm, wind: 0.20 kN/m²

Shoring Tower tied at top!



15.2.4 ST 60 Shoring Tower 113 cm, wind: 0.60 kN/m²

Shoring Tower tied at top!

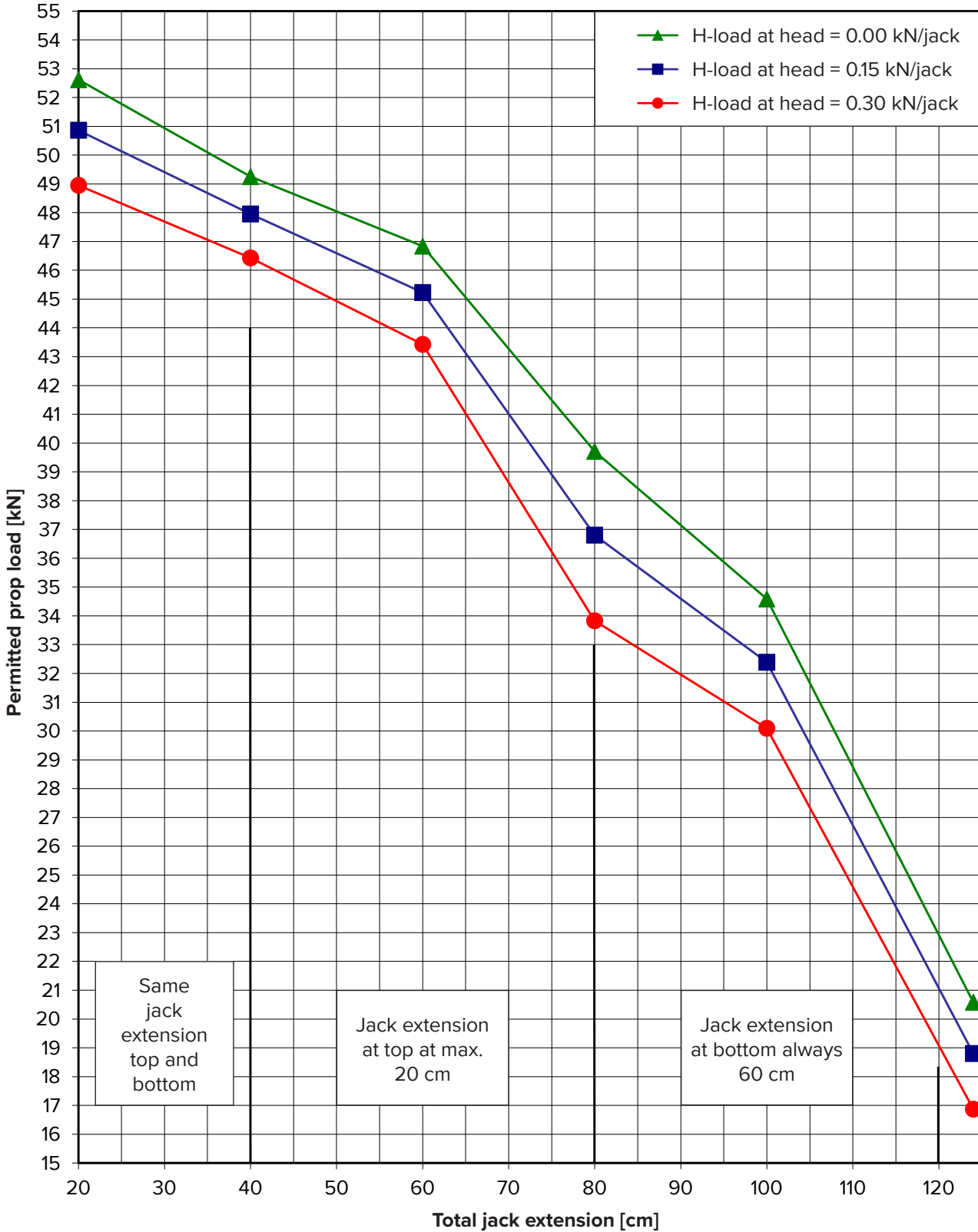


Safe Working Load (SWL)

15.2.5 ST 60 Shoring Tower 150 cm, wind: 0.20 kN/m²

Free-standing single tower

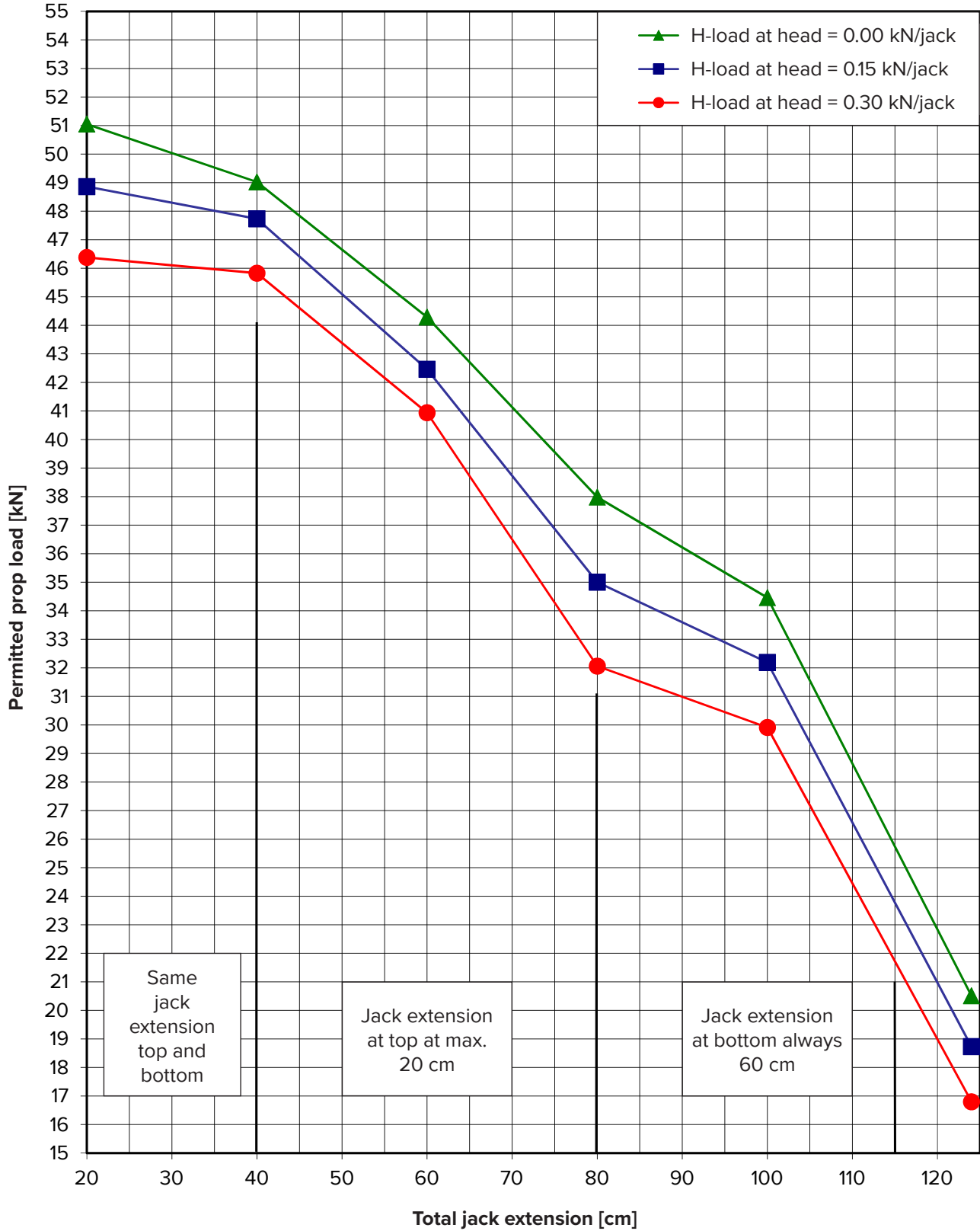
Height of Shoring Tower H = 3.425 m - 4.465 m



15.2.6 ST 60 Shoring Tower 150 cm, wind: 0.20 kN/m²

Free-standing single tower

Height of Shoring Tower H = 5.425 m - 6.465 m

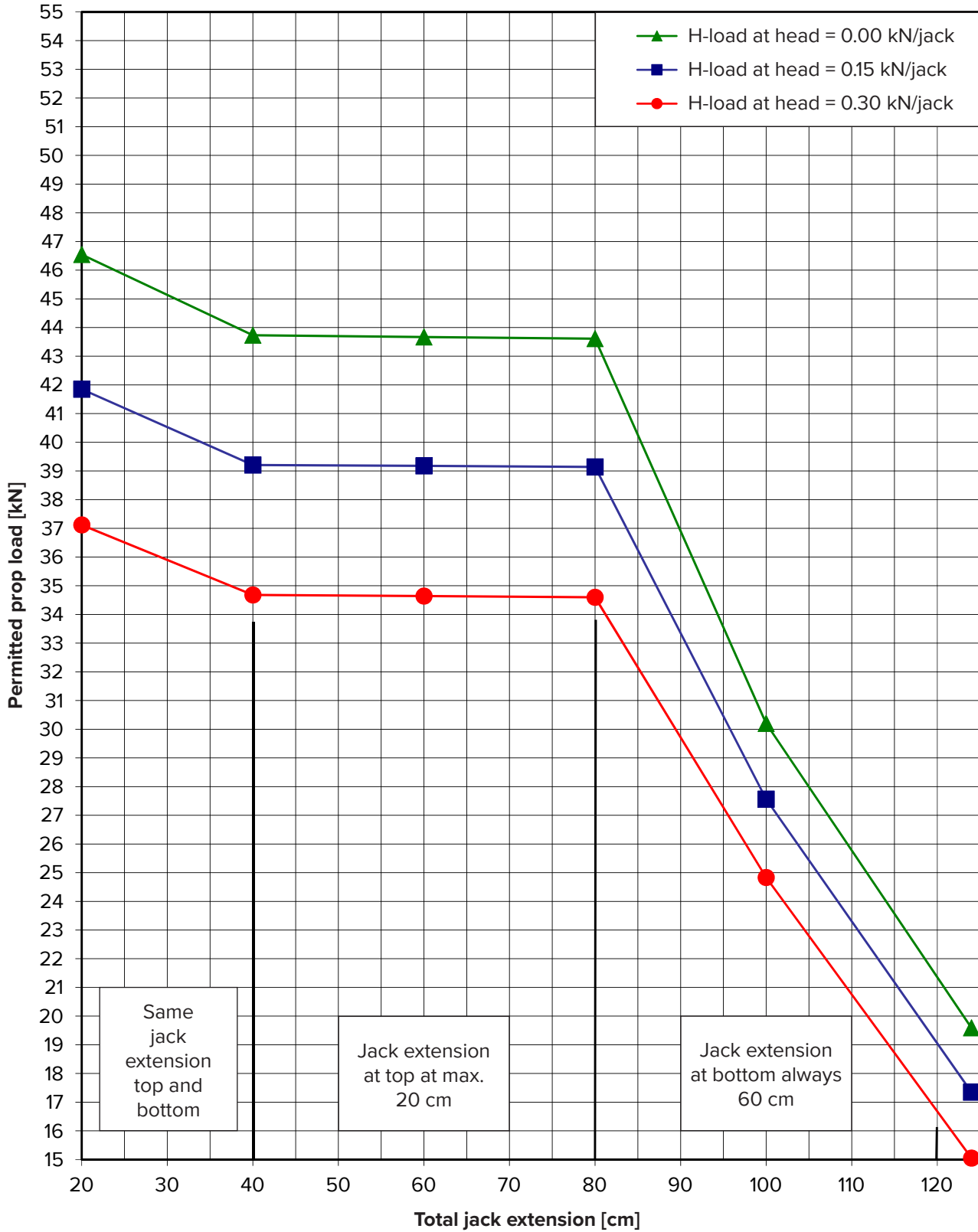


Safe Working Load (SWL)

15.2.7 ST 60 Shoring Tower 113 cm, wind: 0.20 kN/m²

Free-standing single tower

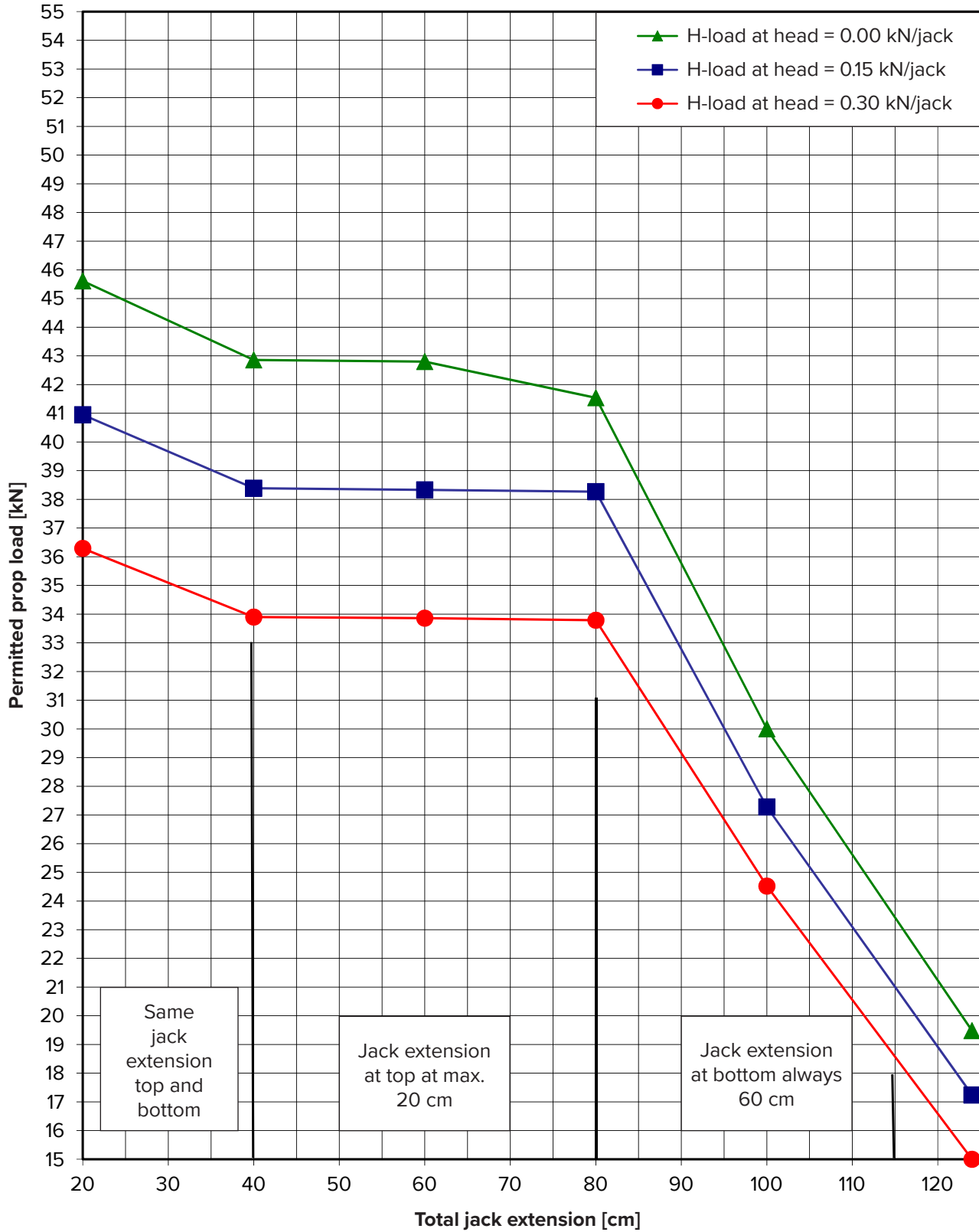
Height of Shoring Tower H = 3.425 m - 4.465 m



15.2.8 ST 60 Shoring Tower 113 cm, wind: 0.20 kN/m²

Free-standing single tower

Height of Shoring Tower H = 5.425 m - 6.465 m



16 Standards, rules, laws

The contractor erecting the scaffold is responsible for safe erection, modification and dismantling of the scaffold. He is required to instruct his employees regarding the tasks to be performed. The contractor is obliged to inform the employees of any new developments in the scaffolding field that may be relevant to safety. Instruction includes persisting in reminding the employees of safe work practices. Every contractor who uses the scaffolds is responsible for using the scaffolding components as intended and observing all regulations pertaining to industrial safety. The following laws and regulations on occupational health and safety in the scaffolding field are relevant at the time of printing:

- German occupational safety law (ASiG); December 12, 1973
- Framework directive 89/391/EEC; June 12, 1989
- German technical rule for workplaces ASR A2.1:11/2012
- German technical rule on occupational safety 2121, part 1; January 2019
- German technical rule on occupational safety 1111; March 2018
- Work equipment directive 2009/104/EC
- Construction site directive 92/57/EEC; June 24, 1992
- German working conditions act (ArbSchG); August 7, 1996
- German social insurance code, book VII (SGB VII); August 7, 1996
- Building site regulation (BaustellV); June 10, 1998
- German product safety act (ProdSG); December 1, 2011
- German ordinance on industrial safety and health (BetrSichV); June 1, 2015
- German ordinance on industrial safety and health pertaining to the use of personal protective equipment at work (PSA-BV)
- Instructions for handling working and protective scaffolds (DGUV 201-011)
- Modules “Work safely - stay healthy” (BGI 5101)
- Use of personal protective equipment to prevent falling from heights (DGUV 112-198)
- Use of personal protective equipment. Rescuing from heights and depths (DGUV 112-199)

Essential information on scaffold erection regulations can also be found in the following standards:

- DIN 4420-1:2004-03
- DIN EN 1991-1-4 and national annex
- DIN EN 1993-1-1 and national annex
- DIN EN 12810-1:2004-03
- DIN EN 12810-2:2004-03
- DIN EN 12811-1:2004-03
- DIN EN 12811-2:2004-04
- DIN EN 12811-3:2003-02
- DIN EN 12812: 2008-12

Always comply with all local standards, regulations and laws.

17 Note on structural analysis

Unless explicitly indicated otherwise, all load specifications in this document are safe working loads. This means that characteristic loads can be used for calculations. The following partial safety factors are included in the safe working load (where applicable):

Load:

$$\gamma_f = 1.5$$

Resistances:

Steel: $\gamma_m = 1.1$

Imperfections, load assumptions and additional rules:

Pursuant to DIN EN 1993 / DIN EN 12810 / DIN EN 12811/ DIN EN 12812 / DIN EN 1991

Aluminium: $\gamma_m = 1.1$

Imperfections, load assumptions and additional rules:

Pursuant to DIN EN 1999 / DIN EN 12810 / DIN EN 12811/ DIN EN 12812 / DIN EN 1991

Timber:

$$\gamma_m = 1.3; K_{mod} 0.9$$

Imperfections, load assumptions and additional rules:

Pursuant to DIN EN 1995 / DIN EN 12810 / DIN EN 12811/ DIN EN 12812 / DIN EN 1991

Concrete:

$$\gamma_m = 1.5$$

Imperfections, load assumptions and additional rules:

Pursuant to DIN EN 1992 / DIN EN 12810 / DIN EN 12811 / DIN EN 12812 / DIN EN 1991

Reinforcing steel:

$$\gamma_m = 1.15$$

Imperfections, load assumptions and additional rules:

Pursuant to DIN EN 1992 / DIN EN 12810 / DIN EN 12811 / DIN EN 12812 / DIN EN 1991

These values only include those loads that derive from the respective part itself (unless indicated otherwise).

An increase of the loads due to effects in the full system (e.g. theory II, substitute horizontal loads, scaffolding class...) have to be considered.

18 Chronology

Changes since edition 2019-06		
Change	Page	Date
Available lengths of DU-AL T200 and T225 beams updated	18	2021-10
ST 60 Box removed	various	2021-10
Infill Bearer removed	19	2021-10

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