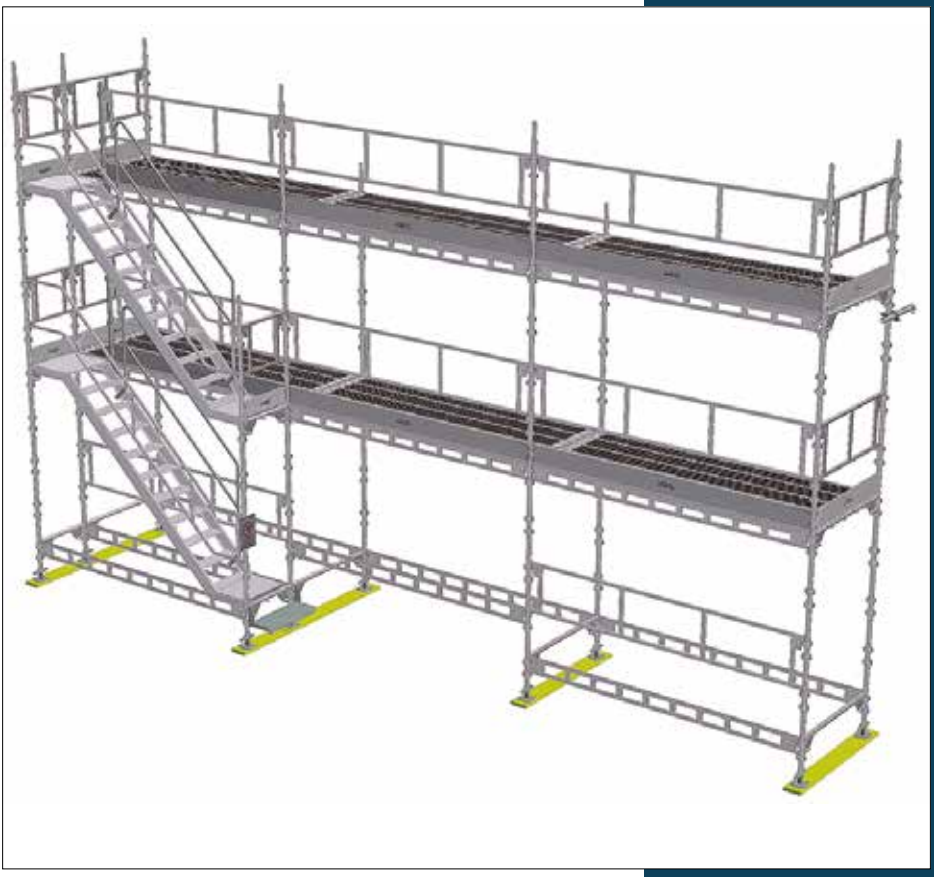
USER´S MANUAL
HAKI UNIVERSAL S4 ALUMINIUM



Important information

HAKI's product liability and user´s manuals apply only to scaffolds entirely composed of components that have been made and supplied by HAKI.

HAKI's type examination certificate apply only to scaffolds whose materials, dimensions and design accord with those specified in the documentation upon which this certificate is based.

HAKI's scaffold systems must not be erected using components of makes other than HAKI or be connected to scaffolds of makes other than HAKI. In such cases, a special study of load-bearing capacity must be carried out. However, HAKI has no objection to the customary addition of scaffold tubes and approved couplers to the scaffold.

Adding components from different suppliers may invalidate the insurance cover.

HAKI reserves the right to make technical modifications on a continual basis.

The latest versions of HAKI user's manuals can be downloaded from our website, www.HAKI.com.

For scaffold structures that are not covered by this user´s manual, please contact HAKI's technical department.

HAKI colour code

Horizontals and diagonals are marked with their nominal sizes (bay sizes) and a colour code. The marking is a useful means of identifi cation when erecting and handling the scaffold material.

564	1050	1964	3050
700	1250	2050	
770	1550	2500	
1010	1655	2550	

Forces and dimensions

1000 N = 1 kN ~ 100 kg

10 N ~ 1 kg

All measurements are in millimeters (mm)

HAKI Universal Aluminium S4

PLEASE NOTE: This user's manual applies solely to scaffolding erected using only HAKI's S4 AL standards. Permitted loads on standards and thus construction heights apply solely to HAKI's S4 AL standards.

HAKI's S6 AL standards must not be incorporated into the scaffolding structure. HAKI's S6 AL standard has a wall thickness of 6 mm and a spigot of Ø 34 mm, which means that it is incompatible.

On the other hand, HAKI's older FSSH AL standards, with welded pockets, may be incorporated into the scaffolding structure, but lower permitted loads on standards then apply in accordance with the user's manual for this system.

In addition, HAKI Universal steel standards may be used, for example in the base of the scaffolding when loads on standards are high or when construction heights are great. In such cases, a special study of the bearing capacity must be carried out.

However, HAKI's other products, including horizontal members, decking etc. of steel or aluminium, may be fully employed in the scaffolding system.

How to identify HAKI's S4 standard

- Plain spigot centred using eight indentations and fixed using a strong aluminium through rivet.
- The wall thickness of the standard tubing is 4 mm.
- Rings of pockets are attached to the standard tube using a special riveting technique.
- HAKI label with white background and the word HAKI in blue.

HAKI Universal Aluminium S4

HAKI Universal Aluminium S4 has been type examined by RISE, Research Institutes of Sweden, in accordance with Ordinance AFS 2013:4 and SS-EN 12810-1 and associated standards - Certifikat nr 14 55 17 - for load class 1-4 (0,75-3,0 kN/m^2).

General data

HAKI Universal Aluminium is erected with bay widths of 700, 770, 1050, 1250 or 1655 mm and normally with a bay length of 3050 mm and 2.0 m between lifts.

Ledger beams LB or single tube beams ERB can be used both as ledger and transom beams.

HAKI decking unit light or AL planks are suitable for decking.

Clear height between the work plane must normally correspond to height class H2, which means a clear height of at least 1.90 m between the work plane and the transoms, alternatively between the work plane and the ledger when the scaffold is widened with brackets. The clear height between the work plane and any horizontal diagonal must be at least 1.90 m regardless of height class.

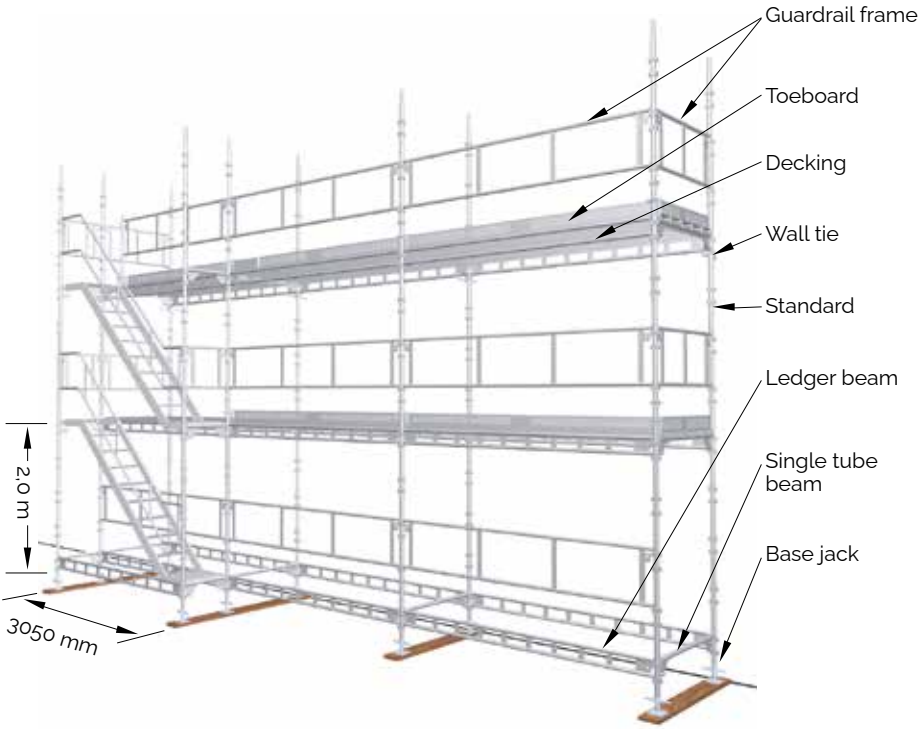
When brackets are used, the space between the main platform and the bracket platform must be covered, normally with a longitudinal beam, or in another appropriate way.

Platforms used must be type-examined and designed so that they can be safely placed on the scaffold's transoms or ledgers, and secured against accidental lifting at both ends.

Lattice beams and couplers used must be certified.

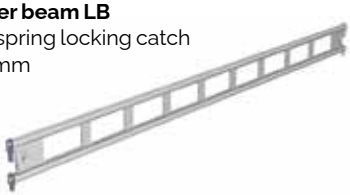
Marking

All components, with the exception of locking catches, pins etc, come permanently marked with the HAKI logo or HAKI text, the first letter of the country of manufacture and the last two figures of the year of manufacture (S25).



IMPORTANT!

ENGAGE LOCKING CATCHES AS EACH COMPONENT IS FIXED

Name	Code	Item No.	Weight
Base jack BS Steel Ø 38 mm Adjustable 55-570 mm 	BS	**2071000**	6,2
Standard S4 AL Standard joint with spigot Ø 38 mm Pockets at same level Ø48 mm 	S4 500 S4 1000 S4 1500 S4 2000 S4 3000	**4017056** **4017106** **4017156** **4017206** **4017306**	1,6 2,8 4,0 5,2 7,7
Standard S4 AL Standard joint without spigot Pockets at same level Ø48 mm 	S4 SC 353 S4 SC 853 S4 SC 1353 S4 SC 1853	**4011105** **4011104** **4011106** **4011107**	1,0 2,2 3,4 4,6
Ledger beam LB With spring locking catch Ø 34 mm 	LB 350 LB 770 LB 1050 LB 1250 LB 1655 LB 1964 LB 2500 LB 3050	**4021031** **4021073** **4021101** **4021121** **4021161** **4021191** **4021246** **4021301**	1,9 2,9 3,5 4,2 4,8 5,8 7,2 8,5
Single tube beam ERB With spring locking catch Ø 48 mm 	ERB 564 ERB 700 ERB 770 ERB 1050 ERB 1250 ERB 1655 ERB 1964 ERB 2500 ERB 3050	**4022051** **4022066** **4022073** **4022101** **4022121** **4022161** **4022191** **4022246** **4022301**	2,5 2,7 2,9 3,2 3,6 4,1 4,5 5,4 6,2
Guardrail frame SKRD With spring locking catch 	SKRD 700 SKRD 770 SKRD 1050 SKRD 1250 SKRD 1655 SKRD 1964 SKRD 2500 SKRD 3050	**4052066** **4052073** **4052101** **4052121** **4052161** **4052191** **4052246** **4052301**	3,3 3,5 4,5 4,8 5,9 6,6 7,8 8,9

Name	Code	Item No.	Weight
Diagonalbrace AL 	DS 700/770	**4122070**	4,0
	DS 1250	**4122120**	4,5
	DS 1655	**4122160**	4,9
	DS 1964	**4122190**	5,4
	DS 2500	**4122245**	6,1
	DS 3050	**4122300**	6,7
Plane brace AL Ø 48 mm 	HDS 3050x1655 AL	**4141000**	7,0
	HDS 3050x1250 AL	**4141001**	6,5
	HDS 2500x1250 AL	**4141005**	6,0
	HDS 2500x1655 AL	**4141006**	6,3
Plan brace telescopic L=1960-3470 mm 	HDS AL	**4141010**	6,3
Wall tie VST With flexible plate Ø 48 mm Erected with right angle coupler 48x48 	VST 1000	**7111100**	5,3
	VST 2000	**7111200**	9,1
	VST 3000	**7111300**	13,7
	VST 4000	**7111400**	16,7
	VST 5000	**7111500**	21,9
	VST 6000	**7111600**	24,5
Tie rod tube SVF AL Tube diameter 48 mm Permissible load 5.4 kN Erected with coupler 48x48 	SVF 450x48	**4832045**	1,2
Tie rod tube SVF Tube diameter 48 mm Permissible load 9.0 kN Erected with right angle coupler 48x48 	SVF 300x48	**8832031**	1,4
	SVF 450x48	**8832046**	2,2
	SVF 600x48	**8832061**	2,6
	SVF 900x48	**8832091**	3,7
	SVF 1200x48	**8832121**	4,8
Decking unit light W=400 mm Load class 3 (2.0 kN/m²) 	1050x400	**4073108**	6,2
	1250x400	**4073124**	7,5
	1550x400	**4073154**	8,7
	1655x400	**4073164**	9,1
	1964x400	**4073194**	10,3
	2050x400	**4073204**	10,7
	2500x400	**4073254**	12,9
	2550x400	**4073258**	13,1
	3050x400	**4073304**	15,2

Name	Code	Item No.	Weight
Decking unit W=600 mm Load class 3 (2.0 kN/m²) With lock in each end	700x600	**4071078**	5,7
	1050x600	**4071118**	7,4
	1250x600	**4071128**	9,1
	1550x600	**4071158**	10,5
	1655x600	**4071168**	11,1
	1964x600	**4071198**	12,5
	2050x600	**4071208**	12,9
	2500x600	**4071268**	15,8
	2550x600	**4071278**	16,1
	3050x600	**4071308**	18,5
Decking unit hatch W=600 mm Load class 3 (2.0 kN/m²) With lock in each end	2500x600 AL	**4071269**	17,0
	3050x600 AL	**4071309**	19,6
Ladder For decking unit with hatch	ST 2100 AL	**2091210**	3,4
Decking unit hatch and ladder Load class 3 (2.0 kN/m²) With lock in each end	3050x600 AL	**4071310**	24,5
AL-plank B=170 mm L=770-2500 - Load class 6 (6.0 kN/m²) L=3050 - Load class 5 (4.5 kN/m²)	ALP 1050x170x90	**2154105**	4,9
	ALP 1250x170x90	**2154125**	5,4
	ALP 1655x170x90	**2154165**	6,5
	ALP 2500x170x90	**2154250**	8,8
	ALP 3050x170x90	**2154305**	10,3
AL-plank B=200 mm L=770-2500 - Load class 6 (6.0 kN/m²) L=3050 - Load class 5 (4.5 kN/m²)	ALP 770x200x90	**2153079**	3,6
	ALP 1050x200x90	**2153105**	4,5
	ALP 1250x200x90	**2153125**	5,0
	ALP 1655x200x90	**2153165**	6,2
	ALP 1964x200x90	**2153195**	7,1
	ALP 2500x200x90	**2153255**	8,7
	ALP 3050x200x90	**2153305**	10,3

Name	Code	Item No	Weight
AL-plank B=230 mm L=770-1964 - Load class 6 (6.0 kN/m²) L=2500 - Load class 5 (4.5 kN/m²) L=3050 - Load class 4 (3.0 kN/m²)	ALP 770x230x90	**2158077**	4,1
	ALP 1010x230x90	**2158100**	4,9
	ALP 1250x230x90	**2158120**	5,6
	ALP 1655x230x90	**2158160**	6,9
	ALP 1964x230x90	**2158190**	7,8
	ALP 2500x230x90	**2158250**	9,5
	ALP 3050x200x90	**2158300**	11,2
AL-plank B=295 mm L=770-1964 - Load class 6 (6.0 kN/m²) L=2500 - Load class 5 (4.5 kN/m²) L=3050 - Load class 4 (3.0 kN/m²)	ALP 770x295x90	**2153078**	4,4
	ALP 1050x295x90	**2153104**	5,5
	ALP 1250x295x90	**2153124**	6,1
	ALP 1655x295x90	**2153164**	7,5
	ALP 1964x295x90	**2153194**	8,6
	ALP 2500x295x90	**2153254**	10,5
	ALP 3050x295x90	**2153304**	12,4
AL-plank B=320 mm L=770-1964 - Load class 6 (6.0 kN/m²) L=2500 - Load class 5 (4.5 kN/m²) L=3050 - Load class 4 (3.0 kN/m²)	ALP 770x320x90	**2153077**	4,6
	ALP 1050x320x90	**2153103**	5,7
	ALP 1250x320x90	**2153123**	6,4
	ALP 1655x320x90	**2153163**	7,9
	ALP 1964x320x90	**2153193**	9,0
	ALP 2500x320x90	**2153253**	11,0
	ALP 3050x320x90	**2153303**	13,1
Toe board AL	Fotlist 564	**4161051**	1.0
	Fotlist 700	**4161071**	1.3
	Fotlist 1050	**4161105**	1.9
	Fotlist 1250	**4161121**	2.2
	Fotlist 1655	**4161161**	2.9
	Fotlist 1964	**4161191**	3.5
	Fotlist 2500	**4161251**	4.6
	Fotlist 3050	**4161301**	5.5
Toe board Wood	FL 3300x150x32	**2025331**	5,6
Toe board clip Steel	LF 70	**7161006**	1,0

Other components

Name		Code	Item No	Weight
Bracket Without Spigot With spring locking catch Ø 48 mm		SK 230 AL SK 460 AL	**4211024** **4211047**	1.7 1.9
Bracket with spigot With spigot Ø 38 mm Tube diameter 48 mm With spring locking catch		SK 564 AL SK 770 AL	**4211052** **4211074**	3,6 3,9
Bracket diagonal S4 AL With spigot Ø 38 mm With spring locking catch Combine with single tube beam 1250 or ledger beam 1250		SKD 1250 AL	**4212002**	7,8
UTV Stair AL		UTV 3050x2000 AL UTV 2500x2000 AL	**4102302** **4102247**	27,2 22,9
UTV Stair handrail		HL 3050x2000 AL HL 2500x2000 AL	**4058300** **4058245**	10,3 9,2
UTV Stair AL With platform and locking Width 600 mm		UTV 500 UTV 1000 UTV 1500	**4102055** **4102105** **4102155**	7,5 11,2 16,1
UTV Handrail inner Width 600 mm For Stair UTV AL		HL inre UTV AL	**7058253**	11,4

Name	Code	Item No	Weight
Handrail post For Stair UTV AL 	LSS 1000	**7015102**	4,2
Handrail post LSS-UTV For Stair UTV AL 4102302 		**7058300**	1,5
Guardrail post SRS Steel For erection on ledger beam LB 	SRS 1000	**7015001**	7,3
Guardrail post SSKS Steel For erection on single ledger ERB 	SSKS 23 mm SSKS 22 mm	**7015005** **7015006**	6,1 6,1
Puncheon unit S4 AL 		**4208002**	1,7
Puncheon unit For tube diameter 50 mm Can be locked with spring pin 12 mm 	50	**7208025**	2,3
Beam Rider BRS AL 	BR 34	**4208020**	1,1
450 Lattice beam w. pockets 	FB 2220 AL FB 4100 AL FB 6100 AL FB 8100 AL	**4032211** **4032411** **4032611** **4032811**	9,9 17,8 25,8 34,0
450 Lattice beam AL 	FB 4100 AL FB 6100 AL FB 8100 AL	**4032410** **4032610** **4032810**	16,7 24,3 32,2

Name	Code	Item No	Weight
Bracket coupler Assembling see page 29 		**2048017**	1,4

Other accessories (not included in the Certificate)

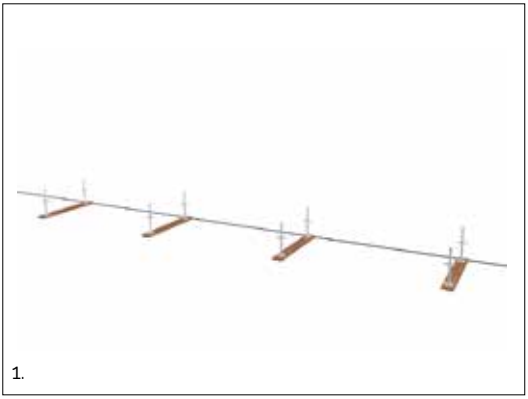
Name	Code	Item No	Weight
Right angle coupler RA With nut N=22 mm Certificate 145515 	48x48 22 mm	**2048010**	1,2
Swivel coupler SW With nut N=22 mm Certificate 145515 	48x48 22 mm	**2048011**	1,4
Locking pin Steel Ø 16 mm 		**5141257**	0,3
For reinforcing standard joint in connection with tensile load,e.g. when scaffolding is suspended, when lifting or when scaffolding is used for temporary roof. 		**2116000**	0,2
Scaffold safety sign Hooked on standard With A4 pocket for Facts about Scaffolding 		**2112000**	1,1

For other accessories, see HAKI Component List.

Information on safety when erecting and dismantling

1. Before erecting or dismantling a scaffold, try to fence off the working area if possible.
2. The location for the scaffold must be checked in order to prevent risks when erecting, dismantling and moving the scaffold and to ensure that work can be carried out safely with regard to level and slope, obstacles and wind conditions.
3. Make sure that all lifting equipment to be used, e.g. chain hoists, lifting ropes, pulley blocks, etc., has been thoroughly tested and approved by an authorized person in accordance with local regulations.
4. Check that tools and protective equipment are available at the worksite.
5. Wear appropriate personal safety equipment at all times, e.g. safety harnesses, proper independent lifelines with suitable fixings, etc.
6. When erecting and dismantling a scaffold, robust temporary decking must be used as temporary platforms for the scaffolders.
7. Always make sure that the safety locking devices that prevent a platform lifting off have been activated once a platform has been installed.
8. Study all relevant instructions or safety directions from the manufacturers of the various scaffolds that are to be used.
9. Never climb up a scaffold from the outside. Always use the stairs, ladders or climbing frames that are designed to provide access to the upper decks from the inside of the scaffold.
10. If the scaffold is to be used outdoors, erection or dismantling work must be discontinued if the weather conditions are too bad. Make sure that all loose components are properly fixed before leaving the scaffold.
11. All scaffolding work must be undertaken by competent operatives under the supervision of a competent person.
12. Raising and lowering of parts, material and tools using ropes or slings must be carried out in a protected lifting area.
13. Lifting equipment must not be fitted to scaffolding unless ties or equivalent devices are secure.
14. Beware of any overhead power lines nearby.
15. Always observe and comply with the regulations issued by the local authorities concerned.

Before erecting the scaffold, check and flatten out the ground. The support surface must not be subject to uneven settlement. Its bearing capacity may be improved with the help of sole pads.



1.

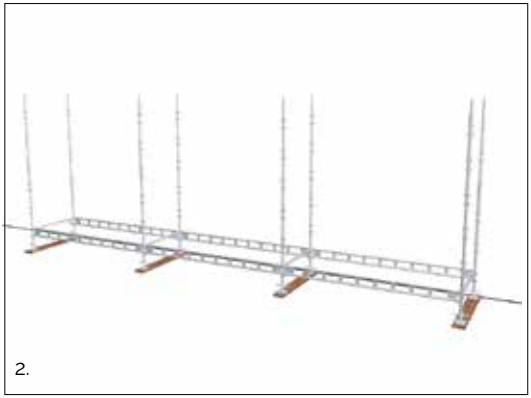
1. Set out the material for the base and the first lift along the facade.

Place the base jacks about 200 mm out from the facade and at the modular distances that are to be used.

If inside brackets are to be used, increase the distance accordingly.

The greatest permissible distance between the facade and work platform without inside handrails and toeboards is 225 mm.

Always start erection at the point that is situated highest.

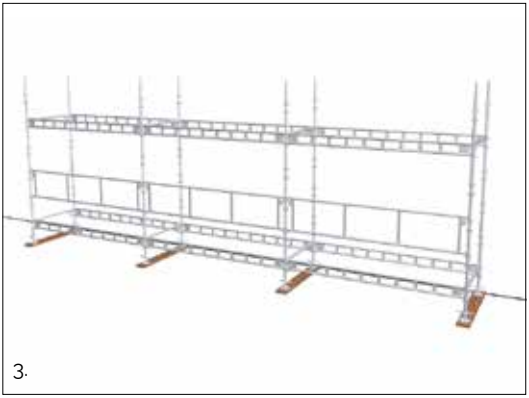


2.

2. Erect the first standard and fit a transom and ledger beam to it.

The beams are fitted to the lowest group of pockets on the standard.

Check that the beam locks are in the locked position after fitting.



3.

3. Fit the SKRD guardrail frames along the scaffold at a level of 1.0 m.

Guardrail frames must be fitted in each bay and at each lift level on the outside of the scaffold.

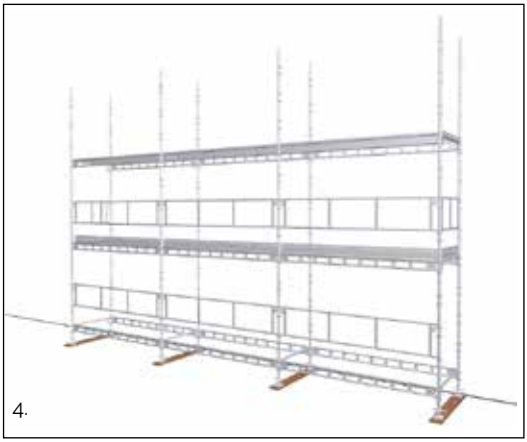
Alternatively, fit the vertical diagonal braces.

Continue erecting the base of the scaffold bay by bay using base jacks, standards, transoms and ledger beams and guardrail frames.

If HAKI UTV stairways are to be used, plan a 2500 or a 3050 mm bay for the ascent.

From time to time, check the levels in both the transverse and longitudinal directions using a spirit level and adjust using the swivel base jacks.

If there are major differences in levels, adjust each individual standard in relation to the support surface so as to make the beams level.



4.

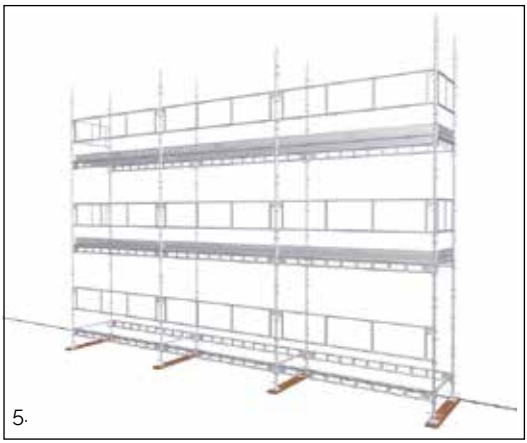
4. Fit the transom and ledger beams for the second lift 2.0 m above the beams that were fitted first.

Fit HAKI decking units to the transom beams. Don't forget to lock the decking.

Fit the second set of 3000 or 2000 mm standards.

Install SKRD guardrail frames for the second lift and fit the toeboards.

Don't forget the end guardrails.



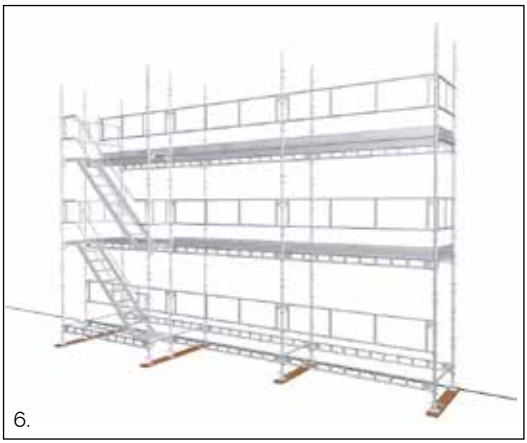
5.

5. Fit the transom and ledger beams for the third lift and then decking, guardrails and toe-boards.

Don't forget to lock the beams and decking.

Anchor the scaffold at a height of approximately 4.8 m using tie rods and clamps. See page 22.

Check that the fixings in the facade can carry the forces involved.



6.

6. Continue erecting the subsequent lifts as described above.

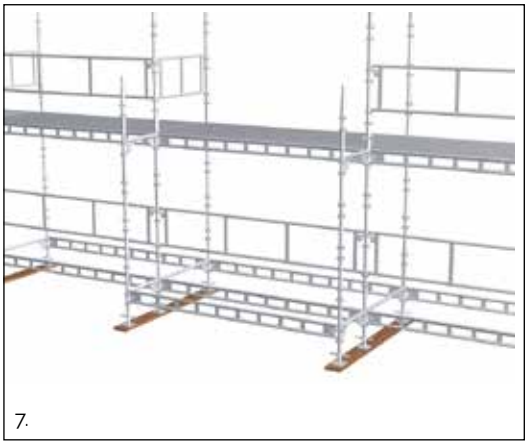
Use approved lifting aids for transport of the material.

If steel or aluminium planks are used please ensure that all the planks are fixed with the locking catch.

When decking using Timber boards, these must be provided with Intermediate transoms. Maximum spacing between intermediate transoms is 1,2 m; see the section "Bracing and decking" in the HAKI Universal User manual.

Dismantling is done in the reverse order.

Scaffolding material must not be thrown down from the scaffold.



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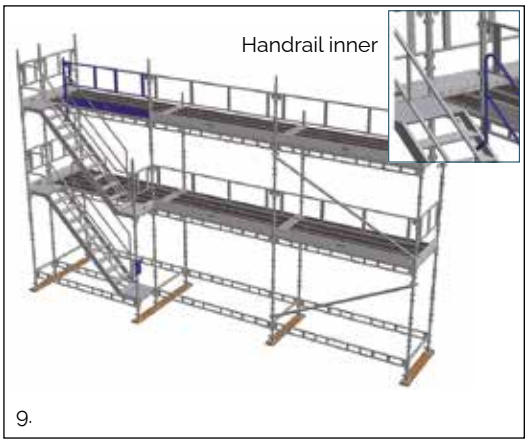
8.



9.

External stairways

There are two options for external stairways: the HAKI UTV of steel and the HAKI UTV of aluminium.

Both options are fitted in a similar manner.

7. The UTV stairway is fitted in an external bay using ERB 700 and LB/ERB 2500/3050 beams.

The stairway is usually built into the scaffold.

Alternatively, the stair tower is erected using separate standards.

Set out the base jacks and erect the standards. Fit the ERB 700 and LB/ERB 2500/3050 beams into the lowest group of pockets.

Fit the transom beams for the second lift too. At other levels, the handrails replace the ledger beams.

8. Fit the hooks of the UTV stairway over the tubes of the transom beams and lock the stairs using the locking device. Fit the handrail at the 1.0 m level and provide the top end with SKRD 700 guardrail frames.

Fit the next set of standards, transom beams, stairs, handrail and guardrail frames.

9. Continue erection up to the desired height.

At the top level, an ERB 2500/3050 beam is fitted externally in the scaffold. An SSK 1000 guardrail post is fitted on the beam so that an SKRD 1964/2500 guardrail frame can be fitted between post and standard.

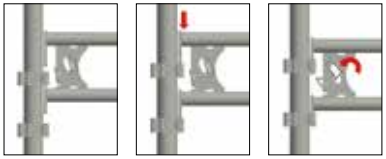
Alternatively, an LB 2500/3050 beam can be combined with an SRS 1000 guardrail post.

The guardrail frame provides fall protection at the top level of the scaffold. At other levels, the next stairway provides sufficient protection.

However, an HLI UTV handrail can be fitted on the inside of the stairway. See detail.

Locking components

It is very important that all components in the HAKI System are continuously locked during the erection. It is made in the following way:

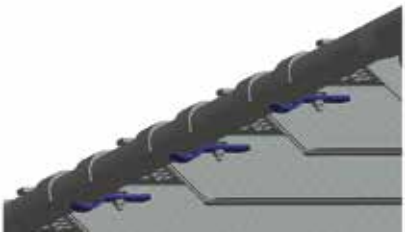


10.

10. The HAKI components are easily locked with a spring locking catch or hook. In locked position, see illustration, the component is prevented from involuntarily coming out of position.

Spring locking catches that are defekted shall immediately be replaced. This is easily done with the help of the HAKI spring locking catch tool.

HAKI supplies the spring locking catch tool and the original spring locking catches.



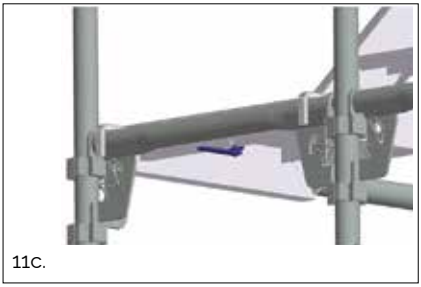
11a.

11. HAKI aluminium plank, steel plank and steel decking unit has the possibility to be locked in both ends.

The locking is a mechanical lock that is locked by hand and prevents the decking from involuntarly coming out of position.

In extreme environments the decking should also be locked using for example steel wire.

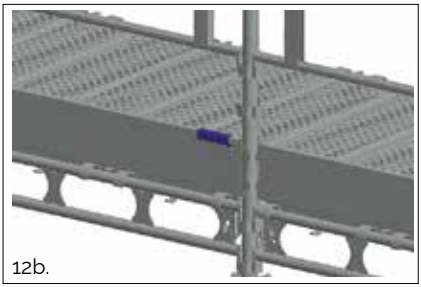
11b.



11c.

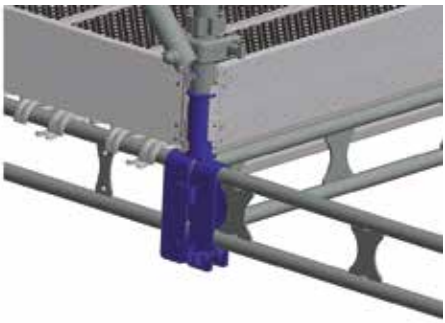
12. Toeboards are locked with a hook.

12a.



12b.

Puncheon Units



13.

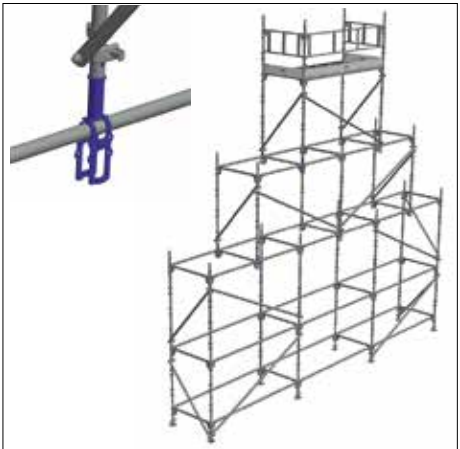
13. Puncheon Units application is to make "off-node" vertical connections.

When using puncheon units, the bay length is slightly shortened, and one can continue upwards with a different bay length.

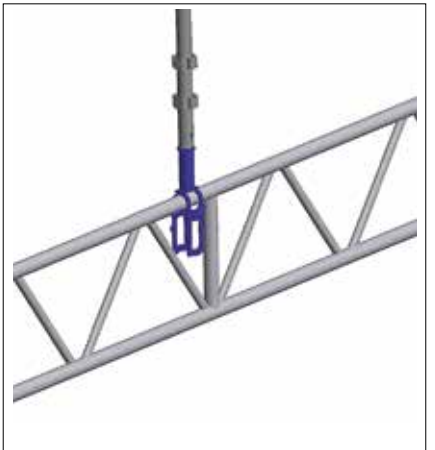
.

Puncheon units can be installed anywhere on the ledger beams, as shown in figure 13.

Puncheon units 50 can be installed on the single ledgers or lattice beams, as shown in figures 13a and 13b.



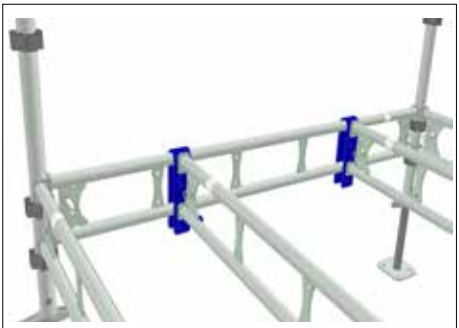
13a. Puncheon Unit for Single Ledgers



13b. Puncheon Unit 50 for 450/750 Lattice Beams

Note! For the permissible point loadings on beams, see page 27

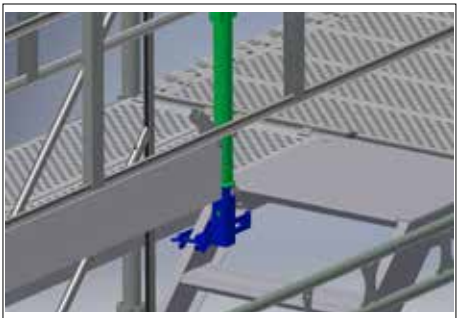
Beam Riders



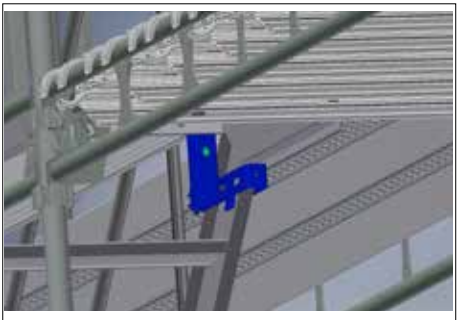
14.

14. Beam Riders are mounted on a ledger beam. By using beam riders, the scaffold frame becomes flexible and the bay lengths can be adjusted.

Handrail post LSS



15a.



15b.

15. When aluminum planks are used as decking, Guardrail Post LSS must be used. This is attached to the stringer on the UTV stairway with the LSS UTV Bracket, as shown in figures 15a and 15b.

Base jacks

The scaffold is erected on base jacks of type BS 34, which are adjustable between 55 and 570 mm.

This means that it is always possible to adjust the standards so as to make the beams level.

Beams

The scaffold is erected using LB AL or ERB AL beams as ledger and/or transom beams with 2.0 m between the lifts.

Each lift must be provided with beams on both the inside and outside. The bottom lift must always be placed at the lowest possible level.

Standards

Standards of length 3000 or 2000 mm are normally used in the scaffold.

Standards shorter than 2000 mm may only be used as landing standards.

Guardrails

Decked lifts must be provided with guardrail frames or double guardrails and toeboards.

The height of the guardrail must always be at least 950 mm.

Access ways must be provided with double handrails.

Instructions for dismantling

1. Dismantle the scaffold from the topmost lift.
2. Start by taking down the toe boards, mid-rails and hand rails.
3. Take down the topmost decking, then the stairs.
4. Take down the horizontals and diagonals of the topmost lift.
5. Finally, take down the standards of the topmost lift.
6. Repeat steps 3 to 5 to take down the second topmost lift and continue the whole process until the tower is completely dismantled.
7. Do not throw or dump the material onto the ground. This may damage the material or cause personal injury. The material must be lowered down to the ground by means of ropes or slings or carried down by hand.
8. Ties must not be removed before the dismantling process has reached the level in question.

Load classes

Refers to EN 12811-1

Load class	Uniformly distributed load [kN/m²]	Concentrated load on area 0.5m x 0.5m [kN]	Load of one person on area 0.2m x 0.2m [kN]	Partial area load	
				Load [kN/m²]	Partial area [m²]
1	0.75	1.5	1.0	-	-
2	1.5	1.5	1.0	-	-
3	2.0	1.5	1.0	-	-
4	3.0	3.0	1.0	5.0	0.4 A
5	4.5	3.0	1.0	7.5	0.4 A
6	6.0	3.0	1.0	10.0	0.5 A

A=the area between two pairs of standards

Decking

HAKI decking units are used for decking. These are available in all bay sizes and with widths of 400 and 600 mm.

Alternatively, HAKI aluminium planks may be used. These units are available in all bay sizes and with widths of 170, 200, 230, 295 and 320 mm.

Further alternatives are aluminium or wooden gratings. These are intended for bay widths of 1250 or 1655 mm. The gratings are laid on the scaffolding ledgers, transverse to the scaffold.

Decking may also be done using 195 x 50 mm scaffold planks, class K24.

Load classes decking

Decking	Width [mm]	Length [mm]	Load class
Decking unit	400, 600	1050 - 3050	3
AL plank	170, 200	770 - 2500	6
		3050	5
	230, 295, 320	770 - 1964	6
		2500	5
		3050	4

Bracing and tying-in

Vertical diagonal bracing between the outside standards must be installed in every 5th bay and always in the end bays. SKRD guardrail frames can replace vertical diagonal braces, but must then be fitted in each bay and at every lift level, including the bottom level.

Plan braces must be fitted in every 5th bay and always in the end bays at every 12th metre in height.

Each inside standard must be tied to the facade or equivalent at every 4th metre in height adjacent to the node between standard and beam.

The lowest tie must be fitted no more than 4.8 m above ground level.

There must be ties that can carry horizontal forces on at least every 5th pair of standards along the scaffold and at every level of ties.

In addition, we recommend that the scaffold always be anchored as high up as possible.

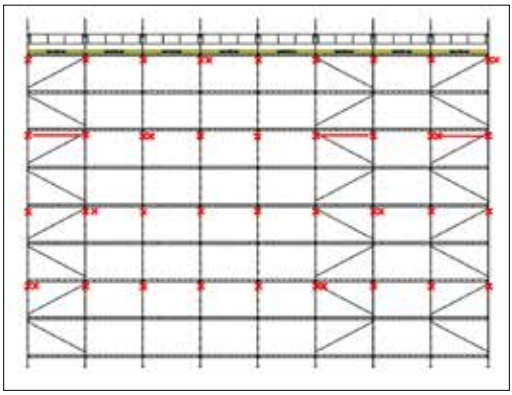
Where there are brackets, the scaffold must be anchored at the level of the brackets. Scaffold with latticebeams must be anchored at the fixing points of the beams.

The following estimated maximum loads apply to scaffolding of this type of 24 m in height in accordance with EN 12811.

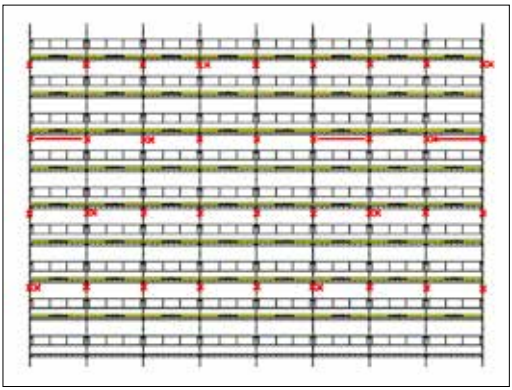
Ties that can withstand horizontal forces should be dimensioned for a load of 4,7 kN parallel with the façade and 5,7 perpendicular to the façade.

Other ties should be dimensioned for a load of 3,9 kN perpendicular to the façade.

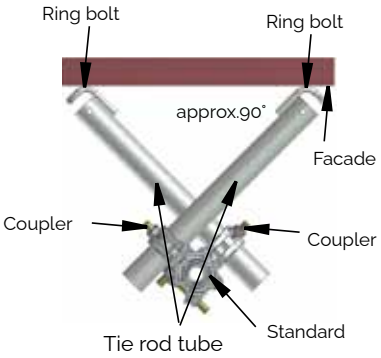
Where a scaffold is covered in sheeting, the number of ties must be increased to take account of wind load. Seperate calculations are therefore required.



Bracing with vertical diagonal braces and tying-in



Bracing with SKRD guardrail frames and tying-in



Examples of ties that can carry horizontal forces.
(PLEASE NOTE: use type examined couplers)

Permissible loads on standards

When calculating permissible construction heights for the scaffold, the following permissible loads on standards can be applied for different combinations of lift height and vertical distances between ties.

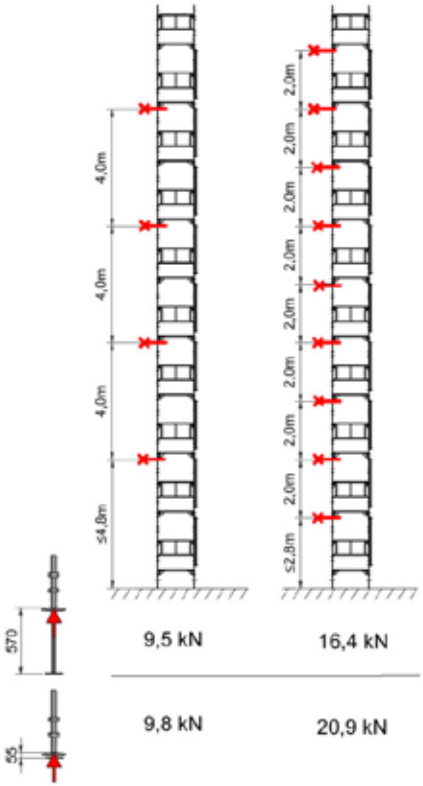
Lift height [m]	Vertical distance between ties [m]	Permissible standard load [kN]		
		Base jack max.	Base jack min.	Vertically braced using SKRD
2.0	2.0 4.0	16.4 9.5	20,9 9,8	16.4 9.5

1 kN ≈ 100 kp

The support surface must be capable of withstanding a design load per standard of twice the relevant permitted load on a standard.

When scaffolding is suspended, standard joints must be locked using 16 mm pins. The permissible tensile load on a standard in a suspended scaffold is **20.0** kN.

When designing using the partial coefficient method, the design bearing capacity is obtained by multiplying the permitted load by 1.5.



Permissible construction heights

The table applies to HAKI Universal Aluminium S4 with bay lengths 3050 mm, lift heights 2.0 m, and vertical distances between ties of 2.0 or 4.0 m.

Work must not be carried out on more than one lift at a time.

Decking has been calculated at 16,5 kg/m^2.

HAKI recommends a bay width of at least 1.0 m for load classes 4, 5 and 6.

Other bay lengths, bay widths and decking alternatives will have an effect on the permissible construction height.

Please contact HAKI's technical department in these cases.

Permissible construction heights for HAKI Universal Aluminium S4

Vertical distance between ties [m]	Decking	Width [mm]	Number of decked levels	Load class				
				1	2	3	4	5
2.0	AL plank 170/200 Load class 5 / AL plank 230/295/320 Load class 4 16.5 kg/m²	700	1	190	182	176	164	148
			5	172	160	152	134	110
			All	68	64	60	54	46
		770	1	188	178	172	160	142
			5	168	154	146	128	100
			All	66	60	56	50	40
		1050	1	182	168	160	144	---
			5	158	138	126	100	---
			All	54	48	44	36	---
		1250	1	176	162	152	---	---
			5	150	126	112	---	---
			All	48	42	38	---	---
4.0	AL plank 170/200 Load class 5 / AL plank 230/295/320 Load class 4 16.5 kg/m²	700	1	102	94	88	76	60
			5	84	72	64	46	22
			All	36	32	28	22	12
		770	1	100	90	84	72	54
			5	82	68	58	40	14
			All	34	28	26	20	10
		1050	1	94	82	74	58	-
			5	70	52	40	14	-
			All	26	22	18	10	-
		1250	1	90	76	66	-	-
			5	64	42	26	-	-
			All	24	16	12	-	-

1 kN = 100 kp

Note! Increased wind load for heights above 24 m has not been considered.

Permissible load classes for different beam combinations

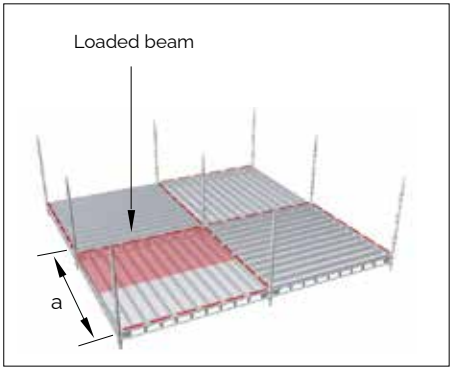
The tables apply to HAKI Universal Aluminium LB AL or ERB AL beams for varying bay sizes, decking of weight 16.5 kg/m² and unilateral or bilateral loading. In the specified load classes, no consideration has been paid to the bearing capacity of the decking.

Permissible load classes for LB AL beam for unilateral loading

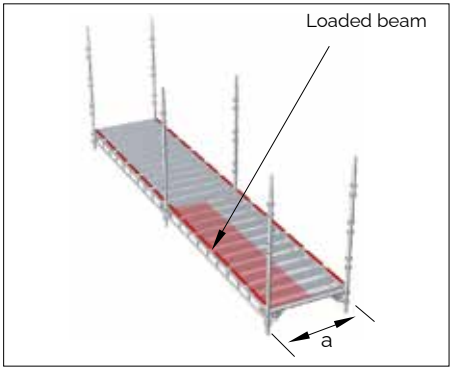
Ledger beam LB AL	a [m]							
	700	770	1050	1250	1655	1964	2500	3050
LB 350	6	6	6	6	6	6	6	6
LB 770	6	6	6	6	6	6	6	6
LB 1050	6	6	6	6	6	6	6	6
LB 1250	6	6	6	6	6	6	6	6
LB 1655	6	6	6	6	6	6	5	5
LB 1964	6	6	6	6	6	6	5	5
LB 2500	6	6	6	6	5	5	4	3
LB 3050	6	6	6	5	5	4	4	3

Permissible load classes for ERB AL beam for unilateral loading

Single tube beam ERB AL	a [m]								
	564	700	770	1050	1250	1655	1964	2500	3050
ERB 564	6	6	6	6	6	6	6	6	6
ERB 700	6	6	6	6	6	6	6	6	6
ERB 770	6	6	6	6	6	6	6	6	6
ERB 1050	6	6	6	6	6	6	6	6	6
ERB 1250	6	6	6	6	6	6	6	6	5
ERB 1655	6	6	6	6	6	5	5	4	4
ERB 1964	6	6	6	5	5	4	4	3	3
ERB 2500	6	5	5	4	4	3	3	3	2
ERB 3050	6	4	4	3	3	3	2	1	1



Wide scaffold



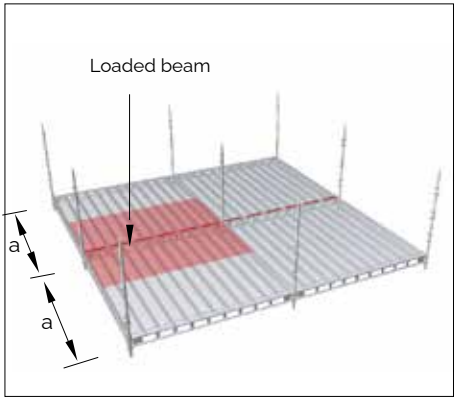
Facade scaffold

Permissible load classes for LB AL beam for bilateral loading

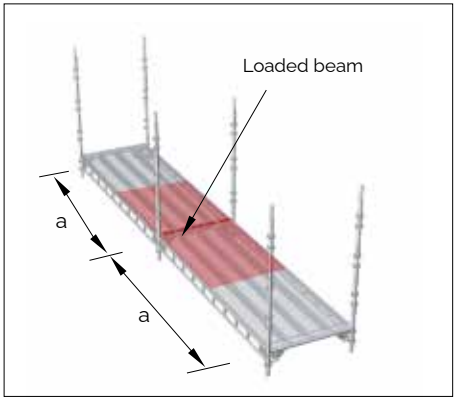
Längdbalk LB AL	a [m]							
	700	770	1050	1250	1655	1964	2500	3050
LB 350	6	6	6	6	6	6	6	6
LB 770	6	6	6	6	6	6	5	5
LB 1050	6	6	6	6	5	5	4	4
LB 1250	6	6	6	6	5	5	4	3
LB 1655	6	6	5	5	4	4	3	3
LB 1964	6	6	5	5	4	4	3	3
LB 2500	5	5	4	4	3	3	3	3
LB 3050	5	5	4	3	3	3	2	---

Permissible load classes for ERB AL beam for bilateral loading

Enrörsbalk ERB AL	a [m]								
	564	700	770	1050	1250	1655	1964	2500	3050
ERB 564	6	6	6	6	6	6	6	6	6
ERB 700	6	6	6	6	6	6	6	5	5
ERB 770	6	6	6	6	6	6	6	5	5
ERB 1050	6	6	6	6	6	5	5	4	4
ERB 1250	6	6	6	6	6	5	5	4	3
ERB 1655	6	5	5	5	4	3	3	3	2
ERB 1964	6	4	4	3	3	3	2	1	1
ERB 2500	5	4	3	3	3	2	1	1	1
ERB 3050	4	3	3	2	1	1	1	---	---



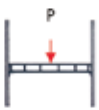
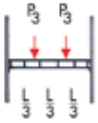
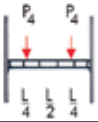
Wide scaffold



Facade scaffold

Permissible loads on beams

Permissible loads on beams installed in HAKI standards.

					
Beam type	Permissible load q [kN/m]	Permissible distributed load Q [kN]	Permissible centrepoint loads P [kN]	Permissible point loads P_3 [kN]	Permissible point loads P_4 [kN
LB 350 AL	141.8	42.5	42.5	21.3	21.3
LB 770 AL	59.1	42.5	30.1	21.3	21.3
LB 1050 AL	42.5	42.5	21.7	16.3	21.3
LB 1250 AL	30.1	36.1	18.1	13.6	18.1
LB 1655 AL	16.8	27.0	13.5	10.1	13.5
LB 1964 AL	11.8	22.6	11.3	8.5	11.3
LB 2500 AL	7.2	17.6	8.8	6.6	8.8
LB 3050 AL	4.8	14.4	7.2	5.4	7.2
ERB 564 AL	33.1	17.0	8.5	6.4	8.5
ERB 700 AL	26.2	17.0	8.5	6.4	8.5
ERB 770 AL	23.6	17.0	8.5	6.4	8.5
ERB 1050 AL	17.0	17.0	8.5	6.4	8.5
ERB 1250 AL	11.8	14.2	7.1	5.3	7.1
ERB 1655 AL	5.6	9.0	4.5	3.4	4.5
ERB 1964 AL	3.8	7.3	3.7	2.8	3.7
ERB 2500 AL	2.4	6.0	3.0	2.3	3.0
ERB 3050 AL	1.6	4.7	2.4	1.8	2.4

Brackets

Each level at which a bracket is fitted must be provided with a wall tie.

Load classes for brackets apply provided that the brackets are fitted in a bay of length max. 3050 mm and in connection with decking of weight 16.5 kg/m².

In the specified weight classes, no consideration has been paid to the bearing capacity of the decking. The permissible load class can never be greater than the load class for the decking.

Bracket	Load class
SK 230 AL	6
SK 460 AL	4
SK 34-564 AL	3
SK 34-770 AL	3
SKD 34-1250 AL	3

Access ways

Access is usually provided by means of HAKI UTV AL stairways that are fitted to the outside of the scaffold using components designed for this purpose. When an external stairway is fitted in accordance with the directions on page 16, the loads on standards should not be reduced.

Permissible load on stairs and landings are 1.0 kN/m² for area on maximum 10 m height.

Alternatively, a HAKI tower scaffold may be used, see User´s Manual HAKI Stair Tower.

Lattice beams

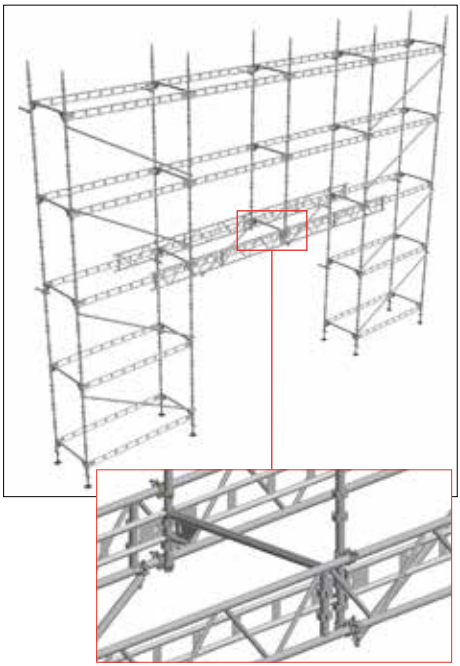
Lattice beams of aluminium

Aluminium lattice beams are fitted in pairs on the inside and outside of the scaffold.

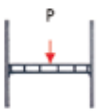
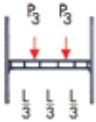
Both the top and bottom tubes must be fixed to the standards using SW 48x48 double couplers. The height is adjusted so that the decking is horizontal when this is installed.

The lattice beams must be braced against lateral movement using a diagonally rigid framework of standards and beams or tubes and couplers.

When erecting as in the illustration with ledger beams and horizontal diagonals, the greatest permitted load on a standard is 14.7 kN at the centre of the lattice beam. Vertical diagonal bracing must be carried out between the outer standards in both bays beside the beam.



Permissible loads on lattice beams

				
Lattice beam	Permissible load q [kN/m]	Permissible distributed load Q [kN]	Permissible centrepoint load P [kN]	Permissible point loads P_3 [kN]
Aluminium				
FB 4100 AL	4.9	19.4	7.5	7.5
FB 6100 AL	3.0	18.3	7.5	6.9
FB 8100 AL	1.7	13.7	6.9	5.1

1 kN ≈ 100 kp

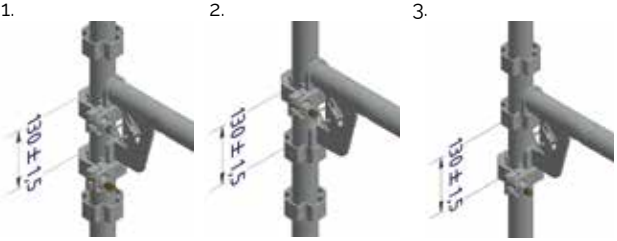
Pocket coupler 2048017

To be used for additional beams and brackets on HAKI standards.
Not for dimensioning of the entire scaffolding.

Assembly:

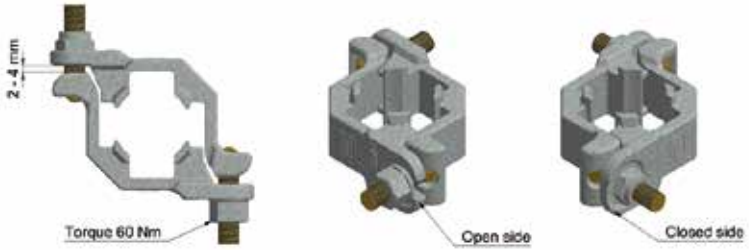
1. Two pocket couplers mounted on free hight and angle between existing pockets.
2. One pocket coupler above existing pocket.
3. One pocket coupler below existing pocket.

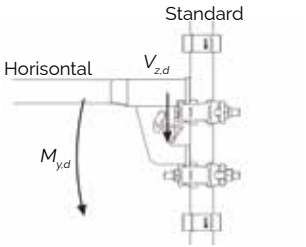
1. 2. 3.



Check that the pockets are parallel, so both hooks are completely down in the pockets. The distance between the top of the pockets shall be 130±1,5 mm.

Tightening torque: 60 Nm for nut on open side. (Threads lubricated)
Nut on closed side, adjusted if necessary, before assembly. Clearance 2-4 mm.





Scaffold system and type of load	Design load capacity	Permissible load gF=1,5
HAKI Universal AL My,d	2005 Nm	1337 Nm
HAKI Universal AL Vz,d	11202 N (22404 N) [1]	7468 N (14936 N) [1]

[1] One coupler (two couplers)

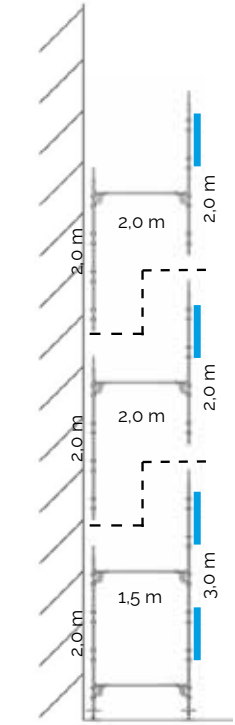
Alternative methods of erection when guardrail is fitted in advance

In order to be able to fit guardrails prior to decking, using HAKI's advance guardrail tool or with the aid of other guardrail fitting devices, the external standards must be one metre higher than the next lift. Some alternative methods of erection to achieve this are shown here.

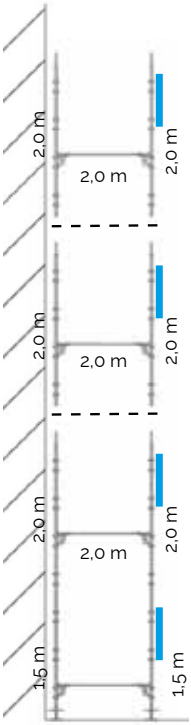
These methods of erection also facilitate the use of temporary guardrails.

For permissible loads on standards, see page 23.

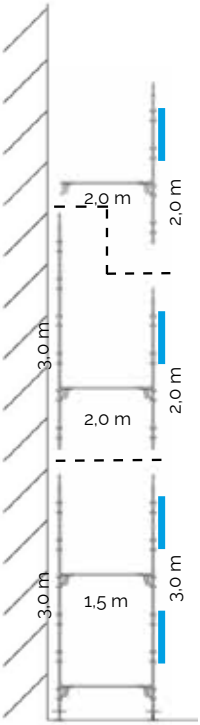
In other respects, see instructions for the fitting devices in question.



With a first lift height of 1.5 m, start with a 2.0 m standard internally and a 3.0 m standard externally. Continue with lift heights of 2.0 m, using 2.0 m standards both internally and externally.



With lift heights of 2.0 m, start with a 1.5 m standard both internally and externally. Continue with 2.0 m standards both internally and externally.



With a first lift height of 1.5 m, start with 3.0 m standards both internally and externally. Continue with lift heights of 2.0 m, using 3.0 m standards internally and 2.0 m standards externally.

Maintenance & storage

1. After use, all components must be thoroughly cleaned and inspected before storage.
2. Any damaged parts or components found must be replaced.
3. The manufacturer or supplier must be consulted before repairing scaffold material.
4. Components must be sorted and stacked properly. Take care not to pile the stacks too high, so that the material lower down in the stacks becomes overloaded and damaged. If the material must be stacked up high, suitable racking and shelves should be used.
5. Wooden and plastic components (e.g. platforms, toe boards, toe board holders, etc.) should be stored in a sheltered area so as to maximize their working life.

Wind, ice and snow

Since extreme weather conditions may occur during winter months, it is important to remove snow and ice immediately.

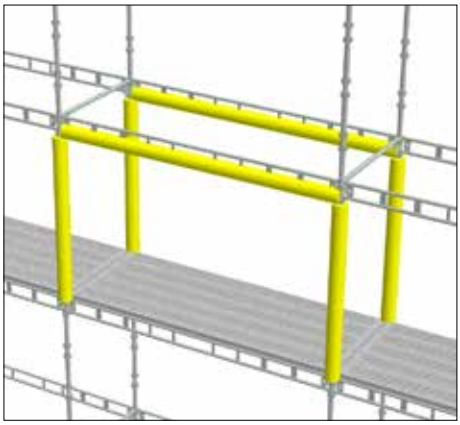
With regards to wind loads, ties must be installed every fourth metre in height; see the section “Bracing and tying-in”. For clad scaffolding, calculations should be made in each individual case.

For more information, please contact HAKI’s technical department.

Attachment points for personal fall protection equipment

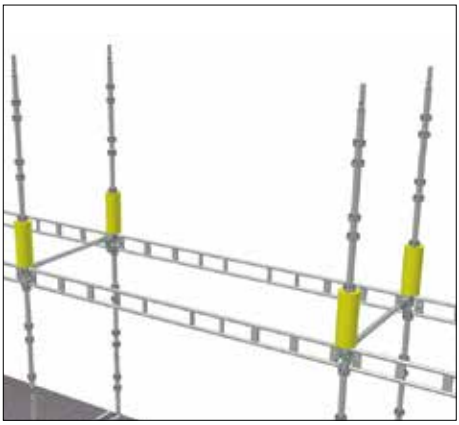
Permissible points of attachment for personal fall protection equipment are as described below.

PLEASE NOTE: Recommendations for points of attachment apply provided that the component in question is otherwise without load and that only one person is attached to the same component at any one time. Components that have been subjected to loading from fall protection equipment must be scrapped and replaced by new material.



Around a standard between two lifts or around the lower tube in a ledger beam LB AL fitted between two standards.

PLEASE NOTE: It is not permissible to attach around a HAKI Universal Aluminium single tube beam ERB AL.



Around a free standard, but only within 40 cm of the node.

PLEASE NOTE: Not next to a standard joint.

No other points of attachment can be recommended. Fall protection equipment MUST NOT be attached to guardrails, brackets and cantilevers, i.e. beams fixed at only one end.

Fall protection equipment MUST NOT be attached to components that have not been locked into place.

PLEASE NOTE: Use only approved safety equipment.

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Notes

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Experience

With over 50 years experience to call on, HAKI has gained a leading reputation in its field. With its own R & D and manufacturing facilities, the company now operates throughout Europe and its equipment is in use worldwide. With all products designed and manufactured to ISO 9001:2008, and a comprehensive training and support infrastructure, you can rely on HAKI for support.

Training

The Company´s dedicated Training Centre is equipped with the full range of HAKI products where a comprehensive choice of courses is offered. With the benefit of this training, all users of HAKI products can be assured that the equipment is being employed safely and effectively.

Support

From computerised estimating facilities to on site assessment and project back up, HAKI is with its customers every step of the way. Working with HAKI means far more than just proven equipment, it means working with People who understand the scaffolding industry. Whatever the project, the company is committed to ensuring every user enjoys the full benefits associated with the use of HAKI - maximising the savings, profitably, and above all, SAFETY.

Health and Safety at Work Act, 1974

HAKI equipment is designed to meet the requirements of the above Act, Section 6.

It is also the customer´s responsibility to comply with the requirements of this Act, particularly to use the equipment in accordance with current codes of practice and in ensuring that components are in good working condition prior to each use.

We are able to provide assistance and advice on matters relating to safe and proper use of HAKI equipment.

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