Assembly instructions for HAKI IV

These assembly instructions are designed for the construction of sectional HAKI IV scaffolding approved in accordance with the technical standards TP 73-05-60/020/83. The instructions are compiled to contain all information required for using HAKI IV scaffolding, so that references to technical standards are not necessary.

1. Introduction

Sectional HAKI IV scaffolding is a temporary structure for working safely at heights. Segments of the basic HAKI IV set are also used for other types of scaffolding – spatial, hung, mobile, staircase towers, shelters, platforms etc. Describing the assembly of all these variants would be far beyond the scope of this manual. Please contact the design department for information on the possibilities of using HAKI scaffolding. We will be glad to answer any queries.

2. Segments of HAKI IV scaffolding

1) **Adjustable footing 0.45m. 0.6m. 0.8 m (alternatively firm footing with holes for height adjustment)**
2) **Post standard 2.72 m, 2.04m, 1.36m (for clips)**
3) **Longitudinal beam 3 m, 2.4m, 1.91m**
4) **Transom beam 1.2 m, 1m, 0.66m.**
5) **Guard frame 3 m, 2.4m, 1.91m, 1.2 m, 1m, 0.66m.**
6) **Diagonal wind bracing 3.8 m**
7) **Diagonal tubular wind bracing 3.5m, 2.9m, 2m**
8) **Anchorage 0.6 m**
9) **Stop capture**
10) **Ladder 2.35 m**
11) **Pendant pulley 100 kg**
12) **Floor beam 0.5 x 1.35 m**

Note. Floor beams can also be made from wooden beams put through the holes in the longitudinal beam and boards nailed to it.

We are also able to produce special custom made segments.

3. Construction elevations of HAKI IV scaffolding

Unanchored scaffolding

Free-standing scaffolding with 1.2 m transom beams can be constructed up to two-stories high with one or two spans with a standardized floor loading capacity of 1145 kg for span (this loading capacity is 950 kg for the scaffolding with 1.2 m transom beams and 650 kg for scaffolding with 0.66 m transom beams). The scaffolding must be diagonally braced. Scaffolding assembled this way is designed for a maximum of 2 workers (only 1 worker for span can work on the scaffolding with transom beams 1 m and 0.66 m, otherwise the scaffolding has to be supported or anchored). In case of higher or longer construction, other security means are to be used to assure the scaffolding's stability in accordance with ČSN 73 8102.

Anchored scaffolding

HAKI IV scaffolding can be constructed as *light or heavy* depending on the type of floor load required.

Construction elevation of HAKI IV – 90 scaffolding

Light scaffolding HAKI IV – 90 (span width 1.25m)

Equal nominal surface loading of floors is up to 1.5 kN/m^2 (max. load weight on one span 570 kg, equally distributed at 150 kg/m^2).

Construction elevation of light scaffolding HAKI IV – 90 – 1.25

total number of loaded floors n_p	**Vertical distance of anchors 1_k (m)**					
	2.04		**4.08**		**6.12**	
	m	**floors**	**m**	**floors**	**m**	**floors**
1	84 (90)	41 (44)	37	18	29	14
2	76 (82)	37 (40)	29	14	21	10
3	68 (74)	33 (36)	23	11	15	7

Values in parentheses apply providing that no floor beams and guard frames are fitted on at least five floors. The construction elevation decreases by 4 floors for every extra loaded floor.

Light scaffolding HAKI IV – 90 (span width 1.05m)

Equal nominal surface loading of floors is up to 1,5 kN/m^2 (max. load weight on one span 475 kg, equally distributed at 150 kg/m^2).

Construction elevation of light scaffolding HAKI IV – 90 – 1.05

total number of loaded floors n_p	**Vertical distance of anchors 1_k (m)**					
	2.04		**4.08**		**6.12**	
	m	**floors**	**m**	**floors**	**m**	**floors**
1	45	22	29	14	23	11
2	39	19	23	11	17	8
3	33	16	17	8	11	5

The construction elevation decreases by 3 floors for every extra loaded floor.

Light scaffolding HAKI IV – 90 (span width 0.71m)

Equal nominal surface loading of floors is up to 1.5 kN/m^2 (max. load weight on one span 325 kg, equally distributed at 150 kg/m^2).

Construction elevation of light scaffolding HAKI IV – 90 – 0,71

total number of loaded floors n_p	**Vertical distance of anchors 1_k (m)**					
	2.04		**4.08**		**6.12**	
	m	**floors**	**m**	**floors**	**m**	**floors**
1			37	18	31	15
2			31	15	25	12
3			25	12	19	9

The construction elevation decreases by 3 floors for every extra loaded floor.

Diagrams of anchoring and diagonal bracing are shown in the appendix.

Heavy scaffolding HAKI IV – 90 (span width 1.25m)

Equal nominal surface loading of floors up to 3 kN/m^2 (max. load weight on one span 1145 kg, equally distributed at 300 kg/m^2).

Construction elevation of heavy scaffolding HAKI IV – 90 – 1.25

total number of loaded floors n_p	**Vertical distance of anchors 1_k (m)**					
	2.04		**4.08**		**6.12**	
	m	**floors**	**m**	**floors**	**m**	**floors**
1	76 (82)	37 (40)	29	14	21	10
2	62 (68)	30 (33)	17	8	6,6	3
3	47,5 (53,5)	23 (26)	-	-	-	-

Values in parentheses apply providing that no floor beams and guard frames will be fitted on at least five floors. The construction elevation decreases by 7 floors for every further loaded floor.

Heavy scaffolding HAKI IV – 90 (span width 1.05m)

Equal nominal surface loading of floors up to 3 kN/m^2 (max. load weight on one span 955 kg, equally distributed 300 kg/m^2).

Construction elevation of heavy scaffolding HAKI IV – 90 – 1.05

total number of loaded floors n_p	**Vertical distance of anchors 1_k (m)**					
	2.04		**4.08**		**6.12**	
	m	**floors**	**m**	**floors**	**m**	**floors**
1	39	19	23	11	17	8
2	29	14	13	6	7	3
3	19	9	-	-	-	-

Heavy scaffolding HAKI IV – 90 (span width 0.71m)

Equal nominal surface loading of floors up to 3 kN/m^2 (max. load weight on one span 650 kg, equally distributed at 300 kg/m^2).

Construction elevation of heavy scaffolding HAKI IV – 90 – 0.71

total number of loaded floors n_p	**Vertical distance of anchors 1_k (m)**					
	2.04		**4.08**		**6.12**	
	m	**floors**	**m**	**floors**	**m**	**floors**
1			31	15	25	12
2			21	10	15	7
3			11	5	-	-

The construction elevation decreases by 5 floors for every extra loaded floor (also applies for widths of 1.05m a 0.71m).

Conditions necessary to reach construction elevations

Diagonal bracing for an anchoring frequency of 2.04m is carried out in every other span on the outer side of the scaffolding and in every fourth span on the inner side of the scaffolding. Diagonal bracing is carried out in every other span on the outer side for an anchoring frequency of 4.08m and every fourth span on the outer side for an anchoring frequency of 6.12m.

The height of the scaffolding has to be decreased in the winter period by 2 floors, with respect to loading by snow, or the snow must be removed.
If a pulley is operated from the scaffolding then it is necessary to decrease the scaffolding's maximum construction elevation by 3 floors (by 4 floors for widths 1.05m and 0.71m). The pulley cannot be located on a corner post.
The maximum distance the scaffolding can rise above the object is that of an anchor, i.e. by 6m.
The maximum specific pressure of footing on the base is 2,72 MPa (1,6 MPa for widths 1,05m and 0,71m)

4. Assembling HAKI IV - 90 scaffolding

General instructions

1) Common tools are used for the assembly – hammer, plumb-line and water level.

2) Clips for the longitudinal beam plane are placed above the clips for the transom beam plane.

3) Segments can be used only for the purpose set out in the technical standards. For example, guard frames etc. cannot replace transom beams, unless it is explicitly specified in some applications of the scaffolding.

4) No segments of the scaffolding systems can be omitted, especially anchoring and diagonal bracing.

5) Horizontal segments must be immediately secured by safety locks.

6) Damaged, incomplete or heavily corroded segments cannot be assembled.

7) Overall assembling of scaffolding has to be carried out by at least two workers.

8) No segments can be dropped from the scaffolding during disassembly due to the risk of damage. It is also prohibited to push the scaffolding over and disassemble it on the ground.

9) Assembly of the upper floor of the scaffolding can be started only after the lower floor is completely finished including anchoring and diagonal bracing.

10) Scaffolding that has been assembled does not have to be anchored up to the 2nd floor, i.e. up to a floor height of approx. 4,5m, however above this height it is necessary to anchor the scaffolding. Work that decreases the scaffolding's stability, for example transporting material by pulley or drilling etc., cannot be performed on unanchored scaffolding of any height.

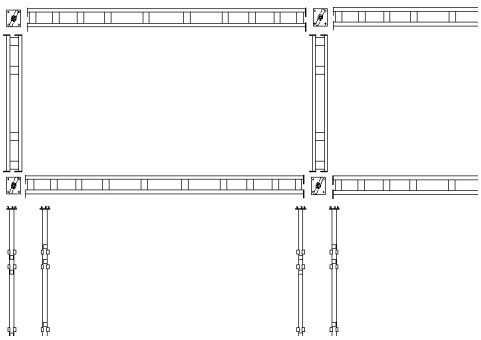
    Note: As the scaffolding anchors into the object, for example, wall plugs in drilled holes, into which wood screws with loopholes are screwed. The anchor has to transfer axial, tensile and compression force of at least 2 kN. With an anchoring frequency of 2,04m, the anchors have to transfer at least 2,2 kN. Please check the bearing capacity of concrete wall plugs with the manufacturer.

11) Disassembly has to be performed in such a way, that the structure's stability is not endangered in any of its phases.

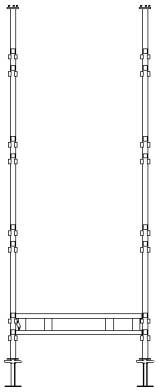
Assembling HAKI IV scaffolding

1) The bearing capacity of the terrain, on which the scaffolding is built, must correspond to the load caused by the weight of the scaffolding structure and its operation. If the scaffolding is not built on consolidated terrain (pavement, concrete etc.), it is necessary to use base sills (wooden planks etc.). Base sills can have a maximum inclination of 15° and have to be secured against possible displacement.

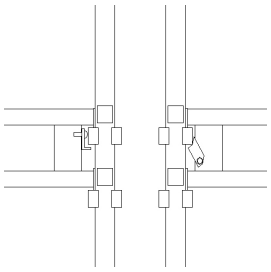
2) The scaffolding segments necessary for constructing the lower floor are laid out along the planned length of scaffolding in pitches approximately corresponding to the span length and width. Assembly is to be started at the highest point of the terrain. The recommended distance of inner footings from the construction face is max. 0,25m (otherwise it is also necessary to install a guard frame on the inner side of the scaffolding). Footings are dropped into the lowest position.



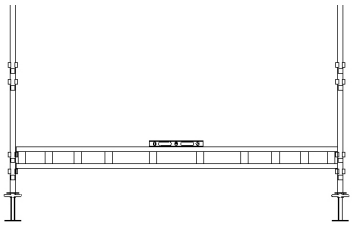
3) The following assembly work must be carried out by at least two workers. 2 standard posts are put on 2 footings and connected by the transom beam on the lowest clips (the transom beam plane clips are closer to the footing).



4) The horizontal segments' safety locks must be turned to the effective position immediately after installation.

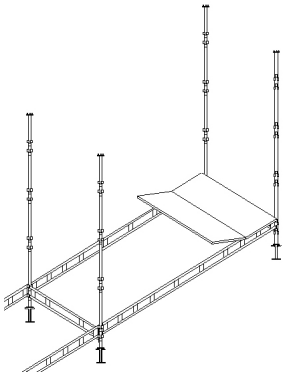


5) Further standard posts are added to the pair of standard posts connected by the transom beam and the scaffolding span is constructed. The scaffolding span must be horizontally adjusted by footings in both the longitudinal and transverse directions.

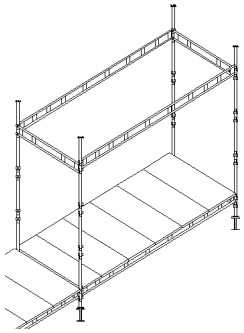


6) The assembly of the lowest floor will be finished in a similar manner. The whole floor is then checked by water level.

7) The floor is established by installing the floor beams (it is necessary to install a guard frame if the floor is more than 1,5m above the terrain).



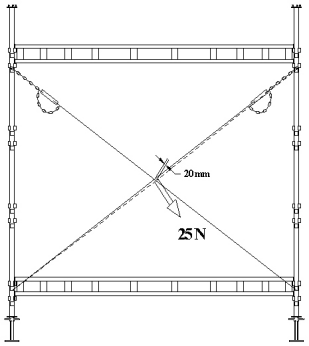
8) Now it is possible to continue assembling the next floor. The standard posts are connected by longitudinal and transom beams 2,04m above the floor (the 3rd pitch of clips).

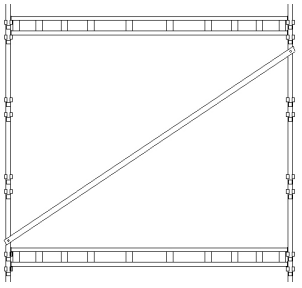


9) Assembly continues by mounting a diagonal bracing. The bracing is suspended on the outer clips of the standard post, namely to the bottom clip of the upper floor and the upper clip of the bottom floor. The diagonal bracing is shortened as required by hanging the tensor into chain links. The bracing has to be tensioned by a tensor to approx. 1 kN. A pre-stress test is carried out by deflecting the bracing in the middle of its length with a perpendicular strength of 25 kN. The deflection should be approx. 20 mm.

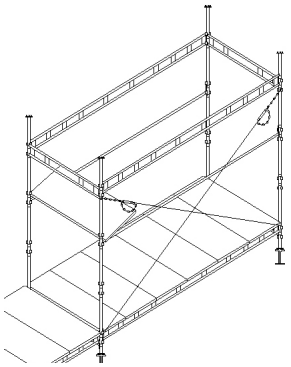
The wire bracing can be fully replaced with pipe bracing, which is fixed by sleeve joints (one pipe replaces two wires).

Note: Strength intensity can be estimated pursuant to the weight of the short guard frame – 27 N.

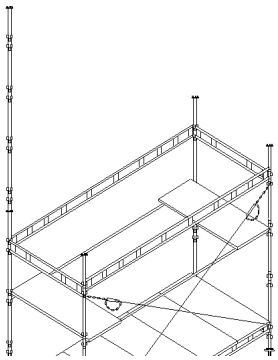




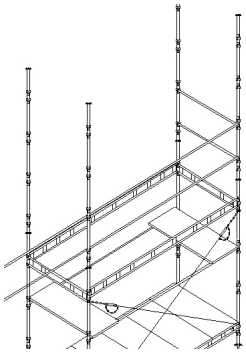
10) Assembly continues by setting the standard posts and fixing the upper floor guard frame. This work can easily be carried out using the so-called sublevel, which consists of a guard frame handrail (a guard frame handrail also has to be installed on the inner side of scaffolding). The sublevel created from the guard frame can be fitted with a maximum of one floor beam on each side of the span.



11) Set and turn the post, so that the bayonet joint closes; then adjust the standard posts from the sublevel.

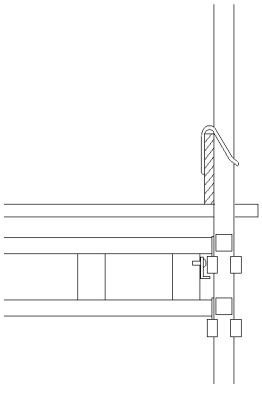


12) Pairs of posts have to be interconnected by both a longitudinal and transverse guard frame immediately after the posts' assembly in order to secure the posts against possible swing and dropping out. The guard frame handrail is suspended in the lower clips of the 2nd group above the floor and the middle bar into the upper clips of the 1st group above the floor.



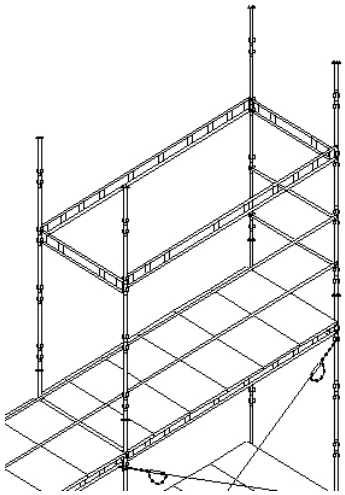
13) Floor beams from the sublevel will be used for the completed floor and the floor will be completely fitted. *Note: The posts can be adjusted even without the sublevel i.e. directly from the deck of the next floor. However, the workers do not have any support in case of stability loss, so we recommend using the sublevel.*

14) The guard frame is equipped with a stop fixed to the scaffolding posts by a stop catch.



15) The method of anchoring the scaffolding is specified depending on the required construction elevation and scaffolding span load. Anchoring is mounted on the post as close as possible to the joint where the post and transom beam meet and it is hooked into the loop of the anchor set into the object. The anchoring pull rod, which is sticking out into the transit profile of the scaffolding, must be bent so that no workers are injured.

16) The construction continues by assembling the next floor. Longitudinal and transom beams will again be hung 3 span pitches above the floor (height 2,04 m).

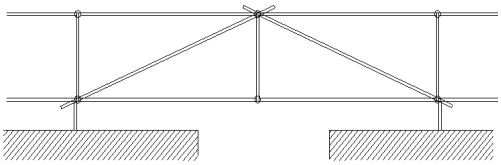


17) Diagonal bracing is completed according to subparagraph 9) after fitting the floors and the scaffolding's construction proceeds in the above described manner. Before assembling the upper floor the lower floor must always be fully completed including floor beams, guard frames, stops, anchoring and diagonal bracing and all segments must be secured by safety locks.

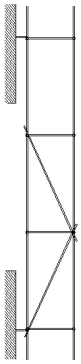
18) After assembling, the whole scaffolding is inspected, especially the anchoring, diagonal bracing and the safety locks.

5. Replacing the anchoring by diagonal bracing

If it is not possible to anchor the post in the point specified by these instructions, then both joints closest must be anchored above and under this point or the anchored joint must be horizontally braced in the adjoining span. In case anchoring is replaced by bracing the anchors, to which the diagonal bracing is led, must carry at least 50% more load than prescribed for the common anchors.



Horizontal angular bracing



Vertical angular bracing