USER MANUAL
ADVANCED USE OF QUICK LIFT

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R001-23	18.01.23	New user manual – First Edition
R002-23	24.03.23	New details in 3.8, 6.2, 6.7, 6.8 (new point), 8.2 and 22.2

User manual – Advanced use of Quick Lift

Content

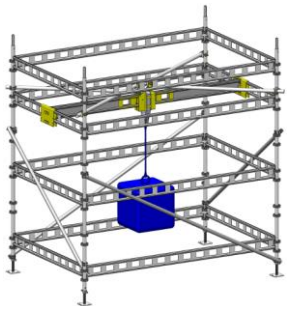
1. Introduction

This project's objective was to legalise the use of lifting equipment together with scaffolding materiel as fundament, by looking at the structural strength and ways to document this use. It was also a goal not to give to restrict regulations on the assembly itself, but to give clear regulations on how this can be assembled to handle applied loads. Quick Lift is owned and produced by ALUHAK systems, and compatible with ALUHAK industrial System Scaffold material. This user manual is therefore only valid using ALUHAK equipment described in the "Product Description" - Chapter 3.3.

2. Abbreviations

CC = Centre to Centre
SW = Self-Weight
SWL = Safe Working load
Ballast = Counterweight
LP = Lifting point = Placement Quick Lift
Pitch = The boat's heaving on waves (over transverse axis)
Roll = The boat's rolling in sea
Fixation = Attachment to solid structure

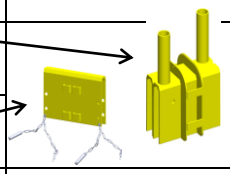
3. Product Description



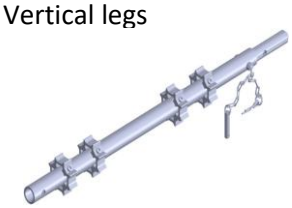
3.1 Manufacturer

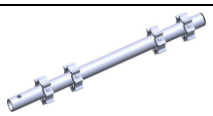
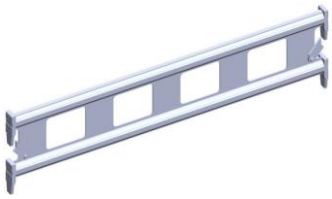
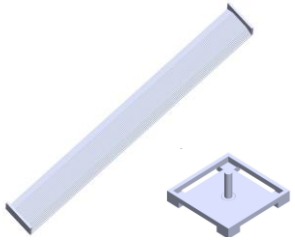
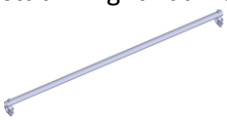
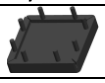
ALUHAK SYSTEMS AS
Møllevegen 3B
4353 KLEPP STASJON – Norway

3.2 Quick Lift Parts available

Product Name	Product/ Article nr.	Weight per item	Type/function	Serial number.	
BRM Double Lifting Guide	36-05-001	6,80 kg	Main lifting guide	320.xxxx	
BRM Stop Double	36-05-004	4,00 kg	Connector Secondary beam	360.xxxx	
Liftingbeam 1,20 m	36-05-120	4,20 kg	1,20m Lifting beam	120.xxxx	
Liftingbeam 1,60 m	36-05-160	5,20 kg	1,60m Lifting beam	160.xxxx	
Liftingbeam 1,90 m	36-05-190	6,10 kg	1,90m Lifting beam	190.xxxx	
Liftingbeam 2,45 m	36-05-245	7,80 kg	2,45m Lifting beam	245.xxxx	
Liftingbeam 3,00 m	36-05-300	9,20 kg	3,00m Lifting beam	300.xxxx	

3.3 Scaffolding parts approved as Fundament together with Quick Lift

Name ALUHAK Product	Description	Product/ Article nr.	Weight	Type/function
Adjustable Base plate	BS 600x34 Hollow	01-03-001	3,40 kg	Foot 
	BS 400x34 Hollow	01-03-002	3,00 kg	
Standards	FS 3,00 m	01-01-300	10,3 kg	Vertical legs 
	FS 2,50 m	01-01-250	8,80 kg	
	FS 2,00 m	01-01-200	7,20 kg	
	FS 1,50 m	01-01-150	5,50 kg	
	FS 1,00 m	01-01-100	3,90 kg	
	FS 0,50 m	01-01-050	2,20 kg	

Top Standards	FSK 1,50 m	01-02-151	4,84 kg	
	FSK 1,00 m	01-02-101	2,88 kg	
	FSK 0,50 m	01-02-051	1,80 kg	
Ledgers and Transoms	LB 3,00 m	02-01-300	8,90 kg	**Secondary beams** and Horizontally connections 
	LB 2,45 m	02-01-245	7,60 kg	
	LB 1,90 m	02-01-190	5,90 kg	
	TB 1,60 m	02-01-160	5,10 kg	
	TB 1,20 m	02-01-120	4,10 kg	
	TB 1,00 m	02-01-100	3,40 kg	
	TB 0,72 m	02-01-072	2,60 kg	
	TB 0,50 m	02-01-050	2,00 kg	
Single Tube Beams	EB 3,00 m	03-01-300	6,20 kg	Horizontally connections 
	EB 2,45 m	03-01-245	5,40 kg	
	EB 1,90 m	03-01-190	4,50 kg	
	EB 1,60 m	03-01-160	4,00 kg	
	EB 1,20 m	03-01-120	3,40 kg	
	EB 1,00 m	03-01-100	3,00 kg	
	EB 0,72 m	03-01-072	2,60 kg	
	EB 0,50 m	03-01-050	2,20 kg	
	EBS 1,90 m New	03-03-190	5,90 kg	
	EBS 1,60 m New	03-03-160	5,20 kg	
	EBS 1,20 m New	03-03-120	4,20 kg	
	EBS 1,00 m New	03-03-100	3,70 kg	
	EBS 1,60 m (Old)	03-02-160	3,70 kg	
	EBS 1,20 m (Old)	03-02-120	3,10 kg	
	EBS 1,00 m (Old)	03-02-100	2,80 kg	
	EBS 0,72 m (Old)	03-02-072	2,40 kg	
	EBS 0,50 m (Old)	03-02-050	2,00 kg	
Pipes and couplers	Pipes (lm) 	10-01-001	1,5kg/m	Horizontally connections, Handles horizontal loads in Quick Lift, Fixation
	Couplers KF 	11-01-001	1,25 kg	
Standard retainer (LL)	LL 3,00 m	23-02-300	7,20 kg	Horizontally connections floor level 
	LL 2,45 m	23-02-245	5,80 kg	
	LL 1,90 m	23-02-190	4,50 kg	
	LL 1,60 m	23-02-160	3,70 kg	
	LL 1,20 m	23-02-120	2,80 kg	
	LL 1,00 m	23-02-100	2,40 kg	
	LL 0,72 m	23-02-072	1,70 kg	
Standard retainer plate	LL plate with pin	23-02-001	1,00 kg	
	LL plate without pin	23-02-002	1,00 kg	
Diagonal bracing	DSTB 3,00 m	04-01-300	6,30 kg	Transferring horizontal load stabilizing fundament 
	DSTB 2,45 m	04-01-245	5,90 kg	
	DSTB 1,90 m	04-01-190	4,90 kg	
	DSTB 1,60 m	04-01-160	4,60 kg	
	DSTB 1,20 m	04-01-120	4,20 kg	
	DST (Telescope)	04-01-350	9,10 kg	Note. Only for compression on small support bays
Rubber Baseplate	Rubber protection for baseplate	41-01-012	0,44 kg	Increases friction against deck 

Note. In general, all type of counterweight/ballast is allowed. See Chapter 6.9 – “Counterweight”.

3.4 The product meets the requirement of the following regulations:

- Machinery Directive – 2006/42/EC (FOR-2009-05-20-544)
- Regulations concerning the performance of work, use of work equipment and related technical requirements – *(FOR-2011-12-06-1357)*
- Facilities regulations (Ptil) §69 - "Lifting appliances and lifting gear" and NORSOK-R002

3.5 Tested and approved by WESTCON Løfteteknikk AS

Documents:

- 2205468-R-KA001 Load test procedure
- 2205468-R-RA001 3rd part verification report

3.6 According to Standards

Design and calculations according to:

- DNVGL-ST-0377
- DNVGL-ST-0378
- NS-EN 1999-1
- NORSOK N-001
- NORSOK R-002
- NORSOK R-003
- NORSOK R-005,
- ILO-152

3.7 Required competence

Users responsible for building and approving Quick Lift fundament, needs to have training according to *FOR-2011-12-06-1357 - §10-4.* This training is done by ALUHAK.

Since needed documentation is based on "normal" scaffolding rules and calculations, scaffolding competence equal §17-4 or higher is highly recommended.

For offshore industry and land based offshore industry, §17-4 or higher, is a requirement.

Due to a high competence recommendation within scaffolding, there are two types of courses for those building and documenting (approving) the fundament requirements.

- With Scaffolding competence (equal §17-4 or higher) – Approx. 7,5 hours
- Without recommended Scaffolding competence or if refreshing of theoretical knowledge is needed – 30 hours.

The riggers using Quick Lift are recommended to conduct a user course for being able understand the requirements for the fundament. Note that local regulations On Site, may have this as a requirement.

Offshore and on land based offshore industry, bound by NORSOK R003 – point 8.5, where riggers are required to do the overall approval before lifting. Users/riggers are mandatory to conduct the user course, before using Quick Lift.

8.5 Suspension from lifting frames made of scaffolding

The use of lifting frames made from scaffolding is conditional on such devices being approved by the supplier for use as temporary attachment points for lifting appliances. The assembly of lifting frames from scaffolding must be performed by an approved scaffolder in accordance with the supplier's instructions for use and load tables. Lifting frames shall be clearly marked "Løftebukk" (lifting frame) and the permitted SWL, approval date and approver's signature. Attachment points and temporary lifting appliances less than or equal to 2 tonnes are to be approved by a rigger, and lifting frames for loads above 2 tonnes shall be approved by an enterprise of competence with reference to Table 3.

– User Course estimated to take 7.5 hours, depending on actual competence.

3.8 Rules for Design Values - Secondary beam

Design value according to NORSOK R002 - Table F5 (Design factors). Secondary beam is defined with highest safety factor (1.25) when taking more the 75% of the load based on the Quick Lift placement. If Quick Lift placement gives les then 75%, meaning being closer to CenterPoint than to the outer wall. This factor is reduced to 1.1.

Table F.5 – Design factors (DF)

ELEMENT CATEGORY	γ_p	γ_c	DF ($\gamma_p \cdot \gamma_c$)
Lifting points including attachments to object Single critical elements supporting the lifting point	1,34	1,25	1,68
Lifting accessories (spreader beam, shackles, slings, etc.)	1,34	1,25	1,68
Main elements which are supporting the lift point	1,34	1,10	1,48
Other structural elements of the lifted object	1,34	1,0	1,34

A DAF factor of 1.5 has been used. The total tilt value corresponding to the result of 5°+5° (Pitch and Roll) which amounts to just over 7°, plus the selected skew for the load.

Note. Design values also correspond to the criteria from the tables in R002 – Annex H.

3.9 Purpose of use

Temporary suspension point, for lifting SWL <= 1000 kg. Permitted maximum load is defined according to the foundation's structure.

4. Manual Description

Manual is to be used together with calculation sheet (Excel worksheet) for documenting the scaffolding fundament, supporting the Quick Lift. This document will describe how to use the calculation tool and general rules regards to the mounting using the documentation.

This guide will not show concrete design on how this should be built but examples on how to safeguard the structural values when the foundation is adapted to the given conditions.

It is important to understand that the Quick Lift fundament's requirement will depend on its placement of point load and skewness of the planned load.

The worksheet is considering multiple placement that is pre-defined (see "Quick lift Placement ID").

5. Risk Assessment

There shall always be an interaction between the user of the equipment and those responsible for the completion of Quick Lift, according to Manual. This to prevent wrong use or incorrect assembly for its use. This applies especially when considering the total weight and the direction in which the load is to be pulled, as this has a direct impact on how the fundament shall be built. This information to be taken care of, when ordered/planned and always confirmed when taken over on site. In addition to this, it is recommended to have a simple sketch showing the permitted pulling direction, available at the location/site.

6. Basic Rules using Quick Lift

6.1 Skewness

It is not allowed to pull the load outside the fundament's outer walls. (This do not apply to tilt due to Pitch and Roll, on floating installations, which is already taken care of in design values.)

If a large skewness it is needed, it is recommended to use 2 or more lifting points in the same fundament and move the load sideways between lifting points (transferring the load). See Chapter 22 – "Example 10 - Tandem Lifting / Transferring of load."

6.2 Lifted load

It is not allowed to do multiple different lifting at the same time in one fundament.

In the case of tandem lifting where the total load exceeds the permitted load for one unit, this must be calculated in each individual case. This is not part of this guide. Contact ALUHAK, in these cases.

6.3 Rubber

To achieve maximum friction against deck, rubber must be used for all self-standing fundaments. The surface must be clean and dry when putting down the rubber.

6.4 Hold back force

Hold back force is the force that needs to be secured for preventing the fundament for sliding. This is normally needed when fundament is not in use and is standing fully effected by wind (32m/s). This force is calculated based on its total self-weight, including needed ballast. Less total weight will give a higher chance for sliding due to wind. This force will always be biggest, when not in use.

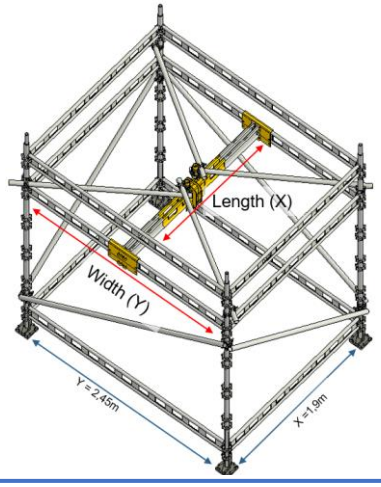
See Chapter 13.1.3, for examples around the use of "Hold back force, when choosing a ballast setup.

Needed Hold back force is found in table column "*Shear/parallel force between floor/deck and foot, included friction (FV diff) - Only applies when ballast is placed*".

To get the actual holdback force based on the counterweight needed for planned load (assuming this is already placed, before its used), this can be found by selecting the counterweight setup in the Quick Lift table (calculation tool) in lower right corner. It is also possible to calculate how much total ballast that is needed for holdback force to be less than zero. This is done by increasing the number in the self-weight cell in the calculation tool.

The difference between the adjusted (dummy) self-weight and the actual self-weight + the setup's counterweight, will be the necessary additional weight needed to prevent the foundation from sliding. Note that by increasing the self-weight (adding ballast) you will also have a reduced counterweight requirement. This assumes that the increase in weight is shared evenly and/or regarding overturning.

Note that counterweight setup needs to be empty to getting the right result. Also remember to reset this to actual self-weight after checking holdback force.



6.5 Direction

The lifting beam is always representing the length of the scaffold, and the Secondary beam supporting the lifting beam is always representing the width.

Ex. If you are using 1,9m lifting beams on a 2,45m ledgers (Secondary beams), length = 1,9m and width = 2,45m.

6.6 Hight

Registered height equals height to Quick Lift placement, and not the fundaments height.

6.7 Horizontal loads on Quick Lift

Large skewness also gives heavy horizontal load. Calculated force to be treated in same direction as the load is pulled. This also applies when using tandem lifting and when transferring loads. Tandem lifting and transfer of loads results in less horizontal load that works against overturning when these work together, but will give internal compression force between lifting points.

6.8 Control and transfer of loads, and Tandem lifting

When transferring loads, it is very important to take care of the risk that may arise from unintentional/accidental movement of the load (ref. NORSOK R003)

NORSOK R003 – 8.2 Control and transfer of loads

Where temporarily assembled lifting appliances are used for controlling and transferring loads, special attention must be paid to the risk of overload and the consequences of unintended movement of the load. When transferring a load between two lifting appliances, the load shall be at rest in the loadbearing lifting appliance when the new lifting appliance takes over. Zones under suspended loads must be assessed in relation to how the load will move in the case of failure of one of the rigging arrangements.

Control and transfer of loads must not be confused with tandem lifts.

Tandem lifting requires the same unit being lifted, and that the total weight does not exceed the allowable load for the weakest Quick Lift configuration (the lifting point). Tandem lifting between several foundations is not part of this manual and must be calculated in each individual case. Contact ALUHAK if necessary. See also point 6.2 - Lifted load.

6.9 Fixation

Fixation must be less than 0,5m from Quick Lift's placement in hight, and always underneath the Quick Lift's hight level. If this is not practically possible, bracing/pipes can be used transferring the fixation point closer to the correct height level. See chapter 18.1.2 – Description (LP6-3).

Note. The 0,5hm difference is automatically calculated in worksheet, but can also be changed manually when fixation is selected. Lower height difference gives a higher capacity giving an increased buckling length.

6.10 Counterweight

If counterweight is used, this to be applied divided on the corners represented based on the Quick Lift placement. Counterweight to be placed as close as possible to the fundament walls (corners) and no more the 0,5m from its outline. Please note that there will be cases where a counterweight is required when the fundament is "not in use", while when in use it is not needed.

Ex. If 200 kg is needed on the width direction, on long side closest to Quick Lift, 100 kg should be placed on each corner on given side. This will also give an effect on the other direction (length direction - short sides). If short side requires ex. 50 kg, this gives 25 kg to each corner. Since one of the corners already has 100 kg placed, there is no need to place an additional 25 kg in this corner. This leaves only 25 kg in opposite corner.

Note that increasing the length of the fundament in one direction also will raise the need of counterweight on the opposite direction due to wind force, as more area is affected.

Note. The fundaments counterweight is calculated based on preventing overturn. This counterweight does not prevent sliding. If securing the parallel forces for sliding is necessary and the foundation cannot be secured by anchoring/attachment, an increased counterweight is needed. See "Hold back force" in chapter 6.4.

Counterweight do not influence max buckling length as its placed in floor level. Buckling length is only to be set based on the fundament`s actual self-weight.

Note. Counterweight can be everything from water canisters to sandbags or even added scaffolding material. The only requirement is that used counterweight is possible to identify by weight and is properly secured at its correct location. It shall also be adapted to the environment where Quick Lift is built. Ex. If built in the process area, counterweight must be of flame resistance material.

6.11 Self-weight of the fundament

It is important to use the correct self-weight as this is affecting all aspects of the fundament's values. Parts as "Adjustable Base plate, LL, Standard retainer plate" and other parts not directly connected to the rest of the fundament's parts, is not to be a part of the fundament's weight, as it does not support for overturn or gives any value that can influence the strength of the fundament.

6.12 Pitch and Roll

If Quick Lift is used on floating installation or boat, pitch and roll is to be defined with its degrees representing the correct values "on site". Since the fundament is not define in direction on site, the system must use the highest values in both directions. (ex. Roll 5° and Pitch 2,7°, then Pitch = 5°)

It is not allowed to use Quick Lift when sea movement exceeds its design value.
(These values are pre-set to 5° and can be changed by responsible engineer/programmer, for the location`s calculation tool.)

6.13 Use of supporting bays

When using supporting bays these must be placed according to Quick Lift placement in the calculation tool.

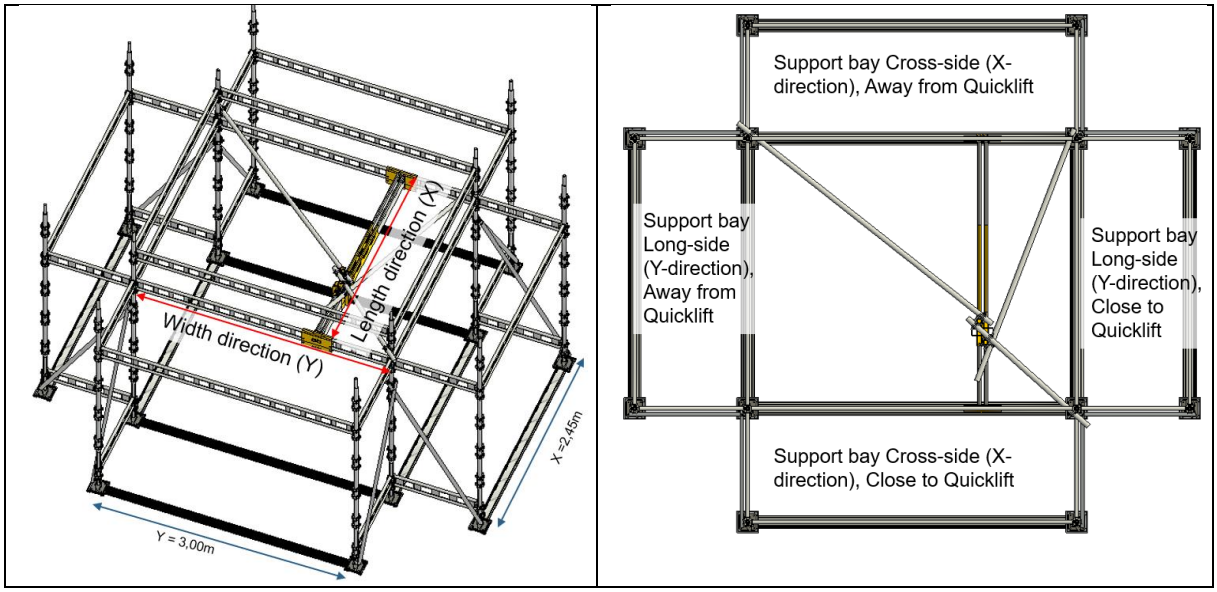
If support bays are used, they shall always be placed at the same side as the pulling direction, meaning the pull is to be done against the supported bays and not away from them. Se more details in "9.4 - Using support bays".

7. Use of Worksheet (calculation tool)

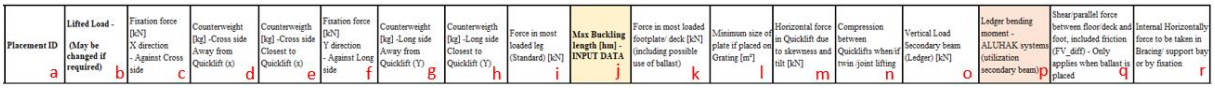
7.1 Main Data (Basic information)

Basic data fundament (Quicklift bay)				Planed Skewness		Additional Supporting bays (if needed)	Length direction (x) - Lifting beam		Width direction (y) - Secondery beam		Select stabilization method	Lokasjons påvirkning Vind / Location affecting wind result
Length	Width	Hight (to Quicklift)	Selfwight	Singel	Double		g	Closest to Quiclift (x)	i	Closest to Quiclift (y)		
a 3,00 m	b 3,00 m	c 2,50 m	d 181 Kg	e 5°	f		h	Away from Quiclift (x)	j	Away from Quiclift (y)	k	l 100% (maximum 25 m/s when in u

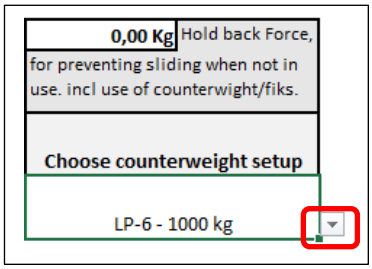
a. Length of the main bay equals length of lifting beam.
b. Width of the main bay equals length of the secondary beams (ledgers holding lifting beam).
c. Height from deck up to Quick Lift.
d. Self-weight of the material used for the whole fundament including supporting bays, but without parts not directly connected to the fundament (see “Self-wight of the fundament”).
e. Planned angle for skewness (Normally approved for 5°). If only planned for tandem lifting and there is no need to combine pulling load in single hoist, this could be set to 0°.
f. If tandem lifting using 2 or more Quick Lift’s in same fundament, a conservative value for assumed degree angle between the Quick Lift’s must be used. If not, this can be set to 0° (or removed).
g. Supporting bay in length direction closest to the Quick Lift.
h. Supporting bay in length direction away from Quick Lift.
   - Note. If Quick Lift is centrical placed in length direction in main bay, and one supporting bay is to be used, support bays will have the same distance to Quick Lift”. The result will be the same in both "away from" and "closest", irrespective of which cell is used.
i. Supporting bay in width direction closest to the Quick Lift.
j. Supporting bay in length direction away from Quick Lift.
   - Note. If Quick Lift is centrical placed in width direction in main bay, and one supporting bay is to be used, support bays will have the same distance to Quick Lift”. The result will be the same in both "away from" and "closest", irrespective of which cell is used.
k. Stabilization method.
   - Note. Must be selected before values are displayed.
l. Wind conditions, local on site.
   - Note. Can be changed depending on local placement and regulation.



7.2 Output Data



a. Lifting point LP
    1. If Lifting point combined with lifted load exceeds the structural limits for the secondary beam, the line will be marked black. Lifting not allowed, try a different compilation.
b. Lifted load / SWL
    1. Load can be adjusted to correct value, but rules for lifting must be followed.
c. Fixation – X direction - (along the lifting beam)
d. Counterweight cross side – Away from Quick Lift
e. Counterweight cross side – Closest to Quick Lift
f. Fixation – Y direction - (along the secondary beam)
g. Counterweight "long" side – Away from Quick Lift
h. Counterweight "long" side – Closest to Quick Lift
i. Force in most loaded Standard
j. Max Buckling length (hm) (*See "safeguarding buckling length"*)
    1. Buckling length is the height between the horizontal connections. Max allowed height depends on the multiple choices made in the calculations. After all input data is made, this number can be adjusted. When this number is red, it exceeds its limits and must be reduced.
    2. Normal scaffolding rules for buckling length applies. Meaning that length/height from lowest connection down to deck, is to be divided on 2.
    3. If site obstacles prevent use of the standards rosettes, pipe and couplers can be used.
    4. If material handling prevents horizontal connections between standards, standards need to be externally connected by support bays or fixation, according to the rules of buckling length.
k. Force to deck including counterweight.
l. Minimum size of the plate if placed on grating.
m. Horizontal force in Quick Lift.
n. Compression between Quick Lift's when/if twin/ tandem lifting.
o. Vertical Load Secondary beam (Ledger).
p. Ledger bending moment -ALUHAK systems (utilization secondary beam).
q. Shear/parallel force between floor/deck and foot, included friction (FV diff) - Only applies when ballast is placed.
    1. When fixation is used, this is addressed in fixation.
    2. This number is based on use of rubber between deck and legs. The rubber to be placed on a clean and dry surface.
    3. When not fully fixated, correct holdback force can be found by choosing the correct counterweight setup. This will include the placed counterweight for when in use.
    4. This force to be handled in the direction that is not secured by fixation.



r. Horizontal load affecting fundaments bracing.

8. Quick Lift Placement ID (ID-Name)

8.1 Description

The «standard» configuration is with a total of 9 different loading points, per fundament. Each point has 4 main directions where each is set with different skewness value in positive and negative direction depending on its placement. Tilt (pitch and roll) always considered against worst thinkable outcome, and in both directions simultaneously. Since the main rule do not allow us to pull outside the fundament 4 walls, the worst thinkable placement will automatically be set at 0 degrees pull (skewness), only giving the tilt value of the boat in negative direction. Each point will have its own values of ballast according to worse thinkable load.

The placement of the loading point is, centre, up close to fundament wall and the point centrically between these two. This applies in both directions, giving a 9-point optional placement of the load.

If Quick Lift is placed in between these points, the two point closest to correct placement is to be used.

In this case the “worst numbers” from each point applies, when using the table.

This also applies when tandem lifting.

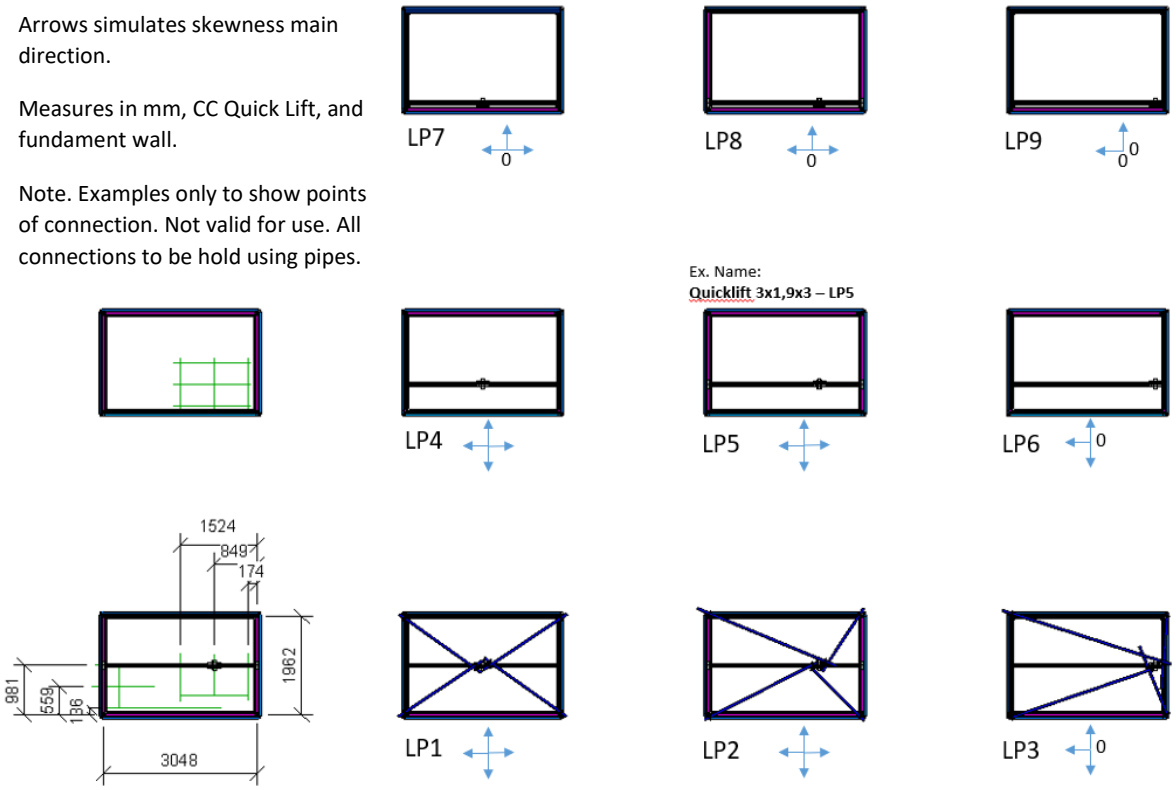
Measured placement per lifting point, will be based upon the size of the Quick Lift bay, and can be found in the “Quick Lift Placement” tab after filling out the measures in the main table (“Quick Lift Table”).

8.2 ID Name and pulling directions (ex. 3m x 1,9m bay)

Arrows simulates skewness main direction.

Measures in mm, CC Quick Lift, and fundament wall.

Note. Examples only to show points of connection. Not valid for use. All connections to be hold using pipes.



Note. If lifting is done by using multiple lifting points, all LP needs to be verified by Id-number and highest values, considered when checking the fundaments working loads.

Ex. Counterweight if tandem lifting or by transferring load, using LP-5 and LP-3:

LP-3 will require more counterweight on cross side/width away from Quick Lift, than LP-5.

LP-5 will require more counterweight on long side away from Quick Lift then LP3, But LP-3 may also have a need of counterweight at long side closest to Quick Lift, while LP-5 will not.

It is therefore important that both "lines" of the table is verified, using the highest value comparing cells I both lines, when documenting the fundaments requirements.

Basic data fundament (Quicklift bay)				Planed Skewness		Additional Supporting bays (if needed)	Length direction (*x*) - Lifting beam		Width direction (*y*) - Secondery beam		Select stabilization method	Lokasjons påvirkning Vind / Location affecting wind result
Length	Width	Hight (to Quicklift)	Selfwight	Singel	Double			Closest to Quiclift (*x*)		Closest to Quiclift (*y*)		
3,00 m	1,90 m	2,50 m	200,0 Kg	5 °	25 °			Away from Quiclift (*x*)		Away from Quiclift (*y*)	Free standing	Open 100% (maximum 25 m/s, when in use)

Quicklift Table	Placement ID	Lifted Load - (Mag be changed if required)	Fixation force [kN] X direction - Against Cross side	Counterweigth [kg] -Cross side Away from Quicklift (*x*)	Counterweigth [kg] -Cross side Closest to Quicklift (*x*)	Fixation force [kN] Y direction - Against Long side	Counterweigth [kg] -Long side Away from Quicklift (Y)	Counterweigth [kg] -Long side Closest to Quicklift (Y)	Normal Force in most loaded leg (Standard) [kN]	Max Buckling length [hm] - INPUT DATA	Normal Force in most loaded footplated deck [kN] (including possible use of ballast)	Minimum size of plate if placed on Grating [m²]	Horizontal force in Quicklift due to skewness and tilt [kN]	Compression between Quicklifts when/if twin rjoint lifting	Vertical Load Secondary beam (Ledger) [kN]	Ledger bending moment - ALUHAK systems (utilization secondary beam)	Shear/parallel force between floor/deck and foot, included friction (FV_diff) - Only applies when ballast is placed	Internal Horizontally force to be taken in Bracing/ support bag or by fixation
	LP-3	250 Kg		11,49 Kg			38,91 Kg	38,91 Kg	7,057 kN	2,5	7,288 kN	0,131 m²	2,390 kN	1,046 kN	5,863 kN	UF: 20,4 %		*1,690 kN*
		500 Kg		54,00 Kg			44,16 Kg	44,16 Kg	12,46 Kg	2,1	12,754 kN	0,230 m²	4,779 kN	2,092 kN	11,727 kN	UF: 40,8 %		*3,379 kN*
		1000 Kg		139,03 Kg			54,66 Kg	54,66 Kg	23,271 kN	1,1	23,848 kN	0,429 m²	9,558 kN	4,184 kN	23,454 kN	UF: 81,6 %		*6,759 kN*
	LP-5	250 Kg					86,83 Kg		6,452 kN	2,5	6,713 kN	0,121 m²	2,103 kN	0,921 kN	3,987 kN	UF: 11,8 %		*1,487 kN*
		500 Kg					140,00 Kg		11,252 kN	2,3	11,673 kN	0,210 m²	4,206 kN	1,841 kN	7,974 kN	UF: 23,6 %		*2,974 kN*
		1000 Kg		25,48 Kg			246,35 Kg		20,852 kN	1,3	21,662 kN	0,390 m²	8,411 kN	3,682 kN	15,947 kN	UF: 47,2 %		*5,948 kN*

Note. Looking at compression pipes between LP's, LP-3 requires a higher load then LP-5. This is due to rules for design values, as LP-3 is more critical for the secondary beam and therefore requires a higher design factor for its calculation. Highest number always to be considered.

8.3 ID Name and placement of Quick Lift (cc)

Ex. 3m x 2,45m & 3m x 3m. See tables for correct placement based on chosen setup, in Worksheet. Measures are taken from centrical point on closest fundament wall to centrically point of lifting point.

Measures Quick Lift Placement	**Length** - Placed on lifting beam(s)	**Width** - Placed on Secondary beams (Ledger)
Bay Size	**3,00 m**	**2,45 m**
Length in mm	From closest wall in length direction (x)	From closest wall in width direction (Y)
LP-1	1524 mm	1249 mm
LP-2	849 mm	1249 mm
LP-3	174 mm	1249 mm
LP-4	1524 mm	736 mm
LP-5	849 mm	736 mm
LP-6	174 mm	736 mm
LP-7	1524 mm	223 mm
LP-8	849 mm	223 mm
LP-9	174 mm	223 mm

Measures Quick Lift Placement	**Length** - Placed on lifting beam(s)	**Width** - Placed on Secondary beams (Ledger)
Bay Size	**3,00 m**	**3,00 m**
Length in mm	From closest wall in length direction (x)	From closest wall in width direction (Y)
LP-1	1524 mm	1524 mm
LP-2	849 mm	1524 mm
LP-3	174 mm	1524 mm
LP-4	1524 mm	874 mm
LP-5	849 mm	874 mm
LP-6	174 mm	874 mm
LP-7	1524 mm	223 mm
LP-8	849 mm	223 mm
LP-9	174 mm	223 mm

9. Calculations made based on output from calculation tool and general rules

9.1 Horizontally load of Quick Lift

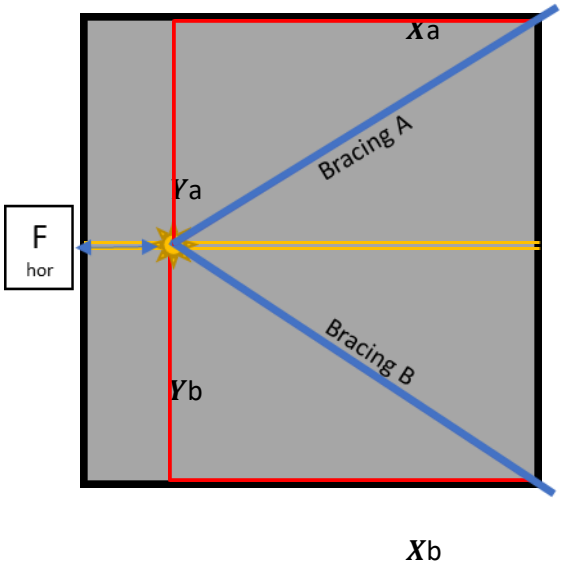
Angle calculation:

Pipe holding the Quick Lift must be calculated using basic scaffolding rules.
Calculation tool is implemented in the Quick Lift Work sheet.

Pipe Calculation - Horizontal Bracing Quick Lift

Xa =	2,199 m	Xb =	2,199 m
Ya =	1,524 m	Yb =	1,524 m
F hor =	2,00 kN		

	Calculated	*Forced*
$Bracing\ length\ A = \sqrt{Xa^2 + Ya^2} =$	2,675 m	
$Bracing\ length\ B = \sqrt{Xb^2 + Yb^2} =$	2,675 m	



$$Bracing\ force\ A = \frac{(F_{Hor}/2) * Bracing\ length\ A}{Xa} = \quad 1{,}22\ kN$$

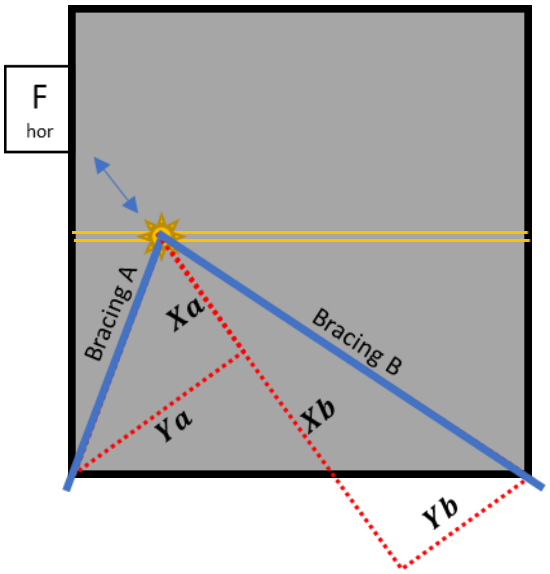
$$Bracing\ force\ B = \frac{(F_{Hor}/2) * Bracing\ length\ B}{Xb} = \quad 1{,}22\ kN$$

If the pull direction equals the same direction as most relevant bracing, the load can be assumed taken in only this one. In which case the whole horizontal load can be verified directly in table, against pressure. Both compression and tension are limited to 9 kN (fixed coupler) per pipe.

Note! In all cases a minimum of 3 pipes is recommended to secure movement in all directions of the fundament.

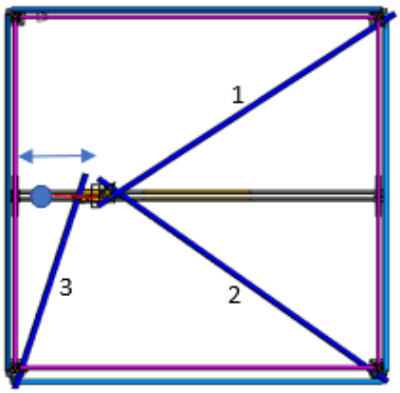
It is possible to calculate length using the line of the pulled direction as X, but also often easier to measure the length of the pipe, on site. If self-measured, use "forced" cell for length.

Example: Diagonally pull, in fundament



Example

You need to consider the 1-2 pipes most relevant for the planned angle pulled (skewness).



In this case only pipe 1 and 2 is taking the load. Pipe 3 has to big angel to take any load in this direction, but will support movment in any of the other directions.

All pipes need to be placed but only pipe 1 and 2 will have loads, to be documented/calculated. Lets use Brace B and LP5 on a 3*3m bay in our calculation. (*Note. since quicklift is centrical placed both pipes will take the same load i capasity*)

LP5 is placed 849mm from colsest wall, giving Xb = 3048 - 849mm = 2199 mm = 2,199m.

LP5 is sentrical placed in giving a Yb = 3048/2=1524mm = 1,524m

$$\textbf{Bracing length B} = \sqrt{Xb^2 + Yb^2} = \sqrt{2,199^2 + 1,524^2} = \textbf{2,676 m}$$

$$\textbf{Bracing force} = \frac{F_{Hor} * \textbf{Bracing length}}{Xb} = \frac{F_{Hor} * 2,676}{2,199} = \underline{\text{Fhor x 1,22}}$$

Using this factor, the value gived in the table for "Horizontal force in Quicklift.....", is to be multiplied. In strech the pipe can stand heavy loads. Bracing's weakest link will therefore be the couples holding the pipe. All horisontal bracing mainly to be used with fixed couplers, limited to 9 kN pressure per brace. Looking at pressure, tables for force on pipe has to been used. (Ref. Technical book of scaffolding)

Table 19 (Scaffolding Book) - Aluminium tubes - Quality grade T5, thickness 4.0 mm, diameter 48.3 mm. Maximum eccentric pressure force when using fixed couplings.

Buckling lengt l_k (m)	Eccentricity e (mm) - Connection KF Coupler	Maximum permissible compression force -F_k
1	53,5	12,0 kN *
1,5	53,5	8,9 kN
2	53,5	6,8 kN
2,5	53,5	5,3 kN
3	53,5	4,2 kN
3,5	53,5	3,3 kN
4	53,5	2,7 kN
4,5	53,5	2,2 kN
5	53,5	1,9 kN
5,5	53,5	1,6 kN
6	53,5	1,4 kN

* Only when using BB Couplers.

9.2 Force in diagonals (fundament frame)

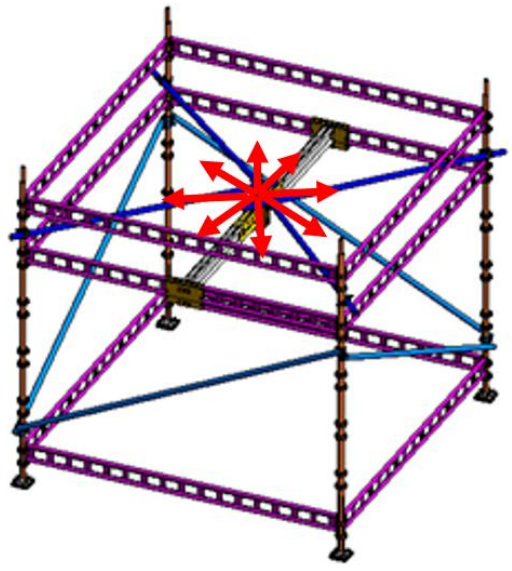
The fundaments bracing ("vertical") must be placed in a way that gives the best effect for transferring force. The bracing will always be considered stronger, in a stretch position.

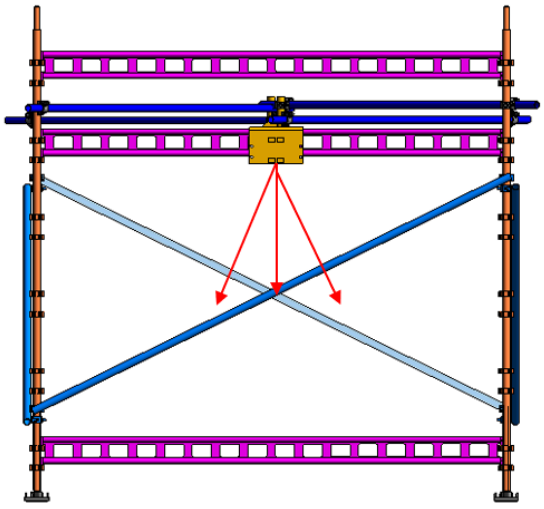
This do not apply when used as support bays, in which case compression shall be used.

With higher loads (>500 Kg) double bracing or alternative fixing is required if load is to be pulled in all directions. Alternative can single bracing be mounted in stretch position, with regulated direction on the pull.

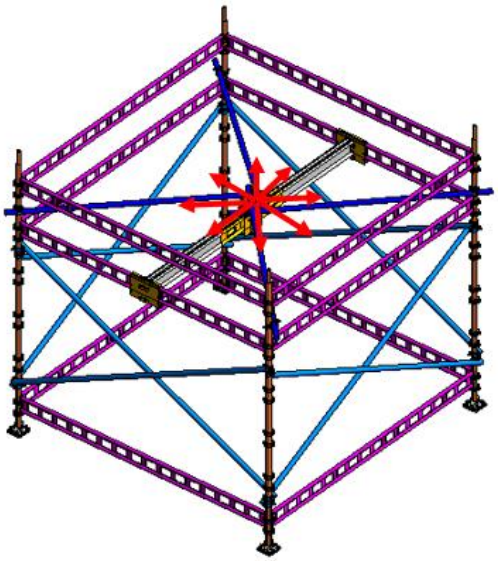
Note. Loads on <= 500 kg, bracing can be mounted according to common scaffolding rules.

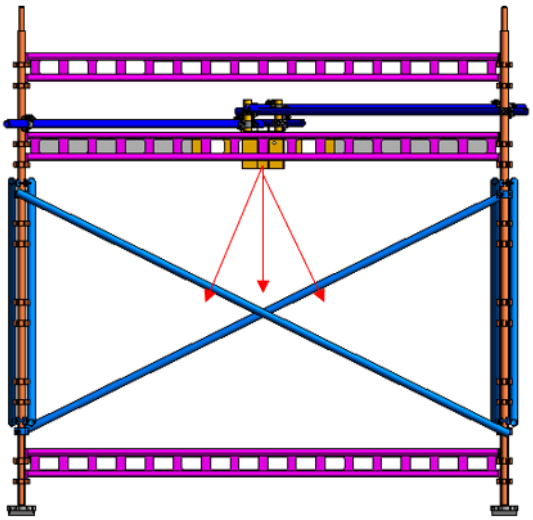
Single fundament <=500kg – Bracing can be installed according to normal scaffolding practice.



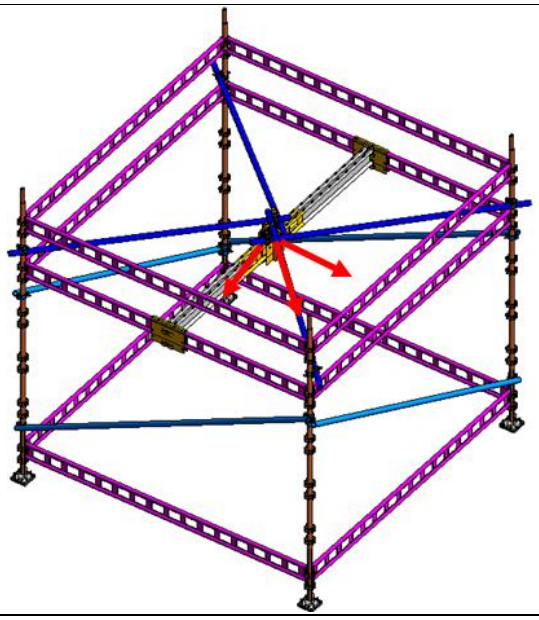


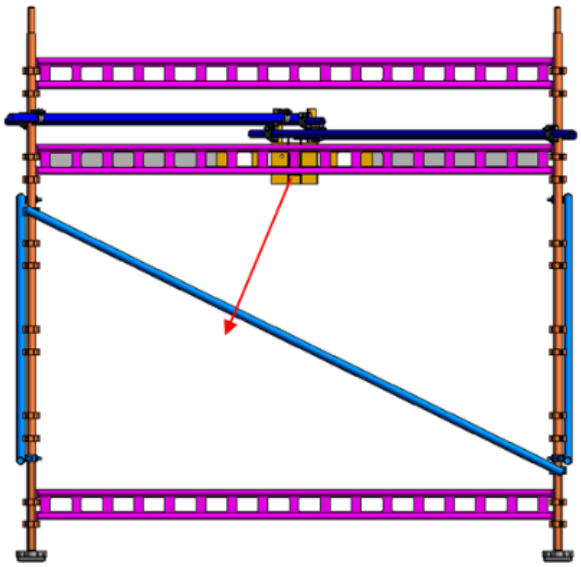
Single fundament 1000kg – Double Bracing all directions.



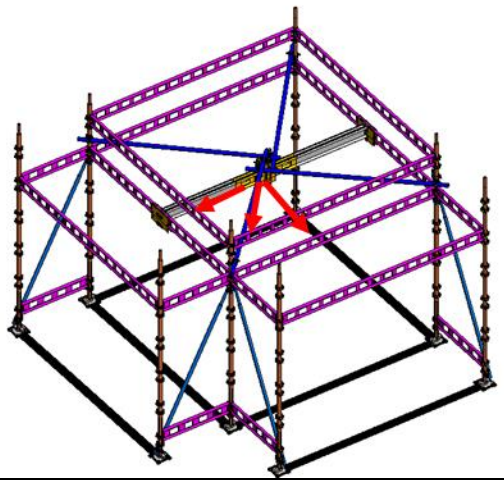


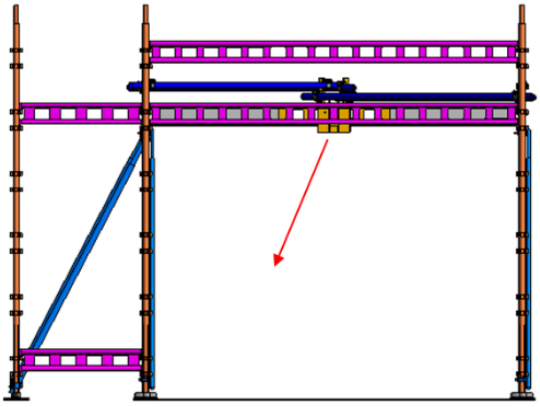
Single fundament 1000kg – All bracing installed taking stretch in pulled direction.





Using support bays. Same rule applies for all loads. (see 9.4 – «Using Support Bays»)





9.3 Bracing Load and Capacity

Column “Internal Horizontally force to be taken in bracing, support bay or by fixation “, is the design forces that must be held internally in the det fundament structure. This is the horizontal value that is affected in the foundation bracing, as compression in support bays or by external fixation.

Bracing Check (Live table in Worksheet)

Type	Length of bay (cc)	Capacity Compression (incl. Half-Coupler)	Capacity Tension (Half-Coupler)	Max. permissible horizontal load by compression	Max. permissible horizontal load in tension
DSTB 3,00 m	3048 mm	5,3 kN	12,1 kN	4,7 kN	10,7 kN
DSTB 2,45 m	2498 mm	7,2 kN	12,1 kN	6,1 kN	10,3 kN
DSTB 1,90 m	1962 mm	10,3 kN	12,1 kN	8,3 kN	9,7 kN
DSTB 1,60 m	1653 mm	12,1 kN	12,1 kN	8,9 kN	8,9 kN
DSTB 1,20 m	1248 mm	12,1 kN	12,1 kN	7,4 kN	7,4 kN
DSTB 1,20 m	1048 mm	12,1 kN	12,1 kN	6,2 kN	6,2 kN
DST (Telescope)*	768 mm	12,1 kN	12,1 kN	4,4 kN	4,4 kN

*Only valid when used on short bays (fully retracted).

9.4 Using Support Bays

When using supporting bays these must always be placed against the loads pulling direction. Resulting a compression against the support bay. If load is pulled away from the support bay, this will result in an uplift. The self-weight of the support bay does not support this uplift. If site conditions makes it difficult to place support bay giving a compression, support bays need to be fixed down to the deck and treated as a fixed solution in that direction. How much force to be hold back by the support bay due to the handling of the lift, can be read in the table “Horizontal force in Quick Lift due to skewness and tilt [kN]”

If chosen bracing do not fully support the needed capacity in compression position, additional compression brace must be added.

When fundament is secured in both directions by support bays, the bending moment affected by the horizontal forces, can be reduced, resulting a higher permissible buckling length, on the most loaded standards. See “13.5.1 - General rule Support bays”.

Large skewness also gives heavy horizontal load. Horizontally force to be considered in same direction as the load is pulled. This also applies when tandem lifting is used, and pulled direction is outside the centrical axis between the lifting points.

Note. tandem lifting gives less horizontal load on working externally against overturn but will result in a compression force between connected lifting points.

9.5 Allowable skewness and horizontal forces – Single lifting

Maximum allowed skewness is 25° in all directions. Note that an increase of skewness also results in a reduction of the permitted load (SWL).

Skewness	Load Class 1	Load Class 2	Load Class 3
5°	1000 kg	500 kg	250 kg
10°	576 kg	288 kg	144 kg
15°	386 kg	193 kg	97 kg
20°	292 kg	146 kg	73 kg
25°	237 kg	118 kg	59 kg

If bigger skewness with higher loads is needed, the horizontally force must be taken up externally. This can be done by securing the hoist using equipment adapted to this purpose, to prevent horizontal movement effecting the fundament.

According to NORSOK R003 (Annex H – Cap. 8.4 & 8.5), the certified user doing the lifting/rigging, in responsible for evaluating nearby structure to hold the required loads needed.

If this is done, the worksheet skewness can be set to 0°.

ALUHAK is not responsible for any external structural load. User of Quick Lift is responsible for all external forces that is not a part of the fundament.

Example of a method for external securing/taking care of the horizontal load.
Quick Lift approved based on 0° skewness.

10. Force in deck/foot

10.1 Floor/Ground supporting the fundament

It is important to identify the structural strength where Quick Lift fundament is placed.
Force needed to be supported is shown in table “Normal Force in most loaded footplate/deck….”
When floor/ground strength is identified, following formula can be used to determent how to distribute the load where, F= Force from Quick Lift according to table, and P= Floor / Ground capacity.

$Area\ m^2 = \frac{\mathrm{F}}{\mathrm{P}}$	$Side\ lengt\ m\ (equal\ sides) = \sqrt{Area}$	$Lengt\ of\ "plank"(m) = \frac{Area\ (m^2)}{\text{width (m)}}$

If you have the ground capacity and want to verify that planned foot plate size is big enough.

$P\ (kN/m^2) = \frac{\mathrm{F\ (kN)}}{Area\ m^2}$	$P\ (kg/cm^2) = \frac{\mathrm{F\ (kg)}}{Area\ cm^2}$

Bearing capacity of soils (P)		
GRAVEL AND ROCKS	500 KN/m2	5 kg/cm2
ASPHALT STANDARD	500 KN/m2 (Street)	5 kg/cm2
COARSE SAND	375 KN/m2	3,75 kg/cm2
ASPHALT	300 KN/m2	3 kg/cm2
FINE SAND - SOLID	250 KN/m2	2,5 kg/cm2
FINE SAND - LOOSE	125 KN/m2	1,25 kg/cm2
CLAY	80 KN/m2	0,8 kg/cm2

10.2 Offshore Structure

According to NORSOK-N003, steel decking has a minimum requirement for a point load capacity of 5kN on a 100x100 mm surface (0.01m²), as well as a permitted "contingency load" of 10 kN.

This gives a total permissible point load in steel decks of 15kN.

If the Quick Lift setup's "most loaded standard including ballast" has a higher need, the deck's structural strength and any measures must be calculated by the responsible structural engineer for the area/installation.

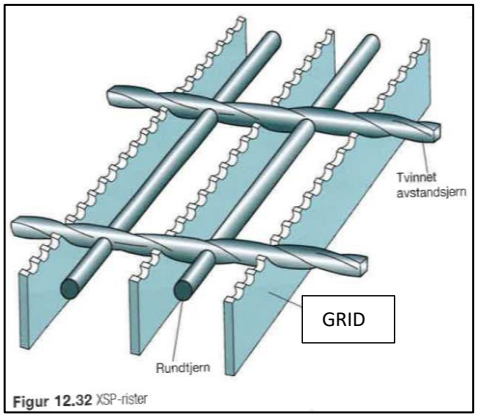
Note that free-standing fundaments initially receive a large load as the horizontal forces are propagated down into the deck. By fixing/anchoring the fundament, this force can usually be reduced to below 15 kN.

Please note that a narrow bay in a free-standing fundament produces a higher force, than with wide fundaments (bays).

It is especially important using the column that includes ballast/counterweight when checking these loads, and that the correct self-weight of the fundament is used in the calculation.

10.3 Grating

The different types of grating will have a different capacity. If you are not able to identify which type grating is used where Quick Lift fundament is supported, the calculation tool table column «minimum size of plate if placed on grating" is to be used. If the grating is identified as one of the three types according to table down below, the column "Force in most loaded footplate/deck…." can be used together with the table to determine decks capacity.



Figur 12.32 XSP-rister

These types can be identified by measuring the gratings main grid.

- Column 1 in table: Grid is 35mm high and 5mm wide. Offshore grating XSP-535-41/101 - 5, Steel grade S355.
- Column 2 in table: Grid is 30mm high and 5mm wide. Offshore/industry grating XSP-530-41/101 – 5, S355.
- Column 3 in table: Grid is 30mm high and 3mm wide. Industry grating XSP-330-41/101 - 3, Steel grade S235.

Span in mm	Column 1 S355 XSP-535-41/101-5 (35 x 5)	Column 2 S355 XSP-530-41/101-5 (30 x 5)	Column 3 S235 XSP-330-41/101-5 (30 x 3)
300	18,7 kN	13,4 kN	5,3 kN
400	12,9 kN	9,3 kN	3,7 kN
500	9,9 kN	7,1 kN	2,8 kN
600	8,0 kN	5,8 kN	2,3 kN
700	6,7 kN	4,8 kN	2,0 kN
800	5,8 kN	4,2 kN	1,7 kN
900	5,1 kN	3,7 kN	1,5 kN
1000	4,5 kN	3,3 kN	1,3 kN
1100	4,1 kN	3,0 kN	1,2 kN
1200	3,7 kN	2,7 kN	1,1 kN
1300	3,4 kN	2,5 kN	Not Allowed
1400	3,2 kN	2,3 kN	Not Allowed
1500	3,0 kN	2,2 kN	Not Allowed

- Table values are based on a 150x150 mm plate, centrical loading of 4 grids, stored on both sides.

- For every additional grid that is loaded an additional 10% force can be added to the table.

- If the grating is cut to size, we must ensure that the load-bearing grids is supported at both ends.

Note. Table and description are referenced from the Norwegian Scaffolding book Issue nr. 3 – 2015.

10.4 Calculation of wind values

Wind calculations is based on a 25m/s windspeed. It is not allowed to use Quick Lift if the wind force hitting the Quick Lift location, exceeds this limit. Looking at the live table, wind must be considered also when not in use. When not in use, a max wind speed of 32m/s is calculated, resulting a need in securing the fundament, when not in use, and placed directly affected by the wind.

If the fundament is placed inside, or in a location that gives a significant reduction in wind hitting the fundament, this will give a reduction in the force working against overturn. This can be chosen as an option in the worksheet.

When reduction is used, this is reduced according to the max windspeed of 32m/s. This gives 24m/s when reduced to 75%. Meaning that fundament can be used in full windspeed of 32m/s if site location is evaluated to 75% or less.

Always check and evaluate wind conditions before deciding how much wind is affecting the fundament. If in doubt, always calculate for worst case wind effect.

11. Buckling length

11.1 Buckling length on standards

Depending on the placement of the Quick Lift and the total length and width of the fundament, the location movement and wind pressure will result in different pressures on the legs.

After length and width including any supplementary subjects is set and the stabilization method is selected, the buckling length is to be adjusted until not showing a red number in the table.

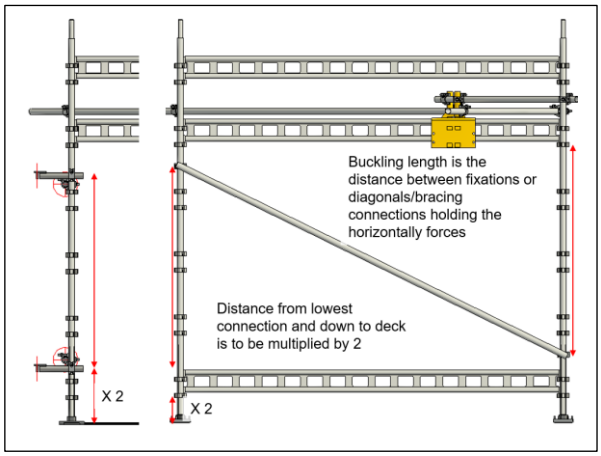
There shall always be done an effort to connect horizontal bindings in the fundament, as close to the floor as possible. But if the module's complexity does not allow this, the maximum allowable hight distance from the floor and up to the first connection shall not be higher than half of the buckling length.

Note. There shall always be at least two horizontally bindings holding in all directions. If the fundament is free standing, the floor binding in not included as one of these two.

Ex. If you get a result of 2,5 m buckling length (maximum buckling length allowed), the maximum distance from the floor shall not exceed more than 1,25m. In all cases at least two bindings are required. If first binding is set on the lowest rosette on a 3 m standard, the second one can be on the highest, giving less than 2,5m buckling length between the horizontally bindings.

If floor binding is used and it is a free-standing fundament supported by additional bays, the two upper rosettes must be connected.

If the complexity of the area, or the activity does not allow you to connect between the standards, each standard must be fixated or supported by support bays according to its buckling length requirements.

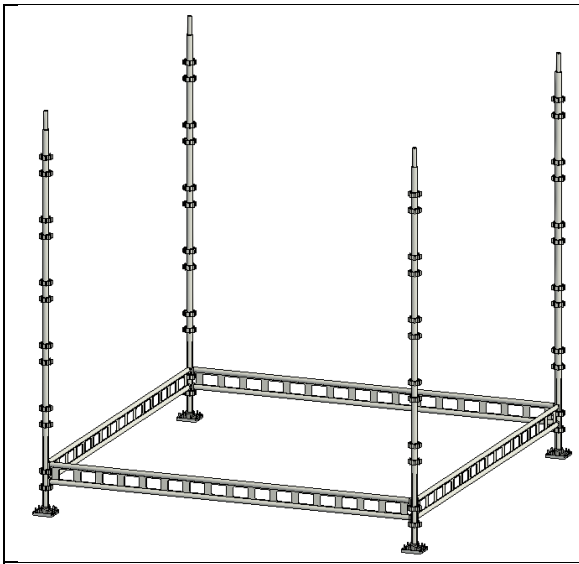
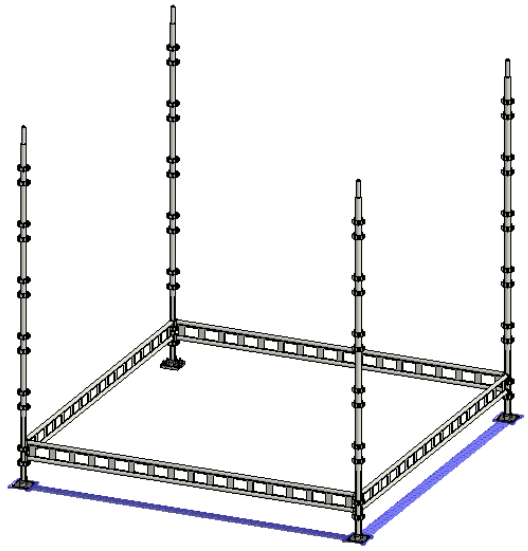
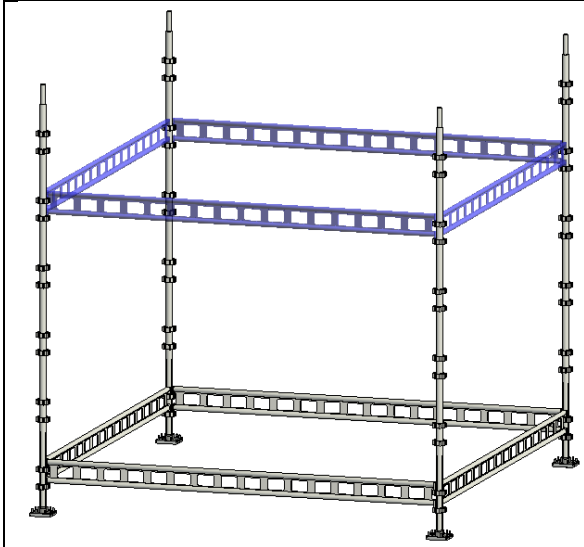
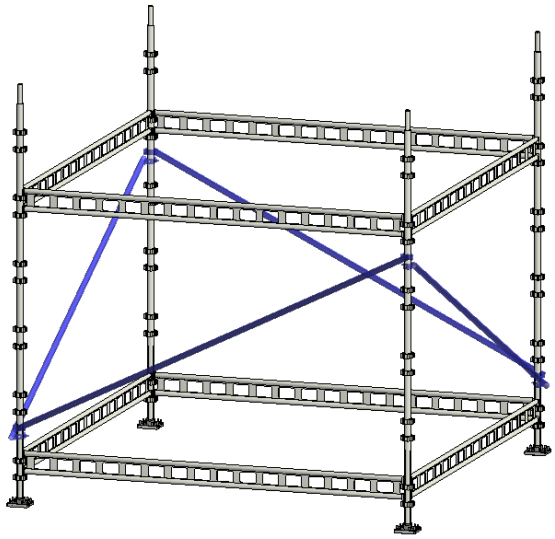


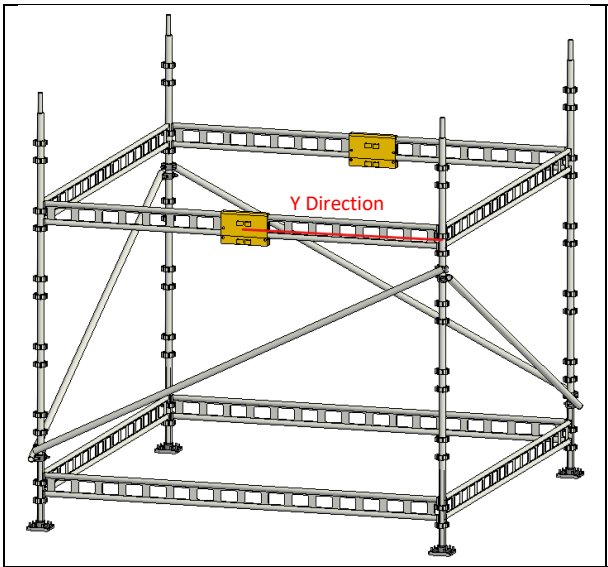
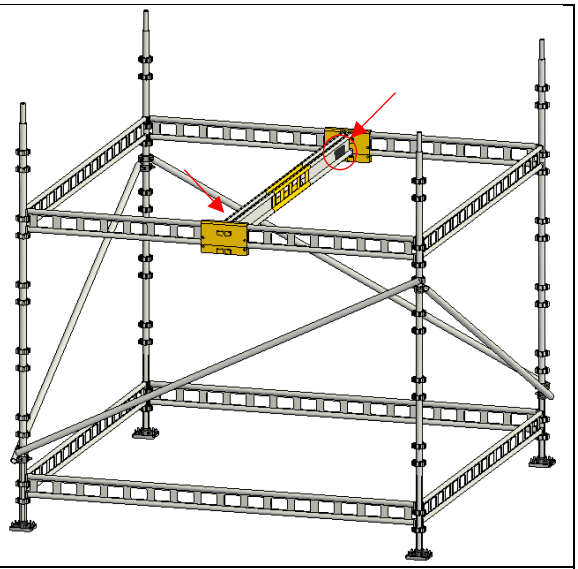
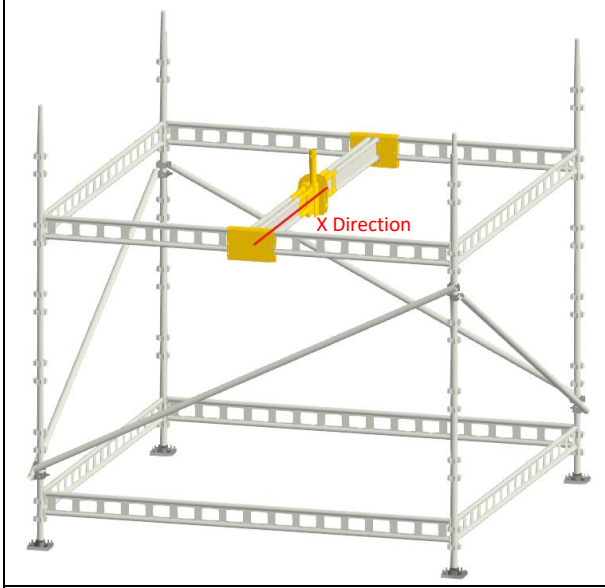
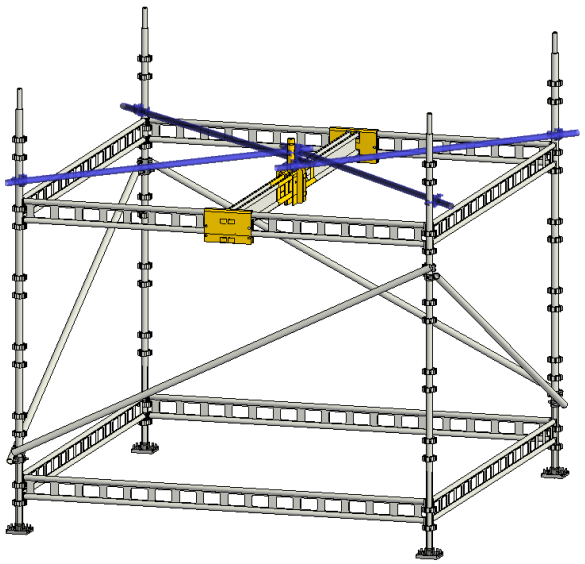
12. Assembly Description – Generally Described

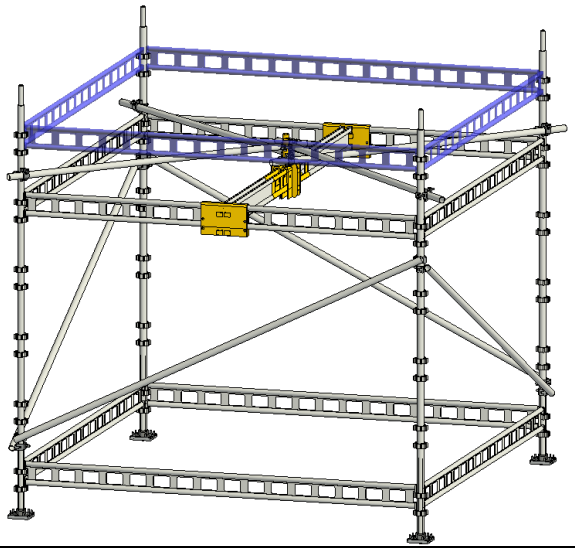
12.1 General Instruction, Fundament and Quick Lift

Important. These instructions must be treated together with all regulations and information given in this manual. Actual designed is depending on the planned activity and must be treated in the planning tool made for the Quick Lift. Higher loads and different placements will acquire different design and/or more horizontally bindings and/or fixations, not shown in underlaying examples.

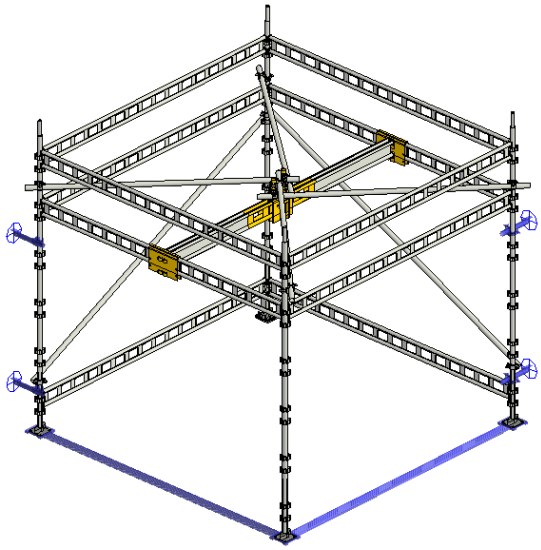
It is important that all lock mechanisms are properly connected and secured tightly on all ledgers and liftingbeam's.

	
Connect bottom frame as close to floor as possible. (See buckling length). Use rubber underneath the adjustable legs. Keep the area clean to get max friction. Max adjustment on the adjustable leg shall not exceed 200mm.	If floor level connection (Standard retainer) is used. Suitable Rubber coating should be put underneath. It is recommended to temporary connect using normal horizontally connections to keep the fundament stable while building it.
	
Mount a set of ledgers in the level where the Quick Lift is to be placed.	Mount bracing according to its requirement, for planned capacity.

	
Place the “BRM Stop Double” on the secondary beams (TB/LB) and measure CC “Wall” & “BRM” unit according to chosen lifting point *(Y direction)*. Se ex. table “ID Name and placement of Quick Lift (cc)”. Find/use measures in Worksheet – column “Quick Lift Placement”.	Mount both lifting beams, leaving the certification tag, visible on the outside. Secure both “BRM Stop Double” for sliding by placing the bolts in the secondary beams (ledgers) openings/holes.
	
Place “BRM Double Lifting Guide” on Liftingbeam’s and measure CC in Direction X. Connect the bolts as described above.	Mount needed Pipes and couplers to secure the “BRM Double Lifting Guide” for horizontally movement. Pipes to be calculated according to “Horizontally load of Quick Lift”

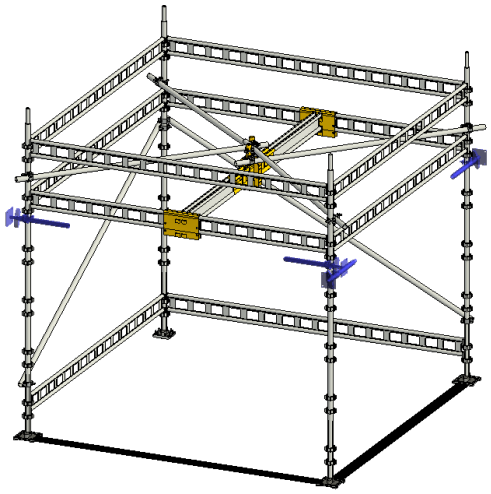


Horizontally connections in mounted 0,5m above Quick Lift level. This is not needed if fundament I fixated in both directions, at Quick Lift level, and supported by two bindings in hight, according to general rule.



Example showing use of floor level connection (Standard retainer). Horizontally movement needs to be taken in fixation or by using braced support bays, in the direction “Standard retainer” are used.

Note. There is also an option to use multiple compression points securing both directions in Quick Lift level, where Standard retainer is used.



12.2 General Description (applies to all configurations)

12.2.1 Not in use:

When “Not in use” and high wind is expected (26-32m/s), fundament must be lightly secured. If fundament is placed on a dry and clean surface it is not expected to move, but due to uncertainty in friction that may come due to wet or soiled surface (deck), securing is necessary. Estimated “hold back” will depend on the configuration’s self-wight and must be secured in all directions. This force is due to high wind and can be reduced to zero if less wind is affecting the fundament. Get correct result by using the live worksheet.

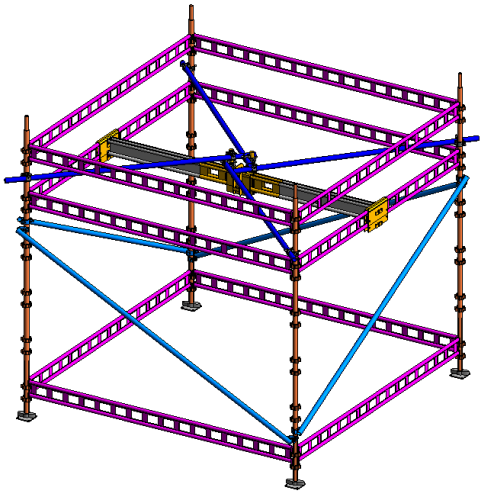
12.2.2 Guidance information (examples):

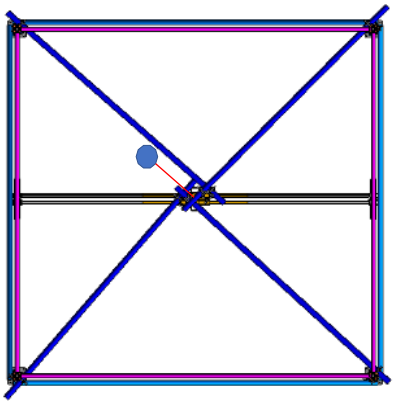
Example 1 specifies the use of diagonals. This is not specified in the remaining examples but applies equally to all configurations. All examples are based on use with 5°+5° skewness and tilt (FPSO).

13. Example 1 – Quick Lift 3x3x2,5 – LP 1

13.1 Configuration 1-1: SWL 250 & 500 kg – SW 230 kg

13.1.1 Design description





13.1.2 Counterweight / Fixations

Not needed, when in use.

13.1.3 Description

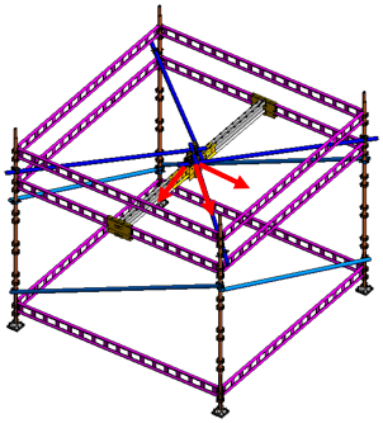
SWL 500kg:

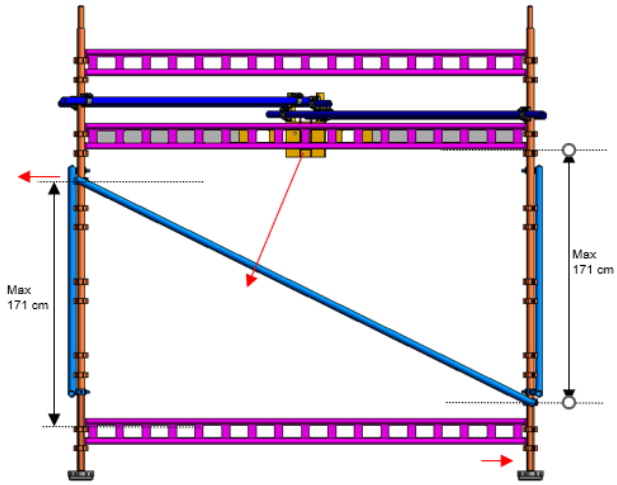
- Use of “normal” bracing (single)
- 5° skewness in all directions.
  - See table 8.5 for other load or skewness.
- Max Buckling length. (See description Buckling length)
  - 2,5 hm at 500kg.
- Free standing.
- Hold Back force, when not in use (32m/s wind).
  - 22,25 kg attachment if counterweight (2 x 7,32 kg, for not in use) is included.
  - If you choose not to use the counterweight, which is necessary to prevent the fundament for tipping when it is “not in use”, this option must be selected in the layout. In that case, the hold back force will increase, and this force must be ensured not only for gliding, but also for lifting. Hold back force is then 26.22 kg
    Important! This option can NOT replace needed counterweight, when in use.
  - If not secured at floor level, a total of 97 kg in counterweight is needed.

13.2 Configuration 1-2: SWL 1000 kg – Bracing in Defined direction – SW 230 kg

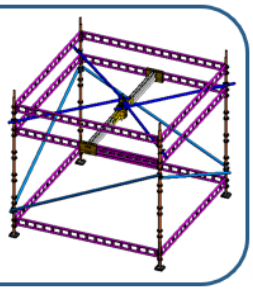
13.2.1 Design description

The diagonals must be placed in such a way that they are subjected to tension when moving loads. Meaning, the highest part of the diagonal in the direction the load is pulled.
Note. Buckling length to be measured between bracing and horizontal connection.





Info. If no lateral pull of the load is planned, as well as if joint lifting is to be used between several units in the same frame. Then the diagonals can be mounted according to generally known practice for scaffolding.



13.2.2 Counterweight / Fixations

Not needed, when in use.

13.2.3 Description

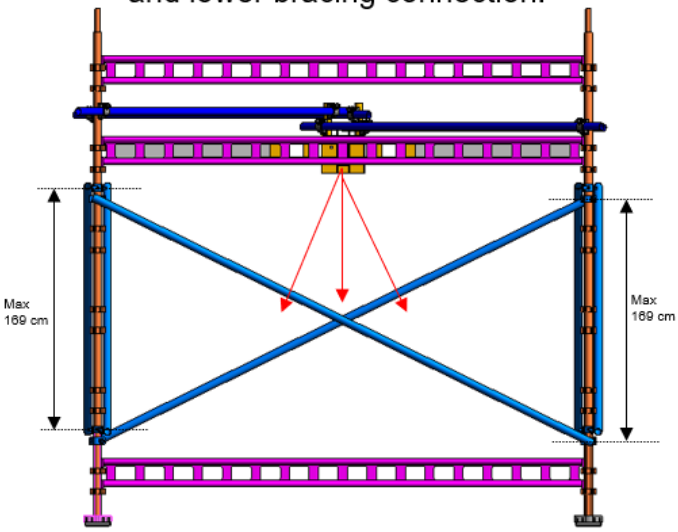
SWL 1000 kg:

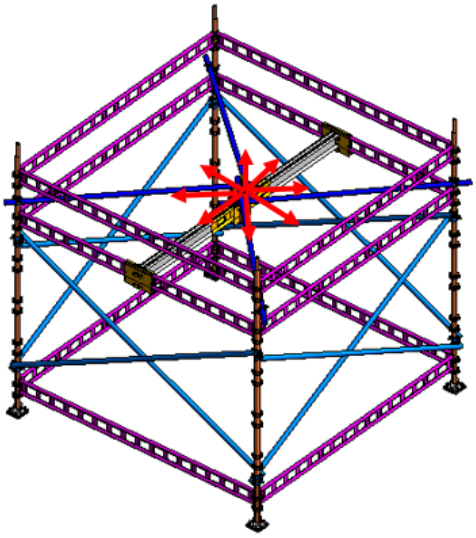
- Use of bracing in stretched position (single).
- 5° skewness in directions resulting stretch on bracing. (Meaning, against high point of the bracing.)
  - See table 8.5 for other load or skewness.
- Buckling length max 1,71 hm.
- Free standing.
- Hold back force, when not in use (32m/s wind).
  - 22,25 kg attachment if counterweight (2 x 7,32 kg, for not in use) is included.
  - If one chooses not to use the counterweight, which is necessary so that it does not tip when the fundament is "not in use", the Hold back force of 26.22 kg must be secured in all directions including uplift.
  - If not secured at floor level, a total of 97 kg in counterweight is needed.

13.3 Configuration 1-3: SWL 1000 kg – Double diagonals – SW 255 kg

13.3.1 Design description

The diagonals are mounted in cross. That is on both sides of the fundaments wall's, in all directions.
Buckling can be measured based on the bracing height, meaning between upper and lower bracing connection.





Info. This solution is needed if the 1000kg load is to be pulled in several directions.

13.3.2 Counterweight / Fixations

Not needed, when in use.

13.3.3 Description

SWL 1000 kg:

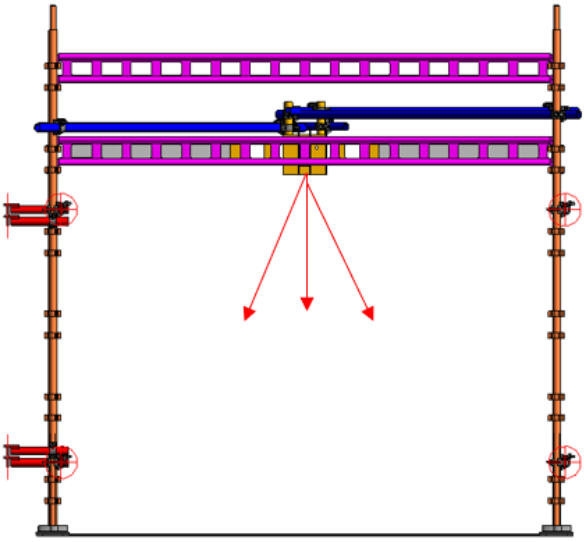
- Use of double bracing (cross diagonal)
- 5° skewness in all directions.
  - See table 8.5 for other load or skewness.
- Buckling length max 1,69hm.
- Free standing.
- Hold back force, when not in use.
  - 19,42 kg attachment if no counterweight is added.
  - If not secured at floor level, a total of 72 kg in counterweight is needed.

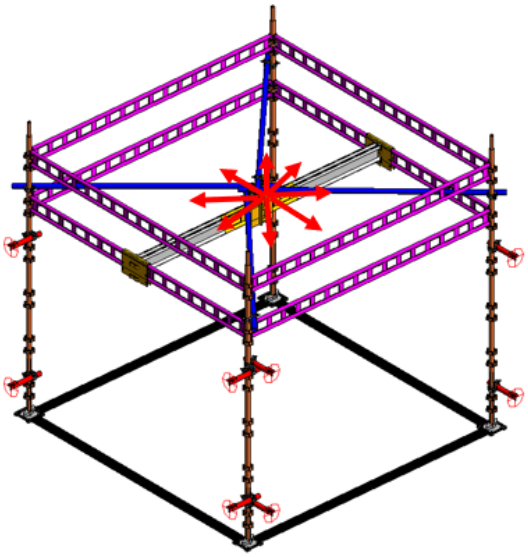
13.4 Configuration 1-4: Attached – SW 183 kg

13.4.1 Design description

Singel fundament - Attached

If no diagonals are used. The fundamental needs to be attached in both directions and both in bottom and top, close to the Quicklift.





Comment. Lowest point to be mounted as low as possible. The maximum high from lowest connection down to the fundament floor, shall not exceed more then half of the solutions maximum buckling length.

13.4.2 Counterweight / Fixations

Fixation needed at in Quick Lift height on a 1000kg lift, is 7,12 kN I both directions. Fixation in floor level equals the same force as “Internal horizontal forces to be taken in bracing…”, and equals 5,948kN.

13.4.3 Description

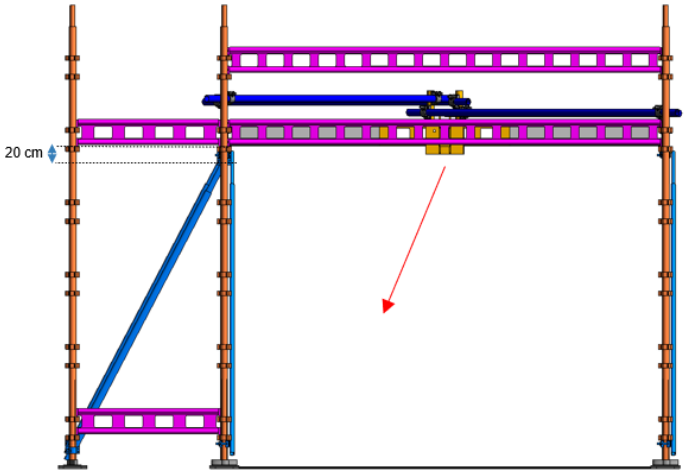
SWL 1000 kg:

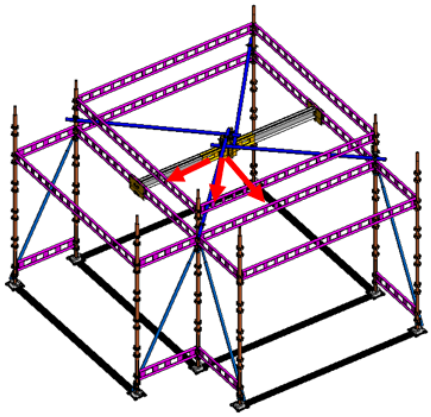
- Fixations in low and high point both directions.
- 5° skewness in all directions.
    - See table 8.5 for other load or skewness.
- Buckling length max 2,5hm.
- Fixed.

13.5 Configuration 1-5: Use of supporting bays – SW 291 kg

Use of supporting bays

Load to be pulled against it's supporting bays. And diagonals to be subjected with compression, in the supporting bay.





Info. The reason for this is that, pulling away from the supporting bay will result an uplift of the supported bay. And the supporting bay do not carry enough self weight to secure the horizontal movement.

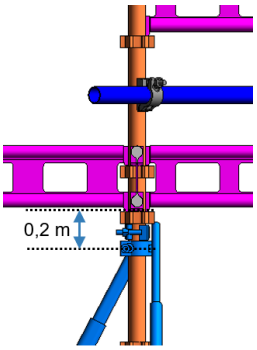
13.5.1 General rule Support bays

Since both direction of the fundament is supported, the horizontally force affecting the standards capacity can be reduced to a more correct value. Normally this load is calculated based on a 0,5hm moment capacity placement, of the horizontally load. This can when both directions are supported, be treated the same way as with fixations, and set to be the correct space, meaning the difference between Quick Lift hight (ledger/secondary beam) and to the centre of the coupler for the compression bracing/tube. *In this example this is about 0,2hm.*

13.5.2 Counterweight / Fixations

Not needed, when in use.

13.5.3 Description



SWL 1000 kg:

- Use of compression pipes/bracing.
- 5° skewness in directions against support bays.
  - See table 8.5 for other load or skewness.
- Buckling length max 2,38hm (moment capacity placed on 0,2hm).
- Free standing.
- 40,21 kg Hold back force, when not in use and hit by 32m/s windspeed.
  - If not secured for sliding, a total of 148 kg in counterweight is needed.

13.6 Example - Table showing details LP 1 Configuration 1

13.6.1 Configuration 1-1 (250kg & 500 kg) & 1-2 (1000 kg) – SW 230 kg

Basic data fundament (Quicklift bay)				Planed Skewness		Additional Supporting bays (if needed)	Length direction (x) - Lifting beam		Width direction (y) - Secondary beam		Select stabilization method	Location affecting wind result
Length	Width	Hight (to Quicklift)	Selfwight	Singel	Double			Closest to Quiclift (x)		Closest to Quiclift (y)		
3,00 m	3,00 m	2,50 m	**230,0 Kg**	5 °				Away from Quiclift (x)		Away from Quiclift (y)	Free standing	Open 100% (maximum 25 m/s, when in use)

Quicklift Table	Placement ID	SWL - (May be changed if required)	Fixation force [kN] X direction - Against cross side	Counterweight [kg] - Cross side Away from Quicklift (x)	Counterweight [kg] -Cross side Closest to Quicklift (x)	Fixation force [kN] Y direction - Against Long side	Counterweight [kg] -Long side Away from Quicklift (Y)	Counterweight [kg] -Long side Closest to Quicklift (Y)	Force in most loaded leg (Standard) [kN]	**Max Buckling length [hm] - INPUT DATA**	Force in most loaded footplate/ deck [kN] (including possible use of ballast)	Minimum size of plate if placed on Grating [m²]	Horizontal force in Quicklift due to skewness and tilt [kN]	Compression between Quicklifts when/if joint lifting	Vertical Load Secondary beam (Ledger) [kN]	Ledger bending moment -ALUHAK systems (utilization secondary beam)	Shear/parallel force between floor/deck and foot, included friction (FV_diff) - Only applies when ballast is placed	Internal Horizontally force to be taken in Bracing/ support bay or by fixation
Calculation: Force, against overturning, including needed fixation or counterweight/ ballast. Calculated data/force for most loaded objects	LP-1	**250 Kg**							4,318 kN	2,5	4,318 kN	0,078 m²	2,103 kN		2,814 kN	UF: 15,74 %		*1,487 kN*
		500 Kg							6,981 kN	2,5	6,981 kN	0,126 m²	4,206 kN		5,628 kN	UF: 31,5 %		*2,974 kN*
		1000 Kg							12,309 kN	2,3	12,309 kN	0,222 m²	8,411 kN		11,255 kN	UF: 63,0 %		*5,948 kN*
	LP-2	**250 Kg**							5,071 kN	2,5	5,071 kN	0,091 m²	2,103 kN		3,987 kN	UF: 22,3 %		*1,487 kN*
		500 Kg		5,01 Kg					8,488 kN	2,47	8,503 kN	0,153 m²	4,206 kN		7,974 kN	UF: 44,6 %		*2,974 kN*
		1000 Kg		33,26 Kg					15,322 kN	2,19	15,421 kN	0,278 m²	8,411 kN		15,947 kN	UF: 89,2 %		*5,948 kN*
	LP-3	**250 Kg**		19,27 Kg					6,393 kN	2,5	6,450 kN	0,116 m²	2,390 kN		5,863 kN	UF: 32,8 %		*1,690 kN*
		500 Kg		61,78 Kg					11,132 kN	2,16	11,316 kN	0,204 m²	4,779 kN		11,727 kN	UF: 65,6 %		*3,379 kN*
		~~**1000 Kg**~~								2,5						UF: 131,2 %		
	LP-4	**250 Kg**							5,052 kN	2,5	5,052 kN	0,091 m²	2,103 kN		2,814 kN	UF: 12,9 %		*1,487 kN*
		500 Kg					1,02 Kg		8,451 kN	2,44	8,454 kN	0,152 m²	4,206 kN		5,628 kN	UF: 25,7 %		*2,974 kN*
		1000 Kg					25,28 Kg		15,248 kN	1,35	15,324 kN	0,276 m²	8,411 kN		11,255 kN	UF: 51,5 %		*5,948 kN*
	LP-5	**250 Kg**							6,055 kN	2,5	6,055 kN	0,109 m²	2,103 kN		3,987 kN	UF: 18,2 %		*1,487 kN*
		500 Kg		5,01 Kg			1,02 Kg		10,456 kN	2,02	10,474 kN	0,189 m²	4,206 kN		7,974 kN	UF: 36,5 %		*2,974 kN*
		1000 Kg		33,26 Kg			25,28 Kg		19,259 kN	0,85	19,433 kN	0,350 m²	8,411 kN		15,947 kN	UF: 73,0 %		*5,948 kN*
	LP-6	**250 Kg**		19,27 Kg					7,795 kN	2,5	7,852 kN	0,141 m²	2,390 kN		5,863 kN	UF: 26,8 %		*1,690 kN*
		500 Kg		61,78 Kg			1,02 Kg		13,936 kN	2	14,123 kN	0,254 m²	4,779 kN		11,727 kN	UF: 53,6 %		*3,379 kN*
		~~**1000 Kg**~~								2,31						UF: 107,3 %		
	LP-7	**250 Kg**					15,25 Kg		5,787 kN	2,5	5,833 kN	0,105 m²	2,103 kN		2,814 kN	UF: 4,3 %		*1,487 kN*
		500 Kg					53,75 Kg		9,920 kN	2,36	10,083 kN	0,181 m²	4,206 kN		5,628 kN	UF: 8,5 %		*2,974 kN*
		1000 Kg					130,73 Kg		18,187 kN	1,87	18,582 kN	0,334 m²	8,411 kN		11,255 kN	UF: 17,1 %		*5,948 kN*
	LP-8	**250 Kg**					15,25 Kg		7,039 kN	2,5	7,085 kN	0,128 m²	2,103 kN		3,987 kN	UF: 6,0 %		*1,487 kN*
		500 Kg		5,01 Kg			53,75 Kg		12,425 kN	2,5	12,600 kN	0,227 m²	4,206 kN		7,974 kN	UF: 12,1 %		*2,974 kN*
		1000 Kg		33,26 Kg			130,73 Kg		23,195 kN	2,15	23,684 kN	0,426 m²	8,411 kN		15,947 kN	UF: 24,2 %		*5,948 kN*
	LP-9	**250 Kg**		19,27 Kg			15,25 Kg		9,197 kN	2,5	9,299 kN	0,167 m²	2,390 kN		5,863 kN	UF: 8,9 %		*1,690 kN*
		500 Kg		61,78 Kg			53,75 Kg		16,739 kN	2,2	17,083 kN	0,308 m²	4,779 kN		11,727 kN	UF: 17,8 %		*3,379 kN*
		1000 Kg		146,81 Kg			130,73 Kg		31,825 kN	2,2	32,652 kN	0,588 m²	9,558 kN		23,454 kN	UF: 35,6 %		*6,759 kN*
Overturning due to wind (Not in use)		**32 m/s**	0 Kg	7,32 Kg	7,32 Kg		7,32 Kg	7,32 Kg	1,954 kN	3	1,214 kN	0,022 m²					0,218 kN	
		75% wind (24m/s)	0 Kg						1,617 kN	3	1,617 kN	0,029 m²						
		50% wind (16m/s)	0 Kg						1,377 kN	3	1,377 kN	0,025 m²						
		Inside	0 Kg						1,184 kN	3	1,184 kN	0,021 m²						

22,25 Kg Hold back Force, for preventing sliding when not in use (incl use of counterweight/fixation).

Choose counterweight setup

When documenting use of LP 1 placement, the following points in the table must be checked.

First marking shows when in use. LP1 on 3 x 3 m fundaments shows that no counterweight is required.

Second marking is movement when not in use. This fundament needs to be fixated when not in use, if standing outside and are affected fully by the wind (32m/s).

If this fundament in placed where only 75% wind force (equals 24m/s) or less is hitting, there is no need for any fixation or counterweight.

Important. This value is only valid if correct self-weight are applied and rubber is used on a clean surface.

13.6.2 Configuration 1-3: 1000 kg – SW 255 kg

Basic data fundament (Quicklift bay)				Planed Skewness		Additional Supporting bays (if needed)	Length direction (x) - Lifting beam		Width direction (y) - Secondary beam		Select stabilization method	Location affecting wind result
Length	Width	Hight (to Quicklift)	Selfwight	Singel	Double			Closest to Quiclift (x)		Closest to Quiclift (y)		
3,00 m	3,00 m	2,50 m	**255,0 Kg**	5 °				Away from Quiclift (x)		Away from Quiclift (y)	Free standing	Open 100% (maximum 25 m/s, when in use)

Quicklift Table	Placement ID	SWL - (May be changed if required)	Fixation force [kN] X direction - Against cross side	Counterweight [kg] - Cross side Away from Quicklift (x)	Counterweight [kg] -Cross side Closest to Quicklift (x)	Fixation force [kN] Y direction - Against Long side	Counterweight [kg] -Long side Away from Quicklift (Y)	Counterweight [kg] -Long side Closest to Quicklift (Y)	Force in most loaded leg (Standard) [kN]	**Max Buckling length [hm] - INPUT DATA**	Force in most loaded footplate/ deck [kN] (including possible use of ballast)	Minimum size of plate if placed on Grating [m²]	Horizontal force in Quicklift due to skewness and tilt [kN]	Compression between Quicklifts when/if joint lifting	Vertical Load Secondary beam (Ledger) [kN]	Ledger bending moment -ALUHAK systems (utilization secondary beam)	Shear/parallel force between floor/deck and foot, included friction (FV_diff) - Only applies when ballast is placed	Internal Horizontally force to be taken in Bracing/ support bay or by fixation
Calculation: Force, against overturning, including	LP1	**250 Kg**							4,446 kN	2,5	4,446 kN	0,080 m²	2,103 kN		2,814 kN	UF: 15,74 %		*1,487 kN*
		500 Kg							7,110 kN	2,5	7,110 kN	0,128 m²	4,206 kN		5,628 kN	UF: 31,5 %		*2,974 kN*
		1000 Kg							12,438 kN	1,69	12,438 kN	0,224 m²	8,411 kN		11,255 kN	UF: 63,0 %		*5,948 kN*
Overturning due to wind (Not in use)	**32 m/s**	0 Kg							2,082 kN	3	1,301 kN	0,023 m²					0,190 kN	
	75% wind (24m/s)	0 Kg							1,746 kN	3	1,746 kN	0,031 m²						
	50% wind (16m/s)	0 Kg							1,505 kN	3	1,505 kN	0,027 m²						
	Inside	0 Kg							1,313 kN	3	1,313 kN	0,024 m²						

19,42 Kg Hold back Force, for preventing sliding when not in use (incl use of counterweight/fixation).

Choose counterweight setup

13.6.3 Configuration 1-4: 1000 kg – SW 181

Basic data fundament (Quicklift bay)				Planed Skewness		Additional Supporting bays (if needed)	Length direction (x) - Lifting beam		Width direction (y) - Secondary beam		Select stabilization method	Location affecting wind result
Length	Width	Hight (to Quicklift)	Selfwight	Singel	Double			Closest to Quiclift (x)		Closest to Quiclift (y)		
3,00 m	3,00 m	2,50 m	**181,0 Kg**	5 °				Away from Quiclift (x)		Away from Quiclift (y)	Fixation	Open 100% (maximum 25 m/s, when in use)

Distance between Quiklift and fixation in hight =

Quicklift Table	Placement ID	SWL - (May be changed if required)	Fixation force [kN] X direction - Against cross side	Counterweight [kg] - Cross side Away from Quicklift (x)	Counterweight [kg] -Cross side Closest to Quicklift (x)	Fixation force [kN] Y direction - Against Long side	Counterweight [kg] -Long side Away from Quicklift (Y)	Counterweight [kg] -Long side Closest to Quicklift (Y)	Force in most loaded leg (Standard) [kN]	**Max Buckling length [hm] - INPUT DATA**	Force in most loaded footplate/ deck [kN] (including possible use of ballast)	Minimum size of plate if placed on Grating [m²]	Horizontal force in Quicklift due to skewness and tilt [kN]	Compression between Quicklifts when/if joint lifting	Vertical Load Secondary beam (Ledger) [kN]	Ledger bending moment -ALUHAK systems (utilization secondary beam)	Shear/parallel force between floor/deck and foot, included friction (FV_diff) - Only applies when ballast is placed	Internal Horizontally force to be taken in Bracing/ support bay or by fixation
Calculation: Force, against overturning, including	LP1	**250 Kg**	2,65 kN			2,65 kN			1,951 kN	2,5	1,951 kN	0,035 m²	2,103 kN		2,814 kN	UF: 15,74 %	0,048 kN	*1,487 kN*
		500 Kg	4,14 kN			4,14 kN			3,306 kN	2,5	3,306 kN	0,060 m²	4,206 kN		5,628 kN	UF: 31,5 %	0,048 kN	*2,974 kN*
		1000 Kg	7,11 kN			7,11 kN			6,016 kN	2,5	6,016 kN	0,108 m²	8,411 kN		11,255 kN	UF: 63,0 %	0,048 kN	*5,948 kN*
Overturning due to wind (Not in use)	**32 m/s**	0 Kg	1,62 kN			1,62 kN			0,596 kN	3	0,596 kN	0,011 m²					0,389 kN	
	75% wind (24m/s)	0 Kg	1,11 kN			1,11 kN			0,596 kN	3	0,596 kN	0,011 m²					0,007 kN	
	50% wind (16m/s)	0 Kg	0,74 kN			0,74 kN			0,596 kN	3	0,596 kN	0,011 m²						
	Inside	0 Kg	0,45 kN			0,45 kN			0,596 kN	3	0,596 kN	0,011 m²						

~~**39,63 Kg**~~ Hold back Force, for preventing sliding when not in use (incl use of counterweight/fixation).

Choose counterweight setup

13.6.4 Configuration 1-5: 1000kg (using support bays)

Basic data fundament (Quicklift bay)				Planed Skewness		Additional Supporting bays (if needed)	Length direction (x) - Lifting beam		Width direction (y) - Secondary beam		Select stabilization method	Location affecting wind result
Length	Width	Hight (to Quicklift)	Selfwight	Singel	Double		1,00 m	Closest to Quiclift (x)	1,00 m	Closest to Quiclift (y)		
3,00 m	3,00 m	2,50 m	**291,0 Kg**	5 °				Away from Quiclift (x)		Away from Quiclift (y)	Free standing	Open 100% (maximum 25 m/s, when in use)

Distance between Quick Lift height and compression pipe / connection = 0,20 hm

Quicklift Table	Placement ID	SWL - (May be changed if required)	Fixation force [kN] X direction - Against cross side	Counterweight [kg] - Cross side Away from Quicklift (x)	Counterweight [kg] -Cross side Closest to Quicklift (x)	Fixation force [kN] Y direction - Against Long side	Counterweight [kg] -Long side Away from Quicklift (Y)	Counterweight [kg] -Long side Closest to Quicklift (Y)	Force in most loaded leg (Standard) [kN]	**Max Buckling length [hm] - INPUT DATA**	Force in most loaded footplate/ deck [kN] (including possible use of ballast)	Minimum size of plate if placed on Grating [m²]	Horizontal force in Quicklift due to skewness and tilt [kN]	Compression between Quicklifts when/if joint lifting	Vertical Load Secondary beam (Ledger) [kN]	Ledger bending moment -ALUHAK systems (utilization secondary beam)	Shear/parallel force between floor/deck and foot, included friction (FV_diff) - Only applies when ballast is placed	Internal Horizontally force to be taken in Bracing/ support bay or by fixation
Calculation: Force, against overturning, including needed fixation or counterweight/ ballast. Calculated data/force for most loaded objects	LP-1	250 Kg							4,632 kN	2,5	4,632 kN	0,083 m²	2,103 kN		2,814 kN	UF: 15,74 %		*1,487 kN*
		500 Kg							7,295 kN	2,5	7,295 kN	0,131 m²	4,206 kN		5,628 kN	UF: 31,5 %		*2,974 kN*
		1000 Kg							12,623 kN	2,38	12,623 kN	0,227 m²	8,411 kN		11,255 kN	UF: 63,0 %		*5,948 kN*
	LP-2	250 Kg							5,385 kN	2,5	5,385 kN	0,097 m²	2,103 kN		3,987 kN	UF: 22,3 %		*1,487 kN*
		500 Kg							8,802 kN	2,47	8,802 kN	0,158 m²	4,206 kN		7,974 kN	UF: 44,6 %		*2,974 kN*
		1000 Kg							15,636 kN	2,19	15,636 kN	0,281 m²	8,411 kN		15,947 kN	UF: 89,2 %		*5,948 kN*
	LP-3	250 Kg							6,707 kN	2,5	6,707 kN	0,121 m²	2,390 kN		5,863 kN	UF: 32,8 %		*1,690 kN*
		500 Kg							11,446 kN	2,16	11,446 kN	0,206 m²	4,779 kN		11,727 kN	UF: 65,6 %		*3,379 kN*
		~~1000 Kg~~								2,5						UF: 131,2 %		
	LP-4	250 Kg							5,366 kN	2,5	5,366 kN	0,097 m²	2,103 kN		2,814 kN	UF: 12,9 %		*1,487 kN*
		500 Kg							8,765 kN	2,44	8,765 kN	0,158 m²	4,206 kN		5,628 kN	UF: 25,7 %		*2,974 kN*
		1000 Kg							15,562 kN	1,35	15,562 kN	0,280 m²	8,411 kN		11,255 kN	UF: 51,5 %		*5,948 kN*
	LP-5	250 Kg							6,369 kN	2,5	6,369 kN	0,115 m²	2,103 kN		3,987 kN	UF: 18,2 %		*1,487 kN*
		500 Kg							10,770 kN	2,02	10,770 kN	0,194 m²	4,206 kN		7,974 kN	UF: 36,5 %		*2,974 kN*
		1000 Kg							19,573 kN	0,85	19,573 kN	0,352 m²	8,411 kN		15,947 kN	UF: 73,0 %		*5,948 kN*
	LP-6	250 Kg							8,109 kN	2,5	8,109 kN	0,146 m²	2,390 kN		5,863 kN	UF: 26,8 %		*1,690 kN*
		500 Kg							14,250 kN	2	14,250 kN	0,256 m²	4,779 kN		11,727 kN	UF: 53,6 %		*3,379 kN*
		~~1000 Kg~~								2,31						UF: 107,3 %		
	LP-7	250 Kg							6,101 kN	2,5	6,101 kN	0,110 m²	2,103 kN		2,814 kN	UF: 4,3 %		*1,487 kN*
		500 Kg							10,234 kN	2,36	10,234 kN	0,184 m²	4,206 kN		5,628 kN	UF: 8,5 %		*2,974 kN*
		1000 Kg							18,501 kN	1,87	18,501 kN	0,333 m²	8,411 kN		11,255 kN	UF: 17,1 %		*5,948 kN*
	LP-8	250 Kg							7,353 kN	2,5	7,353 kN	0,132 m²	2,103 kN		3,987 kN	UF: 6,0 %		*1,487 kN*
		500 Kg							12,739 kN	2,5	12,739 kN	0,229 m²	4,206 kN		7,974 kN	UF: 12,1 %		*2,974 kN*
		1000 Kg							23,509 kN	2,15	23,509 kN	0,423 m²	8,411 kN		15,947 kN	UF: 24,2 %		*5,948 kN*
	LP-9	250 Kg							9,511 kN	2,5	9,511 kN	0,171 m²	2,390 kN		5,863 kN	UF: 8,9 %		*1,690 kN*
		500 Kg							17,053 kN	2,2	17,053 kN	0,307 m²	4,779 kN		11,727 kN	UF: 17,8 %		*3,379 kN*
		1000 Kg							32,139 kN	2,2	32,139 kN	0,578 m²	9,558 kN		23,454 kN	UF: 35,6 %		*6,759 kN*
Overturning due to wind (Not in use)	32 m/s	0 Kg							2,268 kN	3	2,268 kN	0,041 m²					0,394 kN	
	75% wind (24m/s)	0 Kg							1,931 kN	3	1,931 kN	0,035 m²						
	50% wind (16m/s)	0 Kg							1,691 kN	3	1,691 kN	0,030 m²						
	Inside	0 Kg							1,499 kN	3	1,499 kN	0,027 m²						

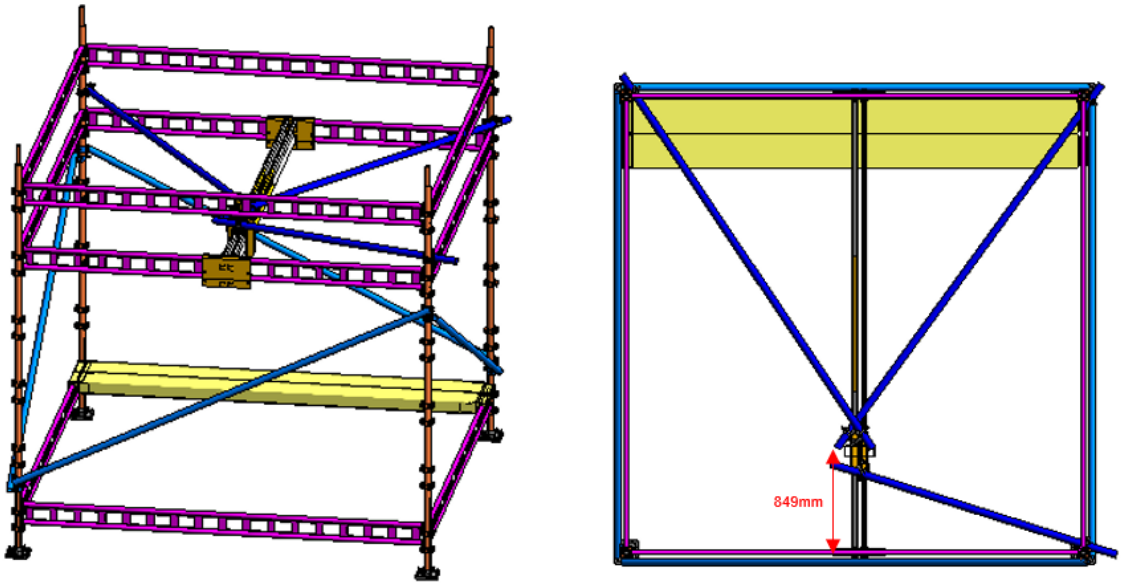
40,21 Kg Hold back Force, for preventing sliding when not in use (incl use of counterweight/fixation).

Choose counterweight setup

14. Example 2 – Quick Lift 3x3x2,5 – LP 2

14.1 Configuration 2-1: SWL 250 & 500 kg – SW 246 kg – (LP2-1)

14.1.1 Design picture



14.1.2 Counterweight / Fixations

- No counterweight is needed when not in use, the 2 planks self-weight is good enough. If these are removed, counterweight will be needed.

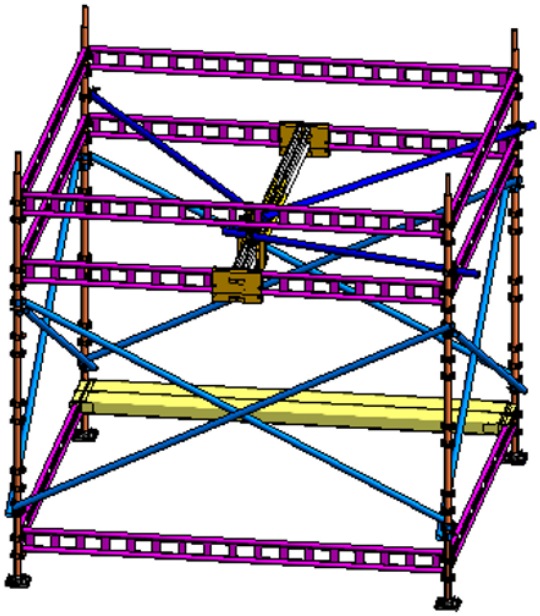
14.1.3 Description

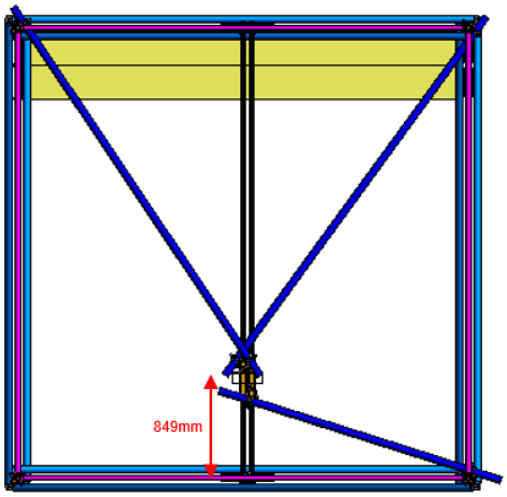
SWL 500 kg:

- Single bracing.
- 5° skewness.
  - See table 8.5 for other load or skewness.
- Buckling length for 250 kg = max 2,5 hm.
- Buckling length for 500 kg = max 2,5 hm.
- Free standing.
- 20,58 kg Hold back force, when not in use (32m/s windspeed).
  - If not secured for sliding, a total of 81 kg in counterweight is needed.

14.2 Configuration 2-2: SWL 1000 kg – SW 271 kg – (LP2-2)

14.2.1 Design picture

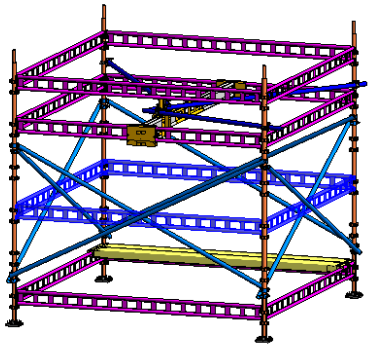




14.2.2 Counterweight / Fixations

20,58 kg Counterweight is needed on cross side.

- This amounts to 9,57 kg after reinforcements (additional ledgers) is added to the weight.



New SW = 306,6 kg

14.2.3 Description

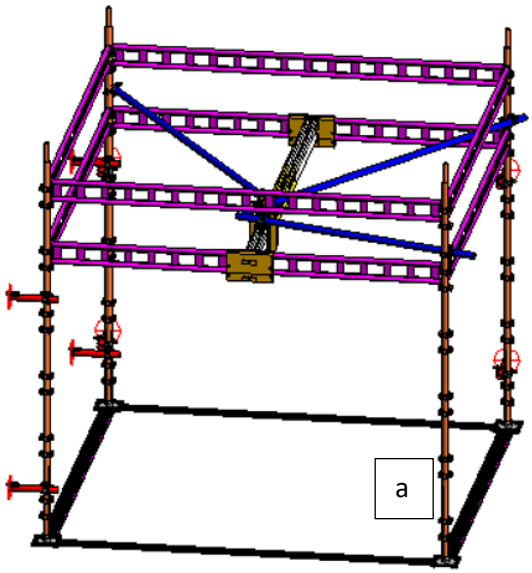
SWL 1000 kg:

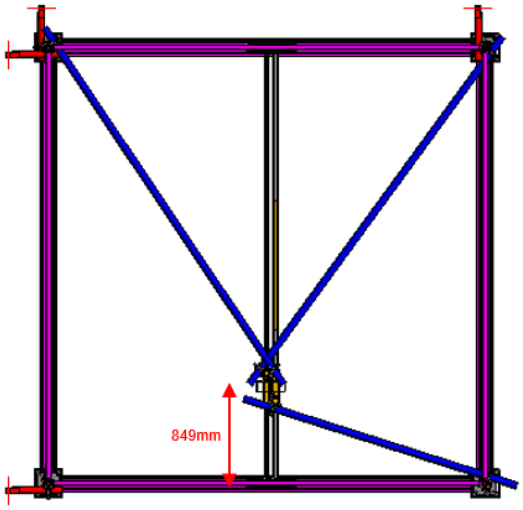
- Use of double bracing (cross diagonal).
- 5° skewness in all directions.
    - See table 8.5 for other load or skewness.
- Buckling length max 1,47hm.
    - <u>Additional ledgers must be placed</u>, securing the most loaded Standards.
        - Note that this will also add weight. By connecting Horizontally connections all around (adding the last one, on the back side of the fundament), this can be added to the fundaments self-weight.
        - If only adding 3 horizontally connections (securing needed for the most loaded legs), it is most conservative not adding this to its self-wight, as it is not equally divided on all 4 legs.
          Note. This only applies for overturn. When looking up buckling length all weight is to be added.
- Free standing.
- 9,43 kg Hold back force, when not in use and needed counterweight is added.

Note. By reinforcing and adding up the self-weight new holdback force will be 2,71kg.

14.3 Configuration 2-3: Attached – SW 178 kg – (LP2-3)

14.3.1 Design picture





14.3.2 Counterweight / Fixations

Fixation needed at in Quick Lift height on a 1000kg lift, is 7,12 kN I both directions. Fixation in floor level equals the same force as “Internal horizontal forces to be taken in bracing…”, and equals 5,948kN.

14.3.3 Buckling length

It is the horizontally force that reduces the standards max capacity for vertical load. The further away anchor point is placed the Quick Lift, the lower capacity the standard gets.

Standard A in picture, do not get any horizontally force between connections. This force is supplied through connecting ledgers or/and secondary beams also including LL (floor binding). When calculating buckling capacity on leg A, fixation placement can be set to 0,1m.

(Note. See measuring of fixation in configuration 6-3).

Remember to reset or remove this value when looking at legs affected directly by fixations.

Note. The buckling length is limited to 2,5 hm (general rules) and therefore equal on both legs, in this example.

14.3.4 Description

SWL 1000 kg:

- Fixations in low and high point both directions.
- 5° skewness in all directions.
    - See table 8.5 for other load or skewness.
- Buckling length max 2,5 hm (on most loaded standard taking anchor force).
- Buckling length max 2,5 hm (on most loaded standard without anchor force).
- Fixed.

14.4 Example - Table showing details LP 2 Configuration 1-3

14.4.1 Configuration 2-1: 200 & 500 kg – SW 246 kg

Basic data fundament (Quicklift bay)				Planed Skewness		Additional Supporting bays (if needed)	Length direction (x) - Lifting beam		Width direction (y) - Secondery beam		Select stabilization method	Lokasjons påvirkning Vind / Location affecting wind result
Length	Width	Hight (to Quicklift)	Selfwight	Singel	Double			Closest to Quiclift (x)		Closest to Quiclift (y)		
3,00 m	3,00 m	2,50 m	246,0 Kg	5 °				Away from Quiclift (x)		Away from Quiclift (y)	Free standing	Open 100% (maximum 25 m/s, when in use)

Quicklift Table	Placement ID	Lifted Load - (May be changed if required)	Fixation force [kN] X direction - Against Cross side	Counterweight [kg] -Cross side Away from Quicklift (x)	Counterweigth [kg] -Cross side Closest to Quicklift (x)	Fixation force [kN] Y direction - Against Long side	Counterweight [kg] -Long side Away from Quicklift (Y)	Counterweigth [kg] -Long side Closest to Quicklift (Y)	Normal Force in most loaded leg (Standard) [kN]	Max Buckling length [hm] - INPUT DATA	Normal Force in most loaded footplate/ deck [kN] (including possible use of ballast)	Minimum size of plate if placed on Grating [m²]	Horizontal force in Quicklift due to skewness and tilt [kN]	Compression between Quicklifts when/if twin /joint lifting	Vertical Load Secondary beam (Ledger) [kN]	Ledger bending moment - ALUHAK systems (utilization secondary beam)	Shear/parallel force between floor/deck and foot, included friction (FV_diff) - Only applies when ballast is placed	Internal Horizontally force to be taken in Bracing/ support bay or by fixation	
Calculation Overturning without fixation or ballast. Incl	LP-2	250 Kg							5,153 kN	2,5	5,153 kN	0,093 m²	2,103 kN		3,987 kN	UF: 22,3 %		*1,487 kN*	
		500 Kg		0,06 Kg					8,570 kN	2,5	8,571 kN	0,154 m²	4,206 kN		7,974 kN	UF: 44,6 %		*2,974 kN*	
		1000 Kg		28,31 Kg					15,405 kN	1,51	15,489 kN	0,279 m²	8,411 kN		15,947 kN	UF: 89,2 %		*5,948 kN*	
Overturning	32 m/s	0 Kg		2,37 Kg	2,37 Kg		2,37 Kg	2,37 Kg	2,036 kN	3	2,050 kN	0,037 m²					0,202 kN		**20,58 Kg** Hold back Force, for preventing sliding when not in use. incl use of counterwight/fiks.
	75% wind (24m/s)	0 Kg							1,699 kN	3	1,699 kN	0,031 m²							

14.4.2 Configuration 2-2: 1000 kg – SW 271 kg

Basic data fundament (Quicklift bay)				Planed Skewness		Additional Supporting bays (if needed)	Length direction (x) - Lifting beam		Width direction (y) - Secondery beam		Select stabilization method	Lokasjons påvirkning Vind / Location affecting wind result
Length	Width	Hight (to Quicklift)	Selfwight	Singel	Double			Closest to Quiclift (x)		Closest to Quiclift (y)		
3,00 m	3,00 m	2,50 m	271,0 Kg	5 °				Away from Quiclift (x)		Away from Quiclift (y)	Free standing	Open 100% (maximum 25 m/s, when in use)

Quicklift Table	Placement ID	Lifted Load - (May be changed if required)	Fixation force [kN] X direction - Against Cross side	Counterweight [kg] -Cross side Away from Quicklift (x)	Counterweigth [kg] -Cross side Closest to Quicklift (x)	Fixation force [kN] Y direction - Against Long side	Counterweight [kg] -Long side Away from Quicklift (Y)	Counterweigth [kg] -Long side Closest to Quicklift (Y)	Normal Force in most loaded leg (Standard) [kN]	Max Buckling length [hm] - INPUT DATA	Normal Force in most loaded footplate/ deck [kN] (including possible use of ballast)	Minimum size of plate if placed on Grating [m²]	Horizontal force in Quicklift due to skewness and tilt [kN]	Compression between Quicklifts when/if twin /joint lifting	Vertical Load Secondary beam (Ledger) [kN]	Ledger bending moment - ALUHAK systems (utilization secondary beam)	Shear/parallel force between floor/deck and foot, included friction (FV_diff) - Only applies when ballast is placed	Internal Horizontally force to be taken in Bracing/ support bay or by fixation	
Calculation Overturning without fixation or ballast. Incl	LP-2	250 Kg							5,282 kN	2,5	5,282 kN	0,095 m²	2,103 kN		3,987 kN	UF: 22,3 %		*1,487 kN*	
		500 Kg							8,699 kN	2,5	8,699 kN	0,157 m²	4,206 kN		7,974 kN	UF: 44,6 %		*2,974 kN*	
		1000 Kg		20,58 Kg					15,533 kN	1,49	15,595 kN	0,281 m²	8,411 kN		15,947 kN	UF: 89,2 %		*5,948 kN*	
Overturning	32 m/s	0 Kg		20,58 Kg					2,165 kN	3	2,226 kN	0,040 m²					0,092 kN		**9,43 Kg** Hold back Force, for preventing sliding when not in use. incl use of counterwight/fiks.
	75% wind (24m/s)	0 Kg		20,58 Kg					1,828 kN	3	1,889 kN	0,034 m²							

Reinforced (4 ledgers added)

Basic data fundament (Quicklift bay)				Planed Skewness		Additional Supporting bays (if needed)	Length direction (x) - Lifting beam		Width direction (y) - Secondery beam		Select stabilization method	Lokasjons påvirkning Vind / Location affecting wind result
Length	Width	Hight (to Quicklift)	Selfwight	Singel	Double			Closest to Quiclift (x)		Closest to Quiclift (y)		
3,00 m	3,00 m	2,50 m	306,6 Kg	5 °				Away from Quiclift (x)		Away from Quiclift (y)	Free standing	Open 100% (maximum 25 m/s, when in use)

Quicklift Table	Placement ID	Lifted Load - (May be changed if required)	Fixation force [kN] X direction - Against Cross side	Counterweight [kg] -Cross side Away from Quicklift (x)	Counterweigth [kg] -Cross side Closest to Quicklift (x)	Fixation force [kN] Y direction - Against Long side	Counterweight [kg] -Long side Away from Quicklift (Y)	Counterweigth [kg] -Long side Closest to Quicklift (Y)	Normal Force in most loaded leg (Standard) [kN]	Max Buckling length [hm] - INPUT DATA	Normal Force in most loaded footplate/ deck [kN] (including possible use of ballast)	Minimum size of plate if placed on Grating [m²]	Horizontal force in Quicklift due to skewness and tilt [kN]	Compression between Quicklifts when/if twin /joint lifting	Vertical Load Secondary beam (Ledger) [kN]	Ledger bending moment - ALUHAK systems (utilization secondary beam)	Shear/parallel force between floor/deck and foot, included friction (FV_diff) - Only applies when ballast is placed	Internal Horizontally force to be taken in Bracing/ support bay or by fixation	
Calculation Overturning without fixation or ballast. Incl	LP-2	250 Kg							5,465 kN	2,5	5,465 kN	0,098 m²	2,103 kN		3,987 kN	UF: 22,3 %		*1,487 kN*	
		500 Kg							8,883 kN	2,5	8,883 kN	0,160 m²	4,206 kN		7,974 kN	UF: 44,6 %		*2,974 kN*	
		1000 Kg		9,57 Kg					15,717 kN	1,47	15,745 kN	0,283 m²	8,411 kN		15,947 kN	UF: 89,2 %		*5,948 kN*	
Overturning	32 m/s	0 Kg		9,57 Kg					2,348 kN	3	2,376 kN	0,043 m²					0,027 kN		**2,71 Kg** Hold back Force, for preventing sliding when not in use. incl use of counterwight/fiks.
	75% wind (24m/s)	0 Kg		9,57 Kg					2,012 kN	3	2,040 kN	0,037 m²							

Choose counterweight setup

LP-2 - 1000 kg

14.4.3 Configuration 2-3: 1000 kg – SW 187 kg (Fixed leg- most loaded)

Basic data fundament (Quicklift bay)				Planed Skewness		Additional Supporting bays (if needed)	Length direction (x) - Lifting beam		Width direction (y) - Secondery beam		Select stabilization method	Lokasjons påvirkning Vind / Location affecting wind result
Length	Width	Hight (to Quicklift)	Selfwight	Singel	Double			Closest to Quiclift (x)		Closest to Quiclift (y)		
3,00 m	3,00 m	2,50 m	187,0 Kg	5 °				Away from Quiclift (x)		Away from Quiclift (y)	Fixation	Open 100% (maximum 25 m/s, when in use)

Distance between Quiklift and fixation in hight= 0,50 hm

Quicklift Table	Placement ID	Lifted Load - (May be changed if required)	Fixation force [kN] X direction - Against Cross side	Counterweight [kg] -Cross side Away from Quicklift (x)	Counterweigth [kg] -Cross side Closest to Quicklift (x)	Fixation force [kN] Y direction - Against Long side	Counterweight [kg] -Long side Away from Quicklift (Y)	Counterweigth [kg] -Long side Closest to Quicklift (Y)	Normal Force in most loaded leg (Standard) [kN]	Max Buckling length [hm] - INPUT DATA	Normal Force in most loaded footplate/ deck [kN] (including possible use of ballast)	Minimum size of plate if placed on Grating [m²]	Horizontal force in Quicklift due to skewness and tilt [kN]	Compression between Quicklifts when/if twin /joint lifting	Vertical Load Secondary beam (Ledger) [kN]	Ledger bending moment - ALUHAK systems (utilization secondary beam)	Shear/parallel force between floor/deck and foot, included friction (FV_diff) - Only applies when ballast is placed	Internal Horizontally force to be taken in Bracing/ support bay or by fixation
Calculation Overturning without fixation or ballast. Incl	LP-2	**250 Kg**	2,67 kN			2,67 kN			2,571 kN	2,5	2,571 kN	0,046 m²	2,103 kN		3,987 kN	UF: 22,3 %	0,032 kN	*1,487 kN*
		500 Kg	4,15 kN			4,15 kN			4,526 kN	2,5	4,526 kN	0,081 m²	4,206 kN		7,974 kN	UF: 44,6 %	0,032 kN	*2,974 kN*
		1000 Kg	7,13 kN			7,13 kN			8,437 kN	2,5	8,437 kN	0,152 m²	8,411 kN		15,947 kN	UF: 89,2 %	0,032 kN	*5,948 kN*
Overturning due to wind (Not in use)	**32 m/s**	0 Kg	1,64 kN			1,64 kN			0,615 kN	3	0,615 kN	0,011 m²					0,373 kN	
	75% wind (24m/s)	0 Kg	1,12 kN			1,12 kN			0,615 kN	3	0,615 kN	0,011 m²						
	50% Wind (16m/s)	0 Kg	0,76 kN			0,76 kN			0,615 kN	3	0,615 kN	0,011 m²						
	Innside	0 Kg	0,47 kN			0,47 kN			0,615 kN	3	0,615 kN	0,011 m²						

~~37,99 Kg~~ Hold back Force, for preventing sliding when not in use. incl use of counterwight/fiks.

Choose counterweight setup

14.4.4 Configuration 2-3: 1000 kg – SW 187 kg (Leg A) - The buckling length is in this case limited by the general rule, and therefore equal in both legs. Different setup will get different results.

Basic data fundament (Quicklift bay)				Planed Skewness		Additional Supporting bays (if needed)	Length direction (x) - Lifting beam		Width direction (y) - Secondery beam		Select stabilization method	Lokasjons påvirkning Vind / Location affecting wind result
Length	Width	Hight (to Quicklift)	Selfwight	Singel	Double			Closest to Quiclift (x)		Closest to Quiclift (y)		
3,00 m	3,00 m	2,50 m	187,0 Kg	5 °				Away from Quiclift (x)		Away from Quiclift (y)	Fixation	Open 100% (maximum 25 m/s, when in use)

Distance between Quiklift and fixation in hight= 0,10 hm

Quicklift Table	Placement ID	Lifted Load - (May be changed if required)	Fixation force [kN] X direction - Against Cross side	Counterweight [kg] -Cross side Away from Quicklift (x)	Counterweigth [kg] -Cross side Closest to Quicklift (x)	Fixation force [kN] Y direction - Against Long side	Counterweight [kg] -Long side Away from Quicklift (Y)	Counterweigth [kg] -Long side Closest to Quicklift (Y)	Normal Force in most loaded leg (Standard) [kN]	Max Buckling length [hm] - INPUT DATA	Normal Force in most loaded footplate/ deck [kN] (including possible use of ballast)	Minimum size of plate if placed on Grating [m²]	Horizontal force in Quicklift due to skewness and tilt [kN]	Compression between Quicklifts when/if twin /joint lifting	Vertical Load Secondary beam (Ledger) [kN]	Ledger bending moment - ALUHAK systems (utilization secondary beam)	Shear/parallel force between floor/deck and foot, included friction (FV_diff) - Only applies when ballast is placed	Internal Horizontally force to be taken in Bracing/ support bay or by fixation
Calculation Overturning without fixation or ballast. Incl	LP-2	**250 Kg**	2,67 kN			2,67 kN			2,571 kN	2,5	2,571 kN	0,046 m²	2,103 kN		3,987 kN	UF: 22,3 %	0,032 kN	*1,487 kN*
		500 Kg	4,15 kN			4,15 kN			4,526 kN	2,5	4,526 kN	0,081 m²	4,206 kN		7,974 kN	UF: 44,6 %	0,032 kN	*2,974 kN*
		1000 Kg	7,13 kN			7,13 kN			8,437 kN	2,5	8,437 kN	0,152 m²	8,411 kN		15,947 kN	UF: 89,2 %	0,032 kN	*5,948 kN*
Overturning due to wind (Not in use)	**32 m/s**	0 Kg	1,64 kN			1,64 kN			0,615 kN	3	0,615 kN	0,011 m²					0,373 kN	
	75% wind (24m/s)	0 Kg	1,12 kN			1,12 kN			0,615 kN	3	0,615 kN	0,011 m²						
	50% Wind (16m/s)	0 Kg	0,76 kN			0,76 kN			0,615 kN	3	0,615 kN	0,011 m²						
	Innside	0 Kg	0,47 kN			0,47 kN			0,615 kN	3	0,615 kN	0,011 m²						

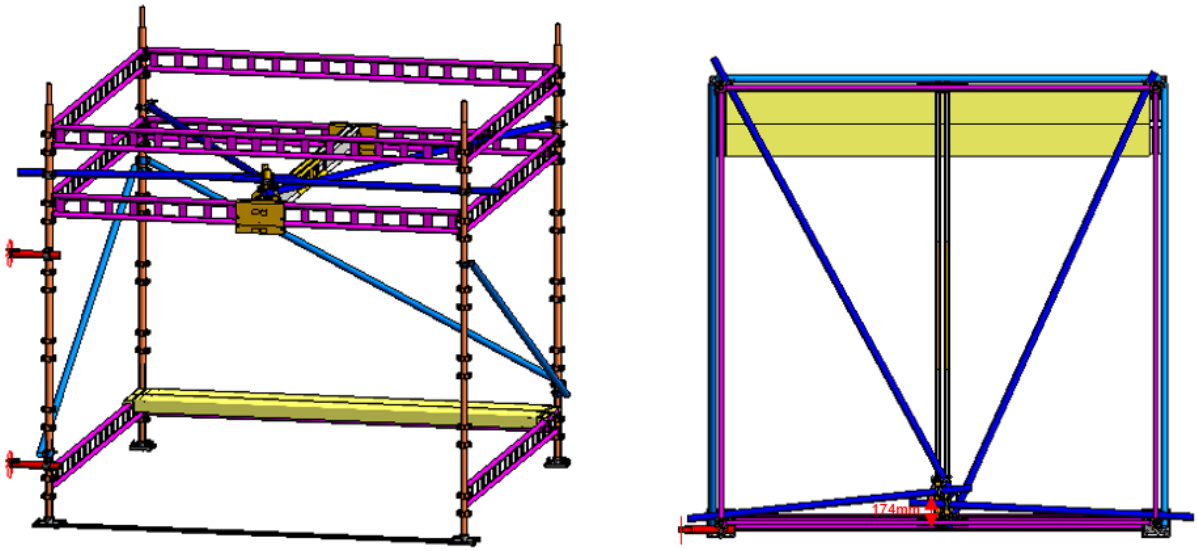
~~37,99 Kg~~ Hold back Force, for preventing sliding when not in use. incl use of counterwight/fiks.

Choose counterweight setup

15. Example 3 – Quick Lift 3x3x2,5 – LP 3

15.1 Configuration 3-1: "Fixated in Y", SWL 250 & 500 kg – SW 241 kg – (LP3-1)

15.1.1 Design picture



15.1.2 Counterweight / Fixations

- 250 kg Solution.
  - 15,87 kg Counterweight - Cross side Away from Quick Lift.
  - Fixation Y direction - High point = 3,00 kN.
  - Fixation Y direction - Low point = 1,69 kN.
- 500 kg Solution.
  - 58,38 kg Counterweight - Cross side Away from Quick Lift.
  - Fixation Y direction - High point 4,69 kN.
  - Fixation Y direction - Low point 3,38 kN.

15.1.3 Description

SWL <=500 kg:

- Single bracing.
- 5° skewness in all directions inside fundaments wall.
  - See table 8.5 for other load or skewness.
- Buckling length for SWL 250 kg = max 2,5 hm ("Fixated in Y").
- Buckling length for SWL 500 kg = max 2,5 hm ("Fixated in Y").
- Partly free standing.
- Hold back force, when not in use and needed counterweight is added.
  - Hold back force to be placed/attached diagonally from fixation.
  - 250 kg = 17,84 kg.
  - 500 kg = 6,23 kg.

15.2 Configuration 3-2: 1000 kg not allowed - (LP3-2)

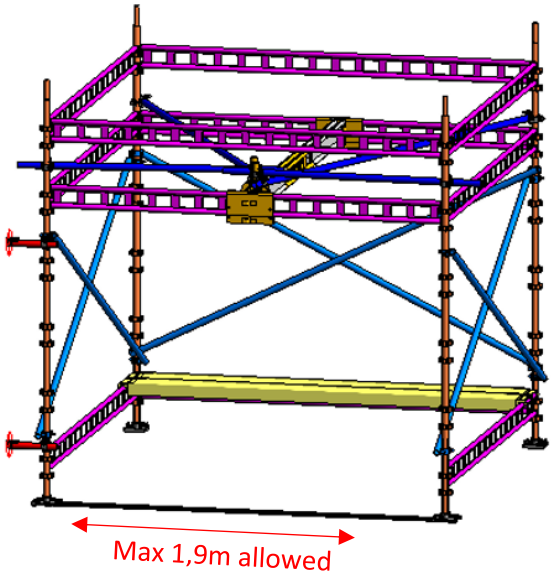
15.2.1 General info

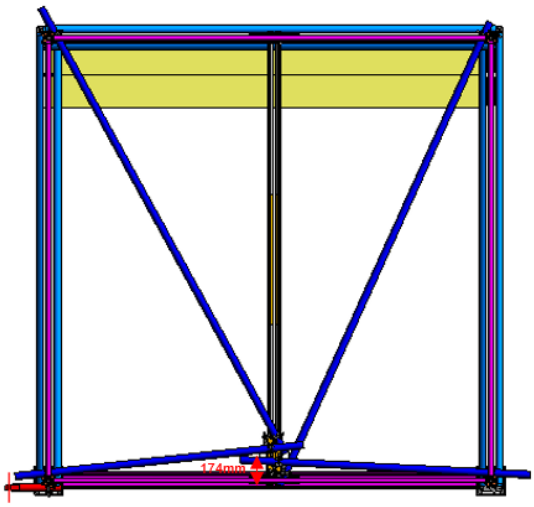
Due to high load on the secondary beam, this configuration (LP-3) will not allow 1000 kg lifting. If Quick Lift is to be placed in LP3 and loaded 1000 kg, the width of the fundament (secondary beam) must be reduced to 1,9m.

It will also be allowed if the width (secondary beam) is 2,45m and the Quick Lift in placed minimum 344 mm (CC) from wall and against centre, along the lifting beam.

Note. This is not a setup that can be treated in this revision of the worksheet but is shown as an example at the end of this manual. (Example 11)

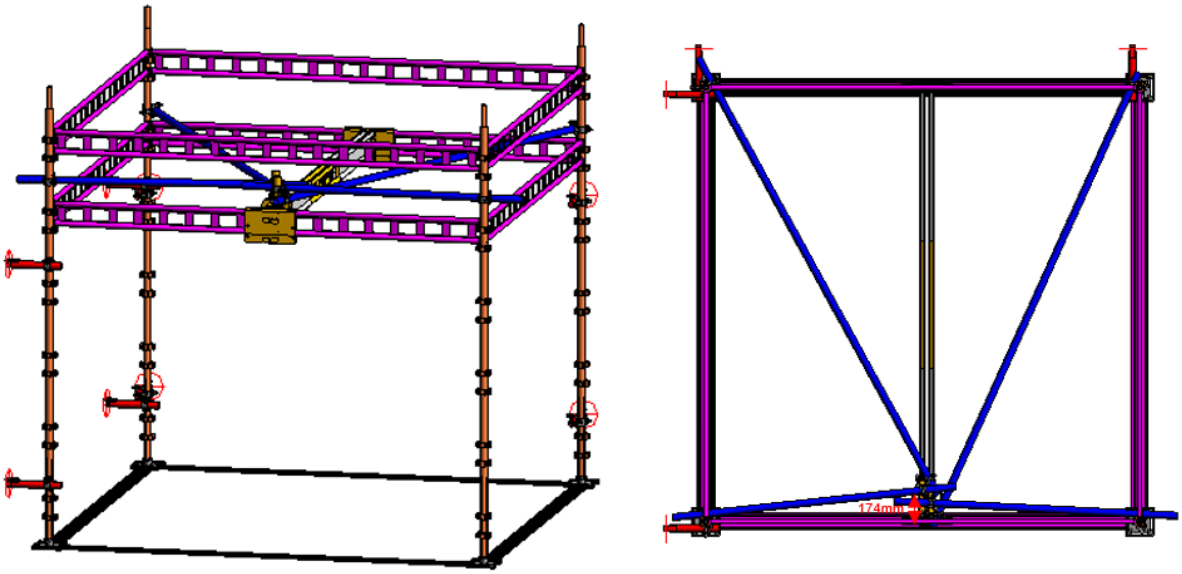
15.2.2 Design picture





15.3 Configuration 3-3: Attached – SW 185 kg – (LP3-3)

15.3.1 Design picture



15.3.2 Counterweight / Fixations

Fixation needed at in Quick Lift height on a 500kg lift, is 4,56 kN I both directions. Fixation in floor level equals the same force as “Internal horizontal forces to be taken in bracing…”, 3,379 kN.

15.3.3 Description

Load max 500 kg:

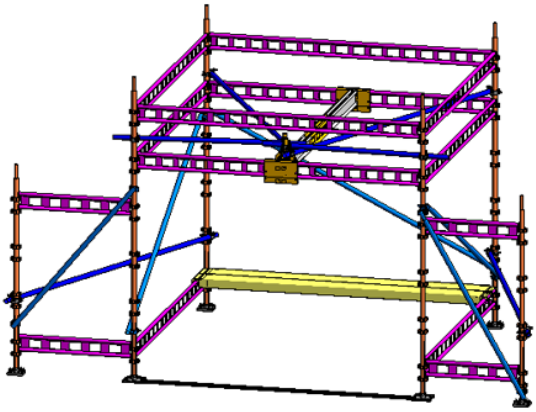
- Fixations in low and high point both directions.
- 5° skewness in all directions inside fundaments wall.
  - See table 8.5 for other load or skewness.
- Buckling length limited to max 2,50hm, in all legs.
- Fixed - No additional holdback force is required.

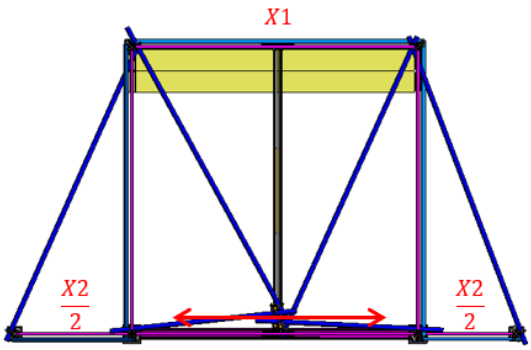
Basic data fundament (Quicklift bay)				Planed Skewness		Additional Supporting bays (if needed)	Length direction (x) - Lifting beam		Width direction (y) - Secondery beam		Select stabilization method	Lokasjons påvirkning Vind / Location affecting wind result
Length	Width	Hight (to Quicklift)	Selfwight	Singel	Double			Closest to Quiclift (x)		Closest to Quiclift (y)		
3,00 m	3,00 m	2,50 m	185,0 Kg	5 °				Away from Quiclift (x)		Away from Quiclift (y)	Fixation	en 100% (maximum 25 m/s, when in use)
										Distance between Quiklift and fixation in hight=		

Quicklift Table	Placement ID	Lifted Load - (May be changed if required)	Fixation force [kN] X direction - Against Cross side	Counterweight [kg] -Cross side Away from Quicklift (x)	Counterweigth [kg] -Cross side Closest to Quicklift (x)	Fixation force [kN] Y direction - Against Long side	Counterweight [kg] -Long side Away from Quicklift (Y)	Counterweigth [kg] -Long side Closest to Quicklift (Y)	Normal Force in most loaded leg (Standard) [kN]	Max Buckling length [hm] - INPUT DATA	Normal Force in most loaded footplate/ deck [kN] (including possible use of ballast)	Minimum size of plate if placed on Grating [m²]	Horizontal force in Quicklift due to skewness and tilt [kN]	Compression between Quicklifts when/if twin /joint lifting	Vertical Load Secondary beam (Ledger) [kN]	Ledger bending moment - ALUHAK systems (utilization secondary beam)	Shear/parallel force between floor/deck and foot, included friction (FV_dir) - Only applies when ballast is placed	Internal Horizontally force to be taken in Bracing/ support bay or by fixation
Calculation Overturning without fixation or ballast. Incl	LP3	250 Kg	2,87 kN			2,87 kN			3,513 kN	2,5	3,513 kN	0,063 m²	2,390 kN		5,863 kN	UF: 32,8 %	0,038 kN	*1,690 kN*
		500 Kg	4,56 kN			4,56 kN			6,417 kN	2,5	6,417 kN	0,116 m²	4,779 kN		11,727 kN	UF: 65,6 %	0,038 kN	*3,379 kN*
		~~1000 Kg~~														UF: 131,2 %		

15.4 Configuration 3-4: Alternative Method for stabilizing – (LP3-4)

15.4.1 Design picture SWL 250 and 500 kg





SW=295,6 kg incl. Support and 240,2 kg exc. support.

15.4.2 Counterweight / Fixations

The horizontal load due to skewness horizontally in picture, is in the same line as the build outs supporting the standards and can therefore be treated as a setup with to supporting bays in that direction. Since these solutions are not adding any actual support bays, the self-weight shall not include the equipment supporting it, but only the equipment that is included in the main bay, when calculating for overturn. Difference between weight with or without support can be treated as added ballast on the side it is placed.

15.4.3 Buckling length

When checking buckling length, all weight needs to be considered (incl. support), as most loaded legs, are affected by its total weight.

15.4.4 Description

Ballast only needed in X direction.

5° skewness in all directions inside fundaments wall.

- See table 8.5 for other load or skewness.

SWL 250 kg:

- Ballast X1: 63,24 kg placed on side farthest away from the Quick Lift. (Due to wind)
- Ballast X2: On the same side as the Quick Lift 63,24 kg is also needed due to wind when not in use. After weight difference of 55,4 kg is included, a total of 7,84 kg is needed.
- Buckling length max 2,5hm (Based on SW= 295,6 kg).
- Hold back force is 56 kg, for sliding.

SWL 500 kg:

- Ballast X1: 94,69 kg placed on side farthest away from the Quick Lift.
- Ballast X2: On the same side as the Quick Lift 63,24 kg is also needed due to wind when not in use. After weight difference of 55,4 kg is included, a total of 7,84 kg is needed.
- Buckling length max 2,16hm (Based on SW= 295,6 kg).
- Hold back force is 47,5 kg, for sliding.

15.5 Example - Table showing details LP 3 Configuration 4 - SWL 500 kg

Checking Overturn and ballast need and Holdback force for sliding:

Basic data fundament (Quicklift bay)				Planed Skewness		Additional Supporting bays (if needed)	Length direction (x) - Lifting beam		Width direction (y) - Secondery beam		Select stabilization method	Lokasjons påvirkning Vind / Location affecting wind result
Length	Width	Hight (to Quicklift)	Selfwight	Singel	Double			Closest to Quiclift (x)	1,00 m	Closest to Quiclift (y)		
3,00 m	3,00 m	2,50 m	**240,2 Kg**	5 °				Away from Quiclift (x)	1,20 m	Away from Quiclift (y)	Free standing	Open 100% (maximum 25 m/s when in use)

Quicklift Table	Placement ID	Lifted Load - (May be changed if required)	Fixation force [kN] X direction - Against Cross side	Counterweight [kg] -Cross side Away from Quicklift (x)	Counterweigth [kg] -Cross side Closest to Quicklift (x)	Fixation force [kN] Y direction - Against Long side	Counterweight [kg] -Long side Away from Quicklift (Y)	Counterweigth [kg] -Long side Closest to Quicklift (Y)	Normal Force in most loaded leg (Standard) [kN]	Max Buckling length [hm] - INPUT DATA	Normal Force in most loaded footplate/ deck [kN] (including possible use of ballast)	Minimum size of plate if placed on Grating [m²]	Horizontal force in Quicklift due to skewness and tilt [kN]	Compression between Quicklifts when/if twin /joint lifting	Vertical Load Secondary beam (Ledger) [kN]	Ledger bending moment - ALUHAK systems (utilization secondary beam)	Shear/parallel force between floor/deck and foot, included friction (FV_diff) - Only applies when ballast is placed	Internal Horizontally force to be taken in Bracing/ support bay or by fixation	
Calculation Overturning without fixation or ballast Incl	LP-3	**250 Kg**		52,18 Kg					6,522 kN	3,2	6,677 kN	0,120 m²	2,390 kN		5,863 kN	UF: 32,8 %	0,152 kN	*1,690 kN*	
		500 Kg		94,69 Kg					11,261 kN	2,16	11,543 kN	0,208 m²	4,779 kN		11,727 kN	UF: 65,6 %	0,038 kN	*3,379 kN*	
		~~**1000 Kg**~~														UF: 131,2 %			
Overturning due to wind (Not in use)	**32 m/s**	0 Kg		94,69 Kg	63,24 Kg				2,130 kN	3	2,601 kN	0,047 m²					0,465 kN		**47,42 Kg** Hold back Force, for preventing sliding when not in use. incl use of counterwight/fiks.
	75% wind (24m/s)	0 Kg		94,69 Kg	3,08 Kg				1,740 kN	3	2,031 kN	0,037 m²							**Choose counterweight setup**
	50% Wind (16m/s)	0 Kg		94,69 Kg					1,460 kN	3	1,742 kN	0,031 m²							LP-3 - 500 kg
	Innside	0 Kg		94,69 Kg					1,237 kN	3	1,519 kN	0,027 m²							

Checking Buckling and Force in deck:

Basic data fundament (Quicklift bay)				Planed Skewness		Additional Supporting bays (if needed)	Length direction (x) - Lifting beam		Width direction (y) - Secondery beam		Select stabilization method	Lokasjons påvirkning Vind / Location affecting wind result
Length	Width	Hight (to Quicklift)	Selfwight	Singel	Double			Closest to Quiclift (x)	1,00 m	Closest to Quiclift (y)		
3,00 m	3,00 m	2,50 m	**295,6 Kg**	5 °				Away from Quiclift (x)	1,20 m	Away from Quiclift (y)	Free standing	Open 100% (maximum 25 m/s when in use)

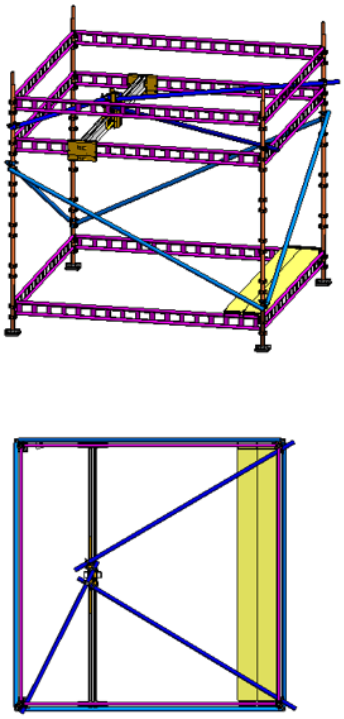
Quicklift Table	Placement ID	Lifted Load - (May be changed if required)	Fixation force [kN] X direction - Against Cross side	Counterweight [kg] -Cross side Away from Quicklift (x)	Counterweigth [kg] -Cross side Closest to Quicklift (x)	Fixation force [kN] Y direction - Against Long side	Counterweight [kg] -Long side Away from Quicklift (Y)	Counterweigth [kg] -Long side Closest to Quicklift (Y)	Normal Force in most loaded leg (Standard) [kN]	Max Buckling length [hm] - INPUT DATA	Normal Force in most loaded footplate/ deck [kN] (including possible use of ballast)	Minimum size of plate if placed on Grating [m²]	Horizontal force in Quicklift due to skewness and tilt [kN]	Compression between Quicklifts when/if twin /joint lifting	Vertical Load Secondary beam (Ledger) [kN]	Ledger bending moment - ALUHAK systems (utilization secondary beam)	Shear/parallel force between floor/deck and foot, included friction (FV_diff) - Only applies when ballast is placed	Internal Horizontally force to be taken in Bracing/ support bay or by fixation	
Calculation Overturning without fixation or ballast Incl	LP-3	**250 Kg**		35,05 Kg					6,807 kN	3,2	6,911 kN	0,124 m²	2,390 kN		5,863 kN	UF: 32,8 %	0,049 kN	*1,690 kN*	
		500 Kg		77,56 Kg					11,546 kN	2,16	11,777 kN	0,212 m²	4,779 kN		11,727 kN	UF: 65,6 %		*3,379 kN*	
		~~**1000 Kg**~~														UF: 131,2 %			
Overturning due to wind (Not in use)	**32 m/s**	0 Kg		77,56 Kg	46,11 Kg				2,416 kN	3	2,784 kN	0,050 m²					0,408 kN		**41,65 Kg** Hold back Force, for preventing sliding when not in use. incl use of counterwight/fiks.
	75% wind (24m/s)	0 Kg		77,56 Kg					2,025 kN	3	2,256 kN	0,041 m²							**Choose counterweight setup**
	50% Wind (16m/s)	0 Kg		77,56 Kg					1,746 kN	3	1,977 kN	0,036 m²							LP-3 - 500 kg
	Innside	0 Kg		77,56 Kg					1,522 kN	3	1,753 kN	0,032 m²							

16. Example 4 – Quick Lift 3x3x2,5 – LP 4

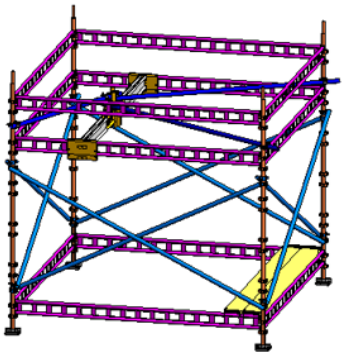
16.1 Configuration 4 (1-3):

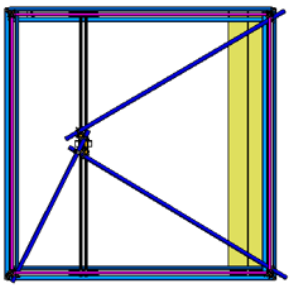
16.1.1 Design pictures

LP4-1 (SWL 250&500 kg)
247 Kg

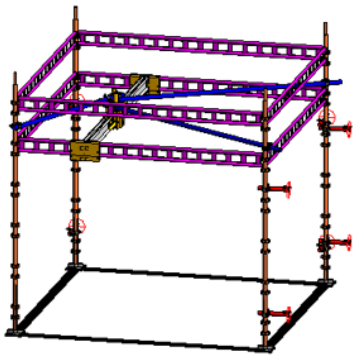


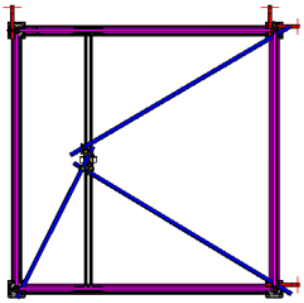
LP4-2 (SWL 1000 kg)
272 Kg





LP4-3 (SWL 1000 kg)
179 Kg





16.1.2 Description

This solution gives the same local placement as LP-2 But will have a less stress on the beams.
If we look away from the small difference in self-wight compared to LP-2, this will have the same needs to counterweight/fixation and holdback force as LP-2.

17. Example 5 – Quick Lift 3x3x2,5 – LP 5

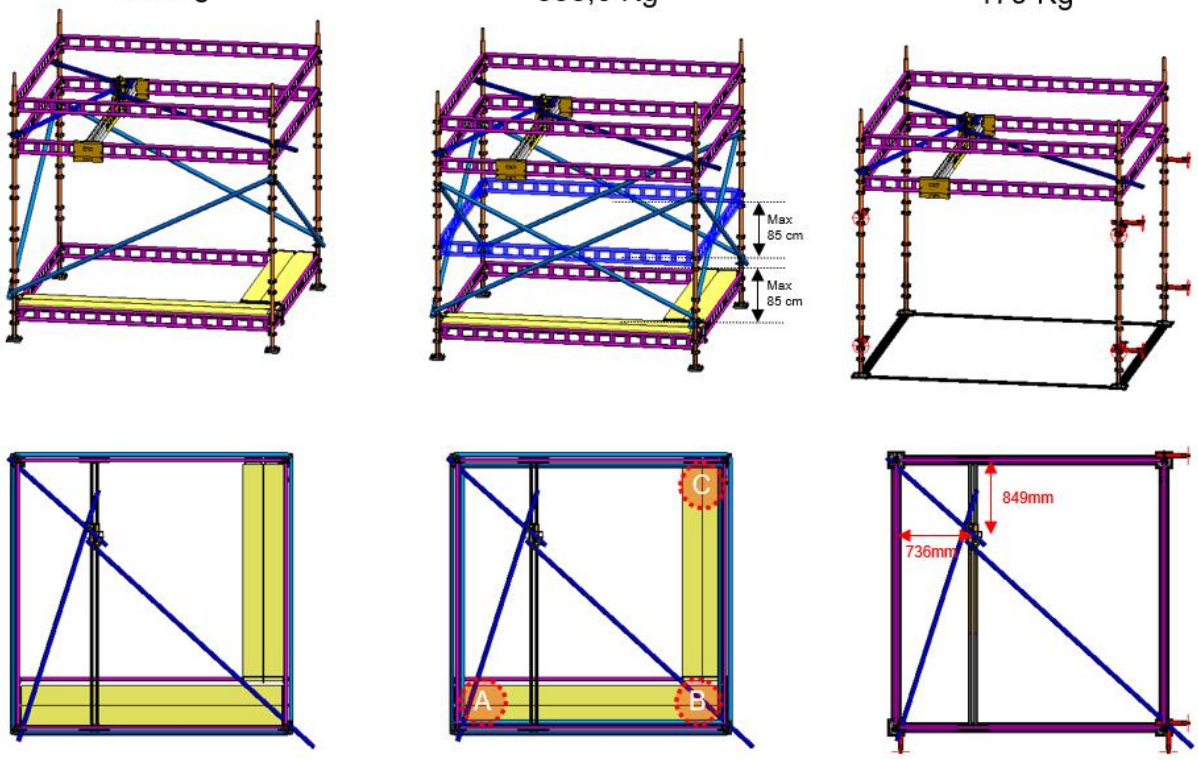
17.1 Configuration 5 - (1-3):

17.1.1 Design pictures

LP5-1 (SWL 500 kg)
278 Kg

LP5-2 (SWL 1000 kg)
338,6 Kg

LP5-3 (SWL 1000 kg)
179 Kg



17.1.2 Description Counterweight placement

Example showing Counterweight placed in the fundaments 3 corners. These examples have a high self-weight due to its setup for supporting the counterweight, leaving no need for counterweight using 5 degrees skewness. This example will therefore be special adapted treating a 10-degree skewness.

No Hold back force is required for LP5-2 but 13kg will be needed for LP5-1 (not in use 32m/s).

Looking at a 1000 kg fundament (LP5-2) with 10° skewness and SW 338,6kg, counterweight will be required on two sides of the fundament.

On “long side” farthest away from lifting point (right in picture) 101,52 kg is required, while on “cross side” farthest away from lifting point (low in picture) 109,43 kg is required.

When dividing this over to the fundament’s corners, this will give a need of:

Corner A	Corner B	Corner C
55 kg	55 kg	51 kg

Buckling length for most loaded leg is 0,85 hm.

Basic data fundament (Quicklift bay)				Planed Skewness		Additional Supporting bays (if needed)	Length direction (x) - Lif
Length	Width	Hight (to Quicklift)	Selfwight	Singel	Double		Closest to C
3,00 m	3,00 m	2,50 m	338,6 Kg	10 °			Away from C

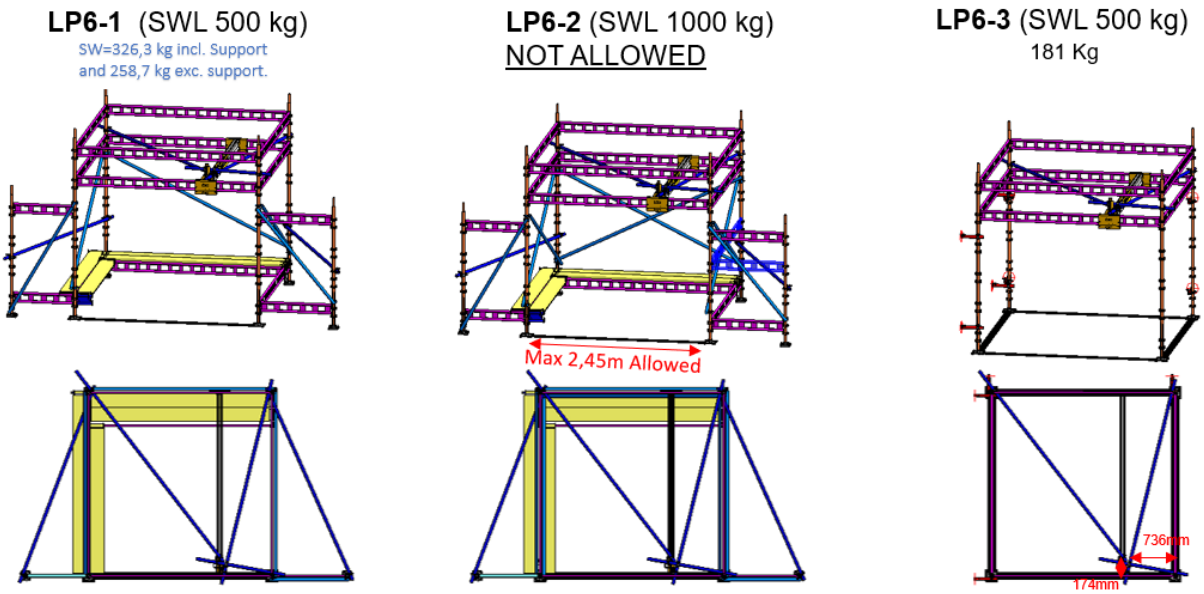
Use/see live worksheet table for more info.

Quicklift Table	Placement ID	Lifted Load - (May be changed if required)	Fixation force [kN] X direction - Against Cross side	Counterweight [kg] -Cross side Away from Quicklift (x)	Counterweigth [kg] -Cross side Closest to Quicklift (x)	Fixation force [kN] Y direction - Against Long side	Counterweigth [kg] -Long side Away from Quicklift (Y)	Counterweigth [kg] -Long side Closest to Quicklift (Y)	Normal Force in most loaded leg (Standard) [kN]	Max Buckling length [hm] - INPUT DATA
	LP5	250 Kg							7,277 kN	2,5
		500 Kg		26,22 Kg			22,26 Kg		12,342 kN	2,02
		1000 Kg		109,25 Kg			101,33 Kg		22,471 kN	0,85

18. Example 6 – Quick Lift 3x3x2,5 – LP 6

18.1 Configuration 6 - (1-3):

18.1.1 Design pictures



18.1.2 Description

The solution shows a different set-up method for placing counterweight. Counterweight must not be placed more than 50 cm from centreline of the fundament wall. Placing it partly outside of the fundament will only increase stability. Since this setup has an almost equal distribution for its self-weight, this can be calculated using the total load, both in overturn and buckling. No holdback force will be needed.

The Quick Lift placement will in this case give a high load to the secondary beam. 1000 kg lifting is therefore not permitted.

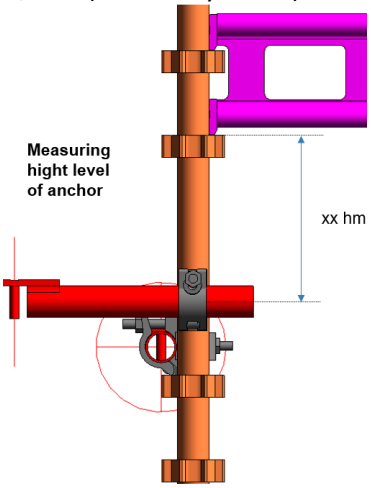
To load this configuration with 1000 kg, the Quick Lift must be placed **minimum 376mm (cc)** from the wall and against centre, along the lifting beams. (See setup for this configuration, in example 12). 1000 kg can also be achieved by reducing the fundament width down to 2,45m (secondary beam).

Fixed solution: Up to 500 kg lifts (LP6-3).

Fixation placed 0,5m from Quick Lift in hight, gives a buckling length of 2,5hm (general limit).

A different setup may give a high reduction in the allowable buckling length. Permitted height can be increased by reducing the space between the Quick Lift and the fixation. (Ref. Configuration 2-3).

Space is measured from top of lower lip on standard where secondary beam is attached, and down to centre of upper anchor pipe/fixation. See table for more info.



18.2 Example - Tables showing details LP 6 Configuration 1 & 3

Config 1:

Basic data fundament (Quicklift bay)				Planed Skewness		Additional Supporting bays (if needed)	Length direction (x) - Lifting beam		Width direction (y) - Secondery beam		Select stabilization method	Lokasjons påvirkning Vind / Location affecting wind result
Length	Width	Hight (to Quicklift)	Selfwight	Singel	Double			Closest to Quiclift (x)		Closest to Quiclift (y)		
3,00 m	3,00 m	2,50 m	326,3 Kg	5 °				Away from Quiclift (x)		Away from Quiclift (y)	Free standing	Open 100% (maximum 25 m/s, when in use)

Quicklift Table	Placement ID	Lifted Load - (May be changed if required)	Fixation force [kN] X direction - Against Cross side	Counterweight [kg] -Cross side Away from Quicklift (x)	Counterweigth [kg] -Cross side Closest to Quicklift (x)	Fixation force [kN] Y direction - Against Long side	Counterweight [kg] -Long side Away from Quicklift (Y)	Counterweigth [kg] -Long side Closest to Quicklift (Y)	Normal Force in most loaded leg (Standard) [kN]	Max Buckling length [hm] - INPUT DATA	Normal Force in most loaded footplate/ deck [kN] (including possible use of ballast)	Minimum size of plate if placed on Grating [m²]	Horizontal force in Quicklift due to skewness and tilt [kN]	Compression between Quicklifts when/if twin /joint lifting	Vertical Load Secondary beam (Ledger) [kN]	Ledger bending moment - ALUHAK systems (utilization secondary beam)	Shear/parallel force between floor/deck and foot, included friction (FV_diff) - Only applies when ballast is placed	Internal Horizontally force to be taken in Bracing/ support bay or by fixation
Calculation Overturning without fixation or ballast. Incl	LP-6	250 Kg							8,291 kN	2,5	8,291 kN	0,149 m²	2,390 kN		5,863 kN	UF: 26,8 %		*1,690 kN*
		500 Kg		32,01 Kg					14,432 kN	1,95	14,527 kN	0,261 m²	4,779 kN		11,727 kN	UF: 53,6 %		*3,379 kN*
		~~1000 Kg~~														UF: 107,3 %		
Overturning due to wind (Not in use)	32 m/s	0 Kg							2,449 kN	3	2,449 kN	0,044 m²						
	75% wind (24m/s)	0 Kg							2,113 kN	3	2,113 kN	0,038 m²						
	50% Wind (16m/s)	0 Kg							1,873 kN	3	1,873 kN	0,034 m²						
	Innside	0 Kg							1,680 kN	3	1,680 kN	0,030 m²						

0,00 Kg Hold back Force, for preventing sliding when not in use. incl use of counterwight/fiks.

Choose counterweight setup

Config 3:

Basic data fundament (Quicklift bay)				Planed Skewness		Additional Supporting bays (if needed)	Length direction (x) - Lifting beam		Width direction (y) - Secondery beam		Select stabilization method	Lokasjons påvirkning Vind / Location affecting wind result
Length	Width	Hight (to Quicklift)	Selfwight	Singel	Double			Closest to Quiclift (x)		Closest to Quiclift (y)		
3,00 m	3,00 m	2,50 m	181,0 Kg	5 °				Away from Quiclift (x)		Away from Quiclift (y)	Fixation	Open 100% (maximum 25 m/s, when in use)

Distance between Quiklift and fixation in hight= 0,50 hm

Quicklift Table	Placement ID	Lifted Load - (May be changed if required)	Fixation force [kN] X direction - Against Cross side	Counterweight [kg] -Cross side Away from Quicklift (x)	Counterweigth [kg] -Cross side Closest to Quicklift (x)	Fixation force [kN] Y direction - Against Long side	Counterweight [kg] -Long side Away from Quicklift (Y)	Counterweigth [kg] -Long side Closest to Quicklift (Y)	Normal Force in most loaded leg (Standard) [kN]	Max Buckling length [hm] - INPUT DATA	Normal Force in most loaded footplate/ deck [kN] (including possible use of ballast)	Minimum size of plate if placed on Grating [m²]	Horizontal force in Quicklift due to skewness and tilt [kN]	Compression between Quicklifts when/if twin /joint lifting	Vertical Load Secondary beam (Ledger) [kN]	Ledger bending moment - ALUHAK systems (utilization secondary beam)	Shear/parallel force between floor/deck and foot, included friction (FV_diff) - Only applies when ballast is placed	Internal Horizontally force to be taken in Bracing/ support bay or by fixation
Calculation Overturning without fixation or ballast. Incl	LP-6	250 Kg	2,86 kN			2,86 kN			4,739 kN	2,5	4,739 kN	0,085 m²	2,390 kN		5,863 kN	UF: 26,8 %	0,048 kN	*1,690 kN*
		500 Kg	4,55 kN			4,55 kN			8,883 kN	2,5	8,883 kN	0,160 m²	4,779 kN		11,727 kN	UF: 53,6 %	0,048 kN	*3,379 kN*
		~~1000 Kg~~	7,93 kN													UF: 107,3 %		
Overturning due to wind (Not in use)	32 m/s	0 Kg	1,62 kN			1,62 kN			0,596 kN	3	0,596 kN	0,011 m²					0,389 kN	
	75% wind (24m/s)	0 Kg	1,11 kN			1,11 kN			0,596 kN	3	0,596 kN	0,011 m²					0,007 kN	
	50% Wind (16m/s)	0 Kg	0,74 kN			0,74 kN			0,596 kN	3	0,596 kN	0,011 m²						
	Innside	0 Kg	0,45 kN			0,45 kN			0,596 kN	3	0,596 kN	0,011 m²						

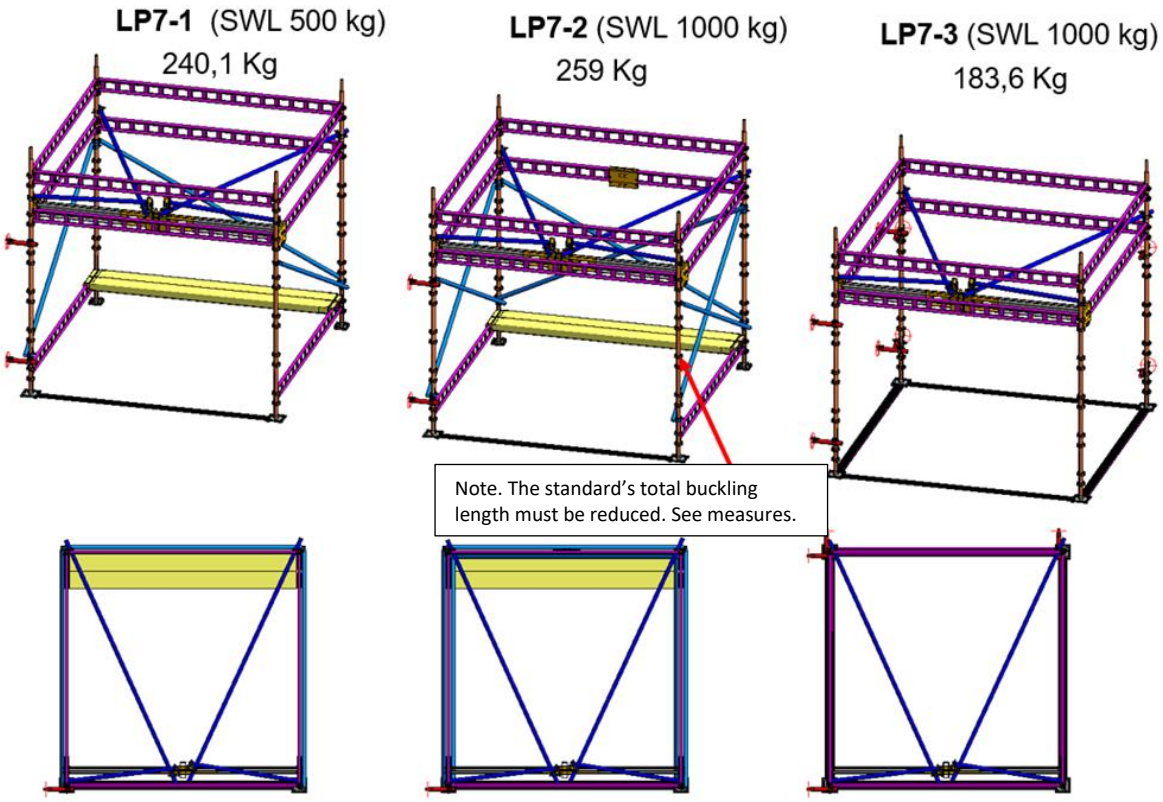
~~39,63 Kg~~ Hold back Force, for preventing sliding when not in use. incl use of counterwight/fiks.

Choose counterweight setup

19. Example 7 – Quick Lift 3x3x2,5 – LP 7

19.1 Configuration 7 (1-3): "Fixated in X"

19.1.1 Design pictures



19.1.2 Description

LP7 has almost the same local placement as LP-3 But will have a less stress on the secondary beams.

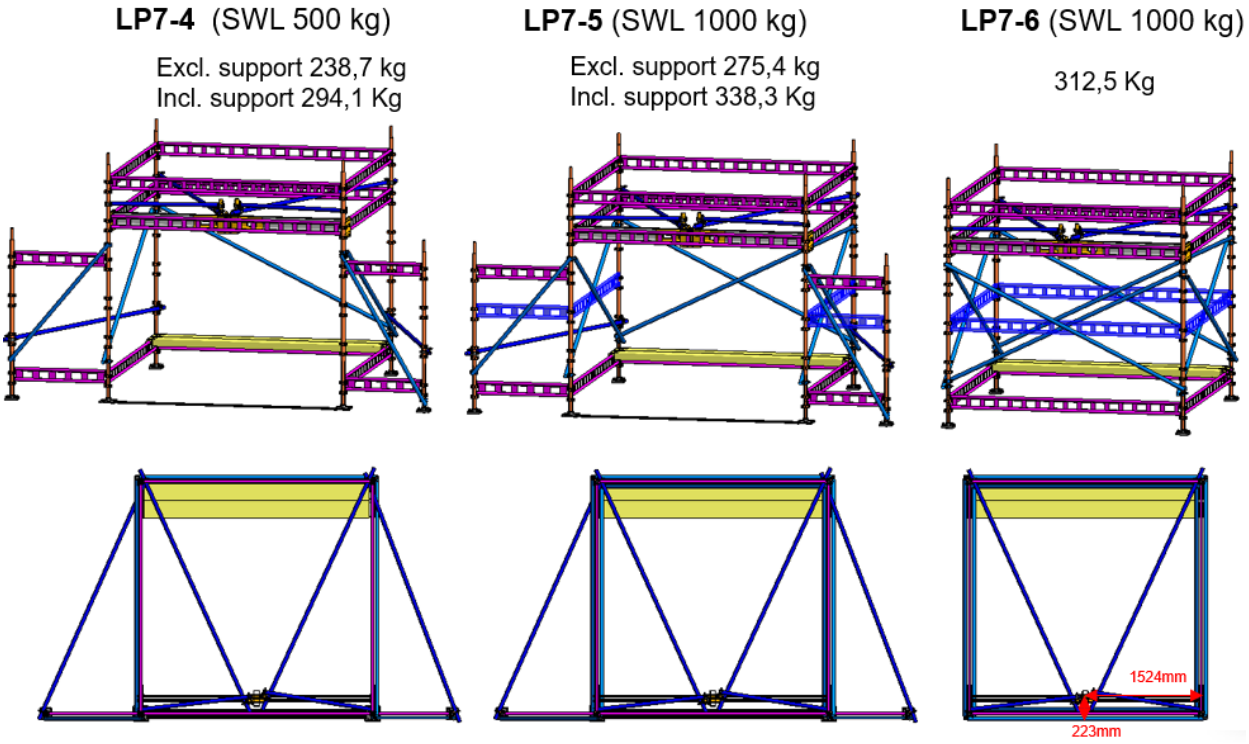
Tables under shows results when calculated using the same method as in LP 3 configurations.
Note that LP7-2 needs to be reinforced in the leg that is not directly held by fixation, due to buckling length. This can be done by adding a supported bay (see config 6), or by adding fixation on this leg.

Description/Fundament	LP7-1	LP7-1	LP7-2	LP7-3
SWL	250 kg	500 kg	1000 kg	1000 kg
Counterweight	12,13 kg	50,62 kg	121,77 kg	N/A
Fixation force High Point	2,80 kN	4,29 kN	7,31 kN	7,12 kN
Fixation force Low Point	1,49 kN	2,97 kN	5,95 kN	5,95 kN
Buckling (Fixated in X)	2,5 hm	2,5 hm	1,88 hm	2,5 hm
Holdback force	*19,03 kg	*8,52 kg	N/A	N/A

* Holdback force, to be attached diagonally from fixation.

19.2 Configuration 7 (4-6):

19.2.1 Design pictures



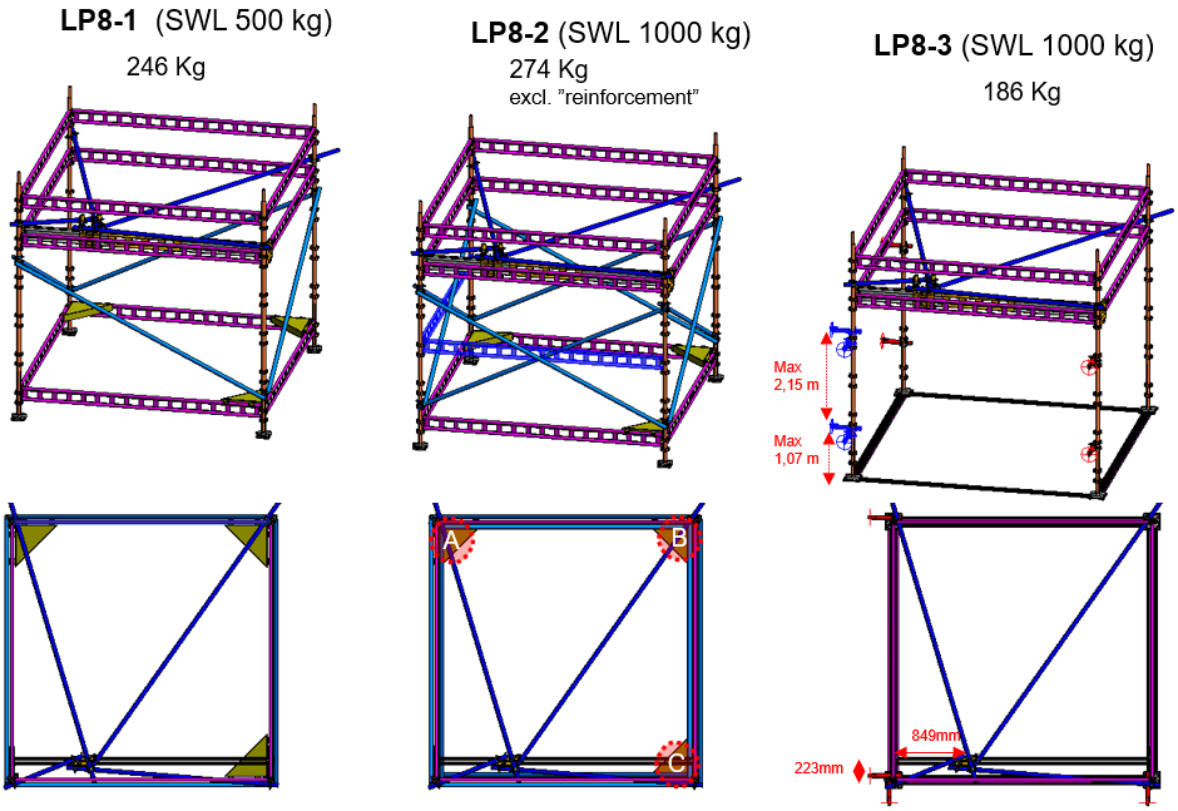
19.2.2 Description

Description/Fundament	**LP7-4**	**LP7-4**	**LP7-5**	**LP7-6**
SWL	250 kg	500 kg	1000 kg	1000 kg
Counterweight (Away)	**63,8 kg**	**87,21 kg**	**152,75 kg**	**105,22 kg**
Counterweight (Close) - *Wind*	63,8 kg	63,8 kg	52,36 kg	0 kg
Weight Difference	55,4 kg	55,4 kg	62,9 kg	N/A
Actual Counterweight (Close)	**8,4 kg**	**8,4 kg**	**0 kg**	**0 kg**
Buckling (SW incl. sup.)	2,5 hm	2,36 hm	1,27 hm	1,33 hm
Holdback force	56,19 kg	49,80 kg	24,92 kg	N/A

20. Example 8 – Quick Lift 3x3x2,5 – LP 8

20.1 Configuration 8 (1-3):

20.1.1 Design pictures



20.1.2 Description

Counterweight can also be placed on triangle plates. Looking at the counterweight needed for 1000 kg (LP8-2), we will need to place 59 kg on corner A & B, and 19,65 kg in corner C.

- Note. When this is placed, no holdback force is necessary.
- Max buckling = 1,18 hm.
- Weight of the 2 additional horizontally connections is not calculated in turs of overturn but needs to be considered when checking buckling length.

500 kg (LP8-1) will give 24,4 kg in A & B and 2,37 kg in C, due to wind. Hold back force = 7,9 kg.

500 kg (LP8-1) will give 5,16 kg in A & B and 2,37 kg in C, due to wind. Hold back force = 18,41 kg.

LP8-3: If fixation is placed in most loaded leg and placed 0,5hm under Quick Lift hight level, buckling length for the most loaded leg shall not be more than 2,15hm. Meaning, it shall not be more then 2,15 m between the two fixations in height, and the max hight from floor level and up to first fixation shall not exceed 107 cm.

Note. If fixation is in the opposite corner ("B" in picture LP8-3), and most loaded standard is not directly held by the fixation, this could be calculated as placed in 0,1hm, allowing a higher buckling length of 2,48m. This indicates that the most loaded standard not necessary must be kept directly by fixation, if the other three legs are fixated.

20.2 Example - Tables showing details LP 8 Configuration 1-3

LP8-1

Basic data fundament (Quicklift bay)				Planed Skewness		Additional Supporting bays (if needed)	Length direction (*x*) - Lifting beam		Width direction (*y*) - Secondery beam		Select stabilization method	Lokasjons påvirkning Vind / Location affecting wind result
Length	Width	Hight (to Quicklift)	Selfwight	Singel	Double			Closest to Quiclift (*x*)		Closest to Quiclift (*y*)		
3,00 m	3,00 m	2,50 m	246,0 Kg	5 °				Away from Quiclift (*x*)		Away from Quiclift (*y*)	Free standing	Open 100% (maximum 25 m/s, when in use)

Quicklift Table	Placement ID	Lifted Load - (May be changed if required)	Fixation force [kN] X direction - Against Cross side	Counterweight [kg] -Cross side Away from Quicklift (x)	Counterweigth [kg] -Cross side Closest to Quicklift (x)	Fixation force [kN] Y direction - Against Long side	Counterweight [kg] -Long side Away from Quicklift (Y)	Counterweigth [kg] -Long side Closest to Quicklift (Y)	Normal Force in most loaded leg (Standard) [kN]	Max Buckling length [hm] - INPUT DATA	Normal Force in most loaded footplate/ deck [kN] (including possible use of ballast)	Minimum size of plate if placed on Grating [m²]	Horizontal force in Quicklift due to skewness and tilt [kN]	Compression between Quicklifts when/if twin /joint lifting	Vertical Load Secondary beam (Ledger) [kN]	Ledger bending moment - ALUHAK systems (utilization secondary beam)	Shear/parallel force between floor/deck and foot, included friction (FV_diff) - Only applies when ballast is placed	Internal Horizontally force to be taken in Bracing/ support bay or by fixation
Calculation Overturning without fixation or ballast. Incl	LP-8	250 Kg					10,31 Kg		7,122 kN	2,5	7,153 kN	0,129 m²	2,103 kN		3,987 kN	UF: 6,0 %		*1,487 kN*
		500 Kg		0,06 Kg			48,80 Kg		12,507 kN	2,2	12,655 kN	0,228 m²	4,206 kN		7,974 kN	UF: 12,1 %		*2,974 kN*
		1000 Kg		28,31 Kg			125,78 Kg		23,278 kN	1,18	23,737 kN	0,427 m²	8,411 kN		15,947 kN	UF: 24,2 %		*5,948 kN*
Overturning due to wind (Not in use)	32 m/s	0 Kg		2,37 Kg	2,37 Kg		48,80 Kg	2,37 Kg	2,036 kN	3	2,188 kN	0,039 m²					0,078 kN	
	75% wind (24m/s)	0 Kg		0,06 Kg			48,80 Kg		1,699 kN	3	1,845 kN	0,033 m²						
	50% Wind (16m/s)	0 Kg		0,06 Kg			48,80 Kg		1,459 kN	3	1,605 kN	0,029 m²						
	Innside	0 Kg		0,06 Kg			48,80 Kg		1,267 kN	3	1,412 kN	0,025 m²						

18,41 Kg Hold back Force, for preventing sliding when not in use. incl use of counterwight/fiks.

Choose counterweight setup

LP-8 - 250 kg

7,90 Kg Hold back Force, for preventing sliding when not in use. incl use of counterwight/fiks.

Choose counterweight setup

LP-8 - 500 kg

LP8-2

Basic data fundament (Quicklift bay)				Planed Skewness		Additional Supporting bays (if needed)	Length direction (*x*) - Lifting beam		Width direction (*y*) - Secondery beam		Select stabilization method	Lokasjons påvirkning Vind / Location affecting wind result
Length	Width	Hight (to Quicklift)	Selfwight	Singel	Double			Closest to Quiclift (*x*)		Closest to Quiclift (*y*)		
3,00 m	3,00 m	2,50 m	274,0 Kg	5 °				Away from Quiclift (*x*)		Away from Quiclift (*y*)	Free standing	Open 100% (maximum 25 m/s, when in use)

Quicklift Table	Placement ID	Lifted Load - (May be changed if required)	Fixation force [kN] X direction - Against Cross side	Counterweight [kg] -Cross side Away from Quicklift (x)	Counterweigth [kg] -Cross side Closest to Quicklift (x)	Fixation force [kN] Y direction - Against Long side	Counterweight [kg] -Long side Away from Quicklift (Y)	Counterweigth [kg] -Long side Closest to Quicklift (Y)	Normal Force in most loaded leg (Standard) [kN]	Max Buckling length [hm] - INPUT DATA	Normal Force in most loaded footplate/ deck [kN] (including possible use of ballast)	Minimum size of plate if placed on Grating [m²]	Horizontal force in Quicklift due to skewness and tilt [kN]	Compression between Quicklifts when/if twin /joint lifting	Vertical Load Secondary beam (Ledger) [kN]	Ledger bending moment - ALUHAK systems (utilization secondary beam)	Shear/parallel force between floor/deck and foot, included friction (FV_diff) - Only applies when ballast is placed	Internal Horizontally force to be taken in Bracing/ support bay or by fixation
Calculation Overturning without fixation or ballast. Incl	LP-8	250 Kg					1,65 Kg		7,266 kN	2,5	7,271 kN	0,131 m²	2,103 kN		3,987 kN	UF: 6,0 %		*1,487 kN*
		500 Kg					40,14 Kg		12,651 kN	2,17	12,773 kN	0,230 m²	4,206 kN		7,974 kN	UF: 12,1 %		*2,974 kN*
		1000 Kg		19,65 Kg			117,13 Kg		23,422 kN	1,18	23,829 kN	0,429 m²	8,411 kN		15,947 kN	UF: 24,2 %		*5,948 kN*
Overturning due to wind (Not in use)	32 m/s	0 Kg		19,65 Kg			117,13 Kg		2,180 kN	3	2,588 kN	0,047 m²						
	75% wind (24m/s)	0 Kg		19,65 Kg			117,13 Kg		1,844 kN	3	2,251 kN	0,041 m²						
	50% Wind (16m/s)	0 Kg		19,65 Kg			117,13 Kg		1,603 kN	3	2,011 kN	0,036 m²						
	Innside	0 Kg		19,65 Kg			117,13 Kg		1,411 kN	3	1,819 kN	0,033 m²						

0,00 Kg Hold back Force, for preventing sliding when not in use. incl use of counterwight/fiks.

Choose counterweight setup

LP-8 - 1000 kg

LP8-3 - Fixation in most loaded leg (0,5hm)

Basic data fundament (Quicklift bay)				Planed Skewness		Additional Supporting bays (if needed)	Length direction (x) - Lifting beam		Width direction (y) - Secondery beam		Select stabilization method	Lokasjons påvirkning Vind / Location affecting wind result
Length	Width	Hight (to Quicklift)	Selfwight	Singel	Double			Closest to Quiclift (x)		Closest to Quiclift (y)		
3,00 m	3,00 m	2,50 m	186,0 Kg	5 °				Away from Quiclift (x)		Away from Quiclift (y)	Fixation	Open 100% (maximum 25 m/s, when in use)

Distance between Quiklift and fixation in hight= 0,50 hm

Quicklift Table	Placement ID	Lifted Load - (May be changed if required)	Fixation force [kN] X direction - Against Cross side	Counterweight [kg] -Cross side Away from Quicklift (x)	Counterweigth [kg] -Cross side Closest to Quicklift (x)	Fixation force [kN] Y direction - Against Long side	Counterweight [kg] -Long side Away from Quicklift (Y)	Counterweigth [kg] -Long side Closest to Quicklift (Y)	Normal Force in most loaded leg (Standard) [kN]	Max Buckling length [hm] - INPUT DATA	Normal Force in most loaded footplate/ deck [kN] (including possible use of ballast)	Minimum size of plate if placed on Grating [m²]	Horizontal force in Quicklift due to skewness and tilt [kN]	Compression between Quicklifts when/if twin /joint lifting	Vertical Load Secondary beam (Ledger) [kN]	Ledger bending moment - ALUHAK systems (utilization secondary beam)	Shear/parallel force between floor/deck and foot, included friction (FV_diff) - Only applies when ballast is placed	Internal Horizontally force to be taken in Bracing/ support bay or by fixation
Calculation Overturning without fixation or ballast. Incl	LP8	250 Kg	2,67 kN			2,67 kN			4,237 kN	2,5	4,237 kN	0,076 m²	2,103 kN		3,987 kN	UF: 6,0 %	0,035 kN	*1,487 kN*
		500 Kg	4,15 kN			4,15 kN			7,861 kN	2,5	7,861 kN	0,142 m²	4,206 kN		7,974 kN	UF: 12,1 %	0,035 kN	*2,974 kN*
		1000 Kg	7,13 kN			7,13 kN			15,110 kN	2,15	15,110 kN	0,272 m²	8,411 kN		15,947 kN	UF: 24,2 %	0,035 kN	*5,948 kN*
Overturning due to wind (Not in use)	32 m/s	0 Kg	1,64 kN			1,64 kN			0,612 kN	3	0,612 kN	0,011 m²					0,375 kN	
	75% wind (24m/s)	0 Kg	1,12 kN			1,12 kN			0,612 kN	3	0,612 kN	0,011 m²						
	50% Wind (16m/s)	0 Kg	0,76 kN			0,76 kN			0,612 kN	3	0,612 kN	0,011 m²						
	Innside	0 Kg	0,46 kN			0,46 kN			0,612 kN	3	0,612 kN	0,011 m²						

~~38,26 Kg~~	Hold back Force, for preventing sliding when not in use. incl use of counterwight/fiks.
Choose counterweight setup	

LP8-3 - Fixation in opposite corner (0,1hm)

Basic data fundament (Quicklift bay)				Planed Skewness		Additional Supporting bays (if needed)	Length direction (x) - Lifting beam		Width direction (y) - Secondery beam		Select stabilization method	Lokasjons påvirkning Vind / Location affecting wind result
Length	Width	Hight (to Quicklift)	Selfwight	Singel	Double			Closest to Quiclift (x)		Closest to Quiclift (y)		
3,00 m	3,00 m	2,50 m	186,0 Kg	5 °				Away from Quiclift (x)		Away from Quiclift (y)	Fixation	Open 100% (maximum 25 m/s, when in use)

Distance between Quiklift and fixation in hight= 0,10 hm

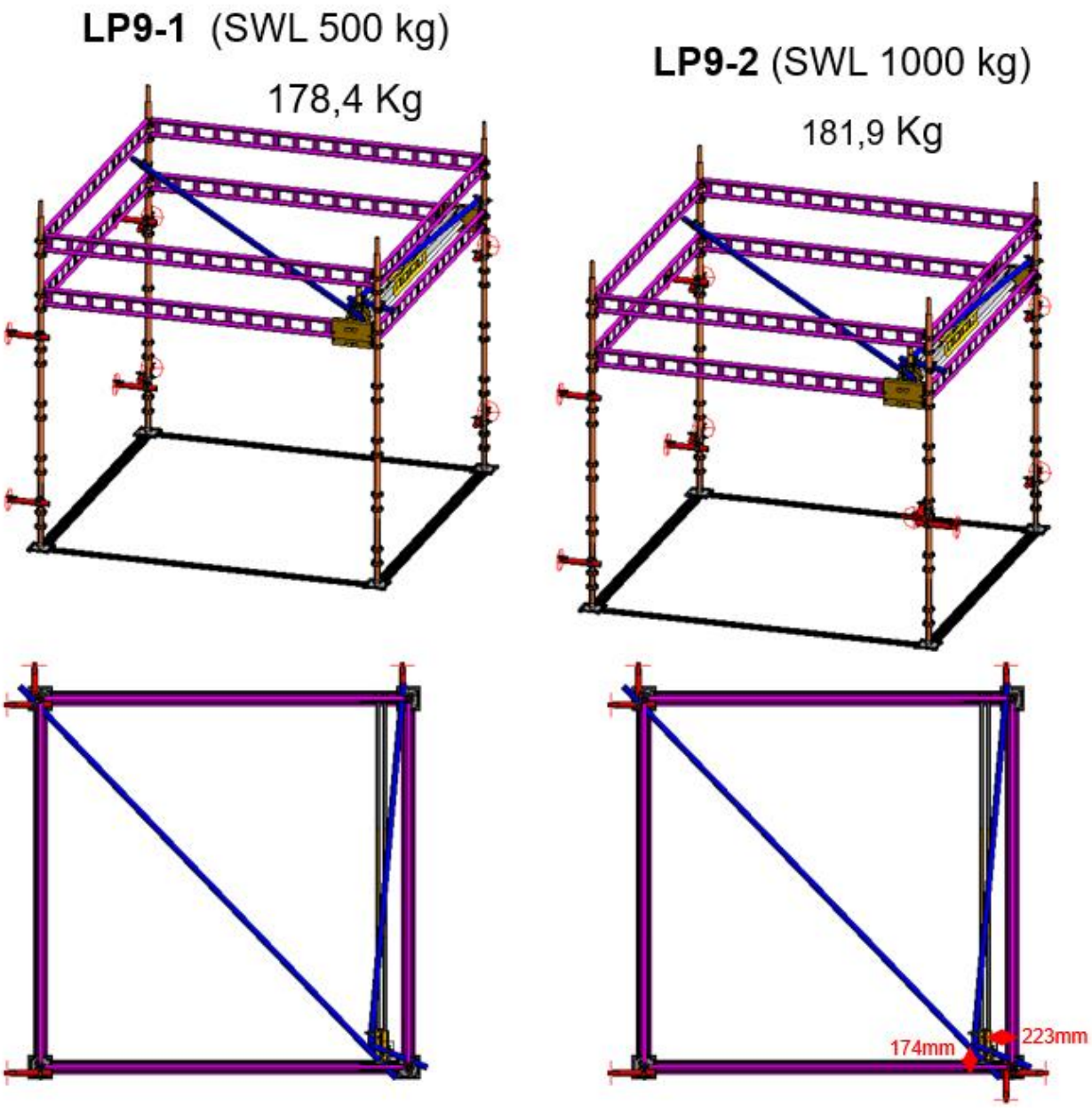
Quicklift Table	Placement ID	Lifted Load - (May be changed if required)	Fixation force [kN] X direction - Against Cross side	Counterweight [kg] -Cross side Away from Quicklift (x)	Counterweigth [kg] -Cross side Closest to Quicklift (x)	Fixation force [kN] Y direction - Against Long side	Counterweight [kg] -Long side Away from Quicklift (Y)	Counterweigth [kg] -Long side Closest to Quicklift (Y)	Normal Force in most loaded leg (Standard) [kN]	Max Buckling length [hm] - INPUT DATA	Normal Force in most loaded footplate/ deck [kN] (including possible use of ballast)	Minimum size of plate if placed on Grating [m²]	Horizontal force in Quicklift due to skewness and tilt [kN]	Compression between Quicklifts when/if twin /joint lifting	Vertical Load Secondary beam (Ledger) [kN]	Ledger bending moment - ALUHAK systems (utilization secondary beam)	Shear/parallel force between floor/deck and foot, included friction (FV_diff) - Only applies when ballast is placed	Internal Horizontally force to be taken in Bracing/ support bay or by fixation
Calculation Overturning without fixation or ballast. Incl	LP8	250 Kg	2,67 kN			2,67 kN			4,237 kN	2,5	4,237 kN	0,076 m²	2,103 kN		3,987 kN	UF: 6,0 %	0,035 kN	*1,487 kN*
		500 Kg	4,15 kN			4,15 kN			7,861 kN	2,5	7,861 kN	0,142 m²	4,206 kN		7,974 kN	UF: 12,1 %	0,035 kN	*2,974 kN*
		1000 Kg	7,13 kN			7,13 kN			15,110 kN	2,48	15,110 kN	0,272 m²	8,411 kN		15,947 kN	UF: 24,2 %	0,035 kN	*5,948 kN*
Overturning due to wind (Not in use)	32 m/s	0 Kg	1,64 kN			1,64 kN			0,612 kN	3	0,612 kN	0,011 m²					0,375 kN	
	75% wind (24m/s)	0 Kg	1,12 kN			1,12 kN			0,612 kN	3	0,612 kN	0,011 m²						
	50% Wind (16m/s)	0 Kg	0,76 kN			0,76 kN			0,612 kN	3	0,612 kN	0,011 m²						
	Innside	0 Kg	0,46 kN			0,46 kN			0,612 kN	3	0,612 kN	0,011 m²						

~~38,26 Kg~~	Hold back Force, for preventing sliding when not in use. incl use of counterwight/fiks.
Choose counterweight setup	

21. Example 9 – Quick Lift 3x3x2,5 – LP 9

21.1 Configuration 9 (1-2):

21.1.1 Design pictures

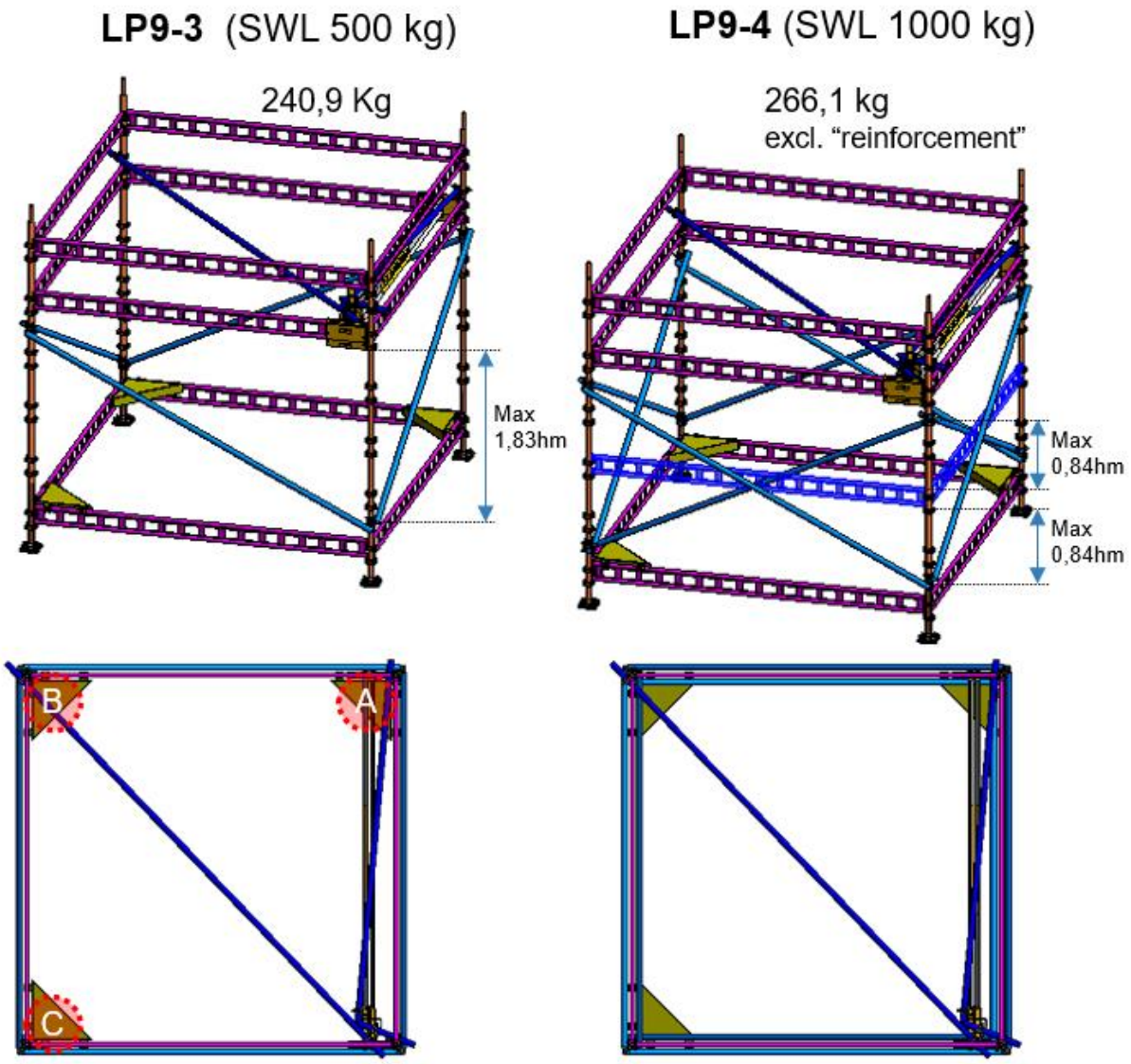


21.1.2 Description

LP9 gives a heavy load on the closest standard as almost all the weight is taken up in this one.
Most loaded standard is calculated based on a 0,1hm fixation (Ref LP2-3 - 12.3.3 Buckling length)
This gives a buckling length of 2,02 hm on a 1000 kg fundament. Since the total hight between floor binding and horizontally binding is 2,2hm additional fixation needs to be added on most loaded leg.
For a 500 kg fundament no reinforcement is needed (500kg = 2,5 hm buckling).
In all cases, the 3 other legs do only get minor forces, and are regulated by general rules.

21.2 Configuration 9 (3-4):

21.2.1 Design pictures



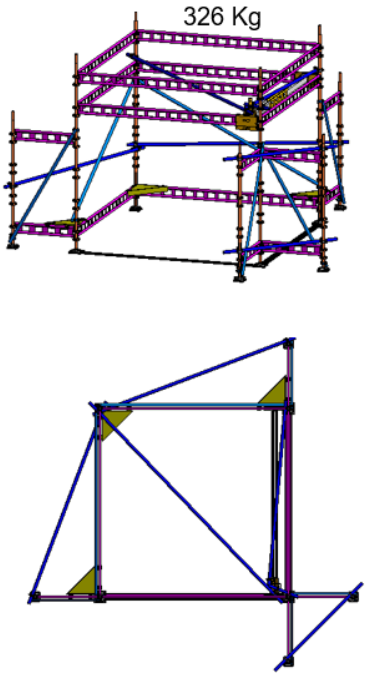
21.2.2 Description

Description/Fundament	**LP9-3**	**LP9-3**	**LP9-4**
SWL	250 kg	500 kg	1000kg
Counterweight A	8 kg	29,5 kg	67,8 kg
Counterweight B	8 kg	29,5 kg	67,8 kg
Counterweight C	6 kg	25,5 kg	59,8 kg
Buckling most loaded standard	2,5 hm	1,83 hm	0,84 hm
NB. When considering the bracings placement, this will give a reduction in standards buckling hight. The 250 kg solution will need to be held for sliding. Holdback force equals 15,68 kg.			

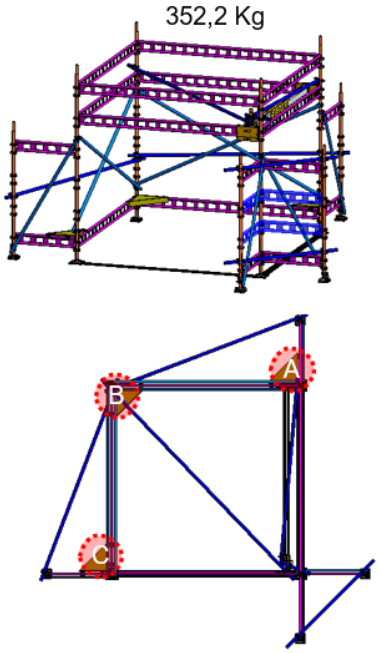
21.3 Configuration 9 (5-7):

21.3.1 Design pictures

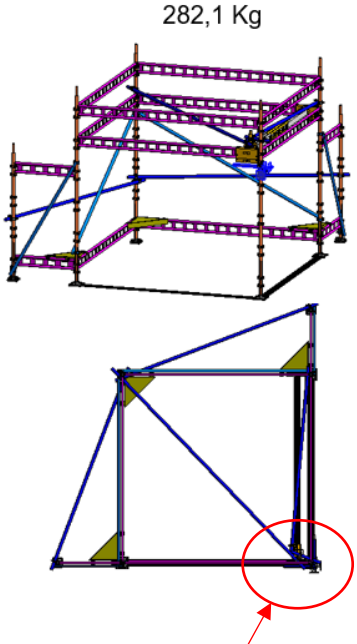
LP9-5 (SWL 500 kg)



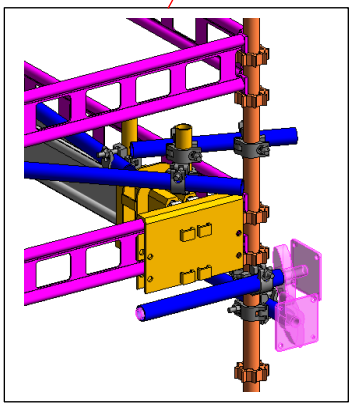
LP9-6 (SWL 1000 kg)



LP9-7 (SWL 250 kg – Max load 362)



21.3.2 Description



Since the supported legs are evenly placed on the fundament, the fundaments are fully calculated with full self-weight. LP9-5 and LP9-6 are calculated with 1m support bay in all directions.

LP9-7 will based on a 0,5hm fixation placement, only have a maximum load of 362 kg due to buckling length of 2,2hm. But by raising the diagonals in the support-legs to be less than 15cm from Quick Lift height, 500 kg will be allowed. Compression points will not affect buckling length but is needed if load is to be pulled outside its frame. Compression tubes must be connected below and up close to the Quick Lift's hight.

Note. LP9-7 calculated with 1m support bays in both directions away from Quick Lift.

Description/Fundament	**LP9-5**	**LP9-5**	**LP9-6**	**LP9-7**	***LP9-7*** *(see requirements)* **("Connected" <0,15hm)**
SWL	250 kg	500 kg	1000 kg	250 kg	500 kg
Counterweight A	N/A	N/A	N/A	N/A	5,1 kg
Counterweight B	N/A	N/A	N/A	N/A	5,1 kg
Counterweight C	N/A	N/A	N/A	N/A	2,1 kg
Buckling most loaded standard	2,5 hm	1,7 hm	0,7 hm	2,5 hm	2,2 hm
Hold back force (32m/s)	61,27 kg	61,27 kg	54,12 kg	42,64 kg	42,64 kg

Support bays - LP9-5 & LP9-6

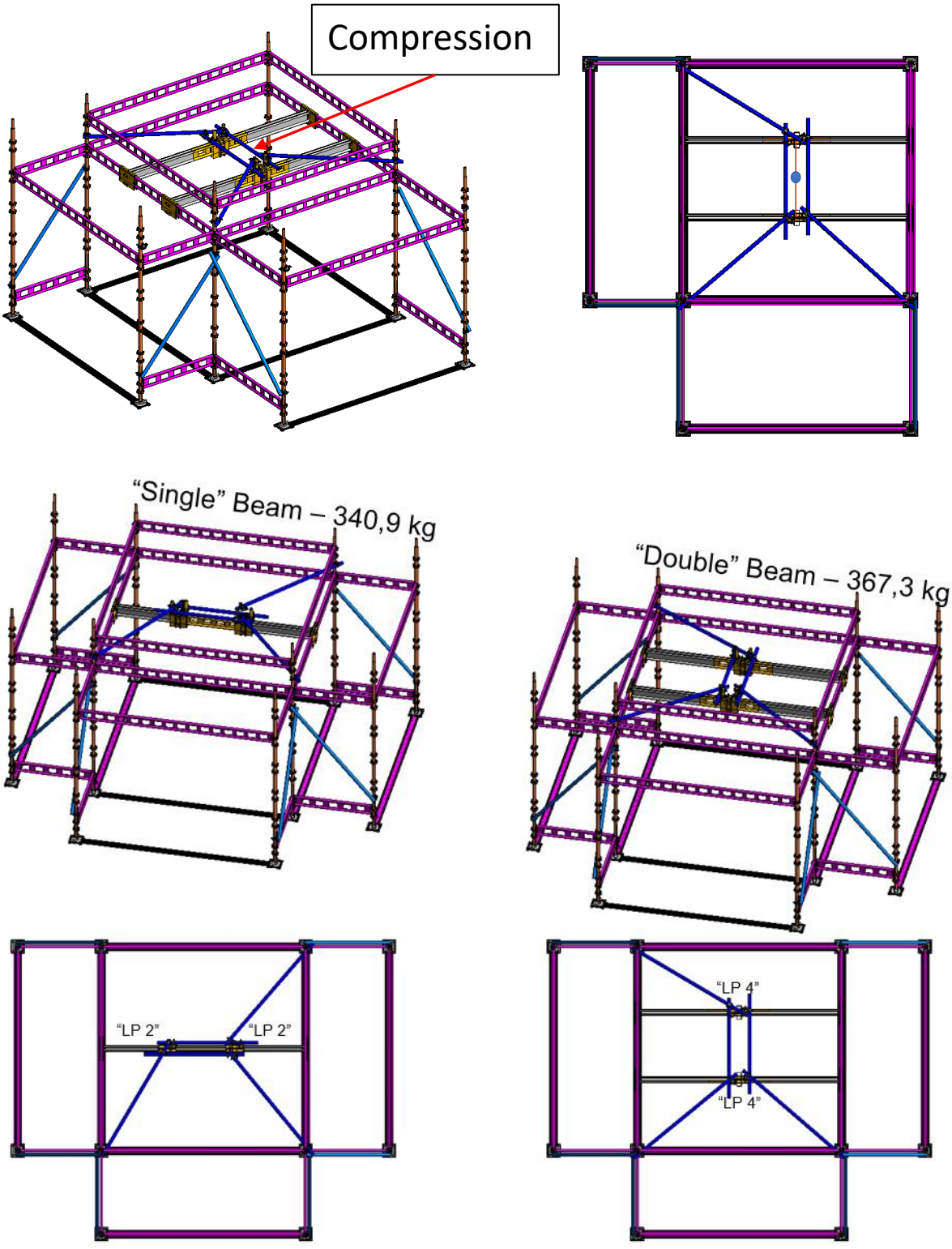
Additional Supporting bays (if needed)	Length direction (x) - Lifting beam		Width direction (y) - Secondery beam	
	1,00 m	Closest to Quiclift (x)	1,00 m	Closest to Quiclift (y)
	1,00 m	Away from Quiclift (x)	1,00 m	Away from Quiclift (y)

Support bays - LP9-7

Additional Supporting bays (if needed)	Length direction (x) - Lifting beam		Width direction (y) - Secondery beam	
		Closest to Quiclift (x)		Closest to Quiclift (y)
	1,00 m	Away from Quiclift (x)	1,00 m	Away from Quiclift (y)

22. Example 10 – Tandem Lifting / Transferring of load

22.1 Examples using tandem lifting / transfer lift and supporting bays



22.2 General rule

Tandem lifting will give less force working for overturn, but still needs to be secured for overturn if load is to be hanging from only one hoist during the lifting process (for example, when transferring loads in relation to lateral movement (Ref. 6.7 & 6.8).

If the load is to be pulled as single lift, same rule applies as “normal” single lifts.

When tandem lifting, it will not be allowed to have more the 25° angel per hoist, giving a maximum of 50° between LP’s.

Both LP's will need to be verified to its closest LP configuration in the table and calculated according to them.

The calculations must be done in two turns. One of the “LP2's” will have a support bay “Close to Quick Lift”, while the other “LP2” will have it “Away from Quick Lift”. If counterweight is needed, highest number from both calculations will be needed on both sides.

22.3 Example shown as “Single Beam”

Both LP’s are placed between LP1 and LP 2 and will be treated as “LP 2” (worst case).

In this case, the fundament in equal in one direction (Same support bay size on both sides in X-direction) while it is different in the other (only one support bay in Y-direction). Since this configuration has the lifting beams centrically in the main fundament and both LP2’s equals the same placement including its support bays, these calculations will show the same result.

This configuration do not need any counterweight but will need a Hold back force of 68,89 kg.

- If it is not secured against sliding, a total of 253 kg of ballast is needed.
- The 1000 kg solution has a maximum buckling length of 1.36 hm, but can be adjusted up to 2.19 hm by adjusting the diagonals of the support beams to <15 cm. (See chapter 13.5 - "Use of support bays ...").
- Without adjusting the diagonals, the buckling length is: SWL 500kg = 2.47hm & 250kg = 2.5hm.

22.4 Example shown as “Double Beam”

Both LP’s are placed between LP1 and LP 4 and will be treated as “LP 4” (worst case).

In this case, the fundament in equal in one direction (Same support bay size on both sides in X-direction) while it is different in the other direction (only one support bay in Y-direction). This configuration must be calculated in two turns. In both cases it will have same support bays included in X direction but will have one calculation placing the support bay in Y direction “Close to Quick Lift”, and the other calculation placing it “Away from Quick Lift”.

In our case (example), these calculations will show the same result, as none of them require any additional load (counterweight).

In both cases this configuration will need a Hold back force of 61,68 kg.

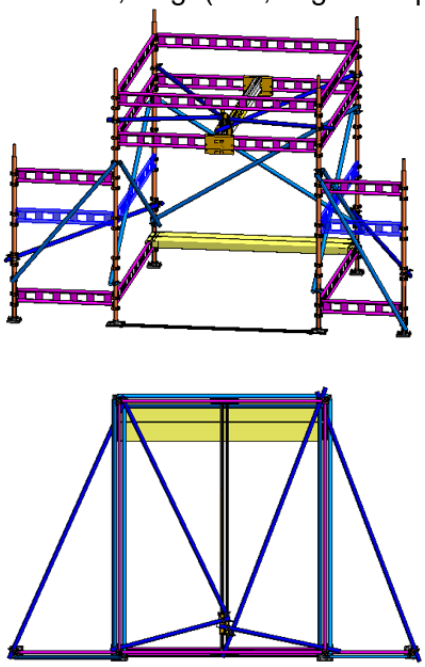
- If not secured for sliding, a total of 226 kg of ballast is needed.
- The 1000 kg solution has a maximum buckling length of 1.35 hm, but can be adjusted up to 2.19 hm by adjusting the diagonals of the support beams to <15 cm. (See chapter 13.5 - "Use of support bays ...").
- Without adjusting the diagonals, the buckling length is: SWL 500kg = 2.44hm & 250kg = 2.5hm.

23. Example 11 – Quick Lift 3x2,45x2,5 – SWL 1000 kg

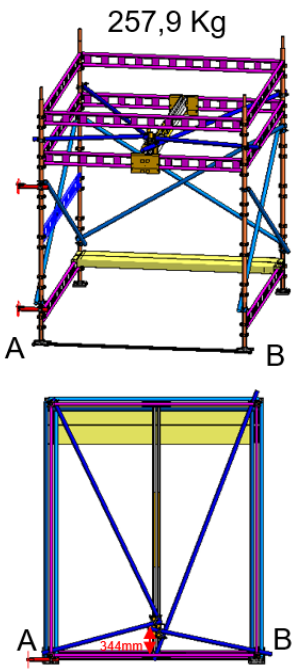
23.1 Configurations LP3.2.2 – 1000 kg:

23.1.1 Design pictures

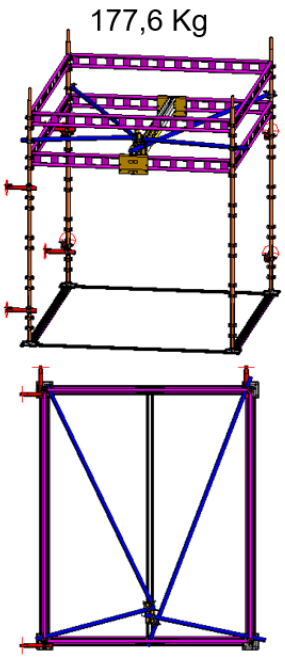
LP3.3-1 (SWL 1000 kg)
328,3 Kg (265,4 kg ex. sup.)



LP3.3-2 (SWL 1000 kg)



LP3.3-3 (SWL 1000 kg)



23.1.2 Description

Description/Fundament	**LP3.2.2-1**	**LP3.2.2-2**	**LP3.2.2-3**
SWL	1000 kg	1000 kg	1000 kg
Counterweight (Away from Quick Lift)	127,23 kg	129,54 kN	N/A
Counterweight (Close to Quick Lift)	*0 kg*	*0 kg*	*N/A*
Fixation (X/Y) /Bracing compression	6,759 kN	8,11 kN (Y)	7,99 kN (X) / 8,11 kN (Y)
Fixation Low point	N/A	6,759 kN	6,759 kN
Buckling A	1,08 hm	1,68 hm	2,33 hm
Buckling B	1,08 hm	*1,68 hm	2,5 hm
Holdback Force (incl. counterweight)	0 kg	0 kg	N/A

Note. This configuration has Quick Lift placed 344mm CC from closest “cross wall”. This gives a 100% utilization centrical on the 2,45m secondary beam.

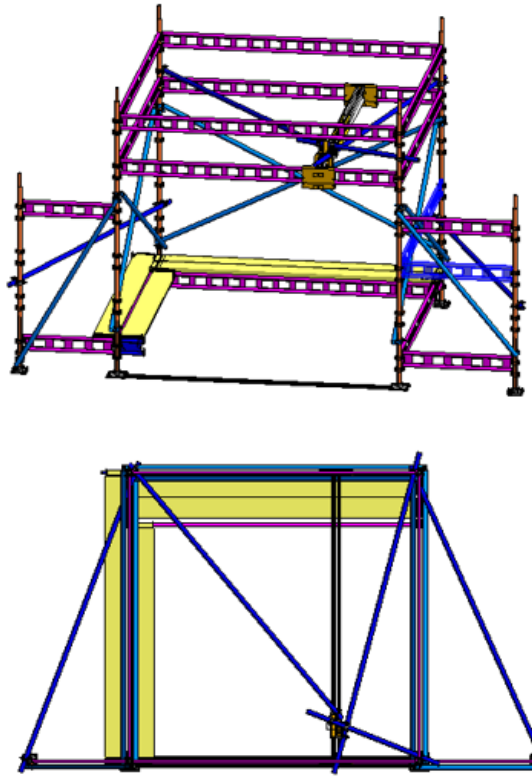
* Measures must be taken for standard B regarding the permissible buckling length. Horizontally bindings must held the standard in "both" directions.

24. Example 12 – Quick Lift 3x3x2,5 – SWL 1000 kg

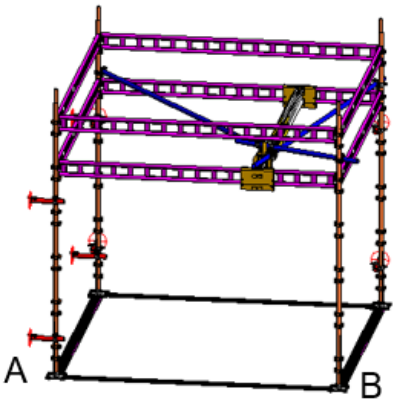
24.1 Configurations LP6.2.2 – 1000 kg:

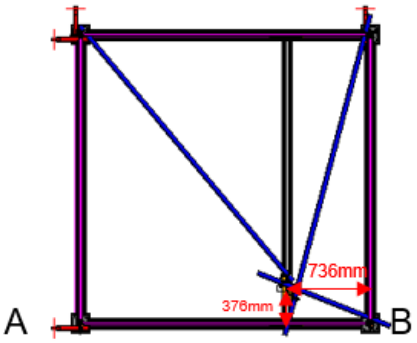
24.1.1 Design pictures

LP6.2.2-1 (SWL 1000 kg)
357,5 Kg (285,8 kg ex. sup.)



LP6.2.2-2 (SWL 1000 kg)
180,3 Kg





24.1.2 Description

Description/Fundament	LP6.2.2-1	LP6.2.2-2
SWL	1000 kg	1000 kg
Counterweight X (Away from Quick Lift)	107,39 kg	N/A
Counterweight Y (Away from Quick Lift)	0 kg	N/A
Upper Fixation / Compression force	6,759 kN	7,92 kN
Lower fixation	N/A	6,759 kN
Buckling A	0,93 hm	1,98 hm
Buckling B	0,93 hm	2,31 hm
Hold back force	0 kg	N/A

Note. This configuration has Quick Lift placed 376mm CC from closest “cross wall”. This gives a 100% utilization on the 3m secondary beam when placed 736mm CC from connected wall.

25. The extremes of the construction

The smallest allowable width of the main Quick Lift bay is using 0.5m ledgers. This will not be considered stable enough as self-standing and must be secured by using fixations, compressions, or support bays.

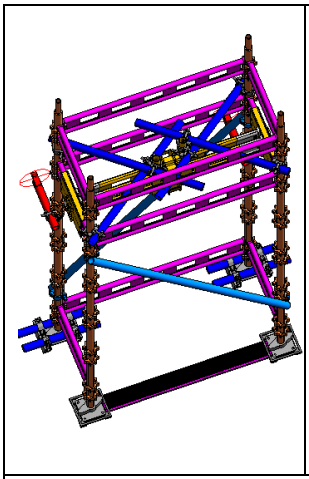
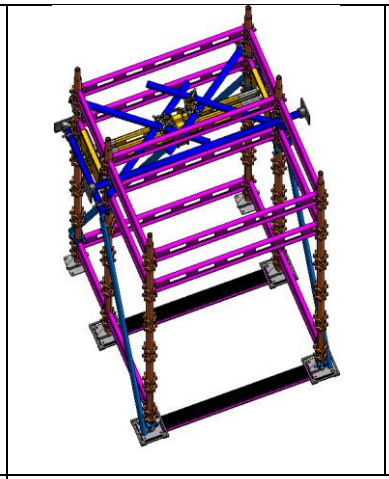
The minimum depth of the support bay is using 0.7m ledgers, but this will also depend on the horizontally load affecting the construction. Smaller support bays give higher stress on the bracing holding it. Use Quick Lift calculating tool for “Bracing capacity” to determine the depth that is necessary.

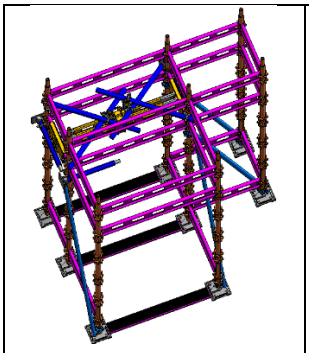
The smallest length of the main Quick Lift bay equals the length of the smallest available lifting beam and is 1.2m. Use the calculation tool to determine need for securing.

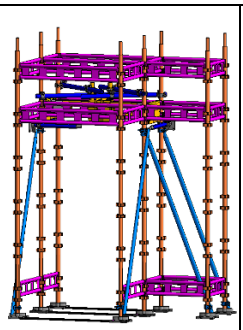
The biggest allowable size for the main bay is using 3 m ledgers in both directions, but this will also depend on the lifting load and its placement in the fundament. Use calculation tool and look at the examples in this manual.

Biggest depth of the support bays is using 3m ledgers. This will give a significant increase in wind affecting for overturn and will most likely never be needed as smaller support bays will be good enough for preventing overturn and/or supporting the horizontally loads. But this solution may still be needed if its location prevents you for using smaller bays.

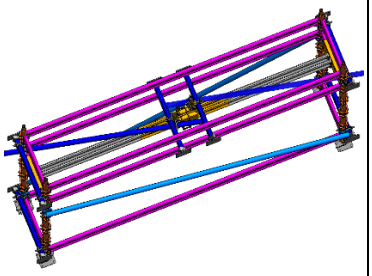
Examples showing and describing the limit/extremes of the fundament:

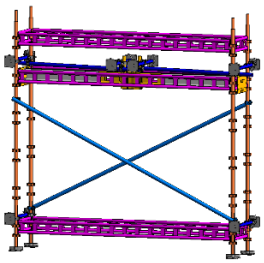
<table>
<tr>
<td colspan="2">  </td>
<td colspan="2">  </td>
</tr>
<tr>
<td colspan="2">Pictures show smallest “fundament” allowed (1,2 x 0,5m) fixated in width direction but also supported by the same fixation in length, through the horizontally bracing holding the Quick Lift unit. It also shows an example on how it could be secured for sliding, if placed on a H-beam.</td>
<td colspan="2">Pictures show smallest “fundament” allowed (1,2 x 0,5m) with smallest support bay depth allowed (0,7m) in width direction on one side, and supported by compression points in all other directions.</td>
</tr>
</table>



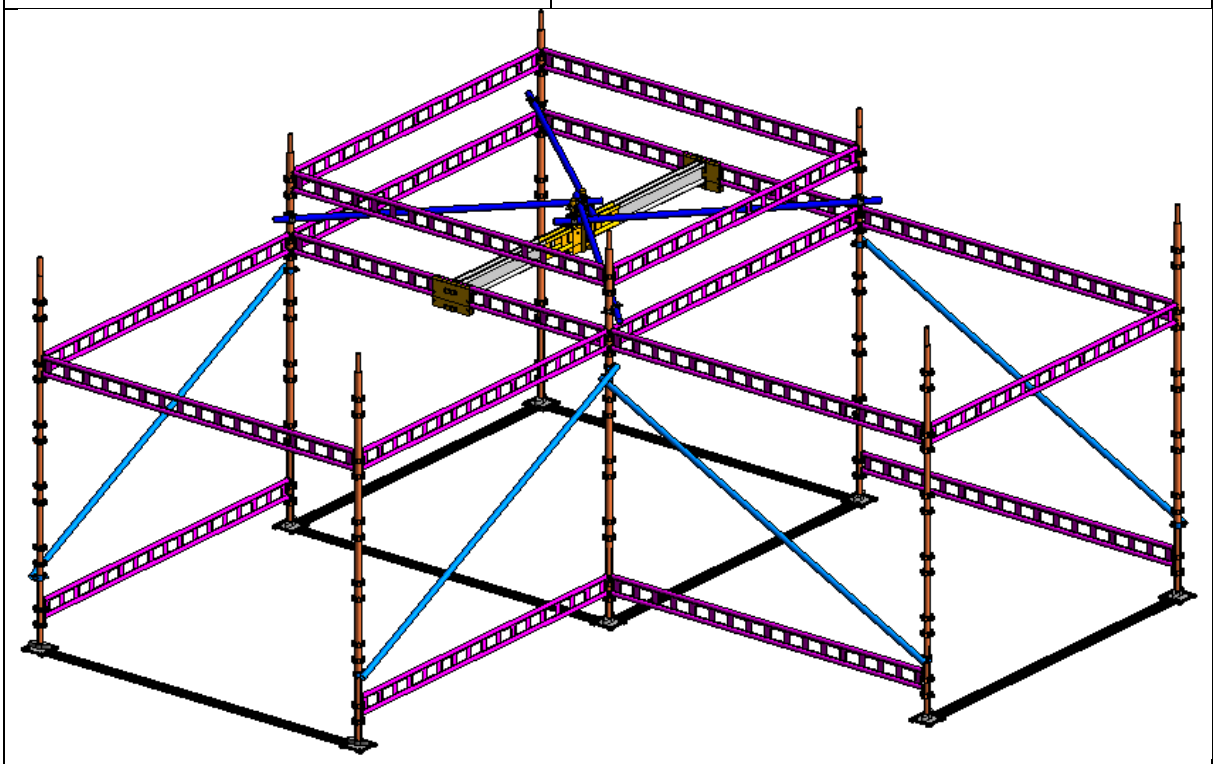


Pictures show smallest "fundament" allowed (1.2 x 0.5m) with smallest support bay depth allowed (0.7m) on one side in both directions and held by compression in opposite directions.





Pictures show biggest length and smallest width allowed (3.0 x 0.5m) held by compression in width direction on both sides. Self-supported in length direction.



Picture shows biggest fundament allowed (3.0 x 3.0m) with biggest support bay depth allowed in both directions.

Note. See general rule for pulling directions using support bays.

26. End Page

26.1 Warning:

The manual's examples are based on advanced use on floating devices, with a pitch and roll sett to 5° and with a local maximum wind speed of 32m/s.

If this is to be used on non-floating installations or on onshore projects, calculation tool must be adapted to sites values, both regarding wind and movement. Examples in this manual will not reflect the correct calculations for these locations.

26.2 Product approval

Quick Lift has been reviewed in accordance with "NORSOK R-002, R-003 & R-005, also including ILO-152"

Quick Lift has been tested and approved for use together with described scaffolding material made by ALUHAK, and verified by Westcon Løfteteknikk AS, ref. attached confirmation in accordance with NORSOK 8.3.

Calculation tool (spreadsheet) and user manual is made by Mats Jektvik (ALUHAK Gruppen) and verified by Westcon Løfteteknikk AS.

For any question, contact ALUHAK Engineering.

Signed: …… Date: ……..

Mats Jektvik

27. Attachments

27.1 2205468-R-RA003 - Third-party confirmation – Westcon Løfteteknikk AS

27.2 R-08.001 EN - Declaration of conformity Quick Lift EN – ALUHAK Systems AS

Aluhak Systems AS
Møllevegen 3B
4353 Klepp Stasjon

Westcon Løfteteknikk AS
Grannesgate 25
N - 5523 Haugesund, NORWAY
Phone: 52 71 93 00
Bank giro: 3330.05.66303
Org.No.: 977 471 184
Webadress: http//www.wcl.no

Your ref.: M-08-2022-R001-EN Our ref.: 2205468-R-RA004 Date: 23.02.2023

Westcon Løfteteknikk AS hereby confirm that the Quick lift and scaffolding from Aluhak Systems AS, which is arranged according to the instructions for use and calculation tool, holds sufficient strength and stability according to the following authority regulations and standards:

- «The Machine Directive» FOR-2022-04-06-544
- «Directive for execution of work» FOR-2011-12-06-1357
- The Petroleum Directives
  - The Facilities regulation §69
  - Technical and Operational regulation §12
- Norsok R-002:2017 Lifting Equipment
- Norsok R-003:2017 Safe use of lifting equipment
- Norsok R-005:2008 Safe use of lifting and transport equipment for petroleum plants onshore

General info
The largest permissible load is SWL 1000 kg, depending on the setup as described in the user manual and calculation tool that documents strength and stability. Permitted locations of the Quicklift are shown in LP 1 to LP 9, in layouts as shown in examples and in chapter 24 of the user guide.

Restrictions for Use
Quicklift can be placed on the top rosette on a 3-meter spire length. The scaffolding shall be fixed in the surrounding structure in the defined direction of use, rather than ballast where possible. The surrounding structure must be rated by riggers to withstand a force of 500 kg per point. It is not permitted to have skew loads beyond the outer edges of the scaffolding. The scaffolding can be used with a maximum wind speed of 25 m/s. For offshore use, maximum operational limitations of 5 degrees heel and trim apply.

User training for offshore and onshore petroleum facilities
Scaffold builders must at least have equipment-specific training according to §10-4 as well as minimum knowledge according to §17-4 with respect to the Directive for execution of work.

User training for use on land
Scaffold builders must at least have equipment-specific training according to §10-4 from the Directive for execution of work.

Referenced documents:
User manual M-08-2022-R001-EN revisjon R001-22, dated 18.01.2023
Calculation tool «Live Tabell Quicklift» revision 1, dated 12.01.2023

Signed by Competence Manager Trygve Ertenstein

On behalf of Westcon Løfteteknikk AS

EC DECLARATION OF CONFORMITY

Aluhak Systems AS. Declares on its own responsibility, the following product:

PRODUCT NAME	ALUHAK Quick Lift
TYPE	According to its guidelines
WLL	<=1000 KG depending on its setup
SERIAL NUMBER	NA

Aluhak AS confirms that the product complies with the following regulations when installed in accordance with guidelines for its representative areas:

- **Machinery Directive - 2006/42/EC** (FOR-2009-05-20-544)
- **Facilities regulations (Ptil) §69** "Lifting appliances and lifting gear"

Quick Lift must only be used in accordance with ALUHAK's instructions/manuals.

Onshore and in areas without the influence of wind, Quicklift can be used in accordance with the Norwegian Assembly instructions, "Monteringsveiledning aluhak Quick lift - M-07-2022-R001-NO". This guide is limited only to this specific set-up and with a central location and on a flat area without movement.

For all other setup methods or when used in areas with wind and/or movement, the user manual "Advanced use of Quicklift - M-08-2022-R001-EN" together with the calculation tool used in connection with the assembly and approval of the setup.

Production and design/structural strength are in accordance with the following standard(s):

- **NS-EN 1999 Eurocode 9: Design of aluminium structures.**
- **EN-12811-1: 2003 - Temporary works equipment Part 1 – Scaffolds, Performance requirements and general design.**
- **EN-12811-2: 2004 - Temporary works equipment - Part 2 – Information on materials.**
- **EN-12811-3: 2002 - Temporary works equipment - Part 3 – Load testing.**
- **EN-74-1: 2005 - Couplers, spigot pins and baseplates for use in falsework and scaffolds.**
- **NORSOK R002: 2017 - Lifting equipment.**
- **NORSOK R003: 2017 - Safe use of lifting equipment.**
- **NORSOK R005: 2008 -Safe use of lifting and transport equipment in onshore petroleum plants**

Place of issue and date: **Møllevegen 3B, Klepp Stasjon, 08.06.2022**

Responsible signature:

Sten Bergman
Aluhak Systems AS

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