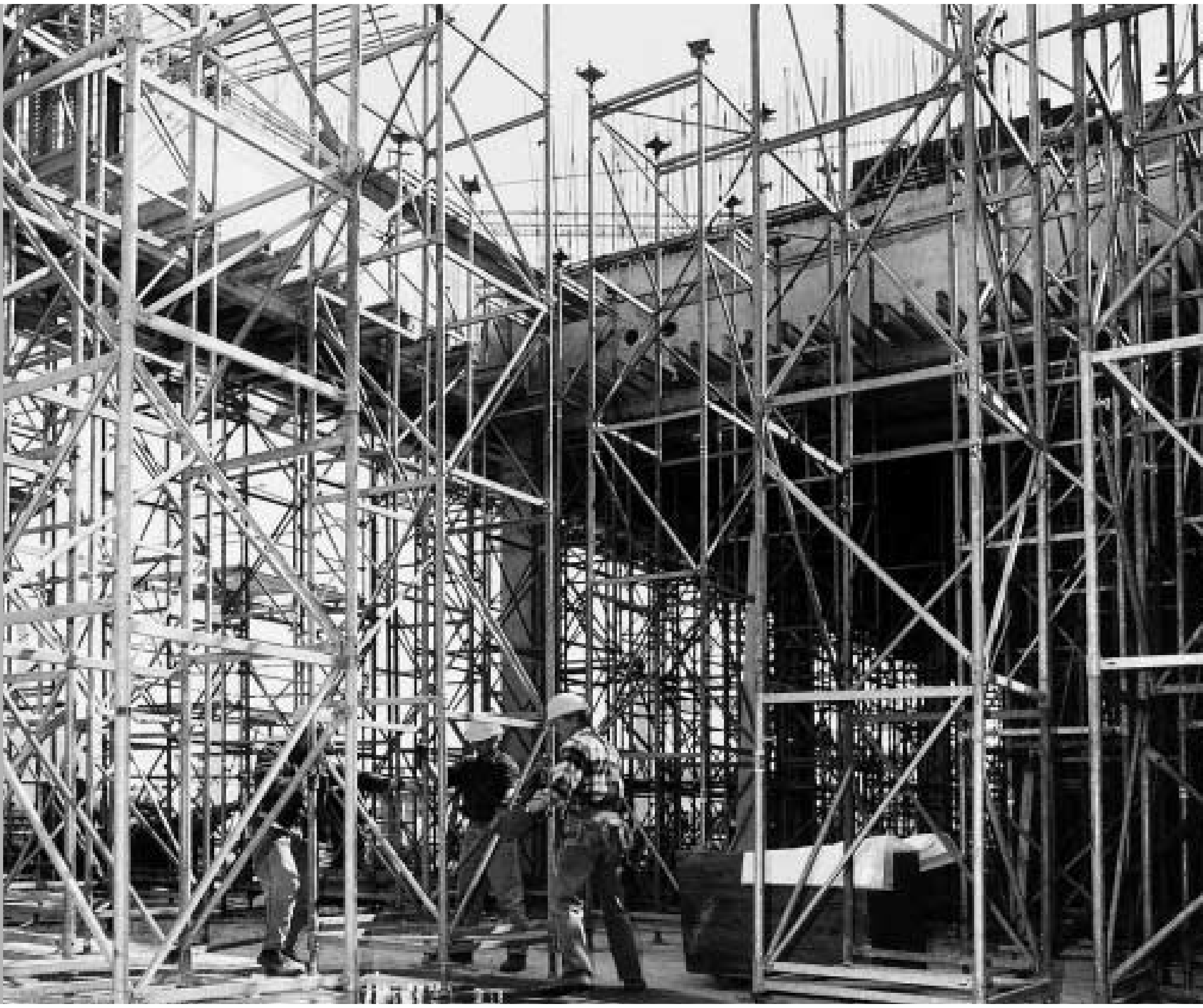
ID 15

Frame support
Instructions for erection and use

September 2004



HÜNNEBECK

Contents

1. Design approval
Available in an up-to-date version accord. to DIN 4421. Use of ID15 Frame Support is allowed in Scaffold Class I, II or III. When used in Scaffold Class III (DIN 4421, γ_τ= 1,00), the maximum load-bearing capacity of up to 4 x 50 kN = 200 kN can be applied. The project-related permissible vertical and horizontal loads can directly be taken from the relevant load tables (diagrams). The design approval saves expenditure of design calculations and additional approval of the loads to be used for a specific construction task.

2. Quick assembly
A very easy and problem-free assembly of the ID 15 tower is ensured by using only 6 different individual components.
The frame 133 is the heaviest part weighing 19.1 kg.
Low assembly costs, low procurement of individual parts, no small parts that can be lost, no crane required while assembling the tower.

3. Application variants
The ID 15 frame support offers a lot of possible applications in all fields of housing, industrial and bridge construction.
Owing to its versatility, the ID 15 frame support always ensures an optimum economic utilization.

4.Combination possibilities
For special applications the individual parts can be combined in varied arrangement, e.g. additional supporting planes (disks) of frames can be closely attached to towers in case of high loads, or single supporting planes braced by tubes and couplers may be applied for forming floor tables.
Thanks to a great many combination possibilities, an optimum adaptation to all structural situations will be ensured.

5. Horizontal assembly
The design of the individual components allows every tower to be assembled in horizontal position. Even tall towers can quickly and time-savingly be assembled and then lifted and transported to the location of use by the help of a crane.

6. Galvanization
All component parts are hot-dip galvanized. Owing to this galvanization the costs for cleaning and maintenance can considerably be reduced.

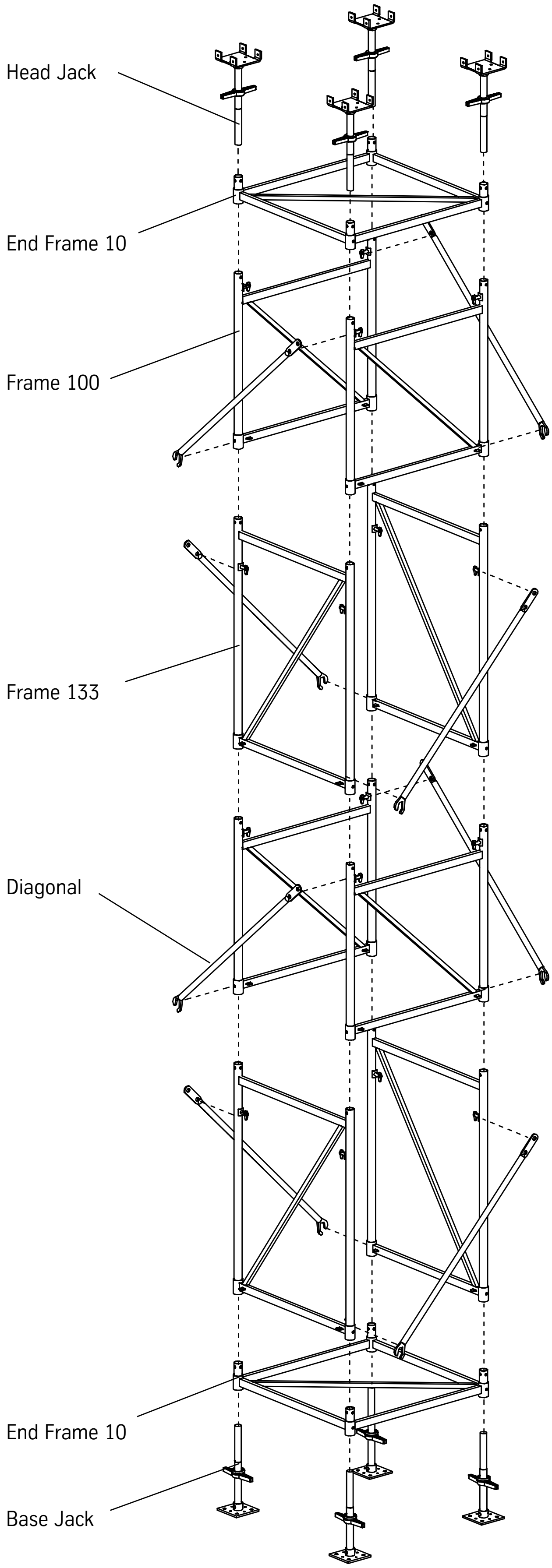
Important remarks

The following instructions for erection and use include detailed information on the handling and proper application of the products that are described and depicted. All instructions regarding technical operation and function have to be observed carefully. Exceptional use requires a separate design calculation.
With regard to safe and technically correct use of our products abroad, all relevant safety rules, regulations and safety instructions of national institutes and/or local authorities have to be followed.
Generally, only flawless material must be used.
Damaged components have to be sorted out. In case of repairs, only original spare parts of the **HÜNNEBECK** Company may be used.
Combined use of our formwork systems with equipment from other suppliers may involve certain dangers and, therefore, requires an additional checkup.
For reasons of further technical development we emphatically reserve the right to revise, change or modify any of the product's components at any time without prior notice.

Product information

The **HÜNNEBECK** ID15 Frame Support is a load-bearing tower with base dimensions of 1.0m x 1.0m. Using only 6 different standard components, every required height can be achieved. Depending on the height required, towers can be assembled either by Frames 100, Frames 133 or combinations of these frames and parts taken from the supplementary components.
Towers of any height can be erected infinitely variable because the combined adjustment range of the Head Jack and Base Jack exceeds the 33 cm grid of the frames. All component parts are hot-dip galvanized. The dead weight comes up to about 42 kg/rising metre (including Head and Base Jacks).
The articulated attached bearing plates of the Head and Base Jacks allow adaptations to sloping situations of up to 6%.
In total, the full adjustment range of the jacks is 59.8 cm.
Due to the official approval, only a reduced range of 49.7 cm may be used.
Both Frames (100 and 133) need the same type of diagonal as bracing. Owing to the required assembly produce by changing the postion of frames by 90° from lift to lift, the same rigidity in all veritcal planes of the towers is achieved.
The standard frames are joined tension-proof by the built-in quick-action connectors.
The post consist of tubes with 48.3 mm dia. and therefore couplers for bracings made of common scaffold tubes can be mounted. The towers may be used for almost all heights when stabilized by horizontal anchorings at certain levels.
The vertical distances for such stabilizing methods are given by the relevant load tables.

2.0 Overview

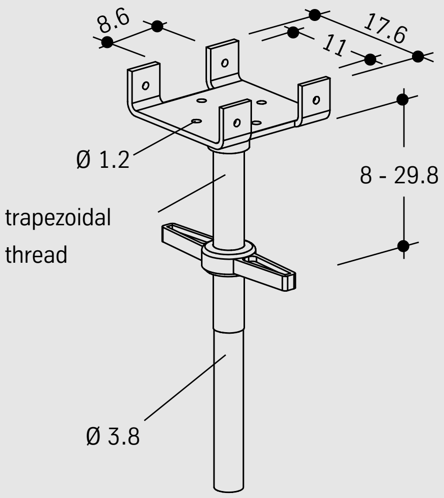

Head Jack
End Frame 10
Frame 100
Frame 133
Diagonal
End Frame 10
Base Jack

3.0 Components

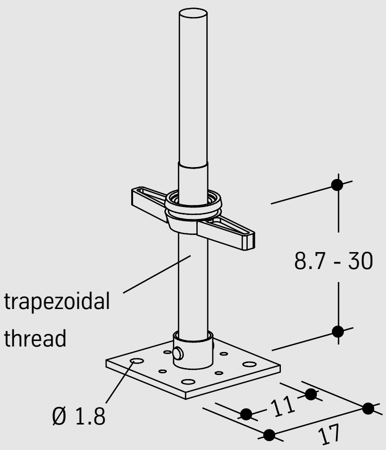
ID 15

	Designation	Art. No.	Weight kg/pce.

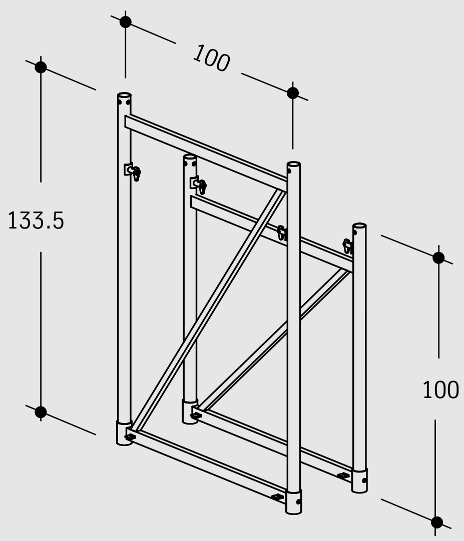
Using the six major components of the basic equipment, frame supports for all required construction heights can be created. Reference must always be made to the design approval of ID 15 with End Frame 10.



Designation	Art. No.	Weight kg/pce.
Head Jack 38/52 For bearing timber or steel beams. Slope of up to 6 % can be compensated by the head plate. Height adjustment: from **8 cm** to **29.8 cm**. Design approval must be adhered to!	148 530	8.2

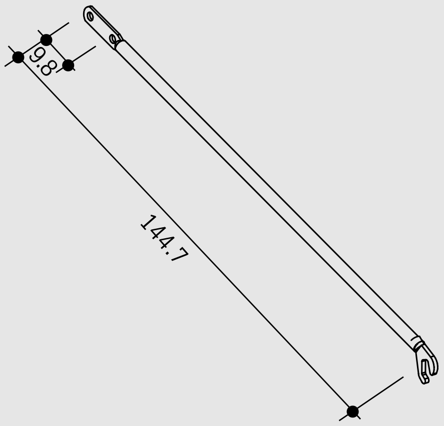
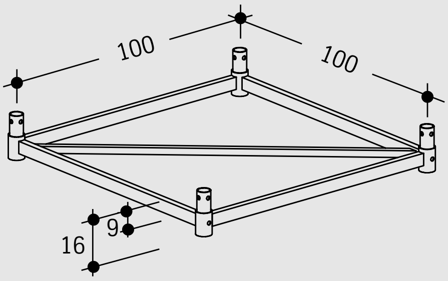
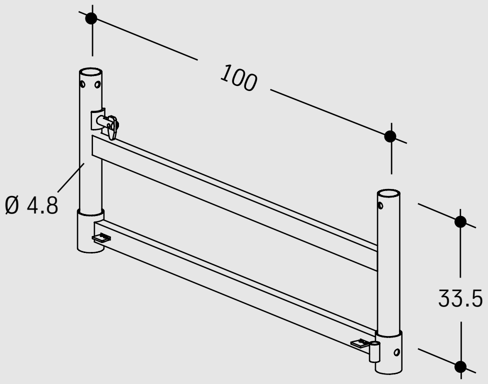
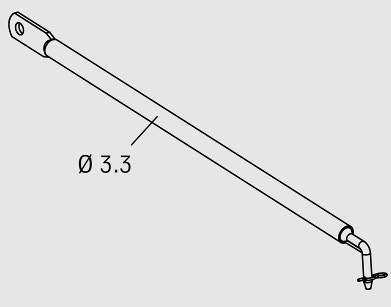


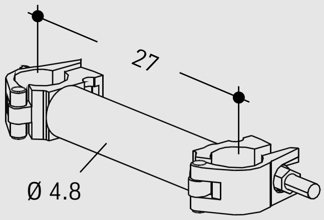
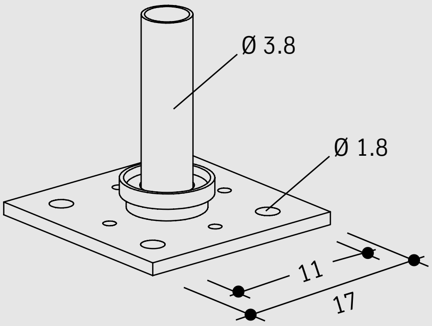
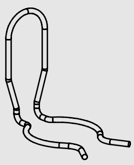
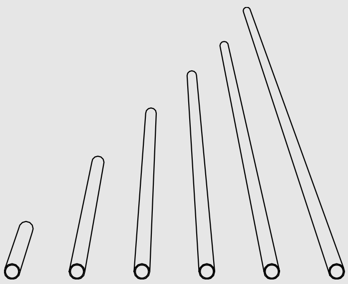
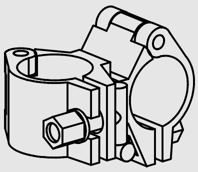
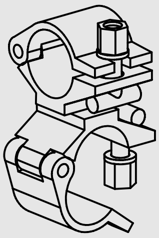
Designation	Art. No.	Weight kg/pce.
Base Jack 38/52 For setting-up the frame support. Slope of up to 6 % can be compensated by the head plate. Height adjustment: from **8.7 cm** to **30.0 cm**. Design approval must be adhered to!	148 552	8.0



Designation	Art. No.	Weight kg/pce.
ID Frame 133	057 162	19.1
ID Frame 100 The frames are tension-resistantly connected with the tightly built-in wedges of the quick-action connectors. Pins with gravity flips are provided for attaching the diagonals. Design height of frame: 100 cm or 133.5 cm.	057 173	16.1

3.0 Components

	Designation	Art. No.	Weight kg/pce.
	**ID Diagonal** Used for bracing both types of frame within the tower at right angles to frame plane. The lower end with its claws is fixed to the horizontal bottom bar of one frame, the upper end fixed to the hinged pin of the opposite frame.	148 574	2.8
 These parts enlarge the structural application possibilities.	**ID End Frame 10** To be assembled as sectional bracing of the frame support to ensure the square shape. Always installed at the top and at the base. Installation height at the top: **9 cm** Installation height at the base: **16 cm**	118 163	15.8
	**ID Adjustment Frame 33** Used for height adjustment of a frame support during successive applications. It makes the complete reconstruction of a tower unnecessary. Structural height of the frame: **33.5 cm**	077 670	8.8
	**ID diagonal** Required as bracing for adjustment frame 33.	077 680	1.9

	Designation	Art. No.	Weight kg/pce.
	**Frame Connection 27** For connection of an additional frame panel (in vertical plane) to the frame support. Distance of legs (centre-to-centre): **27 cm**.	121 915	2.2
	**Head/Base Piece, rigid** Applicable to frame supports which do not require adjustment at the base or at the top. Structural height: **2.7 cm.**	062 935	2.7
	**ID 15 Base Jack Retainer** Prevents the base jack or head/base piece from dropping-out when towers are lifted and moved by crane.	078 652	0.1
Scaffold tubes 48.3 x 3.2 mm 	**Scaffold tube 50**	169 001	1.9
	Scaffold tube 100	169 012	3.8
	Scaffold tube 150	169 023	5.7
	Scaffold tube 200	169 034	7.6
	Scaffold tube 250	169 045	9.5
	Scaffold tube 300	169 056	11.4
	Scaffold tube 350	169 067	13.3
	Scaffold tube 400	169 078	15.2
	Scaffold tube 450	169 089	17.1
	Scaffold tube 500	169 090	19.0
	**Rigid Coupler 48/48** w.a.f. 22	002 514	1.2
	Rigid Coupler 48/48 w.a.f. 19 Permissible load: 9 kN. Required torque: 5 kNcm.	801 135	1.2
	**Swivel Coupler 48/48** w.a.f. 22	002 525	1.4
	Swivel Coupler 48/48 w.a.f. 19 Permissible load: 5 kN. Required torque: 5 kNcm.	801 146	1.4

4.0 Application planning & preparatory work

The quick and safe erection of ID15 frame supports can be significantly improved by precedent application planning and preparatory work.

Application planning

- Drawings, material list, instructions for erection and use as well as the latest approvals of the design analyses should completely be handed over to the job-side.

Preparations for erecting

- Check the material with regard to completeness and flawlessness and store it up clearly organized.
- Sort out damaged parts and place them separately, order replacemant parts. Damaged parts may also be, e.g., head jacks with bearing plates which show too much slope.
- Store and protect small quantities of material which will not be required during reconstruction of towers.
- Arrange everything, if necessary, for marking the final positions of the towers on the foundations in time.
- Instruct site staff for the assembly and operation procedures as far as necessary.

Static fundamentals for the design analsis of slab supporting systems.

Weight density of freshly placed concrete:

$\gamma_c = 26.0$ kN/m³

Dead load resulting from formwork, shoring structure, steel beams and/ or timber formwork beams.

Live loads according to DIN 4421

Horizontal loads from wind pressure, DIN 1055, Teil 4.*

***** Wind pressure:

q = 0	within the building (no wind)
q = 0.5 kN/m²	0-8 m over ground
q = 0.8 kN/m²	> 8 -20 m over ground
q = 1.1 kN/m²	> 20-100 m over ground

shape coefficient for ID15 tower: **1.3**

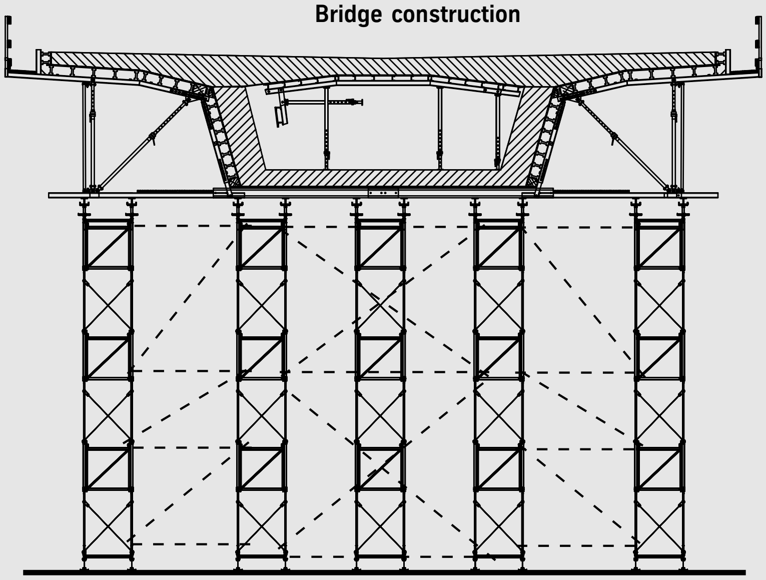
***** Wind load per rising „m“ of **ID 15**: **1.3** • 0.4 m²/m • q

= 0.52 m²/m • q

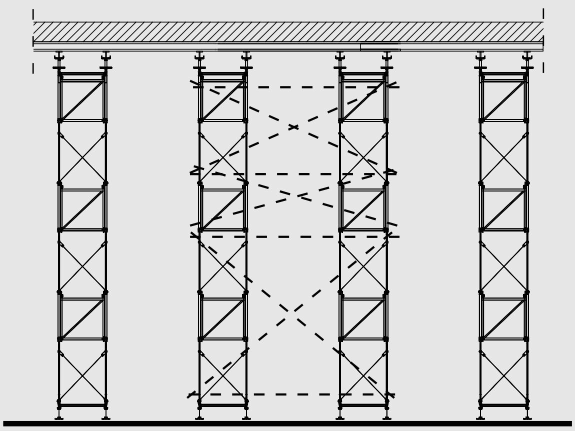
0 to 8 m	= 0.52 • 0.5 = 0.26 kN/m
> 8 to 20 m	= 0.52 • 0.8 = 0.42 kN/m
> 20 to 100 m	= 0.52 • 1.1 = 0.57 kN/m

Example:

Bridge construction



Slab construction



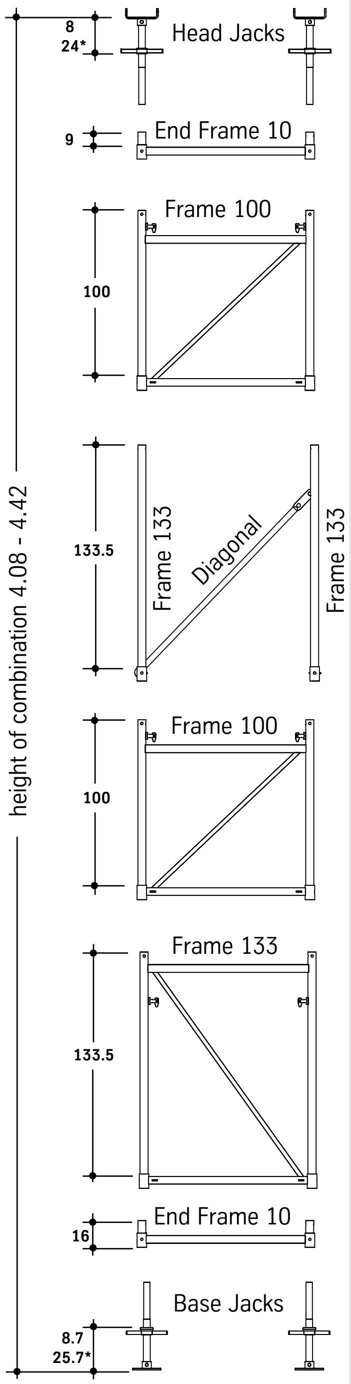
Lateral concrete pressure acting on formwork must be taken and absorbed by tie rods/anchors so that no additional loads will have a detrimental effect on the supporting structure.

5.0 Determination of material

ID 15

Guide figures for calculating the required times for assembly and disassembly of towers:
0.17 hours per rising metre (each procedure). Approx. 4 hours per tonne (on a average). Time required for bracings made of tubes and couplers: approx. 25 to 30 hours per tonne.

Example of an ID 15 tower combination



*accord. to approval

Table of combinations

Art. No.:	148 530	148 552	057 162	057 173	118 163	148 574	Weight of tower kg
Weight/item [kg]	8.2	8.0	19.1	16.1	15.8	2.8	
Height of tower m	**Head Jack**	**Base Jack**	**Frame 133**	**Frame 100**	**End Frame 10**	**Dia-gonal**	
1.42 - 1.75	4	4	–	2	2	2	134.2
1.75 - 2.08	4	4	2	–	2	2	140.2
1.84 - 2.17	4	4	2	–	2	2	156.0
1.93 - 2.26	4	4	2	–	2	2	171.8
2.42 - 2.75	4	4	–	4	2	4	172.0
2.75 - 3.08	4	4	2	2	2	4	178.0
3.09 - 3.42	4	4	4	–	2	4	184.0
3.42 - 3.75	4	4	–	6	2	6	209.8
3.75 - 4.08	4	4	2	4	2	6	215.8
4.09 - 4.72	4	4	4	2	2	6	221.8
4.42 - 4.75	4	4	6	–	2	6	227.8
4.75 - 5.08	4	4	2	6	2	8	253.6
5.09 - 5.42	4	4	4	4	2	8	259.6
5.42 - 5.75	4	4	6	2	2	8	265.6
5.76 - 6.09	4	4	8	–	2	8	271.6
6.09 - 6.42	4	4	4	6	2	10	297.4
6.42 - 6.75	4	4	6	4	2	10	303.4
6.76 - 7.09	4	4	8	2	2	10	309.4
7.09 - 7.42	4	4	10	–	2	10	315.4
7.42 - 7.75	4	4	6	6	2	12	341.2
7.76 - 8.09	4	4	8	4	2	12	347.2
8.09 - 8.42	4	4	10	2	2	12	353.2
8.43 - 8.76	4	4	12	–	2	12	359.2
8.76 - 9.09	4	4	8	6	2	14	385.0
9.09 - 9.42	4	4	10	4	2	14	391.0
9.43 - 9.76	4	4	12	2	2	14	397.0
9.76 - 10.09	4	4	14	–	2	14	403.0
10.09 - 10.42	4	4	10	6	2	16	428.8
10.43 - 10.76	4	4	12	4	2	16	434.8
10.76 - 11.09	4	4	14	2	2	16	440.8
11.10 - 11.43	4	4	16	–	2	16	446.8
11.43 - 11.76	4	4	12	6	2	18	472.6
11.76 - 12.09	4	4	14	4	2	18	478.6
12.10 - 12.43	4	4	16	2	2	18	484.6
12.43 - 12.76	4	4	18	–	2	18	490.6
12.76 - 13.09	4	4	14	6	2	20	516.4
13.10 - 13.43	4	4	16	4	2	20	522.4
13.43 - 13.76	4	4	18	2	2	20	528.4
13.77 - 14.10	4	4	20	–	2	20	534.4
14.10 - 14.43	4	4	16	6	2	22	560,2
14.43 - 14.76	4	4	18	4	2	22	566,2
14.77 - 15.10	4	4	20	2	2	22	572,2
15.10 - 15.43	4	4	22	–	2	22	578,2
15.43 - 15.76	4	4	18	6	2	24	604.0
15.77 - 16.10	4	4	20	4	2	24	610.0
16.10 - 16.43	4	4	22	2	2	24	616.0
16.44 - 16.77	4	4	24	–	2	24	622.0
16.77 - 17.10	4	4	20	6	2	26	647.8
17.10 - 17.43	4	4	22	4	2	26	653.8
17.44 - 17.77	4	4	24	2	2	26	659.8
17.77 - 18.10	4	4	26	–	2	26	665.8
18.10 - 18.43	4	4	22	6	2	28	691.6
18.44 - 18.77	4	4	24	4	2	28	697.6
18.77 - 19.10	4	4	26	2	2	28	703.6
19.10 - 19.44	4	4	28	–	2	28	709.6
19.44 - 19.77	4	4	24	6	2	30	735.4
19.77 - 20.10	4	4	26	4	2	30	714.4

Extension of jacks accord. to approval: Head Jack 240 mm extended
Base Jack 257 mm extended

6.0 Load-bearing capacity

The follwing diagrams are examples to show the load-bearing capacity of the ID 15 tower, assembled with End Frames 10, and Head Jacks 38/52 as well as Base Jacks 38/52.
For the pratical use, i.e. design calculation and execution of a shoring system, always make use of the complete approval and take into consideration the relevant Standard DIN 4421.

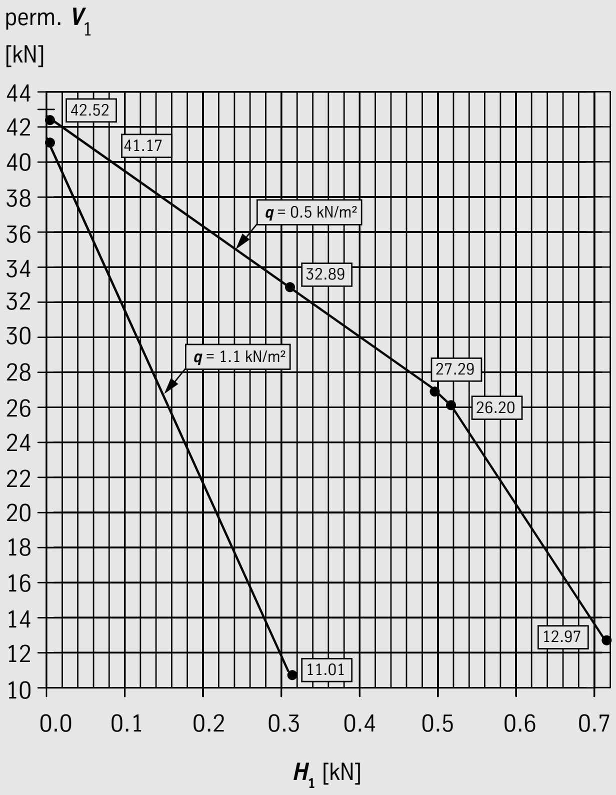
The statical analysis has to be worked out as per DIN 4421 according to the general formula

$$\gamma_T \cdot V \leq \text{perm. } V$$

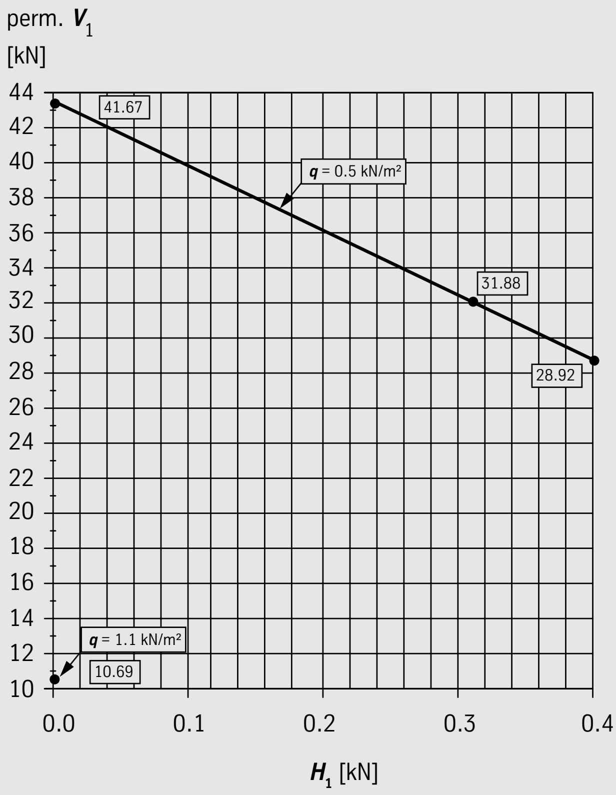
Explanations of terms:

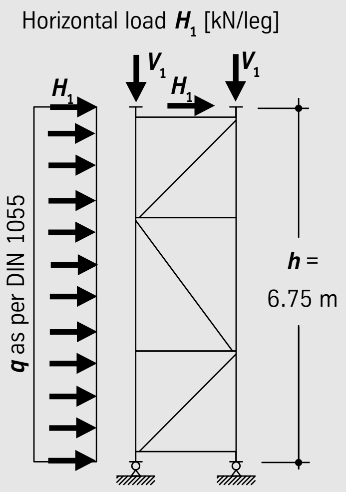
γ_T group factor as to DIN 4421
V existing vertical load
perm. V permissible vertical load

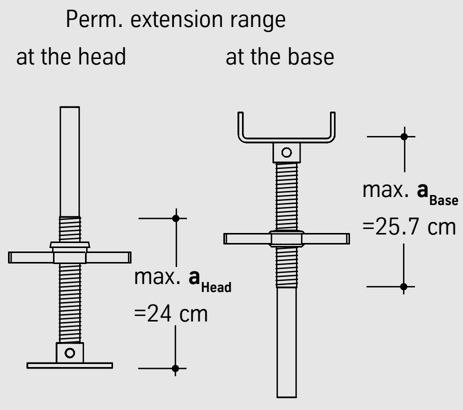
Example 1
Combined permissible horizontal and vertical loads for a **free-standing ID 15 frame support**. Wind pressure on the tower is already included in the diagram.
Height of tower = 6.75 m

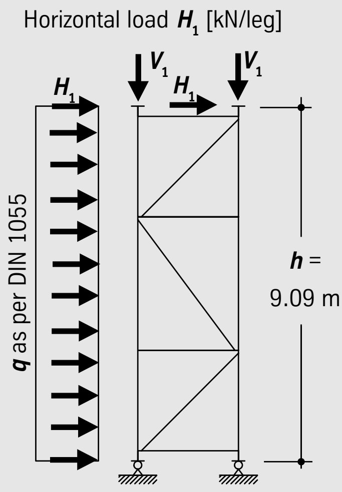


Example 2
Combined permissible horizontal and vertical loads for a **free-standing ID 15 frame support**. Wind pressure on the tower is already included in the diagram.
Height of tower = 9.09 m









The size of the group factor depends on the **scaffold class** of **DIN 4421** which is made reference to. As individual supporting member, the ID 15 Tower with End Frame 10 is in conformance with the high requirements of the **scaffod class III** as stated in the approval. That is why the ID 15 frame support can be used in each of the three classes, especially also in **class III** with the most favourable **group factor of γ_T =1.00.**

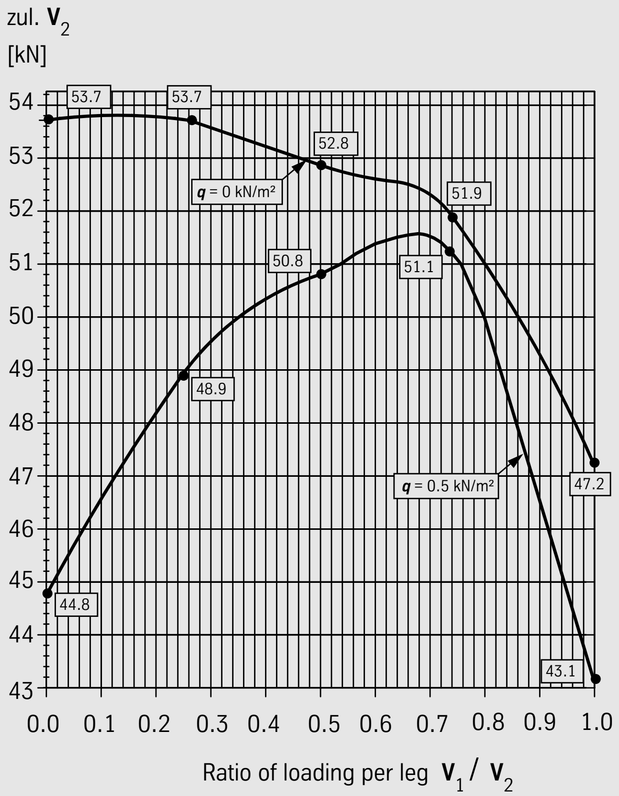
The loads stated in the approval of the tower can be fully applied to within the **scaffold class III**.

The necessary safety against tilting and sliding of individual frame supports must be proved separately according to the relevant regulations for the stability of such structures.

Example 3

Permissible vertical loads (with different amounts per leg) for an ID 15 Tower which is **supported at the head**. Horizontal loads must be taken and transmitted above the head jacks.

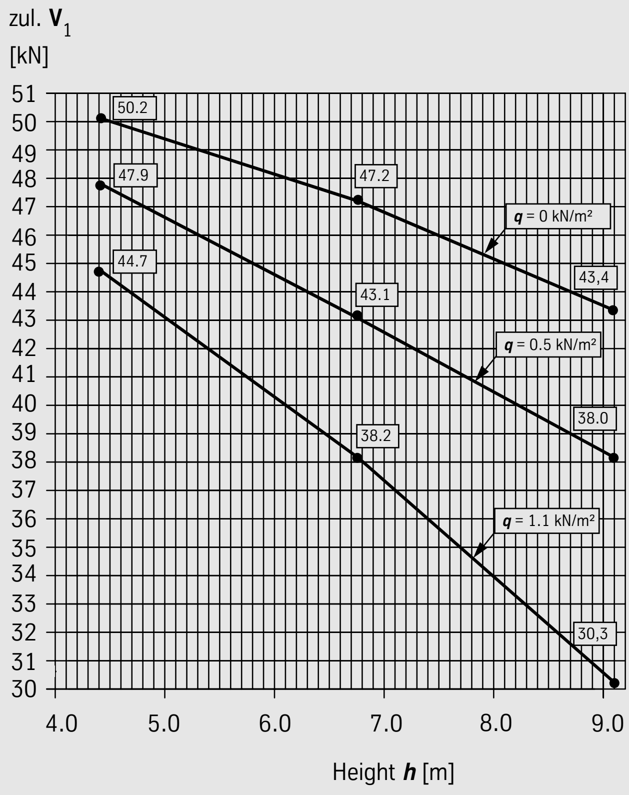
Height of tower h = 6.75 m

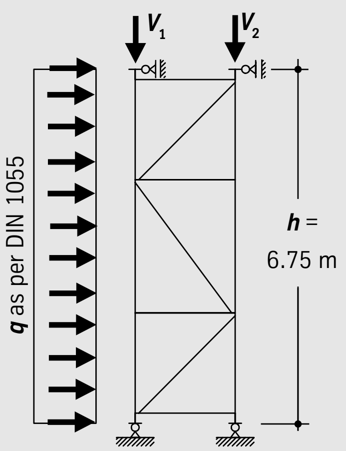


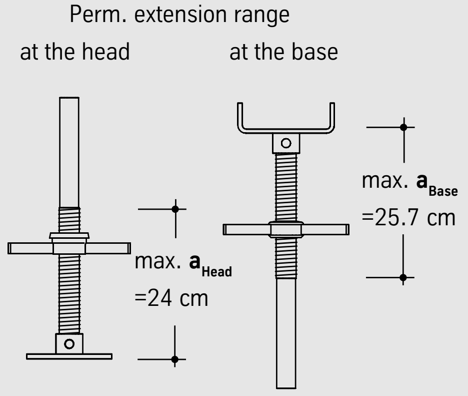
Example 4

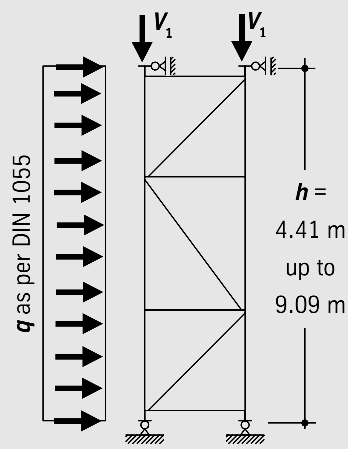
Permissible vertical loads for an ID 15 Tower which is **supported at the head**. Horizontal loads must be taken away and transmitted above the head jacks.

Height of tower from 4.41 m up to 9.09 m





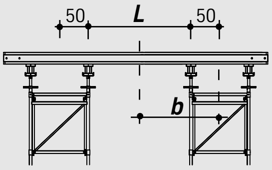




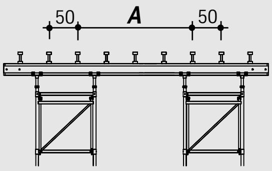
7.0 ID 15 Frame Support with H 20 beams

Loading Table (with H 20 secondary beams and double H 20 primary beams)

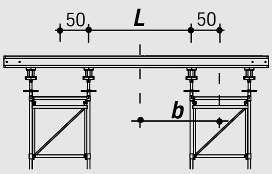
	„*t*“ slab thickness [cm]													
	„*q*“ total loading [kN/m²]													
	14	**16**	**18**	**20**	**22**	**24**	**26**	**28**	**30**	**35**	**40**	**45**	**50**	**55**
	5.39	5.91	6.43	6.95	7.47	7.99	8.51	9.03	9.61	11.2	12.7	14.3	15.9	17.4
Spacing of second beams [m]	*L* = allowable span of secondary beam [m]													
0.20	4.00	4.00	4.00	4.00	3.94	3.83	3.73	3.65	3.57	3.39	3.25	3.13	3.02	2.93
0.33	3.83	3.68	3.54	3.43	3.32	3.23	3.15	3.08	3.01	2.86	2.74	2.64	2.55	2.47
0.40	3.61	3.46	3.33	3.22	3.13	3.04	2.96	2.89	2.83	2.69	2.58	2.48	2.40	2.32
0.50	3.35	3.21	3.09	2.99	2.90	2.82	2.75	2.69	2.63	2.50	2.39	2.30	2.22	2.14
0.63	3.11	2.98	2.87	2.78	2.69	2.62	2.55	2.49	2.44	2.32	2.22	2.12	2.01	1.92
0.67	3.04	2.92	2.81	2.72	2.64	2.56	2.50	2.44	2.39	2.27	2.17	2.05	1.95	1.86
0.75	2.92	2.80	2.70	2.61	2.54	2.47	2.40	2.35	2.29	2.18	2.05	1.93	1.83	1.68



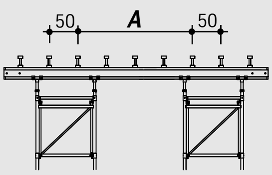
„**b**“ Loading widths **[m]** (b=L/2 + 0.5 m)	**„*A*“ allowable span of primary beams [m]**, (double beams: 2 x H20 timber beams)													
	resulting loads per leg [kN]													
1.00	3.35	3.21	3.09	2.99	2.90	2.82	2.75	2.69	2.63	2.50	2.39	2.30	2.22	2.14
	11.7	12.4	13.2	13.9	14.6	15.3	16.0	16.6	17.4	19.5	21.6	23.6	25.6	27.4
1.25	3.11	2.98	2.87	2.78	2.69	2.62	2,55	2,49	2.44	2.32	2.22	2.12	2.01	1.92
	13.8	14.7	15.6	16.4	17.2	18.1	18.9	19.7	20.7	23.2	25.6	27.8	29.8	31.7
1.50	2.92	2.80	2.70	2.61	2.54	2.47	2.40	2.35	2.29	2.18	2.05	1.93	1.83	1.68
	15.9	16.9	17.9	18.8	19.8	20.8	21.7	22.7	23.7	26.7	29.1	31.4	33.7	35.1
1.75	2.78	2.66	2.57	2.48	2.41	2.34	2.28	2.23	2.18	2.02	1.90	1.76	1.59	1.44
	17.8	18.9	20.1	21.2	22.3	23.4	24.4	25.5	26.7	29.5	32.2	34.5	35.9	37.2
2.00	2.66	2.55	2.46	2.37	2.30	2.24	2.17	2.10	2.04	1.89	1.73	1.54	1.39	1.26
	19.7	21.0	22.2	23.5	24.7	25.9	27.0	28.0	29.2	32.3	34.7	36.3	37.9	39.4
2.25	2.55	2.45	2.35	2.26	2.18	2.11	2.04	1.98	1.92	1.75	1.54	1.37	1.23	1.12
	21.6	22.9	24.2	25.5	26.7	28.0	29.1	30.3	31.6	34.6	36.3	38.1	39.8	41.6
2.50	2.44	2.33	2.23	2.15	2.07	2.00	1.94	1.88	1.82	1,58	1.38	1.23	1.11	1.01
	23.2	24.6	26.0	27.3	28.7	30.0	31.3	32.5	33.9	36.0	37.9	39.9	41.8	43.8



	t slab thickness [cm]													
	q total loading [kN/m²]													
	60	**65**	**70**	**75**	**80**	**85**	**90**	**95**	**100**	**105**	**110**	**115**	**120**	**125**
	19.0	20.5	22.1	23.7	25.2	26.8	28.3	29.9	31.3	32.6	33.9	35.2	36.5	37.8
Spacing of second. beams [m]	*L* allowable spann of secondary beam [m]													
0.20	2.84	2.77	2.70	2.64	2.59	2.54	2.49	2.45	2.40	2.37	2.33	2.30	2.26	2.23
0.33	2.40	2.34	2.28	2.23	2.18	2.12	2.06	2.00	1.96	1.92	1.88	1.85	1.81	1.75
0.40	2.26	2.20	2.13	2.06	1.99	1.93	1.88	1.83	1.76	1.69	1.62	1.56	1.51	1.46
0.50	2.05	1.97	1.90	1.84	1.75	1.64	1.55	1.47	1.41	1.35	1.30	1.25	1.21	1.17
0.63	1.84	1.71	1.59	1.49	1.40	1.31	1.24	1.18	1.13	1.08	1.04	1.00	---	---
0.67	1.74	1.61	1.49	1.39	1.31	1.23	1.16	1.10	1.06	1.01	---	---	---	---
0.75	1.55	1.43	1.33	1.24	1.16	1.10	1.04	---	---	---	---	---	---	---



b Loading widths **[m]** (b=L/2 + 0,5 m)	***A* allowable span of primary beams [m]**, (double beamsh: 2 x H20 timber beams)													
	resulting loads per leg [kN]													
1.00	2.05	1.97	1.90	1.84	1.75	1.64	1.55	1.47	1.41	1.35	1.30	1.25	1.21	1.17
	29.0	30.5	32.1	33.6	34.6	35.4	36.2	36.9	37.6	38.3	38.9	39.6	40.2	40.9
1.25	1.84	1.71	1.59	1.49	1.40	1.31	1.24	1.18	1.13	1.08	1.04	1.00	---	---
	33.6	34.8	35.8	36.8	37.8	38.7	39.7	40.7	41.5	42.3	43.2	44.0	---	---
1.50	1.55	1.43	1.33	1.24	1.16	1.10	1.04	---	---	---	---	---	---	---
	36.2	37.4	38.6	39.7	40.9	42.1	43.2	---	---	---	---	---	---	---
1.75	1.33	1.22	1.14	1.06	---	---	---	---	---	---	---	---	---	---
	38.6	40.0	41.3	42.7	---	---	---	---	---	---	---	---	---	---



Deflections of beams are limited to L/500.

This loading table should be considered as general help for technical elaborations, but it does not replace a seperate statical proof of the final stability of the whole structure.

Loading assumptions according to DIN 4421:

w_f dead load for formwork = 0.25 kN/m²

w_c load of concrete = t [m] x 26.0 kN/m³

(weight density of concrete = 26 kN/m³

p live load = 0.20 x w_c

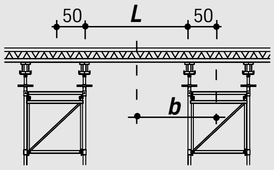
(minimum 1.5 kN/m², maximal 5.0 kN/m²)

Total load $q = w_f + w_c + p$ [kN/m²]

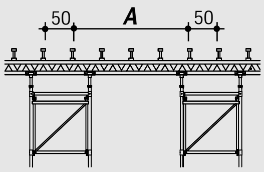
7.0 ID 15 Frame Support with R 24 beams

Loading Table (with R24 secondary beams and double R24 primary beams)

t slab thickness [cm]	14	16	18	20	22	24	26	28	30	35	40	45	50	55
q total loading [kN/m²]	5.39	5.91	6.43	6.95	7.47	7.99	8.51	9.03	9.61	11.2	12.7	14.3	15.9	17.4

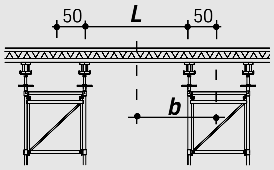


Spacing of second. beams [m]	***L*** allowable span of secondary beam [m]													
0.20	5.33	5.03	5.03	4.74	4.74	4.44	4.44	4.14	4.14	3.85	3.85	3.55	3.55	3.55
0.33	4.44	4.44	4.14	4.14	3.85	3.85	3.55	3.55	3.55	3.26	3.26	2.96	2.96	2.96
0.40	4.14	4.14	3.85	3.85	3.55	3.55	3.55	3.26	3.26	3.26	2.96	2.96	2.66	2.66
0.50	3.85	3.85	3.55	3.55	3.26	3.26	3.26	3.26	2.96	2.96	2.66	2.66	2.37	2.37
0.63	3.55	3.55	3.26	3.26	3.26	2.96	2.96	2.96	2.96	2.66	2.37	2.37	2.37	2.07
0.67	3.55	3.26	3.26	3.26	2.96	2.96	2.96	2.96	2.66	2.66	2.37	2.37	2.07	2.07
0.75	3.55	3.26	3.26	2.96	2.96	2.96	2.66	2.66	2.66	2.37	2.37	2.07	2.07	1.78

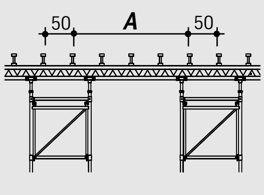


b Loading widths **[m]** (b=L/2 + 0,5 m)	**„A" allowable span of primary beams [m]**, (double beams: 2 x R24 timber beams) / **resulting loads per leg [kN]**													
1.00	3.85	3.85	3.55	3.55	3.26	3.26	3.26	3.26	2.96	2.96	2.66	2.66	2.37	2.37
	13.1	14.3	14.6	15.8	15.9	17.0	18.1	19.2	19.0	22.1	23.3	26.2	26.7	29.3
1.25	3.55	3.55	3.26	3.26	3.26	2.96	2.96	2.96	2.96	2.66	2.37	2.37	2.37	2.07
	15.3	16.8	17.1	18.5	19.9	19.8	21.1	22.3	23.8	25.6	26.8	30.1	33.4	33.4
1.50	3.55	3.26	3.26	2.96	2.96	2.96	2.66	2.66	2.66	2.37	2.37	2.07	2.07	1.78
	18.4	18.9	20.5	20.6	22.2	23.7	23.4	24.8	26.4	28.2	32.2	32.9	36.5	36.2
1.75	3.26	2.96	2.96	2.96	2.66	2.66	2.66	2.37	2.37	2.37	2.07	2.07	1.78	1.78
	20.1	20.5	22.3	24.1	23.9	25.6	27.3	26.6	28.3	32.9	34.2	38.4	38.5	42.3
2.00	2.96	2.96	2.66	2.66	2.66	2.37	2.37	2.37	2.37	2.07	2.07	1.78	1.48	1.48
	21.3	23.4	23.6	25.5	27.4	26.9	28.7	30.4	32.4	34.3	39.1	39.7	39.3	43.2
2.25	2.96	2.66	2.66	2.66	2.37	2.37	2.37	2.07	2.07	2.07	1.78	1.48	1.48	1.18
	24.0	24.4	26.5	28.6	28.3	30.3	32.2	31.2	33.2	38.6	39.8	39.9	44.2	42.8
2.50	2.66	2.66	2.37	2.37	2.37	2.07	2.07	2.07	2.07	1.78	1.48	1.48	1.18	1.18
	24.7	27.1	27.1	29.3	31.4	30.7	32.7	34.7	36.9	38.8	39.5	44.3	43.3	47.5

t slab thickness [cm]	60	65	70	75	80	85	90	95	100	105	110	115	120	125
q total loading [kN/m²]	19.0	20.5	22.1	23.7	25.2	26.8	28.3	29.9	31.3	32.6	33.9	35.2	36.5	37.8



Spacing of second. beams [m]	***L*** zulässige Spannweite der Belagträger [m]													
0.20	3.26	3.26	3.26	2.96	2.96	2.96	2.96	2.96	2.66	2.66	2.66	2.66	2.66	2.66
0.33	2.66	2.66	2.66	2.66	2.37	2.37	2.37	2.37	2.07	2.07	2.07	2.07	2.07	2.07
0.40	2.66	2.37	2.37	2.37	2.07	2.07	2.07	2.07	2.07	2.07	1.78	1.78	1.78	1.78
0.50	2.37	2.07	2.07	2.07	2.07	1.78	1.78	1.78	1.78	1.48	1.48	1.48	1.18	1.18
0.63	2.07	2.07	1.78	1.78	1.78	1.48	1.48	1.18	1.18	0.89	0.89	0.89	0.89	0.59
0.67	2.07	1.78	1.78	1.48	1.48	1.18	1.18	1.18	0.89	0.89	0.89	0.59	0.59	0.59
0.75	1.78	1.78	1.48	1.48	1.18	1.18	0.89	0.89	0.59	0.59	0.59	0.59	0.59	---



b Loading widths **[m]** (b=L/2 + 0.5 m)	***A* allowable span of primary beams [m]**, (double beamsh: 2 x R20 timber beams) / **resulting loads per leg [kN]**													
1.00	2.37	2.07	2.07	2.07	2.07	1.78	1.78	1.78	1.78	1.48	1.48	1.48	1.48	1.48
	31.9	31.5	33.9	36.3	38.7	37.2	39.3	41.5	43.4	40.4	42.0	43.6	45.2	46.8
1.25	2.07	2.07	1.78	1.78	1.78	1.48	1.48	1.48	1.18	1.18	1.18	1.18	1.18	1.18
	36.4	39.4	38.3	41.0	43.7	41.5	43.9	46.3	42.7	44.4	46.2	48.0	49.8	51.5
1.50	1.78	1.78	1.48	1.48	1.48	1.18	1.18	1.18	1.18	0.89	0.89	0.89	0.89	---
	39.5	42.7	41.1	44.0	46.9	43.8	46.4	49.0	51.2	46.1	47.9	49.8	51.6	---
1.75	1.48	1.48	1.18	1.18	1.18	1.18	0.89	0.89	0.89	---	---	---	---	---
	41.2	44.6	42.2	45.2	48.2	51.2	46.8	49.4	51.6	---	---	---	---	---

Deflections of beams are limited to L/500.

This loading table should be considered as general help for technical elaborations, but it does not replace a seperate statical proof of the final stability of the whole structure.

Loading assumptions according to DIN 4421:

w_f dead load for formwork = 0.25 kN/m²

w_c load of concrete = t [m] x 26.0 kN/m³

(weight density of concrete = 26 kN/m³

p live load = 0.20 x w_c

(minimum 1.5 kN/m², maximal 5.0 kN/m²)

Total load $q = w_f + w_c + p$ [kN/m²]

8.0 Erection and dismantling

Basic hints:

- Preassemble ID15 towers according to the required height combinations and the „sequence assembly“.
  Install frames and stabilizing diagonals in one vertical tower plane ***alternately*** from one lift to another.

- Adjust head and base jacks at rough extension lengths. It should be noted that the adjusted length of the head jack must have enough reserve for releasing from load when striking the towers after concreting.

- Erect preassembled towers by crane. For this, attach the crane ropes to the horizontal members of the upper frames. Do not use neither the end frame nor the head jacks.

- Base jacks may only stand on a sturdy foundation. The allowable inclination can be of up to a maximum of 6%.

- Erect all frame supports perpendicularly before loading.

- Install bracings (scaffold tubes with couplers) if required for statical reasons or some other purpose.

- Simple auxiliary bracings or provisions against tilting of towers must generally be taken into consideration during erection and striking. Normally, it might be sufficient to install only horizontal scaffold tubes (48.3 mm dia.) which are connected to all neighbouring legs of towers by means of rigid couplers 48/48. It is advisable to provide the tubes of the bracings as close as possible to existing walls or columns (piers, etc.) for transmitting forces. Single towers must be stabilized to the ground by tubes and couplers.

- Final height adjustment (levelling) should be performed at the head jacks after placing the primary beams. The head jacks can adapt to a 6% pitch. Greater pitches have to be compensated for by means of timber wedges (hard wood).

- All aspects of the approval have to be adhered to.

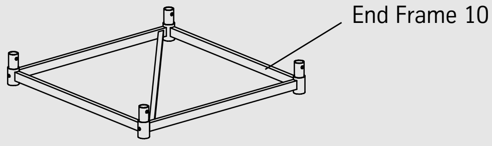
- Furthermore, the „Safety Rules and Requirements for Protection of Health in Falsework and Formwork Construction“ as well as other relevant national or local regulations must be paid attention to (Germany: BBG, Doc. No. ZH 1/603).

Dismantling:

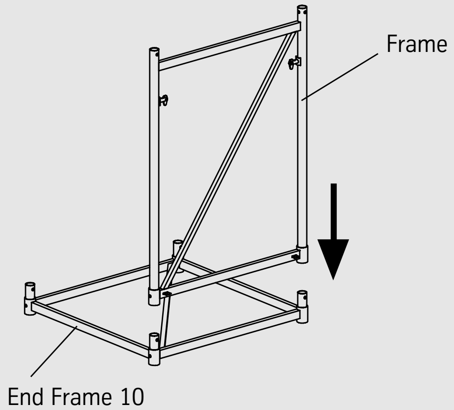
It is advisable to lower shoring systems formed by frame supports by releasing the head jacks. This is especially necessary when built-in bracings of tubes and couplers do not allow for a smooth screwing down of the base jacks.
The frame supports can be dismantled after the formwork and the timber and/or steel beams have been removed from the top of the lowered towers.
Should there be no possibility of getting the towers to an opening in the slab in order to pick them up by crane and shift them out of the building area, then the towers may be dismantled in their positions.
This dismantling in upright normally starts with removing the head jacks and then by taking away one component after another. The individual components can then be transported in packages to the next site of use or the storage area again.

Erection

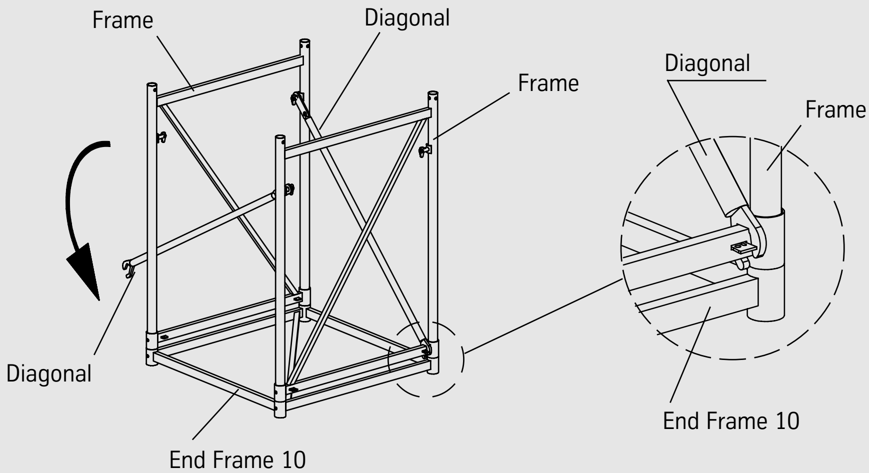
1. Lay End Frame 10 on the floor-possibly on even assembly ground as near to crane as possible.



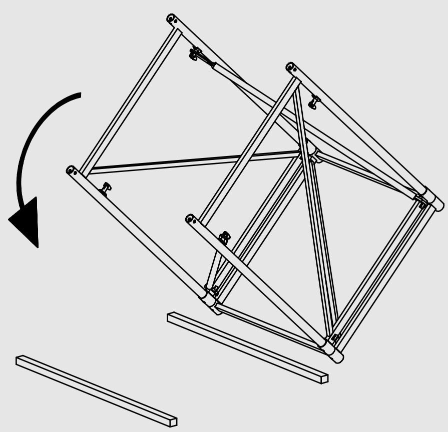
2. Stick 2 Frames onto the End Frame and look them by means of the quick-action connectors.



3. Connect the Diagonal with its lower end over the horizontal member of the frame.



4. Turn the partly assembled unit on its side for progressing assembly.

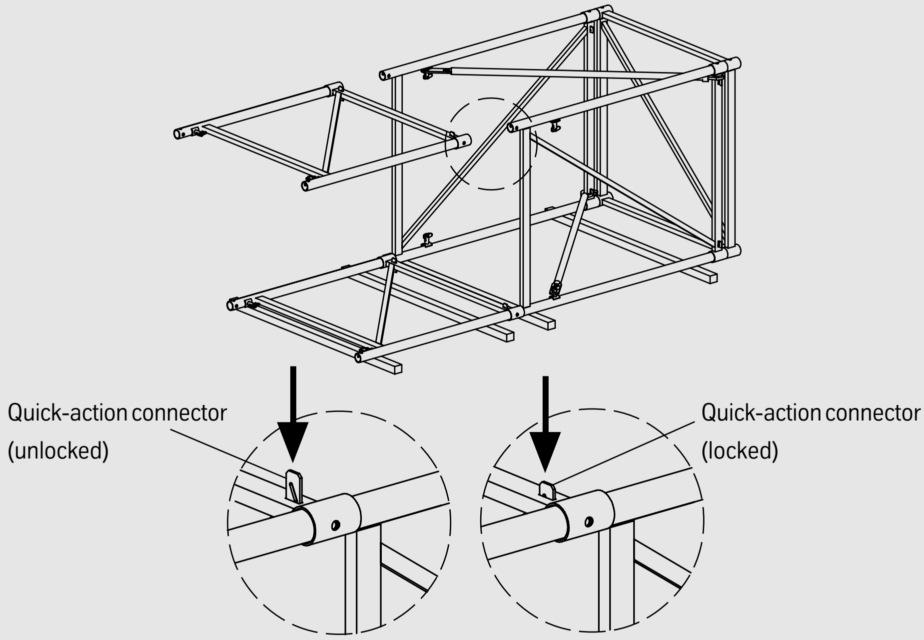


8.0 Erection and dismantling

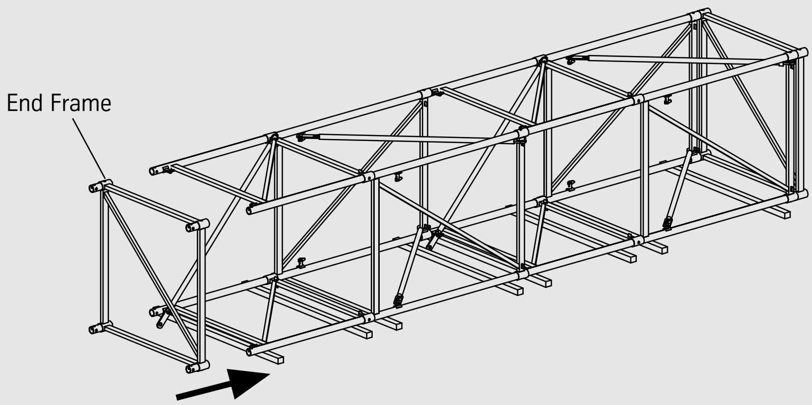
Erection

5. Stick further frames on and lock them with the quick-action connectors.

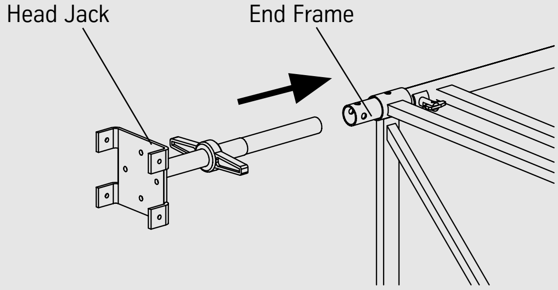
> **Import note:**
> When lifting towers by crane, make sure not to attach crane ropes or slings to the unsecured top End Frame 10 but to the horizontal members of the vertical frames directly below this. Lifting towers into upright position after assembling can be performed up to maximum heights of approximately 10 m.



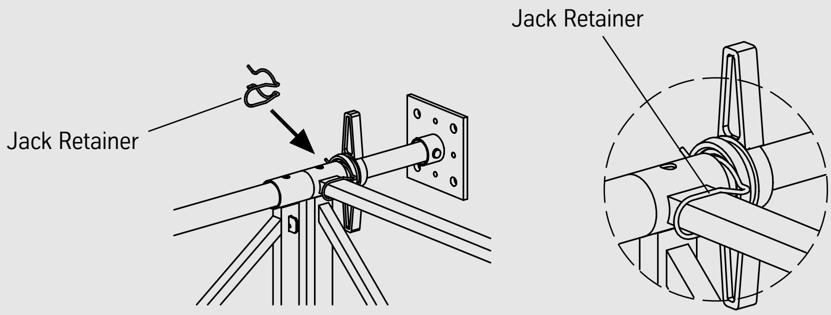
6. Attach next frames. Continue according to the before mentioned assembly procedure until the required combination height has been reached.



7. Place End Frame on the last two vertical Frames.



8. Insert Head Jacks into the End Frame.



Erection and dismantling

Assembly and disassembly have to be performed either from a mobile scaffold or from a working platform. Especially the requirements stated in the new Decree for the Reliability of Operation (dated Sept. 27, 2002) and the existing Safety Rules for Protection of Health in Falsework and Formwork Construction (UVV) must be adhered to.

Step1: Dismantling starts by lowering the Head Jacks.

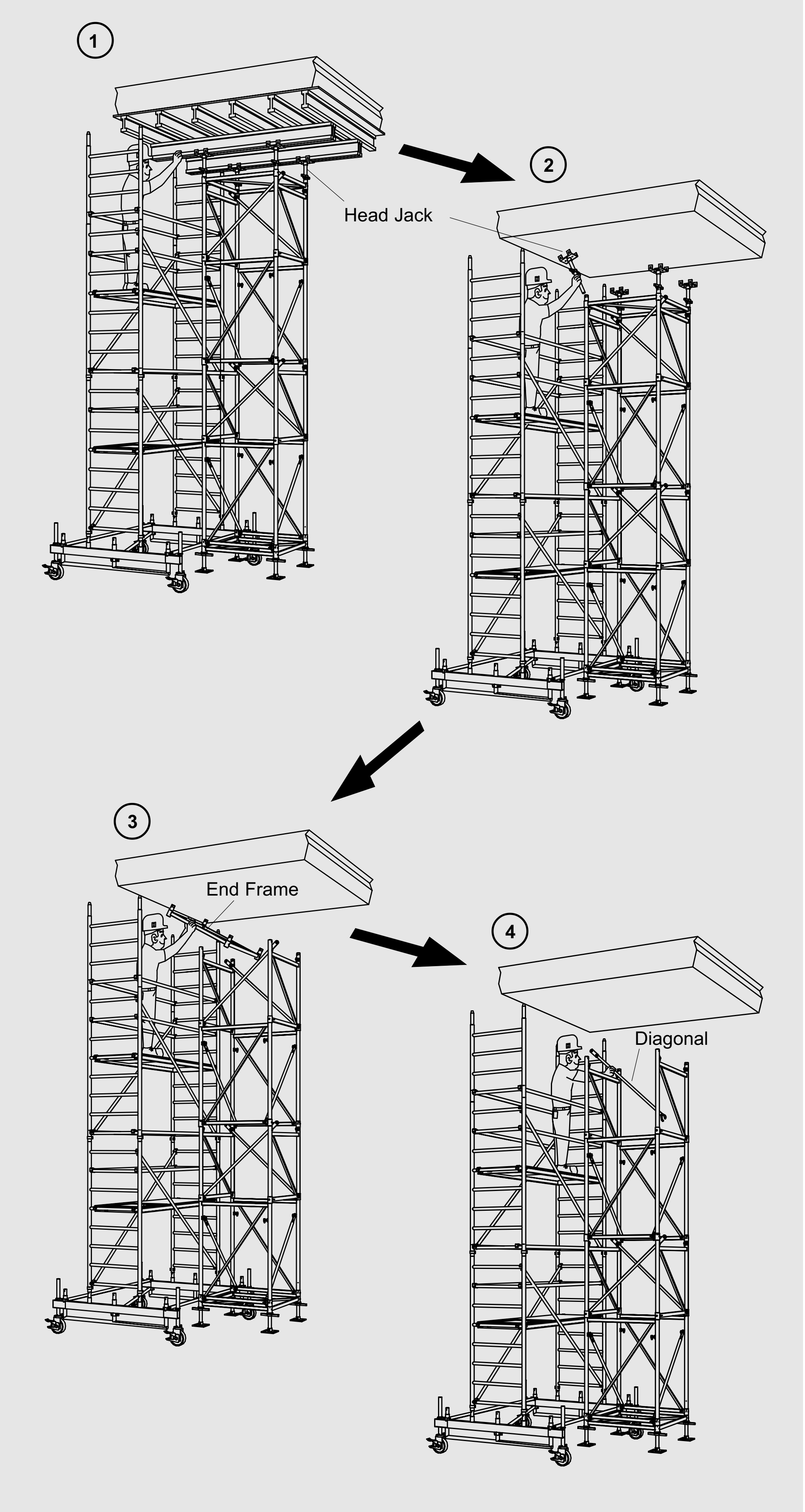
The supported slab formwork has to be striked (removed) in accordance with the relevant Instructions for Assembly and Use of the formwork system applied.

Disassembly of ...

... the Head Jacks **(Step 2)**

... the End Frame **(Step 3)**

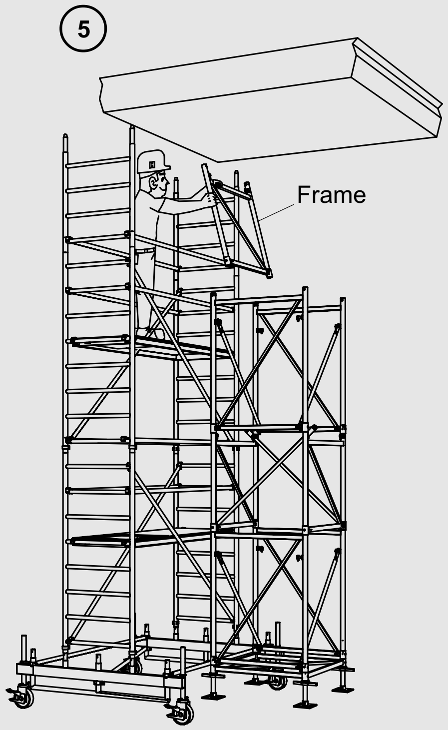
... the Diagonals **(Step 4)**.



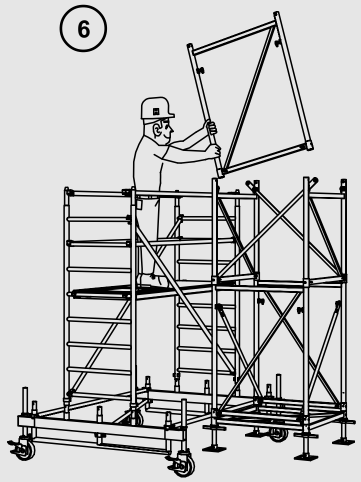
8.0 Erection and dismantling

Disassembly ...

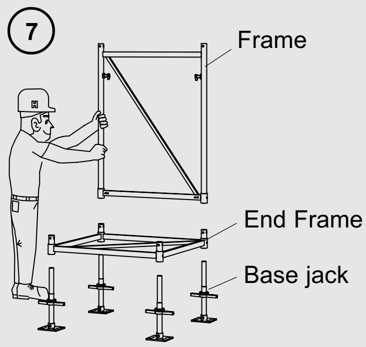
... of the Frames **(Step 5)**



The working height of the mobile scaffold has to be adapted to the required height for all operations during erection and disassembly **(Step 6).**



After removing the last two vertical Frames at the bottom, the End Frame can easily be lifted and taken away from the 4 Base Jacks **(Step 7)**.



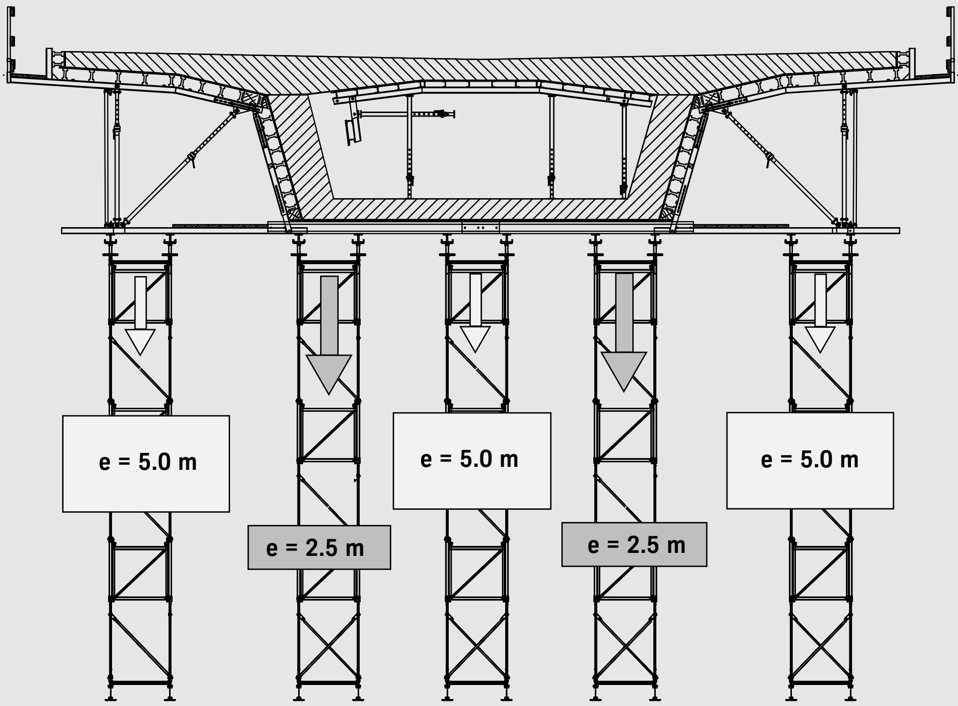
Distances in longitudinal and transverse direction of towers according to vertical loads (V) on supports as stated in the statical computation.

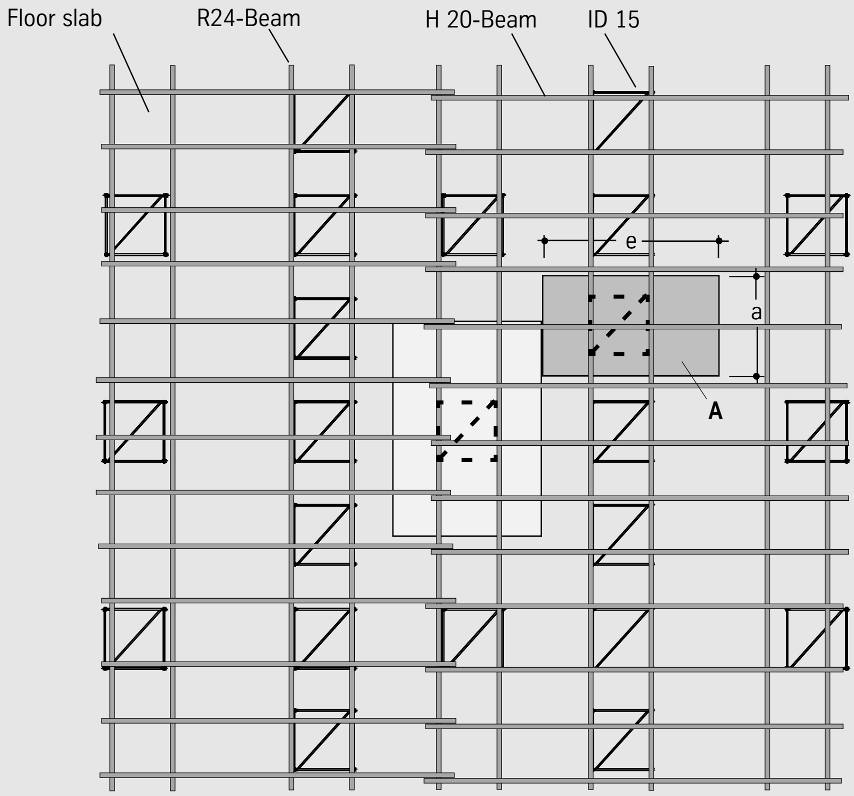
Assumptions (V-loads):
Dead load of concrete, dead load of formwork, live load.

Horizontal loads from wind pressure and V/100 require bracings between towers for reasons of stability of the falsework.
(scaffold tubes & couplers)

(**here**: arrangement of towers without bracings)

Typical application in bridge construction (example)

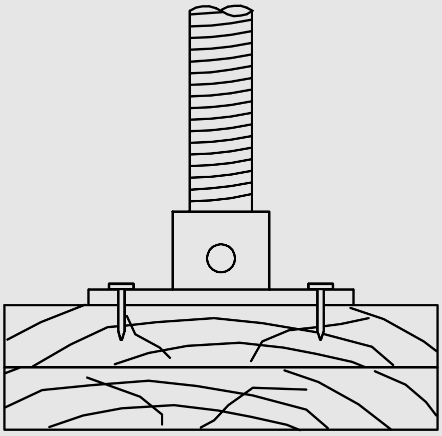




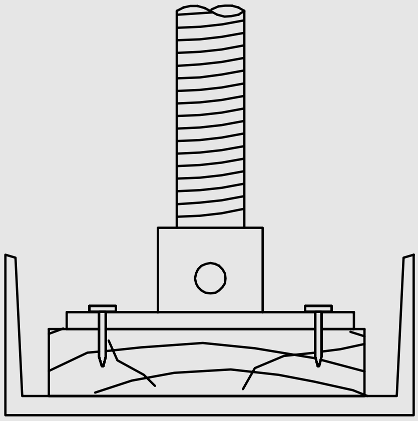
A= a · e

9.0 Application examples

Shifting variants

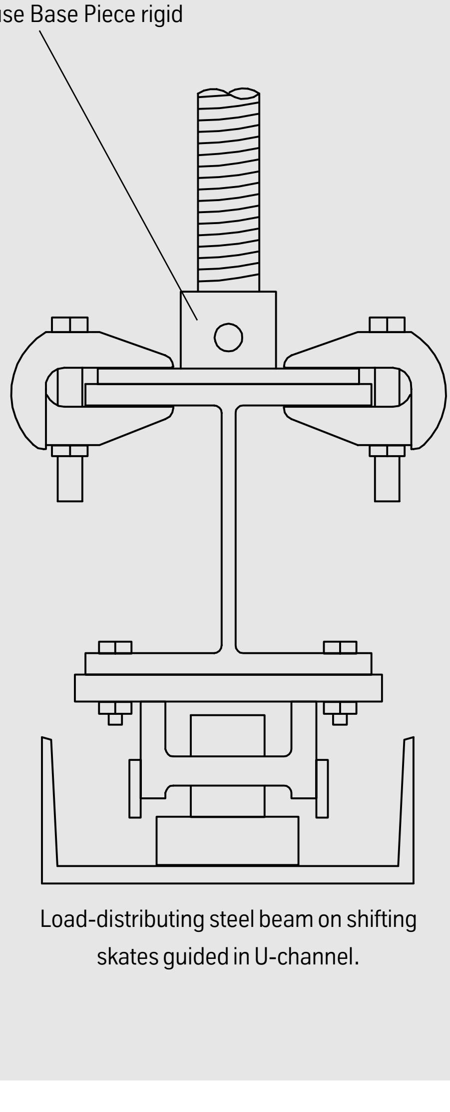


Planks



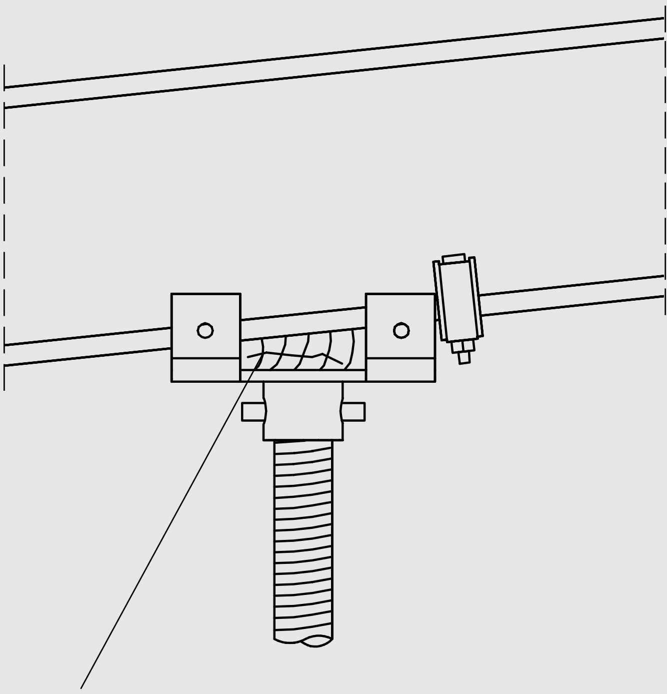
Plank guided in U-channel

if possible use Base Piece rigid



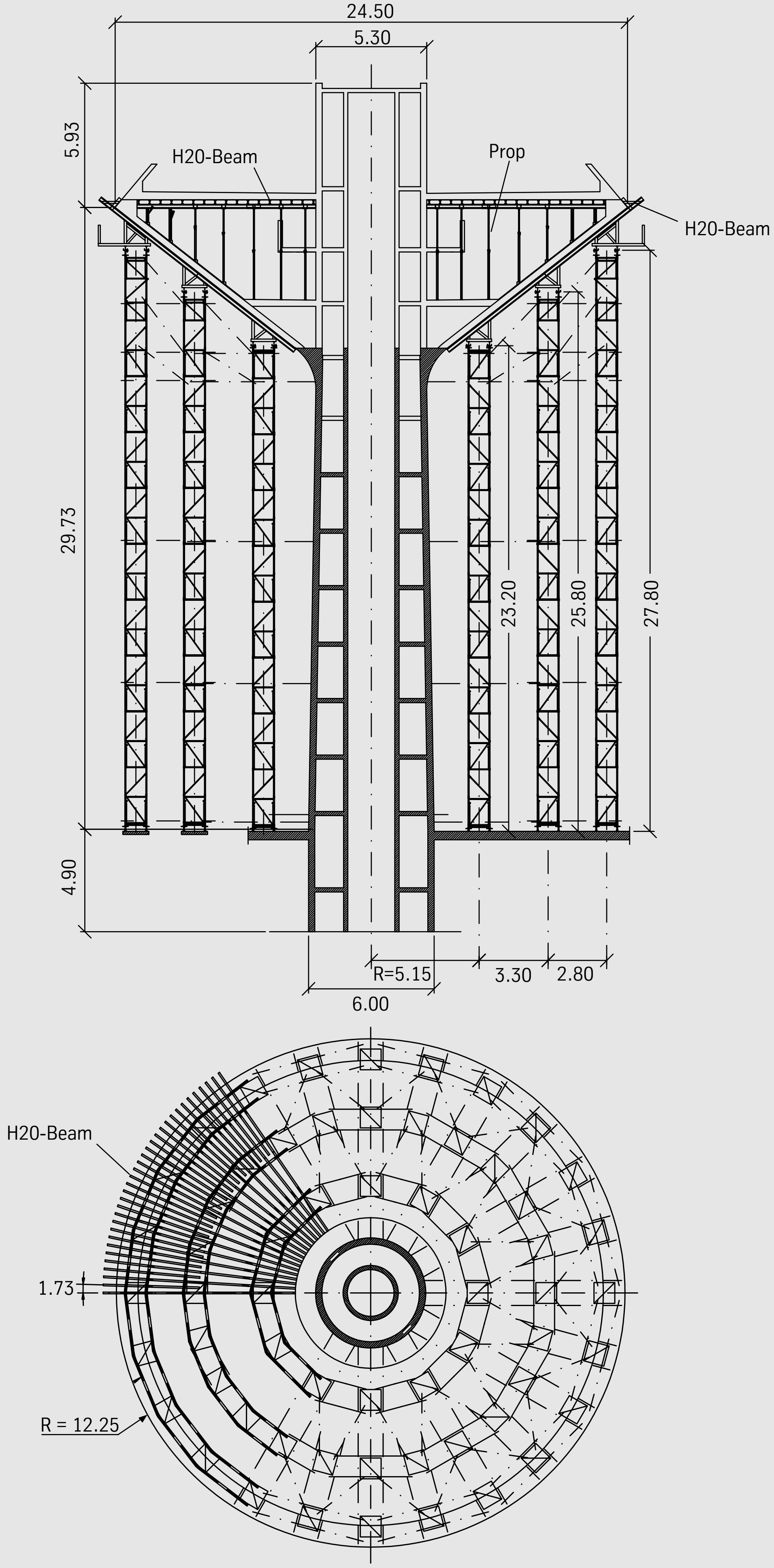
Load-distributing steel beam on shifting skates guided in U-channel.

The Head Plate adapts to slopes of up to 6%

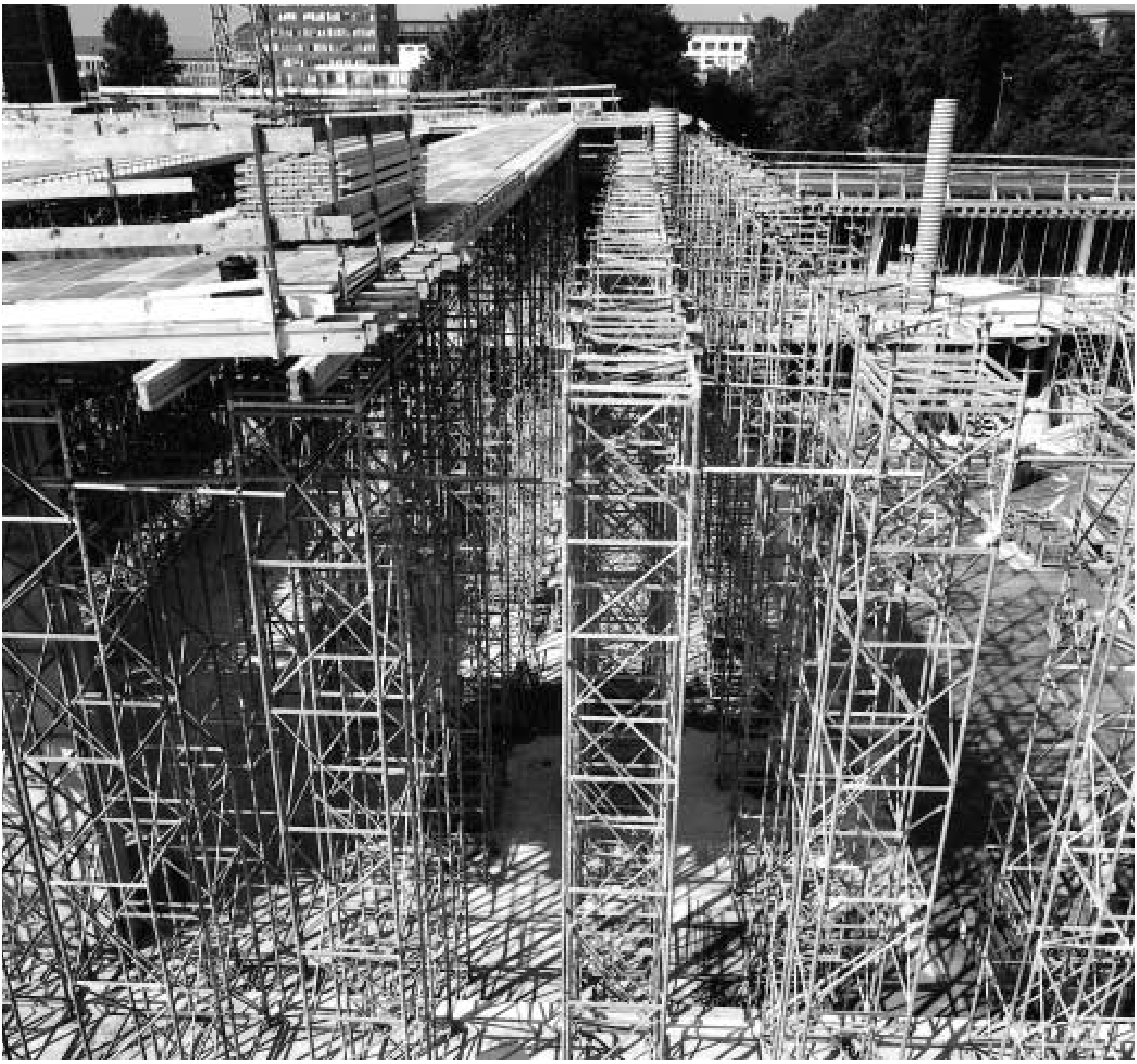


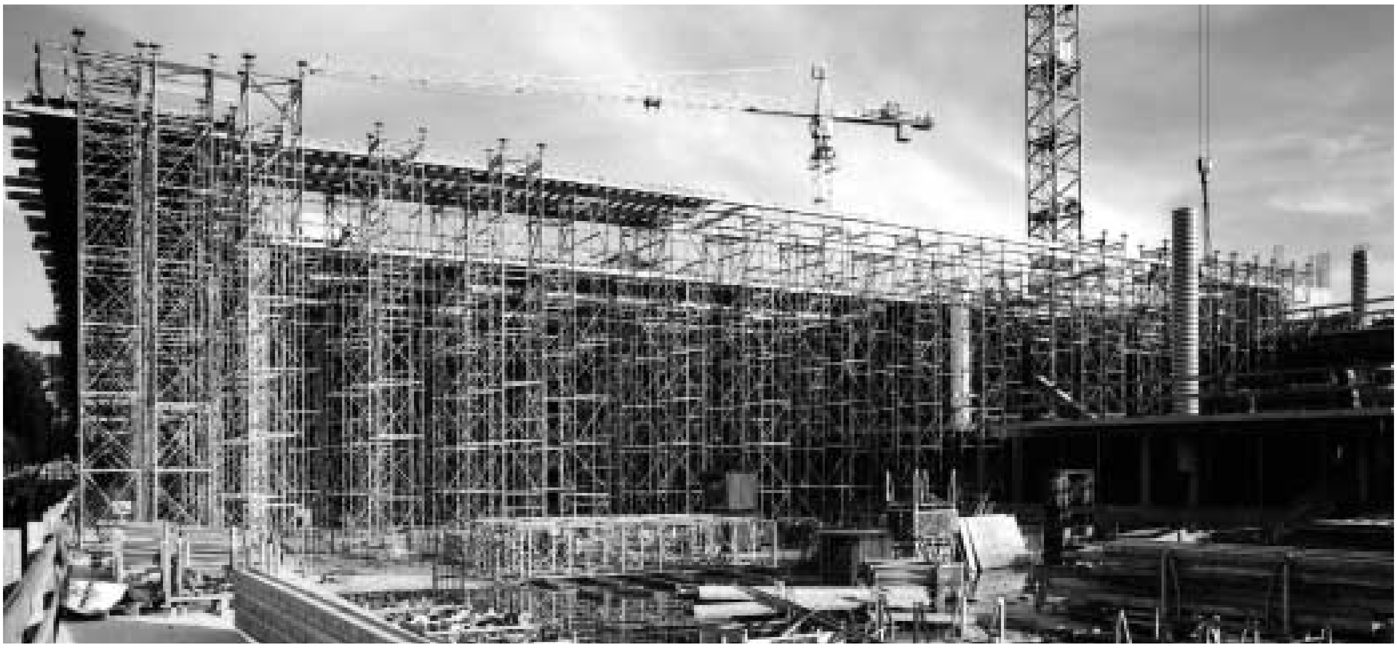
Timber wedge for compensating slope of primary beam
(e. g. timber beam or steel beam)

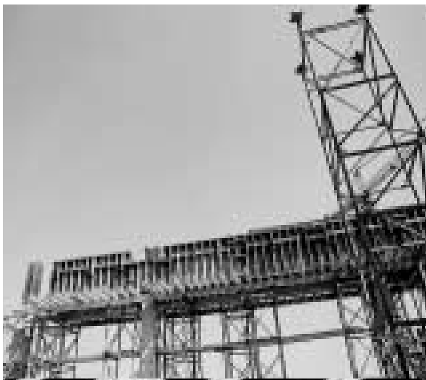
Water tower

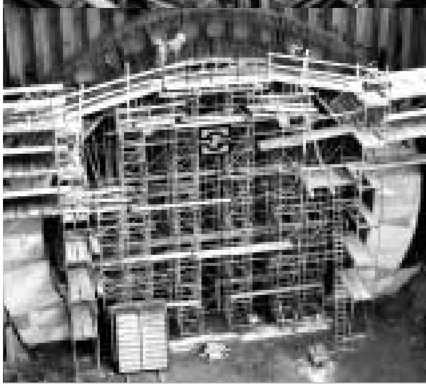

24.50
5.30
5.93
H20-Beam
Prop
H20-Beam
29.73
23.20
25.80
27.80
4.90
R=5.15
3.30
2.80
6.00
H20-Beam
1.73
R = 12.25

10.0 Construction sites









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