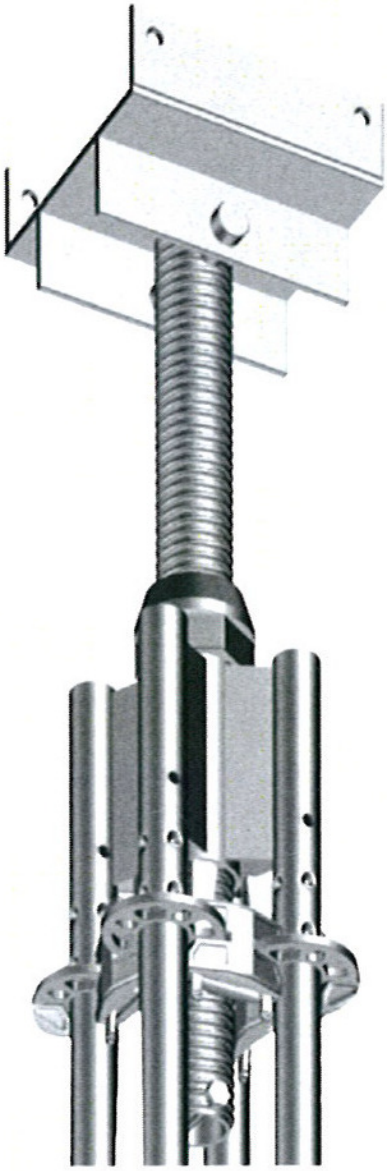
# Gebruikershandleiding
# Layher AR Zware Ondersteuning (Engels)



Deze gebruikershandleiding is opgesteld door de leverancier.

Het materieelboek BAM Materieel is leidend betreffende voorwaarden en assortiment.

# Propping

## UsingAllroundScaffolding

**Technical Brochure**

The universal system for everyday and engineered scaffolding solutions

General construction approval
Z-8.22-64

Certification according to
DIN ISO 9001/EN 29 001
by TÜV-CERT

WorkCover registered
AS/NZS 1576
Standard compliant

Allround Scaffolding®

Ingenious. Strong. Limitless.

Layher®

More Possibilities. The Scaffolding System.

***Faster. Stronger. Safer. More Profitable.***




# Introduction

**Layher's Allround scaffolding** makes an ideal propping system:

- being both a scaffolding and a propping system it is economic and versatile
- it has extremely high strength capacity values, is self supporting and is quick to install

Allround in standard configurations up to six metres in height is rated for the following permissible loadings:

- with lifts of 2.0 metres - up to **45 kN** per standard
- with lifts of 1.5 metres - up to **60 kN** per standard
- with lifts of 1.0 metres - up to **70 kN** per standard

(see Tables 3a & 3b on pages 8-9 for details)

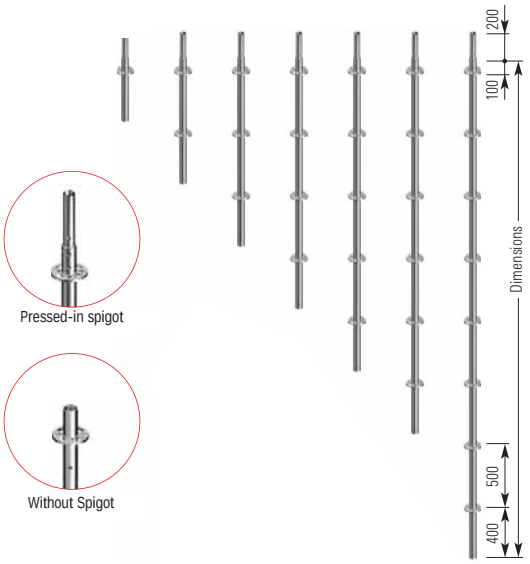
Permissible loadings can be increased considerably further by:

- using Layher's reinforced base jacks and head jacks (U-heads)
- additional bracing (ledgers and diagonals), and/or
- joining standards with our unique twin wedge couplers

For example, a single 1.09m x 1.09m heavy duty Allround tower can support loads of close to **700kN** (see example on pages 11-12) or even higher.

*Appropriate static calculations should be performed to prove the appropriate configuration of Allround components for each individual situation.*

# Required components for propping




Vertical standards

Spigot

Special Bolt

Double wedge head coupler

Base collar, extended

Base collar

Heavy duty
4 way base collar

Base plate 60

Base plate 80
reinforced

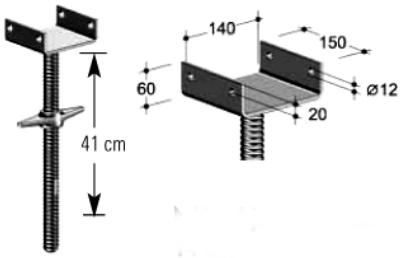
Swivelling base plate
80 reinforced

Heavy duty
base jack

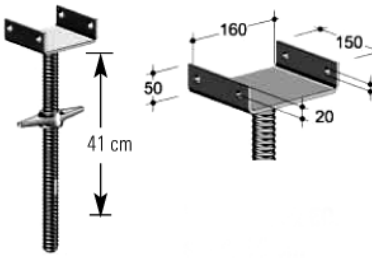
# Required components for propping

| Designation | Length | Approximate Weight (kg) | Reference Number |
|---|---|---|---|
| **Vertical standard with pressed-in spigot,** steel | 0.5 | 2.9 | 5603.050 |
| | 1.0 | 5.5 | 2603.100 |
| | 1.5 | 7.8 | 2603.150 |
| | 2.0 | 10.2 | 2603.200 |
| | 2.5 | 12.2 | 2603.250 |
| | 3.0 | 14.6 | 2603.300 |
| | 4.0 | 19.1 | 2603.400 |
| **Vertical standard without spigot,** steel for accommodating head jacks (U-heads) and for spigot Reference no. 2605.000 for suspended scaffolding | 0.5 | 2.5 | 2604.050 |
| | 1.0 | 4.5 | 2604.100 |
| | 1.5 | 6.8 | 2604.150 |
| | 2.0 | 9.0 | 2604.200 |
| | 2.5 | 11.7 | 2604.250 |
| | 3.0 | 13.7 | 2604.300 |
| | 4.0 | 18.4 | 2604.400 |
| **Double wedge head coupler,** steel F= 4.0kN working load (for other loads as per connector approval) | | 1.6 | 2628.000 |
| **Base collar,** steel | 0.24 | 1.6 | 2602.000 |
| **Base collar, extended,** steel | 0.43 | 2.7 | 2660.000 |
| **Heavy duty 4 way base collar,** steel | 0.21 | 14.0 | 0709.691 |
| **Base plate 60,** hollow (max. spindle travel 41cm) | 0.6 | 3.6 | 4001.060 |
| **Base plate 60,** solid (max. spindle travel 41cm) | 0.6 | 6.7 | 5602.060 |
| **Base plate 80, reinforced** (max. spindle travel 55cm) | 0.8 | 4.9 | 4002.080 |
| **Swivelling base plate, 60, reinforced** (max. spindle travel 41cm) | 0.6 | 6.1 | 4003.000 |
| **Heavy duty base jack,** steel (max. spindle travel 25cm) | 0.67 | 25.0 | 0710.182 |
| **Special bolt M 12 x 60,** with nut | | 0.08 | 4905.060 |
| **Spigot,** for 2604 | 0.52 | 1.6 | 2605.000 |

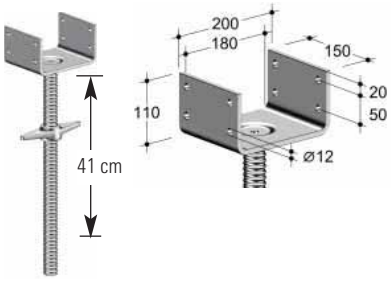
# Required components for propping




**Head jack 60, solid 14cm**

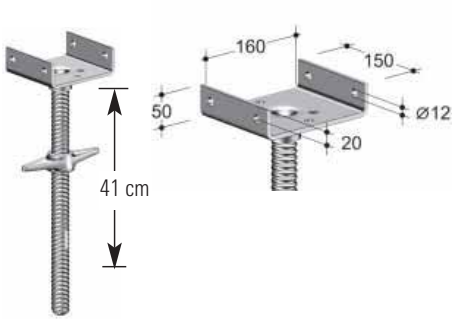



**Head jack 60, solid 16cm**

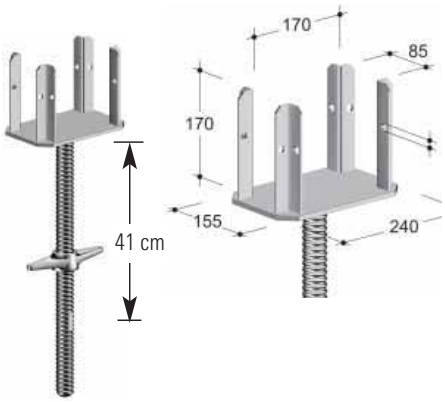



**Head jack 60, solid 18cm**

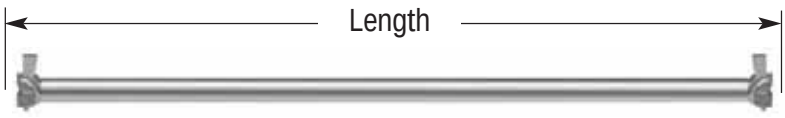
**Heavy duty fork head**



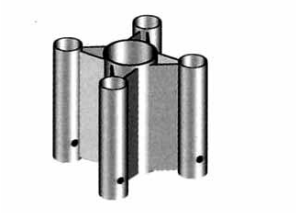

**Swivelling head jack 60, solid**



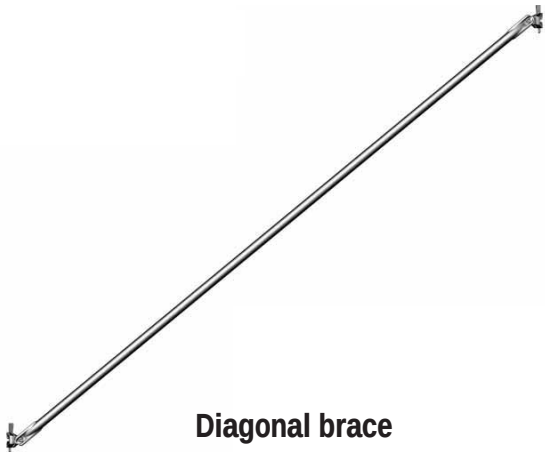

**Crosshead spindle 60, solid**




**Ledger**



**Heavy duty 4 way head collar**



**Diagonal brace**

# Required components for propping

| Designation | Length | Approximate Weight (kg) | Reference Number |
|---|---|---|---|
| **Head jack 60, solid, 14cm** (max. spindle travel 41cm), effective width of fork 14cm | 0.6 | 7.4 | 5313.060 |
| **Head jack 60, solid, 16cm** (max. spindle travel 41cm), effective width of fork 16cm | 0.6 | 7.5 | 5314.060 |
| **Head jack 60 massive, 18cm** (max. spindle travel 40cm), effective width of fork 18cm | 0.6 | 7.6 | 5316.060 |
| **Heavy duty fork head,** steel (max. spindle travel 25cm), effective width of fork 30cm | 0.76 | 28.8 | 0710.183 |
| **Heavy duty 4 way head collar,** steel | 0.21 | 8.3 | 0709.679 |
| **Swivelling head jack 60, solid** (max. spindle travel 41cm), effective width of fork 16cm | 0.6 | 8.2 | 5312.000 |
| **Crosshead spindle 60, solid** (max. spindle travel 41cm), opening dimensions 18.5 / 17cm | 0.6 | 7.9 | 5315.060 |
| **Ledger,** steel<br>The 0.39m ledger is used on the 0.39m bracket for fall protection. The 1.04m ledger corresponds to half the 2.07m bay. The 1.29m ledger corresponds to half the 2.57m bay. | 0.39<br>0.73<br>1.04<br>1.09<br>1.29<br>1.40<br>1.57<br>2.07<br>2.57<br>3.07<br>4.14 | 2.1<br>3.4<br>4.4<br>4.6<br>5.3<br>5.8<br>6.3<br>8.2<br>10.0<br>12.0<br>15.1 | 2607.039<br>2607.073<br>2607.103<br>2607.109<br>2607.129<br>2607.140<br>2607.157<br>2607.207<br>2607.257<br>2607.307<br>2607.414 |
| **Diagonal brace,** steel | | | |
| For 0.73 m bay length, 2.0 m bay height | 2.12 | 7.3 | 2620.073 |
| For 1.09 m bay length, 2.0 m bay height | 2.25 | 7.7 | 2620.109 |
| For 1.40 m bay length, 2.0 m bay height | 2.40 | 8.1 | 2620.140 |
| For 1.57 m bay length, 2.0 m bay height | 2.49 | 8.4 | 2620.157 |
| For 2.07 m bay length, 2.0 m bay height | 2.81 | 9.2 | 2620.207 |
| For 2.57 m bay length, 2.0 m bay height | 3.18 | 10.3 | 2620.257 |
| For 3.07 m bay length, 2.0 m bay height | 3.58 | 11.4 | 2620.307 |
| For 4.14 m bay length, 2.0 m bay height | 4.51 | 14.0 | 2620.414 |
| For 1.57 m bay length, 0.5 m bay height | 1.52 | 5.7 | 5606.050 |
| For 1.57 m bay length, 1.0 m bay height | 1.57 | 6.3 | 5606.100 |
| For 1.57 m bay length, 1.5 m bay height | 2.09 | 7.3 | 5606.150 |
| For 2.07 m bay length, 0.5 m bay height | 2.036 | 7.2 | 5609.050 |
| For 2.07 m bay length, 1.0 m bay height | 2.20 | 7.4 | 5609.100 |
| For 2.07 m bay length, 1.5 m bay height | 2.479 | 8.2 | 5609.150 |
| For 2.57 m bay length, 0.5 m bay height | 2.49 | 8.4 | 5607.050 |
| For 2.57 m bay length, 1.0 m bay height | 2.64 | 8.8 | 5607.100 |
| For 2.57 m bay length, 1.5 m bay height | 2.87 | 9.5 | 5607.150 |
| For 3.07 m bay length, 0.5 m bay height | 3.00 | 9.6 | 5610.050 |
| For 3.07 m bay length, 1.0 m bay height | 3.13 | 9.9 | 5610.100 |
| For 3.07 m bay length, 1.5 m bay height | 3.32 | 10.4 | 5610.150 |

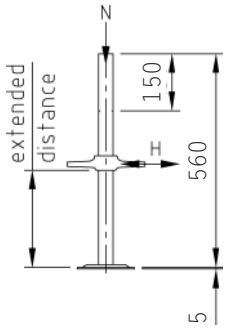
# Loading on base plates

**Tables 1a-d and 2a-b** show the allowable loading for the Layher base plates and U-head jacks for different horizontal loadings (%) and extended heights. Intermediate values can be linearly interpolated. The loadings apply to centrically loaded base jacks and U-head jacks with a vertical load eccentricity of up to 5mm off centre (exception: if the swivelling head jack 60 solid is used the load can be applied centrically). In the case of single beams, the bracket head must be rotated (see Figure 9, page 16) or packing should be inserted at left and right (see Figure. 1, page 7). In the case of support structures for heights up to 6.50m, a horizontal load of 2% applies. For higher support structures this is 3%.

## TABLE 1a

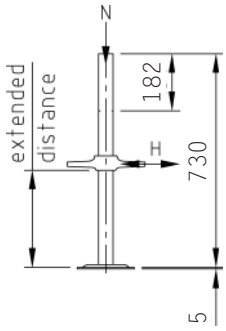
| Load-bearing capacity of base plate 60 [kN] (Ref No: 4001.060) | | | | |
|---|---|---|---|---|
| Horizontal load | Extended distance [mm] | | | |
| | 100 | 200 | 300 | 370* |
| 0% | 62.2 | 59.0 | 53.9 | 48.2 |
| 1% | 59.5 | 54.0 | 47.0 | 41.0 |
| 2% | 54.7 | 46.3 | 37.8 | 32.2 |
| 3% | 50.6 | 40.5 | 31.8 | 26.6 |
| 4% | 46.9 | 35.9 | 27.3 | 22.7 |
| 5% | 43.7 | 32.1 | 23.9 | 19.8 |

* 370mm = maximum possible spindle extension



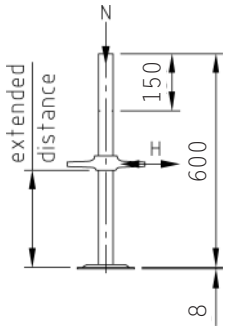

## b

| Load-bearing capacity of base plate 80 reinforced [kN] (Ref No: 4002.080) | | | | | |
|---|---|---|---|---|---|
| Horizontal load | Extended distance [mm] | | | | |
| | 100 | 200 | 300 | 400 | 500 |
| 0% | 76.0 | 71.8 | 64.8 | 53.1 | 40.0 |
| 1% | 72.5 | 65.2 | 56.0 | 44.7 | 34.2 |
| 2% | 66.2 | 55.4 | 44.6 | 34.7 | 26.8 |
| 3% | 60.9 | 48.0 | 37.1 | 28.6 | 22.2 |
| 4% | 56.3 | 42.2 | 31.8 | 24.2 | 18.8 |
| 5% | 52.2 | 37.7 | 27.7 | 20.9 | 16.4 |



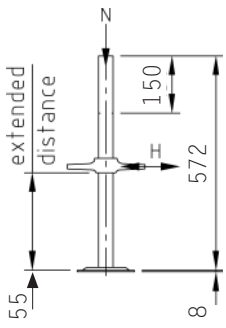

## c

| Load-bearing capacity of base plate 60 solid [kN] (Ref No: 5602.060) | | | | |
|---|---|---|---|---|
| Horizontal load | Extended distance [mm] | | | |
| | 100 | 200 | 300 | 400 |
| 0% | 178.1 | 160.9 | 129.4 | 91.4 |
| 1% | 166.2 | 140.1 | 107.6 | 77.1 |
| 2% | 146.3 | 112.1 | 82.0 | 59.5 |
| 3% | 130.5 | 93.3 | 66.5 | 48.5 |
| 4% | 117.4 | 76.9 | 55.8 | 40.9 |
| 5% | 106.2 | 69.4 | 48.1 | 35.2 |




## d

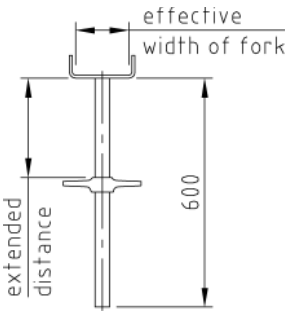
| Load-bearing capacity of swivelling base plate [kN] (Ref No: 4003.000) | | | | | |
|---|---|---|---|---|---|
| Horizontal load | Extended distance [mm] | | | | |
| | 50 | 100 | 200 | 300 | 340 |
| 0.5% | 44.5 | 44.5 | 44.5 | 44.5 | 44.5 |
| 1% | 44.3 | 44.3 | 44.3 | 44.3 | 34.2 |
| 2% | 44.1 | 44.1 | 44.1 | 44.1 | 40.4 |
| 3% | 43.9 | 43.9 | 43.9 | 37.1 | 33.4 |
| 4% | 43.7 | 43.7 | 42.2 | 31.8 | 28.5 |
| 5% | 43.5 | 43.5 | 37.7 | 27.7 | 24.7 |



# Loading on head jacks

## TABLE 2a

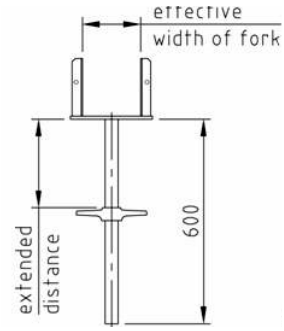
| Load-bearing capacity of head jack 60 solid [kN]* (Ref No: 5313.060 - effective width of fork = 14cm, 5314.060 - effective width of fork = 16cm, 5316.060 - effective width of fork = 18cm, 5315.060 - crosshead jack; opening dimensions 18.5 / 17cm) | | | | |
|---|---|---|---|---|
| **Horizontal load** | **Extended distance [mm]** | | | |
| | **100** | **200** | **300** | **400 **** |
| 0% | 107.9 | 93.3 | 75.6 | 59.7 |
| 1% | 103.0 | 86.3 | 68.9 | 53.9 |
| 2% | 94.3 | 74.6 | 57.9 | 45.0 |
| 3% | 86.3 | 65.7 | 49.9 | 38.4 |
| 4% | 80.0 | 58.4 | 43.7 | 33.6 |
| 5% | 74.3 | 52.5 | 38.8 | 29.8 |




* Load to 5mm eccentricity to EN 12812.2004, par. 9.3.6:
** Do not exceed the maximum allowed extended distance of 400mm!
*If there is no centring device provided the load eccentricity at the loading points must be assessed to at least 5mm. If there is a centring device the assessment concerning the size of the eccentricity can be reduced to a value corresponding to the permissible deviation.*

## b

| Load-bearing capacity of swivelling head jack 60 solid [kN]* (Ref No: 5312.000 - effective width of fork = 16cm) | | | | |
|---|---|---|---|---|
| **Horizontal load** | **Extended distance [mm]** | | | |
| | **100** | **200** | **300** | **400** |
| 0% | 178.1 | 160.9 | 129.4 | 91.4 |
| 1% | 166.2 | 140.1 | 107.6 | 77.1 |
| 2% | 146.3 | 112.1 | 82.0 | 59.5 |
| 3% | 130.5 | 93.3 | 66.5 | 48.5 |
| 4% | 117.4 | 79.6 | 55.8 | 40.9 |
| 5% | 106.2 | 69.4 | 48.1 | 35.2 |



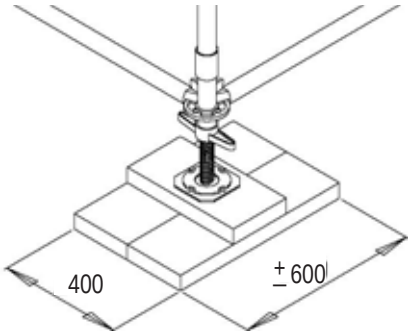

* Vertical loads can be applied centrically thanks to the articulated mounting of the top plate (no eccentricity).
*Maximum allowed spindle travel is 400mm. Note: there is no stop at the head of head jacks.*

# Packing under base jacks

**If the support** structure cannot be assembled in, for instance, an area with an existing floor or foundation beams, it is necessary to place sole boards underneath the base plates. This must be done in such a way that there is no possibility, when the formwork is rinsed clean, during the pouring and the curing of the concrete or during heavy rain, of undesired settling or subsidence occurring.

On compacted ground, packing with a minimum plan area of 0.25m$^2$ (Figure 1 below) is generally sufficient. If in doubt, soleboards or similar material need to be laid on the ground.

**Figure 1**
**Placing sole boards under base plates**



# Diagonal bracing configurations and allowable standard loadings

**For the Allround** system to be able to accommodate the horizontal stabilisation forces, it is essential that diagonal bracing be installed at all times. Free-standing individual support towers (rule from experience: the maximum height of which may not exceed 4x smallest base dimension!) and start and end bays must have diagonal bracing installed.

Note that, diagonal bracing must be installed, in both directions, in (O) every, (A) every 2nd, (B) every 3rd, (C) every 4th, or (D) every 5th bay. The diagonal bracing configurations are shown in Figure 2, page 10. The combined bay size/diagonal bracing configuration determines the allowable loading for the Allround standards. A diagonal bracing configuration needs to be chosen in accordance with Tables 3a-b for each bay size in Tables 5a-c to 6a-c or for independently calculated bay sizes.

## TABLE 3a

**Permissible loading to Allround standards depending on diagonal bracing patterns**

| Bay Size [mm] | Diagonal bracing pattern (see page 10) | Permissible loadings on standards [kN] (for total standard height to 6.00m and lift height 2m) | |
|---|---|---|---|
| | | Middle standard | Exterior standard |
| 732 | A | 33.6 | 33.6 |
| | B | 30.8 | 30.8 |
| | C | 29.4 | 29.4 |
| | D | 26.8 | 26.8 |
| 1088 | A | 43.4 | 35.6 |
| | B | 38.9 | 34.4 |
| | C | 37.7 | 32.4 |
| | D | 35.8 | 30.8 |
| 1400 | A | 44.4 | 36.4 |
| | B | 42.4 | 35.2 |
| | C | 40.4 | 34.0 |
| | D | 38.5 | 32.7 |
| 1572 | A | 45.2 | 36.6 |
| | B | 43.0 | 36.1 |
| | C | 41.3 | 35.1 |
| | D | 40.1 | 34.0 |
| 2072 | A | 45.0 | 36.9 |
| | B | 43.8 | 36.6 |
| | C | 42.4 | 36.0 |
| | D | 41.5 | 35.3 |
| 2572 | A | 44.2 | 37.2 |
| | B | 43.5 | 36.7 |
| | C | 42.2 | 36.3 |
| | D | 41.5 | 35.7 |
| 3072 | A | 43.9 | 36.6 |
| | B | 43.0 | 36.6 |
| | C | 42.4 | 36.1 |
| | D | 41.9 | 35.7 |

# Diagonal bracing configurations and allowable standard loadings

If it is not possible to fix system ledgers and diagonal braces onto the top rosette of the standards or if the Allround base collar is left out, the allowable standard loading will be reduced.

If in such situations the allowable loading for the standards is exceeded, add additional diagonal bracing or reduce the bay size. In these cases, individual static calculation is required.

## TABLE 3b

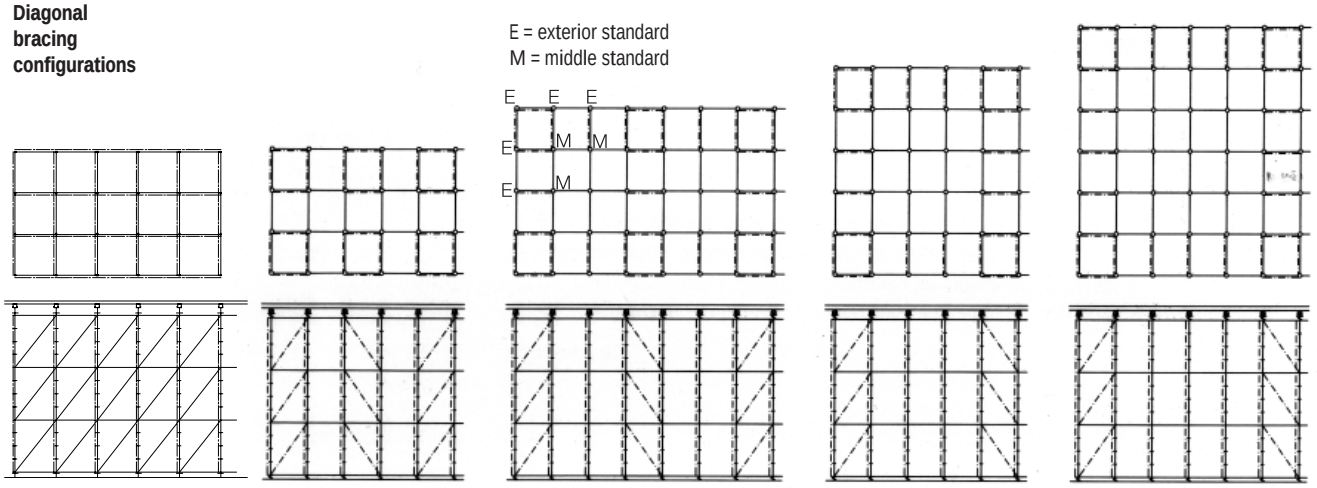
**Lift heights 1.5m and 1.0m**

| Bay size [mm] | Diagonal bracing pattern see page 10 | Permissible loadings on standards [kN] for total standard height to 6.00m | | | |
|---|---|---|---|---|---|
| | | Lift height 1.5m | | Lift height 1.0m | |
| | | Middle standard | Exterior standard | Middle standard | Exterior standard |
| 1572 | O | 60.9 | 53.0 | 73.0 | 62.8 |
| | A | 58.4 | 51.4 | 68.8 | 61.9 |
| | B | 57.1 | 49.6 | 66.8 | 60.1 |
| | C | 55.4 | 48.2 | 63.9 | 57.5 |
| | D | 53.6 | 46.6 | 61.3 | 55.2 |
| 2072 | O | 60.5 | 52.6 | 72.5 | 62.4 |
| | A | 58.7 | 51.6 | 69.7 | 62.0 |
| | B | 57.8 | 50.9 | 68.2 | 61.4 |
| | C | 56.5 | 49.7 | 66.6 | 59.9 |
| | D | 55.3 | 48.7 | 64.9 | 58.4 |
| 2572 | O | 59.8 | 52.0 | 72.1 | 62.7 |
| | A | 58.3 | 51.7 | 70.2 | 61.8 |
| | B | 57.3 | 50.5 | 68.8 | 61.2 |
| | C | 56.9 | 50.1 | 67.4 | 60.7 |
| | D | 55.9 | 49.2 | 66.6 | 59.4 |
| 3072 | O | 58.9 | 51.9 | 71.7 | 62.4 |
| | A | 57.8 | 51.4 | 69.9 | 62.2 |
| | B | 57.3 | 51.0 | 68.8 | 61.9 |
| | C | 56.6 | 49.8 | 67.6 | 60.9 |
| | D | 55.8 | 49.1 | 66.3 | 58.3 |

Permissible loadings on on standards can be increased further by adding additional standards, ledgers and/or diagonals. Static calculations are required for this.

# Diagonal bracing configurations and allowable standard loadings

**Figure 2**
**Diagonal bracing configurations**




**O**: diagonal bracing every bay **A**: diagonal bracing every 2nd bay **B**: diagonal bracing every 3rd bay **C**: diagonal bracing every 4th bay **D**: diagonal bracing every 5th bay

The selected diagonal bracing configuration plus diagonal bracing in the start and end bays can result in a denser pattern (or even two adjoining sections with diagonal bracing) at the end of the support structure.

In Figure 3a and 3b combinations of different diagonal bracing configurations are shown in one direction only. The above obviously applies to both directions.

**Figure 3a**
**Diagonal bracing configuration C & A**

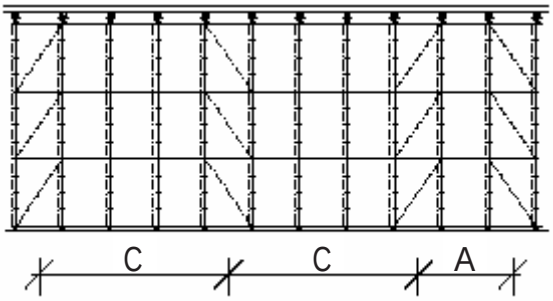
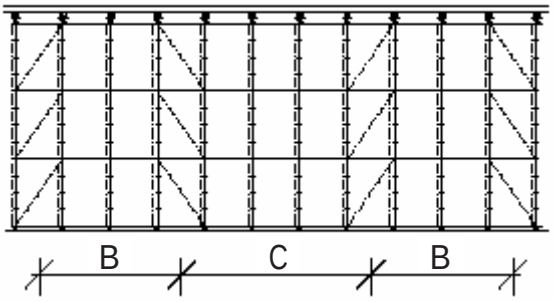



**Figure 3b**
**Diagonal bracing configuration C & B**



# Heavy duty towers and columns

**In applications where** the load-bearing capacities of traditional falsework towers are exceeded, it is possible to use the **heavy duty towers and columns** using Allround scaffolding.

Heavy duty spindles fit into specially designed heavy-duty top and bottom collars. This grouping of the standards allows a large increase in the capacity over individual standards. An extremely high load-bearing capacity is achieved by combining four Allround standards.

This support can be used in a number of arrangements with various load-bearing capacities: a heavy duty tower or a heavy duty column. These arrangements can be further expanded by using Layher Allround standard components to cater for a vast variety of irregularly shaped areas.

**Figure 4a** Heavy Duty Tower

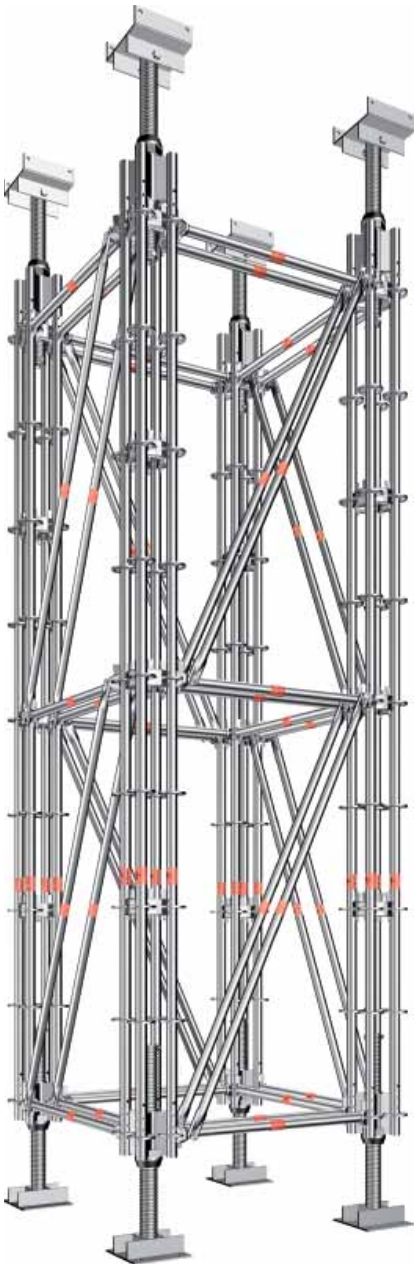
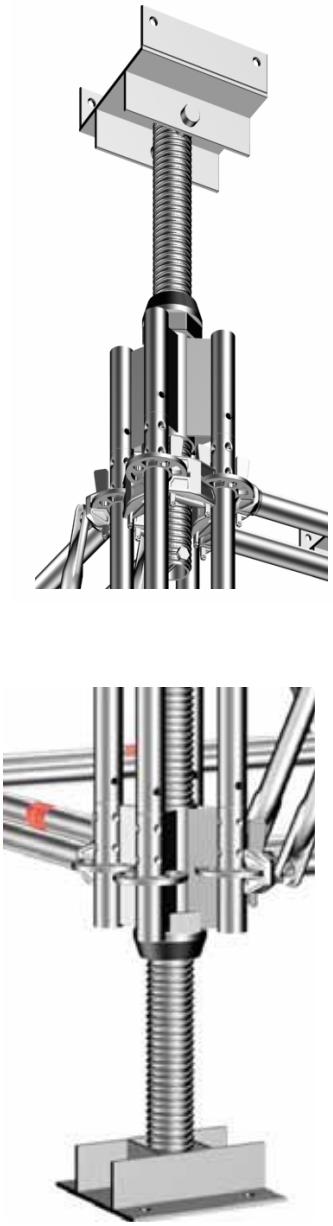


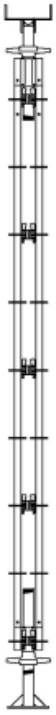
**Figure 4a** Heavy Duty Column



# Heavy duty towers and columns

## TABLE 4a

**Load bearing capacity - heavy duty column - Permissible loads for one Allround heavy duty column [kN]**



| Inclination of the column | | Vertical | | 45° | | Horizontal | |
|---|---|---|---|---|---|---|---|
| Distance between the wedge head couplers [m] | | 0.5 | 1.0 | 0.5 | 1.0 | 0.5 | 1.0 |
| Column height | 2m | 223.4 | 215.8 | 219.2 | 211.8 | 218.0 | 210.2 |
| | 3m | 212.0 | 191.0 | 205.2 | 182.4 | 203.0 | 179.4 |
| | 4m | 195.6 | 146.6 | 182.8 | 133.4 | 178.0 | 129.0 |
| | 5m | 170.0 | 212.2 | 150.2 | 102.2 | 142.0 | 95.4 |
| | 6m | 147.2 | 104.0 | 123.4 | 81.8 | 112.4 | 72.0 |
| | 7m | 133.6 | 88.2 | 100.6 | 62.4 | 89.0 | - |
| | 8m | 112.8 | 74.0 | - | - | - | - |

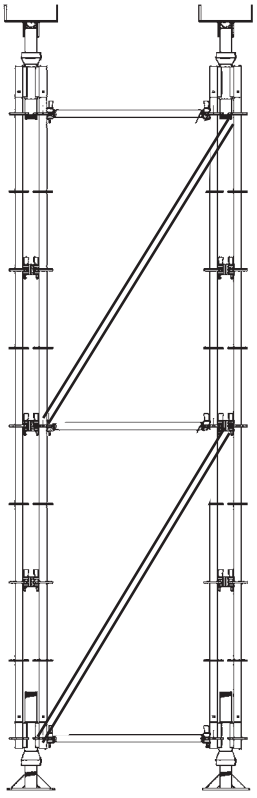
maximum extension of the top jack ≤ 250mm

maximum extension of the top jack ≤ 250mm

## TABLE 4b

**Load bearing capacity - heavy duty tower - Permissible loads [kN] for one Allround heavy duty tower 1.09 x 1.09m**

| Tower height | Anchoring on top | | Free standing | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | 0* | 1.6* | 3.2* | 4.8* | 6.4* | 8.0* | 9.6* |
| 4m | w/o wind | 632.8 | 655.2 | 641.6 | 576.0 | 494.4 | 404.4 | 301.6 | 171.2 |
| | with wind** | 632.8 | 655.2 | 641.6 | 573.6 | 490.4 | 399.2 | 292.0 | 145.6 |
| 6m | w/o wind | 667.2 | 694.4 | 646.4 | 572.8 | 492.0 | 402.4 | 301.6 | 178.4 |
| | with wind** | 667.2 | 674.4 | 596.0 | 512.0 | 424.0 | 321.6 | 192.8 | - |
| 8m | w/o wind | 672.8 | 680.8 | 642.4 | 564.8 | 482.4 | 392.8 | 292.8 | 173.6 |
| | with wind** | 672.8 | 610.4 | 523.4 | 439.2 | 340.8 | 215.2 | - | - |
| 10m | w/o wind | 687.2 | 665.6 | 629.6 | 552.2 | 496.6 | 381.6 | 280.8 | - |
| | with wind** | 641.6 | - | - | - | - | - | - | - |
| 12m | w/o wind | 687.2 | 651.2 | 615.2 | 537.6 | 456.0 | 367.2 | 267.2 | - |
| | with wind** | 572.8 | - | - | - | - | - | - | - |
| 16m | w/o wind | 677.6 | 620.0 | 580.8 | 504.8 | 421.6 | 331.2 | - | - |
| | with wind** | 440.0 | - | - | - | - | - | - | - |
| 20m | w/o wind | 669.6 | 584.8 | 535.2 | 461.6 | 367.8 | - | - | - |
| | with wind** | 304.0 | - | - | - | - | - | - | - |



* acting horizontal load on top of standard [kN]

** wind load assumed: ___

Spindle extension ≤ 250mm

# Loading on Allround standards

**The vertical load** on the Allround support structure is determined by the density of the concrete, the thickness of the floor, the weight of the formwork and the pouring load.

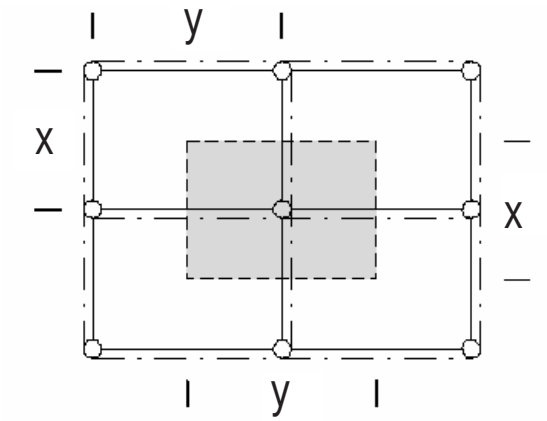
The density of the concrete, the weight of the formwork and the pouring load can vary from situation to situation. The free fall of the concrete must not be from a height greater than 1.0m and an excessive amount of weight in any one spot must be avoided.

The vertical loading (kN/m$^2$) for evenly distributed loads on the Allround support structure can be calculated as follows:

**(Concrete density x floor thickness + formwork weight + pouring load)**
**x safety factor 1.15 (EN 12812 support class Q).**

The loading on the standards can be calculated by multiplying the Allround section surface area and the load per m$^2$.
(Loading on standards = (x) x (y) x vertical loading per m$^2$).

**Figure 5**
**Loading on standards for evenly distributed load**




Where only the strength of the Allround standards need to be considered, the bay sizes and diagonal bracing configuration can be selected according to Table 3a-b, pages 8-9. However, the allowable loadings on jacks must not be exceeded.

In many situations what will determine the critical bay size is not the strength of the Allround components but the formwork or the broad slab floor. This is discussed on pages 16-19, Tables 5a-c and 6a-c. In these tables the following (mean) values are used for the calculations:

| | |
|---|---|
| Density of reinforced concrete | 25.0kN/m$^3$ |
| Weight of the formwork for the floor (cross beams, longitudinal beams, plywood sheeting) | 1.0kN/m$^2$ |
| Pouring load (free fall less than1.0m) | 1.5kN/m$^2$ |
| Maximum height of the support structure for in situ pouring | 6.5m |

These values should first be checked before using Tables 5a-c and 6a-c.

The support structures for floors that are to be poured in situ are worked out in more detail on pages 16-19, Tables 5a-c and 6a-c. Where loads are not evenly distributed, e.g. in the case of floor joists or walls that need to be poured in situ, the support structure must be calculated separately.

# Loading on Allround standards and lift height

**The lift height** is defined as the height between floors minus the thickness of the floor that is being poured. The total length of the standards of an Allround support structure is the lift height minus the height of the formwork, minus the minimum sizes of the Allround base collar and the base and U-head jacks. The minimum sizes of these last components are as follows:

| | |
|---|---|
| base jack | 45mm (not extended) |
| U-head jack | 50mm (not extended) |
| base collar | 165mm |
| | 260mm |

If the Allround base collar is not used, a measurement of 95mm can be used in the calculation instead of 260mm (however, individual static calculations for the Allround standards are required).

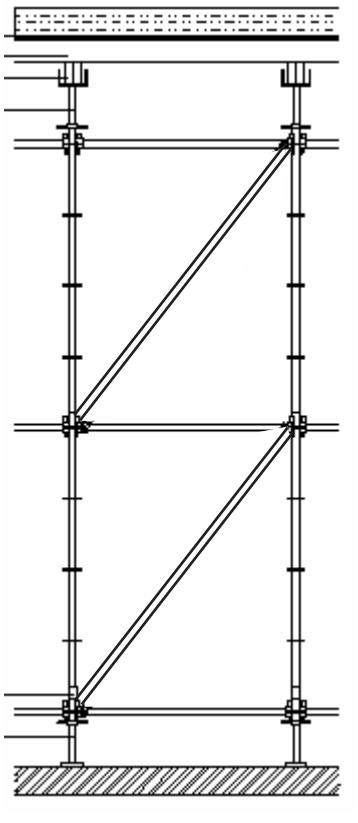
Some examples have been provided of the sum of the minimum Allround sizes and the customary formwork measurements in Figures 6 and 7. The difference between the lift height and these totals must be rounded down to the nearest 500mm. The result is the total required length of the standard.

The remaining height should generally be distributed over the base and U-head jacks. To allow for the room required to disassemble the formwork, the head jacks must always be extended by 80mm.

**Figure 6** **Required length of standard - Example 1**

Formplate 21mm
Top beam160mm
Lower beam 160mm
U-head jack 50mm
(not extended)

**Figure 6a**



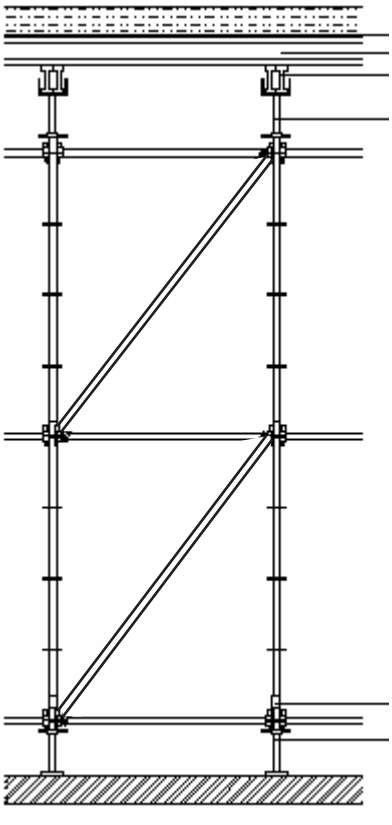
Base collar 165mm

Base jack 45mm+
(not extended)

**Total 601mm**

Formplate 21mm
H 20 beam 200mm
H 20 beam 200mm
U-head jack 50mm
(not extended)

**Figure 6b**



Base collar 165mm

Base jack 45mm+
(not extended)

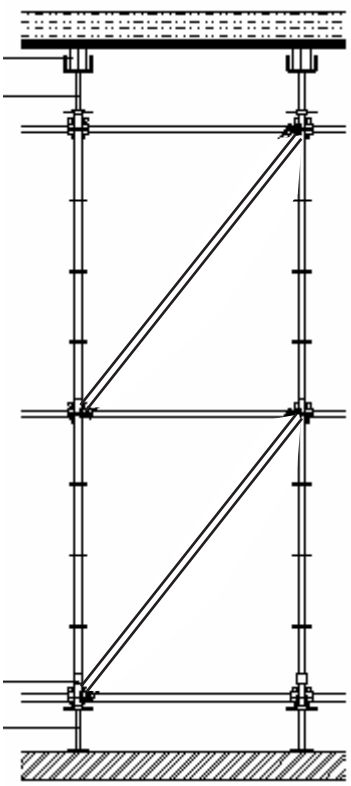
**Total 681mm**

# Loading on Allround standards and lift height

**Figure 7** **Required length of standard - Example 2**

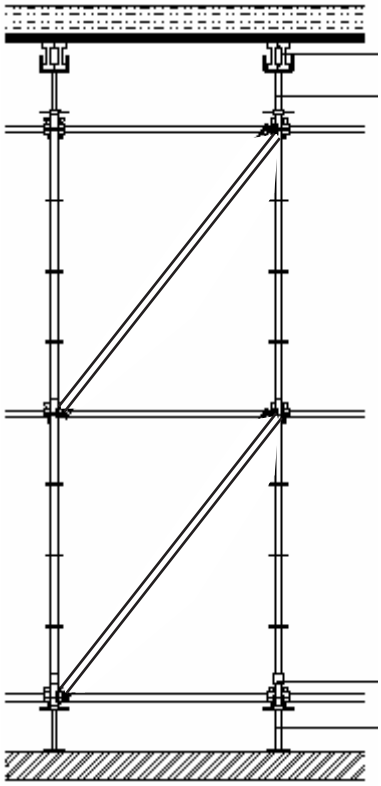
Timber beam 160mm
U-Head jack 50mm
(not extended)

**Figure 7a**



Base collar 165mm
Base jack 45mm+
(not extended)

**Total 420mm**



H 20 beam 200mm
U-head jack 50mm
(not extended)

**Figure 7b**

Base collar 165mm
Base jack 45mm+
(not extended)

**Total 460mm**

| **Calculation example:** | mm | mm |
|---|---|---|
| Height between floors | 6200 | 6000 |
| Floor thickness | -230 | -250 |
| Lift height | 5970 | 5750 |
| Formwork and minimum dimensions of Allround base collar, base and U-head jacks (Figure 6a) | -601 | -601 |
| Subtotal | 5369 | 5149 |
| Subtotal rounded down to nearest 500mm (= standard length) | 5000 | 5000 |
| Head jack extension | 189 | 80 |
| Base jack extension | 180 | 69 |

# Allround support structures for formwork

**Formwork consisting of** cross beams, longitudinal beams and plywood sheeting can be supported efficiently by standard Allround system components.

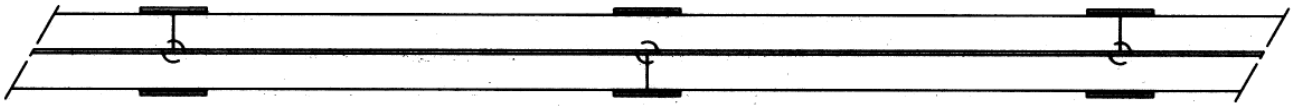
In many cases it is not the strength of the Allround components that determines the critical size of the sections, but the formwork itself. The strength of the formwork determines the amount of deflection. Base of tables 5a-c and 6a-c are these deflection limitations (which are widely used in Europe):
- permissible deflection for 'fair-faced' work e.g. exposed concrete work such as exposed concrete soffits: 1/500 of the span
- permissible deflection for 'concealed' work e.g. concrete soffits that are hidden by a ceiling: 1/333 of the span

Figure 10a opposite shows a support structure with standard Allround components and 60x160mm timber beams. The cross beams have been doubled up.

Figure 10b opposite shows a support structure with standard Allround components and I-beams (e.g. Doka H20 beams). The cross beams have been doubled up.

When the cross beams are doubled as shown, they must be laid from U-head jack to U-head jack: (see Figure 8 below).

**Figure 8** **Using double cross beams**



For a support structure with single cross beams that are I-beams, it is important to ensure that the single cross beams are in the centre of U-head. This is achieved by rotating the bracket head or by inserting packing on either side of the cross beam (see Figure 9 below).

**Figure 9** **Using single cross beams**

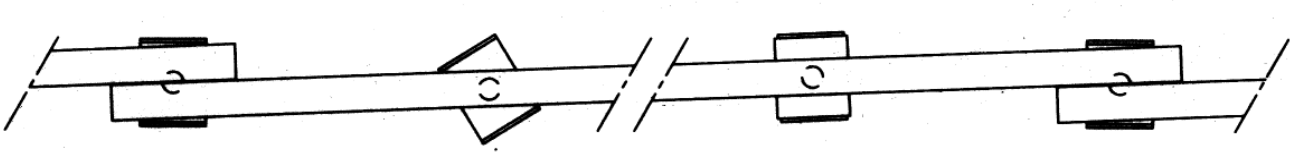


**Figure 10a (Table 5a)**

**Allround support structure with 60 x 160mm timber beams and plywood sheeting (double cross beams)**

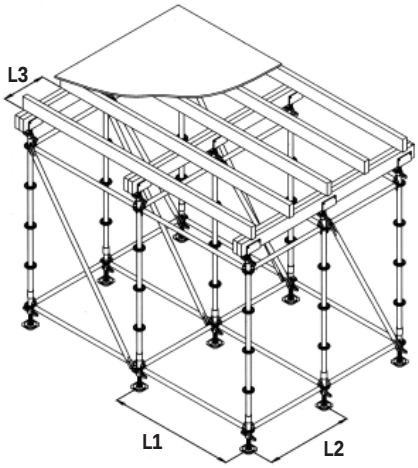
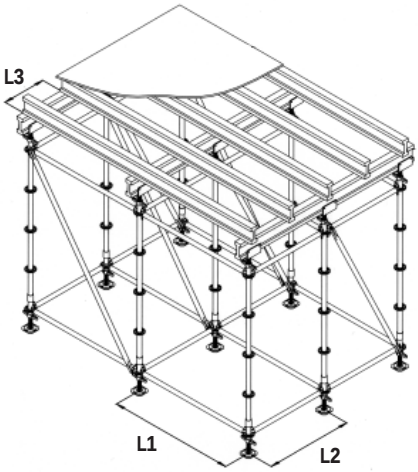



**Figure 10b (Table 5b)**

**Allround support structure with I-beams (e.g. Doka H20 beams) and plywood sheeting (double cross beams)**



# Allround support structures for formwork

## TABLE 5a Allround support structure with 60x160mm timber beams and plywood sheeting (double cross beams)

| Floor thickness [mm] | Longitudinal beam L3 spacing [mm] | | | | Bay sizes** [mm] L1 x L2 | | Loading on standards [kN] |
|---|---|---|---|---|---|---|---|
| | plywood 18mm* | | plywood 21mm* | | | | |
| | 'concealed work' | 'fair-face work' | 'concealed work' | 'fair-face work' | | | |
| ≤ 100 | 850 | 720 | 900 | 800 | 2072 | 2072 | 24.7 |
| 100-150 | 690 | 600 | 800 | 700 | 2072 | 2072 | 30.9 |
| 150-220 | 650 | 550 | 740 | 630 | 1572 | 2072 | 30.0 |
| 150-220 | 450 | 450 | 450 | 450 | 2572 | 1572 | 37.2 |
| 220-260 | 400 | 400 | 400 | 400 | 2572 | 1400 | 37.3 |
| 260-310 | 530 | 530 | 530 | 530 | 2072 | 1572 | 38.4 |
| 310-360 | 480 | 480 | 480 | 480 | 2072 | 1400 | 38.4 |
| 360-440 | 540 | 440 | 580 | 510 | 1572 | 1572 | 38.4 |
| 440-500 | 480 | 420 | 550 | 480 | 1572 | 1400 | 38.0 |
| 500-540 | 470 | 420 | 540 | 470 | 1400 | 1572 | 40.5 |
| 540-630 | 450 | 380 | 520 | 440 | 1400 | 1400 | 41.1 |
| 630-840 | 400 | 350 | 460 | 360 | 1400 | 1088 | 41.2 |
| 840-1170 | 360 | 320 | 420 | 360 | 1088 | 1088 | 42.9 |
| 1170-1400 | 340 | 300 | 390 | 340 | 732 | 1088 | 34.3 *** |

* These values may vary according to the timber used. Consult your timber supplier.
** For each floor thickness the bay size for a larger floor thickness may be used.
*** 34.3kN represents a 2% higher load than stated in Table 9a for bay size 732 @ bracing pattern A. This exceeding by 2% is acceptable.

## TABLE 5b Allround support structure with I-beams and plywood sheeting (double cross beams)

| Floor thickness [mm] | Longitudinal beam L3 spacing [mm] | | | | Bay sizes** [mm] L1 x L2 | | Loading on standards [kN] |
|---|---|---|---|---|---|---|---|
| | plywood 18mm* | | plywood 21mm* | | | | |
| | 'concealed work' | 'fair-face work' | 'concealed work' | 'fair-face work' | | | |
| ≤ 140 | 710 | 620 | 800 | 720 | 2572 | 2072 | 36.8 |
| 140-210 | 650 | 560 | 750 | 650 | 2072 | 2072 | 38.3 |
| 210-220 | 650 | 550 | 740 | 640 | 2572 | 1572 | 37.2 |
| 220-260 | 580 | 520 | 670 | 590 | 2572 | 1400 | 37.3 |
| 260-310 | 560 | 480 | 650 | 570 | 2072 | 1572 | 38.4 |
| 310-360 | 530 | 460 | 610 | 530 | 2072 | 1400 | 38.4 |
| 360-470 | 490 | 430 | 570 | 490 | 1572 | 1572 | 40.5 |
| 470-540 | 470 | 420 | 540 | 490 | 1572 | 1400 | 40.5 |
| 540-630 | 450 | 380 | 520 | 440 | 1400 | 1400 | 41.1 |
| 630-840 | 400 | 350 | 460 | 400 | 1400 | 1088 | 41.2 |
| 840-1170 | 360 | 320 | 420 | 360 | 1088 | 1088 | 43.2 |

* These values may vary according to the timber used. Consult your timber supplier.
** For each floor thickness the bay size for a larger floor thickness may be used.

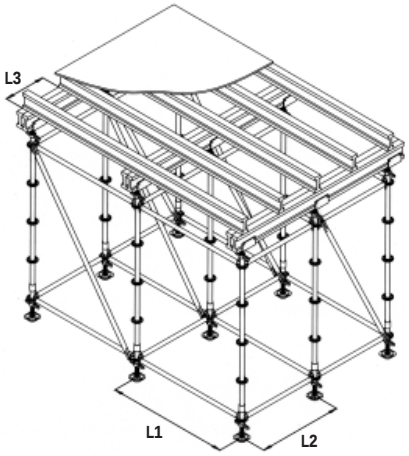
# Allround support structures for formwork

## TABLE 5c Allround support structure with I-beams and plywood sheeting (single cross beams)

| Floor thickness [mm] ≤ | Longitudinal beam L3 spacing [mm] | | | | Bay sizes** [mm] | | Loading on standards [kN] |
|---|---|---|---|---|---|---|---|
| | plywood 18mm* | | plywood 21mm* | | | | |
| | 'concealed work' | 'fair-face work' | 'concealed work' | 'fair-face work' | L1 | x L2 | |
| 100 | 850 | 720 | 900 | 800 | 2572 | 2072 | 24.7 |
| 100-150 | 690 | 600 | 800 | 700 | 2072 | 2072 | 30.9 |
| 100-150 | 690 | 600 | 800 | 700 | 2572 | 1572 | 29.1 |
| 150-180 | 680 | 580 | 770 | 670 | 2572 | 1400 | 29.0 |
| 180-220 | 650 | 550 | 740 | 630 | 2072 | 1572 | 30.0 |
| 220-250 | 640 | 540 | 730 | 620 | 2072 | 1400 | 29.2 |
| 250-300 | 560 | 500 | 640 | 560 | 1572 | 1572 | 28.4 |
| 300-340 | 540 | 470 | 630 | 540 | 1572 | 1400 | 27.8 |
| 340-380 | 530 | 460 | 610 | 530 | 1400 | 1400 | 27.1 |
| 380-500 | 480 | 420 | 550 | 480 | 1400 | 1088 | 26.3 |
| 500-660 | 430 | 370 | 500 | 440 | 1088 | 1088 | 25.9 |
| 660-1000 | 370 | 330 | 440 | 380 | 1088 | 732 | 25.2 |
| 1000-1540 | 330 | 280 | 380 | 330 | 732 | 732 | 25.3 |

Figure 10c (Table 5c)

**Allround support structure with H 20 beams and plywood sheeting (single cross beams)**




* These values may vary according to the timber used. Consult your timber supplier.
** For each floor thickness the bay size for a larger floor thickness may be used.

NB. The loadings on the standards in tables 5a-c and 6a-c must be checked against the load-bearing capacity of the base and U-head jacks.

# Allround support structures for wide slab flooring

**For wide slab** floors it is sufficient to have an in-line support structure of cross beams or I-beams. The Allround bay size (L1xL2) is determined by the type of wide slab floor, the materials of the in-line support structure, and the thickness of the floor that will be poured.

Figures 11a-c show Allround in-line support structures with double beams, single and double I-beams respectively.

Tables 6a-c show the Allround bay size and resulting load on the standards for different floor thicknesses. The loading on the standards should be checked against the load-bearing capacity of the base and U-head jacks (Tables 1 and 2, pages 6-7).

Double timber beams or I-beams must be laid from U-head jack to U-head jack (see Figure 8 page 16). Where single support beams are used they must bear centrically on the head jacks (see Figure 9, page 16).

# Allround support structures for wide slab flooring

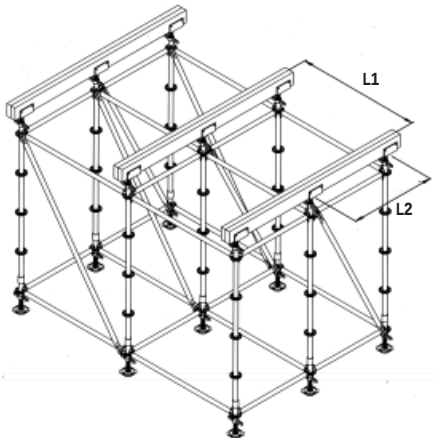
## TABLE 6a Allround in-line support structure for wide slab floors with double 60x160mm timber beams

| Floor thickness* [mm] | Bay sizes** [mm] L1 x L2 | Loading on standards [kN] |
|---|---|---|
| ≤ 220 | 1572 2072 | 26.2 |
| 220-260 | 1400 2072 | 26.7 |
| 260-360 | 1088 2072 | 27.2 |
| 360-400 | 1088 1572 | 22.6 |

* These values may vary according to the timber used. Consult your timber supplier.
** For each floor thickness the bay size for a larger floor thickness may be used.

Figure 11a (Table 6a)

Allround in-line support structure for wide slab floors with double 60 x 160mm timber beams



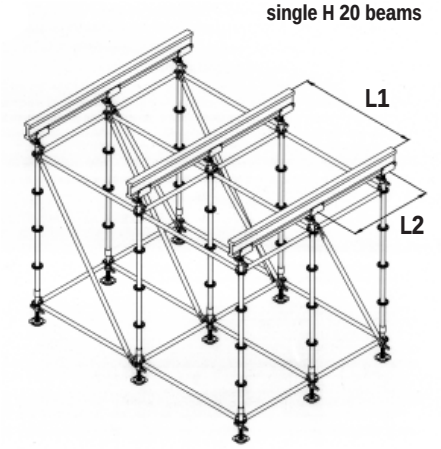

## TABLE 6b Allround in-line support structure with single I-beams

| Floor thickness* [mm] | Bay sizes* [mm] L1 x L2 | Loading on standards [kN] |
|---|---|---|
| ≤ 180 | 1572 2072 | 22.5 |
| 180-220 | 1400 2072 | 23.6 |
| 220-260 | 1572 1572 | 22.0 |
| 260-280 | 1088 2072 | 22.0 |
| 280-400 | 1088 1572 | 26.6 |

* These values may vary according to the timber used. Consult your timber supplier.
** For each floor thickness the bay size for a larger floor thickness may be used.

Figure 11b (Table 6b)

Allround in-line support structure with single H 20 beams



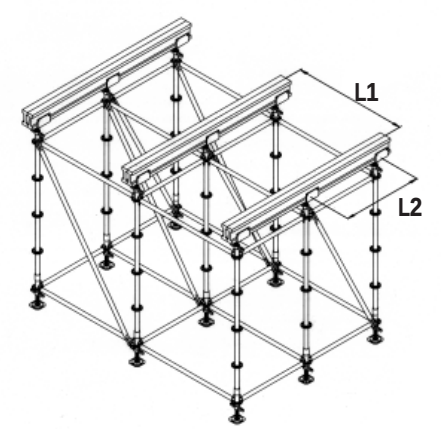

## TABLE 6c Allround in-line support structure with double I-beams

| Floor thickness* [mm] | Bay sizes** [mm] L1 x L2 | Loading on standards [kN] |
|---|---|---|
| ≤ 250 | 1572 2072 | 36.1 |
| 250-260 | 1400 2072 | 33.1 |
| 260-380 | 1088 2572 | 35.4 |
| 380-400 | 1088 2072 | 29.8 |

* These values may vary according to the timber used. Consult your timber supplier.
** For each floor thickness the bay size for a larger floor thickness may be used.

Figure 11c (Table 6c)

Allround in-line support with double H 20 beams



# Overhang for walkways and soffits

**The Layher Allround** support structures can be extended quite simply with the use of base collars or 0.50m standards and diagonal bracing.

Depending on the floor thickness and the position of the soffit, one or two diagonals for each base collar or 0.5m standard are normally sufficient for a walking platform (Figure 12a).

A walking platform should be at least 60cm wide and be fitted with toe boards and guard rails.

If longer standards and several diagonal braces are used, the Allround overhang can carry much higher loads (Figure 12b). For such overhangs static calculations are required.

**Figure 12a**

**Extending the Allround support structure with single diagonal bracing**

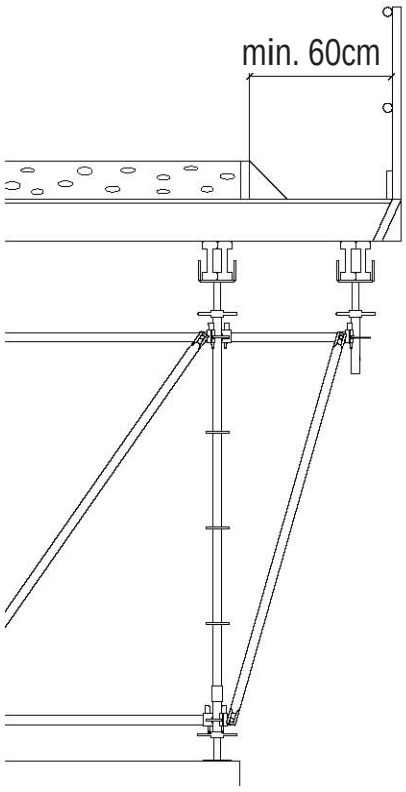
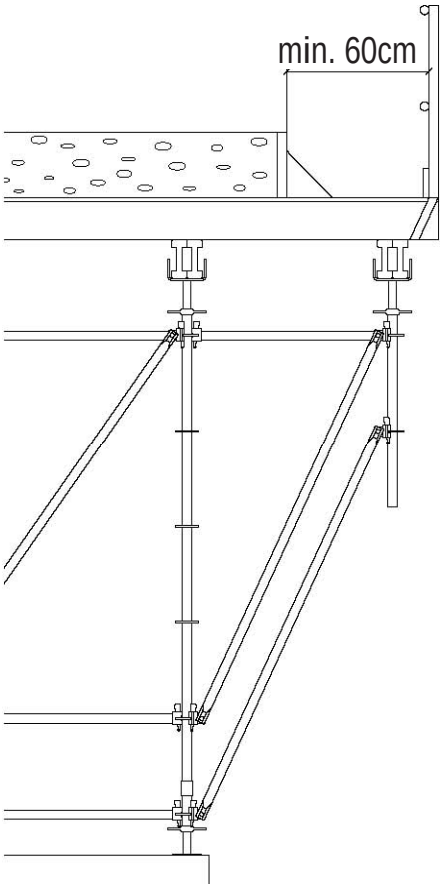



**Figure 12b**

**Extending the Allround support structure with double diagonal bracing**




0.50m standard without spigot (2604.050) or base collar (2602.000)

# Multiple support levels

**After initial set** a poured concrete floor takes time to reach its maximum strength.

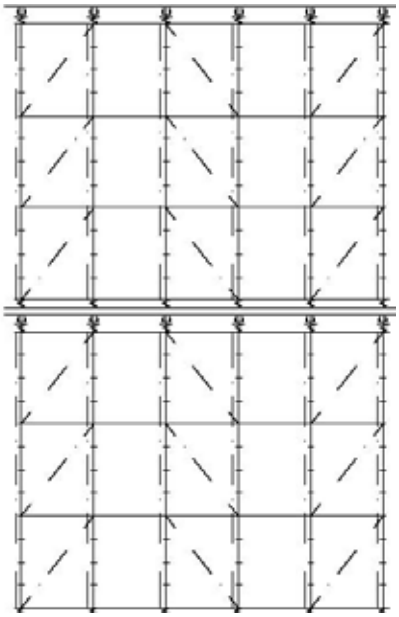
When there are multiple levels of support scaffolding, the support structure of floors that are not fully cured will also have to carry part of the load of the floor(s) and support structure above.

Depending on how fast construction takes place, the total load on the lowest support structure could increase to more than the weight of two floors above.

Where multiple levels are to be poured in a construction process a suitably qualified engineer should be consulted.

**Figure 13**

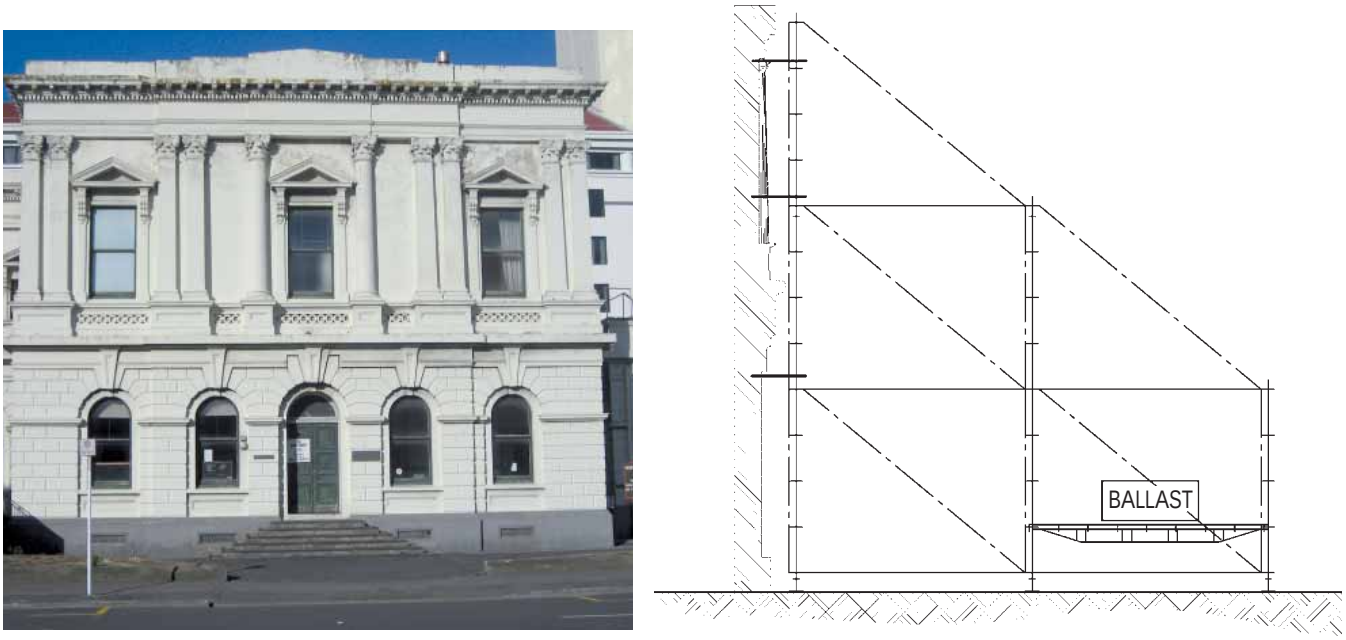
**Multiple levels of Allround support structures**



# Supporting a free-standing façade with Allround scaffolding

**Figure 16**

**Example of scaffold for free-standing façade**

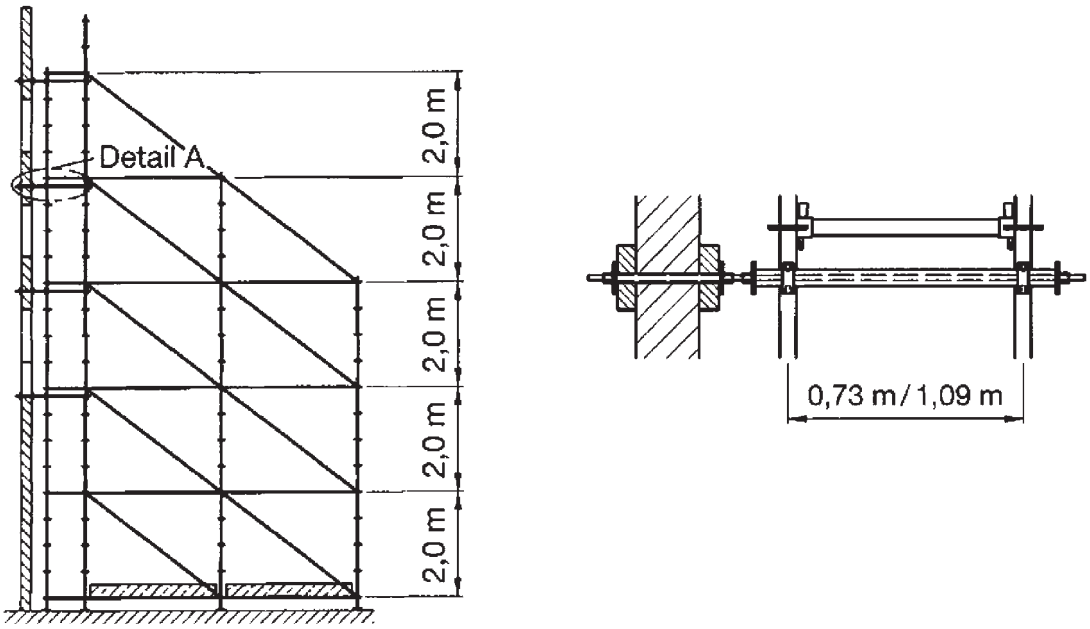



Allround scaffolding may support a free-standing façade, for example during renovation of historic buildings. The scaffold must be able to withstand the resulting wind loads and stabilisation loads. Individual static calculations are required.

The scaffold must be tied into the façade as shown in the example in the diagram below (Figure 17).

**Figure 17**

**Tying the scaffold into a free-standing façade**



# Supporting scaffolds for free-standing walls and façades

**In order to guarantee** their stability, propping scaffolds must be equipped with ballast.

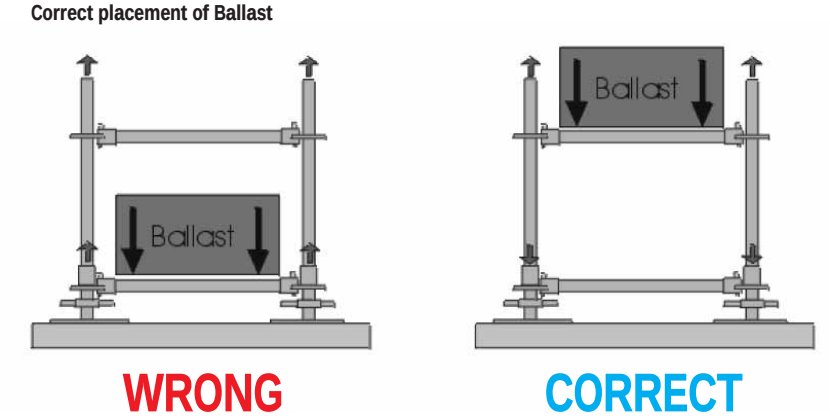
Always use allround standards with bolt-in spigots!

**The amount and kind of the ballast depend mainly on the:**

- height of the wall
- available space at the base in order to widen the scaffold
- climatic conditions (➔ dynamic wind pressure)

**Figure 14**

**Correct placement of Ballast**

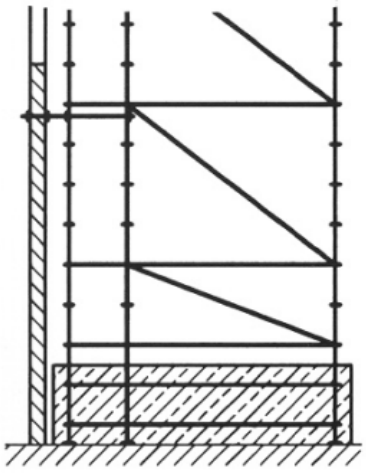



- do not load the ballast on the base collar level (no tension can be transferred) (see Figure 14 above).
- don't use fluid or grainy ballast.
- carry out a static investigation.

If the load capacity of the decks, standards or transoms has been reached (due to wind, dead load of scaffolding and ballast) then the standards may be embedded in a concrete foundation (see Figure 15 below).

**Figure 15**

**Embedding vertical standards in concrete foundations**



# Propping using Layher Allround Scaffolding

## Faster

- Superior system technology
- Shorter assembly time
- Shorter dismantling time
- Lower labour costs

## Stronger

- Verified high load bearing capacity
- Eight connection points on each node
- Significantly less weight than other systems
- Lower transport costs

## Safer

- Certified consistent quality
- ISO 9001 TÜV certified
- AS/NZS 1576 standard compliant
- Stable structure from base out

## More profitable

- Components can be used for propping or general scaffolding
- Increase available uses for your equipment
- Give clients a wider range of services
- Greater revenue

## Save time. Save money.

***Faster. Stronger. Safer. More Profitable.***



LAYHER PTY LTD

**P** 1300 136 026
**F** 1300 136 027
info@layher.com.au
www.layher.com.au

PO Box R1353
Royal Exchange
NSW 1225
Australia

PO Box 8468
Perth Business Centre
WA 6000
Australia

PO Box 7677
East Brisbane
QLD 4169
Australia

LAYHER LTD

**P** 0800 529 437
**F** +64 4 568 2788
info@layher.co.nz
www.layher.co.nz

PO Box 38388
Wellington Mail Centre
Wellington 5045
New Zealand