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**DOUBLE WALL ANCHORS**

Double Wall anchors are used for transporting and relocating precast concrete sandwich panels.

**About Double Walls**

Double walls consist of two thin precast concrete formwork layers which are joined by lattice girders. These form permanent shuttering and after installation on site, the core is concrete-filled.

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**Dimensions of Double Wall Anchors**

<table>
<thead>
<tr>
<th>Anchor width</th>
<th>Leg bar diameter Smooth steel S235</th>
<th>Crossbar diameter</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1</td>
<td>d</td>
<td>D2</td>
<td>H1</td>
</tr>
<tr>
<td></td>
<td>mm</td>
<td></td>
<td>mm</td>
</tr>
<tr>
<td>≤ 200</td>
<td>14</td>
<td>20</td>
<td>450</td>
</tr>
<tr>
<td>200 - 310</td>
<td>14</td>
<td>22</td>
<td>450</td>
</tr>
<tr>
<td>310 - 360</td>
<td>14</td>
<td>25</td>
<td>500</td>
</tr>
</tbody>
</table>

**Maximum Wall Weights**

<table>
<thead>
<tr>
<th>Concrete Strength</th>
<th>Min concrete thickness</th>
<th>Min concrete cover</th>
<th>Min Edge distance</th>
<th>Allowable loads</th>
<th>Maximum wall weights</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/mm²</td>
<td>mm</td>
<td>kN</td>
<td>tonnes</td>
<td>Loadcase 1</td>
<td>Loadcase 2</td>
</tr>
<tr>
<td>15</td>
<td>50</td>
<td>10</td>
<td>300</td>
<td>25.2</td>
<td>7.9</td>
</tr>
<tr>
<td>20</td>
<td>50</td>
<td>10</td>
<td>300</td>
<td>29.1</td>
<td>9.1</td>
</tr>
<tr>
<td>25</td>
<td>50</td>
<td>10</td>
<td>300</td>
<td>32.5</td>
<td>10.2</td>
</tr>
<tr>
<td>30</td>
<td>50</td>
<td>10</td>
<td>300</td>
<td>35.6</td>
<td>11.2</td>
</tr>
<tr>
<td>35</td>
<td>50</td>
<td>10</td>
<td>300</td>
<td>36.5</td>
<td>12.1</td>
</tr>
</tbody>
</table>

The minimum edge distances given in this table are for the loadings given here. Please contact CFS if you have different conditions and we can provide a bespoke calculation.
DOUBLE WALL LIFTING ANCHORS

Loadcase 1 – Factory – Axial loading only
- Rotate to vertical using tilting table and then axial lifting with a lifting beam
- Concrete strength 15 to 25 N/mm²
- Dynamic factor = 1.3 (tower crane, mobile crane)
- No demoulding
- All axial load, no angled and no shear lifting

Loadcase 2 – Factory – Axial, angled and shear loading
- Stripping without tilting table. Tilting the walls in shear from the horizontal to the vertical using the anchors
- Concrete strength 15 to 25 N/mm²
- Dynamic factor = 1.3 (tower crane, mobile crane)
- Lifting chains at an angle ≤ 45°

Loadcase 3 – Site – Axial and angled loading
- Delivery of double wall standing vertically
- Concrete strength 20 to 35 N/mm²
- Dynamic factor = 1.3 (tower crane, mobile crane)
- Lifting chains at an angle ≤ 45°

Loadcase 4 – Site – Axial, angled and shear loading
- Delivery of double wall lying flat on the bed of the truck
- Concrete strength 20 to 35 N/mm²
- Tilting of the walls in shear to the vertical using the anchors
- Dynamic factor = 1.3 (tower crane, mobile crane)
- Lifting chains at an angle ≤ 45°

Edge Distances and Spacing
To use the load tables shown here, the minimum distance from the edge of a panel and from any recesses is 300mm and the minimum distance between anchors is 600mm. If you have a different situation contact CFS for a bespoke calculation.

Concrete Cover
The concrete cover towards the outside of the panel must be determined by the engineer according to the durability requirements of the wall. To the inside, the concrete cover should be as stated in the table. If the contours of the stirrup are visible on the inside surface of the wall, the capacity of the anchor is not guaranteed and the anchor should not be used.

Reinforcement
Minimum reinforcement should be determined by the engineer. The manufacturer’s data has been generated from tests with 1 layer of A252 mesh, please provide at least this level of reinforcement.

Insert Depth
The anchors should be installed so that the upper end of the stirrup does not project out of the end of the wall.

Anchor Arrangement
If using more than two double wall anchors, suspension will be structurally indeterminate unless a compensation equaliser or similar is used. This is due to possible uneven rope lengths or different heights of the installed double wall anchors. Without this aid it is impossible to calculate the load on each anchor.

Allowable Load Under Angle
In the load table our load values $F_{VM}$ is the vertical component of the load, no angled load reduction necessary.
HOISTING, TRANSPORTATION AND RELOCATION

Visual Check
A visual check on the anchors should be carried out for obvious damage before installation. Do not use damaged anchors.

Transport cases
Shear loading is not generally permitted during transport. A shear lift may only be used when lifting the slabs from horizontal to upright from the formwork platform or from the transport truck on site. Please refer to the engineer’s instructions for correct transportation position.

Modes of transport, hoisting and use of equalisers
There are different hoisting load factors to take into account in the calculations depending on the transport and lifting device. Each loadcase in the table covers a different lifting situation.

Axial Load, T Pitching shear Load, T Special Shell 2 requirements
< 3.3 < 1.2 None
< 3.4 1.2 < PL < 1.5 2B12 bars @ 1000s

Twinwall steel

<table>
<thead>
<tr>
<th>Thickness</th>
<th>Steel Cover</th>
<th>Girder &amp; Lifter Height</th>
<th>mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>200</td>
<td>25</td>
<td>120</td>
<td></td>
</tr>
<tr>
<td>250</td>
<td>25</td>
<td>170</td>
<td></td>
</tr>
<tr>
<td>300</td>
<td>25</td>
<td>220</td>
<td></td>
</tr>
<tr>
<td>300</td>
<td>35</td>
<td>200</td>
<td></td>
</tr>
<tr>
<td>350</td>
<td>35</td>
<td>250</td>
<td></td>
</tr>
<tr>
<td>400</td>
<td>35</td>
<td>300</td>
<td></td>
</tr>
</tbody>
</table>

FLEXI-X LIFTERS

- Increase load capacity for tilting
- Easier to fix in the mould via the X cross bar

Rules for Flexi-X lifter positioning
1) Flexi-X must be positioned between two lattice girders
2) Only one Flexi-X may be located between two girders
3) Minimum spacing of adjacent Flexi-X’s = 500mm

In red zone lifters must be within 100mm of lattice. Axial and pitching capacity must be reduced by 50%

If the pitching load is greater than 1.2T, but less than 1.5T, then the two edge bars on the mesh must be B12, spacing 100m

Note: Panel may be pitched in either direction, but if possible shell 1 should be uppermost

Axial Load

Pitching Load

-X- bars on Flexi-X lifter must lie in shell 1

Centres of lattice girders ≤ 500mm

Pitching load adjustment for different shell 2 strengths

f_u > 20 MPa at time of lift, use pitching load x 1.15
f_u > 25 MPa at time of lift, use pitching load x 1.30

Dynamic load

V = Volume of concrete formwork
q = concrete contact surface
A = concrete contact surface to formwork

Load is calculated as follows:

FS [kN] = q [kN/m^2] x A [m^2]

Formwork adherence and friction
Oiled steel formwork
Wood formwork

The concrete used.

Concrete contact pressure:

q [kN/m^2] = \( \frac{C}{V} \) x [kN/m^2]

where:

C = dead weight of precast concrete element
V = Volume of concrete formwork

Axial Load, T

Pitching Load, T

Special Shell 2 requirements

None

2B12 bars @ 1000s
GENERAL USAGE INSTRUCTIONS

1) Nominal lifter size to be same as nominal girder height.
2) Concrete strength of shell 2 at time of lifting $\geq 15$ MPa
3) Minimum cover to lifter is 10mm. The ‘X’ bars in shell 1 should just be completely covered with concrete.
4) ‘X’ bars to be wired to mesh bars. Wire in 3 places only and avoid distortion of mesh through over-tightening.
5) Shell 1 thickness $\geq 65$mm.
6) Combined thickness of shell 1 and shell 2 $\geq 145$mm
7) Axial load may be inclined at 30 degrees to vertical without any down rating of capacity.