Modern Concrete
All Products

Hollow Core Guide

Products Guid
Modern4concrete is a manufacturer of a full range of precast building components including the provision of all services from conceptualization, design, installation and after sales service. Also, we have all facilities to produce wide range with high quality of cement blocks, inter-lock & ready mix concrete.

Modern4concrete was established since 2009, in order to lead the trend of construction conversion in Egypt to highly industrialized construction method according to international standards & specifications which precast concrete construction sector in Egypt was lacking application of these technical specifications on most of his previous precast experiences.

Modern4concrete Company is located in El-Sadat city (On Cairo-Alexandria desert highway) Industrial zone, plot No. (M) on total area (175,000 M2). This factory truly was born a giant, because we hired a professional staff of engineers and technicians for each department, looking after the business in all stages: Design, Production, Quality control and Erection on site. Also, we have the latest advanced production lines with largest productivity capacity imported from most famous specialized companies on each field.

Modern4concrete has own Technical Office with full capability to deal with the all types of projects: Housing, industrial buildings, Offices, Hospitals, schools, Car Parking, Commercial buildings and all sorts of miscellaneous precast products using our different variety of precast concrete building systems.
Hollow Core Slabs (HCS) System
Product Guide

1. Introduction

A Hollow Core Slabs (HCS) is a precast pre-stressed concrete element having continuous voids provided to reduce self-weight and to provide an efficient & economical structural section for flooring, roof system, wall cladding & boundary fences. (HCS) are used for a variety of applications in low and high-rise commercial residential and industrial buildings. Structurally, HCS provide pre-stressed members concerning load capacity, span range and deflection control. In addition, by connecting the slabs with joint reinforcement, the floor can be arranged, distributing lateral forces for stability purpose.

The purpose of this technical data is to provide assistance in selecting and detailing precast concrete hollow-core slab manufactured by Modern Concrete. The load tables presented herein are intended as a guide only.

Final design is determined by our engineering department based on information presented in the final plans and specifications. To ensure the optimum selection for your application, please contact us for assistance.
2. Advantages of Concrete Hollow Core Slabs

1. Modern Concrete (HCS) section weigh up to 50% less than traditional in-situ concrete slabs of the same size, resulting in considerable savings in construction costs.
2. The reduction in weight will result in a lighter structural framing leading to saving in construction cost.
3. (HCS) industrial production lines are providing Just In-Time manufacturing resulting in less-on-site congestion and reduce financing cost.
4. (HCS) will help achieving a shorter and faster construction durations in all weather conditions, which are in turn, are reflected as savings.
5. (HCS) bottom surface is smooth which means that paint can be applied directly to it and it is maintenance free.
6. (HCS) provide the efficiency of pre-stressed member for load capacity, span range and deflection control.
7. (HCS) reduce sound transmission and vibrations.
8. (HCS) meet the highest requirements for non-flammable and excellent fire rating.
9. (HCS) voids provide raceways for electrical, heating or other MEP service pipes.
10. (HCS) are manufactured in a closed environment using the highest levels of technology to ensure high quality product.
3. Design of HCS using (Load Table Design Criteria)

A floor consisting of (HCS) can be designed to provide a rigid and homogenous part of the structure diaphragm, this can be used as part of the stabilizing system and achieved by arranging the joint reinforcement to be the slabs together. Normally there is no need for structural screed for stability purpose. Each single element is designed to carry loads according to specifications. This is normally done by Modern Concrete design department. Topping for leveling purpose is needed to level the slab considering camber and other irregularities.

If there is a need for structural screed to (act) together with the slab for vertical load bearing and stability of the building, this will be advised by Modern Concrete designer. External structural Engineers have to study the following Guide Tables to select suitable section according to Loads & span of slabs.

The tables herein list allowable live loads in Kg per square meter. For uniformly distributed loading. Non-uniform loading conditions resulting from point loads, line loads, openings and cantilevers require special design consideration.

The allowable load is usually governed by the ultimate capacity of the section. As a design aid, the ultimate moment capacities in governing criterion for short spans may be the horizontal shear stress between the slab and the topping.
Allowable live loads for long span, heavily reinforced sections are limited to loads that result in a bottom-tension stress equal to the cracking stress.

Loads beyond this limit may result in deflections that exceed the allowable value in the ACI code. The load tables are based on a slab concrete strength of \( f'c = 400 \text{ kg/cm}^2 \).

Tables for topped sections are based on a topping strength of \( f'ci = 250 \text{ kg/cm}^2 \) and minimum thickness of 50 mm. Maximum spans and loads shown are not absolutes. Longer spans or heavier loads may be achieved under certain conditions or different criteria than assumed in the tables. Contact us if you need assistance.

Hollow core slabs can be regarded as the best section for a structural flexural member. The design of the cross-section allows the concrete to be used optimally both in the compression and tension zones. Theoretically, the concrete below the compression zone which is redundant is omitted by longitudinal voids, thus reducing the weight of slab. By applying pre-stressing force with tendons at the bottom of slab, this will increase the tensile capacity of the slab.

All slabs can be produced with reduced widths. The narrow slabs are produced by cutting the standard width slabs after the extrusion. The location of the longitudinal cut should correspond to the location of a longitudinal Void, at a distance of 35mm-70mm from the pre-stressed strands, for 150mm-265mm thickness and 50mm-100mm for 320mm-500mm thickness. It is recommended that the cut edge is placed over a wall or beam as the cut edge will be straight without chamfer as for full width slabs.

This gives hollow core slabs the distinct advantage for higher load carrying capacity and achieving long span capability.

A floor consisting of jointed hollow core slabs provides a monolithic slab structure. In order to achieve this, the joint between adjacent hollow core slabs must be properly grouted. The jointed hollow core slabs are capable of distributing vertical loads within the slab ‘field’ and provide a rigid diaphragm to transmit lateral loads to the stabilizing structure.
Slab Design Considerations:
The following items will affect the selection of appropriate slab sizes and should be carefully reviewed by the Architect/Engineer while developing the plans and specifications for a project:

Fire Rating:
• The fire rating requirement should be clearly specified in the contract documents. Fire rating specifications are as important as all other design parameters. HC Slab rating requirements are determined by the Architect or Engineer of Record, who is also responsible for establishing the fire rating criteria for the total project.

Loading Conditions:
• Specify all uniform loading requirements on structural plans.
• Identify line and point loads resulting from bearing walls, masonry walls, face brick, columns, mechanical equipment, etc.
• Identify diaphragm forces and lateral loads resulting from wind or earth pressures.
• Review roof plans for vertical protrusions such as parapets and penthouses. Slab supporting stairs require special loading considerations.
• Large openings or closely spaced groups of smaller openings will reduce the slab load carrying capacity.
Topping:
• Specify whether or not concrete topping is to be composite. Composite action requires the topping to be bonded to the top surface of the slab. Topping separated by a vapor barrier or insulation is non-composite and must be considered a superimposed load.
• Large cambers resulting from long spans and/or heavy loads will affect the quantity of topping, assuming a level floor is required. 50 mm of composite topping at mid span is minimal, and additional thickness at the ends of the slab may be required to maintain level floor elevations.

Camber:
• Camber is inherent in all pre-stressed products. It is the result of the eccentric pre-stress force required to resist design loads, and cannot be designed in, out, or to an exact number. The amount of camber will depend upon the span, design loads and thickness of slab. Slabs stored in the yard for more than 6 weeks, usually due to construction schedule changes, will experience more camber growth.
• Adjacent slab of dissimilar length, strand pattern or with openings will have inherent camber differences.

Sound Ratings:
The following tables contain values for the Sound Transmission Class (STC) and the Impact Insulations Class (IIC) of various floor systems utilizing Modern Concrete hollow-core slabs.

Sound Transmission Class (STC)

| HC 160 mm | 49 | HC 160 mm | 49 |
| HC 160 mm + 50 mm Topping | 53 | HC 160 mm + 50 mm Topping | 53 |
| HC 200 mm | 51 | HC 200 mm | 51 |
| HC 200 mm + 50 mm Topping | 54 | HC 200 mm + 50 mm Topping | 54 |
| HC 265 mm | 52 | HC 265 mm | 52 |

The values for the Sound Transmission Class were determined by tests which were in accordance with ASTM E90. The STC is a measure (in decibels) of the ease at which air-borne sound is transmitted through a floor system. The larger the value of the STC for a given system, the greater the sound insulation.
# Modern Concrete Hollow-core Slab

## Uniformly Distributed Superimposed Load in Kg. Per Sq. Meter

<table>
<thead>
<tr>
<th>Standard Designation</th>
<th>7-Wire 18600 Lolas</th>
<th>P/S Strand Area</th>
<th>Ultimate Bending Moment, $\phi$ Mn Ton.m</th>
<th>Simple Span in (m)</th>
<th>$\phi$ Vw in Ton Per Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>4.09 cm²</td>
<td>2.08 cm²</td>
<td>3.888</td>
<td>4</td>
<td>6.25</td>
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<td>B</td>
<td>7.09 cm²</td>
<td>3.64 cm²</td>
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<td>5</td>
<td>1100</td>
</tr>
<tr>
<td>C</td>
<td>9.09 cm²</td>
<td>4.68 cm²</td>
<td>8.176</td>
<td>6</td>
<td>1200</td>
</tr>
</tbody>
</table>

*Includes the live load plus dead load that is additional to the weight of the bare ground slabs in place.

## Notes:

1. Design Standard: ACI 318-2008
2. For complete and detailed calculations consult Modern Concrete company (MCC).
3. For longer spans, heavier loads, more fire resistance or special conditions consult Modern Concrete (MCC).
4. The table indicates maximum safe loads. Camber and deflection must always be investigated by the architect, and/or engineer for the contemplated loading and span so that these factors are compatible with the contiguous materials in the proposed structure.
5. Values to the left and below the heavy stepped line are controlled by shear.

Grouted Weight Of Slabs = 220 kg/m²

- $f_{c} = 400$ kg/cm²
- $f_{ct} = 250$ kg/cm²
- Area = 1102 cm²
- $f_{pu} = 18600$ kg/cm²
- $f_{pu} = 11160$ kg/cm²
- $IC = 34296$ cm³
- bw = 28.8 cm
- $REI = 60$ min.
**Modern Concrete Hollow-core Slab**

**UNIFORMLY DISTRIBUTED SUPERIMPOSED* LOAD IN KG. PER SQ. METER**

<table>
<thead>
<tr>
<th>Standard Designation</th>
<th>7-Wire 18600 Lolasx P/S Strand Area cm²</th>
<th>P/S Strand Area cm²</th>
<th>Ultimate Bending Moment, Ø Mn Ton.m</th>
<th>SIMPLE SPAN IN ( M )</th>
<th>Ø Vcew In Ton Per Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT</td>
<td>4.093</td>
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<td>5.522</td>
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<tr>
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<td>9.257</td>
<td>1500 1150 850 650 475 350 200 125 0 0 0</td>
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</tr>
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<td>CT</td>
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<td>11.543</td>
<td>1600 1300 1150 850 650 525 350 250 150 0 0</td>
<td>6.65</td>
</tr>
</tbody>
</table>

*Includes the live load plus dead load that is additional to the weight of the bare ground slabs in place.

**NOTES:**

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4. The table indicates maximum safe loads. Camber and deflection must always be investigated by the architect, and/or engineer for the contemplated loading and span so that these factors are compatible with the contiguous materials in the proposed structure.
5. Values to the left and below the heavy stepped line are controlled by shear.

*Grouted Weight Of Slabs & 50mm Topping = 345 kg/m²*

- $f'c=400\text{kg/cm}²$
- $f'c=250\text{kg/cm}²$
- $f'c=1116\text{kg/cm}²$
- $f'c=67898\text{cm}²$
- $bw=28.8\text{cm}$
- $REI=60\text{min.}$
Modern Concrete Hollow-core Slab

UNIFORMLY DISTRIBUTED SUPERIMPOSED* LOAD IN KG. PER SQ. METER

<table>
<thead>
<tr>
<th>Standard Designation</th>
<th>7-Wire 18600 L0ax P/S Strand Area cm²</th>
<th>P/S Strand Area cm²</th>
<th>Ultimate Bending Moment, 9 Mn Ton.m</th>
<th>SIMPLE SPAN IN (M)</th>
<th>Ø Vew In Ton Per Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>4.093</td>
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<td>4.5</td>
<td>5</td>
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<td>B</td>
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<td>9.472</td>
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<tr>
<td>C</td>
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<td>1250</td>
<td>14.06</td>
<td>12.5</td>
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<td>6.51</td>
<td>1250</td>
<td>250</td>
<td>150</td>
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</tbody>
</table>

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NOTES:

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5. Values to the left and below the heavy stepped line are controlled by shear.

Grouted Weight Of Slabs = 240 kg/m²

- f'c = 400 kg/cm²
- f'cu = 18600 kg/cm²
- Area = 1196 cm²
- IC = 61096 cm³
- bw = 23.8 cm
- REI = 60 min.
# Modern Concrete Hollow-core Slab

## Uniformly Distributed Superimposed Load in Kg. Per Sq. Meter

<table>
<thead>
<tr>
<th>Standard Designation</th>
<th>7-Wire 18600 Lax P/S Strand Combination</th>
<th>P/S Strand Area cm²</th>
<th>Ultimate Bending Moment, Ø Mn Ton.m</th>
<th>SIMPLE SPAN IN (M)</th>
<th>Ø Vcw In Ton Per Unit</th>
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<tr>
<td>AT</td>
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<td>7.163</td>
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<td>CT</td>
<td>5.012.5</td>
<td>4.65</td>
<td>15.09</td>
<td>1600 1400 1200 1050 950 800 650 525 325 250 200 125 0 0</td>
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<tr>
<td>DT</td>
<td>7.012.5</td>
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<td>17.96</td>
<td>1600 1400 1200 1050 950 850 750 700 600 500 400 325 250 150</td>
<td>7.06</td>
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</table>

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5. Values to the left and below the heavy stepped line are controlled by shear.

**Wire mesh**

Grouted Weight of Slabs & 50mm Topping = 365 kg/m²

- $f_c = 400$ kg/cm²
- $f_{cd} = 250$ kg/cm²
- $Area = 1700$ cm²
- $bw = 23.8$ cm
- $RC = 60$ min.
**Modern Concrete Hollow-core Slab**

UNIFORMLY DISTRIBUTED SUPERIMPOSED* LOAD IN KG. PER SQ. METER

<table>
<thead>
<tr>
<th>Standard Designation</th>
<th>7-Wire</th>
<th>P/S Strand Area cm²</th>
<th>Ultimate Bending Moment, Ø Mn Ton.m</th>
<th>SIMPLE SPAN IN (M)</th>
<th>Ø Vcw In Ton Per Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>18600</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>Ø 9.3</td>
<td>2.08</td>
<td>7.82</td>
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</tr>
<tr>
<td>B</td>
<td>Ø 9.3</td>
<td>3.12</td>
<td>11.59</td>
<td>1700 250 750 650 250 125 0 0 0 0</td>
<td>7.4</td>
</tr>
<tr>
<td>C</td>
<td>Ø 9.3</td>
<td>4.16</td>
<td>15.27</td>
<td>1700 1500 1000 650 400 250 125 0 0 0</td>
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</tr>
<tr>
<td>D</td>
<td>Ø 12.5</td>
<td>5.58</td>
<td>19.92</td>
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</tr>
<tr>
<td>E</td>
<td>Ø 12.5</td>
<td>7.44</td>
<td>25.93</td>
<td>1700 1500 1000 800 700 550 450 300 200 100</td>
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</tr>
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<td>F</td>
<td>Ø 12.5</td>
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<td>31.64</td>
<td>1700 1500 1000 800 700 550 475 400 300 225</td>
<td>7.4</td>
</tr>
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</table>

*Includes the live load plus dead load that is additional to the weight of the bare ground slabs in place

**NOTES:**

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4. The table indicates maximum safe loads. Camber and deflection must always be investigated by the architect, and/or engineer for the contemplated loading and span so that these factors are compatible with the contiguous materials in the proposed structure.
5. Values to the left and below the heavy stepped line are controlled by shear.

Grouted Weight Of Slabs = 350 kg/m²

- $f'_c=400$ kg/cm²
- $f'_d=250$ kg/cm²
- $\theta_a=1741$ cm²
- $f_pu=18600$ kg/cm²
- $f_pu=11160$ kg/cm²
- $\theta_c=152070$ cm²
- $bw=23.4$ cm
- $REI=60$ min.
# Modern Concrete Hollow-core Slab

**UNIFORMLY DISTRIBUTED SUPERIMPOSED* LOAD IN KG. PER SQ. METER**

<table>
<thead>
<tr>
<th>Standard Designation</th>
<th>7-Wire 18600 Lolax P/S Strand Combination</th>
<th>P/S Strand Area cm²</th>
<th>Ultimate Bending Moment, Ø Mn Ton.m</th>
<th>SIMPLE SPAN IN (M)</th>
<th>Ø Vcw In Ton Per Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT</td>
<td>4 Ø 9.5</td>
<td>2.08</td>
<td>945</td>
<td>4.5</td>
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</tr>
<tr>
<td>BT</td>
<td>6 Ø 9.5</td>
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<td>950</td>
<td>4.5</td>
</tr>
<tr>
<td>CT</td>
<td>8 Ø 9.3</td>
<td>4.16</td>
<td>18.51</td>
<td>1950</td>
<td>4.5</td>
</tr>
<tr>
<td>DT</td>
<td>12.5 Ø 9.3</td>
<td>5.58</td>
<td>23.76</td>
<td>1950</td>
<td>4.5</td>
</tr>
<tr>
<td>ET</td>
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<td>7.44</td>
<td>30.71</td>
<td>1950</td>
<td>4.5</td>
</tr>
<tr>
<td>FT</td>
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<td>9.3</td>
<td>37.35</td>
<td>1950</td>
<td>4.5</td>
</tr>
</tbody>
</table>

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5. Values to the left and below the heavy stepped line are controlled by shear.

**Grouted Weight Of Slabs & 50 mm Topping = 475 kg/m²**

- $f_{cc} = 400$ kg/cm²
- $f_{cp} = 1860$ kg/cm²
- $f_{ps} = 11160$ kg/cm²
- $f_{cy} = 250$ kg/cm²
- $f_{cu} = 25320$ kg/cm²
- $w = 23.4$ cm
- $A_{w} = 2245$ cm²
- $REI = 60$ min.
# Modern Concrete Hollow-core Slab

## Uniformly Distributed Superimposed* Load in Kg per Sq. Meter

<table>
<thead>
<tr>
<th>Standard Designation</th>
<th>7-Wire 18600 Ldax P/S Strand Combination</th>
<th>P/S Strand Area cm²</th>
<th>Ultimate Bending Moment, Ø Mn Ton.m</th>
<th>Simple Span m</th>
<th>Ø Vcw in Ton per Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>6 Ø 12.5</td>
<td>5.58</td>
<td>25.03</td>
<td>5 6 7 8 9 10 11 12 13 14 15 16</td>
<td>10.6</td>
</tr>
<tr>
<td>B</td>
<td>8 Ø 12.5</td>
<td>7.44</td>
<td>32.75</td>
<td>100 875 625 450 325 225 125 0 0 0</td>
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<td>10 Ø 12.5</td>
<td>9.3</td>
<td>40.15</td>
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<td>150 950 800 650 600 500 400 300 250</td>
<td>10.6</td>
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</table>

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5. Values to the left and below the heavy stepped line are controlled by shear.

Grouted Weight Of Slabs = 3.76 kg/m²

<table>
<thead>
<tr>
<th>f&lt;sub&gt;c&lt;/sub&gt;</th>
<th>f&lt;sub&gt;cd&lt;/sub&gt;</th>
<th>Area</th>
<th>bw</th>
<th>RE</th>
</tr>
</thead>
</table>
| 400 kg/cm²   | 250 kg/cm²   | 1881 cm² | 27.0 cm | 60 min.
# Modern Concrete Hollow-core Slab

**UNIFORMLY DISTRIBUTED SUPERIMPOSED LOAD IN KG PER SQ. METER**

<table>
<thead>
<tr>
<th>Standard Designation</th>
<th>7-Wire 18600 Lb/Strand P/S Strain Area cm²</th>
<th>P/S Ultimate Bending Moment, 0 Mo Ton.m</th>
<th>SIMPLE SPAN IN (M)</th>
<th>Ø Vcw In Ton Per Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT</td>
<td>6 Ø 12.5</td>
<td>5.58</td>
<td>2800 2250 1750 14.00 1000 650 450 275 150 0 0 0</td>
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<td>BT</td>
<td>8 Ø 12.5</td>
<td>7.64</td>
<td>2800 2250 1750 14.00 1200 1000 725 525 375 225 125 0 0</td>
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</tr>
<tr>
<td>CT</td>
<td>10 Ø 12.5</td>
<td>9.3</td>
<td>2800 2250 1750 14.00 1200 1000 850 750 650 400 275 150 0</td>
<td>1.24</td>
</tr>
<tr>
<td>DT</td>
<td>12 Ø 12.5</td>
<td>11.16</td>
<td>2800 2250 1750 14.00 1200 1000 850 750 650 550 400 275 150</td>
<td>1.24</td>
</tr>
<tr>
<td>ET</td>
<td>14 Ø 12.5</td>
<td>13.02</td>
<td>2800 2250 1750 14.00 1200 1000 850 750 650 550 500 400 250</td>
<td>1.24</td>
</tr>
</tbody>
</table>

*Includes the live load plus dead load that is additional to the weight of the bare ground slabs in place.

## Notes:

1. Design Standard: ACI 318-2008
2. For complete and detailed calculations consult Modern Concrete company (MCC).
3. For longer spans, heavier loads, more fire resistance or special conditions consult Modern Concrete (MCC).
4. The table indicates maximum safe loads. Camber and deflection must always be investigated by the architect, and/or engineer for the contemplated loading and span so that these factors are compatible with the contiguous materials in the proposed structure.
5. Values to the left and below the heavy stepped line are controlled by shear.
### Modern Concrete Hollow-core Slab

**UNIFORMLY DISTRIBUTED SUPERIMPOSED* LOAD IN KG PER SQ. METER**

<table>
<thead>
<tr>
<th>Standard Designation</th>
<th>7-Wire 18600 Lolax P/S Strand Area cm²</th>
<th>P/S</th>
<th>Ultimate Bending Moment, Ø Mn Ton.m</th>
<th>SIMPLE SPAN (M)</th>
<th>Ø Vcw In Ton Per Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>6.0 12.5</td>
<td>5.58</td>
<td>33.36</td>
<td>2200 700 1150 800 550 375 250 125 0 0 0 0</td>
<td>15.5</td>
</tr>
<tr>
<td>B</td>
<td>8.0 12.5</td>
<td>7.44</td>
<td>43.86</td>
<td>2200 800 1200 850 625 450 300 200 100 0 0 0</td>
<td>15.5</td>
</tr>
<tr>
<td>C</td>
<td>10.0 12.5</td>
<td>9.3</td>
<td>54.01</td>
<td>2200 1300 1500 150 875 650 475 350 225 150 0 0</td>
<td>15.5</td>
</tr>
<tr>
<td>D</td>
<td>12.0 12.5</td>
<td>11.16</td>
<td>65.56</td>
<td>2200 1500 1500 150 1000 850 500 350 250 150 0 0</td>
<td>15.5</td>
</tr>
<tr>
<td>E</td>
<td>14.0 12.5</td>
<td>13.02</td>
<td>72.15</td>
<td>2200 1800 1500 150 1000 900 650 500 375 275 175</td>
<td>15.5</td>
</tr>
</tbody>
</table>

*Includes the live load plus dead load that is additional to the weight of the bare ground slabs in place.

### Notes:
1. Design Standard: ACI 318-2008
2. For complete and detailed calculations consult Modern Concrete company (MCC).
3. For longer spans, heavier loads, more fire resistance or special conditions consult Modern Concrete (MCC).
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5. Values to the left and below the heavy stepped line are controlled by shear.
# Modern Concrete Hollow-core Slab

**Uniformly Distributed Superimposed* Load in Kg per Sq. Meter**

<table>
<thead>
<tr>
<th>Standard Designation</th>
<th>7-Wire 18600 Løtak P/S Strand Combination</th>
<th>P/S Strand Area cm²</th>
<th>Ultimate Bending Moment, Ø Mn Ton.m</th>
<th>Simple Span in (M)</th>
<th>Ø Vcw In Ton Per Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT</td>
<td>6 Ø 12.5</td>
<td>5.58</td>
<td>37.19</td>
<td>2500 950 950 625 425 250 125 0 0 0 0</td>
<td>17.5</td>
</tr>
<tr>
<td>BT</td>
<td>8 Ø 12.5</td>
<td>7.44</td>
<td>48.65</td>
<td>2500 1750 1550 975 725 500 325 200 0 0 0</td>
<td>17.5</td>
</tr>
<tr>
<td>CT</td>
<td>10 Ø 12.5</td>
<td>9.3</td>
<td>59.8</td>
<td>2500 1750 1450 250 1000 725 525 375 250 150 0 0</td>
<td>17.5</td>
</tr>
<tr>
<td>DT</td>
<td>12 Ø 12.5</td>
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<td>70.06</td>
<td>2500 1750 1450 250 1000 950 725 550 400 250 175 0</td>
<td>17.5</td>
</tr>
<tr>
<td>ET</td>
<td>14 Ø 12.5</td>
<td>13.02</td>
<td>81.11</td>
<td>2500 1750 1450 250 1000 950 850 700 550 400 300 175 0</td>
<td>17.5</td>
</tr>
</tbody>
</table>

*Includes the live load plus dead load that is additional to the weight of the bare ground slabs in place.

**Notes:**

1. Design Standard: ACI 318-2008
2. For complete and detailed calculations consult Modern Concrete company (MCC).
3. For longer spans, heavier loads, more fire resistance or special conditions consult Modern Concrete (MCC).
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# Modern Concrete Hollow-core Slab

**UNIFORMLY DISTRIBUTED SUPERIMPOSED LOAD IN KG. PER SQ. METER**

<table>
<thead>
<tr>
<th>Standard Designation</th>
<th>7-Wire Strand 18600 Lolax</th>
<th>P/S Strand Area</th>
<th>Ultimate Bending Moment, Ø Mn Ton.m</th>
<th>SIMPLE SPAN IN (M)</th>
<th>Ø Vcw In Ton Per Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>18600 Lolax</td>
<td>cm²</td>
<td></td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>A</td>
<td>7 Ø12.5</td>
<td>6.51</td>
<td>48.35</td>
<td>5500</td>
<td>2600</td>
</tr>
<tr>
<td>B</td>
<td>9 Ø12.5</td>
<td>8.37</td>
<td>61.5</td>
<td>3300</td>
<td>2700</td>
</tr>
<tr>
<td>C</td>
<td>11 Ø12.5</td>
<td>10.25</td>
<td>74.34</td>
<td>3300</td>
<td>2700</td>
</tr>
<tr>
<td>D</td>
<td>13 Ø12.5</td>
<td>12.09</td>
<td>86.61</td>
<td>3300</td>
<td>2700</td>
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<tr>
<td>E</td>
<td>15 Ø12.5</td>
<td>13.95</td>
<td>97.77</td>
<td>3300</td>
<td>2700</td>
</tr>
</tbody>
</table>

*Includes the live load plus dead load that is additional to the weight of the bare ground slabs in place.

## NOTES:

1. Design Standard: ACI 318-2008
2. For complete and detailed calculations consult Modern Concrete company (MCC).
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5. Values to the left and below the heavy stepped line are controlled by shear.

Grouted Weight Of Slabs = 595 kg/m²

- $f_c=400$ kg/cm²
- $f_{cd}=250$ kg/cm²
- Area = 2974 cm²
- $f_{pu}=18600$ kg/cm²
- IC = 907874 cm²
- bw = 34.0 cm
- REI = 60 min.
## Modern Concrete Hollow-core Slab

### Uniformly Distributed Superimposed* Load in Kg. Per Sq. Meter

<table>
<thead>
<tr>
<th>Standard Designation</th>
<th>7-Wire 18600 Lølax P/S Strand Area cm²</th>
<th>Ultimate Bending Moment, Ø Mn Ton.m</th>
<th>Simple Span in (M)</th>
<th>Ø Vcw in Ton Per Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT</td>
<td>7 Ø12.5</td>
<td>6.51</td>
<td>52.7</td>
<td>3200 2700 2000 1500 1000 750 525 325 175 0 0 0 0 0 0 26.1</td>
</tr>
<tr>
<td>BT</td>
<td>9 Ø12.5</td>
<td>8.37</td>
<td>66.78</td>
<td>3200 2700 2250 1900 1500 1100 800 575 400 250 100 0 0 0 0 0 26.1</td>
</tr>
<tr>
<td>CT</td>
<td>11 Ø12.5</td>
<td>10.23</td>
<td>80.53</td>
<td>3200 2700 2250 1900 1700 1450 1100 825 600 425 300 150 0 0 0 0 0 26.1</td>
</tr>
<tr>
<td>DT</td>
<td>13 Ø12.5</td>
<td>12.09</td>
<td>94.0</td>
<td>3200 2700 2250 1900 1700 1500 1300 1075 825 625 450 300 200 0 0 0 0 0 26.1</td>
</tr>
<tr>
<td>ET</td>
<td>15 Ø12.5</td>
<td>13.95</td>
<td>106.9</td>
<td>3200 2700 2250 1900 1700 1500 1300 1150 1000 800 600 450 325 200 0 0 0 0 26.1</td>
</tr>
</tbody>
</table>

*Includes the live load plus dead load that is additional to the weight of the bare ground slabs in place.

### Notes:
1. Design Standard: ACI 318-2008
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3. For longer spans, heavier loads, more fire resistance or special conditions consult Modern Concrete (MCC).
4. The table indicates maximum safe loads. Camber and deflection must always be investigated by the architect, and/or engineer for the contemplated loading and span so that these factors are compatible with the contiguous materials in the proposed structure.
5. Values to the left and below the heavy stepped line are controlled by shear.
4. The Manufacturing Process:

HCS slabs are made with G50 concrete and ½” or 3/8" strands ASTM A416 as standard. Our machines extruded precast pre-stressed hollow core slab. The slabs are manufactured on 150 L/M long beds in standard widths of 120 cm and thickness of (16, 20, 26.5, 32, 40 and 50) cm. High strength pre-stressing strands are cast into the slabs at the spacing and location required for the given span, loading and fire cover conditions.

The slabs are cut to length for each project using a diamond-blade saw machine. After the slabs are cut, they are removed from the casting beds and placed into car rail to transfer them to storage stock yard.

All products from Modern Concrete equal or exceed the requirements of applicable ASTM specifications. The concrete mix is designed to have release strength of \( f'_{ci} = 250 \text{ kg/cm}^2 \), and a 28-day compressive strength of \( f'_c = 400 \text{ kg/cm}^2 \).

The pre-stressing strands are uncoated, seven wire, low relaxation with a minimum ultimate strength of 18600 kg/cm2.

- Quality Assurance
  A. Manufacturer Qualifications: The precast concrete manufacturing plant shall be certified and following the Pre-stressed Concrete Institute (PCI) Plant Certification Program.
  “Manual for Quality Control for Plants and Production of Precast and Pre-stressed Concrete Products”,
Materials:

1. **Portland Cement** :
   - Physical analysis of cement ES 4756 – 1
   - Complete chemical analysis of cement ES 4756 – 1


3. **Aggregates** :
   - Potential reactivity of aggregate ASTM C-289
   - Organic impurities in fine aggregate ASTM C-40
   - Grain size distribution ASTM C-33
   - Specific gravity of coarse aggregate ASTM C127
   - Specific gravity of fine aggregate ASTM C128
   - Absorption of aggregate ASTM C33
   - Unit weight ASTM C29
   - Voids in aggregate ASTM c33
   - Resistance to abrasion of coarse aggregate by the use of Los Angles Machine ASTM C131 – ASTM C33
   - Aggregate impact value BS 812 – part 112
   - Chloride & Sulphate in fine aggregate BS 812 – part 117 & 118
   - Soundness of aggregate by use of magnesium sulphate ASTM C88 – C33

4. **Water** : Potable or free from foreign materials in amounts harmful to concrete and embedded steel.

5. **Strand** :
   1. Uncoated, 7-Wire, Low Lax strand: ASTM A416 (including supplement) – Grade 250K or 270K.
      - Standard size for the used strands: 9.3 mm, 12.7 mm

**Concrete Mixes**:

1. 28 – Day compressive Strength Minimum 40 N/mm2.
2. Release Strength Minimum 25 N/mm2.
3. Use of Calcium Chloride or admixtures containing chlorides is not permitted.
Execution:

1. **Machineries Using For Production:**
   1. Extruder machine.
   2. Saw machine.
   4. Bed master for cleaning bed and sides.
   5. Gantry hopper for dosing concrete.
   7. Trolleys for shifting slabs.
   8. Tower concrete plant.
   9. Concrete transporting system.
   10. Heating system.

2. **Sequence Of Operations:**
   1. **Bed preparation:** by Bed Master Machine
      a. Clean the bed & sides.
      b. Place strand guides at both end as per design.
      c. Pull the stands according to design.
      d. Put forms below the plate near the starting of casting one meter apart for oil & water separator.
      e. Put safety chains every 30 m.

   2. **Strands stressing:** By Stressing Machine
      a. Stress the strands as per the elongation given.
      b. Switch alarm on while stressing to move all persons in a safety area.

   3. **Casting:** By Extruder Machine
      a. Place the Extruder machine on the bed.
      b. Place the end stopper.
      c. Set correct concrete cover.
      d. Lock the strands on strand guide.
      e. Fill water in the beginning of casting.
      f. Remove the end stopper after 1 m casting.
      g. Place the bed cover immediately after casting unless there are marking on the slab.
4-Detention of bed: By stressing Machine
   a-After getting correct strength of concrete from laboratory, distress the bed immediately. “Schmidt hummer use to determine the required strength “
   b-Cut the strand on both end.
   c-Remove the strands & place it in the waste strand area.
5-Cutting of Slabs: By Saw Machine.
   a-Before start cutting of slabs, all strands in the cut out area to be cut.
6-Demoulding of Slabs:
   a-Check the full bed for same length slabs /part slabs for easily in trolley.
   b-Proper beams to be used for lifting
   c-Both ends of the slab should be same level while lifting.

7 - Placing of Slabs on Trolley:
   a-As for as possible same length slab should be kept in one trolley. Place the longest one at the bottom.
   b-The overhang after wooden support should not be more than 60 Cm.
   c-Minimum 30 Cm should be left near wooden support at end for lifting with belt.
   d-Leave 20cm at end of each trolley to get gap between trolleys.
   e-Write element code, project, bed no, date of casting on front side of slab.
   f-All exposed strands to be painted with red oxide paint (at both ends, cut out).
   g-Slabs of same bed &project should be placed in same trolleys.
   h-Different thick slabs of same project should be kept in separate trolleys for easy handling at stock yard.
   i-Always place the wooden support at same level.
   j-Keep the stock slabs on separate trolley or top of the trolley.
Daily Tests:
1-Sand Equivalent according to ASTM D2149.
2-Making and Curing Concrete Test Specimens in the Field according to ASTM C31.
3-Compressive Strength of Cylindrical Concrete Specimens according to ASTM C39.
4-Rebound Number of Hardened Concrete by Schmidth Hammer according to ASTM C805.
5-Load test to hollow core according to ACI 318.
*Modern Concrete Hollow-core Slab Details:

1-HC on External Load Bearing Panels
- Floor finishing (ceramic)
- Structural screw 5 cm thick (w/ wire mesh Ø7mm 20 x 20)
- Hollow core slab 26.5 cm

2-HC on Internal LB Panel
- Floor finishing (ceramic)
- Structural screw 5 cm thick (w/ wire mesh Ø7mm 20 x 20)
- Hollow core slab 26.5 cm

3-HC on Roof Slab
- Floor finishing (ceramic)
- Structural screw 5 cm thick (w/ wire mesh Ø7mm 20 x 20)
- Hollow core slab 26.5 cm
- Water proofing membrane
- Compacted soil

4-HC on Internal Load Bearing Panel
- Floor finishing (ceramic)
- Structural screw 5 cm thick (w/ wire mesh Ø7mm 20 x 20)
- Hollow core slab 26.5 cm
- Water proofing membrane
- Compacted soil

5-Using HC as Slab on Grade (External Wall)
- Internal precast concrete non-load bearing panel 20 cm thick

6-Using HC as Slab on Grade (Internal Foundation)
- Structural screw 5 cm thick (w/ wire mesh Ø7mm 20 x 20)
- Hollow core slab 26.5 cm
- Water proofing membrane
- Compacted soil
*Modern Concrete Hollow-core Slab Details:

7-HC Slabs as Slab on Grade

<table>
<thead>
<tr>
<th>Layer</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulated cladding panel 20 cm</td>
<td></td>
</tr>
<tr>
<td>Dowel Ø25 mm</td>
<td></td>
</tr>
<tr>
<td>Grout</td>
<td></td>
</tr>
<tr>
<td>Structural screw 5 cm thick (w/ wire mesh Ø7mm 20 x 20)</td>
<td></td>
</tr>
<tr>
<td>Hollow core slab 26.5 cm</td>
<td></td>
</tr>
</tbody>
</table>

8-HC Slab as Slab on Grade

<table>
<thead>
<tr>
<th>Layer</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulated cladding panel 20 cm</td>
<td></td>
</tr>
<tr>
<td>Dowel Ø25 mm</td>
<td></td>
</tr>
<tr>
<td>Grout</td>
<td></td>
</tr>
<tr>
<td>Structural screw 5 cm thick (w/ wire mesh Ø7mm 20 x 20)</td>
<td></td>
</tr>
<tr>
<td>Hollow core slab 26.5 cm</td>
<td></td>
</tr>
<tr>
<td>Precast non-load bearing panel 15 cm</td>
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</tr>
</tbody>
</table>

9-HC Slab on Typical Floor

<table>
<thead>
<tr>
<th>Layer</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulated cladding panel 20 cm</td>
<td></td>
</tr>
<tr>
<td>Dowel Ø25 mm</td>
<td></td>
</tr>
<tr>
<td>Grout</td>
<td></td>
</tr>
<tr>
<td>Structural screw 5 cm thick (w/ wire mesh Ø7mm 20 x 20)</td>
<td></td>
</tr>
<tr>
<td>Hollow core slab 26.5 cm</td>
<td></td>
</tr>
<tr>
<td>Precast non-load bearing panel 15 cm</td>
<td></td>
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</tbody>
</table>

10-HC Slabs on Typical Floors

<table>
<thead>
<tr>
<th>Layer</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulated cladding panel 20 cm</td>
<td></td>
</tr>
<tr>
<td>Dowel Ø25 mm</td>
<td></td>
</tr>
</tbody>
</table>

11-HC Slab on Roof

<table>
<thead>
<tr>
<th>Layer</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulated cladding panel 20 cm</td>
<td></td>
</tr>
</tbody>
</table>

12-HC Slabs on Roof

<table>
<thead>
<tr>
<th>Layer</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulated cladding panel 20 cm</td>
<td></td>
</tr>
<tr>
<td>Dowel Ø10 mm</td>
<td></td>
</tr>
<tr>
<td>Precast non-load bearing panel 15 cm</td>
<td></td>
</tr>
</tbody>
</table>
*Modern Concrete Hollow-core Slab Details:

13 - Exterior Bearing (Typ. Flr.)

14 - Exterior Bearing (Roof)

15 - Interior Bearing

16 - Exterior Side Lap

17 - Interior Shear Wall

18 - Interior Change of Direction
*Modern Concrete Hollow-core Slab Details:

19- Header Support at Large Opening

20- Slab Header Types

21- Small Side Slab Roof Overhang

22- Cantilever HC Slab for Bay Windows

23- End Bearing on Steel

24- Interior Bearing on Steel
Modern Concrete Hollow-core Slab Details:

25- Interior Side Lap on Steel

26- Interior Change of Direction

27- Angle Support at Corridors

28- Change of Direction on Angles

29- End Bearing on Upset Steel

30- Interior Bearing on Upset Steel
*Modern Concrete Hollow-core Slab Details:

31- Interior Bearing on Upset Steel

32- Interior Bearing on Upset Steel

33- Cantilever HC Slab for Bay Windows

34- Exterior Bearing on Metal Stud

35- Exterior Bypass Side on Metal Stud

36- Exterior Side Lap on Metal Stud
*Modern Concrete Hollow-core Slab Details:

37- Interior Bearing on 200mm Metal Wall

38- Typ. Girder-Slab System

39- Elevator Door Support Detail A

40- Elevator Door Support Detail B

41- Elevator Stud & Slab at Elevator Wall

42- Exterior Bearing on 150mm Wall
Modern Concrete Hollow-core Slab Details:

43- Interior Bearing on 150mm ICF Wall  
44- Exterior Bearing on 200mm ICF Wall  
45- Interior Bearing on 200mm ICF Wall  

46- Brick Releasing Angle

If gROUT AND INSTALLATION OF SLAB IS TO BE PERFORMED THEN THE CONTRACTOR IS TO RETAIN FROM INSTALLING BRICK RELEASING ANGLES UNTIL THE WORK HAS BEEN COMPLETED, ESPECIALLY IN SITUATIONS WHERE THE ANGLE WOULD HINDER FROM PERFORMING THE AGREED UPON SCOPE OF WORK.

ALL BRICK RELEASING ANGLES SHOULD BE ANCHORED INTO THE WALL SHEETING (SEE SECTIONS BELOW WHICH HAS BEEN DESIGNED TO ACCOUNT FOR SUCH LOADING) DO NOT INSTALL RELEASING ANGLES INTO GROUT OR ATTACH DIRECTLY TO THE HOLLOW-CORE SLAB.

IF YOU NEED ADDITIONAL INFORMATION OR ASSISTANCE PLEASE CONTACT MODERN CONCRETE TECHNICAL OFFICE.