

# HTC Sweden AB

Betong och gjutteknik

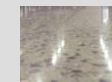
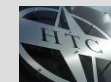
## Concrete and Pouring Techniques

Case study

HTC Sweden AB



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### General

Concrete floors should be designed according to general requirements based on the activity and stress that the floor will be exposed to. The designer always has the responsibility for maintaining the calculations of the requirements for reinforcement and the choice of concrete quality.



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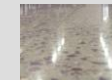
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## General

In order for the floor to obtain the optimal aesthetical appearance, the pouring and treatment of the concrete during laying is extremely important. When grinding, the external surface of the concrete is exposed and any defects or cracks and pores that occurred during pouring can be both time-consuming and difficult to correct.



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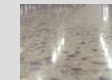
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In connection with our addition, we wanted to plan already from the project stage for good pouring, and in the end as good a floor both functionally and aesthetically as possible. Therefore we collected knowledge both from the concrete supplier and the contractor to optimise the prerequisites.



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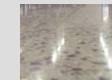
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Below, in addition to reference pictures of our HTC Superfloor, you will also find a “case study” for the entire pouring process that can hopefully also be applied to other situations.



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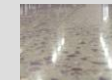
Picture: Meticulous preparatory work beginning from the subgrade.

## Preparatory work:

The isolated subgrade with coarse gravel was topped with macadam (gravel 4-8 mm) which was carefully compacted. The surfaces were floated with a bullfloat to further level and compact the surface to avoid the risk of settling.



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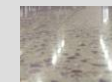
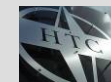
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The reinforcing netting was finger-jointed and checked that it was placed at the correct level, 25-30 mm under the pouring level.



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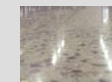
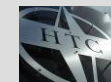
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The floor was designed to be poured in two layers, the lower layer in standard concrete, 110 mm, with a top pouring, 70 mm, wet-on-wet with finer ballast aggregate to obtain as stone-rich an upper surface as possible.



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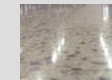
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The choice of two-layer construction was guided only by the design wishes of HTC Sweden AB. In the office section, the concrete was coloured with a red colouring pigment while the workshop section remained the standard grey.



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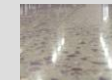


The pouring was performed in stages of 300 – 500 sq. m. / day.

The screed guides between the pouring zones were created with concrete screed guides, of the type BBK ban, with a steel top with a 7 mm plastic rim that was removed before the next pouring zone was begun. A concrete net was placed under the screed guide to prevent the concrete from flowing off. This type of screed guide has prepared holes for bolts of cc 150 mm.



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The concrete mixer truck/pump should be placed in an appropriate location so that all or as large portions of the work area as possible can be reached.

Before pouring from the truck, the concrete should be rotated for 7-10 minutes to obtain as even quality as possible and to avoid separation.

The mixer should also be started during longer pouring pauses.



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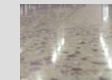


The first poured layer is pumped out and vibrated with a poker vibrator. Pouring thickness 110 mm with standard concrete of quality C28/35. (see separate preparation instructions with the concrete)

Keep in mind: Internal vibration should always be performed on concrete with compression reinforcement located on the ground, as in this case. Always vibrate carefully close to guides, screed guides and forms.



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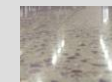
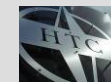
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**Remember: Never transport the concrete with the vibrator, as this involves a risk for over vibration and separation.**



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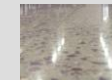
The external surface was poured with laser assistance approx. 1 hr after the foundation. Pouring thickness approx. 70 mm.

Concrete of a quality equivalent to C28/35 was used here, but with an aggregate of crushed material of max. 8 mm. We ensured that the crushed material was free from impurities and slate to obtain a good upper surface when grinding later.

To minimize the plastic cracking (microcracks), polypropylene fibres were added to the concrete mixture (0.8 kg / c3).



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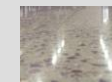
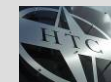
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Plastic fibres also have aesthetic benefits when the floor is ground and polished since the aggregate material remains more even in the concrete's upper surface. The fibres are however completely invisible in the polished surface.



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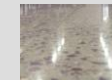
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When the concrete topping is vibrated with the poker vibrator, it is important to remember not to pull up the vibrator so quickly that larger cobble fractions from the base course are pulled up into the concrete topping.



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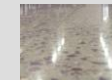
A vibrating bullfloat is used to obtain the best surface evenness after pouring.

To obtain the greatest possible evenness, floating should be performed in two directions perpendicular to each other.

Remember: Do not walk in the concrete more than necessary. This minimises the risk that the ballast material is pressed down, which can create sections in the floor where only the cement paste is visible.



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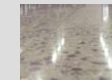


When the concrete has reached the correct bearing capacity, surface work is begun with a power trowel equipped with a floating disc. The procedure was performed carefully 2 times over the surface of the floor. Surfaces which are not accessible with the machine such as corners, joints, etc are floated by hand.

Careful power floating is an important element that strengthens the concrete's upper layer through fibrillation and mixing of cement and sand particles, as well as making it more compact and vibrating the surface to make it as porous as possible.



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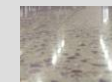
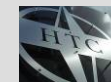


After floating is completed, the surface is machine trowelled slightly to further strengthen the external surface.

Remember: A surface which has been trowelled too hard will be more costly to grind.



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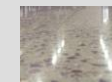
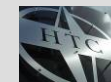


We chose to finish trowelling with a wide blade that was pulled across the concrete to obtain the most porous upper surface possible.

This treatment facilitates grinding since the surface is not hard-trowelled but still compact and pore-free.



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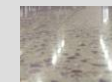
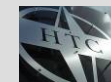
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When the concrete hydrates and begins to harden, internal strains in the concrete occur which will create shrinkage cracks.



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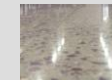
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To control the shrinkage, it is important to cut control joints in the floor as early as possible. Cutting should be performed in square boxes with a depth of approx. 20-25 mm or up to 30% of the pouring thickness, but it is important to never cut into the lower reinforcement.

We used a machine named Soff-Cut. This is a dry-cutting method that can be begun already 1-2 hours after finishing. The joints are shallow and the early cutting minimises the risk for shrinkage cracks.



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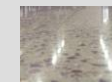
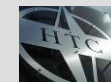
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After the cutting, a plastic strip is placed into the cut joints to avoid chipping in the joints when grinding of the floor is begun. This plastic strip is removed from the joint later and is replaced with real jointing material.



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## Other things to consider:

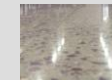
All too rapid and early drying of the concrete would cause shrinkage cracks, so to avoid this the surface is coated with water and covered with plastic sheeting.

It is advisable to allow the surface to harden under water at least 3-4 days.

The concrete should have reached more than 70% of its final strength before grinding begins. Depending on weather and temperature, we generally recommend that grinding begins at the earliest 5-7 days after pouring if the choice of concrete was a standard product such as the one we used. With material that hardens more quickly, grinding can begin even earlier.



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As a result of rain and snow, such early grinding was not possible in our case and we were forced to wait until the building had a roof.



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