High-quality concrete floors

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High-Quality Concrete Floors

Sols en béton de haute qualité

Betonböden von hoher Qualität

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How does it come that so many engineers/architects and end users are dissatisfied with their concrete floors today?

High maintenance costs, uneven surfaces and wide cracks are some of the quite common problems in factory floors all over the world. In a factory, the floor is the most important part of the whole building. The floor is always produced on site and normally with a new crew and/or new material. In other words the conditions are always changed from site to site. How the floor will look like and perform during its "lifetime" is depending on many factors but there are three major factors affecting the end result more than others.

These three factors are:

1. Concrete mix
2. Water-cement ratio in placed concrete
3. Production method

1. CONCRETE MIX

It is obvious that if you want to make a floor with some special features, you need a concrete mix that is suitable for the purpose of the finished product. You cannot just use the same concrete mix you are using for walls, foundations etc. if you want to make a really good floor. If you want low shrinkage, high wear resistance and limited curling, you have to take this into consideration already when you design the concrete mix. You need to specify the concrete mix for your floor.

Multibuilders (end users) are nowadays realizing that they will get the floor they are requesting only if they specify the floors production in details, from concrete mix design to how to place and execute the production of the floor at building site.

2. WHY IS THE W/C-RATIO IN PLACED CONCRETE SO IMPORTANT?

When the concrete mix is transported to the building site and placed in situ you need to vibrate the concrete with a poker vibrator for good compaction. You also need to use a surface vibrator in order to achieve right level and flatness of the floor.

Even if you had not vibrated the concrete at all you would find that a distribution of the components in the mix is taking place. Downwards goes heavier material like coarse aggregates and up goes water and fine sand. This means that you got a much higher water-cement ratio at the surface whereas that at the bottom will be slightly lower than the average w/c-ratio of the initial mix.This affects also the compressive strength of the surface. A design engineer is looking for a compressive strength at the surface of 300 kp/cm^2, if he specifies that. But he will achieve only about 255 kp/cm^2 in the upper part because due to gravitation, heavier particles in the concrete will move towards bottom and fines and water to the surface. This happens without vacuum dewatering.
In a vacuum dewatered floor, the water content is reduced and the quality of the concrete improves at least by 70 % and the compressive strength will be at least 435 kp/cm^2. The "classical" test from the Hannover University shows also very clearly how vacuum treatment improves the compressive strength at top and bottom of a 200 mm thick slab.

Even more important is the effect of shrinking and curling.
A "normal" floor with a high w/c-ratio at the top will curl.
A vacuum treated floor will not show any curling at all because of a low w/c-ratio at the top.

3. PRODUCTION METHOD

Even if you have taken into consideration the first two factors you still can get a "bad" or an ordinary concrete floor, if the production method is not specified.
The production method is very important for good result and the contractor has to follow all instructions carefully step by step in order to achieve the optimum result.

This Swedish method is a rational method developed with one purpose in mind - to achieve the best possible concrete floor to a reasonable cost. The method is based on experience from thousands of building sites all over the world and it includes vacuum treatment of placed concrete which reduces the w/c-ratio to such a low level that you can step out on the concrete surface, check and adjust the level.