WHEN IS A CONCRETE FLOOR SLAB DRY?

Natural drying of a concrete slab will take several months and it's important to ensure fixed floor coverings aren't installed too soon.

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Installing fixed floor coverings over concrete slabs that have not had sufficient time to dry can result in unacceptable movement in solid timber and timber composite overlay flooring, moisture build-up causing bubbling and adhesion loss under impermeable flooring such as vinyl and cracks in tiled flooring as the concrete shrinks, so it is crucial to allow concrete to dry out enough before installing fixed floor coverings. But how dry is dry enough?

Moisture sources

Most of the moisture that causes problems in a concrete slab comes from either:

- excess moisture still in the concrete that has not had sufficient time to dry – concrete requires more water to make it workable than is required for hydration, and most of this extra water must dry before flooring is laid
- ground moisture that is coming through a damaged or non-existent damp-proof membrane under the slab.

Concrete floor slab drying times

Natural drying of a concrete slab will take several months. Under good drying conditions, a rule of thumb is to allow at least 1 month of drying for every 25 mm of slab thickness after the building is closed in. For a 100 mm thick slab, this means a minimum drying time of 4 months is needed (see Figure 1). This may be longer if there is:

- high humidity
- low air temperature
- reduced ventilation because of limited airflow across the slab.

The construction programme must allow for poor drying conditions. Forced drying of slabs using heaters or dehumidifiers is *not* recommended as it results in drying the surface of the slab only – the moisture within the slab remains.

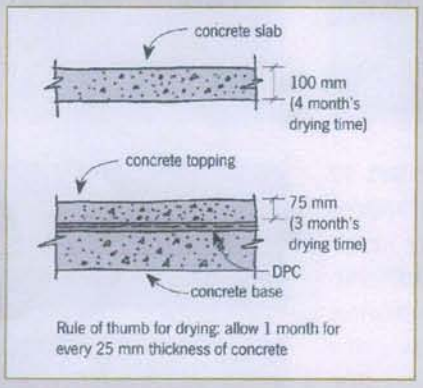

Figure 1: Estimated concrete floor drying times.

Target maximum relative humidity

Under E2/AS1, a concrete floor slab is permitted to have a maximum relative humidity of 75% before laying flooring, when measured using a flooring hygrometer (Edney gauge). However, due to the accuracy variable of the hygrometer and the sensitivity of timber to moisture movement, BRANZ recommends a maximum of 70% relative humidity for timber or wood-based flooring.

Measuring moisture content

A simple test of a slab's moisture content can be carried out by laying a 1.0 m × 1.0 m piece of clear polythene over the floor and taping down all edges. Alternatively, a rubber mat may be used. If there is condensation under the polythene or rubber after 24 hours, the slab is too wet. This quick test provides a rough indication only. If there is no condensation, use a hygrometer or humidity probes to carry out a more accurate measurement of moisture content.

The moisture content of concrete can be measured using:

- a hygrometer (Edney gauge) – this is the only method of measuring moisture in concrete that is given in E2/AS1
- in situ, calibrated humidity probes in accordance with ASTM F2170-02 – these have recently become more affordable.

Using hygrometers and humidity probes

A flooring hygrometer measures the relative humidity of the air in contact with the surface of the concrete slab, which in turn provides a reading of the concrete's moisture level.

When using a flooring hygrometer, it must be sealed to the concrete and left for at least 16 hours. It cannot be used if the floor has been wetted, and some conditions (for example, artificial drying or surface contaminants such as curing agents) will distort the reading.

Factory-calibrated humidity probes may be embedded in the slab during concrete placement or inserted into a hole drilled in the slab in accordance with the manufacturer's instructions. Probes measure the relative humidity of the concrete within the slab rather than at the surface. While there is no specific New Zealand recommendation for moisture content using probes, overseas recommendations range between 60–80%.

For further information, see BRANZ Bulletin 506 Laying solid timber strip flooring on concrete slabs.

Allow time for on-site acclimatisation

Once the slab is dry, timber and wood-based overlay flooring must be allowed to acclimatise on site for at least 48 hours before being laid (manufacturers may require 3 days). This will ensure that it is at the same temperature and moisture level as the space in which it is being laid. Packets of flooring should be opened and stacked off the substrate to allow full air circulation around the material. Vinyl flooring should be rolled out and left for 48 hours to allow it to relax and the temperature to equalise with that of the space.

If these steps and the manufacturer's instructions are followed, the results should be a satisfactory and trouble-free fixed flooring laid over a concrete slab.