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Performance standards in building — Performance test for precast concrete floors — Behaviour under non-concentrated load

Normes de performance dans le bâtiment — Essai de performance des planchers préfabriqués en béton — Comportement sous charge non concentrée

INTERNATIONAL ISO

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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Performance standards in building — Performance test for precast concrete floors — Behaviour under non-concentrated load

1 Scope

This International Standard defines test procedures for determining the mechanical performance of precast concrete floors made of a single piece, or made up of precast joists (reinforced concrete or precast concrete) completed with filler blocks and concrete poured *in situ*. The parameters measured are:

— the maximum load, by progressive loading, which does not result in collapse,

— the instantaneous and deferred deformations under imposed load, and

— the maximum load which the floor or its constituent precast elements can support without collapse during its construction.

This International Standard applies to the testing of floors designed to support loads of less than 5 000 $N \cdot m^{-2}$ and having spans of less than 12 m.

2 Test principles

Test pieces made up of floor sections or of precast floor elements and resting on two or three supports are subjected to increasing loads (instantaneous tests) or long-term tests.

2.1 Instantaneous tests

The floor is loaded by hydraulic actuators giving a constant load. This load is increased in steps. The instantaneous deformations are recorded at each increment. Once the imposed load has been reached, unloading takes place and the residual deformations are measured. The test is then continued until rupture, that is up to the time the load can no longer be supported. The test may also be stopped at a preset load; this load is noted as the non-rupture load if the floor actually does not rupture under it.

2.2 Long-term tests

The load is applied progressively until it has reached the imposed load. It is then maintained constant for at least six months.

The deformations are measured at regular intervals throughout the period.

3 Test machine

Any press which develops a force sufficient to break the floor being tested, permitting application of this force to the test piece according to one or two lines perpendicular to the span, may be used as a test machine. If the application is carried out on two lines, they are usually at 1/4 of the filler block or at 1/3 of the span.

The force shall be uniformly distributed over the width of the test piece through the use of a hinge.

The forces applied shall be measured with an accuracy of ± 5 %.

The supports shall not be affected by settling greater than 2 mm.

The test piece shall be seated on supports separated from the rollers by a distribution plate.

When the test is carried out on three supports, the upper surfaces (or arrises) of these supports shall not — before and under loading — be separated more than 2 mm from the plane defined by one of the supports and the end of the other.

The instruments measuring the deformations shall have an accuracy of 0,1 mm.

4 Test method

4.1 Test on the finished floor

4.1.1 Test piece

As the case may be, the test piece consists of either

— a slab-type precast element, or

— three joists (or ribs), two rows of inserted hollow filler blocks, two half-rows of lateral filler blocks and the corresponding added concrete.

4.1.2 Test conditions

The test may be carried out at any temperature between 0 °C and 40 °C. This temperature shall be recorded.

4.1.3 Test procedure

The test can be carried out

— on a floor with a span corresponding to the usual dimensions of the floor elements, or

— on a floor resting freely on three equidistant supports.

In the case of a test on three supports, the loading shall be carried out at an equal speed on the two spans simultaneously.

The loading shall be carried out by increments equal to 1/5 of the imposed load for which the floor is designed, and for 2 min to 5 min.

For each unit-increment of the load, the loading speed shall be a maximum of 100 N/s.

The floor deformations shall be measured at each increment, in mid-span, at three points, one located on the axis of the test piece and the other two near its edges.

The measurement results shall be corrected by taking into account settling of the supports. The settling of the supports shall be measured at the same time as the floor deformations.

4.1.3.1 Instantaneous loading test

The instantaneous loading test consists of two distinct phases:

a) Loading up to the imposed load

After the step corresponding to the imposed load, the floor is unloaded; it is then left in this state for 5 min to 10 min.

b) Loading until rupture

The floor is loaded again in steps until such time as it is no longer possible for the floor to sustain the load.

During these two phases, the appearance of any defects such as cracks, creaks, chips, etc., are recorded.

The loading shall be halted every time a new type of defect appears and the defect shall be recorded.

4.1.3.2 Long-term loading test

The imposed load is maintained for six months.

In the course of this period, deformations shall be measured every week during the first two months, and subsequently each month.

The residual deformation shall be measured immediately after unloading, then after stabilization. It is considered that the latter has been obtained if the variation of deformation over one week is less than 1/20 of the maximum deformation.

4.1.4 Presentation of results

The test report shall include:

a) the load chart as shown in figure 1; at the various increments, any defects shall be noted (cracks, chips, etc.);

b) indication of the load and the rupture mode;

c) recorded deformations, as shown in figure 2;

d) indication of the residual deformations.

4.2 Tests on isolated joists

4.2.1 Test piece

A test piece consists of an isolated joist.

4.2.2 Test conditions

The tests may be carried out at any temperature between 0 °C and 40 °C. This temperature shall be recorded.

The test is carried out only on precast joists.

Depending on the case, the elements shall rest on:

— their end supports,

— their end supports and one intermediary prop support at mid-span, or

— their end supports and two intermediary prop supports, placed at either 1/3 of the span or at 2/5 and 3/5 of the span.

4.2.3 Test procedure

The procedure is as indicated in 4.1.3, by loading in increments. In this case, the imposed load shall be equal to the sum of the weight of one row of filler blocks, the weight of concrete to be used on the building site and the conventional building site load (personnel and equipment).

The load shall be applied in accordance with the following schemes, corresponding to the three types of loading.

4.2.4 Presentation of the results

See 4.1.4.

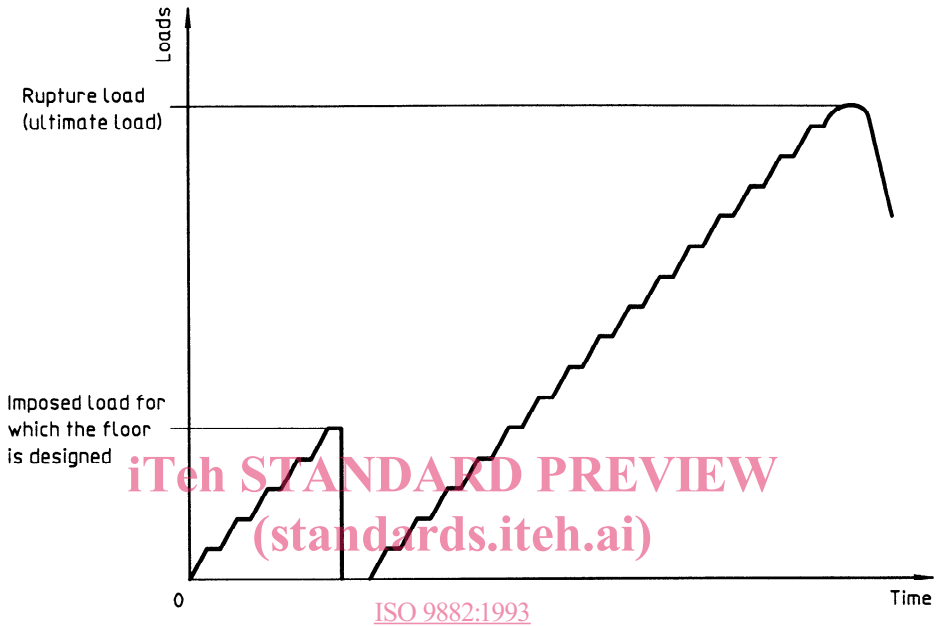

Figure 1 — Load chart

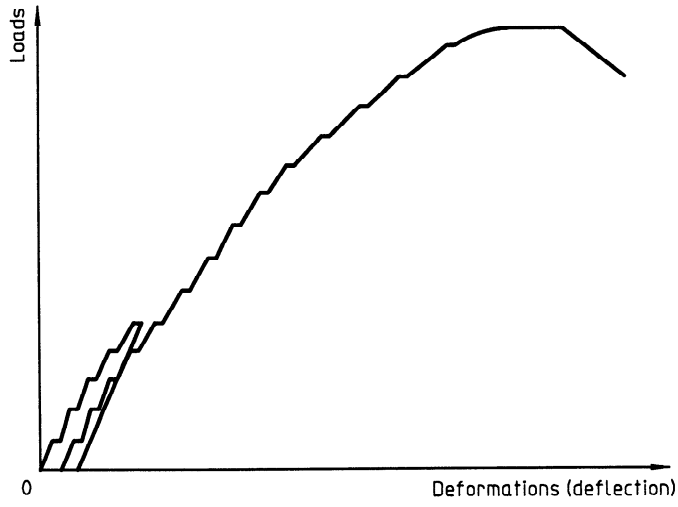

Figure 2 — Chart of the recorded deformations

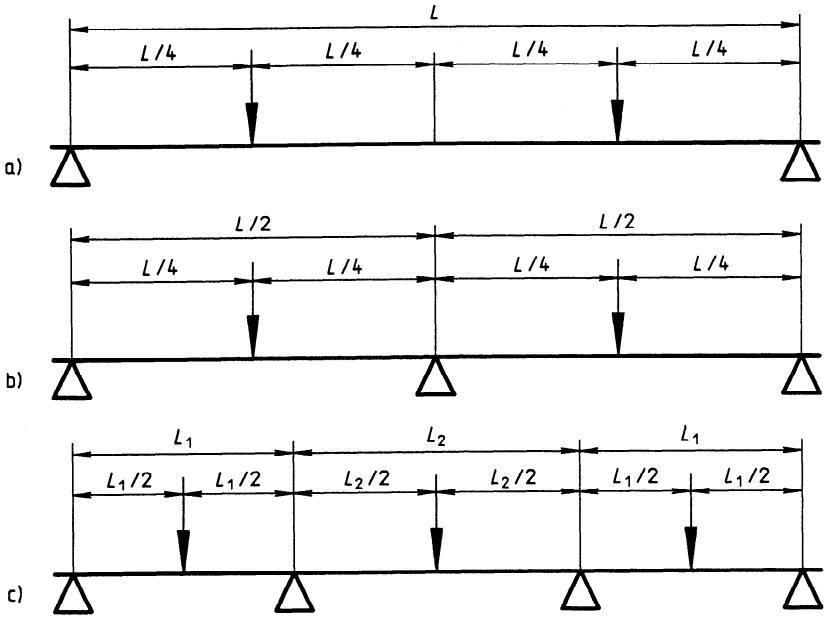

Figure 3 — Schemes for the loading of joists

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