CONCRETE, HARDENED:  
COMPRESSIVE STRENGTH — ACCELERATED CURING FOR 24 HOURS

1. SCOPE AND FIELD OF APPLICATION

The NORDTEST method is intended for the determination of the compressive strength of test specimens at 24 hours age after they have been made subject to heat curing.

After calibration for the compressive strength of test specimens that have been stored in the normal manner acc. to NT BUILD 203, the method may be used to evaluate the 28 days compressive strength already after 24 hours. The conditions for this are stated in the comments.

2. REFERENCES

NT BUILD 191 CONCRETE, FRESH: SAMPLING
NT BUILD 200 CONCRETE, HARDENED: DIMENSIONS FOR TEST SPECIMENS
NT BUILD 201 CONCRETE: MAKING AND CURING OF TEST SPECIMENS FOR STRENGTH TESTS
NT BUILD 203 CONCRETE, HARDENED: COMPRESSIVE STRENGTH OF TEST SPECIMENS
3. **SAMPLING**

If nothing otherwise is indicated in the request for sampling, the test specimens shall be taken in acc. with NT BUILD 191. The manner of the sampling shall be stated in the test report.

The sizes and dimensions of the test specimens should be acc. to NT BUILD 200.

4. **METHOD OF TEST**

4.1 **Principle**

The method is based on the principle of accelerating the compressive strength of the concrete by heat-curing it in a controlled manner.

4.2 **Apparatus**

Equipment as listed in NT BUILD 191, 201 and 203. The cubic moulds described in NT BUILD 201 should have tight fitting lids. All types of moulds should be capable of rendering test specimens whose load bearing surfaces, without any grinding or levelling, have the planeness stated in NT BUILD 200.

Curing container with lid, both made from corrosion resistant material, and heat insulated.

The container should be filled with water. It should be equipped with one or several immersion heaters governed by a thermostat which maintains the temperature of the water at 55 ± 2 °C.

If special reasons call for it, the temperature of the water may be chosen from the range of 50 - 70 °C. But the temperature must not vary from the selected one with more than ± 2 °C.

The temperature of the water during the heat curing process must be continuously recorded with an accuracy of ± 1 °C.

The shape of the container must be such that the water can freely flow around the test specimens when they, placed on a detachable
grid, are lowered down into the container so that the surface of the water is about 50 ± 10 mm above them. The container should be equipped with a stirrer or pump providing a slow circulation of the water so that all the surfaces of the test specimens are in contact with the water of the correct temperature.

4.3 Preparation of Test Samples

The test specimens shall be manufactured acc. to NT BUILD 201. They shall be made from concrete having a starting temperature of 15 - 20 ºc.

4.4 Procedure

Immediately after the casting, the lid is put on the moulds. Within 15 minutes after the casting, they should be placed in the water that has reached the intended curing temperature. The container should then be closed.

The test specimens should now be water-cured for a period of 24 hours ± 5 minutes. The temperature of the water - with the exception of the first 15 minutes - must be kept constant within the range of 50 - 70 ºC ± 2 ºC. After the curing is completed, the specimens are demoulded.

Within 15 minutes after the specimens have been demoulded the load-bearing surfaces of the specimens should be dried and the compressive strength of them should be determined acc. NT BUILD 203. Normally, the density is not calculated.

4.5 Expression of Results

The compressive strength is expressed in MPa (N/mm²) with one decimal figure rounded off to the nearest 0 or 5.

4.6 Test Report

If a test report is submitted, it should contain at least the following information:
a) Name and address of the testing laboratory
b) Date and identification symbols of the report
c) Test method (number and title)
d) Any deviation from the test method
e) Name and address of the person or institution who ordered the test
f) Name and address of the person performing the test, and method of sampling
g) Name and address of the manufacturer of the concrete
h) The identification symbols of the concrete. The composition and temperature of the concrete should also be noted
i) Date when the test was performed, and when the sample was delivered
j) Test results
k) Any other information of importance for the evaluation of the test results
l) Evaluation of the test results, if this is required in the request for the test

Comments

The method may be used, after it has been calibrated, to estimate the compressive strength of test specimens at the age of 28 days with the condition that the following factors, that influence the relation between the compressive strength between 24 hours and 28 days, are kept constant.

- the sizes and dimensions of the test specimens
- the material in the concrete and its composition
- the starting temperature of the concrete
- the curing temperature

The curing temperature has been set at 55 ºC since this is used, e.g. in the British Standards. There are many conceptions about a correct curing temperature. Thus other curing temperatures are permitted.

The reliability of the method may be increased if one registers the temperature of the concrete - perhaps also of the water -
for a comparative calculation of the degree of maturity of the concrete.