1. SCOPE AND FIELD OF APPLICATION

This NORDTEST method is intended for the determination of the force that is needed to break off a concrete cylinder from a completed object of the measures stated in Fig. 1. This force is here defined as the breaking force. The cylinder may be taken out either after the concrete is cured or, by sampling from a horizontal surface, be formed with the aid of a sleeve inserted in the fresh concrete after the preparation of the surface has been completed.

The method may be used for the evaluation of the compressive strength in completed object with the condition that the values obtained according to the method have been calibrated for concrete with a known compressive strength and of the same composition as the concrete whose compressive strength one intends to evaluate. The relationship between the force and the tensile strength of the concrete may then usually be expressed in a linear function.

The method may also be used for the determination of a bond or an adhesion in joints. Then the height of the test specimen, and if a break has occured in the joints should always be stated in the test report.
The core bending test may also be used to determine if the strength of the object has achieved a sufficient level in relation to, e.g. 
- prestressed concrete (for pre-tensioned and post-tensioned concrete) 
- form stripping 
- protection against freezing that may cause damages 
- termination of curing

The method can not be used when the temperature of the concrete is lower than 0 ºC.

The number of test points and the age of the concrete at the time of testing are not considered in the method.

2. SAMPLING

The test points should be selected with reference to the purpose of the investigation. The open distance between the planned test points and the planned test points and the edges of the object shall be at least 4 x the maximum nominal particle size used in the concrete, still at least 50 mm. The intended rupture surface must not be crossed by any reinforcement rods or net.

The evaluation of the results should be based on not less than 5 bending tests.

The thickness of the object at the test place must be at least 90 mm.

3. METHOD OF TEST

3.1 Principle

The method is based on the procedure that one breaks off a cylinder having a diameter of 55 mm and a height of 70 mm by means of a device that increases the load acc. to Fig. 1 with a welldefined lever. The cylinders may be core drilled or shaped in a sleeve, e.g., acc. to Fig. 2.
Fig. 1. Test sample with load cell. Measures.

Fig. 2. Example of load system and sleeves.
3.2 Apparatus

A load system consisting of, i.e., a load cell that provides the load acc. to Fig. 1.

One must be able to increase the load continuously at a rate acc. to 3.4.

The amount of maximum load must be determined with an accuracy within ± 2%. The ultimate load should be recorded after the rupture has occurred.

A drilling machine with a core drill which can provide a test sample and groove acc. to Fig. 1.

Sleeve, concrete-resistant, one for each test sample, which provides a test sample and a groove acc. to Fig. 1. This may be used in place of the core drilling machine for the testing of concrete in frameform or similar constructions, see 3.3

3.3 Preparation of Test Samples

If the concrete is not damaged by the use of the core drilling machine, this may be used for the manufacture of the test samples.

During tests in frameform or similar constructions, the sleeves may be used. They should be oiled and placed in the concrete after the surface of the concrete has been finished so that test samples acc. to Fig. 1 may be obtained. The concrete surrounding the sleeves should be compacted by means of light tappings on the surface of the concrete so that the sleeves are completely surrounded by the concrete. The sleeves may be removed at the time when the concrete is not damaged by the removal of the sleeves.

The test samples should be treated in the same manner as the concrete in the object between the manufacture and the test.
3.4 **Procedure**

The concrete must not be frozen during the testing.

The load cell should be placed so that it touches the concrete acc. to Fig.1. The load is then continuously increased at the rate of $0.1 \pm 0.05$ kN/s. The highest load is noted at the ultimate load.

3.5 **Expression of Results**

The ultimate load should be stated in kN and rounded off to the nearest 0.05 kN.

The height of the test specimens should be stated in mm.

3.6 **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  
g) Name and address of the manufacturer of the concrete  
h) The identification symbols of the concrete. If a reference test has been performed, the composition and temperature of the concrete should also be noted  
i) Identification of the tested surfaces, shape and dimension of the tested object  
j) Date when the test was performed  
k) The age of the concrete, if known  
l) Test results  
m) Any other information of importance for the evaluation of the test results  
n) Evaluation of the test results, if this is required in the request for the test.