TECHNICAL REPORT

Test method for elastomeric insulating elements – Determination of creep

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EUROPEAN ORGANISATION FOR TECHNICAL APPROVALS

EOTA Technical Report 037

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Foreword

EOTA Technical Reports are developed as supporting reference documents to European Technical Approval Guidelines (ETAG) and can also be applicable to a Common Understanding of Assessment Procedures (CUAP), an EOTA Comprehension Document or an European Technical Approval, as far as reference is made therein.

EOTA Technical Reports go into detail in some aspects and express the common understanding of existing knowledge and experience of the EOTA Bodies at a particular point in time.

Where knowledge and experience is developing, especially through approval work, such reports can be amended and supplemented.

When this happens, the effect of the changes upon the European Technical Approval Guidelines will be laid down in the relevant Comprehension Documents, unless the European Technical Approval Guideline is revised.

This document was developed by the Belgian Building Research Institute, BBRI.

1 Scope

This technical report specifies a method that enables the user to determine the creep properties of elastomeric insulator elements.

2 Introduction

The test is based on the principle that a specimen, most often a rectangular shape, is subjected to static load.

This force is related to the design load.

After applying the load, the displacement is measured and recorded during 4 logarithmically scaled timeframes; after the load phase, the elastic recuperation displacement is measured.

Using these measurements, the creep rate, creep rate straightness, elastic recuperation and creep criterion are determined.

3 Apparatus

A static pressure equipment is needed, equipped with a measurement device capable of determining displacements with an accuracy of 0,01 mm. The measurement device may be of the electronic type, equipped with data logging equipment.

Vernier calipers are needed, for determining thicknesses with an accuracy of 0,01 mm.

The laboratory is to be maintained at standard laboratory conditions.

4 Sample taking and conditioning

The sample must be acclimatized to the standard laboratory conditions for 24 hours prior to testing.

If the sample has to be cut, milled or shaped before testing, the sample will subsequently be left to set for 24 hours prior to testing. The sample may be cut, milled or shaped before acclimatizing.

5 Test procedure

The thickness of unloaded the specimen is determined by measuring the thickness at the corners and by calculating the average value; this average thickness is labeled h_0.

The sample is then placed between the working surfaces of the pressure equipment. Before applying pressure the comparator is set to zero. After applying pressure for t seconds, the displacement d_1 is recorded. Linked to this displacement d_1 is the thickness h_1 of the specimen after n seconds.

In the same way, after $t \times n$, $t \times n^2$, $t \times n^3$ and $t \times n^4$ seconds the displacements d_2, d_3, d_4 and d_5 are determined, as are the corresponding thicknesses h_2, h_3, h_4 and h_5.

After the entire cycle, thus after $t \times n^4$ seconds, the specimen is unloaded and left to elastically recuperate at laboratory conditions.

Default values for t and n are: t = 60 seconds and n = 10, resulting in measurements after 60, 600, 6.000, 60.000 and 600.000 seconds; thus a complete load cycle equates by approximation 7 days.

After $30^{\pm 2}$ minutes and after $8^{\pm 0,5}$ hours of unloading, the thickness of the unloaded specimen is determined by measuring the thickness at the corners and by calculating the average value; these average thicknesses are labeled $h_{R,30}$ and $h_{R,240}$.

6 Results

The creep rate per decade, creep rate straightness, elastic recuperation and creep criterion are determined as follows:

Relative creep rate, for n decades:

$$CR_{relative,n} = \frac{\frac{h_n - h_0}{h_0}}{n} [\%]$$

The value of $CR_{relative,n}$ will be rounded off to 1 decimal.

Absolute creep rate, for n decades:

$$CR_{absolute,n} = \frac{h_n - h_0}{n-1} [mm]$$

The value of $CR_{absolute,n}$ will be rounded off to 2 decimals.

Creep rate straightness:

$$CRS = \frac{d_5 - d_3}{d_3 - d_1}[\%]$$

The value of CRS will be rounded off to 1 decimal.

Elastic recuperation:

$$ER = \frac{h_{R30}}{h_0}[\%]$$

The value of ER will be rounded off to 1 decimal.

If the sampletaking consists of more than one sample, average values must be used.

7 Test report

The test report shall contain the following information:

a) number, title and publication date of this technical report

b) name and address of the laboratory that did the tests and the name and address of the laboratory that prepared the samples (if these are different)

c) identification number of the test report

d) name and address of the manufacturer or supplier of the product

e) name and the identifier or batch number of the product

f) date the product was produced

g) sampling method and the body that performed it

h) location, date and time of the sampling

i) identification of elastomeric insulator element samples (for multiple samples each individual sample must be identified)

j) test date

k) load

l) test results (for multiple samples the individual results and averages must be stated)

m) comments, if any

n) date of the test report and signature.