BS EN 14196:2016

BSI Standards Publication

Geosynthetics — Test methods for measuring mass per unit area of clay geosynthetic barriers

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National foreword

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The UK participation in its preparation was entrusted to Technical Committee B/553, Geosynthetics.

A list of organizations represented on this committee can be obtained on request to its secretary.

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English Version

Geosynthetics - Test methods for measuring mass per unit area of clay geosynthetic barriers

Géosynthétiques - Méthodes d'essai pour la détermination de la masse surfacique des barrières géosynthétiques argileuses bentonitiques

Geokunststoffe - Prüfverfahren zur Bestimmung der flächenbezogenen Masse von geosynthetischen Tondichtungsbahnen

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EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document (EN 14196:2016) has been prepared by Technical Committee CEN/TC 189 “Geosynthetics”, the secretariat of which is held by NBN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by August 2016, and conflicting national standards shall be withdrawn at the latest by August 2016.

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1 Scope

This European Standard describes a test method for the laboratory determination of the mass per unit area of a sample of clay geosynthetic barrier (GBR-C) in the condition as received.

Since manufacturers quote mass per unit area at a given moisture content, it is necessary to measure the moisture content.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN ISO 9862, *Geosynthetics - Sampling and preparation of test specimens (ISO 9862)*

EN ISO 10318-1, *Geosynthetics - Part 1: Terms and definitions (ISO 10318-1)*

ISO 11465, *Soil quality — Determination of dry matter and water content on a mass basis — Gravimetric method*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 10318-1 and the following apply.

3.1
moisture content
part of the mass of a clay geosynthetic barrier that is absorbed water, expressed as a percentage of the mass of dry clay

4 Principle

The mass per unit area is determined by weighing specimens of known dimensions cut from positions distributed over the full width of the sample in accordance with EN ISO 9862

The moisture content of the clay component of the GBR-C is measured in accordance with ISO 11465.

5 Apparatus

5.1 Balances

Balance of 0,01 g readability for specimens having a mass of up to 200 g.

Balance of 0,1 g readability for specimens having a mass of 200 g or more.

5.2 Die or template

Of known dimensions to a tolerance of ± 0,5 % either square with an edge length not less than 200 mm or circular with a diameter not less than 200 mm.

5.3 Miscellaneous

Knives, spatulas, scoops, quartering cloth, sample splitters etc., as required.

6 Procedure

a) Cut a minimum of five specimens in accordance with EN ISO 9862 and either i*)* or *ii*) as follows:

— *i*) If a die is used to cut the specimen: reduce the loss of clay by leaving the die in place and removing all the remaining sample outside the edge of the die. This includes brushing the cutting board clean. Weigh all material found within the edge of the die along with the specimen.

— *ii*) If a template is used to cut the specimen: collect all clay lost from the edges and weigh 50 % of this with the specimen.

NOTE 1 The loss of clay during the specimen cutting process can have a significant impact on the accuracy of this test method.

b) Weigh the specimens

NOTE 2 The mass per unit area of the clay component of the GBR-C is estimated by subtracting the manufacturer's declared mass per unit area of the synthetic component(s) from the total GBR-C mass per unit area. The estimation of the actual dry clay mass per unit area can be obtained by using the actual average value for the synthetic component(s) as obtained from the manufacturer for the actual lots used to make the GBR-C.

c) If the mass per unit area of the geosynthetic component is not known with sufficient confidence, it shall be measured in accordance with Annex A.

d) Determine the moisture content of the clay component w_{clay} in accordance with ISO 11465. This can be done either on the bentonite from the manufactured GBR-C or on the bentonite used in the production if no water is added during the manufacturing process.

7 Calculation

a) Calculate the mass per unit area of each of the specimens using the following formula:

$$\rho_{GBR-C} = \frac{m_{GBR-C}}{A} \quad (1)$$

where:

ρ_{GBR-C} = mass per unit area of the GBR-C specimen rounded to the nearest 10 g/m^2;

m_{GBR-C} = mass of GBR-C specimen measured in g to the accuracy of the balance used (Refer to 5.1)

A = area of specimen, in m^2 to the nearest 0,001 m^2

b) The mass per unit area of the clay component of the GBR-C is determined using the following formula:

$$\rho_{CLAY} = \rho_{GBR-C} - \rho_{SYN} \quad (2)$$

where:

ρ_{CLAY} = mass per unit area of clay component rounded to the nearest 10 g/m^2;

ρ_{SYN} = nominal mass per unit area of GBR-C synthetic component(s), in g/m^2, as provided by the manufacturer or as determined in accordance with Annex A.

NOTE The synthetic component(s) may consist of woven or non-woven structures, of threads, or other materials attached, e.g. membrane, coating, lamination.

c) The mass per unit area of the clay component normalized to a moisture content of 0 % of the GBR-C is determined using the following formula:

$$\rho_{\mathrm{CLAY0\%}} = \frac{\rho_{\mathrm{CLAY}}}{(w_{\mathrm{CLAY}} + 100)/100} \quad (3)$$

where:

w_{CLAY} = percent moisture content of the clay component determined in accordance with ISO 11465 rounded to the nearest 0,1 %.

8 Test Report

Report the following information on mass per unit area of GBR-Cs:

a) reference to EN 14196;

b) sample identification (for example sample number, roll number or other traceable identifier);

c) method used for cutting specimens, sample size, specimen size and shape, number of test specimens used;

d) full description of the GBR-C tested and a description of the individual components (e.g. bonding method / clay / geosynthetic / coating);

e) mass per unit area of the synthetic component(s) (ρ_{SYN}).
The source of the information (e.g. the manufacturers data sheet in which case a copy shall be supplied, which shall clearly show the range of tolerance) relating to the synthetic component with the test method used together with the stated accuracy of the value or the average mass per unit area of the synthetic component(s) (ρ_{SYN}) to the nearest 1 g/m^2, if measured according to Annex A;

f) as received average mass per unit area of the GBR-C (ρ_{GBR}-C) to the nearest 10 g/m^2;

g) average mass per unit area of the clay component of the GBR-C (ρ_{CLAY}) to the nearest 10 g/m^2;

h) average mass per unit area of the clay component of the GBR-C ($\rho_{CLAY0\,\%}$) to the nearest 10 g/m^2 normalized to a moisture content of 0 %

i) average moisture content of the clay component of the GBR-C (w_{CLAY}) to the nearest 0,1 %;

j) for the properties reported under f, g, h and i above, the test results for each specimen and the average shall also be reported

k) state whether the mass of the geosynthetic(s) has been determined in accordance with Annex A.

l) statement of any deviation from the testing procedures.

Annex A
(normative)
Test method for the determination of the mass per unit area of the synthetic component

A.1 Apparatus

A.1.1 Oven

Drying oven in which the temperature is set to (105 ± 5) °C.

A.1.2 Blowing or suction apparatus

Apparatus for removing as much of the clay component as possible.

A.1.3 Balances

As in 5.1.

A.2 Procedure

Where the mass per unit area of the synthetic component(s) is not known, determine this mass by dissection of the specimens.

Having determined the mass per unit area of each specimen in accordance with this standard, separate the components by peeling. Brush each component, taking care not to lose any threads from any woven structure, or loose fibres from non-woven structures, and then either by blowing or using suction remove as much of the clay component as possible.

Immerse each specimen in tap water until the clay can be easily removed from the fibres. Remove the bulk of clay from the synthetic components either by scraping the substrate and/or by cutting the seams or link bridges (stitch-bonded GBR-Cs). For needle punched GBR-Cs, remove the bulk of clay from the synthetic components by making the clay move towards the edges of the specimen by applying pressure from centre outwards. Thoroughly wash the remaining clay from the synthetic components until they seem clay free and the rinsing water is clear of clay.

Dry the synthetic component(s) specimens, e.g. in an oven at a temperature at which the specimens are not damaged, until a constant mass is reached (m_{syn}). Weigh the synthetic component(s) separately.

A.3 Calculation

Calculate the mass per unit area of each of the specimens using the following formula:

$$\rho_{SYN} = \frac{m_{SYN}}{A} \qquad \text{(A.1)}$$

where:

ρ_{syn} = mass per unit area of the synthetic component rounded to the nearest 1 g/m^2;

m_{syn} = mass of synthetic component measured in g to the accuracy of the balance used (Refer to 5.1)

A = area of specimen, in m^2 to the nearest 0,001 m^2

NOTE Using this procedure, it has been found that the total mass per unit area of the synthetic components can be anything up to 20 % above their nominal weight as stated on manufacturer's data sheets (because of the difficulty in removing all the clay).

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