BRITISH STANDARD

BS EN 15428:2007
Incorporating corrigendum September 2009

Soil improvers and growing media — Determination of particle size distribution

ICS 65.080

BSI British Standards

National foreword

This British Standard is the UK implementation of EN 15428:2007.

BSI, as a member of CEN, is obliged to publish EN 15428 as a British standard. However, during the development of this European Standard, the UK committee voted against its approval as a European Standard.

In the opinion of the UK committee, the shaking conditions for the sieve testing contained in Clauses 5 and 6 are not defined adequately, which is reflected by the performance results in Annex B. Failure to define these conditions can mean poor reproducibility between laboratories, and may lead to inconsistent results when independently testing the same sample.

The inter-laboratory trial results in Annex B are an amalgamation of results from 1997 and 2005. Attention is drawn to the fact that the laboratories were not using BS EN 15428 when the 1997 results were achieved as BS EN 15428 predates them. Furthermore, the 2005 results do not reflect a valid test of BS EN 15428 as the samples used for testing were pre-dried. This is contrary to Clause 7.1, which states 'samples' shall be analysed in a state ready to be used.

The UK participation in its preparation was entrusted to Technical Committee AW/20, Top soil and other growing media.

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

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 September 2009

ISBN 978 0 580 69206 2

Amendments/corrigenda issued since publication

Date	Comments
30 September 2009	Correction to national foreword

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 15428

September 2007

ICS 65.080

English Version

Soil improvers and growing media - Determination of particle size distribution

Amendements du sol et supports de culture - Détermination de la répartition granulométrique

Bodenverbesserungsmittel und Kultursubstrate - Bestimmung der Partikelgrößenverteilung

This European Standard was approved by CEN on 28 July 2007.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: rue de Stassart, 36 B-1050 Brussels

Ref. No. EN 15428:2007: E

Contents

Page

Foreword

This document (EN 15428:2007) has been prepared by Technical Committee CEN/TC 223 “Soil improvers and growing media”, the secretariat of which is held by BSI.

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 March 2008, and conflicting national standards shall be withdrawn at the latest by March 2008.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This document specifies a method of determination of particle size distribution in soil improvers and growing media.

2 Normative references

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

EN 12579, *Soil improvers and growing media - Sampling*

EN 13040:2007, *Soil improvers and growing media — Sample preparation for chemical and physical tests, determination of dry matter content, moisture content and laboratory compacted bulk density*

CR 13456:1999, *Soil improvers and growing media — Labelling, specifications and product schedules*

ISO 565, *Test sieves - Metal wire cloth, perforated metal plate and electroformed sheet - Nominal sizes of openings*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in CR 13456:1999 and EN 13040:2007 apply.

4 Principle

Sieving an air-dried sample of a growing medium or soil improver with specified test sieves using a mechanical sieving machine and determination of the weight fraction distribution.

5 Apparatus

5.1 Sieving-shaking machine, vertical vibrating movement, with amplitude adjustment, and interval timer. Sieving time: 7 min in periods of 10 s shaking and 1 s rest with an amplitude in the range between 0,5 mm and 1,5 mm.

5.2 Test sieves, diameter 200 mm or 300 mm, rim height 55 mm, aperture sizes as listed in ISO 565, of stainless steel woven wire with square openings 31,5 mm, 16,0 mm, 8,0 mm, 4,0 mm, 2,0 mm, 1,0 mm, and reception tray, sieve lid.

5.3 Drying oven, forced air suction, adjustable to 40 °C ± 5 °C.

NOTE Care should be taken to prevent loss of fine lightweight particles.

5.4 Three drying trays, rim height ca 50 mm ± 10 mm, minimum bottom area of 400 cm^2, heat proof to 50 °C.

5.5 Balance with a weighing range at least 4 kg and an accuracy 0,1 g.

5.6 Apparatus for sample division, comprising any suitable equipment for combining and reducing the samples which preserves the characteristics of the product. Depending on the particle size, material and

particle size distribution, the opening width of the passage should be 2,5 times to 3 times greater than the diameter of the largest particle.

6 Optimization of sieving machine

Prior to its first use the shaking machine shall be optimized as described in Annex A. Optimization shall be repeated annually.

7 Test sample

7.1 General

For the determination of the particle size distribution materials shall be sampled in accordance with EN 12579.

This European Standard is applicable to samples supplied in a form in which they are used and is not necessarily applicable to or suitable for all types of growing medium or soil improver, for example material that is not able to flow when used or is sticky.

Samples shall be analysed in a state ready to be used.

Prepare the test sample in accordance with EN 13040:2007 up to Clause 7**.**

7.2 Determination of the sub-sample volume

First determine the analytical sample size. For fine materials, use a smaller volume than for coarser materials to reduce the risk of blocking the sieves (see Table 1).

Place the 8,0 mm mesh sieve (5.2) on the sieving machine with the reception tray under it. Reduce the sample to the size of the sub-sample using an apparatus for sample division (5.6). Transfer the appropriate sub-sample (750 ml for 300 mm sieve and 375 ml for 200 mm sieve) to the sieve and place the lid on the sieve. Secure to the sieving tower and switch on the sieving machine (5.1) for 1 min at the standard setting. For samples in which the moisture content is too high, first air dry the sample in a drying oven for 16 h (5.3).

NOTE If the moisture content is too high, the sample will not pass through the sieve.

After sieving, weigh the sieve (*c*), the reception tray with the sample (*a*), then dry-clean the sieve and reception tray and weigh them empty (*d* and *b* respectively).

Calculate the fraction according to 10.1.

Table 1 — Sample volumes

Sieve diameter	Sub-sample portion If 0 mm to 8 mm fraction ≤ 50 % w/w total	Sub-sample portion If 0 mm to 8 mm fraction > 50 % w/w total
200 mm	375 ml	125 ml
300 mm	750 ml	250 ml

8 Air drying

Take three representative appropriate volumes (see Table 1) of the sample as received using an apparatus for sample division (5.6) and place them into 3 separate drying trays. Spread the sample over the surface of the tray as uniformly as possible and weigh. Place the trays in the drying oven (5.3) at 40 °C for at least 16 h and re-weigh. Calculate the moisture loss.

After drying, the remaining moisture content in the sub-samples shall not exceed 15 % of the total weight. The moisture content shall be determined as described in EN 13040:2007.

9 Procedure

Determine the particle size distribution within 24 h after drying. Store the sample in a dry atmosphere until sieving can be performed.

NOTE As samples absorb moisture, volume changes can occur.

Assemble the sieves in order of aperture size, with the largest aperture at the top, on top of the reception tray on the sieving machine. Distribute all the dried sub-sample (Clause 8) equally on the upper sieve. Place the lid on the upper sieve and secure the sieves. Switch on the sieving machine for 7 min at the prescribed setting (Clause 6). Determine the weight fractions of each sieve and of the reception tray. Dry-clean the sieves and the reception tray. When the three sub-samples have been sieved and weighed, determine the empty weights of the sieves and the reception tray. Calculate the fraction distribution as described in 10.2.

10 Calculations and expression of results

10.1 Calculation of fraction distribution during sample pre-treatment

Calculate the fraction distribution during sample pre-treatment as follows:

The sieving fraction greater than 8 mm is given by

$$\text{Sieving fraction} > 8\,\text{mm}\,(\%\ \text{by mass}) = \frac{c - d}{(c-d)+(a-b)} \times 100\% \qquad (1)$$

The sieving fraction smaller than 8 mm is given by

$$\text{Sieving fraction}\ 0 - 8\,\text{mm}\,(\%\ \text{by mass}) = \frac{a-b}{(c-d)+(a-b)} \times 100\% \qquad (2)$$

where

a is the weight of reception tray plus sample, expressed in g;

b is the weight of the empty reception tray, expressed in g;

c is the weight of the 8,0 mm sieve plus sample, expressed in g;

d is the weight of the empty 8,0 mm sieve, expressed in g.

10.2 Calculation of fraction distribution of a sample

The portion masses are expressed on the total mass of the sample.

$$\text{Fraction mass}_x = \frac{A_x}{\sum A_x} \times 100 \text{ weight\%} \quad (3)$$

where x = 1...7

1 - sieve 31,5 mm

2 - sieve 16 mm

3 - sieve 8 mm

4 - sieve 4 mm

5 - sieve 2 mm

6 - sieve 1 mm

7 - reception tray

$A_{1...7}$ = (weight sieve plus sample - weight empty sieve).

For each fraction determine the average and round it to the nearest whole percent. Then determine the coefficient of variance of the three sub-samples according to the calculation below (example calculation of portion x). Do this for portions 2 to 6 and only for the three largest fractions. Disregard the portion of > 31,5 mm.

If the coefficient of variance of a portion is greater than 20 % the sample should be considered as insufficiently homogenous. The analysis should be repeated in its entirety.

$$\text{Average}_x = \frac{\sum Z_x}{n} \quad (4)$$

where: n = *number of replicates (3 or 4)*

$$\text{Coefficient of Variance}_x = \frac{\sqrt{\sum (Z - G_x)^2 / (n-1)}}{G_x} \times 100 \quad (5)$$

11 Precision

Typical performance characteristics for precision and accuracy are shown in Table B.1 to Table B.7.

12 Test report

The test report shall include the following information:

a) reference to the European Standard (EN 15428:2007);

b) complete identification of the sample;

c) all the analytical methods used;

d) results of the determination as whole numbers, expressed as mass/mass dry matter basis;

e) any details not specified in this European Standard, or which are optional, as well as any other factor that may have affected the results.

NOTE The test report may be prepared separately or in conjunction with the test report of a subsequent analytical method.

Annex A
(normative)

Optimization of the sieving machine

A.1 Test sample

Homogeneous, peat type 1, < 16 mm, fraction 0 to 1 mm 10 to 40 %.

A.2 Sample pre-treatment

Take a sub-sample of the test sample (for 300 mm sieve take 500 ml, for 200 mm sieve take 250 ml) from which the particles greater than 16 mm have been sieved out manually; dry this sample for 24 h at 40 °C. Place sieves and reception tray on the sieving machine in such a way that the sieves with the greatest mesh widths are on top. Distribute the sub-sample equally on the upper sieve. Place the lid on the upper sieve and fix the sieves. Switch on the sieving machine for 7 min at maximum amplitude. Determine the weight fractions for each sieve and reception tray. Dry clean the sieves and the reception tray. Determine the empty weights of the sieves and reception tray.

NOTE The fraction distribution can be determined by calculation 10.2 (sieving analysis for peat types 1, 2 and 3). In case 10 to 40 % of the sample falls within the 0 to 1 mm category, the optimization procedure can be continued with the selected test sample.

A.3 Optimization

Divide the calibration of the amplitude in ten equal steps. Take thirty sub-samples of 500 ml each of the test sample from which the particles greater than 16 mm have been sieved out manually. Put each of these samples in a drying tray and spread the sample as much as possible over the area of the drying tray. Place the samples in the drying oven at 40 °C for at least 12 h. After drying the moisture content in the samples may not exceed 15 % of the total weight. For each of the amplitude settings sieve 3 sub-samples according to the procedure described below. Assemble the sieves in ascending order of aperture size on top of the reception tray on the sieving machine.

Divide the sub sample equally over the upper sieve. Place the lid on the upper sieve and fix the sieves on the sieving machine. Switch on the sieving machine for 7 min at the chosen setting.

Determine the weight per sieve and reception tray including the sieving fractions. Dry clean the sieves and the reception tray. When the three sub-samples have been sieved and weighed in this way, determine the empty weights of the sieves and the reception tray.

NOTE The fraction distribution can be calculated with the calculation found in 10.2 (sieving analysis for peat types 1, 2 and 3).

A.4 Determination of the optimum amplitude setting

Round off all values obtained at 5 %. Determine at which setting the rounded-off value for the fraction 0 mm to 1 mm is greatest. This setting is chosen as standard setting.

NOTE If more than one setting gives the greatest fraction 0 to 1 mm, then the lowest amplitude setting is chosen as the standard setting

Annex B
(informative)

Results of an interlaboratory trial to determine particle size

Two inter laboratory trials were organized (1997 and 2005) to test the procedures specified in this European Standard. In this trial the number of laboratories as specified below determined particle size in 6 sample types:-

1) Peat (2005)

2) Bark (2005)

3) Composted green waste (2005)

4) Perlite (2005)

5) Coarse peat (1997)

6) Composted bark (1997)

In the inter-laboratory trial of 2005, sub-samples were also distributed ready to be sieved according to the procedure described from Clause 9 onwards. The sub samples were made using a sample divider and were dried. In this way the influence can be seen of a proper sub sampling method.

The repeatability (r) and reproducibility (R) of the results of the analyses of the samples is given in Tables B.1 to B.7.

The values have been calculated according to ISO 5725 [1].

Table B.1 — Results of the inter laboratory trial for the determination of particle size Z1 > 31,5 mm

Sample	Peat (2005)	Bark (2005)	Composted greenwaste (2005)	Perlite (2005)	Coarse peat (1997)	Composted bark (1997)
Number of laboratories retained after eliminating outliers	15	15	15	15		
Number of outliers (laboratories)						
Mean value [% m/m]	0,1	0,0	0,0	0,0		
Repeatability standard deviation, s_r [% m/m]						
Repeatability relative standard deviation (%)						
Repeatability limit, $r = 2.8s_r$ [% m/m]						
Reproducibility standard deviation, s_R [% m/m]						
Reproducibility relative standard deviation (%)						
Reproducibility limit, $r = 2.8s_R$ [% m/m]						

Sample	Prepared Peat (2005)	Prepared Bark (2005)	Prepared Composted greenwaste (2005)	Prepared Perlite (2005)
Number of laboratories retained after eliminating outliers	15	15	15	15
Number of outliers (laboratories)				
Mean value [% m/m]	0,2	0,0	0,0	0,0
Repeatability standard deviation, s_r [% m/m]				
Repeatability relative standard deviation (%)				
Repeatability limit, $r = 2.8s_r$ [% m/m]				
Reproducibility standard deviation, s_R [% m/m]				
Reproducibility relative standard deviation (%)				
Reproducibility limit, $r = 2.8s_R$ [% m/m]				

Table B.2 — Results of the inter laboratory trial for the determination of particle size Z2 16 mm to 31,5 mm

Sample	Peat (2005)	Bark (2005)	Composted greenwaste (2005)	Perlite (2005)	Coarse peat (1997)	Composted bark (1997)
Number of laboratories retained after eliminating outliers	15	16	16	16	10	
Number of outliers (laboratories)	1				0	
Mean value [% m/m]	0,9	0,1	0,1	0,0	12,1	
Repeatability standard deviation, s_r [% m/m]	0,86				4,57	
Repeatability relative standard deviation (%)	95,67				106,00	
Repeatability limit, $r = 2,8s_r$ [% m/m]	2,42				12,79	
Reproducibility standard deviation, s_R [% m/m]	1,43				7,57	
Reproducibility relative standard deviation (%)	158,56				175,59	
Reproducibility limit, $r = 2,8s_R$ [% m/m]	4,01				21,19	

Sample	Prepared Peat (2005)	Prepared Bark (2005)	Prepared Composted greenwaste (2005)	Prepared Perlite (2005)
Number of laboratories retained after eliminating outliers	16	16	16	16
Number of outliers (laboratories)	0			
Mean value [% m/m]	1,9	0,0	0,2	0,0
Repeatability standard deviation, s_r [% m/m]	1,69			
Repeatability relative standard deviation (%)	89,56			
Repeatability limit, $r = 2,8s_r$ [% m/m]	4,72			
Reproducibility standard deviation, s_R [% m/m]	2,37			
Reproducibility relative standard deviation (%)	126,07			
Reproducibility limit, $r = 2,8s_R$ [% m/m]	6,64			

Table B.3 —Results of the inter laboratory trial for the determination of particle size Z3 8 mm to 16 mm

Sample	Peat (2005)	Bark (2005)	Composted greenwaste (2005)	Perlite (2005)	Coarse peat (1997)	Composted bark (1997)
Number of laboratories retained after eliminating outliers	16	16	15	16	9	8
Number of outliers (laboratories)	0	0	1		0	0
Mean value [% m/m]	14,4	2,9	5,0	0,0	34,6	5,9
Repeatability standard deviation, s_r [% m/m]	5,19	1,01	1,69		3,75	4,88
Repeatability relative standard deviation (%)	36,02	34,75	33,94		30,39	233,56
Repeatability limit, $r = 2.8s_r$ [% m/m]	14,54	2,84	4,72		10,51	13,66
Reproducibility standard deviation, s_R [% m/m]	7,17	1,7	2,19		6,13	5,92
Reproducibility relative standard deviation (%)	49,70	58,48	44,12		49,67	283,23
Reproducibility limit, $r = 2.8s_R$ [% m/m]	20,06	4,77	6,14		17,17	16,57

Sample	Prepared Peat (2005)	Prepared Bark (2005)	Prepared Composted greenwaste (2005)	Prepared Perlite (2005)
Number of laboratories retained after eliminating outliers	16	16	16	15
Number of outliers (laboratories)	0	0	0	
Mean value [% m/m]	15,3	2,6	5,8	0,0
Repeatability standard deviation, s_r [% m/m]	4,15	1,09	2,23	
Repeatability relative standard deviation (%)	27,18	41,87	38,37	
Repeatability limit, $r = 2.8s_r$ [% m/m]	11,62	3,06	6,25	
Reproducibility standard deviation, s_R [% m/m]	5,69	1,50	2,65	
Reproducibility relative standard deviation (%)	37,29	57,53	45,56	
Reproducibility limit, $r = 2.8s_R$ [% m/m]	15,94	4,21	7,43	

Table B.4 —Results of the inter laboratory trial for the determination of particle size Z4 4 mm to 8 mm

Sample	Peat (2005)	Bark (2005)	Composted greenwaste (2005)	Perlite (2005)	Coarse peat (1997)	Composted bark (1997)
Number of laboratories retained after eliminating outliers	16	12	16	16	9	8
Number of outliers (laboratories)	0	4	0	0	0	0
Mean value [% m/m]	14,9	70,0	21,1	7,1	13,7	5,4
Repeatability standard deviation, s_r [% m/m]	2,24	1,97	3,03	1,38	1,69	0,75
Repeatability relative standard deviation (%)	15,04	2,82	14,35	19,46	34,67	38,55
Repeatability limit, r = 2,8s_r [% m/m]	6,28	5,52	8,50	3,87	4,74	2,10
Reproducibility standard deviation, s_R [% m/m]	4,58	5,34	4,30	2,50	4,46	1,32
Reproducibility relative standard deviation (%)	30,72	7,63	20,33	35,17	91,35	67,81
Reproducibility limit, r = 2,8s_R [% m/m]	12,83	14,94	12,03	6,99	12,49	3,69

Sample	Prepared Peat (2005)	Prepared Bark (2005)	Prepared Composted greenwaste (2005)	Prepared Perlite (2005)
Number of laboratories retained after eliminating outliers	15	14	16	16
Number of outliers (laboratories)	1	2	0	0
Mean value [% m/m]	15,7	68,4	21,5	7,1
Repeatability standard deviation, s_r [% m/m]	2,29	2,04	1,52	1,17
Repeatability relative standard deviation (%)	14,59	2,98	7,08	16,42
Repeatability limit, r = 2.8s_r [% m/m]	6,43	5,71	4,26	3,28
Reproducibility standard deviation, s_R [% m/m]	2,89	3,61	3,69	2,41
Reproducibility relative standard deviation (%)	18,34	5,28	17,19	33,79
Reproducibility limit, r = 2.8s_R [% m/m]	8,08	10,10	10,33	6,76

Table B.5 —Results of the inter laboratory trial for the determination of particle size Z5 2 mm to 4 mm

Sample	Peat (2005)	Bark (2005)	Composted greenwaste (2005)	Perlite (2005)	Coarse peat (1997)	Composted bark (1997)
Number of laboratories retained after eliminating outliers	15	12	14	15	9	7
Number of outliers (laboratories)	1	4	2	1	0	1
Mean value [% m/m]	11,4	22,0	24,5	47,4	9,1	9,5
Repeatability standard deviation, s_r [% m/m]	1,61	1,72	1,51	2,23	1,50	0,83
Repeatability relative standard deviation (%)	14,15	7,81	6,15	4,71	46,13	24,34
Repeatability limit, $r = 2{,}8s_r$ [% m/m]	4,50	4,82	4,22	6,25	4,20	2,32
Reproducibility standard deviation, s_R [% m/m]	2,66	4,93	1,84	3,72	2,62	1,97
Reproducibility relative standard deviation (%)	23,43	22,37	7,51	7,85	80,62	57,83
Reproducibility limit, $r = 2{,}8s_R$ [% m/m]	7,45	13,80	5,15	10,42	7,35	5,50

Sample	Prepared Peat (2005)	Prepared Bark (2005)	Prepared Composted greenwaste (2005)	Prepared Perlite (2005)
Number of laboratories retained after eliminating outliers	14	14	14	14
Number of outliers (laboratories)	2	2	2	2
Mean value [% m/m]	10,9	23,3	24,1	47,8
Repeatability standard deviation, s_r [% m/m]	1,03	1,67	1,28	1,78
Repeatability relative standard deviation (%)	9,43	7,14	5,29	3,72
Repeatability limit, $r = 2.8s_r$ [% m/m]	2,87	4,67	3,57	4,98
Reproducibility standard deviation, s_R [% m/m]	1,32	3,87	1,66	2,24
Reproducibility relative standard deviation (%)	12,11	16,59	6,90	4,69
Reproducibility limit, $r = 2.8s_R$ [% m/m]	3,69	10,84	4,66	6,27

Table B.6 — Results of the inter laboratory trial for the determination of particle size Z6 1 mm to 2 mm

Sample	Peat (2005)	Bark (2005)	Composted greenwaste (2005)	Perlite (2005)	Coarse peat (1997)	Composted bark (1997)
Number of laboratories retained after eliminating outliers	14	15	14	15	9	7
Number of outliers (laboratories)	1	0	1	0	0	1
Mean value [% m/m]	11,7	2,2	18,5	17,6	7,6	13,5
Repeatability standard deviation, s_r [% m/m]	1,33	0,55	1,25	1,05	0,88	1,29
Repeatability relative standard deviation (%)	11,38	24,36	6,74	5,95	32,45	26,83
Repeatability limit, $r = 2.8s_r$ [% m/m]	3,72	1,53	3,50	2,93	2,46	3,61
Reproducibility standard deviation, s_R [% m/m]	2,24	1,03	1,93	2,87	1,10	1,86
Reproducibility relative standard deviation (%)	19,17	46,00	10,41	16,32	40,58	38,75
Reproducibility limit, $r = 2.8s_R$ [% m/m]	6,26	2,89	5,4	8,04	3,08	5,21

Sample	Prepared Peat (2005)	Prepared Bark (2005)	Prepared Composted greenwaste (2005)	Prepared Perlite (2005)
Number of laboratories retained after eliminating outliers	15	14	14	14
Number of outliers (laboratories)	0	1	1	1
Mean value [% m/m]	11,7	2,3	18,2	18,0
Repeatability standard deviation, s_r [% m/m]	0,97	0,22	0,81	0,84
Repeatability relative standard deviation (%)	8,27	9,41	4,43	4,67
Repeatability limit, $r = 2.8s_r$ [% m/m]	2,72	0,61	2,26	2,36
Reproducibility standard deviation, s_R [% m/m]	2,22	0,69	1,69	1,59
Reproducibility relative standard deviation (%)	18,95	29,67	9,27	8,86
Reproducibility limit, $r = 2.8s_R$ [% m/m]	6,23	1,92	4,72	4,46

Table B.7 — Results of the inter laboratory trial for the determination of particle size Z7 0 mm to 1 mm

Sample	Peat (2005)	Bark (2005)	Composted greenwaste (2005)	Perlite (2005)	Coarse peat (1997)	Composted bark (1997)
Number of laboratories retained after eliminating outliers	13	15	16	16	9	6
Number of outliers (laboratories)	3	1	0	0	0	2
Mean value [% m/m]	42,1	3,0	29,9	27,4	22,4	66,5
Repeatability standard deviation, s_r [% m/m]	4,27	0,35	4,21	2,29	1,93	2,35
Repeatability relative standard deviation (%)	10,13	11,62	14,06	8,35	24,13	9,90
Repeatability limit, $r = 2.8s_r$ [% m/m]	11,96	0,98	11,79	6,41	5,40	6,58
Reproducibility standard deviation, s_R [% m/m]	5,24	1,00	7,88	6,75	4,28	4,25
Reproducibility relative standard deviation (%)	12,43	33,16	26,30	24,62	53,49	17,91
Reproducibility limit, $r = 2.8s_R$ [% m/m]	14,67	2,79	22,05	18,91	11,98	11,91

Sample	Prepared Peat (2005)	Prepared Bark (2005)	Prepared Composted greenwaste (2005)	Prepared Perlite (2005)
Number of laboratories retained after eliminating outliers	15	16	16	16
Number of outliers (laboratories)	1	0	0	0
Mean value [% m/m]	43,6	3,3	29,1	26,6
Repeatability standard deviation, s_r [% m/m]	2,44	0,40	1,75	1,44
Repeatability relative standard deviation (%)	5,59	12,03	6,01	5,42
Repeatability limit, $r = 2.8s_r$ [% m/m]	6,83	1,11	4,89	4,03
Reproducibility standard deviation, s_R [% m/m]	5,45	0,94	6,26	5,97
Reproducibility relative standard deviation (%)	12,48	28,57	21,52	22,44
Reproducibility limit, $r = 2.8s_R$ [% m/m]	15,25	2,63	17,53	16,71

Bibliography

[1] ISO 5725-1:1994, Accuracy (trueness and precision) of measurement methods and results— Part 1: General principles and definitions

[2] ISO 5725-2:1994, Accuracy (trueness and precision) of measurement methods and results — Part 2: Basic method for the determination of repeatability and reproducibility of a standard measurement method

[3] ISO 5725-3:1994, Accuracy (trueness and precision) of measurement methods and results — Part 3: Intermediate measures of the precision of a standard measurement method

[4] ISO 5725-4:1994, Accuracy (trueness and precision) of measurement methods and results — Part 4: Basic methods for the determination of the trueness of a standard measurement method

[5] ISO 5725-5:1998, Accuracy (trueness and precision) of measurement methods and results — Part 5: Alternative methods for the determination of the precision of a standard measurement method

[6] ISO 5725-6:1994, Accuracy (trueness and precision) of measurement methods and results — Part 6: Use in practice of accuracy values

This page has been intentionally left blank

BSI - British Standards Institution

BSI is the independent national body responsible for preparing British Standards. It presents the UK view on standards in Europe and at the international level. It is incorporated by Royal Charter.

Revisions

British Standards are updated by amendment or revision. Users of British Standards should make sure that they possess the latest amendments or editions.

It is the constant aim of BSI to improve the quality of our products and services. We would be grateful if anyone finding an inaccuracy or ambiguity while using this British Standard would inform the Secretary of the technical committee responsible, the identity of which can be found on the inside front cover. Tel: +44 (0)20 8996 9000. Fax: +44 (0)20 8996 7400.

BSI offers members an individual updating service called PLUS which ensures that subscribers automatically receive the latest editions of standards.

Buying standards

Orders for all BSI, international and foreign standards publications should be addressed to Customer Services. Tel: +44 (0)20 8996 9001. Fax: +44 (0)20 8996 7001 Email: orders@bsigroup.com You may also buy directly using a debit/credit card from the BSI Shop on the Website http://www.bsigroup.com/shop

In response to orders for international standards, it is BSI policy to supply the BSI implementation of those that have been published as British Standards, unless otherwise requested.

Information on standards

BSI provides a wide range of information on national, European and international standards through its Library and its Technical Help to Exporters Service. Various BSI electronic information services are also available which give details on all its products and services. Contact Information Centre. Tel: +44 (0)20 8996 7111 Fax: +44 (0)20 8996 7048 Email: info@bsigroup.com

Subscribing members of BSI are kept up to date with standards developments and receive substantial discounts on the purchase price of standards. For details of these and other benefits contact Membership Administration. Tel: +44 (0)20 8996 7002 Fax: +44 (0)20 8996 7001 Email: membership@bsigroup.com

Information regarding online access to British Standards via British Standards Online can be found at http://www.bsigroup.com/BSOL

Further information about BSI is available on the BSI website at http://www.bsigroup.com.

Copyright

BSI Group
Headquarters 389
Chiswick High Road,
London, W4 4AL, UK
Tel +44 (0)20 8996 9001
Fax +44 (0)20 8996 7001
www.bsigroup.com/
standards