SLOVENSKI STANDARD
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Preskusi kemičnih lastnosti agregatov - 8. del: Metoda razvrščanja za določevanje kovin v pepelu po sežigu gospodinjskih odpadkov

Tests for chemical properties of aggregates - Part 8: Sorting test to determine metal content of Municipal Incinerator Bottom Ash (MIBA) Aggregates

Prüfverfahren für chemische Eigenschaften von Gesteinskörnungen - Teil 8: Sortierverfahren zur Bestimmung des Metallgehalts in Hausmüllverbrennungsasche (HMV-Asche)

Tests sur les propriétés chimiques des granulats - Partie 8: Essai de comptage des particules métalliques contenues dans les granulats provenant de mâchefers issus d'incinérateurs municipaux

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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-CENELEC Management Centre has the same status as the official versions.

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Foreword

This document (EN 1744-8:2012) has been prepared by Technical Committee CEN/TC 154 “Aggregates”, 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of an identical text or by endorsement, at the latest by February 2013, and conflicting national standards shall be withdrawn at the latest by February 2013.

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.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

This document forms part of a series of tests for chemical properties of aggregates. Test methods for other properties of aggregates will be covered by the following European Standards:

— EN 932, *Tests for general properties of aggregates*

— EN 933, *Tests for geometrical properties of aggregates*

— EN 1097, *Tests for mechanical and physical properties of aggregates*

— EN 1367, *Tests for thermal and weathering properties of aggregates*

The other parts of EN 1744, Tests for chemical properties of aggregates, are:

— *Part 1: Chemical analysis*

— *Part 3: Preparation of eluates by leaching of aggregates*

— *Part 4: Determination of water susceptibility of fillers for bituminous mixtures*

— *Part 5: Determination of acid soluble chloride salts*

— *Part 6: Determination of the influence of recycled aggregate extract on the initial setting time of cement*

— *Part 7: Determination of loss of ignition of Municipal Incinerator Bottom Ash Aggregate (MIBA Aggregate)*

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

1 Scope

This European Standard specifies a simple method for the examination of Municipal Incinerator Bottom Ash (MIBA) Aggregates for the purpose of estimating the relative proportions of metallic constituents.

This European Standard describes the reference methods used for type testing and, in case of dispute, for estimating the relative proportions of aluminium or other metallic constituents of MIBA Aggregates. For other purposes, in particular factory production control, other methods may be used provided that an appropriate working relationship with the reference method has been established.

NOTE MIBA Aggregates can also contain agglomerates which only contain a portion of metal. A supplementary method for preparation of a test portion containing agglomerated particles, using crushing and sieving, is given in Annex A (normative).

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 932-1, *Test for general properties of aggregates — Part 1: Methods for sampling*

EN 932-2, *Test for general properties of aggregates — Part 2: Methods for reducing laboratory samples*

EN 932-5, *Test for general properties of aggregates — Part 5: Common equipment and calibration*

EN 933-1, *Test for geometrical properties of aggregates — Part 1: Determination of particle size distribution — Sieving method*

EN 933-2, *Test for geometrical properties of aggregates — Part 2: Determination of particle size distribution — Test sieves, nominal size of apertures*

3 Terms and definitions

For the purpose of this standard, the following definitions apply:

3.1
laboratory sample
sample intended for laboratory testing

3.2
subsample
sample obtained by means of a sample reduction procedure

3.3
constant mass
mass determined by successive weighings performed at least 1 h apart and not differing by more than 0,1 %

Note 1 to entry: In many cases, constant mass can be achieved after a test portion has been dried for a pre-determined period in a specified oven at (110 ± 5) °C. Test laboratories can determine the time required to

achieve constant mass for specific types and sizes of sample dependent upon the drying capacity of the oven used.

3.4
MIBA Aggregate
aggregate produced by processing Municipal Incinerator Bottom Ash

3.5
particle size fraction (di/Di)
fraction of an aggregate passing the larger (Di) of two sieves and retained on the smaller sieve (di)

4 Principle

The test consists of sorting particles from a subsample of the coarse part of MIBA Aggregates by hand to separate out metallic particles. The metallic particles are then separated into ferrous (magnetic) and non-ferrous (non-magnetic) particles using a magnet.

The proportion by mass of each of these constituents is determined and expressed as a percentage of the mass of the subsample.

NOTE 1 For the purpose of this standard, ferrous particles are to be understood as particles attracted by the hand held magnet and non-ferrous particles are metallic non-ferrous particles.

NOTE 2 Aluminium/alloy particles in coarse aggregates mixtures might react and cause change in volume.

When it is not possible to separate the metallic fraction from the agglomerate particles, those agglomerates should be handled as metallic particles.

5 Apparatus

Unless otherwise stated, all apparatus shall conform to the general requirements of EN 932-5.

5.1 Test sieves, 63 mm, 31,5 mm, 16 mm and 4 mm size conforming to EN 933-2.

An 8 mm size test sieve is also required if the supplementary test portion preparation method in Annex A (normative) is used.

5.2 Tightly fitting pan and lid, for the sieves.

5.3 Ventilated oven, thermostatically controlled to maintain a temperature of (110 ± 5) °C.

5.4 Balance, accurate to ± 0,1 % of the mass of the test portion.

5.5 Trays, or other suitable containers.

5.6 Hand held magnet, with a mass in the range of 300 g to 600 g and with a pull strength of at least 60 kg.

5.7 Brushes, for cleaning the sieves and the sieved particles.

5.8 Sieving machine, (optional).

5.9 Laboratory crusher, if the supplementary test portion preparation method in Annex A (normative) is used.

6 Preparation of subsample

Bulk samples shall be taken in accordance with EN 932-1 and reduced in accordance with EN 932-2 to produce a laboratory sample with a minimum mass as given in Table 1.

Table 1 — Minimum mass of laboratory sample

Upper aggregate size, *D*, mm	Minimum laboratory sample mass, kg	
	Coarse aggregate	All-in aggregate
63	50	75
31,5 or less	20	30

Dry the laboratory sample at (110 ± 5) °C to constant mass. Weigh and record the dry mass as M_0.

Sieve the sample on the 63 mm and 4 mm sieves, using the EN 933-1 dry sieving method. Agitate with sufficient vigour to ensure complete separation of particles bigger than 4 mm.

Weigh and record the mass of particles retained on the 63 mm sieve as M_{63} and then discard them. Weigh and record the mass of the particles passing the 4 mm sieve as M_4, and then discard them. Record the mass of the remaining subsample as M_1.

7 Procedure

7.1 Further reduction of the subsample

If necessary, further reduce the size of the remaining subsample to give at least 1 000 particles in accordance with EN 932-2. Table 2 gives guidance on the minimum mass required.

Table 2 — Guidance on the mass of at least 1 000 particles

Upper aggregate size, *D*, mm	Minimum subsample mass, kg
63	50
31,5	10
20	4
16	2
14	1
8	0,5
NOTE The actual mass required to give 1 000 particles depends upon the particle size distribution and particle density of the aggregate. Experience will allow test laboratories to estimate the mass required for aggregates that are tested routinely.	

If a reduced 4/63 mm size subsample is used, weigh and record the mass of the remaining subsample as M_2.

7.2 Separating into size fractions

Sieve the 4/63 mm size subsample into the three size fractions in Table 3 using the dry sieving procedure of EN 933-1.

Table 3 — Size fractions for initially separation, mm

4/16	16/32	32/63

Place each size fraction in a separate tray.

NOTE 1 Sieving into size fractions makes sorting easier.

NOTE 2 For some aggregates, there may not be any particles in the larger size fractions.

NOTE 3 If necessary, the supplementary test portion preparation method in Annex A (normative) can be used after this initial separation stage.

7.3 Separating metallic particles

Spread the particles in the 32/63 mm size fraction onto a clean, flat surface and separate the metallic particles by hand. If necessary, use a small brush to clean finer particles from the metal pieces.

NOTE Particles can also be washed with a minimum amount of water to aid separation of the finer particles. If water is used, the particles need to be dried to constant mass again before weighing.

When it is not possible to separate the metallic fraction from the agglomerate particles, those agglomerates should be handled as metallic particles.

Use the magnet to further separate the metallic particles into ferrous (magnetic) and non-ferrous (non-magnetic) particles. Place them in separate marked trays (M_{F1} and M_{NF1}).

Repeat this procedure with the 16/32 mm size fraction (M_{F2} and M_{NF2}) and then with the 4/16 mm size fraction (M_{F3} and M_{NF3}).

7.4 Weight of metallic particles

Weigh the mass of the ferrous particles of each fraction (M_{F1}, M_{F2} and M_{F3}). Sum the values and record the total mass as M_F.

Weigh the mass of the non-ferrous particles of each fraction (M_{NF1}, M_{NF2} and M_{NF3}). Sum the values and record the total mass as M_{NF}.

8 Calculation and expression of results

Calculate the percentage by mass of each metallic constituent as follows:

$$P_F = 100 \times \frac{M_F}{M_1} \quad (1)$$

$$P_{NF} = 100 \times \frac{M_{NF}}{M_1} \quad (2)$$