METHOD B4

THE SIEVE ANALYSIS OF AGGREGATES, INCLUDING THE DETERMINATION OF THE MATERIAL PASSING THE 0,425 AND 0,075mm SIEVES

SCOPE

This method describes the sieve analysis of a dried aggregate sample, after it has been washed through a 0,075 mm sieve, and the sub-sequent determination of the percentages of material by mass passing the 0,425 and 0,075 mm sieves, also called the fines and dust content of aggregates respectively.

These determinations are done on aggregates for asphalt, surface treatments and concrete.

2 APPARATUS

2.1 A suitable riffler.

2.2 The following sieves, 200 mm in diameter, complying with the requirements of SABS 197 (sieves larger than 4,75 mm must be of perforated plate and sieves 4,75 mm and smaller of woven wire mesh): 75 mm, 53 mm, 37,5 mm, 26,5 mm, 19,0 mm, 13,2 mm, 9,5 mm, 6,7 mm, 4,75 mm, 3,35 mm, 2,36 mm, 1,18 mm, 0,600 mm, 0,425 mm, 0,300 mm, 0,150 mm and 0,075 mm together with a bottom pan and lid.

2.3 A mechanical sieve shaker (optional).

2.4 A balance with a pan to weigh up to 5 kg, accurate to 1,0 gram

2.5 A suitable basin, about 350 mm in diameter.

2.6 A pan about 300 mm square.

2.7 Flat pans about 200 mm in diameter and 30 mm deep.

2.8 A drying oven, thermostatically controlled and capable of maintaining a temperature of 105 to 110EC.

2.9 The following brushes for cleaning the sieves: a brass or copper wire brush, measuring approximately 50 mm x 25 mm with bristles not more than 25 mm long and a hard-bristle brush measuring approximately 50 mm x 25 mm.

3 METHOD

3.1 See of test sample

The approximate mass of the test sample is given in Table 1. The test sample may only be obtained by quartering and must by no means be weighed out exactly.

TABLE 1

Max. Particle Size	Aprox. Mass of Sample
75.0	10.0
53.0	7.0
37.5	4.0
26.5	3.0
19.0	2.5
13.2	1.5
9.5	1.0
4.75	0.7
2.36 & finer	0.5

3.2 **Quartering**

The field sample is poured into one or more of the riffler pans. The material is then poured through the riffler by slowly tilting the pan so that the material flows in an even stream over its width. At the same time the pan is moved to and fro along the full length of the riffler to ensure an even flow of the material. The process is repeated with the contents of one of the pans under the riffler until a sample of the required size is obtained.

3.3 **Drying**

Place the test sample in a suitable basin and dry in an oven at a temperature not exceeding 110EC to a constant mass. Weigh the test sample.

3.4 **Washing**

Place the material in a suitable basin and cover with tap water. Agitate thoroughly in the water to loosen any dust particles adhering to the aggregate and also to break down any clay lumps that may exist.

Decant the wash water over the 0,075 mm sieve protected by one or two coarser sieves. The wash water containing the minus 0,075 mm material is discarded or allowed to run away. Continue this washing procedure until the wash water is clear.

Transfer the material retained on the 0,075 mm sieve and the protecting sieves to a square pan by inverting the sieves one by one and washing down with water. The water in the pan is poured off carefully and the material dried in an oven at a temperature of 105 to 110EC to a constant mass (see 5.1 and 5.2).

3 .5 **Sieving**

Nest the required or specified sieves in order of decreasing size of opening from the top to bottom and pour the sample on to the top sieve. Agitate the sieves by hand or with a mechanical apparatus and continue sieving for a sufficient period in such a manner that, after completion, not more than 1 % by mass of the residue on any individual sieve will pass that sieve during one minute of continuous hand sieving. After sieving, the material retained on each sieve, as well as the material which has passed the bottom sieve, is weighed and the results recorded on Form B4/1.

4 CALCULATIONS

4.1 Calculate the mass of the minus 0,075 mm material by subtracting the total mass of the material retained on the sieves from the mass of the original test sample (see 5.2).

4.2 Convert the mass of each fraction retained between two sieves to a percentage of the total dry mass of the sample.

4.3 Convert the percentages retained on the sieves to Dercentaaes passinq the sieves.

4.4 Calculate the percentages to the nearest 0,1.

Report the following results to the nearest whole number on a suitable form such as B4/2 or B4/3.

(a) The percentage passing each sieve.

(b) The percentage passing the 0,425mm sieve, i.e. the fines content.

(c) The percentage passing the 0,075 mm sieve, i.e. the dust content.

The results may also be plotted on a suitable grading sheet-such as Form A1/3.

5 NOTES

5.1 The washing procedure for samples containing a high percentage of minus 0,075 mm material may be facilitated by dry-sieving the sample prior.to washing.

5.2 If the minus 0,075 mm fraction is already washed out, e.g. in the case of aggregate tor asphalt after extraction of the binder, or the sample is regarded as free from dust, e.g. single-size surfacing stone, paragraphs 3.4 and 4.1 may be omitted.

The same applies when a very accurate analysis is not necessary or too time-consuming.

5.3 Table ll gives the maximum allowable mass of material retained on a specific sieve 200 mm in diameter. To prevent overloading of a sieve, the material should be divided and sieved in more than one operation.

TABLE II

Sieve Size (mm)	**Maximum allowable mass on sieve (Kg)**
75.0	1
53.0	1
37.5	1
26.5	0.8
19.0	0.6
13.2	0.4
9.5	0.3
6.7	0.3
4.75	0.25
3.35	0.25
2.36	0.2
1.18	0.2
0.60	0.2
0.30	0.15
0.15	0.15
0.075	0.10

5.4 The sieves should be checked frequently and replaced when the mesh becomes stretched or broken .

REFERENCE

SABS Method 829

SAMPLE NO .....
MONSTER NR .....

DATE .....
DATUM .....

DRY MASS .....
DROË MASSA .....

SIEVE APERTURE SIFOPENING mm	MASS RETAINED MASSA WAT AGTERBLY	PERCENTAGE RETAINED PERSENTASIE WAT AGTERBLY	PERCENTAGE PASSING PERSENTASIE WAT DEURGAAN
75,0			
53,0			
37,5			
26,5			
19,0			
13,2			
9,5			
6,7			
4,75			
3,35			
2,36			
1,18			
0,600			
0,300			
0,150			
0,075			
* < 0,075			
TOTAL			

* DRY MASS OF TOTAL SAMPLE BEFORE WASHING MINUS MASS OF FRACTION >0,075 mm AFTER WASHING AND DRYING

* DROË MASSA VAN DIE HELE MONSTER VOOR DIT GEWAS IS MINUS MASSA VAN FRAKSIE >0,075 mm NADAT DIT GEWAS EN DROOG GEMAAK IS

FORM B4/1

Recording sheet for sieve analysis

AGGREGAAT VIR BETON / AGGREGATE FOR CONCRETE

BESKRYWING:
DESCRIPTION:

MONSTER NR / SAMPLE NO	SIFONTLEDING / SIEVE ANALYSIS — PERSENTASIE WAT DEUR SIWWE GAAN PER MASSA / PERCENTAGE PASSING SIEVES BY MASS															ORGANIESE MATERIE A.A. / ORGANIC MATERIAL (KLEURNR./SHADE NO.)	FYNHEIDSMODULUS / FINENESS MODULUS
	75 mm	53 mm	37,5 mm	26,5 mm	19,0 mm	13,2 mm	9,5 mm	6,7 mm	4,75 mm	2,36 mm	1,18 mm	0,600 mm	0,425 mm	0,300 mm	0,150 mm	0,075 mm		

FORM B4/2

Data sheet for tests on aggregate for concrete

AGGREGATE FOR BITUMINOUS SURFACING / AGGREGAAT VIR BITUMINEUSE DEKLAE

SAMPLE NO / MONSTER NR	SIEVE ANALYSIS / SIFONTLEDING — PERCENTAGE PASSING SIEVES / PERSENTASIE WAT DEUR SIWWE GAAN BY MASS / PER MASSA													A.L.D. / G.K.A	FLAKINESS INDEX / PLATHEIDSINDEKS	STRIPPING VALUE / AFSTROOPWAARDE	CRUSHING VALUE / VERGRUISINGSWAARDE	
	37,5 mm	26,5 mm	19,0 mm	13,2 mm	9,5 mm	6,7 mm	4,75 mm	2,36 mm	1,18 mm	0,600 mm	0,300 mm	0,150 mm	0,075 mm				% < 2,36 mm AT / BY 400 kN	LOAD FOR / LAS VIR % < 2,36mm

FORM B4/3

Data sheet for tests on aggregate for bituminous surfacings