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TESTING PROCEDURES FOR PAVEMENT MATERIALS
ROAD AGGREGATES

**DESCRIPTION: DETERMINATION OF AGGREGATE FINGERS VALUE AND
AGGREGATE PLIERS VALUE**

1. SCOPE

The test was developed for rapid field or laboratory strength assessments of aggregates with particular reference to calcrete gravels for unpaved roads. The percentage of the aggregate that cannot be broken between the fingers is called the Aggregate Fingers Value (AFV) and that which cannot be broken between the standard pair of pliers the Aggregate Pliers Value (APV).

A relationship exists between the results on calcrete nodules obtained by this test and those obtained by means of the 10% FACT.

2. STANDARD TEST REFERENCE

Netterberg, F (1967). Some Roadmaking Properties of South African Calcretes. Proc. 4th Reg. Conf. Africa Soil Mech. Fndn Engng, Cape Town, 1, 77-81. (CSIR Reprint RR91).

3. DEVIATION FROM TEST REFERENCE

There are no deviations. However, provision is also made for tests on water-saturated and a different size of aggregate when requested. This test method is equivalent to the DRTT/CSIR Method CB22 of the 1989-01-21. Only improvements to the wording and record form have been made, a detailed description and dimensions of the standard pliers provided, and provision made for also testing glycol-saturated aggregate.

4. DATE OF THIS REVISION

2008-03-08 (FN).

5. NUMBER OF PAGES

THIS METHOD CONSISTS OF 4 PAGES, 2 TABLES AND 1 FIGURE

6. APPARATUS

1. Standard (180 mm) pair of engineer's combination pliers with bare steel handles and with dimensions similar to those in Figure 1. Suitable examples are Hazet 1850-3/7 in and Gedore 8210-7 in. However, any pliers complying with the dimensions shown in Figure 1 may be used. Do not insulate or pad the handles or use electrician's pliers unless the insulation is removed.

2. Sieves: 19,0 mm and 13,2 mm. If no sieves are available in the field select pieces of approximately 13-19 mm aggregate visually at random.
3. At least two basins or other containers for holding aggregate. In the field the test may be carried out on the ground (either bare or on pieces of paper or plastic) or on any other suitable working surface provided that the pieces do not become wet, lost or interchanged.

7. TEST RECORD FORM

Standard Form No. FN B.22.

8. METHOD

8.1 Preparation of sample

Obtain the air dry sample by screening out the fraction passing the 19,0 mm sieve and retained on the 13,2 mm sieve from a representative Test Sample. (See (Note 1, Note 2, Note 3, Note 4.)

8.2 Test procedure

1. Split off, using a riffler, about 200 pieces (100-300 are sufficient) of aggregate from the fraction which was screened or selected (Note 5). Place them in a basin and count the number of pieces (=A). Record the average shape of the pieces (e.g. rounded or angular).
2. **FINGERS TEST:** Try to break each piece between the thumbs and the forefingers using both hands at once (Note 6). Place each unbroken piece in a second container and use all of them for the pliers test. After all have been tested count the number of unbroken pieces (=B). The broken pieces shall be discarded if not required for a moisture content determination (Note 7).
3. **PLIERS TEST:** Try to break each unbroken piece in the concave serrated portion of the jaws of a standard pair of 180 mm pliers using only one hand (Note 6). Place each unbroken piece in a third container or back in the original (now empty) container. After all have been tested count the number of unbroken pieces (=C). The broken pieces shall be discarded if not required for a moisture content determination (Note 7).

9. RECORDING OF RESULTS

The results shall be recorded on a suitable data sheet such as the example attached.

10. CALCULATIONS

The **Aggregate Fingers Value (AFV)** shall be calculated as follows:

$$\text{AFV in \%} = \frac{B}{A} 100$$

Where B = total number of pieces not broken between the fingers
and A = total number of pieces used for both the AFV and APV tests.

The **Aggregate Pliers Value (APV)** shall be calculated as follows:

$$\text{APV IN \%} + \frac{C}{A} 100$$

Where C = number of pieces not broken between the pliers.

11. REPORTING OF RESULTS

Report the results to the nearest whole number on a percentage basis.

12. NOTES

1. When used as a rough field test at least 100 pieces of aggregate approximately 13-19 mm in diameter should be visually selected at random from a stockpile or representative sample.
2. The test may also be done on 9-13 mm aggregate if desired or if only this is available. However, the results may differ from those on 13-19 mm aggregate. Record the size fraction tested.
3. The test has traditionally been done on the 13-19 mm fraction as found in the material. However, it may alternatively be done on a mixture of this and the > 19 mm fraction crushed < 19 mm. The 13-19 mm fraction in the crushed oversize is added to that found in the sample. As the results obtained using this procedure may differ from those obtained using the standard procedure it is important to record what is done. The alternative procedure is usually only followed when there is a shortage of material. When testing crushed aggregate, avoid excessively flaky pieces, and place the pieces flat (i.e. not on edge) in the pliers.
4. The test may also be done on aggregate that has been saturated by immersion in water or ethylene glycol for 24 hours and allowed to drain briefly. It is not essential to surface dry the aggregate. Record whether tested dry or soaked in water or glycol. If there is a shortage of material some idea of the effect of soaking can be obtained by carrying out a wet pliers test on the unbroken pieces from the dry pliers test (i.e. C). However, this is not strictly a valid procedure and a special note should be made if this is done.
5. Although the number of pieces of aggregate should preferably exceed 100, the test can be done on a lesser number, but the results will not be as reliable. As a rough field test the total number selected is used for the test.
6. Exert more or less maximum strength (about 90% at first in order to avoid becoming tired too quickly) and cease testing if becoming too tired and strength is obviously falling off seriously. A piece is considered broken if it breaks into two or more smaller pieces or is completely crushed, but not if only a small corner breaks off.
7. When requested, determine the moisture content by oven drying of the saturated aggregate after testing. All the pieces used for both the AFV and the APV tests should be used for the moisture content determination unless instructions are given to determine the moisture contents of the three portions separately (i.e. (i) the pieces

broken between the fingers, (ii) those unbroken between the fingers but broken between the pliers, and (iii) those unbroken between the pliers (= C).

8. Suppliers of suitable combination pliers:

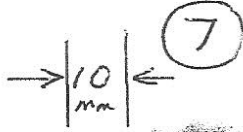
- (a) Hazet 1850-3/7": Harry P. Will, P.O. Box 401, 2121 Parklands; Tel 011-8862706, Fax 011-8862806.
- (b) Gedore 8210-7": Gedore Tools, P.O. Box 68, 3620 New Germany; Tel 031-7053587, Fax 031-7053277.

If one of these is not readily available the following dimensions and tolerances are suggested (see figure 1) :

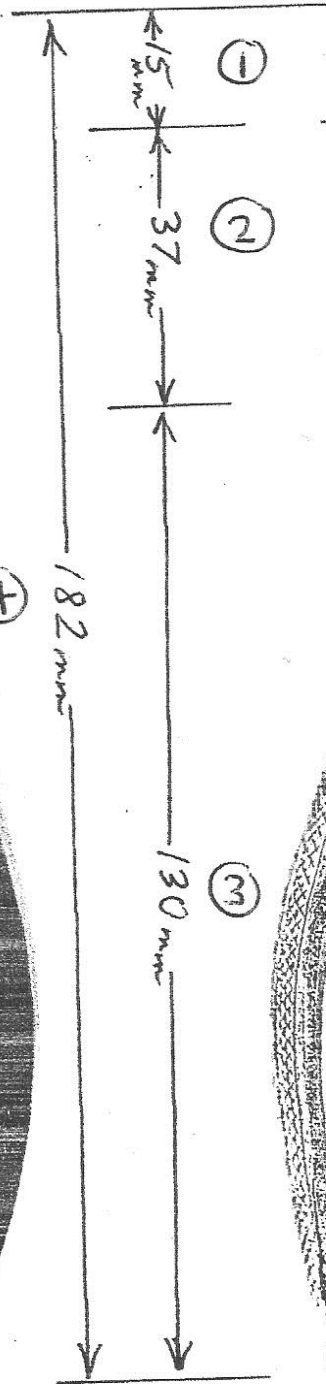
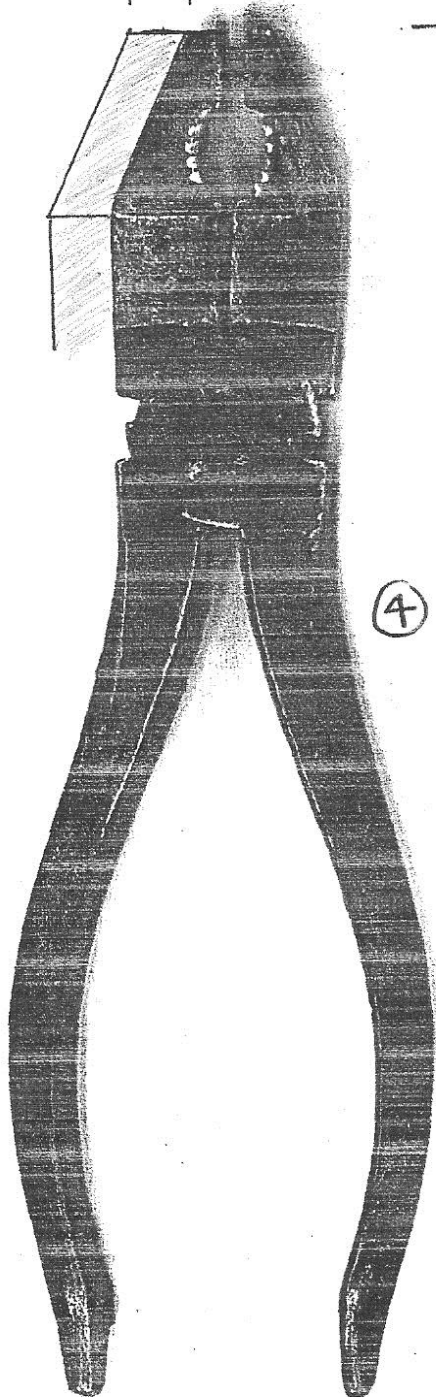
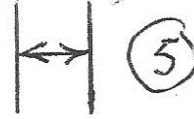
1 : 15 ± 5 mm	4 : 182 ± 5 mm	7 : 10 ± 1 mm
2 : 37 ± 1 mm	5 : 5 ± 1 mm	
3 : 130 ± 5 mm	6 : 11 ± 1 mm	

FN/cb AFV/APV TEST 2008-04-29

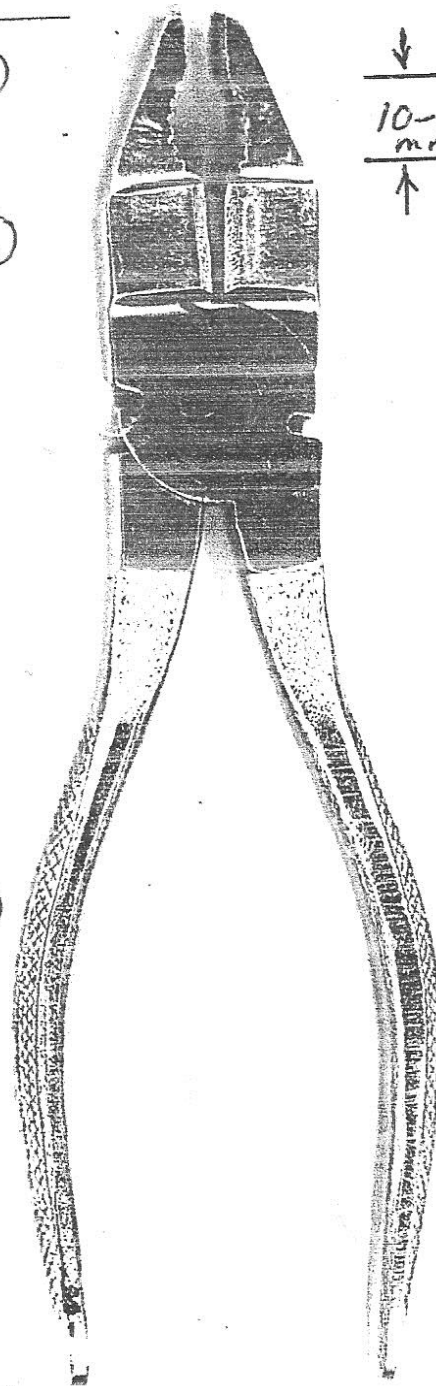
JAW THICKNESS



JAW WIDTH (CLOSED) 4-6 mm



JAW LENGTH 10-12 mm with circled 6



NO-NAME BRAND

GEDORE 8210-7"

NOTE UNINSULATED HANDLES

FIGURE 1: SUITABLE ENGINEER'S COMBINATION PLIERS FOR APV TEST

