FREEZING AND THAWING OF COARSE AGGREGATE

LS-614 ____
A23.2-24A ____

APPARATUS

1. Freezer (Chest, Stand up or Walk-in):
   (a) Maintains temperature of -18 ± 2.0°C?..... ____
   (b) Air circulated by fan? ..... ____
   (c) Maximum variation within 25 cm of top and bottom of space does not exceed 2.0°C? .. ____
   (d) Temperature monitored at different points in freezer? ..... ____

2. Sieves, 300 mm or more in diameter:
   LS-614:
   37.5 mm? ____ 19.0 mm? ____ 9.5 mm? ____
   26.5 mm? ____ 13.2 mm? ____ 4.75 mm? ____

or A23.2-24A:
   40 mm? ____ 20 mm? ____ 10 mm? ____
   28 mm? ____ 14 mm? ____ 5 mm? ____

3. Thermometers, Mercury, Alcohol or Electronic.
   (a) Range of ***-35º C to +50º C***, 1° divisions and readable to 0.5°C?..... ____
   (b) Calibrated with ASTM precision reference thermometer accurate to 0.1°C, at 0°C?..... ____

4. Autoclavable Plastic Containers, with air tight screw-on caps and able to withstand a continuous temperature of 110°C, in 1L and 500 mL sizes?..... ____

5. Plastic Mesh Baskets
   (a) Stackable, holds four 500 mL, or two 1 L and one 500 mL containers? ..... ____
   (b) Suitable spacers to prevent contact between containers (each other) and freezer walls? ____

6. Balance, accurate to 0.1% of sample mass or 1 g (greater)?..... ____

7. Oven, mechanical convection, maintains temperature of 110 ± 5°C?..... ____

8. Control Aggregate, standard ‘Brechin’ coarse aggregate?..... ____

9. Reagent, 3% by mass of sodium chloride to 97% water? ..... ____
   Note: Common table salt is acceptable.

COMMENTS:

Pass	Retained	Mass, g
37.5 mm	26.5 mm	5000
26.5 mm	19.0 mm	2500
19.0 mm	13.2 mm	1250
13.2 mm	9.5 mm	1000
9.5 mm	4.75 mm	500

or A23.2-24A: ____

Pass	Retained	Mass, g
40 mm	28 mm	5000
28 mm	20 mm	2500
20 mm	14 mm	1250
14 mm	10 mm	1000
10 mm	5 mm	500

4. Sample placed in appropriate size container and identified? ..... ____
5. Samples larger than 19.0 mm (20 mm) in two or more containers? ..... ____
6. Containers marked with arrow to indicate rotation? ..... ____

Procedure

1. Containers filled with 3% sodium chloride solution to completely immerse aggregate? ..... ____
2. Containers sealed and kept at room temperature for 24 ± 2 hours? ..... ____
3. Solution rapidly drained off using 1.18 mm (1 mm) screen-fitted lid and resealed? ..... ____
4. Containers placed in baskets, on sides with spacers between to prevent contact? ..... ____
5. Freeze samples by placing baskets in freezer at -18 ± 2°C for 16 ± 2 hrs? ..... ____
6. Remove from freezer and allow to thaw at room temperature for approx. 8 hrs? ..... ____
7. Rotate containers one quarter turn and return to freezer? ..... ____
8. Process continued for five cycles? ..... ____
9. Wash aggregate by filling container with water, drain through screen-fitted lid? ..... ____
10. Repeat five times without removing aggregate from containers? ..... ____
11. Remove lids and dry aggregate to a constant mass in containers at 110 ± 5°C? ..... ____
12. Place each fraction on same sieve used in preparation and shake in same sieve shaker (sieving time determined in accordance with Appendix 1 of the method)? ..... ____
    Note: Sieves may be inverted, *i.e.* nested smallest opening to largest, top to bottom.
13. Weigh each fraction and record to nearest 1 g? ..... ____

COMMENTS:

Calculate the percent loss to nearest 0.1%? ..... ____

2. Calculation for weighted loss:

$$Weighted\ Percent\ Loss = \frac{\sum Fraction\,\%\ x\ ret.grading}{100}$$

Calculate the weighted percent loss to nearest 0.1%?..... ____

Use of Laboratory Control Aggregate

1. Sample of control aggregate is tested each time a freeze-thaw test is conducted?..... ____
2. Control sample loss weighted as follows:
   LS-614:
   19.0 to 13.2 mm: 35% 13.2 to 9.5 mm: 33% 9.5 to 4.75 mm: 32%?..... ____
   A23.2-24A:
   20 to 14 mm: 35% 14 to 10 mm: 33% 10 to 5 mm: 32%?..... ____
3. The mean loss of the Brechin control aggregate is 20.8%? ..... ____
1. Individual test data should not normally be greater than 25.3% or less than 16.3%..... ____
2. Control chart showing data for last 20 samples of reference material?..... ____
   Mean for last 20 samples..... ____
   Low for last 20 samples ..... ____
   High for last 20 samples ..... ____

COMMENTS: