Guide Specifications For

Geotechnical Applications using STALITE Fine Lightweight Aggregate

Aggregate

Lightweight aggregate shall be STALITE expanded slate or approved equal produced by the rotary kiln process and meeting the requirements of ASTM C 330. Lightweight aggregate shall have a proven record of durability, and be non-corrosive, with the following properties:

Aggregate Physical Properties

A1 The soundness loss shall not exceed 10% after five cycles of sodium sulfate (AASHTO T 104).

A2 The chloride content shall not exceed 100 ppm (AASHTO T 291).

A3 Aggregate shall conform to the fine aggregate gradation 4.75 mm to 0 (#4 to 0) specified in ASTM C 330 when tested in accordance with ASTM C 136.

Project Performance Specification

B1 The aggregate loose bulk density shall not exceed 65 lbs/ft^3 when tested in accordance with ASTM C 29. (See Comment 1)

B2 The in-place compacted dry density shall not exceed 80 lbs/ft^3 when tested in accordance with the method specified by the engineer. (See Comment 2)

B3 Material shall be compacted to a minimum 65% relative density as determined by ASTM D 4254. Determine the maximum index density and unit weight by using a vibratory table when tested in accordance with ASTM D 4253. The minimum index density and unit weight is determined when aggregate is tested in accordance with ASTM D 4254. (See Comment 2)

B4 The angle of internal friction, ϕ, shall not be less than 40 degrees when tested in accordance with the method specified by the engineer. (See Comment 3)

Construction

C1 Method of Construction: Lightweight aggregate fill shall be placed in uniform layers. The lift thickness and number of passes by equipment used will be determined by the engineer depending on the project requirements (i.e., stability, compaction and density). (See Comment 4)

Comments

1. For quality control and shipment quantities, the purchaser and supplier should agree on a maximum delivered loose bulk density (unit weight).

2. ASTM D 4253 “Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table” and ASTM D 4254 “Standard Test Methods for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density” can be used to determine the maximum density of cohesionless lightweight aggregate fines. Like many cohesionless fine aggregates, STALITE fine lightweight aggregates do not exhibit a defined optimum moisture content. It is recommended that the moisture content at the time of placement be sufficient to prevent in service settlement of the lightweight fine aggregates.

   The minimum relative density, D_d, is calculated using the following equation:

$$D_d(\%) = \frac{\gamma_{dmax}\left(\gamma_d - \gamma_{dmin}\right)}{\gamma_d\left(\gamma_{dmax} - \gamma_{dmin}\right)} \times 100$$

   where:

   γ_{dmax} = maximum index density as determined by ASTM D 4253

   γ_{dmin} = minimum index density as determined by ASTM D 4254

   γ_d = measured in-place density as determined by ASTM D 1556 “Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method” or other appropriate method approved by the engineer.

3. STALITE lightweight aggregate has been tested by both direct shear and triaxial test methods. With either method, the phi angle will vary in both ordinary and STALITE fill, depending on test procedure, aggregate grading, particle angularity, amount of compaction and amount of consolidating stress applied during the test. The engineer shall design and specify the minimum phi angle appropriate for the project design and the material(s) that are contemplated for use in the project. Contact Carolina Stalite Company for fine lightweight aggregate properties.

4. Conventional placement and compaction methods may be used when constructing fill with STALITE fine lightweight aggregate.

5. ASTM and AASHTO equivalent specifications and test methods:

ASTM	AASHTO
C 29	T 19
C 136	T 27
C 330	M 195