

# Guide Specifications For

## Geotechnical Applications using

# STALITE Coarse Lightweight Aggregate

### Aggregate

Lightweight coarse 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 abrasion loss shall not exceed 40% (ASTM C 131).
- A3 The chloride content shall not exceed 100 ppm (AASHTO T 291).
- A4 Aggregate shall conform to the coarse aggregate gradation for 19 mm to 4.75 mm (3/4" to #4) 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 55 lbs/ft<sup>3</sup> when tested in accordance with ASTM C 29. (See Comment 1)
- B2 The in-place compacted moist density shall not exceed 63 lbs/ft<sup>3</sup> when tested in accordance with the method specified by the engineer. The wet procedure shall be performed with the lightweight aggregate tested in saturated surface dry (SSD) conditions after a minimum water immersion period of 72 hours. (See Comment 2)
- B3 The angle of internal friction,  $\phi$ , 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 project requirements (i.e., stability, compaction and density). (See Comment 4)
- C2 In confined areas, vibratory plate compaction equipment shall be used (5 hp to 20 hp) with a minimum of two passes in 6" lifts for a 5 hp plate and 12" lifts for a 20 hp plate.
- C3 The contractor shall take all necessary precautions when working adjacent to the lightweight fill to ensure that the material is not over compacted. Construction equipment, other than for placement and compaction, shall not operate on the exposed lightweight aggregate fill.

### Comments

1. For quality control and shipment quantities, the purchaser and supplier should agree on a maximum delivered loose bulk density (unit weight).
2. Several methods have been used to determine the in-place moist bulk density (unit weight) of a given aggregate. The following methods have been used with proven performance:

- A. The lightweight aggregate producer shall submit verification of a compacted moist density of less than 63 lb/ft<sup>3</sup> when measured by a one point proctor test conducted in accordance with a modified version of ASTM D 698. Because of the cohesionless nature of coarse lightweight aggregate, the standard shall be modified as follows: The aggregate sample shall be placed in a 0.5 cubic foot bucket at the moisture content that the aggregate will be delivered to the jobsite. The sample shall be placed in three equal layers and compacted by dropping a 5.5 pound rammer from a distance of 12 inches 25 times on each layer.
- B. Material shall be compacted to a minimum 65% relative density as determined by ASTM D 4253 and 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.

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, degree of compaction and amount of consolidating stress applied during the test. Design and specify the minimum phi angle appropriate for the project design objectives and material(s) that are contemplated for use in the project. Contact Carolina Stalite Company for coarse lightweight aggregate properties.

Direct Shear: The minimum angle of internal friction shall be tested in accordance with ASTM D 3080 on a saturated representative sample (with particles larger than 0.75 inch removed) and tested in a round or square shear box that is a minimum of 12 inches across. Follow the procedure in ASTM D 3080 or shear the box at a rate of 0.01 inches per minute at normal loads of 250, 500 and 1,000 lbs/ft<sup>2</sup>.

4. Typical practice with a vibratory roller is to place lightweight aggregate in horizontal layers that do not exceed 12" loose thickness. Each layer is then compacted using vibratory compaction equipment weighing no more than 12 tons static weight. The minimum recommended number of passes is two. Additional passes may be required and should be determined in the field by the engineer to ensure stability of the layer.

5. ASTM and AASHTO equivalent specifications and test methods:

ASTM	AASHTO	ASTM	AASHTO
C 29	T 19	C 330	M 195
C 131	T 96	D 698	T 99
C 136	T 27		