EXPANDED POLYSTYRENE FILL SAMPLING AND SPECIMEN PREPARATION PROCEDURE

GEOTECHNICAL TEST PROCEDURE
GTP-7
Revision #1

AUGUST 2015
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STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING BUREAU

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1. **SCOPE**

1.1 This procedure outlines the method used by the NYSDOT Geotechnical Engineering Bureau in selecting representative specimens from large blocks of Expanded Polystyrene (EPS), also known as Geofoam. These blocks of EPS are typically either 3’ x 4’ x 8’ (1 m x 1.2 m x 2.4 m) or 2’ x 4’ x 8’ (0.6 m x 1.2 m x 2.4 m). Other sizes may exist.

1.2 The objective is to select nine (9) representative specimens for Density Testing (ASTM D1622) and Compressive Strength testing (ASTM D1621). These nine specimens will be taken from three columns cut out of the large EPS block. (Figures 1 & 2)
2 APPLICABLE DOCUMENTS


3 TERMINOLOGY

3.1 For description of terms related to this Sampling and Specimen Preparation Procedure, refer to ASTM D1622 and ASTM 1621

4 SUMMARY OF METHOD

4.1 This procedure obtains test specimens for ASTM D1622 Density and ASTM D1621 Strength testing. If other Test Methods are to be performed, refer to the appropriate Test Method for sample selection and preparation.

4.2 This procedure standardizes the sampling method for obtaining nine (9) specimens for testing of a randomly selected, representative block of expanded polystyrene.
5 SIGNIFICANCE AND USE

5.1 Expanded polystyrene fill is used as an extremely lightweight soil replacement to reduce stresses on the underlying soils when treating an unstable roadway embankment foundation or to reduce lateral earth pressures on retaining walls, abutments or foundations.

5.2 As a lightweight material, expanded polystyrene can have a density that is less than 1% of soil or rock.

5.3 Although the use of expanded polystyrene is focused on its lightweight nature, EPS must be capable of providing structural support under loading without experiencing undue strains or deformations.

6 APPARATUS

6.1 Cutters:
   A. Electric Hot-Wire hand-held to make intermediate or long cuts. Practice has shown that for long cutting wires the following works well – 3’ (1 m) of 22 gage NiCr wire using 6 volts, 3 ohms, and 2 amps. The longer cuts were made with a 6’ (1.8 m) wire using 14 volts, 6.5 ohms, and 2 amps. (Figures 3 & 6).

   B. Alternative cutting devices – any suitable means until the final cut.

Figure 3 Hand-Held Hot Wire
Figure 4  Confining Miter Box Cutter

Figure 5  Confining Miter Box Cutter
6.2 Measuring & marking tools. (Final cut should have no marks).

6.3 Confining miter box cutter for the final cube cuts. (Figures 4 & 5).

6.4 Trays with dividers to hold the specimens to maintain each orientation and location.

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Figure 6 Cutting wire setup including switches

7 SAMPLING

7.1 Randomly select a representative block of expanded polystyrene.

8 SPECIMEN PREPARATION

8.1 Measure and draw three 14” x 14” (350 mm x 350 mm) areas, as shown in Figure 1, along a diagonal line from one corner to the opposite corner.

8.2 Inspect the block to determine the best two undamaged diagonal corners before selection. Two columns are taken at opposite diagonal corners and the third column is from the center of the large EPS block. Generally these columns are 14” (350 mm) square
(minimum) by the depth of the block which may be either 2’ (0.6 m) or 3’ (1 m) thick. (Figure 2).

8.3 Orientation of top and bottom must be maintained throughout all cutting and trimming processes. This is crucial to determine if there is any variation within the large EPS block. (Figure 7).

8.4 Rough cut the three columns using either large hand-held electric hot–wire cutters or other suitable means. The hot-wire method **must** be used for all final cuts.

8.5 The goal is to select a total of nine cubes from the interior of the EPS block (three from each column) staying away from any surface defects. Divide the three columns into three horizons (upper, middle, & lower). (Figure 8)
8.6 The upper and lower horizons should be taken no closer than 3” (75 mm) from the column top or bottom. The middle horizon shall be taken at the mid-height of the column. The intent is to obtain one specimen at each of the three horizons within each column. These small cubes shall be cut to approximately 3.5” (89 mm) in all dimensions. A hand saw or other means of cutting the cubes to rough size can be used. Caution should be exercised not to damage the cube when doing the rough cut. (Figure 9)
8.7 Trimming the nine cubes to final test size requires precise “Hot Wire” trimming. The final cubes shall not be marked, however orientation must be maintained. Extreme attention to maintaining cube location, orientation and 90° angles is critical. The cubes shall be no smaller than 2” (50 mm) in any dimension. The preferred final dimension for all sides is approximately 2.3” (58 mm) to allow for any minor trimming corrections. All final trimming must be by Hot-Wire.

9 DOCUMENTATION

9.1 The identification of the parent EPS block must be recorded, as well as the column and level of each cube. The trimmed dimensions of each cube and orientation must be recorded.