

# SPECIFICATION FOR EXPANDED POLYSTYRENE IN GROUND IMPROVEMENT WORKS

## 1.0 LIGHTWEIGHT MATERIALS

### 1.1 Compressive Strength

The compressive strength should be at least  $100 \text{ kN/m}^2$  if not otherwise specified. The average value for tested blocks should not be less than  $100 \text{ kN/m}^2$ . The average value for individual blocks (minimum 6 samples) should not be less than  $90 \text{ kN/m}^2$  and no single test result should be less than  $80 \text{ kN/m}^2$ .

If higher strength lightweight materials is required, the average value for tested blocks should at least be equal to the design compressive strength. The average value for individual blocks (minimum 6 samples) should not be less than 90% of the design strength and no single test result should be less than 80% of the design strength.

The compressive strength is defined as the stress at 5% strain measured in an unconfined compression apparatus. Tests should be made on sample of size  $50 \times 50 \times 50 \text{ mm}$ . The number of blocks to be tested is given in table 1.

### 1.2 Dimension

The shortest side of any block should at least be 0.5m if not otherwise specified. The block length should at least be 2.5 m. Block sides should be plane and at right angles to each other. Tolerance levels for given dimensions (length, width, height) should be within  $\pm 1\%$ . Block surfaces should not deviate from a plane surface with more than 5 mm measured with a 3 m straightedge. For test frequency see clause 3.1.

Differences in heights between adjacent blocks in the same layer should not exceed 5 mm. Particular care should be taken if the blocks are delivered from different producers.

### 1.3 Flammability (NOT USED)

Lightweight materials used shall be of self extinguishing quality (SE quality).

SE quality blocks should have an oxygen index  $> 25$  as described in ASTM D-2863, or grading B1 according to DIN specifications.

## 2.0 CONSTRUCTION OF LIGHTWEIGHT MATERIALS FILLS

### 2.1 Evenness Requirements

Before placing the bottom layer, the subsoil should be levelled according to the tolerances  $\pm 50 \text{ mm}$ . Deviations in the subsoil stratum from an even surface should be 10 mm or less measured with a 3 m straightedge. The required evenness of the stratum may be achieved by pulling a straightedge across the subsoil surface (e.g. a heavy ladder pulled by hand).

When placing the lightweight materials-blocks, a continuous check should be kept to ensure that the evenness of the blocks are satisfactory in each layer. The importance of this factor increases with the height of the fill.

## 2.2 Placing and Adjusting the Blocks

When more than one layer is applied, the lightweight materials-blocks in different layers should be placed at right angles to each other in order to avoid continuous vertical joints.

The shape of the blocks may easily be adjusted by hand or chainsaw in order to accommodate the shape of structures. Small gaps (less than 2-3 cm) may be accepted in such cases and when blocks are placed at different angles (i.e. in curves). Larger gaps should be filled with sand or light expanded clay aggregate ("Leca"), but gaps larger than 5 cm are not permitted.

## 2.3 End Adjustments and Varying Slopes

The different layers in an lightweight materials fill should be parallel to the pavement construction. Sloping end adjustments along the road should be accomplished by levelling terraces in the subsoil in accordance with the block thickness. End adjustments using lightweight materials chips or thin boards should not occur.

## 2.4 Side Slopes / Coverage

For fills with normal side slopes of 1:1.5 or 1:2, the side slope of the lightweight materials fill should not be steeper than 1:1.

All types of fill materials may be used on side slopes. The minimum thickness should be at least 250 mm. If the lightweight materials blocks are protected by polyethylene foil/membrane or equivalent, the foil/membrane should be placed in contact with the block surface and covered with a geotextile cloth before applying the covering materials. Clay or well graded, fine grained, non-cohesive material (no stones) should then be used next to the geotextile.

Where membrane or geotextile is specified to protect lightweight materials blocks from solvent such as petrol, the membrane or geotextile should have a thickness of at least 0.3 mm and be inert to petrol and other solving agents.

## 2.5 Concrete Slab

A minimum 100mm thick reinforcement concrete slab shall be cast directly on the lightweight materials blocks.

The concrete mix should be designed for a strength of Grade 25 or better. A welded steel reinforcement grid should place in the middle of the slab. Reinforcing bars of the grid should have a diameter of 5 mm placed at 150mm c/c. The grids should be produced in sizes 2 x 5 m and placed with overlap according to BS 8110.

## 3.0 QUALITY ASSURANCE

### 3.1 Quality Control

Selection of blocks for quality control should be made at random, but evenly distributed among any sets of blocks. The frequency when testing for material strength shall be shown in table 1. Block dimensions and evenness should be checked on one block for every 25 blocks. Requirements regarding evenness and level of subsoil surface below the lightweight materials should be checked in a cross section profile for every 10 m of road.

**Table 1**

<b>Size of Fill</b>	<b>No. of Blocks to be Tested</b>
< 500m <sup>3</sup>	Minimum 3 blocks
500 -1000m <sup>3</sup>	Minimum 5 blocks
> 1000m <sup>3</sup>	Minimum 5 blocks per 1000 m <sup>3</sup>

### **3.2 Documentation of Quality from Producer**

The Contractor shall produce documents giving details of the quality assurance system applied in the production process. Quality certificates should be submitted for blocks delivered on site. Sample testing should be performed according to clause 3.1 by an approval laboratory before the blocks are placed in the fill.



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