Structural Fill

Road Construction

Structural Fill EPS blocks are widely used as a lightweight sub-base for road construction to alleviate pressure in poor ground conditions. EPS has high compressive strength capability and long term performance providing a cost effective and reliable solution in difficult conditions.

When used as a lightweight fill below road construction Structural Fill reduces vertical and lateral pressures on the ground and surrounding structures. This reduces settlement problems and saves time and cost on the project.

Significant time is saved on the project through reducing or removing the need for surcharging. Cost reduction is achieved by removing the need for specialised foundations.

Structural Fill Benefits

- Load Bearing
- Lightweight
- Water Resistant
- Versatile
- Resistant to freeze/thaw
- Flame Retardant Available
- ODP = 0 GWP = <5
- Fully Recyclable

Structural Fill is supplied as large blocks of EPS which are lightweight and easy to handle and install on site.

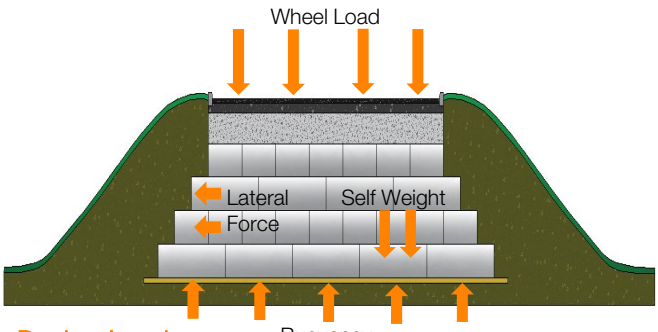
Standard Block Size			
	Length	Width	Thickness
Dimensions (mm)	2400	1200	600

Other sizes are available, cut to suit the layout on site.

Design Considerations

There are three main considerations when designing with Structural Fill EPS blocks for Road Construction.

- Downward forces from wheel loads and self weight of construction
- Upward forces from buoyancy in wet conditions
- Lateral forces against existing structures



Design Loads

Structural Fill EPS is graded by its 10% compressive strength in accordance with BS EN 13163. For civil engineering applications factors of safety are applied to provide a design resilient against the effects of long term loads.

For compressive strengths and other characteristics please refer to the table of physical properties at the end of this information sheet.

Recommended factors of safety and other design considerations are covered within this document. If you require clarification or would like to discuss your project please contact our team of experts on 01786 471586.

CONTACT US

01786 471586 enquiriesuk@sundolitt.com www.sundolitt.com

Structural Fill

Road Construction

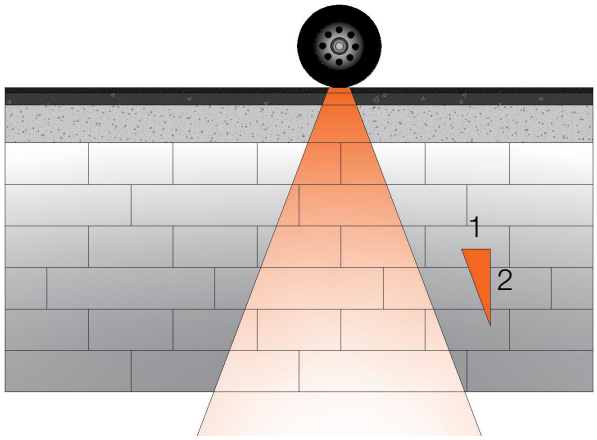
Wheel Loads

Structural Fill EPS Blocks exhibit excellent stability under cyclic loading. When used in applications not exceeding the 1% compressive strength the Structural Fill remains elastic.

Extensive studies of the cyclic load behaviour of EPS have been carried out with the conclusion that a factor of 1.25 should be applied to the safe deign load for EPS. The safe design load is taken as 35% of the 10% compressive strength.

With this factor of safety applied a deformation of less than 0.4% is expected under cyclic loading. As EPS remains elastic at this level of compression there will be no permanent deformation of the EPS fill material.

Calculating the load spread on layers of a sub-base of Structural Fill EPS Blocks a gradient of 2 : 1 is taken. (see diagram below)



The assessment of traffic loads are calculated in accordance with the appropriate documents within The Design Manual for Roads and Bridges (DMRB).

Self Weight

Fully compensating designs can be achieved using Structural Fill EPS as a lightweight fill. As the EPS blocks are around 1% of the weight of traditional fill materials the net weight of the new road construction can be equal to the weight of soil removed. This alleviates pressures on existing poor ground.

Allowance for water absorption should be allowed for in the self weight of the Structural Fill Blocks. This is taken as 1% water vol/vol.

Factored Design Values for Cyclic Loading (kN/m^2)	
S70	20
S100	28
S150	42
S200	56
S250	70
S300	84
S350	98
S400	112
S500	140

Buoyancy

When constructing in areas liable to seasonal flooding or within the natural water table the effect of buoyancy must be taken into account.

Structural Fill EPS Blocks are considered closed bodies where only minute amounts of water will enter the blocks when suddenly submerged. Under long term wet conditions the EPS Blocks will absorb between 5 – 8% vol/vol.

The buoyancy force is calculated as the difference between the unit density of the EPS Blocks and the unit density of water.

In periodic flood conditions the buoyancy factor will therefore be greater than where ground water is constantly present. Typical flotation forces used in design are 9.6 kN/m^3 for flood areas and circa 9.0 kN/m^3 in conditions of long term submersion.

Lateral Forces

Road designs incorporating lightweight Structural Fill significantly reduces lateral forces. This simplifies the design of bridge support foundations as they are no longer required to account for large rotational forces.

More information on designing for reduced lateral forces can be found in our information sheet covering the use of Structural Fill against Bridge Abutments.

CONTACT US

01786 471586 enquiriesuk@sundolitt.com www.sundolitt.com

Structural Fill

Road Construction

Installation

Structural Fill is lightweight and easy to install. EPS is inert and non-toxic there is no requirement for PPE during normal handling of EPS.

The surface onto which the EPS blocks are to be laid must be level and even. This can be compacted ground or a blinding layer of sand or concrete.

When building on ground with poor bearing capacity or differing soil conditions it is recommended that a Geotextile membrane is placed below the EPS blocks.

Blocks should be placed tightly butted together with joints staggered in a brickwork pattern. Additional layers above should be cross laid, this assists in providing a solid fill spreading loads evenly.

Where cutting of the blocks is required on site this should be carried out using a saw or hot wire cutter.

Fixing

During installation the use of short lengths of rebar driven vertically into the blocks may be used to provide temporary fixing. The EPS blocks may also be adhered together to prevent movement during installation processes.

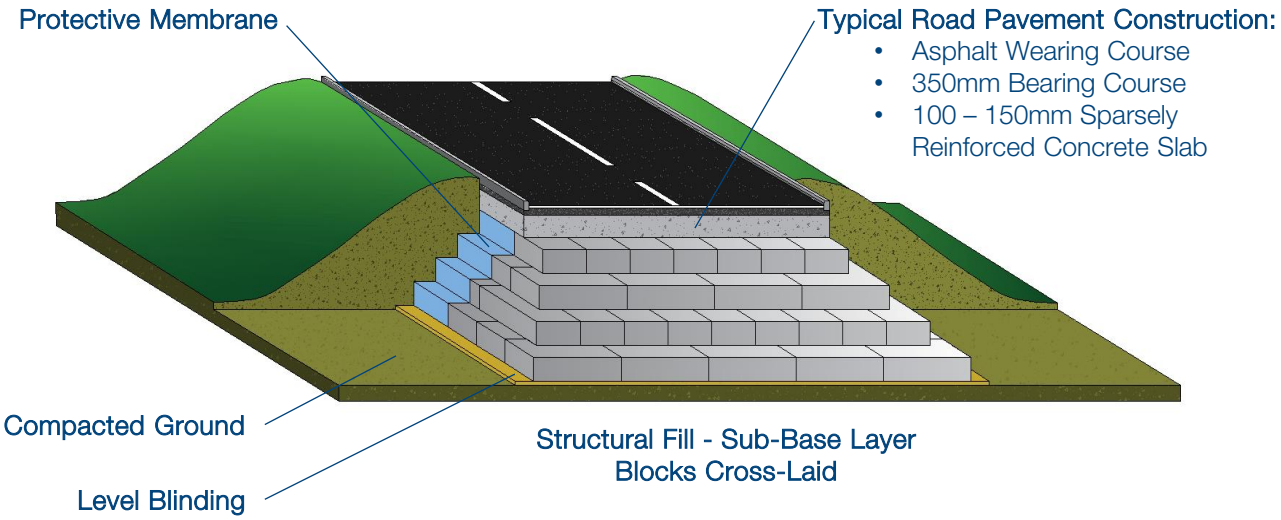
Once the topping layers of concrete, sand or soil are in place the blocks will no longer be susceptible to movement.

Protective Layers

EPS Fill must be protected against contact with hydrocarbons and organic solvents such as petrol. Protection from ground contaminants must also be considered.

The top layer of Structural Fill should be protected using an impermeable membrane able to withstand mechanical and chemical damage. All membrane seams must be lapped and sealed against penetration of chemicals.

Care must be taken not to damage any membranes during the construction process.



CONTACT US

01786 471586 enquiriesuk@sundolitt.com www.sundolitt.com

Structural Fill

Installation Guide

Road Pavement

The road pavement structure is built up over the protective membrane on top of the Structural Fill EPS blocks. The pavement depth and design will be in accordance with the guidance given in the DMRB.

Soil and landscaping is placed to the sloping/staggered sides of the Structural Fill to the depth and contour required.

A minimum cover of 200mm sand and gravel should be placed over the Structural Fill where plant is to be run over the EPS during construction.

To prevent initial compression in the EPS Blocks where concrete is poured insitu the maximum weight of wet concrete should not exceed the 1% compressive strength of the Structural Fill material.

Any road furniture can be incorporated as necessary, allowing for foundations by cutting into the EPS blocks and ensuring protective membrane is continuous.

Accreditation

Sundolitt Structural Fill is manufactured in accordance with BS EN ISO 14933.

✓ QMS ISO 9001 Registered Company

✓ EMS ISO 14001 Registered Company

Other Applications for Structural Fill:

- Road Widening
- Rail Embankments
- Bridge Abutments
- Retaining Walls
- Culverts
- Landscaping
- Temporary Access
- Noise Bunds
- Void Formers

Sundolitt Structural Fill - Physical Properties									
PRODUCT GRADE	S70	S100	S150	S200	S250	S300	S350	S400	S500
Nominal Density (kg/m³)	15	20	25	30	35	38	42	48	55
Compressive Strength at 1% nominal Compression (kPa)	20	45	70	90	100	120	140	160	190
Compressive Strength at 10% nominal Compression (kPa)	70	100	150	200	250	300	350	400	500
Bending Strength (kPa)	115	150	200	250	350	450	525	600	750
Shear Strength (kPa)	55	75	100	125	170	225	260	300	375
Design Load for Compressive Creep (kPa) (<2% over 50 yrs)	21	30	45	60	75	90	105	120	150
Coefficient of Friction	0.5								
Poisson's Ratio	0.10								

*Flame retardant material available specified as: SE70, SE100, SE150, SE200, SE250, SE300, SE350, SE400 and SE500

CONTACT US

☎ 01786 471586 ✉ enquiriesuk@sundolitt.com 🖱 www.sundolitt.com