



# COMPRESSIVE STRENGTH

Of Expanded Polystyrene (EPS) for Civil Engineering Applications Explained.



EPS has been successfully used as a light weight fill material in Civil Engineering applications for many years. However there is conflicting information in the market place regarding the compressive strength properties of EPS. **So what is fact and fiction?**

### Short Term Compression:

The EPS market has traditionally quoted *1% compressive strength figures* in literature, data sheets and websites which are based on short term rapid load tests. These tests are short term compression laboratory tests involving a load being applied and then removed after a short period of time. See Table 1. This data obtained from a 1994 \*Transport Research Laboratory Report applies only to embankments and landscaping applications **NOT** civil

engineering applications with long term imposed loads. The report has been superseded by *BS EN14933:2007*.

### Long Term Compression:

For civil engineering applications BS EN14933:2007 recommends that engineers use *2% compressive stress figures* to calculate the required grade of EPS material. These figures are extrapolated in accordance with BS EN1606:2013 to provide 50 year long term data reflecting the actual compressive

creep that would take place over the life span of the EPS once installed and carrying the maximum imposed load. See Table 2.

### Product Classification:

EPS products are also classified into types based on the *10% compressive strength figures*, an extract of Table C.1 - Classification of EPS Products is shown in Table 3 below taken from BS EN 14933:2007.

Table 1

Typical Compressive Strength at 1% Compression	
EPS Grade	(kPa)
EPS 70	20
EPS 100	45
EPS 150	70
EPS 200	90
EPS 250	100
EPS 300	120

Short Term Load Results

Table 2

Typical Compressive Strength at 2% Compression	
EPS Grade	(kPa)
EPS 70	21
EPS 100	30
EPS 150	45
EPS 200	60
EPS 250	75
EPS 300	90

Long Term Load Results

Table 3

Typical Compressive Strength at 10% Compression	
EPS Grade	(kPa)
EPS 70	70
EPS 100	100
EPS 150	150
EPS 200	200
EPS 250	250
EPS 300	300

In accordance with BS EN 14933:2007

BS EN14933:2007 - Thermal insulation and light weight fill products for civil engineering applications — Factory made products of expanded polystyrene (EPS)  
 BS EN1606:2013 - Thermal insulating products for building applications. Determination of compressive creep

\*The use of polystyrene for embankment construction - Contractor report 356

# Compressive Strength of Expanded Polystyrene (EPS) for Civil Engineering



## Product Comparison:

The Construction Products Regulations (CPR) makes the technical specification of construction products transparent which means manufacturers must comply with harmonised standards such as BS EN14933:2007 when placing products on the market.

This results in uniform product specifications for all EPS manufacturers and therefore engineers can confidently compare EPS products based on any physical property. Table 4 compares the physical properties of some of the most popular EPS products manufactured to BS

EN14933:2007 and sold in the UK for use in civil engineering applications. For the purpose of this comparison we have used the Compressive Strength at 10% figure and Nominal Density (kg/m<sup>3</sup>) to show the products are identical in terms of performance\*

**Table 4 - Material Comparison**

	Product Type (BS EN 14933:2007)					
	EPS 70	EPS 100	EPS 150	EPS 200	EPS 250	EPS 300
<b>SPI</b>	Geofill EPS70	Geofill EPS100	Geofill EPS150	Geofill EPS200	Geofill EPS250	Geofill EPS300
Compressive Stress at 10%	70	100	150	200	250	300
Nominal Density (kg/m <sup>3</sup> )	15	20	25	30	35	40
<b>Cordek</b>	Filcor 20	Filcor 45	Filcor 70	Filcor 90	Filcor 100	Filcor 120
Compressive Stress at 10%	70	100	150	200	250	300
Nominal Density (kg/m <sup>3</sup> )	15	20	25	30	35	40

## Conclusion:

**As you can see from the comparison table the products are identical in terms of performance as per the requirements of BS EN14933:2007 and therefore engineers can specify like for like product without concern.**



[www.styrene.biz](http://www.styrene.biz)

\*Data obtained from RIBA Product Selector, manufacturers Declaration of Performance certificates and manufacturers websites.