

# Type 1 granular sub-base and other unbound mixtures

## Implementation day 1 January 2004

### Introduction

Bulletins 1 to 5 of this series of information sheets gave an introduction to the changes that producers, specifiers and users of aggregates need to be familiar with since the adoption of European Standards on 1 January 2004.

The situation for Type 1 granular sub-base is slightly different. Type 1 is considered to be an unbound mixture of aggregates, rather than simply an aggregate. It could be described as being like an asphalt mixture (but without any bitumen) or a CBM (but without any cement). It is therefore outside the scope of European Standards for Aggregates and is covered instead by BS EN 13285: **2003, Unbound mixtures - Specification.**

There is currently no National Guidance in the UK for BS EN 13285. This document therefore highlights key points of the standard and makes recommendations for its application in the UK.

### Scope

The European Standard applies to unbound mixtures and includes aggregates from natural manufactured and recycled sources. In the UK BS EN 13285 applies to granular sub-bases and cappings with the requirements of the standard for the relevant material properties cross-referenced to BS EN 13242: **Aggregates for unbound and hydraulically bound materials.**

Further information on BS EN 13242 is given in Bulletin 5 of this series.

### General

No British Standard is superseded by

BS EN 13285 and prior to 1 January 2004 the requirements for Type 1 were given in the Specification for Highway Works (SHW).

BS EN 13285 significantly extends the existing requirements for Type 1 and the SHW has been revised to specify Type 1 and other unbound mixtures in accordance with BS EN 13285.

Note that the revision to SHW has changed the material descriptions for capping. The designations 6F1 and 6F2 are now reserved for material excavated from within the site. Imported fine graded and coarse graded cappings are now designated 6F4 and 6F5 respectively.

### Aggregate requirements

Aggregates used in Type 1 and other unbound mixtures must conform to the requirements of BS EN 13242 for

- crushed, broken and totally rounded particles
- resistance to fragmentation (Los Angeles on the 10/14 fraction)
- magnesium sulfate soundness

Resistance to wear (Micro-Deval on the 10/14 fraction) and water absorption must be declared on request. There is no requirement in the UK for the other properties given in BS EN 13242 for natural aggregates. Some additional requirements may be necessary for manufactured and recycled aggregates.

### Mixture Designation

Unbound mixtures are described in terms of 'd/D', where d, the lower sieve size, is always zero, and D is the upper sieve size. The mixture

designation of Type 1 (and Type 2 and 6F4 capping) is 0/32.

### Gradings

BS EN 13285 emphasises consistency and continuity of gradings within the overall grading limits. It achieves this through requirements over and above a simple grading envelope. The supplier must declare a typical grading for his unbound mixture within a relatively narrow band, and then work to tolerances about that declared grading within the overall grading limits. Furthermore, the difference in the percentage passing adjacent sieves must be 'not too little and not too much', again with defined limits, to ensure grading continuity. The overall limits, bands for declared gradings, tolerances and differences are specified by grading category.

As can be seen from the new grading requirements for Type 1, there is an appreciable oversize allowance which consequently allows the material to approximate to the existing Type 1 grading requirements.

### Fines content

BS EN 13285 gives requirements for the percentage of material passing the 0.063mm sieve. There are maximum and minimum requirements. It is recommended that the existing UK practice is maintained and that 'no requirement' is specified for the minimum fines content.

### Oversize

Significant oversize allowances are available for unbound mixtures. For Type 1 (and Type 2



and 6F4), a minimum of 75% must pass the 31.5mm sieve. This goes some way to explaining how a mixture designation of 0/32 can be roughly equivalent to a material formerly specified as 37.5mm down.

#### **Other requirements**

BS EN 13285 permits the use of national regulations to control frost heave and permeability. This means that in the UK, the frost heave test (BS 812: Part 124) and the plasticity index test (BS 1377: Part 2) are still required for Type 1.

The standard also requires declaration of dry density, optimum moisture content and water-soluble sulfate content when requested.

#### **CE marking**

The product standard sets out a mandatory system of factory production control. However, it does not necessarily provide for all the essential requirements of the Construction Products Directive and is not mandated. Therefore Type 1 and other unbound mixtures cannot be CE marked.

#### **Note**

This bulletin sheet does not replace the relevant product standard - BS EN 13285 - and aims to give introductory information only. Further information can be obtained from **QPA** at the address overleaf.

BS EN 13285: 2003

#### **Unbound mixtures - Specification**

BS EN 13242: 2002

#### **Aggregates for unbound and hydraulically bound materials for use in civil engineering works and road construction**

All documents are available from  
**Customer Services at British Standards Institution**

389 Chiswick High Road London W4 4AL  
Tel 020 8996 9001 Fax 020 8996 7001  
e-mail [orders@bsi-global.com](mailto:orders@bsi-global.com)  
[www.bsi-global.com](http://www.bsi-global.com)

# Sample Specification

An example of a European Standard specification for Type 1 made from crushed rock natural aggregate is shown below. Note that different aggregate, grading and mixture requirements would apply to Type 2, 6F4, 6F5 and other sub-base and capping materials.

## Example of a European Standard specification for Type 1 made from crushed rock natural aggregate

### Requirements for aggregates used in the Type 1

Property	BS EN 13242 category
Crushed, broken and totally rounded particles	C <sub>90/3</sub>
Resistance to fragmentation - Los Angeles coefficient, 10/14 fraction	LA <sub>50</sub>
Resistance to wear -Micro-Deval coefficient, 10/14 fraction	M <sub>DE</sub> NR, value to be declared
Magnesium sulfate soundness	MS <sub>35</sub>
Water absorption	WA <sub>24</sub> NR, value to be declared
All other BS EN 13242 requirements	Category NR (no requirement)

### Summary grading requirements

Grading shall conform to BS EN 13285 designation 0/32 G<sub>p</sub>, maximum fines UF<sub>9</sub>, oversize OC<sub>75</sub>, as summarised below.

#### Note

For the 63, 31.5 and 0.063mm sieves there is only a requirement to comply with the overall grading range.

Sieve size (mm)	Percentage by mass passing		
	Overall grading range	Supplier declared value grading band	Tolerance on the supplier declared value
63	100		
31.5	75 - 100		
16	43 - 81	54 - 72	± 15
8	23 - 66	33 - 52	± 15
4	12 - 53	21 - 38	± 15
2	6 - 42	14 - 27	± 13
1	3 - 32	9 - 20	± 10
0.063	0 - 9		
Grading of individual batches - differences in values passing selected sieves			
		Percentage by mass	
Retained sieve size (mm)	Passing sieve size (mm)	Not less than	Not more than
8	16	7	30
4	8	7	30

### Other mixture requirements

The Type 1 shall not be frost susceptible.

The size fraction of the Type 1 passing a 0.425mm test sieve shall be non-plastic.



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