

Advice Sheet 17: BS3882:2015 British Standard Topsoil

What is Topsoil?

Topsoil is an important component of most landscape projects, the scale of which could range from a individuals' private garden to the development of the London 2012 Olympic Park. Topsoil provides the function of supporting the growth of vegetation. It does this by providing an anchorage for plant roots, by slowly releasing nutrients, providing oxygen, by draining excess water whilst retaining moisture to sustain plant growth during dry periods.

Topsoil can be both naturally occurring and manufactured. Naturally occurring topsoil is the product of dynamic, chemical, physical and biological processes acting on weathered mineral matter. Manufactured topsoil is usually the result of mixing organic matter, mineral matter and lime/fertiliser to produce a growing medium.

What is the BS3882?

This British Standard specified requirements for topsoils that are moved or traded and is not intended for the grading of topsoil *in situ*. The 2015 version has 2 different grades of topsoil; **Multipurpose** topsoil and **Specific Purpose** topsoil. As can be implied from the name, multipurpose topsoil is fit for the majority of situations where topsoil is required and is capable of sustainably supporting grass, trees, shrubs, herbaceous plants and other plantings. Specific purpose topsoil comprises of topsoils with characteristics appropriate for specialist applications, e.g. supporting the growth of certain plant communities. Specific purpose topsoils can either be:

- Acidic
- Calcareous
- Low Fertility
- Low Fertility (Acidic)
- Low Fertility (Calcareous)

The now obsolete BS3882:1994 version had 3 grades; Premium Grade, General Purpose Grade and Economy Grade. Problems occurred with these categories as many users of topsoil always opted for the premium grade, when the general purpose grade would have been fit for purpose, because a true understanding of the soil science behind the classification and proposed end-use was lacking. In effect the 2007 version combined the premium grade and general purpose grade into one; the multipurpose grade. In the new standard the permissible ranges have been revised and manufactured topsoils have been given equal status as natural topsoil, which is more fitting for the landscape industry today.

Sampling

The standard states that natural topsoil should be sampled to its full depth before stripping. Sampling patterns should be based on a rectilinear grid or W-pattern. Before sampling a specialist resource survey should be carried out which will determine the different soil areas where a separate topsoil analysis will be required. A minimum of 10 incremental samples should be taken across each sampling area and mixed together to create a 2Kg composite sample.

For manufactured topsoils point samples should be taken from the stockpile at regular intervals from the surface and the core. One composite sample shall represent no more than 5000m³ of topsoil supplied or produced.

These composite samples should then be thoroughly mixed and sub-divided by quartering or riffing to produce a reduced sample of not less than 1Kg which can then be sent to NRM for analysis.

Analysis

The minimum testing requirement includes the nutrient status (pH, phosphorus, potassium, magnesium and total Nitrogen), texture, organic matter, coarse fragments and visible contaminants, along with the neutralising value, soil conductivity and the phytotoxic contaminants (zinc, copper and nickel). However it is the responsibility of the supplier/producer to request any further analysis which will be dependant on the history of the source(s) of the material that make up the topsoil and the intended end use. Appropriate assumptions should be made if this information is not available. Further analysis could include other potentially toxic elements (Mercury, Cadmium, Lead, Chromium, Arsenic, Molybdenum, Fluoride, Selenium or Boron), Cyanide, Phenols, Polyaromatic Hydrocarbons (PAH) or Total Petroleum Hydr carbons (TPH). Methods of tests employed at NRM satisfy the BS3882:2015 standard.

Report

The NRM BS3882 Topsoil report will classify the soil into either its grade, or report the Topsoil as a failure and non-compliant. On the left of the report is the list of the tests performed, and on the right the test is marked with a Y (yes) or a N (no), which state if that test result falls within the permissible range **for that grade** of topsoil. The supplier needs a full list of 'Y' against a particular grade of Topsoil before a declaration of compliance can be made. The Topsoil characteristics are listed in Table 1 (please see following page).

What is the relevance of Electrical Conductivity and ESP (Exchangeable Sodium Percentage)?

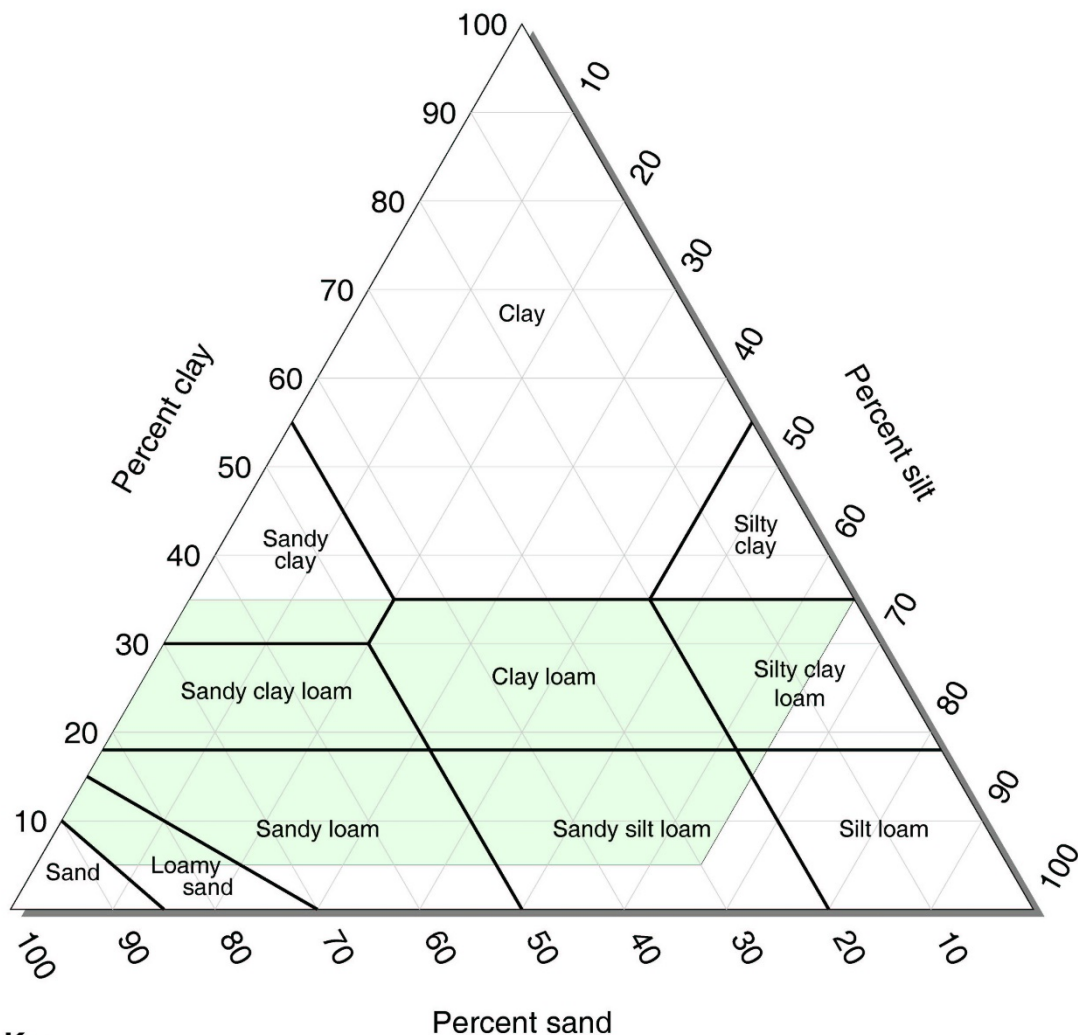
Salinity is measured by the electrical conductivity of the soil solution which is a measure of the soluble salts in the soil. The most common soluble constituents are products of fertilisers (ammonium, potassium, calcium, magnesium, sulphate and nitrate) or sodium and chloride from sea water flooding. There are 3 possible problems with very high salinity;

- An osmotic effect on root activity
- A toxicity effect
- A soil structural stability effect depending on the proportion of sodium in the soluble ions.

Different plant species display a range of tolerances to the soluble salts present: this can be measured by soil electrical conductivity. However a low soil electrical conductivity is not necessarily a guide to the absence of sodium related structural problems. The exchangeable sodium percentage (ESP) is a measure of the exchangeable sodium ions relative to the total exchangeable ions. Ideally, the ESP should be less than 15% where the clay content is less than 35%. Gypsum can be applied to ameliorate structural instability due to excessive sodium, preventing clay dispersion by exchanging the exchangeable sodium with calcium.

Table 1 – Topsoil Characteristics Parameter	Multipurpose Topsoil	Specific Purpose Topsoil				
		Acidic	Calcareous	Low fertility	Low fertility acidic	Low fertility calcareous
Soil Texture (% m/m)	See textural classification triangle for permitted soil textural classes (Figure 1)					
Soil Organic Matter LOI (% m/m)						
Clay 5 – 20%	3 – 20	3 – 30	3 – 20	2 – 20	2 – 30	2 – 20
Clay 20 – 35%	5 – 20	5 – 30	5 – 20	2 – 20	2 - 30	2 – 20
Maximum Coarse Fragment Content (% m/m)						
>2mm	30					
>20mm	10					
>50mm	0					
pH H ₂ O	5.5 – 8.5	3.5 – 5.5	7.5 – 9.0	3.5 – 9.0	3.5 – 5.5	7.5 – 9.0
Carbonate (% m/m)	N/A	N/A	> 1	N/A	N/A	> 1
Plant Available Nutrient Content						
Nitrogen (% m/m)						
Extractable Phosphorous (mg/l)						
Extractable Potassium (mg/l)	> 0.15 16 – 140	> 0.15 16 – 140	> 0.15 16 - 140	N/A <20	N/A <20	N/A <20
Extractable Magnesium (mg/l)	121 – 1500 51 - 600	121 –1500 51 - 600	121 - 1500 51 – 600	N/A N/A	N/A N/A	N/A N/A
Carbon:Nitrogen Ratio	< 20:1	< 20:1	< 20:1	< 35:1	< 35:1	< 20:1
Electrical Conductivity (μS cm ⁻¹)	3300	N/A	N/A	N/A	N/A	N/A
Phytotoxic Contaminants (by Soil pH) (mg/kg DS) (nitric acid extractable)	Multipurpose and Specific Purpose Topsoils					
	Soil pH <6.0	Soil pH 6.0 – 7.0		Soil pH >7.0		
	Zinc, Zn Copper, Cu Nickel, Ni	<200 <100 <60	<200 <135 <75		<300 <200 <110	
Visible Contaminants (% m/m)						
> 2mm	< 0.5					
... of which plastics	< 0.25					
... sharps	Zero in 1kg of air-dried soil					

Fig. 1. Textural Class:



Key

 Area within which texture of topsoil is required to fall.

We refer the reader to the informative British Standard BS3882:2015 for more details on Topsoil and its use, handling and storage. The standard can be purchased from the British Standards Institute, 309 Chiswick High Road, London W4 4AL. Telephone: 020 8996 7001

Email: orders@bsi-global.com

Website: <http://www.bsi-global.com>