

Specification for Topsoil

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- Association of County Councils
- Association of Playing Fields and Landscape Managers
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- British Vermiculite Association
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- UK Ecolabelling Board
- University of Liverpool
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Foreword

This British Standard has been prepared under the direction of the Agriculture and Food Standards Policy Committee. It supersedes BS 3882:1965, which is withdrawn.

The methods of sampling and test are derived from, but are not identical with, MAFF Reference Book RB427 (1986) *Analysis of Agricultural Materials* [1]. Where possible, harmonization with methods developed by ISO/TC 190 “Soil Quality” has also been attempted, and when ISO/TC 190 has completed its relevant methods, this standard will be revised.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 28, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

Introduction

Naturally occurring topsoil is the dynamic product of chemical, physical and biological processes. It is the result of interaction between the inherent nature of the parent material and the prevailing environment (including human activity and vegetation). The properties of a topsoil may thus change if one or more of these factors changes. For example, if a topsoil were stripped and transported to a new location, spread in a different topographic or drainage situation and planted with a different vegetation, the topsoil which would develop at the new site would become very different from the one that was lifted.

Transporting soil involves mechanical handling, i.e. excavation, loading, transport and distribution on site. Not all naturally occurring topsoils would survive such handling and retain the ability to develop into an acceptable soil in a reasonable time at the new site, even though in their undisturbed, naturally occurring condition they might be very productive and capable of sustaining plant growth over long periods of time. For example, clay textured soil could be very productive *in situ* but its structure may suffer damage during stripping, etc. which would take years of careful husbandry to reverse.

In the context of soil profile construction, the subsoil is also an important medium for root growth since it provides reserves of water and nutrients and mechanical anchorage.

1 Scope

This British Standard specifies requirements for topsoils. It establishes three grades of material and gives recommendations for the use and handling of topsoil. It is not intended (or appropriate) for the grading, classification or standardization of *in situ* topsoil or subsoil. Methods of sampling are given in Annex A. Methods for determination and calculation are given in Annex B to Annex M and Annex P.

NOTE For some purposes a purchaser of soil may need to specify particular soil properties appropriate to the intended use. For example, sports ground builders will have particular requirements concerning soil texture, drainage and stone content and stone shape; landscapers would need acid soil when planting calcifuges. Further guidance on special uses and handling is given in Annex N.

2 References

2.1 Normative references

This British Standard incorporates, by dated or undated reference, provisions from other publications. These normative references are made at the appropriate places in the text and the cited publications are listed on the inside back cover. For dated references, only the edition cited applies; any subsequent amendments to or revisions of the cited publication apply to this British Standard only when incorporated in the reference by amendment or revision. For undated references, the latest edition of the cited publication applies, together with any amendments.

2.2 Informative references

This British Standard refers to other publications that provide information and guidance. Editions of these publications current at the time of issue of this standard are listed on the inside back cover, but reference should be made to the latest editions.

3 Definitions

For the purposes of this British Standard, the following definitions apply.

3.1

topsoil

natural topsoil (see 3.2) or material with a mineral base which will perform the functions of topsoil and in which plants will grow healthily

3.2

natural topsoil

upper layer of an *in situ* soil profile, usually darker in colour and more fertile than that below (subsoil) and which is a product of natural biological and environmental processes

NOTE The thickness of a natural topsoil will vary with land use and management from only a few millimetres in some sites to more than 350 mm in deeply cultivated agricultural sites.

3.3

subsoil

soil layer extending between the natural topsoil and the parent material (see 3.4)

NOTE It usually has a lower organic matter and plant nutrient content than natural topsoil.

3.4

parent material

broken weathered rock or other underlying geological material from which the natural soil has developed

3.5**soil texture**

a classification of the proportions of mineral particles, i.e. sand, silt and clay (see Figure 1 and N.6.2)

3.6**soil structure**

nature and degree of aggregation of primary soil particles (mineral and organic) into larger units

3.7**soil consistency**

degree of resistance of soil to deformation, e.g. hard, brittle, friable, plastic, liquid

NOTE Consistency is closely related to water content (see 3.8).

3.8**soil plastic limit**

water content at which the soil consistency changes from being brittle (friable) to plastic

3.9**soil organic matter**

decomposed remains of plants or animals no longer distinguishable

NOTE Fossil and other unreactive organic matter such as coal are excluded.

3.10**loss on ignition**

measure of soil organic matter (see N.9)

3.11**soil pH value**

measure of the acidity or alkalinity of soil (see N.7)

3.12**plant nutrient content of soil**

concentration of “available” plant nutrients which can be expressed as a dimensionless index (see N.8)

3.13**soil electrical conductivity**

electrical conductivity of an extract obtained by equilibrating soil with water or an aqueous solution (see Annex L)

NOTE It is a useful indirect measure of the total soluble constituents in a soil.

3.14**soil salinity**

concentration of soluble ionic constituents, particularly calcium, magnesium, potassium, ammonium, nitrate, phosphate, sodium, chloride and sulfate

NOTE The cause of a high electrical conductivity (N.6.5.2) [an indirect measure of the constituents soluble in the extractant (see D.3.1)] should always be verified by analysis.

3.15**soil contaminants**

substances which, when present in soil materials in sufficient concentration, may inhibit or prevent plant growth, or are toxic or hazardous to plants, animals or humans, or through chemical effects attack building materials or services, or are flammable or explosive

NOTE In this context, “contaminants” may either be introduced, e.g. from former industrial sites, or be derived from natural sources, e.g. metalliferous geological deposits.

3.16**source**

location where natural topsoil originated

4 Classification

The topsoil shall be classified in one of the following grades (see 6.1):

a) Premium grade

Premium grade is natural topsoil. It is of high intrinsic fertility, loamy texture and good structure. It has the capacity, if correctly handled and in the right site and climate, to be used in plant nurseries, gardens, horticulture, amenity and landscape sites where it is intended to grow the most demanding plants or where the topsoil may be subject to intensive or frequent cultivation, e.g. annual bedding. This high quality may be unnecessary for the majority of topsoil applications where the other grades may be entirely satisfactory.

NOTE 1 Premium grade is generally the most limited in supply.

NOTE 2 If mishandled or badly stored, premium grade topsoil can change to one of the other grades.

b) General purpose grade

General purpose grade includes natural topsoil and premium grade topsoil that has deteriorated due to poor handling, or a manufactured soil which has appropriate properties. This grade of topsoil has the capacity (depending on texture, stone content, etc.), if correctly handled and in the right site and climate, to be suitable for good quality agriculture, silviculture, amenity, horticulture and landscape sites supporting crops, grass, trees, shrubs, herbaceous and other planting.

NOTE General purpose grade topsoil may require improvement by lime and/or fertilizer treatment.

c) Economy grade

This is derived from a topsoil of lower quality than general purpose grade topsoil or a material, such as selected subsoil or friable mineral matter which is suitable for plant growth, for example, greensand, river silt or glacial moraine. It is divided into materials of “low clay” and “high clay” subgrades. The latter requires more careful handling and will be less tolerant of compaction.

This material is suitable for amenity woodland, wildlife conservation areas, less intensively used amenity grassland and agricultural land of low inherent productivity.

NOTE Because of its possible origin, no minimum organic matter or plant nutrient status is specified for economy grade topsoil but it should be recognized that if the status is less than that specified for the other grades it will probably require fertilizing, manuring and careful husbandry (perhaps over a number of years) to achieve satisfactory productivity; however, if this care is taken it could become equal in quality to one of the other grades.

5 Sampling

Laboratory samples shall be prepared in accordance with Annex A.

6 Topsoil characteristics

6.1 General

6.1.1 Results for extractable phosphorus, potassium and magnesium contents determined in accordance with this standard shall be expressed as a dimensionless index as given in Table 1.

Table 1 — Classification of topsoil analysis results

Index	Concentration of extractable elements in milligrams per litre of soil		
	P	K	Mg
0	0 to 9	0 to 160	0 to 25
1	10 to 15	61 to 120	26 to 50
2	16 to 25	121 to 240	51 to 100
3	26 to 45	241 to 400	101 to 175
4	46 to 70	401 to 600	176 to 250
5	71 to 100	601 to 900	251 to 350
6	101 to 140	901 to 1 500	351 to 600
7	141 to 200	1 501 to 2 400	601 to 1 000
8	201 to 280	2 401 to 3 600	1 001 to 1 500
9	over 280	over 3 600	over 1 500

6.1.2 The topsoil shall conform to the requirements given in Table 2 determined in accordance with the relevant method of test.

6.2 Weeds and foreign matter

When inspected visually, all grades of topsoil shall be free from propagules of aggressive weeds (see **N.6.4.5**), fragments of glass, bricks, concrete, wire or other potentially hazardous foreign matter and bulk vegetative growth, in order to ensure negligible risk of subsequent weed problems (introduced in the soil) or traumatic injury.

NOTE Soils should contain no undesirable concentrations of contaminants. The current Inter-departmental Committee on the Redevelopment of Contaminated Land (ICRCL) Guidance [3] assists in interpreting soil analyses. The potential acidity (usually due to sulfide) should be less than that which would cause the pH to fall to 4.5.

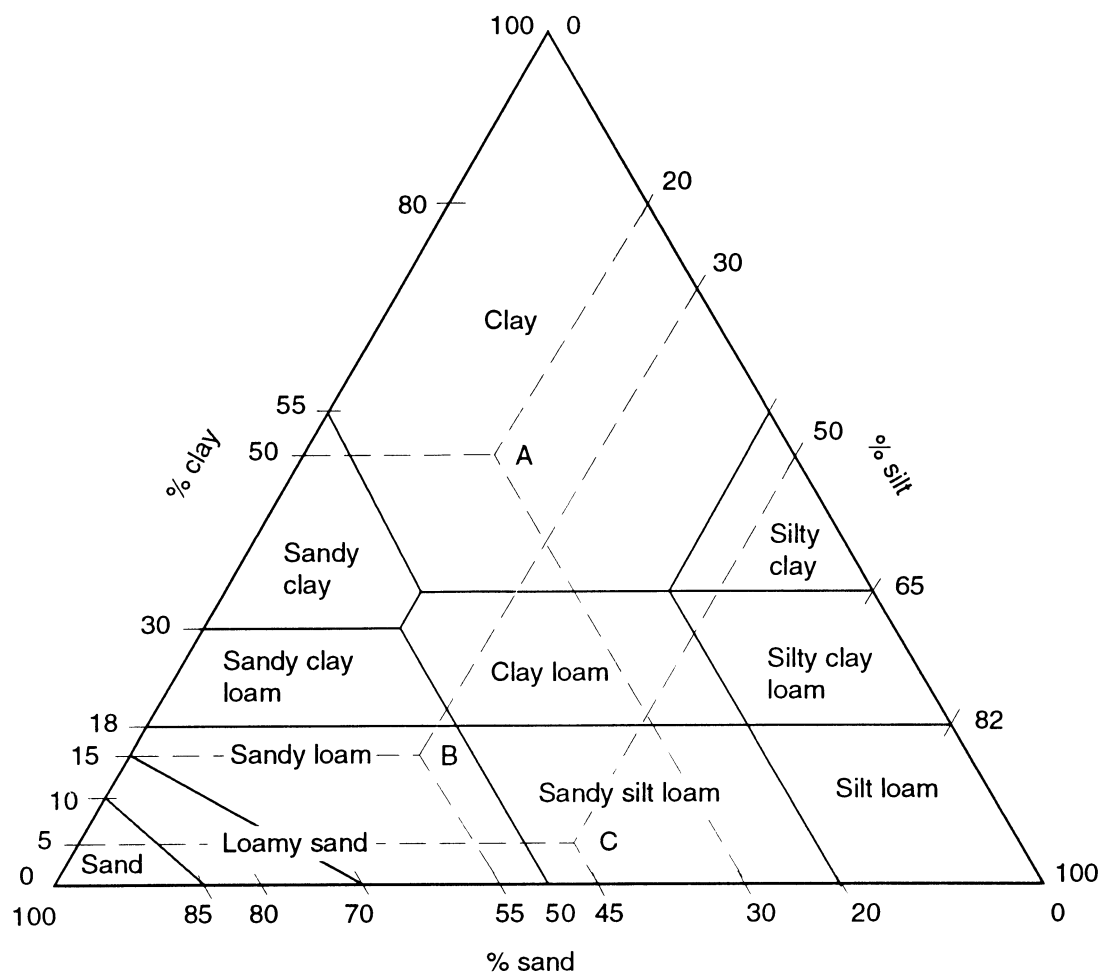
7 Documentation

The supplier shall provide a declaration of analysis including information detailing each of the relevant parameters (see clause 6) for the category of topsoil being declared, together with other analytical information.

NOTE An example of a format for a declaration of analysis is given in Figure 3.

Table 2 — Topsoil characteristics

	Premium grade	General purpose grade	Economy grade		Method of test
			Low clay	High clay	
Source	Origin to nearest 100 m	—	—	—	—
Textural classification (see Figure 1)	see Figure 2 a)	see Figure 2 b)	see Figure 2 c)	—	BS 1377-2:1990 (see also Annex K and Annex P)
Maximum stone content % (<i>m/m</i>)					
Stone size: > 2 mm	30	60	65	—	BS 1377-2:1990
> 20 mm	10	30	60	—	
> 50 mm	0	10	40	—	
pH value	5.5 to 7.8	5.0 to 8.2	5.0 to 8.2	—	BS 1377-3:1990
Nutrient content					
P index min.	2	2	N/A	—	Annex C
K index min.	2	2	N/A	—	Annex E
Mg index min.	1	1	N/A	—	Annex G
N % (<i>m/m</i>) min.	0.2	0.2	N/A	—	Annex B
Loss on ignition % (<i>m/m</i>) (see note 3 and Figure 1)	See Figure 2	See Figure 2	See Figure 2	—	Annex M
Exchangeable sodium percentage (ESP) % (see note 4)	< 10	< 15	< 15	—	Annex J (Annex L)
NOTE 1 If the final land use is to be playing fields or if visual or other factors are important, a purchaser may specify screening (see N.4) to a maximum stone size (see N.6.3) or particular particle size distribution. NOTE 2 Premium grade topsoil should have a structure comprising strong, fine to medium sized granular peds or fine subangular blocky peds [2]. NOTE 3 Soils with greater than 20 % (<i>m/m</i>) organic matter content can be described as peaty. NOTE 4 If the specific electrical conductivity of a calcium sulfate extract is greater than 2 800 $\mu\text{S}\cdot\text{cm}^{-1}$, the ESP should be determined.					



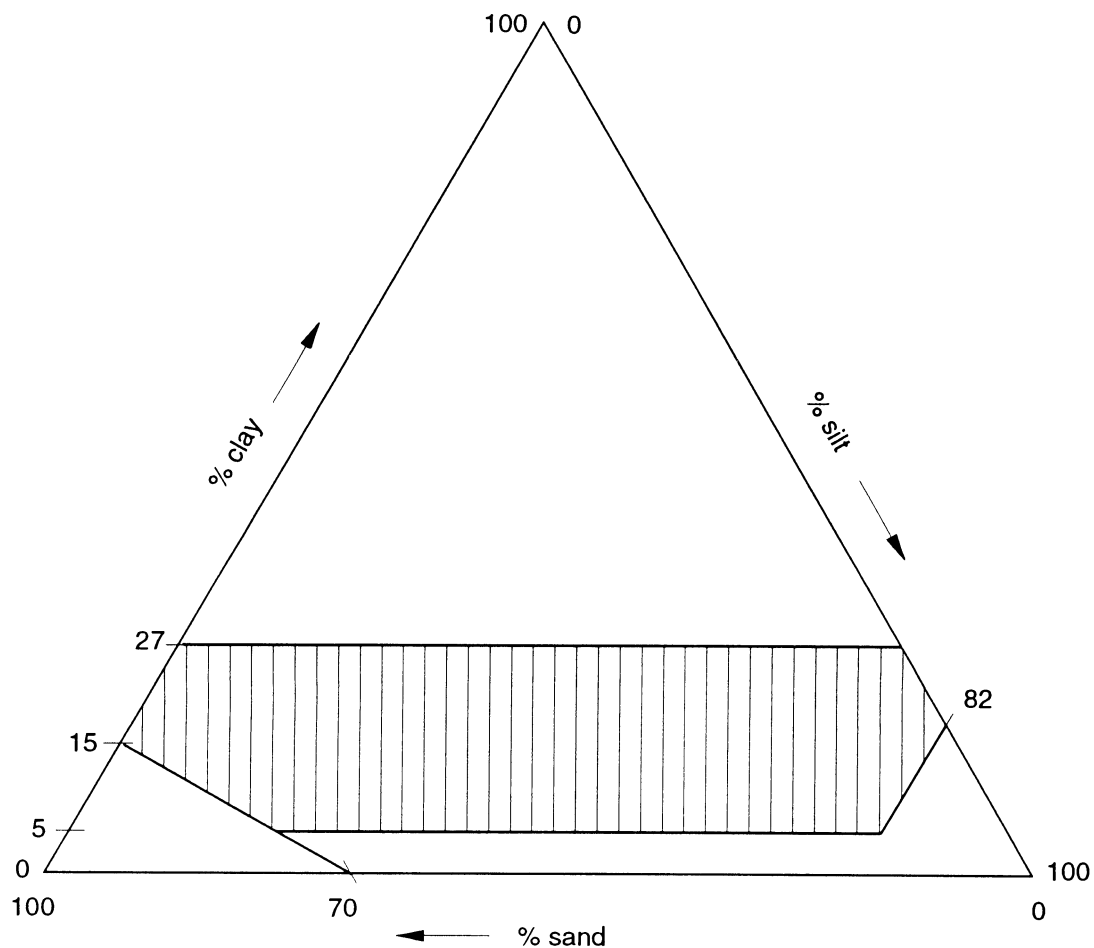
NOTE Examples of textural classification:

Soil A with 30 % sand, 20 % silt and 50 % clay is in the "Clay" textural class;

Soil B with 55 % sand, 30 % silt and 15 % clay is in the "Sandy loam" textural class;

Soil C with 45 % sand, 50 % silt and 5 % clay is in the "Sandy silt loam" textural class.

Figure 1 — Textural classification (limiting percentage of sand silt and clay sized particles for the mineral texture class)



Key

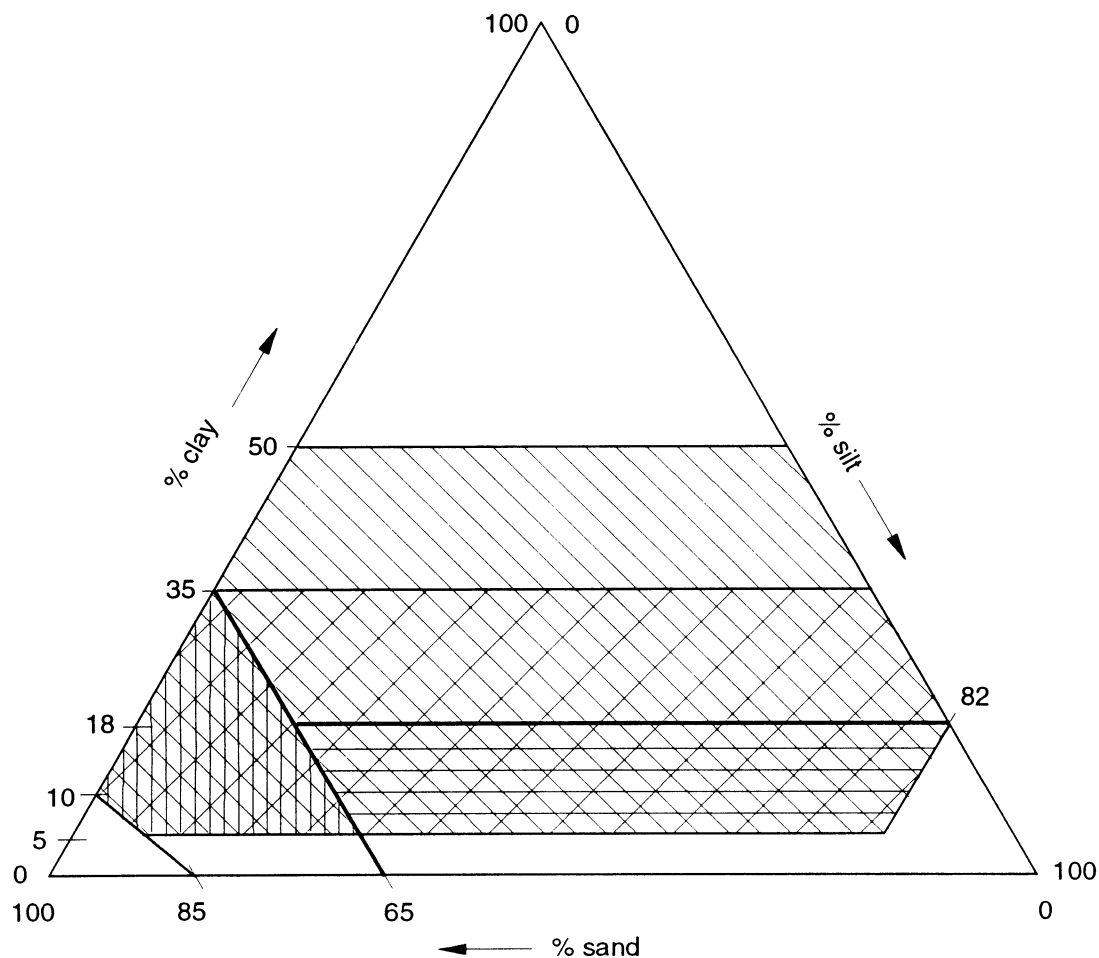


LOI 5 % to 50 %

NOTE For premium grade the soil texture falls within the shaded area and the loss on ignition is between 5 % (m/m) and 50 % (m/m).

a) Premium grade

Figure 2 — Textural ranges, loss on ignition and carbonate content of the soil grades



Key

	10 % to 50 % LOI or 5 % to 50 % LOI if $\text{CaCO}_3 > 5 \%$
	5 % to 50 % LOI
	3 % to 50 % LOI
	2 % to 50 % LOI

NOTE The texture classes qualifying are dependent on loss on ignition (LOI) and carbonate mineral content (expressed as calcium carbonate) because of the structure modifying effects of these components. No soil has LOI > 50 % (m/m). General purpose grade is applicable to soils whose LOI falls within the appropriately shaded area. The procedure for the estimation of calcium carbonate is described in Annex P.

b) General purpose grade

Figure 2 — Textural ranges, loss on ignition and carbonate content of the soil grades (continued)