

Materials used for the control of liquid spillages —

Part 1: Determination of sorbency

ICS 13.020.40; 71.100.99; 75.180.99

Confirmed December 2009

Committees responsible for this British Standard

The preparation of this British Standard was entrusted to Technical Committee CII/63, Chemical spill control, upon which the following bodies were represented:

- British Safety Industry Federation
- CIA — Chemical Industries Association
- Environment Agency
- Personal Safety Manufacturers' Association
- Co-opted members

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 19 October 2004

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First published March 2000
Second edition October 2004

Amendments issued since publication

Amd. No.	Date	Comments
15978	18 November 2005	Correction to the derived units for S_{30} in 8.4.2 (litres per metre)

The following BSI references relate to the work on this British Standard:
Committee reference CII/63
Draft for comment 04/30092197 DC

ISBN 0 580 44546 1

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Foreword

This British Standard has been prepared by Technical Committee CII/63. It supersedes BS 7959-1:2000, which is withdrawn.

BS 7959-1 gives test methods used for the control of spilled liquids. These materials, which are generically known as “sorbents”, include those which act by adsorption, absorption and gelling. The test methods generally apply to sorbents of all types, which allows user to make reliable comparisons between materials of different types for specific applications.

This new edition of the standard differs from the 2000 edition in that four named challenge liquids are now included. Previously the standard allowed any liquid to be used for the test. The change was made to introduce clarity into the marketplace for sorbent materials thus enabling sorbent users to more easily compare information from suppliers and make informed decisions on the use of sorbent products.

Sorbent materials are generally available in two basic types. There are hydrophobic grades (so-called oil sorbents) that pick up oils and other organic liquids but repel water and most aqueous solutions. Hydrophilic grades, on the other hand, pick up both oils and organic liquids and most aqueous solutions of chemicals.

Named challenge liquids are specified in the standard as this will simplify the information likely to be given to users of sorbent materials. In principle, only two types are needed: one for hydrophobic materials and one for hydrophilic materials. However, it is widely found that that amount of liquid picked up varies according to the viscosity of the challenge liquid, and viscosity variations are much more widely found in oils than in aqueous solutions. Four hydrophobic challenge liquids have been included, three representing low, medium and high viscosity oils, and one representing volatile organic compounds (VOCs). For hydrophilic materials, water has been chosen rather than a chemical solution on the grounds of safety.

BS 7959-2 gives a method for the determination of water repellency (buoyancy) for hydrophobic materials.

This British Standard calls for the use of substances and/or procedures that may be injurious to health if adequate precautions are not taken. It refers only to technical suitability and does not absolve the user from legal obligations relating to health and safety at any stage.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 15 and a back cover.

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Introduction

Good working practices should ensure that liquid spills are prevented. However, when these do occur, there are many ways in which a liquid spill may be controlled. These include prevention by the use of safe working practices, physical containment either at source or later after the liquid has spread, and removal of the liquid.

Removal may be accomplished using several different techniques, such as purely mechanical (pumps, skimmers, separators), washdown (where permitted) with solvents or detergents, and the use of materials that immobilize the liquid into a form rendered suitable for physical lift-up. It is these latter materials that form the subject of this standard.

Traditionally, these materials have come to be known by the term “sorbents” and this term has been adopted for the purposes of the standard.

Sorbent materials carry out the process of fixing spilt liquids in different ways, of which the following have been clearly identified.

- a) Adsorption is a surface process whereby capillary attraction holds the liquid on the external surface of the adsorbent material, and in the void spaces formed by the intrinsic structure of the material.
- b) Absorption is a process whereby a material picks up and retains a liquid throughout its molecular structure, causing the material to swell.
- c) Gelling is a process whereby usually a soluble material dissolves in a liquid forming a very viscous, continuous solution which takes on a solid form allowing physical removal. The same effect is sometimes achieved using insoluble materials such as clays.

Although the materials and processes described above are essentially very different, the principal aim of their use is to immobilize and facilitate physical lift-up of the spilled liquid. This part of BS 7959 covers methods of test to determine how much liquid may be picked up by a sorbent material. The word sorbency is used to describe this property.

The user of these materials may want to compare and verify supplier’s claims for sorbency, therefore a common test methodology is given for sorbents of all types. This allows the user to make reliable comparisons between materials of different types.

The test method for the determination of swell ratio allows the difference between an adsorbent and the other types of sorbent material to be readily distinguished.

1 Scope

This part of BS 7959 describes methods of sampling and determining the sorbency of materials used for the control of liquid spillages.

A variety of materials of different composition and format are used in this application and, for the purposes of this standard, the following categories are used.

- Type I web type sheet, pad or roll.
- Type II: loose material discrete particles of variable size.
- Type III: filled products socks, booms, pillows, cushions.
- Type IV: agglomerates masses of strands for pick-up of viscous liquids.
- The methods are applicable to sorbent materials of any type.

The standard also includes a test (swell ratio test, Clause 10) that will distinguish between absorbents and adsorbents.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the reference cited applies. For undated references, the latest edition of the referenced document (including any amendments).

BS 604, *Specification for graduated glass measuring cylinders*.

BS 4231, *Industrial liquid lubricants — ISO viscosity classification*.
(ISO 3448)

BS EN 590, *Automotive fuels — Diesel — Requirements and test methods*.

3 Terms and definitions

For the purposes of this part of BS 7959, the following terms and definitions apply.

3.1

absorption

process where the liquid is distributed into the solid body of the material

NOTE This process is usually accompanied by swelling, enabling the volume of liquid absorbed to exceed the free volume of the absorbent.

3.2

adsorption

process where the liquid is held on the surface of the material

NOTE This process generally limits the volume of liquid which can be adsorbed to the free volume of the adsorbent, except in the case of high viscosity liquids where the volume of liquid adsorbed is increased by liquid clinging to the external surface.

3.3

free volume

volume of interstitial space between particles or fibres which is available for liquid uptake

NOTE As applied to adsorbents, the free volume is the overall volume of the material in the form supplied less the volume of solid adsorbent present. Calculation of the free volume of filled materials allows an assessment to be made of the maximum volume of liquid that can be adsorbed.

3.4

gelation

process where a gellant or thickener is added to a liquid to increase its viscosity until it becomes a solid or semi-solid