

Surface active agents — Detergents for washing fabrics — Guide for comparative testing of performance

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The Chemicals Standards Committee, under whose direction this British Standard was prepared, consists of representatives from the following Government departments and scientific and industrial organizations:

- Association of Fatty Acid Distillers
- British Tar Industry Association
- Chemical Industries Association*
- Chemical Society, Analytical Division
- Department of Health and Social Security
- Department of Industry, Laboratory of the Government Chemist*
- Fertiliser Manufacturers' Association Ltd
- Hydrocarbon Solvents Association
- Institution of Gas Engineers
- Ministry of Agriculture Fisheries and Food
- Ministry of Defence
- National Sulphuric Acid Association
- Paintmakers' Association of Great Britain Ltd.
- Royal Institute of Public Health and Hygiene
- Soap and Detergent Industry Association*
- Standardization of Tar Products Tests Committee

The organizations marked with an asterisk in the above list, together with the following, were directly represented on the committee entrusted with the preparation of this British Standard:

- British Man-made Fibres Federation
- British Hotels and Restaurants and Caterers Association
- British National Committee on Surface Active Agents
- Carpet Cleaners' Association
- Consumers Standards Advisory Committee of BSI
- Department of the Environment
- National Federation of Consumer Groups
- National Institute for Research in Dairying
- Society of Dyers and Colourists
- Textile Institute
- Textile Research Council

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National foreword

This British Standard has been prepared under the direction of the Chemical Standards Committee, with the approval of the Fibres, Yarns and Fabrics Committee. It is identical with ISO 4319 “*Surface active agents — Detergents for washing fabrics — Guide for comparative testing of performance*”.

For some years the United Kingdom has participated in the work of Technical Committee 91, Surface Active Agents, of the International Organization for Standardization (ISO). As this work progresses it is intended to implement the International Standards produced by the publication of corresponding British Standards, either as Parts of existing standards or as new British Standards.

Terminology and conventions. The text of the International Standard has been approved as suitable for publication, without deviation, as a British Standard. Some terminology and certain conventions are not identical with those used in British Standards; attention is especially drawn to the following.

Where the words “International Standard” appear, referring to this standard, they should be interpreted as “British Standard”.

Cross reference. For the following International Standard referred to in the text there is a corresponding British Standard; this is as listed below:

International Standard	Corresponding British Standard
ISO 2267:1972	BS 5377 <i>Specification for assessment of laundering effects by means of a cotton control cloth</i> Part 1:1976 <i>Preparation and use of cotton control cloth</i> (Identical)

For the sake of convenience the relevant portion of ISO 607¹⁾ (with explanatory drawing), referred to in the text is reproduced as National appendix A.

BS 3762:1964 “*Methods of sampling and testing detergents*” Part 1 “*Sampling*” corresponds to ISO 607 in giving methods of sampling but specifies the use of different equipment.

The references to ISO 3758²⁾ and ISO 4312³⁾, for which there are no corresponding British Standards, constitute informative matter only, and since no mandatory requirements are involved, the validity of this British Standard is not affected.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 16, 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.

¹⁾ In course of preparation. (At present published as ISO/R 607:1967.)

²⁾ ISO 3758, at present at the stage of draft, and BS 2747:1967 “*Textile care labelling code*” are similar in scope but differ in technical content.

³⁾ ISO 4312 is at present at the stage of draft and it is intended to publish this as a dual numbered standard, BS 5377 “*Specification for assessment of laundering effects by means of cotton control cloth*” Part 2 “*Methods of analysis and test for unsoiled cotton control cloth*”.

0 Introduction

The methods of assessing performance of detergents for washing fabrics depend on many variables which are linked together in a complex way. This is why it has been considered necessary to lay down a guide concerning the drawing up and application of comparative test methods.

This guide has been drawn up in the full recognition that no single test, or series of tests, carried out in a laboratory will be able to define completely the limits of product performance for the numerous different washing products on the market today. The position is all the more complex when the many different national washing habits and soils, and the wide variety of textiles, are taken into account.

Soil is composed of a variety of substances such as fats, proteins, pigments and other coloured particles which exhibit quite different adhesive properties on the fabric. The chemical composition of the fibre, the textile structure and the finish will also greatly influence soil adhesion to the fabric. It is therefore very important, in comparative testing, to understand that differences in the degree of soil removal may be observed if the soiled material is unfinished or resin-finished cotton, shrink-resistant wool, nylon, polyester, or polyacrylic fabric and if the fabrics are loosely or closely knit or woven, are light or heavy, or have a smooth or rough surface.

In addition to the aspects relating directly to cleaning, a good detergent should have other properties in order to ensure good acceptance and to present no danger. In particular, it should not attack either the fabric (materials, dyes, finishes) being washed or the washing machines, and it should retain its properties during long periods of storage.

Although toxicological and ecological properties are also extremely important for products widely used in the home, their assessment is beyond the scope of this guide.

Despite these complexities, it should be possible for a given country or group of countries to devise satisfactory comparative test methods.

1 Scope

This International Standard constitutes a guide for carrying out comparative tests of fabric washing products in such a way as to realistically reflect the performance of the products likely to be used by consumers.

It gives details of the variables to be considered, indicating the significance and importance of each of these variables, and provides a basis for the drawing up of adequate comparative test methods which will give a valid estimation of the performance of a fabric washing product when two or more products are compared during the same series of tests.

2 Field of application

This International Standard applies to all products sold for use in domestic washing machines.

In general, it does not apply to industrial washing products or to other specialized products.

3 References

ISO 607, *Surface active agents — Detergents — Methods of sample division*⁴⁾.

ISO 2267, *Surface active agents — Verification of certain effects of laundering — Preparation and use of unsoiled cotton control cloth*.

ISO 3758, *Textiles — Care labelling code*⁵⁾.

ISO 4312, *Surface active agents — Verification of certain effects of laundering — Methods of analysis and test for unsoiled cotton control cloth*⁵⁾.

4 General

When the products to be compared are recommended for several laundry conditions, they shall be examined under these varied conditions according to the manufacturer's directions in order to obtain a true assessment of their value; conversely, a product shall not be tested under conditions for which it has not been recommended.

⁴⁾ In preparation. (Revision of ISO/R 607.)

⁵⁾ At present at the stage of draft.

The choice of the products and the characteristics which the testing laboratory will examine has a strong influence on the design of the experiment, including the washing process, the selection of the fabric load and other variables. The performance testing shall be carried out on products readily available in the particular country. Knowledge of the formulation of the products is unnecessary as it is not, in general, possible to predict the performance of a product on the basis of the formulation alone.

Sampling of the products shall be performed following the procedure specified in ISO 607.

This International Standard contains four clauses covering the principal considerations in fabric washing product assessment. These considerations are

- the characteristics of the fabric to be assessed;
- the fabric loads required for this assessment;
- the washing processes to be employed;
- the most significant aspect of the physical characteristics of the product.

In the clauses dealing with fabric load, washing process and physical characteristics, a number of variables and secondary variables are listed. For each secondary variable, a limited number of recommendations are given for a test method which is designed to compare two or more products, together with the reasons behind these recommendations and possible interactions with other variables.

5 Choice of performance characteristics to be assessed

5.1 General comments

There is no single assessment that will give the overall performance of a fabric washing product.

In order to assess cleaning or redeposition, it is recommended that naturally soiled fabrics, as referred to in clause 6, be used.

A series of assessments is necessary in order to evaluate the various aspects of the end results of performance tests.

These aspects of the end results are classified below and the method of appraisal is detailed in clause 8.

5.2 Classification of end results of performance tests

The (overall) performance of the washing product may be classified according to several separate criteria:

a) *Fabric appearance*

This criterion covers soil removal, redeposition, brightening, stain removal and overall whiteness.

b) *Fabric feel*

This criterion is influenced by the fabric, its construction, the drying methods used, the type and quantity of product, water hardness, deposition and the washing machine.

c) *Fabric stability*

This criterion covers chemical and physical damage, including the effect on the colour or the finish of the fabric, the dimensional stability and the physical strength of the fabric.

d) *Effect on washing and drying equipment*

This criterion covers any interaction between the product and the washing machine.

5.3 Difficulties of assessment of the performance

Except perhaps for stain removal, all the characteristics mentioned under criterion 5.2 a) are very difficult to estimate after only one wash, differences usually being too small and too variable to allow any meaningful assessment. For this reason, several wash cycles are necessary to obtain a clear picture of the effect of redeposition, partial removal of dirt and fading of colours.

An assessment may be made either by using similar articles from a large number of family bundles (see 6.2.1) or preferably by repeated wash and wear cycles (generally at least ten) on the same articles (see 6.2.2), stopping the experiment when the differences between the products are stable, at the required confidence level.

The removal of stains derived from natural soils, artificially applied to test pieces, may be estimated after each wash and averaged across all the washes.

Certain characteristics which reflect the possible damage caused to the articles by the washing products will require at least twenty-five washes and sometimes up to fifty washes. This is a very lengthy operation. In addition, it is very difficult to differentiate between the damage caused by the detergent itself and the damage caused by other factors, such as abrasion or stresses of the physical effects of the washing process. The effect on colours is also difficult to estimate because of the extreme variety of dyes. Assessment should separate what is due to the detergent itself and what is due to the actual stability of the dye in the washing environment (temperature effect, bleeding, dye transfer). Soil (mainly perspiration) may also influence the dye resistance. The assessment should include a control whereby articles of the same colour are washed in plain water at the same temperature to determine the inherent dye stability of the fabrics and to determine the effect of the products being tested on colours which are fast in water alone.

The amount of residue retained on the cloth depends on the performance of the washing machine (rinsing and spinning) as well as on the efficiency of the washing product. The amount alone is not sufficient to describe the results. Depending on the nature of the deposition, the resulting damage may be a certain harshness of the article or a yellowing of the fabric which affects the overall appearance. The harmful effects of deposition on equipment and, in particular, on washing machines are also of importance to the consumer. New machines or new parts should be used when the effect of deposition on equipment is to be assessed.

6 Fabric load

6.1 General comments

It is generally recognized and accepted that normally soiled fabrics should be used for comparative testing of detergents. Standard soiled and artificially stained fabric has been used by detergent technologists for many years in rigorous tests to establish important aspects of detergent formulations. For example, artificially stained fabric may be useful for determining the optimum level of bleaching agent.

Several other selected tests exist in the literature, but no individual tests nor any combination of these tests may be considered to relate satisfactorily to the performance of a product under actual conditions. For this assessment, soiled fabric from a domestic source shall be used.

The composition of a household load varies from country to country, but there are certain articles which are common to most loads. The degree and source of soiling will also vary from household to household, so that a sufficiently large selection of soiled fabrics should be used to even out soil differences between loads over the period of test.

Artificially stained or unsoiled test cloths for examining specific ingredients or special product effects (rather than overall performance) may be included with naturally soiled loads.

The detailed composition of the load will depend on several factors, such as

- the capacity of the machine used in the experiment;
- the cycle of the machine to be used;
- the characteristics to be assessed;
- the experimental process envisaged which determines the type of load and the number of replications.

6.2 Naturally soiled fabrics

Naturally soiled fabrics are the essential component of the load and shall be used to assess most performance aspects, such as cleaning (soil removal), stain removal and overall appearance.

The characteristics may be assessed from two different points of view:

- a) the influence of the detergent after a single wash (after one wash of many family bundles);
- b) the effect of the detergent after several wash and wear cycles (after ten or more washes of the same articles).

These will give different answers since some effects appear only after several washes. Only the multi wash and wear procedure will truly reflect the overall performance of the detergent, and this procedure should always be used for the complete assessment of products.