

Microbiological examination for dairy purposes —

Part 4: Methods for assessment of hygienic conditions

NOTE It is essential that Parts 0 and 1, and appropriate Sections of Parts 2 and 3, which are published separately, are read in conjunction with this Part.

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Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Agriculture and Food Standards Policy Committee (AFC/-) to Technical Committee AFC/14, upon which the following bodies were represented:

- AFRC Institute of Food Research
- Association of British Preserved Milk Manufacturers
- Association of Public Analysts
- British Food Manufacturing Industries Research Association
- Campden Food and Drink Research Association
- Dairy Trade Federation
- Department of Trade and Industry (Laboratory of the Government Chemist)
- Joint Committee of the Milk Marketing Board and the Dairy Trade Federation
- Milk Marketing Board
- Milk Marketing Board for Northern Ireland
- Ministry of Agriculture, Fisheries and Food
- Public Health Laboratory Service
- Scottish Milk Marketing Board
- Society for Applied Bacteriology
- Society for General Microbiology

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Foreword

This Part of BS 4285 has been prepared under the direction of the Agriculture and Food Standards Policy Committee.

It supersedes **2.1, 2.2, 2.3, 2.4, 2.5, C.1, C.2, C.3, C.4, C.5** and Tables 2 and 3 of BS 4285:1968, which is withdrawn.

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.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 12, 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 Scope

This Part of BS 4285 describes methods for assessing the hygienic status of plant and equipment after cleaning and disinfection. The methods described are appropriate for farm dairy equipment, milk tanks, milk collection tankers, containers for milk, milk processing equipment and general items of equipment used in dairies.

NOTE The publications referred to in this standard are listed on the inside back page.

2 General considerations

2.1 In general, a cleaning control procedure should comprise the following components.

- a) A general inspection should firstly be carried out. This may include a visual examination, checks involving smell and touch, chemical and/or physical analysis of residues, corrosion, etc., examination of records and checks for equipment malfunction.
- b) A microbiological examination should form part of the routine monitoring of the hygienic status of plant and equipment unless a general inspection (see a) above) renders this superfluous. This may involve swabbing or rinsing of plant and/or sampling first product through the plant after the cleaning and disinfection cycle is complete. This latter process of indirect assessment of the hygienic status of plant may be the only practicable method depending on the nature of the plant to be assessed or it may be the more straightforward and thus the preferred method for use initially.

2.2 Sampling for microbiological examination should only be carried out by personnel experienced in sampling for this purpose.

CAUTION. Attention is drawn to the Health and Safety at Work etc. Act 1974, and the need for ensuring that procedures described in this standard are carried out with suitable precautions.

2.3 Samples should be accompanied by information which identifies the nature of the samples together with the place, date and time of sampling including any batch details and the name and designation of the sampling personnel. When appropriate, it should also include any relevant conditions or circumstances (for example, the condition of the product containers and their surroundings, temperature and humidity of the atmosphere, method of sterilization of the sampling equipment, whether a preservative substance has been added¹⁾ to the samples), and any special information relating to the equipment or product being sampled, for example difficulty in achieving homogeneity of the product.

3 Inspection procedures

3.1 An immediate and important impression of the cleanliness of a production line in a dairy plant can be obtained by visual inspection of the accessible parts of a plant. Colour changes, greasy residues, powder or thin, hard films indicate inadequate detergents and/or inadequate time/temperature combination for the circulation of cleaning solutions and/or an inadequate final rinse. More substantial residues of product may indicate poor training or discipline of cleaning personnel and/or inadequate circulation and/or leaking valves. Incomplete drainage of equipment increases the risk of contamination of product with chemicals and microorganisms.

3.2 Visual inspection may be carried out using an ordinary flashlight or by ultraviolet light. Among many other confirmatory tests the following may be applied to the surface under examination:

- a) absence of signs of fluorescence when the surface is carefully inspected with long wavelength (340 nm to 380 nm) ultraviolet light;
- b) presence of a film or residues on improperly cleaned equipment demonstrated by using a sterile spatula to scrape the surface carefully;
- c) presence of soiling on an improperly cleaned surface demonstrated by discolouring of a piece of clean disposable muslin or tissue paper wiped over the inside of a milk can or over metal surfaces of other equipment.

3.3 At regular intervals, heat exchanger plate packs, product pumps and valves should be opened and seals and rubbers inspected, especially if products with a high viscosity are processed. This is important even when cleaning in place (CIP) is fully automated.

¹⁾ Preservative should not be added if a microbiological examination is to be undertaken (see BS 4285-1.1).

It is equally important to inspect at regular intervals the spray balls of the CIP system to ascertain whether the holes are blocked.

If plant is dismantled for checking, a rinse and disinfection cycle of the section of plant involved should follow re-assembly.

3.4 Whenever visible residues are found in the equipment, it is essential, that the cause be traced and measures be taken to remedy the fault. *There is no value in a microbiological check of visually dirty equipment.* Even if a sample happened to be satisfactory from a microbiological viewpoint, all other consequences of inadequate cleaning should be considered. A chemical test to determine the main composition of the residue is rarely necessary but may be helpful sometimes.

4 Preparation and use of swabs and rinses

4.1 Introduction

In the swab technique a swab previously immersed in a known volume of swab solution is rubbed over the surface under examination. Microorganisms which are transferred onto the swab are then transferred to the swab solutions by vigorous agitation of the swab in the swab solution. In the rinse technique the item under examination is rinsed with a rinse solution in such a manner that microorganisms on the item are transferred to the rinse solution.

Test portions of the swab solution or rinse solution are then subjected to selected microbiological tests, and the results of these tests are expressed as an index of the hygienic condition of the item under examination.

4.2 Swab solution and rinse solution

4.2.1 Use sterile peptone/salt diluent (as described in BS 4285-1.2) for both swab and rinse solutions.

If there is any possibility of residual traces of chlorine or quaternary ammonium compounds being present on the item under examination, as a result of the use of chemical cleaning, it is essential that the swab or rinse solution also incorporates an appropriate inactivator, as given in **4.2.2** or **4.2.3**.

4.2.2 Inactivation of traces of chlorine compounds is achieved by the addition of sodium thiosulphate to the peptone/salt diluent, before autoclaving, at a concentration of 0.5 g/L, by the addition of either 0.25 g of crystalline sodium thiosulphate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) or 1 mL of a 250 g/L solution of crystalline sodium thiosulphate, to each 500 mL of peptone/salt diluent.

NOTE The thiosulphate level specified is not sufficient to inactivate significant chlorine residuals resulting from ineffective equipment rinsing or draining. If a chlorine test on the rinse or swab solution immediately after use shows the presence of chlorine, the microbiological test will be invalidated, and this reason for invalidation should be reported.

4.2.3 Inactivation of traces of quaternary ammonium compounds is achieved by the addition of sterile inactivator at a concentration of 1 % (V/V) to the sterilized swab or rinse solution immediately before swabbing or rinsing. A suitable inactivator is prepared by adding 4 % (m/m) of egg lecithin to a 2 % (V/V) solution of Tween 80.

4.2.4 If the quantity of rinse solution required to effectively rinse a plant is so large as to make the use of standard rinse solution impracticable, potable water may be used as an alternative, after sterilization. The water supply should be treated by the addition of 25 mL of 10 % (V/V) approved hypochlorite to each 40 L of water, and a contact time of 10 min allowed before use. The hypochlorite should then be inactivated by the addition of excess crystalline sodium thiosulphate (approximately 20 g/40 L of water) and the absence of residual chlorine confirmed using the method described in Appendix A. The sterilized water should be sampled and tested in the same manner as that for the rinse solution after use. Small numbers of spore-forming organisms may survive, in which case the final result will require correction. If rinse solution is prepared in this manner, include in the test report a note to this effect, and report the results on the sterilized water supply.

4.3 Apparatus

4.3.1 Swab technique

4.3.1.1 *Test tubes*, capacity 100 mL, of polypropylene or other autoclavable plastics, with cotton wool plug or suitable rubber closure.

4.3.1.2 *Stainless steel wire*, type EN56 complying with BS 1554 of length 350 mm and diameter 2.64 mm, formed into a loop at the one end, leaving a straight length of 300 mm, and notched at the other end to hold the ribbon gauze.

4.3.1.3 *Ribbon gauze*, unmedicated, 50 mm wide.

4.3.1.4 *Other apparatus*, specified as appropriate to the test methods applied to the swab solution.

4.3.2 Rinse technique

4.3.2.1 *Autoclavable plastics bottles*, of 500 mL capacity with suitable closures.

NOTE Rinse solution is normally dispensed in 500 mL quantities, but smaller or larger quantities with appropriately sized containers may be required for specific applications.

4.3.2.2 *Other apparatus*, specified as appropriate to the test methods applied to the rinse solution.