CONFIRMED
DECEMBER 2007

Specification for

Colour coding for one-mark and graduated pipettes (including requirements for the service performance of the colour coding enamels)

UDC 542.3:531.732.004.922

Cooperating organizations

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

Agricultural Research Council
Association for Science Education
British Laboratory Ware Association*
British Lampblown Scientific Glassware Manufacturers' Association Ltd.*
British Pharmacopoeia Commission
Chemical Industries Association*
Chemical Society
Chemical Society, Analytical Division
Department of Health and Social Security*
Department of Industry, Laboratory of The Government Chemist*
Department of Industry, National Physical Laboratory
Glass Manufacturers' Federation*
Institute of Petroleum
Ministry of Defence
Pharmaceutical Society of Great Britain
Scientific Instrument Manufacturers' Association*
Society of Chemical Industry*
Society of Glass Technology*
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:

Association of Clinical Biochemists
British Glass Industry Research Association
British Society of Scientific Glassblowers
Institute of Medical Laboratory Sciences
Royal Institute of Chemistry

This British Standard, having been prepared under the direction of the Laboratory Apparatus Standards Committee, was published under the authority of the Executive Board on 28 February 1978

First published March 1966
First revision February 1978

The following BSI references relate to the work on this standard:
Committee references LBC/8, LBC/27
Draft for comment 71/54684

ISBN 0 580 09929 6

Amendments issued since publication

Amd. No.	Date of issue	Comments

Contents

Foreword

This British Standard, prepared under the direction of the Laboratory Apparatus Standards Committee, specifies a system of colour coding for one-mark pipettes and graduated pipettes, and describes test methods for assessing the service performance of the colour coding enamels.

The committee responsible for the first edition, which was published in 1966, took into account work in the international field so that the system adopted in the British Standard was identical with that published in the ISO Recommendation ISO/R 1769 (now International Standard ISO 1769), although the range was restricted to codes for those pipettes which were used in the United Kingdom.

The growth of international trade now makes it appropriate to include in the present edition the full international range, but each code for pipettes which are not known to be used in the United Kingdom is marked in Table 1 and Table 2 with an asterisk.

As was originally intended, standard test methods for assessing the service performance of the enamels have now been developed, and they are described in Appendix A of this edition. These methods also are aligned with those under discussion internationally.

The coding system is designed to facilitate sorting of large batches of mixed pipettes, mainly by unskilled operatives. It is not intended to be memorized, and its use to the analyst is likely to be no more than a help to select quickly several similar pipettes from a mixed batch. Pipettes of different capacities or subdivisions are immediately distinguishable by the code if they are of similar visual appearance; if they bear the same code they are clearly distinguishable by shape and size.

It is not intended to recommend the general adoption of colour coding for pipettes or to make colour coding a mandatory requirement of British Standard specifications for pipettes; if, however, pipettes complying with the requirements of the following British Standards are colour coded: BS 696, BS 700, BS 1428-D4, BS 1583, then it is recommended that the codes used should comply with the requirements of this British Standard.

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 4, 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.

Section 1. General

1 Scope and field of application

1.1 This British Standard provides a system of coding, by means of coloured bands, for one-mark pipettes for identification of nominal capacities, and for graduated pipettes for identification of nominal capacities and units of subdivision.

1.2 Test methods are described for the assessment of the service performance of the enamels, in terms of whether an enamel will withstand attack under the test conditions described in Appendix A. However, the enamels are not classified by degree of resistance.

2 References

The titles of the publications referred to in this standard are listed on the inside back cover.

Section 2. Colour coding

3 Coding

The colour coding for one-mark pipettes shall be as detailed in Table 1, and for graduated pipettes shall be as detailed in Table 2.

4 Colours

In addition to black and white, five colours are specified in this standard. Variations in the enamels used and in the methods of application appropriate for pipettes made from different types of glass inevitably result in minor variations of colour, and it is therefore not possible to specify exactly the colours to be used. Nevertheless it is recommended that the colours on the pipettes, other than black and white, should approximate to the following, which are selected from the series of strong colours in BS 381C:1964.

Yellow	No. 355	(Lemon)
Orange	No. 557	(Light Orange)
Red	No. 538	(Post Office Red)
Green	No. 218	(Grass Green)
Blue	No. 166	(French Blue)

5 Method of marking

The code shall take the form of colour bands extending at least 150° around the circumference of the pipette, and situated not more than 70 mm from the top of the pipette and not less than 20 mm above the nearest graduated line.

In the case of pipettes intended for mouth use, the minimum distance from the top of the pipette to the upper edge of the nearest colour band shall be 12 mm.

It is recommended that a single band should be 6 mm to 10 mm wide and that in the case of two bands each should be 3 mm to 5 mm wide and they should be spaced 2 mm to 3 mm apart.

6 Identification of type 1 graduated pipettes

If required an additional narrow band of the same colour, 1 mm to 1.5 mm wide and placed 2 mm to 3 mm above the upper edge of the main coding band, may be used to identify type 1 graduated pipettes complying with the requirements of BS 700, i.e. pipettes adjusted for delivery from the zero line down to any graduation line.

Section 3. Durability

7 Requirements

7.1 Coloured band(s). The coloured band(s) shall be of fired-on enamel and shall comply with the requirements of **7.2** and **7.3**.

7.2 Resistance to detergent solutions. A colour coding enamel, when tested by the procedure described in **A.4**, shall not change in colour, with or without loss of gloss, to the extent that its identity is lost or that it can be confused with any other colour used for colour coding.

7.3 Resistance to acid solutions. A colour coding enamel, when tested by the procedure described in **A.5**, shall not change in colour, with or without loss of gloss, to the extent that its identity is lost or that it can be confused with any other colour used for colour coding.

NOTE It is recommended that, if the pipette is cleaned under drastic conditions, the colour band(s) should not be immersed in the cleaning solution(s).

8 Test report on durability

If a test report on the durability of the colour coding enamels is required, the following minimum information shall be given:

a) size and description of the batch or consignment of pipettes from which the sample was taken;

b) number of test pieces in the sample;

c) colour of the enamels tested;

d) results of test for resistance to detergent solutions and of test for resistance to acid solutions;

e) date of test.

Table 1 — Colour coding for one-mark pipettes

Nominal capacity	Colour code bands	British Standards in which these sizes of pipettes are specified
ml		
0.001	1 Blue	
0.002	2 Red	
0.003	1 Yellow	
0.004	2 Green	
0.005	1 White	1428-D4
0.01	1 Orange	1428-D4
0.015	2 Blue	
0.02	1 Black	1428-D4
0.025	2 White	
0.03	2 Yellow	
0.035	2 Black	
0.04	2 Red	
0.05	1 Green	1428-D4
0.075	2 Orange	
0.1	1 Blue	
0.15	1 White	
0.2	1 Red	
0.25	2 Green	
0.3	1 Yellow	
0.4	2 Red	
0.5	2 Black	1583
1	1 Blue	696-1:1583
2	1 Orange	1583
3	1 Black	1583
4	2 Red	1583
5	1 White	1583
6	2 Orange	
7	2 Green	
8	1 Blue	
9	1 Black	
10	1 Red	696-1:1583
15	1 Green	1583
20	1 Yellow	1583
25	1 Blue	1583
30	1 Black	
40	1 White	
50	1 Red	1583
75	1 Green	
100	1 Yellow	
150	2 Black[a]	
200	1 Blue	1583

[a] This code is not known to be used in the United Kingdom.

Table 2 — Colour coding for graduated pipettes

Nominal capacity	Sub-division	Colour code bands	British Standards in which these sizes of pipettes are specified
ml	ml		
0.01	0.001	1 Blue	
0.05	0.001	1 Yellow	
0.1	0.001	2 Green	
	0.005	1 Red	1428-D4
	0.01	1 White	
	0.05	2 Orange	1428-D4
0.125	0.125	2 Yellow[a]	
0.2	0.001	2 Blue	
	0.002	2 White	
	0.01	1 Black	1428-D4
	0.1	1 Orange	1428-D4
0.5	0.005	1 Green	
	0.01	2 Yellow	
	0.02	2 Red	1428-D4
	0.05	2 Black	
	0.25	2 Green[a]	
1	0.01	1 Yellow	700
	0.05	2 Green[a]	
	0.1	1 Red	
1.5	0.01	2 Red[a]	
2	0.01	2 White	
	0.02	1 Black	700
	0.05	2 Orange[a]	
	0.1	1 Green	
3	0.01	2 Blue[a]	
5	0.05	1 Red	700
	0.1	1 Blue	
10	0.1	1 Orange	700
15	0.1	2 Green[a]	
20	0.1	2 Yellow	
25	0.1	1 White	
	0.2	1 Green	700
50	0.1	2 Orange[a]	
	0.2	1 Black[a]	
100	0.2	1 Red[a]	

[a] These codes are not known to be used in the United Kingdom.

Appendix A Tests for durability of colour enamels

A.1 Reagents

Analytical grade reagents shall be used throughout.

A.1.1 *Water, distilled or deionized*. Complying with the requirements of BS 3978.

A.1.2 *Detergent solution*. Dissolve 50 g of tetrasodium pyrophosphate ($Na_4P_2O_7$) and 5 g of sodium dodecylbenzene sulphonate ($C_{18}H_{29}SO_3Na$), in 1 litre of water.

A.1.3 *Hydrochloric acid*. 2N.

A.1.4 *Acetone*

A.2 Apparatus

A.2.1 *Beaker*. 1 litre capacity.

A.2.2 *Clock glass*. Of diameter sufficient to cover the 1 litre beaker.

A.2.3 *Thermometer*. One complying with the requirements of BS 1704 would be suitable.

A.2.4 *Heating bath*. Of about 5 litres capacity, with suitable heating equipment which enables a test solution to be maintained at a constant temperature of 80 ± 1 °C.

A.2.5 *Sample holder*. Suitable for holding 30 mm lengths of pipette stem, and made from a material resistant to the test solutions, e.g. polypropylene or platinum wire.

A.2.6 ***Stoppered storage vessels***

A.3 Sample

A.3.1 *Preparation*. Cut test pieces about 30 mm long from the stems of the pipettes so as to include the colour coding enamel. Wash each test piece three times in separate portions of cold water, and then three times in separate portions of acetone. Finally wipe the test pieces with a soft, dry, lintless cloth, and transfer them to a stoppered storage vessel unless proceeding immediately with testing.

A.3.2 *Number of pieces*. The number of test pieces in a sample will depend on the size of the batch of pipettes examined, but not more than 10 test pieces either from the same or different samples shall be immersed in the same test solution, in order to avoid the possibility of the concentration of dissolved enamel in the solution being high enough to change the conditions of test.

A.4 Test procedure for resistance to detergent solutions

Heat 700 ml of the detergent solution to 80 ± 1 °C in the beaker using the heating bath. Suspend the sample with the aid of the sample holder, in the hot test solution, so that the test pieces are freely in contact with the solution on all sides. Cover the beaker with the clock glass.

Maintain the temperature of the solution at 80 ± 1 °C for 2 h from the time of immersion.

After this period, remove the test pieces from the solution, wash them thoroughly with water, wipe with a soft, dry, lintless cloth, and then rinse three times in fresh portions of acetone. Allow to drain dry.

A.5 Test procedure for resistance to acid solutions

Transfer about 700 ml of the cold hydrochloric acid to the clean beaker and allow to stand until it reaches room temperature (20 ± 5 °C).

Suspend the sample, with the aid of the sample holder, in the hydrochloric acid so that the test pieces are freely in contact with the acid on all sides, and cover with the clock glass. Allow to stand for 1 h at room temperature.

After this period, remove the test pieces from the acid, wash them thoroughly with water, wipe with a soft, dry, lintless cloth, and then rinse three times in fresh portions of acetone. Allow to drain dry.

A.6 Examination of sample

At the end of each test, compare the colour of the enamel on each of the treated pieces with that on a similar test piece which has been prepared in accordance with **A.3** and then stored without further treatment. Disregard any loss of gloss in the treated test pieces, but note any change or loss of colour such as might lead to confusion with any other colour used in colour coding of pipettes (see clause **4**).

blank

Publications referred to

BS 381C, *Colours for specific purposes.*
BS 696, *Gerber method for the determination of fat in milk and milk products.*
BS 696-1, *Apparatus.*
BS 700, *Graduated pipettes (including blowout pipettes).*
BS 1428, *Microchemical apparatus.*
BS 1428-D4, *Capillary pipettes.*
BS 1583, *One-mark pipettes.*
BS 1704, *General purpose thermometers.*
BS 3978, *Water for laboratory use.*
ISO 1769, *Laboratory glassware — Pipettes — Colour coding.*

BSI — British Standards Institution

BSI is the independent national body responsible for preparing British Standards. It presents the UK view on standards in Europe and at the international level. It is incorporated by Royal Charter.

Revisions

British Standards are updated by amendment or revision. Users of British Standards should make sure that they possess the latest amendments or editions.

It is the constant aim of BSI to improve the quality of our products and services. We would be grateful if anyone finding an inaccuracy or ambiguity while using this British Standard would inform the Secretary of the technical committee responsible, the identity of which can be found on the inside front cover. Tel: 020 8996 9000. Fax: 020 8996 7400.

BSI offers members an individual updating service called PLUS which ensures that subscribers automatically receive the latest editions of standards.

Buying standards

Orders for all BSI, international and foreign standards publications should be addressed to Customer Services. Tel: 020 8996 9001. Fax: 020 8996 7001.

In response to orders for international standards, it is BSI policy to supply the BSI implementation of those that have been published as British Standards, unless otherwise requested.

Information on standards

BSI provides a wide range of information on national, European and international standards through its Library and its Technical Help to Exporters Service. Various BSI electronic information services are also available which give details on all its products and services. Contact the Information Centre. Tel: 020 8996 7111. Fax: 020 8996 7048.

Subscribing members of BSI are kept up to date with standards developments and receive substantial discounts on the purchase price of standards. For details of these and other benefits contact Membership Administration. Tel: 020 8996 7002. Fax: 020 8996 7001.

Copyright

BSI
389 Chiswick High Road
London
W4 4AL