

Safety of toys —

Part 4: Specification for experimental sets for chemistry and related activities

This European Standard EN 71-4 has the status of a British Standard.

Cooperating organizations

The European Committee for Standardization, under whose supervision this European Standard was prepared, comprises the national standards organizations of the following Western European countries.

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National foreword

This Part of BS 5665 has been prepared under the direction of the Textiles and Clothing Standards Policy Committee and is the English language version of EN 71 “*Safety of toys*” — Part 4: “*Experimental sets for chemistry and related activities*” published by the European Committee for Standardization (CEN).

EN 71-4 was produced as a result of international discussions in which the UK took an active part.

Additional information. When marking or specifying a product the manufacturer may mark or specify by reference to either the European Standard or the British Standard¹⁾.

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. In particular the attention of users is drawn to the Toys (Safety) Regulations 1989 (SI 1275).

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN title page, pages 2 to 8, 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⁾Marking EN 71-4 or BS 5665-4 on or in relation to a product represents a manufacturer’s declaration of conformity, i.e. a claim by or on behalf of the manufacturer that the product meets the requirements of the standard. The accuracy of the claim is therefore solely the responsibility of the person making the claim. Such a declaration is not to be confused with third party certification of conformity, which may also be desirable.

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English version

Safety of toys
Part 4: Experimental sets for chemistry and related activities

Sécurité des jouets
Partie 4: Coffrets d'expériences chimiques et d'activités connexes

Sicherheit von Spielzeug
Teil 4: Experimentierkästen für chemische und ähnliche Versuche

This European Standard was accepted by CEN on 29 May 1990. CEN members are bound to comply with the requirements of the CEN/CENELEC Common Rules which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to CEN Central Secretariat has the same status as the official versions.

CEN members are the national standards organizations of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxemburg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart 36, B-1050 Brussels

Foreword

This European Standard consists of the following parts:

- *Part 1: Mechanical and physical properties;*
- *Part 2: Flammability;*
- *Part 3: Migration of certain elements;*
- *Part 4: Experimental sets for chemistry and related activities.*

This standard is Part 4 of the European Standard for safety of toys.

This Part 4 should be read in conjunction with Part 1, particularly the foreword and clauses 1 and 2 of Part 1.

It is intended to reduce the risks which may present health hazards to a child when the experimental sets are used as intended or in a foreseeable way, bearing in mind the normal behaviour of children.

When using these experimental sets, the possible dangers should be kept to a minimum, by adding appropriate information to make the experiment recognized and controllable.

Requirements are laid down in this standard.

Differing legal requirements, e.g. for classification of dangerous substances, Risk/Safety phrases, labelling and limits for substances, exist in EFTA-countries.

Technical rules for inclusion and exclusion of substances in Table 1 are in preparation and will be added to this standard at the earliest opportunity.

Brief history

The Commission of the European Communities (CEC) informed in March 1985 the CEN Technical Board (CEN BT) of the activities of the Commission concerning the preparation of a new proposal for an EEC-directive within the field of safety of toys (now published as Council Directive 88/378/EEC of 3 May 1988).

On 1988-05-18 the Commission submitted a draft standardization request to CEN. This request charges CEN with the preparation of a European Standard on maximum concentration limits in chemical toys for dangerous substances and preparations as defined in directives 67/548/EEC and 88/379/EEC, essential to the functioning of chemical toys.

The draft standardization request was accepted by CEN BT on 1988-06-16/17 (resolution BT 86/1988).

A parallel draft EFTA standardization request was submitted from EFTA on 1988-09-23.

On 1988-06-08 CEN/TC 52 set up a working group CEN/TC 52/WG 5. The task of the working group was to prepare two final working drafts covering the mandate.

The working group, WG 5, convened in November 1988 in Berlin, in March 1989 in Salzburg and in October 1989 in Brussels.

The revised third working draft, as prepared during the meeting in Salzburg, was approved on 1989-03-16 by CEN/TC 52 for submission as a draft European Standard for enquiry. A revised draft European Standard, as prepared during the meeting of WG 5 in Brussels, was approved on 1989-10-17.

In accordance with the Common CEN/CENELEC Rules, the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxemburg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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1 Object

This Part of this European Standard specifies requirements for the maximum amount of certain substances and preparations used in experimental sets for chemistry and related activities.

The standard applies to chemistry sets and supplementary sets. It also covers toys for experiments within the fields of mineralogy, biology, physics, microscopics and environmental sciences whenever they contain one or more chemical substances and/or preparations.

It also specifies requirements for marking, contents list, instructions for use and for equipment intended for carrying out the experiments.

2 Field of application

See Part 1 of this European Standard.

This Part includes requirements for:

- the maximum amounts of substances and preparations classified as dangerous within the definitions contained in Directives 67/548/EEC (with subsequent amendments and adaptations) and 88/379/EEC (with subsequent amendments and adaptations); and
- the maximum amounts of substances and preparations which in excessive amounts may harm the health of the children using them and which are not covered by the above mentioned Directives; and
- the maximum amounts of any other chemical substances delivered with the toy.

3 References

EN 71-1:1988, *Safety of toys — Part 1: Mechanical and physical properties*.

European Council Directive 67/548/EEC — Classification, packaging and labelling of dangerous substances (with subsequent amendments and adaptations)²⁾.

European Council Directive 88/379/EEC — Classification, packaging and labelling of dangerous preparations (with subsequent amendments and adaptations)³⁾.

4 Definitions

For the purpose of this Part of EN 71 the following definitions apply:

4.1

chemistry set

a toy consisting of one or more chemical substances and/or preparations with or without equipment intended for carrying out chemical experiments

NOTE The definition also covers toys for experiments within the fields of mineralogy, biology, physics, microscopics and environmental sciences whenever they contain one or more chemical substances and/or preparations.

4.2

supplementary set

a chemistry set which is intended to be used with a complete chemistry set

5 Chemical substances

Only substances and preparations given in Table 1 can be supplied in chemistry sets up to the amounts stated.

NOTE The quality of the chemicals used should be appropriate for the experiments described. In particular the chemicals should not contain impurities or blends which allow undefined and dangerous reactions.

Other substances shall not be supplied with the toy. However, the instructions for use may prescribe the use of other substances, e.g. sugar, that are not considered as dangerous substances or preparations within the definitions contained in Directives 67/548/EEC (with subsequent amendments and adaptations) and 88/379/EEC (with subsequent amendments and adaptations).

Additionally, denatured methylated spirits and the reagents referred to in Table 2 may be prescribed for use, but shall not be provided with the toy.

The chemical substances and preparations listed in Table 1, in so far as they are classified as dangerous within the definitions contained in the above Directives, shall have their containers labelled accordingly.

²⁾At present the following amendments and adaptations exist: 69/81/EEC, 70/89/EEC, 71/144/EEC, 73/146/EEC, 75/409/EEC, 76/907/EEC, 79/370/EEC, 79/831/EEC, 81/957/EEC, 82/232/EEC, 83/467/EEC, 84/449/EEC, 86/431/EEC, 87/432/EEC, 88/302/EEC, 88/490/EEC.

³⁾At present the following adaptation exists: 89/178/EEC.

Table 1 — Maximum amounts of chemical substances and preparations

Chemical substance/preparation ^a	Maximum amount per set	Danger symbol (See Figure 1)	CAS number ^b	EINECS number ^b
Ammonium carbonate	5 g	Do not inhale fumes	506-87-6	2139115
Ammonium chloride	30 g	Xn	12125-02-9	2351864
Ammonium iron (III) sulfate	5 g	—	10138-04-2	2333824
Ammonium nickel (II) sulfate ^c	3 g	Xn	15699-18-0	2397935
Ammonium sodium hydrogen phosphate	5 g	—	13011-54-6	2358608
Calcium carbonate	100 g	—	471-34-1	2074399
Calcium chloride	10 g	Xi	10043-52-4	2331408
Calcium hydroxide ^d	20 g	C	1305-62-0	2151373
Calcium nitrate	5 g	Xi	10124-37-5	2333321
Calcium oxide ^d	10 g	C	1305-78-8	2151389
Calcium sulfate	100 g	—	7778-18-9	2319003
Charcoal ^c	100 g	—	16291-96-6	2403833
Citric acid	20 g	—	77-92-9	—
Clove oil ^c	10 mL	—	84961-50-2	2846387
Cobalt (II) chloride hexahydrate	3 g	Xn	7791-13-1	—
Copper sheet	100 g	—	7440-50-8	2311596
Copper (II) oxide	10 g	Xn	1317-38-0	2157066
Copper (II) sulfate	15 g	Xn	7758-98-7	2318476
Disodium disulfite	10 g	Xi	7681-57-4	2315480
Glycerol (containing at least 15 % water)	25 g	—	56-81-5	2002895
Hexamethylenetetramine ^c (solid fuel)	10 g	Xn	100-97-0	2029058
INDICATORS:				
Eosin (solid) ^c	1 g	—	17372-87-1	2414096
Litmus blue	1 pad or 1 roll or 1 g	—	—	—
Litmus red ^c	1 pad or 1 roll or 1 g	—	1393-92-6	2157396
Methyl orange ^c (20 % <i>m/m</i> sodium sulfate mixture)	3 g	—	547-58-0	2089253
Methylene blue ^c	1 g	Xn	61-73-4	2005152
Non bibulous indicator sticks — Universal indicator paper ^c	1 pad	—	—	—
Phenolphthalein ^c	1 g	—	77-09-8	2010047
Iodine (2,5 % <i>m/V</i>) in potassium iodide (2,5 % <i>m/V</i> aqueous solution)	10 mL	Xn	7553-56-2	2314424
Iron filings/iron powder ^c	100 g	—	7439-89-6	2310964
Iron (III) chloride	10 g	Xn	7705-08-0	2317294
Iron (II) sulfate	10 g	Xn	7720-78-7	2317535
Lactose	100 g	—	63-42-3	2005592
Lead solder ^c	100 g	—	—	—
Luminol (5 % <i>m/m</i> mixture with sodium sulfate) ^c	3 g	—	521-31-3	2083094

Table 1 — Maximum amounts of chemical substances and preparations

Chemical substance/preparation ^a	Maximum amount per set	Danger symbol (See Figure 1)	CAS number ^b	EINECS number ^b
Magnesium strip	3 g	F Do not inhale fumes from burning material	7439-95-4	2311046
Magnesium sulfate	25 g	—	7487-88-9	2312982
Manganese (IV) dioxide	5 g	Xn	1313-13-9	2152026
Manganese (II) sulfate	15 g	—	7785-87-7	2320899
Pepsin	10 g	—	9001-75-6	2326293
Potassium aluminium sulfate ^c	10 g	—	10043-67-1	2331413
Potassium bromide	15 g	Xn	7758-02-3	2318303
Potassium hexacyanoferrate (III) ^c	10 g	—	13746-66-2	2373233
Potassium hexacyanoferrate (II) ^c	10 g	—	13943-58-3	2377222
Potassium iodide	10 g	—	7681-11-0	2316594
Potassium permanganate ^e	15 g	Xn, O	7722-64-7	2317603
Potassium permanganate: sodium sulfate mixture (1:2 <i>m/m</i>)	10 g	Xn, O	—	—
Silver nitrate (1 % <i>m/V</i> aqueous solution)	10 mL	Xi	—	—
Sodium acetate	20 g	—	127-09-3	2048238
Sodium carbonate	50 g	Xi	497-19-8	2078388
Sodium chloride	100 g	—	7647-14-5	2315983
Sodium hydrogen carbonate	50 g	—	144-55-8	2056338
Sodium hydrogen sulfate	30 g	C	7681-38-1	2316657
Sodium metasilicate	30 g	Xn	6834-92-0	2299129
Sodium sulfate	100 g	—	7757-82-6	2318209
Sodium tetraborate ^c	10 g	Xn	1330-43-4	2155404
Sodium thiosulfate	50 g	—	7772-98-7	2318675
Sulfur	15 g	—	7704-34-9	2317226
Tannin ^c	15 g	—	1401-55-4	2157532
Tartaric acid	20 g	Xi	87-69-4	2010691
Tincture of Iodine ^c (2,5 % <i>m/V</i> ethanolic solution)	10 mL	Xn	—	—
Urea ^c	10 g	—	57-13-6	2003155
Zinc powder/zinc pellets	20 g	F	7440-66-6	2311753

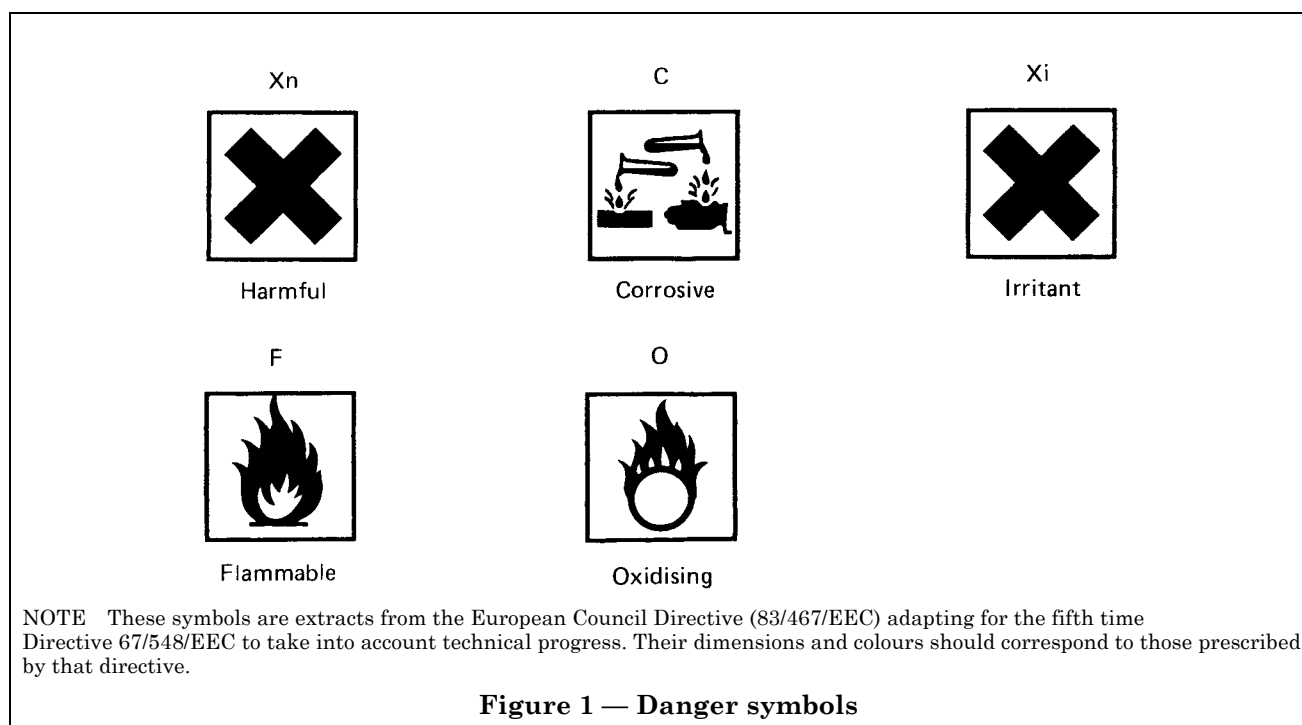
^a The substances in Table 1 are listed in alphabetical order and may therefore be placed in different positions in the national translations.

^b Chemical Abstract Service Registry Number (CAS) and European Inventory of Existing Chemical Substances Number (EINECS) are provided for information purposes only.

^c The chemical nomenclature is mainly based on IUPAC with the exceptions of the substances marked.

^d Only one of these substances shall be provided per set.

^e Only to be provided for toys for children over the age of 12 years.



6 Equipment

6.1 General requirements

Chemistry sets shall be supplied with instructions for use, the containers necessary for carrying out the experiments described in the instructions for use, eye protection and if required a test tube stand.

Supplementary sets shall be supplied with a contents list as specified in clause 8 and marked in accordance with 7.3.3.

6.2 Containers

Glassware intended to be heated shall be made of borosilicate glass. The minimum dimensions of the test tubes shall be 110 mm in length and 15 mm in internal diameter.

Glassware not intended for heating shall be labelled in accordance with 7.2.

Empty containers intended for storage of reagents shall have a maximum volume of 100 ml and shall comply with Table 2.

NOTE The containers shall be fitted with closures to prevent access to the contents by children below the age of 10 years.

6.3 Test tube stand and test tube holder

The test tube stand shall not overturn when a test tube positioned in an outermost hole is filled with 5 ml of water and tilted to an angle of 15°.

The experimental set shall contain a functional test tube holder when heating is required for carrying out the experiments.

6.4 Eye protection

The eye protection shall be of such nature or design that the eyes are protected to a maximum extent.

Eye protection shall pass the test described in 4.12 of EN 71-1:1988 except that the warning required by 3.2.2.12 of EN 71-1:1988 shall not be given.

If the experimental set does not contain eye protection for the supervising adult the outer packaging shall be marked in accordance with 7.3.2.

7 Marking

7.1 General requirement

Markings shall be visible, easily legible, indelible and in the national language(s) of the country of sale.

7.2 Marking of individual containers and glassware

Individual containers shall be marked with the following information:

- The name of the chemical substance or preparation as given in Table 1 and Table 2; and
- The required danger symbol given in Table 1 and Table 2.

NOTE In addition common names of the chemical substances and preparations in the containers may be given.

Glassware not intended for heating shall be marked with:

— “Not to be heated.”

7.3 Marking of the outer packaging

7.3.1 The outer packaging shall bear the name and/or trade name and/or mark, the address and telephone number of the manufacturer or his authorized representative or the importer.

The name and address may be abbreviated provided that the abbreviation enables the manufacturer, his authorized representative or the importer to be identified.

7.3.2 The outer packaging shall additionally bear the following warnings:

- “WARNING! Only for use by children over 10 years old. Only for use under the supervision of an adult.
- “CAUTION! Contains some chemicals which are classified a safety hazard.

Read the instructions before use, follow them and keep them for reference.

Do not allow chemicals to come into contact with any part of the body, particularly the mouth and eyes. Keep small children and animals away from experiments.

Store the chemistry set out of reach of small children.”

Where appropriate (see 6.4):

“Eye protection for supervising adults is not included.”

NOTE If appropriate, ages greater than 10 years in the first warning can be fixed by the manufacturer.

For sets containing potassium permanganate the age given in the first warning shall be 12 years.

7.3.3 Supplementary sets shall additionally be marked with the following warning on the outer package:

- “CAUTION! This supplementary set does not contain all equipment and chemicals necessary for performing tests.

For carrying out experiments a complete chemistry set is required.”

7.3.4 Letters of a minimum height of 7 mm shall be used for the terms “WARNING” and “CAUTION”.

8 Contents list with warnings and first aid information

The contents list shall contain the following information:

- a) A list of the chemicals supplied.
- b) The Risk/Safety phrases specified in Directive 67/548/EEC (with subsequent amendments and adaptations) as appropriate to each particular substance.

c) The manufacturer provides an empty space in which the telephone number of the local poison centre (central office for first aid information) or hospital in case of intake by accident of dangerous substances should be entered.

d) General first aid information as follows:

“In case of eye contact: Wash out eye with plenty of water, holding eye open if necessary. Seek immediate medical advice.

If swallowed: Wash out mouth with water, drink some fresh water. Do not induce vomiting. Seek immediate medical advice.

In case of inhalation: Remove person to fresh air.

In case of skin contact and burns: Wash affected area with plenty of water for 5 minutes.

In case of doubt seek medical advice without delay. Take the chemical together with the container with you.

In case of injury always seek medical advice.

NOTE First aid information may also be found in the instructions for carrying out the experiment.”

e) Specific first aid information when appropriate.

9 Instructions for use

9.1 General instructions

The instructions for use shall be given in the national language(s) of the country of sale.

The marking specified in 7.3 shall be repeated on the cover of the instructions for use.

The first page(s) of the instructions for use shall contain a list of its contents. This list shall refer to the information required in 9.2 and 9.3.

Detailed information on how to perform each experiment shall be given.

NOTE 1 All experiments described should be evaluated by the manufacturer. In particular, substances should not be formed in amounts that are injurious to health.

When appropriate, danger symbols and Risk/Safety phrases as specified in Directive 67/548/EEC (with subsequent amendments and adaptations) and information on first aid in the event of foreseeable accidents shall be given with the description of the experiment.

NOTE 2 Any known hazards arising from the use of the toy should be detailed (e.g. handling of dangerous chemicals, handling of glassware, retarded boiling point, back-flow of barrier water into overheated glassware, evolution of gases and handling of burners and other heating sources).

Information on disposal of used chemicals including substances and preparations not supplied with the toy, but needed for the described experiments, shall be given. The necessity of disposing of, e.g. foodstuffs used for experimenting, shall be underlined.

Table 2 — Empty containers for reagents

Reagent	Maximum volume	Danger symbol	CAS number	EINECS number
Hydrochloric acid 2 mol/L	100 mL	Xi	7647-01-0	2315957
Hydrogen peroxide 3 % V/V	100 mL	—	7722-84-1	2317650
Sodium Hydroxide solution 1 mol/L	100 mL	Xi	1310-73-2	2151855

The instructions for disposal shall take account of national regulations for the disposal of such chemicals.

The opening pages of the instructions for use shall provide the following information:

- Advice for supervising adults (see 9.2).
- The information required in clause 8.
- Safety rules (see 9.3).

9.2 Advice for supervising adults

The advice for adults shall contain the following information:

- “Read and follow these instructions, the safety rules and the first aid information and keep them for reference.
- The incorrect use of chemicals can cause injury and damage to health. Only carry out those experiments which are listed in the instructions.
- This chemistry set is for use only by children over 10 years (or over 12 years where appropriate).
- Because children’s abilities vary so much, even within age groups, supervising adults should exercise discretion as to which experiments are suitable and safe for them. The instructions should enable supervisors to assess any experiment to establish its suitability for a particular child.
- The supervising adult should discuss the warnings and safety information with the child or children before commencing the experiments. Particular attention should be paid to the safe handling of acids, alkalies and flammable liquids.

f) The area surrounding the experiment should be kept clear of any obstructions and away from the storage of food. It should be well lit and ventilated and close to a water supply. A solid table with a heat resistant top should be provided.

g) Instructions for the use of the burner.”

9.3 Safety rules

The following safety rules shall be given.

— “Do read these instructions before use, follow them and keep them for reference.

Do keep young children, animals and those not wearing eye protection away from the experimental area.

Do always wear eye protection.

Do store experimental sets out of reach of young children.

Do clean all equipment after use.

Do wash hands after carrying out experiments.

Do not use equipment which has not been supplied with the set.

Do not eat, drink or smoke in the experimental area.

Do not allow chemicals to come into contact with the eyes or mouth.

Do not replace foodstuffs in original container. Dispose of immediately.”

National appendix A

The United Kingdom participation in the preparation of this European Standard was entrusted by the Textiles and Clothing Standards Policy Committee (TCM/-) to Technical Committee TCM/15 upon which the following bodies were represented:

Association for Consumer Research (ACRE)
 Association of Consulting Scientists
 Association of Public Analysts
 British Association of Toy Retailers
 British Colour Makers' Association
 British Importers' Confederation
 British Paediatric Association
 British Paper and Board Industry Federation
 British Plastics Federation
 British Retailers' Association
 British Toy and Hobby Manufacturers' Association Ltd.
 British Toymakers' Guild
 Child Accident Prevention Trust
 Consumer Policy Committee of BSI
 Department of Education and Science
 Department of Health
 Department of Trade and Industry (Laboratory of the Government Chemist)
 Department of Trade and Industry (Consumer Safety Unit, CA Division)
 Institute of Trading Standards Administration
 Mail Order Traders' Association
 Man-made Fibres Producers' Committee
 National Fillings Trades Association
 Paintmakers' Association of Great Britain Ltd.
 Pressed Felt Manufacturers' Association
 Royal Society for the Prevention of Accidents
 Society of British Printing Ink Manufacturers
 Toy and Giftware Importers' Association

The following bodies were also represented in the drafting of the standard, through subcommittees and panels:

Titanium Pigment Manufacturers' Technical Committee
 Writing Instruments Association

National appendix B

The British Standard corresponding to the European Standard referred to in the text is as follows:

European Standard	British Standard (content identical)
EN 71-1:1988	BS 5665 Safety of toys Part 1:1989 Specification for mechanical and physical properties
EEC Directive	UK Statutory Instrument
European Council Directive 67/548/EEC	SI 1984/1244 Classification, Packaging and Labelling of Dangerous Substances 1984 (as amended by SI 1922/1986, 766/1988 and 2208/1989)
European Council Directive 88/379/EEC	Not implemented at time of publication of this British Standard

BSI — British Standards Institution

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