

CONFIRMED  
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Specification for

# Extenders for paints

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The Pigments, Paints and Varnishes Industry Standards Committee, under whose supervision this British Standard was prepared, consists of representatives from the following Government departments and scientific and industrial organizations:

- British Colour Makers' Association\*
- Department of Industry
- Department of Industry (Laboratory of the Government Chemist)
- Department of the Environment
- Department of the Environment (Building Research Establishment)
- Greater London Council
- Institution of Corrosion Technology
- London Transport Executive
- Ministry of Defence\*
- National Federation of Builders' and Plumbers' Merchants
- Oil and Colour Chemists' Association\*
- Paint Research Association\*
- Paintmakers' Association of Great Britain Limited\*
- Post Office
- Royal Institute of British Architects
- Society of Chemical Industry
- Titanium Pigment Manufacturers' Technical Committee\*
- White Lead Manufacturers' Association\*
- Zinc Development Association\*
- Zinc Pigment Development Association

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:

- Amalgamated Society of Painters and Decorators
- Asbestine Importers Association
- Chemical Industries Association
- China Clay Association
- Mica Trade Association
- Paint Manufacturers and Allied Trades Association Ltd.

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# Foreword

This British Standard for extenders for paints was first published in one volume in 1952 and subsequently revised in 1965.

This revision brings the British Standard into line with ISO 3262:1975, “*Extenders for paints*”.

For the purposes of this British Standard the text of ISO 3262 given in this publication should be modified as follows.

**Terminology.** The words “British Standard” should replace “International Standard” wherever they appear. The decimal point should replace the decimal comma wherever it appears.

**Cross-references.** The references to other International Standards should be replaced by references to British Standards as follows:

| Clause  | Reference to ISO Standard | Appropriate British Standard                                                                                                                                             |
|---------|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Table 1 | ISO 787-XVIII             | BS 3483 “ <i>Methods for testing pigments for paints</i> ”<br>Part B4 “ <i>Determination of residue on sieve (water method, using a mechanical flushing procedure)</i> ” |
| 6       | ISO 842                   | BS 4726 “ <i>Methods for sampling raw materials for paints and varnishes</i> ”                                                                                           |
| 8       | ISO 48                    | BS 903 “ <i>Methods of testing vulcanized rubber</i> ”<br>Part B6 “ <i>Total sulphur</i> ” (included in BS 903-B6 to BS 903-B10)                                         |
| 10      | ISO 787-II                | BS 3483-B6 “ <i>Determination of matter volatile at 105 °C</i> ”                                                                                                         |
| 12.2    | ISO 787-III               | BS 3483-C1 “ <i>Determination of matter soluble in water (hot extraction method)</i> ”                                                                                   |
| 13      | ISO 787-IX                | BS 3483-C4 “ <i>Determination of pH value of aqueous suspension</i> ”                                                                                                    |
| Annex   | ISO 787-V                 | BS 3483-B7 “ <i>Determination of oil absorption value</i> ”                                                                                                              |

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## Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 18, 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 and field of application

This International Standard specifies the principal requirements and the corresponding methods of test for certain paint extenders.

It is applicable to the types and grades of paint extender listed in clause 4.

## 2 References

ISO 787, *General methods of test for pigments*.

ISO 842, *Raw materials for paints and varnishes — Sampling*.

## 3 Definition

### extender

an inorganic material in powder form, with a refractive index usually less than 1,7, used as a constituent of paints to confer special effects and to modify properties such as sedimentation, working and film-forming properties

## 4 Types and grades

The extenders are classified in types according to the nature of the material, and in grades according to their residue on sieve and particle size.

### Extender No. 1: Barytes (grades a, b)

Barium sulphate, natural.

### Extender No. 2: Blanc fixe

Barium sulphate, precipitated.

### Extender No. 3: Whiting (grades a, b, c, d)

Calcium carbonate, natural. Craie, Kreide. Naturally occurring cretaceous chalk, primarily  $\text{CaCO}_3$  of micro-crystalline form (essentially remains of coccoliths and foraminifera).

### Extender No. 4: Calcium carbonate, crystalline (grades a, b, c, d)

Limestone, Iceland spar, natural calcium carbonate other than that covered by extender No. 3.

### Extender No. 5: Calcium carbonate, precipitated (grades a, b)

Calcium carbonate prepared by precipitation.

### Extender No. 6: Dolomite (grades a, b, c, d)

Calcium magnesium carbonate. In chemical composition, approximately equimolecular proportions of calcium and magnesium carbonates.

### Extender No. 7: China clay (grades a, b, c)

Aluminium silicate, natural, hydrated. Kaolin, essentially kaolinite,  $\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2 \cdot 2\text{H}_2\text{O}$ , of lamellar crystalline form.

### Extender No. 8: Talc, fibrous form (grades a, b)

Magnesium silicate, natural, hydrated,  $3\text{MgO} \cdot 4\text{SiO}_2 \cdot \text{H}_2\text{O}$ .

### Extender No. 9: Talc, lamellar form (grades a, b, c)

Magnesium silicate, natural, hydrated,  $3\text{MgO} \cdot 4\text{SiO}_2 \cdot \text{H}_2\text{O}$ .

### Extender No. 10: Talc, containing carbonate

Magnesium silicate, natural, hydrated,  $3\text{MgO} \cdot 4\text{SiO}_2 \cdot \text{H}_2\text{O}$ , lamellar form. Different from extender No. 9 in that it contains carbonate.

### Extender No. 11: Mica (grades a, b)

Potassium aluminium silicate, natural, hydrated,  $\text{K}_2\text{O} \cdot 3\text{Al}_2\text{O}_3 \cdot 6\text{SiO}_2 \cdot 2\text{H}_2\text{O}$ , lamellar form. Muscovite. Wet ground (grade a) and dry ground (grade b).

### Extender No. 12: Silica (quartzite), type 1 (grades a, b, c, d)

Silica, natural.  $\text{SiO}_2$  content not less than 80 % but less than 98 %.

**Extender No. 13:** Silica (quartzite), type 2 (grades a, b, c, d)

Silica, natural, SiO<sub>2</sub> content equal to or greater than 98 %.

**Extender No. 14:** Kieselguhr, type 1 (grades a, b, c, d)

Diatomaceous siliceous earth. SiO<sub>2</sub> content not less than 70 % but less than 80 %.

**Extender No. 15:** Kieselguhr, type 2 (grades a, b, c, d)

Diatomaceous siliceous earth. SiO<sub>2</sub> content not less than 80 %.

**Extender No. 16:** Calcium silicate, synthetic

Hydrated synthetic calcium silicate.

**Extender No. 17:** Sodium aluminium silicate, synthetic

Hydrated synthetic sodium aluminium silicate.

**Extender No. 18:** Silica, synthetic

Hydrated synthetic silica.

## 5 Composition and properties

The material shall be in the form of a dry powder or in such condition that it may readily be reduced thereto by crushing under a palette knife without any grinding action being necessary. When examined microscopically at a suitable magnification, it shall closely resemble an agreed sample.

The composition and properties of the materials shall be as given in Table 1.

It should be noted, however, that in Table 1 no reference is made to oil-absorption values; these are given in the table in the Annex for information only.

## 6 Sampling

Sampling shall be carried out in accordance with ISO 842.

### Methods of test

All reagents used shall be of recognized analytical reagent quality. Distilled water or water of equal purity shall be used throughout the tests.

## 7 Comparison of colour

NOTE There is no objection to the use of a particular instrumental method, agreed between the interested parties, for comparison of colour. However, in view of differences between the results obtained with various instruments, the simple visual method is given as the reference method.

### 7.1 Procedure

Place approximately equal masses of the test sample and the agreed sample on a ground glass plate placed on a piece of white paper.

Place a piece of thin glass plate vertically between the two samples so as to form a partition. Push the samples towards each other until they come into contact with the glass plate. Remove the glass plate and flatten the surface of the two heaps with another glass plate which shall then be removed before viewing.

Examine the colour of the samples in diffuse daylight or, if good daylight is not available, make the comparison in artificial daylight.

Add carefully a few drops of either white spirit or water (as agreed between the interested parties) in such a way that the two samples are just wetted without being disturbed, and repeat the colour comparison by the same method as before.

## 8 Determination of residue on sieve

### 8.1 Apparatus

**8.1.1** *Three sieves*, 100 to 200 mm diameter, with sides of height 50 mm and meshes of apertures 45, 63 and 125  $\mu\text{m}$  respectively.

**8.1.2** *Glass rod*, tipped with rubber having a hardness of 50 IRHD<sup>1)</sup>.

**8.1.3** *Filter crucible of sintered glass*, pore size index P 40 (diameter of pores 16 to 40  $\mu\text{m}$ ).

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<sup>1)</sup> See ISO 48, *Vulcanized rubbers — Determination of hardness*.

Table 1 — Composition and properties of extenders

| No. | Extender                                                                       | Composition<br>% (m/m)                                                             | Test<br>method | Colour<br>(see clause 7)                                                  | Residue on sieve <sup>a</sup><br>(see clause 8)<br>% (m/m) max. |                         |                           | Particle size distribution <sup>b</sup><br>(see clause 9)<br>% (m/m) min. |                      |                      |                              | Matter volatile at<br>105 °C<br>(see clause 10)<br>% (m/m) max. | Loss on ignition<br>(see clause 11)<br>% (m/m) | Matter soluble in<br>water<br>(see clause 12)<br>% (m/m)<br>max. | pH of aqueous<br>suspension<br>(see clause 13) |
|-----|--------------------------------------------------------------------------------|------------------------------------------------------------------------------------|----------------|---------------------------------------------------------------------------|-----------------------------------------------------------------|-------------------------|---------------------------|---------------------------------------------------------------------------|----------------------|----------------------|------------------------------|-----------------------------------------------------------------|------------------------------------------------|------------------------------------------------------------------|------------------------------------------------|
|     |                                                                                |                                                                                    |                |                                                                           | 125 µm                                                          | 63 µm                   | 45 µm                     | < 20 µm                                                                   | < 10 µm              | < 5 µm               | < 2 µm <sup>c</sup>          |                                                                 |                                                |                                                                  |                                                |
| 1   | Barytes<br>grade a<br>grade b                                                  | BaSO <sub>4</sub> , 90 min.                                                        | see clause 14  | No extender to be darker or more strongly coloured than an agreed sample. | —<br>—                                                          | —<br>—                  | 2,0<br>0,5                | 65<br>99                                                                  | 40<br>95             | 20<br>80             | (5)<br>(20)                  | 0,5                                                             | 0,5 max.                                       | 0,5                                                              | 6 to 10                                        |
| 2   | Blanc fixe                                                                     | BaSO <sub>4</sub> , 95 min.                                                        | see clause 14  |                                                                           | 0,02                                                            | 0,1                     | 0,2                       | 90                                                                        | 80                   | 60                   | (25)                         | 0,5                                                             | —                                              | 0,5 <sup>d</sup>                                                 | 5,5 to 9,5                                     |
| 3   | Whiting<br>grade a<br>grade b<br>grade c<br>grade d                            | CaCO <sub>3</sub> , 96 min.<br>99 max.                                             | see clause 15  |                                                                           | 0,5<br>0,01<br>—<br>—                                           | 6<br>0,5<br>0,05<br>—   | 15<br>2<br>0,5<br>0,01    | —<br>85<br>90<br>97                                                       | —<br>65<br>80<br>95  | —<br>45<br>55<br>70  | —<br>(20)<br>(25)<br>(35)    | 0,3                                                             | 42 to 44                                       | 0,15                                                             | 8,0 to 9,5                                     |
| 4   | Calcium carbonate<br>(crystalline)<br>grade a<br>grade b<br>grade c<br>grade d | CaCO <sub>3</sub> , 98 min.                                                        | see clause 16  |                                                                           | 0,01<br>0,01<br>—<br>—                                          | 1,0<br>0,5<br>0,01<br>— | 5,0<br>1,5<br>0,1<br>0,01 | 70<br>80<br>95<br>—                                                       | 40<br>45<br>65<br>98 | 25<br>30<br>35<br>70 | (10)<br>(10)<br>(15)<br>(25) | 0,3                                                             | 42 to 44,5                                     | 0,15                                                             | 8 to 10                                        |
| 5   | Calcium carbonate<br>(precipitated)<br>grade a<br>grade b                      | CaCO <sub>3</sub> , 97 min.<br>100 max.                                            | see clause 15  |                                                                           | 0,1<br>0,1                                                      | 0,25<br>0,25            | 0,5<br>0,5                | 90<br>—                                                                   | 70<br>90             | 40<br>70             | —<br>(20)                    | 1,0                                                             | 43,5 to 44,5                                   | 0,3                                                              | 8 to 10,5                                      |
| 6   | Dolomite<br>grade a<br>grade b<br>grade c<br>grade d                           | CaMg(CO <sub>3</sub> ) <sub>2</sub> ,<br>97 min. <sup>e</sup>                      | see clause 16  |                                                                           | 0,01<br>0,01<br>—<br>—                                          | 1,0<br>0,5<br>0,01<br>— | 5,0<br>1,5<br>0,1<br>0,01 | 70<br>80<br>95<br>—                                                       | 40<br>45<br>65<br>98 | 25<br>30<br>35<br>70 | (10)<br>(10)<br>(15)<br>(25) | 0,3                                                             | 46 to 48                                       | 0,2                                                              | 8 to 10,5                                      |
| 7   | Chine clay<br>grade a<br>grade b<br>grade c                                    |                                                                                    |                |                                                                           | —<br>—<br>—                                                     | —<br>—<br>—             | 0,5<br>0,1<br>0,05        | 90<br>95<br>99,5                                                          | 70<br>80<br>99       | —<br>—<br>—          | (15)<br>(35)<br>(70)         | 2                                                               | 10 to 14                                       | 0,5                                                              | 4,5 to 9,5                                     |
| 8   | Talc, fibrous form<br>grade a<br>grade b                                       |                                                                                    |                |                                                                           | —<br>—                                                          | —<br>—                  | 1,5<br>0,5                | 75<br>90                                                                  | 55<br>75             | 40<br>50             | (20)<br>(25)                 | 0,5                                                             | 4 to 7                                         | 0,5                                                              | 8,5 to 10                                      |
| 9   | Talc, lamellar form<br>grade a<br>grade b<br>grade c                           |                                                                                    |                |                                                                           | 0,01<br>—<br>—                                                  | 0,5<br>0,01<br>—        | 3,0<br>0,10<br>0,01       | 80<br>95<br>—                                                             | 50<br>70<br>95       | 30<br>40<br>70       | (8)<br>(15)<br>(25)          | 0,5                                                             | 4 to 8                                         | 0,5                                                              | 8,5 to 10                                      |
| 10  | Talc, containing<br>carbonate<br>grade a<br>grade b<br>grade c                 | Magnesium silicate<br>with a max. of 50 %<br>MgCO <sub>3</sub> + CaCO <sub>3</sub> | see clause 16  |                                                                           | 0,01<br>—<br>—                                                  | 0,5<br>0,01<br>—        | 3,0<br>0,10<br>0,01       | 80<br>95<br>—                                                             | 50<br>70<br>95       | 30<br>40<br>70       | (8)<br>(15)<br>(25)          | 0,5                                                             | 28 max.                                        | 0,5                                                              | 8 to 10,5                                      |
| 11  | Mica<br>grade a<br>grade b                                                     |                                                                                    |                |                                                                           | —<br>—                                                          | 1,0<br>—                | 3,0<br>0,5                | 98<br>98                                                                  | 80<br>70             | 30<br>30             | (5)<br>(10)                  | 0,5                                                             | 5,5 max.                                       | 0,5                                                              | 7 to 9,5                                       |

No extender to be darker or more strongly coloured than an agreed sample.

Table 1 — Composition and properties of extenders

| Extender |                                                                       | Composition<br>% (m/m)                      | Test<br>method                  | Colour<br>(see clause 7)                                                       | Residue on sieve <sup>a</sup><br>(see clause 8)<br>% (m/m) max. |                     |                       | Particle size distribution <sup>b</sup><br>(see clause 9)<br>% (m/m) min. |                      |                    |                     | Matter volatile<br>at 105 °C<br>(see clause 10)<br>% (m/m) max. | Loss on ignition<br>(see clause 11)<br>% (m/m) | Matter soluble in<br>water<br>(see clause 12)<br>% (m/m)<br>max. | pH of aqueous<br>suspension<br>(see clause 13) |            |            |       |            |      |           |       |             |     |
|----------|-----------------------------------------------------------------------|---------------------------------------------|---------------------------------|--------------------------------------------------------------------------------|-----------------------------------------------------------------|---------------------|-----------------------|---------------------------------------------------------------------------|----------------------|--------------------|---------------------|-----------------------------------------------------------------|------------------------------------------------|------------------------------------------------------------------|------------------------------------------------|------------|------------|-------|------------|------|-----------|-------|-------------|-----|
|          |                                                                       |                                             |                                 |                                                                                | 125 μm                                                          | 63 μm               | 45 μm                 | < 20 μm                                                                   | < 10 μm              | < 5 μm             | < 2 μm <sup>c</sup> |                                                                 |                                                |                                                                  |                                                |            |            |       |            |      |           |       |             |     |
| 12       | Silica (quartzite) type 1<br>grade a<br>grade b<br>grade c<br>grade d | SiO <sub>2</sub> , 80 to 98                 | Any recognized classical method | —<br>No extender to be darker or more strongly coloured than an agreed sample. | 40<br>2<br>—<br>—                                               | —<br>25<br>0,5<br>— | —<br>60<br>5,0<br>0,1 | —<br>—<br>70<br>—                                                         | —<br>—<br>—<br>—     | —<br>—<br>10<br>95 | —<br>—<br>—<br>—    | } 0,5                                                           | } 5 max.                                       | } 0,5                                                            | } 7 to 10                                      |            |            |       |            |      |           |       |             |     |
| 13       | Silica (quartzite) type 2<br>grade a<br>grade b<br>grade c<br>grade d | SiO <sub>2</sub> , 98 min.                  |                                 |                                                                                | 40<br>2<br>—<br>—                                               | —<br>25<br>0,5<br>— | —<br>60<br>5,0<br>0,1 | —<br>—<br>70<br>—                                                         | —<br>—<br>—<br>—     | —<br>—<br>10<br>95 | —<br>—<br>—<br>—    |                                                                 |                                                |                                                                  |                                                | } 0,5      | } 0,2 max. | } 0,5 | } 7 to 8,5 |      |           |       |             |     |
| 14       | Kieselguhr, type 1<br>grade a<br>grade b<br>grade c<br>grade d        | SiO <sub>2</sub> , 70 to 80                 |                                 |                                                                                | —<br>—<br>—<br>—                                                | —<br>—<br>—<br>—    | 15<br>5<br>1<br>1     | 70<br>75<br>80<br>90                                                      | 10<br>20<br>30<br>50 | —<br>5<br>10<br>30 | —<br>—<br>—<br>—    |                                                                 |                                                |                                                                  |                                                |            |            |       |            | } 12 | } 15 max. | } 1,0 | } 6,5 to 10 |     |
| 15       | Kieselguhr, type 2<br>grade a<br>grade b<br>grade c<br>grade d        | SiO <sub>2</sub> , 80 min.                  |                                 |                                                                                | —<br>—<br>—<br>—                                                | —<br>—<br>—<br>—    | 15<br>5<br>1<br>1     | 70<br>75<br>80<br>90                                                      | 10<br>20<br>30<br>50 | —<br>5<br>10<br>30 | —<br>—<br>—<br>—    |                                                                 |                                                |                                                                  |                                                |            |            |       |            |      |           |       |             | } 2 |
| 16       | Calcium silicate,<br>synthetic                                        | To be agreed between the interested parties |                                 |                                                                                | —                                                               | 1,0                 | 3,0                   | 90                                                                        | 70                   | 40                 | —                   | 12                                                              | 8 max.                                         | To be agreed<br>between the<br>interested parties                | 8 to 12,5                                      |            |            |       |            |      |           |       |             |     |
| 17       | Sodium aluminium<br>silicate, synthetic                               |                                             |                                 |                                                                                |                                                                 | —                   | 2,0                   | 4,0                                                                       | 85                   | 50                 | 20                  | —                                                               | 12                                             |                                                                  | 8 max.                                         | 8 to 12,5  |            |       |            |      |           |       |             |     |
| 18       | Silica, synthetic                                                     | SiO <sub>2</sub> , 97 min.                  |                                 |                                                                                | see<br>clause 17                                                | —                   | 2,0                   | 2,0                                                                       | 80                   | 50                 | 20                  | —                                                               | 12                                             |                                                                  | 8 max.                                         | 3,5 to 8,0 |            |       |            |      |           |       |             |     |

<sup>a</sup> The determination of residue on sieve using the method in this International Standard requires considerable experience. More reproducible results may be obtained if a mechanical flushing method is used (See ISO 787-XVIII) but these results will be lower than those obtained using the manual method. The results obtained, therefore, by the different methods should not be used for comparison.

<sup>b</sup> The method for the determination of particle size distribution is based on Stokes' law. Strictly speaking, Stokes' law applies to spherical particles. Extender particles are not strictly spherical, therefore the given figures are not an absolute measure of particle size, but serve as a means of comparing different samples of the same extender. They should not be used to compare one extender with another because different extenders have different particle shapes. Furthermore, the figures do not necessarily relate to those given under "Residue on sieve", since these refer to actual dimensions of the particles.

<sup>c</sup> The 2 μm limits are given for guidance only.

<sup>d</sup> Excluding water-soluble alkaline earth compounds. (See 12.3, Method 1A.)

<sup>e</sup> The proportion by mass of CaCO<sub>3</sub> to MgCO<sub>3</sub> is in practice between 1,18 and 1,23 CaCO<sub>3</sub> : 1,0 MgCO<sub>3</sub>.

<sup>a</sup> The determination of residue on sieve using the method in this International Standard requires considerable experience. More reproducible results may be obtained if a mechanical flushing method is used (See ISO 787-XVIII) but these results will be lower than those obtained using the manual method. The results obtained, therefore, by the different methods should not be used for comparison.

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<sup>c</sup> The 2 µm limits are given for guidance only.

<sup>d</sup> Excluding water-soluble alkaline earth compounds. (See 12.3, Method 1A.)

<sup>e</sup> The proportion by mass of CaCO<sub>3</sub> to MgCO<sub>3</sub> is in practice between 1,18 and 1,23 CaCO<sub>3</sub> : 1,0 MgCO<sub>3</sub>.