BRITISH STANDARD

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Specification for

Contrast aid paints used in magnetic particle flaw detection

UDC 620.179.14:667.637.4

Co-operating organizations

The Mechanical Engineering Industry Standards Committee, under whose supervision this British Standard was prepared, consists of representatives from the following Government departments and professional and industrial organizations:

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British Steel Corporation
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Welding Institute
Individual firms

This British Standard, having been approved by the Mechanical Engineering Industry Standards Committee, was published under the authority of the Executive Board on 21 December, 1973

The following BSI references relate to to the work on this standard:
Committee reference MEE/169
Draft for comment 72/37771 DC

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Amendments issued since publication

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2434	January 1978	
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Contents

Foreword

During the preparation of standard methods for non-destructive testing, it became apparent that ancillary standards are required for the test equipment and testing materials. This British Standard has accordingly been prepared under the authority of the Mechanical Engineering Industry Standards Committee to facilitate the provision of contrast aid paints with requisite characteristics for use in magnetic particle flaw detection.

The detection and interpretation of surface imperfections by the magnetic particle method can, when using non-fluorescent inks, be considerably influenced by the surface condition and colour of the component under examination. This particularly applies when the surface is naturally dark in colour or, where due to ageing, weathering, heat etc., there is poor contrast between the magnetic particles and the surface background. Under such conditions, there is a risk that certain minute imperfections which could be vitally important when assessing the service life and safety of a component, might not be observed.

However, by using a suitable white background (contrast aid) paint the possibility of observational errors arising can be considerably reduced. A number of contrast aid paints are currently available but examination of these has shown a wide range of characteristics, which include materials with high and low flashpoints, matt and semi-gloss finishes, fixed and peelable coatings, and coatings which are easily removed by solvent and others which are practically unremovable.

This standard does not set out to specify precisely the constituents and composition of paints but is intended to ensure that they have the necessary characteristics for satisfactory use in magnetic particle flaw detection. Attention is drawn to the fact that the requirements of Statutory Regulations e.g. Factories Act, apply when paints are used in certain locations.

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.

1 Scope

1.1 This British Standard defines three classes of contrast aid paints related to their surface drying times (see **5.4**) and specifies requisite characteristics for their use in magnetic particle flaw detection.

1.2 The standard does not specify precise details covering the constituents of the types of paint suitable for contrast aid purposes.

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

2 Terminology

For the purposes of this British Standard, the terms and definitions given in BS 2015 and BS 3683-2 apply.

3 Personnel safety

3.1 Contrast aid paints shall not contain any ingredients that may cause injury or discomfort to operators when used in accordance with the manufacturer's instructions.

3.2 The manufacturer shall provide clear instructions for safe use and a warning, on the container, of any safety or health hazards (see also **7.2**).

NOTE 1 Attention is drawn to the requirements of the Pharmacy and Poisons Act, 1933 and the Petroleum (Consolidation) Act, 1928.

NOTE 2 Guidance on the labelling of hazardous chemicals is given in "Marking Containers of Hazardous Chemicals" published by the Chemical Industries Association Ltd., Alembic House, 93 Albert Embankment, London SE1.

NOTE 3 Paints containing free aluminium, magnesium or titanium can enter into a thermite reaction with certain oxides (particularly rust) when heated by friction or impact. This exothermic reaction can ignite a flammable atmosphere. Therefore, it is essential that such paints are not used on equipment that is located, or which could be taken into, places where a flammable atmosphere might be present.

NOTE 4 Attention is drawn to the possible hazards which can arise when aerosols containing flammable propellants are used.

4 Materials compatibility

4.1 Paints shall not corrode or otherwise adversely affect the integrity of steel components. Paints containing zinc or zinc compounds are not compatible with certain types of steel and are therefore excluded.

4.2 Paints, when applied to components that are subsequently to be used within hydraulic or lubricating systems, shall, when dry, be insoluble in the fluids employed in such systems.

4.3 Paints, when dry, shall be compatible with the magnetic ink or powder used (see BS 4069).

4.4 Paints shall be capable of being wetted by the detecting medium and the paint film shall be insoluble in that medium.

5 Paint characteristics

5.1 Colour. The paint colour shall be white since this results in maximum definition and gives excellent contrast with black magnetic particle inks and powders.

5.2 Pigment. The pigment shall be titanium dioxide.

5.3 Contrast ratio. The contrast ratio of the paint, when tested by the method given in BS 3900-D4, shall be not less than 85 %. For testing purposes, paints shall be applied in accordance with the manufacturer's instructions for normal use to give a dry film thickness of 25 ± 2 μm, and the transparent substrate employed shall be of a type which is unaffected by the paint under test.

NOTE 1 Measurement of film thickness can be achieved by using a suitable paint inspection gauge. The gauge should have a resolution of better than 2 μm and a measurement accuracy of ± 10 %.

NOTE 2 A paint which satisfies the contrast ratio test with a dry film thickness of 25 μm will give a satisfactory background coating on a component with a dry film thickness of approximately 10 μm.

5.4 Surface drying time. The paint, applied in accordance with the manufacturer' instructions and tested by the method given in BS 3900-C2, shall be classified according to the drying time requirements given in Table 1.

Table 1 — Classification according to drying time

Classification	Drying time
	minutes
A — Fast drying	Not more than 2
B — Medium drying	More than 2 but not exceeding 10
C — Slow drying	More than 10 but not exceeding 60

5.5 Application and removal

5.5.1 Paints shall be suitable for brush, dip or spray application to components.

5.5.2 Paints, when applied by any of the methods described in **5.5.1**, shall, when dry, form a tightly adherent film on the component under examination.

5.5.3 Where it is necessary after examination to remove the film, the paint shall be readily soluble in the solvent recommended by the manufacturer and be capable of being removed by gentle rubbing with a cloth soaked in that solvent.

5.6 Coating thickness. Regardless of the method of application, the paint shall produce a thin even film on the component, sufficient to eliminate reflections from the surface and to produce a white background on the surface under examination. A film having a thickness of approximately 10 μm meets this requirement. (See note 1 to **5.3** regarding measurement of film thickness.)

NOTE Coatings thicker than approximately 10 μm are deprecated as they seriously affect the sensitivity of the ensuing magnetic particle flaw detection test, resulting in misinterpretation and the possibility of minute imperfections being missed when the magnetic ink is applied.

5.7 Finish. Paints shall dry with a smooth matt finish. Paints that dry with a gloss or semi-gloss finish are excluded.

5.8 Shelf life. Paints, when stored at normal room temperature in their original sealed containers, shall retain the characteristics described in this standard for a period of not less than 12 months.

6 Containers

Paints shall be supplied in re-sealable containers or, alternatively, in aerosol cans.

7 Marking

7.1 The containers of paints supplied to this standard shall be marked "Contrast aid paint for magnetic particle flaw detection processes" and with the number of this standard, i.e. BS 5044.

NOTE Attention is drawn to the certification facilities offered by BSI; see the inside back cover of this standard.

7.2 In addition, the following information shall be given:

1) the surface drying time classification, A, B or C (see **5.4**);

2) instructions relating to preparation and use of the paint;

3) the classification by flashpoint (see Appendix A);

4) a warning of any health or safety hazards (see Clause **3**);

5) the date of manufacture;

6) the name and address of supplier;

7) the net contents.

Appendix A Classification of paint by flashpoint

When tested in accordance with BS 3900-A8, paints shall be classified according to their flashpoint as follows:

Classification of paint	Flashpoint
	°C
Highly flammable	below 32
Flammable	32 to 61
Low fire risk	above 61

Publications referred to

This standard makes reference to the following British Standards:
BS 2015, *Glossary of paint terms.*
BS 3900, *Methods of test for paints.*
BS 3900-D4, *Comparison of contrast ratio (hiding power) of paints of the same type and colour.*
BS 3683, *Glossary of terms used in non-destructive testing.*
BS 3683-2, *Magnetic particle flaw detection.*
BS 3900, *Methods of test for paints.*
BS 3900-A8, *Danger classification by flashpoint (closed cup method).*
BS 3900-C2, *Surface-drying time (Ballotini method).*
BS 4069, *Magnetic flaw detection inks and powders.*

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