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General methods of test for pigments and extenders —

Part 25:

Comparison of the colour, in full-shade
systems, of white, black and coloured
pigments — Colorimetric method

Méthodes générales d'essai des pigments et matières de charge —

*Partie 25: Comparaison, dans les systèmes monopigmentaires, de la
couleur des pigments blancs, noirs et colorés — Méthode colorimétrique*



Reference number
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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 787-25 was prepared by Technical Committee ISO/TC 35, *Paints and varnishes*, Sub-Committee SC 2, *Pigments and extenders*.

ISO 787 consists of the following parts, under the general title *General methods of test for pigments and extenders*:

- *Part 1: Comparison of colour of pigments*
- *Part 2: Determination of matter volatile at 105 °C*
- *Part 3: Determination of matter soluble in water — Hot extraction method*
- *Part 4: Determination of acidity or alkalinity of the aqueous extract*
- *Part 5: Determination of oil absorption value*
- *Part 7: Determination of residue on sieve — Water method — Manual procedure*
- *Part 8: Determination of matter soluble in water — Cold extraction method*
- *Part 9: Determination of pH value of an aqueous suspension*

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- Part 10: Determination of density — Pycnometer method
- Part 11: Determination of tamped volume and apparent density after tamping
- Part 13: Determination of water-soluble sulphates, chlorides and nitrates
- Part 14: Determination of resistivity of aqueous extract
- Part 15: Comparison of resistance to light of coloured pigments of similar types
- Part 16: Determination of relative tinting strength (or equivalent colouring value) and colour on reduction of coloured pigments — Visual comparison method
- Part 17: Comparison of lightening power of white pigments
- Part 18: Determination of residue on sieve — Mechanical flushing procedure
- Part 19: Determination of water-soluble nitrates (Salicylic acid method)
- Part 21: Comparison of heat stability of pigments using a stoving medium
- Part 22: Comparison of resistance to bleeding of pigments
- Part 23: Determination of density (using a centrifuge to remove entrained air)
- Part 24: Determination of relative tinting strength of coloured pigments and relative scattering power of white pigments — Photometric methods
- Part 25: Comparison of the colour, in full-shade systems, of white, black and coloured pigments — Colorimetric method
- Part 26: Determination of relative tinting strength and remaining colour difference on reduction — Colorimetric method

Parts 13, 14 and 17 are bound together as one document. Parts 6, 12 and 20 have been withdrawn.

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General methods of test for pigments and extenders

Part 25:

Comparison of the colour, in full-shade systems, of white, black and coloured pigments — Colorimetric method

1 Scope

This part of ISO 787 specifies a general test method for comparing the colour, in full-shade systems, of white, black or coloured pigments with that of an agreed reference pigment, using a colorimetric procedure.

NOTE 1 When the general method specified in this part of ISO 787 is applicable to a given pigment, only a cross-reference to ISO 787-25 needs to be included in the International Standard giving the specification for that pigment, indicating any detailed modification that may be needed in view of the special properties of the material in question. Only when the general method in this part of ISO 787 is not applicable to a particular material is a different photometric method for comparison of colour to be specified.

ISO 787-1:1982, *General methods of test for pigments and extenders — Part 1: Comparison of colour of pigments*, describes a general test method for visual comparison of the colour of pigments.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 787. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 787 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 787-9:1981, *General methods of test for pigments and extenders — Part 9: Determination of pH value of an aqueous suspension*.

ISO 842:1984, *Raw materials for paints and varnishes — Sampling*.

ISO 3219:1993, *Plastics — Polymers/resins in the liquid state or as emulsions or dispersions — Determination of viscosity using a rotational viscometer with defined shear rate*.

ISO 3682:1983, *Binders for paints and varnishes — Determination of acid value — Titrimetric method*.

ISO 4629:1978, *Paint media — Determination of hydroxyl value — Titrimetric method*.

ISO 7724-1:1984, *Paints and varnishes — Colorimetry — Part 1: Principles*.

ISO 7724-2:1984, *Paints and varnishes — Colorimetry — Part 2: Colour measurement*.

ISO 7724-3:1984, *Paints and varnishes — Colorimetry — Part 3: Calculation of colour differences*.

ISO 8780-6:1990, *Pigments and extenders — Methods of dispersion for assessment of dispersion characteristics — Part 6: Dispersion using a triple-roll mill*.

ASTM D 16-1991, *Standard terminology relating to paint, varnish, lacquer and related products*.

ASTM D 387-1986, *Standard test method for color and strength of color pigments with a mechanical muller.*

ASTM D 3022-1984, *Standard test method for color and strength of color pigments by use of a miniature sandmill.*

3 Definitions

For the purposes of this part of ISO 787, the following definitions apply.

3.1 full-shade system: A pigmented system that contains one pigment only.

3.2 full-shade colour: The colour of a full-shade system that is applied in a hiding layer (optically infinite). (See also note 3.)

NOTE 2 Hiding cannot be achieved with some coloured pigments of very high transparency.

3.3 mass tone: The colour of a full-shade system that is not applied in a hiding layer, for example on a white test substrate. (See also notes 3 and 4.)

NOTES

3 The definitions given in 3.2 and 3.3 are in conflict with those in ASTM D 16 and with the usage of "mass color" in ASTM D 387 and ASTM D 3022.

4 With pigmented systems, it is possible to produce a number of different mass tones, depending on the thickness of the applied layer and the properties of the test substrate. Therefore, a mass tone is only clearly defined if the preparation, the composition, the application technique and the film thickness of the pigmented system as well as the substrate are defined.

4 Principle

The test pigment and an agreed reference pigment are dispersed in a particular test medium, consisting of a mixture of an alkyd resin and fumed silica, using an automatic muller. From the dispersions of the two pigments, specimens on suitable substrates are prepared. The tristimulus values of the specimens are measured as described in ISO 7724-2 and from these the appropriate colour characteristics (relative hue and amount of chromaticity difference for black and white pigments; lightness, hue, chroma and total colour difference for coloured pigments) are calculated as described in ISO 7724-3.

5 Materials

5.1 Alkyd resin (binder)

The alkyd resin shall consist of 63 % (m/m) linseed oil, 23 % (m/m) phthalic anhydride and 14 % (m/m)

trimethylol propane, and shall comply with the following requirements:

		Test method
Acid value	max. 15 mg KOH/g	ISO 3682
Viscosity (of the product as delivered)	7 Pa·s to 10 Pa·s	ISO 3219
Hydroxyl value	30 mg to 50 mg KOH/g	ISO 4629

5.2 Fumed silica

The fumed silica shall comply with the following requirements:

		Test method
Specific surface area (BET)	175 m ² /g to 225 m ² /g	to be agreed between the interested parties
pH value of a 4 % dispersion in water	3,6 to 4,5	ISO 787-9

NOTE 5 Fumed silica is necessary to avoid flocculation and to control the flow properties of the pigmented system.

5.3 Preparation of the test medium

The preferred test medium (see tables 1 and 2 for quantities) is prepared as follows:

Mix well 9,7 parts by mass of alkyd resin (5.1) and 3 parts by mass of fumed silica (5.2). Take care that no silica is lost by evolution of dust. Disperse the mixture twice on a triple roll mill (see ISO 8780-6).

Another test medium may be agreed between the interested parties. This shall be indicated in the test report.

Table 1 — Recommended quantities of white pigment and test medium

Pigment (Density)	Mass of pigment	Volume of test medium (5.3)
g/ml	g	ml
Titanium dioxide ($\rho = 4,0$)	4,0	3,0
Zinc sulfide ($\rho = 4,0$)	4,0	2,8
Zinc oxide (zinc white) ($\rho = 5,8$)	5,0	2,6