

INTERNATIONAL STANDARD



1247

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

Aluminium pigments for paints

Pigments d'aluminium pour peintures

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FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO Member Bodies). The work of developing International Standards is carried out through ISO Technical Committees. Every Member Body interested in a subject for which a Technical Committee has been set up 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.

Draft International Standards adopted by the Technical Committees are circulated to the Member Bodies for approval before their acceptance as International Standards by the ISO Council.

Prior to 1972, the results of the work of the Technical Committees were published as ISO Recommendations; these documents are now in the process of being transformed into International Standards. As part of this process, International Standard ISO 1247 replaces ISO Recommendation R 1247-1971 drawn up by Technical Committee ISO/TC 35, *Paints and varnishes*.

The Member Bodies of the following countries approved the Recommendation :

Austria	Iran	South Africa, Rep. of
Brazil	Israel	Spain
Chile	Italy	Sweden
Denmark	Netherlands	Switzerland
Egypt, Arab Rep. of	New Zealand	Turkey
Germany	Peru	United Kingdom
Greece	Poland	U.S.S.R.
India	Portugal	

The Member Body of the following country expressed disapproval of the Recommendation on technical grounds :

France*

* Subsequently, this Member Body approved the Recommendation.

Aluminium pigments for paints

1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies the requirements and corresponding test methods for aluminium pigments suitable for use in paints including

- a) general purpose, decorative and protective paints, and
- b) speciality finishing paints.

2 REFERENCES

ISO/R 760, *Determination of water by the Karl Fischer method.*

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

ISO 793, *Aluminium and aluminium alloys — Determination of iron — Orthophenanthroline photometric method.*

ISO/R 795, *Chemical analysis of aluminium and its alloys — Photometric determination of copper (Oxaldehydehydrazide method applicable to copper content between 0,002 and 0,8 %).*

ISO/R 798, *Chemical analysis of aluminium and its alloys — Gravimetric determination of zinc in aluminium alloys (Zinc content between 0,50 and 6,5 %).*

ISO 808, *Aluminium and aluminium alloys — Determination of silicon — Spectrophotometric method with the reduced silicomolybdic complex.*

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

ISO 886, *Aluminium and aluminium alloys — Determination of manganese — Photometric method (Manganese content between 0,005 and 1,5 %).*

ISO 1250, *Mineral solvents for paints — White spirits and related hydrocarbon solvents.*

3 DESCRIPTION

Aluminium pigments are composed of finely divided aluminium metal. The particles of aluminium metal are lamellar in shape when examined microscopically. The material may be in the form of a powder or a paste and have leafing or non-leafing characteristics.

NOTE — Mica and other adulterants shall be absent. If, on solution of the sample in hydrochloric acid as described in 15.3.3, a non-fatty residue is obtained, the residue shall be examined.

4 CLASSIFICATION

4.1 Types

This International Standard covers four types of aluminium pigments, as follows :

- type 1 : aluminium powder, leafing
- type 2 : aluminium paste, leafing
- type 3 : aluminium powder, non-leafing
- type 4 : aluminium paste, non-leafing

4.2 Classes

Pigments of types 1 and 2 are further classified by their water-covering capacity as shown in table 1.

TABLE 1 — Classes of types 1 and 2

Type	Class	Water-covering capacity
		m ² /g
1	a	up to 0,8
	b	over 0,8 up to 1,5
	c	over 1,5 up to 2,2
	d	over 2,2
2	p	up to 1,7
	q	over 1,7 up to 2,4
	r	over 2,4

NOTE — Attention is drawn to the reproducibility limits given in 11.8.

5 REQUIRED CHARACTERISTICS AND THEIR TOLERANCES

The material shall have the characteristics given in the appropriate column of table 2.

The liquid contained in paste pigment shall be category A mineral solvent complying with ISO 1250, or other appropriate liquid as may be agreed between the interested parties.

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TABLE 2 — Required characteristics and their tolerances

Characteristic	Requirement according to type				Test method
	Type 1 Leafing powder	Type 2 Leafing paste	Type 3 Non-leafing powder	Type 4 Non-leafing paste	
Matter volatile at 105 °C, % (m/m)	max. 1,0	max. 35,0 ¹⁾	max. 1,0	max. 35,0 ¹⁾	ISO 787 Part II
Matter soluble in organic solvents, % (m/m)	max. 6,0	max. 4,0	max. 1,5	max. 6,0	Sub-clause 8.1 (types 1 and 2) and sub-clause 8.2 (types 3 and 4)
Appearance of paint pre- pared in an agreed vehicle	To match closely the appearance of paint prepared similarly from an agreed sample				Clause 9
Residue on sieve ²⁾	Nil on 250 µm	Nil on 180 µm	Nil on 250 µm	Nil on 180 µm	Clause 10
Water-covering capacity, m ² /g	Within the limits for the agreed class (see 4.2)		—	—	Clause 11
Leafing power, %	min. 65	min. 65	Nil	Nil	Clause 12 (types 1 and 2) and clause 13 (types 3 and 4)
Water content, % (m/m)	max. 0,2	max. 0,15	max. 0,2	max. 0,15	Clause 14
Metallic impurities, % (m/m) on dry pigment	max. 1,0 for Cu + Fe + Pb + Si + Zn max. 0,03 for Pb Separate limits for metals other than lead may be agreed between the interested parties		Limits to be agreed between the interested parties		For lead : clause 15 ³⁾ For iron : ISO 793 ³⁾ For copper : ISO/R 795 ³⁾ For silicon : ISO 808 ³⁾ For manganese : ISO 886 ³⁾ For zinc : ISO/R 798 ³⁾

1) Alternative limits for volatile content of pastes may be agreed between the interested parties.

2) Additional limits for residue on sieves of smaller aperture may be agreed between the interested parties.

3) These methods are recommended for reference purposes, but other methods may be used by agreement between the interested parties.

6 PACKING

The material shall be packed in air-tight containers.

7 SAMPLING

7.1 For the purpose of testing a pigment in accordance with this International Standard, a sample representative of the bulk material shall be taken by the appropriate procedure specified in ISO 842. The sample shall have a mass of not less than 250 g and shall be packed in the manner specified in ISO 842.

For both pastes and powders, a sampling tube shall be used which enables the whole depth (and, preferably, the longest diagonal) of the container to be sampled. For powders, which may be compacted, a sharply pointed sampling tube shall be used, and the container shall be rolled vigorously before sampling.

Suitable designs of sampling tubes are illustrated in figure 1.

7.2 Except where otherwise agreed between the interested parties, the agreed sample referred to in table 2 and clause 9 shall comply in all respects with the requirements of this International Standard. The sample shall have a mass of not less than 250 g and shall be packed in the manner specified in ISO 842.

METHODS OF TEST

8 DETERMINATION OF MATTER SOLUBLE IN ORGANIC SOLVENTS

8.1 **Method 1** (for use with leafing pigments, types 1 and 2)

8.1.1 Principle

The sample is treated with hydrochloric acid to dissolve the metal and the residual oily and fatty matter is extracted with acetone, dried and weighed.

8.1.2 Reagents

All reagents shall be of recognized analytical quality. Distilled water or water of equivalent purity shall be used in the test.

8.1.2.1 Hydrochloric acid, approximately 6 N solution.

8.1.2.2 Acetone

8.1.3 Procedure

8.1.3.1 TEST PORTION

Weigh, to the nearest 1 mg, about 2 g of the material into a 400 ml beaker.

8.1.3.2 DETERMINATION

Add 100 ml of hot water to the test portion and cover the beaker, for example with a watch-glass. Add the hydrochloric acid (8.1.2.1) in small portions, heating gently to complete the reaction after each addition until all the metal is dissolved. Not more than 60 ml of acid should be necessary.

Cool the beaker and contents to room temperature and filter the contents through an acid-washed, grease-free filter paper. Thoroughly wash the beaker, the cover and the filter paper with cold water.

Allow the paper to drain and dry completely in the filter funnel, heating gently if necessary to a temperature not exceeding 50 °C. Remove as much water as possible from the beaker by shaking it.

Place a weighed 100 ml beaker under the funnel. Wash the original beaker and the cover with warm acetone (8.1.2.2) and transfer the washings to the filter paper. Wash the paper at least five times with warm acetone, filling it about half full each time. Finally rinse the tip of the funnel. Gently warm the beaker and its contents on a water bath without using a free flame, until the acetone has been evaporated as completely as possible. Continue the evaporation by heating the beaker at a temperature of 105 ± 2 °C for 1 h, then cool and weigh.

8.1.4 Expression of results

Calculate the matter soluble in organic solvents, as a percentage by mass, by the following formula :

$$\frac{100 m_1}{m_0}$$

where

m_0 is the mass, in grams, of the test portion;

m_1 is the mass, in grams, of the residue.

8.2 Method 2 (for use with non-leaving pigments, types 3 and 4)

8.2.1 Principle

The sample is dispersed in solvent and the solvent-extractable matter is filtered off, dried and weighed.

8.2.2 Reagents

8.2.2.1 Solvent mixture, obtained by mixing 3 parts by volume of toluene with 1 part of diethyl ether, ρ 0,720 g/ml.

8.2.2.2 Light petroleum spirit, boiling range 40 to 60 °C.

8.2.3 Apparatus

Sintered glass filter crucible, of porosity grade P 16 (pore size index 16 μ m).

8.2.4 Procedure

8.2.4.1 TEST PORTION

Weigh, to the nearest 1 mg, about 2 g of the material into a 250 ml beaker and disperse it in 20 ml of the solvent mixture (8.2.2.1), with frequent intermittent swirling of the contents of the beaker.

8.2.4.2 DETERMINATION

When complete dispersion has been obtained, add a further 10 ml of the solvent mixture, thoroughly agitate by swirling the beaker and then allow to stand for 1 h for the metallic flakes to settle.

Decant the supernatant liquid into the sintered glass filter crucible (8.2.3) and filter by suction into a clean flask.

When all the liquid has been filtered, add a further 30 ml of the solvent mixture to the residue in the beaker and repeat the swirling so as to redisperse the aluminium pigment. Filter the dispersion through the sintered glass filter crucible, washing the beaker with the light petroleum spirit (8.2.2.2).

Transfer the filtrate from the flask to a 250 ml beaker and evaporate to minimum bulk (about 50 ml). Transfer the concentrated filtrate to a weighed 100 ml beaker and wash the 250 ml beaker with the light petroleum, transferring the washings into the 100 ml beaker. Evaporate the contents of the 100 ml beaker just to dryness, heat in an oven at a temperature of 105 ± 2 °C for 1 h, then cool and weigh.

8.2.5 Expression of results

Calculate the matter soluble in organic solvents, as a percentage by mass, by the following formula :

$$\frac{100 m_1}{m_0}$$

where

m_0 is the mass, in grams, of the test portion;

m_1 is the mass, in grams, of the residue.