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Plastics/rubber — Polymer dispersions and rubber latices (natural and synthetic) — Definitions and review of test methods

Plastiques/caoutchouc — Dispersions de polymères et latex de caoutchouc (naturel et synthétique) — Définitions et revue des méthodes d'essai

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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 61, *Plastics*, Subcommittee SC 9, *Thermoplastic materials* in collaboration with ISO/TC 45, *Rubber and rubber products*.

This third edition cancels and replaces the second edition (ISO 12000:2000), which has been technically revised to update the references to the test methods and change dated references to undated references.

Plastics/rubber — Polymer dispersions and rubber latices (natural and synthetic) — Definitions and review of test methods

1 Scope

This International Standard gives definitions relative to polymer dispersions and latices and identifies the test methods applicable for determining the properties of polymer dispersions, comprising products of synthetic or natural origin including synthetic and natural rubber latices. Some of the test methods apply only to polymer dispersions or latices of specific chemical composition or to those to be used for specific applications.

NOTE When they are not the subject of an existing International Standard, the test methods to be used for investigation of an individual polymer dispersion or latex are intended to be the subject of an agreement between the interested parties.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 35, *Natural rubber latex concentrate — Determination of mechanical stability*

ISO 123, *Rubber latex — Sampling*

ISO 124, *Latex, rubber — Determination of total solids content*

ISO 125, *Natural rubber latex concentrate — Determination of alkalinity*

ISO 126, *Natural rubber latex concentrate — Determination of dry rubber content*

ISO 127, *Rubber, natural latex concentrate — Determination of KOH number*

ISO 291, *Plastics — Standard atmospheres for conditioning and testing*

ISO 472, *Plastics — Vocabulary*

ISO 506, *Rubber latex, natural, concentrate — Determination of volatile fatty acid number*

ISO 705, *Rubber latex — Determination of density between 5 °C and 40 °C*

ISO 706, *Rubber latex — Determination of coagulum content (sieve residue)*

ISO 976, *Rubber and plastics — Polymer dispersions and rubber latices — Determination of pH*

ISO 1147, *Plastics/rubber — Polymer dispersions and synthetic rubber latices — Freeze-thaw cycle stability test*

ISO 1409, *Plastics/rubber — Polymer dispersions and rubber latices (natural and synthetic) — Determination of surface tension by the ring method*

ISO 1652, *Rubber latex — Determination of apparent viscosity by the Brookfield test method*

ISO 1656, *Rubber, raw natural, and rubber latex, natural — Determination of nitrogen content*

ISO 1657, *Rubber, raw and rubber latex — Determination of iron content — 1,10-Phenanthroline photometric method*

ISO 1802, *Natural rubber latex concentrate — Determination of boric acid content*

ISO 2005, *Rubber latex, natural, concentrate — Determination of sludge content*

ISO 2006-1, *Rubber latex, synthetic — Determination of mechanical stability — Part 1: High-speed method*

ISO 2006-2, *Rubber latex, synthetic — Determination of mechanical stability — Part 2: Moderate-speed method under load*

ISO 2115, *Plastics — Polymer dispersions — Determination of white point temperature and minimum film-forming temperature*

ISO 23529, *Rubber — General procedures for preparing and conditioning test pieces for physical test methods*

ISO 2555, *Plastics — Resins in the liquid state or as emulsions or dispersions — Determination of apparent viscosity by the Brookfield Test method*

ISO 2811-1, *Paints and varnishes — Determination of density — Part 1: Pyknometer method*

ISO 2811-3, *Paints and varnishes — Determination of density — Part 3: Oscillation method*

ISO 3136, *Rubber latex — Styrene-butadiene — Determination of bound styrene content*

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

ISO 3251, *Paints, varnishes and plastics — Determination of non-volatile-matter content*

ISO 3899, *Rubber — Nitrile latex — Determination of residual acrylonitrile content*

ISO 3900, *Rubber — Nitrile latex — Determination of bound acrylonitrile content*

ISO 4576, *Plastics — Polymer dispersions — Determination of sieve residue (gross particle and coagulum content)*

ISO 4655, *Rubber — Reinforced styrene-butadiene latex — Determination of total bound styrene content*

ISO 7143, *Binders for paints and varnishes — Methods of test for characterizing water-based binders*

ISO 7780, *Rubbers and rubber latices — Determination of manganese content — Sodium periodate photometric methods*

ISO 8053, *Rubber and latex — Determination of copper content — Photometric method*

ISO 9252, *Synthetic rubber latex — Microbiological examination*

ISO 13741-1, *Plastics/rubber — Polymer dispersions and rubber latices (natural and synthetic) — Determination of residual monomers and other organic components by capillary-column gas chromatography — Part 1: Direct liquid injection method*

ISO 13741-2, *Plastics/rubber — Polymer dispersions and rubber latices (natural and synthetic) — Determination of residual monomers and other organic components by capillary-column gas chromatography — Part 2: Headspace method*

ISO 13773, *Rubber — Polychloroprene latex — Determination of alkalinity*

ISO 23529, *Rubber — General procedures for preparing and conditioning test pieces for physical test methods*

NOTE Where individual standards overlap, it is intended that they will be harmonized by the Technical Committees responsible for them, ISO/TC 45 and ISO/TC 61.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
dispersion
heterogeneous system in which a finely divided material is distributed in another material

[SOURCE: ISO 472]

3.2
polymer dispersion
liquid to semi-liquid material, usually milky-white, containing the polymeric material in a stable condition finely dispersed in a continuous liquid phase, normally water

3.3
latex
colloidal aqueous dispersion of a polymeric material

[SOURCE: ISO 472]

Note 1 to entry: Frequently, "latex" is also used as a synonym for polymer dispersions in general.

Note 2 to entry: Polymer dispersions and latices are often further explained by adding the designation of the base polymer by name or by abbreviation, for instance polyacrylate dispersion, SBR latex.

4 Sampling

Sampling shall be carried out in accordance with ISO 123 (rubber latex).

Representative samples of polymer dispersions and of latices are a prerequisite for reliable and reproducible results from the test methods. Therefore the material to be tested shall be uniform.

5 Conditioning

The conditioning and testing atmosphere shall comply with the specified test method or referring standard, as applicable. If there are no such requirements, then samples shall be conditioned and tests carried out in one of the standard atmospheres specified in either ISO 291 for polymer dispersions or ISO 23529 for latices, as appropriate.

6 Test methods

Test methods shall be selected from those given in Table 1 for rubber latices, and those in Table 2 for polymer dispersions, as appropriate.

Table 1 — Test methods developed by ISO/TC 45

Property	Units	Test method	Comments
Physical and physico-chemical properties			
Mechanical stability	s	ISO 35	Natural rubber latex only
Total solids content	% (*m*/*m*)	ISO 124	
Alkalinity	g/100 g of latex	ISO 125	Natural rubber latex only
Dry rubber content	% (*m*/*m*)	ISO 126	Natural rubber latex only
Density	Mg/m^3	ISO 705	Natural rubber latex only
Coagulum content (sieve residue)	% (*m*/*m*)	ISO 706[a]	
pH	pH-units	ISO 976[a]	
Surface tension	mN/m	ISO 1409	
Viscosity	mPa × s	ISO 1652	Apparent viscosity
Sludge content	% (*m*/*m*)	ISO 2005	Natural rubber latex only
High-speed mechanical stability	% (*m*/*m*)	ISO 2006	Synthetic rubber latex only
Microbiological examination	—	ISO 9252	
Chemical properties			
KOH number		ISO 127	Natural rubber latex only
Volatile fatty acid number		ISO 506	Natural rubber latex only
Nitrogen content	% (*m*/*m*)	ISO 1656	Natural rubber latex only
Iron content (1,10-phenanthroline photometric method)	ppm (*m*/*m*)	ISO 1657	
Boric acid content	% (*m*/*m*)	ISO 1802	Natural rubber latex only
Bound styrene content	% (*m*/*m*)	ISO 3136	Styrene-butadiene latex
Residual acrylonitrile content	% (*m*/*m*)	ISO 3899	Nitrile latex
Bound acrylonitrile content	% (*m*/*m*)	ISO 3900	Nitrile latex
Total bound styrene content	% (*m*/*m*)	ISO 4655	Reinforced styrene-butadiene latex
Manganese content (sodium periodate photometric method)	mg/kg	ISO 7780	
Copper content (photometric method)	mg/kg	ISO 8053	Synthetic rubber latex only
Alkalinity	mmol HCl per 100 g	ISO 13773	
General			
Sampling	—	ISO 123	

[a] Test methods for polymer dispersions used as raw materials for paints are specified in ISO 7143.

Table 2 — Test methods developed by ISO/TC 61

Property	Units	Test method	Comments
Physical and physico-chemical properties			
Non-volatile matter at specified temperatures	% (*m*/*m*)	ISO 3251[b]	
Apparent viscosity by Brookfield Test method (general procedure)	Pa × s	ISO 2555	
Density	g/ml	ISO 2811-1[b] ISO 2811-3[b]	
Viscosity using rotational viscometer at defined shear rate	Pa × s	ISO 3219 [a]	
Gross particle content by sieve analysis	% (*m*/*m*)	ISO 4576 [a]	Residue on sieve(s) substantially larger than average particle size
Chemical properties			
Residual monomers and other organic constituents by capillary-column gas chromatography	mg/kg	ISO 13741-1[a] ISO 13741-2[a]	Direct liquid injection method Headspace method
General			
Freeze–thaw cycle stability	number of cycles	ISO 1147	Generally, applicable only to polymer dispersions
White point temperature and minimum film-forming temperature	°C	ISO 2115	

[a] Test methods for polymer dispersions used as raw materials for paints are specified in ISO 7143.

[b] Developed by ISO/TC 35.

7 Precision of the test methods used

Details of the precision of the test method used shall be given in a "Precision" clause. If the experimental data on which the stated precision is based are included in the standard, this may be placed in an informative annex. The precision shall be expressed as a percentage of the results in terms of the following:

a) repeatability;

b) reproducibility.

8 Test report

The results of the individual tests performed on a polymer dispersion/latex shall be recorded in a test report. This shall comply with the requirements of the particular International Standard in question, but shall include at least the following information:

a) a reference to the International Standard used for the test;

b) all details necessary to identify completely the product and sample tested;

c) the results of the test and the conditions of testing;

d) any deviations from the procedure specified;

e) any unusual incident noted during the test;

f) the date and place of the test.

ICS 83.080.20;83.040.10

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