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Jawaharlal Nehru

“Step Out From the Old to the New”

IS 9316-4 (1988): Methods of test for rubber latex, Part 4: Determination of total solids content (RL:4) [PCD 13: Rubber and Rubber Products]



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Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

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IS : 9316 (Part 4) - 1988

Indian Standard

METHODS OF TEST FOR RUBBER LATEX

PART 4 DETERMINATION OF TOTAL SOLIDS CONTENT

RL : 4

(First Revision)

UDC 678.4.31 : 543.8

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Indian Standard

METHODS OF TEST FOR RUBBER LATEX

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0. FOREWORD

0.1 This Indian Standard Part 4 (First Revision) was adopted by the Bureau of Indian Standards on 14 March 1988, after the draft finalized by the Rubber Sectional Committee had been approved by the Petroleum, Coal and Related Products Division Council.

0.2 Test methods for rubber latex had been originally covered in the following Indian Standards:

- a) For *natural* rubber latex
 - IS : 3708 (Part 1)-1966*
 - IS : 3708 (Part 2)-1968†
- b) For *styrene butadiene* rubber latex
 - IS : 4511 (Part 1)-1967‡

0.2.1 Since some of the test methods covered in above standards were common, the concerned Committee had decided some years ago to unify and publish a separate series of methods of test which would be applicable to all types of latices — natural as well as synthetic. Accordingly, the following six test methods had been covered under IS : 9316§.

*Methods of test for natural rubber latex: Part 1 Dry rubber content, sludge content, density, total alkalinity, KOH-number, mechanical stability, volatile fatty acid number, pH, total nitrogen, total copper, total iron, total manganese and total ash.

†Methods of test for natural rubber latex, Part 2.

‡Methods of tests for styrene-butadiene rubber (SBR) latices: Part 1 Determination of dry polymer, pH, density, residual styrene, bound styrene and soap content.

§Methods of test for rubber latex.

Part 1-1979 Determination of surface tension

Part 2-1979 Determination of viscosity

Part 3-1979 Determination of coagulum content

Part 4-1979 Determination of total solids content

Part 5-1979 Drawing of samples

Part 6-1982 Determination of pH

0.2.2 As a result of further rethinking on the subject, it has now been decided to re-designate the test methods common to natural and synthetic rubber latices as RL series; test methods for natural rubber latex as NRL series and test methods for styrene-butadiene rubber latex as SBRL series. Consequently, test methods for rubber latex have been rationalized into the following three series:

- a) IS : 9316 Unified methods of test applicable to both natural and synthetic rubber latices — RL series,
- b) IS : 3708 Methods of test applicable to natural rubber latex — NRL series, and
- c) IS : 4511 Methods of test applicable to styrene-butadiene rubber latex — SBRL series.

0.3 The existing Indian Standards under IS : 3708 (Part 1)* and (Part 2)†, IS : 4511 (Part 1)‡ and IS : 9316 (Parts 1 to 6)§ are being gradually replaced by separate standards under the above three series, designated by the appropriate NRL, SBRL, or RL series, respectively.

0.3.1 The methods covered under NRL : 13, NRL : 14 and NRL : 15 of IS : 3708 (Part 1)-1966* have now been covered under RL series as IS : 9316 (Part 7), (Part 8) and (Part 9) respectively.

0.4 In order to facilitate cross-reference, it has been decided to retain the original discrete NRL, SBRL and RL series number assigned to various test methods in IS : 3708 (Part 1)* and (Part 2)† IS : 4511 (Part 1)‡

*Methods of test for natural rubber latex:

Part 1 Dry rubber content, sludge content, density, total alkalinity, KOH-number, mechanical stability, volatile fatty acid number, pH , total nitrogen, total copper, total iron, total manganese and total ash.

†Methods of test for natural rubber latex: Part 2.

‡Methods of tests for styrene butadiene rubber (SBR) latices: Part 1 Determination of dry polymer, pH , density, residual styrene, bound styrene and soap content.

§Methods of test for rubber latex.

and IS : 9316 (Parts 1 to 6)* in the revised parts of IS : 3708, IS : 4511 and IS : 9316, respectively.

0.4.1 For proper referencing of the existing test methods and the new methods under revision, a statement showing corresponding methods is given in Appendix A.

0.5 In preparing the above series, the need to align the test methods with the corresponding ISO Standard/DIS/DP, wherever available, has also been taken into account for updating the test methods. In the preparation of this standard, assistance has been derived from ISO 124-1985. 'Rubber latices—Determination of total solids content', issued by the International Organization for Standardization (ISO).

0.6 In reporting the result of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS : 2-1960†.

1. SCOPE

1.1 This standard (Part 4) prescribes a method for determination of total solids content of natural rubber latex concentrate which contains preservative agents and which has been prepared by some type of concentration process, and also for determination of total solids content of synthetic rubber latices

1.1.1 The method is not necessarily suitable for latices from natural sources other than *Hevea brasiliensis* or for compounded latex, vulcanized latex or artificial dispersions of rubber.

2. METHOD FOR TAKING OUT SAMPLES

2.1 The method for taking out samples shall be in accordance with the method prescribed in IS : 9316 (Part 5)-1988‡.

3. OUTLINE OF THE METHOD

3.1 A test portion is heated to constant mass in an oven under specified conditions, either at atmospheric pressure or under vacuum, depending on the type of latex. The total solids content is determined by weighing before and after heating.

*Methods of test for rubber latex.

†Rules for rounding off numerical values (revised).

‡Methods of test for rubber latex: Part 5 Drawing of samples (first revision).

4. APPARATUS

4.1 Glass Petri Dish

4.2 **Oven** — capable of being maintained at $70 \pm 2^\circ\text{C}$ or $105 \pm 2^\circ\text{C}$.

4.3 **Vacuum Oven** — capable of being maintained at $125 \pm 2^\circ\text{C}$.

5. PROCEDURE

5.1 For natural rubber latex concentrate, proceed according to 5.1.1 and for synthetic rubber latex, proceed according to either 5.1.1 or 5.1.2.

5.1.1 *Heating at Atmospheric Pressure* — Weigh, to the nearest 1 mg, a dish, together with its cover. Pour into the dish 2.0 ± 0.5 g of latex, replace the cover and weigh to the nearest 1 mg. Gently swirl the contents of the dish to ensure that the latex covers the bottom. If desired, approximately 1 ml of distilled water or water of equivalent purity may be added and mixed well with the latex by swirling. Place the dish, uncovered, in the oven so that it is horizontal and heat it at either $70 \pm 2^\circ\text{C}$ or $105 \pm 2^\circ\text{C}$ until the sample has lost its whiteness, or for 16 h or 2 h, respectively. Allow to cool in a desiccator, replace the cover and weigh. Return the dish, uncovered, to the oven for 30 min if the drying temperature is $70 \pm 2^\circ\text{C}$, or for 15 min if the drying temperature is $105 \pm 2^\circ\text{C}$. Allow to cool in the desiccator, replace the cover and reweigh. Repeat the drying procedure at intervals of 30 or 15 min, as appropriate, until the loss in mass between two successive weighings is less than 1 mg.

5.1.2 *Heating at Reduced Pressure* — Weigh, to the nearest 0.1 mg, a dish together with its cover. Pour into the dish 1.0 ± 0.2 g of latex, replace the cover and weigh to the nearest 0.1 mg. Remove the cover, add 1 ml of distilled water or water of equivalent purity and mix well by swirling to ensure that the latex covers the bottom of the dish.

Place the dish, uncovered, in the vacuum oven so that it is horizontal. Reduce the pressure slowly, to avoid foaming and splattering, and heat at $125 \pm 2^\circ\text{C}$ for 45 to 60 min at a pressure below 20 kPa*. Allow to cool in a desiccator, replace the cover and weigh. Repeat the drying procedure at intervals of 15 min until the loss in mass between two successive weighings is less than 0.5 mg.

6. CALCULATION

6.1 Calculate the total solids content (TSC), expressed as a percentage by mass, using the formula:

*1 kPa = 1 kN/m².

$$\text{TSC, percent by mass} = \frac{m_1}{m_0} \times 100$$

where

m_0 = mass, in g, of the test portion; and

m_1 = mass, in g, of the dried material.

NOTE — The results of duplicate determinations shall not differ by more than 0.2 percent (m/m).

7. TEST REPORT

7.1 The test report shall include the following particulars:

- a) Reference to this standard;
- b) Identification of the test sample;
- c) The results, and the form in which they are expressed;
- d) Any unusual features noted during the determination; and
- e) Any operation not included in this standard to which reference is made, or regarded as optional.

APPENDIX A

(Clause 0.4.1)

**TABLE SHOWING CORRESPONDENCE OF VARIOUS METHODS OF TEST COVERED
IN THE EXISTING IS : 9316 (PARTS 1 TO 5)-1979, IS : 9316 (PART 6)-1982, IS : 3708
(PART 1)-1966, IS : 3708 (PART 2)-1968, IS : 4511 (PART 1)-1967 WITH THE
REVISION/PROPOSED REVISION OF IS : 9316, IS : 3708 AND IS : 4511**

<i>Existing Test Methods</i>			<i>Proposed Revision</i>	
Test Method	IS No.	Part (Series)	IS No.	Series
(1)	(2)	(3)	(4)	(5)
RL SERIES				
Determination of surface tension	IS : 9316-1979	Part 1	IS : 9316 (Part 1)-1987	(RL : 1)
Determination of viscosity	IS : 9316-1979	Part 2	IS : 9316 (Part 2)-1987	(RL : 2)
Determination of coagulum content	IS : 9316-1979	Part 3	IS : 9316 (Part 3)-1987	(RL : 3)
Determination of total solids content	IS : 9316-1979	Part 4	IS : 9316 (Part 4)-1988	(RL : 4)
Drawing of samples	IS : 9316-1979	Part 5	IS : 9316 (Part 5)-1988	(RL : 5)
Determination of pH	IS : 9316-1982	Part 6	IS : 9316 (Part 6)-1988	(RL : 6)
Determination of total copper	IS : 3708-1966	Part 1 (NRL : 13)	IS : 9316 (Part 7)-1987	(RL : 7)
Determination of total iron	IS : 3708-1966	Part 1 (NRL : 14)	IS : 9316 (Part 8)-1987	(RL : 8)
Determination of total manganese	IS : 3708-1966	Part 1 (NRL : 15)	IS : 9316 (Part 9)-1987	(RL : 9)

IS : 9316 (Part 4) - 1988

NRL SERIES

Determination of dry rubber content	IS : 3708-1966	Part 1 (NRL : 1)	IS : 3708 (Part 1)-1985 (NRL : 1)
Determination of sludge content	IS : 3708-1966	Part 1 (NRL : 5)	IS : 3708 (Part 2)-1985 (NRL : 5)
Determination of density	IS : 3708-1966	Part 1 (NRL : 6)	IS : 3708 (Part 3)-1985 (NRL : 6)
Determination of total alkalinity	IS : 3708-1966	Part 1 (NRL : 7)	IS : 3708 (Part 4)-1985 (NRL : 7)
Determination of KOH-number	IS : 3708-1966	Part 1 (NRL : 8)	IS : 3708 (Part 5)-1985 (NRL : 8)
7 Determination of mechanical stability	IS : 3708-1966	Part 1 (NRL : 9)	IS : 3708 (Part 6)-1985 (NRL : 9)
Determination of volatile fatty acid number	IS : 3708-1966	Part 1 (NRL : 10)	IS : 3708 (Part 7)-1986 (NRL : 10)
Determination of total nitrogen	IS : 3708-1966	Part 1 (NRL : 12)	IS : 3708 (Part 8)-1986 (NRL : 12)
Determination of total ash	IS : 3708-1966	Part 1 (NRL : 16)	IS : 3708 (Part 9)-1986 (NRL : 16)
Determination of boric acid	IS : 3708-1968	Part 2 (NRL : 17)	IS : 3708 (Part 10)-1986 (NRL : 17)
Determination of magnesium	IS : 3708-1968	Part 2 (NRL : 18)	IS : 3708 (Part 11)-1986 (NRL : 18)

*Existing Test Methods**Proposed Revision*

Test Method	IS No.	Part (Series)	IS No.	Series
(1)	(2)	(3)	(4)	(5)
SBRL SERIES				
Determination of dry polymer	IS : 4511-1967	Part 1 (SBRL : 1)	IS : 4511 (Part 1)-1986	(SBRL : 1)
Determination of density	IS : 4511-1967	Part 1 (SBRL : 6)	IS : 4511 (Part 2)-1986	(SBRL : 6)
Determination of volatile unsaturates	IS : 4511-1967	Part 1 (SBRL : 8)	IS : 4511 (Part 3)-1987	(SBRL : 8)
Determination of bound styrene	IS : 4511-1967	Part 1 (SBRL : 9)	IS : 4511 (Part 4)-1986	(SBRL : 9)
∞ Determination of soap content	IS : 4511-1967	Part 1 (SBRL : 10)	IS : 4511 (Part 5)-1986	(SBRL : 10)
Determination of high speed mechanical stability	—	IS : 4511 (Part 6)-1987	(SBRL : 11)