IS : 9316 (Part 5) - 1988

Indian Standard

METHODS OF TEST FOR RUBBER LATEX

PART 5 DRAWING OF SAMPLES

RL : 5

(First Revision)

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0. FOREWORD

0.1 This Indian Standard (Part 5) (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.

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

Accordingly, the following six test methods had been covered under IS : 9316*:

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 *p*H

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† are now being covered under the RL series in IS : 9316 (*under print*).

*Methods of test for rubber latex.

†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, *p*H, total nitrogen, total copper, total iron, total manganese and total ash.

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

§Methods of test for styrene butadiene rubber (SBR) latices: Part 1 Determination of dry polymer, *p*H, density, residual styrene, bound styrene and soap content.

0.4 In order to facilitate cross-reference, it has been decided to retain the original discrete NRL, SBRL and RL series numbers assigned to various test methods, in IS : 3708 (Part 1)* and (Part 2)†, IS : 4511 (Part 1)‡ 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 The method for drawing of samples as given in the original standard published in 1979 has been revised to give more precise definitions, the apparatus in more detail and it further clarifies some ambiguity on preliminary testing. The method of homogenizing latex in drums fitted with bungs has been altered, and in order to safeguard against stratification, closer agreement in total solids content is required between samples drawn from different levels.

0.6 In preparing the above series, the need to align the test methods with the corresponding ISO Standards 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 123-1985 'Rubber latex—sampling', issued by the International Organization for Standardization (ISO).

0.7 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 5) prescribes procedures for sampling of natural rubber latex concentrate containing preservative agents and also for the sampling of synthetic rubber latices.

1.2 This standard is suitable for the sampling of rubber latex that is contained in drums, tank cars, or tanks.

*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, *p*H, total nitrogen, total copper, total iron, total manganese and total ash.

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

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

§Methods of test for rubber latex.

‖Rules for rounding off numerical values (*revised*).

2. TERMINOLOGY

2.0 For the purpose of this standard, the following definitions shall apply.

2.1 Lot — A definite quantity of latex processed or produced under conditions which are presumed uniform, from which test sample is required. The lot may be in one or more containers or vessels, for example, it may consist of several drums of the same latex.

2.2 Sample — Any quantity of latex that is drawn from the lot.

2.3 Laboratory Sample — A quantity of latex intended for laboratory inspection and testing and that is representative of the lot.

2.4 Test Sample — A quantity of latex that is suitable for testing obtained by filtering the laboratory sample.

NOTE — The laboratory sample, and not the test sample, is used for determination of coagulum content.

3. OUTLINE OF THE METHOD

3.1 The latex is agitated thoroughly to obtain a homogeneous bulk. A representative sample (**2.3**) is taken from the bulk of the latex. The test sample (**2.4**) is prepared from the laboratory sample **2.3**.

4. APPARATUS

4.1 Stirrer — For homogenization of latex in drums. For open-headed drums, use either **4.1.1** or **4.1.2**. For drums fitted with a bung, use **4.1.3**.

4.1.1 *Perforated Stainless Steel Disc Plunger* — of diameter approximately 150 mm, with holes of diameter approximately 10 mm.

4.1.2 *Motor Driven Stirrer* – with a rotational frequency of 100 to 700 rev/min. A suitable type of stirrer consists of a collapsible two-bladed stainless steel propeller of 110 mm minimum diameter when fully opened, mounted on a stainless steel shaft sufficiently long for the propeller to be at a distance of about one-tenth the height of latex from the bottom of the drum. If desired, two propellers may be used on the same shaft, in which case the lower one shall meet the foregoing requirements as regards position. The shaft speed shall give a brisk turnover without creating a vortex. The part of the equipment immersed in the latex shall not contain copper.

4.1.3 *Motor Driven Drum Roller* — capable of rotating a drum at approximately 10 rev/min.

4.2 Sampling Tubes for Latex in Drums — Use either **4.2.1** or **4.2.2**.

4.2.1 *Glass Tube* — of internal diameter 10 to 15 mm and length at least 1 m, open at both ends and having a stopper for closing the tube while withdrawing the latex.

4.2.2 *Stainless Steel Sampling Tube* — of internal diameter approximately 25 mm and length at least 1 m, the bottom of which can be opened or closed by remote control. An outline drawing of a suitable design is given in Fig. 1.

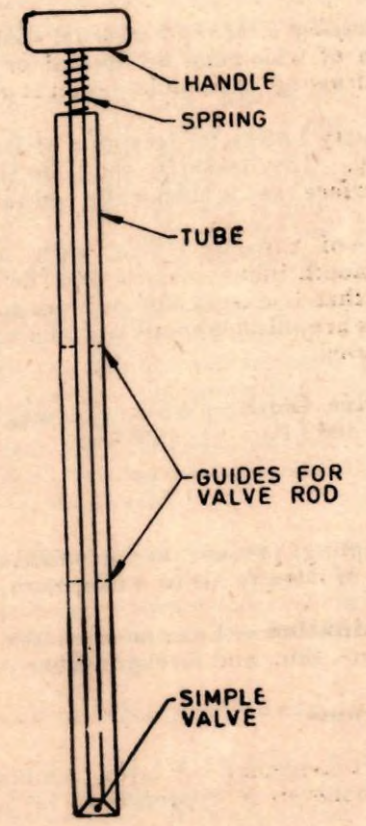

FIG. 1 SAMPLING TUBE FOR DRUMS, TANK CARS AND SMALLER TANKS

4.3 Sampling Devices for Latex in Tank Cars or Tanks — Use **4.3.1** for sampling latex, the depth of which is 3 m or more. Use either **4.3.2** or **4.3.1** for sampling latex, the depth of which is less than 3 m.

4.3.1 *Sampling Vessel* — Consisting of a weighed cylindrical, stainless steel vessel of capacity approximately one litre, closed by bung that can be removed by remote control. The weight of the vessel shall be sufficient to ensure that when empty and closed, it will sink freely through the latex. To the top of the cylinder there are attached, to at least two points, strong cords of material inert to the latex, of length greater than the depth of the latex that is to be sampled.

4.3.2 *Stainless Steel Sampling Tube* — of internal diameter 25 mm and length 3 m, the bottom of which can be opened or closed by remote control. An outline drawing of suitable design is given in Fig 1.

4.4 Beakers — of capacity 2 litres, for reception of latex from sampling tube or sampling vessel. The beaker(s) shall be shock-resistant and have a smooth inner surface that is chemically resistant to latex.

4.5 Sample Bottles — of capacity 1 litre, with screw caps. The bottles shall have a smooth inner surface and be composed of an impermeable material that is chemically resistant to the latex. Glass or some types of plastics are suitable materials. Thin or flexible plastic containers shall not be used.

4.6 Stainless Steel Wire Cloth — With an average aperture width of 180 ± 10 μm [*see* IS : 460 (Part 1) - 1985*].

5. SAMPLING

5.0 At all stages of sampling, prevent the introduction of air into the latex and keep exposure of latex to air to a minimum.

5.1 Preliminary Examination — Examine the latex visually for the presence of gross coagulum, skin, and foreign matter.

5.2 Sampling From Drums

5.2.1 *Homogenization* — Homogenize the latex manually as specified in **5.2.1.1** or **5.2.1.2**, whichever is appropriate, or mechanically as specified in **5.2.1.3**.

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*Specification for test sieves: Part 1 Wire cloth test sieves (*third revision*).

5.2.1.1 If the drum is fitted with a bung and manual or mechanical homogenization of the latex cannot be achieved; place the drum on a drum roller (**4.1.3**) and roll for 24 h at about 10 rev/min.

5.2.1.2 If the drum is of the open-head type, remove the end head and stir the contents thoroughly for at least 10 min, preferably by means of the perforated stainless steel disc plunger (**4.1.1**).

5.2.1.3 Agitate the contents of the drum by means of the motor-driven stirrer (**4.1.2**) for 10 min to homogenize the latex. Avoid excessive stirring.

5.2.2 *Taking of Laboratory Sample* — After homogenization of the latex, take the laboratory sample without delay using the glass tube (**4.2.1**) or the stainless steel sampling tube (**4.2.2**).

5.2.2.1 In the case of glass tube, ensure that it is clean and dry and slowly insert it in the drum until it reaches the bottom. Then close the upper end of the tube with the stopper, withdraw it and transfer its contents to a clean, dry sample bottle (**4.5**). Repeat the operation until sufficient latex has been obtained to fill the sample bottle, leaving an air space of 2 to 5 percent to allow for thermal expension. Screw the cap firmly on the bottle.

5.2.2.2 In the case of stainless steel sampling tube, slowly insert it in the drum, holding the bottom of the tube open, until it reaches the bottom. Then release the handle to close the bottom of the tube, and withdraw the tube. Transfer the contents of the tube into a beaker (**4.4**) by depressing the handle. Repeat the operation until sufficient latex has been obtained. Transfer the latex from the beaker to a clean, dry sample bottle (**4.5**), leaving an air space of 2 to 5 percent and screw the cap firmly on the bottle.

5.2.3 *Sampling from Several Drums* — Where sampling of same latex from several drums is required, for example 10 percent sample of a latex, the amount of latex drawn from each drum may be reduced proportionately. Combine and stir the individual samples and bottle the resultant laboratory sample.

5.3 Sampling from Tank Cars and Tanks

5.3.1 *Sampling Operation* — Use the sampling vessel (**4.3.1**) or sampling tube (**4.3.2**), whichever is appropriate. Operate the sampling vessel by lowering it, with the bung in place, into the latex to the required depth and then pulling out the bung. Allow a few seconds for the vessel to fill with latex and then pull it up and transfer its contents to a beaker. Transfer the latex to the sample bottle, leaving an air

space of 2 to 5 percent (to allow for thermal expansion) and screw the cap firmly on the bottle. Operate the sampling tube by inserting it, with the bottom closed, into the latex to the required depth and then, by depressing the handle, and opening the bottom of the tube. After the tube has filled with latex, release the handle to close the bottom and withdraw the tube. Transfer the contents of the tube into a beaker and transfer the latex to the sample bottle, leaving an air space of 2 to 5 percent. Screw the cap firmly on the bottle.

5.3.2 *Testing for Homogeneity* — Take separate samples, 100 mm from the top surface and 100 mm from the bottom of the latex. Determine the total solids content by the method specified in IS : 9316 (Part 4)-1988*. If the results from the top and bottom samples do not agree within 0·5 percent (*m*/*m*) total solids, thoroughly rehomogenize the complete lot until samples obtained do agree within this tolerance.

NOTE — Thorough agitation can be achieved with an efficient mechanical stirrer or by pumping the latex around or into another container.

5.3.3 *Taking of Laboratory Sample* — After the degree of homogeneity specified in **5.3.2** has been achieved, take three samples of similar volume, the first half-way between the top and the centre of the latex, the second at the centre of the latex, and the third half-way between the centre and the bottom of the latex. Combine and stir the three samples and transfer the resultant laboratory sample to a sample bottle.

NOTE 1 — If the sampling tube is used, a single sample may be taken by inserting the tube, with the bottom held open, to the bottom of the latex and then closing the bottom of the tube before withdrawing it from the latex.

NOTE 2 — Coagulum content is determined on laboratory sample and not on test sample.

5.4 Preparation of Test Sample — Stir the laboratory sample carefully and filter it through the stainless steel wire cloth. Transfer the filtered latex to another sample bottle, leaving an air space of 2 to 5 percent and screw the cap firmly on the bottle.

6. LABELLING OF LABORATORY SAMPLE AND THE TEST SAMPLE

6.1 These samples shall be labelled and the lable shall contain:

a) A description of the material;

*Methods of test for rubber letex: Part 4 Determination of total solids content (*first revision*).

b) Size and particulars of consignment (tank-wagon, tank, ship, barrel, drum);

c) Designation and reference number of the sample;

d) Consigner;

e) Place of sampling;

f) Date of sampling; and

g) Name of the sampler.

7. TEST REPORT

7.1 The test report shall include the following information:

a) A referance to this standard;

b) All details necessary for identification of test sample;

c) Frequency of sampling;

d) A record of creaming, visible gross coagulum, skin and foreign matter (if any) present in the original container;

e) Any unusual features noted during the sampling; and

f) Any operation not included in this standard 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

Existing Test Methods			Proposed Revision		Remarks
Test Method	IS No.	Part (Series)	IS No.	Part (Series)	
(1)	(2)	(3)	(4)	(5)	(6)
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 *p*H	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)	
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)
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)
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)

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

Quantity	Unit	Symbol
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

Quantity	Unit	Symbol
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

Quantity	Unit	Symbol	Definition
Force	newton	N	1 N = 1 kg.m/s^2
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m^2
Frequency	hertz	Hz	1 Hz = 1 c/s (s^{-1})
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m^2