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SPECIFICATION FOR RUBBER TEATS AND VALVES FOR FEEDING BOTTLES AND SOOTHERS

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BUREAU OF CEYLON STANDARDS

SPECIFICATION FOR RUBBER TEATS AND VALVES FOR FEEDING BOTTLES AND SOOTHERS

S.L.S. 253 : 1973

Gr.4

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53, DHARMAPALA MAWATHA
COLOMBO 3.

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SRI LANKA STANDARD SPECIFICATION FOR RUBBER TEATS AND VALVES FOR FEEDING BOTTLES AND SOOTHERS

FOREWORD

This Sri Lanka Standard Specification has been prepared by the Drafting Committee on Rubber Teats and was approved by the Agricultural and Chemicals Divisional Committee of the Bureau of Ceylon Standards and was authorised for adoption and publication by the Council of the Bureau on 5th December, 1973.

Rubber teats, valves and soothers shall be made of high quality material which releases negligible amounts of undesirable substances and absorbs the minimum of material from the solution in contact with them. It is not uncommon to find that items covered by this specification often contain harmful ingredients which are likely to go into solution and contaminate the milk or liquid baby food. Further, they often impart undesirable odour, taste or discolouration, and also cause irritation to the feeding baby, becoming hard and tacky at times. Some of the rubber ingredients are also harmful to the baby and may cause, in acute cases, contact dermatitis.

This standard prescribes physical and chemical requirements for teats, valves and soothers. Due to the lack of facilities to conduct biological tests on rubber teats, valves and soothers it is hoped that the accelerators recommended in this Standard are strictly adhered to during the manufacture. However, other accelerators, if guaranteed against contact dermatitis and harmful contamination, could be used in the manufacture of teats, valves and soothers. The shapes and sizes for the teats and valves was left to be as agreed to between the purchaser and supplier due to the absence of standard dimensions for necks of feeding bottles.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with C.S. 102: Ceylon Standard on Presentation of Numerical Values. The number of significant places retained in the rounded off value shall be the same as that of the specified value in this Standard.

In the preparation of this standard considerable assistance derived from the Indian Standards Institution is gratefully acknowledged.

1. SCOPE

This standard prescribes the requirements, sampling and methods of test for rubber teats, and valves for feeding bottles and soothers.

2. REQUIREMENTS

2.1 Material

2.1.1 The teats, valves and soothers shall be made from rubber together with necessary compounding and vulcanizing ingredients. These shall be made from solid rubber or latex and shall be free from grits, reclaimed rubber or vulcanized waste. The rubber mix shall not include any ingredient known to be injurious or poisonous to human beings.

2.1.2 All ingredients used shall be free from harmful substances liable to extraction by contact with milk or liquid baby food, or which may cause the development of undesirable odour, taste or discolouration. Softners and organic accelerators and antioxidants, if incorporated, shall not impart an undesirable odour or taste to the finished teats, valves and soothers. The following accelerators are recommended.

(a) Dithiocarbamates, and

(b) Thiurams.

2.2 Workmanship and Finish - The teats, valves and soothers shall be transparent or translucent and shall be free from patches, blisters, porosity, embedded foreign matter and physical defects when examined visually.

2.2.1 **Shape and size** – The shape and size of the rubber teats, valves and soothers shall be as agreed to between the purchaser and the supplier.

2.2.2 Each teat shall be pierced by the manufacturer.

2.3 **Acetone Extract** – The teats, valves and soothers shall not yield more than 3 per cent of extractable matter when extracted with hot acetone (see Appendix B - 1).

2.4 **Free Sulphur in Acetone Extract** – The amount of free sulphur in the teats, valves and soothers shall not exceed 0.2 per cent by mass (see Appendix B-2).

2.5 **Change in Physical Properties** - The teats, valves and soothers shall not show any sign of deterioration such as tackiness, hardness, crackiness and discolouration, when subjected to autoclaving (see Appendix B-3).

2.6 **Properties of Water Extract** – The teats, valves and soothers shall not impart any colour, odour or turbidity to water extract (see Appendix B-4).

2.7 **pH of the Water Extract** – The pH of the water extract of teats, valves and soothers shall be 7.0 ± 0.5 (see Appendix B-5).

2.8 **Tension Set** – The tension set of teats, valves and soothers shall not be more than 20 per cent (see Appendix B-6).

3. MARKING

Each teat valve and soother or package or both shall be legibly marked with the following:

(a) Manufacturer's name or trade-mark, if any;
(b) Number of teats, valves or soothers in each package; and
(c) Batch number or date of manufacture.

4. PACKING

Teats, valves or soothers may be packed in polythene covers and may be put into a carton.

5. SAMPLING

For the purpose of ascertaining the conformity of the rubber teats or valves or soothers in a consignment, to this specification, the scale of sampling and criteria for conformity shall be as prescribed in Appendix A.

6. TEST METHODS

6.1 **Standard Atmospheric Conditions for Physical Tests** - Unless otherwise required by the particular method of test, the test specimens shall be conditioned to a moisture equilibrium in an atmosphere of 65 ± 2 per cent relative humidity and temperature of 27 ± 2°C, and if possible, tested in that atmosphere, or soon after removal from that atmosphere.

6.2 **Quality of Reagents** – Unless specified otherwise, pure chemicals (See note) and distilled water shall be employed in tests.

NOTE: 'Pure chemicals' shall mean chemicals that do not contain impurities which affect the results of analysis.

6.3 Tests regarding acetone extract, free sulphur in acetone extract, determination of change in physical properties, determination of properties of water extract, pH of water extract and tension set shall be done in accordance with the methods prescribed in Appendix B.

APPENDIX A

(see Clause 5)

SAMPLING OF RUBBER TEATS, VALVES AND SOOTHERS

A-1 GENERAL REQUIREMENTS OF SAMPLING

A-1.1 Precautions shall be taken to protect the samples, the material being sampled and the containers for samples from adventitious contamination.

A-1.2 The samples shall be placed in clean, dry and air-tight glass or other suitable containers on which the material of the teats, valves and soothers have no action.

A-1.3 The sample containers shall be of such size that they are almost completely filled by the sample.

A-1.4 Each sample container shall be sealed air-tight after filling and marked with full details of sampling, the date of sampling and the date of manufacture.

A-2 SCALE OF SAMPLING

A-2.1 **Lot** - All the rubber teats or valves or soothers (referred to below as items) of the same size and manufactured from the same raw materials under similar conditions of manufacture in one consignment shall constitute a lot.

A-2.1.1 Samples shall be tested from each lot seperately, for ascertaining the conformity of a lot to the requirements of this specification.

A-2.2 The number of items to be selected in the sample from a lot shall depend upon the size of the lot and shall be in accordance with Table 1.

TABLE 1. NUMBER OF ITEMS TO BE SELECTED FROM A LOT AND PERMISSIBLE NUMBER OF DEFECTIVES

No. of items in the lot	No. of items to be selected in the samples	Permissible No. of defective items for workmanship and finish	No. of tests to be performed for other characteristics
(1)	(2)	(3)	(4)
Up to 3 000	90	2	1
3 001 to 10 000	180	4	2
10 001 to 35 000	270	6	3
35 001 and above	450	8	5

A-2.2.1 Although it is not possible to lay down any fixed rule as to how the samples are to be selected from the packages, it is desirable that the items be drawn evenly from as many packages as possible. However, at least 10 per cent of the packages shall be selected and an equal number of items drawn at random from each package selected to give the required number of items in accordance with col. 2 of Table 1.

A-3 NUMBER OF TESTS AND CRITERIA FOR CONFORMITY

A-3.1 **Workmanship and finish** - All the items selected as in Clause A-2.2.1 shall be inspected for workmanship and finish in accordance with Clauses 2.2, 2.2.1 and 2.2.2. An item shall be considered to be defective, if it fails to satisfy the requirements of workmanship and finish in any one or more respects.

A-3.1.1 A lot shall be considered as having satisfied the requirements of workmanship and finish, if the number of defective items found as in Clause A-2.1 does not exceed the applicable permissible number of defective items.

A-3.2 For determining the conformity of the lot to the requirements of, acetone extractable matter, free sulphur in acetone extract, change in physical properties of water extracted teat, valve or soother and water extract, pH of water extract and tension set, the number of tests to be carried on a lot, shall be in accordance with col. 4 of Table 1 (see Clause A-2.2). For carrying out these tests, the rubber teats, valves or soothers as selected under col. 2 of Table 1 and found satisfactory for workmanship and finish shall be used. In case additional number of teats vlaves or soothers are required for these tests, they shall also be selected at random from the package already used for drawing the samples.

A-3.2.1 All the test results for the different characteristics shall satisfy the requirements of the specification individually.

APPENDIX B

(see clause 6.3)

TEST METHODS

B-1 DETERMINATION OF ACETONE EXTRACTABLE MATTER

B-1.1 **Principle** - A known quantity of the sample is weighed and wrapped in a filter paper, folded, so that the particles cannot become detached and find their way into the extraction flask. The sample is then placed in the siphon cup of the extraction apparatus and extracted for a period considered adequate for the separation involved, preferably by heating on a water bath. The extracted matter in the flask is freed from the solvent and its contents are finally dried at a constant temperature, cooled and weighed.

B-1.2 **Procedure** - Place a weighed specimen of approximately 2 g in a filter paper. If the specimen is in the form of a sheet, cut it with scissors into strips 3 to 5 mm in width. If the specimen may become tacky during extraction, take care that adjacent portions are separated by paper. Fold the paper so that it will fit in the extraction cup and suspend the cup in a weighed extraction flask containing 50 to 75 ml of acetone. (Prior to weighing of the flask, it shall have been dried for 2 h at 70 ± 5°C and cooled in a desiccator to the temperature of the balance). Extract the specimen continuously for 16 h heating at such a rate that the time required to fill and empty the siphon cup will be between 2.5 and 3.5 min. Carefully note all characteristics of the extracts, both when hot and cold. Evaporate off the acetone over a steam bath, using a gentle current of filtered air to prevent boiling. Remove the flask from the steam bath just prior to the disappearance of the last traces of solvent to prevent loss of extract. Continue the passage of air through the flask for 10 min to remove the remaining solvent and dry the flask for 2 h at 70 ± 5°C in an air-bath. Cool in a desiccator to the temperature of the balance and weigh.

B-1.3 Calculation – Calculate the percentage of the acetone extract as follows:

$$\text{Acetone, extract per cent} = \frac{m_1}{m_0} \times 100$$

Where

m_0 = mass, in grammes, of specimen, and
m_1 = mass, in grammes, of extract.

B–2 DETERMINATION OF FREE SULPHUR FROM ACETONE EXTRACTABLE MATTER

B-2.1 Principle – Free sulphur in the acetone extracts is determined by the acid digestion method. In this method, the sample is treated with an oxidising acid such as nitric and an auxiliary agent such as bromine, at an elevated temperature. By this oxidation, sulphur is converted to sulphate, in which form it is estimated gravimetrically.

B-2.2 Reagents

B-2.2.1 Bromine - saturated bromine water.

B-2.2.2 Nitric Acid - relative density 1.50

B-2.2.3 Zinc-Nitric Acid Solution - Add 200 g of zinc oxide to one litre of nitric acid (relative density 1.42).

B-2.2.4 Potassium Chlorate Crystals.

B-2.2.5 Picric Acid - saturated solution.

B-2.2.6 Barium Chloride Solution - 100 g/litre.

B-2.2.7 Hydrochloric Acid - (relative density 1.15)

B-2.3 Procedure - Add to the flask containing the acetone extract, 10 ml of zinc-nitric acid solution and 2 to 3 ml of bromine and cover with a watch glass. Allow to stand near a steam plate for 30 min, then heat on the steam plate to a foamy syrup. Add 10 ml of nitric acid and heat on the hot plate with the cover removed until all bromine is expelled. Continue if organic matter or carbon remains at this point, add a few millilitres of nitric acid and a few crystals of potassium chlorate and evaporate at boiling. Repeat this operation until all carbon is removed and the solution is clear, colourless, or light yellow.

B-2.3.1 At this point either of the following methods may be used.

B-2.3.1.1 **Method A** - Place the flask on an asbestos gauze and evaporate the mixture to dryness over a Tirril burner. Then bake the mixture at the highest temperature of the burner until all nitrates are decomposed and no more nitrogen oxide fumes can be detected. The flask and its contents must be carefully annealed after this procedure by gradually decreasing the flame or by placing the flask on successively cooler source of heat.

B-2.3.1.2 **Method B** - Evaporate the mixture, cool, add 10 ml of hydrochloric acid, and evaporate to dryness, avoiding spattering. Repeat this procedure once, or more, if oxides of nitrogen are still evolved.

B-2.3.2 Cool the flask, add 50 ml of hydrochloric acid (1:6) and digest hot until solution is as complete as possible. Filter while hot. Wash the filter and dilute the filtrate and washings to about 300 ml. Add 10 ml of saturated picric acid solution, heat to 90° C, and precipitate the sulphate by dropwise addition of barium chloride solution while stirring vigorously. Digest the precipitate overnight, preferably at 60° to 80° C, using a watch glass to cover the beaker. Filter the barium sulphate and wash with water until the filtrate is colourless. Dry, incinerate, and finally ignite the precipitate at 650° to 900° C to constant mass. Cool in a desiccator and weigh.

B-2.4 Calculation -

Calculate the percentage of sulphur as follows:

$$\text{Sulphur, per cent by mass} = \frac{m_1 \times 0.137\,3 \times 100}{m_0}$$

Where

m_0 = mass, in grammes, of specimen, and
m_1 = mass, in grammes, of barium sulphate.

B-3 CHANGE IN PHYSICAL PROPERTIES

B-3.1 Principle – Teats, valves and soothers are autoclaved for a known time at constant temperature and the change in physical properties of these items as examined visually, is reported.

B-3.2 Procedure – Take three teats or valves and autoclave them in 250 ml of water for 1 h at 120 ± 5°C. For soothers carry out the same but at a temperature of 100 ± 5°C. Cool the autoclave to room temperature and keep the water extract for further test (see Clause B-4). Keep the samples in an air-oven maintained at 120 ± 2°C (for soothers at 100 ± 2°C) for 1 h., and examine the samples after cooling to room temperature for any sign of deterioration such as tackiness, hardness, crackiness and discolouration.

B-4 WATER EXTRACT

B-4.1 Examine the water extract as obtained under Clause B-3.2 for any colour, odour and turbidity imparted to the water.

B-5 DETERMINATION OF pH VALUE OF WATER EXTRACT

B-5.1 Principle – The pH value of the water extract is determined electrometrically with the help of the glass electrode, by direct reading method.

B-5.2 Apparatus

B-5.2.1 Beaker – A glass beaker of sufficient size to accommodate the sample used.

B-5.2.2 Metallic Container – made of stainless steel or copper for boiling water.

B-5.2.3 pH Meter – Equipped with glass and calomel electrodes to read directly pH having an accuracy of 0.05 pH.

B-5.2.4 Watch-Glass

B-5.3 Procedure – Boil the sample for 5 min in water and discard the water. Boil the sample again for 15 min in water and decant the extract into the container. Let the mixture cool to room temperature, in an atmosphere free from chemical fumes which might contaminate the samples. Decant off any supernatant liquid. Place the electrodes in the sludge and rotate the beaker gently in alternate direction until a constant pH value is obtained. Repeat the procedure on a second sample.

Note 1 – To prevent contamination of the sample during boiling, a clean watch-glass may be used over the beaker.

Note 2 – Standardize the pH meter with a reliable buffer in the pH range of the aqueous extract samples to be tested.

Note 3 – The distilled water used in the test shall be as pure as possible. The pH of the freshly boiled distilled water shall be 6.9 to 7.1.

B-5.4 Report – The report shall include the following:

(a) Proper identification of the sample, and

(b) Result obtained from the two individual determination and also their average.

B-6 TENSION SET

B-6.1 Procedure – Cut out the rim of the sample and cut it open to form a band. Mark two reference lines 25 mm apart in the centre of the band and stretch it gently up to 75 mm; hold it in that position for 10 min and then release. Measure the distance between the reference lines after 10 min.

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Printed at SLSI (Printing Unit)

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Colombo 08.