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DRAFT STANDARD FOR PUBLIC COMMENT

(වෙනස්වීමට ඉඩ ඇත. திருத்தத்திற்குட்படக்கூடியது. Liable to alteration)

නිකුත් කළ දිනය வெளியீட்டுத் திகதி Date of Issue	} 2024-07-26	අදහස් එවියයුතු අවසාන දිනය அபிப்பிராயங்களை தெவிப்பதற்கான இறுதித்திகதி Latest Date for Receipt of Comments	} 2024-09-26

Draft Sri Lanka Standard
SPECIFICATION FOR PROCESSED LIQUID MILK
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This draft should not be regarded or used as a Sri Lanka Standard.

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Comments to be sent to: SRI LANKA STANDARDS INSTITUTION, 17, VICTORIA PLACE, ELVITIGALA MAWATHA, COLOMBO 08.

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Introduction

This Draft Sri Lanka Standard has been prepared by the Sri Lanka Standards Institution and is now being circulated for technical comments to all interested parties.

All comments received will be considered by the SLSI and the draft if necessary, before submission to the Council of the Institution through the relevant Divisional Committee for final approval.

The Institution would appreciate any views on this draft which should be sent before the specified date. It would also be helpful if those who find the draft generally acceptable could kindly notify us accordingly.

All Communications should be addressed to:

The Director General
Sri Lanka Standards Institution,
17, Victoria Place,
Elvitigala Mawatha,
Colombo 08.

Draft Sri Lanka Standard
SPECIFICATION FOR PROCESSED LIQUID MILK

DSLS:…….

Gr.

SRI LANKA STANDARDS INSTITUTION
No. 17, Victoria Place
Elvitigala Mawatha,
Colombo 08,
Sri Lanka.

Draft Sri Lanka Standard
SPECIFICATION FOR PROCESSED LIQUID MILK

FOREWORD

This Sri Lanka Standard was approved by the Sectoral Committee on Food Products and was authorized for adoption and publication as a Sri Lanka Standard by the Council of the Sri Lanka Standards Institution on .....

During the revision of **SLS 181**:1983 "Sri Lanka Standard specification for Raw and Processed milk", the committee decided to have two separate Standards namely, Specification for Raw milk and Specification for Processed liquid milk, as the basic requirements are different for raw milk and processed liquid milk.

This Standard supersedes a part of **SLS 181 "**Sri Lanka Standard specification for Raw and Processed milk".

Liquid milk is the most consumed, processed and marketed dairy product in the world. Liquid milk includes products such as pasteurized milk, sterilized milk, semi-skimmed/ low fat milk, skimmed/ non-fat milk, standardized milk, reconstituted milk, ultra heat treated/ ultra high temperature (U.H.T.) milk, flavoured milk, toned milk, lactose hydrolyzed milk, commercially sterile milk and fortified milk.

This Standard is subject to the restrictions imposed under the Sri Lanka Food Act No. 26 of 1980 and the Animal Diseases Act No. 59 of 1992 and the regulations and amendments framed thereunder, and other applicable regulatory and statutory requirements.

For the purpose of whether a particular requirement of this Standard is complied with, the final value, observed deciding or calculated, expressing the results of an analysis shall be rounded off in accordance with **SLS 102**. The number of significant places to be retained in the rounded off value should be the same as that of the specified value in this Standard.

In the preparation of this Standard, the assistance derived from the following publications is gratefully acknowledged.

CODEX CXS 206 - 1999	General standard for the use of dairy terms
CODEX CXS 193 - 1995	General standard for contaminants and toxins in food and feed
CAC/ RCP 57 : 2004	Code of hygienic practice for milk and milk products

1 SCOPE

1.1 This Standard prescribes the requirements and methods of sampling and test for processed liquid milk.

1.2 This Standard applies for processed liquid milk obtained from milking of cattle, buffalo, goat.

1.3 This Standard does not cover raw milk and milking done at farms.

2 REFERENCES

SLS	102	Rules for rounding off numerical values
SLS	143	Code of hygienic practice for general principles of food hygiene
SLS	191	White sugar
SLS	393	Code of practice for preparation of test samples, initial suspension and decimal dilutions for microbiological examination of food and animal feeding stuffs Part 5: Specific rules for the preparation of milk and milk products
SLS	428	Random sampling methods
SLS	516	Methods of test for microbiology of food and animal feeding stuffs Part 1: Horizontal method for the enumeration of microorganisms Section 1: Colony count at 30 °C by the pour plate technique Part 3: Horizontal method for the detection and enumeration of coliforms Section 1: Most probable number technique Part 5: Horizontal method for the detection of *Salmonella* spp. Part 6: Horizontal method for the enumeration of coagulase-positive Staphylococci (*Staphylococcus aureus* and other species) Section 1: Technique using Baired-Packer agar medium Part 10: Commercial sterility of low acid and acid canned foods Part 12: Horizontal method for the detection and enumeration of presumptive *Escherichia coli* (Most probable number technique) Part 15: Horizontal method for the detection and enumeration of *Listeria monocytogenes* and of *Listeria* spp. Section 1: Detection method
SLS	614	Potable water
SLS	872	Code of hygienic practice for dairy industry
SLS	883	Brown sugar
SLS	910	Maximum residue limits for pesticides in food
SLS	1558	Methods of tests for microbiology of milk and milk products Part 2: Enumeration of presumptive *Escherichia coli* Section 1: Most probable number technique using 4-methylumbelliferyl-β-D- glucuronide (MUG)
SLS	1800	Raw milk
SLS ISO	14501	Milk and milk powder - Determination of aflatoxins M_1 content- Clean-up by immunoaffinity chromatography and determination by high-performance liquid chromatography
DSLS ISO	14673-1	Milk and milk products — Determination of nitrate and nitrite contents — Part 1: Routine method
SLS ISO	14674	Milk and milk powder - Determination of aflatoxins M_1 content- Clean-up by immunoaffinity chromatography and determination by thin layer chromatography
SLS	735 P 1 S 14	Methods of tests for milk and milk products – Part 1: Determination of fat content – Section 14: Milk, dried milk products and cream – Gravimetric method
SLS	735 P 22	Methods of tests for milk and milk products – Part 22: Determination

of lactose content by high-performance liquid chromatography (Reference method)

SLS 735 P 24 Methods of tests for milk and milk products – Part 24: Determination of antimicrobial residues – Tube diffusion test

SLS 735 P 27 S 1 Methods of tests for milk and milk products – Part 27: Determination of alkaline phosphatase activity – Section 1: Fluorimetric method for milk and milk-based drinks

Official Methods of Analysis of the Association of Official Analytical Chemist, 21st Edition 2019

3 DEFINITIONS

For the purpose of this Standard, the following definitions shall apply:

3.1 milk: normal mammary secretion, free from colostrum obtained from one or more milking of healthy animals without either addition to it or extraction from it, intended for consumption as liquid milk or for further processing

3.2 raw/ fresh/ unprocessed milk: Milk in its natural liquid form and such milk may be chilled, but has not been subjected to chemical treatment or physical treatment other than straining intended to alter the quality or compositional characteristics of the milk

3.3 standardized milk: Milk that has been standardized to fat and milk solids non-fat as set out in Table **1**

3.4 semi-skimmed/ low fat milk: Milk prepared by the partial removal of milk fat from milk to satisfy the milk fat, as set out in Table **1**

3.5 skimmed milk/ non-fat milk: Milk from which almost all the milk fat has been removed to satisfy the milk fat, as set out in Table **1**

3.6 pasteurized milk: Milk that has been heated in such a way that every particle of milk is heated to at least 63 ˚C and not more than 65 ˚C and held continuously at that temperature for at least 30 minutes or heated to at least 71.5 ˚C and held at that temperature continuously for at least 15 seconds or any other approved time-temperature combination equivalent thereto, eliminate the milk-borne pathogens and to extend the shelf-life that will serve to give a negative phosphatase test, and cooled immediately to a temperature of 4 ˚C and kept at a temperature of not more than 6 ˚C until end of the shelf-life period

3.7 sterilized milk: Milk that has been heated to at least 121 ˚C and held at that temperature continuously for at least 20 minutes or any other approved time-temperature combination and maintained without appreciable loss of volume, sufficient to render it **"**commercially sterile**"** and shall be packaged in hermetically sealed containers

3.8 ultra heat treated/ ultra high temperature (UHT) milk: Milk that has been heated, without appreciable loss of volume, to a temperature of 140 ˚C for 2 to 3 seconds or a temperature between 135 ˚C to 150 ˚C with an appropriate holding time and then filled and sealed aseptically into sterile containers to achieve "commercial sterility"

3.9 flavoured milk: A product prepared from milk and permitted flavouring substances and with or without addition of optional ingredients given in clause **5.2** and effectively heat treated by one of the methods given in clauses **3.6**, **3.7** and **3.8**

3.10 toned milk: Milk that has been standardized to fat and milk solids non-fat percentage set out in Table **1.** It shall be pasteurised or sterilized and shall show a negative phosphatase test

3.11 lactose hydrolyzed milk: The product obtained from milk treated with the enzyme lactase to give a low lactose milk, containing glucose and galactose and shall comply with the lactose, as given in clause **6.3.2**

3.12 recombined milk product: The product resulting from the combining of milk fat and milk-solids-non-fat in their preserved forms with or without addition of water to achieve the appropriate milk product composition

3.13 commercially sterile: Any condition which is free of viable microorganisms, including spores, of public health significance and microorganisms capable of reproducing in the food under normal conditions of storage and distribution

4 TYPES

4.1 Standardized milk
4.2 Semi skimmed/ low fat milk
4.3 Skimmed milk/ non-fat milk
4.4 Flavoured milk
4.5 Semi skimmed/ low fat flavoured milk
4.6 Skimmed/ non fat flavoured milk
4.7 Toned milk
4.8 Lactose hydrolysed milk
4.9 Recombined milk

NOTE
*These types could be effectively heat treated by one of the methods given in clauses **3.6**, **3.7** and **3.8***

5 INGREDIENTS

5.1 Basic ingredients

5.1.1 *Raw Milk*, conforming to SLS: 1800

5.2 Optional ingredients

In addition to the basic ingredient given in **5.1**, processed milk may contain one or more of the substances given below.

5.2.1 *Water*, conforming to **SLS 614** - only permitted for recombined milk and flavoured milk

5.2.2 *Sugar*, conforming to **SLS 191** or **SLS 883**

5.2.3 *Vitamins and minerals*

5.2.4 Prebiotics

5.2.5 *Food additives*

5.2.5.1 Permitted colouring substances, natural or artificial

5.2.5.2 Flavouring ingredients or permitted flavouring substances, natural or artificial

5.2.5.3 Acidity regulators

Sodium dihydrogen citrate	INS 331 (i)	Limited by GMP
Trisodium citrate	INS 331 (iii)	
Potassium dihydrogen citrate	INS 332 (ii)	
Sodium hydrogen carbonate	INS 500 (ii)	
Potassium hydrogen carbonate	INS 501 (ii)	
Sodium dihydrogen phosphate	INS 339 (i)	1320 mg/ kg as Phosphorous
Disodium hydrogen phosphate	INS 339 (ii)	
Trisodium phosphate	INS 339 (iii)	

5.2.5.4 Emulsifiers and Stabilizers – Limited by GMP

Sodium alginate	INS 401
Potassium alginate.	INS 402
Ammonium alginate	INS 403
Carrageenan	INS 407
Lecithin	INS 322
Pectins	INS 440
Microcrystalline cellulose	INS 460 (i)
Mono and diglycerides of fatty acids	INS 471
Xanthan gum	INS 415
Guar gum	INS 412
Sodium carboxymethyl cellulose	INS 466
Carob (Locust) bean gum	INS 410

5.2.4.5 Sweeteners (only for 'energy reduced' or 'no sugar added' products).

Sucralose	INS 955	300 mg/ l
Neotame	INS 961	20 mg/ l
Stevia	INS 960	Limited by GMP

NOTE

The food additives specified in clause 5.2.5 *may be added, within the limits specified, only in flavoured milk*

6 REQUIREMENTS

6.1 Hygiene requirements

6.1.1 Milk shall be processed, packaged, stored and distributed under hygienic conditions as prescribed in **SLS 143** and **SLS 872**.

6.2 General requirements

6.2.1 The product shall have a characteristic odour and flavour.

6.2.2 The product shall be remained homogeneous and no deposition of solids take place on standing.

NOTE
Slight depositions may be observed in flavoured milk added with cocoa and/or coffee.

6.2.3 The product shall be free from dirt and extraneous matter.

6.3 Compositional requirements

6.3.1 The product shall conform to the requirements given in Table **1**, when tested according to the methods given in Column **12** of the table.

TABLE 1 – Compositional requirements for processed liquid milk

Sl No	Characteristics	Requirement									Method of test
		Pasteurized, Sterilized, or UHT									
		Standardized	Semi skimmed /Low fat	Skimmed/ Non fat	Flavoured	Semi skimmed/ Low fat flavoured	Skimmed /Non fat flavoured	Toned	Lactose hydrolysed	Recombined	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
i)	Milk fat, per cent by mass m/ m	3.3 (min)	0.5-1.9	0.5 (max)	2.0 (min)	0.5-1.9	0.5 (min)	2.0 (max)	3.3 (min)	3.3 (min)	SLS 735 P 1 S 14
ii)	Milk solids non-fat, per cent by m/ m (min)	8.2	8.5	8.5	7.2	7.2	8.0	8.5	5.0	8.3	Appendix **B** and **C**

6.3.2 Lactose content in lactose hydrolysed milk shall not exceed 1.25 per cent by mass when tested according to the method given in **SLS ISO 22662**.

6.4 Microbiological limits

6.4.1 *Pasteurized milk*

The product shall not exceed the microbiological limits given in Table **2**, when tested according to the methods given in Column **7** of the table.

TABLE 2 – Microbiological limits

Sl No	**Test organism**	**n**	**c**	**Limit**		**Method of Test**
				m	**M**	
(1)	(2)	(3)	(4)	(5)	(6)	(7)
i)	Aerobic plate count, cfu per ml	5	3	3×10^4	5×10^4	**SLS 516: Part 1/ Section 1**
ii)	Coliforms, MPN per ml	5	0	Absent	-	**SLS 516: Part 3/ Section 1 Enumeration method**
iii)	*Escherichia coli*, MPN per ml	5	0	Absent	-	**SLS 516: Part 12** or **SLS 1558: Part 2/ Section 1**
iv)	*Staphylococcus aureus*, cfu per ml (coagulase positive)	5	0	Absent	-	**SLS 516: Part 6/ Section 1**
v)	*Salmonella* spp., in 25 ml	5	0	Absent	-	**SLS 516: Part 5**
vi)	*Listeria monocytogenes* and *Listeria* spp., in 25 ml	5	0	Absent	-	**SLS 516: Part 15/ Section 1**

where,
n is the number of sample units to be tested;
c is the maximum allowable number of sample units yielding values between m and M;
m is the limit under which a count is acceptable for any sample unit; and
M is the limit above which a count is unacceptable for any sample unit.

6.4.2 *Sterilized milk and UHT milk*

The product shall be processed to achieve “commercial sterility”, when tested in accordance with the method given in **Part 10** of **SLS 516.**

7 CONTAMINANTS

7.1 Aflatoxins

The product shall not exceed the level 0.5 µg/ kg for aflatoxin M_1, when determined according to the method given in **SLS ISO 14674** or **SLS ISO 14501**.

7.2 Veterinary drug residues

The product shall not exceed the limit for veterinary drugs residues given in Table **3** when determined in accordance to the method given in **DSLS 735 Part 24**.

TABLE 3 - Limits for veterinary drug residues

Sl No (1)	**Veterinary drug residues** (2)	**Limit** (3)
i)	Ampicillin, µg/kg, max.	4
ii)	Cephelexin, µg/kg, max.	100
iii)	Cloxacillin, µg/kg, max.	30
iv)	Flumequine, µg/kg, max.	50
v)	Clavulanic acid, µg/kg, max.	200
vi)	Sum of Enrofloxacin and ciprofloxacin, µg/kg, max.	100
vii)	Sulfaquinoxaline, µg/kg, max.	0 .01

NOTE
Not for routine analysis.

7.3 Potentially toxic elements

The product shall not exceed the limits for potentially toxic elements given in Table **4** when tested in accordance with the method prescribed in Column **4** of the table.

TABLE 4 - Limits for potentially toxic elements

Sl No (1)	**Potentially toxic element** (2)	**Limit** (3)	**Method of test** (4)
i)	Lead as Pb, on wet basis, mg/ kg, max.	0. 02	**AOAC 999.10/ AOAC 2013.06**
ii)	Arsenic as As, on wet basis, mg/ kg, max.	0. 1	**AOAC 999.10/ AOAC 2013.06**

DSLS:

7.4 Nitrates

Processed milk shall not exceed the limit 0.4 mg/ kg for nitrates when tested according to the method given in DSLS ISO 14673-1.

7.5 Pesticide residues

The product shall be processed, so that residues of pesticides do not remain or if practically unavoidable are reduced to the minimum level to comply with the maximum tolerable limits specified in **SLS 910.**

NOTE
It is not necessary to carry out this determination as a routine for all the samples. This should be tested in case of dispute and when required by the purchaser or vendor or when there is any suspicion of pesticide contamination.

8 PACKAGING

Processed milk shall be packaged in a food grade material/ container which is impermeable and non absorbent. It shall be sufficiently inert to preclude substances from being transferred to food in quantities large enough to endanger human health or to bring about an unacceptable change in the composition of the product or deterioration in its organoleptic properties. If the material/ container is printed, the printing ink shall not penetrate to the product.

9 MARKING AND/ OR LABELLING

The following shall be marked and/ or labelled legibly and indelibly on each container destined for the final consumer:

a) Name of the product including the type;
b) If product is flavoured denote as "X-flavoured milk" (where "X" denotes the flavour used);
c) Source of milk should be identified as buffalo, cow, goat;
d) Description of the heat treatment, the product has undergone (pasteurized, sterilized or UHT) in similar sized font of the product name;
e) Brand name or trade name, if any;
f) Net volume in 'ml' or 'l';
g) List of ingredients, in descending order of their proportion, if any;
h) Any permitted food additives name and INS number; if any;
j) The name and address of the manufacturer and distributer or importer;
k) Batch or code number or a decipherable code marking;
m) Date of manufacture;
n) Date of expiry;
p) Instructions for storage**,** if applicable;
q) Where a permitted sweetener or a combination of permitted sweeteners is used, following shall be written on the label of the package; "contains permitted sweeteners "Y" and "Z" and substituting for the letter(s) "Y" and "Z" the name(s) of any permitted sweetener used; and

r) the word “fresh” cannot be used

9 SAMPLING

Representative samples of milk shall be drawn according to the method prescribed in Appendix **A.**

10 METHODS OF TEST

Test shall be carried out as specified in **Section 1** of **Part 1**, **Section 1** of **Part 3**, **Part 5**, **Section 1** of **Part 6**, **Part 10**, **Part 12** and **Section 1** of **Part 15** of **SLS 516, Part 24** of **SLS 735, Section 1** of **Part 2** of **SLS 1558**, **SLS ISO 14501, DSLS ISO 14673-3, SLS ISO 14674, SLS ISO 22662, ISO 26844,** Appendix **B, C** and **D** of this Standard and Official Methods of Analysis of the Association of Official Analytical Chemist, 21st Edition 2019.

11 CRITERIA FOR CONFORMITY

A lot shall be declared as conforming to the requirements of this Standard if all the test results satisfy the relevant requirements.

11.1 Each container inspected as in **A.4.1.1** or **A.4.2.1** satisfies the packaging and marking and/ or labelling requirements given in this Standard.

11.2 Each sample tested as in **A.4.1.2,** satisfies the general, requirements given in this Standard.

11.3 Each sample tested as in **A.4.1.3**, satisfies the compositional requirements given in this Standard.

11.4 Samples tested as in **A.4.1.4**, satisfies the microbiological requirements given in this Standard.

11.5 Each sample tested as in **A.4.1.5**, satisfies the requirements given in **6.5.2** for Sterilized milk and UHT milk

APPENDIX A
SAMPLING

A.1 LOT

In any consignment, all the containers of the same size and belonging to one batch of manufacture or supply shall constitute a lot.

A.2 GENERAL REQUIREMENTS OF SAMPLING

When taking samples, the following precautions shall be taken:

A.2.1 Samples shall be drawn in a protected place not exposed to damp air, dust or soot.

A.2.2 The samples for microbiological analysis shall be drawn first.

A.2.3 The samples shall be protected against adventitious contamination.

A.2.4 The sampling instruments (*see* Appendix **F**) shall be clean and dry when used. When taking samples for microbiological examination, the sampling instruments shall be sterilized.

A.2.5 The samples shall be kept in glass or suitable containers. They shall be clean and dry when used. The samples for microbiological examination shall be kept in sterilized containers. (see Appendix **E**)

A.2.6 All sampling equipments and containers shall be sterilized by either of the following methods:

Hot air method

a) Heating in a hot air-oven for not less than 2 hours at 160 ˚C or
b) Heating in a sterilizing oven for at least 1 hour at 170 ˚C ± 3 ˚C

or

Autoclave method

Autoclaving for 121 ˚C ± 3 ˚C for at least 15 minutes

A.2.7 The samples shall be stored in such a manner that there will be no deterioration of quality of the material.

A.2.8 The sample containers shall be sealed air-tight after filling and marked with necessary details of sampling.

A.2.9 Samples shall be examined within 24 hours of receipt at the laboratory and shall be held at 6 ˚C to 10 ˚C until the commencement of testing. (except sterilized and UHT milk)

A.3 SCALE OF SAMPLING

A.3.1 The samples shall be tested from each lot for ascertaining its conformity to the requirements of this Standard.

A.3.2 The number of containers to be selected from a lot shall be in accordance with Table **4** or **A.3.7** as applicable.

A.3.3 Sampling from retail containers

TABLE 5 - Scale of sampling for retail containers

Number of retail containers in the lot (1)	Number of retail containers to be selected (2)
Up to 1200	5
1201 to 35000	8
Above 35000	13

A.3.3.1 Each container as selected in A.3.3 shall be individually tested for compositional requirements given in clause **6.3** of this Standard shall be carried out on each container

A.3.3.2 In addition to the Table **5**, 5 samples (5 containers) shall be drawn for the microbiological testing given in **6.4.1** (in case of pasteurized products)
Appendix E

A.3.3.3 In addition to the Table **4**, 9 samples (9 containers) shall be drawn for the microbiological testing given in **6.4.2** (in case of sterilized and UHT products)

A.3.3.4 C*omposite sample*
After conducting the compositional analysis, the content left shall composite to form a composite sample

A.3.3.3 The retail containers shall be selected at random. In order to ensure randomness of selection, random number tables as given in **SLS 428** shall be used.

A.3.5 Reference sample

A.3.5.1 If a reference sample is required for analysis (except microbiological, potentially toxic elements, Aflatoxin examination) number of containers selected from the lot shall be three times the number specified in Table **3** in case of retail containers and containers so obtained, shall be divided into three equal sets.

If a reference sample is required, the number of containers to be selected from a lot shall be three times the number given in Column **2** of Table **5.** The containers so selected shall be divided into three equal parts. One of these parts shall be marked for the purchaser, one for the supplier and third for the referee.

A.4 NUMBER OF TESTS

A.4.1 Each container selected as in **A.3.3, A.3.4** and **A.3.5** shall be examined for packaging and marking and/ or labelling requirements.

A.4.2 Each of the remaining containers selected as in **A.3.2**. or **A.3.3** shall be examined for the general requirements given in clause **6.2.1**, **6.2.2** and **6.2.3**.

A.4.1.3 Tests for compositional requirements given in clause **6.3** of this Standard shall be carried out on each container selected as in **A.3.3**.

A.4.1.4 Five sample units selected as in **A.3.4** shall be tested for microbiological requirements given in Clause **6.4.1** of this Standard for pasteurized milk.

A.4.1.5 Nine sample units selected as in **A.3.5** shall be tested for requirements given in Clause **6.4.2** for Sterilized milk and UHT milk.

A.4.1.6 Composite sample obtained from the units selected as in **A.3.3** shall be tested for Clause **7**.

APPENDIX B
DETERMINATION OF MILK FAT (ROSE-GOTLIEB METHOD)

B.1 APPARATUS

B.1.1 Fat-extraction apparatus

Either of the following apparatus may be used:

a) A fat-extraction tube conforming to the dimensions and capacities given in **Figure 1, 2** or **3** fitted as shown with either a wash-bottle top or a siphon, carrying the two tubes in a two-holed bark cork and provided also with a ground-glass stopper or with a solid bark cork. The solid bark cork used to close the tube shall be sound, free from pores and channels which would allow leakage of solvent, and previously extracted with ether. The narrow tube with the hook-shaped lower end (*see* **Figure 1**, **2** and **3**) is a sliding fit in the cork and of such length that the opening at its lower end may be placed, if necessary, at a distance of 25 mm from the bottom of the tube.

NOTE
Other modifications of the Rohrig tube of the same capacity may also be used.

b) A Mojonnier fat - extraction tube of the dimensions and capacity given in **Figure 3**, closed with a solid bark or ground-glass stopper.

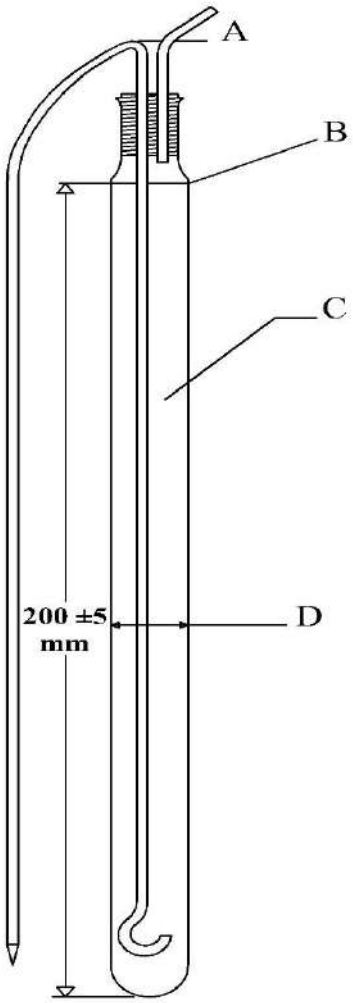

FIGURE 1 (a) - With siphon fitting

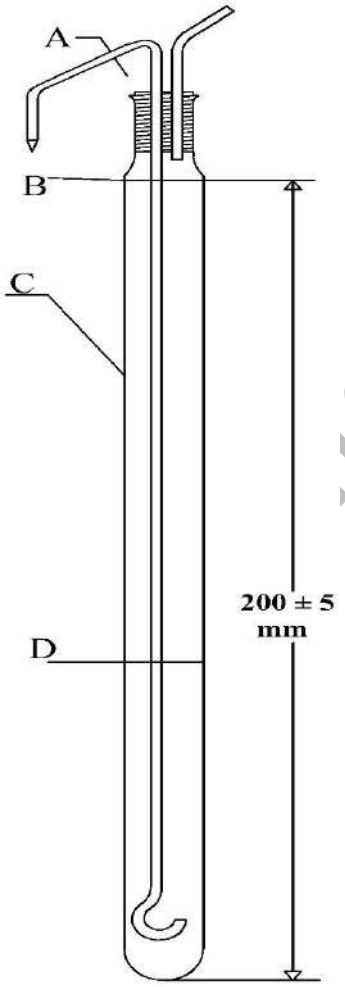

FIGURE 1 (b) - With wash-bottle Fitting

A External diameter of tubing 3.5 mm ± 0 . 5 mm
B Capacity to this level with fittings removed 105 ml ± 5 ml
G Wall thickness 1.5 mm ± 0 . 5 mm
D Internal diameter 26 mm ± 1 mm

FIGURE 1 Fat-extraction apparatus
Minimum bore 4 mm (Max external diameter 6 mm)

DSLS:

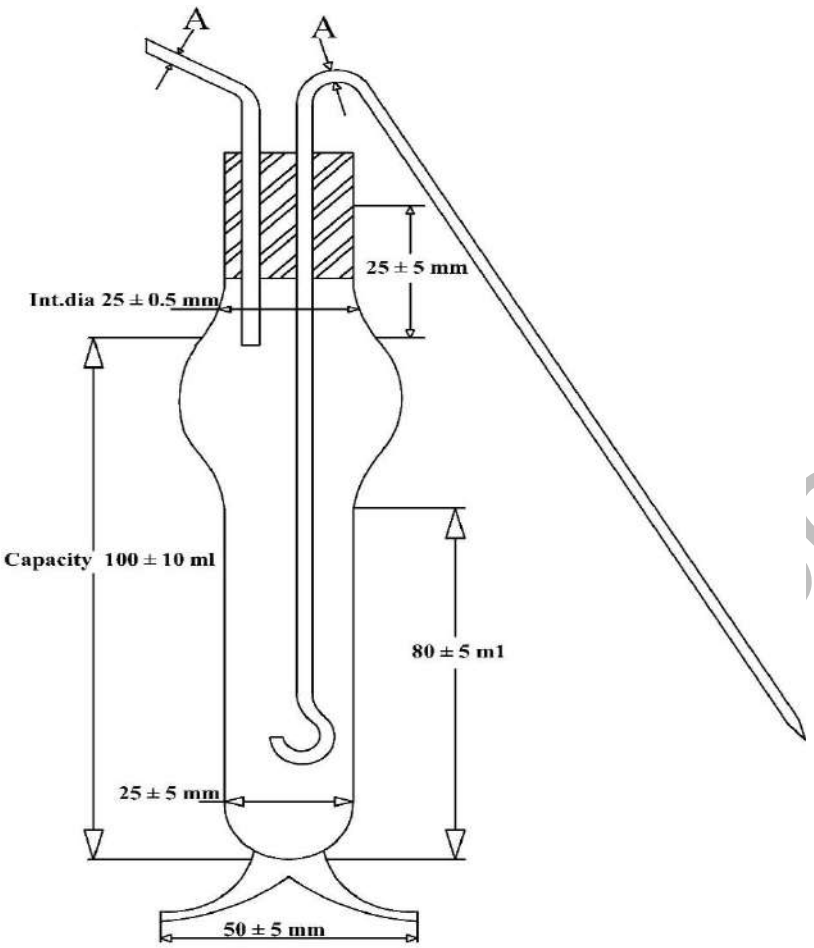

FIGURE 2 Fat extraction apparatus (with siphon fitting)

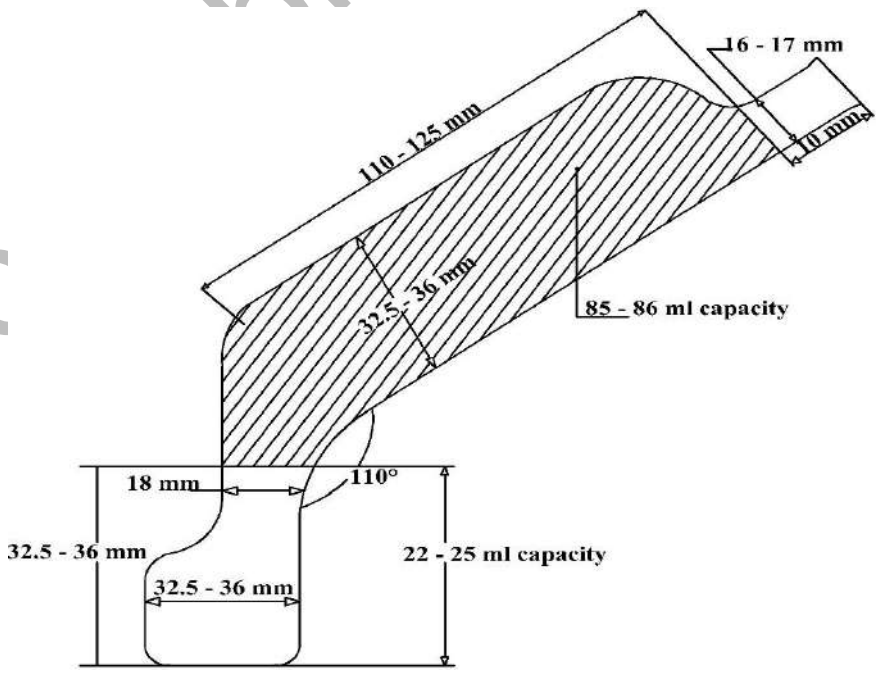

FIGURE 3 Mojonnier – type fat – extraction apparatus

B. 1.2 A well ventilated electrically heated oven, set to operate at 98 ˚C.

B.2 REAGENTS

B.2.1 *Aqueous Ammonia* concentrated, approximately 35 per cent *m/ m*

B.2.2 *Ethyl alcohol,* 95 to 96 per cent *V/ V.*

B.2.3 *Diethyl ether* peroxide free. (The ether may be maintained free from peroxide by storing over a moist zinc-copper couple).

B.2.4 *Light petroleum,* boiling range 40 ˚C to 60 ˚C, recently distilled.

B.2.5 *Mixed solvent,* prepared by mixing equal volumes of the diethyl ether and light petroleum.

B.3 PROCEDURE

B.3.1 Using the fat-extraction tube (**Figure 1**, **2** or **3)**, weigh, to the nearest milligram about 10 g to 11 g of the prepared sample into the extraction tube. Add 1 ml of aqueous Ammonia and mix well. Add 10 ml of alcohol and again mix well. Complete extraction of the fat is dependent on satisfactory mixing at each stage.

Add 25 ml of diethyl ether, close the tube with the cork (or stopper), which is wetted with water before insertion, and shake vigorously for one minute. Remove the cork and, with 25 ml of light petroleum, wash the cork and neck of the tube so that the washings run into the tube. Replace the cork, again wetted with water, and shake, vigorously for 30 seconds. (It is essential that the cork (or stopper) be wetted with water before each insertion and washed with solvent during each removal. Also, before each removal, to avoid spurting of the solvent, a slightly reduced pressure should be induced in the tube by cooling. Rubber stoppers shall not be used.)

Allow the tube to stand until the ethereal layer is clear and completely separated from the aqueous layer, usually for not less than 30 min or centrifuge at about 1000 r.p.m. for 30 minutes. Remove the cork and insert the siphon (or wash-bottle) fitting so adjusted for length that the inlet is 2 mm to 3 mm above the interface between the ethereal and aqueous layers and transfer the ethereal layer to a suitable flask. Add 5 ml of mixed solvent to the extraction tube, using it to wash the siphon or wash-bottle fitting which is raised sufficiently to permit this but not removed from the inside of the tube. Lower the fittings and transfer the solvent to the flask without shaking. Repeat this operation with further 5 ml of mixed solvent. Wash the tip of the siphon fitting into the flask with mixed solvent.

Remove the siphon fitting and repeat the extraction of the milk residue, using 15 ml of ether and 15 ml of light petroleum, and repeat the subsequent operations, as before. Use the ether to wash the inner limb of the siphon (or wash-bottle) fitting during its removal from the tube. Finally repeat the extraction once more with 15 ml each of ether and petroleum.

Distil carefully the solvents from the flask and dry the residual fat in the oven at 98 ˚C

to 100 ˚C for one hour taking precautions to remove all traces of volatile solvent. Cool the flask to room temperature in a desiccator charged with an efficient desiccant and weigh. Repeat this procedure for periods of half an hour until successive weighings do not show a loss in mass by more than one milligram.

Extract completely the fat from the flask by repeated washing with light petroleum, allowing any sediment to settle before each decantation. Dry the flask in the oven, cool and weigh as before. The differences in mass, before, and after the petroleum extractions, subject, if necessary, to a correction for the blank described below, is the mass of fat contained in the mass of milk taken.

Make a blank determination using the specified quantities of reagents throughout, and distilled water in place of the milk, and deduct the value found, if any from the apparent mass of fat. A flask, similar to that used to contain the fat, shall receive the same heating and cooling treatments and shall be used as countermass.

B.3.2 Using the Mojonnier fat-extraction tube (Figure 3)

Weigh, to the nearest milligram about 10 g or 11 g of the prepared sample into the tube. Add one ml of aqueous ammonia and mix well in the lower bulb. Add 10 ml of the alcohol and mix by allowing the liquid to flow backwards and forwards between the two bulbs. (Avoid bringing the liquid too near the neck of the tube). Allow the tube to cool in cold, running water or by immersing in chilled water.

Add 25 ml of ether, close with a bark or glass stopper which is wetted with water-before Insertion, and shake vigorously for one minute.

(It is essential that the cork or stopper be wetted with water before each insertion and washed with solvent during each removal. Also, before each removal to avoid spurting of the solvent a slightly reduced pressure should be induced in the tube by cooling. Rubber stoppers shall not be used).

Open the tube and add 25 ml of light petroleum, close the tube, and shake vigorously for one minute. Allow the tube to stand on the flat bottom of the lower bulb until the ethereal layer is clear and completely separated from the aqueous layer, usually for not less than 30 minutes or centrifuge until clear. Examine the tube to see if the junction of the liquid is at the lower end of the narrow neck of the tube.

If it is below this, it should be raised by the addition of a little distilled water run down the side of the tube.

Carefully decant as much as possible of the supernatant layer into a suitable flask by gradually bringing the cylindrical bulb of the tube into a horizontal position. When as much as possible has been poured off, wash the outside of the neck of the tube and the cork or stopper with mixed solvent, collecting the rinsings in the flask. With the Mojonnier tube in a vertical position, wash the inside of the neck with 4 ml to 5 ml of mixed solvent, and decant.

Repeat the extraction of the milk residue and the subsequent operations but using 15 ml of ether and 15 ml of petroleum.

Finally repeat the extraction and subsequent operations once more with 15 ml each of ether

and petroleum.

Distil carefully the solvents from the flask and dry the residual fat in the oven at 98 ˚C to 100 ˚C for one hour taking precautions to remove all traces of volatile solvent. Cool the flask to room temperature in a desiccator charged with an efficient desiccant and weigh. Repeat this procedure for periods of half an hour until successive weighings do not show a loss in mass by more than one milligram. Extract completely the fat from the flask by repeated washing with light petroleum, allowing any sediment to settle before each decantation, dry the flask in the oven, cool and weigh as before. The difference in mass before, and after the petroleum extractions, subject, if necessary, to a correction for the blank described below, is the mass of fat contained in the mass of milk taken.

Make a blank determination using the specified quantities of reagents throughout, and distilled water in place of milk, and deduct the value found, if any, from the apparent mass of fat. A flask similar to that used to contain the fat shall receive the same heating and cooling treatments and shall be used as a countermass.

APPENDIX C
DETERMINATION OF MILK SOLIDS OTHER THAN MILK FAT

For the purpose of this Standard, the term “total solids” is applied to the dry residue obtained when the milk is treated as described in the method below. The method is not applicable to milks having a titratable acidity exceeding 0.20 per cent m/ V expressed as lactic acid.

C.1 APPARATUS

C.1.1 A flat-bottomed, metal dish, 70 mm to 80 mm in diameter and 10 mm to 25 mm deep, provided with an easily removable but closely fitting lid. Aluminium, nickel and stainless steel are suitable metals.

C.1.2 A well ventilated, electrically heated oven, set to operate at 100 ˚C ± 1 ˚C.

C.2 PROCEDURE

Heat the uncovered empty dish and lid in the oven for at least 30 minutes. Place in a desiccator charged with an efficient desiccant, such as silica gel or phosphoric oxide, and allow to cool to room temperature (usually for 30 minutes to 45 minutes) and weigh accurately. Pipette 3 ml to 4 ml of the milk into the dish, cover the dish with the lid and weigh again. Place the dish uncovered, on a rapidly boiling water bath so that the bottom of the dish is in direct contact with steam or in close contact with a thin metal plate (e.g. aluminium, copper or stainless steel) fitted on top of the bath. To promote uniform drying, ensure that the base of the dish is horizontal.

After about 30 minutes, the film of milk solids should appear dry and cracked. Remove the dish

from the bath, wipe the outside free of any moisture and transfer it to the oven. Place the lid by the dish. Use a shelf near the middle of the oven, keep the dish away from the walls and insulate the bottom of the dish from the surface of the shelf. The bulb of the thermometer registering the air temperature in the oven should be immediately above the shelf carrying the dish.

After 2.5 hours, cover the dish with the lid, transfer it immediately to the desiccator, allow to cool as before and weigh. Repeat the heating for periods of 1 hour, cooling and weighing, until the loss of the mass between successive weighings does not exceed 0.5 mg.

C.3 CALCULATION

Solids not fat = Total solids per cent by mass-fat per cent by mass (reading obtained from Appendix **B**).

$$Total\ \ solids,\ \ per\ \ cent,\ by\ \ mass = \frac{m_1}{m_2}\ \text{x}\ 100$$

where

m_1 = mass, in g, of the residue after drying; and
m_2 = mass, in g, of the prepared sample taken for the test.

APPENDIX D
DETERMINATION OF MILK SOLIDS OTHER THAN MILK FAT IN FLAVOURED MILK

Determine the total solids other than milk fat as given in Appendix **C**. The total solids determined by this method includes any sucrose added to the flavoured milk. Determine the amount of sucrose present by the methods given below and subtract this value from the value obtained for total solids other than milk fat by the method given in Appendix **C**.

D.1 DETERMINATION OF REDUCING SUGARS

D.1.1 Reagents

D.1.1.1 Stock solution of dextrose, weigh to the nearest milligram about 10 g of anhydrous dextrose into a 1-litre graduated flask and dissolve it in water. Add to this solution 2.5 g of Benzoic acid, shake to dissolve the Benzoic acid and make up the volume to the mark with water. (This solution shall not be used after 48 hours)

D.1.1.2 Standard dextrose solution, dilute a known aliquot of the stock solution of dextrose (*see* **D.1.1.1**) with water containing 0.25 per cent *(m/V)* of Benzoic acid to such a concentration that more than 15 ml but less than 50 ml of it will be required to reduce all the copper in the Fehling's solution taken for titration. Note the concentration of anhydrous dextrose in this solution as milligrams per 100 ml (*see* Note), prepare this solution fresh every day.

NOTE
When 10 ml (see **D.1.3.1.a**) *of Fehling's solution are taken for titration, a standard dextrose solution containing 0.11 to 0.30 per cent (m/V) of anhydrous dextrose is convenient for use.*

D.1.1.3 *Methylene blue indicator solution,* dissolve 0.2 g of methylene blue in water and dilute to 100 ml.

D.1.1.4 *Petroleum ether,* re-distilled below 60 ˚C.

D.1.1.5 *Fehling's solution (Soxhlet modification),* prepared by mixing immediately before use, equal volumes of Solution A and Solution B.

a) Solution A

Dissolve 34.639 g of Copper sulphate ($CuSO_4.5H_2O$) in water, add 0.5 ml of concentrated Sulphuric acid of relative density 1.84 and dilute to 500 ml in a graduated flask. Filter the solution through prepared asbestos.

b) Solution B

Dissolve 173 *g* of rochelle salt (Potassium sodium tartrate ($KNaC_4H_4O_6.4H2O$) and 50g of Sodium hydroxide, analytical reagent in water, dilute to 500 ml in a graduated flask and allow the solution to stand for two days. Filter the solution through prepared asbestos.

a) Standardization of Fehling's solution

Pour standard dextrose solution (*see* **D.1.1.2**) into a 50-ml burette (*see* Note **3** under **D.l.2.3**). Find the titre (that is, the volume of standard dextrose solution required to reduce all the copper in 10 ml of Fehling's solution) corresponding to the concentration of standard dextrose solution from Table **5**. (If, for example, the standard dextrose solution contains 167.0 mg of anhydrous dextrose per 100 ml, the corresponding titre would be 30 ml). Pipette 10 ml (*see* **D.1.3.1.a**) of Fehling's solution into a 300-ml conical flask and run in from the burette almost the whole of the standard dextrose solution required to effect reduction of all the copper, so that not more than one millilitre will be required later to complete the titration. Heat the flask containing the mixture over a wire gauze. Gently boil the contents of the flask for 2 minutes. At the end of 2 minutes of boiling, add without interrupting boiling, one millilitre of methylene blue indicator solution. While the contents of the flask continue to boil, begin to add standard dextrose solution (one or two drops at a time) from the burette till the blue colour of the indicator just disappears. (The titration should be completed within one minute, so that the contents of the flask boil altogether for 3 minutes without interruption (*see* Note **2** under **D.1,2.3**). Note the titre (that is the total volume in millilitres of standard dextrose solution used for the reduction of all the copper in 10 ml of Fehling's solution.) Multiply the titre (obtained by direct titration) by the number of milligrams of anhydrous dextrose in one millilitre of the standard dextrose solution to obtain the dextrose factor. Compare this factor with the dextrose factor given in Table **6** and determine correction, if any, to be applied to the dextrose factor derived from Table **6**.

DSLS:

Example

Concentration in mg/100 ml of anhydrous dextrose of standard dextrose solution	=	167.0
Titre in millilitre obtained by direct titration	=	30.1
Dextrose factor for 30.1 ml of standard dextrose solution	=	Titre in millilitre X number of milligrams of anhydrous dextrose in one millilitre of standard dextrose solution
	=	30.1×1.670
	=	50.2670
Dextrose factor for 30.1 ml of standard dextrose solution from Table **5** (calculated by interpolation)	=	50.11
Correction to be applied to the dextrose factor derived from Table **6**	=	50.2670-50.11
	=	+0.1570

D. 1.2 Procedure

D.1.2.1 *Preparation of solution*

Weigh to the nearest milligram about 3 g to 4 g of the prepared sample (*see* **D.l.1.1**) in Soxhlet extraction thimble and extract the fat in a Soxhlet apparatus using petroleum ether. Take out carefully the thimble along with the fat-free material from the Soxhlet apparatus and dry the same to be free from the petroleum ether. Dissolve carefully the entire fat-free sample in a small quantity of water in a beaker. If necessary, add water to the thimble and dissolve the adhering material. Collect the washings into the beaker. Warm to a temperature of 50 ˚ C to 60 ˚C. Cool it. Filter through a Whatman filter paper No. 40 or its equivalent, collecting the filtrate in a 100-ml graduated flask. Wash the filter paper and the insoluble starch residue, if any, on the filter paper carefully. Collect the washings in the graduated flask. Make up to the mark with water.

TABLE 6 - Dextrose factors for 10 ml of Fehling's solution
(*see* D.1.1.5.C)

Titre ml (1)	**Dextrose factor*** (2)	**Dextrose content per 100 ml of solution, mg** (3)
15	49 .1	327
16	49 .2	307
17	49 .3	289
18	49 .3	274
19	49 .4	260
20	49 .5	247 .4
21	49 .5	235 .8
22	49 .6	225 .9
23	49 .7	216 .1
24	49 .8	207 .4
25	49 .8	199 .3
26	49 .9	191 .8
27	49 .9	184 .9
28	50 .0	178 .5
29	50 .0	172 .5
30	50 .1	167 .0
31	50 .2	161 .8
32	50 .2	156 .9
33	50 .3	152 .4
34	50 .3	172 .5
35	50 .4	167 .0
36	50 .4	140 .0
37	50 .5	136 .4
38	50 .5	132 .9
39	50 .6	129 .6
40	50 .6	126 .5
41	50 .7	123 .6
42	50 .7	120 .8
43	50 .8	118 .1
44	50 .8	115 .5
45	50 .9	113 .0
46	50 .9	110 .6
47	51 .0	108 .4
48	51 .0	106 .2
49	51 .0	104 .1
50	51 .1	102 .2

*Milligrams of anhydrous dexterous corresponding to 10ml of Fehling's solution.

D.1.2.2 *Incremental method of titration*

Pour the prepared solution (*see* **D. 1.2.1**) into a 50-ml burette (*see* Note **3** below **D.1.2.3**). Pipette 10 ml of Fehling's solution into a 300-ml conical flask and run in from the burette 15 ml of the prepared solution. Without further dilution, heat the contents of the flask over a wire gauze, and boil. (After the liquid has been boiling for about 15 seconds, it will be possible to judge if almost all the copper is reduced, by the bright red colour imparted to the boiling liquid by the suspended cuprous oxide.) When it is judged that nearly all the copper is reduced, add one millilitre of methylene blue indicator solution (*see* Note **1**), Continue boiling the contents of the flask for one to two minutes from the commencement of ebullition, and then add the prepared solution in small, quantities (one millilitre or less at a time), allowing the liquid to boil for about 10 seconds between successive additions, till the blue colour of the indicator just disappears (*see* Note **2** below **D.1.2.3**). In case there still appears to be much unreduced copper after the mixture of Fehling's solution with 15 ml of the prepared solution has been boiling for 15 seconds, add the prepared solution from the burette, in larger increments (more than one millilitre at a time according to judgement), and allow the mixture to boil for 15 seconds after each addition. Repeat the addition of the prepared solution at intervals of 15 seconds until it is considered unsafe to add a large increment of the prepared solution. At this stage, continue the boiling for an additional one to two minutes, and one millilitre of methylene blue indicator solution and complete the titration by adding the prepared solution in small quantities (less than one millilitre at a time) (*see* also Note **2**).

NOTES

1) It is advisable not to add the indicator until the end point has been nearly reached because the indicator retains its full colour until the end point is almost reached and thus gives no warning to the operator to go slowly.

2) When the operator has had a fair amount of experience with the method a sufficiently accurate result may often be obtained by a single estimation by the incremental method of titration. For the utmost degree of accuracy of which the method is capable a second titration should be carried out by the standard method of titration (see **D.l.2.3**).

D.1.2.3 *Standard method of titration*

Pipette 10 ml of Fehling's solution into a 300-ml conical flask and run in from the burette almost the whole of the prepared solution required to effect reduction of all the copper (determined under **D.1.2.2**) so that, if possible, not more than one millilitre will be required later to complete the titration. Gently boil the contents of the flask for 2 minutes. At the end of 2 minutes of boiling, add without interrupting boiling, one millilitre of methylene blue indicator solution. While the contents of the flask continue to boil, begin to add the prepared solution (one or two drops at a time) from the burette till the blue colour of the indicator just disappears (*see* Note **1**). (The titration should be completed within one minute so that the contents of the flask boil altogether for 3 minutes without interruption (*see* Note **2**).

In case of doubt, the flame may be removed from the wire gauze for one or two seconds and the flask held against a sheet of white paper.

(A holder of paper, suitably fixed around the neck of the flask, is very convenient for this

purpose as it can be left round the neck of the flask, without risk of overbalancing it). The top edge of the liquid would appear bluish if the indicator is not completely decolourized. It is inadvisable to interrupt the boiling for more than a few seconds as the indicator undergoes back oxidation rather rapidly when air is allowed free access into the flask, but there is no danger of this as long as a continuous stream of steam is issuing from the mouth of the flask.

NOTES

1) *The indicator is so sensitive that it is possible to determine the end point within one drop of the prepared solution in many cases. The complete decolouration of the methylene blue is usually indicated by the whole reaction liquid, in which the cuprous oxide is continuously churned up becoming red or orange in colour*.

2) *It should be observed that with both incremental and standard methods of titration, the flask containing the reaction mixture is left on the wire gauze over the flame throughput the titration, except when it may be removed for a few seconds to ascertain if the end point is reached.*

3) *In adding sugar solution to the reaction mixture, the burette may be held in hand over the flask. The burette may be fitted with a small outlet tube bent twice at right angles, so body of the burette can be kept out of the steam while adding sugar solution. Burettes with glass taps are unsuitable for this works as the taps become heated by the steam and are liable to jam.*

D.1.3 Calculation

D.l.3.1 Refer to Table **6** for the dextrose factor corresponding to the titre (determine as given under **D.1.2.3**) and apply the correction previously determined under **D.1.1.5.c**). Calculate the dextrose content of the prepared solution (*see* **D.1.2.1**) as follows:

$$\text{Milligrams of anhydrous dextrose present in one millilitre of the prepared solution} = W = \frac{\text{Dextrose factor}}{\text{Titre}}$$

D.l.3.1 Instead of using 10 ml of Fehling's solution, a 25 ml portion may also be substituted throughout the procedure (including 'standardization of Fehling's solution' under **D.l.l.5.c**). In this case, the standard dextrose solution, used in standardizing the Fehling's solution and the prepared solution of the material (*see* **D.l.2.1**) shall contain 0.25 per cent to 0.75 per cent *(m/ V)* of anhydrous dextrose, and Table **6** shall be used for all calculations.

D.1.3.2

$$\text{Reducing sugar per cent,by mass} = \frac{m_1}{m_2} \times 100$$

where,
m_1 = milligrams of anhydrous dextrose in 1 ml solution of the material (*see* **D.1.3.1**); and
m_2 = mass, in g, of the prepared sample used for making 100 ml of solution (*see* **D.l.2.1**).

TABLE 7 - Dextrose factors for 25 ml of Fehling's solution
(*see* D.l.3.1 and D.1.3.1.a)

Titre ml (1)	**Dextrose factor** (2)	**Dextrose content per 100 ml of solution, mg** (3)
15	120 .2	810
16	120 .2	751
17	120 .2	707
18	120 .3	668
19	120 .3	638
20	120 .3	601 .5
21	120 .3	572 .9
22	120 .3	547 .3
23	120 .4	523 .6
24	120 .5	501 .9
25	120 .5	482 .0
26	120 .6	463 .7
27	120 .6	446 .8
28	120 .7	431 .1
29	120 .7	416 .4
30	120 .8	402 .7
31	120 .8	389 .7
32	120 .8	377 .6
33	120 .9	366 .3
34	120 .9	355 .6
35	121 .0	345 .6
36	121 .0	336 .3
37	121 .1	327 .4
38	121 .2	318 .8
39	121 .2	310 .7
40	121 .2	303 .1
41	121 .3	295 .9
42	121 .4	289 .0
43	121 .4	282 .4
44	121 .5	276 .1
45	121 .5	270 .1
46	121 .6	264 .3
47	121 .6	258 .8
48	121 .7	253 .5
49	121 .7	248 .4
50	121 .8	243 .6

**Milligrams of anhydrous dextrose corresponding to* 25 *ml of Fehling[1]s solution.*

NOTE
Tables **6** *and* **7** *show, for the standard method of titration, the values corresponding to integral millilitres of the sugar solutions, intermediate values being obtained by interpolation.*

D.2 DETERMINATION OF SUCROSE

D.2.1 Reagents

D.2.1.1 Concentrated Hydrochloric acid, relative density 1.16 of analytical reagent grade.

D.2.1.2 Fehling's solution (Soxhlet modification), prepared by mixing immediately before use, equal volumes of Solution A and Solution B.

a) Solution A

Dissolve 34.639 g of Copper sulphate ($CuSO_4.5H_2O$) in water, add 0.5 ml of concentrated Sulphuric acid of relative density 1.84, and dilute to 500 ml in a graduated flask. Filter the solution through prepared asbestos.

b) Solution B

Dissolve 173 g of rochelle salt (Potassium sodium tartrate ($KNaC_4H_4O_6.4H_2O$) and 50 g of Sodium hydroxide, analytical reagent in water, dilute to 500 ml in a graduated flask and allow the solution to stand for two days. Filter this solution through prepared asbestos.

D.2.2 Procedure

Take 10 ml of the prepared solution (*see* **D.1.2.1**) in a conical flask and add 1.5 ml of the concentrated Hydrochloric acid and about 10 ml of water. Heat the flask at 60 ˚C to 70 ˚C for 10 min in a water-bath. Cool immediately and neutralize with 30 per cent Sodium hydroxide *(m/ V)* and transfer quantitatively the neutralized inverted solution to a graduated flask and make up the volume to 100 ml.

Determine the reducing sugars in the inverted solution as described in Appendix **D.**

D.2.3 Calculation

D.2.3.1 *Sucrose, per cent by mass = (Q - R)* 0.95

where

Q = total sugars (after inverting); and
R = reducing sugars (before inverting) (*see* **D.1.3**)

APPENDIX E
MICROBIOLOGICAL TEST SAMPLE PREPARATION

E.1 Prepare the test sample in accordance with **SLS 393 Part 5**.

DSLS:

APPENDIX F
SAMPLING EQUIPMENT

F.1 Plungers and dippers shall be of stainless steel or other suitable material of adequate strength, and shall be of sufficiently robust construction to prevent distortion in use. They shall, however, be sufficiently light for the operator to be able to move them rapidly through the liquid. If solder is used in the manufacture of the apparatus, it shall be capable of withstanding sterilization at 180 ˚C. All surfaces shall be smooth and free from crevices and all corners shall be rounded.

F.2 PLUNGERS OR AGITATORS

In general, plungers or agitators for mixing liquids in bulk shall be of sufficient area to produce adequate disturbance of the product.

In view of the differing shapes and sizes of containers, no specific design of plunger can be recommended for all purposes.

A form of plunger recommended as being suitable for the mixing of liquids in buckets or in cans (*see* **Figure 4**) has the following approximate dimensions:

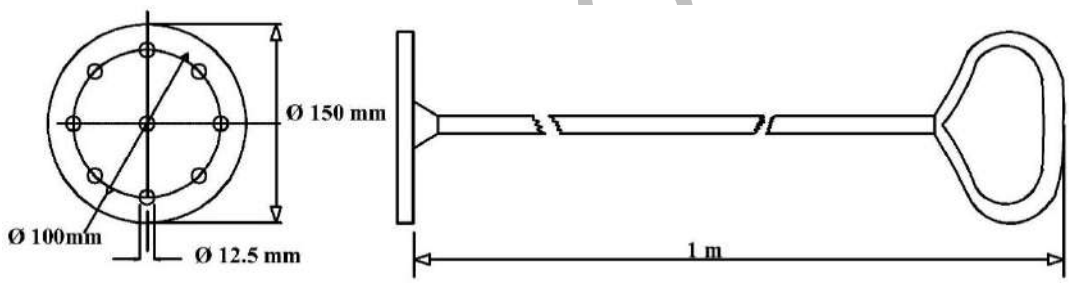

FIGURE 4 Recommended plunger for cans and buckets (*see* **H.2)** a disc 150 mm in diameter, perforated with six holes each 12.5 mm in diameter on a pitch circle of 100 mm diameter, the disc being fixed centrally to a metal rod, the other end of which forms a loop handle. The length of the rod, including the handle, should be approximately 1 m.

A suitable plunger for use with road and rail tanks (*see* **Figure 5**) has the following approximate dimensions:

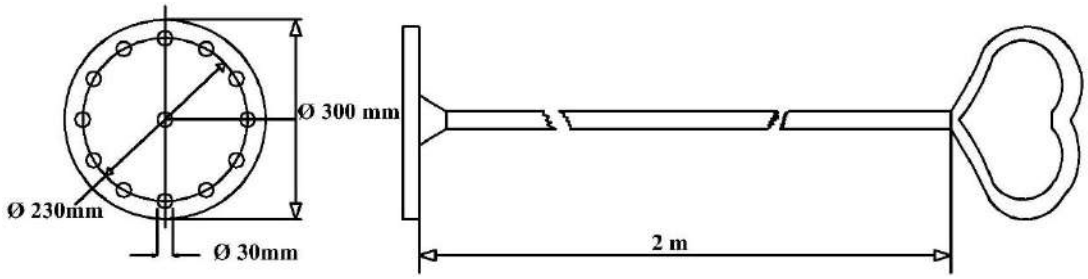

FIGURE 5. Suitable plunger for road and rail tanks (*see* H.2)

A rod not less than 2 m in length is fitted with a disc 300 mm in diameter, perforated with twelve holes each 30 mm in diameter on a pitch circle of 230 mm diameter.

For mixing the contents of large vessels, mechanical agitation by clean* compressed air or suitable stirring is advisable.

F.3 DIPPERS

A dipper of suitable size and shape for collecting the sample is illustrated in **Figure 6**. The dipper shall be fitted with a solid handle at least 150 mm in length. The capacity of the dipper shall be not less than 85 ml. It is an advantage for the handle to be bent over. The tapered form of the cup permits nesting of the dippers.

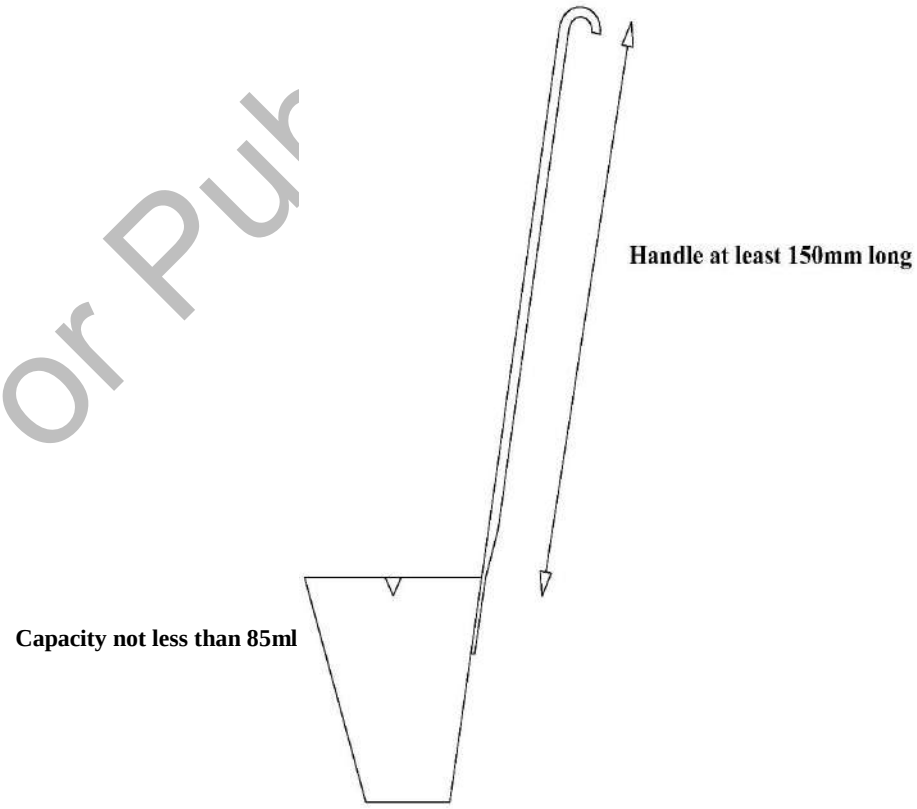

FIGURE 6 Suitable dipper for liquids (*see* H. 3)

DSLS:

*__NOTE__
Whenever "clean compressed" is required by this Standard, it is necessary to use compressed air from which all contaminant (including oil, water and dust) have been included.
Alternatively, a dipper may be used which is of similar capacity, but which has parallel sides graduated into 5 *equal sections for assistance in sampling proportionately consignments held in more than one container.*

F.4 PLUNGER DIPPERS

If desired, the plunger and dipper may be combined.

F.5 SAMPLING FOR MICROBIOLOGICAL EXAMINATION

When the sample is required for microbiological examination, the sampling equipment shall be sterilized as described in a. **A.2.6**
