SRI LANKA STANDARD 731: 2008
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SPECIFICATION FOR
MILK POWDER
(First Revision)

SRI LANKA STANDARDS INSTITUTION

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SLS 731 : 2008

Gr. 8

SRI LANKA STANDARDS INSTITUTION
17. Victoria Place
Elvitigala Mawatha
Colombo 8
Sri Lanka.

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This standard does not purport to include all the necessary provisions of a contract.

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SPECIFICATION FOR MILK POWDER
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FOREWORD

This Sri Lanka Standard was approved by the Sectoral Committee on Agriculture and Food Products and was authorized for adoption and publication as a Sri Lanka Standard by the Council of the Sri Lanka Standards Institution on 2008-07-29.

This specification was first published in 1986. In order to ensure proper quality it is necessary to have a strict quality control based on specifications. It was, therefore, found necessary to revise this standard by incorporating additional quality requirements. However in view of the non availability of a suitable test method to determine protein exclusively derived from milk it was decided that this test method may be included at a later stage.

This specification is subject to the restrictions imposed under the Sri Lanka Food Act No. 26 of 1980 and regulations framed thereunder, wherever applicable.

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

In the preparation of this specification valuable assistance derived from the following publications is gratefully acknowledged.
Codex Stan 207-1999 Codex Standard for milk powder and cream powder
IS 1165 : 2002 Indian Standard Specification for milk powder

1 SCOPE

1.1 This standard prescribes the requirements, methods of sampling and testing for full cream/whole milk powder, partly skimmed /low fat milk powder and skimmed /non fat milk powder.

1.2 This standard applies to milk powders intended for direct consumption or further processing.

2 REFERENCES

ISO 5739 Caseins and caseinates – Determination of contents of scorched particles and of extraneous matter
ISO 8156 Dried milk and dried milk products – Determination of insolubility index
ISO/DIS 17678 Milk fat – Detection of foreign fats by gas chromatographic analysis of triglycerides (Reference method)
CS 102 Presentation of numerical values
SLS 143 Code of practice for general principles of food hygiene

SLS 313 Methods of analysis of oils, fats and fatty materials
Part 1 : Determination of physical characteristics
Part 2 : Determination of chemical characteristics
SLS 428 Random sampling methods
SLS 467 Code of practice for labelling of prepackaged foods
SLS 516 Microbiological test methods
Part 1: General guidance for enumeration of microorganisms colony count technique
Part 2 : Enumeration of yeasts and moulds
Part 3 : Detection and enumeration of coliforms, faecal coliforms and *Escherichia. coli*
Part 5 : General guidance for detection of *Salmonella*
Part 6 : General guidance for enumeration of Staphylococcus *aureus*
SLS 735 Methods of test for milk and milk products
Part 1: Determination of fat content
Part 2 : Determination of titratable acidity
Part 3 : Determination of moisture
Part 7 : Determination of protein
SLS 872 Code of hygienic practice for dairy industries

3 DEFINITION

For the purpose of this specification, the following definition shall apply:

3.1 milk powder : It shall be the material prepared by spray drying of standardized milk obtained from fresh cow milk or buffalo milk or a mixture thereof. The standardized milk shall be prepared by adjustment of suitably processed milk solids by the addition and / or withdrawal of milk constituents in such a way as not to alter the whey protein to casein ratio of the milk being adjusted. All processing and drying shall be carried out in a manner that minimizes the loss of nutritive value, particularly protein quality.

4 TYPES

Milk powder shall be of the following types:

a) Full cream milk powder / Whole milk powder
b) Partly skimmed milk powder / Low fat milk powder
c) Skimmed milk powder / Non fat milk powder

5 INGREDIENTS

All ingredients used shall comply with the Food Act No. 26 of 1980 and regulations framed thereunder.

5.1 Main ingredient

5.1.1 *Fresh cow or buffalo milk or a mixture thereof*

NOTE : *The fat and / or protein content of the milk may have been adjusted, only to comply with the compositional requirements of this standard, by the addition and/ or withdrawal of milk constituents in such a way as not to alter the whey protein to casein ratio of the milk being adjusted.*

5.2 Optional ingredients

In addition to the ingredient given in **5.1**, one or more of the following may be used.

5.2.1 *Stabilizers*

Sodium citrate Potassium citrate	Maximum 5 g/kg singly or in combination, expressed as anhydrous substances

5.2.2 *Emulsifiers*

Lecithins – limited by GMP

5.2.3 *Anticaking agent*

Tricalcium orthophosphate – limited by GMP

5.2.4 *Vitamins*

5.2.5 *Minerals*

6 REQUIREMENTS

6.1 Hygiene

The product shall be manufactured, packaged, stored and distributed under hygienic conditions as prescribed in **SLS 143** and **SLS 872.**

6.2 Appearance

The product shall be white or light cream in colour. It shall be substantially free from scorched particles of dried milk, and shall conform to either Grade A or Grade B of the American Dairy Products Institute (ADPI) standard for scorched particles when tested as per the method described in Appendix **B**. It shall also be free from extraneous matter.

6.3 Flavour

The flavour of the product or of the reconstituted milk shall be pleasant and shall have a characteristic flavour of milk. It shall be free from off flavours.

6.4 Compositional requirements

The product shall also conform to the requirements given in Table **1,** when tested according to the methods prescribed in Column 6 of the Table.

TABLE 1 – Compositional Requirements

Sl. No.	Characteristic	Requirement			Method of test
		Full cream/ Whole milk powder	Partly skimmed/Low fat milk powder	Skimmed / Non fat milk powder	
(1)	(2)	(3)	(4)	(5)	(6)
i)	Moisture, per cent by mass, Max.*	4.0	4.0	4.5	**SLS 735 Part 3**
ii)	Milk Fat, per cent by mass	26.0 (Min)	1.6 to 25.9	1.5 (Max)	**SLS 735 Part 1**
iii)	Refractive index of the extracted milk fat at 40 ^{0}C	1.4527-1.4548	1.4527-1.4548	NS	**Appendix D**
iv)	Reichert Miessel value of the extracted milk fat, Min.	24	NS	NS	
v)	Polenske value of the extracted milk fat	1.4 -2.5	NS	NS	
vi)	Milk protein in milk solids – not- fat , per cent by mass ,Min. *	34.0	34.0	34.0	**Appendix E**
vii)	Titratable acidity (as lactic acid), per cent by mass, Max.	1.5	1.5	1.7	**SLS 735 Part 2**
viii)	Insolubility index (ml), Max.	1.0	1.0	1.0	**Appendix C**

NOTE : ***** *The moisture content does not include water of crystallization of the lactose, the milk solids – not-fat content includes water of crystallization of the lactose.*

NS – Not specified

6.5 Microbiological limits

The product shall conform to the microbiological limits given in Table **2**, when tested according to the methods prescribed in Column **7** of the Table.

TABLE 2 - Microbiological limits

Sl. No (1)	Test Organism (2)	n (3)	c (4)	Limit		Method of test (7)
				m (5)	M (6)	
i)	Aerobic plate count, per g	5	2	20 000	50 000	**Appendix F**
ii)	Coliform, MPN per g	5	1	< 0.3**	20	
iii)	*E. coli*, MPN per g	5	0	< 0.3**	-	
iv)	*Salmonella*, per 25 g	10	0	0	-	
v)	*Staphylococcus aureus*, per g (coagulase positive)	5	2	10	100	

NOTE: ** *m <0. 3 means no positive tube in the standard 3 tube MPN method*.

where,

n = number of sample units to be tested;

c = maximum allowable number of sample units yielding values between m and M;

m = limit below which a count is acceptable for any sample unit; and

M = limit above which a count is unacceptable for any sample unit.

7 PACKAGING

7.1 The milk powder shall be packed in clean and sound food grade containers or in a food grade flexible package made from a film or combination of any of the substrates made of board, paper, polyethylene, metalized polyester film or aluminum foil in such a way as to protect it from deterioration.

7.2 Full cream / whole milk powder and partly skimmed / low fat milk powder may preferably be packaged in food grade nitrogen, carbon dioxide or a mixture thereof.

7.3 The packages shall be hermetically sealed.

8 MARKING AND / OR LABELLING

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

a) The name and type of the product;

The name and the type of the product shall be either “full cream/ whole milk powder” or “partly skimmed / low fat milk powder” or “skimmed / non-fat milk powder”

b) Brand name or trade name, if any;

c) Net mass in ‘g’ or ‘kg’;

e) Any permitted food additive’s name or INS number;

f) The name and address of the manufacturer and packer or distributor in Sri Lanka;

g) Batch or code number or a decipherable code marking;

h) Date of manufacture;

j) Date of expiry;

k) In case, where milk powder imported in bulk and repacked, the date of repacking;

l) Country of origin, in case of imported products;

m) List of ingredients;

A complete list of ingredients shall be declared on the label in descending order of proportion except that in the case of added vitamins and added minerals, these ingredients shall be arranged as separate groups for vitamins and minerals, respectively, and within these groups, vitamins and minerals need not be listed in descending order of proportion;

n) Storage instructions;

p) Information for use;

i) Directions as to the preparation and use of the product and its storage and keeping after the container / package has been opened shall appear on the label or on the accompanying leaflet;

ii) The labelling of partly skimmed/ low fat milk powder and skimmed / non fat milk powder shall include the statement “**UNFIT FOR BABIES”** or “**NOT TO BE USED FOR BABIES”.**

8.2 The marking and labelling shall also be in accordance with **SLS 467**.

9 DECLARATION OF NUTRITVE VALUE

Nutrition information, if declared, shall contain the following information;

a) The amount of energy, expressed in kilocalories (kcal) and / or kilojoules (kJ) per 100 g of the food as sold as well as per specified quantity of the food as suggested for consumption.

b) The number of grams of milk protein, carbohydrate and milk fat per 100 g of the food as sold as well as per specified quantity of the food as suggested for consumption. In addition, the declaration per 100 kilocalories (or per 100 kilojoules) is permitted.

c) The total quantity of each vitamin and mineral per 100 g of the food as sold as well as per specified quantity of the food as suggested for consumption. In addition, the declaration per 100 kilocalories (or per 100 kilojoules) is permitted.

10 SAMPLING

Representative samples of the product shall be drawn as prescribed in Appendix **A.**

11 METHODS OF TEST

11.1 Tests shall be carried out as given in Parts **1, 2**, **3** and **7** of **SLS 735** and Appendices **B** to **F** of this specification.

11.2 Reagents

All reagents used shall be of recognized analytical quality and wherever water is mentioned, distilled or deionized water shall be used.

12 CRITERIA FOR CONFORMITY

A lot shall be declared as conforming to the requirements of this specification if the following conditions are satisfied

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12.1 Each container examined as in **A.6.1** satisfies the packaging and marking requirements.

12.2 The test results on each sample, tested as in **A.6.2** satisfy the microbiological requirements given in **6.5**.

12.3 Test results on the composite sample tested as in **A.6.3** satisfies the requirements given in **6.2**, **6.3** and **6.4**

APPENDIX A
SAMPLING

A.1 LOT

In a single consignment, all the containers containing milk powder of one type and belonging to one batch of manufacture or supply shall constitute a lot.

A.2 GENERAL REQUIREMENTS OF SAMPLING

In drawing, preparing, storing and handling samples, the following precautions and directions shall be observed.

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

A.2.2 The sampling instruments shall be clean and dry when used.

A.2.3 The samples shall be placed in clean and dry glass containers.The sample containers shall be of such a size that they are almost completely filled by the sample.

A.2.4 Precautions shall be taken to protect the samples, the material being sampled, the sampling instruments and the sample container from adventitious contamination.

A.2.5 Each container shall be sealed air-tight after filling and marked with necessary details of sampling.

A.2.6 Samples shall be stored in such a manner that the temperature of material does not vary unduly from the normal temperature.

A.2.7 When taking samples for microbiological tests, in addition to the requirements given in **A.2.1** to **A.2.6,** the following precautions shall be observed:

A.2.7.1 The sampling instrument and the sample containers shall be sterile when used.

A.2.7.2 Tests shall be carried out immediately after sampling.

A.3 SCALE OF SAMPLING

A.3.1 Samples shall be tested from each lot for ascertaining its conformity to the requirements of this specification.

A.3.2 The number of containers to be selected from a lot shall be in accordance with Table **3**.

TABLE 3 - Scale of sampling

Number of containers in the lot (1)	Number of containers to be selected (2)
Up to 300	15
301 to 500	16
501 to 1 000	18
1 001 to 3 000	20
3 001 to 10 000	25

A.3.3 The 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.4 PREPARATION OF SAMPLES

A.4.1 Microbiological tests

A sub sample of ten containers shall be drawn from the containers selected as in **A.3.2** to prepare samples for microbiological tests. Sufficient quantity of material shall be drawn from the top, middle and bottom portions of each package of the sub sample using an appropriate sampling instrument which is sterile. The material obtained from each container shall be mixed separately under aseptic conditions to form individual samples for microbiological tests. These individual samples shall be put into sterile sample containers and marked with necessary details of sampling. The material obtained from each container shall not be less than 100 g.

A.4.2 Tests other than microbiological tests

The remaining containers of the sample of containers selected as in **A.3.2** shall be used to prepare test samples for tests other than microbiological tests.

A.4.2.1 Composite sample

Equal quantities of material shall be drawn from top, middle and bottom portions of each container using an appropriate sampling instrument. The material so obtained shall be mixed together to form a composite sample of not less than 300 g and transferred to a sample container.

A.5 REFERENCE SAMPLE

If reference samples are required for tests other than microbiological tests, the size of an individual sample and the composite sample shall be 150 g and 300 g respectively. The individual samples so obtained shall be divided into three sets in such a way that each set has a sample representing each selected container, and transferred to three sets of sample

containers. One of these shall be marked for the purchaser, another for the vendor and the third for reference. The composite sample shall be divided into three equal parts and transferred to three sample containers. One of these composite samples shall be for the purchaser, another for the vendor and the third for the reference.

A.6 NUMBER OF TESTS

A.6.1 Each container selected as in **A.3.2** shall be examined for packaging and marking requirements.

A.6.2 The samples prepared as in **A.4.1** shall be tested for microbiological requirements as given in **6.5.**

NOTE: *All the samples shall be tested for Salmonellae. Five samples shall be tested for other requirements.*

A.6.3 The composite sample prepared as in **A.4.2.1** shall be tested for the requirements given in **6.2, 6.3** and **6.4.**

APPENDIX B
DETERMINATION OF SCORCHED PARTICLES

B.1 Four procedures are in use for this determination.

B.2 APPARATUS AND REAGENTS

B.2.1 *ADPI Scorched particle standards for dry milks, photoprint published by the* American Dairy Products Institute.

B.2.2 *Balance,* torsion or similar type, approximately 500 g capacity and 0.1 g or better sensitivity.

B.2.3 *Mixer,* Waring blender or similar type *

B.2.4 *Scorched particle filtering discs,* cotton discs 32 mm diameter, or cotton pads mounted on test cards for use with the aspirator – type tester.

B.2.5 *Scorched particle disc test cards,* needed for individual discs only

B.2.6 *Scorched particle tester,* aspirator or pressure type 28 mm filtering diameter.

B.2.7 *Defoaming agent,* Diglycol laurate S.

B.2.8 *Water,* Sediment-free (distilled or efficiently filtered), preferably between 18 ^{0}C to 26 ^{0}C.

B.2.9 *Sodium citrate,* 10 per cent solution - Dissolve 100 g of sodium citrate in distilled water and make up to one litre. Filter through a cotton disc before using.

B.2.10 *Sodium hexametaphosphate (Calgon powder-unadjusted),* 2 per cent solution. Dissolve 20 g of unadjusted Calgon in distilled water and make up to one litter. Filter cold through a cotton disc before using.

B.2.11 *Tetra sodium salt of ethylene diamine tetra acetic acid (EDTA),* 10 per cent solution. Dissolve 100 g of the chemical and make up-to one litre. Filter cold through a cotton disc before using.

NOTES

1. The intensity of colour in the ADPI "Scorched Particle Standards for Dry Milks" photoprint may fade over a period of time, depending on exposure to light and the method of handling/ storage. To minimize fading when not in use, the photoprint should be stored in a dark place (i.e., desk or file drawer), ideally between two sheets of black construction paper. Periodic replacement is recommended. If it is noted that a standard photoprint has faded, it should be replaced with a new standard.

*2.*Malted milk – type mixers and the solubility index mixer do not always give comparable results. Waring Blender with worn bent shaft should be replaced since metal particles may be produced, giving false scorched particle readings.*

B.3 PROCEDURE

B.3.1 Water disc method

Measure 250 ml of sediment-free water in Waring Blender jar. Start the mixer and add 25 g of nonfat dry milk of 32.5 g dry whole milk. Add approximately 0.5 ml of diglycol laurate S and mix for 60 seconds in the blender. Filter the entire solution through a standard cotton disc, using an aspirator or pressure-type tester.

Rinse the mixing container and tester with approximately 50 ml of sediment free water, also passing this through the cotton disc.

If re-liquefied sample is allowed to stand before filtering, stir vigorously just before pouring it into the tester. Do not allow samples to stand uncovered.

Remove the filter disc, place it in a scorched particle disc test card and dry at 30 ^{0}C to 40 ^{0}C in a dust-free atmosphere.

Compare the dry disc, placed on a table and viewed from directly above with the ADPI Scorched particle standards photoprint under uniform, indirect light. Any test falling between two standard discs should be assigned the higher disc's letter, for example a disc showing more scorched particles than standard disc A. but less than B should be assigned a B, and similarly for the other discs.

B.3.2 Calgon method (for nonfat dry milk)

Measure 250 ml of the 2-per cent Calgon solution, heated to 80^0C, into a Waring Blender jar. Turn on the mixer and add 17 g of well-mixed sample of nonfat dry milk or 22 g dry whole milk. Add approximately 0.5 ml of diglycol laurate S and mix for 30 seconds in the blender. Filter immediately through a standard cotton disc, using an aspirator or pressure-type tester.

Rinse the beaker with about 25 ml of water, also passing this through the cotton disc. Place the disc in a scorched particle disc test card and dry the disc at 30 ^{0}C to 40 ^{0}C in a dust – free atmosphere.

Compare the dry disc, placed on a table and viewed form directly above, with the ADPI Scorched particle standards photoprint under uniform, indirect light. Any test falling between two standard discs should be assigned the higher disc's letter.

B.3.3 Sodium citrate method (for nonfat dry milk)

Measure 200 ml of hot (80 ^{0}C to 90 ^{0}C) 10-per cent sodium citrate solution into a Waring Blender jar. Turn on the mixer and add 17 g of well-mixed sample of nonfat dry milk or 22 g dry whole milk. Add approximately 0.5 ml of diglycol laurate S. and mix for 30 seconds in the blendor. Filter the entire solution through a standard cotton disc, using an aspirator or pressure –type tester

Rinse the mixing container and tester with hot sediment-free water also passing this through the cotton disc.
Place the filter disc in a scorched particle disc test card and dry at 30 ^{0}C to 40 ^{0}C in a dust –free atmosphere.

Compare the dry disc, placed on a table and viewed form directly above, with the ADPI Scorched particle standards photoprint under uniform, indirect light. Any test falling between two standard discs should be assigned the higher disc's letter, **or**

B.4 Proceed as described in **ISO 5739 : 2003** Casein and caseinates – Determination of contents of scorched particles and of extraneous matter.

APPENDIX C
DETERMINATION OF INSOLUBILITY INDEX

Determination of insolubility index shall be carried out as described in **ISO 8156 : 1987** Dried milk and dried milk products – Determination of insolubility index.

APPENDIX D
DETERMINATION OF REICHERT-MEISEL NUMBER, POLENSKE VALUE AND REFRACTIVE INDEX

D.1 Milk fat separated as per **SLS 735 Part 1 : 1986** shall then be tested for Reichert Meisel number, Polenske value and refractive index, in accordance with the relevant methods given in **SLS 313 Part 1 : 1993** and **SLS 313 Part 2 : 1993**.

D.2 For qualitative analysis, as an confirmatory measure proceed the gas chromatographic method described in **ISO 17678** Milk fat – Detection of foreign fats by gas chromatographic analysis of triglycerides (Reference method).**

NOTE: *** At the time of revision of this Sri Lanka Standard the **ISO 17678** is at the draft stage*

APPENDIX E
DETERMINATION OF MILK PROTEIN IN MILK SOLIDS NOT- FAT

E.1 Determination of milk protein shall be carried out as described in **SLS 735:Part 7:1989**.

E.2 CALCULATION

$$Milk\ \ protein\ \ in\ \ milk\ \ solids\ \ not-fat\ \ \ per\ \ \ cent, by\ \ \ mass = \frac{p}{100-m-f} x100$$

where,

p = Estimated total protein content, per cent by mass
f = Milk fat content, per cent by mass
m=Moisture content, per cent by mass

APPENDIX F
MICROBIOLOGICAL EXAMINATION

F.1 RECONSTITUTION OF THE POWDER

Weigh 10 g of the powder into a wide mouthed bottle using a sterile spoon or spatula. Add 90 ml of sterile 0.1 per cent peptone water diluent previously warmed to 45 ^{0}C. Agitate mildly to wet sample completely. Soak for 120 seconds and then shake the bottle, making 25 up and down movements of about one foot in 7 seconds. Hold in a water bath at 45 ^{0}C for 15 minutes.

Gently invert the sample six times and prepare serial decimal dilutions immediately.

NOTE: *If the powder is difficult to disperse, for example, if the milk powder is aged, 1.25 per cent (m/V) sodium citrate solution may be used in place of 0.1 per cent peptone solution.*

F.2 AEROBIC PLATE COUNT

Enumeration of Aerobic Plate Count shall be carried out as described in **SLS 516 Part 1 : 1991** using plate count agar or yeast extract milk agar and incubating at 30 ± 1 ^{0}C for 72 ± 3 h.

F.3 ENUMERATION OF COLIFORMS AND *E.coli*

Enumeration of Coliforms and *E.coli* shall be carried out as described in **SLS 516 Part 3:1982**. Incubate at 30 ± 1 ^{0}C for 48 ± 2 h for coliforms and *E.coli.*

F.4 DETECTION OF *Salmonella*

Detection of *Salmonella* shall be carried out as described in **SLS 516 Part 5 : 1992** using the following procedure, for pre-enrichment:

F.4.1 Preparation of Brilliant green solution

Add 0.5 g of Brilliant green to 100 ml of distilled water. Store for at least one day in advance.

F.4.2 Pre-enrichment

Weigh 25 g of the sample aseptically. Pour it over the surface of 225 ml of sterile distilled water containing 1 ml of 0.5 % brilliant green solution (see **F.4.1**). Do not shake. Allow to stand undisturbed at room temperature for 60 ± 10 minutes before incubation. Incubate at 37 ^{0}C for 16 hours to 20 hours. (Adjustment of pH is not necessary).

F.5 ENUMERATION OF *Staphylococcus aureus*

Enumeration of *Staphylococcus aureus* shall be carried out as described in **SLS 516 Part 6: 1992**.

SRI LANKA STANDARDS INSTITUTION

The Sri Lanka Standards Institution (SLSI) is the National Standards Organization of Sri Lanka established under the Sri Lanka Standards Institution Act No. 6 of 1984 which repealed and replaced the Bureau of Ceylon Standards Act No. 38 of 1964. The Institution functions under the Ministry of Science & Technology.

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Printed at the Sri Lanka Standards Institution, 17, Victoria Place, Elvitigala Mawatha, Colombo 08.

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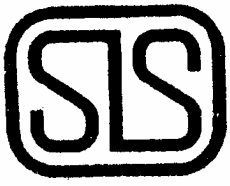

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