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**Draft Sri Lanka Standard  
SPECIFICATION FOR FRESH MUSHROOM  
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**Draft Sri Lanka Standard**  
**SPECIFICATION FOR FRESH MUSHROOM**

**DSL:**

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**Draft Sri Lanka Standard**  
**STANDARD SPECIFICATION FOR FRESH MUSHROOM**

**FOREWORD**

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

This Standard has been formulated to standardize the quality of mushroom by prescribing physical, chemical and microbiological requirements under hygienic conditions.

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 **SLS 102**. The number of significant places retained in the rounded off value shall be the same as that of the specified value in this specification.

In the preparation of this Standard, the valuable assistance derived from the related publications of the Food and Agriculture Organization (FAO) of the United Nations, Codex Alimentarius Commission, Philippine National Standard, Thai Agricultural Standard, Unec Standard and Rwanda Standard are gratefully acknowledged.

**1 SCOPE**

**1.1** This Standard specifies the requirements, methods of tests for commercial mushroom species growing in Sri Lanka (Appendix C) that cultivated and through wild collections.

**1.2** This Standard does not cover dried, cooked and canned mushroom.

**2 REFERENCES**

|         |     |   |
|---------|-----|---|
| SLS     | 102 | Rules for rounding off numerical values   |
| SLS     | 143 | Code of practice for general principles of food hygiene   |
| SLS     | 349 | Method of test for the determination of ash insoluble in hydrochloric acid in fruit and vegetable products  |
| SLS     | 516 | Method of test for microbiology of food and animal feeding stuffs<br>Part 3/ Section 1: Horizontal method for the detection and enumeration of coliforms – Most probable number technique<br>Part 5: Horizontal method for the determination of <i>Salmonella</i> spp.<br>Part 12: Horizontal method for the detection and enumeration of presumptive <i>Escherichia coli</i> |
| SLS     | 467 | Labelling of prepackaged foods  |
| SLS     | 910 | Maximum residue limits for pesticides in food   |
| DSLS    |     | GAP for Mushroom Cultivation  |
| SLS ISO | 874 | Fresh Fruits and Vegetables - Sampling  |

### 3 DEFINITIONS

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

**3.1 clean:** Mushroom free from foreign substances, other than traces of casing material in case of button mushroom.

**3.2 closed mushroom:** Immature mushroom which cannot see any part of the stem or caps visually.

**3.3 contamination:** Unwanted materials presence in mushroom, storage place, conveyance, container or environment and during postharvest handling that may pose hazard.

**3.4 contaminants:** Include physical, chemical and biological substances that are not inherently present in mushroom.

**3.5 damage:** The following specific defects shall be considered as damage:

- a) Discolouration when the colour of the cap or stem materially affects the appearance or marketing quality of the mushroom
- b) Dirt when any amount is embedded in the cap or stem
- c) More than a quarter of the mushroom cap is missing
- d) Mechanical Damages

**3.6 defects:**

**3.6.1 damaged mushroom:** Mushroom with more than quarter of the cap/pileus missing.

**3.6.2 crushed mushroom:** In case of button mushroom, parts of mushroom passing through a sieve having a 15 x 15 mm mesh for fresh mushroom.

**3.6.3 pests damaged mushroom:** Mushroom having holes and missing parts caused by pests and appear as worms of insects inside the mushroom.

**3.6.4 spoiled mushroom:** Mushroom which are discoloured or rotten as a result of attack by microorganism and/or mould or by other environmental factors.

**3.7 diameter:** The greatest dimension of the cap/pileus measured at right angles to the stem.

**3.8 fresh mushroom:** Edible mushroom sorted and packed, delivered to the consumer as soon as possible after they have been picked.

**3.9 mushroom pests:** Living organisms such as microorganisms, mites, insects, and other animals that cause damage to mushroom.

**3.10 open mushroom:** Mushroom which are completely opened and having umbrella shape. Especially in button mushroom, Makandura white and paddy straw mushroom etc.

**3.11 organic impurities of vegetable origin:** Admixture of other edible mushroom, parts of plants such as leaves and other tree stalks.

**3.12 pileus:** Part of the mushroom which serves as the cap.

**3.13 veiled mushroom:** It is the stage between not fully opened and ready to open stage. Veil is a thin membrane that covered cap and stalk of the immature mushroom.

## **4 REQUIREMENTS**

### **4.1 Quality requirements**

**4.1.1** Mushroom shall be handled, stored, packaged and transported under hygienic conditions, in accordance with the hygienic conditions as prescribed in **SLS 143**.

**4.1.2** In all classes, subject to the special provisions for each class and the tolerances allowed, mushroom shall be,

- a) healthy, eg; not spoiled, practically clean, firm (inherent);
- b) free as far as possible from insect damage and microbial damage;
- c) processed the flavor and the taste appropriate (inherent) to the species;
- d) free from mushrooms which are poisonous to humans;
- e) free from other edible mushroom other than intended variety;
- f) free from disease or serious deterioration;
- g) clean, practically free of any visible foreign matter, other than casing material, when applicable;
- h) fresh in appearance: mushroom shall not show any sign of shriveling or loss of firmness.
- i) practically free from insects or other pests;
- j) free of abnormal external moisture;
- k) free of any foreign smell and/or taste;
- k) having unique colour and shape according to the variety; and
- l) free from physical damage.

## **4.2 Classification and tolerances**

The mushroom are classified into three classes;

### **4.2.1 *Extra Class***

**4.2.1.1** Cultivated mushroom in this class shall be of superior quality. They shall be characteristic of the commercial type. They shall be well formed.

**4.2.1.2** They shall be free from defects, with the exception of very slight superficial defects, provided these do not affect the general appearance of the produce, the quality, the keeping quality and presentation in the package.

**4.2.1.3** Very slight superficial defects may appear during cultivation, harvest, storage, packaging or transport.

**4.2.1.4** The cultivated mushroom shall be practically free of casing material; uncut mushroom may also have traces of casing material on the foot.

### **4.2.2 *Class I***

**4.2.2.1** Cultivated mushroom in this class shall be of good quality. In shape, appearance, maturity and colouring. They shall be characteristic of the commercial type.

**4.2.2.2** The following slight defects, however, may be allowed, provided these do not affect the general appearance of the produce, the quality, the keeping quality and presentation in the package:

- a) A slight defect in shape
- b) Slight defects in colouring
- c) Slight superficial bruising
- d) Very slight internal moisture of the stalk
- e) Slight traces of casing material; uncut mushroom may also have some casing material on the foot

### **4.2.3 *Class II***

**4.2.3.1** This class includes cultivated mushroom that do not qualify for inclusion in the higher classes but satisfy the minimum requirements specified above.

**4.2.3.2** The following defects may be allowed, provided the cultivated mushroom retain their essential characteristics as regards the quality, the keeping quality and presentation:

- a) Defects in shape

- b) Defects in colouring
- c) Slight bruising
- d) Slight damage to the stalk
- e) Slight internal moisture of the stalk
- f) Discoloured feathering
- g) Hollow stalks
- h) Traces of casing material; uncut mushrooms may also have some casing material on the foot.

#### **4.2.4** *Unclassified*

This class includes mushroom which have not been classified in any of the foregoing classes but satisfy the minimum requirement specified in Clause **4.1**.

### **4.3** **Quality tolerances**

#### **4.3.1** *Extra Class*

**4.3.1.1** A total tolerance of 5 per cent, by number or weight, of cultivated mushroom not satisfying the requirements of the class but meeting those of Class I shall be allowed.

**4.3.1.2** Within this tolerance not more than 0.5 per cent in total may consist of produce satisfying the requirements of Class II quality.

#### **4.3.2** *Class I*

**4.3.2.1** A total tolerance of 10 per cent, by number or weight, of cultivated mushroom not satisfying the requirements of the class, but meeting those of Class II shall be allowed.

**4.3.2.2** Within this tolerance not more than 1 per cent in total may consist of produce satisfying neither the requirements of Class II quality nor the minimum requirements, or of produce affected by decay.

#### **4.3.3** *Class II*

**4.3.3.1** A total tolerance of 10 per cent, by number or weight, of cultivated mushroom satisfying neither the requirements of the class nor the minimum requirements shall be allowed.

**4.3.3.2** Within this tolerance not more than 2 per cent in total may consist of produce affected by decay.

**4.4** Special tolerances for the button type mushrooms in each class is given in Table **1**.

**TABLE 1 - Special tolerances where the stage of development in button type mushrooms**

| <b>SI No.</b><br>(1) | <b>Class</b><br>(2) | <b>Closed mushrooms</b><br>(3)                                    | <b>Veiled mushroom</b><br>(4)                           | <b>Open mushroom</b><br>(5)                             |
|----------------------|---------------------|---|---|---|
| i)                   | Extra               | 5%, by number or weight, of veiled mushrooms are allowed          | 5%, by number or weight, of open mushrooms are allowed  | 5%, by number or weight, of flat mushrooms are allowed  |
| ii)                  | Class I             | 10%, by number or weight, of veiled mushrooms are allowed         | 10%, by number or weight, of open mushrooms are allowed | 10%, by number or weight, of flat mushrooms are allowed |
| iii)                 | Class II            | 25%, by number or weight, of veiled or open mushrooms are allowed | 25%, by number or weight, of open mushrooms are allowed | 25%, by number or weight, of flat mushrooms are allowed |

**4.5 Size tolerances**

For all classes (if sized): a total tolerance of 10 per cent, by number or weight, of cultivated mushroom not satisfying the requirements as regards sizing shall be allowed.

**4.6 Provisions concerning size**

Size is determined by the maximum diameter of the cap and the length of the stalk. Harvesting sizes of common mushroom growing in Sri Lanka (Annex 1) are varied according to the variety.

**4.7 Tolerance of defects**

The product shall conform to the requirements given in Table 2, when tested according to the methods given in Column 4 of the Table 2.

**TABLE 2 - Tolerance defects for cultivated mushrooms**

| <b>SI No.</b><br>(1) | <b>Characteristic</b><br>(2)                              | <b>Requirement</b><br>(3)   | <b>Test method</b><br>(4) |
|----------------------|---|---|---------------------------|
| i)                   | Acid insoluble ash, per cent by mass, max                 | 0.5   | <b>SLS 349</b>            |
| ii)                  | Organic impurities, per cent by mass, max                 |   | <b>Appendix B</b>         |
|                      | Uncut mushroom  | 8.0   |                           |
|                      | Cut mushroom  | 1.0   |                           |
| iii)                 | Content of insect damaged mushroom, per cent by mass, max | Not more than 1% of total damage including not more than 0.5%, serious damage | <b>Appendix B</b>         |

**4.8 Microbiological requirements**

Product shall comply with the microbiological limits as prescribed in Table 3 when tested in accordance with the relevant method given in Column 4 of the Table 3.

**TABLE 3 - Microbiological limits for fresh mushrooms**

| <b>SI No.</b><br>(1) | <b>Test organism</b><br>(2)               | <b>Limit</b><br>(3) | <b>Test method</b><br>(4)         |
|----------------------|---|---------------------|-----------------------------------|
| i)                   | <i>Escherichia coli</i> , MPN per g, max. | Not detected        | <b>SLS 516: Part 12</b>           |
| ii)                  | <i>Salmonella</i> , per 25 g, max.        | Not detected        | <b>SLS 516: Part 5</b>            |
| iii)                 | Total coliforms, MPN per g, max.          | Less than 10        | <b>SLS 516: Part 3 /Section 1</b> |

**4.9 Requirement for limits of contaminants****4.9.1 Potentially toxic elements**

The product shall not exceed the limits for potentially toxic elements given in Table 4 when tested in accordance with the relevant methods given in Column 4 of the Table 4.

**TABLE 4 – Limits for potentially toxic elements**

| <b>SI No.</b> | <b>Elements</b>             | <b>Limit</b> | <b>Test method</b>  |
|---------------|-----------------------------|--------------|---------------------|
| (1)           | (2)                         | (3)          | (4)                 |
| i             | Lead, as Pb, mg/kg, max.    | 0.3          | <b>AOAC 2013.06</b> |
| ii            | Cadmium, as Cd, mg/kg, max. | 0.2          | <b>AOAC 2013.06</b> |
| iii           | Mercury, as Hg, mg/kg, max. | 0.05         | <b>AOAC 2013.06</b> |

#### **4.9.2 Pesticide residues**

The product shall not contain pesticide residues in excess of the limits as prescribed in **SLS 910**.

### **5 PACKAGING**

The product shall be packaged in food grade packages which will safeguard the hygienic, and organoleptic properties of the product.

### **6 MARKING AND / OR LABELLING**

**6.1** The following shall be marked or labelled legibly and indelibly on each package:

- a) Name of the species / variety;
- b) Class;
- c) Name and address of the processor, packer or distributor (including country of origin);
- d) Brand name or trade mark, if any;
- e) Batch or code number;
- f) Net mass, in g or kg;
- g) Date of manufacture;
- h) Storage conditions (Temperature);
- j) Maximum retail price (MRP); and
- k) Date of expiry/ best before.

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

### **7 SAMPLING**

Representative samples of the product for ascertaining conformity to the requirements of this Standard shall be drawn as prescribed in Appendix A.

### **8 METHODS OF TEST**

**8.1** Tests shall be carried out as prescribed in Appendix **B** given in this Standard, **SLS 349, Section 1 of Part 3 of SLS 516, Part 5 of SLS 516, Part 12 of SLS 516** and Official Methods of Analysis of the Association of Official Analytical Chemists (**AOAC**).

## **9 CRITERIA FOR CONFORMITY**

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

**9.1** Each package inspected as in **A.3.1** satisfies the relevant requirements.

**9.2** The test results on each quality parameters when examined as in **A.3.2** shall satisfy the relevant requirements given in Clause **4** of this Standard.

### **APPENDIX A COMPLIANCE OF A LOT**

The sampling scheme given in this Appendix should be applied where compliance of a lot to the requirements of this Standard to be assessed based on statistical sampling and inspection.

#### **A.1 LOT**

A stated quantity of produce of same quality or grade in bulk form or packages of same weight and presented for inspection.

#### **A.2 SCALE OF SAMPLING**

**A.2.1** In case of goods in packaged form the number of packages to be selected from the lot shall be in accordance with Clause **4.1.2** of **SLS ISO 874**.

**A.2.2** In case of goods in bulk form, samples shall be drawn from the lot in accordance with Clause **4.1.2** of **SLS ISO 874**.

#### **A.2.3** *Preparation of bulk sample or reduced sample*

**A.2.3.1** In case of goods in packaged form equal a quantity of goods shall be taken from top, middle and bottom layers of each package selected as in **A.2.1** and mix them together to form a bulk sample. Then the bulk sample shall be reduced to the laboratory sample of the size given in Table **3** of **SLS ISO 874**.

**A.2.3.2** In case of goods in bulk form, the reduced sample shall be prepared in accordance with Clause **4.1.2** of **SLS ISO 874**.

#### **A.3 NUMBER OF TESTS**

**A.3.1** Each package selected as in **A.2.1** shall be inspected for packaging and marking and / or labelling requirements.

**A.3.2** The sample prepared as in **A.2.3.1** or **A.2.3.2** shall be visually examined for requirements given in Clause **4**.

**APPENDIX B**  
(Normative)  
**DETERMINATION OF ORGANIC IMPURITIES,  
INSECT DAMAGED MUSHROOMS**

**B.1 Principle**

Impurities, insect damaged mushrooms and maggot damaged mushroom are determined by normal count under normal vision of a naked eye or by magnifying lense of X10, if necessary.

**B.2 Equipment**

**B.2.1** *Balance*, capable of being read to the nearest 0.01 g

**B.2.2** *Dishes*

**B.2.3** *Tweezers, scalpel*

**B.2.4** *Shallow container*, having a surface area of at least 200 cm<sup>2</sup>

**B.2.5** *Magnifying lense* , of X10

**B.2.6** *Set of test sieves*, with long rounded apertures, comprising sieve of 5.00 mm × 5.00 mm, a receiver and a lid.

**B.3 Preparation of the test sample**

**B.3.1** Carefully mix the laboratory sample to make it as uniform as possible, and then proceed to reduce it, if necessary, until a quantity of approximately 500 g is obtained.

**B.3.2** Weigh, to the nearest 1 g, the test sample so obtained and place it in the container (**B.2.4**).

**B.3.3** During the preparation of the test sample, note whether any particular odour foreign to that of wheat is detected, whether any living insects (specified in Annex **B**) are present or other anomalies.

**B.4 Procedure**

**B.4.1 General**

If a grain exhibits several defects, it shall be classified in the category with the lowest maximum permissible level

#### **B.4.2** *Determination of organic impurities*

Separate organic impurities from the test sample (**B.3.2**), put it in a tared dish (**B.2.4**) and weigh it to the nearest 0.01 g (**W<sub>1</sub>**).

#### **B.4.3** *Determination of damaged and insect damaged mushroom*

**B.4.3.1** Weigh the test sample obtained in **B.4.2**, after removing organic impurities (**W<sub>2</sub>**).

**B.4.3.2** Separate damaged mushrooms (**3.6.1**) and insect damaged mushroom (**3.6.3**) from the test sample (**B.4.3.1**), put them in a tared dish (**B.2.4**) separately and weigh them to the nearest 0.01 g, **W<sub>3</sub>** and **W<sub>4</sub>** respectively).

#### **B.5** **Calculations**

##### **B.5.1** *Organic Impurities (OI)*

$$OI = \frac{W_1}{W_0} \times 100\%$$

Where;

OI is organic impurities;

W<sub>0</sub> is the test sample obtained in **B.3.2**;

W<sub>1</sub> is the weight of organic impurities obtained in **B.4.2**.

##### **B.5.2** *Insect damaged mushroom (IDM)*

$$IDM = \frac{W_4}{W_3} \times 100\%$$

Where;

IDM is Insect Damaged Mushroom;

W<sub>2</sub> is test sample obtained in **B.4.3.1**;

W<sub>4</sub> is weight of insect damaged mushroom obtained in **B.4.3.2**.

**APPENDIX C**  
**ALL EDIBLE MUSHROOM SPECIES GROWING IN SRI LANKA**

| Scientific name   | English name   |
|---|--|
| <p><b>Common mushroom varieties in Sri Lanka</b></p> <p><i>Pleurotus ostreatus</i><br/> <i>Pleurotus saju - caju</i><br/> <i>Pleurotus saju cystidiosus</i><br/> <i>Pleurotus angustatus</i><br/> <i>Calocybe</i> spp.<br/> <i>Volvariella volvacea</i><br/> <i>Agaricus bisporus</i></p> | <p>American Oyster<br/>           Butan Oyster<br/>           Abalone<br/>           Pink Oyster<br/>           Makandura White<br/>           Straw Mushroom<br/>           Button Mushroom</p> |
| <p><b>Tested mushroom in Sri Lanka</b></p> <p><i>Lentinus edodes</i><br/> <i>Pleurotus eryngii</i><br/> <i>Ganoderma lucidum</i></p>  | <p>Shitake<br/>           King Oyster<br/>           Ganoderma</p>   |
| <p><b>Other possible mushroom species that can cultivate in Sri Lanka</b></p> <p><i>Cordyceps militaris</i><br/> <i>Calvatia gigantea</i><br/> <i>Hericium erinaceus</i><br/> <i>Morchella</i> spp.<br/> <i>Termitomyces</i><br/> <i>Auricularia auricula-judae</i></p>                   | <p>Cordyceps<br/>           Giant Puffball<br/>           Lion's Mane Mushroom<br/>           Morel<br/>           Termite Mushroom<br/>           Ear Mushroom</p>                              |

**ANNEX 01**  
(Informative)  
**SIZES OF MUSHROOM SPECIES AT HARVESTING**

| <b>Mushroom species</b>  | <b>Average cap size / diameter (cm)</b> | <b>Average stalk size (length in cm)</b> |
|--|---|--|
| <b>Mushroom that are commonly cultivate in Sri Lanka</b>       |   |  |
| American Oyster ( <i>Pleurotus ostreatus</i> )                 | 4-10                                    | 2-4                                      |
| Bhutan Oyster ( <i>Pleurotus saju -caju</i> )                  | 4-8                                     | 2-4                                      |
| Abalone ( <i>Pleurotus saju cystidiosus</i> )                  | 3-11                                    | 2-3                                      |
| Pink Oyster ( <i>Pleurotus angustatus</i> )                    | 4-6                                     | 2-4                                      |
| Makandura White ( <i>Calocybe</i> spp.)                        | 3-5                                     | 4-8                                      |
| Straw Mushroom ( <i>Volvariella volvacea</i> )                 | 3-5                                     | 2-4                                      |
| Button mushroom ( <i>Agaricus bisporus</i> )                   | 3-5                                     | 2-4                                      |
| <b>Tested mushroom in Sri Lanka</b>                            |   |  |
| Shitake ( <i>Lentinus edodes</i> )                             | 4-6                                     | 1-4                                      |
| King oyster ( <i>Pleurotus eryngii</i> )                       | 3-6                                     | 4-8                                      |
| Ganoderma ( <i>Ganoderma lucidum</i> ) (medicinal /not edible) | 6-12                                    | 2-4                                      |
| <b>Other possible mushroom species</b>                         |   |  |
| Cordyceps ( <i>Cordyceps militaris</i> )                       | 0.5-1                                   | 2-4                                      |
| Giant Puffball ( <i>Calvatia gigantea</i> )                    | 4-10                                    | -  |
| Lion's Mane Mushrooms ( <i>Hericium erinaceus</i> )            | 3-6                                     | 2-3                                      |
| Morel ( <i>Morchella</i> spp.)                                 | 2-3                                     | 2-4                                      |
| Termite mushrooms ( <i>Termitomyces</i> )                      | 2-3                                     | 4-10                                     |
| Ear mushroom ( <i>Auricularia auricula-judae</i> )             | 2-4                                     | 1-2                                      |

.....