

**AMENDMENT NO. 1 FEBRUARY 2016
TO
IS 1319 : 1983 SPECIFICATION FOR EDIBLE
TAPIOCA STARCH**

(Second Revision)

(Page 5, clause 3.3) — Insert the following new clause and renumber the subsequent clauses accordingly:

‘3.4 The hydrocyanic acid content in the product shall not exceed 5 ppm when determined as per the method given in Annex A.

(Page 8, clause 7.2) — Insert the following new Annex at the end:

ANNEX A
(Clause 3.4)

DETERMINATION OF HYDROCYANIC ACID

A-0 PRINCIPLE

The glucosides are hydrolyzed and the liberated hydrocyanic acid steam distilled and titrated with silver nitrate in an ammoniacal medium in the presence of potassium iodide, the hydrocyanic acid forming the soluble complex $\text{Ag}(\text{CN})_2$. The end point of the titration is characterized by the appearance of permanent turbidity due to precipitation of silver iodide.

Autolysis of bound glucosides shall not take place in sago, since the enzyme linamarase associated with hydrolysis of the glucoside, linamarin, is completely lost during processing. Hence, extraneous addition of linamarase is needed to release free hydrocyanic acid (HCN) from any bound glucoside.

A-1 APPARATUS

A-1.1 Mechanical Grinding Mill

A-1.2 Sieve, with 1 mm aperture.

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A-1.4 Volumetric Flask, 250 ml capacity.

A-1.5 Pipette, 100 ml capacity.

A-1.6 Steam Distillation Apparatus

A-2 REAGENTS

A-2.1 Sodium Hydroxide Solution, 2.5 percent.

A-2.2 Ammonia Solution, approximately 6 M prepared by diluting concentrated ammonia solution (0.9 g/ml) with an equal volume of water.

A-2.3 Potassium Iodide Solution, 5 percent.

A-2.4 Silver Nitrate Standard Solution, 0.02 M.

A-2.5 Linamarase Solution

- a) *Isolation of linamarase from cassava leaf/rind* — Cut cassava leaf/rind into small pieces and homogenize with chilled acetone using a homogenizer. Filter the slurry through Whatman No. 1 filter paper using a Buchner funnel and wash the residue with acetone till colourless. Air dry the acetone powder collected on the filter paper and store at -20°C.

Stir acetone powder (10 g) obtained from leaf/rind with phosphate buffer (0.1 M, pH 6.0) for 30 min. Centrifuge the solution at 10 000 g and collect the clear supernatant. Add 3 volumes of chilled acetone and keep the solution at 4°C overnight. Collect the protein precipitate by centrifugation at 10 000 g for 15 min. Dissolve the precipitate in 10 ml phosphate buffer (0.1 M, pH 6.0), dialyze against tenfold diluted phosphate buffer (0.01 M) and use for hydrolysis.

- b) *Isolation of linamarase from cassava latex* — Latex is collected from the cut ends of cassava petioles. 2 g latex is stirred with 50 ml phosphate buffer for 30 min and the solution centrifuged at 10 000 g for 30 min. Further process is similar as given in **A-2.5 (a)**.

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A-3 PROCEDURE

Grind a small quantity of the sample and reject it. Then grind adequate quantity of the remaining sample to pass through 1 mm sieve. Weigh 20 g of ground sample, transfer to 1 litre distillation flask or 800 ml Kjeldahl flask, add 200 ml water and add 1.0 ml linamarase to the system. Immediately connect the flask to the distillation apparatus. Let the system stand for 2 h. Autolysis should be conducted with apparatus completely connected for distillation. Steam distill and

collect 150 - 160 ml distillate in NaOH solution (0.5 g in 20 ml water) and dilute to definite volume that is 250 ml. Take 100 ml from this, add 8 ml of 6 M NH_4OH and 2 ml of potassium iodide solution and titrate with 0.02 M AgNO_3 until permanent turbidity appears. For easy recognition of the end point of titration, it is recommended that a black back ground be used.

A-4 CALCULATION

1 ml 0.02 M silver nitrate = 1.08 mg of HCN

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(Reaffirmed - 2012)

(Reaffirmed 2017)

(Reaffirmed 2022)

Indian Standard
**SPECIFICATION FOR
EDIBLE TAPIOCA STARCH**
(Second Revision)

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SPECIFICATION FOR EDIBLE TAPIOCA STARCH

(Second Revision)

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Indian Standard

SPECIFICATION FOR EDIBLE TAPIOCA STARCH

(*Second Revision*)

0. FOREWORD

0.1 This Indian Standard (Second Revision) was adopted by the Indian Standards Institution on 23 June 1983, after the draft finalized by the Edible Starches and Starch Products Sectional Committee had been approved by the Agricultural and Food Products Division Council.

0.2 Tapioca starch, also known as cassava starch and manioc starch is obtained from the tubers of tapioca (*Manihot utilissima* Pohl and *M. palmata* Muell. Arg.).

0.2.1 Tapioca starch is used for edible purposes, chiefly in the manufacture of sago (*SABOODANA*), in the making of puddings, biscuits, confectionery, custard powder, baking powder and in the preparation of pharmaceutical products. It is also used for a variety of industrial purposes like sizing of textiles, paper making, manufacture of cosmetics and adhesives.

0.3 While formulating this standard, the Sectional Committee responsible for its preparation took into consideration the prevailing methods for the manufacture of tapioca starch and the available data, both foreign and Indian, on its composition. Furthermore, due consideration has been given to the relevant Rules prescribed by the Government of India under the *Prevention of Food Adulteration Act*, 1954. Due consideration has also been given to the *Standards of Weights and Measures (Packaged Commodities) Rules*, 1977. However, this standard is subject to the restrictions imposed under these, wherever applicable.

0.4 This standard was first published in 1958 and subsequently revised in 1969. The present revision incorporates modifications in requirements like moisture content, total ash and acid insoluble ash based on prevalent manufacturing and trade practices in the country. Besides, opportunity has been taken to permit determination of starch by the method of difference.

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0.5 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard prescribes the requirements and the methods of sampling and test for edible tapioca starch.

2. TERMINOLOGY

2.1 For the purpose of this standard, edible tapioca starch shall mean the starch obtained from the tubers of tapioca (*Manihot utilissima* Pohl and *M. palmata* Muell. Arg.).

3. REQUIREMENTS

3.1 Description — The material shall be either in the powder or granular form and shall be white or off white in colour. It shall be free from adulterants, insect or fungus infestation and fermented, musty or any other undesirable odour. The material shall be free from dirt and extraneous matter.

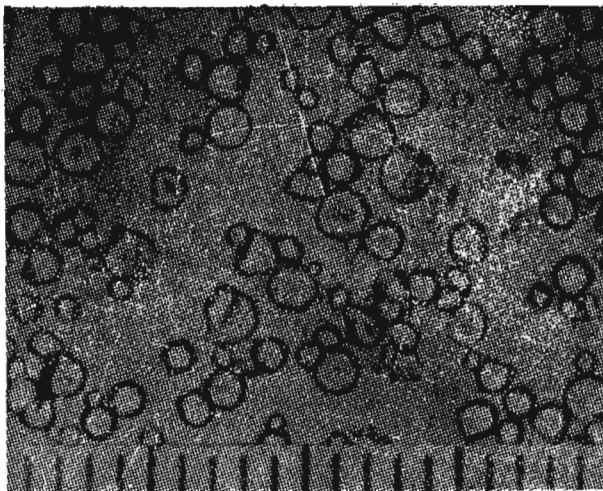
3.2 Microscopic Appearance and Granule Size — When the material is subjected to microscopic examination prescribed in 4 of IS:4706 (Part 1)-1978†, the starch granules shall conform to the following description:

‘Tapioca starch granules are compounds, made up of two to eight components. The component fragments range from 5 to 35 micron (0.005 to 0.035 mm), the average dimensions being about 15 micron. Many granules are egg-shaped with one end cut off, leaving a concave surface. Some granules are curved on one side and irregularly flat on the other. The granules usually show a distinct eccentric hilum and occasionally striations may be seen.’

NOTE — To facilitate easy identification of the starch granules, a photomicrograph of tapioca starch has been provided in Fig. 1.

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

†Methods of test for edible starches and starch products: Part 1 Physical methods (*first revision*).



(Scale : 1 division = 10 microns)

FIG. 1 PHOTOMICROGRAPH OF TAPIOCA STARCH ($\times 325$)

3.3 Particle Size — When tested by the method prescribed in 3 of IS : 4706 (Part 1)-1978*, not more than 2 percent by mass of the material shall be retained on 75 μm IS sieve and not more than 0.5 percent by mass shall be retained on 150 μm IS sieve.

NOTE 1 — In case IS sieves [conforming to IS : 460 (Part 1)-1978†] are not available, BS test sieve 200, ASTM sieve 200 and Tyler sieve 200; BS test sieve 100, ASTM sieve 100 and Tyler sieve 100 which have their apertures within the limits specified for 75 and 150 μm IS sieves respectively, may be used.

NOTE 2 — The requirement of 3.3 is not applicable to the material in granular form.

3.4 Hygienic Conditions — The product shall be processed and packed under hygienic conditions (see IS : 2491-1972‡).

3.5 The material shall also comply with the requirements given in Table 1.

*Methods of test for edible starches and starch products: Part 1 Physical methods (first revision).

†Specification for test sieves: Part 1 Wire cloth test sieves (second revision).

‡Code for hygienic conditions for good processing units (first revision).

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TABLE 1 REQUIREMENTS FOR EDIBLE TAPIOCA STARCH

(Clause 3.5)

SL No.	CHARACTERISTIC	REQUIREMENT	METHOD OF TEST, REF TO	
			CI No. of IS : 4706 (Part 1)- 1978*	CI No. of IS : 4706 (Part 2)- 1978†
(1)	(2)	(3)	(4)	(5)
i)	Moisture, percent by mass, <i>Max</i>	14.0	—	4
ii)	Total ash (on dry basis), percent by mass, <i>Max</i>	0.60	—	5
iii)	Acid-insoluble ash (on dry basis), percent by mass, <i>Max</i>	0.2	—	8
iv)	Starch (on dry basis), percent by mass, <i>Min</i> (see Note)	98.0	—	—
v)	Protein (on dry basis), percent by mass, <i>Max</i>	0.30	—	10
vi)	Sulphur dioxide, mg/kg, <i>Max</i>	100.0	—	11
vii)	Crude fibre (on dry basis), percent by mass, <i>Max</i>	0.20	—	12
viii)	pH of aqueous extract	4.5 to 7.0	—	13
ix)	Cold-water solubles (on dry basis), percent by mass, <i>Max</i>	0.70	12	—

NOTE — The starch content shall be calculated by the method of difference, that is, $100 - [\text{percent of protein (on dry basis)} + \text{percent of total ash (on dry basis)} + \text{percent of crude fibre (on dry basis)}]$.

*Methods of test for edible starches and starch products: Part 1 Physical methods (*first revision*).

†Methods of test for edible starches and starch products : Part 2 Chemical methods (*first revision*).

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4. PACKING

4.1 Unless otherwise agreed to between the purchaser and the supplier, the material shall be packed in clean, sound and new A-twill jute bags (see IS : 1943-1964*) lined with polyethylene material. The mouth of each bag shall be either machine-stitched or rolled-over and hand-stitched, in a secure manner.

5. MARKING

5.1 Each container shall be suitably marked so as to give the following information:

- a) Name of the material and its physical form (powder or granular, as the case may be);
- b) Name of the manufacturer;
- c) Batch or code number;
- d) Net mass; and
- e) Any other details required under the *Standards of Weights and Measures (Packaged Commodities) Rules, 1977* and *Prevention of Food Adulteration Act, 1954*.

5.1.1 Each container may also be marked with the ISI Certification Mark.

NOTE— The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

6. SAMPLING

6.1 The method of drawing representative samples of the material shall be as given in IS : 4662-1977†.

6.2 Number of Tests and Criteria for Conformity

6.2.1 Starch content and moisture content shall be tested on each of the individual samples and the remaining requirements shall be tested on the composite sample.

*Specification for A-twill jute bags (revised).

†Methods for sampling of starches and starch products (first revision).

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6.2.2 The lot shall be declared as conforming to the requirements of the specification if all the test results on individual and composite samples satisfy the relevant requirements.

7. TESTS

7.1 The tests shall be carried out as prescribed in 3.2 and in col 4 and 5 of Table 1.

7.2 Quality of Reagents — Unless specified otherwise, pure chemicals shall be employed in tests and distilled water (*see* IS : 1070-1977*) shall be used where the use of water as a reagent is intended.

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

*Specification for water for general laboratory use (*second revision*).

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

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

Supplementary Units

QUANTITY	UNIT	SYMBOL
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

QUANTITY	UNIT	SYMBOL	DEFINITION
Force	newton	N	1 N = 1 kg.m/s ²
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m ²
Frequency	hertz	Hz	1 Hz = 1 c/s (s ⁻¹)
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m ²

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