इंटरनेट मानक

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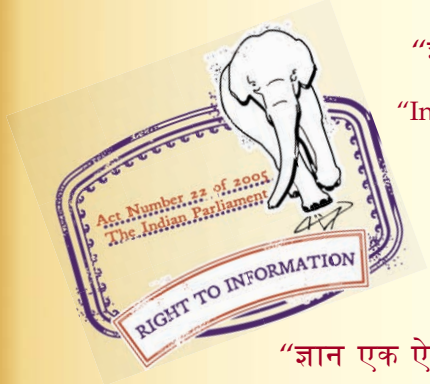
IS 3881 (1993): Tomato Juice [FAD 10: Processed Fruits and Vegetable Products]



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"ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है"
Bhartṛhari—Nītiśatakam
"Knowledge is such a treasure which cannot be stolen"

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IS 3881 : 1993

भारतीय मानक

टमाटर रस – विशिष्टि

(पहला पुनरीक्षण)

Indian Standard

TOMATO JUICE — SPECIFICATION

(First Revision)

UDC 663·813 : 635·64

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

July 1993

Price Group 5

AMENDMENT NO. 1 APRIL 1996
TO
IS 3881 : 1993 TOMATO JUICE — SPECIFICATION

(First Revision)

(*Foreword*) — Insert the following before the last para:

'A scheme for labelling environment friendly products known as ECO-Mark has been introduced at the instance of the Ministry of Environment and Forests (MEF), Government of India. The ECO-Mark shall be administered by the Bureau of Indian Standards (BIS) under the *BIS Act*, 1986 as per the Resolution No. 71 dated 20 February 1991 and Resolution No. 425 dated 28 October 1992 published in the Gazette of the Government of India. For a product to be eligible for marking with the ECO-Mark it shall also carry the Standard Mark of BIS for quality besides meeting additional environment friendly (EF) requirements. The environment friendly requirements for tomato juice are, therefore, included through Amendment No. 1 to this standard.

This amendment is based on the Gazette Notification No. 624 (E) dated 6 September 1995 for Labelling Beverages, Infant Foods, Processed Fruits and Vegetable Products as environment friendly, published in the Gazette of the Government of India.'

(*Page* 1, *clause* 4.2.6) — Insert the following new matter after 4.2.6:

'4.3 Additional Requirements for ECO-Mark

4.3.1 *General Requirements*

4.3.1.1 The product shall conform to the requirements prescribed under 4.1 to 4.2.6.

4.3.1.2 The manufacturer shall produce the consent clearance as per the provisions of *Water (PCP) Act*, 1974, *Water (PCP) Cess Act*, 1977 and *Air (PCP) Act*, 1981 along with the authorization if required under *Environment (Protection) Act*, 1986 and the Rules made thereunder to the Bureau of Indian Standards while applying for the ECO-Mark and the product shall also be in accordance with the *Prevention of Food Adulteration Act*, 1954 and the Rules made thereunder. Additionally, FPO 1955 (Fruit Product Order) framed under *Essential Commodities Act*, 1955, *Standards of Weights and Measures Act*, 1977 requirements wherever applicable has to be complied with.

4.3.1.3 The product/packaging may also display in brief the criteria based on which the product has been labelled environment friendly.

4.3.1.4 The material used for product packing shall be recyclable or biodegradable.

4.3.1.5 The date of manufacture and date of expiry shall be declared on the product package by the manufacturer.

4.3.1.6 The product shall be microbiologically safe when tested as per IS 5403 : 1969 and IS 5887 (Part 5) : 1976 and shall be free from bacterial and fungal toxins.

4.3.1.7 The pesticide residues, if any in the product shall not exceed the limit as prescribed in *PFA Act*, 1954 and the Rules made thereunder.

4.3.1.8 The product package or leaflet accompanying it may display instructions of proper use, storage and transport (including refrigeration temperature compliance) so as to maximize the product performance, safety and minimize wastage.

4.3.2 *Specific Requirements*

4.3.2.1 The product shall not contain any of the heavy metal contaminants in excess of the quantities prescribed in Table 2.'

(*Page* 3, *clause* 5.2) — Insert the following new clause after 5.2:

'5.2.1 *ECO-Mark*

The product may also be marked with the ECO-Mark, the details of which may be obtained from the Bureau of Indian Standards.'

(*Page* 3, *Annex* A) — Insert the following new references:

'IS No.	*Title*
5403 : 1969	Method for yeast and mould count of foodstuffs
5887 (Part 5) : 1976	Methods for detection of bacteria responsible for food poisoning : Part 5 Isolation, identification and enumeration of *Vibrio Cholerae* and *Vibrio Parahaemolyticus* (*first revision*)'

(FAD 10)

Reprography Unit, BIS, New Delhi, India

Processed Fruits and Vegetable Products Sectional Committee, FAD 10

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Processed Fruits and Vegetable Products Sectional Committee had been approved by the Food and Agriculture Division Council.

Tomato-based products such as canned tomatoes, tomato concentrates (tomato puree and tomato paste), tomato juice and tomato ketchup are being produced and marketed in large quantities in the country and also have an export market. To develop a stable market of such products, it is necessary to have a quality control on products.

The standard was first published in 1966 to ensure the production of tomato juice of desirable quality. It has been revised to update its requirements taking into consideration the Codex Standard for Tomato Juice Preserved Exclusively by Physical Means (CODEX Stan 49-1981) and the EEC Regulation No. 1764/86 of 27 May 1986 on Minimum Quality Requirements for Tomato Based Products Eligible for Production Aid. Wherever, it has not been possible to conform to the EEC requirements, additional requirements for EEC have been given in Annex H to ensure conformity for the purpose of trade to EEC countries.

In the preparation of this standard, due consideration has been given to the provision of the *Prevention of Food Adulteration Act*, 1954 and the *Rules* framed thereunder, and also the *Fruit Products Order*, 1955. However, this standard is subject to the restrictions imposed under these, wherever applicable.

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 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of specified value in this standard.

Indian Standard

TOMATO JUICE — SPECIFICATION

(First Revision)

1 SCOPE

1.1 This standard prescribes the requirements and the methods of test for tomato juice.

2 REFERENCES

The Indian Standards listed in Annex A are necessary adjuncts to this standard.

3 TERMINOLOGY

3.0 For the purpose of this standard, the following definitions shall apply.

3.1 Tomato Juice

Juice derived from sound, fresh and fully ripe tomatoes containing a minimum of 5 percent by mass of total soluble solids exclusive of salt. The juice shall be strained free from skins and other coarse parts of tomatoes but may contain finely divided insoluble solids from tomato flesh.

3.2 Head Space

The distance between the top of the double seam and the level of the surface of the contents in the container.

3.3 Defects

Presence of seeds, skins, stems, core and other coarse and hard substances.

4 REQUIREMENTS

4.1 General

Tomato juice shall be derived from sound, fresh and fully ripe tomatoes and shall have:

a) Characteristic red colour;

b) Good flavour, characteristic of properly processed product;

c) Product shall be free from foreign taste, in particular the taste of burned or caramelized products;

d) The product shall have an evenly divided texture and consistency;

e) Free from extraneous plant material including skin, seeds, and other coarse parts of tomatoes;

f) Practically free from mineral impurities.

4.1.1 Mineral impurities content shall not exceed 0·1 percent of the dry mass content reduced by common salt when determined by the method prescribed in IS 13816 : 1993.

4.2 Ingredients

4.2.1 The only substances that may be added to the tomato juice are common salt, sugar, dextrose, ascorbic acid, citric acid, natural spices, aromatic herbs and their extracts and natural aromas (*see* Annex H).

4.2.2 The product shall be free from any added colours or artificial flavours.

4.2.3 *Other Requirement*

The product shall also conform to the requirements prescribed in Table 1.

4.2.4 The product shall not contain any metallic contaminants in excess of quantities specified in Table 2.

4.2.5 *Minimum Fill*

Containers shall be filled as commercially practicable. However, the product shall occupy not less than 90 percent of the water capacity of the container when tested in accordance with the method prescribed in Annex G. The water capacity of the container is the volume of distilled water at 27° C which the sealed container will hold when completely filled.

4.2.5.1 When the product is packed in glass containers, the water capacity shall be reduced by 20 ml.

4.2.6 *Microbiological Requirements*

When tested by the method prescribed in **18** of IS 2860 : 1964 the product shall ;

a) be free from microorganisms capable of development under normal conditions of storage, and

b) not contain substances originating from microorganisms which may represent a hazard to health.

Table 1 Requirements for Tomato Juice

(*Clause* 4.2.3)

Sl No.	Characteristic	Requirement	Method of Test, Ref, to	
			Annex of This Standard	Other Indian Standard
(1)	(2)	(3)	(4)	(5)
i)	Vacuum in the can, in mm, *Min*	Negative	—	Cl 5 of IS 2860 : 1964
ii)	Head space in the can, in mm, *Max*	7	—	Cl 6 of IS 2860 : 1964
iii)	Total soluble solids (exclusive of salt), percent by mass, *Min* (*see* Note 1)	5	—	IS 13815 : 1993
iv)	Sodium chloride, percent by mass, *Max* (*see* Note 2)	3	B	—
v)	Total titratable acidity (expressed as crystallized monohydrate citric acid), percent by mass of the dry mass content, (reduced by added common salt), *Max*	10	—	IS 13844 : 1993
vi)	Volatile acidity (expressed as acetic acid), percent by mass of the dry mass content (reduced by added common salt), *Max*	0·4	C	—
vii)	*p*H	4·5	D	—
viii)	Mould count, *Max*	45 percent positive fields	E	—
ix)	Sugar content (expressed as invert sugar), percent by mass of the dry mass content, (reduced by added common salt), *Max*	42	F	—

NOTES

1 The total soluble solids content is determined after the chloride content has been determined and added salt deducted. For every 1 percent chloride, 1·13 degree Brix or 0·015 7 Refractive Index (at 20°C) must be substracted. These corrections take account of the pre-existing natural salt content which is considered equal to 2 percent.

2 When determining the quantity of added common salt, the natural content of chlorides shall be considered as equal to 2 percent of the dry mass content. Dry mass content shall be tested by the method prescribed in IS 5781 : 1993.

Table 2 Limits for Metallic Contaminants in Tomato Juice

(*Clause* 4.2.4)

Sl No.	Characteristic	Requirement	Method of Test, Ref to Cl No. of IS 2860 : 1964
(1)	(2)	(3)	(4)
i)	Arsenic (as As), ppm, *Max*	1·0	13
ii)	Lead (as Pb), ppm, *Max*	1·0	14
iii)	Copper (as Cu), ppm, *Max*	30	15
iv)	Zinc (as Zn), ppm, *Max*	19	16
v)	Tin (as Sn), ppm, *Max*	250	17

5 PACKING AND MARKING

5.1 Packing

The product shall be packed either in hermetically sealed open top sanitary cans made from tin plate and inside lacquered or in food grade plastic containers or glass containers or flexible packs or asceptic packages.

5.2 Marking

Each pack shall be marked or labelled with the following particulars:

a) Name of the product with the brand name, if any;

b) Indication of the source of manufacture;

c) Net content in grams;

d) Month and year of manufacture;

e) Batch or code number, if any;

f) List of ingredients in descending order;

g) List of additives, if used;

h) The words 'Best before..... (Month and year to be indicated);

j) Manufacturing licence number; and

k) Any other details required under the *Standards of Weights and Measures (Packaged Commodities) Rules* and *Prevention of Food Adulteration Rules*, 1955.

6 SAMPLING

6.1 The method of drawing representative samples of the material and the criteria for conformity shall be as prescribed in IS 2860 : 1964.

7 TESTS

7.1 Tests shall be carried out as prescribed in col 4 and 5 of Table 1 and col 4 of Table 2 and **4.1.1**, **4.2.5** and **4.2.6**.

ANNEX A

(*Clause* 2)

LIST OF REFERRED INDIAN STANDARDS

IS No.	*Title*	*IS No.*	*Title*
2860 : 1964	Methods of sampling and test for processed fruits and vegetables	IS 13815 : 1993 ISO 2173 : 1978	Fruit and vegetable products — Determination of soluble solids content — Refractometric method
5781 : 1993 ISO 1026 ; 1982	Fruit and vegetable products : Determination of dry matter content under reduced pressure and of water content by azeotropic distillation	IS 13816 : 1993 ISO 762 : 1982	Fruit and vegetable products— Determination of mineral impurities content
6542 : 1972	Code of hygienic conditions for fruit and vegetable canning units	IS 13844 : 1993 ISO 750 : 1981	Fruit and vegetable products — Determination of titratable acidity

ANNEX B

[*Table* 1, *Sl No.* (iv)]

DETERMINATION OF SODIUM CHLORIDE

B-0 PRINCIPLE

A test sample of the product is diluted. An excess of titrated silver nitrate solution is then added. The excess is then standardized with titrated solution of potassium thiocyanate in the presence of ferric ammonia alum.

B-1 REAGENTS

B-1.1 Standard Silver Nitrate Solution — 0·1 N.

B-1.2 Pure Nitric Acid

B-1.3 Standard Solution of Ferric Ammonium Sulphate [$NH_4 Fe (SO_4)_2 12H_2O$]

B-1.4 Standard Potassium Thiocyanate Solution — 0·1 N.

B-2 APPARATUS

B-2.1 Analytical Balance

B-2.2 Conical Flask — of 200-ml capacity.

B-2.3 Graduated Pipette — of 10-ml and 20-ml capacity.

B-2.4 Burette — of 25-ml capacity.

B-3 PREPARATION OF SAMPLE

B-3.1 Weigh 300/R g of the product, where R is the total soluble solids content.

B-3.2 Transfer product to a 200-ml volumetric flask, using distilled water which has been recently boiled and cooled.

B-3.3 Rinse the weighing vessel with distilled water and transfer the rinse water to the volumetric flask. Make up to the mark with distilled water.

B-3.4 Shake well and filter the solution using a pleated filter.

B-3.5 Transfer 20 ml of the filtrate to a 250-ml conical flask and dilute with 40 to 50 ml of distilled water.

B-4 PROCEDURE

B-4.1 Add about 2 ml of nitric acid (**B-1.2**) and 10 ml (measured with graduated pipette) of standard silver nitrate solution (**B-1.1**). Boil for five minutes, then cool.

B-4.2 Titrate using potassium thiocyanate (**B-1.4**) until the liquid turns a persistent pink colour, after adding a few drops of ferric ammonium sulphate solution (**B-1.3**). An initial determination is made using distilled water (white).

B-5 CALCULATIONS

B-5.1 The difference between the used volumes of nitric acid and potassium thiocyanate represents the volume of silver nitrate solution used to precipitate the chloride present in the test sample, reduction made for white. 1 ml of silver nitrate solution 0·1 N corresponds to 0·005 85 g of sodium chloride. Express the results in grams of sodium chloride per 100 g of the product.

B-5.2 The natural content of chlorides is fixed arbitrarily as 2 percent of the dry mass content.

$$\text{Added chlorides} = Cl_t - Cl_{nat}$$

$$\text{Natural chloride content } (Cl_{nat}) = \frac{2\,(NTS - Cl_t)}{100}$$

where

NTS = dry mass content, and

Cl_t = total chloride.

ANNEX C

[*Table* 1, *Sl No.* (vi)]

DETERMINATION OF VOLATILE ACIDITY

C-1 PRINCIPLE

C-1.1 Volatile acids are removed in a stream of water vapour and titrated in the distillate in the presence of phenolphthalein or by using a *p*H meter.

C-2 REAGENTS

C-2.1 Sodium Hydroxide — 0·02 N titrated solution, freshly prepared from a 0·01 N solution.

C-2.2 Phenolphthalein — 0·05 percent solution in alcohol.

C-2.3 Crystallized Tartaric Acid

C-2.4 Hydrochloric Acid — 0·1 N titrated solution.

C-3 APPARATUS

C-3.1 Steam Distillation Apparatus — for removing acids in a stream of water vapour.

C-3.2 Analytical Balance

C-3.3 Burette — 10-ml, graduated in twentieths of a millilitre.

C-3.4 Conical Flask — 200 ml.

C-4 PROCEDURE

Fill the flask of the apparatus with about 1·5 litres of freshly boiled distilled water. Add a few pieces of pumice stone. Weigh accurately, to within 0·01 g, a quantity of product corresponding to 600/R g, where R represents the total soluble solids content. After dilution as necessary, pour into the inner tube of the apparatus. Add about 100 mg of crystallized tartaric acid (**C-2.3**). Connect the flask to the condenser. Distil 1·50 ml in about 30 minutes, collecting the distillate in a 200-ml conical flask, with the tip of the condenser immersed in a small quantity of freshly boiled distilled water. Stop the procedure. Pour a

few drops of phenolphthalein (**C-2.2**) into the flask and titrate the acidity using the 0·02 N sodium hydroxide solution (**C-2.1**) until the indicator turns a persistent pink colour. Since 0·02 N sodium hydroxide solution is unstable, check the titre before use with an 0·02 N solution of hydrocloric acid (**C-2.4**). Titration may also be made by using a *p*H meter.

C-5 EXPRESSION OF RESULTS

Volatile acidity is expressed as acetic acid percentage of dry mass content reduced by added common salt. One ml of 0·02 N sodium hydroxide solution (**C-2.1**) corresponds to 0·001 2 g of acetic acid.

ANNEX D

[*Table* 1, *Sl No.* (vii)]

DETERMINATION OF *p*H

D-1 PRINCIPLE

D-1.1 The *p*H of tomato-based products is determined electrometrically using a *p*H meter.

D-2 APPARATUS

D-2.1 *p*H Meter

D-2.2 Reference and *p*H Electrodes or Combined Electrode

D-3 REAGENTS

D-3.1 Buffer Solution — *p*H 4·0 and *p*H 7·0.

D-4 PROCEDURE

D-4.1 Calibrate the *p*H meter using the buffer solutions.

D-4.2 Measure the temperature of the product using a thermometer and set the instrument to that temperature.

D-4.3 Insert the electrodes or combined electrode into the undiluted tomato product.

D-5 EXPRESSION OF RESULTS

The *p*H is shown directly by the apparatus.

ANNEX E

[*Table* 1, *Sl No.* (viii)]

ESTIMATION OF MOULD COUNT

E-1 APPARATUS

E-1.1 Howard Mould-Counting Apparatus

E-1.1.1 *Howard Mould-Counting Slide*

Glass slide of one piece construction with flat plane circle, about 19 mm in diameter or rectangle 20 × 15 mm, surrounded by moat and flanked on each side by shoulders 0·1 mm higher than plane surface. Cover glass is supported on shoulders and leaves depth of 0·1 mm between underside of cover glass and plane surface. Central plane, shoulders and cover glass have optically worked surfaces. To facilitate calibration of microscope, new slides are engraved with circle 1·382 mm in diameter or with 2 fine parallel lines 1·382 mm apart.

E-1.1.2 *Accessory Disc for Mould-Counting*

Glass disc fitting into microscope eyepiece, ruled into squares each side of which is equal to one sixth of the diameter of field. Since limiting diaphragm is eyepiece field stop, ruling, equal one sixth of this diaphragm opening. Field viewed on slide with mould-counting microscope has diameter of 1·382 mm of magnification of 90 to 125 X.

E-1.2 Compound Microscope

With standardized field of view of 1·382 mm diameter at 90 to 125 X; and equipped with drop-in ocular disc ruled in squares, each of which is one-sixth of field diameter.

E-2 PROCEDURE

E-2.1 Clean Howard cell so that Newton's rings are produced between slide and cover glass. Remove cover and with knife blade or scalpel, place portion of well-mixed sample upon central disc; with same instrument; spread it evenly and cover with glass so as to give uniform distribution. Use enough sample to bring material to edge of dish. (It is of utmost importance that portion be taken from thoroughly-mixed sample and spread evenly over slide disc, otherwise, when care slip is put in place, insoluble material, and consequently moulds may be more abundant at centre of mount.) Discard any mount showing uneven distribution or absence of Newton's rings, or liquid that has been drawn across moat and between cover glass and shoulder.

E-2.2 Place slide under microscope and examine with such adjustment that each field of view covers 1·5 mm^2. (This area, which is essential, may frequently be obtained by so adjusting draw-tube that diameter of field becomes 1·382 mm.) When such adjustment is not possible, make accessory drop-in ocular diaphragm with aperture accurately cut to necessary size. Diameter of area field of view can be determined by use of stage micrometer. When instrument is properly adjusted, quantity of liquid examined per field is 0·15 mm^3. Use magnification of 90 to 125 X. In those instances where identifying characteristics of mould filaments are not clearly discernible in standard field, use magnification of approximately 200 X (8 mm objective) to confirm identity of mould filaments previously observed in standard field.

E-2.3 From each of 2 or more mounts examine at least 25 fields taken in such a manner as to be respresentative of all sections of mount. Observe each field, noting presence or absence of mould filaments and recording results as positive when aggregate length of not more than 3 filaments present exceeds one-sixth of diameter of field.

E-3 CALCULATIONS

E-3.1 Calculate portion of positive fields from results of examination of all observed fields and report as percent fields containing mould filaments.

ANNEX F

[*Table* 1, *Sl No.* (ix)]

DETERMINATION OF SUGAR CONTENT

F-0 GENERAL

Usually between 40 and 60 percent of the dry mass content in tomato based products consists of reducing sugar, mostly glucose and fructose in roughly equal proportions. The natural sucrose content of tomatoes is negligible. The natural sugar content is determined by the Lane and Eynon method without inversion.

F-1 REAGENT

F-1.1 Copper Sulphate Solution (Fehling's Solution A)

Dissolve in distilled water 34·639 g of copper sulphate ($CuSO_4$ $5H_2O$), dilute to 500 ml and filter through glass wool or filter paper.

F-1.2 Alkaline Solution of Potassium Sodium Tartrate (Fehling's Solution B)

Dissolve 173 g of potassium sodium tartrate ($KNaC_4H_4O_6$ $4H_2O$) (Rochelle salt) with 50 g of NaOH in water and dilute to 500 ml. Leave standing for two days, then filter through asbestos.

F-1.3 Lead Acetate, Saturated Solution

F-1.4 Carrez Solution I — 15 percent aqueous solution of potassium ferrocyanide.

F-1.5 Carrez Solution II — 30 percent aqueous solution of zinc acetate.

F-1.6 Methylene Blue — 1 percent aqueous solution.

F-1.7 Sodium Sulphate or Sodium Oxalate — Saturated solution.

F-1.8 Phenolphthalein — 1 percent solution in alcohol.

F-1.9 Sodium Hydroxide — 0·1 N.

F-2 APPARATUS

F-2.1 Analytical Balance

F-2.2 Filter Paper — for rapid filtration.

F-2.3 Burette — of 100-ml capacity.

F-2.4 Erlenmeyer Conical Flask — of 250-ml capacity.

F-2.5 Pipette — of 10-ml capacity.

F-2.6 Volumetric Flask — of 250-ml capacity.

F-2.7 Round Bottom Flask — of 200-ml capacity.

F-3 PROCEDURE

F-3.0 For the determination of sugars in tomato-based products, the quantity of the sample analyzed must be such that, after clarification and dilution, the sugar solution analyzed must contain a quantity of sugar such that 10 ml of Fehling's solution is completely reduced by 25 to 50 ml of sugar solution. The sugar solution must therefore contain between 105 and 205 mg of invert sugar per 100 ml of solution, as shown in Table 3.

During determination, the measured sugar solution is diluted so that 32 ml are required to reduce 10 ml of Fehling's solution : this concentration falls in the middle of the range given in Table 3. The sugar solution thus contains roughly 160 mg of invert sugar per 100 ml of solution.

F-3.1 Weigh out a quantity of the product corresponding to approximately 150/R g where R is the natural total soluble solids content.

F-3.2 Transfer the test sample to a 200-ml round-bottom flask. Rinse the test sample container and transfer the rinse water to the flask; then make up to the mark using distilled water.

F-3.3 Remove 100 ml of this solution using a pipette and transfer to a 250-ml volumetric flask.

F-3.4 Using a pipette, add 4 to 5 ml of saturated lead acetate solution; continue to add this solution carefully, two drops at a time, until the liquid is clear.

F-3.5 Clarification should, however, preferably be obtained by adding 5 ml of Carrez solution I and 5 ml of Carrez solution II.

F-3.6 After clarification, allow the liquid to stand for 15 minutes. Then add a quantity of the saturated solution of sodium sulphate or sodium oxalate in order to remove any excess lead acetate. If there is any excess lead acetate, the addition of sodium sulphate or oxalate solution will produce a white precipitate.

F-3.7 Allow to stand for 15 minutes, then make up to the 250-ml mark with distilled water. Shake well, then filter using folded filter paper. Transfer some of the clear filtrate to a 100-ml burette; this solution is now ready for analysis.

F-3.8 Two determination of the sugar content must be carried out.

F-3.8.1 *Test Determination*

Transfer 10 ml of a mixture of equal parts of Fehling's *A* and *B* solutions into a 250-ml Erlenmeyer flask placed on a wire mesh. (Equal quantities of Fehling's solution A and B should be mixed together a few minutes before the determination). Using the burette, add about 25 ml of the sugar solution. Boil for 15 seconds.

F-3.8.2 *Final Determination*

Place 10 ml of a mixture of equal parts of the Fehling's solutions in a 250-ml Erlenmeyer flask, then add directly the quantity of sugar solution which was used up during the test titration, less 0·5 ml. Bring the mixture to the boil and simmer for exactly two minutes. Add one or two drops of methylene blue, then add the remaining sugar solution, two or three drops at a time, at 10-second intervals for about one minute, until the blue colour of the indicator turns reddish brown.

Let A be the quantity of sugar solution used up, expressed in 0·1 ml.

NOTE — As this is an empirical method, all the instructions given above must be followed rigorously.

F-4 CALCULATIONS

F-4.1 Refer to Table 3 to calculate from the number of ml of sugar solution used up (A), the invert sugar content of the sugar solution (C) and of the quantity of the product contained in the test sample. The formula for the calculation is as follows:

$$\text{Invert sugars in g per 100 g of product} = \frac{C \times 0{\cdot}5}{\text{mass of sample}}$$

where

C = column 3 of Table 1, corresponds to the volume A of sugar solution used up (column 1 of the Table).

F-4.2 If the invert sugar content (expressed as percentage by mass of tomato-based product is divided by the total soluble solids content, the result is the invert sugar content per 100 g of soluble solids.

Table 3 Invert Sugar Factor for 10 ml of Fehling's Solution

(*Clauses* F-3.0 *and* F-4.1)

Millilitres of Sugar Solution Used up	Invert Sugar Factor	Milligrams of Invert Sugar in 100 Millilitres of Solution
A	*B*	*C*
25·0	51·2	204·8
2		203·4
4		201·9
6		200·4
8		198·9
26·0	51·3	197·4
2		196·0
4		194·6
6		193·2
8		191·8
27·0	51·4	190·4
2		189·1
4		187·7
6		186·4
8		185·0
28·0	51·4	183·7
2		182·5
4		181·2
6		180·0
8		178·7
29·0	51.5	177·5
2		176 3
4		175·2
6		174·0
8		172·0
30·0	51·5	171·7
2		170·6
4		169·5
6		168·5
8		167·4
31·0	51.6	166·3
2		165·3
4		164·3
6		163·2
8		162·2
32·0	51·6	161·2
2		160·3
4		159·4
6		158·4
8		157·5
33·0	51·7	156·6
2		155·7
4		154·8
6		154·0
8		153·1
34·0	51·7	152·2
2		151·3
4		150·5
6		149·6
8		148·8
35·0	51·8	147·9
2		147·1
4		146·3
6		145·5
8		144·7
36·0	51·8	143·9
2		143·2
4		142·4
6		141·7
8		140·9
37·0	51·9	140·2
2		139·5
4		138·8
6		138·0
8		137·3
38·0	51·9	136·6
2		135·9
4		135·3
6		134·6
8		134·0
39·0	52·0	133·3
2		132·7
4		132·0
6		131·4
8		130·7
40 0	52·0	130·1
2		129·5
4		128·9
6		128·3
8		127·7
41·0	52·1	127·1
2		126·5
4		125·9
6		125·4
8		124·8
42·0	52·1	124·2
2		123·6
4		123·1
6		122·5
8		122·0
43·0	52·2	121·4
2		120·9
4		120·3
6		119·8
8		119·2
44 0	52·2	118·7
2		118·2
4		117·7
6		117·1
8		116·6
45·0	52·3	116·1
2		115·6
4		115·1
6		114·7
8		114·2
46·0	52·3	113·7
2		113·2
4		112·8
6		112·3
8		111·9
47·0	52·4	111·4
2		111·0
4		110·5
6		110·5
8		109·6
48·0	52·4	109·2
2		108 8
4		108 4
6		107·9
8		107·5
49·0	52·5	107·1
2		106·7
4		106·3
6		105·9
8		105·5
50·0	52·5	105·1
2		
4		
6		
8		

ANNEX G

(*Clause* 4.2.5)

DETERMINATION OF WATER CAPACITY

G-1 GENERAL

This method applies to metal containers and glass containers.

G-2 PROCEDURE

G-2.1 Metal Containers

G-2.1.1 Select a container which is undamaged in all respects.

G-2.1.2 Wash, dry and weigh the empty container after cutting out the lid without removing or altering the height of the double seam.

G-2.1.3 Fill the container with distilled water at 27°C to 4·8 mm vertical distance below the top level of the container, and weigh the container thus filled.

G-2.2 Glass Containers

G-2.2.1 Select a container which is undamaged in all respects.

G-2.2.2 Wash, dry and weigh the empty container.

G-2.2.3 Fill the container with distilled water at 27°C to the level of the top thereof, and weigh the container thus filled.

G-3 CALCULATION AND EXPRESSION OF RESULTS

G-3.1 Metal Containers

Substract the mass found in **G-2.1.2** from the mass found in **G-2.1.3**. The difference shall be considered to be the mass of water required to fill the container. Results are expressed as ml of water, percent.

G-3.2 Glass Containers

Substract the mass found in **G-2.2.2** from the mass found in **G-2.2.3**. The difference shall be considered to be the mass of water required to fill the container. Results are expressed as ml of water, percent.

ANNEX H

(*Clause* 4.2.1)

ADDITIONAL REQUIREMENTS FOR EEC

H-0 For export to EEC countries, the following additional requirements have to be complied with.

H-1 Addition of sucrose or dextrose is not permitted.

H-2 Ascorbic acid may be added in tomato juice only if the dry mass content is less than 7 percent. However it shall not exceed 0·03 percent by mass of the finished product.

Standard Mark

The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made thereunder. The Standard 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 BIS and operated by the producer. Standard marked products are also continuously cheked by BIS for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act, 1986* to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

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Central : Manak Bhavan, 9 Bahadur Shah Zafar Marg NEW DELHI 110002	{331 01 31 331 13 75
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Southern : C. I. T. Campus, IV Cross Road, MADRAS 600113	{235 02 16, 235 04 42 235 15 19, 235 23 15
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