*Indian Standard*

( Reaffirmed 1999 )
(Reaffirmed 2014)

# SPECIFICATION FOR DOMESTIC ELECTRIC FOOD-MIXERS (LIQUIDIZERS AND GRINDERS)

*( First Revision )*

Second Reprint OCTOBER 1990

UDC 643.343.34 - 83:64.06 - 83



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

Gr 5

*September* 1980

# *Indian Standard*

# SPECIFICATION FOR DOMESTIC ELECTRIC FOOD-MIXERS ( LIQUIDIZERS AND GRINDERS )

## *( First Revision )*

Electrical Appliances Sectional Committee, ETDC 43

| *Chairman* | *Representing* |
|---|---|
| SHRI B. MAJUMDAR | Development Commissioner, Small Scale Industries ( Ministry of Industry ), New Delhi |
| *Members* | |
| SHRI A. N. GHOSH ( *Alternate* to Shri B. Majumdar ) | |
| SHRI M. L. ANAND | Consumer Council of India, New Delhi |
| COL J. C. ANAND | Controllerate of Inspection ( Electronics ) ( Ministry of Defence ), Bangalore |
| MAJ V. B. DESHMUKH ( *Alternate* ) | |
| SHRI S. K. ANEJA | Electrical Appliances Manufacturers' Association, Delhi |
| SHRI Y. P. SURI ( *Alternate* ) | |
| SHRI A. U. ANSARI | Directorate of Industries, Delhi Administration, Delhi |
| SHRI J. L. CHHABRA | Directorate General of Supplies & Disposals ( Inspection Wing ), New Delhi |
| SHRI K. L. GARG ( *Alternate* ) | |
| CHIEF ENGINEER ( ELECTRICAL )-I | Central Public Works Department, New Delhi |
| SURVEYOR OF WORKS V ( *Alternate* ) | |
| SHRI S. S. CHITNIS | Elpro International Ltd, Pune |
| SHRI P. S. BHATIA ( *Alternate* ) | |
| SHRI H. M. DESAI | The Bombay Electric Supply & Transport Undertaking, Bombay |
| SHRI P. A. B. PANIKAR ( *Alternate* ) | |
| DR R. N. DHAR | National Physical Laboratory ( CSIR ), New Delhi |
| SHRI B. K. DOSHI | Messrs Jashwantlal Kantilal, Bombay |
| SHRI N. J. DOSHI ( *Alternate* ) | |

( *Continued on page* 2 )

( *Continued from page* 1 )

| *Members* | *Representing* |
|---|---|
| SHRI P. K. JAIN | Directorate of Industries, Government of Haryana, Chandigarh |
| SHRI O. P. BAHL ( *Alternate* ) | |
| JOINT DIRECTOR (ELECTRICAL ENGINEERING ) | Railway Board ( Ministry of Railways ) |
| SHRI V. S. KALBAG | Tempo Industrial Corporation, Bombay |
| SHRI ARVIND BOLAR ( *Alternate* ) | |
| SHRI G. L. KESWANI | Directorate General of Technical Development, New Delhi |
| SHRI D. D. RAJDEV ( *Alternate* ) | |
| SMT BHARGAVI MENON | Lady Irwin College, New Delhi |
| SHRI S. K. MUKHERJEE | National Test House, Calcutta |
| SHRI K. K. SHARMA ( *Alternate* ) | |
| SHRI P. M. NAIR | National Radio & Electronics Co Ltd, Bombay |
| SHRI G. D. VERNEKAR ( *Alternate* ) | |
| SHRI E. N. NARAYANASWAMY | Department of Industries & Commerce, Government of Tamil Nadu, Madras |
| SHRI C. NATARAJAN ( *Alternate* ) | |
| SHRI JOGINDER SINGH PALL | Ditz Electricals ( India ) Ltd, Delhi |
| SHRI HARDIT SINGH ( *Alternate* ) | |
| SHRI H. C. PANDE | Directorate of Technical Development & Production ( Air ) ( Ministry of Defence ), New Delhi |
| SHRI S. R. BHASKARAN ( *Alternate* ) | |
| SHRI D. V. KRISHNA RAO | Consumer Guidance Society of India ( Regd ), Bombay |
| SHRI N. RAJAGOPALAN | The Standard Electric Appliances, Tuticorin |
| SHRI R. IYADURAI ( *Alternate* ) | |
| LT-COL B. B. RAJPAL | Engineer-in-Chief's Branch, Army Headquarters |
| SHRI SOHAN SINGH ( *Alternate* ) | |
| SHRI D. SUDHAKAR REDDY | Tamil Nadu Electrical Appliances Manufacturers' Association, Madras |
| DR R. RAMARATHNAM ( *Alternate* ) | |
| SHRI K. P. SETHI | Racold Appliances Pvt Ltd, Pune |
| SHRI S. K. VINAYAK ( *Alternate* ) | |
| SHRI JAGDISH SHARAN | Bajaj Electricals Ltd, Bombay |
| SHRI S. P. SACHDEV, Director ( Elec tech ) | Director General, ISI ( *Ex-officio Member* ) |

*Secretary*

SHRI M. N. MURTHY

Assistant Director ( Elec tech ), ISI

# *Indian Standard*

# SPECIFICATION FOR DOMESTIC ELECTRIC FOOD-MIXERS ( LIQUIDIZERS AND GRINDERS )

# *( First Revision )*

## 0. FOREWORD

**0.1** This Indian Standard ( First Revision ) was adopted by the Indian Standards Institution on 29 January 1980, after the draft finalized by the Electrical Appliances Sectional Committee had been approved by the Electrotechnical Division Council.

**0.2** This standard was originally published in 1967. This revision has been carried out to:

a) include the experience gained in the field since publication of the earlier version,

b) align with the latest developments at the international level, and

c) align with IS : 302-1979*.

**0.3** This standard covers general and safety requirements of domestic electric food-mixers used for mixing liquids, making slurries or pulps of food and for pulverizing dry food stuffs. Determinaion of performance of food-mixers is also a very important aspect for evaluating the quality of food-mixers. This necessitates conducting some actual operational tests for which the food-mixers are designed.

**0.4** While preparing this standard assistance has been derived from the following publications:

IEC Pub 335-14 ( 1973 ) Safety of household and similar electrical appliances: Particular requirements for electric kitchen machines. International Electrotechnical Commission.

CEE Pub 10 Part II Section G/H ( 1970 ) Particular specification for kitchen machines. International Commission on Rules for Approval of Electrical Equipment.

*General and safety requirements for household and similar electrical appliances ( *fifth revision* ).

**0.5** In this standard reference with regard to general and safety requirements and methods of test have been made to IS : 302-1979* which is a necessary adjunct to this standard. The clauses of this standard correspond to the clauses of IS : 302-1979*. Additional requirements and modifications in respect of various clauses are indicated to cover domestic electric food-mixers. Should, however, any deviation exist between IS : 302-1979* and this standard the provisions of the latter shall apply.

**0.6** 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, 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 covers electric motor driven food-mixers ( grinders and liquidizers ) intended for domestic use and designed for operation at voltages not exceeding 250 V. Multipurpose machines which are used together with certain accessories are also covered by this standard as far as it applies.

## 2. TERMINOLOGY

**2.0** For the purpose of this standard, the following definitions, in addition to the relevant definitions given in IS : 302-1979* shall apply.

**2.1 Food-Mixer** — A single appliance which can do the functions indicated at **2.2** and **2.3**.

**2.2 Grinder** — A portable appliance which by operation of high speed blades or cutters is intended primarily for pulverizing or powdering dry foodstuffs either raw or roasted, such as coffee seeds, cereals, grains, etc.

**2.3 Liquidizer** — A portable appliance which by operation of high speed blades or cutters is designed either for mixing liquids or for converting foods with or without the presence of water ( or vegetable oils ) depending on the type of food, into forms of slurry or pulps.

*General and safety requirements for household and similar electrical appliances ( *fifth revision* ).

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

**2.4 Normal Load** — Denotes the load obtained when the appliance is operated under the load indicated in the instructions booklet in terms of recipes (can be different for grinder and liquidizer) or the load necessary to attain the rated input (including the tolerances) at rated voltage in case the actual load in terms of recipes is not indicated by the manufacturer in the instructions booklet.

NOTE — In case the input differs with various kinds of recipes indicated in the instructions booklet, the normal load shall correspond to the highest input.

## 3. GENERAL REQUIREMENTS

**3.1** The provisions of **3** of IS : 302-1979* shall apply in addition to **3.2.**

**3.2** The external finish used on metal components shall be of heat and moisture resisting nature and shall not be adversely affected by variations in temperature occuring under normal operating conditions or during the endurance test. The external finish of the body of the food-mixer shall not become stained due to spillage of food-stuff from the bowl of the food-mixer.

## 4. GENERAL NOTES ON TESTS

**4.1** The relevant provisions of **4** of IS : 302-1979* shall apply except as stated otherwise in individual tests.

**4.2** Unless the appliance is designed to be fixed in normal use, it is tested as a portable appliance.

## 5. RATING

**5.1 Rated Voltage** — The provisions of **5.1** of IS : 302-1979* shall apply.

**5.2 Rated Input** — The rated input shall not exceed 600 watts.

**5.3 Rated Capacity** — The rated capacity shall be the maximum specified quantity handled by the unit for each complete cycle of operation. The value shall be declared by the manufacturer.

**5.3.1** The recommended rated capacities are as under:

| | |
|---|---|
| a) For liquidizers | 0·5, 0·75, 1, 1·25 and 1·5 litres |
| b) For grinders | 50, 75 and 100 ml |

*General and safety requirements for household and similar electrical appliances (*fifth revision*).

## 6. CLASSIFICATION

**6.1** The relevant provisions of 6 of IS : 302-1979* shall apply.

## 7. MARKING

**7.1** The relevant provisions of 7 of IS : 302-1979* shall apply in addition to those indicated in 7.2 to 7.5.

**7.2** Each appliance shall be accompanied by an instructions booklet containing the following information:

a) *Precautions*

1) While positioning of the appliance, and
2) Before switching on the appliance.

b) *Warning*

1) About the parts of the appliance which shall not be brought into contact with liquids;
2) About keeping away from moving parts; and
3) About running the appliance empty, if necessary.

c) *Instructions*

1) For assembling and dismantling the bowl for cleaning and servicing;
2) Type of supply to which the appliance may be connected, and instructions for electrical connections;
3) Instructions to the affect that after every use of food-mixer, pour little hot water into the bowl to remove left over material, specially sticky substances, so that the cutter will rotate freely during the subsequent use; and
4) The manufacturer may include instructions stating that the machine may be overhauled at least once in a year so that its useful life is increased.

d) Directions to switch off when the motor stalls or smoke emanates from the appliance, and

e) Guide for operation giving maximum quantity per loading and in the case of multi-speed appliances speed/control positions suitable for various operations.

*General and safety requirements for household and similar electrical appliances (*fifth revision*).

**7.3** If the appliance is delivered with alternative accessories, the rated input shall correspond to the most unfavourable accessory and speed setting.

**7.4 Marking of Control Switch** — The 'on' or 'off' or both positions of the control switch shall be clearly marked. If any speed control device is provided, the various positions shall be clearly and indelibly marked.

**7.5** Accessories sold separately by the appliance manufacturer shall be accompanied by an instructions sheet giving all relevant information, unless it is included in the manufacturer's instructions for the appliance.

**7.6** The appliance 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 by granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

## 8. PROTECTION AGAINST ELECTRIC SHOCK

**8.1** The relevant provisions of **8** of IS : 302-1979* shall apply.

## 9. STARTING

**9.1** The relevant provisions of IS : 302-1979* shall apply. However, care shall be taken to see that accidental stalling does not occur during the test. The speed control shall be at the lowest setting and the test shall be carried out under normal load (*see* **2.4**).

## 10. INPUT

**10.1** The input of the food-mixer shall be measured with the normal load as indicated in the instructions booklet by the manufacturer. For the purpose of this test, the normal load shall preferably be in terms of weight/volume of the food required for operational tests indicated in **34**. The method of preparation of the food and the operating time shall also be as indicated by the manufacturer. If the appliance is either a simple mixer or liquidizer, the input shall be measured for the corresponding operation only. If the input varies considerably during the

*General and safety requirements for household and similar electrical appliances (*fifth revision*).

operation, the energy consumed is measured by means of an energy meter and the mean value of the input is determined for the representative period. The input so measured shall conform to **10.1** of IS : 302-1979*. If the normal load is not declared by the manufacturer this test shall be carried out under loading conditions indicated in **34.2** and/or **34.3** and/or **34.4**.

## 11. TEMPERATURE-RISE

**11.1** The relevant provision of **11** of IS : 302-1979* shall apply in addition to the following.

**11.2** The food-mixer is operated under conditions of normal loading (*see* **2.4**) while connected to the supply circuit at the maximum rated voltage. To obtain normal loading conditions, the mixer bowl (generally liquidizer) shall be filled with lubricating oil or mixture of oils, paper pulp and water or any other suitable material as to give consistently the normal loading (in watts).

**11.3** The temperature of any material or insulation which may be exposed to excessive temperature during the operation of the appliance shall be measured. The values measured shall not exceed the values specified in Table 1 of IS : 302-1979* when measured by the methods indicated therein.

## 12. OPERATION UNDER OVERLOAD CONDITIONS OF APPLIANCES WITH HEATING ELEMENTS

**12.1** Clause **12** of IS : 302-1979* does not apply.

## 13. ELECTRICAL INSULATION AND LEAKAGE CURRENT AT OPERATING TEMPERATURE

**13.1** The relevant provisions of **13** of IS : 302-1979* shall apply except that the provisions of **13.4** are not applicable.

## 14. RADIO AND TELEVISION INTERFERENCE SUPPRESSION

**14.1** The relevant provisions of **14** of IS : 302-1979* shall apply.

## 15. MOISTURE RESISTANCE

**15.1** The relevant provisions of **15** of IS : 302-1979* shall apply except that the spillage test shall be carried out as given in **15.2**.

---

*General and safety requirements for household and similar electrical appliances (*fifth revision*).

**15.2 Spillage** — The bowl shall be completely filled with water, and a further quantity of water, equal to 15 percent of the volume of the bowl shall be poured-in slowly over a period of one minute. In the case of completely closed lidless bowls 20 percent by volume of the bowl shall be slowly poured over the centre of the bowl.

**15.2.1** The machine shall then withstand the tests specified in **16.3** and **16.4** of IS : 302-1979*

## 16. INSULATION RESISTANCE AND ELECTRIC STRENGTH

**16.1** The relevant provisions of **16** of IS : 302-1979* shall apply.

## 17. OVERLOAD PROTECTION

**17.1** Clause **17** of IS : 302-1979* is not applicable.

## 18. ENDURANCE

**18.1** The relevant provisions of **18** of IS : 302-1979* shall apply with the modifications mentioned in **18.2** to **18.4**.

**18.2** The food-mixer shall be operated for 500 cycles with 'ON' and 'OFF' times as marked by the manufacturer in case of food-mixers intended for intermittent operation. In case of short time rated food-mixers, the appliance shall be operated for 500 cycles, the 'ON' time shall be as marked on the name plate and the 'OFF' time shall be the time required to return back to approximately ambient temperature.

**18.3** Food-mixers which can be operated at different speeds shall be operated at the highest speed setting.

**18.4** Food-mixers may be operated with artificial load as indicated in **11.2** provided the input is same as that obtained under normal load.

## 19. ABNORMAL OPERATION

**19.1** The relevant provisions of **19** of IS : 302-1979* shall apply except that the provisions of **19.2** to **19.5** are not applicable.

## 20. STABILITY AND MECHANICAL HAZARDS

**20.1** The relevant provisions of **20** of IS : 302-1979* shall apply except that the test finger test specified at **20.2** is carried out with the lid placed on the bowl and the bowl placed on the pedestal.

---

*General and safety requirements for household and similar electrical appliances (*fifth revision*).

## 21. MECHANICAL STRENGTH

**21.1** The relevant provisions of **21** of IS : 302-1979* shall apply.

## 22. CONSTRUCTION

**22.1** The relevant provisions of 22 of IS : 302-1979* shall apply in addition to those specified in **22.2** to **22.10**.

**22.2** The machine shall be compact, self-contained, and of rigid construction.

**22.3** All parts required to be cleaned and kept in a hygienic condition shall be readily accessible without the use of special tools.

**22.4** All castings and other materials required to be handled shall be smooth, round edged, free from blow holes, pits, foreign matter and surface imperfections.

**22.5** Machined and formed parts shall be made to ensure complete interchangeability and parts subject to wear shall easily replaceable.

**22.6** In the case of liquidizers, a lid shall be provided to retain food during preparation. It shall be so designed as to remain secured to the appliance during its extended operation. A breather incorporated either in the lid or in a stopper to be connected to the lid shall also be provided.

**22.7** In the case of grinder with the bowl of the open type a lid shall be provided.

**22.8** The design shall ensure that no accidental bodily contact is made with the cutters or blades during the operation of the machine.

**22.9** The machine shall be designed to ensure that lubricants do not contaminate the food and that food is prevented from reaching the moving parts of the machine except blades and cutters.

**22.10** The cutters and such other exposed parts of the machine in contact with food shall be of such material as to prevent fouling of foodstuffs and to resist corrosion and rusting. Stainless steel is one such material which can meet the above requirements.

## 23. INTERNAL WIRING

**23.1** The relevant provisions of **23** of IS : 302-1979* shall apply.

*General and safety requirements for household and similar electrical appliances (*fifth revision*).

## 24. COMPONENTS

**24.1** The relevant provisions of **24** of IS : 302-1979* shall apply in addition to the following.

**24.2 Body or the Motor Housing** — It shall be made of cast iron, cast aluminium, sheet metal, high impact thermosetting plastics or thermoplastics like acrylonitrile-butadiene-styrene (ABS) and polypropylene, of adequate strength and shall provide stability to the machine and shall also withstand all stresses encountered during normal use. Openings for ventilation of the motor shall be properly screened to ensure that no water, dirt or vermin can enter the housing during normal use.

**24.3 Electric Motor** — For satisfactory performance of food-mixers, it is recommended that the motors used shall generally conform to the requirements of IS : 996-1979†. However, if there are any deviations between the requirements of IS : 996-1979† and those of this standard, the provisions of the latter shall apply. It may be provided with facility to operate at more than one speed.

**24.4 Controls** — Switches shall conform to the provisions of **36.1.** They may have stable positions for operation at various speeds. However, they may have a non-holding quick action position for instantaneous operation extending over controlled short durations.

**24.5 Mechanical Power Coupling** — The coupling shall be flexible and shall be fabricated out of materials which shall not deteriorate with extended normal use of 500 cycles as indicated in **18.** It shall be able to withstand shocks and vibrations of power transmission and speed changes (in case of multi-speed machine). It shall be easily replaceable.

**24.6 Bearings** — The bearings may be of the sleeve or ball type. They shall be permanently lubricated. The bearings shall have a life of at least 500 cycles as indicated in **18.**

**24.7 Bowl** — The container or the bowl in which food is converted into slurry, pulp or other liquids or in which dry food is pulverized shall be made out of materials which are neutral to food acids and salts, which do not deteriorate with age and which are able to withstand temperatures up to 100°C without change in their physical, mechanical and chemical structures and properties. Preferred materials are clear or coloured or milky glass, clear or coloured high impact thermosetting plastic or stainless steel. The bowl shall be easily removable from the machine, and shall be free from pits, cracks and crevices. It shall be smooth and shall not have corners and niches, to facilitate cleaning. The fixing arrangement

*General and safety requirements for household and similar electrical appliances (*fifth revision*).

†Specification for single-phase small ac and universal electric motors (*first revision*).

of the bowl shall be adequately strong to stand repeated operations. It may be fitted with handling grips.

**24.8 Assembly** — The bowl shall have arrangements for its stable and easy mounting on the motor housing without the use of any tools. Accurate guides shall be provided to ensure correct mounting. Where the bowl is detachable from base plate, a proper gasket shall be provided, also mechanical seal for leak-proof assembly shall be provided. It shall be possible to remove the bowl with base plate if provided separately as one assembly for the purposes of emptying the contents.

**24.9 Blades of Cutters** — The material of the blades of cutters shall be stainless steel.

## 25. SUPPLY CONNECTIONS AND EXTERNAL FLEXIBLE CABLES AND CORDS

**25.1** The relevant provisions of **25** of IS : 302-1979* shall apply except that the provisions of **25.2**, **25.3**, **25.8**, **25.9**, **25.14** are not applicable.

## 26. TERMINALS FOR EXTERNAL CONDUCTORS

**26.1** The relevant provisions of **26** of IS : 302-1979* shall apply.

## 27. PROVISION FOR EARTHING

**27.1** The relevant provisions of **27** of IS : 302-1979* shall apply.

## 28. SCREWS AND CONNECTIONS

**28.1** The relevant provisions of **28** of IS : 302-1979* shall apply.

## 29. CREEPAGE DISTANCES, CLEARANCES AND DISTANCES THROUGH INSULATION

**29.1** The relevant provisions of **29** of IS : 302-1979* shall apply.

## 30. RESISTANCE TO HEAT, FIRE AND TRACKING

**30.1** The provisions of **30.1** and **30.2** of IS : 302-1979* shall apply. The provisions of **30.3** of IS : 302-1979* are not applicable.

## 31. RESISTANCE TO RUSTING

**31.1** The provisions of **31** of IS : 302-1979* shall apply.

## 32. RADIATION

**32.1** Clause **32** of IS : 302-1979* is not applicable.

---

*General and safety requirements for household and similar electrical appliances (*fifth revision*).

## 33. FINISH

**33.1** The relevant provisions of **33** of IS : 302-1979* shall apply.

## 34. OPERATIONAL TESTS

**34.1** The food-mixers shall be subjected to such of the following operational tests for which it is declared suitable by the manufacturer with the mixer connected in a circuit with a watt-meter and supplied with the maximum rated voltage. The tests with the recipes shall generally be conducted as per the method specified in the instructions booklet for the corresponding recipes. However, if the method for making the recipes is not given in the instructions booklet, the methods given in **34.2, 34.3** and **34.4** shall be followed. The total time of actual operation of the machine in each test shall be noted and recorded with a stop-watch or a similar device. When the food-mixer is of intermittent operation type, each maximum period of operation during the test shall be equal to the period marked and each period of rest shall at least be equal to the rest period marked.

**34.2 Grinding Coffee ( For Machines Which Have a Dry Grinding Arrangement )** — Freshly roasted coffee seeds corresponding to the grading 'Light roast' of IS : 3077-1972† shall be used for this test. The weight of seeds in grams shall be 40 percent of the rated capacity in millilitres of the grinder bowl of the machine under test. The seeds shall be ground for an operational time of 3 minutes or less and the total time including periods of rest shall not exceed 5 minutes. If required, the material adhering to the sides and cover may be scrapped and loosened with a spoon, once during the test, when the machine is at rest. At the end of the test the material shall be removed and weighed.

The result of grinding shall be assessed by sieving successively through the following Indian Standard Sieves‡:

710, 500 and 355 microns

The method of sieving indicated in IS : 3077-1972† shall be used. The material retained on each of the first two sieves shall not be more than 20 percent of the weight obtained at the end of the test. The material passing through the third sieve shall not be less than 30 percent of the same weight.

NOTE — It is recommended that coffee seeds of the 'Peabury' variety supplied by the Coffee Board, are used for this test.

*General and safety requirements for household and similar electrical appliances (*fifth revision*).

†Specification for roasted and ground coffee (*first revision*).

‡Sieve designations are according to IS : 460-1962 Specification for test sieves (*revised*).

**34.3 Whisking Egg Whites** — Fresh eggs shall be used for this test. The whites shall be carefully separated and used at once. The weight in grams of the egg whites used in a test shall be 20 percent of the rated capacity of the liquidizer bowl in millilitres. The egg whites shall be initially at room temperature. They shall be whisked in the machine to produce a stiff froth. The actual operational time required shall not exceed 3 minutes, and the total time including periods of rest shall not exceed 5 minutes. The result shall be considered satisfactory if the bowl is inverted for 5 seconds and the material remains in the bowl.

**34.4 IDLI Batter** — The general procedure for preparing the *IDLI* batter is to take decuticled black gram ( *URAD DAL* ) and parboiled rice in the proportions 1 : 2 by mass, soak them separately in the required quantity of water for 12 hours and then to grind them separately before mixing them together. The black gram is ground to a smooth and frothy consistency, and the rice is ground to a fine semolina in water.

For the purpose of this test the solid ingredients shall be taken in the weights specified below for different sizes of liquidizer bowls and soaked in the quantity of water shown against each mass of solid. The soaked solid with the unabsorbed water shall then be transferred to the bowl and ground. Excess water to the extent of 20 percent can be added as and when needed for achieving smooth grinding results during grinding.

| *Rated Capacity of Bowl* | *Black Gram* | | *Parboiled Rice* | |
|---|---|---|---|---|
| | Solids | Water | Solids | Water |
| litres | g | ml | g | ml |
| 0·5 | 100 | 225 | 100 | 113 |
| 1·0 | 200 | 450 | 200 | 225 |
| 1·5 | 300 | 675 | 300 | 338 |

NOTE — For intermediate capacities the quantity of solid ingredients shall be fixed by interpolation.

The maximum operational time for grinding each ingredient shall be 6 minutes with a period of rest as recommended by the manufacturer.

NOTE — To prepare a batter with the black gram and rice in the proportions 1 : 2 requires two batches of rice to be ground for every batch of black gram. For the present test one batch of each will suffice as the results of grinding are assessed without completing the mixture and cooking it in the form of *IDLIS*.

The results of grinding the black gram are assessed by working the mixture between the thumb and fingers. The mixture shall be smooth and frothy and no lumps shall be detected.

The results of grinding the rice shall be assessed by diluting the ground mixture with sufficient quantity of clean water and sieving it successively through the following Indian Standard Sieves:

1·40 mm, 1·00 mm and 500 microns.

The ground material from the bowl is recovered as fully as possible by rinsing it with water, the same water being then used for dilution. After sieving, the water from the material retained by each sieve shall be allowed to drain away for 5 minutes and the material shall then be recovered and weighed.

The grinding shall be considered satisfactory if not more than 10 percent of the mass of rice originally taken is retained by the 1·40 mm sieve; not more then 15 percent by the 100 mm sieve and not more than 70 percent by the 0·5 mm sieve.

## 35. TEMPERATURE WITHSTAND TEST FOR BOWL

**35.1** Boiling water shall be poured into the bowl at room temperature rapidly to fill it to its capacity.

**35.1.1** After the test the bowl shall be emptied and brought back to room temperature. The test shall be repeated five times. The bowl shall not show any sign of cracks and deformation and shall properly fit into the holder after the test.

NOTE — This test is not applicable in case the bowl is made of metal.

## 36. TEST FOR CONTROLS

**36.1 Test for Switches** — Controlling switches shall be capable of breaking the stalled motor current at the maximum rated voltage six times without failure. This test is carried out on dc unless the machine is marked 'ac only'. (For the purpose of these tests the rated capacity shall be taken as equivalent to the rated input of the machine.)

**36.2 Test for Speed Regulators** — Under consideration.

## 37. STRENGTH OF ASSEMBLY

**37.1** The bowl shall be assembled and mounted on the motor housing under the following controlled conditions six times. There shall be no chipping, cracking, or visible denting on the mating surfaces:

a) Press fit joints using a force of 25 kgf, and

b) Screwed on joints using a screwing couple of 25 kgf.cm.

## 38. SCHEDULE OF TESTS

**38.1 Type Tests** — The tests specified in Table 1 shall constitute type tests and shall be carried out on 2 samples of the food-mixers.

**38.1.1** *Criteria of Acceptance* — All the samples shall successfully pass all the type tests for proving conformity with the requirements of this specification. If any of the samples should fail in any of the type tests, the testing authority, at its discretion, may call for fresh samples not exceeding twice the original number and subject them to all the tests or the test(s) in which the failure(s) occurred. No failure shall be permitted in the repeat test(s).

**TABLE 1 TYPE TESTS**

( *Clause* 38.1 )

| Sl. No. | Tests | Clause Reference |
|---|---|---|
| 1. | Protection against electric shock | 8 |
| 2. | Starting | 9 |
| 3. | Input | 10 |
| 4. | Temperature-rise | 11 |
| 5. | Electrical insulation and leakage current at operating temperature | 13 |
| 6. | Moisture resistance | 15 |
| 7. | Insulation resistance and electric strength | 16 |
| 8. | Endurance | 18 |
| 9. | Abnormal operation | 19 |
| 10. | Stability and mechanical hazards | 20 |
| 11. | Mechanical strength | 21 |
| 12. | Supply connections and external flexible cables and cords | 25 |
| 13. | Provision for earthing | 27 |
| 14. | Screws and connections | 28 |
| 15. | Creepage distances, clearances and distances through insulation | 29 |
| 16. | Resistance to heat, fire and tracking | 30 |
| 17. | Finish | 33 |
| 18. | Operational tests | 34 |
| 19. | Temperature withstand test for bowl | 35 |
| 20. | Test for controls | 36 |
| 21. | Strength of assembly | 37 |

**38.2 Acceptance Tests** — The following shall constitute acceptance tests:

| *Tests* | *Clause Reference* |
|---|---|
| a) Protection against electric shock | 8 |
| b) Input | 10 |
| c) Electrical insulation and leakage current at operating temperature | 13 |
| d) Moisture resistance | 15 |
| e) Insulation resistance and electric strength | 16 |
| f) Provision for earthing | 27 |
| g) Operational tests | 34 |
| h) Temperature withstand test for bowl | 35 |

**38.2.1** A recommended sampling procedure for acceptance test is given in Appendix B of IS: 302-1979*.

**38.3 Routine Tests** — The following shall constitute routine tests:

| *Tests* | *Clause Reference* |
|---|---|
| a) Protection against electric shock | 8 |
| b) High voltage | 13 |
| c) Provision for earthing | 27 |

NOTE 1 — High voltage test as a routine test may comprise the flash test specified in **13.3.2** of IS : 302-1979*.

NOTE 2 — A simple running test to verify satisfactory functioning shall be conducted on every food-mixture.

*General and safety requirements for household and similar electrical appliances (*fifth revision*)

# INDIAN STANDARDS
# ON
# ELECTRICAL APPLIANCES

IS:

302-1979 General and safety requirements for household and similar electrical appliances (*fifth revision*)
365-1965 Electric hot plates (*revised*)
366-1976 Electric irons (*second revision*)
367-1977 Electric kettles and jugs for household and similar use (*second revision*)
368-1977 Electric immersion water heaters (*second revision*)
369-1965 Electric radiators (*revised*)
959-1980 Electric soldering irons (*second revision*)
1287-1965 Electric toasters (*revised*)
1401-1970 Assessibility test probes (*first revision*)
1415-1966 Electric hand lamps (*revised*)
1416-1972 Safety transformer (*first revision*)
2082-1965 Storage type automatic electric water heaters (*revised*)
2268-1966 Electric call bells and buzzers for indoor use (*revised*)
2994-1965 Electric stoves
3010 (Part I)-1965 Appliance-connectors and appliance-inlets (non-reversible three-pin type): Part I Appliance connectors
3010 (Part II)-1965 Appliance-connectors and appliance-inlets non-reversible three-pin type): Part II Appliance inlets
3017-1965 Thermostats for use with electric water heaters
3412-1965 Electric water boilers
3481-1966 Electric portable lamp stands and brackets
3514-1966 Electric coffee percolators (non-regulator type)
3724-1966 Cartridge type heating elements (non-embedded type)
3725-1966 Resistance wires, tapes and strips for heating elements
4158-1967 Solid embedded type electric heating elements
4159-1976 Mineral filled sheathed heating elements (*first revision*)
4165-1967 Thermostats for general purpose electric ovens
4250-1980 Domestic electric food mixers (liquidizers and grinders) (*first revision*)
5159-1969 Mains-operated electric shavers
5160-1969 Mains-operated synchronous clocks
5161-1969 Flexible electric heating pads for domestic use
5579-1970 Neon testers
5790-1970 Domestic electric cooking ovens
6290-1971 Steam irons
6365-1971 Laboratory electric ovens
6390-1971 Domestic electric clothes washing machines (non-automatic)
6446-1972 Mica insulated heating elements
7137-1973 Portable, hand held mains-operated electric massagers
7154-1973 Mains-operated electric hair-dryers
7603-1975 Portable low speed food grinding machines
8506-1977 Laboratory electrical resistance furnaces

# BUREAU OF INDIAN STANDARDS

*Headquarters :*

Manak Bhavan, 9 Bahadur Shah Zafar Marg, NEW DELHI 110002

Telephones : 331 01 31
331 13 75

Telegrams : Manaksanstha
(Common to all Offices)

| *Regional Offices :* | | *Telephone* |
|---|---|---|
| Central | : Manak Bhavan, 9, Bahadur Shah Zafar Marg, NEW DELHI 110002 | 331 01 31<br>331 13 75 |
| * Eastern | : 1/14 C.I.T. Scheme VII M, V.I.P. Road, Maniktola, CALCUTTA 700054 | 37 86 62 |
| Northern | : SCO 445-446, Sector 35-C, CHANDIGARH 160036 | 2 18 43 |
| Southern | : C.I.T. Campus, IV Cross Road, MADRAS 600113 | 41 29 16 |
| † Western | : Manakalaya, E9 MIDC, Marol, Andheri (East), BOMBAY 400093 | 6 32 92 95 |

| *Branch Offices :* | |
|---|---|
| 'Pushpak', Nurmohamed Shaikh Marg, Khanpur, AHMADABAD 380001 | 2 63 48 |
| ‡ Peenya Industrial Area, 1st Stage, Bangalore-Tumkur Road, BANGALORE 560058 | 39 49 55 |
| Gangotri Complex, 5th Floor, Bhadbhada Road, T.T. Nagar, BHOPAL 462003 | 55 40 21 |
| Plot No. 82/83, Lewis Road, BHUBANESHWAR 751002 | 5 36 27 |
| Kalai Kathir Building, 6/48-A Avanasi Road, COIMBATORE 641037 | 2 67 05 |
| Quality Marking Centre, N.H. IV, N.I.T., FARIDABAD 121001 | — |
| Savitri Complex, 116 G.T Road, GHAZIABAD 201001 | 8-71 19 96 |
| 53/5 Ward No. 29, R.G. Barua Road, 5th By-lane, GUWAHATI 781003 | 3 31 77 |
| 5-8-56C L. N. Gupta Marg, ( Nampally Station Road ) HYDERABAD 500001 | 23 10 83 |
| R14 Yudhister Marg, C Scheme, JAIPUR 302005 | 6 34 71 |
| 117/418 B Sarvodaya Nagar, KANPUR 208005 | 21 68 76 |
| Plot No. A-9, House No. 561/63, Sindhu Nagar, Kanpur Road, LUCKNOW 226005 | 5 55 07 |
| Patliputra Industrial Estate, PATNA 800013 | 6 23 05 |
| District Industries Centre Complex, Bagh-e-Ali Maidan, SRINAGAR 190011 | — |
| T. C. No. 14/1421, University P. O., Palayam, THIRUVANANTHAPURAM 695034 | 6 21 04 |
| *Inspection Offices* (With Sale Point) : | |
| Pushpanjali. First Floor, 205-A West High Court Road, Shankar Nagar Square, NAGPUR 440010 | 52 51 71 |
| Institution of Engineers (India) Building, 1332 Shivaji Nagar, PUNE 411005 | 5 24 35 |

| | |
|---|---|
| *Sales Office Calcutta is at 5 Chowringhee Approach, P. O. Princep Street, CALCUTTA | 27 68 00 |
| † Sales Office is at Novelty Chambers, Grant Road, BOMBAY | 89 65 28 |
| ‡ Sales Office is at Unity Building, Narasimharaja Square, BANGALORE | 22 39 71 |

Printed at Dee Kay Printers, New Delhi, India