भारतीय मानक

सेल्फ-कन्टेन्ड पेयजल कूलर — विशिष्टि

भाग 1 उर्जा खपत तथा कार्यकारिता

(तीसरा पुनरीक्षण)

Indian Standard

SELF-CONTAINED DRINKING WATER COOLERS — SPECIFICATION

PART 1 ENERGY CONSUMPTION AND PERFORMANCE

(Third Revision)

ICS 27.200; 97.130.20

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

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Price Group 4

FOREWORD

This Indian Standard (Part 1) (Third Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Refrigeration and Air-Conditioning Sectional Committee had been approved by the Mechanical Engineering Division Council.

This standard was first issued in 1959 and was revised in 1971 to allow for the use of more readily available materials as alternative to stainless steel for the constructions of storage tanks of storage type water coolers. The main modifications made in the second revision were as follows:

a) It did not specify any particular material for the storage tank but instead stipulated that the materials used would be corrosion resistant, non-toxic non-absorbent and durable.
b) The requirement relating to the performance factor was deleted in view of lack of authentic data available in this regard and the difficulties experienced by the manufacturers to meet this requirement.
c) The classification of the various types of water coolers had been aligned with the practices prevailing in other countries.
d) It specified only 35°C ambient temperature for capacity rating test condition and also included maximum operating condition of 43°C ambient and the related requirements so as to provide guidance to the consumers about the performance of these units at adverse ambient conditions.

Water coolers with a voltage and a frequency other than specified in this standard may also be manufactured for the purposes of export.

Since the publication of second revision, 7 amendments were issued. The rate of energy consumption for different cooling capacity rating were specified through amendment in 1989. These were reduced in 1991. In the third revision all these amendments have been reviewed and incorporated in the standard. In this revision, the energy consumption has been further reduced by approximately 3 to 11 percent.

In view of the prevailing energy scenario in the country, the Govt of India is laying emphasis on the energy conservation through various means by emphasizing the use of energy efficiency products. Accordingly, Govt of India is considering introduction of scheme of energy labelling. The drinking water cooler is one such item which consumes considerable amount of energy and hence is considered as a product which may be covered under energy labelling scheme.

With a view to segregate performance and energy labelling requirements, this standard has been split into two parts. The other part of this standard shall deal with the energy labelling requirements. The maximum energy consumption values specified in this standard for various capacity ranges are based on the data generated over the years. Regular R & D efforts should be employed to improve the energy consumption with the developments in technology.

Under the Montreal Protocol and subsequent London Amendment, India has agreed to phase out the use of ozone depleting substances according to a schedule. The above protocol grants a 10 year grace period on all phase out dates and interim reduction deadlines for developing countries whose per capita consumption of Annex A chemicals (as identified in Annexures to Montreal Protocol) is less than 0.3 kg/year. Annex A chemicals include CFC 11, 12, 113, 114, 115 and Halon 1211 and Halon 1301.

The composition of the Committee responsible for the formulation of this standard is given in Annex A.

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 '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 the specified value in this standard.

Indian Standard

SELF-CONTAINED DRINKING WATER COOLERS — SPECIFICATION

PART 1 ENERGY CONSUMPTION AND PERFORMANCE

(Third Revision)

1 SCOPE

This standard (Part 1) prescribes the general constructional requirements, recommended standard sizes, methods of testing and rating, and installation of self contained drinking water coolers operated by electrically driven vapour compression type refrigerating machine with air-cooled condenser.

2 REFERENCES

The Indian Standards listed below contain provisions which through reference in this text, constitute provision of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

IS No.	*Title*
694 : 1990	PVC insulated cables for working voltages up to and including 1 100 V (*third revision*)
996 : 1979	Single-phase small ac and universal electric motors (*second revision*)
9968 (Part 1) : 1988	Elastomer insulated cables : Part 1 For working voltages up to and including 1 100 V (*first revision*)

3 TERMINOLOGY

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

3.1 Cooling Capacity Rating of a Water Cooler — It is the quantity of water, it will cool under given ambient temperature conditions with a given inlet water temperature and a given outlet water temperature. This shall be expressed as number of litres of water cooled per hour.

3.2 Power Input of a Water Cooler — It is the total power input in watts when the cooler is operated under given conditions.

3.3 Self-Contained Drinking Water Cooler — A factory made assembly, in one structure which includes a complete mechanical refrigerating system, and which has the primary function of cooling potable water and also provides for dispensing such water, by either integral or remote means, or both.

3.4 Pressure Type Water Cooler — A type of water cooler which employs a closed cooling chamber having connections for inlet water under pressure and outlet for cold water.

3.5 Storage Type Water Cooler — A type of water cooler which stores and cools the water in the same container or separate containers. Such water coolers may or may not be fitted with plumbing connections for water inlet, drain, overflow, etc.

3.6 Static Head — It is the minimum head in metres of water column required to promote the flow at the rated capacity defined in **3.1** through cooling unit and its controlling valve. This is essentially applicable to pressure type after cooler.

3.7 Storage Capacity of Tank in the Storage Type Drinking Unit — It shall be the amount of water in litres that can be drawn from drinking water faucet after the storage tank has been first filled to the level which is normally maintained, either by a water level actuated automatic shut off valve or manually in case of non-plumbing type models.

4 CLASSIFICATION

4.1 Self-propelled water coolers shall be classified as:

a) Pressure type water coolers, and
b) Storage type water coolers.

4.1.1 Pressure type water coolers shall ordinarily be of the two types given below:

a) *Bubbler Type*—The type of cooler employs a bubbler which projects stream of water so that it can be consumed without use of cups, glasses or other containers.
b) *Faucet Type*—This type employs faucet or spout suitable for filling cups, glasses or other containers.

4.1.2 Storage type water coolers shall ordinarily be any of the following types:

a) Cooler which may store or cool water in the same container, and

b) Cooler which may employ bottle or container for storing supply of water to be cooled. Such bottle or container is placed on or within the water cooler.

4.1.3 Water cooler with remote type dispensing means have the primary function of cooling potable water for delivery to remotely installed dispensers. Such remotely installed dispensing means are not considered part of the water cooler. Water coolers with remote type dispensing means can be either of pressure type or storage type.

4.2 The self-contained coolers may also employ means of pre-cooling. For bubbler type pressure water coolers, normal spill of cold water may be utilized to cool incoming water in a heat changer also called pre-cooler. In another arrangement suction line of refrigeration system may be used to pre-cool incoming water before it enters storage tank.

5 PERFORMANCE REQUIREMENTS

5.1 All ratings shall be based on either 230 or 240 volts in the case of single phase supply and either 400 or 415 volts in the case of 3 phase supply. The unit, however, shall be capable of working at any voltage within ±10 percent of the rated voltage.

5.2 Capacity Rating Test Conditions

Self-contained water coolers of all type shall be rated under the following conditions:

a) Ambient temperature 35.0°C,

b) Inlet water temperature 30.0°C, and

c) Maximum outlet water temperature 13.5°C.

5.2.1 *Maximum Operating Test Conditions*

Self-contained water coolers of all types shall perform satisfactorily and meet the requirements given in **7.7.4** when tested under the following conditions :

a) Ambient temperature 43.0°C,

b) Inlet water temperature 35.0°C,

c) Maximum outlet water temperature 18.5°C,

d) Water flow rate maintained at 90 percent of the capacity as determined under the conditions specified in **5.2**, and

e) Supply voltage at 90% and 110% of rated voltage.

5.3 The recommended sizes, capacity ratings and static heads for different types of water coolers shall be as given in Table 1.

5.3.1 It is recommended that static water head in the inlet pipe, wherever provided, shall not exceed 12 m in any type of water cooler.

5.4 Drinking water requirements for various types of services shall be as specified in Table 2.

Table 1 Minimum Static Head For Pressure Type Water Coolers

(*Clause* 5.3)

Size	Cooling Capacity Rating	Storage Capacity for Storage Type Water Coolers	Minimum Static Head
	l/h	l	m
(1)	(2)	(3)	(4)
0	5	5, 10 and 15	3
1	10	10, 20 and 30	3
2	15	15, 30 and 40	3
3	30	30, 40 and 60	3
4	40	40, 60 and 80	4.5
5	60	60, 80 and 120	4.5
6	80	80, 120 and 225	4.5
7	120	120, 225 and 300	4.5
8	150	150, 300 and 400	4.5
9	225	225, 400 and 550	4.5

Table 2 Drinking Water Requirements For Various Types of Services

(*Clause* 5.4)

Type of Service	Drinking Water Temperature	Requirement
(1)	(2)	(3)
Office	10-15.5	0.166 litre/person hour
Light manufacturing	10-15.5	0.5 litre/person/hour
Heavy manufacturing	13-18	1.0 litre/person/hour
Hot heavy manufacturing	15-18.5	1.0 litre/person/hour
Restaurant	10-15.5	0.5 litre/person
Cafeteria	10-15.5	0.33 litre/person
Cinema	10-15.5	6 litre/100 seats
Theatre	10-15.5	6 litre/100 seats continuous capacity (each fountain shall have storage capacity to provide 28 litres in 10 min)
School	10-15.5	Same as for offices
Hospitals : per bed per attendant	10-15.5	0.33 litre
Hotels	10-15.5	0.33 litre/hour/room
Public fountains, parks fairs, etc	10-15.5	120-160 litres/hour
Departmental stores hostel and offices building lobbies	10-15.5	23-28 litres/hour fountain

NOTE — The above requirements relate to coolers with faucet arrangements. In the case of coolers with bubbler type outlet, the water requirements per person shall be taken as 2.5 times the above values.

5.5 Published Ratings

Published ratings shall include the rated cooling capacity under the conditions specified in **5.2**.

5.6 Tolerances

5.6.1 To comply with this standard, declared or reported water cooler ratings shall be based on conditions specified in **5.2** and shall be such that performance of any unit shall have a capacity not less than 90 percent of the stated capacity.

5.6.2 The storage capacity of the storage type water coolers shall not be less than 95 percent of the values specified.

5.6.3 The rate of energy consumption for drinking water coolers tested under test conditions laid down in **5.2** shall not be more than the values given below for the following capacity rating:

Size	*Cooling Capacity Rating* l/h	*Rate of Maximum Energy Consumption in Watts*
0	5	175
1	10	270
2	15	300
3	30	400
4	40	575
5	60	775
6	80	950
7	120	1 300
8	150	1 550
9	225	2 200

6 COMPONENTS AND THEIR MATERIALS

6.1 Chassis shall be of rigid construction, made of steel or alloy steel members and coated with anti-rust plating or paint.

6.2 Cooling unit for storage type water cooler shall consist of storage tank with its surfaces acting as heat exchanger on the exterior. If the heat exchanger consists of cooling coil it shall be bonded to the tank on the exterior and held in good thermal contact. The coil, if prone to rust, shall be given a good coating of suitable rust preventing material.

6.3 Cooling unit for pressure type water cooler shall comprise a suitable heat exchanger designed to promote effective heat transfer. In case of double coil heat exchanger, both coils shall be held in good thermal contact. The portion of the heat exchanger in contact with the cooled water shall be of suitable corrosion resistant alloy so as to keep the water safe for human consumption.

6.4 The condensing unit shall be selected to balance the rated output plus all the losses. If not internally spring mounted, the compressor shall be securely supported on antivibration mountings to prevent transmission of mechanical vibrations. Low pressure and high pressure cut outs shall be provided to protect the compressor against unusually low suction and high pressure for water coolers using expansion valve only. This provision, however, will not be applicable to systems using capillaries. The compressor motor shall be equipped with an overload protection.

6.5 The refrigerant used shall be odourless, non-irritating, non-toxic, non-inflammable, non-explosive, non-corrosive and shall be free from CFC.

6.6 The refrigerant flow to the low side shall be controlled by expansion valve or capillary preceeded by suitable liquid refrigerant drier.

6.7 Thermostat capable of adjustment shall control the automatic operation of the condensing unit to maintain the required temperature of the cooled water.

6.8 In storage type unit, the storage tank shall be of corrosion resistant, non-toxic, non-absorbent and durable materials made up of stainless steel or FDA grade material. The tank shall be provided, where necessary, with overflow and make up correction with ball float and drain. The construction of the tank shall be such that the possibility of any dirt accumulating in the tank due to rough surface and improper welded joints is eliminated. There shall be no direct contact of any lead based solder with the water so as to keep the water safe for human consumption.

6.9 A cleanable or throwaway type strainer (filter) to remove suspended matters from water may also be fitted externally to the water cooler at the inlet to the cooling unit when desired by the purchaser. The filter elements shall not be of asbestos based materials. The filter shall have suitable mesh size (500u and more) and shall be free from mercury, lead, aluminium, cadmium, arsenic and other poisonous materials for human consumption.

6.10 The drain tray shall be made of sufficiently strong corrosion-resistant material which shall not warp or get deteriorated in constant use with cooled water under varying weather conditions. This shall be of ample size to prevent any splash outside its periphery. The drain wherever provided, shall have a suitable strainer so as to prevent this from being clogged.

6.11 The outlet device and its valve for fitting the container or for direct feed shall be drip proof and made of a material which is corrosion resistant or where the material is not corrosion resistant it shall be coated against corrosion so as to keep the water safe for human consumption.

6.12 The thermal insulation for the cooling unit, connections therefrom to the outlets, and for suction pipe of the condensing unit shall be of vapour-proof materials or covered with external vapour-proof barrier. The insulation shall have no interior air gap and shall be of sufficient thickness to prevent condensation on the exterior cold surfaces.

6.13 The inflow drain and overflow connections wherever provided, shall be accessible so as to facilitate easy connection at the time of the installation.

6.14 The panel of the unit shall be of suitable materials (steel sheets, galvanized iron, aluminium or plastics

or decorative laminates) having proper thickness and suitably protected against the corrosion and coated to give decorative finish and long life under condition of use. It shall be easily removable.

6.15 The inspection lid for storage type water cooler shall be of rigid construction and hinged. It shall be provided with a gasket to keep the storage tank dust-proof. The internal part of the inspection lid shall be of corrosion resistant material so as not to contaminate the water and make it unsafe for human consumption, if necessary.

6.16 Three-core cable conforming to IS 9968 (Part 1) or IS 694 of at least 1.5 metres length shall be provided with each unit. A three-pin plug and starter, if required, shall be provided at the time of installation.

6.17 Where the static head is in excess of 12 m, a suitable pressure reducing device shall be provided at the time of installation.

7 TESTS

7.1 Type Tests

The following shall constitute the type tests :

a) Insulation resistance tests,
b) High voltage test,
c) Cooling capacity rating test, and
d) Maximum operating condition test.

7.1.1 Once a water cooler has undergone type test any major alterations effecting the performance which the manufacturer intends to make in the water cooler shall be reported to the testing authority and further type test shall be carried out in the modified water cooler in accordance with the procedure laid down in **7.7**.

7.2 Production Routine Tests

Every water cooler, after completion, shall be subjected to the following routine tests at the manufacturer's works :

a) Electric insulation test,
b) Performance test, and
c) High voltage test.

7.2.1 The manufacturer shall furnish with each water cooler a certificate that the production routine tests specified in **7.2** have been conducted in accordance with the prescribed procedure (*see* **7.8**) and that the unit conforms to the requirements of this standard.

7.3 Acceptance Tests

If the purchaser desires any of the production routine tests to be repeated at the time of purchase then, where agreed to between the purchaser and the manufacturer, the tests may be carried out at the manufacturer's works; alternatively, the tests may be repeated at the place specified by the purchaser provided all the arrangements for tests are made by the purchaser at the specified place.

7.4 Sample for Tests

7.4.1 *Type Tests*

Two water coolers of each type and size shall be sent along with manufacturer's detailed specifications to the appropriate testing authority for purposes of type tests.

7.4.2 *Acceptance Tests*

The number of samples shall be as agreed to between the purchaser and the manufacturer.

7.5 Preparation and Test Conditions

7.5.1 Each specimen tested shall be selected from stock or routine factory production, and shall be representative of construction and adjustments.

7.5.2 The drinking water cooler with all panels in place shall be tested in a room in which the temperature can be controlled. Panels should remain in place throughout the entire test.

7.5.3 Pressure water coolers shall have an arrangement to maintain a constant head at the inlet of the water coolers. This shall be connected to a pressure water supply which is provided with means of controlling the water temperature.

7.5.4 Water coolers shall have a hand regulated shut-off valve, if necessary, attached at the cooled water outlet in place of the bubbler or faucet for regulating the flow of water and measuring its temperature.

7.5.5 Bottle water coolers shall be tested with the largest bottle for which the cooler is designed.

7.5.6 The storage type water cooler shall be tested with the storage tanks filled up to the normal level required for the rated storage capacity.

7.5.7 Water coolers shall be operated until stable operating conditions are reached. The stable operating conditions are deemed to have reached when during a time of 2 hours the outlet water temperature does not vary by more than $\pm 0.5^{\circ}C$ from the mean value.

7.5.8 The water cooler being tested shall be located in a room so that its temperature is not affected by direct radiation to or from external cooling or heating equipment. The air circulation in the room shall be such that the specified uniformity of ambient temperature is obtained without direct draft upon the water cooler under test.

7.5.9 The fan motor and compressor shall be so connected as to facilitate measurement of the power

input. When tested under actual working conditions the fan motors shall conform to the requirements specified in IS 996.

7.6 Instruments

7.6.1 Temperature measurement shall be made with one or more of the following instruments :

a) Mercury-in-glass thermometers,
b) Thermocouples,
c) Electric resistance thermometers, or
d) Electric resistance measuring instruments having accuracy 0.2 percent of the scale.

7.6.1.1 Accuracy of measurement shall be within $\pm 0.25^{\circ}$C.

7.6.2 Electrical measurements shall be made with indicating instrument.

7.6.2.1 The accuracy of indicating instruments shall be within 0.5 percent of the full scale reading.

7.6.3 Volume measurement shall be made with one or more of the following instruments:

a) Liquid quantity measuring device, measuring either volume or weight, or
b) Liquid flow meter.

7.6.3.1 Accuracy of measurement shall be within ±1 percent.

7.6.4 The smallest division on the scale of any instrument shall not exceed twice the specified accuracy for it.

7.7 Procedure for Type Tests

7.7.1 *Insulation Resistance*

The insulation resistance between all electric circuits included in the cooler, and earthed metal parts, when measured at normal room temperatures at the manufacturer's works with a voltage of 500 V dc shall be not less than 1 MΩ at the end of maximum operating condition test. This test shall be repeated after high voltage test.

7.7.2 *High Voltage Test*

The electrical insulation of all electric circuits included in the water cooler shall be such as to withstand a high voltage test of 1 000 V rms applied for 2 seconds between all electric circuits and all accessible metal parts (electrically connected together for this test) at normal room temperature. For water coolers to be connected to circuits of 50 V and below, the high voltage tests shall be 500 V rms. The test voltage shall be alternating of approximately sine-wave form, and of any convenient frequency between 25 and 100 Hz.

7.7.3 *Cooling Capacity Rating Test*

The object of the test is to determine the cooling capacity of a specimen cooler under rating conditions specified in **5.2.** The procedure given in **7.7.3.1** to **7.7.3.9** shall be adopted to measure the following:

a) Temperature of inlet water;
b) Temperature of outlet water;
c) Volume of water in litres cooled per hour;
d) Volume of water in litres, by passed per hour through pre-cooler, if provided;
e) Ambient temperature;
f) Voltage at motor service connections when the cooler is working;
g) Power consumption of the unit; and
h) Current taken by the unit.

7.7.3.1 Start the condensing unit and regulate the voltage at the service connection to within ± 5 percent of the motor rated voltage.

7.7.3.2 Pressure bubbler water coolers equipped with a pre-cooler and when being tested for capacity with the pre-cooler, shall have the outlet hand-regulated shut-off valve arranged to bypass 60 percent of the total stream to the drain and 40 percent to an outside drain. The flow from both streams shall be noted and their sum reported as litres of water per hour.

7.7.3.3 Adjust the temperature of the inlet water for all types of water coolers or the average temperature of the water in bottles for bottle water coolers to within $\pm 0.5^{\circ}$C of the rating conditions specified in **5.2.** For non plumbing type storage water coolers a temporary inlet water connection with a flow regulator/valve shall be provided to facilitate maintenance of constant water level in the tank to rated storage capacity, as specified by the manufacturer.

7.7.3.4 Adjust or bridge the temperature control device so that continuous operation during the test is assumed.

7.7.3.5 Operate the water cooler until steady temperatures and mechanical equilibrium are established. For storage type water cooler, the water cooler shall be run for a time depending upon storage and cooling capacity so as to ensure that a stable outlet water temperature is established.

7.7.3.6 At an interval of 15 minutes record readings of the measurements stated in **7.7.3.** In the case of bottle water coolers, measurements of inlet water temperature may be taken only at the beginning of the test and when abottle is replaced.

7.7.3.7 Continue the test until eight successive readings of outlet water temperature are steady, with individual readings varying within $\pm 0.5^{\circ}$C and average of such readings conforming to **5.2.**

7.7.3.8 Ambient temperatures shall be maintained within $\pm 1^{\circ}$C of the specified value and shall be measured at points located 25 cm from the sides other than the sides in which the condenser outlet is located, on the perpendicular passing through the geometrical centres of the surfaces of these sides.

7.7.3.9 Evaluation and report of cooling capacity rating test results:

a) The cooling capacity rating of the cooler tested shall be the average of the eight successive readings recorded in **7.7.3.7**.

b) The test report shall contain the measurements of parameters given in **7.7.3** (a) to (h) after specified rating conditions have become established.

7.7.4 *Maximum Operating Condition Test*

Water coolers shall be tested at the conditions specified in **4.2.1**. The water cooler shall operate continuously for a period of 2 hours after the test conditions are established without tripping of motor overload protective device.

7.7.5 The type test report shall also contain the following identification data:

a) Name-plate data of water cooler:
b) Name-plate data of compressor;
c) Kind of cooler, that is whether pressure bubbler with pre-cooler, pressure bubbler with no pre-cooler, pressure faucet, bottle faucet, etc; and
d) Motor name-plate data.

7.8 Procedure for Production Routine Tests

7.8.1 *Insulation Resistance Test*

Electrical insulation test shall be carried out at 500 V dc, as given in **7.7.1** after the end of performance test.

7.8.2 *Performance Test*

For pressure type water cooler, measurement shall be made of the following under the prevailing ambient conditions and the performance figure from (a) to (g) shall be compared with the results of the unit which has already passed the type test:

a) Temperature of inlet water;
b) Temperature of outlet water;
c) Volume of water in litres cooled per hour;
d) Ambient temperature;
e) Voltage at motor service connections;
g) Power consumption; and
h) Current.

7.8.2.1 For storage type water coolers, pull down test may be conducted instead of the one involving continuous flow of water through the unit. Measurement shall be made of the pull down time. When the initial water temperature, not exceeding 32°C, drops down by at least 15°C during the test, measurement shall also be made of the following, which shall be compared with the results of a type tested and approved unit, under the same temperature conditions :

a) Ambient temperature,
b) Initial water temperature,
c) Final water temperature,
d) Pull down time,
e) Voltage,
f) Current, and
g) Power consumption.

The initial and final temperature of the water shall be measured in the top layer of the water surface in the tank after thoroughly mixing the water. When the initial water temperature, not exceeding 32°C, drops down by at least 15°C during the test, measurement shall be compared with the results of a type tested and approved unit, under the prevailing ambient conditions.

7.8.3 *High Voltage Test*

This shall be conducted as given in **7.7.2**.

8 MANUFACTURER'S CERTIFICATE

8.1 The manufacturer shall furnish with each water cooler a copy of the type test certificate, if required by the customer, and shall also certify that the water cooler has been manufactured according to the type tested by the testing authority and that it conforms to the requirements of this standard.

8.1.1 The manufacturer's certificate shall not be necessary unless specifically demanded by the consumer/if the water cooler bears the BIS Certification Mark (*see* **9.2**).

9 MARKING AND INFORMATION

9.1 Each self-contained water cooler shall have the following information marked in a permanent and legible manner in a location where it is easily accessible and easily visible after installation:

a) Name-plate data of water cooler including make, model and serial number of the unit and the name and quantity of refrigerant;
b) Supply characteristics;
c) Cooling capacity;
d) Wiring diagram;
e) Full load current, and
f) The rate of maximum energy consumption under test conditions laid down in **5.2** in watts (*see* **5.6.3**).

9.2 BIS Certification Marking

9.2.1 The water cooler may also be marked with the Standard Mark.

9.2.2 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 details of condition under which a license for the use of the standard mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

ANNEX A

(*Foreword*)

COMMITTEE COMPOSITION

Refrigeration and Air Conditioning Sectional Committee, ME 03

Organization	*Representative(s)*
Indian Institute of Technology, New Delhi	PROF R. S. AGARWAL (***Chairman***)
All India Air conditioning & Refrigeration Association, New Delhi	SHRI KAMAL SAHDEV SHRI A. P. KHURANA (*Alternate*)
ASHRAE India Chapter, Gurgaon	SHRI P. K. CHOWDHURY SHRI ASHISH REKHEJA (*Alternate*)
Blue Star Limited, Thane	SHRI D. RAVINDRA SHRI N. SIVASANKARAN (*Alternate*)
Central Public Works Department, New Delhi	Chief Engineer (E) SUPERINTENDENT ENGINEER (*Alternate*)
Confederation of India Industry, New Delhi	SHRI S. S. GOPALKRISHNAN
Directorate General of Supplies & Disposals, New Delhi	SHRI J. K. KHANNA SHRI R. KARUPPIAH (*Alternate*)
Directorate of Quality Assurance, Pune	COL M. S. PARTHASARATHY LT-COL B. T. JADE (*Alternate*)
Energy Management Centre, New Delhi	SHRI J. VASUDEVAN SHRI SATISH SABHARWAL (*Alternate*)
Fedders Lloyd Corporation Ltd, New Delhi	SHRI H. J. KEWALRAMANI SHRI UMAKANT V. H. (*Alternate*)
Frac Power Motors, New Delhi	SHRI V. D. TREHAN
Godrej Appliances Ltd, Mumbai	SHRI B. J. WADIA SHRI N. T. DESAI (*Alternate*)
Indfos Industries Ltd, New Delhi	SHRI S. S. MALHOTRA SHRI D. K. JAIN (*Alternate*)
Indian Society of Heating, Refrigerating and Air conditioning Engineers, New Delhi	President
Kirloskar Copeland Ltd, Pune	SHRI V. G. SARDESAI SHRI N. M. INGLE (*Alternate*)
Kirloskar Pneumatic Co Ltd, Pune	SHRI V. D. MANE SHRI ADITYA KOWSHIK (*Alternate*)
National Dairy Development Board, Anand	SHRI V. D. JOSHI SHRI T. N. JAYARAMAN (*Alternate*)
National Thermal Power Corporation Ltd, New Delhi	SHRI S. ANAND SHRI T. PAL (*Alternate*)
Tecumseh Products India Ltd, Hyderabad	DR VENKATESWARLU SHRI V. RAGHAVENDRA RAO (*Alternate*)
Annapurna Electronics & Services Ltd, Hyderabad	SHRI G. K. PRASAD
Tata Energy Research Institute, New Delhi	SHRI PANKAJ BHATIA DR AJAY MATHUR (*Alternate*)
Videocon Appliances Ltd, Aurangabad	SHRI M. S. DHABER SHRI S. SHANKARNARAYANAN (*Alternate*)
Volga Airtechnics Ltd, Ahmedabad	SHRI A. K. MEHTA
Voltas Limited, Mumbai	SHRI S. R. SRINIVASAN SHRI M. M. ROY (*Alternate*)

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Organization	*Representative(s)*
Voltas Ltd (White Goods), Hyderabad	SHRI S. JAMES SHRI S. BHUJANGA RAO (*Alternate*)
Whirlpool of India Ltd, Ranjangaon, Pune	SHRI S. M. SASTRY
BIS Directorate General	SHRI M. L. CHOPRA, Director & Head (MED) [Representing Director General (*Ex-officio*)]

Member-Secretary
SHRI P. VENKATESWARA RAO
Joint Director (MED), BIS

Panel for Refrigeration and Commercial Appliances, ME 3/P-1

Organization	*Representative(s)*
Whirlpool of India Limited, Ranjangaon, Pune	SHRI S. M. SASTRY (***Convenor***)
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