

IMMERSION WATER HEATERS

Four Found Unsafe

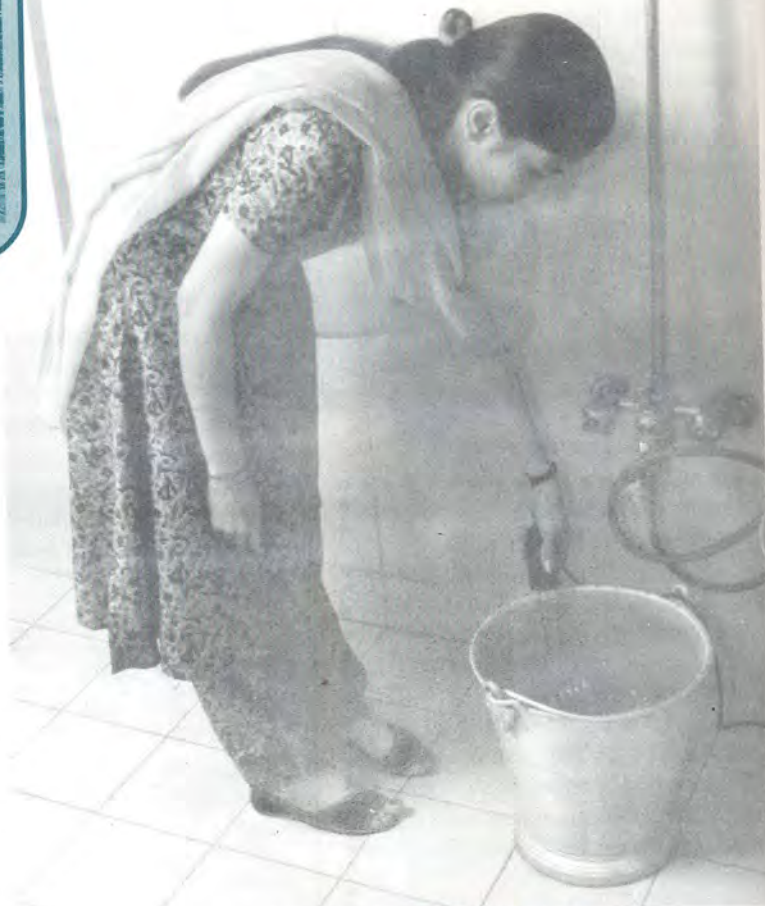
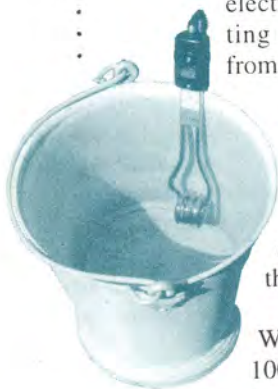
They are simple in design, you tend to think, easy to store and easy to use. But think again. Especially if you are using a *Murphy Bonus Original, Classic, Soni*, or *National Super* brand immersion water heater. Going by our test findings of 13 brands of immersion water heaters, four brands failed to qualify in one parameter or the other.

Immersion water heaters have been in use for more than two decades now and have survived stiff competition from geysers. Their small structure, no infrastructure and relative ease of maintenance has found it convenient to use by travellers, hostelites and people of the lower income group. Also, attracting users is its small size, low price and less energy consumption as compared to geysers. But the potential danger of electric shock lingers, preventing this easy-to-use product from sweeping the market.

Brands Tested

All 13 brands were purchased incognito from authorised dealers/retail outlets from across the country.

We tested two samples (230V, 1000W) of each brand as per



the methods and standards laid down by the Bureau of Indian Standards (BIS). The BIS specifies 20 safety tests and two performance tests for immersion water heaters. Going a step further, we devised an energy consumption test for all these brands. We also verified the marking and labelling information on the samples and the instruction sheets accompanying them.

The brands tested, both national and regional, were, *Bajaj, Spherohot, ABC, Powerpack, National Super, Suntrack, Soni, Kraft, Classic, Lifeline, Murphy Bonus Original, Vijay* and *Remson Goldline*.

Safety First

Since safety would be the users' prime concern, we tested the samples for their ability to protect them against electric shock. All the brands conformed to the standards.

We also performed tests to check the leakage current. Leakage current flows through the insulating material depending on the voltage, property of insulating material and loose connection. This current in microamperes value may not be fatal but may give the user a mild shock when he touches the water in the bucket while the heater is on and the heater earthing is weak. As

per standards, leakage current should not exceed 210 micro amps (rms). All brands conformed to the standards.

But then, for a product used in humid conditions and water being a good conductor of electricity, the real performers would stand out only in such conditions. So, we simulated humid conditions and checked for leakage current. Out of the 13 brands, 10 conformed to the standard for leakage current, i.e. a maximum of 210 micro amps. But *Murphy Bonus Original* with 485 micro amps, *Classic* with 301 micro amps and *Soni* with 273 micro amps failed to meet the standard.

Abnormal Conditions

What would happen if water heaters were used with less water, more water or no water at all? Our tests revealed that except for *Murphy Bonus Original*, all

the other brands would perform satisfactorily under abnormal conditions. Mechanical damage was noticed in one of *Murphy's* samples while the second sample did not conform to the high voltage test.

Every Part Apart

For an electric product to be absolutely safe, its components must be of good quality. They should withstand variations in voltage. Also, the construction of the water heater should conform to the standards. In separate tests, we tested three-pin plugs and the power supply cords which carry current to the immersion water heater.

The manufacturer of any appliance is responsible for all its components. Plugs are an integral part of any electrical appliance and hence supplying plugs of standard quality is the responsibility of the manufacturers.

We tested plugs of both the samples of all the brands as per clause no. 24 of IS-1293-1988 with latest amendment no. 5 (August 1996). The BIS specifies only two samples for water heaters, so we chose to test only two plugs which are an integral part of the same. Further, we tested these plugs on only one parameter, test for heat resistance, which we felt would be useful to the consumers.

Moulded plugs of *Bajaj* and *Remson Goldline*, the only ones to carry the IS 6538 mark, deformed during the test. Still, it is generally considered safe to opt for moulded plugs as they have a single complete body unlike the normal plugs, reducing chances of electric shock to the user. Recently, there has been a draft amendment by the BIS wherein the temperature in the heat resistance test may be brought down to 70-80 °C from 125 °C.

KEY FINDINGS

We tested two samples (230V, 1000W) each of 13 brands of electric immersion water heaters representing reasonably all parts of the country. The names of the brands tested are, *Spherehot, ABC, Bajaj, National Super, Powerpack, Suntrack, Soni, Kraft, Classic, Lifeline, Murphy Bonus Original, Vijay* and *Remson Goldline*. They were tested against the specifications set by the Bureau of Indian Standards (BIS).

☞ Nine brands conformed to all the tests and four did not conform to various safety and performance parameters.

Safety

☞ *Murphy Bonus Original, Classic* and *Soni* did not conform to the leakage current after moisture resistance test. They recorded leakage current more than the specified 210 micro amperes — 485, 301 and 273 micro amps, respectively — which may not be fatal, but may cause a mild electric shock.

☞ *Murphy Bonus Original* also did not conform to the abnormal operation test, which checks the safety of the user if the heater is used with water below the minimum level, above the maximum level or even without water.

☞ The power supply cords of *Classic, Murphy Bonus Original* and *Soni* failed to comply with the standards. Their cross-sectional area was smaller than that specified. Thus they would be unable to withstand any overload of current. Also, the power supply cord of *Murphy Bonus Original* was found to be 1.4 m as against the standard 2 m.

Components

☞ The components of the samples were also subjected to a quality test. The moulded plugs of *Bajaj* and *Remson Goldline* deformed during the heat resistance test. They were the only moulded plugs marked with IS 6538.

Performance

☞ *National Super* did not conform to the 'finish' parameter of the performance test. The metallic grip for holding the heating elements with earthing screw and washer and screws for fixing the attachment head were found rusted posing a threat of electric shock to the user.

Labelling

☞ Only *Bajaj* followed all the norms laid down for care labelling. None of the other brands detailed the instructions as per the standards. *Kraft, Murphy Bonus Original* and *National Super* did not provide any instruction sheets at all.

☞ *Murphy Bonus Original* was found without the mandatory ISI mark.

Energy Cost

☞ The energy consumption of *Spherehot* was found to be the lowest (Rs 687.81 per annum), while *Murphy Bonus Original* recorded the highest (Rs 763.87 per annum) consumption of energy.

Price

☞ Vast differences were observed between the billed price and the prices printed on the carton in majority of the brands. The least expensive was *Murphy Bonus Original* at Rs. 110 and the most expensive was *Bajaj* costing Rs. 265.

The power supply cords of *Soni*, *Classic* and *Murphy Bonus Original* have smaller cross-sectional area than specified in the standards. This means that these cords would not be able to withstand large overloads of current. *Murphy Bonus Original's* cord was only 1.4 metres long as against the BIS minimum requirement of 2 metres.

Performance Tests

These were divided into two categories - endurance and finish. In the endurance test specified by the BIS, the samples were operated continuously for 96 hours in a

vessel containing water at 1.15 times the maximum rated input (wattage) as specified in the standard. To pass this test, the insulation, contacts and connections should not be damaged or loosen as a result of this heating and vibration. All the 13 brands conformed to the standard.

After the gruelling endurance test, the samples were checked visually for any damage, rusting or change in the finish of the metal components. All the brands except *National Super* passed the test. The metallic grip holding the heating element with earthing screw and washer and screws used to fix the attachment head had rusted after the endurance test. This could render the user vulnerable to electric shock.

This is an improvement on our earlier test in 1996-97, when we had first tested Immersion Water Heaters (report not published). Then we had found that the screws of most of the brands had rusted as they were made of iron. We had written to the manufacturers who responded positively and replaced those iron screws with brass plated ones resulting in all the brands passing the test for rusting.

Energy Consumption

Water heaters are known to consume a considerable amount of energy. We devised a test to verify the assumption. By keeping other factors like voltage and water level constant, we checked the time required for each sample to reach the temperature of 65°C from 40°C. The energy consumption of *Spherehot* turned out to be the lowest (Rs 687.81 per annum), while that of *Murphy Bonus Original* (Rs 763.87 per annum) was the highest (see box for details).

Various other quality tests like mechanical strength, construction, internal wiring, provision for earthing, screws and connections,

resistance to heat and resistance to rusting were also conducted. All the brands conformed to the respective standards.

Incomplete Labels

Dealing with electricity and human life, it becomes all the more essential to educate the user about the proper use, precautions and the possible problems of the electrical appliances. And this is mandatory by law, too. Despite the BIS giving specifications for proper labelling, none of the brands, except *Bajaj*, has explained it in detail. *Kraft*, *National Super* and *Murphy Bonus Original* do not have instruction sheets at all.

Though the ISI mark is mandatory, *Murphy Bonus Original* did not have it on its sample. Also, according to standard, any marking on the sample has to be legible and durable. Hence, manufacturers emboss it on their products to make it last longer. *Murphy Bonus Original* has provided information of wattage rating on a sticker. This could easily peel off due to moisture.

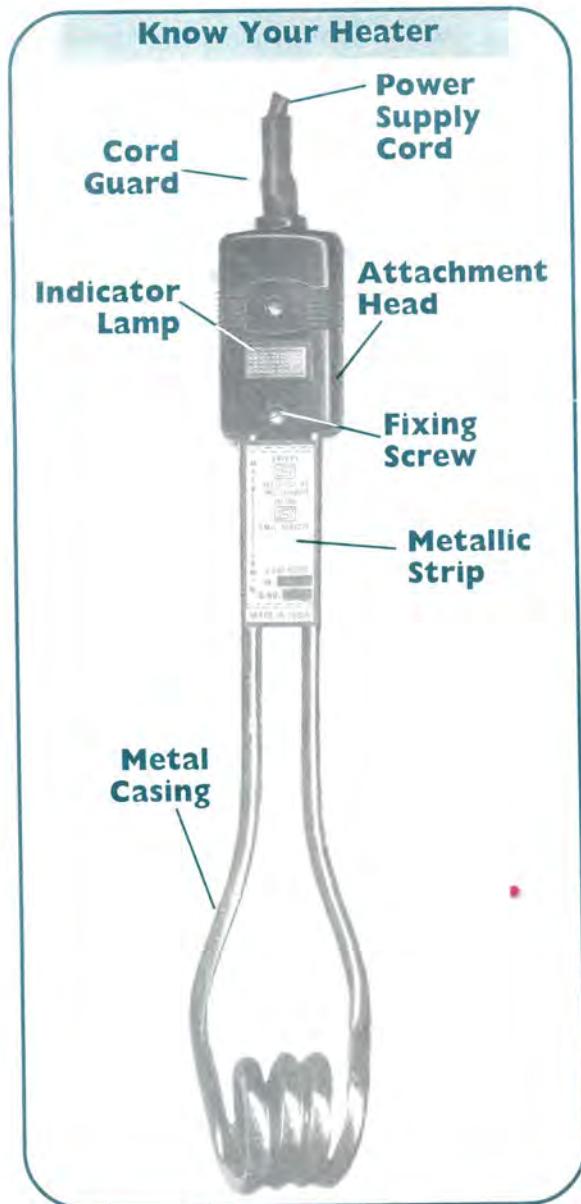
How Well They Fared?

We rated the brands that passed all the safety and performance tests against each other. We considered the quantifiable parameters in these tests and took into account their energy consumption. This is also the first time that we are considering the labelling of a product for rating. The heaters have been rated according to the varying levels of compliance.

Guarantee & Warranty

Most manufacturers offer guarantee and/or warranties for their after-sales service. Take a close look at the contents of the warranty before you purchase any electric immersion water heater.

Verify closely the format of these guarantees and warranties because the two are often interchangeably used by the manufacturers and the



Energy Consumption

By keeping all the parameters constant, energy consumption of all the brands was calculated in the form of Watt Hour (WH). This was then converted to Kilo Watt Hour (KWH). The KWH consumption for a day was then calculated. Finally, by considering the cost of energy at approximately Rs. 4 per KWH, the energy cost for the appliance to be operated once a day throughout the year was derived.

BRANDS	Energy cost for one daily use in a year	Time Taken (40°C - 65°C)
	(in Rs.)	(in mins/secs)
Spherehot	687.81	27.30
Bajaj	694.52	26.21
Vijay	725.62	30.00
ABC	726.79	28.30
Kraft	740.51	28.30
Suntrack	744.89	31.30
Powerpack	745.48	31.00
National Super	747.96	33.30
Lifeline	752.78	28.30
Remson Goldline	752.92	31.00
Classic	756.86	28.30
Soni	759.05	30.00
Murphy Bonus	763.87	32.00
Original		

dealers alike. Of the 13 brands we purchased, only **Bajaj** and **Vijay** provided two years' guarantee. **Kraft** and **Murphy Bonus Original** did not have any provision, while the rest provided guarantee/warranty for only one year.

But irrespective of what warranty/guarantee manufacturers offer, they are liable to an inherent warranty under the Sale of Goods Act, 1930. This means that the heater should be safe to handle and should not pose an electric or fire hazard. However, warranties are mostly limited to manufacturing defects.

The guarantee does not apply to normal wear and tear of parts. **Lifeline**, **Spherehot**, **ABC**, **Bajaj**, **National Super**, **Suntrack**, **Vijay** and **Remson Goldline** guarantee/warranty cards do not cover damage resulting from accident, mishandling or negligence on the part of the customers. In the case of **Spherehot** and **Bajaj**, guarantee does not apply if the appli-

ance is not used in accordance with the instructions provided and is opened/handled by any other than their authorised service personnel.

Insist on a guarantee/warranty card. Ensure that all the details are filled in. Take photocopies of the guarantee/warranty card and file them carefully. In case of a complaint, never part with the original but send a copy to the dealer/manufacturer.

Manufacturers' Response

As a policy, we convey the test results to all the manufacturers, irrespective of whether their brand has passed or failed our test. The results are posted to their registered offices

by courier. The manufacturers receive only the result of their own product and are given two weeks from the date of receipt to respond.

Doshi Heaters Pvt. Ltd., manufacturers of **Spherehot**, admitted to incomplete labelling information on their product. They agreed to incorporate the complete details in their future models. Also, they would start marking AC and IS 368:1992 on the labels of their products. Finally they have also agreed to show small photographs on the carton for the correct use of the product.

Bajaj Electricals Ltd. disagreed to our findings of their moulded plugs deforming during resistance to heat test. They contested this citing a clause in the BIS test procedure which said that the resistance to heat test shall be conducted on the insulating material close to the live parts (inner cover) and not on the outer cover.

But in a similar case, Philips India had contended our test findings for the plugs



Tips for Use

Before connecting to the power supply, the immersion water heater should be immersed in such a vessel or a bucket that the level of water should be in between the Maximum and Minimum levels indicated on the appliance.

Use buckets with sufficient depth, ideally metal ones and not plastic buckets.

Switch off the main supply and remove the plug from the socket before removing the water heater from water.

Do not remove the water heater immediately after switching off the supply. It is advisable to wait for at least a minute or two after the supply has been switched off.

Do not bring the immersion heater in contact with any combustible material immediately after it has been removed from the water.

Clean the appliance at regular intervals for best results.

of steam irons. We had then contacted BIS which had ruled that the sample as a whole should fulfill the requirements of resistance to heat test.

Associated Marketing Agency, manufacturers of **Vijay**, contended that they did not mention the details of vessel since any container could be used for this purpose. Also, they claimed to have mentioned that the heater should be used for heating water and no other liquids thus satisfying the combustible material requirement of the BIS.

Plastic buckets could melt if used for heating water. Also using vessels of low depth could render the level to dip below the minimum required. They have not mentioned specifically that the heater should not be brought near combustible material immediately after its withdrawal from water.

Manufacturers of **Lifeline, Powerpack, Suntrack, ABC, Kraft, Remson Goldline, Soni, Classic** and **National Super** did not reply to our letters. No manufacturer's address was printed on **Murphy Bonus Original's** carton (refer box in the flap).

Areas of Action

Immersion water heaters are inherently risky products. Still they are widely used. So, steps have to be taken to make them safer by either improving their design or introducing additional parts to prevent possible electric shock to the users.

Some of the designs we suggest are :

☞ The size of the attachment head should be increased or an additional gripping of moulded material should be provided so that the user may comfortably lift the appliance.

☞ Thermal cut-out should be provided so that during abnormal operations the current supply to the heater gets automatically limited.

☞ The distance between the



Possible Faults in an Electric Immersion Water Heater, their Causes and Remedies

Possible faults	Causes	Remedies
1. Leakage fault (Experiencing Shock)	a) Attachment head could be broken. b) Leakage in the supply cord. c) Leakage through the heating element.	a) Replace the attachment head. b) Cord may be old. Replace it. c) Repairing not possible. Replace the heater.
2. Burst metal tube	a) Metal tube is not dipped inside the water upto the minimum level marked on the metal strip.	a) Cannot be repaired. Replace the heater.
3. Earthing Fault & Short Circuit	a) Heating element inside the metal tube (casing) may touch the corners of metal casing of water heater. b) If the earthing wire directly touches the live or neutral wires or terminals due to overheating. This generally happens when the live, neutral & earth wires are not properly placed inside the attachment head.	a) Here the fault is from inside the heater. It can not be repaired and the heater should be replaced. b) It is better to provide fuse and circuit breaker in the location where heater is to be used to avoid danger to the user.
4. Open circuit fault	a) Connections of supply cord may be broken at the terminals in the attachment head or in the plug top causing discontinuity known as open circuit.	a) Check the cord connections inside plug top as well as at the attachment head.
5. Loose fitting or loose connections	a) A screw may be missing.	a) Get another screw of the same type and tighten it.

Note: It is always advisable to give the Immersion Water Heater for repairs to an authorised service centre or a qualified electrician.

rating plate giving information of the water levels and the attachment head should be increased.

☞ There should be strict monitoring by the BIS to see that all the brands follow the mandatory guidelines for care labelling.

☞ Instructions for use should be provided at least in Hindi and English, and if possible, in other languages too. Visuals for safe use

could also be given for a better understanding for users.

☞ The moulded attachment head should be provided for safety to users.

These suggestions have been sent to the BIS and the manufacturers for their comments. BIS has noted these suggestions and proposes to discuss them in its next meeting. ■