



Water Pumps

Lifting Waters, Mostly Efficiently

If you are in one of the metro cities or Tier 2 towns of the country, it is likely that one of the members of your family has cribbed, sometime or the other, about having to switch on and switch off the water pump to either fill the groundwater tank or lift water to the tank on the roof. And worse than anything else is when there is no water in the house because either the pump could not lift it with enough pressure or crashed while performing its duty. In many cases, that is the day when you check the brand of the pump for the second time (first incidence being at the time of purchase).

Here, to figure out how top water-pump brands across the country are performing and whose consumers are relatively better off, we took all pumps to an NABL-certified lab and put them through stringent tests. We tested these pumps for the powers they possessed, inspected what safety standards they followed, scrutinized their guarantees or warranties, and found out if they actually meant what they claimed and if they really stood by their promise. So, which among these are worth buying?

How We Tested?

Consumer Voice bought 13 brands of mono pump sets with 0.5 (½) hp capacity. These were selected on the basis of market share and popularity as identified through a market survey. The test followed IS 8472:2009 (pumps – regenerative or clear, cold water) standards. The motor of the mono set pump is single-phase, and the testing has been done according to IS 8472 and 996–2009, meant specifically for single-phase small AC and universal electric motors.

CV Recommendation

V-Guard | CRI

- V-Guard and CRI score highest on energy efficiency and overall effectiveness.
- CRI makes the least noise among the tested brands and has the lowest vibration.

Brands to Avoid

- **KSB**
Although the brand gives 24 months' warranty – which is more than any other brand's – its self-priming time is more than its declared value, and thus does not comply with the standard requirement.
- **Lubi**
The brand scores lowest on overall performance, does not have thermal protectors, and is also the loudest in terms of making noise while functioning.

Value for Money

V-Guard

MRP: Rs 4,225; retail price: Rs 2,450

KEY FINDINGS

- In overall efficiency (high water output at low energy consumption), V-Guard performed on top followed by CRI and Kirloskar.
- In pump performance, V-Guard tops the chart followed by Kirloskar and CRI.
- Most of the brands did not attain the declared rated load of 0.37 kilowatts or 0.5 horsepower.
- Self-priming time of KSB was more than what it declared, thereby not complying with the requirements
- Arise, CRI, V-Guard, Lubi and KSB provide all the labelling requirements.
- The pumps of brands CRI, V-Guard, Sharp, Ujala, Lubi and KSB are ISI-marked.
- KSB, Kirloskar and CRI give 24, 18 and 15 months' warranty, respectively, while all other brands give only 12 months' warranty.
- Lubi produced the highest noise levels (88.0), while CRI made the least noise.
- Kirloskar showed maximum vibration (0.7 mm/sec) and scored the least; Arise, CG and CRI had the lowest vibration.



What Are These Water Pumps?

Pumps that handle clear, cold water are generally constructed as bare pumps or monoset pumps in single or multi-stage construction. These pumps are self-priming, run on single-phase electric connection, and have pumping capacities between 0.5 and 1.0 horsepower (hp). They are commonly used in houses to either pump water to the overhead tank or increase the pressure of the water on supply line. While such pumps are manufactured in both organized and unorganized sectors, we have tested only the popular branded pumps from the organized sector.

BRANDS TESTED

Rank	Brand Name	Model	Manufacturer
1	V-Guard	Neon H80	V-Guard
2	Arise	Super master II	Arise India
3	CRI	ENR 9	CRI Pumps
3	Crompton Greaves	Mini Marvel II	Crompton Greaves
3	Ujala	Magic Flow	Ujala pumps
4	Kirloskar	Jalraj	Kirloskar Brothers
4	Bajaj	Max Flow PX PL051	Bajaj Electricals
5	Lubi	MDH 50A little master I	Mira industries
5	Texmo	Taro	Texmo Industries
6	Sharp	SP 50	Sharp Enterprises
7	Usha	2540	Usha
8	Khaitan	Mini Gem	Khaitan Electrical
9	KSB	Hydroblock II	KSB pumps

TEST RESULTS

PUMP PERFORMANCE TESTS

At rated frequency, the pump should give a minimum of 90 per cent of rated total head at a minimum of 90 per cent of rated discharge. The pump should not take more than 110 per cent of the declared power input at the guaranteed duty point.

The motor should not get overloaded in the operating head range of ± 25 per cent of rated head at rated voltage when the supply frequency is within the limits (± 3 per cent of the rated frequency). The maximum allowable current should be 1.07 times of the declared full load current.

u Rated Total Head

The total head is the sum of the static head and the friction head. All the brands passed in the rated total head.

- Kirloskar scored highest points; KSB and Sharp scored the least.

u Rated Discharge

All the brands passed in the rated discharge (output water per second).

- The highest score was obtained by Kirloskar and the lowest score by KSB.

Brand	Overall Efficiency, %	Score out of 25
V-Guard	13.73	19.06
CRI	13.66	18.97
Kirloskar	13.48	18.72
Arise	12.8	17.75
Ujala	12.33	17.12
Lubi	12.14	16.86
CG	11.96	16.54
Bajaj	11.91	16.54
Texmo	11.88	16.50
Usha	11.07	15.37
Sharp	9.49	13.18
KSB	9.45	13.12
Khaitan	9.37	13.01

u Rated Input Power

Input power should not be more than the declared value by the manufacture. All brands passed this test.

u Rated Current

All the brands passed in the rated current as measured value was lower than the declared value.

u Load Test at Duty Point(Input Power)

During the load test, most of the pumps did not attain the declared rated load of 0.37 kW or 0.5 hp.

u Overall Efficiency

The pump set runs for years and remains in use almost every day. For a pump that is of the capacity of half for one horsepower, power consumption can be substantial. Overall efficiency of the tested pump sets varied from 9.37 per cent to 13.73 per cent. Higher efficiency is considered better in terms of higher water output with low power consumption. V-Guard performed on top followed by CRI and Kirloskar.

ELECTRICAL PERFORMANCE TESTS

u 'No Load' Test

At a rated voltage, the no-load wattage was measured.

- The lowest no-load wattage was found in CG, making it the top scorer.
- The highest no-load wattage was found in Usha and Khaitan, making them bottom scorers.

u Insulation Resistance Test

Insulation resistance between all windings combined and the motor frame shall not be less than

5 mega ohm at 500 volt DC.

- The observed values of insulation resistance before and after high voltage test in all samples were more than 5 mega ohms. So, all brands scored same points.

u High Voltage Test

After temperature rise test, 500 V AC current was applied for one minute between windings and frame to check if there was any flashover.

- All the brands passed in this test.

u Breakaway Torque

Minimum breakaway torque should be 30 percent of full-load torque.

All brands conformed to this requirement as specified in the Indian Standard.

- Khaitan scored the highest for having maximum torque.
- Arise and Texmo scored the lowest for having comparatively less torque.

u Pull-up Torque

Minimum pull-up torque should be 20 per cent of full-load torque. It should be sufficient to accelerate the motor under the burst condition of voltage and frequency for which the appliance has been designed.

- All the brands conformed to this requirement.
- Sharp with maximum pull-up torque scored highest.

u Pull-out Torque

The highest torque that the motor can develop while running at rated voltage and frequency is called pull-out torque. The minimum pull-out torque should be 150 per cent of the full-load torque.

All brands passed the test as they all met the minimum standard requirement.

- The top scorer in this test was Arise with maximum pull-out torque.
- The lowest score went to CG.

u Moisture-Proof

Pumps are expected to be resistant to moisture to a certain level.

- All the brands complied with this requirement when tested as per the laid-down requirement.



Comparative Test

PERFORMANCE SCORES

Brands →		V-Guard	Arise	CRI	Crompton Greave	Ujala	
Test Parameters ↓							
Warranty, months	Weightage	12	12	15	12	12	
MRP, Rs	↓	4225	3530	3304	3700	3200	
Retail price, Rs		2450	2430	2700	2857	2476	
General Quality Tests	11	10	11	9.7	9.24	10.47	
Packaging quality	2	2.0	2.0	1.7	1.7	1.7	
Labeling/Marking	4	4.0	4.0	4.0	3.54	3.77	
General construction	4	3.0	4.0	3.0	3.0	4.0	
Material of construction	1	1	1	1	1	1	
Pump Performance	55	45.41	43.22	43.46	42.62	41.67	
Total head	5	4.55	4.27	4.36	4.43	3.05	
Discharge	5	4.09	3.76	4.31	3.68	4.22	
Input power	5	3.81	3.45	3.15	4.02	5.0	
Current	5	4.18	3.84	3.23	4.05	4.99	
Overall efficiency	25	19.06	17.75	18.97	16.54	17.12	
Load test: efficiency	5	3.09	3.15	3.07	3.41	2.82	
Hydrostatic test	2	2	2	2	2	2	
Self-priming time	5	4.63	5.0	4.37	4.49	2.47	
Electrical Performance of Motor Part	32	27.18	26.34	26.66	28.4	27.37	
No load test	4	3.33	3.57	3.62	3.91	3.61	
Breakaway torque	3	1.92	1.80	2.05	2.03	1.93	
Pull-up, pull-out and starting torque	6	4.78	5.04	4.86	4.33	4.59	
Noise and vibration	4	3.26	3.65	3.67	3.63	2.97	
Insulation resistance and high voltage test	3	3	3	3	3	3	
Moisture and leakage test	6	5.98	5.98	5.98	5.98	5.99	
Temperature rise	6	4.91	3.3	3.48	5.52	5.28	
Overall Score (rounded off)	100	83	81	80	80	80	

Ratings: >90: very good*****, 71-90: good****, 51-70: average***, 30-50: poor**, < 30: very poor*

OF DOMESTIC PUMPSETS (0.5 HP)

	Kirloskar	Bajaj	Lubi	Texmo	Sharp	Usha	Khaitan	KSB
								
	18	12	12	24	12	12	12	12
	3028	3700	3750	2940	3200	3150	3480	3430
	2250	2450	2800	2571	2300	2700	2600	2800
	8.28	9.47	9.7	10.31	11	10.7	10.24	10.7
	1.2	1.7	1.7	2.0	2.0	1.7	1.7	1.7
	3.08	3.77	4.0	3.31	4.0	4.0	3.54	4.0
	3.0	3.0	3.0	4.0	4.0	4.0	4.0	4.0
	1	1	1	1	1	1	1	1
	43.51	42.07	41.69	39.98	37.21	39	36.46	34.18
	4.72	4.25	4.01	4.0	4.42	4.41	4.53	3.93
	4.05	3.83	3.57	3.83	3.29	3.78	3.87	2.99
	3.91	3.81	3.91	3.71	2.95	2.9	2.95	4.14
	3.68	4.13	4.18	3.5	3.65	3.01	2.8	4.0
	18.72	16.54	16.86	16.50	13.18	15.37	13.01	13.12
	3.08	3	2.89	2.96	3.4	2.8	2.73	3
	2	2	2	2	2	2	2	2
	3.35	4.51	4.27	3.48	4.32	4.73	4.57	1.0
	26.63	26.67	25.73	26.8	27.75	25.23	26.9	28.37
	3.62	3.23	3.44	3.86	3.33	1.66	1.86	3.77
	2.06	2.05	1.98	1.82	2.33	2.84	2.99	2.29
	4.71	4.69	4.48	4.67	5.73	4.75	4.86	4.88
	2.86	3.39	2.74	3.57	3.35	3.35	3.22	2.86
	3	3	3	3	3	3	3	3
	5.98	5.98	5.98	5.98	5.98	5.98	5.98	5.98
	4.4	4.33	4.11	3.9	4.03	3.65	4.99	5.59
	78	78	77	77	76	75	74	73

Comparative Test

u Leakage Current Test

Leakage current shall not exceed 3.5 milliamps (RMS) when a voltage equal to 1.1 times the rated voltage is applied to the motor.

- All the brands met this requirement.

u Temperature-Rise Test

Temperature rise of motor at rated voltage and at reduced voltage was measured. The observed values were found to be less than the maximum specified in all the samples. Hence, all bands passed the test – lower temperature rise is good for better performance of motor.

- For temperature at rated voltage, the top scorer was CG and the lowest was Arise.
- For temperature at reduced voltage, the top score was of KSB and the lowest was of Arise.

u Noise Level and Vibration Measurement Test

The noise level was measured at a distance of one metre around the motor with rated voltage applied under 'no load' condition.

- The lowest noise level was of CRI.
- The lowest vibration was measured in Arise CG, CRI and Texmo.

- CRI and Arise scored the highest in both the parameters.
- Lubi had the highest noise level (88.0) and Kirloskar the maximum vibration (0.7mm/sec), and both scored the least.

GENERAL REQUIREMENTS

u Construction

To check if the construction of the pumps was as per the relevant Indian Standard, pumps were evaluated on the following parameters:

Mounting | Thermal protector | Earthing | Type of enclosure | Method of cooling | Provision of handling

- Bajaj, CRI, CG, V-Guard, Kirloskar and Lubi did not have marking which states that thermal protector is provided. The rest of the brands scored full points as they complied hundred per cent with the required standard.

u Hydrostatic Test

To check the robust construction of the pump casing, it was tested to withstand the shut-off pressure for at least 15 seconds.

- All the brands withstood the test and scored same.



u Self-Priming Test

Self-priming time is the total elapsed time between starting the unit and the time required to obtain a continuous flow through the discharge pipe. The self-priming time is checked against the declared time by the manufacturer at a minimum static suction lift of three metres.

- Self-priming time of KSB was more than the declared value, not complying with the requirement. It scored the lowest.
- Arise scored the highest for having the least self-priming time.

PACKING AND MARKING

u Packing

While some pumps came in thick cardboard packing with thermocol protection, some only had a basic cardboard cover and one just came wrapped in a poly cover. Hence, the ones in the cardboard box and thermocol protection obtained most points.

- The highest scorers were Arise, V-Guard, Sharp and Texmo, followed by the rest in cardboard boxes and Kirloskar in the last with a mere poly wrap.

u Marking

There are no major discrepancies as far as required marking information is concerned. V-Guard, Arise and Usha give detailed information on installation, operating, trouble shooting and after-sales service in their manuals.

- Most brands provided an operating manual and a warranty card. Kirloskar had not provided the operating manual but a warranty card was given.
- Kirloskar along with Crompton Greaves, Texmo and Khaitan did not share details of power input and self-priming time.
- Texmo along with Bajaj and Ujala have not mentioned their direction of rotation.

REACTION OF MANUFACTURERS

Brand, Company	Manufacturer's Comment	Voice Society's Reply
V-Guard, V-Guard Industries Ltd	Pull-up torque is 27	Our test lab has confirmed 21
Khaitan , Khaitan Electricals Ltd	i) Marking observations mismatch ii) Results of total head and discharge overall efficiency are higher by 15 per cent to 25 per cent of reported values	i) Typographical errors, duly noted and updated ii) Our test lab has re-verified and confirmed the results as reported
Kirloskar , Kirloskar Brothers Ltd	Queried on test results, especially marking observations, and sent their test data on some parameters	Reply sent as per comments received
Crompton Greaves, Crompton Greaves Ltd	Queried on test results, especially marking observations	Reply sent as per comments received

The Social Focus

Water pumps are high power-consuming devices and are increasingly being used for domestic purposes. Most of the domestic power is generated at thermal power plants. These plants burn coal and emit harmful gases including carbon dioxide and sulphur dioxide into the atmosphere. Hence, lesser the consumption of domestic power, lesser will be the environment degradation.

One of the purposes of this test by Consumer Voice is to ensure that manufacturers of water pumps will make extra efforts in making these energy-efficient. This will be our and their small bit towards energy conservation and environment protection – which is also an important agenda of governments and citizenry across the world.