



# भारतीय मानक ब्यूरो

## BUREAU OF INDIAN STANDARDS

47

Doc. No. : PRTD/AR/PF:03	Issue No. : 2	Issue Date 30 Sept. 2020	Report of Action Research
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1.	Action Research Project No. (as assigned by PRTD)	AR-xxxx AR/0047
2.	Title of the Action Research Project	Reconciling Product standardization and quality control : A case of submersible Pump Industry in India
3.	Name & Designation of Officer	Ravindra Beniwal, Scientist-C
4.	Employee No.	067857
5.	Deptt./BO/RO & Place of Posting	TED, BIS HQ's
6.	Date of Approval of the Project	12. June. 2020
7.	Objective of the Project	Attached in Report
8.	Report of Action Research Activities	Attach as per Annexure, as appropriate Attached
9.	Conclusion & Recommendations	Attached in Report
10.	Any other relevant information	NA

DDG (PRT) Dy. No. 311/05/2021  
(Incoming) Date 01/05/2021

DDG (Std.) Diary No. 311/05/2021  
Dated 01/05/2021

DDG (PRT) Dy. No. 330/05/2021  
Dated 01/05/2021

DDG (PRT) Dy. No. 330/05/2021  
Dated 01/05/2021

31/05/2021

Sign. of Officer  
with Date

19.4.2021

Head of Deptt./BO H(TED)  
Activity Head DDG (Std.)  
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31/5/21

11/6/2021

H(PRTD)  
Annexure

SED(SKS) - For n.a. pt.  
Renu Singh  
01/06/21

- Table of Contents with List of Figures and Tables, as applicable
- Introduction (Action Research Project Proposal to be clearly mentioned)
- Review of Literature (Background research/Literature Survey/any other means etc)
- Methods & Materials, Data, Details of Field Visits for studies & research etc.
- Results & Analysis
- Summary and Conclusions
- Recommendations
- Details of the BIS support availed with justification, bills/vouchers, etc., as relevant
- List of References, Bibliography (wherever applicable)
- Appendices (where included)
- Index (where included)

None Availed

### Style of Presentation (for guidance)

- Report to be submitted in A4 size paper.
- If tables and figures are large, they may be reduced to the standard size (provided the reduced area is not less than 50% of the original) and /or folded just once to flush with the margin (if the page size does not exceed 250x360mm).
- Beginning with 1<sup>st</sup> page as above (PF:03), all pages should be numbered consecutively as Page x of n (n being the total pages).

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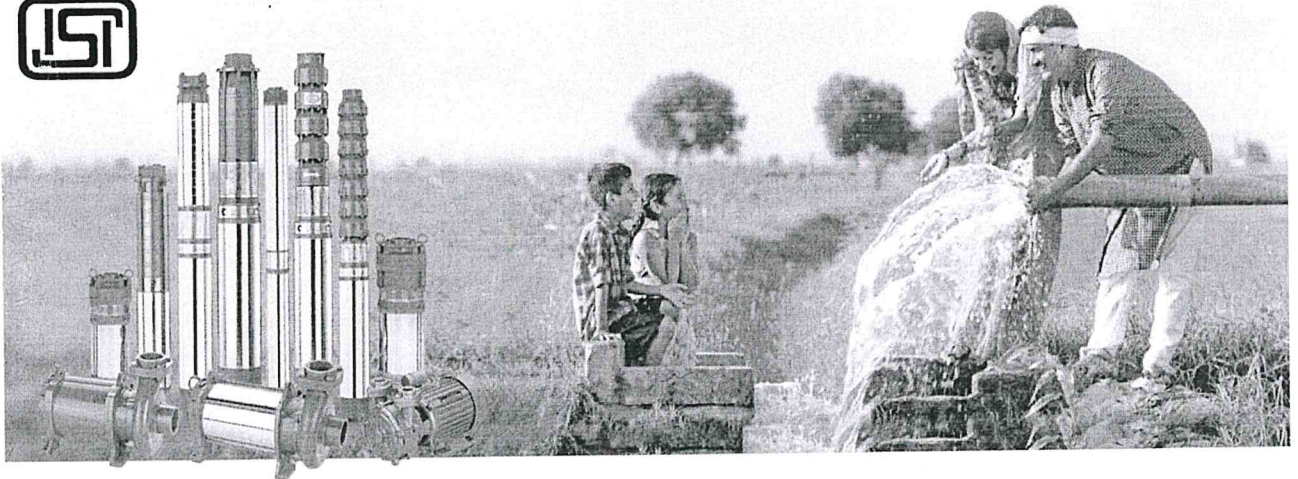
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IS 8034



RECONCILING PRODUCT STANDARDIZATION AND QUALITY CONTROL  
A CASE OF SUBMERSIBLE PUMP INDUSTRY IN INDIA



ACTION RESEARCH PROJECT BY

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**GOVERNMENT OF INDIA**



**INTRODUCTION & PROJECT OBJECTIVES**

- ✓ Proposing evidence based strategy
- ✓ Widening the licensee base and revenue generation of BIS
- ✓ Strengthening quality control
- ✓ Helping poor farmers

BIS is operating around 600 licenses of pump manufacturing industry in the country as per IS 8034 (Submersible Pumpsets).

It has been observed by past experience of field posting at Ahmedabad Branch Office that there is a huge gap between total production of Pumpsets by a licensee and no. of Pumpsets marked and sold with ISI mark during an operative period. The gap analysis will help generating more revenue to BIS and strengthening the quality control scheme at grass-root level.

These pumps are widely used by farmers across the country for agricultural and other household purposes. However if a sub-standard pump is used, it results increasing cost of maintenance and a financial burden to the farmer. Ensuring the better quality by enhanced coverage of Pumpsets under BIS certification scheme will also help increasing farmers' income.

Thus, the project will help proposing evidence based strategy to widen the licensee base and revenue generation of BIS with an underlying objective of strengthening quality control and helping poor farmers.

## PROJECT METHODOLOGY

- ✓ Data of Pumps & Marking Fee
- ✓ Analysis
- ✓ Talk & Feedback
- ✓ Challenges

- Collection and study of the data of **no. of Submersible Pumpsets manufactured** by leading industries in India during last 3 years
- Study of the data of no. of Pumpsets **marked and sold with ISI mark** by leading industries in India during last 3 years
- Collection and review of the **data of Marking fee paid to BIS** by these industries during last 3 years
- Holding series of talks to take **feedback from manufacturers association** to critically analyze the **gap between total production and total ISI marked Pumpsets and reasons thereof**
- Highlighting **grass-root challenges and suggesting strategies for more ISI outreach and better quality control** in the sector



- ✓ Introduction of a Pump
- ✓ Working of a Submersible Pump
- ✓ Advantages and Limitations

## INTRODUCTION TO SUBMERSIBLE PUMPSET

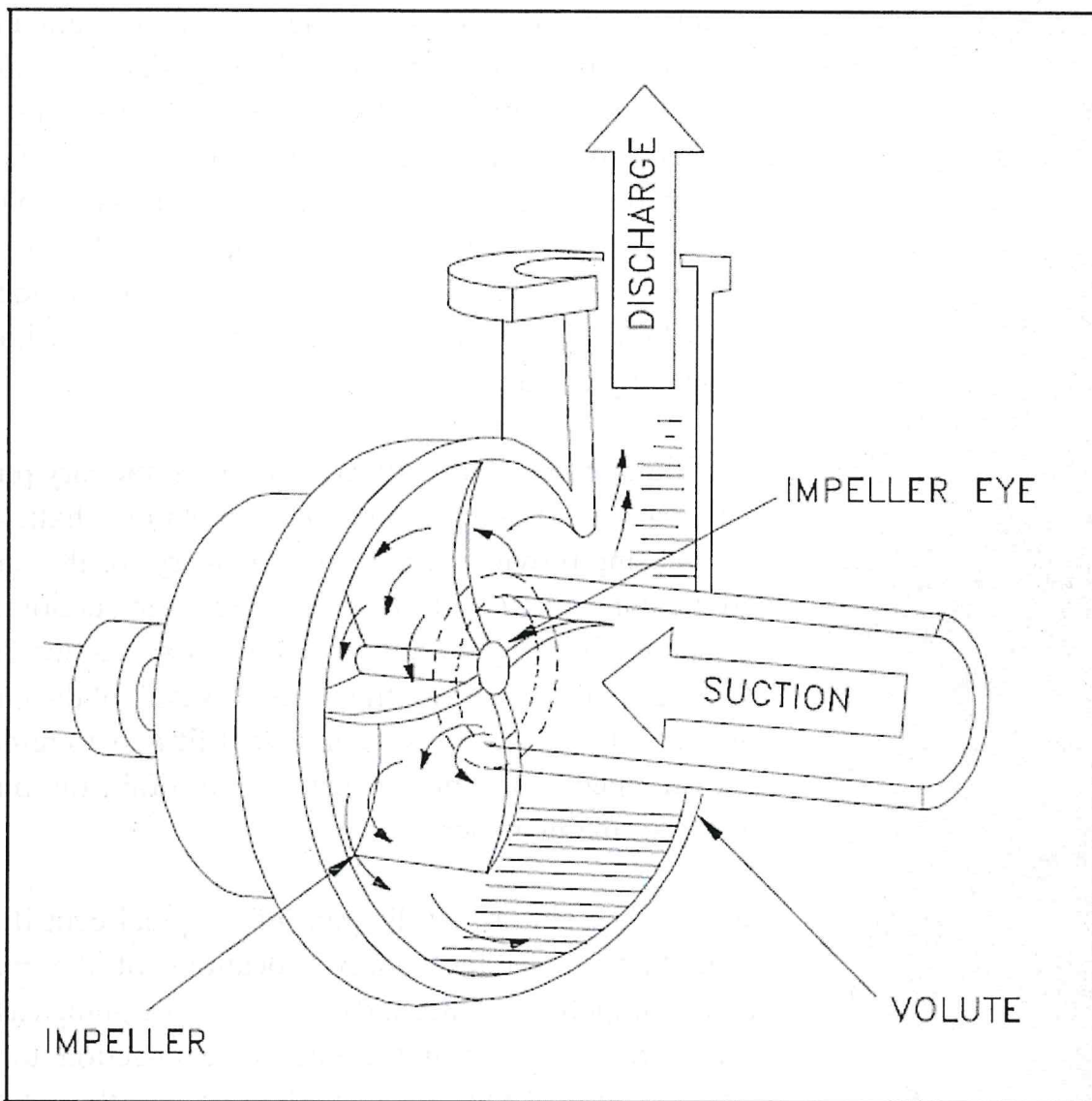
A **pump** is a device that moves fluids, by mechanical action, typically converted from electrical energy into Hydraulic energy. Pumps are in general classified as Centrifugal Pumps or Positive Displacement Pumps.

In 1689 the physicist Denis Papin invented the centrifugal pump and today this kind of pump is the most used around the world. The centrifugal pump is built on a simple principle: Liquid is led to the impeller hub and by means of the centrifugal force it is flung towards the periphery of the impellers. The construction is fairly inexpensive, robust and simple and its high speed makes it possible to connect the pump directly to an asynchronous motor. The centrifugal pump provides a steady liquid flow, and it can easily be throttled without causing any damage to the pump.

Centrifugal pumps basically consist of a stationary pump casing and an impeller mounted on a rotating shaft. The pump casing provides a pressure boundary for the pump and contains channels to properly direct the suction and discharge flow. The pump casing has suction and discharge penetrations for the main flow path of the pump and normally has small drain and vent fittings to remove gases trapped in the pump casing or to drain the pump casing for maintenance.

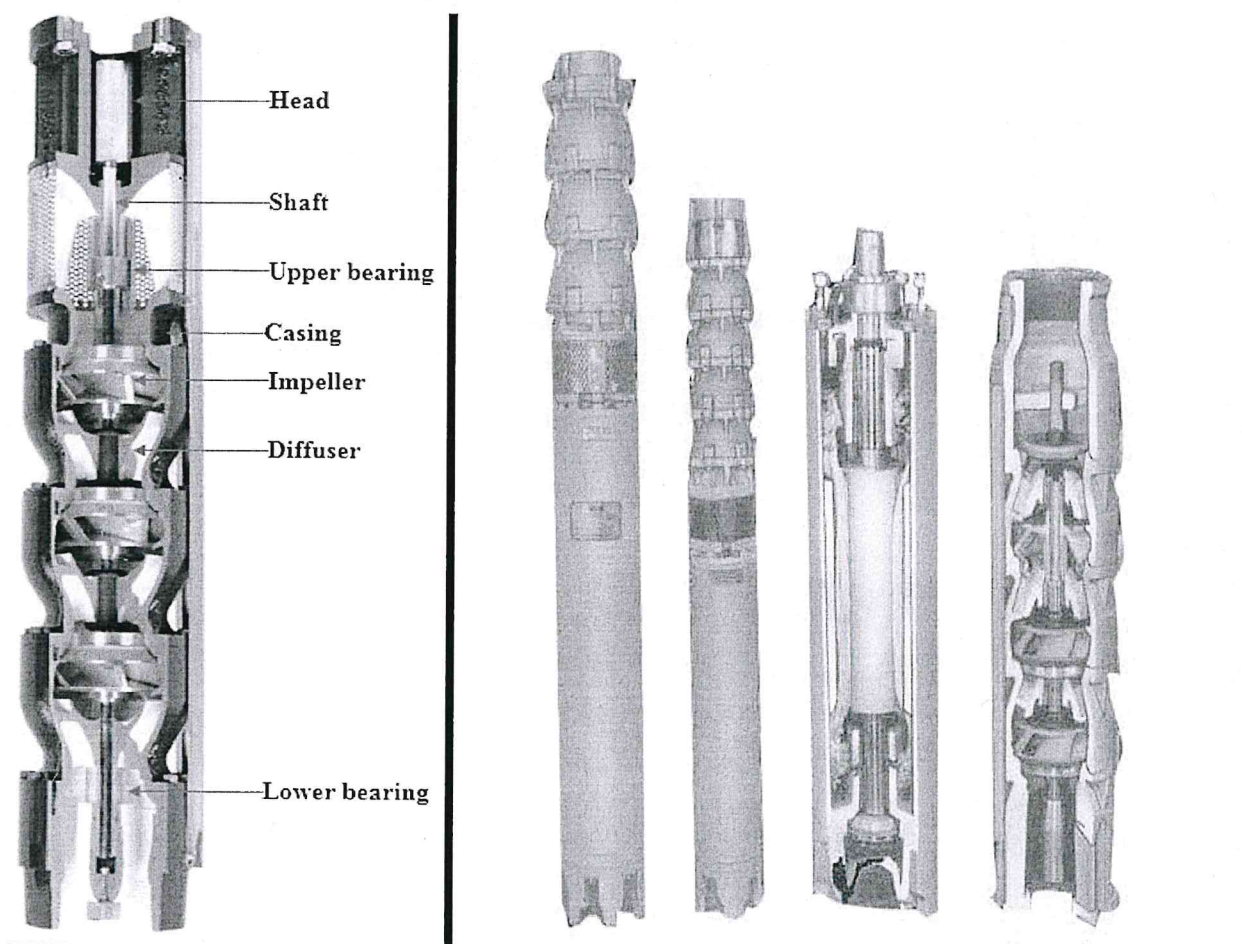
Figure 1 is a simplified diagram of a typical centrifugal pump that shows the relative locations of the pump suction, impeller, volute, and discharge. The pump casing guides the liquid from the suction connection to the center, or eye, of the impeller. The vanes of the rotating impeller impart a radial and rotary motion to the liquid, forcing it to the outer periphery of the pump casing where it is collected in the outer part of the pump casing called

the volute. The volute is a region that expands in cross-sectional area as it wraps around the pump casing. The purpose of the volute is to collect the liquid discharged from the periphery of the impeller at high velocity and gradually cause a reduction in fluid velocity by increasing the flow area. This converts the velocity head to static pressure. The fluid is then discharged from the pump through the discharge connection.

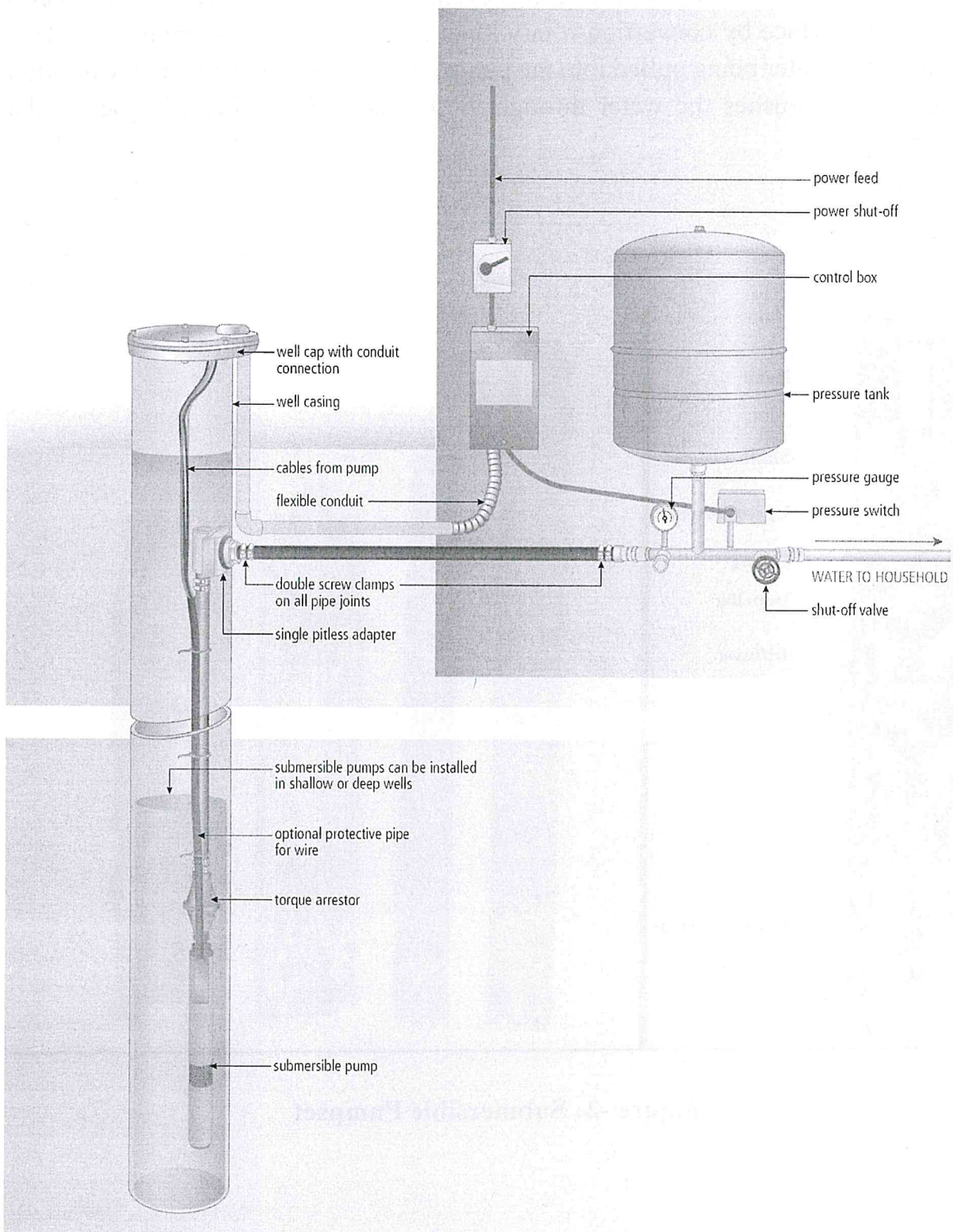


**Figure -1 : Centrifugal Pump Schematic**

A submersible pump is a Centrifugal Pump which is an air-tight sealed motor close-coupled to the pump body. A submersible pump never requires priming as the whole assembly is submerged in the fluid and prevents the Cavitation problem. It pushes water to the surface by converting rotary kinetic energy into pressure energy. This is done by the water being pulled into the pump: first in the intake, where the rotation of the impeller pushes the water through the diffuser. From there, it goes to the surface.



**Figure -2: Submersible Pumpset**



**Figure -3: Submersible Pump Installation in Borewell**

A typical installation for a submersible pump, pressure tank and fittings is shown in Figure 3. Prior to well installation, the pump should be wired, submerged in a container of water and operated.

### **Advantages**

- Submersible pumps are efficient, high in capacity, require very little maintenance and are generally very economical.

### **Limitations**

- The tolerances between the impellers and diffusers are relatively small; therefore, submersible pumps are unsuitable for pumping water that contains sand or other abrasives.
- Submersible pumps are water cooled and water lubricated. They should not be installed in wells that will pump dry, unless they are protected by a liquid level control.
- Submersible pumps are not suitable for pumping water containing a high concentration of dissolved gases because the pump may become gas locked.
- Most submersible pumps are designed for use in wells with a minimum 4 inch inside diameter. Use caution in selecting the submersible pump most suitable for a given well and application.
- Pump selection should be based on the desired pump capacity and the safe pumping capacity of the well.

## CHAPTER 4

✓ Total Licences

✓ State with highest no. of licences

✓ Main clusters

### STATUS OF BIS LICENCES IN THE COUNTRY

- No. of Licences (IS 8034), All India : 600
- Highest No. of Licences (IS 8034), Gujarat: 394
- Main Clusters of Submersible Pumps Industry-
  - Ahmedabad
  - Rajkot
  - Coimbatore
  - Jalandhar
  - Belgaum
  - Kolhapur
  - Hyderabad



**Figure -4 : Status of BIS Licences (IS 8034)**

- ✓ Type –A industry
- ✓ Type-B industry

## **UNDERSTANDING THE DATA FROM LEADING MANUFACTURERS**

As Gujrat is having maximum number of licences as per IS 8034, Data has been gathered from Indian Pump Manufacturers Association, Ahmedabad for study of the total no. of pumpsets manufactured, the pumpsets sold with ISI mark, the marking fee paid to BIS. It was observed after analyzing the data and discussion with the manufacturers that there are two type of industries which are having BIS Licence for Submersible Pumpset as per IS 8034:-

- TYPE-A

Industry that pays more than minimum marking fee but still also sell Non-ISI Pumpsets

- TYPE-B

Industry that always pays only the minimum marking fee and also sell Non-ISI Pumpsets

**TYPE-A**

**Industry that pays more than minimum marking fee but still also sell Non-ISI Pumpsets (Example)**

Total No. of Submersible Pumpsets <b>manufactured</b>			Submersible Pumpsets sold <b>with ISI</b> mark (IS 8034)			Marking Fee Paid to BIS (IS 8034) in Rupees		
2018	2019	2020	2018	2019	2020	2018	2019	2020
48312	43312	<b>53333</b>	11164	6588	<b>9147</b>	233753.28	136846.96	<b>180354.85</b>

**TYPE-B**

**Industry that always pays only minimum marking fee and also sell Non-ISI Pumpsets (Example)**

Total No. of Submersible Pumpsets <b>manufactured</b>			Submersible Pumpsets sold <b>with ISI</b> mark (IS 8034)			Marking Fee Paid to BIS (IS 8034)		
2018	2019	2020	2018	2019	2020	2018	2019	2020
12389	16247	18455	1345	1565	1780	<b>37000</b>	<b>37000</b>	<b>37000</b>

*(Data Source: Indian Pump Manufacturers Association, Ahmedabad)*



## BEHIND THE GAP: FEEDBACK FROM MANUFACTURERS ASSOCIATIONS

- ✓ Variation in Indian Conditions
- ✓ Grouping Guidelines for Certification

A series of talks and correspondence were held with the pump manufacturing association to understand the gap between the no. of pumpsets manufactured and no. of pumpsets sold with ISI mark. Following issues were observed after discussion which helped understanding the gap behind the data-

- Indian Conditions in various states e.g. Rajasthan, Maharashtra etc. calls for **demands from consumers/farmers for Borewell diameter sizes of 80 mm, 125 mm, 175 mm & 225 mm** due to different terrain conditions & traditional boring practices. However IS 8034 specifies only 100 mm, 150 mm & 200 mm Borewell diameter, hence industry has to sell these pumpset models without using ISI mark on the Pumpsets. Similar case is there with 150 mm (Single Phase & Oil filled motor) and voltages other than those mentioned in IS 8034.

- Grouping guidelines for certification as per IS 8034 stipulates that a 'series' may be defined as a group of pumpsets having the same Head per Stage, Discharge, Bore Size, Delivery Size, Category, Type of Duty, No. of Phases, Rated Voltage, No. of Poles and Type of Cooling. **Any change in these parameters is to be treated as a different series.** For assessing conformity of a particular series, pumpset having the highest number of stages for every motor rating in a particular series is required to be tested for all the requirements.

## ANALYZING THE INDUSTRY NEEDS vis-à-vis IS 8034 & GUIDELINES

✓ Additional Borewell Diameters

✓ Single Phase Oil Filled Motor

✓ Redefining the Series

Analyzing the needs of industry in view of the issues raised by the manufacturers, following steps are recommended to bridge the gap for industry needs-

- Specifications for following borewell diameters can be added in the IS 8034-

<b>Nominal dia Of borewell (mm)</b>	<b>Max. OD of sub. Pumpset (mm)</b>
80	74
125	122
175	171
225	220

- Tables of specifications for 150 mm (single phase oil filled motor) may be added in IS 8034.
- The conformity of a particular series may be assessed by independent testing of pump set having 'Lowest and Highest No. of stages' in a 'particular series' only as hydraulic tests will remain same in that series for all stages. In case of inclusion is required in a particular series of pumpsets already covered in the existing license, the same rule should be applied.

- ✓ Revision of IS 8034
- ✓ Revision of Grouping Guidelines
- ✓ QCO

## **CONCLUSIONS AND RECOMMENDATIONS: WAY FORWARD TO STRENGTHEN QUALITY CONTROL**

Based on the data analysis, feedback from industry and keeping in view the need to strengthen quality control, widen the outreach of ISI mark and helping poor farmers; following steps are recommended-

### **TYPE-A**

**Industry that pays more than minimum marking fee but still also selling Non-ISI Pumpsets**

- Additional varieties for Borewell Diameters, Type of cooling, Phase and Motor Ratings may be incorporated in IS 8034
- Grouping Guidelines may be revised to incorporate more varieties in a series

### **TYPE-B**

**Industry that always pay only the minimum marking fee and also selling Non-ISI Pumpsets**

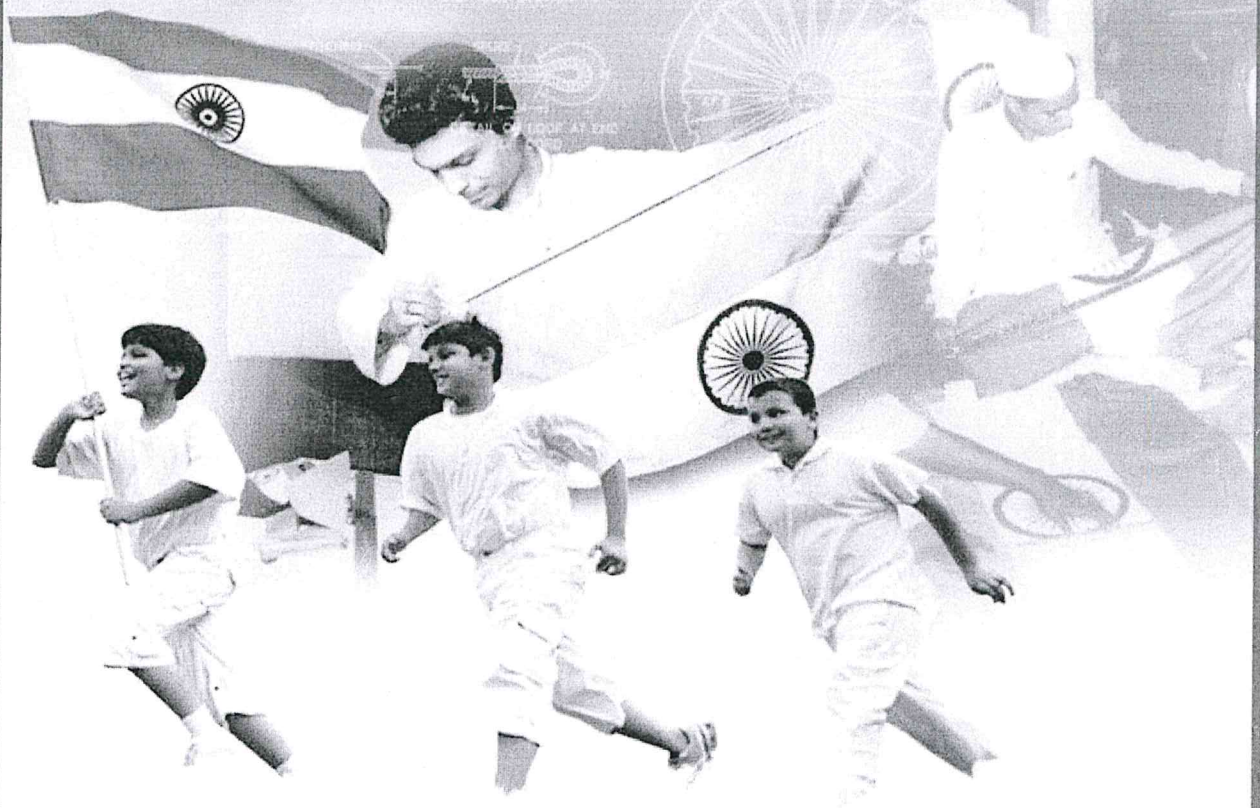
- A Quality Control Order may be placed to make IS 8034 mandatory to manufacture and sell the Submersible Pumpsets to strengthen quality control in the sector and to widen the outreach of ISI mark.

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Doc. No. : PRTD/AR/PF:04	Issue No. : 1	Issue Date 28 Apr 2020	<b>DECLARATION OF ORIGINAL WORK</b>
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**DECLARATION OF ORIGINAL WORK**

Ravindra Beniwal, scientist-c

I, ----- (indicate official's Name & Designation),


Employee No ----- 06785 7 ----- hereby declare that the Action Research Project titled

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mp Industry in India” is the original research work done by me. I have not copied from any other Action

Research Project or any other work of similar nature and topic done by any person/institution/body either published or yet to be published. Data and information from other sources, used if any, have been with prior permission, wherever required and is duly acknowledged appropriately in the project report submitted by me.

This declaration is made on the ..... 19<sup>th</sup> ..... day of April ..... 2021 .....

  
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Note: Joint Declaration should be submitted for Projects undertaken jointly

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