

Case Study: Survey on Agricultural Pumps in the Western Maharashtra

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Abstract- Agricultural motor pumps which are used for the water supply to the various crops production. In this paper we take audit for the earthings of motor pumps which have been used by farmers. In this paper we have been discussed about the importance of Earthing to the pumps for the safety purpose of farmers.

Keywords- Importance of Earthing, Motor pumps, Crops, Water usage.

I. INTRODUCTION

There are mainly two types of water pumps are used in western Maharashtra and they are as follows-

1. Monoblock Pumps
2. Submersible Pumps

Monoblock pumps have the common shaft for all their rotating parts. They have played a major role in the irrigation development in the agricultural sector. Monoblock pumps are now replaced with the submersible pumps in the agricultural sector. Because of the continuous depletion of water level in land Monoblocks pumps are technologically incapable of drawing out water in most of the agricultural region of western Maharashtra.[1]

Submersible pumps have a sealed motor that is closely coupled with pump and the whole assembly submerged deep in the water which has to pump out.

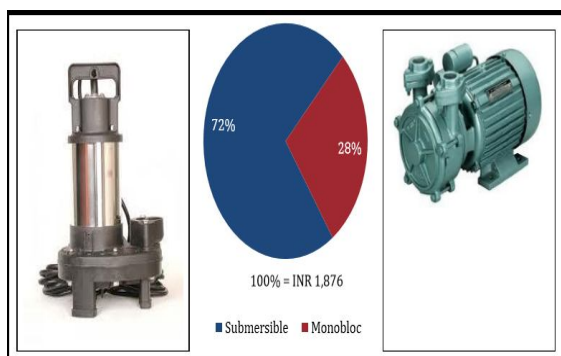


Fig. Types of pumps used.

In the western Maharashtra farmers are using agricultural pumps of different horse power. The HP specifications are generally decided commonly and depend largely on the level of groundwater. Farmers from regions where the ground water level is low use pump sets of high HP rating such as 10 HP, 15 HP and even up-to 50 HP in some extreme cases. Apart from the ground water level conditions farmers also use high HP pump sets to have higher water output.[2] [3] [4]

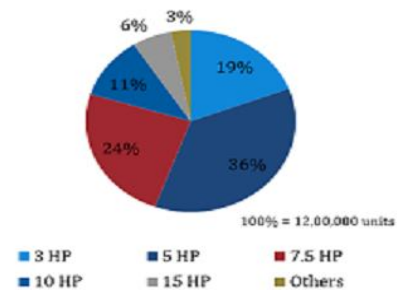


Fig. Usage of pumps with HP

What is Earthing-Earthing is the method of transmitting the instant electricity discharge directly to the ground through low resistance wires or electrical cables. This is one of the significant features of electrical networks. Because it builds the most eagerly accessible and hazardous power source much secure to utilize. The process of earthing in case of short circuit condition the electrical wire carefully removes the overflow of current and allows it to flow through the earth. All this occurs without unnecessary problems, only through resourceful and inexpensive manufacture, plan as well as arrangement!

Importance of Earthing- The main intention of electrical earthing is to keep away from the danger of electric shock due to the outflow of current from ground through the not preferred path as well as to make sure that the potential of a conductor does not increase with respect to the ground than its planned insulation. In any abnormal conditions like the overvoltage or any other due to the faulty condition the overcurrent or overvoltage is been transmitted through the transmission line, farmers got the risk of the getting electrical shocks while they start the motor. To overcome this electrical shock risk we must have the earthings to the pumps.

Fault in Grounding directly impacts human safety. Major accidents happen due to improper Earthing. Leakage of current passes through human body and fatality occurs.

Purpose of Earthing in an electric power system is to limit, with respect to the general mass of earth, the potential of current carrying conductors, which are part of the equipment, non-current carrying metal works, associated with the equipment, apparatus and appliances connected to the system Earthing plays an important role in Generation, Transmission & Distribution for safe and proper operation of electric system Every Earthing should be tested / checked at regular interval so as resistance of Earth connection is minimized. The records should be maintained if results are poor, action should be taken to improve.

Types of Earthing- This includes the following types

Plate Earthing system- In this type of system, a plate is made up of copper or GI (galvanized iron) which are placed vertically in the ground pit less than 3meters from the earth. For a better electrical grounding system, one should maintain the earth moisture condition around the plate earthing system.



Plate Earthing

Fig- Plate Earthing

Pipe Earthing system- A galvanized steel based pipe is placed vertically in a wet is known as pipe earthing, and it is the most common type of earthing system. The pipe size mainly depends on the soil type and magnitude of current. Usually, for the ordinary soil, the pipe dimension should be 1.5 inches in diameter and 9feets in length. For rocky or dry soil, the pipe diameter should be greater than the ordinary soil pipe. The soil moisture will decide the pipe’s length to be placed in the earth.



Fig- Pipe Earthing

Rod Earthing system- This type of earthing system is similar to pipe earthing system. A copper rod with galvanized steel pipe is placed upright in the ground physically or using a hammer. The embedded electrodes lengths in the earth decrease the resistance of earth to a preferred value .



Fig- Rod Earthing

Why accident happens-

Major Accident is happening due to improper earthing and leakage current passed through human body or through hazards material and fatality or loss occurs. Person dies after touching the pole. It was observed that the pole was not earthed & lamp wire inside was with deteriorated insulation & came in contact with inside



Fig- Improper Earthing

In a sugar factory a person was stacking sugar bags by climbing on steel ladder. He took support of roof truss and got shock. The fitting erected on truss was short & hence leakage passed to the laborer.

A person on the roof is electrocuted as he touches the TV antenna. In TV, phase directly goes to internal circuit & neutral connected to chassis. Antenna circuit is also connected through capacitor. As phase position changed & phase comes directly in contact with chassis: circuit is completed but as a capacitor of antenna gets shorted, leakage transfers from chassis to metallic part of antenna.

A holy cow fell down in the gutter and got shocked. Earth wire was disconnected from earth rod and was in energized condition due to heavy leakage.[6]
The accident rate is been calculated from this survey is 80%.

How to overcome this problem- After this survey we noticed that the 2 farmers are using proper earthed motor pumps out of 10. So the farmers have to make sure that the motor pumps which they used are earthed properly in this way we can decrease the accidental rate of farmers while using pumps.



Fig- Proper earthed motor pump

II. LITERATURE SURVEY

The agricultural sector is more important for the Maharashtra and the irrigation is the very important part for the agriculture. The developed irrigation is the main factor behind the increased production of various crops and because of this the increased crop production helps to decrease the poverty in the western region of Maharashtra. In Maharashtra the agricultural plays the main role in the economy by which it consist of total 65% of population depend on it for their live hood. The average cropping intensity in the state is about 121%. Food crops, including cereals and pulses, occupy 13.4

million ha (62 % of the gross cultivated area), while sugarcane and cotton occupy 3.8 million ha (18% of gross cropped area).
Climate- The western area of Maharashtra receives the average 3000mm in heavy monsoon rains. There are three distinct cropping seasons in Maharashtra: Summer season (March to mid of June); Rainy (kharif) season (middle June to September); and Winter (rabi) season (October to February). The southwest monsoon usually begins in the last week of June and lasts till mid-September. Pre-monsoon showers begin towards the middle of June and post monsoon rains occasionally occur in October. The highest average monthly rainfall is during July and August. In the winter season there maybe a little rainfall associated with western winds over the region. In recent years, decreased rainfall has been observed in the southwest monsoon and increased rainfall in the post monsoon season, which has determined changes in the normal planting time of kharif crops. Proper crop planning should consider the differences in agro-climatic zones and relevant contingency plans should be developed for various moisture availability scenarios[9]

Temperature- The month of March marks the beginning of the summer and the temperature rises steadily until June, when the monsoon starts. In the central plains summer temperatures will vary between 40-45 degrees Celsius. May is usually the warmest and January the coldest months of the year. The winter season lasts until February with lower temperatures occurring in December and January[9]

Soil- The major soils of Maharashtra are classified in the following types:

1. light black coarse shallow soils occurring in central high elevations
2. medium black soils occurring in central plateaus
3. deep black soils occurring in central river valleys
4. reddish brown soils occurring in western hill slopes
5. alluvial soils occurring in western coastal areas
6. yellowish brown soils of mixed origin occurring in high elevations in the east
7. yellowish brown soils occurring in eastern plateaus
8. lateritic soils occurring in western coastal areas
9. saline soils occurring in the western Konkan region[9]

Types of crops- The most common crops in kharif are sorghum, millets, cotton, rice, maize and groundnut. Among the rabi crops, wheat, rabi sorghum, rabi millet, onion, chilies, and pulses are the most common. Maize is normally grown in areas of high rainfall and good soils. Sorghum is planted in areas with moderate rainfall and light textured soils. Millets are drought tolerant crops preferred in low rainfall areas with light soils. Sorghum and millets are normally grown in very

similar agro-ecological conditions and both have wide adaptability in respect to soils, rainfall and temperature. Groundnut is grown in light soils and can produce reasonable yields under moderate water stress. Cotton is planted under rained conditions in the medium to high rainfall zones of the state. Alternative crops in the cotton area are sorghum, groundnut, pulses and millets. Rice is grown as monocrop in areas of higher rainfall (Konkan region) rice areas are sugarcane, sorghum, pulses, and oilseeds.

In western Maharashtra sugarcane is the main important crop which have been taken by most of the farmers. Water required per kg of sugar The CACP report further calculates that in Maharashtra every kilogram of sugar needs 2068 liters of water, where as in UP the requirement is almost half, at 1044 liters. [5] [8]

For that purpose the farmers have to use the motor pumps to provide the water to the sugarcane or any other crop from the well or bore well. For this the farmers uses variations of different motors having different HP and different ratings. As the motors have been used for more times so that it will earthed properly with the various types as above explained types of

Earthings. To check the earthings of motors we made a survey on the 6 motors which are in the farm on well and bore-well also. In this survey we check the motors having earthed properly or not then we found the data as mentioned in the table.

Sr. no.	Pump Co.	Rating (HP)	Earthing Yes/No	Type of Earthing
1	Shri Drip	5	No	
2	KSB	5	No	
3	Texmo	7.5	Yes	Pipe
4	Laxmi	5	No	
5	Shakti	5	No	
6	Prime	5	Yes	Rod
7	Tubewell	7.5	No	
8	Krushi	5	No	Rod
9	Texmo	7.5	Yes	
10	Kisan	5	No	

III. CONCLUSION

After this survey we conclude that the accident rate of farmers in western Maharashtra is 70%. To decrease these accidents farmers have to use motor pumps with the proper earthing. Due to the use of earthed motor pumps the accident rate is been decreased by 60% and the remaining 10%

accidents will be happen due to the miss-handling of electrical motor pumps or due to lose connections of the electrical wiring. So farmers have to do proper earthings to their motor pumps like plate earthing as well as rod and pipe earthings in the proper way. So the farmer lives will be saved and the rate of production of crops will be increased in the western Maharashtra.

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