



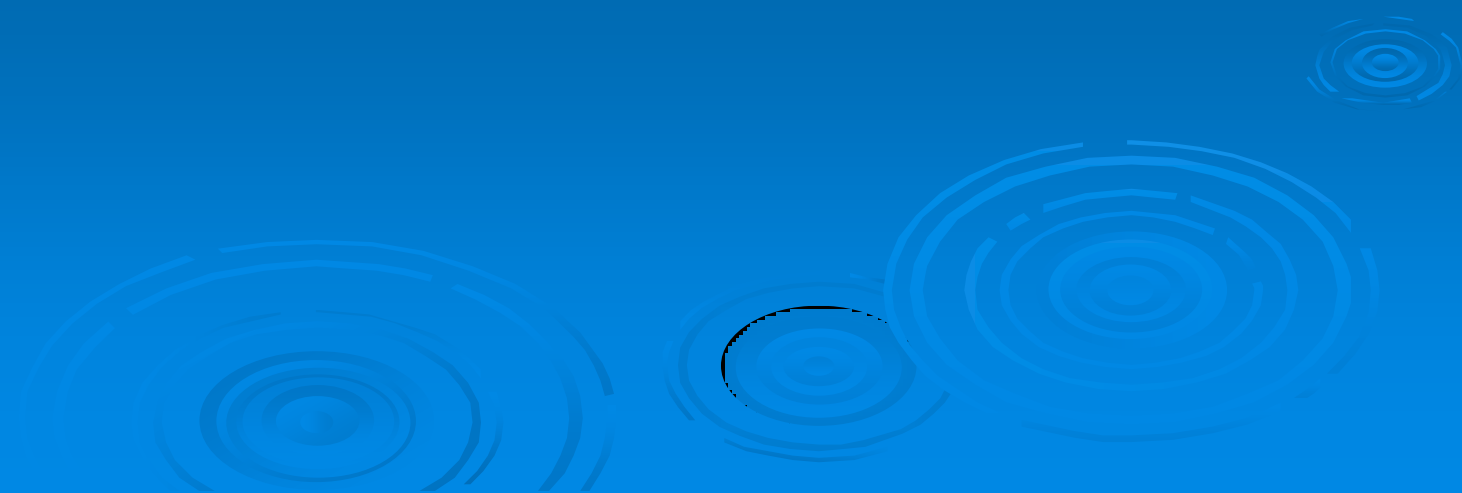
*Energy Efficiency in
pumping systems for
buildings*

By

C.G.Sripriya

Best Engineers Pumps (P) Ltd.,

SYNOPSIS

- ◆ This paper deals about the energy efficiency in pumps and its advantages.
 - ◆ It also highlights areas where losses can occur when selecting a pumping system.
 - ◆ It also deals with methods to correct it for getting the required results.
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INTRODUCTION

Energy efficiency is the watch word used in all products.

Energy efficiency, is using less energy to provide the same level of service.

A 13 watt fluorescent light bulb outputs the same amount of visible light as a 60 watt incandescent bulb, so you are getting more light for less energy.

According to a popular German magazine(ΔP) 50% of the world power is consumed by pumpsets.

In that 30% is consumed by agricultural pumpsets,9% by domestic pumpsets and 11% by industrial pumpsets.

Types of pumpsets and energy efficiency ratings on pumpsets

The various types of pumpsets based on pumping methods and applications are as follows :

- 1. Monobloc pumpsets-used for agricultural and domestic purposes**
- 2. Borewell pumpsets-used for agricultural and domestic purposes**
- 3. Openwell pumpsets-used for agricultural and domestic purposes**
- 4. Centrifugal Jetpumps –used for domestic purposes**
- 5. Self priming and regeneraritive pumps–used for domestic purposes**

At present Bureau of energy efficiency has introduced star ratings for monoblocs,openwell,borewell pumpsets.

The ratings are as follows

- ◆ **5 star-1.2% above BIS efficiency**
- ◆ **4 star-1.15% above BIS efficiency**
- ◆ **3 star-1.10% above BIS efficiency**
- ◆ **2 star-1.05% above BIS efficiency**
- ◆ **1 star-BIS efficiency.**

All the above details are available in Bureau of energy efficiency website. (www.bee-india.nic.in)

PUMP COST VS POWER COST

The effect of improvement in a pumpset Efficiency versus Savings Achieved is illustrated in the example below.

Assume a 5HP motor with the rated output power of 3.7Kw,the input power consumed by the motor running at 90% load is given by
 $3.7 / 0.68 * 0.9 = 5\text{kW}$ per hour where 0.68 is the motor efficiency factor as per IS 8034

If the motor is running for 8 hours per day, then the power consumed will be $5 * 8 = 40$ kWh/day

For 330 days per year $330 * 40 \text{ kWh} = 13200 \text{ kWh}$ per year

If you assume Rs.6/- per unit cost, $13200 * 6 = 79200$ rupees per year.

The ratio of power to pump is $79200 / 16000 = 4.95$

Therefore the power cost per annum is 4.95 times of the pumpset cost.

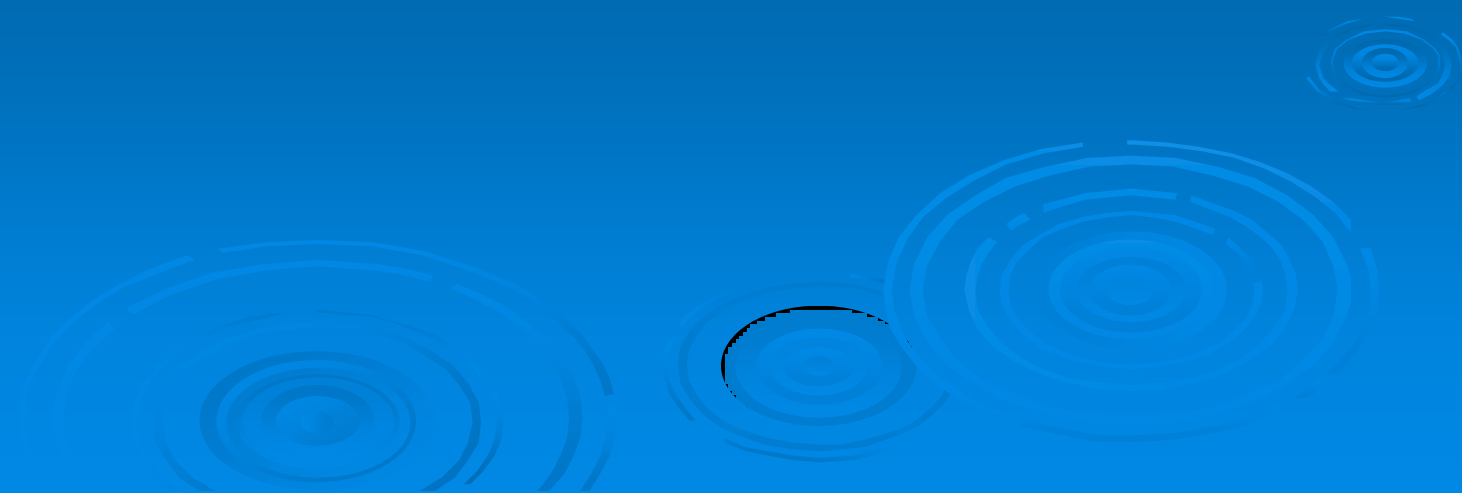
If you achieve 10% efficiency improvement in the pumpset, it results in 0.495 times in pump cost.

Pumping systems in buildings.

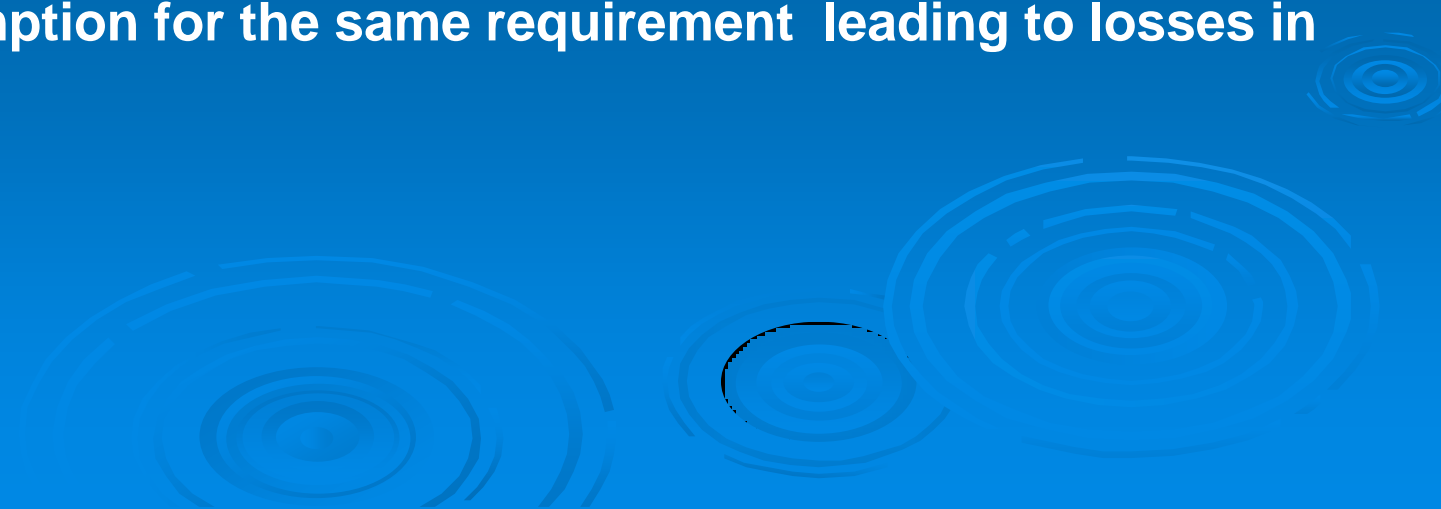
Different components of pumping systems are as follows

- 1. The pump**
- 2. The prime mover like electric motor.**
- 3. Suction and delivery Pipe lines or piping systems.**

Proper selection of above systems will ensure efficient operations of the pumpset by minimizing the losses.



THE PUMP

- The pump shall be selected in such a way that it shall operate at near maximum pumpset efficiency during peak demand period in the ranges of head and discharge.
 - The pumpset should operate within its head range for efficient and reliable operation.
 - Selecting improper pump will result in less discharge and more power Consumption for the same requirement leading to losses in the system.
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The prime mover like electric motor

- The kilowatt rating of the prime mover shall be matching with the power needed by pump and power transmission systems to be used.
- Selecting the matching prime mover will ensure longer life of pump and reduce energy consumption there by increasing the efficiency.

Suction and delivery Pipe lines or piping systems.

The sizes of pipes shall be selected in such a way that the friction head shall not exceed 10% total equivalent length of piping system up to delivery point as per IS 10804

Selecting a smaller pipe size will result in friction losses in pipelines leading to loss in discharge and loading on motor. Selecting bigger size pipe also will result in pressure losses which may affect the operating of pumpset.

The supply voltage to the pumpset should not vary between 15% and +15% for efficient operation of the pumpset.

The installation of the pumpset should be done according to the correct procedure for reliability of the pumpset.

At present there are Variable Frequency Drive pumpsets which maintains discharge(Q) constant and varies head(H) based on it. The power consumed by these pumps are more or less constant.

Conclusion

By proper selection and installation of the pumpset and pumping systems we can save money and ensure long life of the entire system.

Energy is wealth. Save it.



Thank You

