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Liquid Power Supply (L P S)

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Abstract –*Electricity is the primary requirement for humans, as it is being the high grade energy which can be converted to other forms easily. The world is in the phase of development we need to adopt the changes and optimize the process of selection by ensuring the advantages. The concept of Urbanization does require a catalyst where the adaption of optical fiber is high in economy. The LPS will be the alternate solution in transmission for developing and under developed countries.*

***Key Words*:** Fibre, Electricity, Energy, ionized, conductivity

1. INTRODUCTION

In the process of electricity usage, the transmission plays a vital role. Where it is being high price to lay electric lines through pole line system to long and distinct places. The LPS ease the electric lines process by reducing time and making the work easier when compared to the pole line system and it also reduces the cost of laying electric lines. Electricity is majorly transmitted through these conventional lines (PLS). The quantity of the wires, cost of the poles are subsequently high. This increase the quantity of metal and material. To eradicate this sort of problems, we can choose LPS as an alternative.

1.1 Pole line system

Electricity transmission through pole line system involves large number of poles, huge quantity of metal and material. This process can be altered through optical fibres which will not suit the developing and under developed countries as the cost of manufacturing is high. During the time of disaster, the optical fibres may increase the cost of reinstallation in case of damage, the cost is thrice compared to the pole line system. So, LPS system which functions similar to the optical fibres with less cost of installation and time fulfil the requirement with in the economy.

1.2 Liquid power supply (L P S)

LPS states the better way of transmission which limit the cost and optimize the work efficiency by reducing time and difficulty. The idea of LPS is to transmit the electricity using liquid with high conducting levels and that works more efficiently during the time of transmission. As the LPS lines laid through the ground it reduces the risk factor and it also support the idea of urbanization. The benefits of adaption are high compared to the pole line system.

Finally, the phase of development require new methods with huge benefits were LPS is a better step toward the phase of development which benefits the mankind.

2. Design of LPS

The design of LPS unit comprises of several layers with their own functionalities, to improve the conductivity and safety. The inner layer in contact with liquid is the conducting layer. The layer above the conducting is the insulating layer which is covered with the leak proof tubes. This setup reduces the risk of handling during the time of transmission. The design setup of LPS varies from single phase to three phase.

In LPS system, the pipelines are assembled with in a fixed distance. The step up transformers are used at the outline to improve the efficiency of transmission. These pipelines are then filled with high conducting and ionized liquid which allows the efficient flow of electricity through it.

There are various problems faced in pole line system. Pole lines are susceptible to damage due to various weather conditions like heavy wind, ice loading conditions in some areas and branches. Sometimes, transmission lines may get effected by the thunder strikes. During heavy winds there may be chance of getting short circuited. During disasters the negligence of broken wire may lead to death. The pole line system effects many other species with in the atmosphere. By adapting the LPS system instead of pole line system we can eradicate many of the problems mentioned above.

Each layer of the pipeline of the LPS system have their own significance. The conducting layer in the innermost, which is in contact with the ionized liquid enhances the electric conductivity of the liquid. The second layer next to conducting layer is the insulating layer, which is used to reduce the power loses and to restrict the flow to outer atmosphere. The uppermost layer is the shielding layer which protects the inner layers and complete design from external factor and vice versa. For better electrical conductivity, we use the liquid which is rich in ions where the ion count is directly proportional to the extents of conductivity. The design of pipelines is flexible which can fit itself in varying inclinations which helps during the time of installation and replacement of pipe lines. The composition of the material may factor the life span.

The cross section of pipeline is shown below in the figure 2.1.

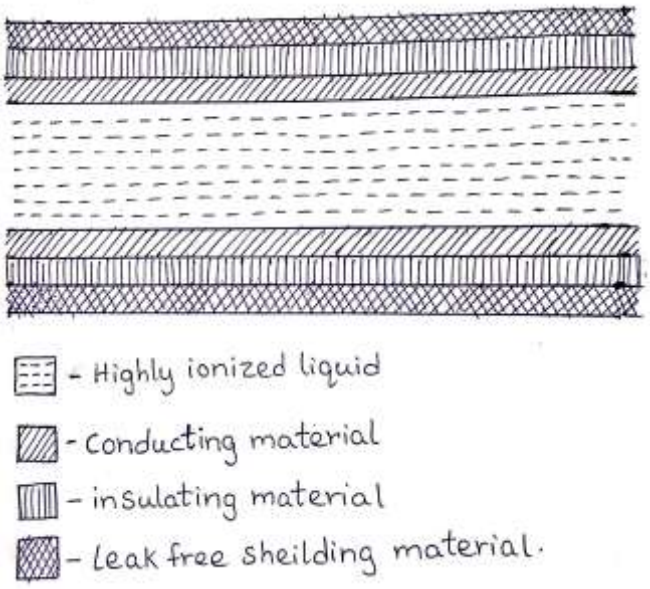

Fig.2.1. LPS pipeline design

This design of the LPS has various advantages over the pole line system as defined in the below table.

Table -2.1: comparison between LPS system and pole line system

FACTORS	**LPS**	**Pole Line System**
Cost	Low	high
Man power	less	more
Effects due to the disasters	Less impact	High impact
Position	Below the ground	Above the ground
Risk	Offer less risk as the electrical lines laid below ground level	Chances of risk is more in case of accidents
Time	Installation require less time	Installation requires more time

The losses during distant transmissions may high, to sort this type of problems we use step-up transformers which enhances the voltage by balancing the transmission losses. We can use similar transformer used in the pole line system for LPS step up. The transformer is placed above the ground were the entry and exit ends of transformer attached to the LPS tubes. The step up transformers are used in obtaining the required voltage at the exit points. To place the tubes in the ground, we need to place hollow pipes of required diameter along the way. This allows free movement while replacing the tubes, without disturbing the ground. The setup of transformer and LPS tube is shown in the below fig.2.2.

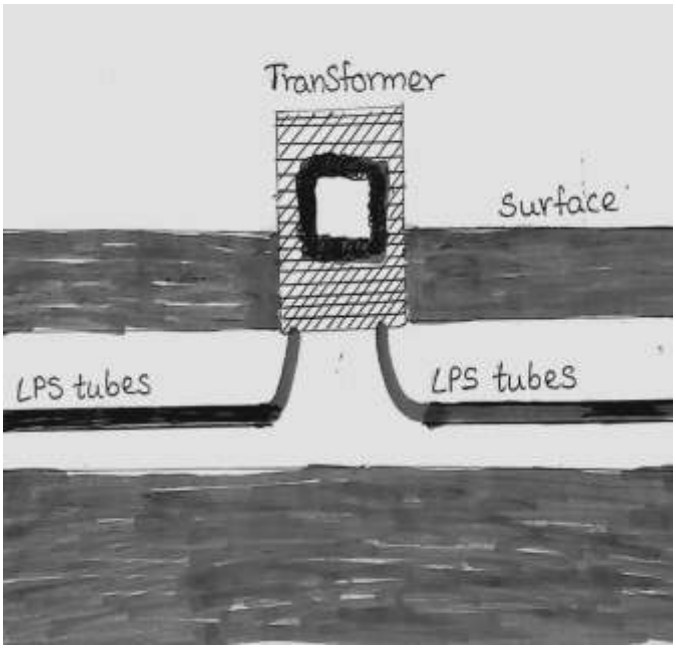

Fig.2.2. setup of LPS transformer

Electricity is generated in various methods. The generated electricity is altered using step up and step down transformers. The usage of step up transformer is briefed above. The step down transformer is used in the sub stations to reduce the frequencies as per usage (i.e. households, industries etc.). Allowing direct flow of high voltages leads to fire accidents. Transformer functions in maintaining the system as per requirements. So, the chain of step up and step down continues throughout the transmission.

Alternating currents(AC) are used during transmissions because of its advantages during distant transmissions. In AC power supply, the flow of current frequently changes its direction. The AC currents are preferable as they are altered easily to higher or lower voltages based on their usage. Using AC, we can improve the efficiency of power transmission.

Electricity transmitted through different phases (i.e. Single phase, three phase). The phase is opted as per the flow during transmission. In case of high voltages, we choose the three phase and in case of low voltages we can move with single phase. We use single phase for households and three phase for industries or businesses that run with heavy machinery or high loads, which requires more power.

A load with single phase can also be driven using three phase transformer by connecting a phase and neutral or two phases. In LPS system, the single phase system requires two pipelines for the phase and neutral connections. Whereas the three phase connection requires three or four pipelines with one as neutral and the other as the phase or live wires.

The LPS system is more economical when compared to pole lined system or optical fiber transmission. The estimated cost for optical fiber transmission can be three times more, when compared to other modes of transmission. The maintenance

of the pole lined system is difficult compared to LPS system. The chances of damage are even high compared to LPS system. A new 69kv overhead transmission line costs approximately $285,000 per mile and a new 138kv overhead line costs approximately $390,000 per mile. These costs may vary from region to region, but expensive compared to LPS system. Unlike the pole lined system, the underground LPS system lines are protected against the various weather conditions. This system positioning may increase the durability.

To adapt LPS system we need to initiate underground pipeline monitoring systems using sensors to detect the position of the damage and the lines can be replaced immediately after identifying the effected zone.

CONCLUSION

This paper has dealt with different transmission systems and the design involved in transmission tube of LPS system, advantages of adapting LPS system compared to other mode of transmissions.

REFERENCES

[1] Biswajeet Rout and Naran.M.Pindoriya (2018) "Active Distribution Analysis - A Case Study", IEEE CONFERENCE, pp.828-833..

[2] D.L.Beeman, and R.H.Kaufmann (1942) "The Fundamentals of Industrial Distribution Systems" AIEE TRANSACTIONS, Vol.61, pp.272-279.R. Nicole, "Title of paper with only first word capitalized," J. Name Stand. Abbrev., in press.

[3] C.J.Soni, P.R.Gandhi, and S.M.Takalkar (2015) "Design and Analysis of 11KV Distribution System using ETAP software" IEEE CONFERENCE, pp.451-456.

[4] Metha V., Metha R. (2006) Principles of power system, S. Chand Publications, pp. 41-126, 356-585.

[5] Ashish R. Ambalkar, "Automatic Load Sharing of Transformers", International Journal for Scientific Research & Development, Volume 2, Issue 12, pp. 739-741,201.

[6] "Implementation of remote monitoring of substation equipment using GSM"- International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, Vol. 5, Issue 6, June 2016.

[7] Prof. M. S. Sujatha and Dr. M Vijay Kumar "On-line Monitoring and Analysis of Fault in Transmission and Distribution Line Using GSM Technique" 30th November 2011 IEEE. Vol. 33 No.2.