IJESRT
INTERNATIONAL JOURNAL OF ENGINEERING SCIENCES & RESEARCH TECHNOLOGY

EXPERIMENTAL STUDY AND THERMAL EFFECT ON SUSPENDED INSULATORS WITH ALUMINOUS PORCELAIN

Priyanka Suryavanshi*, Prof. A. K. Kori
*Research scholar, Fourth Semester ME (High Voltage Engg.), Jabalpur Engineering College, Jabalpur (M.P) 482011, India
Associate Professor, Department of Electrical Engineering, Jabalpur Engineering College, Jabalpur (M.P) 482011, India

ABSTRACT
The suspension insulators are subjected on transmission line for a long time, in service. Long-term reliability of the insulators depends on both mechanical and electrical performance. This study described the thermal performance testing by heating process and thermal mechanical performance test methods on alumina porcelain insulators which are used for transmission lines. There are three types of testing with variable electrical load such as 1000watts, 2000 watts and 3000 watts, which are applied on suspension insulators by using of alumina porcelain coating material.

KEYWORD- Experimental approach, Temperature, aluminous porcelain.

INTRODUCTION
The insulation of overhead transmission lines and substations is subjected to several basic types of abnormal conditions that can cause flashovers and outages of long duration. One of these types is the abnormal voltage in the insulation system caused by the contamination of solid insulator surfaces. The number of insulators needed to protect against contamination is uncertain, because there is a wide range in the severity of contamination, and there is considerable uncertainty as to the basic mechanisms by which contamination affects the insulation level of a given configuration.

The porcelain encased in the cap serves to maintain the insulation between the caps and pin. It simultaneously transmits the mechanical load applied on the insulator from pin to cap. This porcelain parts is very important from both the electrical and mechanical points of view and the porcelain must be of sufficient thickness to withstand the most power full lighting stroke.

ELECTRICAL BREAKDOWN
When subjected to a high enough voltage, insulators suffer from the phenomenon of electrical breakdown. When the electric field applied across an insulating substance exceeds in any location the threshold breakdown field for that substance, the insulator suddenly becomes a conductor, causing a large increase in current, an electric arc through the substance. Electrical breakdown occurs when the electric field in the material is strong enough to accelerate free charge carriers (electrons and ions, which are always present at low concentrations) to a high enough velocity to knock electrons from atoms when they strike them, ionizing the atoms. These freed electrons and ions are in turn accelerated and strike other atoms, creating more charge carriers, in a chain reaction. Rapidly the insulator becomes filled with mobile charge carriers, and its resistance drops to a low level. In a solid, the breakdown voltage is proportional to the band gap energy.

The air in a region around a high-voltage conductor can break down and ionise without a catastrophic increase in current; this is called "corona discharge". However if the region of air breakdown extends to another conductor at a different voltage it creates a conductive path between them, and a large current flows through the air, creating an electric arc. Even a vacuum can suffer a sort of breakdown, but in this case the breakdown or vacuum arc involves charges ejected from the surface of metal electrodes rather than produced by the vacuum itself. In case of some insulators, the conduction may take place at a very high temperature as then the energy acquired by the valence electrons is sufficient to take them into conduction band.

ISSN: 2277-9655
(I2OR), Publication Impact Factor: 3.785

USES-*A flexible coating of an insulator is often applied to electric wire and cable, this is called insulated wire. Since air is an insulator, in principle no other substance is needed to keep power where it should be. High-voltage power lines commonly use just air, since a solid (e.g., plastic) coating is impractical. However, wires that touch each other produce cross connections, short circuits, and fire hazards. In coaxial cable the center conductor must be supported exactly in the middle of the hollow shield in order to prevent EM wave reflections.*

EXPERIMENTAL SETUP

Figure.1. Experimental setup

Figure.2. Energy meter

PERFORMANCE TESTING

Table .1.Heat performance testing applied load 1000 Watts and 8 ampere

Sr. No.	**Time in minutes**	**Temperature (°C) on Final stage**
1	**10**	**42**
2	**20**	**48**
3	**30**	**52**
4	**40**	**60**
5	**50**	**67**
6	**60**	**73**

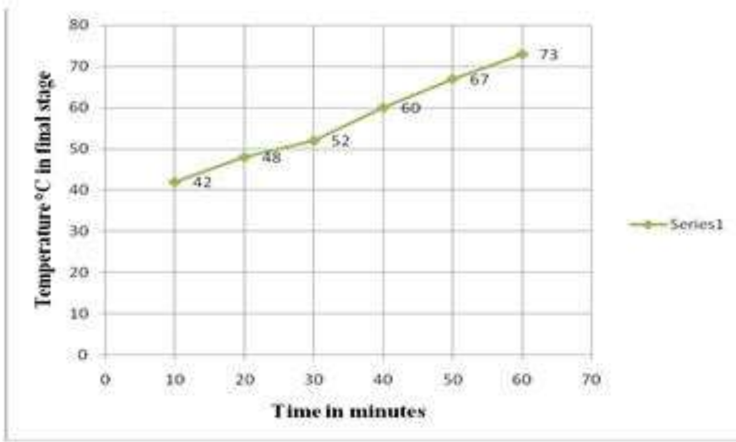

Figure.3. Heat performance testing applied load 1000 Watts and 8 ampere

Table .2.Heat performance testing using of aluminous porcelain applied load 2000 Watts and 10 ampere

Sr. No.	Time in minutes	Temperature (°C) on Final stage
1	10	54
2	20	64
3	30	80
4	40	92
5	50	97
6	60	102

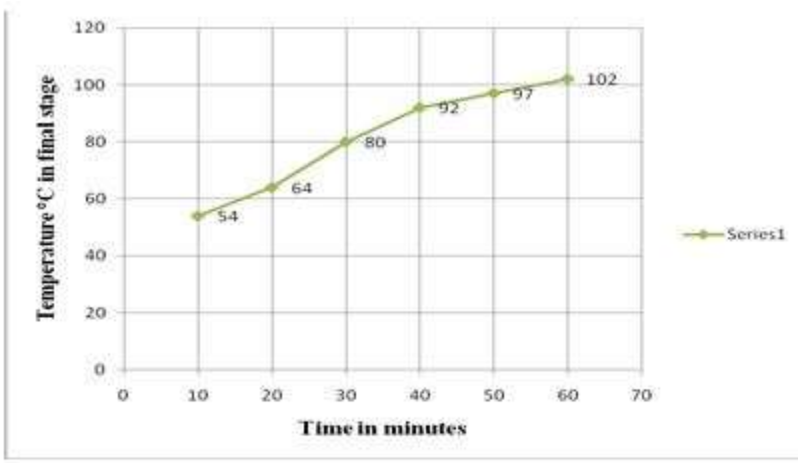

Figure.4. Heat performance testing using of aluminous porcelain applied load 2000 Watts and 10 ampere

Table .3.Heat performance testing using of aluminous porcelain applied load 3000 Watts and 12 ampere

Sr. No.	Time in minutes	Temperature (°C) on Final stage
1	10	54
2	20	66
3	30	85
4	40	98
5	50	110
6	60	110

ISSN: 2277-9655
(I2OR), Publication Impact Factor: 3.785

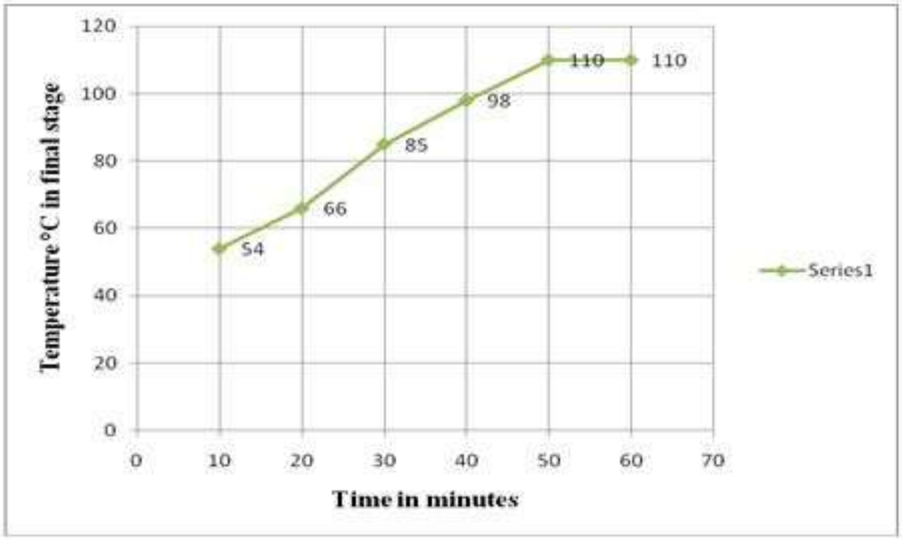

Figure.5. Heat performance testing using of aluminous porcelain applied load 3000 Watts and 12 ampere

CONCLUSION

There are no failures in mechanical performance tests such as high voltage strength, a flashover voltage, impact strength, when the temperature are below than 110°C, and no fracture phenomena by heating parameter , we are absorbed by experimental approach and using insulator has coating of aluminous porcelain. All Type test done with three types load such as 1000watts, 2000 watts and 3000 watts ,After this no damage the using insulator when applied temperature are below than 110°C.

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