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# DEVELOPMENT AND MANUFACTURING PROCESS PORCELAIN INSULATOR

C.P.RAJA , B.PANDIYARAJAN , S.MATHIYAZHAGAN N.MATHIAZHAGAN

***Abstract*—** In order to transmit electrical energy from thegenerating station to the centers of Consumption, metallic wires are used. Varying composition of alumina, kaolin or china clay, ball clay, feldspar, Quartz and many composition of material was used to produce different samples of porcelain insulators to investigate their resulting properties and suitability for mass product viability. The basic raw materials were separately prepared using a 200 µm sieve. The mixtures were formulated to produce porcelain samples by using sodium silicate as deflocculant, while the slip casting process was used in the production of the electrical porcelain insulator. Produced insulator samples were fired by means of bisque and glaze firing techniques respectively.

***Keywords*** -- Electrical Insulator , Material science, design .

## I. INTRODUCTION

The term ceramic in a wider sense are the product of high temperature chemistry of non-metallic and inorganic materials. Anything, which is shaped in plastic state and fired in a particular temperature, is called ceramics. Ceramic is one of the developing technologies in the world. Now a days ceramics is an art of science and technology.

The main constituent of ceramic is clay. Clay is hydrated Aluminium silicate having the formula $Al_2O_3 . 2SiO_2 . 2H_2O$. in modern ceramics many other raw materials play an important role. But that of Clay is still a major one. The term 'clay' is applied those natural earthy deposits which Passes the singular property of plasticity. Firstly clay is a secondary 'rock', that is, it has been formed by weathering of certain other rocks. Secondly, clay is mixture of Aluminium silicates.

The main property of clay which is plastic for ceramic is attainment of required Shape while mixing with water and shaped. When dried this becomes hard and in higher temperature it become like rock substance. All plastic materials, which are Fired up to 600ºC, cannot be made plastic again.

C.P.Raja , PG Student, Meenakshiramaswamy Engineering College,Thathanur , Tamilnadu, India.
B.Pandiyarajan , Assistant Professor ,Meenakshiramaswamy Engineering College, Thathanur,Tamilnadu,India.
S.Mathiyazhagan , HOD, Mechanical, Meenakshi Ramaswamy Engineering College ,Thathanur,Tamil Nadu. India.
( Email id: mathiyazhagan4690@gmail.com )
Dr.N.Mathiazhagan , Principal, Meenakshi Ramaswamy Engineering College, Thathanur ,Tamilnadu, India.
( Email id: mathi.sharmi@gmail.com )

In order to transmit electrical energy from the generating station to the centers of Consumption, metallic wires are used. These long wires or transmission lines must be supports on special supports are known as insulators Electrical Insulator must be used in electrical system to prevent unwanted flow of current to the earth from its supporting points. The insulator plays a vital role in electrical system. Electrical Insulator is a very high resistive path through which practically no current can flow. In transmission and distribution system, the overhead conductors are generally supported by supporting towers or poles. The towers and poles both are properly ground.

## II. RELATED WORK

J. Mackevich (2002**)** it is the objective of this series of articles, beginning in this issue, to review for users the benefits of polymer insulating materials. Material science, design, and processing conditions all influence performance and must be considered. The series goal is to acquaint the user with relevant topics so that more informed decisions can be made in the evaluation, selection, and use of outdoor polymer material insulation. In Part I, a comparison of porcelain and polymer properties is presented, including the relative advantages of each.

F. V. Topalis (2002) the dielectric behavior of polluted porcelain insulators is investigated by means of experimental tests and simulation methods. The elaboration of the experimental results, using well known mathematical models of polluted insulators, leads to the identification of the arc constants. It was found out that the arc constants are independent of the insulator type and of the experimental pollution procedure (salt fog or solid layer cool fog method). This allows the formulation of a generalized simulation model of polluted insulators. The critical parameters for the flashover (voltage, current and gradient) are computed by means of the developed model, using only the geometric dimensions of the insulator, the pollution severity and the arc constants. Different types of porcelain insulators are investigated and the variation of the critical parameters upon the density of the pollution layer is determined.

G. H. Vaillancourt (2002) until now at Hydro-Quebec, overhead power transmission line porcelain insulators had been tested by the buzz method which simply consists in applying a short-circuit to each insulator in a string and listening for a buzz-like sound indicating a good insulator. However, safety considerations that preclude short-circuiting insulators and other disadvantages of that method have led Hydro-Quebec to undertake and complete the development of a new insulator tester. The working principle of this new device is based on the automatic measurement and recording of the electric field along the insulator string which decreases considerably in front of an internally-shorted insulator. The tester is slid along the string while the insulators are counted automatically.

## III. MANUFACTURING PROCESS

### 1) Preparation of Body Slip

These are the following raw material are used for silp forming by ball mill

- Alumina
- Feldspar
- Steatite
- TGH clay
- BGP clay
- TA clay
- DM clay
- Hymod KC clay
- NC 2 clay
- UC clay

All the raw materials are weighed as per the specifications initially. Then the raw materials are poured into the ball mill The Ball mill is rotating chamber contains hard balls then 3500 its of water Be added after closing the open lid, the mills are rotated at a Speed at which the balls and materials are carried up the side and the roll over each other to the bottom. The grinding is therefore effected by impact and rubbing after running of 3 hours the slip will be formed.

Then the slip like weight and sieve residue test will be conducted. If the slip will pass the both tests, the slip will be pumped to the vibro sieve mesh, and then stored into the storage Blunger tank. In this blunger, the slip is stirred with water in large Vessel to maintain a homogeneous slip here the whole mixture to be kept in constant movement. The final slip is known as fresh body slip.

By the meantime the scraps are poured into the scrap Blunger and make them to fine homogeneous mixture with water. This is known as scrap body slip. It is passed through the automatic. Electromagnet chamber to remove the iron particles. After that it sent It to scrap, storage blunger. Then the fresh body slip and the scrap body slip will be mixed as per the requirement in mixture storage agitator.

Here the mixed Body slips are kept agitated just enough to prevent separation. They operate much like slungers but less vigorously. The mixed Body slip will be passed through the electromagnetic chamber to remove all the iron particles contain in the slip. Thus, finally the dust free, homogeneous slip will be stored in a final tank agitator, which is ready to supply for filter press.

### 2) Filter press

After slip forming, the slip will be sent it to filter press for Purifying and mixing can be de- watering. The slip will be pumped into the filter press by Ramp-Pump. Before starting the slip filling we set 280 kg / $cm^2$ pressure on the opposite end of the press.

A filter press consists essentially of a series of grooved trays, which can be fitted together to make thin rectangular chambers and individual outless. Each chamber is lined with a filter cloth in such a way that the inlet opens inside the cloth but the outlet out side it.

280 kg / $cm^2$ press the grooved trays have the faced joint Surfaces. They are separated by hollow frames with faced Surfaces corresponding with these of the plates. The feed of slip be through the centre.

Here the chambers are tightened by using hydraulic press Tighting. The advantage of using this is able to extent a known Pressure so that the unnecessary strain can be eliminated. The method of forcing the slip into the press is pumping. (Ramp pump). The pressure applied to the slip being pumped into Filter press is regulated.

The pumping pressure is $15^{kg} / cm^2$

When sufficient water has been removed the compression on the press is released and the trays are separated. The press centers are individually stripped off and dropped on to the trolleys under the filter press. After to the filter cake M.C will be tested. The required moisture content is 20% to 21%.

### 3) Pug Mill

In the dewatered slip, the plastic mass lacks complete Uniformity and contains entrapped air. The function of pug mills is to improve the uniformity of a Plastic clay body giving it greater workability because of proper Coating of clay particles with water. Then they also remove any air Bubbles.

The pug mill consists essentially of knives set as a screw on one or two rotating shafts moving in a trough. The machine is Continuous one and is fitted with a suitable feeding hopper, and usually the discharge end has an auger and a mouthpiece for Extraction of a solid column of pugged material. The knife blades and the auger screw blades may be set the same shaft.

### 4) PED ( pug electrical drier)

Here the pugs are dried by applying an alternative current to the pugs. An application of high frequency alternating current across a Non-conductor causes heating inside it. As the heating arises in the Center of the piece the method would seem to be very helpful in the Drying of large and thick pieces.

The variable frequency drive will be used to after the Temperature range. Because the frequency and temperature is directly proportional to each other.

### 5) Frequency, current & Temperature visits.

By increasing the frequency of the current the temperature of the pug will be raised .The register temperature detector can be used to measure the Pug temperature. The starting temperature of pug will be around 32°C and it will be increased to maximum 40°C. The heating rate 1°C/hr is maintained.

## IV. CONCLUSION

The insulator is resisted unwanted current flow. The extension of study will be doing in future change the method in casting process and the investigation of the internal structure of clay or porcelain particles, before and after firing to determine their effect on the physical, thermal and electrical properties of porcelain insulators good quality high voltage porcelain bodies were produced from alumina, china clay or kaolin clay, ball clay, feldspar, quarts and many composition material was used preparation body slip. The bug mill was mixed all the material. The sample with composition of 33% alumina, 15%ball clay, 32% feldspar and 20% quartz. The mixed material went storage tank here three tank was used to manufacturing porcelain insulator

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