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Transformer bushings purpose

Bushing power transformer is a type of porcelain or ebony column insulator put on the top or side transformer tank, through which connections are made to the outer circuit. The types of bushings are as follows:- Porcelain insulator housing uses up to 11 KV. Oil-filled housings consisting of a hollow porcelain cylinder of a special shape with a hollow tubular conductor through its centre used for voltages above 33 KV. Capacitor type housings made of thick layers of bakelized paper alternating with thin sorted layers of tin foil are covered with porcelain raincoats and filled with asphalt in the annal space between the raincoat and the housing used in the outdoor sub-station for voltages above 33 KV. Design and construction of the capacitor housing :- General design details are given in Fig. The active part of the housing consists of an impregnated paper (OIP) core made of high-quality Kraft insulating paper with condenser grades to check the ground wound under voltage on the central tube/conductor . The innermost layer of the capacitor is electrically connected to the fixing flange by a test tap . The core is dryed under heat and vacuum and then impregnated with an excellent degree of insulating oil. Porcelain insulators on the top and bottom of the housing , oil resistance high quality rubber seals & rings O are held together with the central tube using a set of strong springs . The fixing flange is equipped with a test thread for measuring capacity and tan delta, an air-releasing screw that releases air trapped in the transformer during oil refilling or can be attached to the Buchholz relay, a label with product details, a handle/eye screw for lifting and space for an annular TYPE CT at the oil end of the housing. At the end of the oil there is an epoxy dyed stress or a base plate to control the high voltages in the oil inside the transformer. The removable lower arc shield is available for housings with a rated power of 245 KV or higher. The interference space between the transformer core and porcelain insulators is filled in a vacuum with specially treated mineral oil. Prismatic (up to 300KV) or magnetic (up to 400 KV) oil visors are available on the expansion dish. A top terminal is available to connect to the top line. Corners are available on request between the top shield and the motherboard. Test Tap:- Test tap is available for capacity measurement, tan delta and insulation resistance (IR) housing value. It is connected to the copper guide to the last condenser foil core directly. During normal operation, this test roll is electrically connected to the mounting flange of the test cover of the tap. Before commissioning, the cover of the threaded test thread must be properly fixed. Regular inspection and maintenance of the case Since the case is a separate unit, as such there is no special maintenance that should be performed. However, regular oil level control and cleaning of porcelain are usually sufficient. In order to determine the medical fitness of the housing, capacity and tan delta measurements may be carried out during annual maintenance. These values shall be compared with the results before commissioning. A delta tan value greater than 0,007 and an increase in capacity of more than 10 % or more . << Previous Next >> For more details, see:- wikipedia.org electrical-engineering-portal.com Youtube.com Multiple Choice Question (MCQ) from electronics page-17:241. Which of the following statements is true? a) The voltage saturation of the VCF silicon transistor is more than the Germanium transistor. (b) The saturated voltage of the VCE for the Germanium transistor is more than a silicon transistor. c) The saturated voltage of the VCE for the silicon transistor is the same as for germanium. (d) The saturated voltage of the VCE for the silicon transistor is lower than the German transistor. Read more... Question multiple options (MCQ) electronics page-16:226. Which of the following statements is correct? (a) Internal electrons are always present in the semiconductor. b) Bound electrons are always present in the semiconductor. c) Free electrons are always present in the semiconductor. d) Internal and bound electrons are always present in the semiconductor. Read more... Question multiple options (MCQ) electronics page-15:211. Materials whose electrical conductivity is usually less than 1 × 106 mho/m are a) Semiconductors b) Conductors c) Insulators d) AlloysClite more... Question multiple options (MCQ) electronics page-14:196. In which of the following devices are the basic resistors added to the package, but added externally? a) UJT b) CUJT c) PUT d) None of the above Read more ... Question multiple options (MCQ) electronics page-13:181. Wiring in JFET is always a) Most carriers b) Minority carriers c) Holes d) Electrons e) Holes and electrons simultaneously Read more ... The two most common types of bushings used on transformers as main entrances are solid porcelain bushings on smaller transformers and oil-filled capacitor housings on larger transformers. Transformer porcelain housing spare parts (pure porcelain construction, copper conductor, with low temperature increase and good heat dissipation.) Solid porcelain bushings consist of high-quality porcelain cylinders through which conductors pass. The outer surfaces have a series of skirts to increase the distance of the escape path to the grounded metal housing. High-voltage bushings are usually oil-filled capacitors of the type. The types of capacitors have a central conductor coated with alternating layers of paper insulation and tin foil and filled with insulating oil. Transformer with RIP 420kV bushings (photo credit: power-technology.com) from the conductor to the grounded tank, consisting of a series of capacitors. The layers are designed to provide approximately the same stress drops between each condenser layer. The acceptance and routine maintenance tests that are most commonly used to check the condition of bushings are doble performance factor tests. The performance factor of the housing in good condition will remain relatively stable throughout its life. A good indicator of insulation damage is a slow-growing performance factor. The most common cause of failure is the entry of moisture through the upper seal of the housing. This condition will be detected before failure by routine Doble testing. If the Doble test is not carried out regularly, the explosive failure is the end result of a non-leaky housing. This, many times, results in catastrophic and expensive transformer failure as well. SOURCE: Transformers: Basics, Maintenance and Diagnostics - U.S. Department of the Interior Bureau of Reclamation This article has several issues. Please help improve or discuss these issues on the talk page. (Learn how and when to remove these template messages) This article needs additional citations for validation. Help improve this article by adding citations to reliable sources. Unsourced material can be attacked and removed. Find sources: Bushing electric – news · newspaper · books · scholar · JSTOR (October 2012) (Learn how and when to delete this template message) This article may require cleanup to meet Wikipedia quality standards. The specific problem is: the article needs wikilinking, formatting, and possibly an expert from the relevant project help improve this article if possible. (October 2012) (Learn how and when to remove this template message) (Learn how and when to remove this template message) Assortment of small ceramic cases for voltage from several hundred to several thousand volts. High voltage housings on a utility transformer in an electrical substation. They're probably working on several hundred thousand volts. In the power supply, the housing is a hollow electric insulator, which allows the electric conductor to safely pass through the guide barrier, as in the case of a transformer or circuit breaker, without electrical contact with it. Cases are usually made of porcelain; although other insulating materials are also used. Explanation All materials carrying an electric charge generate an electric field. When a voltage conductor is close to the material's ground potential, it can form a very high force field, especially where field lines are forced to curve sharply around grounded material. The housing controls the shape and strength of the field and reduces electrical voltage in the insulating material. Housing capacitor Housing The housing must be designed to withstand the force of the electric field produced in the insulation if material is present. As the strength of the electric field increases, escape routes can develop in isolation. If the energy of the escape route exceeds the dielectric strength of the insulation, it can pierce the insulation and allow electricity to lead to the nearest grounded material that causes burning and arc. The typical housing design has a conductor (usually made of copper or aluminum, occasionally made of other conductive materials), surrounded by insulation, except at the ends of the terminal. In the case of a bus, the wires will support the bus in its position. In the case of a housing, a fastening device will also be attached to the insulation to keep it in place. Usually, the fixing point is integral or surrounds the insulation over part of the insulated surface. The insulated material between the fixing point and the wire is the most stressed area. The design of any electrical housing shall ensure that the electrical strength of the insulated material is able to withstand the penetrating electrical energy passing through the conductor through any highly stressed area. It must also be able to withstand sustained, occasional and exceptional high-voltage torque, as well as normal continuous service, because it is the voltage that controls and controls the development of escape routes and not the current. Insulated housings can be installed either indoor or outdoor, and the choice of insulation will be determined by the location of the installation and electrical services on the housing. In order for the housing to function successfully for many years, insulation must remain effective both in composition and in the shape of the design and will be key factors for its survival. Therefore, the bushings can vary greatly in both the material and the design style. Types Of Porcelain Insulation The oldest cases use porcelain for indoor and outdoor applications. Porcelain was originally used because of its properties, it is resistant to moisture once sealed with a sua carbonated glaze, and low production costs. The main drawback of porcelain is that its small linear expansion value must be adapted using flexible seals and substantial metal fittings, which pose production and operational problems. The basic porcelain housing is a hollow porcelain shape that fits through a hole in the wall or metal housing, allowing the wire to pass through its center, and connect at both ends with another device. Cases of this type are often made of wet process of burnt porcelain, which is then glazed. A semiconducting glaze can be used to compensate for the electrical potential gradient along the entire length of the housing. The inside of the porcelain housing is often filled with oil, which provides additional insulation, and the housings of this construction are widely used up to 36 KV, where the higher partial are allowed. Where partial discharge is required to match IEC60137, paper and resin insulated conductors are used in conjunction with porcelain, for unheated indoor and outdoor applications. The use of resin (polymer, polymer, composite) insulated housing for high voltage applications is common, although most high voltage bushings are usually made of resin impregnated paper insulation around conductors with porcelain or polymer weather shelters, for the outside end and occasionally for the inner end. Paper insulation Another early form of insulation was paper, but the paper is hygroscopic and absorbs moisture that is harmful and disadvantaged by inflexible linear patterns. Cast resin technology has dominated isolated products since the 1960s, thanks to its shape flexibility and higher dielectric strength. Typically, paper insulation is later impregnated either with oil (historically) or more often today with resin. In the case of resin, the paper is coated with phenolic resin to become synthetic resin bonded paper (SRBP) or impregnated after dry winding with epoxy resins to become resin impregnated with paper or epoxy resin impregnated with paper (RIP, ERIP). SRBP insulated bushings are usually used up to a voltage of around 72.5 kV. Above 12 kV, however, it is necessary to check the external electrical field and compensate for internal energy storage, which marginalizes the dielectric strength of paper insulation. To improve the performance of paper-insulated bushings, metal foils can be inserted during the winding process. These act to stabilize the generated electric fields, homogenize internal energy using the capacity effect. This function results in a capacitor/capacitor housing. The capacitor housing is made by inserting very fine layers of metal film into the paper during the winding process. Embedded conductive films create a capacitive effect that more evenly disperses electricity throughout the insulated paper and reduces the voltage of the electric field between the powered wire and any grounded material. Capacitor housings create electric random fields that are significantly less efficient around the fixing flange than the foil-free design, and when used in conjunction with resin impregnation, they create housings that can be used with great success at an operating voltage of over one million. Resin insulation Since 1965, resinous materials have been used for all types of housings up to the highest voltage. The flexibility of using a cast form of insulation has replaced paper insulation in many product areas and dominates the existing isolated housing market. As with paper insulation, the control of electrical stress fields remains important. Resin insulation has a greater dielectric strength than paper and requires less stress control at voltages below 25 kV. However Compact and highly rated switchboards, have grounded materials closer to housings than in the past and these structures may require pressure screens in resents operating as early as 12 kV Fixing points are often an integral part of the main shape of the resin and pose fewer problems with grounded materials than metal flanges used on paper cases. However, care should be taken to ensure that in resinous insulated housings that use internal casting screens so that the benefit of controlling electrical voltage in the field is not adjusted by increasing the partial discharge caused by difficulties in removing micro cavities in the resin around the screens during the casting process. The need to remove cavities in the resin becomes more sensitive as the tension increases, and it is normal to return to the resin impregnated, thwarted paper insulation for cases rated above 72.5 kV. Housings on small ferroresonant transformer housings on single-phase distribution transformer 20 kV transformer housings and cables 110 kV housings in the building wall Housings for 110 kV and 220 kV Bushings on transformer 380 kV and gis bushing connection to 1 MV AEG utility transformer, Germany, 1932 Bushing failure Dry bushingOil filled capacitor bushingOil filled capacitor bushing sometimes fail due to partial discharge. This is sometimes due to the slow and progressive degradation of insulation for many years under the strain of service; however, it can also be rapid degeneration that destroys a good housing within a few hours. However, some bushings that fail at an early stage of operation are caused by voltage control failures or basic maintenance, while others relate to in-progressing failure mechanisms built into production. This view is evidenced by a minority of failures around the world. Reference central electricity generation council (1982). Modern practice of power plant. Pergamon. ISBN 0-08-016436-6. IEC60137-2008, BEAIRA Technical Report Q/T123-1952 Design of high voltage capacitors and high voltage capacitors, TECHNICAL REPORT BEAIRA Q/T125-1952 Voltage in high voltage capacitor housings, BSEN 50180, 50181, 50386 Retrieved from

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