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Advantages Of Sf6 Gas In Replacement Of Insulating Oil Type 1 Dielectric In Tank Type Power Switch Live Installed In The Cardenas Electrical Substation One.

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ABSTRAC
Industrial activity continues to grow day by day, and domestic users continue to purchase a large number of household appliances, a situation that translates into constant growth in the electrical load. This increase leads to the need to increase the generation, transmission and distribution capacity of the national system. The expansion of the electrical power system and/or the increase in the capacity of the systems already installed requires studies that ensure that the demand for electrical energy is covered without compromising the correct functioning of the system.
In the event of a failure in a high-power system, the release must be carried out appropriately and in the shortest possible time, seeking not to damage the equipment that is interconnected in the system. This need gave rise to a series of investigations to create equipment that had the necessary characteristics to be able to control the electrical current in the event of a contingency, such as an electrical failure due to a short circuit.

Keywords: *Industry, Pollution, sustainable*

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I. Introducción

The National Electrical System is mainly made up of the Generating Plants, Transmission Lines and Power Substations, the latter play a very important function since they are the receiving and sending nodes of the energy packages which are distributed and regulated to small and large consumers located in many cases at great distances.

As the population grew, it was necessary to create electrical equipment of greater power and smaller size, the demand for electrical energy grew on a large scale. Meeting the growing needs of the electricity market has been a challenge for energy generating companies in our country to this day.

The application of power switches in electrical power systems (SEP) is essential for a flexible and reliable operation of the national electrical network, which is necessary for the continuity of the service. That is why the switch depends largely on the operating conditions of the point of the network where it is going to be installed, in its case it is considered a distribution substation, therefore several factors influence its design such as the voltage level. , type of primary devices connected, interrupting capacity, etc.

In summary of the above, the live tank type power switch insulated in SF6 Gas (Sulfur Hexafluoride) was considered, Model: 3AP1-FG-145 kv. For compliance with the purchase specifications and characteristics applied by NRF-022-CFE-2010, of the Federal Electricity Commission, for power switches from 72.5 Kv to 420 kV.

The other point to consider is the SF6 GAS, because it retains high thermal conductivity, which helps cool the plasma created by the electric arc and by passing through zero the current wave, facilitates the extinction of the arc. Physically, the gas has electronegative characteristics, that is, the property of capturing free electrons, transforming the atoms into negative ions, which causes the gas to have high breaking characteristics of the electric arc and therefore the great speed of dielectric recovery between the contacts. , after the extinction of the arc.

The biggest disadvantage of the live tank type power switch, in Dielectric Insulating Oil type 1, is that they are flammable and can cause chemical reactions due to electric arcs or static discharges, with the release of combustible gases such as hydrogen or light hydrocarbons such as methane that become explosive when mixed

with air. Oxidation forms granular or bituminous deposits, a type of sludge that forms in the circuit breaker chamber of the power switch. These alterations are more pronounced at higher temperatures, producing true adhesions on the opening and closing operations, which are submerged in the oil. This layer adhered to the metal part is a poor conductor of heat, which further accelerates the formation of bituminous deposits, generating an acceleration of the process. This forces us to carry out tests in a short time, generating costs of 70%, unlike gas. SF6 that can go up to five years without maintaining the power switch.

Power switches are designed to work under certain limits of interrupting capacity, so with the passage of years and the increase in electrical energy consumption, said interrupting capacity increases considerably. Given this consideration, a change of power must be considered. power switches with greater interrupting capacity, in order to ensure that under normal or fault conditions the switch operates correctly. The above will be the object of study of this work.

II. RESULTS AND DISCUSSION

In this thesis work, the advantages of SF6 Gas were analyzed, replacing the type 1 dielectric insulating oil, incorporated into the electric arc that is produced in the rupture chamber, such as the live tank type power switch, and the benefit of restoration of the circuit to supply electrical energy to the population that is distributed from the facilities of the Cárdenas one electrical substation and the economic factor that stands out as one of the benefits for the federal electricity commission.

During the research process, the advantages of SF6 gas in Opening and Closing conditions were noted, which make it an important part of electrical power systems, in a protection and control system.

The standards and their nominal characteristics of the switches are very useful, since they are applicable internationally and their importance lies in the fact that they are essential for safe and efficient work, taking into account that they are of great importance for a certificate. The standards and tests to verify compliance are relatively strict.

On the other hand, the application of the knowledge acquired and used in field practice is shown, as well as the research that aims to be a reference for future work on substations and the equipment found in them or academic research related to the topic. .

Recommendations for Future Work.

The study of electric arc is of great importance in power systems due to its frequent appearance and the current values they handle (in the order of kA). Generation companies invest large amounts of money to purchase equipment that can control the electric arc phenomenon, reducing the risk for the people who operate it or even damage to the equipment.

In this chapter we have seen broadly what an electric arc is, how it is formed and why it is important to know how to control it to prevent it from reaching dimensions that can be dangerous. We have seen that power switches play an important role in an electrical power system (EPS), which is why the phenomenon they produce when opening their contacts, called electric arc, is the subject of research worldwide.

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