

Experimental Study of Breakdown of Dry Air with Impulse Voltage

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Abstract: At atmospheric pressure the di-electric strength of SF6 is about 2.5 times that of air. Thus uses as a insulating medium in high voltage electric devices. Since SF6 is used as a good insulating material but it has many disadvantages. It is not found in abundant quantity, it is poisonous, and also SF6 gas is classified as a greenhouse gas. In order to overcome the above disadvantages of SF6 gas it is found the substitution of SF6 gas known as “DRY AIR “having breakdown strength approximately same as SF6.

Keywords: Dry air with Impulse voltage, atmospheric pressure the di-electric strength.

1. INTRODUCTION

In this paper experiment are carried out to see the effect of humidity on the characteristics of dry air .in our country during summer when the atmospheric temperature is about 44@c and even more percentage humidity is low as 10@c ,the air is dry and having a good breakdown strength. Experiments are carried out in the summer season on the different geometry of electrodes roughness of the surface of the electrodes are also taken as consideration

During monsoon when the humidity varies in the monsoon of June and July at different values of humidity, the experiment are performed and the effect is analyzed

2. EXPERIMENTAL SETUP

The size and shape of the electrodes to be used to perform the experiment are shown in fig.



SETUP OF IMPULSE GENERATOR



CONTROL PANNEL

SETUP OF PLANE TO PLANE GAP



SETUP OF PLANE TO NEEDLE GAP



SETUO OF SPHERE TO SPHERE GAP

The electrodes are subjected to high voltage standard impulse from 1600kv impulse generator the breakdown between the electrodes are recorded on DIAS(digital impulse analyzing system) the same electrode are tested for breakdown on power frequency also the records are then compared from the breakdown characteristic

The following table shows the reading obtained by applying standard impulse voltage to different configuration of electrodes. The room temperature was 43 degree Celsius and humidity was 12 % atAtm 723mm of Hg during the experiment .

s.no	ELECTRODE TYPE	DISTANCE BETWEEN ELECTRODE (in cm)	IMPULSE Breakdown voltage In (kv)	
			Smooth surface	Rough surface
1	Sphere-Sphere	2	25	24.7
		3	36.2	36
2	Rod-Rod	2	20.8	20.7
		3	22.8	22.6
3	Plane-plane	2	21.3	21
		3	33.4	32.9
4	Needle-Needle	2	18.5	18.4
		3	18.8	18.6

3. CONCLUSION

The results obtained show that for impulse voltage (-ve polarity) the breakdown voltage is slightly lower for the rough electrodes then the smooth and polished electrode. However the roughness has been not measured this conclusion can be drawn for that for more roughness there may be further reduction in the breakdown voltage. In this the effect of humidity will be observed by performing the same experiment when the humidity reaches to the value of 85% to 90%.

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