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Enhanced performance of zinc oxide arrester by simple modification in processing and design

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Abstract

Reliable performance of Zinc Oxide arrester blocks can be broadly judged by their energy absorption capability. In this exhaustive study, attempts were made to explore various alternative approaches for enhancement of this parameter. Significant improvements in this respect were noticed at least in two cases - with an alternative sintering orientation of the blocks and with the change of arrester block geometry from cylindrical to hexagonal. Sintering is an important operation in the processing of zinc oxide (ZnO) arrester blocks. The blocks are conventionally placed vertically upon ceramic trays called saggers in large electric kiln or furnace. Placement or positioning of the blocks was tried in several orientations including the control (or conventional) process. The extent of the improvement was assessed through comparison of energy absorption capability. Variation in performance of the devices was found to differ depending on orientations and some orientations have demonstrated superior results compared than that of control group. Secondly, investigation has been conducted to observe the effect of the higher surface to volume (S/V) ratio. The round side or C-surface of the cylindrical block was ground by diamond wheel to transform into hexagonal shape. S/V ratio was increased by 11% for the hexagonal blocks which caused an enhancement of 35% of energy absorption capability. This enhanced performance is attributable to increased S/V ratio of the hexagonal arrester blocks facilitating greater heat transfer. Thus adoption of simultaneous modifications for both sintering orientation and change in geometry of arrester blocks is expected to enhance substantially the energy absorption capability leading to improved functional reliability of electrical system.

Biography

Shahida Begum, Associate Professor, in Mechanical Engineering at Universiti Tenaga Nasional (UNITEN), Malaysia. She had her BSc in Chemical Engineering from Bangladesh University of Engineering and Technology (BUET) and PhD in Mechanical and Manufacturing Engineering from Dublin City University, Ireland. She is involved in teaching of different courses in undergraduate and post graduate level and actively involved with research and published many papers in reputed journals. She also worked as a post graduate research fellow at Harris Corporation, Semiconductor Division, Ireland. She is the Head for Centre of Advanced Materials in the university.