

C.R. COLEMAN - RUABON.

7th April, 1970.

P.G. Benignus, St. Louis.

W.R. Richard, St. Louis.

SPECIAL CAPACITOR IMPREGNANT FOR ICAR.

CRC/bjo'g.

R.H. MUNCH - ST. LOUIS.

When I visited ICAR at Monza last week, they said that their tests on our alkyl benzene samples, A215 and A230 had unfortunately been unsuccessful.

In these capacitors, the dielectric consists of a single layer of polypropylene film only. This film is 'keyed' by an electrical treatment by the film manufacturer and then metallized with aluminium by ICAR. The film thickness is 8 microns and the capacitors are used at 380 volts ac and life tested at 1.25 times this voltage. The film presently used contains some pin holes and a self-healing process takes place.

The problem is that during life-testing, corona discharges take place with the result that the metallized coating is eroded and the capacitance falls to 20% of the initial value. Examination of the windings reveals numerous perfectly circular patches which are distinguishable from the spots where self-healing has taken place which are irregular in outline. The circular patches are more numerous near the edges than at the centre of the windings.

Impregnation with trichlorodiphenyl does not give a satisfactory self-healing action. With mineral oil and castor oil the self-healing is satisfactory but the corona problem exists. ICAR want us to propose a suitable impregnant and submit samples for testing.

I find it difficult to identify the physical properties that are required in order to satisfy these requirements. Since the corona patches are more numerous near the edges it would appear that the impregnation is complete and the viscosity of the impregnants A215 and A230 was low enough. Perhaps the degree of swelling and plasticization of the polypropylene by the impregnant is critical. If this is too low, voids may be present, but if it is too high, the metal layer may be detached or torn. Perhaps the relative permittivity of the impregnant is critical. It is possible to imagine a thin surface layer on the film where the DK approaches that of the impregnant with a gradual reduction with increasing depth into the film so that the electric field strength at the surface is low.

Does your work on the surface tension of impregnants offer any clue to a solution?

A further thought is that in these capacitors it might be possible to tolerate a relatively highly conducting impregnant. If so, Aroclor 1242 heavily loaded with a rapidly acting HCl scavenger could be a solution.

DSW 201899

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I made this visit with a man from BCL and we intend to carry out some joint work to investigate the plasticizing action of various impregnants on polypropylene. He suggested trying the phosphate esters, but I recall that you doubted whether these have sufficient thermal stability for capacitor requirements. I also have noted that you have found that silicate esters tend to evolve gas when under electrical stress, so these are unlikely to be suitable.

In the UK, BICC are working to develop the same type of capacitor and they are using both DDB and Aroclor 1242 as the impregnants, with zinc metallized film. This work is confidential and they have not asked our help with any problems.

I should be grateful for any lead you can give me towards a solution.

Best regards,

CRC

COLIN R. COLEMAN.

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