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ASSESSMENT OF MATERIALS FOR STATIC RISKS

Resistivity measurements are used to qualify materials in many areas where static electricity causes problems or presents risks. In some situations this can be appropriate (e.g. flooring and footwear), when the requirement is to drain charge from a conductor (e.g. the body) in contact. In cases where problems arise from the static charge retained on the material itself, it may be quite inappropriate (e.g. packaging materials, cleanroom garment fabrics). Charge decay measurements may be used in such situations, so long as the method of measurement is suitable [1,2] and if the charge decay time is adequately short [3].

Cleanroom garment fabrics are usually constructed to include conductive threads. The aim of these threads is to limit the nearby influence of fabric surface charges by proximity to 'earthy' conductors (i.e. limit surface potential). Low fabric surface potentials will avoid risks of damage by direct discharges and by indirect induction effects. If the 'conductive threads' have a 'core conductivity' there is no sensible opportunity for assessment by resistivity measurements. As the basic fabric is usually polyester, charge decay times are likely to be very long - unless the fibres or fabric have been specially treated. Both established methods of assessment (resistivity and charge decay) are likely to suggest such fabrics are unsuitable. However, tribocharging studies where such fabrics are rubbed to see what surface potentials are likely in practice may show even transient surface potentials to be low. In such situations why would such fabrics not be acceptable?

A new method of studying tribocharging was reported at a recent conference [3] that involves simultaneous measurement of surface voltage generated and the quantity of charge transferred at individual rubbing actions. The approach enables calculation of the 'capacitive loading' provided by materials - and this can be very high for some fabrics that include conductive threads. The suitability of materials can now be more rationally assessed for risks from static by either whether they show an adequately short charge decay time or whether they show an adequately high capacitive loading.

An open discussion of approaches for the fair assessment of materials is urgently needed in view of the low damage thresholds reported for MR heads.

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References:

[1] J. N. Chubb, P. Malinverni *"Experimental comparison of methods of charge decay measurements for a variety of materials"* EOS/ESD Symposium, Dallas 1992 p5A.5.1

[2] British Standard BS 7506: Part 2: 1996 *'Methods for measurements in electrostatics'*

[3] J. N. Chubb *"The assessment of materials by tribo and corona charging and charge decay"* Inst Phys Conference 'Electrostatics 1999', Cambridge, March 1999.