Abstract

With the progress of science and technology, electrical and electronic devices have grown rapidly. Widespread use of these devices has led to many electrostatic discharge, electromagnetic field/radiation and contamination related problems as systems operate in close proximity. Electrostatic discharge (ESD) impacts productivity and product reliability in virtually every aspect of today's electronics environment. ESD affects production yields, manufacturing costs, product quality, product reliability, and profitability. Industry experts have estimated average product losses due to static range from 8-33%. Others estimate the actual cost of ESD damage to the electronics industry as running into the billions of dollars annually. With incorporation of conductive material, textile fabrics have possibility to give effective solution for electronic industry and more specific to cleanroom. Hence as a solution, in this research work efforts are put up to develop high functional conductive fabrics from woven process to avoid hazardous malfunctions in working area. Conductive fabrics are made where a grids or stripes of conductive yarns are present inside a matrix of cotton or polyester yarns. The main objective of present study is to develop different variety of heterogeneous high functional textile fabrics with primary aim of electrostatic discharge control & secondary aim of electromagnetic field & contamination control for cleanroom environment. An attempt is to be made to explore the development of high functional fabrics that can handle parallel situations of electrostatic discharge, electromagnetic field and contamination simultaneously in optimized manner. Particular attention is paid, in the selection, design and preparation of these conductive fabrics to ensure that they can provide an optimal service. Surface resistivity, field strength, air permeability and fabric particle density transfer rate tests are carried out for these fabric samples. For test results, effect of material, EPI/PPI, yarn fineness, weft space, water repellent treatment and conductive pattern are studied to judge and to optimize electrostatic discharge properties of fabrics. With fabric analysis, optimize solutions are also recommended for ISO 3 & ISO 4 cleanroom applications.