STUDY OF FLOORING MATERIALS IN VIEW OF CONDUCTIVITY FOR RESIDENTIAL BUILDING

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Abstract
Electronics organizations adopt the conductive or static dissipative type of special flooring system to reduce bad impacts of electrostatic charge. In case of residential building the flooring is resistive to electrical conductivity because of which people residing will not get the benefits of earthing as the human body does not get connected to earth. Static charge in human body goes on increasing because of electronic gadgets and appliances and even small movement on floor. There are various conductive materials available in market used in various industries which can also be used for residential building to dissipate static charge in users.

I. INTRODUCTION

In residential building products like conductive flooring or static dissipative floorings are rarely used. Flooring materials used in residential building has more resistive properties to electricity. As per the study it has been seen that static charge gets increased if body does not connected with ground or Insulated. In residential building human body is not connected with the earth as people are using foot wears which are made from plastic or rubber soles because of which static charge on human body gets increased and body voltage may get rise to higher level. The study shows that human body is an electrostatic generator so it is necessary to discharge the electricity. This charge can be increased even if small movement such as walking on floor or any movement. The proper flooring and footwear system can dissipate electrostatic energy and contribute to safer environment which is used in ESD safe industries. To remove such static electricity it is required to provide good flooring system so that it can dissipate easily. A conductive floor is defined as having a resistance to ground of less than or equal to $1x10^6$ ohms. While static dissipative floor is defined as a resistance to ground is more than $1x10^6$ ohms.[2] a 'grounded' human being is someone who is connected to and receives direct benefit from the infinite free electron source generated directly from our planet earth. It is well accepted that electrical systems of homes or sophisticated electrical equipment must be grounded to function safely and effectively. In case of homes or residential buildings mostly used floorings consist of insulative properties, as well as electrical gadgets and appliances increases electrostatic charge however the body voltage reaches more than recommended body voltage. Electronics organizations adopt the conductive or static dissipative type of special flooring system to reduce bad impacts of electrostatic charge. Hence it is necessary to study the properties of flooring materials and obtain Earthing aspect in Residential Building.

II. REVIEW OF EARTHING PAPERS

Worldwide society for barefoot living promotes the benefits of removing shoes and socks and walk naturally on earth.[1]some authors like David Wolfe say "the common shoes as perhaps the world's most dangerous invention." more than ten years of research has shown that more time when people walk in contact with earth, they feel better.[9] Other research also shown that the feeling of well-being that comes from

walking barefoot gives physiological benefits such as proper functioning of immune systems, circulation, synchronization of biorhythms and other physiological processes, includes diseases of aging and aging process itself.[1] In simple words it is a high voltage and less current. It is an imbalance in the amounts of positive and negative charge obtain within the surface of an object.[3] This is not big thing but in case of some industries like armed forces, explosive stores, electronics organizations, there is need to provide static control measures. Static controlled industries have appeared with products such as wristbands, ESD shoes and bins, conductive floorings and static dissipative flooring. The free electrons on the surface of the Earth are easily transferred to the human body by direct contact.

Understanding Earthing (Grounding) by Gaetan Chevalier (2012), this paper shows information that Earthing is much important to human health benefits. Earthing gives body ample amount of electrons from the earth the scientific research and observations related to earthing shows attention on inflammation process due to process of such transfer of electrons from earth to body. It is necessary to contact with earth by removing shoes or footwear made by plastic or rubber soles. Research shows that a person who grounded is less stressed and more relaxed. Earthing creates a shift from sympathetic to parasympathetic activation, reduces tension in muscles, increases heart rate variability and much more

The Flooring and Footwear System – An Important Part of any Electrostatic Discharge Control Program by Justine Mooney et al. (2007) the paper shows that human body generates electrostatic charge hence it is required to dissipate it. Such ESD can damages highly sensitive electronics components. There are certain examples of ESD protective tile floor covering with ESD slippers can retain their ESD control properties without any additional special treatment. The paper concludes that the use of ESD control floorings did not generates body voltage more than 20 volts.

"Static Electricity" Measuring your body voltage by William J.Beaty (1999) say that static charge is actually an imbalance in the amount of negative and positive charges obtained on the surface of object. In case of static electricity the amount of voltage is higher and amount of current is negligible. When scuffing the shoes upon a rug on dry winter season, body gets charged up to potential of several thousand volts with respect to ground. A simple spark everyone experienced that exist only when high voltage is present, such spark requires voltage about 500 volts.

Static Control Flooring: trends in technology research paper by Peter Song, most of ESD causes due to contact and separation of dissimilar materials. It is imbalance in electrons on surface of materials it creates electric field that influences other materials at a distance. There are certain manufacturing and environmental conditions that require the use of a static control system.

Conductive Flooring for Hospital Operating Rooms by Thomas H. Boone et al (1960) the study shows that any conductive type of flooring may be expected to best service as compared to nonconductive flooring of the same type. However, an architect may use his choice of a conductive flooring material on his knowledge of the behavior of similar nonconductive materials. Determination of resistance and other factors such as applied voltage, Time, Contact Resistance, Electrodes, Frequency and other factors taken into account. the property of flooring like Indentation, Scratch Resistance, Slipperiness, Scrubbing, Water absorption, Stain resistance such tests were conducted on conductive flooring .

Earthing: Health Implications of Reconnecting The Human Body to the Earth's Surface Electrons by Gaetan chevalier et al (2011) this paper gives the details regarding the direct physical contact with the vast supply of electrons on the surface of earth good better health benefits to human body. The observations shows that to walk barefoot outdoors reduces Chronic Pain, improves Sleep, reduction in Stress level, Improvement in Heart Rate Variability(HRV).Grounding the body substantially increases the zeta potential and decreases RBC aggregation, however reducing blood viscosity.

Earthing-the most important health discovery ever? by Clinton Ober et al 2010, this book is based upon the research and personal and professional experiences of the authors. This book consist of information regarding meaning of earthing, Clinton ober's observations,

Feedback of people regarding earthing, health connections of earthing, technical notes on grounding and earthing methods as well as selected bibliography has been included in it. This book is a source of information to Grounding and its importance to human being.

Grounding and human health-a review by I.A.Jamieson et al (1960) this paper demonstrates that grounding/earthing is always considered in industries as a good practice. Which reduces risk of excess charge in industries, but it is beneficial by biological considerations of human health. The research shows that, by using proper grounding methodologies helps in optimally functioning of human body. This paper considered various relevant scientific studies of human body regarding grounding aspect. Such as sleeping on carbon-fibres mattress pads connected directly to ground wire in earth.

Evaluation of performance of footwear and flooring system in combination with personnel using volt probability analysis by Jeremy smallwood et al (2011) A proper flooring system and footwear both combination is necessary in application of ESD control in electronics manufacturing companies. It avoids risk of electrostatic generation, ignition, and electrostatic shocks to personnel in working environment.

III. MATERIALS and Methods of Testing

Using a Surface Resistivity Meter (SRM) the surface resistivity of plain surface is measured. This instrument gives the readings for flooring's resistance property easily. The readings were taken on various floorings are as follows:-

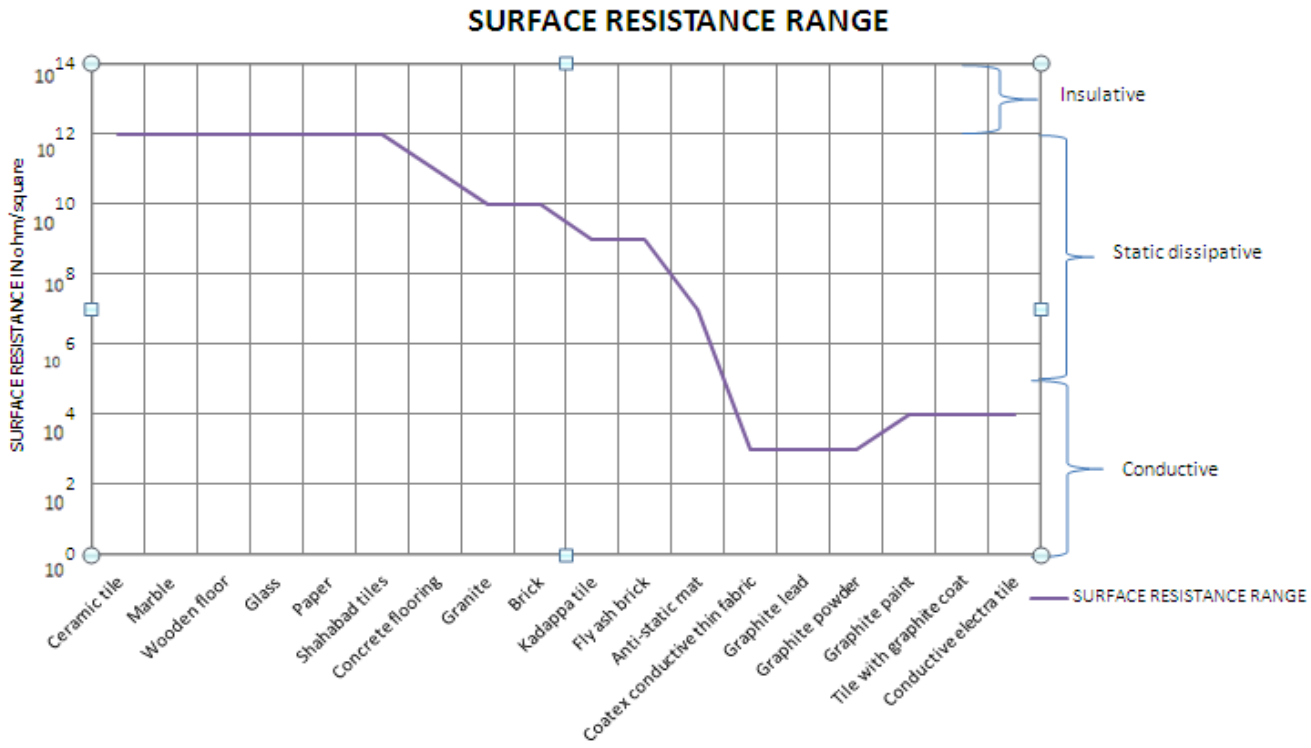

Figure 01: Resistivity of Flooring Tiles & Other Materials

The diagram shows that flooring used in buildings are mostly of insulative range. To reduce ESD inside building we must provide conductive surface to the flooring.

Using Body Voltage Checker various measurements in Residential building at each floors were taken and shown graphically as follows:-

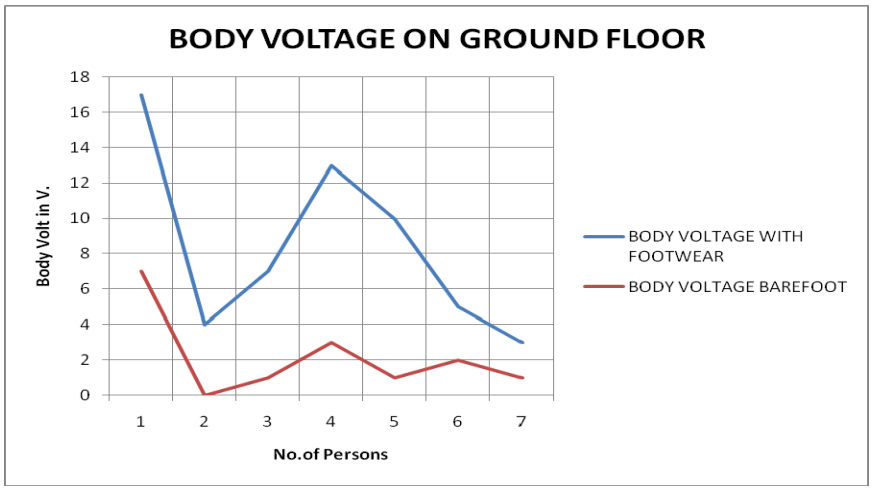

Figure 02.Body voltage on Ground Floor

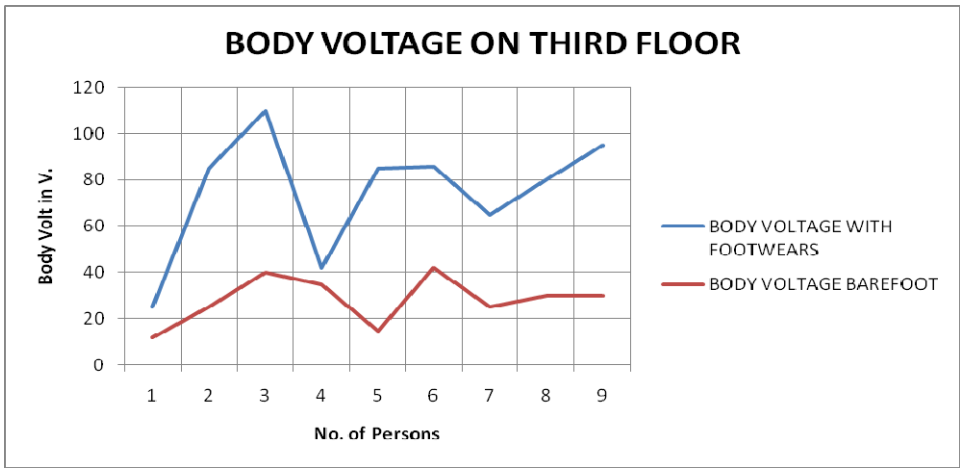

Figure 03.Body Voltage on Third Floor

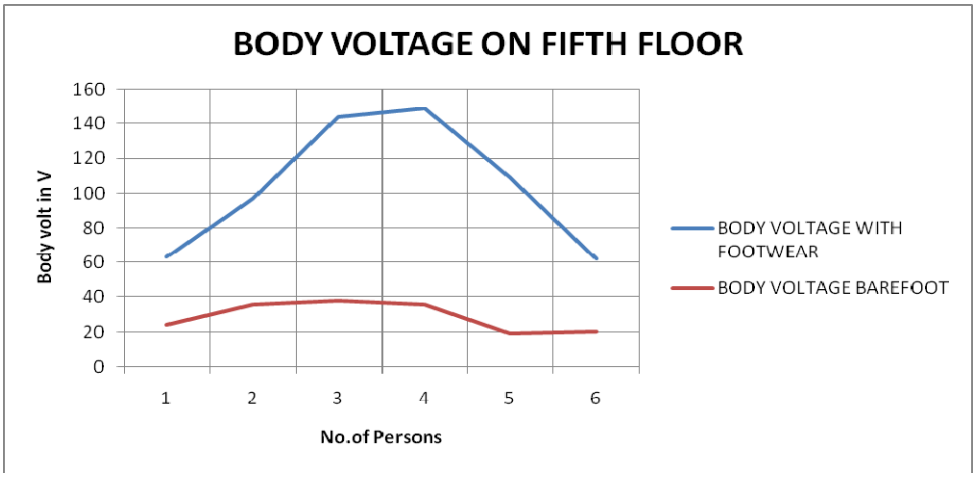

Figure 04.Body Voltage on Fifth Floor

IV. CONCLUSION

It is observed that the commonly adopted flooring materials in residential building are insulative in nature in view of electrical conductivity aspect, which prevents the people coming in contact, to dissipate the static charge. To achieve this inside the building the flooring materials are needed to be conductive in nature which can be obtained from resources available in market. By using the common earthing practices available in industries the flooring can be made more conductive for residential buildings to facilitate the reduction in static charge in the body of users.

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