



وزارة الإسكان والمرافق والمجمعات العمرانية
المركز القومي لبحوث الإسكان والبناء
معهد بحوث الأعمال الكهروميكانيكية في المباني

Test for Electrical Resistance Related To :
El Maadi for Specialized contracting company
(المعادي للمقاولات المتخصصة)

Prepared by: Electro Mechanical Institute
(Housing & Building Research Centre)

Contents:

- 1- Introduction
- 2- Test standards
- 3- Test equipment
- 4- Environmental conditions
- 5- Accreditation
- 6- Test Methods
- 7- Test Results
- 8- Conclusions



Eng. Nayha AbdelRahm

U. Osama



وزارة الإسكان والمرافق والمجتمعات العمرانية
المركز القومي لبحوث الإسكان والبناء
معهد بحوث الأعمال الكهروميكانيكية في المباني

1- Introduction

This report presents the test results **for a** (raised floor tile sample) **Brand** (New Floor-Italy) **model** (412-36) calcium sulphate core 36mm with steel sheet on bottom and cover rubber artigo granito Ant 48 (2mm thickness). The tests are carried out upon the request of Eng./Maxim Halim. The tests shown later are carried out upon his request that submitted to Electromechanical Systems Institutes, HBRC, Dokki, Giza, Egypt. The tests are carried out in the presence of (project consultant, and the executing company representative).

Test standards, test results, and recommendations are shown as follows:

2- Test Standards

The test specimen is tested according to the following standards:

- ANSI/ESD S7.1-2005
- EN 1081

3-Test Equipment

No.	Equipment
1	Tripod Electrode as per EN 1081
2	Megger
3	Load (300 N)
4	Two Electrodes as per ANSI/ESD S7.1
5	Length Measurement Tool



4-Environmental conditions

Start Temp. (°C) : 24	End Temp. (°C) : 23.8	R.H. (%) : 26 ± 2
-----------------------	-----------------------	-------------------

Eng/ Nourhan AbdelRah

M. Osama

5-Accreditation

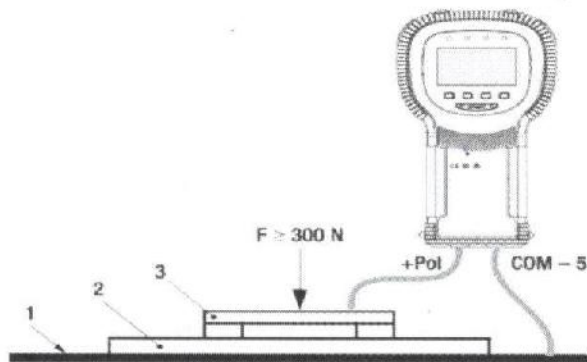
The laboratory is bound by the terms of the international standard for accreditation of laboratories **ISO 17025 of 2017** in terms of confidentiality of data, transparency and neutrality with customers.

6-Test Methods

❖ According to (EN-1081).

Vertical resistance measurement:

Resistance was measured between points on the surface of the insulation material and the strip below it **for a** (raised floor tile sample). According to **EN-1081** standard and as indicated in the Fig. (1), the measured resistance (at 100 volt) between the points on the surface of the insulation and the strip grounding below it is shown in Table (1).



1. Metal plate
2. Test specimen
3. Tripod electrode
4. Resistance meter
5. High-resistance measuring cable

Fig.1: Measurement between points on the surface of the insulation material and the strip below



M. Osama

Eng / Nourh Abdelrah

❖ According to (ANSI/ESD S7.1-2005).

Vertical resistance measurement:

Resistance was measured between points on the surface of the insulation material and the strip below it for a (raised floor tile sample). According to ANSI/ESD S7.1-2005 standards and as indicated in the Fig. (2), the measured resistance (at 100 volt) between the points on the surface of the insulation and the strip grounding below them is shown in Table (2).

❖ According to (ANSI/ESD S7.1-2005).

Surface resistance measurement:

Resistance was measured between the points on the surface of the insulation material for a (raised floor tile sample). According to ANSI/ESD S7.1-2005 standards and as indicated in the Fig. (3), the measured resistance (at 100 volt) between the points on the surface of the insulation is shown in Table (3).

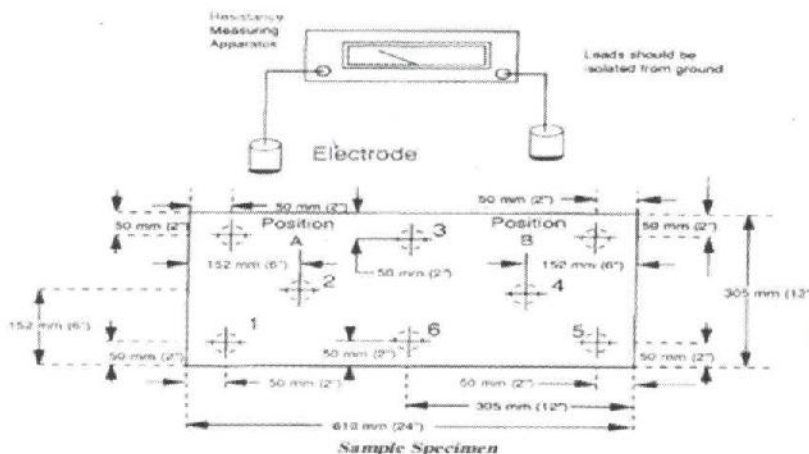
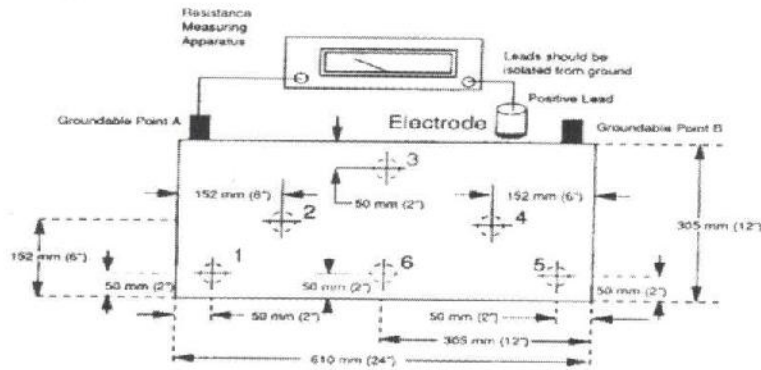


Fig.2: Measurement between points on the surface of the insulation material and the strip below

Eng/ Nawal Abdel Rahman

M. Osama



Sample Specimen

Fig. 3: Measurement between the points on the surface of the insulation material

7-Test Results

- ✓ Resistance was measured between points on the surface of the insulation material and the strip below it **for a** (raised floor tile sample). According to EN-1081 standards (at 100 volt).

Table (1)

Point	Resistance (ohm)
<u>1</u>	<u>$8 * 10^6$</u>
<u>2</u>	<u>$8 * 10^6$</u>
<u>3</u>	<u>$10 * 10^6$</u>
<u>4</u>	<u>$9 * 10^6$</u>
<u>5</u>	<u>$7.5 * 10^6$</u>
Average	<u>$8.5 * 10^6$</u>



M. Osama

Eng. Nanteh Abdelrah



وزارة الإسكان والمرافق والمجتمعات العمرانية
المركز القومي لبحوث الإسكان والبناء
معهد بحوث الأعمال الكهروميكانيكية في المباني

- ✓ Resistance was measured between points on the surface of the insulation material and the strip below it **for a** (raised floor tile sample). According to ANSI/ESD S7.1-2005 standards (at 100 volt).

Table (2)

<u>point</u>	<u>Resistance (ohm)</u>
<u>1</u>	<u>$8 * 10^6$</u>
<u>2</u>	<u>$7.5 * 10^6$</u>
<u>3</u>	<u>$6.5 * 10^6$</u>
<u>4</u>	<u>$9 * 10^6$</u>
<u>5</u>	<u>$9 * 10^6$</u>
<u>Average</u>	<u>$8 * 10^6$</u>



Eng/ Naithe Abd El-Rah

M. Osama



وزارة الإسكان والمرافق والمجمعات العمرانية
المركز القومي لبحوث الإسكان والبناء
معهد بحوث الأعمال الكهروميكانيكية في المباني

- ✓ Resistance was measured between the points on the surface **for a** (raised floor tile sample). According to ANSI/ESD S7.1-2005 standards (at 100 volt).

Table (3)

<u>Point</u>	<u>Resistance (ohm)</u>
<u>1</u>	<u>$5 * 10^6$</u>
<u>2</u>	<u>$5 * 10^6$</u>
<u>3</u>	<u>$5.2 * 10^6$</u>
<u>4</u>	<u>$3 * 10^6$</u>
<u>5</u>	<u>$6.8 * 10^6$</u>
<u>Average</u>	<u>$5 * 10^6$</u>

Conclusions

- The electrical Resistance that measured between points on the surface of the insulation material and the strip below it (vertical resistance) **for a** (raised floor tile sample) has an average value of $(8 * 10^6 \text{ ohm})$.
- The electrical Resistance that measured between the points on the surface (Surface resistance) **for a** (raised floor tile sample) has an average value of $(5 * 10^6 \text{ ohm})$.
- There are two types of electrostatic discharge (ESD) materials. These types are: conductive (resistance less than $1 * 10^6 \Omega$) and dissipative (resistance between $1 * 10^6 \Omega$ and $1 * 10^9 \Omega$), see the attached standard page.
- The Tested material is dissipative ESD material (resistance between $1 * 10^6 \Omega$ and $1 * 10^9 \Omega$).

Eng / Nourhan Abdel-Razek

87 El-Tahreer St. Dokki Giza P.O. Box 1770
Tel.:(02)37496734-33356853 Fax: 37496734- 33351564
www.hbrc.edu.eg Email: emi@hbrc.edu.eg



M. Mohamed

٨٧ شارع التحرير- الدقي ص.ب. ١٧٧٠٠٠
تليفون: ٣٧٤٩٦٧٣٤-(٠٢)-٣٣٣٥٦٨٥٣
فاكس: ٣٣٣٥١٥٦٤ -٣٧٤٩٦٧٣٤



وزارة الإسكان والمرافق والمجمعات العمرانية
المركز القومي لبحوث الإسكان والبناء
معهد بحوث الأعمال الكهروميكانيكية في المباني

- v. It is recommended to use a ground system to connect the metallic strips below ESD material to allow the conduction of the formed electrostatic charges to ground.
- vi. Static dissipative flooring tile is the floor material with a grounding resistance of less than $1 * 10^9$ ohm but greater than $1 * 10^6$ ohm, which is also used for the mitigation of electrostatic discharge (ESD) and usually composed of carpet, synthetic rubber or vinyl composition.
- vii. Conductive flooring is generally used in large areas such as factories, workshops, and operating rooms. Dissipative floor is used in the data center, server room, computer room, engine room, command room, school, bank, and other places.

Remarks

- The test is carried out according to the request from client and on his responsibility.
- The aforementioned data according to what was mentioned in the letter of the body requesting the testing without any responsibility on the center.
- The attached results stated apply only to the particular item submitted for testing, bearing in mind that the results are not valid for the approval of any quantitative production/ and practices/ supplies/ as well as export, and the institute is not responsible for any other sample except the tested one.
- This certificate is valid for 3 months. This report shall not be reproduced, without permission from head of institute. In this case, the certificate is to be reproduced in full.



Eng / Nawal Abdel-Rah

M. ofono

87 El-Tahreer St. Dokki Giza P.O. Box 1770
Tel.:(02)37496734-33356853 Fax: 37496734- 33351564
www.hbrc.edu.eg Email: emi@hbrc.edu.eg

٨٧ شارع التحرير-النجي ص.ب.١٧٧٠٠
تليفون: ٣٧٤٩٦٧٣٤-(٠٢)-٣٣٣٥٦٨٥٣
فاكس: ٣٣٣٥١٥٦٤-٣٧٤٩٦٧٣٤



وزارة الإسكان والمرافق والمجمعات العمرانية
المركز القومي لبحوث الإسكان والبناء
معهد بحوث الأعمال الكهروميكانيكية في المباني

Tested Object Photograph



Tested by

Eng/ Nourhan abdelrahman

Nourhan Abdelrahman

Technical reviewer

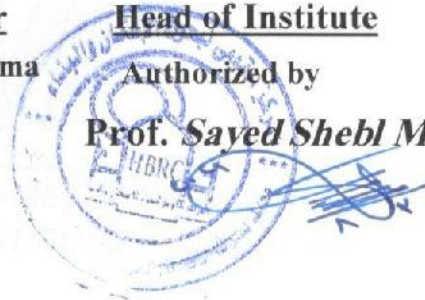
Dr/ Mohamed osama

M. Osama

Head of Institute

Authorized by

Prof. Sayed Shebl Mohamed



Compliance Verification (Periodic Testing)

Equipment: An instrument or collection of instruments that provide an indication or measurement. It may or may not be repeatable or accurate. This equipment is typically used for indications of pass or fail.

✓ **Conductive Flooring Material:** A floor material that has a resistance to ground of less than 1.0×10^6 ohms.

Dissipative Floor Material: Floor material that has a resistance to ground between 1.0×10^6 and 1.0×10^9 ohms.

Groundable Point, Floor Material: A point on the floor material that is intended to accommodate an electrical connection from the floor material to an appropriate electrical ground.

Laboratory Evaluation Equipment: An instrument or collection of instruments that meet the criteria of a standard or standard test method that provides a measurement that is accurate and repeatable. This equipment is typically used to qualify materials, devices or procedures prior to acceptance and under controlled conditions.

Point-to-Point Resistance: The resistance in ohms measured between two electrodes placed on any surface.

Resistance to Ground: The resistance in ohms measured between a single electrode placed on a surface and ground.

Resistance to Groundable Point: The resistance in ohms measured between a single electrode placed on a surface and a groundable point.

Static Control Floor: A permanently installed floor material such as tile, carpet, polymer, epoxy, or sheet flooring that controls static charges on personnel, equipment, or other objects contacting the floor material.

Static Control Floor Finish: A non-permanent coating periodically applied to floor surfaces that controls static charges on personnel, equipment, or other objects contacting the floor material.

Static Control Floor Mat: A movable island of material placed over existing flooring that controls static charges by grounding personnel, equipment, or other objects contacting the floor material. Static control floor mats may be checked either resistance to ground or point to point resistance. Conductive floor mats may be tested point to ground. A current limiting resistor may be used to connect the mat to ground. This may cause the readings to exceed 1.0×10^6 ohms.

4.0 PERSONNEL SAFETY

4.1 The procedures and equipment described in this document may expose personnel to hazardous electrical conditions. Users of this document are responsible for selecting equipment that complies with applicable laws, regulatory codes and external and internal policy. Users are cautioned that this document cannot replace or supersede any requirements for personnel safety.

4.2 Ground Fault Circuit Interrupters (GFCI) and other safety protection should be considered wherever personnel might come in contact with electrical sources.

4.3 Electrical hazard reduction practices should be exercised and proper grounding instructions for equipment must be followed.

5.0 EQUIPMENT AND MATERIALS

5.1 Equipment Requirements

5.1.1 Resistance Measuring Meters

5.1.1.1 The instrumentation may consist of either a power supply and current meter (ammeter), or an integrated instrument that combines these functions.

5.1.1.1.1 Use of Laboratory Evaluation Meters: The meter(s) shall have an output voltage, while under load, of 10 volts ($\pm 5\%$) for measurements less than 1.0×10^6 ohms and 100 volts ($\pm 5\%$) for measurements of 1.0×10^6 ohms and above. The meter must be capable of making measurements from 2.0×10^3 ohms ($\pm 10\%$ accuracy) to 1.0×10^{10} ohms ($\pm 10\%$ accuracy).