राष्ट्रीय प्रौद्योगिकी संस्थान कालिकट
National Institute of Technology Calicut
एन.आई.टी. कॉंपस (पी.ओ), कालिकट, केरल-673 601, भारत ◆ NIT Campus (P.O.), Calicut, Kerala-673 601, India

Phone: 0495 2286100, 2286101
Fax: 0495 2287250
website: www.nitc.ac.in

DEPARTMENT OF ELECTRICAL ENGINEERING

EED/SA/earth/61/B

24/03/2010

To
M/s Excel Earthings
TC - 13 / 1155 ,Mannuthy P O
Thrissur Dt.

Dear Sir,

Sub: Test Report of Earthing station using Excel Earthing compound
Ref: Your letter no. nil dated 8-12- 2008

This is to certify that the excel earthing compound treatment of soil results in appreciable reduction of earth resistance and the decrease in the earth resistance is constant over the year. Detailed test report no EED/SA/earth/61/A dated 24/03/2010 is enclosed.

Prof & Head

Professor & Head
Dept. of Electrical Engineering
National Institute of Technology Calicut
NIT Campus P.O.
Calicut -673601 - Kerala

Dept. Of Electrical Engineering ★ National Institute Of Technology Calicut ★
Calicut -673 601

DEPARTMENT OF ELECTRICAL ENGINEERING
National Institute of Technology Calicut
NIT Campus P. O., Calicut, 673601, Kerala, India
Ph: 0495-2286300 (HOD), 2286301 (office)

EED/SA/earth/61/A

24/03/2010

TEST REPORT Sheet1/3

Name of item/equipment	Earthing Stations using 'Excel Earthing Compound'
Make/model	Earthing Stations made by M/s. Excel Earthings, Trichur
Client	M/s. Excel Earthings, TC - 13 / 1155 Mannuthy P O Thrissur, Kerala
User dept. & reference	M/s. Excel Earthings, TC - 13 / 1155 Mannuthy P O Thrissur, Kerala- Letter dated 08/12/08
Type of Testing	Earth resistance measurement as per IS 3043 in line with client's instructions
Tests conducted and results	
Period of tests	January 2009 to March 2010
Details of item	Earthing Station using 'Excel Earthing Compound '
Sl no. of the item	Nil
Testing standard/parameters	Earth resistance measurement in earthing station using excel earthing compound as per IS 3043 in line with client's instructions

OBJECTIVES OF THE TEST:

1. Studies on the effectiveness of soil treatment by 'Excel Earthing Compound' with regard to reduction in earth resistance and durability of the effect.
2. Comparison of earth resistance between earthing stations using charcoal and 'excel earthing compound'.

FIELD STUDIES:

A location in the campus of National Institute of Technology Calicut, where the soil resistivity is 400 ohm-meters was chosen for conducting the field studies. In this location, two numbers of earth pits were made as per IS 3043:1987. One earth pit with 'Excel Earthing Compound' and the other with charcoal used as the backfill. The earth resistance values were monitored over a period of one year for both the earth stations.

EXCEL EARTHING COMPOUND:

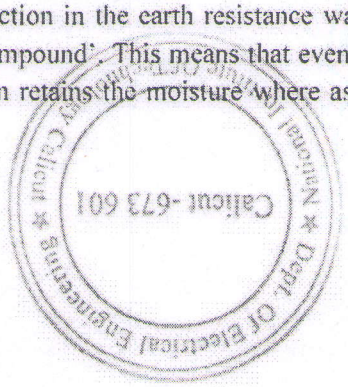
'Excel Earthing Compound' is a product of M/s Excel Earthings, Thrissur-Kerala. It is manufactured from a composition of minerals and materials to obtain highly conductive, moisture absorbing and retaining characteristics providing continuous resistance against corrosion.

ANALYSIS OF THE RESULT:

One year is taken as the test period to cover all the seasons. During the period under test (year 2009) summer is from March to May and Monsoon is from June to August.

1 The earth resistance value of earth station treated with 'Excel Earthing Compound' decreased by approximately 96% of its initial value whereas the earth resistance value of Earth station treated with 'Charcoal' decreased only by 84% of its initial value over the period of one year.

2 During summer, there was increase of earth resistance in the earthing station treated with charcoal. While approximately 10% reduction in the earth resistance was observed for the earthing station treated with 'Excel Earthing Compound'. This means that even during the summer months, 'Excel Earthing Compound' suspension retains the moisture where as 'charcoal' treated earthing system dries up.



EXPERIMENTAL SETUP:

In the location, two numbers of earth pits are made as per IS 3043:1987. Plate electrodes are placed at the centre of each pit with details shown below. 50kg of Charcoal is mixed with water (in the volume ratio 1:1.5) to make slurry and is used to fill the space around the ground electrode in one earth pit. 50kg of 'Excel Earthing Compound' supplied by M/s Excel Earthings is mixed with water (in the volume ratio 1:3 as instructed by the client) and this slurry is used to fill the surrounding volume of the ground electrode in the second pit. Common salt is not added in any of the pits as it is corrosive and soluble. After the installation no water is applied to both the pits during the test period of one year except rain water. 6mm thick CI plate is used as the pits are of experimental.

The values of earth resistances were measured regularly and monthly average values were computed and shown below. The earth resistance values were monitored over a period of one year for both the earth stations.

MATERIALS USED FOR EARTHING STATIONS:

Earthing station using Charcoal	Earthing station using Excel Earthing Compound
• Cast Iron Earth Plate : 60 cm x 60 cm x 6mm • Copper wire 8 SWG - 10 feet • G.I Pipe : B – Class (1.5 inch x 8 feet) • G I Nut & bolts and washers (2 inch length with 6mm. dia.) : 3 Nos • Charcoal : 50 kg. and water in the volume ratio 1:1.5 to make slurry	• Cast Iron Earth Plate : 60 cm x 60 cm x 6mm • Copper wire 8 SWG - 10 feet • G.I Pipe : B – Class (1.5 inch x 8 feet) • G I Nut & bolts and washers (2 inch length with 6mm. dia.) : 3 Nos • 'Excel Earthing Compound': 50 kg. and water in the volume ratio 1:3 to make slurry

INSTRUMENTS USED:

1) Magneto Generator type EARTH TESTER Model: CIE /222(M). , Accuracy ±5%

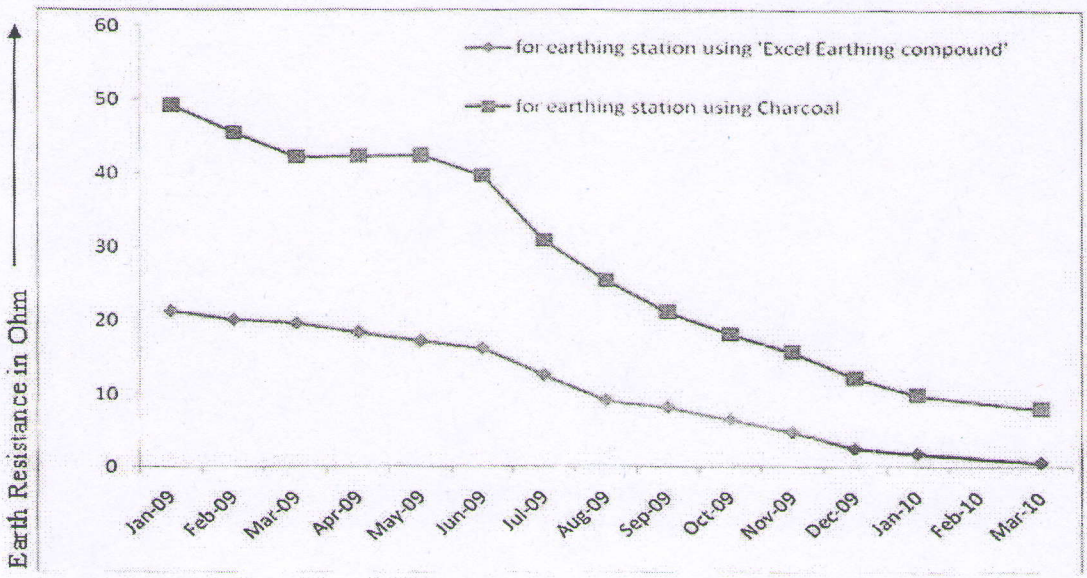
2) Digital Earth Tester DET 20 Make : Motwane , Accuracy ±1.5%

EARTH RESISTANCE MEASUREMENT:

The values of earth resistances were measured regularly and monthly average values were computed and shown below. Values are recorded with necessary correction factors of the instruments.

Sl no.	Measurement	Resistance measured in earthing using	
		'Excel Earthing Compound'	'Charcoal'
1	January 2009	21.3 Ω	49.2 Ω
2	February 2009	20.1 Ω	45.5 Ω
3	March 2009	19.6 Ω	42.2 Ω
4	April 2009	18.4 Ω	42.3 Ω
5	May 2009	17.2 Ω	42.4 Ω
6	Jun 2009	16.2 Ω	39.6 Ω
7	July 2009	12.6 Ω	30.8 Ω
8	August 2009	9.2 Ω	25.4 Ω
9	September 2009	8.3 Ω	21.1 Ω
10	October 2009	6.6 Ω	18.1 Ω
11	November 2009	4.9 Ω	15.7 Ω
12	December 2009	2.6 Ω	12.2 Ω
13	January 2010	1.9 Ω	9.8 Ω
14	March 2010	0.7 Ω	8 Ω

VARIATION OF EARTH RESISTANCE:



SHEET RESISTANCE OF EXCEL EARTHING COMPOUND AND CHARCOAL:

The samples were made slurry using double distilled water and casted to sheet form (of thickness 3 mm) and dried at room temperature for 24 hours

Sheet resistance of Excel Earthing compound : $2.89 \times 10^6\ \Omega$
Sheet resistance of Charcoal : $52.5 \times 10^6\ \Omega$

The pH value of 'Excel Earthing Compound' slurry is of the order 8.

CONCLUSION:

The excel earthing compound treatment of soil results in appreciable reduction of earth resistance over the test period of one year and the decrease in the earth resistance is almost constant.
Soil dries up in summer months producing cracks in the fillings and thereby increasing the resistance. After the raining season, these cracks will be filled with water, increasing the moisture content and thereby decreasing the earth resistance. 'Excel Earthing Compound' will retain the moisture irrespective of seasonal variations while charcoal gets dried up.
'Excel Earthing Compound' suspension forms an electrolyte which is basic in nature. Therefore it does not corrode iron or zinc. In the context of present day practice of using cast iron and galvanized steel as material for grounding, this property is especially important.

Measurements & testing: TKS

24.03.2010

Dr Ashok S
Faculty I/C of Testing

Dept. Of Electrical Engineering * National Institute of Technology Calicut
Calicut -673 601

Professor & Head
Dept. of Electrical Engineering
National Institute of Technology Calicut
NIT Campus P.O.
Calicut -673601 - Kerala