

Report on  
**Measurement of Earth Resistance of  
INTESS Earth Electrode for  
M/s Inter Tech**



**POWER SYSTEMS DIVISION**  
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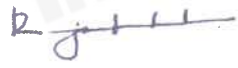
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**CPRI**

**CONSULTANCY REPORT**

Title	Measurement of Earth Resistance of INTESS Earth Electrode		
Objectives	To carryout Earth Resistance Measurements and Soil Resistivity for INTESS Earth Electrode		
Name and Address of the client	M/s Inter tech, B-83, Flatted Factory Complex, Near Modi Mills Okhla, New Delhi-110020		
Client's reference and date	Reference no. B-5/6326	Dated: 01-06-2011	
CPRI'S reference	No. :2/9/PS/Grounding/10	Dated: 31-3-2011	
CPRI Report No.	PS/RT7/96/2011		
Name(s) of investigator(s) from CPRI	Shri R.A.Deshpande ( Joint Director) Shri C Prabhakar, Engineering Officer (Gr.3)		
Names of interacting person from client's side	Shri K.K.Gupta		
Report contains	(i) Number of Sheets: (ii)Number of Figures: (iii) No. of graphs/Oscillograms/ Drawing (iv) Any other enclosures (if any):	11 4 0 Nil	
Report prepared by:	Signature:	Report Approved by:      Signature:	
Shri C Prabhakar Engineering Officer(Gr.3) Date: July 27, 2011		Shri R A Deshpande Joint Director Date: July 27, 2011	



# Measurement of Earth Resistance of INTESS Earth Electrode

## 1.0 Background

M/s Inter-tech, New Delhi awarded the work of measurement of earth resistance of 'INTESS' Earth Electrode, precasted in conductive concrete 'Marconite' to M/s CPRI.

## 2.0 Methodology

The investigation was carried out using methodology that was mutually agreed by M/s Inter-tech and M/s CPRI:

- (a) A suitable site at CPRI, Bangalore was chosen for construction of INTESS Earth Electrode system.
- (b) The site was characterized by measurement of its soil resistivity as per procedure given in Appendix I.
- (c) Earth resistance was measured for the earth pit using Fall of Potential method as described in Appendix II.

## 3.0 Earth Electrode Resistance measurement

During measurement, the remote electrode was placed at about 51 meters away from the test electrode (200 mm dia). Calibrated Earth Tester was employed for carrying out current injection and measurement. Voltage measurements were made between the test earth pit and different points on the surface of the earth. The reading on the earth tester was noted which gives the division of voltage and the injected current. Measurements were taken along a straight line between test and remote electrode, at intervals of 3.0 meters each starting from a point close to the test electrode. The earthing arrangement of INTESS earth electrode is as shown in fig. 1 & 2.

### 3.1 INTESS Electrode Configuration:

**Sample I:** Single Steel Rod of 3m length with a diameter of 40mm was placed in the earth pit of dimensions 0.5 m length, 0.5 m breadth and 3 m depth. Conductive concrete mixture of 200 mm dia in the ratio of 4 bags of "Marconite" and 2 bags of cement was made surrounding the rod for precasting. Local mud which was removed during excavation was refilled surrounding the precasted setup. The pit was made ready on 08-06-2011. The measurement procedure adopted is as described in section 3.0 above.

**Sample II:** Single Copper Rod of 3m length with a diameter of 16mm was precasted in conductive concrete shell of 100mm dia in the ratio of 1 bag of conductive concrete



'Marconite' and 12.5 Kg of cement. The whole setup was placed in the pit of dimensions 0.5 m length, 0.5 m breadth and 3 m depth. The earth pit was refilled with Local mud. The pit was made ready on 08-06-2011. The measurement procedure adopted is as described in section 3.0 above.

#### 4.0 Measurement results

Earth Resistance and Soil Resistivity measurements were carried out on 16-07-2011.

##### 4.1 Soil Resistivity Measurement Results:

The soil was found to be homogenous, as the variation in maximum and minimum soil resistivity value was within  $\pm 30\%$  of the average value. The measured average soil resistivity was **468.29  $\Omega$ -m**.

##### 4.2 Earth Resistance Measurement Results:

The measurement procedure adopted is as described in section 3.0 above.

The value of earth resistance measurement was made at the location where the average earth resistance is:

Sample I	<b>55.43 <math>\Omega</math></b> (for 200 mm dia Precasted electrode)
Sample II	<b>90.87 <math>\Omega</math></b> (for 100 mm dia Precasted electrode)


#### 5.0 Conclusions

It is inferred from the results of measurements that the resistance of earthing system of INTESS earth electrode is **55.43 $\Omega$**  (for 200 mm dia Precasted electrode) and **90.87  $\Omega$**  (for 100 mm dia Precasted electrode) at the location where the soil resistivity is **468.29  $\Omega$ -m**

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