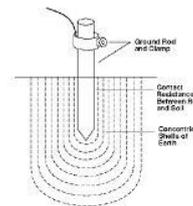


## DISTRIBUTION COMMISSIONING FORM (DCF) 4.1 – Earthing System Resistance Testing (All Equipment)



**Purpose:** This form covers testing of the earth resistance of electrodes or earth systems.

For more information refer to the *Distribution Commissioning Forms Guideline (EDM 34137510)*

**Notes:** The following tests must be carried out on all replacements or new installations before they are put into service. Refer to the Work Instruction *Maintaining and replacing down earth assemblies (EDM 41862205)*.

<b>Address/Pole No.</b>			
<b>Work Package No.</b>		<b>SPIDAWeb Pick ID:</b>	

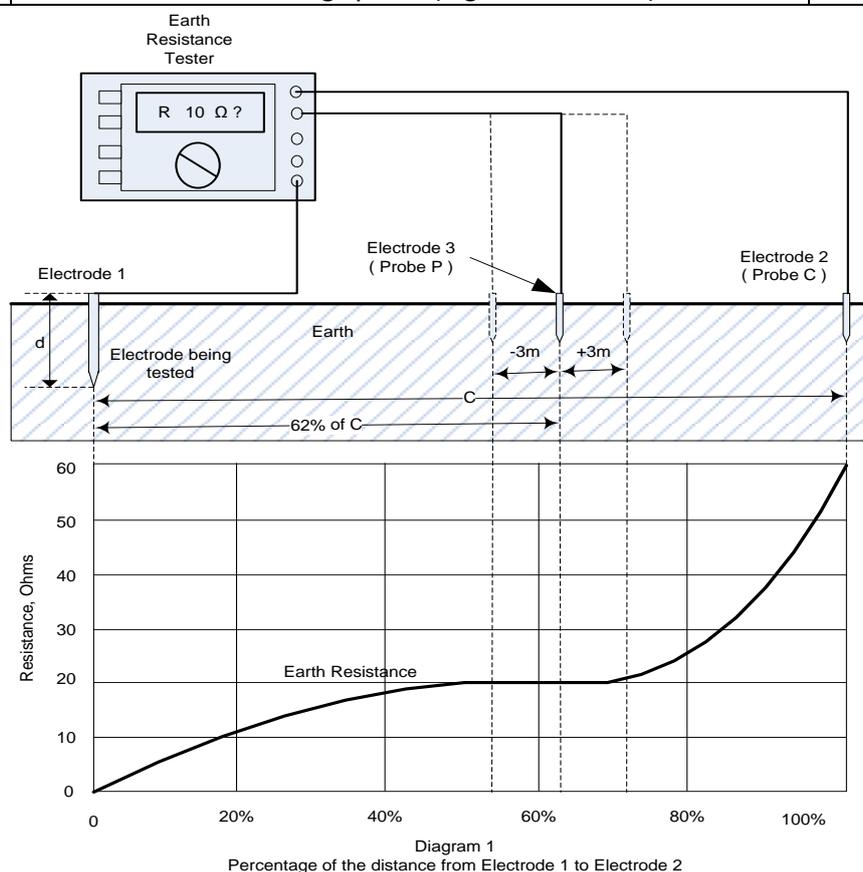
### 1. Pre-Test Checks

Visual inspection	Rated system voltage			Volts		
	Equipment being protected by the earth system (e.g. transformer, pole-top switch)					
	No. of earth electrodes per earthing point				#	
	Approximate depth of earth electrodes	A	B	Meters		
	Size of earth cables			mm <sup>2</sup>		
	Check that the earth conductors are correctly installed to the earth bar (if applicable) and that there are no signs of damage.					
	Check that the earth electrodes are properly installed and connected to the earth system by earth conductors.					
	Check that the earth pits are properly installed, access to the earth electrode is possible and the earth pit lids are in good condition.					
	Check that the compound earth grid is bonded to the substation screening fence (not a customer property bounded fence) and connected to a MEN / N-E connections or earth terminals bar (if applicable).					

### 2. Earthing System Resistance Test

Fall of potential method	Test Equipment: Earth Resistance Tester (three-pole fall of potential method)
	<p>The earth electrode under test (electrode 1) must be disconnected from the earthing system.</p> <p>This test involves two test instrument electrodes (electrode 2 and electrode 3). If the depth of electrode 1 is d, then the test probe P (electrode 3) of the tester must be placed at a minimum of 2 x d from the earth electrode 1 and the C probe (electrode 2) must be minimum 3.2 x d from the earth electrode 1 (in that ratio where P is 62% of the distance between the earth electrode and C probe). This ensures an accurate earth resistance measurement. Otherwise, the measurement would result in higher resistance readings due to summation of the zones of influence of the earth electrode and the C probe. (see probe spacing table 1 below)</p> <p>In the case that the electrode under test (electrode 1) is unknown, install the electrode 2 at a distance of 50 metres away, and electrode 3 at a distance of 31 metres (around 62% of the distance between electrodes 1 and 2) in a straight line.</p> <p>This test is repeated by moving the electrode 3 a distance of 3 metres forwards and backwards from its initial position and in straight line.</p> <p>The final test result is the average of the three test results. (See diagram 1 below.)</p>

Test results	First Test Initiate test: Electrode 2 at C metres Electrode 3 at 0.62C metres Record value:	Second Test Reposition electrode 3: + 3 metres from initial position Record value:	Third Test Reposition electrode 3: - 3 metres from initial position Record value:
	Ω	Ω	Ω
	Average the value of the three tests and record.		
Acceptable values (Distribution Substation Manual)	Description		Maximum Allowable Resistance
	High voltage system – overhead systems (each electrode)		max 30 Ω
	Low voltage system: transformer rating up to 63 kVA		max30 Ω
	Low voltage system: pole-top transformer not greater than 315 kVA		max30 Ω
	Low voltage system: pad-mounted transformer rating 160 kVA or greater (each electrode)		max 10 Ω
	High voltage system: underground system (ground mounted equipment) (each electrode)		max 10 Ω
	Combined HV-LV earthing system (e.g. transformers)		max 1 Ω



ELECTRODE DEPTH	Test Lead lengths from Earth Electrode	
	Potential Probe (P)	Current Probe (C)
<15m	30m	50m
15 - 30m	60m	100m
30 - 45m	90m	150m
45 - 60m	120m	190m
60 - 75m	150m	240m
75 - 100m	200m	320m

**Straight line probe spacing table 1 (Western Power Network)**

### 3. Handover of Responsibility

I hereby certify that all items have been completed with satisfactory results and transfer control to the network operating authority.			
Commissioned by		NAC	
Signature		Date & Time	

1. Ensure the work area is left tidy and no hazards to the public.
2. Hand over responsibility to the operating authority.
3. The completed form must be returned to the project file/work pack.