

Electrical Transient Analyzer Program

Ground Grid Systems

IEEE Std 80-2000/2013
Optimize Number of Conductors and Rods

Number of Ground Conductors: 9

Number of Ground Rods: 80

Total Length of Ground Conductors: 80.00 m

Total Length of Ground Rods: 240.00 m

Total Computational Time: 0.00 minutes

Frequency: 50.0

Unit System: Metric

Project Filename: Man Fact GridDieselPV

Output Filename: C:\ETAP 2401\Man Fact GridDieselPV\Grid1_Untitled.GR1S

Ground Grid Input Data

System Data

Freq. Hz	Weight kg	Ambient Temp. °C	Short-Circuit Current				Fault Duration (Seconds)		
			Total Fault Current	X/R	Sf Division Factor	Cp Projection Factor	Tf for Total Fault Duration	Tc for Sizing Ground Conductors	Ts for Available Body Current
			kA		%	%			
50.0	70	40.00	1.000	2725.32	100.0	100.0	0.50	0.50	0.50

Soil Data

Surface Material			Upper Layer Soil			Lower Layer Soil	
Material Type	Resistivity	Depth	Material Type	Resistivity	Depth	Material Type	Resistivity
	ohm.m	m		ohm.m	m		ohm.m
Gravel	8534.4	0.300	Dry soil	1000.0	5.00	Wet organic soil	10.0

Material Constants

Conductor/Rod	Type	Conductivity %	α_r Factor	K0 @ 0 °C	Fusing Temperature °C	Resistivity of Ground Conductor	Thermal Capacity
			@ 20 °C 1/°C			@ 20°C micro ohm.cm	Per Unit Volume J/(cm³.°C)
Conductor & Rod	Copper, annealed soft-drawn	100.0	0.00393	234.0	1083.0	1.72	3.42

Rod Data

Diameter cm	Length m	Optimized	Cost \$/Rod
		No. of Rods Arrangement	
3.000	3.00	80 Rods along Grid Perimeter	100.00

Grid Configuration

Conductor Size mm²	Depth m	Optimized						Shape: Rectangular	
		Grid Length m		Number of Conductor		Separation m			Cost \$/m
				in X Direction	in Y Direction	in X Direction	in Y Direction		
		Lx	Ly						
120	1.50	8.00	10.00	5	4	2.7	2.5	10.00	

Cost

Conductor			Rod			Total Cost \$
Total No.	Total Length m	Cost \$	Total No.	Total Length m	Cost \$	
9	80	800.00	80	240	8000.00	8800.00

Ground Grid Summary Report

Rg	GPR	Touch Potential			Step Potential		
Ground Resistance ohm	Ground Potential Rise Volts	Permissible/ Tolerable Volts	Calculated Volts		Permissible/ Tolerable Volts	Calculated Volts	
				%			%
38.610	65626.6	2737.1	2723.9	99.5	10282.3	2391.2	23.3

Total Fault Current:	1.000 kA	Reflection Factor (K):	-0.790
Maximum Grid Current:	1.700 kA	Surface Layer Derating Factor (Cs):	0.885
		Decrement Factor (Df):	1.700