

Typical soil resistivity values

Tables 1-3 provide typical soil resistivity values based on soil types. To use these values for your project you should refer to the geotechnical report or if it is not available then find out the types of soils which are present for the region of your project (there are geological maps available).

In addition Table 4 provides the resistivity of typical surface layer materials used for substations.

Table 1. Range of earth resistivity [ref. 1]

Type of earth	Average resistivity(Ω -m)
Wet organic soil	10
Moist soil	100
Dry soil	1000
Bedrock	10,000

Type of earth	Average resistivity(Ω m)
Wet organic soil	10
Dry, humous soil	30
Moist soil	100
Limestone shale	300
Moraine sandstone	1000
Coarse sand, gravel	3000

Bedrock	10,000
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Table 2 – Range of soil resistivity [ref. 2]

Table 3. Geological period and formation [ref. 3]

Earth resistivity ohm-meters	Quaternary	Cretaceous tertiary quaternary	Carboniferous triassic	Carbrain Ordovician devonian	Precambrian and combination with Carbrain
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1 Sea water					
10					
Unusually low		Loam			
		Clay			
30 Very low		Chalk			
			Chalk		
100 Low			Trap		
			Diabase		
300			Limestone		
Medium			Sandstone	Shale	
1000				Limestone	
High				Sandstone	
				Dolomite	
3000					Sandstone
Very High					Quartzite
					Slate
10,000					Granite
Unusually high	Coarse sand and				Gneisses

Earth resistivity ohm-meters	Quaternary	Cretaceous tertiary quaternary	Carboniferous triassic	Carbrain Ordovician devonian	Precambrian and combination with Carbrain
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gravel in
surface
layers

Table 4. Resistivity of typical surface layer materials in substations

Material	Electrical resistivity (Ω.m)
Concrete (wet)	50 - 100
Concrete (dry)	2000 – 10,000
Crushed rock for surface coverings (wet)	3000
Asphalt (wet)	10,000

Table 5. Resistivity values for various materials [ref. 4]

Material	Resistivity Ωm	
	Typical	Usual limits
Salt sea water	0.2	0.15 to0.25
Estuarine water	0.5	0.2 to 5
Artesian water	4	2 to 12

Material	Resistivity Ωm	
Damp black inland soil ^a	8	5 to 100
Damp clay	10	2 to 12
Inland lake water, reservoirs	20	10 to 500
River banks, alluvium	25	10 to 100
Clay/sand mixture ^b	30	20 to 200
River water(upstream)	40	30 to 200
Concrete ^c	100	40 to 1 000
Dry inland soil ^a	100	20 to 1 000
Moraine gravel	2 000	1 000 to 10 000
Coal	2 000	1 000 to 5 000
Secondary rock	3 000	1000 to 50 000
Sand ^b	3 000	1 000 to 10 000
Solid volcanic rock ^d	20 000	10 000 to 50 000
Ice ^e	100 000	10 000 to 100 000