Neutral Earthing Resistor: Resistance, Current and Energy

Neutral earthing resistor resistance, current, power and energy for a rated time, with a check against the system's capacitive charging current.

Method: Neutral earthing resistor sizing R = V_ph/I_f (definitions; IEEE 32 ratings practice)

Input parameters

Unit system: SI

Parameter	Value	Unit
System line voltage	11.000	kV
Earth-fault current limit	300.00	A
Rated time	10.000	s
System capacitive charging current ($3I_0$)	20.000	A

Calculated results

Parameter	Value	Unit
Resistance	21.170	Ω
Power at fault current	1,905.3	kW
Energy for the rated time	19.053	MJ
Ratio to charging current	15.000	

Formula and method

$$R = \frac{V/\sqrt{3}}{I_{NER}}, \quad P = \frac{V}{\sqrt{3}} I_{NER}, \quad E = Pt$$

Variables

V	System line voltage	V
I_{NER}	Earth-fault current limit	A
t	Rated time	s
$3I_{c0}$	System capacitive charging current ($3I_0$)	A
R	Resistance	Ω
P	Power at fault current	W
E	Energy for the rated time	J
$I_{NER}/3I_{c0}$	Ratio to charging current	-

Method and standards

Ohm's law and energy.

Assumptions and limits

- Single phase-to-earth fault; resistor dominates.
- The ratio to charging current is shown only when a charging current is entered.

References

- Neutral earthing resistor sizing R = V_ph/I_f (definitions; IEEE 32 ratings practice)

Report details

Report reference	FCC-T4WH-PA8B (the same inputs always give the same reference)
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Release checks	2 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/electrical/protection/neutral-earthing-resistor

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.