Insulation Resistance: Temperature Correction, PI and DAR

Insulation resistance corrected to 40 °C, polarisation index (10 min/1 min) and dielectric absorption ratio (60 s/30 s) from megger readings.

Method: IEEE Std 43-2013 (insulation resistance testing of rotating machinery): R_40 = R_T × 0.5^((40 − T)/10); PI = R_{10}/R_1; DAR = R_{60}/R_{30}

Input parameters

Unit system: SI

Parameter	Value	Unit
Reading at 1 minute (MΩ)	450.00	
Reading at 10 minutes (MΩ)	1,250.0	
Reading at 30 seconds (MΩ)	320.00	
Winding temperature during the test	30.000	°C

Calculated results

Parameter	Value	Unit
1-minute reading corrected to 40 °C (MΩ)	225.00	
Temperature correction factor	0.50000	
Polarisation index R_{10}/R_1	2.7778	
Dielectric absorption ratio R_{60}/R_{30}	1.4062	

Notes for this case

- Correction halves resistance for each 10 °C rise (IEEE 43 approximation); acceptance values are set by your standard.

Formula and method

$$R_{40} = R_T \cdot 0.5^{(40-T)/10}, \quad PI = \frac{R_{10}}{R_1}, \quad DAR = \frac{R_{60}}{R_{30}}$$

Variables

R_1	Reading at 1 minute (MΩ)	-
R_{10}	Reading at 10 minutes (MΩ)	-
R_{30s}	Reading at 30 seconds (MΩ)	-
T	Winding temperature during the test	K
R_{40}	1-minute reading corrected to 40 °C (MΩ)	-
K_T	Temperature correction factor	-
PI	Polarisation index R_{10}/R_1	-
DAR	Dielectric absorption ratio R_{60}/R_{30}	-

Method and standards

IEEE 43.

Assumptions and limits

- DC insulation test.
- Minimum PI of 2.0 for thermal classes B, F and H and 1.5 for class A (IEEE 43); when the corrected 1-minute reading is above 5 000 MΩ the PI may not be meaningful and no PI warning is given.

References

- IEEE Std 43-2013 (insulation resistance testing of rotating machinery): R_40 = R_T × 0.5^((40 − T)/10); PI = R_{10}/R_1; DAR = R_{60}/R_{30}

Report details

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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/motors/insulation-resistance-pi

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.