



Cambridge Instruments
& Engg. Co.

EST. 1963 · HOWRAH, INDIA

TEST REPORT FORM

Transformer Insulation Resistance Test

Megger test of HV, LV and between windings · 15 s / 60 s / 10 min, DAR, PI and temperature correction

01 Job and transformer details

Customer / substation	Transformer ID / tag	Test date
Make and serial no.	Rating (kVA / MVA)	Vector group
HV / LV voltage (kV)	Oil temperature (°C)	Winding temperature (°C)
Condition ☐ Oil-filled ☐ Dry type ☐ Cast resin ☐ Energised before test	Ambient (°C) / humidity (%)	Weather
Test instrument, serial no.	Tested by	Calibration due

02 Readings MΩ. Bushings clean and dry, all terminals of a winding shorted together, test voltage applied continuously

Test winding to ...	Test voltage V DC	15 s	60 s	10 min	K20 page 2	IR60 at 20 °C IR60 × K20	DAR 60 s / 15 s	PI 10 min / 60 s
HV to LV + earth								
LV to HV + earth								
HV + LV to earth								
HV to LV (guard on earth)								
Tertiary to earth (if fitted)								
Core to earth (link removed)								

Test voltage is normally 5 kV DC for HV windings and 1 kV DC for LV windings, or 500 V for windings below 1 kV. Use the voltage your specification or the manufacturer gives. For the core and its earth link use 500 V to 1 kV.

03 Evaluation

Test	IR60 at 20 °C MΩ	Acceptance value from your spec, MΩ	IR check	PI	PI check	Result
			☐ Meets ☐ Below		☐ Meets ☐ Below ☐ N/A	☐ PASS ☐ FAIL
			☐ Meets ☐ Below		☐ Meets ☐ Below ☐ N/A	☐ PASS ☐ FAIL
			☐ Meets ☐ Below		☐ Meets ☐ Below ☐ N/A	☐ PASS ☐ FAIL
			☐ Meets ☐ Below		☐ Meets ☐ Below ☐ N/A	☐ PASS ☐ FAIL
			☐ Meets ☐ Below		☐ Meets ☐ Below ☐ N/A	☐ PASS ☐ FAIL

04 Result and sign-off

Overall result ☐ PASS ☐ BELOW LIMIT	Compared with previous test ☐ Better ☐ Similar ☐ Falling
Remarks and recommended action	

Signature and date: tester	Signature and date: reviewer
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WORKSHEET AND REFERENCE

Correction, limits and method

How to bring a reading to 20 degrees C and what to compare it with

01 Formulas

Temperature factor to 20 °C
 $K20 = 2^{((T - 20) / 10)}$

IR at 20 °C
 $IR20 = IR60 \times K20$

Worked example
 $T = 40\text{ °C}$, $IR60 = 800$: $K20 = 4$,
 $IR20 = 3200$

Dielectric absorption ratio
 $DAR = IR60s / IR15s$

Polarization index
 $PI = IR10min / IR60s$

Leakage at 60 s
 $I (\mu A) = V / IR (M\Omega)$

02 Temperature factor K20

T is the winding or oil temperature in °C

T (°C)	10	15	20	25	30	35	40	45
K20	0.5	0.7071	1	1.414	2	2.828	4	5.657
T (°C)	50	55	60	65	70	75	80	
K20	8	11.31	16	22.63	32	45.25	64	

Approximation. This is the common rule that insulation resistance halves for every 10 °C rise, referred to 20 °C. Oil-filled transformers can follow a different slope, so where the manufacturer or IEEE C57.152 gives a table for your unit, use that. Test at a similar temperature each time and trend the corrected value.

03 Guide values

no single value fits every unit: use your specification or the manufacturer

Check	GUIDE	Common practice
Minimum IR60 per winding		1 MΩ per kV of winding voltage
Absolute floor for LV windings		about 1 MΩ
Compare with		factory report and last site test

PI (10 min / 60 s)	GUIDE	Reading
Below 1.0		Poor
1.0 to 2.0		Questionable
2.0 to 4.0		Good
Above 4.0		Excellent

The values above are widely used rules of thumb, shown to help you judge a result on site. They are not limits from a standard. A falling trend between tests matters more than one absolute number.

04 Method notes

- De-energise, isolate and earth the transformer, and let it rest so surface charge dissipates. Disconnect external cables, surge arresters and any neutral earthing link as your procedure requires.
- Clean and dry the bushings. Use the guard terminal for the HV-LV test where surface leakage could mislead the reading.
- Discharge each winding for at least as long as it was energised before touching a terminal.

CIE INSTRUMENTS FOR THIS TEST

DIT-5000

Digital, up to 5000 V and 200 GΩ, auto-ranging

DIT-2500

Digital, 100, 250, 500, 1000 and 2500 V, up to 50 GΩ, with DAR and PI

CIE/777

Motor-driven, for steady voltage during a 10 minute PI test



Check it online

Scan for the free PI and DAR calculator.
cieinstruments.in/tools



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Page 2 of 2 · Calculation aid, not a substitute for the standard or your site procedure

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