

HANDLING ON INTERLEAF
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IVECO Standard	INSULATION RESISTANCE TESTS	16-2105
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PERFORMANCE STANDARD		

3 TEST APPARATUS AND TEST PROCEDURE

Test apparatus shall consist of:

- Step-up transformer, 500 Va , capacity up to 5 KV.
- Step-up transformer, 2000 Va , capacity up to 50 KV.
- Supply transformer (2 off), continuously variable (VARIAC), suitable for matching the primaries of the above transformers.
- Electrostatic voltmeter, accuracy $\pm 2 \%$ and capacity 5 and 50 KV respectively.
- HT AC test setup with sinusoidal waveform and frequency 50 to 60 Hz.

Instrumentation may be replaced with other apparatus provided it is equivalent or better in terms of characteristics, accuracy and repeatability.

4 PREPARATION OF TEST PARTS AND APPARATUS

Apply test voltage to test parts and apparatus where specified as per design, drawing or procurement specification bearing in mind that

- on complete devices test voltage is to be applied only to the parts concerned, disconnecting those which might be damaged by HT, e.g. circuits, windings, etc.,
- loose components, e.g. insulators, cups, spacers, etc, are to be assembled to supporting metal parts and live parts as on actual installation, or by interposing tinfoil between opposite contact surfaces,
- on flat parts, to determine slab-type insulation breakdown voltage, test voltage must be applied across the metal surface supporting the test slab and a 10 mm metal ball positioned centrally on top of slab, loaded to 1 N,
- for tubes, caps and other tubular wiring protections, a straight metal plug is to be securely inserted inside the test specimen with a 0.5 mm dia. bare copper wire coil wound externally around the middle of the plug , ensuring that the copper wire is adequately taut.

5 TEST CONDITIONS

5.1 Test environment

- Temperature: $23 \pm 5 \text{ }^{\circ}\text{C}$
- Relative humidity: 45 -70 %
- Atmospheric pressure: 860 thru 1060 mbars

Prior to testing, test devices and test circuit shall be conditioned for 0.5h in test environment. Also, test devices must have successfully passed the humid heat test.

6 TEST PROCEDURE

Carry out tests as per paras.a) e b).

- a) Pulse leakage test to monitor solid insulation resistance to nominal voltage.
- b) Dielectric strength test (HT AC test at industrial frequency) to monitor solid insulation strength in peak overvoltage conditions, and endurance test.

NOTE : As very high test voltages are applied to test devices, with consequent potential danger for test personnel safety, always ensure that all equipment used and implementation of test procedures are in line with the safety requirements envisaged for HT applications.

6.1 After conditioning test parts or devices, place the apparatus involved on test setup top, making sure that test equipment meets the safety requirements envisaged for HT applications.

6.2 Test readings shall be taken across the following:

- Across terminals and galvanic insulated parts.
- Across terminals and conductive case with galvanic insulated parts.
- Across terminals and electrodes wrapped around the case (e.g. in metal foil) for non-conducting body.

6.3 Apply specified 500 Vrms (50 - 60 Hz) across above points and hold for 60 s minimum, subsequently entering significant parameters in test part or test device form.

6.4 This test only applies to components/systems featuring inductive devices, e.g. relays, motors, coils, etc. or which are connected to inductive load circuits.

7 TEST DESCRIPTION

7.1 Disruptive discharge test

Apply test transformer secondary HT to metal parts specified on drawing and/or procurement specification and prepared as per para.4, and increase in 500 ± 100 V/s increments through supply variator, up to full discharge.

7.2 HT test as per drawing and/or procurement specification

Apply specified voltage to the parts as per para. 7.1 starting from initial reading up to 50 % of target voltage and increase gradually taking care to avoid significant transients. When test voltage is attained, hold for 60 s.

Reduce this voltage evenly as quickly as possible down to zero.

8 TEST LEVEL

Regardless of whether the devices under test are supplied at 12 V or 24 V nominal, apply a virtually sinusoidal 500 Vrms at industrial frequency for 60 s.

For testing with DC test voltage shall be increased by 1.4 V (700 V).

9 EXPRESSION OF RESULTS AND ACCEPTABILITY CRITERIA

Repeat the tests on the number of parts or devices specified on the drawing and/or procurement specification and compare results with target parameters. Actual reading shall be equal to or higher than requirements, i.e. the discharge voltage shall be > 500 Vrms without dielectric breakdown and disruptive discharge (surface discharge, electric discharge, breakthrough).

However, manufacturer and supplier may decide to allow tests using DC voltage, in which case the voltage used shall be 1.4 higher than that for AC testing.

Enter the following parameters in test form:

- Applied voltage.
- Actual disruptive discharge reading
- Target HT reading specified on drawing and/or procurement specification
- Test method used
- Parts to which voltage was applied.
- Part conditions (whether new or previously used for other tests)

NOTE : The use of grounded capacitors to meet EMC requirements will result in increased test current, making it more difficult to test disruptive discharge. The problem may be overcome by using DC test voltage, or by monitoring AC resistive current only.

REFERENCES

IVECO STD.: 19-0201.