A Publication of ELTEK International Laboratories

Data Journal

Component Compatibility Testing

Some examples of ASTM standards:

ASTM D-5642
Referenced documents inside this standard
- ASTM D-149
- ASTM D-1676
- ASTM D-1711

ASTM D-3455
Referenced documents inside this standard
- ASTM D-877
- ASTM D-924
- ASTM D-971
- ASTM D-974
- ASTM D-1500
- ASTM D-2413
- ASTM D-3487

ASTM D-882
ASTM D-149
ASTM D-2305
ASTM D-732

Some examples of IEEE standards:

IEEE Std. 1043
IEC Std. 60343

Some examples of UL standards:

UL 1446
UL 749

What is Component Compatibility Testing for Components and Electrical Insulation Systems ?

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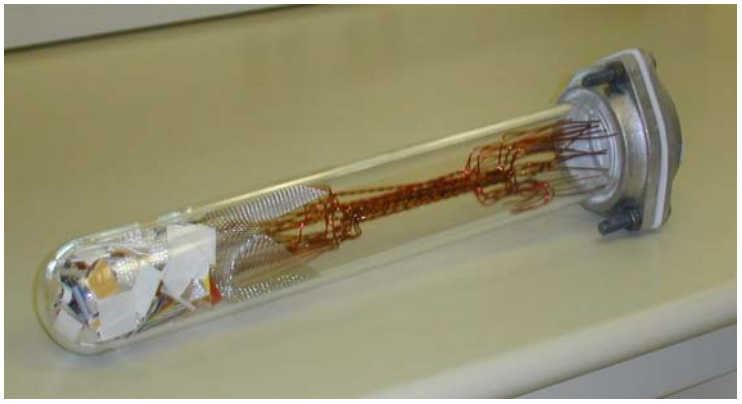
Component Compatibility Testing (CCT) provides a way for manufacturers to find and avoid materials that may be incompatible with other material in their desired system or end-use product. This can be accomplished in several different ways. Individual materials can be tested for compatibility with the environment they are to be used in; for example, with dishwashing detergents or laundry soaps. Complete systems and materials can be tested in sealed environments with lubricating/insulating oils and refrigerants to confirm they won't decompose or adversely affect the insulating oils.

Sealed tube tests can be performed to verify compatibility of materials to be used in end products with existing Electrical Insulation Systems (EIS). Fully wrapped form wound coils, like those used in large applications, can be tested in different solutions that represent the environment they are to be used in to verify the insulating materials and processing methods can withstand the conditions.

Some of the testing performed in the Component Compatibility Lab allows Electrical System manufacturers to make material changes to already existing systems without the need of full thermal aging.

Examples of Tests

ASTM D-5642 - Sealed Tube Compatibility Testing to UL 1446



Sealed Tube Test

Sealed tubes is the most frequently requested test performed in the Component Compatibility Lab. This test allows companies to determine if the materials they want to use in the assembly of an end product will adversely affect the Electrical Insulation System.

For example, a company that produces electric drills finds a polymer that would reduce construction costs, and wants to know if it can be used safely in their current design. This is accomplished by taking the insulating materials and insulated conductors, in the form of twisted pairs, used in the Electrical Insulation System they want to adopt, and sealing them in a glass tube (control tube). Those same materials and insulated conductors are also sealed in separate glass tubes with any additional items that are to be used in the end product construction (candidate tubes). The tubes are then aged for a predetermined amount of time. After aging is completed, a dielectric breakdown test is performed on the twisted insulated conductor pairs. The results of the insulated conductors in the candidate tubes are compared to those of the control tube to determine the compatibility of the materials inside.

Sealed Tube Testing is an efficient way to predict what could occur to a product after prolonged use and material degradation without putting any consumers at risk.

Examples of Tests

ASTM D-3455 - Oil and Refrigerant Compatibility Testing

The insulating oil used in transformers is an integral part of its operation, and therefore its performance is of the utmost importance. ELTEK Labs also tests the insulating oil and refrigerant in A/C compressors, where the oil and refrigerant are both critical to operation.

The oil and refrigerant compatibility tests are designed to identify any potential problems between the materials used in the construction of the transformer, or compressor, and the oil and/or refrigerant. This is done by placing a model, assembled with all the materials in the original design, in a sealed vessel with the oil and/or refrigerant. The vessel and its contents are then thermally aged. Upon the completion of aging, several tests are conducted on the oil and the model to determine if there are any undesired effects on the electrical insulation materials or, more importantly, to the insulating oil.

UL 749 - Soap and Detergent Compatibility

These tests were designed to determine any adverse effects long term exposure to dishwashing and laundry detergents may have on materials being considered for use in dishwashers and washing machines. The materials are exposed to concentrations of the desired detergents and then aged for a specific time period. Those materials are then tested for different properties, which can include tensile strength, dielectric strength and extractables.

IEEE 1043 - Environmental Compatibility

For these tests form wound insulated coils are submersed in different solutions and energized for extended periods of time. These tests are designed to determine if the insulation and processing methods used for the coils can withstand the harsh environments that the end products are to be subjected to, i.e. a submersed water pump. The tests can be conducted in water, salt water, or in solutions with either an acidic or basic PH depending on what is appropriate for each application.

IEC 60643 - Other Tests Performed

Other tests conducted in the Component Compatibility Lab include Corona Resistivity, and Voltage-Endurance of Form Wound Bars and Coils. Like the other tests, these are intended to provide a way for manufacturers to design a better and more reliable product by gaining as much information about the materials and their interactions before assembly begins, saving both time and money.

Definitions:

Compatibility Testing: To evaluate the interaction of different chemistries with each other. Interactions that are not compatible cause an increase in decomposition which will result in reduced performance and life.

EIS – from the IEC text
EIS is a product manufactured from one or more electrical insulation system (EIM). It is employed in a particular electrical apparatus together with electrically conductive parts at different voltages.

EIS – from UL 1446: Systems of Insulating Materials – General Insulation Systems –
An intimate combination of insulating materials used in electrical equipment. For example, the combination of a coil form, separators, magnet-wire coating, varnish, lead-wire insulations, and outer wrapping of a relay coil.

High Voltage Tester

Corona: A faint glow enveloping the high-field electrode in a corona discharge, often accompanied by streamers directed toward the low-field electrode.

ASTM D-3455: Compatibility Of Construction Materials With Electrical Insulating Oil Of Petroleum Origin

ASTM D-5642: Sealed Tube Chemical Compatibility Test

Summary of the Benefits of Component Compatibility Testing

These tests are designed to provide a way for manufacturers to design a better and more reliable product by gaining as much information about the materials and their interactions before assembly begins, saving both time and money.

This lab also allows Electrical System manufacturers to make material changes to already existing systems without the need of full thermal aging.

Sealed Tube testing is an efficient way to predict what could occur to a product after prolonged use and material degradation without putting any consumers at risk.

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