



## **EIU Course 101, Class 3: The Structure of Standards**

### Section 1 – General

1.1 The Structure of Standards refers to the flow or arrangement of the safety and performance requirements. All safety and performance requirements start with the end-product.

#### **The Flow of Standards**

1. Always states here → Safety and Performance of the End-product
2. Construction of and evaluation of the Prototype
3. Design
4. When the application requires, Compatibility of the EIS for the environment
5. For thermal classes requiring, selection of an established EIS
6. Pre-selection of materials, Compatibility of the EIM and minor materials
7. Long term retention of properties of materials
8. Material properties as received

Many of the end-product requirements can be satisfied by selection and usage of materials having documented performance as a material. Many of the end-product performance requirements such as thermal classification or long term compatibility can be satisfied when an established EIS is selected and the information used.

However, using either EIM or EIS with established performance or thermal rating does not always resolve all of the safety or performance requirements of the end-product. The process of evaluating the end-product is based on the application and the specific combination of the T.E.A.M. factors. Using documented EIM and EIS can satisfy and simplify many situations and applications by using Electrical Insulation Systems (EIS) and Electrical Insulation Materials (EIM) Standards.

1.2 One example of safety requirements being met by using information about the individual materials is for flame ratings (Safety). When the safety of the end-product application requires a flame rating of V-0 (refer to flame testing in a separate course), one solution is to test the end-product.

However, another approach is to select individual materials each of which have a V-0 rating. If all materials are flame resistant, the collective would be expected to retain that flame-resistant characteristic.

In addition to the individual materials being flame resistant, the end-product usually contains other non-combustible materials such as the metal core or stack. Selection of documented V-0 materials can remove the need for evaluation of the end-product without the need to conduct flame testing on the end-product itself.

With reference to flame ratings, the flow of information on satisfying requirements began with the end-product but was resolved by the material selection. The requirement for safety (flame ratings) did not originate with the materials but with the end-product.

The fact that individual materials can be tested and rated makes the selection of the materials easier. The testing and rating of the individual materials reduces, or in some cases eliminates, the need to test the end-product because the performance has been established.

1.3 Another aspect of end-product performance is the operating temperature of the end-product in the application. The operating temperature should be determined by the application. For example, the operating temperature of an electric motor is influenced by air flow through the windings, the amount of metal to act as a heat sink, as well as by other aspects of design and operating environment.

The operating temperature of a specific electric motor cannot be predetermined by the design of the motor itself without the application being included. For many motor applications the thermal classification evaluation can be resolved by use of an established EIS with the thermal classification equal to or higher than the operating temperature of the motor in application.

The Standards related to the evaluation of an electric motor are the starting point, but the thermal capabilities can be resolved by the selection of an established EIS which exceeds the thermal requirements. As presented in the T.E.A.M. course, thermal is only one aspect of the total stresses of the real world. Also as presented in the T.E.A.M. course, the total stresses can be separated and addressed in part and the results of the individual parts can be merged to address the total.

The flow of standards starts with the end-product and moves to the individual material for resolution of some, or in some cases all, of the performance and safety requirements.