

IECEE

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OPERATIONAL & RULING DOCUMENTS

Guide on Product Families, Family Ranges or Series of Products

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IECEE Secretariat, 3, rue de Varembé, Geneva, Switzerland, Telefax : +41 22 919 0300, e-mail : pro@iec.ch



IEC System for Conformity Testing and Certification of Electrotechnical Equipment and Components

Introduction

The IECEE CMC has identified the need to define a Family Range or a Series of Products as a means to improve the acceptance of CB Test Certificates among IECEE member NCBs. It was noted that inconsistencies in the range of products that may be covered by one CBTC and in the scope of evaluation of a product family often result in NCBs questioning CB Test Certificates and Test Reports.

The objective of this Guide is to assist NCBs and CBTLs in the decisions on the coverage of a CB Test Certificate and on the selection of appropriate samples from a product family for evaluation and testing. It provides a general definition of a product family and, in Annex A, some specific examples of product families and sample selection criteria in various IECEE product categories.

For the purpose of this Guide, the terms Product Family, Family Range or Product Series are considered synonymous.

Issues to be Noted

A number of issues have been identified in the CTL and CMC discussions on the subject of Family Ranges. They are provide here for guidance to the application of the Family Range concept.

First and foremost it must be noted that the concept of a product family may vary significantly among the different product categories in the IECEE, and even among different types of products within one category, such as MED or OFF.

Furthermore, product families may be defined differently among the same products in the fields of Electrical Safety as compared to EMC. Clearly, this is related to the different compliance criteria in these fields and the different product features that must be evaluated to verify compliance.

Secondly, the CTL has emphasized that the examples compiled by each of the CTL Expert Task Forces (ETFs) are provided primarily to illustrate the product family concept, and that they apply only to the specific product types in the examples.



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Another significant issue to note is the need to provide a proper balance between the consistency of approach desired the IECEE and the flexibility needed by manufacturers.

Definition of Product Family

Having considered the identified objectives and concerns, the CTL has developed the following definition of a Product Family.

*“A **product family** can be defined by the maximum configuration, a list of components/sub-assemblies plus a description of how the models are constructed from the maximum configuration and list.
All models which are included in the **family** typically have common design, construction, parts, or assemblies essential to ensure conformity with applicable requirements.
For the same products, there may be differences in defined **product families** that are contingent upon the nature or type of compliance criteria applied (e.g. safety, EMC, performance, efficacy, etc.).
If a product standard defined a **product family**, in the context of the specific standard, this definition takes over.”*

This definition is provided for use in the decisions on the range of products that may appear on one CB Test Certificate and in the accompanying CB Test Report.

The examples provided in Annex A apply only to the specified types of products. However, they can be of some help for similar product when deciding on the number and type of samples to be selected from a product family for evaluation and testing.



Annex A

Examples of Product Families and Sample Selection Criteria

Product Category: HOUS (CTL-ETF 1)

1. Heating Appliances

The test results stated on the CB Test Report should make reference to all of the models in addition to clarify differences among those models.

- a) Oil-filled radiators with different input and different number of elements (IEC 60335-2-30) as follows:

600 W with 5 elements / 1000W with 6 elements / 1500W with 7 elements / 2000W with 10 elements / 2500W with 12 elements / 3000W with 14 elements

Considering the specific input for each element (input/number of elements) the models giving the most unfavourable result should be the models of 1500W and 3000W in general.

In the first page of the Test Report, it should be declared that only the models of 1500W and 3000W was tested considering most severe condition.

- b) Flexible sheet heating elements for room heating with same heat dissipation/area (construction of heating elements) but with different input and size (IEC60335-2-96) as follows:

752 W / 1,126 W / 1,470 W / 2,010 W / 2,470 W / 2,836 W

Considering the construction that all models have the same heat dissipation/area (construction of heating elements), only the smallest size of unit or minimum size required by standard should be tested in general.

In the first page of the Test Report, it should be declared that only the models of 752 W Type were tested because the test covers all the models quoted.

2. Motor-Operated Appliances

The test results stated on the CB Test Report should make reference to all of the models in addition to clarify differences among those models.

- a) Refrigerators with same refrigerant circuit having the same motor compressor, same mass of the refrigerant, same input (and same defrosting input, if any) but with different internal volume (capacity) (IEC 60335-2-24) as follows:

150W 100 litres / 150W 120 litres / 150W 140 litres / 150W 160 litres

Considering that the motor compressor operates more frequently for model with 160 litres, this one should be considered for the tests in general.



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In the first page of the Test Report, it should be clarified that only the model with 160 litres was tested because it gives most unfavourable result.

- b) Fan with same type of motor (permanent split capacitor motor) and its housing but with different numbers of turn of coils and with different rated frequency (IEC60335-2-80) as follows:

6.0W / 7.0W (50Hz / 60 HZ), 9.5W / 10.5W (50Hz / 60 HZ), 12.5W / 15.0W (50Hz / 60 HZ) 16.5W / 19.0W (50Hz / 60 HZ)

Considering that the number of turn of coil was simply increased without changing its housing among models, "16.5W / 19.0W (50Hz / 60 HZ)" models should be tested in general.

In the first page of the Test Report, it should be clarified that only the models of "16.5W / 19.0W (50Hz / 60 HZ)" was tested because it gives most unfavourable result.

Note: It is necessary to be more careful to check the construction of winding in order to include in the same family".

Product Category: OFF, TRON (CTL-ETF 2)

IT Component Power Supplies

Series of ratings

1. Different output ratings, number of outputs, component ratings.
2. Same enclosure, same MAINS layout, Same style and insulation system of transformer.
It may be possible to select a few models to represent the series, and repeat partially the tests on the selected models.

PC's with different combinations of sub-assemblies (disk-drives, DVD-drives etc.)

1. Same power supplies
2. Same enclosure

Power Amplifiers

1. Same enclosure, same MAINS lay out.
2. Different output ratings (100W, 200W, 300W)
3. Power transformer: Different ratings, sizes same insulation system.
In this case (as a minimum, Input, Heating and some Fault Tests would be repeated for multiple models.

Video Recorders (VHS and/or DVD and /or hard disk)

Different features for different TV systems and different feature for recording and storing (e.g. Size of hard disk)

1. Same MAINS lay out.
2. Basically same sub-assemblies



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TV-Sets

Having different screen dimensions.

1. Same MAINS layout, same style and insulation system of transformer.
2. If equipped with CRT than same high voltage layout.
3. Different output ratings.

Product Categories: MEAS and MED (CTL-ETF 3)

Measurement Equipment

Same MAINS layout, same measuring circuit, same separation of measurement-inputs.

Can differ in for instance software, enclosure-size, number of inputs.

It may be possible to select a few models to represent the series, and repeat partially the tests on the selected models.

Patient monitors

Same MAINS layout, same applied parts and separations, same classifications

Can differ in Software, evaluation features with different interface.

It may be possible to select a few models to represent the series, and repeat partially the tests on the selected models.

ECG monitors

Same MAINS layout, same applied parts and separations, same classifications.

Can differ in Software, evaluation features with different interface, amount of channels.

It may be possible to select a few models to represent the series, and repeat partially the tests on the selected models.

Product Categories: INST, CONT, CAP, BATT, MISC (CTL-ETF 4)

ETF 4 feels that in these product categories it would be inappropriate to provide specific examples of product families since product families are either already included in the standards or are manufacturer-specific.

Product Categories: LITE, SAFE (CTL-ETF 5)

The examples of product families and appropriate sample selection criteria are given in the following documents:

- IEC 60598-1/2003 - Annex T (Normative)
- Luminaires components – CTL Provisional Decision Sheets N° 570/06 – 577/06 – 587/06.
- CTL-ETF5/OSM-LUM/L.I.P. Decision Sheets N. 008/03 – 009/03 – 009A/03.m, for luminaires.



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- CTL-ETF5/OSM-LUM/L.I.P. Decision Sheets N. 215/03 – 221/03 – 233/03, for luminaire components.

Product Category: CABL (CTL-ETF 6)

For the insulated cables, each particular type of cable specified in the different parts of International Standards IEC 60227 and IEC 60245 is considered a family range. These types, together with their code designations, are listed in Annex A of the standards IEC 60227-1 and IEC 60245-1. The approach for selection of test samples is illustrated in the following Table 1 and Table 2.



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Table 1 Sample to be selected when testing according to IEC60227

| Code designation concerned | Number of cores and nominal cross-sectional areas concerned | Colors | Type of cables and cords | Number and size of sample to be tested |
|----------------------------|---|--------|--|---|
| 60227 IEC 01 | All | All | Single-core non-sheathed cable with rigid conductor for general purpose | 1 sample of approximately minimum cross-section, 1 sample of approximately maximum cross-section |
| 60227 IEC 02 | All | All | Single-core non-sheathed cable with flexible conductor for general purpose | 1 sample of approximately minimum cross-section, 1 sample of approximately maximum cross-section |
| 60227 IEC 05 | All | All | Single-core non-sheathed cable with solid conductor for internal wiring for a conductor temperature of 70°C | 1 sample |
| 60227 IEC 06 | All | All | Single-core non-sheathed cable with flexible conductor for internal wiring for a conductor temperature of 70°C | 1 sample |
| 60227 IEC 07 | All | All | Single-core non-sheathed cable with solid conductor for internal wiring for a conductor temperature of 90°C | 1 sample |
| 60227 IEC 08 | All | All | Single-core non-sheathed cable with flexible conductor for internal wiring for a conductor temperature of 90°C | 1 sample |
| 60227 IEC 10 | All | All | Light polyvinyl chloride sheathed cable | 1 sample of approximately minimum cross-section and approximately maximum number of cores, 1 sample of approximately maximum cross-section and approximately minimum number of cores |
| 60227 IEC 41 | All | All | Flat tinsel cord | 1 sample |
| 60227 IEC 43 | All | All | Cord for indoor decorative lighting chains | 1 sample |
| 60227 IEC 52 | All | All | Light polyvinyl chloride sheathed cord | 1 sample round, 1 sample flat |
| 60227 IEC 53 | All | All | Ordinary polyvinyl chloride sheathed cord | For round: 1 sample of approximately minimum cross-section and approximately maximum number of cores, 1 sample of approximately maximum cross-section and approximately minimum number of cores For flat: 1 sample |



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Table 1 (continued)

| Code designation concerned | Number of cores and nominal cross-sectional areas concerned | Colors | Type of cables and cords | Number and size of sample to be tested |
|----------------------------|---|--------|---|---|
| 60227 IEC 56 | All | All | Heat-resistant light PVC-sheathed cord for a maximum conductor temperature of 90°C | 1 sample round, 1 sample flat |
| 60227 IEC 57 | All | All | Heat-resistant ordinary PVC-sheathed cord for a maximum conductor temperature of 90°C | For round: 1 sample of approximately minimum cross-section and approximately maximum number of cores, 1 sample of approximately maximum cross-section and approximately minimum number of cores For flat: 1 sample |
| 60227 IEC 71f | All | All | Flat polyvinyl chloride sheathed lift cable and cable for flexible connections | 1 sample of approximately minimum cross-section and approximately maximum number of cores, 1 sample of approximately maximum cross-section and approximately minimum number of cores |
| 60227 IEC 71c | All | All | Circular polyvinyl chloride sheathed lift cable and cable for flexible connections | 1 sample of approximately minimum cross-section and approximately maximum number of cores, 1 sample of approximately maximum cross-section and approximately minimum number of cores |
| 60227 IEC 74 | All | All | Oil resistance, polyvinyl chloride sheathed, screen flexible cable | 1 sample of approximately minimum cross-section and approximately maximum number of cores, 1 sample of approximately maximum cross-section and approximately minimum number of cores |
| 60227 IEC 75 | All | All | Oil resistance, polyvinyl chloride sheathed, unscreened flexible cable | 1 sample of approximately minimum cross-section and approximately maximum number of cores, 1 sample of approximately maximum cross-section and approximately minimum number of cores |



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Table 2 Sample to be selected when testing according to IEC 60245

| Code designation concerned | Number of cores and nominal cross-sectional areas concerned | Colors | Type of cables and cords | Number and size of sample to be tested |
|-------------------------------|---|--------|--|--|
| 60245 IEC 03 | All | All | Heat resistant silicon insulated cable for a conductor temperature of maximum 180°C | 1 sample of approximately minimum cross-section, 1 sample of approximately maximum cross-section |
| 60245 IEC 53 | All | All | Ordinary tough rubber sheathed cord | 1 sample of approximately minimum cross-section and approximately maximum number of cores, 1 sample of approximately maximum cross-section and approximately minimum number of cores |
| 60245 IEC 57 | All | All | Ordinary polychloroprene or other equivalent synthetic elastomer sheathed cord | 1 sample of approximately minimum cross-section and approximately maximum number of cores, 1 sample of approximately maximum cross-section and approximately minimum number of cores |
| 60245 IEC 66 | All | All | Heavy polychloroprene or other equivalent synthetic elastomer sheathed flexible cable | 1 sample of approximately minimum cross-section and approximately maximum number of cores, 1 sample of approximately maximum cross-section and approximately minimum number of cores |
| 60245 IEC 58 60245 IEC 58f | All | All | Polychloroprene or equivalent synthetic elastomer sheathed cable for decorative chains | 1 sample round, 1 sample flat |
| 60245 IEC 70 | All | All | Braided lift cable for normal use | 1 sample of approximately maximum number of cores |
| 60245 IEC 74 | All | All | tough rubber sheathed lift cable for normal use | 1 sample of approximately maximum number of cores |
| 60245 IEC 75 | All | All | Polychloroprene or other equivalent synthetic elastomer sheathed lift cable for normal use | 1 sample of approximately maximum number of cores |



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Table 2 (continued)

| Code designation concerned | Number of cores and nominal cross-sectional areas concerned | Colors | Type of cables and cords | Number and size of sample to be tested |
|----------------------------|---|--------|---|--|
| 60245 IEC 81 | All | All | Rubber sheathed arc welding electrode cable | 1 sample of approximately minimum cross-section, 1 sample of approximately maximum cross-section |
| 60245 IEC 82 | All | All | Polychloroprene or other equivalent synthetic elastomer sheathed arc welding electrode cable | 1 sample of approximately minimum cross-section, 1 sample of approximately maximum cross-section |
| 60245 IEC 04 | All | All | Heat resistant ethylene-vinyl acetate rubber or other equivalent synthetic elastomer insulated, single-core, non-sheathed 750V cable for a maximum conductor temperature of 110°C | 1 sample of approximately minimum cross-section, 1 sample of approximately maximum cross-section 1 sample with solid conductor 1 sample with strand conductor |
| 60245 IEC 05 | All | All | | 1 sample of approximately minimum cross-section, 1 sample of approximately maximum cross-section |
| 60245 IEC 06 | All | All | Heat resistant ethylene-vinyl acetate rubber or other equivalent synthetic elastomer insulated, single-core, non-sheathed 500V cable for a maximum conductor temperature of 110°C | 1 sample |
| 60245 IEC 07 | All | All | | 1 sample |
| 60245 IEC 86 | All | All | Rubber insulated and sheathed cords for applications requiring high flexibility | 1 sample of approximately minimum cross-section and approximately maximum number of cores |
| 60245 IEC 88 | All | All | Cross-linked PVC(XLPVC) insulated and sheathed cords for applications requiring high flexibility | 1 sample of approximately minimum cross-section and approximately maximum number of cores |
| 60245 IEC 89 | All | All | EPR insulated and braided cord for applications requiring high flexibility | 1 sample of approximately minimum cross-section and approximately maximum number of cores |