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INTERNATIONAL ELECTROTECHNICAL COMMISSION

TECHNICAL COMMITTEE NO. 92:
Safety of audio, video and similar electronic equipment

Interpretations of IEC 60065, 6th edition.

With reference to document 92/80/INF, the following common opinions on interpretation questions are made available.

Interpretations on the following subclauses are included;

- subclause 1.1.3
- subclause 2.8.11
- subclause 8.8
- subclause 10.3
- subclause 14.2.5
- subclause 14.5.1.1
- subclause 14.6.2
- subclause 14.6.6
- subclause 14.10.2

Subclause 1.1.3: Requirements for altitude - clearances

Question:

Have the factors given in IEC 60664-1, table A.2 to be applied for the determination of clearances at altitudes above 2000 m?

With respect to the altitude the following requirements are given:

IEC 60065, 5th edition: standard applies to 2000 m only.

IEC 60065, 6th edition: standard applies to 2000 m only, for higher altitudes special measures might be necessary.

IEC 60065, 7th edition: standard applies to 2000 m only, for higher altitudes reference is made to IEC 60664-1, table A.2.

Examples of distances (clearance) for reinforced insulation:

As an example an altitude of 3500 m is taken. From Table A.2 of IEC 60664-1 a factor of 1,21 is found.

230 V mains:

5th edition: 6 mm

6th edition: 6 mm x factor?

7th edition: 4 mm x 1,21 = 4,84 mm

SMPS with V_{peak} 600 V:

5th edition: 6 mm

6th edition: 6 mm x factor 1,21? = 7,26 mm

7th edition: 5 mm x 1,21 = 6,05 mm

Interpretation of the WG:

For determining the additional clearance in case of altitudes above 2000 m, the values based on the 7th edition are applicable.

Rationale:

The 6th edition only indicates that special measures might be necessary. Since the clearance values in the 6th edition are not based on IEC 60664-1 also the factors according to table A.2 of IEC 60664-1 do not apply in this case.

Actions:

No action regarding the text in IEC 60065 is needed.

Subclause 2.8.11: Potential ignition sources**Questions:**

The interruption of a connection may cause interruption or short circuit of, for example, a semiconductor device and as a consequence the protective devices operate or the power supply shut down. In this case the open circuit voltage drops immediately to 0 V.

- 1) What is the time frame for checking the steady-state open circuit voltage?
- 2) Which voltage has to be taking into account in the evaluation of the potential ignition source?

Interpretations of the WG:

- 1) WG1 decided that the measurement shall be done any time after 1 s after opening the circuit.
- 2) WG1 decided that the maximum voltage shall be measured not earlier than 1 s after the interruption is made.

Rationale:

A minimum time is needed to obtain steady state.

Actions:

No action regarding the text in IEC 60065 is needed.

Subclause 8.8: Use of non-separable thin sheet insulation:

Question:

Current technology is utilising non-separable thin sheet insulation within transformers for the provision of supplementary and /or reinforced insulation.

How should such non-separable insulation be assessed for suitability in these applications?

Interpretation of the WG:

The current published requirements in the standard do not adequately address the use on non-separable thin sheet insulation.

The following amendment to the standard will be published to address this issue:

add to clause 8.8

For requirements for non-separable thin sheet insulation in two or more layers, see 8.xx

add new clause 8.xx

8.xx Requirements for non-separable thin sheet insulation in two or more layers

Three separate test specimens of the sheet, of 70 mm, width shall be supplied by the manufacturer.

The test is carried out by fixing a specimen on a mandrel made of steel, nickel plated, or brass with smooth surface finish as shown in figure x.

A metal foil (aluminium or copper) $0,035 \text{ mm} \pm 0,005 \text{ mm}$ thick shall be placed close to the surface of the specimen and submitted to a pull of 1 N. The metal foil shall be so positioned that its edges are 20 mm away from the edge of the specimen and, when the mandrel is in its final position, it covers the edges upon which the specimen is lying by at least 10 mm. The specimen is submitted to a pull of 150 N at its free end by an appropriate clamping device.

The specimen shall be slowly rotated forwards and backwards three times by 230° without jerks. If the specimen breaks at the clamping device during the rotation, the test is repeated. If one or more specimens break at any other place, the test is not fulfilled. While the mandrel is in its final position, within the minute following the final positioning, a test voltage of 1,5 times the value specified in table 5 is applied, as described in 10.3.2, between the mandrel and the metal foil.

No flashover or breakdown shall occur during the test; corona effects and similar phenomena being disregarded.

add new Figure x (Figure 6 of IEC 61558-1)

Rationale:

The test on thin foil according to the transformer standard IEC 61558-1 is considered to cover this kind of thin sheet sufficiently.

Actions:

The above amendment is proposed to be introduced in amendment 1 to IEC 60065, 7th edition.

Subclause 10.3: Resistors bridging insulation.**Question:**

Subclause 10.3 requires an insulation resistance of 2 MOhm between parts of different polarity directly connected to the mains.

Is a discharge resistor with a value of less than 2 MOhm (for example 100 kOhm) across the mains acceptable?

Is disconnection of the resistor during the measurement of insulation resistance and dielectric strength test allowed in case the resistor complies with subclause 14.1?

Interpretation of the WG:

There is no requirement for the minimum value of such discharge resistor which, if in compliance with subclause 14.1, can be disconnected during the tests of subclause 10.3.

Rationale:

The standard does not prescribe minimum impedance of the parts connected to the mains.

In the case of a linear transformer connected to the mains, an impedance of 10 Ohm is possible.

The reason for the 2 MOhm requirement is related to insulation, such as printed boards, which could cause arcing and fire in case of becoming low resistance.

Actions:

No action regarding the text in IEC 60065 is needed.

Subclause 14.2.5: Applicability**Question:**

Does subclause 14.2.5 apply in addition to the subclauses 14.2.1, 14.2.2 and 14.2.3?

Interpretation of the WG:

Subclause 14.2.5 applies to those capacitors not covered by 14.2.1, 14.2.2 and 14.2.3.

Rationale:

The above mentioned subclauses already include requirements for passive flammability by the reference to IEC 60348-14.

Actions:

No action regarding the text in IEC 60065 is needed (will be covered by IEC 60065, 7th edition).

Subclause 14.2.5:**Question:**

After the short circuit of the capacitor the protective devices operate or the power supply shut down and current through the simulated short circuit decrease immediately to 0 A.

What is the time frame for checking the steady state short circuit current?

Interpretation of the WG:

WG1 decided that the measurement shall be done any time after 1 s after short circuiting the circuit.

Rationale:

A minimum time is needed to obtain steady state.

Actions:

No action regarding the text in IEC 60065 is needed.

Subclause 14.5.1.1, 2nd dash:**Question:**

Subclause 14.5.1.2, 2nd dash states that the characteristics of the thermal link with regard to the circuit conditions (reference to IEC 60691, 6.2) shall be appropriate for the application in the apparatus.

Do we accept such thermal links in the transformer that are evaluated only resistively in IEC 60691?

Interpretation of the WG:

The assumption may not be correct, see also the 3rd paragraph. A resistive impedance of the secondary is transformed to the primary, especially under fault conditions. The resistive aspect is much more significant than the inductive aspect. Therefore, the text is taken to be correct. Inductive types of thermal links are more used for heavy motors.

Action:

No action regarding the text in IEC 60065 is needed.

Subclause 14.6.2: Application of switches**Question:**

Can we consider the below-described function as "capable of being switched-off automatically and without human intervention at the time of switching"?

Description:

The product's power consumption is more than 15W and no manually operated mechanical switch is applied.

The player consists of a CDR loader, CD changer and a hard-disc drive.

On this hard disc drive music can be stored in the MP-3 format.

Function: After down-loading a CD disc on the hard disc, the user may switch the player into the off/stand-by mode but the player will (or has to) complete first several MP-3 conversion activities on the hard-disc which take several minutes (might be up to 1/2 h). When the MP-3 conversion on the hard disc has been completed the player will automatically switch-off to the low power consumption/stand-by mode.

Because of this we cannot have a manually operated mechanical switch which is switching off the power, so we would like to make use of the exceptions as given in clause 14.6.2 of the IEC60065, 6th edition.

Interpretation of the WG:

No switch is required in this case.

Rationale:

In this case the switching-off is controlled by a data link. Data links can exist between apparatus as well as within one apparatus.

Actions:

No action regarding the text in IEC 60065 is needed.

Subclause 14.6.6 a):**Question:**

Subclause 14.6.6 a) gives the requirements for the switch as a separate component. Do we have to take into account the ambient rating for the switch when it is used in the equipment?

Interpretation of the WG:

The ambient temperature of the area of the switch has to be taken into account.

Action:

No action regarding the text in IEC 60065 is needed.

Subclause 14.10.2:**Question:**

Clause 14.10.2 states in part that an apparatus with a charging circuit that is provided with rechargeable batteries shall be provided with a special battery pack with special means provided to prevent the recharging of non-rechargeable cells.

- a) It is assumed that a "special" adaptor for standard sized (C, D, AA, etc) non-rechargeable batteries does not meet the intent of this requirement. Is this assumption correct?
- b) Is a special detection circuit accepted in lieu of a mechanical means as identified in the example in the requirement?

Interpretation of the WG:

The answer in both cases is yes.

Action:

No action regarding the text of IEC 60065 is needed.
