10 Design verification

10.1 General

Design verification is intended to verify compliance of the design of an ASSEMBLY or ASSEMBLY system with the requirements of this series of standards.

Where tests on the ASSEMBLY have been conducted in accordance with the IEC 60439 series, and the test results fulfill the requirements of the relevant part of IEC 61439, the verification of these requirements need not be repeated.

Repetition of verifications in the product standards of switching devices or components incorporated in the ASSEMBLY, which have been selected in accordance with 8.5.3 and installed in accordance with the instructions of their manufacturer is not required. Tests on individual devices to their respective product standards are not an alternative to the design verifications in this standard for the ASSEMBLY.

If modifications are made to a verified ASSEMBLY, Clause 10 shall be used to check if these modifications affect the performance of the ASSEMBLY. New verifications shall be carried out if an adverse effect is likely.

The various methods include:

– verification testing;
– verification comparison with a tested reference design;
– verification assessment, i.e. confirmation of the correct application of calculations and design rules, including use of appropriate safety margins.

See Annex D.

When there is more than one method for the same verification, they are considered equivalent and the selection of the appropriate method is the responsibility of the original manufacturer.

The tests shall be performed on a representative sample of an ASSEMBLY in a clean and new condition.

The performance of the ASSEMBLY may be affected by the verification tests (e.g. short-circuit test). These tests should not be performed on an ASSEMBLY that is intended to be placed in service.

An ASSEMBLY which is verified in accordance with this standard by an original manufacturer (see 3.10.1) and manufactured or assembled by another does not require the original design verifications to be repeated if all the requirements and instructions specified and provided by the original manufacturer are met in full. Where the ASSEMBLY manufacturer incorporates their own arrangements not included in the original manufacturer's verification, the ASSEMBLY manufacturer is deemed to be the original manufacturer in respect of these arrangements.

Design verification shall comprise the following:

a) Construction:
   - 10.2 Strength of materials and parts;
   - 10.3 Degree of protection of enclosures;
   - 10.4 Clearances and creepage distances;
   - 10.5 Protection against electric shock and integrity of protective circuits;
   - 10.6 Incorporation of switching devices and components;
   - 10.7 Internal electrical circuits and connections;

10.8 Terminals for external conductors.

b) Performance:

10.9 Dielectric properties;

10.10 Verification of temperature rise;

10.11 Short-circuit withstand strength;

10.12 Electromagnetic compatibility;

10.13 Mechanical operation.

The reference designs, the number of ASSEMBLIES or parts thereof used for verification, the selection of the verification method when applicable, and the order in which the verification is carried out shall be at the discretion of the original manufacturer.

The data used, calculations made and comparison undertaken for the verification of ASSEMBLIES shall be recorded in verification reports.

10.2 Strength of materials and parts

10.2.1 General

The mechanical, electrical and thermal capability of constructional materials and parts of the ASSEMBLY shall be deemed to be proven by verification of construction and performance characteristics.

Where an empty enclosure in accordance with IEC 62208 is used, and it has not been modified so as to degrade the performance of the enclosure, no repetition of the enclosure testing to 10.2 is required.

10.2.2 Resistance to corrosion

10.2.2.1 Test procedure

The resistance to corrosion of representative samples of ferrous metallic enclosures including internal and external ferrous metallic constructional parts of the ASSEMBLY shall be verified.

The test shall be carried out on:

- an enclosure or representative sample enclosure with representative internal parts in place and door(s) closed as in normal use, or
- representative enclosure parts and internal parts separately.

In all cases hinges, locks and fastenings shall also be tested unless they have previously been subjected to an equivalent test and their resistance to corrosion has not been compromised by their application.

Where the enclosure is subjected to the test it shall be mounted as for normal use according to the original manufacturer's instructions.

The test specimens shall be new and in a clean condition and shall be subjected to severity test A or B, as detailed in 10.2.2.2 and 10.2.2.3.

NOTE The salt mist test provides an atmosphere that accelerates corrosion and does not imply that the ASSEMBLY is suitable for salt laden atmosphere.

10.2.2.2 Severity test A

This test is applicable to:

– metallic indoor enclosures;