



IEC 61215:1993 Ed. 1.0 and IEC 61215:2005 Ed. 2.0  
Crystalline silicon terrestrial photovoltaic (PV) modules - Design qualification and type approval.  
IEC 61646:1996 Ed. 1.0 Thin-film terrestrial photovoltaic (PV) modules - Design qualification and type approval

## Retesting Guideline

### **Product or Process Modifications Requiring Limited CBTL Retesting to Maintain Certification**

This document sets forth a uniform approach to maintain the certification of products that have, or will, undergo modification from the articles originally certified. It should not be used as a guideline to certify new product submittals.

Changes in material selection, components and manufacturing process can impact electrical performance and reliability of the modified product. The recommended test sequences given below have been selected to identify adverse changes to the modified product.

Those products meeting the requirements of the relevant standard after retesting are considered to be compliant and will be issued an amended CB Conformity Assessment Certificate and an Amended Technical Report Form.

The number of samples to be included in the retesting program and the pass/fail criteria is to be taken from the standard originally used to certify the product (either IEC 61215 or IEC 61646).

The document is organized by major modification headings and specific supporting examples. Following this is the recommended retesting sequence with parenthetical reference to the specific clauses of the relevant IEC standard.

For the modifications listed below, the Qualification Approval tests in IEC 61215 and IEC 61646, shall be used as a guideline by the National Certification Body (NCB) and Certification Body Testing Laboratory (CBTL):

For the modifications listed below, the Qualification Approval tests in IEC 61215 and IEC 61646, shall be used as a guideline by the assessor:

#### **a) Change in cell technology**

For modifications such as:

- metallization materials and/or process,
- anti-reflective coating material,
- type of diffusion process
- semiconductor layer materials,
- order of cell process if the change involves the metallization system,
- change of manufacturing site of the solar cells not under the same QA system,
- use of cells from a different manufacturer and
- major reduction in cell thickness (greater than 25%).



Repeat:

- Thermal cycling, 200 cycles (10.11),
- Damp heat (10.13),
- Outdoor exposure (10.8), and
- Hot spot endurance (10.9).

**b) Modification to encapsulation system**

For modifications such as:

- different materials,
- different additives and
- Different encapsulation process e.g. curing rate

Repeat:

- UV (10.10) / thermal cycling, 50 cycles (10.11) / humidity freeze sequence (10.12),
- Damp heat (10.13),
- Wet leakage current (10.15 Ed. 2.0 only),
- Outdoor exposure (10.8),
- Hail impact (10.17) if not tempered glass, and
- Hot spot (10.9) if material composition changes.

**c) Modification to superstrate**

For modifications such as:

- different material,
- different thickness, reduced by more than 10%
- if glass, retest if there is a reduction in the heat strengthening process (for example retest if change is from tempered glass to heat strengthened or annealed), and
- different surface treatments, adhesives or primers if they are in direct contact with encapsulate material.
- If the change is from glass to non-glass or vice-versa, it should be considered a new product altogether.

Repeat:

- UV (10.10) / thermal cycling, 50 cycles (10.11) / humidity freeze (10.12) sequence,
- Mechanical load test (10.16),
- Hail test (10.17),
- Damp heat (10.13) (if non-glass)
- Wet leakage current test (10.15 Ed. 2.0 only for non-glass constructions)
- Hot spot (10.9) for non-glass if material changes or thickness is reduced and
- Outdoor exposure (10.8) if change in material.



**d) Increase in module size**

- For increase by more than 20% of length or width.

Repeat:

- Thermal cycling, 200 cycles (10.11),
- Mechanical load (10.16), and
- Hail impact (10.17) (for size increases of more than 50%).

**e) Modification to backsheet/substrate**

For modifications such as:

- Different material
- Different thickness, and
- Different additives, surface treatments, adhesives and primers.

Repeat:

- UV (10.10) / thermal cycling, 50 cycles (10.11) / humidity freeze (10.12) sequence,
- Robustness of terminations (10.14),
- Damp heat (10.13) (if non-glass),
- Wet leakage current test (10.15 Ed. 2.0 only),
- Hail impact (10.17) if rigidity depends on the backsheet,
- Mechanical load (10.16) if mounting depends on the backsheet/substrate.

If there is a change from superstrate to substrate design or from substrate to superstrate design, the entire qualification test sequence in IEC 61215 shall be conducted.

**f) Modification to frame and/or mounting structure**

For modifications such as:

- cross section of frame
- different framing material
- different mounting technique

Repeat:

- Mechanical load test (10.16),
- Outdoor exposure (10.18) if plastic material is used,
- UV (10.10) / thermal cycling (10.11), 50 cycles / humidity freeze (10.12) sequence, if plastic material is used,
- Damp heat (10.13) if an adhesive system is used to mount the module,
- Thermal cycling (10.11), 200 cycles, if an adhesive system is used to mount the module, and
- Wet leakage current (10.15 Ed. 2.0 only if the area or location of contact to the laminate changes).



**g) Modification to junction box/electrical termination**

For modifications such as:

- different material,
- different design,
- different potting material, and
- different method of attachment.

Repeat:

- Robustness of terminations (10.14),
- TC 50 (10.11), 10 HF (10.12),
- Damp heat (10.13),
- Wet leakage current test (10.15 Ed. 2.0 only), and
- By-pass diode thermal test (10.18 Ed. 2.0 only, if bypass diode is in the box).

**h) Change in cell interconnect materials or technique**

For modifications such as:

- Different interconnect material,
- different thickness of interconnect material
- different bonding technique
- different number of interconnects
- different number of solder bonds
- different solder material or flux.

Repeat:

- Temperature cycling, 200 cycles (10.11),
- Damp heat (10.13) for changes in materials, and
- Hot spot for changes in bonding technique or solder material (10.9).

**i) Change in electrical circuit of an identical package**

For modifications such as:

- Modifications to the interconnection circuitry (for example more cells per bypass diode or re-routing of output leads) and
- Reconfiguration of voltage (ie. 12 to 24)



Repeat:

- Hot spot (10.9),
  - By-pass diode thermal test if the current in each diode increases (10.18 Ed. 2.0 only), and
  - Temperature cycling, 200 cycles (10.11) if there are internal conductors behind the cells.
- j) Higher or lower power output (by 10%) in the identical package including size and using the identical cell process**

Repeat:

- Hot spot (10.9), and
  - Bypass diode thermal test (10.18 Ed. 2.0 only) if greater than 10% higher.
- k) Qualification of a frameless module after the design has received certification as a framed module**

Repeat the following tests with the laminate mounted using the manufacturers mounting instructions.

- Damp heat (10.13) (If frame is part of the package seal),
- Mechanical load (10.16),
- Hail impact (unless superstrate is tempered glass) (10.17), and
- Wet leakage current (10.15 Ed. 2.0 only).

### **Modifications that do not require re-testing**

Provided that all structural components, materials used and processes (including cell process) remain the same, the following modifications shall not require re-testing:

- fewer cells in module;
- smaller cells in module, as long as each cell has the same number or area of interconnects and equivalent numbers of solder bonds per unit area.