Annex J - Specific requirements for PVT collector Certification

1. Introduction and definition

PVT collectors (named hybrid collectors in ISO 9806) generate heat and electric power at the same time. They are clearly identified in the scope of the test standard EN ISO 9806. The thermal performance and durability of a PVT collector is tested by the ISO 9806 standard and the electrical performance and safety is tested by the corresponding IEC (or EN) standards.

However the product standard EN 12975-1:2006 + A1 does not identify hybrid collectors in its scope, the next revision of this standard is expected to do so. Therefore, until there is an approved standard that deals specifically with PVT collectors, it is necessary to clarify the specific issues for certifying PVT collectors with an Annex to the Scheme Rules.

2. Classification and Certification of PVT collector

Each PVT collector is considered a collector within the category it falls in as a thermal collector. i.g.: air heating PVT collector or liquid heating PVT collector

Some Certification bodies may certify PVT collectors in compliance with EN 12975-1 (please see explanation in scope of Scheme Rules where all indication to the test standard EN 12975-2 must be understood as an indication to the test standard EN ISO 9806) and some certification bodies may certify PVT collectors in compliance with the Solar Keymark Scheme Rules. In both cases, the indication in this Annex shall be followed.

3. Family of PVT Collector

All PVT collectors of one PVT collector family shall be covered by one IEC PV(T) certificate. The different electrical nominal power ranges within a PVT collector family has to lay in a total range of ± 10%. According to different sizes within a PVT family, the same rules as described in SK-Scheme Rules clause 4.2.1 will apply. Even, if the IEC certificate is covering different back sheet colours, the Solar Keymark certificate is only valid for the tested colour.

Background:

PV laminates for PVT applications within one product family usually differs only in electrical output. If the nominal electrical output differs not more than 10%, there's no need for several tests for a Solar Keymark certification. The resulting influence either on the thermal performance or the durability is negligible. If the nominal electrical output differs more than 10%, the thermal performance has to be tested with the PVT with the highest and lowest nominal electrical output.

Note: The PVT with the highest nominal electrical output will correspond with the lowest thermal power.

As the colour of the used back sheet (as part of the "thermal absorber") may influence the solar thermal efficiency and durability, the Solar Keymark certificate is only valid for the back sheet colour, used within EN 9806 testing.

4. Application of Specific Rules for PVT collectors

The Solar Keymark Scheme Rules shall be followed together with this Annex for certifying PVT collectors. Compliance with the product standard EN 12975-1:2006 + A1 is required, taking into account the following considerations or additions:

Clause	EN 12975-1:2006 + A1	Considerations or additions
1	Scope	Hybrid collectors are accepted in the scope. Electrical safety or other specific properties related to electric power generation are not covered
2	Normative References	EN 12975-2 is substituted by EN ISO 9806:2013
3	Terms and definitions	Hybrid collectors are those that generate heat and electrical power
4	Symbols and units	EN 12975-2 is substituted by EN ISO 9806:2013
5	Durability and reliability	Required tests by EN 12975-2 are substituted by those of EN ISO 9806
6	Safety	The stagnation temperature shall be determined using EN ISO 9806 instead of EN 12975-2, taking into consideration clause 4 of this Annex Safety requirements regarding the electrical performance shall be dealt with in clause 6 of this Annex
7	Collector Identification	In 7.1, instead of the solar collector description of D.2 of EN 12975-2 it must be annex A of EN ISO 9806. The engineering drawings and list of components must also cover the electrical components of the hybrid collector

The following requirements must also be met:

- The inspector must have a specific training and qualification regarding the electrical performance (approval by certification body) in order to assure that the Factory Production controls or changes in the product do not affect the compliance with the thermal performance and electrical safety.
- Any changes in the electrical components must be communicated to the Certification Body, just like any changes in the rest of the collector

5. Requirements for thermal performance

When performing the tests according to ISO EN 9806, the following requirements shall be fulfilled:

- All “official” measurements for thermal performance shall take place with the electrical production under MPP conditions; in addition to that, voluntary measurements with open or short connected electrical circuit are possible.
- The PV modules normally have a range of power output. As the influence on the thermal performance is only marginal, the panel to be tested can be selected out of the range given in clause 3 (+-10%).
- PVT Air collectors without additional glazing shall be tested as “unglazed/ uncovered” (Wind speed dependency and net-irradiation has to be taken into account).

6. Requirements for electrical safety and performance

6.1 General requirements

The Solar Keymark Certification of hybrid collectors is in compliance with the product standard EN 12975-1 (taking into consideration the actual circumstance) and the ISO 9806 test standard. The compliance of the IEC or corresponding EN standards is not the responsibility of the Keymark Certification Bodies, however the electrical performance and security may affect the conformity of the product. Therefore, some additional requirements of this clause must be satisfied.

The PV module may have already been tested and certified, but as it is integrated in a hybrid collector, many of its characteristics need to be rechecked.

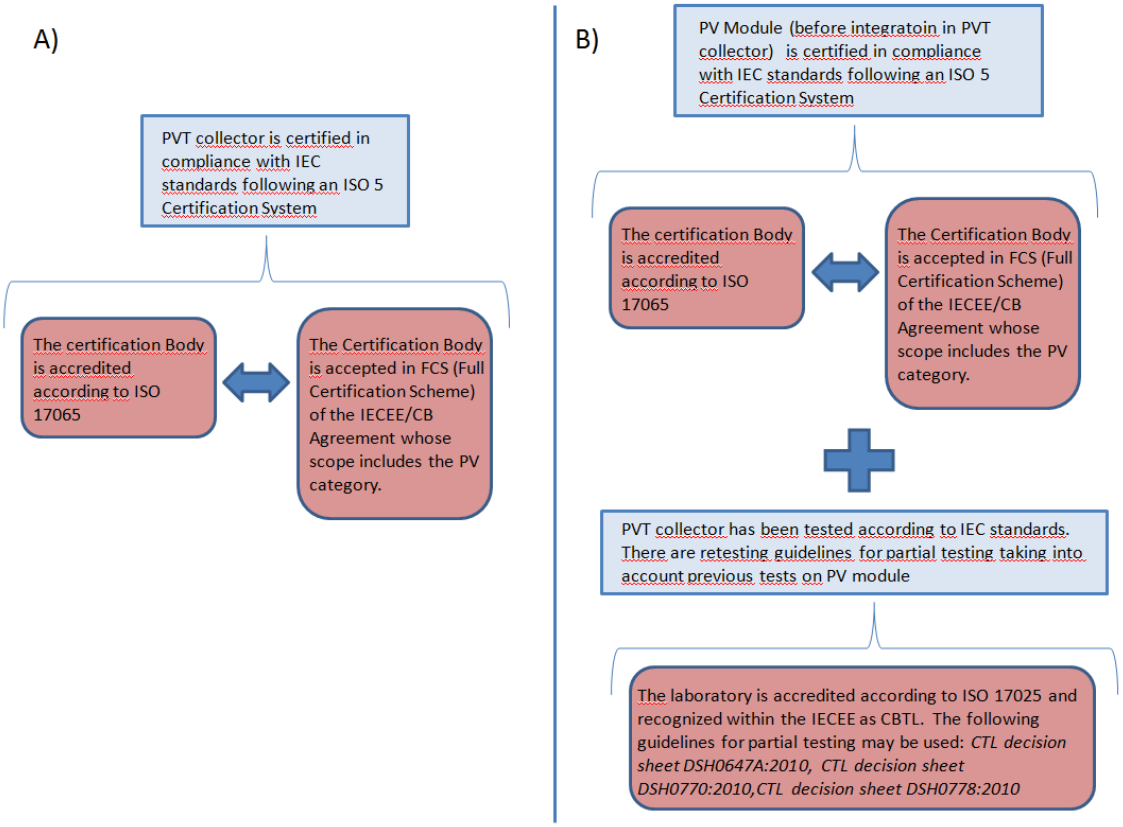
The following requirements may be met independently:

a) The hybrid collector is certified in compliance with the corresponding IEC standards. This certification scheme must be an ISO 5 System (as defined in ISO 17067) and the certification body must comply with one of the following requirements:
   i. Be accredited according to ISO 17065
   ii. Be accepted in FCS (Full Certification Scheme) of the IECEE/CB Agreement whose scope includes the PV category.

b) The PV module (before integration into the hybrid collector) is certified in compliance with the corresponding IEC standards, with the requirements stated in clause a) and the tests according to the corresponding IEC standards and retesting guidelines have been performed on the hybrid collector by a laboratory accredited according to ISO 17025 and recognized within the IECEE as CBTL. (in this case there might be some conditions accepted by IEC for partial testing, hence reducing double testing, if a verification procedure confirms that the assembly of the PVT did not adversely affect PV components and the PV module safety and durability through evaluation based on the IEC 61215, 61646, 62108 and 61730 retest guidelines
   - *CTL decision sheet DSH0647A:2010 "*Retest Guidelines for IEC 61215 and IEC°61646"
   - *CTL decision sheet DSH0770:2010 "*Retest Guidelines for IEC 61730-1/-2"
   - *CTL decision sheet DSH0778:2010 "Retesting guideline for changes in CPV cell package technology"*

For hybrid collectors sold within the EU, the European Low Voltage Directive 2006/95/EG must be complied with.

Note regarding a) ii : The scope of certification bodies may be checked at
a) http://members.iecee.org/iecee/ieceemembers.nsf/ScopeOverview?ReadForm
b) Within the scope it must be checked that the certification body works under the FCS (full certification scheme) for each relevant standard. FCS is an extension to the IECEE CB agreement that has follow up activities based on an ISO 5 System. (more information on http://www.iecee.org/cb_fcs/default.htm and on http://www.iecee.org/Operational_documents/iecee_documents/od-3000.pdf)



Indicative diagram of requirements for certification on PVT collectors

6.2 Requirements when testing according to IEC standards

The IEC or EN standards that may be complied with are listed enclosed. The latest revision of each standard is to be used:

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Product	Standards
Crystalline silicon terrestrial photovoltaic (PV) modules	EN 61215 "Crystalline silicon terrestrial photovoltaic (PV) modules - Design qualification and type approval (IEC 61215)" EN 61730-1 "Photovoltaic (PV) module safety qualification - Part 1: Requirements for construction" (IEC 61730)" EN 61730-2 "Photovoltaic (PV) module safety qualification - Requirements for testing" (IEC 61730)
Thin-film terrestrial photovoltaic (PV) modules	EN 61646 "Thin-film terrestrial photovoltaic (PV) modules - Design qualification and type approval" (IEC 61646) EN 61730-1 "Photovoltaic (PV) module safety qualification - Part 1: Requirements for

	construction" (IEC 61730)" EN 61730-2 "Photovoltaic (PV) module safety qualification - Requirements for testing" (IEC 61730)"
Concentrator photovoltaic (CPV) modules and assemblies	EN 62108 "Concentrator photovoltaic (CPV) modules and assemblies – Design qualification and type approval (IEC 62108)" IEC 62688 "Concentrator photovoltaic (CPV) module and assembly safety qualification" (after official publication as standard) EN 61730-1 "Photovoltaic (PV) module safety qualification - Part 1: Requirements for construction" (IEC 61730)" EN 61730-2 "Photovoltaic (PV) module safety qualification - Requirements for testing" (IEC 61730)"

6.3 Requirements on the Keymark Certificate or on the data sheet

The data sheet shall include the following information:

- IEC standards that are applicable
- Test report according to IEC standards on hybrid
- ISO 5 System certificate on the PV module or on the hybrid collector
- PV module information (manufacturer(brand), model, size and range of power)
- If the same module will be sold with different back sheet colours, the tested colour has to be given in the test report, the certificate and the data sheet
- If it is not possible to define the collector with the lowest performance within a family, all measured results has to be mentioned in the data sheet.
  (E.g. air heating collectors open to ambient)

7.0 Substitution of PV Laminates

In case there's a need to substitute the used (and tested) PV laminate within an existing family, the following requirements applied:

As the electrical safety is not only related to the used components, but also to the production (e.g. lamination process) and it's settings, it is <u>not</u> possible to substitute the PV laminate by a different certified type even when produced with the same materials and components <u>without any retests</u>. There's always the obligation for the required tests described in chapter 6.