

Solar Keymark Network

Experience exchange circle of test labs and certifiers
working according to the Solar Keymark scheme rules



Equivalent absorber coatings

Date 19/3 2018

Different coatings are considered as equivalent provided that

1. They are applied on the same substrate (e.g. copper, aluminium)
and
2. The specific test procedure described below has been passed successfully
and
3. The equality is accepted by the Solar Keymark Network

Procedure

If a coating is to be considered equivalent to other coatings then the following tests shall be passed and requirements shall be fulfilled:

1. Two identical collectors (apart from the absorber coating) are compared to verify the equality of the two coatings. The absorbers of the two collectors must be made of the same material and must have the same thickness. One of the collectors is coated with one of the reference coatings fulfilling the following requirements: $\alpha \geq$ mean value of α values in the group - 1 % point; $\epsilon \leq$ mean value of ϵ values in the group + 1 % point. The mean value shall be given and updated each time a new member is included. The other collector is coated with the new coating.
2. The durability and reliability tests according to EN 12975-2 (being relevant with regard to the absorber, thus 5.3 High Temperature Resistance, 5.4 Exposure and 5.6 Internal Shock) for the collector with the new coating performed by an EN12975 accredited test lab are successfully passed.
3. The power curves (for $G = 1000 \text{ W/m}^2$) determined by an accredited test lab for the two collectors with different coatings shall not differ by more than 2% of the peak power at a temperature difference of 0 K and not more than 2% of the peak power at a temperature difference of 50 K. Peak power is the module power at temperature difference at 0 K. The principle is illustrated in figure 1.
4. The absorptance and emittance of the different coatings under question shall have - according to the specifications of the manufacturer - equivalent optical properties ($\alpha_1 = \alpha_2 \pm 1\%$ point at most, $\epsilon_1 = \epsilon_2 \pm 1\%$ point at most) and the same range of the production variability, e.g. $0.95 \pm 2\%$ points.
5. For selective absorber coatings on metal, a IEA SHC Task X test shall be performed successfully
6. The interchange ability is accepted by the Solar Keymark Network

The equivalency of the absorber coating can be challenged anytime. In this case the absorber has to be sampled by an accredited third party or by the test lab. The costs for the whole procedure are fully carried by the challenger. Upon presentation of tests that suggest none-equivalency of an absorber coating, the SKN is obliged to request the re-evaluation of a absorber coating the latest until the forthcoming SKN meeting. The absorber has to be sampled by a third party.

List of equivalent absorber coatings are given on the next pages.

Power curve and error band

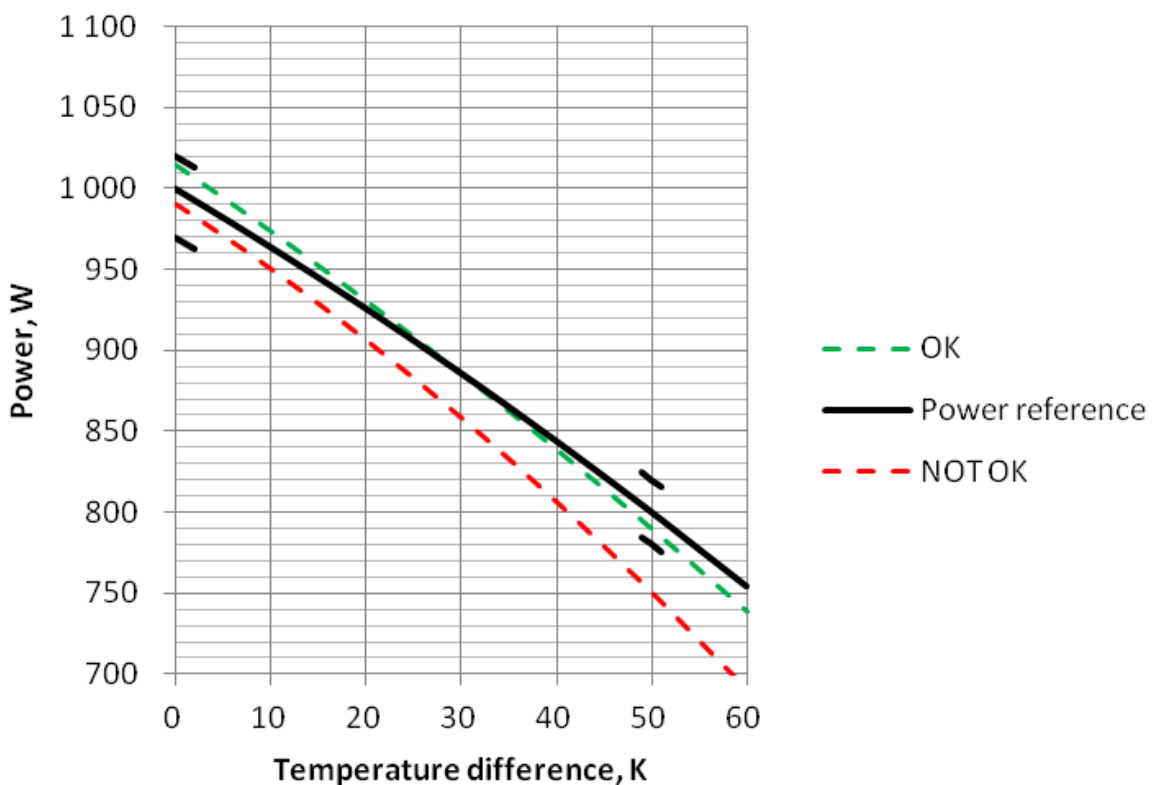


Fig.1. Illustration of the principle given in point 3: The power curve for the collector with the coating in question shall be within the 2 % peak MAX and MIN marks indicated at 0 and 50 K. In the case shown here with a module peak power of 1 000 W, the MAX (MIN) points are 20 W bigger (smaller) than the corresponding reference power curve (black curve). The green dotted curve illustrate a power curve fulfilling the requirement; the red dotted curve illustrates a power curve NOT fulfilling the requirement (because of a too low value at 50 K).

Coatings on aluminium – values declared by manufacturer

| Aluminium - Equivalent Group 1 | α (+/-) | ϵ (+/-) | Reference to decision |
|--------------------------------|----------------|------------------|---|
| Alanod – mirotherm, MT1300 | 0.95±0.01 | 0.05±0.02 | D5.M6, SKN_N0131R0 + document SKN_N0410R0 |
| Alanod Eta plus AL | 0.95±0.02 | 0.05±0.02 | D5.M6, SKN_N0219R0 + document SKN_N0410R0 |
| Solarceo on Al | 0.95±0.02 | 0.05±0.02 | D1. Correspondence, SKN_N0219R0 |
| TiNOX robust Al | 0.94±0.02 | 0.04±0.02 | D1. Correspondence, SKN_N0382R0 |
| TiNOX energy Al | 0.95±0.02 | 0.04±0.02 | D6.M8, SKN_N0115R0, SKN_N0129R0 |
| | | | |
| Mean value | 0.948 | 0.046 | |

Coatings on copper – values declared by manufacturer

| Copper - Equivalent Group 1 | α (+/-) | ϵ (+/-) | Reference to decision |
|-----------------------------|----------------|------------------|------------------------------|
| Alanod Eta plus CU | 0.95±0.02 | 0.05±0.02 | D1.M5 + document SKN_N0410R0 |
| Sunselect | 0.95±0.02 | 0.05±0.02 | D1.M5 |
| Tinox classic | 0.95±0.02 | 0.04±0.02 | D1.M5, SKN_N0113R0 |
| Tinox energy CU | 0.95±0.02 | 0.04±0.02 | D9.M7, SKN_N0113R0 |
| Solarceo on Cu | 0.95±0.02 | 0.05±0.02 | D2.M15, SKN_N0219R0 |
| | | | |
| Mean value | 0.950 | 0.046 | |