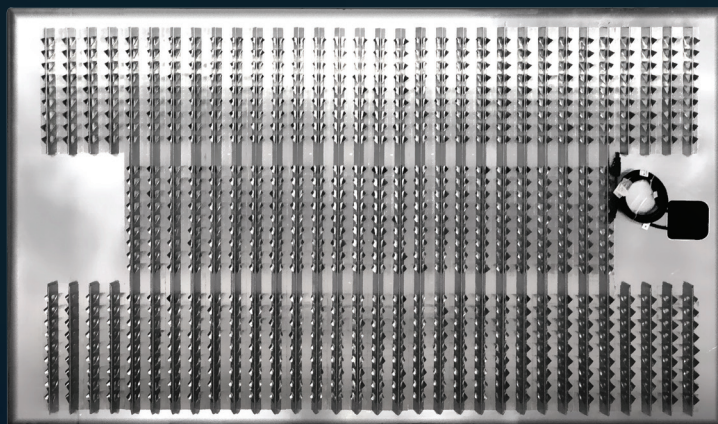


COOLBACK

®



GET THE MOST OUT OF YOUR PV MODULE WITH COOLBACK®

PATENTED BACKSHEET / FRAME INTEGRATION & UPGRADE



1 MORE OUTPUT

7% MORE OUTPUT*



LOWER TEMPERATURE



LESS DUST & DIRT



2 LONGER LIFETIME

20% LONGER LIFETIME**



LOWER TEMPERATURE



LESS BENDING



HUMIDITY BARRIER



3 SMART STRUCTURE

30% LESS VOLUME***



FRAME REPLACEMENT



SMART STACKABILITY

FOR MANUFACTURERS

Produce PV modules that meet the high demands of your customers with high performance in kWh and lifetime, at no extra cost of investment. COOLBACK® is easily integrated into existing PV module production. Lamination processes are unchanged, and framing is replaced using automated assembly with COOLBACK® profiles. Cost competitive and high speed.

FOR USERS, INVESTORS & EPCs

Enhance PV module performance in output and lifetime with COOLBACK®. Don't waste Watts - especially in high irradiation areas, where the nominal operational cell temperatures (NOCT) cause high heat losses and speed up degradation. COOLBACK® lowers the levelized costs of energy (LCOE) and upgrades module quality. Same Watts, more output.

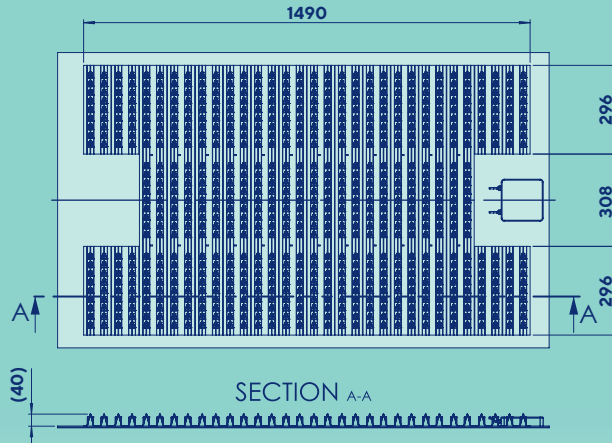
* proven extra instantaneous output, depending on local irradiation and wind

** based on lower temperatures per temperature cycle during lifetime

*** based on optimized container transport volume

COOLBACK® BUILDUP

The COOLBACK® buildup is based on a backsheet consisting of an adhesion promotor, an isolating layer and a metallic outer layer. PV module assembly is in accordance with standard operation procedures. Smart structure assembly - instead of framing - is possible

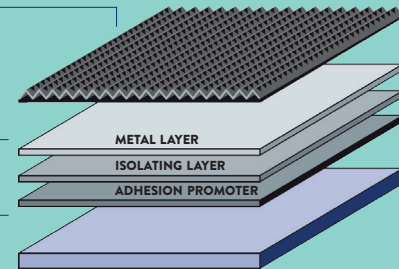


with the COOLBACK® assembly machine. The backsheet is available on coil or in sheet. Manufacturer preference of material is considered for a 1500 Volt and a 1000 Volt backsheet. Modules of 60-cells and 72-cells are both supported by COOLBACK®.

COOLBACK® SMART STRUCTURE
Instead of frame

COOLBACK® BACKSHEET
Instead of standard backsheet

ORIGINAL BOM:
glass, cells, encapsulants

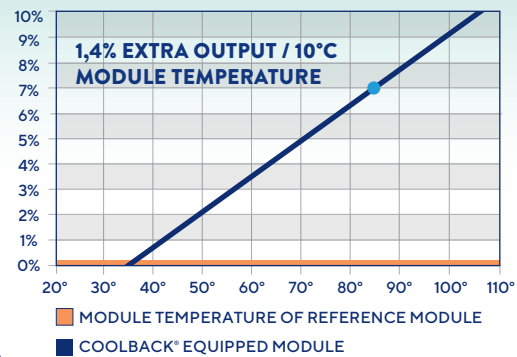


COOLBACK® PERFORMANCE

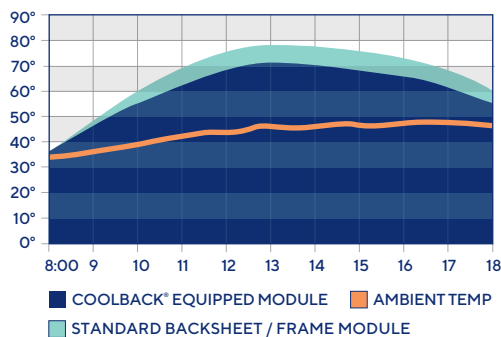
COOLBACK® output performance is proven by independent certification bodies.

- 1 The amount of extra output using COOLBACK® based on standard (reference) module temperatures. Under wind conditions between 0,5 and 4,5 m/s, an additional 1.4% output can be expected for every 10°C above 35°C. *Example:* A standard module with an operational temperature of 85°C, COOLBACK® would generate an additional 7% in output.
- 2 Results of a typical day at the Sevilla, Spain test station:
 - (a) up to 10°C difference in module temperature.
 - (b) up to 5,5% extra output and a cumulative of 3,5% extra output.

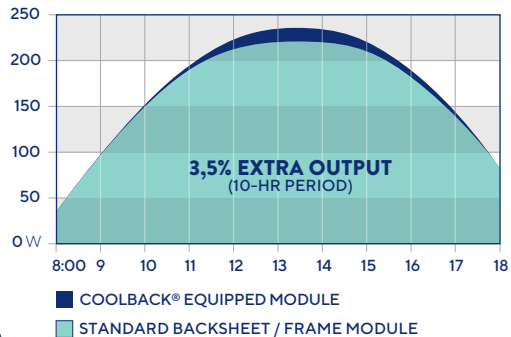
(1) % EXTRA OUTPUT GAINED IN kWh



(2a) MODULE TEMPERATURE - AMBIENT



(2b) OUTPUT IN WATTS PER MINUTE



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Certifications



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established in 2011