Minutes of the 4th meeting of the Industrial Council for Independent Module Tests focus on thin film - April 22, 2009 at the Airporthotel, Berlin-Adlershof

Attending:

Jürgen Arp (Abastrial) Carsten Wagner (Arinna) Tom Clarius (Avancis) Willi Ernst (CentroSolar - Biohaus) Ralf Siebert, (Conergy AG) Ralf Haselhuhn (DGS) Ingo Baumann (Energiebau Solarstromsysteme GmbH) Claudia Ferrara (Fraunhofer ISE) Christian Will (IBC Solar) Jörg Kienzle (Inventux Technologie AG) Niklas Papathanasiou (Inventux Technologie AG) Thorsten Ronge (Inventux Technologie AG) Thorsten Sueck (Meier Solar Solutions) Paul Grunow (PI Photovoltaik-Institut Berlin AG) Carsten Kühler (PI Photovoltaik-Institut Berlin AG) Martin Schachinger (PvXchange) Thomas Block (Schott Solar) Klaus Schäfer (Sharp Electronics)	Volker Hartmann (Signet Solar) Torsten Bachmann (Signet Solar) Claas Helmke (Solar Integrated Technologies) Stefan Haupt (SolarWorld) Torsten Geipel (Solon) Frank Zetzsche (Sulfurcell) Marion Joensson (Sunfilm) Dan Li (SunEdison) Andreas Cox (TÜV Rheinland) Ulrike Jahn (TÜV Rheinland) Jan Bresinsky (Würth Solar) Jürgen Bärwinkel (VDE Prüf- und Zertifizierungsinstitut) Friedrich Kessler (ZSW) Karl-Heinz Remmers, Christian Dürschner, Eva Schubert, Andrea Jeremias, Diana Schaal and André Pfeiffer (Solarpraxis)

I. Opening remarks by André Pfeiffer (Solarpraxis AG)

II. Objective and current status of (thin-film) module tests, presented by André Pfeiffer (Solarpraxis AG)

Participation in the module tests is initially voluntary, but the council reserves the right to conduct anonymous tests on major market players; all modules shall be purchased anonymously on the market.

Roadmap for crystalline modules:
The basic agreement with TÜV Rheinland for crystalline modules will be signed at the end of April; afterwards, individual agreements can be entered into with companies that want to take part in the test.

Invitations to the tests of crystalline modules will be sent out at the beginning of May
The first crystalline modules will be purchased in mid-May
Tests of the first crystalline modules (three months) from the beginning of June to August
The first test results will be published in **photovoltaik** and **pv magazine** in September

The roadmap for thin-film panels will be specified along with the testing and evaluation criteria by the council.

III. Presentation of PI and test results of thin-film panels by Paul Grunow (PI Berlin)

PI shall conduct IEC tests, including climate chambers, outdoor tests, isolation tests, mechanical tests (especially for glass/class modules), tests of electroluminescence, thermography, corrosion (wet leakage tests), and hot spot endurance tests.

When exposed to heat, glass/glass modules break especially easily. Any shards of glass that fall down can cause considerable injuries.

Electrochemical corrosion: The TCO layer can come off of the glass (TCO corrosion). In this test, the module is exposed to salt water. This test is important for the use of thin-film panels in humid areas.

Thin-film panels are generally very susceptible to corrosion. Water can enter through the edges, which have to be properly sealed: composite glass, ceiling, adhesive metal tape, or a second watertight layer that closes off the space between module components.

Test under diffuse light: Weak Light Performance

IV. Presentation of test criteria for thin-film panels, by Andreas Cox (TÜV Rheinland), and discussion

The test and evaluation criteria that the council adopted for crystalline panels serve as the starting point.

1. Declaration (15 %):
Test of all certificates granted: IEC 61646 and IEC 61730, CE, and for components based on the data sheet, demonstration of certificates that must be presented, if necessary, on request.
Council proposal: additional declaration of compliance with CE

2. Safety (25%)
In compliance with IEC 61730, including individual components
Impulse of strength (40%)
High-voltage test (isolation test dry & wet - Wet Leakage Test) (40%)
Visual inspection (10%)
Accessibility (of plugs and sockets) (10%)

3. Performance (20%)
In compliance with IEC 61646, ed. 2, and IEC 60904, performance under STC (Standard Test Conditions), stabilized, temperature coefficient, outdoor calibration in Italy

Performance (60%)
Output tolerance (30%)
Temperature coefficient (10%)
Efficiency (0%)

Stabilization: Because there are different types of thin-film modules (CdTe, a-Si, CI(G)S), µ-a-Si), they reacted differently, say, to storage in the dark, which affects performance. The panels therefore have to be stabilized before testing. Because stabilization will depend on the technology in question, the steps taken are coordinated with the manufacturer.

Once all test cycles, including stabilization, have been completed, the panels will have to fulfill at least 90% of the minimum power rating indicated by the manufacturer and comply with the minimum requirements for electric isolation when dry/wet.

The module tests are based on acknowledged IEC standards, which they partly also exceed. In IEC tests, the manufacturers provide the panels themselves. For these tests of thin-film panels, the panels will be purchased anonymously; manufacturers will not be able to select the specific test candidates, but will merely indicate which type and series.

Five test modules are required per module type. One module is for reference purposes, with the other two pairs undergoing various tests according to the test plan.

Discussion:

- A module's power yield depends on its output, which can only be simulated, and the simulation does not necessarily have to correspond with reality. In particular, there are great fluctuations (up to 20%) for thin-film panels under weak light (200 watts/m2), which rules out reliable measurements. Furthermore, such variables as the angle of incident light also affects weak light performance. Since 1996, institutes have been working on standards for performance measurements of thin-film panels under weak light conditions.

- Proposal by Mr. Arp:
  Filters should be used to remedy measurement inaccuracies for weak light response. **The proposal will be presented at the next meeting.**

- Those attending the meeting voted to have weak light performance included as an evaluation criterion.

- Measurement inaccuracies are to be discussed in the text when the results are presented.

4. Ageing (25%)
Based on IEC 61646: damp/heat test (1000 h & 500 h), changing temperature cycles (200), mechanical load

Certification also covers the composite material between the carrier material and the carrier; it must be stable. Mechanical load tests in coordination with manufacturers.

The additional assessment criterion "XY?" for thin-film panels could detrimentally affect thin-film panels in the aging test after 1500 hrs compared to crystalline modules. (cf. test and assessment criteria). It was agreed that this should not happen.

Proposal:
An additional module shall be purchased in case the 1500 hrs. test is not passed so that further tests can be conducted. Due to a lack of time, this issue could not be discussed. **A proposal will be presented at the next meeting.**

Conclusion: The assessment should not disadvantage thin-film panels.

5. Workmanship (10%)
Seals, sharp edges, lamination (bubbles, foreign particles), appearance

6. Soft criteria (5%)
Warrantee/guarantee, transport/packaging, ease of installation, handling of complaints

Council resolution: the material's environmental impact should be considered.
The weighting of soft criteria was not decided.

Discussion:
Because the market is switching from a seller's to a buyer's market, the handling of complaints is to play an important role in the assessment, though it is hard to measure. This evaluation will, however, be itemized when published. And the text for the findings can focus on this item if need be.

Because the market continues to change quickly in other respects as well, the question is whether a module manufacturer will still be around when a problem occurs. The question is then whether warranty claims can be filed with third parties.

Conclusion: Soft criteria will have to be reconsidered in this light.
A proposal will be presented at the next meeting.

V. Concluding remarks by André Pfeiffer (Solarpraxis)