

Hilti Aktiengesellschaft
9494 SCHAAN
Herrn Giovanni Riello
LIECHTENSTEIN

Offenbach, 2009-09-22

Your ref.

Your letter
2009-07-10

Our ref. - please indicate
744000-3990-0001/121262
FG13/lab-den

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Translation: In any case the German version shall prevail

PR Ü F B E R I C H T
zur Information des Auftraggebers
Test Report for the Information of the applicant

Produkt / Product **Other appliance**
Typ / Type **Hilti Montagesystem Solarpark**

Dieser Prüfbericht enthält das Ergebnis einer einmaligen Untersuchung an dem zur Prüfung vorgelegten Erzeugnis. Ein Muster dieses Erzeugnisses wurde geprüft, um die Übereinstimmung mit den nachfolgend aufgeführten Normen bzw. Abschnitten von Normen festzustellen. Die Prüfung wurde durchgeführt von 2009-08-14 bis 2009-09-14.

This test report contains the result of a singular investigation carried out on the product submitted. A sample of this product was tested to found the accordance with the thereafter listed standards or clauses of standards resp.

The testing was carried out from 2009-08-14 to 2009-09-14.

Der Prüfbericht berechtigt Sie nicht zur Benutzung eines Zertifizierungszeichens des VDE und berücksichtigt ausschließlich die Anforderungen der unten genannten Regelwerke.



The test report does not entitle for the use of a VDE Certification Mark and considers solely the requirements of the specifications mentioned below.

Wenn gegenüber Dritten auf diesen Prüfbericht Bezug genommen wird, muss dieser Prüfbericht in voller Länge an gleicher Stelle verfügbar gemacht werden.

Whenever reference is made to this test report towards third party, this test report shall be made available on the very spot in full length.

1. Order and extend of the evaluation

On account of the order an evaluation of the sufficient low-resistance connections of the aluminum Hilti channel installation system Solar Park and measurements of the resistance values were carried out at the VDE Testing and Certification Institute in 63069 Offenbach. In order to test the channel installation system Solar Park for weather and corrosion durability, the resistance measurements were repeated on the test samples, which had been prepared accordingly (see standard, section 3).

2. Description of the test object

Presented for testing were different, representative connecting parts of the Hilti channel installation system Solar Park (see Picture 5–9). The test samples consisted of several individual parts of the Hilti channel installation system Solar Park screwed together by the customer. The component list for each test sample is given in annex 7, picture 1.

3. Basis for evaluation

- DIN VDE 0100:1973-05, especially part 540: 1991-11 „Earthing arrangements, protective conductors and protective bonding conductors“
- DIN EN 60439-1 (VDE 0660 part 500):2005-01 „Low-voltage switchgear and control gear assemblies“, especially
 - Section 7.4.3.1 „Protection by using protective circuits“ and
 - Section 8.2.4.1 „Verification of the effective connection between the exposed conductive parts of the ASSEMBLY and the protective circuit“.
- DIN ISO 6988 (Sulfur dioxide/24h) „Weather and corrosion resistance“
- DIN EN 60068-2-11 (gas mixture or salt mist/10days) „Weather and corrosion resistance“.



4. Measurement and tests

4.1 Mechanical evaluation and visual examination

- Visual examination of connections via construction parts for mechanical correctness
- Provide measures against self-loosening of connections.

4.2 Measurement of the resistance of the Hilti channel installation system Solar Park in delivery state:

The measurement of the resistance of the connections of the channel installation system Solar Park was carried out on the test sample prepared by the manufacturer (see picture 1 and 5 – 9). The used measurement equipment with 2 wire measuring technology (see picture 2-3) was:

- Schleich GLP2e, Inventory No. 1500230, calibrated until 05 / 2010, (measuring with AC 25 A).

4.3 Test for weather and corrosion resistance

The test samples (see picture 10–12) were submitted to a sulfur dioxide test according to DIN ISO 6988 for a period of 24 hours. Following this the samples had to undergo a 10 day salt mist test according to DIN EN 60068-2-11. During these tests the samples were evaluated for weather and corrosion resistance.

4.4 Repeated measurement of the resistance of the Hilti channel installation system Solar Park:

The measurement of the resistance was repeated on 3 samples after the treatment with sulfur dioxide and salt mist, in order to determine any possible changes within the measuring results. The used measurement equipment with 2 wire measuring technology (see picture 2 and 4) was:

- Schleich GLP2e, Inventory No. 1500230, calibrated until 05 / 2010, (measuring with AC 25 A).

5. Results of the tests and measurements

5.1 Results of the mechanical evaluation and visual examination

The visual examination showed that the mechanical connections are correctly constructed. The screws are self-locking. Therefore, a self-loosening of the screws can be deemed impossible. According to the information provided by the manufacturer the screws have been tightened with the necessary torque.



Evaluation:

The visual examination did not reveal any obvious non-conformities.

5.2 Results of the measurements

Resistance values of the connections of the Hilti channel installation system Solar Park:

Resistance/Current/Voltage Measurements on connections of the Hilti channel installation systems Solar Park prior to the corrosion test					
Test samples 1-5 - 2 minutes at 25 A, min.					
Test Sample	1	2	3	4	5
Resistance (Ω)	0,010	0,012	0,012	0,013	0,010
Voltage (V)	0,270	0,320	0,312	0,404	0,248
Current (A)	25	25	25	25	25

Resistance/Current/Voltage Measurements on connections of the Hilti channel installation systems Solar Park after the corrosion test					
Test samples 1-5 - 2 minutes at 25 A, min.					
Test Sample	1	2	3	4	5
Resistance (Ω)		0,010		0,016	0,012
Voltage (V)		0,249		0,349	0,304
Current (A)		25		25	25



Evaluation:

The requirement of the standard DIN EN 60439-1, section 8.2.4.1 for the max. value for resistance of 0.1Ω is fulfilled on all connections of the channel installation system according to the measurements performed in respect to item 4.2 and 4.4.

The secured, low-resistance conductivity of the connections is therefore ensured.

6. Summarizing evaluation

The connecting parts of the Hilti channel installation system Solar Park have fulfilled the evaluation basis for a safe, low-resistance connection.

The connections have been realized mechanically correct and have been secured against self-loosening.

On the connecting parts of the Hilti channel installation system Solar Park a maximum resistance value of 0.013Ω was measured in delivery state and after the corrosion test a maximum value of 0.016Ω was determined. These values are significantly lower than the required value of max. 0.1Ω .

Best regards

VDE Prüf- und Zertifizierungsinstitut GmbH
VDE Testing and Certification Institute
Department F1


Herbert Schönfeld
Harald Frerk

Annex and pictures

Test Specimen* No.	Used parts
1	<ul style="list-style-type: none"> - Rammin Profile MSP-HDG-RP - Comfort Connector MSP-AL-CC - MSP-HDG M12x130 bolt with toothed head - M12 HDG hex nut with flange - MSP-HDG-TP toothed plate - Transversal Channel MSP-AL-TC
2	<ul style="list-style-type: none"> - Ground Connector MSP-AL-GC - Transversal Channel MSP-AL-TC
3	<ul style="list-style-type: none"> - Transversal Channel MSP-AL-TC - Longitudinal Channel MSP-AL-LC - Cross Connector MSP-AL-XC
4	<ul style="list-style-type: none"> - Longitudinal Channel MSP-AL-LC - Sleeve MSP-AL-LS - Self-drilling screw S-MD 43 S (one side)
5	<ul style="list-style-type: none"> - Base Plate MSP-AL-BP - Support Post MSP-AL-SP - Hex bolt with flange M12x100 A2-70 - Hex nut with flange M12 A4 - Basic Connector MSP-AL-BC - Toothed Plate MSP-AL-TP - Hex bolt with flange M12x130 A2-70

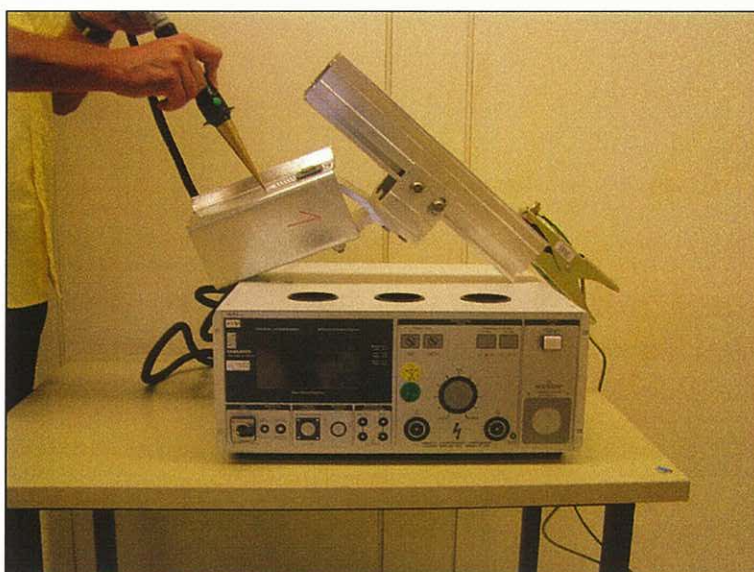
*Construction of the test items acc. to IFU (Instruction for Use)

Picture 1: Overview of the used parts of the channel installation system Solar Park

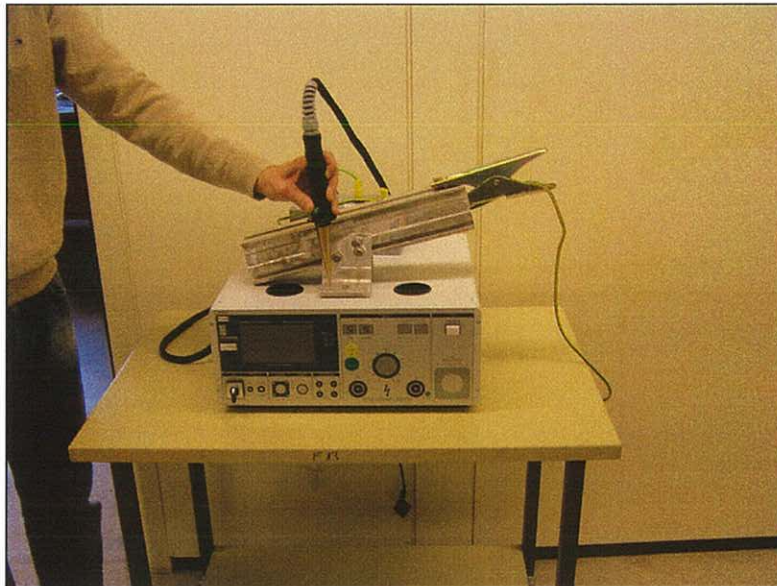




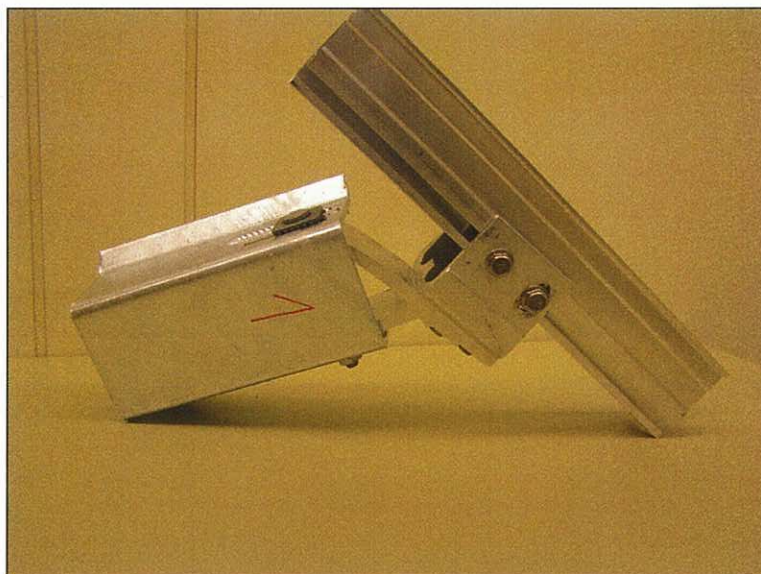
Picture 2: Measuring equipment Schleich GLP2e, inventory no. 1500230



Picture 3: Measurement configuration before the corrosion test

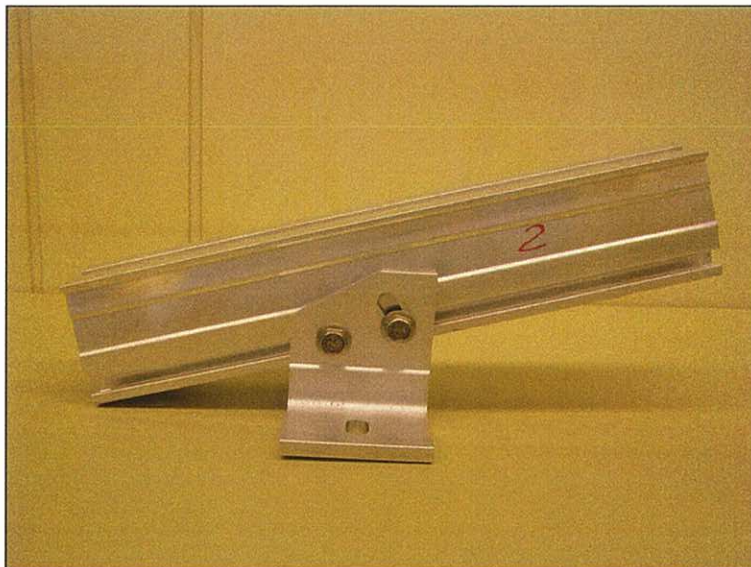


Picture 4: Measurement configuration after the corrosion test

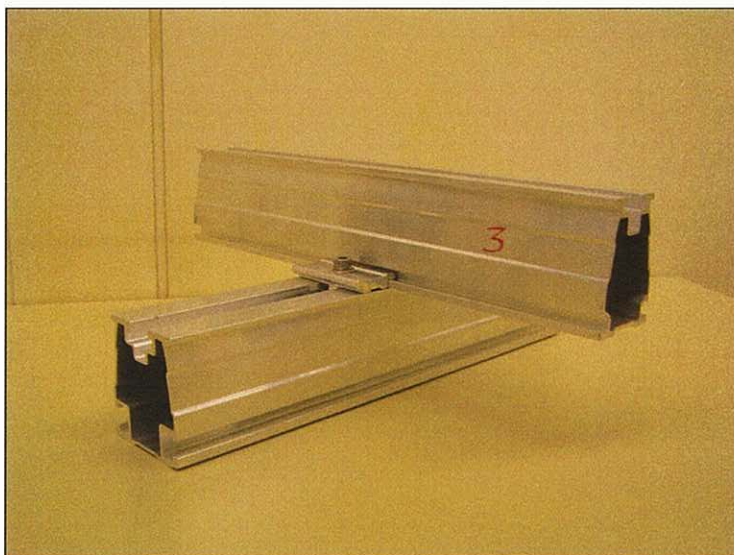


Picture 5: Sample1



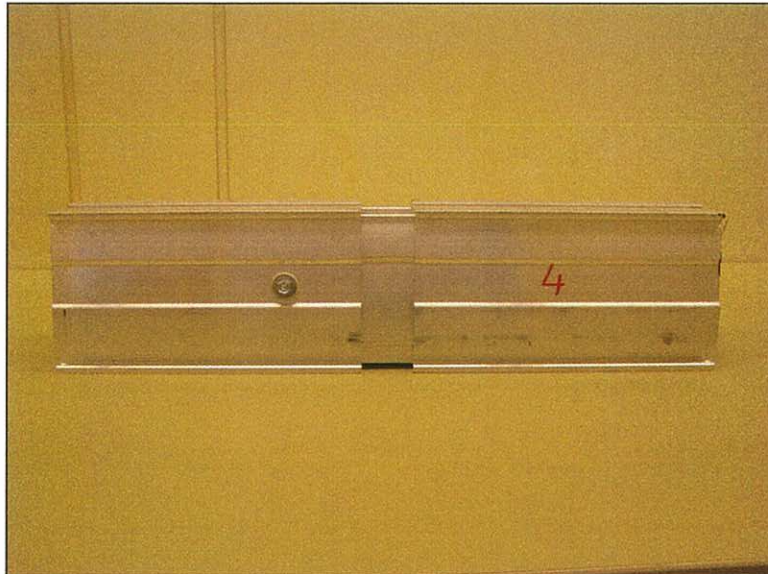


Picture 6: Sample 2

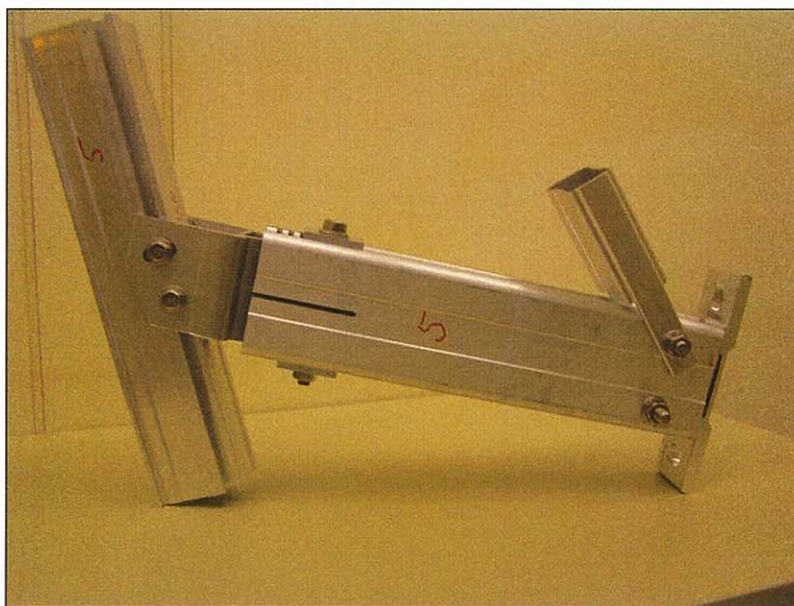


Picture 7: Sample 3





Picture 8: Sample 4



Picture 9: Sample 5



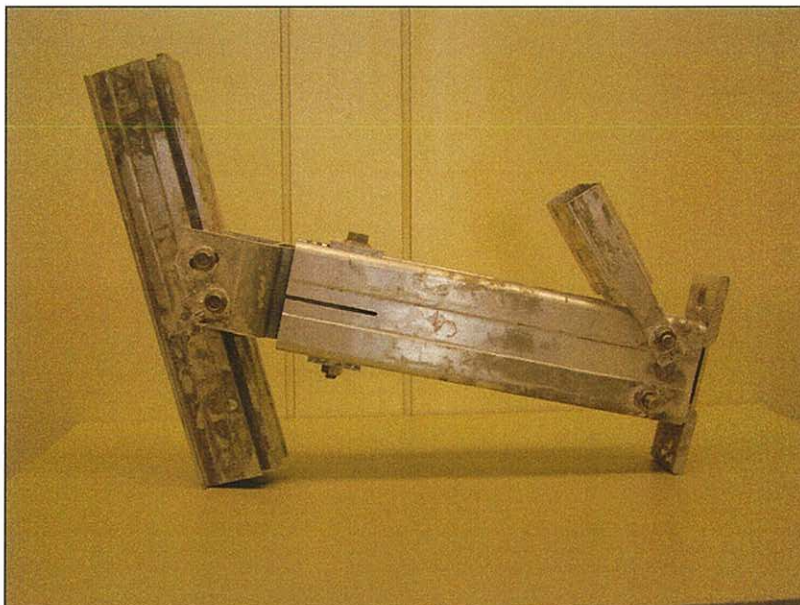


Picture 10: Sample 2 after the treatment with sulfur dioxide and salt mist



Picture 11: Sample 4 after the treatment with sulfur dioxide and salt mist





Picture 12: Sample 5 after the treatment with sulfur dioxide and salt mist



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