



Business division V – Civil and underground engineering

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Working group 5.1 – Structural Sealing

Investigation Report

UB 5.1/10-535

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Object:	Application-technical test of waterproofness of the <i>Me-taSole</i> mounting system with different fastenings for the clamp base
Client:	IFBT Institut für Fassaden and Befestigungstechnik Hans-Weigel-Straße 2b 04319 Leipzig
Receipt of specimens:	21/12/2010 (Specimen receipt number: 1031)
Testing period:	December 2010 - February 2011
Staff engineer:	Dipl.-Ing. Jüling

This investigation report consists of 4 pages and one annex.

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1 The Assignment

The assignment is to check the tightness of the mounting system designated *MetaSole* that is offered by Renusol GmbH in the framework of application-gearred testing for fastening framed photovoltaic modules on sloping roofs with trapezoidal steel sheet covers.

The client wants the clamp bases to be fastened with various drilling screws on the raised beads of the trapezoidal steel sheets to be exposed to water.

2 The Subject Matter of the Test

The *MetaSole* mounting system (Annex 1, Figures 1 and 2) consists of the following components:

- clamp base
a flat, lane-shaped aluminium section 125 mm long with rails/claws formed along the longitudinal edges for receiving the clamps, two drill holes for threading the screws through and an EPDM sealing strip glued on over the entire underside surface (Annex 1, Figure 3)
- SFS SDK2-S-377-6.0 x 35 drilling screw for fastening the clamp base on sheets with a thickness of 0.75-1.0 mm or
- EJOT JT3-X-2-6,0 x 25 A16/2 drilling screw for fastening the clamp base on sheets with a thickness of 0.4-1.0 mm
- the end and middle clamp for anchoring the PV modules with the clamp base

The drilling screws were used to fasten the clamp bases as per the manufacturer's specifications. While the EJOT screws with a SW 8 mm nut cap were tightened to press the gasket (torque: 3-3.5 Nm) when mounting (that is preferably carried out with a cordless screwdriver), the SFS drilling screws were screwed on with an SFS cap especially provided for it (Annex 1, Figures 4 - 6). This special cap is used to prevent the screw from overtightening at the torque set in the factory by breaking off the screw head cap.

In order to anchor the middle clamps made available for the tests, they are pushed onto the clamp bases and tightened in the middle of the base at the specified torque of 15 Nm.

2 Tightness Tests

The tests to be carried out have the purpose of checking the tightness of the fastening points of the *MetaSole* mounting system penetrated by the drilling screws. The client wants a water exposure test to the upper edge of the clamp base with the middle clamp screwed open.

This is the reason why employees of MFPA Leipzig screwed two trapezoidal steel sheets (1 mm thick each) that were freed from the protective foil with the dimensions of 1.0 m x 1.0 m onto reinforced concrete slabs of the same dimensions that were covered with absorbent cardboard layers.

While the clamp base was screwed on trapezoidal steel sheet with the SFS screws in the aforementioned manner, the clamp base was anchored on the other sheet with the EJOT screws. After fastening the clamp bases, the middle clamps were pushed up to the middle and the screw was tightened at a torque spanner up to a torque of 15 Nm.

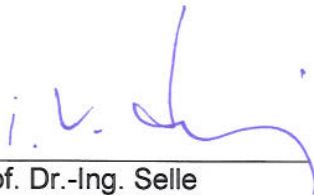
Afterwards, two cylinders adapted to the geometry of the trapezoidal steel sheets are concentrically glued on and sealed to the middle points of the clamp bases. After the sealing material hardened for one day, the inside spaces of the cylinder were filled to a height corresponding to the upper edge of the clamp bases 15 mm over the upper edge of the trapezoidal steel sheet (Annex 1, Figure 7). The water was dyed to illustrate any water penetration to the screwing points. The exposure period was agreed as 14 days, during which there was a visual inspection at regular intervals of the tightness via level of filling and for discoloration of the absorbent cardboard layers on the undersides of the sheets. After the end of the test period, the water was removed from the cylinders, the sheets were disassembled with the screwed on clamp bases and both the undersides of the sheets and the cardboard layers were checked for any discoloration.

3 Results of the Test and Summary

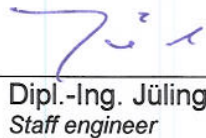
We were not able to document any water penetration on the clamp bases fastened with various screwings either during the 14 days of water exposure or after disassembling the test structures.

The results of the tests carried out indicate that the *MetaSole* mounting system offered by Renusol for fastening framed PV modules did not show leaks when using the SFS SDK2-S-377-6.0 x 35 and EJOT JT3-X-2-6.0 x 25 A16/2 drilling screws under the constraints investigated within the test period of 14 days.

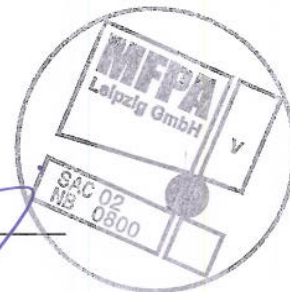
Leipzig, 28/02/2011



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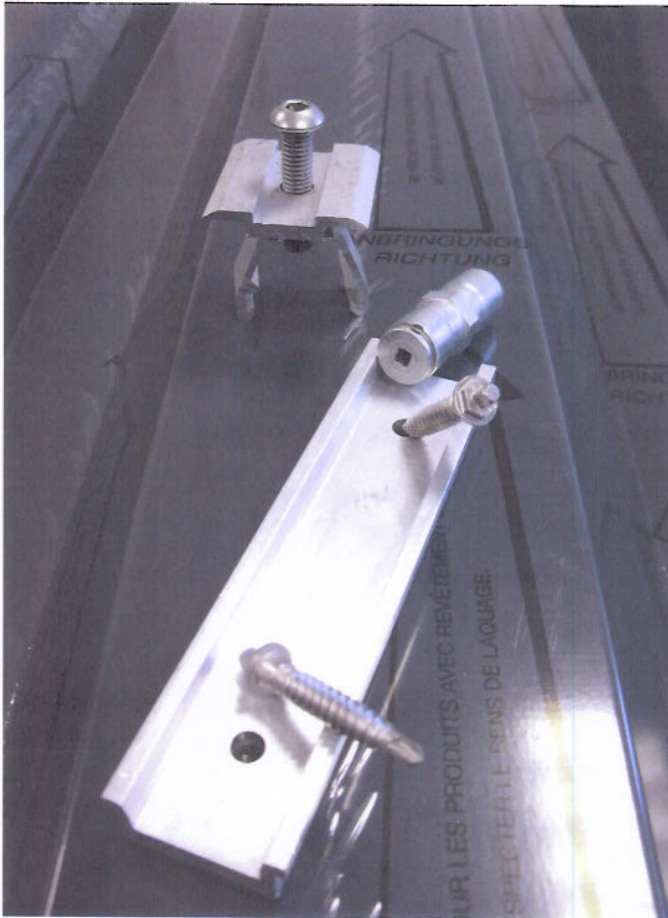


Fig. 1:
MetaSole fastening system with the
clamp base, middle clamp and SFS
SDK2-S-377-6.0 x 35 drilling screws
as well as the SFS cap for tightening
screws



Fig. 2: MetaSole fastening system with the
clamp base, middle clamp and
EJOT JT3-X-2-6,0 x 25 A16/2 drilling screws

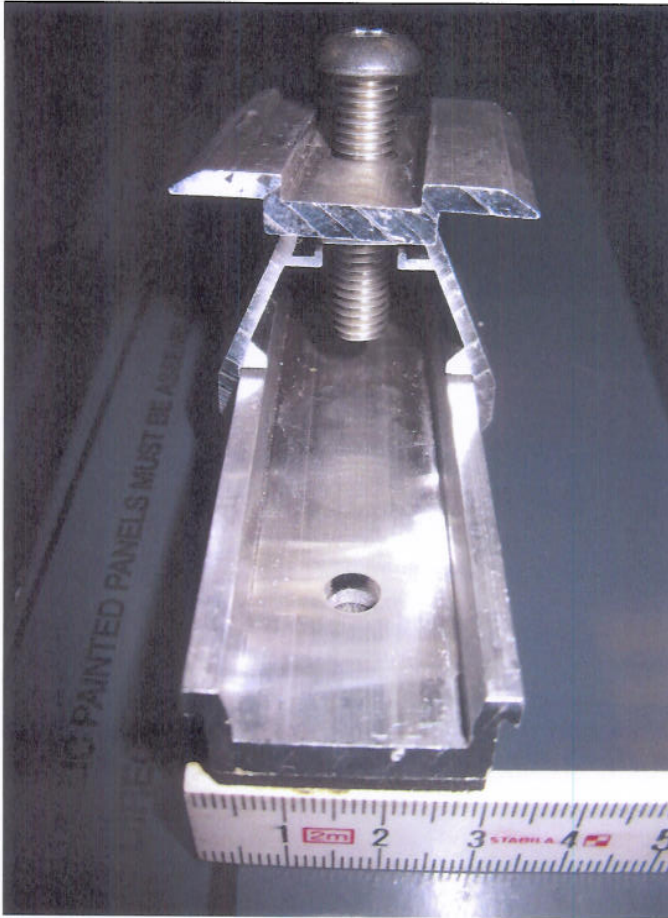


Fig. 3:
clamp base with middle clamp pushed
up



Fig. 4: clamp base fastened on the trapezoidal steel sheet with the
SFS drilling screws on the left: head cap already untightened

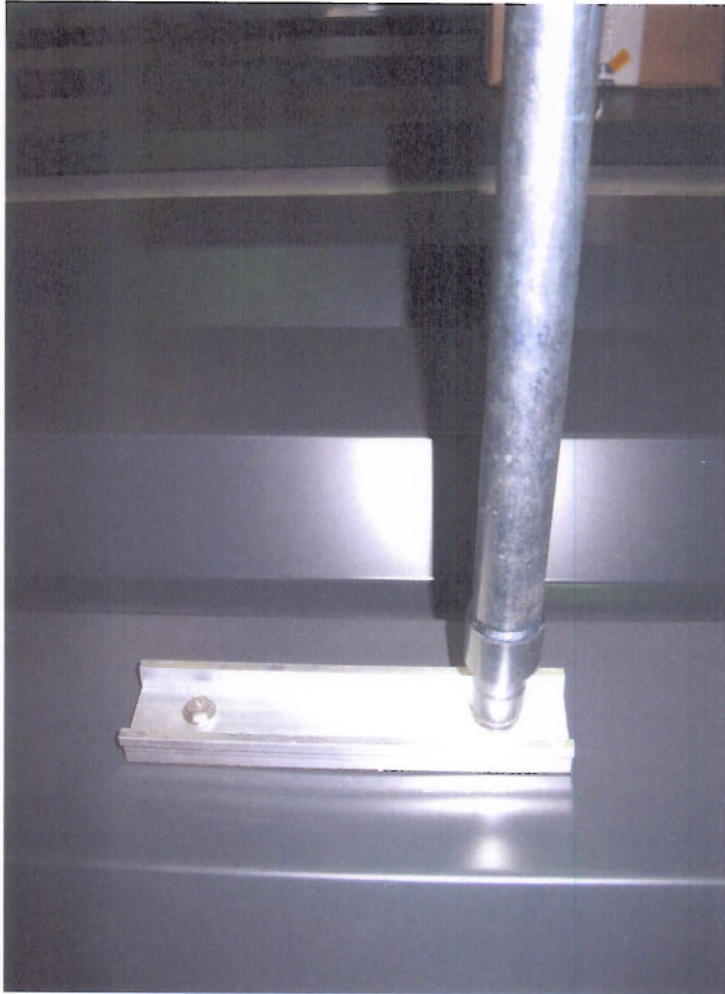


Fig. 5:
tightening the SFS drilling screw
with the SFS cap especially
provided for it

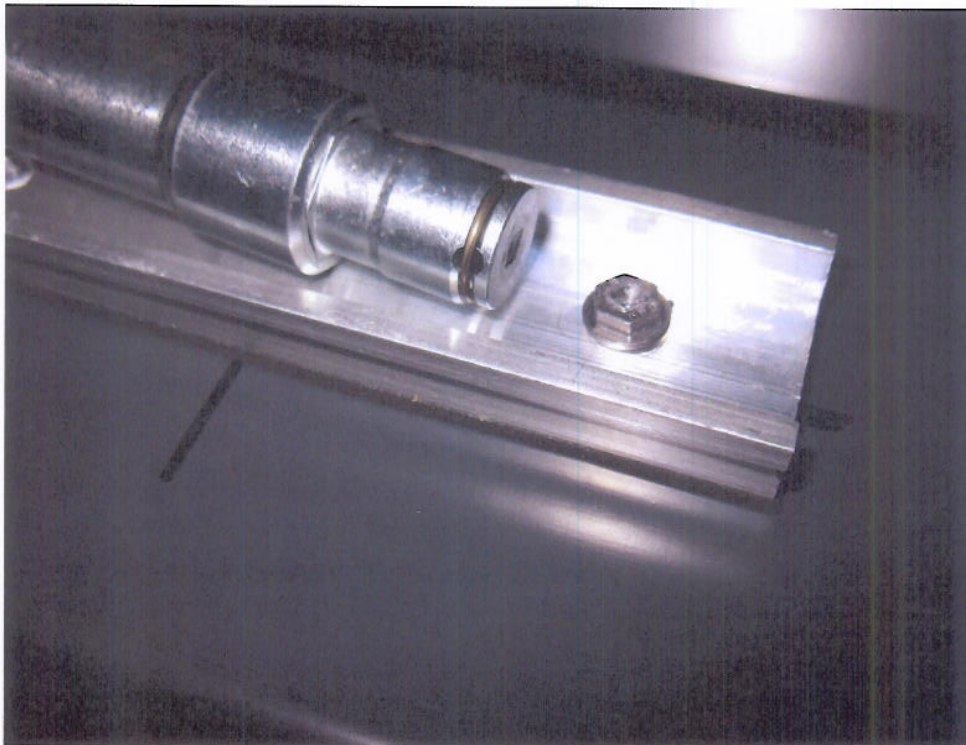


Fig. 6: untightened screw head cap after reaching torque

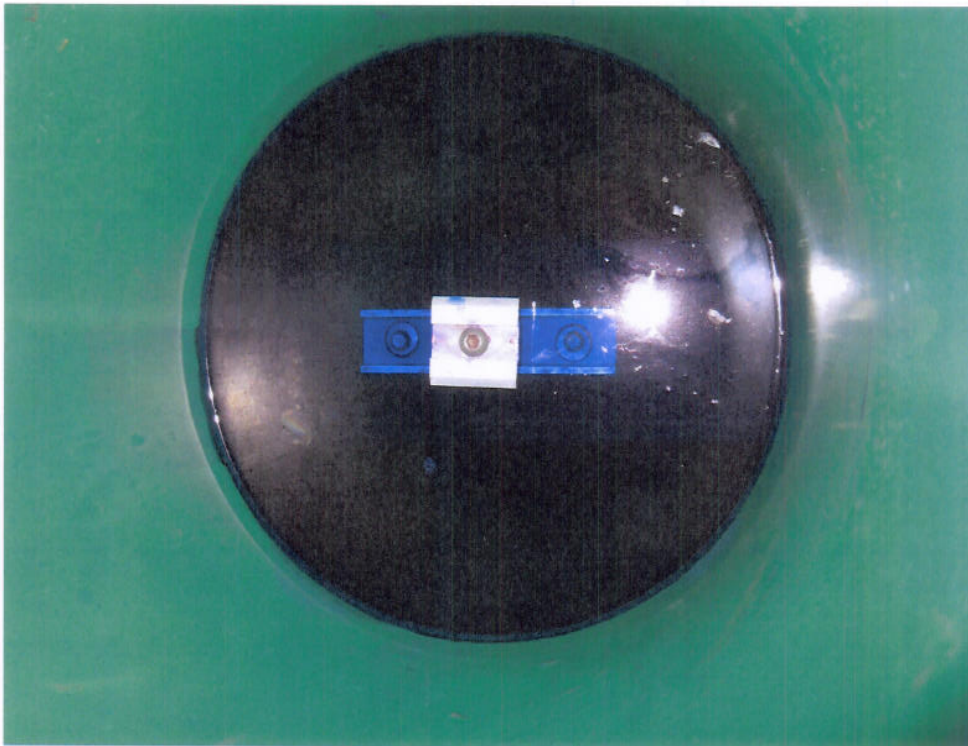


Fig. 7: testing waterproofness with a water column as per the upper edge clamp base (water coloured blue for checking purposes)