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Certificate and test report Nr. J136HOS

Connections for solar thermal systems.
Test according to SPF test procedure: Test class A1



RATTAY SOLAR-EPDM-2in2 with RATTAY-Quickfit

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1. Description of the sample

1.1 Product information and technical description

Manufacturer:	Rattay Metallschlauch- und Kompensatorentechnik GmbH
Model:	RATTAY SOLAR-EPDM-2in2 with RATTAY-Quickfit also available as RATTAY SOLAR-EPDM-DUO execution (different insulation type)
Connection Type:	Hose
Application range:	Pipework for solar thermal installations.
Nominal fitting length:	n.a.
Nominal diameter:	20 mm, available also in 12mm, 16 mm and 25 mm
Description of sample:	Corrugated metal pipe. Two pipes enclosed in a twin-chamber flexible elastomeric hose for thermal insulation.
Connection and seal:	RATTAY-Quickfit
Materials*	VA 1.4404 / AISI 316L (Corrugated pipe) KAIFLEX SOLAR EPDM (Thermal insulation)
Heat transfer media*	not specified
Application limitations*	175 °C

*(manufacturer information)

2. Test methods and results

2.1 General remarks

The test is intended to assess the resistance of the tubes against an assumed mechanical and thermal load encountered during the lifetime of a typical solar installation. As a representative sample for a typical pipe, pieces of approx. 35 cm have been tested.

The test does not include the testing of the insulation material used to enclose the tubes. It is assumed that the elastomeric hose (KAIFLEX SOLAR EPDM) is tested against weathering and UV-irradiation.

The test samples have been submitted by the manufacturer.

2.2 Test procedure

Test according to SPF standard. Test Class A1.

Three test samples are tested in parallel. None of the samples is allowed to fail for passing the test. During the test the samples are flowed through with a water glycol mixture at a pressure of 6 bars. The test samples are installed with a well-defined misalignment corresponding to the selected test class (A, B, or C).

The test procedure is split in three phases:

Phase 1:	450 cycles, full stroke (see below)
Phase 2:	5000 cycles, half stroke (see below)
Phase 3:	50 cycles, full stroke (see below)

Full stroke

The temperature of the fluid is increased up to the maximum temperature T_{high} . Upon stabilisation of the temperature the maximum dynamic load according to the selected test class (1, 2 or 3) is applied. At maximum mechanical and thermal load a temperature shock is applied by flushing the sample with fluid at T_{low} . The decay time of this temperature shock is less than 5 seconds. The time required for one cycle is in the range of 15 minutes. The full stroke cycles reflect the conditions that are encountered under stagnation of the solar thermal system.

Half stroke

For the half stroke cycles the dynamic loads are reduced to 50% of the limits given by the selected test class. The fluid is kept at ambient temperature.

The validity and authenticity of this report can be checked anytime

The half stroke cycles reflect the normal operating conditions of a solar thermal system.

2.3 Test parameter

2.3.1 Static deformation (installation tolerance), SPF Class A

The test samples are installed with a static deformation as follows:

$S_{axial} < 5 \text{ mm}$ axial misalignment
 $S_{lateral} < 4 \text{ mm}$ lateral (radial) misalignment
 $S_{angular} < 1^\circ$ angular misalignment

2.3.2 Dynamic deformation, SPF Class 1

Dynamic load realised during the testing of the sample:

$D_{axial} < 8 \text{ mm}$ axial dynamic load
 $D_{lateral} < 4 \text{ mm}$ lateral (radial) dynamic load

2.3.3 Thermal and pressure load

Thermal load realised during the testing of the sample.

$T_{low} = < 80^\circ\text{C}$
 $T_{high} = 180^\circ\text{C} (\pm 5^\circ\text{C})$
 Decay time = 5 sec (± 1 sec)
 Test pressure = 10 bar

2.4 Photographs of test samples



Figure 1: (before test start)
Test samples.

The un-plated brass adapters are not part of the test samples and are required solely to connect the samples to the test rig.

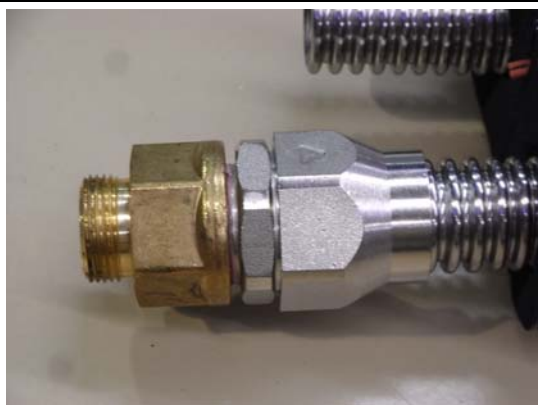


Figure 2: (before test)
Compression fitting.

The un-plated brass adapters are not part of the test samples and are required solely to connect the samples to the test rig.



Figure 3: (before test start)
Detail of installed test samples before testing. For each sample one of the tubes was connected and tested. The second tube is not considered.



Figure 4: (after test)
No leakage was observed. The EPDM insulation of the two tubes was separated and the UV-protection foil was overheated. This is due to the harsh condition during the test. In a normal installation the thermal load on the insulation is much smaller.

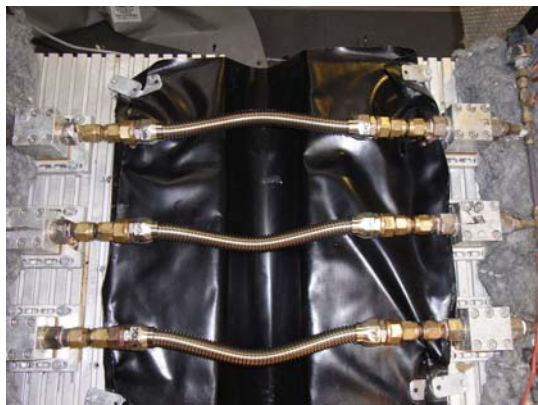


Figure 5: (after test)
Corrugated pipe taken out of insulating tube.



Figure 6: (after test)
Close look at the connectors of the test sample.

2.5 Result

No leakage, deficiency and no other failure has been observed during the test.

The pipe system **RATTAY SOLAR-EPDM-2in2 with RATTAY-Quickfit** therefore fulfils the requirements of the SPF test procedure class A1 and is certified under the SPF number J136HOS. This certificate covers the hydraulic pipes and connectors and does not include the insulation.

3 Remarks

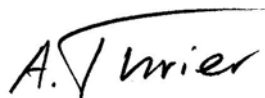
This report must not be copied except in full.
The test results only refer to the tested sample.

This certificate is valid for 5 years until 06.05.2015

Rapperswil, 06.05.2010



Dr. Andreas Bohren
Head SPF Testing



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Responsible for the testing