

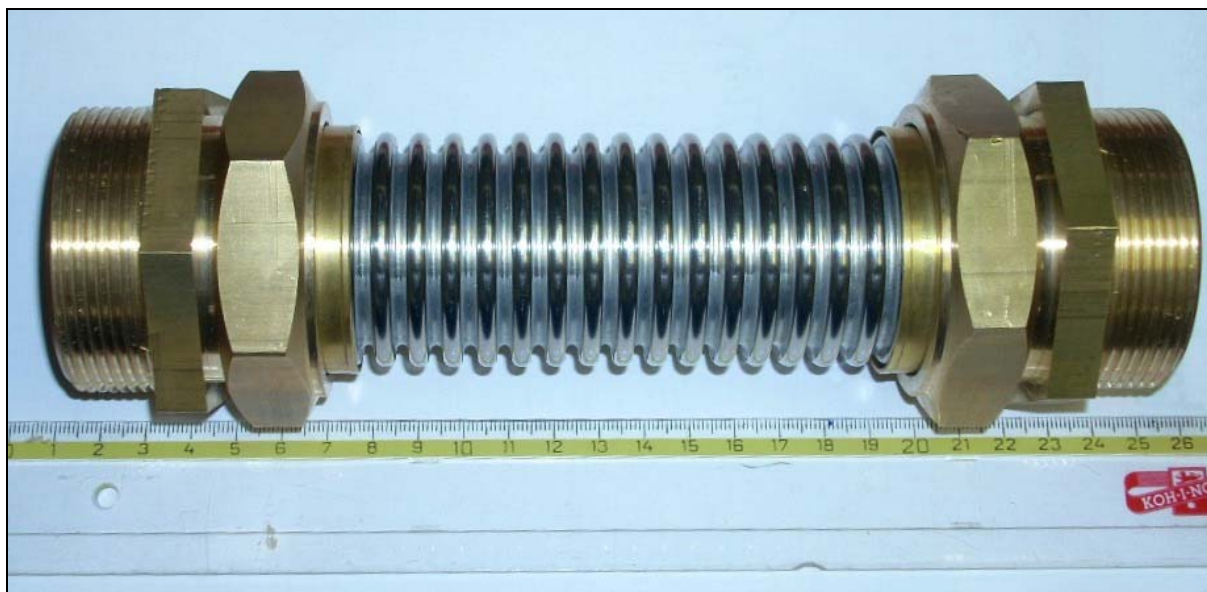
Orderer:

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IT-25065 Lumezzane (BS)

Certificate and test report Nr. J146CON

Coupling system for solar thermal applications.
Test according to SPF test procedure: Test class A1



Fast coupling system for corrugated stainless steel pipes

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1. Description of the sample

1.1 Product information and technical description

Manufacturer:	MFC S.r.l. - 25065 Lumezzane (Italy)
Model:	Fast coupling system for corrugated stainless steel pipes
Tested sample:	MFC 5085-G 1 ½"
Connection Type:	Corrugated stainless steel pipe (DN40) to female connections
Application range	Pipework connections for solar thermal installation.
Nominal diameter:	DN40 x Ø1 ½" mm
Description of sample:	Metallic coupling system for connecting corrugated stainless steel tubes to female connections
Materials	Brass CW614N (CuZn39Pb3) - EN12164
Heat transfer media	Ethylene or Propylene glycol / Water
Application limitations	3.5 bar maximum working Pressure

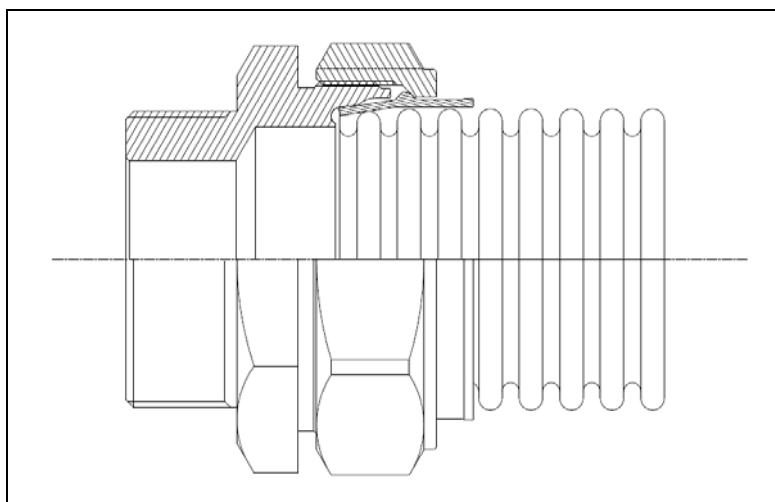


Fig. 1 Cross section of the mounted fitting system

2. Test methods and results

2.1 General remarks

The test procedure is intended to assess the resistance of the connection system against the assumed thermal load encountered during the lifetime of a typical solar installation with state-of-the-art solar collectors (selective absorber coating, solar glazing). The test concerns only the “fast coupling system for corrugated stainless steel pipes connectors”, i.e. only the connection of the corrugated stainless steel tube. The corrugated tube itself is not part of the test procedure. Different couplings are available to connect corrugated s/s tubes to copper tubes, soldered spigots, corrugated tubes, and other male or female standard connection components. As long as the tested “fast coupling system for corrugated stainless steel pipes connectors” is used, the test J146 is valid for all these types as it concerns only the connection of the corrugated tube.

One pipe-work sample made of a corrugated stainless steel tube provided with the above described has been tested, meaning two connectors. The sample has been assembled by the manufacturer in a professional manner.

The test procedure does not cover the corrugated tube itself.

The connector system is not intended to be used as compensator between solar thermal collectors.

2.2 Test procedure and test parameters

Test according to SPF standard. Test Class A1 reduced to the thermal loads and with reduced pressure requirements. The 500 thermal shocks represent the stagnation cycles to be expected during the lifetime of a solar thermal system.

The sample is not allowed to fail for passing the test. During the test procedure the sample is flowed through with glycol at a pressure of 3.5 bars maximum. The test sample was installed without any static misalignment (installation tolerance) and the SPF test procedure is reduced to the thermal shocks. No further static or dynamic mechanical loads are applied during the whole test procedure.

The test procedure is made up of 500 thermal shocks as follows:

The temperature of the fluid (and hence the fitting) is increased up to the maximum temperature of $T_{\text{high}}=180^{\circ}\text{C}$ ($\pm 5^{\circ}\text{C}$). Upon thermal stabilisation of the whole system a thermal shock is triggered and the samples are flushed with fluid at the lower temperature level $T_{\text{low}} < 80^{\circ}\text{C}$. The decay time of the shock is in the range of 5 seconds.

The time required for one complete temperature cycle is approx. 30 minutes.

These thermal shocks represent the thermal loads that occur during the filling procedure of a drained collector system.

2.3 Photographs of test samples



Figure 2: (before test start)
General view on the test sample



Figure 3: (before test start)
Close view on ready installed coupling system.



Figure 4: (before test start)
The grey cast metal adapter is not part of the test and is needed to connect the samples to the test bench.

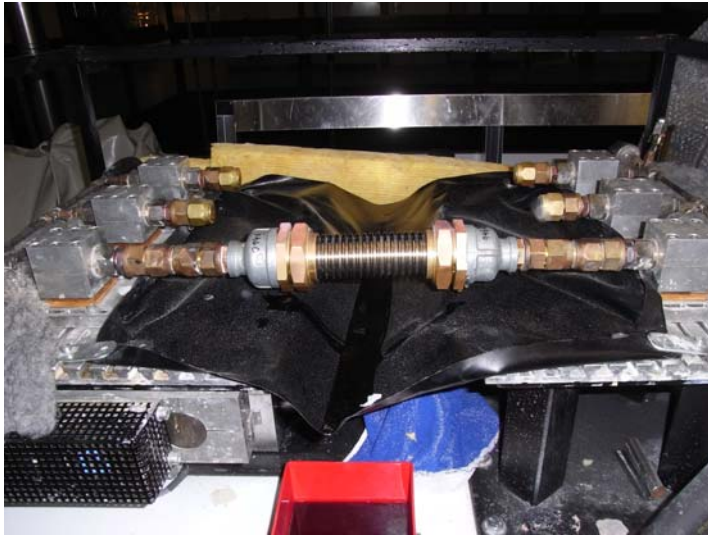


Figure 5: (after test)
Test sample on test stand after the test start



Figure 6: (after test)
Opened test sample. No visible signs of deterioration that could indicate reduced lifetime or leakage.
The red colour inside the connectors is a sign of overheating during the test.



Figure 7: (after test)
Close look at the opened test sample. No visible signs of deterioration that could indicate reduced lifetime or leakage.

2.4 Notes

The test results and the certificate are valid for fluids in the liquid phase. The behaviour of the fitting for vaporous heat transfer media as well as evaporation and condensation effects are not assessed with the present test procedure.

The fittings must be used together with corrugated stainless steel tubes which are able to absorb the mechanical movements caused by thermal elongations, mechanical misalignment and similar.

2.5 Result

No leakage, deficiency and no other failures have been observed during the test. The “fast coupling system for corrugated stainless steel pipes” is therefore considered as suitable for the use in solar thermal installations.

The “fast coupling system for corrugated stainless steel pipes” in the tested dimension therefore fulfils the requirements of the SPF test procedure class A1 restricted to a maximum operating pressure of 3.5bar and is certified under the SPF number J146CON.

The certificate is also valid for the coupling system in the DN32 version.

The certificate is valid for 5 years.

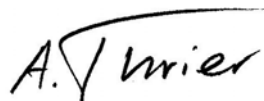
3 Remarks

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

Rapperswil, 26.09.2012



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