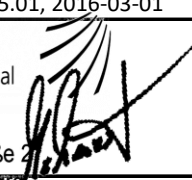


Annex to Solar Keymark Certificate - Summary of EN ISO 9806:2013 Test Results						Licence Number		011-7S2880 L																	
						Date issued		2018-08-28																	
						Issued by		Din Certco																	
Licence holder		GoGaS Goch GmbH & Co. KG				Country		Deutschland																	
Brand (optional)						Web		www.gogas.com																	
Street, Number		Zum Ihnedieck 18				E-mail		christean.schmidt@gogas.com																	
Postcode, City		44265, Dortmund				Tel/Fax		+49 231 46505 64 / +49 231 46505-88																	
Collector Type						Flat plate collector, glazed																			
Collector name						Power output per collector unit [W]																			
						wind speed, u = 1,3 m/s																			
						Air flow rate [kg/h]		Net irradiance, G'' [W/m²]																	
								400		700		1000													
Lubi-black						300		826		1342		1858													
						649		1039		1689		2338													
						959		1123		1825		2527													
Maximum power output per m² gross area												568													
Performance parameters test method						Steady state - outdoor																			
Performance parameters (related to AG)						ṁ		η _{0,hem}		a ₂		a ₂		b _u											
Units						kg/h		-		W/(m²K)		W/(m²K²)		s/m											
Test						300		0,523		-		-		0,046											
						649		0,629		-		-		0,034											
						959		0,673		-		-		0,032											
Incidence angle modifier test method						Steady state - outdoor																			
Bi-directional incidence angle modifiers						No																			
Incidence angle modifier						Angle		10°		20°		30°		40°		50°		60°		70°		80°		90°	
Transversal						K _{θT, coll}		1,00		1,00		1,00		0,98		0,96		0,90		0,77		0,52		0,00	
Longitudinal						K _{θL, coll}		1,00		1,00		1,00		0,98		0,96		0,90		0,77		0,52		0,00	
Heat transfer medium for testing						Air																			
Maximum flow rate for testing (per gross area, A _G)						dm/dt		0,060		kg/(sm²)															
Maximum temperature difference for thermal performance calculations						(θ _m -θ _a) _{max}		11		K															
Standard stagnation temperature (G = 1000 W/m²; θ _a = 30 °C)						θ _{stg}		84		°C															
Effective thermal capacity, incl. fluid (per gross area, A _G)						C/m²		8,6		kJ/(Km²)															
Maximum operating temperature						θ _{max, op}		120		°C															
Maximum operating pressure						p _{max, op}		-		kPa															
Testing laboratory		TestLab Solar Thermal Systems, Fraunhofer ISE				http://www.collectortest.com																			
Test report(s)		KTB Nr.: 2018-04				Dated		22.08.2018																	
Comments of testing laboratory						Datasheet version: 5.01, 2016-03-01																			
<p>Note: Scenocalc results and energy labeling information (see p.2) is not applicable for solar air heating collectors which can only be measured in open to ambient operation. The performance parameters are given as instantaneous efficiency points.</p>						<p>TestLab Solar Thermal Systems</p>  <p>Heidenhofstraße 2 D-79110 Freiburg Tel: +49 (0)761 4588 5354</p>																			
DIN CERTCO • Alboinstraße 56 • 12103 Berlin, Germany Tel: +49 30 7562-1131 • Fax: +49 30 7562-1141 • E-Mail: info@dincertco.de • www.dincertco.de																									

Annex to Solar Keymark Certificate Supplementary Information	Licence Number	0
	Issued	2018-08-28

Annual collector output in kWh/collector at mean fluid temperature ϑ_m, based on EN ISO 9806:2013 test results													
Standard Locations		Athens			Davos			Stockholm			Würzburg		
Collector name	ϑ_m	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C
Lubi-black		See note on p.1											
Annual output per m ² gross area													
Fixed or tracking collector		Fixed (slope = latitude - 15°; rounded to nearest 5°)											
Annual irradiation on collector plane		1765 kWh/m ²			1714 kWh/m ²			1166 kWh/m ²			1244 kWh/m ²		
Mean annual ambient air temperature		18,5°C			3,2°C			7,5°C			9,0°C		
Collector orientation or tracking mode		South, 25°			South, 30°			South, 45°			South, 35°		

The collector is operated at constant temperature ϑ_m (mean of in- and outlet temperatures). The calculation of the annual collector performance is performed with the official Solar Keymark spreadsheet tool Scenocalc Ver. 5.01 (March 2016). A detailed description of the calculations is available at www.solarkeymark.org/scenocalc

Additional Information

Collector heat transfer medium	Air
Hybrid Thermal and Photo Voltaic collector	No
The collector is deemed to be suitable for roof integration	No
The collector was tested successfully according to EN ISO 9806:2013 under the following conditions:	
Climate class (A, B or C)	A --
Maximum tested positive load	1500 Pa
Maximum tested negative load	1000 Pa
Hail resistance using ice balls (diameter)	25 mm

Energy Labelling Information

	Reference Area, A_{sol} (m ²)	Data required for CDR (EU) No 811/2013 - Reference Area A_{sol}	
Lubi-black	4,45	Collector efficiency (η_{col})	See note on p.1 %
		<i>Remark: Collector efficiency (η_{col}) is defined in CDR (EU) No 811/2013 as collector efficiency of the solar collector at a temperature difference between the solar collector and the surrounding air of 40 K and a global solar irradiance of 1000 W/m², expressed in % and rounded to the nearest integer. Deviating from the regulation η_{col} is based on reference area (A_{sol}) which is aperture area for values according to EN 12975-2 or gross area for ISO 9806:2013.</i>	
		Data required for CDR (EU) No 812/2013 - Reference Area A_{sol}	
		Zero-loss efficiency (η_0)	See note on p.1 --
		First-order coefficient (a_1)	See note on p.1 W/(m ² K)
		Second-order coefficient (a_2)	See note on p.1 W/(m ² K ²)
		Incidence angle modifier IAM (50°)	See note on p.1 --
		<i>Remark: The data given in this section are related to collector reference area (A_{sol}) which is aperture area for values according to EN 12975-2 or gross area for ISO 9806. Consistent data sets for either aperture or gross area can be used in calculations like in the regulation 811 and 812 and simulation programs.</i>	