





Annex to Solar Keymark Certificate					Licence Number		011-7S859 R																	
Summary of EN 12975-2 Test Results					Issued		2015-12-10																	
Collector test standard		EN 12975-2																						
Licence holder	Thermostrom Energietechnik GmbH				Country	Austria																		
Brand (optional)	--				Web	www.thermostrom.at																		
Street, Number	Ennser Strasse 91-93				E-mail	office@thermostrom.at																		
Postcode, City	AT-4407 Steyr-Dietachdorf				Tel	+43 (0)72 523 82-71																		
Collector Type					Evacuated tubular collector																			
					Power output per collector G = 1000 W/m ² ̑ _m - ̑ _a																			
					0 K		10 K		30 K		50 K		70 K		130 K									
Collector name					W		W		W		W		W		W									
Strebel AS 100 HP16					2'188		2'142		2'040		1'925		1'798		1'344									
Power output per m² aperture area. For aperture area, see page 2					740		724		690		651		608		455									
Performance parameters test method					Steady state - outdoor																			
Performance parameters (aperture area)					̑ ₀		a ₁		a ₂															
Units					-		W/(m ² K)		W/(m ² K ²)															
Test results					0.740		1.520		0.005															
Incidence angle modifier test method					Steady state - outdoor																			
Bi-directional incidence angle modifiers					Yes																			
Incidence angle modifier					Angle		10°		20°		30°		40°		50°		60°		70°		80°		90°	
Transversal					K _{̑T, coll}		1.00		1.01		1.03		1.05		1.03		0.89		0.65		0.34		0.00	
Longitudinal					K _{̑L, coll}		1.00		1.00		0.99		0.97		0.92		0.84		0.70		0.45		0.00	
Fluid for testing					Water-Glycole																			
Flow rate for testing (per Aa)					dm/dt		0.025		kg/(sm ²)															
Maximum temperature difference for thermal performance calculations					(̑ _m -̑ _a) _{max}		130		K															
Standard stagnation temperature (G = 1000 W/m²; ̑_a = 30 °C)					̑ _{stg}		289		°C															
Effective thermal capacity (per Aa)					C/m ²		6.0		kJ/(Km ²)															
Maximum operating temperature					̑ _{max, op}		120		°C															
Maximum operating pressure					p _{max, op}		600		kPa															
Testing laboratory					SPF, CH-8640 Rapperswil							www.solarenergy.ch												
Test report(s)					C1112LPEN C1112QPEN							Dated		22.07.2009 22.07.2009										
Comments of testing laboratory					--							 INSTITUT FÜR SOLARTECHNIK 												



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Annual collector output in kWh/collector at mean fluid temperature ϑ_m , based on EN 12975-2 Test Results

Collector name	Standard Locations ϑ_m	Athens			Davos			Stockholm			Würzburg		
		25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C
Strebel AS 100 HP16		3'645	3'160	2'676	3'099	2'643	2'214	2'218	1'837	1'495	2'387	1'978	1'603
Annual output per m ² aperture area		1'232	1'067	904	1'047	893	748	749	621	505	806	668	542
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 (July 2015). A detailed description of the calculations is available at www.solarkeymark.org/scenocalc

Additional Information

Collector heat transfer medium	Liquid
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 12975-2 under the following conditions:	
No valid climate reference class	--
Positive Mechanical Load	1000 Pa
Negative Mechanical Load	1000 Pa
Hail resistance using steel ball (maximum drop height)	m

Energy Labelling Information

	Reference Area, A_{sol} (m ²)	Data required for CDR (EU) No 811/2013 - Reference Area A_{sol}	
Strebel AS 100 HP16	2.96	Collector efficiency (η_{col})	67 %
		<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.</i>	
		Data required for CDR (EU) No 812/2013 - Reference Area A_{sol}	
		Zero-loss efficiency (η_0)	0.740 --
		First-order coefficient (a_1)	1.52 W/(m ² K)
		Second-order coefficient (a_2)	0.005 W/(m ² K ²)
		Incidence angle modifier IAM (50°)	1.02 --
		<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>	