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SPF INSTITUT FÜR SOLARTECHNIK

Summary of EN 12975 Test Results, annex to Solar KEYMARK Certificate	Licence Number	011-7S2645 F
	Issued	2016-04-19

Company holding the	Riello NV/SA		**Country**	Belgium
Brand (optional)	–		**Website**	www.riello.be
Street, street number	Waverstraat 15		**E-mail**	info@riello.be
Postal Code / City, province	BE-9310	Moorsel (Aalst)	**Tel/Fax**	+32 53 769 030/789 440

Collector Type (flat plate glazed/un-glazed; evacuate tubular)	Flat plate collector - glazed
Thermal / photo voltaic hybid collector? (PVT collector)	No
Integration in the roof possible ? (manufacturers declaration)	Yes

						Power output per collector module				
						G = 1000 W/m²				
						Tm-Ta				
	Aperture area (Aa)	Gross length	Gross width	Gross height	Gross area (AG)	0 K	10 K	30 K	50 K	70 K
Collector name	m²	mm	mm	mm	m²	W	W	W	W	W
CSAL 25 RS	2.152	2'000	1'145	85	**2.290**	1'694	1'604	1'413	1'207	987

Performance test method		Glazed liquid heating collector - steady state - outdoor								
Performance parameters related to aperture		η0	a1	a2						
Units		-	W/(m²K)	W/(m²K²)						
Test results - *Flow rate and fluid see note 1*		0.784	4.08	0.0084						
Bi-directional incidence angle	Yes	Kθ *values are obligatory for 50°.*								
Incidence angle modifiers Kθ(θT)	Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
transversal direction	Kθ(θT)	1.00	1.00	1.00	0.98	0.96	0.87	0.68	0.38	0.00
Incidence angle modifiers Kθ(θL)	Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
longitudinal direction	Kθ(θL)	1.00	1.00	1.00	0.98	0.96	0.87	0.68	0.38	0.00

Stagnation temperature - *Weather conditions see note 2*	T_{stg}	197	°C
Effective thermal capacity	$c_{eff} = C/A_g$	5.11	kJ/(m²K)
Max. intende operation temperature - *see note 3*	$T_{max,op}$	--	°C
Max. operation pressure - *see note 3*	$p_{max,op}$	1000	kPa

Pressure drop table - for a collector family, the values shall be for the module with highest ΔP per m² aperture area

Flow rate	kg/(s m²)	0.007	0.014	0.020	0.027	0.034	0.041	0.048	0.054	0.061	0.068
Pressure drop, ΔP	Pa	329	690	1084	1509	1968	2458	2981	3537	4124	4744

Optional weather data	Location		Link	

Testing Laboratory	SPF, CH-8640 Rapperswil		
Website	www.spf.ch		
Test report id. number	C1697LPEN, C1697QPEN	**Date of test reports**	31.03.2016

During the test G_{DIF}/G_{TOT} was always between 0.09 and 0.26

Comments of testing laboratory:

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Note 1	**Flow rate**	0.022	kg/(s m²)	**Fluid**	Water-Glycole
Note 2	**Irradiance, G = 1000 W/m²; Ambient temperature , Ta=30 °C**				
Note 3	**Given by manufacturer**				

Dr. Andreas Bohren

Datasheet version: 4.06, 2014-01-15

Annual collector output based on EN 12975 Test Results, annex to Solar KEYMARK Certificate	Licence Number	011-7S2645 F
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Annual collector output kWh/module

Collector name	Location and collector temperature (Tm)											
	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
CSAL 25 RS	2'681	1'875	1'221	2'016	1'384	881	1'481	957	583	1'612	1'031	619

Collector mounting: Fixed or tracking	Fixed; slope = latitude - 15° (rounded to nearest 5°)

Overview of locations

Location	Latitude °	Gtot kWh/m²	Ta °C	Collector orientation or tracking mode
Athens	38	1'765	18.5	South, 25°
Davos	47	1'714	3.2	South, 30°
Stockholm	59	1'166	7.5	South, 45°
Würzburg	50	1'244	9.0	South, 35°

Gtot	Annual total irradiation on collector plane	kWh/m²
Ta	Mean annual ambient air temperature	°C
Tm	Constant collector operating temperature (mean of in- and outlet temperatures)	°C

The calculation of the annual collector performance is performed with the official Solar Keymark spreadsheet tool ScenoCalc. The collector output is calculated hour by hour according to the efficiency parameters from the Keymark test using constant collector operating temperature (Tm). A detailed description of the calculations is available at http://www.sp.se/en/index/services/solar/ScenoCalc/Sidor/default.aspx.