

Summary of EN 12975 Test Results, annex to Solar KEYMARK Certificate	Certificate No.	<b>011-7 S399 F</b>
	Date of issue	31-05-2013

Company	BULEX	Country	Belgium
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Collector Type (flat plate / evacuate tubular / un-glazed)	Flat plate collector
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Integration in the roof possible ?	Yes
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Collector name	Aperture area (Aa) [m <sup>2</sup> ]	Gross length [mm]	Gross width [mm]	Gross height [mm]	Gross area (Ag) [m <sup>2</sup> ]	Power output per collector unit G = 1000 W/m <sup>2</sup> Tm-Ta :				
						0 K	10 K	30 K	50 K	70 K
						[W]	[W]	[W]	[W]	[W]
SRD 2.3	2.352	1 233	2 033	80	2.507	1 839	1 745	1 541	1 318	1 077
SRDV 2.3	2.352	2 033	1 233	80	2.507	1 839	1 745	1 541	1 318	1 077
SRD 2.3 H	2.352	1 233	2 033	80	2.507	1 839	1 745	1 541	1 318	1 077
SRD 2.3 V	2.352	2 033	1 233	80	2.507	1 839	1 745	1 541	1 318	1 077

Collector efficiency parameters related to <u>aperture area (Aa)</u> Type of fluid and flow rate see note 1	η <sub>0a</sub>	0.782	-
	a <sub>1a</sub>	3.929	W/(m <sup>2</sup> K)
	a <sub>2a</sub>	0.010	W/(m <sup>2</sup> K <sup>2</sup> )

Stagnation temperature - Weather conditions see note 2	t <sub>stg</sub>	195	°C
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Effective thermal capacity	C <sub>eff</sub> = C/Aa	4.99	kJ/(m <sup>2</sup> K)
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Max. operation pressure - see note 3	p <sub>max</sub>	1000	kPa
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Incidence angle modifiers K <sub>θ</sub> (θ)	G <sub>DIF</sub> /G <sub>TOT</sub>		θ <sub>T</sub> / θ <sub>L</sub>	50°	10°	20°	30°	40°	60°	70°
	min	max	K <sub>θ</sub> (θ <sub>T</sub> )	0.91	1.00	0.99	0.98	0.95	0.84	0.69
	0	0	K <sub>θ</sub> (θ <sub>L</sub> )	0.91	1.00	0.99	0.98	0.95	0.84	0.69
G <sub>DIF</sub> /G <sub>TOT</sub> : min&max - while measuring					<b>Optional values</b>					


Testing Laboratory	TÜV Energie und Umwelt GmbH
Website	www.eco-tuv.de

Test report id. number	21221150_EN_P_BU_SRD2.3 ; 21221150_EN_R_BU_SRD2.3 ; 21221150_EN_P_BU_SRDV2.3 ; 21221150_EN_R_BU_SRDV2.3 ; 21217689_EN_BUL_H ; 21217689_EN_BUL_V
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Date of test report	21221150 (all 29-05-2013) ; 21217689 (all 07-11-2011)
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Perf. test method	EN 12975-2 6.1.5 (indoor)
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Comments of testing laboratory :	
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Note 1	Fluid	Water	Flow rate	0.017	kg/s per m <sup>2</sup>		
Note 2	Irradiance, G <sub>s</sub> =1000 W/m <sup>2</sup> Ambient temperature, T <sub>a</sub> =30 °C						
Note 3	Given by manufacturer						



<b>Annual collector output based on EN 12975 Test Results, annex to Solar KEYMARK Certificate</b>	<b>Certificate No.</b>	<b>011-7 S399 F</b>
	Issued	31-05-2013

Annual collector output kWh													
Collector name	Location and collector temperature (T <sub>m</sub> )												
	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	
SRD 2.3	2 851	1 993	1 289	2 298	1 558	969	1 578	1 019	615	1 715	1 094	650	
SRDV 2.3	2 851	1 993	1 289	2 298	1 558	969	1 578	1 019	615	1 715	1 094	650	
SRD 2.3 H	2 851	1 993	1 289	2 298	1 558	969	1 578	1 019	615	1 715	1 094	650	
SRD 2.3 V	2 851	1 993	1 289	2 298	1 558	969	1 578	1 019	615	1 715	1 094	650	

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

Overview of locations				
Location	Latitude °	G <sub>tot</sub> kWh/m <sup>2</sup>	T <sub>a</sub> °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°

G <sub>tot</sub>	Annual total irradiation on collector plane	kWh/m <sup>2</sup>
T <sub>a</sub>	Mean annual ambient air temperature	°C
T <sub>m</sub>	Constant collector operating temperature (mean of in- and outlet temperatures)	°C

Calculation of the annual collector performance is done by the official Solar Keymark spreadsheet tool. Hour by hour the collector output is calculated according to the efficiency parameters from the Keymark test using constant collector operating temperature (T<sub>m</sub>). Detailed description with all equations used is available from the Solar Keymark web site (direct link:<http://www.estif.org/solarkeymark/annexb1.php>)

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