TÜVRheinland®
DIN CERTCO
Genau. Richtig.

Summary of EN 12975 Test Results, annex to Solar KEYMARK Certificate				Licence Number	011-7S2228 F
				Issued	2013-11-19

Company holding the	Hoval AG		Country	Liechtenstein	
Brand (optional)			Website	www.hoval.com	
Street, street number	Ausstrasse 70		E-mail	info@hoval.com	
Postal Code / City, province	FL-9490	Vaduz	Tel/Fax	423	399 24 25 00/ 399 24 11

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

Collector name	Aperture area (Aa)	Gross length	Gross width	Gross height	Gross area (AG)	Power output per collector module G = 1000 W/m² Tm-Ta 0 K	10 K	30 K	50 K	70 K
	m²	mm	mm	mm	m²	W	W	W	W	W
UltraSol Eco vertikal	2.40	2 050	1 230	54	**2.52**	1 886	1 779	1 547	1 291	1 013
UltraSol Eco horizontal	2.40	1 230	2 050	54	**2.52**	1 886	1 779	1 547	1 291	1 013

Performance test method	Glazed liquid heating collector - steady state - indoor			
Performance parameters related to aperture	η0	a1	a2	
Units	-	W/(m²K)	W/(m²K²)	
Test results - Flow rate and fluid see note 1	0.786	4.360	0.012	

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	0.98	0.96	0.92	0.86	0.74	0.50	0.25	0.00	
Incidence angle modifiers Kθ(θL)	Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°	
longitudinal direction	Kθ(θL)	1.00	0.98	0.96	0.92	0.86	0.74	0.50	0.25	0.00	

Stagnation temperature - Weather conditions see note 2	Tstg	165	°C
Effective thermal capacity	ceff = C/Ag	6.55	kJ/(m²K)
Max. intende operation temperature - see note 3	Tmax,op	190	°C
Max. operation pressure - see note 3	pmax,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)										
Pressure drop, ΔP	Pa										

Optional weather data	Location		Link	
Testing Laboratory	TÜV Rheinland			
Website	www.tuv.com/st			
Test report id. number	21222881_EN_EcoV 21222881_EN_P_EcoH	Date of test report	19 November 2013 19 November 2013	
During the test GDIF/GTOT was always between	0.15	and	0.97	(for IAM determination)

Comments of testing laboratory:

Note 1	**Flow rate**	0.019	kg/(s m²)	**Fluid**	Water
Note 2	**Irradiance, G = 1000 W/m²; Ambient temperature , Ta=30 °C**				
Note 3	**Given by manufacturer**				

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Datasheet version: 4.05, 2013-11-07

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Annual collector output based on EN 12975 Test Results, annex to Solar KEYMARK Certificate	Licence Number	011-7S2228 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
UltraSol Eco vertikal	2 779	1 840	1 104	2 041	1 324	765	1 507	921	520	1 636	983	542
UltraSol Eco horizontal	2 779	1 840	1 104	2 041	1 324	765	1 507	921	520	1 636	983	542

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.

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ScenoCalc version: Ver. 4.05 (Nov, 2013)