



Summary of EN 12975 Test Results, annex to Solar KEYMARK Certificate						Licence Number		SKM 9954/2							
						Issued		23/12/2015							
Company holding the				CICERO HELLAS S.A.		Country		GREECE							
Brand (optional)				CALPAK		Website		http://www.calpak.gr							
Street, street number				9, Sygrou Ave.		E-mail		export@calpak.gr							
Postal Code / City, province				11743 Athens		Tel/Fax		30 210 9247250 / 9231616							
Collector Type (flat plate glazed/un-glazed; evacuate tubular)						Evacuated tubular collector									
Thermal / photo voltaic hybrid collector? (PVT collector)						No									
Integration in the roof possible ? (manufacturers declaration)						Yes									
	Aperture area (Aa)	Gross length	Gross width	Gross height	Gross area (AG)	Power output per collector module									
						G = 1000 W/m ²									
						Tm-Ta									
						0 K	10 K	30 K	50 K	70 K					
Collector name	m ²	mm	mm	mm	m ²	W	W	W	W	W					
CALPAK 6VTS	0,96	1600	660	110	1,06	488	479	460	438	412					
CALPAK 7VTS	1,13	1600	827	110	1,24	574	564	541	515	485					
CALPAK 8VTS	1,30	1600	953	110	1,43	660	649	623	593	558					
CALPAK 9VTS	1,46	1600	1073	110	1,61	742	729	699	665	627					
CALPAK 10VTS	1,62	1600	1193	110	1,79	823	809	776	738	695					
CALPAK 12VTS	1,96	1600	1420	110	2,13	996	978	939	893	841					
CALPAK 14VTS	2,26	1600	1653	110	2,48	1.148	1.128	1.083	1.030	970					
CALPAK 16VTS	2,55	1600	1887	110	2,86	1.295	1.273	1.222	1.162	1.095					
Performance test method						Glazed liquid heating collector - steady state - indoor									
Performance parameters related to aperture area						η0	a1	a2							
Units						-	W/(m ² K)	W/(m ² K ²)							
Test results - Flow rate and fluid see note 1						0,508	0,844	0,004							
Bi-directional incidence angle modifiers?						Yes <i>Kθ values are obligatory for 50°.</i>									
Incidence angle modifiers Kθ(θT) transversal direction						Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
						Kθ(θT)	1,01	1,04	1,07	1,09	1,14	1,22	1,24	0,00	
Incidence angle modifiers Kθ(θL) longitudinal direction						Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
						Kθ(θL)	1,00	1,00	0,99	0,98	0,96	0,93	0,87	0,00	
Stagnation temperature - Weather conditions see note 2						Tstg	278				°C				
Effective thermal capacity						ceff = C/Ag	4,9				kJ/(m ² K)				
Max. intende operation temperature - see note 3						Tmax,op	-				°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 m ²)	0,0054	0,0109	0,0163	0,0218	0,0272	0,0327	0,0436	0,0545	0,0654					
Pressure drop, ΔP	Pa	0,0692	0,1892	0,3392	0,5192	0,7292	0,9692	1,5392	2,2292	3,0392					
Optional weather data						Location				Link					
Testing Laboratory						TÜV Rheinland, Demokritos									
Website						www.tuv.com/st, www.solar.demokritos.gr									
Test report id. number						21223034, 4167 DQ1			Date of test report		21-03-2016, 23-12-2015				
During the test GDIF/GTOT was always between						0,1	and	0,2							
Comments of testing laboratory:															
Note 1	Flow rate	0,020	kg/(s m ²)	Fluid	Water										
Note 2	Irradiance, G = 1000 W/m ² ; Ambient temperature, Ta=30 °C														
Note 3	Given by manufacturer														
Datashet version: 4.06, 2014-01-15															
Central Offices: Kalavriton 4, 145 64 kifisia, Athens, Tel: +301 6233493-4 , Fax: +301 6233495, http://www.dqshellas.gr, e-mail: ioannisalexioiu@dqshellas.gr															



Annual collector output based on EN 12975 Test Results, annex to Solar KEYMARK Certificate	Licence Number	SKM 9954/2
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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		
CALPAK 6VTS	884	790	689	758	664	569	548	470	394	590	507	425		
CALPAK 7VTS	1.040	930	811	892	782	670	645	553	464	694	596	500		
CALPAK 8VTS	1.197	1.070	933	1.026	899	771	742	636	533	799	686	575		
CALPAK 9VTS	1.344	1.202	1.048	1.152	1.010	866	833	715	599	897	770	646		
CALPAK 10VTS	1.491	1.333	1.162	1.279	1.121	960	924	793	665	995	855	717		
CALPAK 12VTS	1.804	1.613	1.406	1.547	1.356	1.162	1.119	959	804	1.204	1.034	867		
CALPAK 14VTS	2.080	1.860	1.622	1.784	1.563	1.340	1.290	1.106	927	1.388	1.192	1.000		
CALPAK 16VTS	2.347	2.099	1.830	2.013	1.764	1.512	1.455	1.248	1.046	1.566	1.346	1.129		

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

Overview of locations				
Location	Latitude °	Gtot kWh/m ²	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/m ²
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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Datasheet version:
4.06, 2014-01-15

ScenoCalc version:
Ver. 4.06 (Jan, 2014)