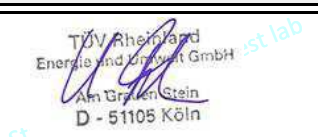


Summary of EN 12975 Test Results, annex to Solar KEYMARK Certificate						Licence Number		011-7S2365 R							
						Issued		2014-05-14							
Company holding the		Ariston Thermo SpA				Country		Italy							
Brand (optional)		CHAFFOTEAUX				Website		www.aristonthermo.com							
Street, street number		Via A. Merloni 45				E-mail		marketing@aristonthermo.com							
Postal Code / City, province		60044 Fabriano (AN)				Tel/Fax		39 02763209-1/ -40							
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)						No									
Collector name	Aperture area (Aa) m ²	Gross length mm	Gross width mm	Gross height mm	Gross area (AG) m ²	Power output per collector module									
						Gb = 850 W/m ² ; Gd = 150 W/m ²									
						Tm-Ta									
						0 K	10 K	30 K	50 K	70 K					
						W	W	W	W	W					
VDF 15	1.58	1 910	1 380	178	2.63	1 292	1 247	1 152	1 046	932					
VDF 20	2.12	1 910	1 840	178	3.51	1 733	1 674	1 545	1 404	1 251					
Performance test method						Liquid heating collector - quasi-dynamic - outdoor									
Performance parameters related to aperture						η_{0b}	c1	c2	c3	c4	c6	K θ d			
Units						-	W/(m ² K)	W/(m ² K ²)	J/(m ³ K)	-	s/m	-			
Test results - Flow rate and fluid see note 1						0.816	2.735	0.007	0.000	0.000	1.013				
Bi-directional incidence angle						Yes					<i>Kθ values are obligatory for 50°.</i>				
Incidence angle modifiers Kθ(θT)						Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
transversal direction						K θ (θ T)	1.00	1.01	1.03	1.03	1.04	1.04	1.04	0.00	
Incidence angle modifiers Kθ(θL)						Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
longitudinal direction						K θ (θ L)	1.00	0.99	0.98	0.95	0.91	0.85	0.70	0.00	
Stagnation temperature - Weather conditions see note 2						Tstg		206		°C					
Effective thermal capacity						ceff = C/Ag		21.95		kJ/(m ² K)					
Max. intended operation temperature - see note 3						Tmax,op		-		°C					
Max. operation pressure - see note 3						pmax,op		600		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)													
Pressure drop, ΔP		Pa													
Optional weather data		Location				Link									
Testing Laboratory		TÜV Energie und Umwelt GmbH													
Website		www.eco-tuv.de													
Test report id. number		21211365						Date of test report		2009.04.30					
During the test GDIF/GTOT was always between						0.06		and		0.95					
Comments of testing laboratory:															
Example comment.															
Note 1		Flow rate		0.022 kg/(s m ²)		Fluid		Water							
Note 2		Irradiance, G = 1000 W/m²; Ambient temperature, Ta=30 °C													
Note 3		Given by manufacturer													
															
Datashet 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	011-7S2365 R
	Issued	14.05.2014

Annual collector output kWh/module														
Collector name	Location and collector temperature (T _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		
VDF 15	2 217	1 775	1 367	1 780	1 394	1 049	1 302	979	711	1 413	1 064	765		
VDF 20	2 974	2 382	1 834	2 388	1 870	1 408	1 747	1 313	955	1 895	1 427	1 026		

Collector mounting: Fixed or tracking	Fixed; slope = latitude - 15° (rounded to nearest 5°)
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Overview of locations				
Location	Latitude °	G _{tot} kWh/m ²	T _a °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 _{tot}	Annual total irradiation on collector plane	kWh/m ²
T _a	Mean annual ambient air temperature	°C
T _m	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 (T_m). A detailed description of the calculations is available at <http://www.sp.se/en/index/services/solar/ScenoCalc/Sidor/default.aspx>.