


Collector Type (flat plate glazed/un-glazed; evacuate tubular)						Flat plate collector - glazed					
Thermal / photo voltaic hybrid collector? (PVT collector)						No					
Integration in the roof possible ? (manufacturers declaration)						Yes					
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					
						G = 1000 W/m ²					
						Tm-Ta					
						0 K	10 K	30 K	50 K	70 K	
						W	W	W	W	W	
PM Tinox	1.62	1 929	933	91	1.80	1 272	1 209	1 073	922	754	
MM Tinox	1.92	1 988	1 041	90	2.07	1 507	1 433	1 272	1 092	894	
GM Tinox	2.23	1 990	1 222	91	2.43	1 751	1 665	1 477	1 269	1 038	
Performance test method						Glazed liquid heating collector - steady state - outdoor					
Performance parameters related to aperture area		η ₀	a ₁	a ₂							
Units		-	W/(m ² K)	W/(m ² K ²)							
Test results - Flow rate and fluid see note 1		0.785	3.722	0.012							
Bi-directional incidence angle modifiers?		No <i>Kθ values are obligatory for 50°.</i>									
Incidence angle modifiers Kθ(θ)		Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
		Kθ(θ)	1.00	0.99	0.98	0.97	0.94	0.90	0.80	0.51	0.00
Incidence angle modifier not bi-directional - leave fields blank											
Stagnation temperature - Weather conditions see note 2						Tstg	203 °C				
Effective thermal capacity						ceff = C/Ag	9.54 kJ/(m ² K)				
Max. intended 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 m ² aperture area											
Flow rate	kg/(s m ²)	-	-	-	-	-	-	-	-	-	
Pressure drop, ΔP	Pa	-	-	-	-	-	-	-	-	-	
Optional weather data		Location			Link						
Testing Laboratory		TZS, ITW University Stuttgart									
Website		http://www.itw.uni-stuttgart.de									
Test report id. number		12COL1079/2, 12COL1079Q/2, 12COL1078/1				Date of test report		2016.03.10			
During the test GDIF/GTOT was always between		0	and	1							
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										
						 Forschungsinstitut Testströme für "Solaranlagen" Institut für Thermodynamik und Universität Stuttgart Pfaffenwaldring, 7050 Stuttgart (Vollmann)					
						Datasheet version: 4.06, 2014-01-15					
DIN CERTCO • Alboinstraße 56 • 12103 Berlin Tel: +49 30 7562-1131 • Fax: +49 30 7562-1141 • E-Mail: info@dincertco.de • www.dincertco.de											

Annual collector output based on EN 12975 Test Results, annex to Solar KEYMARK Certificate	Licence Number	011-7S1941 F
	Issued	10.03.2016

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
PM Tinox	2 023	1 442	946	1 535	1 062	671	1 131	740	450	1 230	800	478
MM Tinox	2 398	1 709	1 121	1 819	1 259	795	1 341	877	533	1 458	948	566
GM Tinox	2 785	1 985	1 302	2 113	1 462	923	1 558	1 019	619	1 693	1 101	658

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

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>.