


Annex to Solar Keymark Certificate						Licence Number		011-7S2924 F				
						Date issued		2019-05-28				
						Issued by						
Licence holder		Şimşek Güneş Kolektörleri				Country		Türkiye				
Brand (optional)		-				Web		https://simseksolar.com.tr/				
Street, Number		Organize Sanayi Bölgesi Rasim Dokur Bulvarı 2. Cadde No:32				E-mail		info@simseksolar.com.tr				
Postcode, City		Akdeniz / Mersin				Tel		+90 324 324 12 35				
Collector Type						Flat plate collector						
Collector name						Power output per collector						
						Gb = 850 W/m ² , Gd = 150 W/m ² & u = 1.3 m/s $\vartheta_m - \vartheta_a$						
		Gross height	Gross area (A_G)	Gross length	Gross width	Aperture area (A_a)	0 K	10 K	30 K	50 K	70 K	117 K
		mm	m ²	mm	mm	m ²	W	W	W	W	W	W
Orion 412 Series		81	1.81	1 935	935	1.62	1 231	1 163	1 021	868	705	282
Orion 413 Series		81	1.83	1 960	935	1.64	1 244	1 176	1 032	878	713	285
Orion 422 Series		81	1.89	1 770	1 065	1.70	1 285	1 215	1 066	906	736	295
Orion 423 Series		81	2.09	1 960	1 065	1.89	1 421	1 343	1 179	1 002	814	326
Orion 424 Series		81	2.22	2 080	1 065	2.01	1 510	1 427	1 252	1 065	865	346
Orion 425 Series		81	2.31	2 170	1 065	2.10	1 571	1 485	1 303	1 108	900	360
Orion 432 Series		81	2.08	1 770	1 175	1.89	1 414	1 337	1 173	997	810	324
Orion 433 Series		81	2.30	1 960	1 175	2.10	1 564	1 478	1 297	1 103	896	359
Orion 434 Series		81	2.44	2 080	1 175	2.23	1 659	1 568	1 376	1 170	950	381
Orion 435 Series		81	2.55	2 170	1 175	2.33	1 734	1 639	1 438	1 223	993	398
Orion 436s Series		81	2.68	2 280	1 175	2.45	1 822	1 723	1 511	1 285	1 044	418
Orion 436 Series		81	2.69	2 290	1 175	2.46	1 829	1 729	1 517	1 290	1 048	420
Orion 437 Series		81	2.73	2 320	1 175	2.50	1 856	1 755	1 540	1 309	1 063	426
Orion 438 Series		81	2.81	2 390	1 175	2.57	1 911	1 806	1 585	1 347	1 095	438
Power output per m² gross area							680	643	564	480	390	156
Performance parameters test method		Quasi dynamic										
Performance parameters (related to A_G)		η _{0, b}	a1	a2	a3	a4	a5	a6	a7	a8	Kd	
Units		-	W/(m ² K)	W/(m ² K ²)	J/(m ³ K)	-	J/(m ² K)	s/m	W/(m ² K ⁴)	W/(m ² K ⁴)	-	
Test results		0.686	3.660	0.007	0.000	0.00	8 111	0.000	0.00	0.0E+00	0.942	
Incidence angle modifier test method		Quasi dynamic - outdoor										
Incidence angle modifier		Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°	
Transversal		K _{θT, coll}	1.00	1.00	0.99	0.98	0.95	0.87	0.69	0.35	0.00	
Longitudinal		K _{θL, coll}	1.00	1.00	0.99	0.98	0.95	0.87	0.69	0.35	0.00	
Heat transfer medium for testing							Water					
Flow rate for testing (per gross area, A_G)							dm/dt	0.020	kg/(sm ²)			
Maximum temperature difference during thermal performance test							($\vartheta_m - \vartheta_a$) _{max}	87	K			
Standard stagnation temperature (G = 1000 W/m²; $\vartheta_a = 30$ °C)							ϑ_{stg}	220	°C			
Maximum operating temperature							$\vartheta_{max, op}$	100	°C			
Maximum operating pressure							p _{max, op}	900	kPa			
Testing laboratory		TZS, ITW University Stuttgart				www.itw.uni-stuttgart.de						
Test report(s)		18COL1434 18COL1435 18COL1435Q				Dated		22.05.2019 22.05.2019 22.05.2019				
Comments of testing laboratory							Datasheet version: 6.0, 2018-10-30					
Documented performance parameters are taken from 18COL1434 (Orion 412 Series)							 Forschungs- und Testzentrum für Solaranlagen Institut für Thermodynamik und Wärmeleittechnik Universität Stuttgart Pfaffenwaldring 6, 70550 Stuttgart (Vaihingen)					
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Supplementary Information		Issued		2019-05-28									
Annual collector output in kWh/collector at mean fluid temperature ϑ_m													
Standard Locations		Athens		Davos		Stockholm		Würzburg					
Collector name	ϑ_m	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C
Orion 412 Series		1 979	1 373	885	1 478	1 004	629	1 089	696	418	1 189	753	445
Orion 413 Series		2 001	1 389	895	1 495	1 015	636	1 101	703	423	1 203	761	450
Orion 422 Series		2 067	1 434	924	1 544	1 048	657	1 137	727	436	1 242	786	465
Orion 423 Series		2 286	1 586	1 022	1 707	1 159	727	1 257	803	483	1 373	869	514
Orion 424 Series		2 428	1 685	1 085	1 813	1 231	772	1 336	853	513	1 459	923	546
Orion 425 Series		2 526	1 753	1 129	1 887	1 281	803	1 390	888	533	1 518	961	568
Orion 432 Series		2 275	1 578	1 017	1 699	1 154	723	1 251	800	480	1 367	865	512
Orion 433 Series		2 515	1 745	1 125	1 878	1 276	800	1 384	884	531	1 511	957	566
Orion 434 Series		2 668	1 851	1 193	1 993	1 353	848	1 468	938	563	1 603	1 015	600
Orion 435 Series		2 789	1 935	1 247	2 083	1 414	886	1 534	980	589	1 676	1 061	627
Orion 436s Series		2 931	2 034	1 310	2 189	1 486	932	1 612	1 030	619	1 761	1 115	659
Orion 436 Series		2 942	2 041	1 315	2 197	1 492	935	1 618	1 034	621	1 768	1 119	662
Orion 437 Series		2 986	2 071	1 335	2 230	1 514	949	1 642	1 049	630	1 794	1 135	672
Orion 438 Series		3 073	2 132	1 374	2 295	1 558	977	1 690	1 080	649	1 847	1 169	691
Annual output per m ² gross area		1 094	759	489	817	555	348	602	384	231	657	416	246
Fixed or tracking collector	Fixed (slope = latitude - 15°; rounded to nearest 5°)												
Annual irradiation on collector plane	1765 kWh/m ²			1714 kWh/m ²			1166 kWh/m ²			1244 kWh/m ²			
Mean annual ambient air temperature	18.5°C			3.2°C			7.5°C			9.0°C			
Collector orientation or tracking mode	South, 25°			South, 30°			South, 45°			South, 35°			
The collector is operated at constant temperature ϑ_m (mean of in- and outlet temperatures). The calculation of the annual collector performance is performed with the official Solar Keymark spreadsheet tool Scenocalc Ver. 6.0 (October 2018). A detailed description of the calculations is available at www.solarkeymark.org/scenocalc													
Additional Information													
Collector heat transfer medium										Water-Glycole			
The collector is deemed to be suitable for roof integration										Yes			
The collector was tested successfully under the following conditions:													
Climate class (A+, A, B or C)										A		--	
G (W/m ²) >		1000		ϑ_a (°C) >		20		H_x (MJ/m ²) >		600			
Maximum tested positive load										2800		Pa	
Maximum tested negative load										2400		Pa	
Hail resistance using steel ball (maximum drop height)										2.0		m	
Additional collector attribute(s)													
<input type="checkbox"/> Using external power source(s) for normal operation				<input type="checkbox"/> Active or passive measure(s) for self-protection									
<input type="checkbox"/> Co-generating thermal and electrical power				<input type="checkbox"/> Wind and/or infrared sensitive collector(s) (WISC)									
<input type="checkbox"/> Façade collector(s)													
Energy Labelling Information													
	Reference Area, A_{sol} (m ²)			Hydraulic Designation Code									
Orion 412 Series	1.81			8-V-1234S-7.2,1815-16.7,945-D									
Orion 413 Series	1.83			8-V-1234S-7.2,1840-16.7,945-D									
Orion 422 Series	1.89			9-V-1234S-7.2,1650-16.7,1075-D									
Orion 423 Series	2.09			9-V-1234S-7.2,1840-16.7,1075-D									
Orion 424 Series	2.22			9-V-1234S-7.2,1960-16.7,1075-D									
Orion 425 Series	2.31			9-V-1234S-7.2,2050-16.7,1075-D									
Orion 432 Series	2.08			10-V-1234S-7.2,1650-16.7,1185-D									
Orion 433 Series	2.30			10-V-1234S-7.2,1840-16.7,1185-D									
Orion 434 Series	2.44			10-V-1234S-7.2,1960-16.7,1185-D									
Orion 435 Series	2.55			10-V-1234S-7.2,2050-16.7,1185-D									
Orion 436s Series	2.68			10-V-1234S-7.2,2160-16.7,1185-D									
Orion 436 Series	2.69			10-V-1234S-7.2,2170-16.7,1185-D									
Orion 437 Series	2.73			10-V-1234S-7.2,2200-16.7,1185-D									
Orion 438 Series	2.81			10-V-1234S-7.2,2270-16.7,1185-D									
Data required for CDR (EU) No 811/2013 - Reference Area A_{sol}						Data required for CDR (EU) No 812/2013 - Reference Area A_{sol}							
Collector efficiency (η_{col})						52%		Zero-loss efficiency (η_0)		0.68		--	
Remark: Collector efficiency (η_{col}) is defined in CDR (EU) No 811/2013 as collector efficiency of the solar collector at a temperature difference between the solar collector and the surrounding air of 40 K and a global solar irradiance of 1000 W/m ² , expressed in % and rounded to the nearest integer. Deviating from the regulation η_{col} is based on reference area (A_{sol}) which is aperture area for values according to EN 12975-2 or gross area for ISO 9806:2017.						First-order coefficient (a_1)		3.66		W/(m ² K)			
						Second-order coefficient (a_2)		0.007		W/(m ² K ²)			
						Incidence angle modifier IAM (50°)		0.96		--			
Remark: The data given in this section are related to collector reference area (A_{sol}) which is aperture area for values according to EN 12975-2 or gross area for ISO 9806. Consistent data sets for either aperture or gross area can be used in calculations like in the regulation 811 and 812 and simulation programs.													
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