

Certificate no. **PSK – 012/2016**
Certificado nº



Name and address of certificate holder:
Nome e morada do titular do certificado:

Jacques Giordano Industries, S.A.
529 Avenue de la Fleuride – ZI des Paluds
13685 Aubagne
France

Product:
Produto:

Thermal solar collector
Coletor solar térmico

Type references:
Referências:

4N

Trademark(s):
Marca(s) comercial(is):

GIORDANO INDUSTRIES

Technical characteristics:
Características técnicas:

Summary of EN ISO 9806 Test Results: Registration No. PSK-012/2016
(in annex)
*Resumo dos resultados dos ensaios realizados segundo a norma EN ISO 9806:
Registo Nº PSK-012/2016 (em anexo)*

This product is in conformity with:
Este produto está em conformidade com:

EN 12975-1:2006+A1:2010, EN ISO 9806:2013

and with the Specific Keymark Scheme Rules for Solar Thermal Products
e com as Regras Particulares do CEN Keymark Scheme para Produtos Solares Térmicos.

Test report(s) no. / issued by:
Relatório(s) de ensaios nº(s) / emitido(s) por:

C1673LPEN and /e C1673QPEN /SPF

Additional information (if any):
Informação adicional (se existir):

This certificate is valid until:
Este certificado é válido até:

2021-04-03

and supersedes certificate no:
e substitui o certificado nº:

Date of issue:
Data de emissão:



2016-04-04



Francisco Barroca
General Manager / *Diretor Geral*



This Certificate includes one Annex with 2 (two) pages
Este Certificado é constituído por um Anexo com 2 (duas) páginas

Annex to Solar Keymark Certificate						Licence Number		PSK-012/2016							
Summary of EN ISO 9806 Test Results						Issued		2016-04-04							
Collector test standard		EN ISO 9806													
Licence holder		Jacques Giordano Industries S. A.				Country		France							
Brand (optional)		Giordano Industries				Web		www.giordano.fr							
Street, Number		529 Avenue de la Fleuride, ZI des Paluds				E-mail		contact@giordano.fr							
Postcode, City		FR-13685, Aubagne Cedex				Tel		+33 442 84 58 00							
Collector Type						Flat plate collector, unglazed									
					Power output per collector $G_b = 850 \text{ W/m}^2$; $G_d = 150 \text{ W/m}^2$; $\vartheta_m - \vartheta_a = 2\text{K}$ <u>u (m/s)</u>										
					1.0		1.5		3.0						
Collector name					W		W		W						
Capteur 4N					2'143		2'101		1'973						
Power output per m² gross area					456		447		420						
Performance parameters test method						Steady state - outdoor									
Performance parameters (related to AG)						η_0, hem	b1	b2	bu	ϵ/α					
Units						-	W/(m ² K)	Ws/(m ³ K)	s/m	-					
Test results						0.607	23.87	5.42	0.012	0.85					
Incidence angle modifier test method						Steady state - outdoor									
Bi-directional incidence angle modifiers						Yes									
Incidence angle modifier						Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
Transversal						$K_{GT, \text{coll}}$	1.00	1.00	0.99	1.01	1.08	1.00	0.82	0.47	0.00
Longitudinal						$K_{GL, \text{coll}}$	1.00	1.00	1.00	0.99	0.98	0.94	0.83	0.58	0.00
Fluid for testing						Water-Glycole									
Flow rate for testing (per gross area, AG)						dm/dt	0.028	kg/(sm ²)							
Maximum temperature difference for thermal performance calculations						$(\vartheta_m - \vartheta_a)_{\text{max}}$	50	K							
Standard stagnation temperature ($G = 1000 \text{ W/m}^2$; $\vartheta_a = 30 \text{ }^\circ\text{C}$)						ϑ_{stg}	53	°C							
Effective thermal capacity (per gross area, AG)						C/m ²	17.1	kJ/(Km ²)							
Maximum operating temperature						$\vartheta_{\text{max, op}}$	60	°C							
Maximum operating pressure						$P_{\text{max, op}}$	400	kPa							
Testing laboratory		SPF, CH-8640 Rapperswil				www.spf.ch									
Test report(s)		C1673LPEN C1673QPEN				Dated		01.03.2016 01.03.2016							
Comments of testing laboratory															
						 INSTITUT FÜR SOLARTECHNIK 									

Annex to Solar Keymark Certificate Supplementary Information	Licence Number	PSK-012/2016
	Issued	2016-04-04

Annual collector output in kWh/collector at mean fluid temperature ϑ_m , based on ISO 9806 Test Results													
Collector name	Standard Locations ϑ_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
Capteur 4N		3'157	--	--	309	--	--	597	--	--	745	--	--
Annual output per m ² gross area		672	--	--	66	--	--	127	--	--	158	--	--
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. 5.01 (July 2015). A detailed description of the calculations is available at www.solarkeymark.org/scenocalc

Additional Information

Collector heat transfer medium	Liquid
Hybrid Thermal and Photo Voltaic collector	No
The collector is deemed to be suitable for roof integration	No
The collector was tested successfully according to EN ISO 9806 under the following conditions:	
Climate class (A, B or C)	A --
Positive Mechanical Load	500 Pa
Negative Mechanical Load	300 Pa
Hail resistance using ice balls (diameter)	35 mm

Energy Labelling Information

	Reference Area, A_{sol} (m ²)	Data required for CDR (EU) No 811/2013 - Reference Area A_{sol}	
Capteur 4N	4.70	Collector efficiency (η_{col})	-- %
		<i>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/m², 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.</i>	
		Data required for CDR (EU) No 812/2013 - Reference Area A_{sol}	
		Zero-loss efficiency (η_0)	0.600 --
		First-order coefficient (a_1)	29.29 W/(m ² K)
		Second-order coefficient (a_2)	0.000 W/(m ² K ²)
		Incidence angle modifier IAM (50°)	1.02 --
		<i>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.</i>	