


<b>Annex to Solar Keymark Certificate</b>					<b>Licence Number</b>		<b>23.01.027</b>																	
					<b>Date issued</b>		<b>2024-02-08</b>																	
					<b>Issued by</b>		<b>ECC</b>																	
<b>Licence holder</b>		<b>HELIOFRANCE</b>			<b>Country</b>		France																	
<b>Brand (optional)</b>		COPERNIC			<b>Web</b>		www.heliofrance.com																	
<b>Street, Number</b>		2862 Route de Toulouse			<b>E-mail</b>		contact@heliofrance.fr																	
<b>Postcode, City</b>		31370 BERAT			<b>Tel</b>		+33 561 444 689																	
<b>Collector Type</b>					Flat plate collector																			
<b>Collector name</b>					<b>Gross area (A<sub>G</sub>)</b> m <sup>2</sup>		<b>Gross length</b> mm		<b>Gross width</b> mm		<b>Gross height</b> mm		<b>Power output per collector</b> G <sub>b</sub> = 850 W/m <sup>2</sup> , G <sub>d</sub> = 150 W/m <sup>2</sup> & u = 1.3 m/s ϑ <sub>m</sub> - ϑ <sub>a</sub>											
													0 K		10 K		30 K		50 K		70 K		83 K	
													W		W		W		W		W		W	
<b>COPERNIC H272.12-N-AR</b>					2,72		2 192		1 241		90		2 090		1 960		1 695		1 421		1 138		949	
<b>COPERNIC H272.12-AR</b>					2,72		2 192		1 241		90		2 090		1 960		1 695		1 421		1 138		949	
<b>COPERNIC V272.12-N-AR</b>					2,72		1 241		2 192		90		2 090		1 960		1 695		1 421		1 138		949	
<b>COPERNIC V272.12-AR</b>					2,72		1 241		2 192		90		2 090		1 960		1 695		1 421		1 138		949	
<b>COPERNIC H232.12-N-AR</b>					2,32		1 870		1 241		90		1 782		1 672		1 446		1 212		970		809	
<b>COPERNIC H232.12-AR</b>					2,32		1 870		1 241		90		1 782		1 672		1 446		1 212		970		809	
<b>COPERNIC V232.12-N-AR</b>					2,32		1 241		1 870		90		1 782		1 672		1 446		1 212		970		809	
<b>COPERNIC V232.12-AR</b>					2,32		1 241		1 870		90		1 782		1 672		1 446		1 212		970		809	
<b>Power output per m<sup>2</sup> gross area</b>													768		721		623		522		418		349	
<b>Performance parameters test method</b>					Steady state - outdoor																			
<b>Performance parameters (related to A<sub>G</sub>)</b>					η <sub>0, b</sub>		a <sub>1</sub>		a <sub>2</sub>		a <sub>3</sub>		a <sub>4</sub>		a <sub>5</sub>		a <sub>6</sub>		a <sub>7</sub>		a <sub>8</sub>		K <sub>d</sub>	
<b>Units</b>					-		W/(m <sup>2</sup> K)		W/(m <sup>2</sup> K <sup>2</sup> )		J/(m <sup>3</sup> K)		-		J/(m <sup>2</sup> K)		s/m		W/(m <sup>2</sup> K <sup>4</sup> )		W/(m <sup>2</sup> K <sup>4</sup> )		-	
<b>Test results</b>					0,776		4,71		0,004		0,000		0,00		8 900		0,000		0,00		0,0E+00		0,93	
<b>Incidence angle modifier test method</b>					Quasi dynamic - outdoor																			
<b>Incidence angle modifier</b>					Angle		10°		20°		30°		40°		50°		60°		70°		80°		90°	
<b>Transversal</b>					K <sub>gT, coll</sub>		1,00		1,00		1,00		0,99		0,97		0,92		0,81		0,56		0,00	
<b>Longitudinal</b>					K <sub>gL, coll</sub>		1,00		1,00		1,00		0,99		0,97		0,92		0,81		0,56		0,00	
<b>Heat transfer medium for testing</b>					Water-Glycole																			
<b>Flow rate for testing (per gross area, A<sub>G</sub>)</b>					dm/dt				0,019		kg/(sm <sup>2</sup> )													
<b>Maximum temperature difference during thermal performance test</b>					(ϑ <sub>m</sub> -ϑ <sub>a</sub> ) <sub>max</sub>				53		K													
<b>Standard stagnation temperature (G = 1000 W/m<sup>2</sup>; ϑ<sub>a</sub> = 30 °C)</b>					ϑ <sub>stg</sub>				185		°C													
<b>Maximum operating temperature</b>					ϑ <sub>max, op</sub>				200		°C													
<b>Maximum operating pressure</b>					p <sub>max, op</sub>				600		kPa													
<b>Testing laboratory</b>					CSTB							https://www.cstb.fr												
<b>Test report(s)</b>					296464 (Istituto Giordano) VAL 14-26049352							<b>Dated</b>		16/07/2012 24/10/2015										
<b>Comments of testing laboratory</b>					Ver. 6.2 (13.01.2022)																			
The Company HelioFrance has changed her certification body from ICIM to Eurovent Certita Certification. This certificate is established with the previous results used for the certification of the range COPERNIC H272 / V272 / H232 / V232 (report N°296464).									Signé numériquement par CONNEXIVE NVI Traumatologie eSignatures de la part de Emmanuel Traynard Date : 08/02/2024 11:44:33															
EUROVENT CERTITA CERTIFICATION SAS au capital de 100 000 € - 34 rue de Laffitte 75009 Paris - FRANCE - Tel. : 33 (0)1 75 44 71 71 - 513 133 637 RCS Paris - SIRET 513 133 637 000 35 – TVA FR 59513133637																								

Annex to Solar Keymark Certificate		Licence Number		21.03.027													
Supplementary Information		Issued		2024-02-08													
<b>Gross Thermal Yield in kWh/collector at mean fluid temperature <math>\vartheta_m</math></b>																	
Standard Locations		Athens		Davos		Stockholm		Würzburg									
Collector name	$\vartheta_m$	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C				
COPERNIC H272.12-N-AR		3 371	2 258	1 409	2 463	1 622	990	1 827	1 124	654	1 996	1 214	696				
COPERNIC H272.12-AR		3 371	2 258	1 409	2 463	1 622	990	1 827	1 124	654	1 996	1 214	696				
COPERNIC V272.12-N-AR		3 371	2 258	1 409	2 463	1 622	990	1 827	1 124	654	1 996	1 214	696				
COPERNIC V272.12-AR		3 371	2 258	1 409	2 463	1 622	990	1 827	1 124	654	1 996	1 214	696				
COPERNIC H232.12-N-AR		2 875	1 926	1 202	2 100	1 384	845	1 559	959	558	1 703	1 035	594				
COPERNIC H232.12-AR		2 875	1 926	1 202	2 100	1 384	845	1 559	959	558	1 703	1 035	594				
COPERNIC V232.12-N-AR		2 875	1 926	1 202	2 100	1 384	845	1 559	959	558	1 703	1 035	594				
COPERNIC V232.12-AR		2 875	1 926	1 202	2 100	1 384	845	1 559	959	558	1 703	1 035	594				
Gross Thermal Yield per m <sup>2</sup> gross area		1 239	830	518	905	596	364	672	413	241	734	446	256				
Annual efficiency, $\eta_a$		70%	47%	29%	56%	37%	22%	58%	35%	21%	59%	36%	21%				
Fixed or tracking collector		Fixed (slope = latitude - 15°; rounded to nearest 5°)															
Annual irradiation on collector plane		1765 kWh/m <sup>2</sup>			1630 kWh/m <sup>2</sup>			1166 kWh/m <sup>2</sup>			1244 kWh/m <sup>2</sup>						
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 $\vartheta_m$ (mean of in- and outlet temperatures). The calculation of the annual collector performance is performed with the official Solar Keymark spreadsheet tool Scenocalc Ver. 6.2 (13.01.2022). A detailed description of the calculations is available at <a href="http://www.estif.org/solarkeymarknew/">http://www.estif.org/solarkeymarknew/</a>																	
<b>Additional Information</b>																	
Collector heat transfer medium										Water							
The collector is deemed to be suitable for roof integration										No							
The collector was tested successfully under the following conditions:																	
Climate class (A+, A, B or C)										C		--					
G (W/m <sup>2</sup> ) >		850		$\vartheta_a$ (°C) >		10		$H_x$ (MJ/m <sup>2</sup> ) >		14							
Maximum tested positive load										1000		Pa					
Maximum tested negative load										100		Pa					
Hail resistance using steel ball (maximum drop height)										2		m					
<b>Additional collector attribute(s)</b>																	
Using external power source(s) for normal operation					No		Active or passive measure(s) for self-protection					No					
Co-generating thermal and electrical power					No		Façade collector(s)					No					
<b>Energy Labelling Information</b>						<b>Additional Informative Technical Data</b>											
Reference Area, $A_{sol}$ (m <sup>2</sup> )						Hydraulic Designation Code				Aperture Area, $A_a$ (m <sup>2</sup> )							
COPERNIC H272.12-N-AR						{F}-{O}-{CL}-{A:Ø,L}-{C:Ø,L}-{D}				"[Aa]"							
COPERNIC H272.12-AR						{F}-{O}-{CL}-{A:Ø,L}-{C:Ø,L}-{D}				"[Aa]"							
COPERNIC V272.12-N-AR						{F}-{O}-{CL}-{A:Ø,L}-{C:Ø,L}-{D}				"[Aa]"							
COPERNIC V272.12-AR						{F}-{O}-{CL}-{A:Ø,L}-{C:Ø,L}-{D}				"[Aa]"							
COPERNIC H232.12-N-AR						{F}-{O}-{CL}-{A:Ø,L}-{C:Ø,L}-{D}				"[Aa]"							
COPERNIC H232.12-AR						{F}-{O}-{CL}-{A:Ø,L}-{C:Ø,L}-{D}				"[Aa]"							
COPERNIC V232.12-N-AR						{F}-{O}-{CL}-{A:Ø,L}-{C:Ø,L}-{D}				"[Aa]"							
COPERNIC V232.12-AR						{F}-{O}-{CL}-{A:Ø,L}-{C:Ø,L}-{D}				"[Aa]"							
<b>Data required for CDR (EU) No 811/2013 - Reference Area <math>A_{sol}</math></b>						<b>Data required for CDR (EU) No 812/2013 - Reference Area <math>A_{sol}</math></b>											
Collector efficiency ( $\eta_{col}$ )						57%				Zero-loss efficiency ( $\eta_0$ )				0,77 --			
Remark: Collector efficiency ( $\eta_{col}$ ) 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 <sup>2</sup> , expressed in % and rounded to the nearest integer. Deviating from the regulation $\eta_{col}$ 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 ( $a_1$ )				4,71				W/(m <sup>2</sup> K)			
						Second-order coefficient ( $a_2$ )				0,004				W/(m <sup>2</sup> K <sup>2</sup> )			
						Incidence angle modifier IAM (50°)				0,97				--			
						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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