





Summary of	EN12976-2	test results	Certification No.	011-7S2256 A
Annex to Solar KEYMARK Certificate			Issued	2016-07-26

Company	Ariston Thermo S.p.A.		Country	Italy	
Brand (optional)	ARISTON KAIROS		Website	www.aristonthermo.com	
Street	Via A. Merloni 45		E-mail	public.relations@aristonthermo.com	
Postal Code	60044	Fabriano	Tel. / Fax	+39	02763209 -1 / -40

## System family overview

Collector name	For each storage and collector size, give number of collectors												
	CNA150HF				CNA200HF				CNA300HF				
Kairos CF2.0-1	1				1				2				

Name of system configuration		ARISTON KAIROS THERMO CF-1 150-1											
Collector name	Kairos CF2.0-1	No. Collectors	1	Storage name	CNA150HF								

## Calculated annual results for "solar-only / preheat system"

Location	Qd,sh MJ/y	Daily drawoff 110 l				Daily drawoff 140 l				Daily drawoff 170 l			
		Qd,hw	QL	Qpar	fsol	Qd,hw	QL	Qpar	fsol	Qd,hw	QL	Qpar	fsol
		MJ/y	MJ/y	MJ/y	%	MJ/y	MJ/y	MJ/y	%	MJ/y	MJ/y	MJ/y	%
Stockholm SE		6150	2763	-	45	7821	3050	-	39	9492	3248	-	34
WürzburgDE		5897	2854	-	49	7506	3248	-	43	9114	3500	-	38
Davos CH		6654	4037	-	61	8483	4478	-	53	10281	4762	-	46
Athens GR		4573	3564	-	78	5834	4194	-	72	7064	4667	-	66

## Perf. indicators for the table above

Qd,sh	MJ/y	Not relevant for solar domestic hot water system
Qd	MJ/y	Annual heat demand for domestic hot water
QL	MJ/y	Annual heat energy delivered by the solar system
Qpar	MJ/y	Annual parasitic energy: (electricity for pumps/controllers)
$f_{sol}=Q_L/Q_d$	-	Solar fraction

Ref. conditions		Stockholm SE	Würzburg DE	Davos CH	Athens GR
	G		1.157	1.230	1.684
T <sub>a,ave</sub>	°C	7,5	9,0	3,2	18,5
T <sub>c,ave</sub>	°C	8,5	10,0	5,4	17,8
± ΔT <sub>c</sub>		6,4	3,0	0,8	7,4

G	kWh/m <sup>2</sup>	Annual irradiation South, 45°
T <sub>a,ave</sub>	°C	Annual average outdoor air temperature
T <sub>c,ave</sub>	°C	Annual average mains cold water temp.
ΔT <sub>c</sub>	K	Seasonal variation of T <sub>c</sub>
Th	45 °C	Desired hot water temperature (mixing valve temperature).

Max. operating press. - collector side	150	kPa	Max. operating press. - tank side	800	kPa
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Testing Laboratory	TÜV Rheinland Energy GmbH
Website	www.tuv.com/st
Test report id. number	21222508_EN_Sys; 21232886.001
Date of test report	2012-09-27; 2016-07-26
Test method	ISO 9459-5 (DST)

## Comments of test lab

Because of reaching the limited faux value according to ISO 9459-5, a long term prediction as a solar plus supplementary system was not possible.



TÜV Rheinland Energy GmbH  
Am Grauen Stein  
51105 Köln



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## System family overview

Collector name	For each storage and collector size, give number of collectors												
	CNA150HF			CNA200HF			CNA300HF						
Kairos CF2.0-1	1			1			2						

Name of system configuration			ARISTON KAIROS THERMO CF-1 200-1		
Collector name	Kairos CF2.0-1	No. Collectors	1	Storage name	CNA200HF

## Calculated annual results for "solar-only / preheat system"

Location	Qd,sh MJ/y	Daily drawoff 170 l				Daily drawoff 200 l				Daily drawoff 250 l			
		Qd,hw	QL	Qpar	fsol	Qd,hw	QL	Qpar	fsol	Qd,hw	QL	Qpar	fsol
		MJ/y	MJ/y	MJ/y	%	MJ/y	MJ/y	MJ/y	%	MJ/y	MJ/y	MJ/y	%
Stockholm SE		9492	3280	-	35	11164	3469	-	31	13939	3627	-	26
WürzburgDE		9114	3500	-	39	10691	3721	-	35	13371	3910	-	29
Davos CH		10281	4762	-	46	12110	4983	-	41	15137	5235	-	35
Athens GR		7064	4699	-	67	8326	5109	-	62	10407	5550	-	54

## Perf. indicators for the table above

Qd,sh	MJ/y	Not relevant for solar domestic hot water system
Qd	MJ/y	Annual heat demand for domestic hot water
QL	MJ/y	Annual heat energy delivered by the solar system
Qpar	MJ/y	Annual parasitic energy: (electricity for pumps/controllers)
$f_{sol}=Q_L/Q_d$	-	Solar fraction

Ref. conditions		Stockholm SE	Würzburg DE	Davos CH	Athens GR
	G		1.157	1.230	1.684
Ta,ave	°C	7,5	9,0	3,2	18,5
Tc,ave	°C	8,5	10,0	5,4	17,8
± ΔTc		6,4	3,0	0,8	7,4

G	kWh/m <sup>2</sup>	Annual irradiation South, 45°
Ta,ave	°C	Annual average outdoor air temperature
Tc,ave	°C	Annual average mains cold water temp.
ΔTc	K	Seasonal variation of Tc
Th	45 °C	Desired hot water temperature (mixing valve temperature).

Max. operating press. - collector side	150	kPa	Max. operating press. - tank side	800	kPa
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## System family overview

Collector name	For each storage and collector size, give number of collectors														
	CNA150HF			CNA200HF			CNA300HF								
Kairos CF2.0-1	1			1			2								

Name of system configuration		ARISTON KAIROS THERMO CF-1 300-1													
Collector name	Kairos CF2.0-1	No. Collectors	2	Storage name	CNA300HF										

## Calculated annual results for "solar-only / preheat system"

Location	Qd,sh MJ/y	Daily drawoff 250 l				Daily drawoff 300 l				Daily drawoff 400 l			
		Qd,hw	QL	Qpar	fsol	Qd,hw	QL	Qpar	fsol	Qd,hw	QL	Qpar	fsol
		MJ/y	MJ/y	MJ/y	%	MJ/y	MJ/y	MJ/y	%	MJ/y	MJ/y	MJ/y	%
Stockholm SE		13939	6055	-	43	16746	6496	-	39	22327	7096	-	32
WürzburgDE		13371	6402	-	48	16052	6969	-	44	21413	7474	-	35
Davos CH		15137	9051	-	60	18165	9650	-	53	24220	10186	-	42
Athens GR		10407	8042	-	77	12488	9019	-	72	16651	10312	-	62

## Perf. indicators for the table above

Qd,sh	MJ/y	Not relevant for solar domestic hot water system
Qd	MJ/y	Annual heat demand for domestic hot water
QL	MJ/y	Annual heat energy delivered by the solar system
Qpar	MJ/y	Annual parasitic energy: (electricity for pumps/controllers)
$f_{sol}=Q_L/Q_d$	-	Solar fraction

Ref. conditions		Stockholm SE	Würzburg DE	Davos CH	Athens GR
	G	1.157	1.230	1.684	1.736
	T <sub>a,ave</sub>	7,5	9,0	3,2	18,5
	T <sub>c,ave</sub>	8,5	10,0	5,4	17,8
	± ΔTc	6,4	3,0	0,8	7,4

G	kWh/m <sup>2</sup>	Annual irradiation South, 45°
T <sub>a,ave</sub>	°C	Annual average outdoor air temperature
T <sub>c,ave</sub>	°C	Annual average mains cold water temp.
ΔTc	K	Seasonal variation of Tc
Th	45 °C	Desired hot water temperature (mixing valve temperature).

Max. operating press. - collector side	150	kPa	Max. operating press. - tank side	800	kPa
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Website	www.tuv.com/st
Test report id. number	21222508_EN_Sys; 21232886.001
Date of test report	2012-09-27; 2016-07-26
Test method	ISO 9459-5 (DST)

Comments of test lab	<p>Because of reaching the limited faux value according to ISO 9459-5, a long term prediction as a solar plus supplementary system was not possible.</p>	 <p>Genau. Richtig.</p> <p>TÜV Rheinland Energy GmbH Am Grauen Stein 51105 Köln</p>
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## System family overview

Collector name	For each storage and collector size, give number of collectors												
	CNA150HF-E				CNA200HF-E				CNA300HF-E				
Kairos CF2.0-1	1				1				2				

Name of system configuration		ARISTON KAIROS THERMO CF-1E 150-1											
Collector name	Kairos CF2.0-1	No. Collectors	1	Storage name	CNA150HF-E								

## Calculated annual results for "solar-only / preheat system"

Location	Qd,sh MJ/y	Daily drawoff 110 l				Daily drawoff 140 l				Daily drawoff 170 l			
		Qd,hw	QL	Qpar	fsol	Qd,hw	QL	Qpar	fsol	Qd,hw	QL	Qpar	fsol
		MJ/y	MJ/y	MJ/y	%	MJ/y	MJ/y	MJ/y	%	MJ/y	MJ/y	MJ/y	%
Stockholm SE		6150	2763	-	45	7821	3050	-	39	9492	3248	-	34
WürzburgDE		5897	2854	-	49	7506	3248	-	43	9114	3500	-	38
Davos CH		6654	4037	-	61	8483	4478	-	53	10281	4762	-	46
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Qd,sh	MJ/y	Not relevant for solar domestic hot water system
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Ref. conditions		Stockholm SE	Würzburg DE	Davos CH	Athens GR
	G	1.157	1.230	1.684	1.736
	T <sub>a,ave</sub>	7,5	9,0	3,2	18,5
	T <sub>c,ave</sub>	8,5	10,0	5,4	17,8
	± ΔT <sub>c</sub>	6,4	3,0	0,8	7,4

G	kWh/m <sup>2</sup>	Annual irradiation South, 45°
T <sub>a,ave</sub>	°C	Annual average outdoor air temperature
T <sub>c,ave</sub>	°C	Annual average mains cold water temp.
ΔT <sub>c</sub>	K	Seasonal variation of T <sub>c</sub>
T <sub>h</sub>	45 °C	Desired hot water temperature (mixing valve temperature).

Max. operating press. - collector side	150	kPa	Max. operating press. - tank side	800	kPa
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Kairos CF2.0-1	1			1			2						

Name of system configuration			ARISTON KAIROS THERMO CF-1E 200-1		
Collector name	Kairos CF2.0-1	No. Collectors	1	Storage name	CNA200HF-E

## Calculated annual results for "solar-only / preheat system"

Location	Qd,sh MJ/y	Daily drawoff 170 l				Daily drawoff 200 l				Daily drawoff 250 l			
		Qd,hw	QL	Qpar	fsol	Qd,hw	QL	Qpar	fsol	Qd,hw	QL	Qpar	fsol
		MJ/y	MJ/y	MJ/y	%	MJ/y	MJ/y	MJ/y	%	MJ/y	MJ/y	MJ/y	%
Stockholm SE		9492	3280	-	35	11164	3469	-	31	13939	3627	-	26
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T <sub>a,ave</sub>	°C	7,5	9,0	3,2	18,5
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± ΔT <sub>c</sub>		6,4	3,0	0,8	7,4

G	kWh/m <sup>2</sup>	Annual irradiation South, 45°
T <sub>a,ave</sub>	°C	Annual average outdoor air temperature
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ΔT <sub>c</sub>	K	Seasonal variation of T <sub>c</sub>
Th	45 °C	Desired hot water temperature (mixing valve temperature).

Max. operating press. - collector side	150	kPa	Max. operating press. - tank side	800	kPa
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Kairos CF2.0-1	1				1				2							

Name of system configuration		ARISTON KAIROS THERMO CF-1E 300-1													
Collector name	Kairos CF2.0-1	No. Collectors	2	Storage name	CNA300HF-E										

## Calculated annual results for "solar-only / preheat system"

Location	Qd,sh MJ/y	Daily drawoff 250 l				Daily drawoff 300 l				Daily drawoff 400 l			
		Qd,hw	QL	Qpar	fsol	Qd,hw	QL	Qpar	fsol	Qd,hw	QL	Qpar	fsol
		MJ/y	MJ/y	MJ/y	%	MJ/y	MJ/y	MJ/y	%	MJ/y	MJ/y	MJ/y	%
Stockholm SE		13939	6055	-	43	16746	6496	-	39	22327	7096	-	32
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G	kWh/m <sup>2</sup>	Annual irradiation South, 45°
T <sub>a,ave</sub>	°C	Annual average outdoor air temperature
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ΔTc	K	Seasonal variation of Tc
Th	45 °C	Desired hot water temperature (mixing valve temperature).

Max. operating press. - collector side	150	kPa	Max. operating press. - tank side	800	kPa
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