Summary of	EN12976-2	SOLAR SYSTEM test results	Licence Number	011-7S2330 A
Annex to Solar KEYMARK Certificate			Issued	2021-02-01

Company	Vaillant GmbH		Country	Germany	
Brand (optional)			Website	www.vaillant.com	
Street	Berghauser Str. 40		E-mail	marc.imann@vaillant.de	
Postal Code	42859	Remscheid	Tel. / Fax	+49	(0) 219118-2043/-72043

System classification	
Application(s)	Hot water
Solar loop, circulation principle	Thermosyphon
Direct solar loop / heat exchanger	Heat exchanger
Open, vented or closed solar loop	Closed
Drain back/down	Always filled (no drain)
Store location	Outdoor
Store orientation (of main axis)	Horizontal
Type of auxiliary heating (internal back-up heat)	None
If other auxiliary/internal back-up heating, please specifiy:	
Solar+supplementary OR Solar-only / Solar pre-heat	Solar only / Solar preheat

Collector(s)

Company	Vaillant GmbH		
Keymark lic.no. if available	*011-7S2327 F*		
Collector name	Per module		
	Gross Area (A_G)	Gross length	Gross width
	m²	mm	mm
VKF 118 T	2.24	2145	1045

Heat store(s)

Company	Vaillant GmbH					
Keymark lic.no. if available	-					
Store name	Total nominal volume	Gross height	Gross width	Gross depth	Auxiliary heated volume	Electrical aux. heating power
	litres	mm	mm	mm	litres	kW
P150M CL	152	1000	600	600	-	-
P200S CL	192	1200	600	600	-	-
P300M CL	301	1800	600	600	-	-

Solar loop controller

Keymark lic.no. if available	-	
Company	-	
Name	-	
Solar loop pump - power range	- W	to - W

Solar loop fluid

Recommended/required	Required	
Company	-	
Name	water glycol mixture	
Freezing point	-28	°C

System family overview

Collector name	Number of collectors in each configuration for each store																													
	Store name																													
	P150M CL						P200S CL						P300M CL																	
VKF 118 T	1						1	2						2																

Testing Laboratory	TÜV Rheinland Energy GmbH
Website	www.tuv.com\solarenergy
Test report id. number	21222193_V_EN_Sys_IT, 21222193_V_EN_Sys_ES
Date of test report	2014-01-07

Comments of test lab
The Total volume was modified to current label values given by the manufacturer.

DIN CERTCO ● Alboinstraße 56 ● 12103 Berlin, Germany
Tel: +49 30 7562-1131 ● Fax: +49 30 7562-1141 ● E-Mail: info@dincertco.de ● www.dincertco.de

Summary of	EN12976-2	test results	Certification No.	011-7S2330 A
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Parameters for systems extrapolation (Annex D)

Collector of measured system		Storage tank of measured system	
A_{ref} [m^2]	2.07	Volume [l]	152
η_0	0.737	A_{hx} [m^2]	0.926
a_1 [W/Km^2]	3.560	Piping	
a_2 [W/Km^2]	0.013		
IAM (50º)	0.870	$U_{loop,p}$	1.41

System parameters

Name of System Configuration	Tested/Extrapol	A_c* [m^2]	u_c* [W/Km^2]	U_s [W/K]	C_s [MJ/K]	S_c [-]	D_L [-]	f_{aux} [-]
VTS 1-150		1.39	7.83	2.35	0.6628	0.12	0.06	-
VTS 1-200		1.39	7.83	2.71	0.8837	0.12	0.06	-
VTS 2-200		2.68	7.33	2.71	0.8837	0.12	0.06	-
VTS 2-300		2.78	7.58	3.79	1.3256	0.12	0.06	-

Testing Laboratory	TÜV Rheinland Energy GmbH
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Date of test report	2014-01-07
Test method	ISO 9459-5 (DST)

Comments of test lab
No comments

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Genau. Richtig.
TÜV Rheinland Energy GmbH
Am Grauen Stein
51105 Köln

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Version 4.5, 2017-10-24

Summary of	EN12976-2	test results	Certification No.	011-7S2330 A
Annex to Solar KEYMARK Certificate			Issued	2021-02-01

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Postal Code	42859 Remscheid	**Tel. / Fax**	+49 (0) 219118-2043/-72043

System family overview

Collector name	For each storage and collector size, give number of collectors																													
	P150M CL						P200S CL						P300M CL																	
VKF 118 T	1						1	2						2																

Name of system configuration			VTS 1-150
Collector name	VKF 118 T	**No. Collectors**	1
Storage name	P150M CL		

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

Location	Qd,sh	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	MJ/y	%
Stockholm SE	0	6150	3185	0	52	7821	3690	0	47	9492	4037	0	43
WürzburgDE	0	5897	3248	0	55	7506	3816	0	51	9114	4226	0	46
Davos CH	0	6654	4730	0	71	8483	5456	0	64	10281	5866	0	57
Athens GR	0	4573	3910	0	86	5834	4699	0	81	7064	5330	0	75

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
	Ta,ave	7.5	9.0	3.2	18.5
	Tc,ave	8.5	10.0	5.4	17.8
	± ΔTc	6.4	3.0	0.8	7.4

G	kWh/m²	**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	250	kPa	**Max. operating press. - tank side**	600 kPa

Testing Laboratory	TÜV Rheinland Energy GmbH
Website	www.tuv.com\solarenergy
Test report id. number	21222193_V_EN_Sys_IT, 21222193_V_EN_Sys_ES
Date of test report	2014-01-07
Test method	ISO 9459-5 (DST)

Comments of test lab

No comments

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51105 Köln

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Version 4.5, 2017-10-24

Summary of	EN12976-2	test results	Certification No.	011-7S2330 A
Annex to Solar KEYMARK Certificate			Issued	2021-02-01

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Postal Code	42859 Remscheid	**Tel. / Fax**	+49 (0) 219118-2043/-72043

System family overview

Collector name	For each storage and collector size, give number of collectors		
	P150M CL	P200S CL	P300M CL
VKF 118 T	1	1 2	2

Name of system configuration					
	VTS 1-200				
Collector name	VKF 118 T	**No. Collectors**	1	**Storage name**	P200S CL

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

Location	Qd,sh	Daily drawoff 140 l				Daily drawoff 170 l				Daily drawoff 200 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	MJ/y	%
Stockholm SE	0	7821	3658	0	47	9492	4068	0	43	11164	4352	0	39
WürzburgDE	0	7506	3784	0	50	9114	4226	0	47	10691	4604	0	43
Davos CH	0	8483	5330	0	63	10281	5866	0	57	12110	6244	0	51
Athens GR	0	5834	4667	0	80	7064	5330	0	75	8326	5897	0	71

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
	Ta,ave	7.5	9.0	3.2	18.5
	Tc,ave	8.5	10.0	5.4	17.8
	± ΔTc	6.4	3.0	0.8	7.4

G	kWh/m²	**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	250	kPa	**Max. operating press. - tank side**	600 kPa

Testing Laboratory	TÜV Rheinland Energy GmbH
Website	www.tuv.com\solarenergy
Test report id. number	21222193_V_EN_Sys_IT, 21222193_V_EN_Sys_ES
Date of test report	2014-01-07
Test method	ISO 9459-5 (DST)

Comments of test lab

No comments

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Postal Code	42859	Remscheid	Tel. / Fax	+49	(0) 219118-2043/-72043

System family overview

Collector name	For each storage and collector size, give number of collectors		
	P150M CL	P200S CL	P300M CL
VKF 118 T	1	1 **2**	2

Name of system configuration					VTS 2-200	
Collector name	VKF 118 T	No. Collectors	2	Storage name	P200S CL	

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

Location	Qd,sh	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	MJ/y	%
Stockholm SE	0	9492	5519	0	58	11164	6150	0	55	13939	6906	0	49
WürzburgDE	0	9114	5519	0	61	10691	6213	0	58	13371	7096	0	53
Davos CH	0	10281	8262	0	80	12110	9177	0	76	15137	10281	0	68
Athens GR	0	7064	6433	0	91	8326	7348	0	89	10407	8609	0	83

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
	Ta,ave	7.5	9.0	3.2	18.5
	Tc,ave	8.5	10.0	5.4	17.8
	± ΔTc	6.4	3.0	0.8	7.4

G	kWh/m²	**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	250	kPa	Max. operating press. - tank side	600	kPa

Testing Laboratory	TÜV Rheinland Energy GmbH
Website	www.tuv.com\solarenergy
Test report id. number	21222193_V_EN_Sys_IT, 21222193_V_EN_Sys_ES
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Comments of test lab

No comments

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Version 4.5, 2017-10-24

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Postal Code	42859 Remscheid	**Tel. / Fax**	+49 (0) 219118-2043/-72043

System family overview

Collector name	For each storage and collector size, give number of collectors		
	P150M CL	P200S CL	P300M CL
VKF 118 T	1	1 2	2

Name of system configuration					
Collector name	VKF 118 T	**No. Collectors**	2	**Storage name**	P300M CL

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

Location	Qd,sh	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	MJ/y	%
Stockholm SE	0	13939	7127	0	51	16746	7852	0	47	16746	8641	0	39
WürzburgDE	0	13371	7253	0	54	16052	8105	0	51	16052	9114	0	43
Davos CH	0	15137	10533	0	70	18165	11542	0	64	18165	12457	0	51
Athens GR	0	10407	8767	0	84	12488	9997	0	80	12488	11731	0	70

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
	Ta,ave	7.5	9.0	3.2	18.5
	Tc,ave	8.5	10.0	5.4	17.8
	± ΔTc	6.4	3.0	0.8	7.4

G	kWh/m²	**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	250	kPa	**Max. operating press. - tank side**	600	kPa

Testing Laboratory	TÜV Rheinland Energy GmbH
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Test report id. number	21222193_V_EN_Sys_IT, 21222193_V_EN_Sys_ES
Date of test report	2014-01-07
Test method	ISO 9459-5 (DST)

Comments of test lab

No comments

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System family overview

Collector name	For each storage and collector size, give number of collectors																													
	P150M CL						P200S CL						P300M CL																	
VKF 118 T	1						1	2						2																

Annual performance parameters in the frame of the EU regulation CDR 811, 812 and 813 dated 2013

Name of system configuration					xxxx
Collector name	CollectorA	No. Collectors	1	Storage name	StoreA

Annual performance parameters in the frame of the EU regulation CDR 811, 812 and 813 dated 2013

Load profile	M	L	XL	XXL	
Annual heat demand (kWh)					
Auxiliary heat contribution			Qnonsol		section 5.9.3.6, see note 1
Average climate (kWh)					Strasbourg
Cold climate (kWh)					Helsinki
Hot climate (kWh)					Athens
Qaux (kWh)					section 5.9.3.4, see note 1
Comply to the load profile (Yes/No)					section 5.10.6 , see note 1
ηwh_nonsol (%)					section 5.9.3.5 , see note 1
Qelec (kWh)					section 5.9.3.5 , see note 1
Qfuel (kWh)					section 5.9.3.5 , see note 1
V40, measured (l)					section 5.10.7, see note 1

Auxiliary thermostat setting	xxx	ºC	Effective power of auxiliary heater	xxx	kW

Note 1: Clause of EN 12976-2:2017

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Date of test report	2014-01-07
Test method	▼

Comments of test lab

Not evaluated in 2013!

Stamp & signature of test lab

DIN CERTCO ● Alboinstraße 56 ● 12103 Berlin, Germany
Tel: +49 30 7562-1131 ● Fax: +49 30 7562-1141 ● E-Mail: info@dincertco.de ● www.dincertco.de