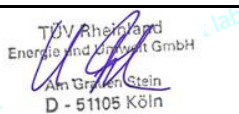


Summary of EN 12975 Test Results, annex to Solar KEYMARK Certificate						Licence Number		011-7S2192 R							
						Issued		2013-11-22							
Company holding the		Viessmann Werke GmbH & Co. KG				Country		Germany							
Brand (optional)		Abrand				Website		www.viessmann.com							
Street, street number		Viessmannstrasse 1				E-mail									
Postal Code / City, province		35107		Allendorf		Tel/Fax		49 06452-70-0							
Collector Type (flat plate glazed/un-glazed; evacuate tubular)						Evacuated tubular collector									
Thermal / photo voltaic hybrid collector? (PVT collector)						No									
Integration in the roof possible ? (manufacturers declaration)						No									
						Power output per collector module									
						G = 1000 W/m <sup>2</sup>									
						T <sub>m</sub> -T <sub>a</sub>									
						0 K	10 K	30 K	50 K	70 K					
Collector name						m <sup>2</sup>	mm	mm	mm	m <sup>2</sup>	W	W	W	W	W
Vitosol 300-T SP3B-12						1.60	2 241	1 053	150	2.36	1 230	1 210	1 163	1 110	1 051
Vitosol 300-T SP3B-24						3.19	2 241	2 061	150	4.62	2 453	2 411	2 319	2 213	2 094
Performance test method						Glazed liquid heating collector - steady state - indoor									
Performance parameters related to aperture						η <sub>0</sub>	a <sub>1</sub>	a <sub>2</sub>							
Units						-	W/(m <sup>2</sup> K)	W/(m <sup>2</sup> K <sup>2</sup> )							
Test results - Flow rate and fluid see note 1						0.769	1.256	0.005							
Bi-directional incidence angle						Yes	K <sub>θ</sub> values are obligatory for 50°.								
Incidence angle modifiers K <sub>θ</sub> (θ <sub>L</sub> ) longitudinal direction						Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
K <sub>θ</sub> (θ <sub>L</sub> )							1.00	0.99	0.98	0.96	0.92	0.86	0.74	0.38	0.00
Incidence angle modifiers K <sub>θ</sub> (θ <sub>T</sub> ) transversal direction						Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
K <sub>θ</sub> (θ <sub>T</sub> )							1.00	0.99	1.02	1.02	1.02	0.95	0.70	0.35	0.00
Stagnation temperature - Weather conditions see note 2						T <sub>stg</sub>		145	°C						
Effective thermal capacity						c <sub>eff</sub> = C/Ag		5.97	kJ/(m <sup>2</sup> K)						
Max. intended operation temperature - see note 3						T <sub>max,op</sub>		273	°C						
Max. operation pressure - see note 3						p <sub>max,op</sub>		600	kPa						
Pressure drop table - for a collector family, the values shall be for the module with highest ΔP per m <sup>2</sup> aperture area															
Flow rate		kg/(s)	0.029	0.041	0.056	0.089	0.167								
Pressure drop, ΔP		Pa	740	1500	2330	5500	16600								
Optional weather data		Location			Link										
Testing Laboratory		TÜV Rheinland Energie und Umwelt GmbH													
Website		www.tuc.vom/st													
Test report id. number		21221632_EN_24; 21221632_P_12				Date of test report		2013.11.22							
During the test GDIF/GTOT was always between						0.09	and	0.51							
Comments of testing laboratory:															
The evacuated tubes are in vertical orientation. The pressure drop was determined for the 24 tube collector!															
Note 1		Flow rate	0.020	kg/(s m <sup>2</sup> )	Fluid	Water									
Note 2		Irradiance, G = 1000 W/m <sup>2</sup> ; Ambient temperature, T <sub>a</sub> =30 °C													
Note 3		Given by manufacturer													
						 TÜV Rheinland Energie und Umwelt GmbH Am Grünen Stein D - 51105 Köln									
Datasheet version: 4.04, 2013-04-22															
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															



Annual collector output based on EN 12975 Test Results, annex to Solar KEYMARK Certificate	Licence Number	011-7S2192 R
	Issued	22.11.2013

Annual collector output kWh/module														
Collector name	Location and collector temperature (Tm)													
	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		
Vitosol 300-T SP3B-12	1 322	1 125	937	1 322	1 125	937	1 322	1 125	937	1 322	1 125	937		
Vitosol 300-T SP3B-24	2 673	2 291	1 952	2 673	2 291	1 952	2 673	2 291	1 952	2 673	2 291	1 952		

Collector mounting: Fixed or tracking Fixed; slope = latitude - 15° (rounded to nearest 5°)

Overview of locations				
Location	Latitude °	Gtot kWh/m <sup>2</sup>	Ta °C	Collector orientation or tracking mode
Athens	38	1 765	18.5	South, 25°
Davos	47	1 714	3.2	South, 30°
Stockholm	59	1 166	7.5	South, 45°
Würzburg	50	1 244	9.0	South, 35°

Gtot	Annual total irradiation on collector plane	kWh/m <sup>2</sup>
Ta	Mean annual ambient air temperature	°C
Tm	Constant collector operating temperature (mean of in- and outlet temperatures)	°C

The calculation of the annual collector performance is performed with the official Solar Keymark spreadsheet tool ScenoCalc. The collector output is calculated hour by hour according to the efficiency parameters from the Keymark test using constant collector operating temperature (Tm). A detailed description of the calculations is available at <http://www.sp.se/en/index/services/solar/ScenoCalc/Sidor/default.aspx>.

<b>DIN CERTCO • Alboinstraße 56 • 12103 Berlin, Germany</b> <b>Tel: +49 30 7562-1131 • Fax: +49 30 7562-1141 • E-Mail: info@dincertco.de •</b> <b>www.dincertco.de</b>	Datasheet version: 4.04, 2013-04-22
	ScenoCalc version: Ver. 4.04 (Jun, 2013)