



## Keymark Certificate



078/000301

AENOR certifies that the organization

### BDR THERMEA GROUP B.V.

registered office MARCHANTSTRAAT, 55 7300 AA APELDOORN (Holanda - Países Bajos)

supplies **Solar collectors**

in compliance with UNE-EN 12975-1:2006+A1:2011 (EN 12975-1:2006+A1:2010)

Trade Mark BRÖTJE FKR 25  
Technical information Specified in Annexes to the Certificate

Production site CL MANGANÈS, 2 08755 CASTELLBISBAL (Barcelona - España)

Certification scheme In order to grant this Certificate, AENOR has tested the product and has verified the quality system implemented for its manufacture. AENOR performs these tasks periodically while the Certificate has not been cancelled, in accordance with Specific Rules RP 078.01.

First issued on 2018-02-26  
Last issued on 2023-02-26  
Validity 2028-02-26

Rafael GARCÍA MEIRO  
CEO





Annex to Solar Keymark Certificate					Licence Number		078/000301							
					Date issued		2023-02-26							
					Issued by		AENOR							
Licence holder		BDR THERMEA GROUP B.V.			Country		NETHERLANDS							
Brand (optional)		--			Web		http://www.bdrthermea.com							
Street, Number		MARCHANTSTRAAT, 55			E-mail		oscar.mongro@BDRThermea.com							
Postcode, City		7300 AA APELDOORN			Tel		+34 936828040							
Collector Type					Flat plate collector									
Collector name					Power output per collector									
					Gb = 850 W/m <sup>2</sup> , Gd = 150 W/m <sup>2</sup> & u = 1.3 m/s $\vartheta_m - \vartheta_a$									
					0 K	10 K	30 K	50 K	70 K	100 K				
					m <sup>2</sup>	mm	mm	mm	mm	mm	mm			
BRÖTJE FKR 25					2,51	2.187	1.147	87	1.914	1.821	1.615	1.383	1.125	689
Power output per m <sup>2</sup> gross area					763	725	643	551	448	275				
Performance parameters test method		Quasi dynamic												
Performance parameters (related to A <sub>G</sub> )		$\eta_0, b$	a1	a2	a3	a4	a5	a6	a7	a8	Kd			
Units		-	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> )	-			
Test results		0,773	3,58	0,013	0,000	0,00	5.083	0,000	0,00	0,0E+00	0,91			
Incidence angle modifier test method		Quasi dynamic - outdoor												
Incidence angle modifier		Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°			
Transversal		K <sub>θT, coll</sub>	1,00	0,99	0,97	0,94	0,90	0,82	0,65	0,33	0,00			
Longitudinal		K <sub>θL, coll</sub>	1,00	0,99	0,97	0,94	0,90	0,82	0,65	0,33	0,00			
Heat transfer medium for testing		Water												
Flow rate for testing (per gross area, A <sub>G</sub> )		dm/dt	0,024	kg/(sm <sup>2</sup> )										
Maximum temperature difference during thermal performance test		( $\vartheta_m - \vartheta_a$ ) <sub>max</sub>	70	K										
Standard stagnation temperature (G = 1000 W/m <sup>2</sup> ; $\vartheta_a = 30$ °C)		$\vartheta_{stg}$	210	°C										
Maximum operating temperature		$\vartheta_{max, op}$	198	°C										
Maximum operating pressure		p <sub>max, op</sub>	1000	kPa										
Testing laboratory		TÜV Rheinland Solar GmbH					http://www.tuv.com/solar							
Test report(s)		300100662.001rev02					Dated		25/11/2022					
Comments of testing laboratory		Ver. 6.2 (13.01.2022)												
<p style="text-align: center;">AENOR INTERNACIONAL, S.A.U. - Génova, 6. - 28004 - Madrid, España - Tel. 91 432 60 00 - www.aenor.com</p> <p style="text-align: center;">Product certification body accredited by ENAC, number 1/C-PR271</p>														



<b>Annex to Solar Keymark Certificate Supplementary Information</b>	<b>Licence Number</b>	<b>078/000301</b>
	<b>Issued</b>	<b>2023-02-26</b>

<b>Gross Thermal Yield in kWh/collector at mean fluid temperature <math>\vartheta_m</math></b>													
Collector name	Standard Locations $\vartheta_m$	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
BRÖTJE FKR 25		3.002	2.130	1.381	2.275	1.562	972	1.675	1.091	656	1.823	1.177	696
Gross Thermal Yield per m <sup>2</sup> gross area		1.196	849	550	906	622	387	667	435	261	726	469	277
Annual efficiency, $\eta_a$		68%	48%	31%	56%	38%	24%	57%	37%	22%	58%	38%	22%
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 <http://www.estif.org/solarkeymarknew/>

<b>Additional Information</b>					
Collector heat transfer medium	Water-Glycole				
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)	A+		--		
G (W/m <sup>2</sup> ) >	1100	$\vartheta_a$ (°C) >	40	$H_x$ (MJ/m <sup>2</sup> ) >	700
Maximum tested positive load			3500	Pa	
Maximum tested negative load			2400	Pa	
Hail resistance using ice balls (diameter)			35	mm	

<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)	Yes

<b>Energy Labelling Information</b>		<b>Additional Informative Technical Data</b>	
	Reference Area, $A_{sol}$ (m <sup>2</sup> )	<b>Hydraulic Designation Code</b>	Aperture Area, $A_a$ (m <sup>2</sup> )
BRÖTJE FKR 25	2,51	1-H-1234S-A:9.2,22272-C:20.6,1100	2,35

<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 ( $\eta_{col}$ )	60%	Zero-loss efficiency ( $\eta_0$ )	0,76
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 ( $a_1$ )	3,58
		Second-order coefficient ( $a_2$ )	0,013
		Incidence angle modifier IAM (50°)	0,89
		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.	