

# AENOR

## Keymark Certificate Solar thermal energy



078/000379

AENOR certifies that the organization

### **BDR THERMEA GROUP B.V**

registered office MERCHANTSTRAAT, 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 RHP 16, Brötje RHP 24  
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 2021-06-16

Validity date 2026-06-16

Rafael GARCÍA MEIRO  
Chief Executive Officer

Original Electronic Certificate

AENOR INTERNACIONAL S.A.U.  
Génova, 6. 28004 Madrid. España  
Tel. 91 432 60 00.- www.aenor.com

Product certification body accredited by ENAC, number 1/C-PR271



Annex to Solar Keymark Certificate					Licence Number		078/000379							
					Date issued		2021-06-16							
					Issued by		AENOR							
Licence holder		BDR THERMEA GROUP B.V.			Country		NETHERLANDS							
Brand (optional)		--			Web		www.bdrthermeagroup.com							
Street, Number		MARCHANTSTRAAT, 55			E-mail		oleguer.fuertes@BDRThermea.com							
Postcode, City		7300 AA APELDOORN			Tel		+34 902898989							
Collector Type					Evacuated tubular collector									
Collector name					Power output per collector									
					Gb = 850 W/m2, Gd = 150 W/m2 & u = 1.3 m/s $\vartheta_m - \vartheta_a$									
					0 K	10 K	30 K	50 K	70 K	115 K				
					m <sup>2</sup>	mm	mm	mm	mm	mm	mm			
Brötje RHP 16					2,87	2.242	1.281	115	1.435	1.395	1.303	1.194	1.070	731
Brötje RHP 24					4,31	2.242	1.921	115	2.156	2.095	1.957	1.794	1.607	1.097
Power output per m <sup>2</sup> gross area					500	486	454	416	373	255				
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		0,507	1,33	0,007	0,000	0,00	13.904	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>	1,03	1,04	1,04	1,05	1,03	0,77	0,58	0,29	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	0,023	kg/(sm <sup>2</sup> )							
Maximum temperature difference during thermal performance test					( $\vartheta_m - \vartheta_a$ ) <sub>max</sub>	85	K							
Standard stagnation temperature (G = 1000 W/m <sup>2</sup> ; $\vartheta_a = 30$ °C)					$\vartheta_{stg}$	180	°C							
Maximum operating temperature					$\vartheta_{max, op}$	180	°C							
Maximum operating pressure					p <sub>max, op</sub>	1000	kPa							
Testing laboratory		TÜV Rheinland Energy GmbH			www.tuv.com/solar									
Test report(s)		21248984.001rev01 21248984.002rev01			Dated		05/05/2021 05/05/2021							
Comments of testing laboratory					Datasheet version: 6.1, 2019-09-26									
					Stamp & signature of test lab									
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Annex to Solar Keymark Certificate Supplementary Information	Licence Number	078/000379
	Issued	2021-06-16

Annual collector output in kWh/collector at mean fluid temperature $\vartheta_m$													
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 RHP 16		1.515	1.170	858	1.515	1.170	858	1.515	1.170	858	1.515	1.170	858
Brötje RHP 24		3.543	2.912	2.277	2.930	2.345	1.795	2.112	1.632	1.210	2.275	1.757	1.288
Annual output per m <sup>2</sup> gross area		822	676	528	680	544	416	490	379	281	528	408	299
Annual efficiency, $\eta_a$		47%	38%	30%	42%	33%	26%	42%	32%	24%	42%	33%	24%
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. 6.1 (September 2019). A detailed description of the calculations is available at <http://www.estif.org/solarkeymarknew/>

**Additional Information**

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	5400 Pa
Maximum tested negative load	2800 Pa
Hail resistance using ice balls (diameter)	25 mm

**Additional collector attribute(s)**

- Using external power source(s) for normal operation
- Active or passive measure(s) for self-protection
- Co-generating thermal and electrical power
- Façade collector(s)

Energy Labelling Information		Additional Informative Technical Data	
	Reference Area, $A_{sol}$ (m <sup>2</sup> )	Hydraulic Designation Code	Aperture Area, $A_a$ (m <sup>2</sup> )
Brötje RHP 16	2,87	1-H-12V-C:3,,1343	2,40
Brötje RHP 24	4,31	1-H-12V-C:3,,1983	3,60

Data required for CDR (EU) No 811/2013 - Reference Area $A_{sol}$	Data required for CDR (EU) No 812/2013 - Reference Area $A_{sol}$
Collector efficiency ( $\eta_{col}$ )	44%
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.	Zero-loss efficiency ( $\eta_0$ )
	0,50
	First-order coefficient ( $a_1$ )
	1,33
Second-order coefficient ( $a_2$ )	
0,007	
Incidence angle modifier IAM (50°)	
0,98	
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.	