

# Pre-qualification Solar Water Heaters

***SOLE S.A.***

***SOLAR SYSTEMS MANUFACTURER***



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***GENERAL WARRANTEE***

# ***SOLE S.A.***

## ***COMPANY PROFILE***

## **COMPANY PROFILE**

### **INTRODUCTION**

Sole S.A. was the first Greek company to be involved in the renewable energy sources sector, since its foundation in 1974. Until today, it still maintains its leadership in the European solar water heater market exporting 70% of its production all over the world. Sole produces solar thermal collectors, thermosyphon solar water heaters, compact solar water heaters and undertakes projects for sanitary or process hot water, room heating, pool heating and Solar Air Conditioning.

### **QUALITY MANAGEMENT & CERTIFICATION**

All SOLE products are manufactured under the Quality management system ISO 9001:2008 certified by the German Certification Body TUV.

All SOLE products are manufactured according to the European norms, they are tested for efficiency and reliability according to EN ISO9806:2013, EN 12975-2:2006 & EN 12976-2:2006 by international accredited laboratories and have been granted a numerous of international certificates such as Solar Keymark (E.U.), SRCC (U.S.A.), Dubai Municipality and the certificate from the Ministry of Industry, Energy and Tourism Government of Spain.

### **PHILOSOPHY**

SOLE S.A. is the inspirer of quality in everyday life with the use of renewable sustainable energy. The company's staff is composed by a group of people, who share one common motto "quality in life begins from each one of us daily". Sole's production line, engineers and sales force are always influenced by the needs of the national and international market in order to satisfy the most demanding consumer.

### **RESEARCH AND DEVELOPMENT**

Research and development of products, services, and new solar applications technologies is the key point for SOLE S.A. This sector is constantly evolving, since SOLE's know-how and experience in producing high quality products permits nothing less, than excellence. Our Technical department extends constant research for the presentation of new products, as well improvement of existing products.

Additionally in order to achieve excellence, all products have been tested and approved by most technologically advanced research institutes in the world. SOLE S.A. was one of the first companies in Greece to attain the international certificate of conformity ISO 9002 (back in 1995). This is equivalent for the recognition of the effective organization of administration and for the good quality of our products on an international basis.



***SOLE S.A.***  
***MANUFACTURING / TRADING***  
***LICENCE***

ΝΟΜΑΡΧ.ΑΥΤΟΔΙΟΙΚΗΣΗ  
ΑΝΑΤΟΛΙΚΗΣ ΑΤΤΙΚΗΣ  
ΔΙΕΥΘΥΝΣΗ ΟΡΥΚΤΟΥ ΠΛΟΥΤΟΥ  
ΚΑΙ ΒΙΟΜΗΧΑΝΙΑΣ

ΠΑΛΛΗΝΗ 17 ΑΠΡ. 2000 2000

Αριθ.Πρωτ. 832

Ταχ.Δ/ση: 17<sup>ο</sup> χιλ. οδού Αθηνών-Μαραθώνα  
153 44 ΠΑΛΛΗΝΗ

Πληροφορίες: Ιωάννης Ι.  
Τηλέφωνο: 60 32 967

ΘΕΜΑ: Χορήγηση άδειας λειτουργίας

ΚΟΙΝΟΠΟΙΗΣΗ:

- ΥΠ.ΑΝ. - Γ.Γ.Β  
Β' ΓΕΝΙΚΗ Δ/ΝΣΗ Δ/ση Πληροφορικής  
Μιχαλακοπούλου 80 115 25 - ΑΘΗΝΑ
- Υπηρεσία Στατιστικής  
Μιχαλακοπούλου 80 115 25 - ΑΘΗΝΑ
- ΚΕΠΕΚ Ν. ΑΥΤ.ΑΝ.ΑΤΤΙΚΗΣ  
ΠΑΛΛΗΝΗ
- "ΣΟΛΕ ΑΒΕΕ"  
Οδός Λαύρων 5' Λαϊκόν Αγίον  
13671 ΑΧΑΡΝΕΣ
- Αστυν. Τμήμα Αχαρνών  
Γραφείο Αστυνόμευσης  
13671 ΑΧΑΡΝΕΣ

ΓΕΝΙΚΑ ΣΤΟΙΧΕΙΑ:

Βιομηχανία: Κατεργασία υφασμάτων  
και ηλεκτρικών θέρμαισμων  
(Κ.Α. 297.1)

Τοποθεσία: Οδός Λαύρων 5' Λαϊκόν Αγίον  
Δήμος Αχαρνών

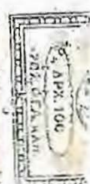
Ιδιοκτήτης: "ΣΟΛΕ ΑΒΕΕ"

ΑΦ.Μ. 094418674 ΔΟΥ: ΦΑΒΕ ΑΘΗΝΩΝ

Κινητήρια Δύναμη	ΒΡ	ΚΩ	Αξία Μηχανήματος
Νέοι μηχανοκίνητοι	152,20	-	9.000.000 Δρχ.

ΓΡΑΜΜΑΤΙΑ

- ΕΤΕ αρ. 707. 07554503651. Αρχ. 15167
- Παραβ. αρ. χορήγησης αρ. 6749494
- 10.000
- 
- 



Α Π Ο Φ Α Σ Η  
Ο Ν Ο Μ Α Ρ Χ Η Σ Α Ν Α Τ Ο Λ Ι Κ Η Σ Α Τ Τ Ι Κ Η Σ

Έχοντας υπόψη:

- Τις διατάξεις των Νόμων 6422/1934, 3200/1955, 1360/1983, του Ν.Α. 1150/1949, του άρθρου 4 του Α.Ν. 207/1967, του από 15-10-22 Β.Α., του από 16-3-1950 Β.Α. όπως αυτό τροποποιήθηκε και συμπληρώθηκε με το από 24-11-53 Β.Α., του Π.Α. 1180/1981, της ΚΥΑ 69269/1990, των Νόμων 2218/1994, 2240/1994, 2516/1997, το Π.Δ. 84/84 Την απόφαση του Νομάρχη Λ. Αττικής, αριθ. 29963/94.



2. Την αριθ. 2091/3-9-93 απόφασή μας με την οποία χορηγείται άδεια λειτουργίας με μηχανό κινητρονισμό διομήσεως στη (1) μηχανή, εν εργασία με κινητρονισμό μηχανών και ηλεκτρικών μηχανημάτων της "ΣΥΛΕ ΑΒΕΕ", που βρίσκεται επί των εδών Λαύρων & Λαύρων Αθηνών στο Δάμα Ακαδημίας.
3. Την από 3-3-2000 αίτηση της "ΣΥΛΕ ΑΒΕΕ", για χορήγηση άδειας λειτουργίας των παραπάνω εργασιών της μετ. π. ο. π. κ. με τη μορφή της.
4. Την από 3-3-2000 έκθεση - εισήγηση της Υπηρεσίας μας.

#### Αποφασίζουμε

Χορηγούμε άδεια λειτουργίας κίνησης, κίνησης, διομήσεως, στο εργοστάσιο μηχανοκίνητης, μηχανοκίνητης, μηχανοκίνητης, μηχανοκίνητης, με συνολ. κιν. δύναμη 152,80 HP, που βρίσκεται επί των εδών Λαύρων & Λαύρων Αθηνών, και ανήκει στην "ΣΥΛΕ ΑΒΕΕ", και που εικονίζεται στα σχεδιαγράμματα που υπέβαλε με την αριθ. 2091/3-9-93 αίτησή μας, με την επιφύλαξη της τήρησης των διατάξεων του από 15.10.22 Β.Δ/τος περί χορηγώσεως αδειών ιδρύσεως και λειτουργίας πάσης μηχανολογικής εγκατάστασης και με τους εξής όρους:

- 1) Να υπάρχουν και διατηρούνται σε καλή κατάσταση τα προστατευτικά περιφράγματα για τους ιμάντες, τροχαλίες, άξονες και λοιπά στοιχεία που κινούνται επικίνδυνα των διαφόρων μηχανημάτων της εγκατάστασης.
- 2) Η εγκατάσταση να πληροί τις διατάξεις του Π.Δ. 1180/81 για την προστασία του περιβάλλοντος.
- 3) Να βρίσκεται σε ετοιμότητα το σύστημα πυρασφάλειας σύμφωνα με την αριθ. 2096/2000 μελέτη πυρασφάλειας.
- 4) Να τηρούνται οι Αστυνομικές, Υγειονομικές και του Υπουργείου Εργασίας διατάξεις.
- 5) Να υπάρχει φερελαιο πρώτων βοηθειών.
- 6) Οι περιβαλλοντικοί όροι αποτελούν συνέχεια των όρων της απόφαση αυτής και η τήρησή τους είναι υποχρεωτική (εγκ. ΚΥΑ. αριθ. 69269/90).
- 7) Να μην κινούνται μηχανήματα που δεν είναι πιστοποιημένα σύμφωνα με τις διατάξεις της.

3. Η Υπηρεσία μας επιφυλάσσει το δικαίωμα να επιβάλλει την εκτέλεση μεταρρυθμίσεων και περιορισμών στην ανωτέρω εγκατάσταση, σε κάθε περίπτωση που θα διαπιστωθεί ότι είναι αναγκαίο για να εκπληρωθεί ο σκοπός των ως άνω διατάξεων.
4. Για την απαιτούμενη σύμφωνα με τις διατάξεις των σχετικών από 16-3-50 και 24-11-53 Β.Δ. καθώς και του 902/75 Π.Δ. υπεύθυνη επίβλεψη, λειτουργία και συντήρηση της εγκαταστάσεως πρέπει να προσλαμβάνεται πρόσωπο που να έχει από τα προβλεπόμενα από τις διατάξεις αυτές και κάθε άλλη σχετική, προσόντα.
5. Η άδεια αυτή μεταβιβάζεται μόνον κατόπιν προηγούμενης εγκρίσεως του Νομάρχη Αθηνών, χωρίς αυτήν την έγκριση η επιχείρηση δεν μπορεί να λειτουργήσει στο όνομα φυσικού ή νομικού προσώπου άλλου, εκτός του ανωτέρω στο όνομα του οποίου εκδόθηκε.
6. Η άδεια αυτή δεν απαλλάσσει τον κάτοχο, Τ.Α.Α. Μ.Ο.Υ.Α. Τ.Α.Α. από την υποχρέωση να εφωδιασθεί με άλλη άδεια, αν από άλλες διατάξεις προκύπτει αντίστοιχη υποχρέωση.
7. Κατά της απόφασης αυτής επιτρέπεται η προσφυγή, για παράβαση νόμου, μέσα σε 30 ημέρες από της κοινοποίησής της, κατά τις διατάξεις του άρθρου 8 του Ν. 3200/1995, από οποιονδήποτε που έχει έννομο συμφέρον δια μέσου της Υπηρεσίας μας ενώπιον του Γενικού Γραμματέα Περιφέρειας.

Κ.Α. 36/110

Με Ε.Ν  
(1) Δ.Χ.Τ.Υ.





ΕΛΛΗΝΙΚΗ ΔΗΜΟΚΡΑΤΙΑ  
ΒΙΟΤΕΧΝΙΚΟ ΕΠΙΜΕΛΗΤΗΡΙΟ ΑΘΗΝΑΣ

Ν.Π.Δ.Δ.  
Ακαδημίας 18, 106 71 Αθήνα  
Τηλ.: 210 3680.700  
Fax: 210 3614726  
E-mail: info@acsmi.gr  
Web site: www.acsmi.gov.gr

ΑΘΗΝΑ : 18/12/2015  
ΑΡ. ΠΡΩΤ. : 12770

ΠΙΣΤΟΠΟΙΗΤΙΚΟ

Το Βιοτεχνικό Επιμελητήριο Αθηνών πιστοποιεί ότι όπως προκύπτει από τα μητρώα που διατηρεί είναι γραμμένη σ' αυτά η πιο κάτω επιχείρηση με τα εξής στοιχεία:

ΕΠΩΝΥΜΙΑ : ΣΟΛΕ ΑΝΩΝΥΜΗ ΒΙΟΜΗΧΑΝΙΚΗ ΚΑΙ ΕΜΠΟΡΙΚΗ ΕΤΑΙΡΕΙΑ ΗΛΙΑΚΩΝ ΣΥΣΚΕΥΩΝ

Δ/ΝΣΗ ΕΔΡΑΣ : ΑΜΑΡΟΥΣΙΟΥ-ΧΑΛΑΝΔΡΙΟΥ 26 ΜΑΡΟΥΣΙ, 15125

ΔΙΑΚΡΙΤ. ΤΙΤΛΟΣ : ΣΟΛΕ ΑΕ

ΞΕΝΟΓΛ. ΔΙΑΚΡΙΤ. ΤΙΤΛΟΣ :

ΑΡΙΘΜΟΣ ΜΗΤΡΩΟΥ : 120097

Γ.Ε.Μ.Η. : 084134002000

ΑΦΜ : 094418674

Δ.Ο.Υ. : Φ.Α.Ε. ΑΘΗΝΩΝ

ΗΜ/ΝΙΑ ΙΔΡΥΣΗΣ : 21/03/1994

ΗΜ/ΝΙΑ ΕΓΓΡΑΦΗΣ : 23/05/1994

Δ/ΝΣΗ ΕΡΓΟΣΤΑΣΙΟΥ : ΛΕΥΚΤΡΩΝ ΑΧΑΡΝΕΣ 13671 --

Δ/ΝΣΗ ΥΠΟΚ/ΜΑΤΟΣ :

ΑΝΤΙΚ. ΔΡΑΣΤΗΡΙΟΤΗΤΑΣ : ΚΑΤΑΣΚΕΥΗ ΚΑΙ ΕΠΙΣΚΕΥΗ ΗΛΙΑΚΩΝ ΘΕΡΜΟΣΙΦΩΝΩΝ ΜΕΡΟΣ ΤΩΝ ΕΡΓΑΣΙΩΝ ΓΙΝΕΤΑΙ ΣΕ ΕΡΓΑΣΤΗΡΙΑ ΤΡΙΤΩΝ ΕΜΠΟΡΙΑ ΗΛΕΚΤΡΙΚΩΝ ΘΕΡΜΟΣΙΦΩΝΩΝ ΚΑΙ ΚΛΙΜΑΤΙΣΤΙΚΩΝ ΜΙΚΤΗ ΔΡΑΣΤ/ΤΑ

ΠΑΤΗΡΗΣΕΙΣ : ΕΧΕΙ ΕΞΟΦΛΗΣΕΙ ΤΙΣ ΣΥΝΔΡΟΜΕΣ ΣΤΟ ΒΕΑ ΓΙΑ ΤΟ ΕΤΟΣ 2016

ΤΟ ΠΙΣΤΟΠΟΙΗΤΙΚΟ ΔΙΝΕΤΑΙ ΜΕΤΑ ΑΠΟ ΑΙΤΗΣΗ ΠΟΥ ΖΗΤΗΣΕ Η ΑΝΩΤΕΡΩ ΕΠΙΧΕΙΡΗΣΗ

ΝΑ ΤΟ ΧΡΗΣΙΜΟΠΟΙΗΣΕΙ ΓΙΑ: ΚΑΘΕ ΝΟΜΙΜΗ ΧΡΗΣΗ



ΓΙΩΒΑΝΝΟΠΟΥΛΟΥ ΠΑΡΑΣΚΕΥΗ  
ΔΙΕΥΘΥΝΤΡΙΑ  
ΒΙΟΤΕΧΝΙΑΣ & ΑΝΑΠΤΥΞΗΣ

# **SOLE S.A.**

## **ARAB-HELLENIC CHAMBER**



***SOLE S.A.***  
***ISO 9001:2008***  
***CERTIFICATION***

# Certificate

Standard **ISO 9001:2008**

Certificate Registr. No. 01 100 063635

Certificate Holder:



**SOLE S.A.**  
1 LEFKTRON & LAIKON AGONON  
136 71, ACHARNES, ATHENS  
GREECE

Scope:

Design, production, trade and technical support of solar systems,  
flat plate solar collectors, boilers and plastic vacuums

Proof has been furnished by means of an audit  
that the requirements of ISO 9001:2008 are met.

Validity:

The certificate is valid from 2016-01-18 until 2018-09-14.  
First certification 2007

2016-01-15

  
TÜV Rheinland Cert GmbH  
Am Grauen Stein · 51105 Köln

# ***CERTIFICATES & TEST REPORTS***





# Certificado

Certificate no.  
Certificado nº

PSK – 002/2016



Name and address of certificate holder:  
Nome e morada do titular do certificado:

SOLE S. A.  
Lefktron and Laikon Agonon,  
Acharnai – 13671, Athens  
GREECE

Product:  
Produto:

Thermal solar system and components – Factory made  
system  
*Instalação solar térmica pré-fabricada e seus componentes*

Type references:

125-1-S150; 125-1-S200; 150-1-S200; 150-1-S230; 150-2-S150;  
200-1-S200; 200-1-S230; 200-1-S260; 200-2-S200; 300-2-S200;  
300-2-S230

Referências:

Trademark(s):  
Marca(s) comercial(is):

EUROSTAR ECO, HELIOTHERMO ECO

Technical characteristics:  
Características técnicas:

Summary of EN 12976 Test Results: Registration No. PSK-002/2016,  
(in annex)  
*Resumo dos resultados dos ensaios realizados segundo a norma EN 12976:  
Registo Nº PSK-002/2016, (em anexo)*

This product is in conformity with:  
Este produto está em conformidade com:

EN 12976-1:2006, EN 12976-2:2006

and with the Specific Keymark Scheme Rules for Solar Thermal Products  
e com as Regras Particulares do CEN Keymark Scheme para Produtos Solares Térmicos.

Test report(s) no. / issued by:  
Relatórios de ensaios nº(s) / emitidos por:

Nº 6075DE2, 6076DE2, 6075F1 / DEMOKRITOS

Additional information (if any):  
Informação adicional (se existir):

—

This certificate is valid until:  
Este certificado é válido até:  
and supersedes certificate no:  
e substitui o certificado nº:

2020-12-13

PSK-025/2015

Date of issue:  
Data de emissão:

2016-01-04

Francisco Barroca  
General Manager / Diretor Geral

This Certificate includes one Annex with 12 (twelve) pages  
Este Certificado é constituído por um Anexo com 12 (doze) páginas





Associação para a Certificação



NCSR "DEMOKRITOS"

Solar &amp; other Energy Systems Laboratory

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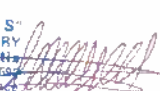
Summary of	<b>EN12976-2</b>	<b>SOLAR SYSTEM test results</b>	Licence Number	<b>PSK-002/2016</b>						
Annex to Solar KEYMARK Certificate			Issued	2016-01-04						
Company	SOLE SA		Country	GREECE						
Brand (optional)	EUROSTAR ECO, HELIOTHERMO ECO		Website	www.eurostar-solar.com						
Street	LEFKTRON & LAIKON AGONON		E-mail	export@sole.com						
Postal Code	13671	ACHARNAI, ATHENS	Tel. / Fax	+30 2102389500 / 2						
<b>System classification</b>										
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 specify:										
Solar+supplementary OR Solar-only / Solar pre-heat			Solar only / Solar preheat							
<b>Collector(s)</b>			<b>Heat store(s)</b>							
Company	SOLE SA		Company	SOLE SA						
Keymark lic.no. if available	PSK-001/2016		Keymark lic.no. if available	-						
Collector name	Per module			Store name	Total nominal volume litres					
	Gross Area (A <sub>G</sub> ) m <sup>2</sup>	Gross length mm	Gross width mm			Gross height mm	Gross width mm	Gross depth mm	Auxiliary heated volume litres	Electrical aux. heating power kW
ECO S260	2.64	2135	1238	125	115	1000	400	400	-	-
ECO S230	2.28	1960	1165	150	142	1040	440	440	-	-
ECO S200	1.88	1960	960	200	170	1065	480	480	-	-
ECO S150	1.48	1540	960	300	276	1765	450	450	-	-
<b>Solar loop controller</b>			<b>Solar loop fluid</b>							
Keymark lic.no. if available	-		Recommended/required	Required						
Company	-		Company	-						
Name	-		Name	Propylenoglycol						
Solar loop pump - power range	- W to - W		Freezing point	-15 °C						
<b>System family overview</b>										
Collector name	Number of collectors in each configuration for each store									
	Store name									
	125		150		200		300			
ECO S260						1				
ECO S230			1			1		2		
ECO S200	1		1			1	2	2		
ECO S150	1			2						
Testing Laboratory			Solar & Energy Systems Laboratory, NCSR "DEMOKRITOS"							
Website			www.solar.demokritos.gr							
Test report id. number			6075DE2, 6076DE2, 6075F1							
Date of test report			2015-12-03, 2015-12-03, 2015-10-20							
Comments of test lab			N.C.S.R "DEMOKRITOS" SOLAR ENERGY LABORATORY Head: Dr. Vassilis Beiotis Tel: +210 6503615 - Fax: +210 6544334 163 10 Ag. Paraskevi - Attiki - Greece							

Version 3.6, 2014-06-18

CERTIF Associação para a Certificação

Rua José Afonso, 9E - 2810-237 Almada - Portugal

Tel: +351 212 586 940 / Fax: +351 212 586 959 / mail@certif.pt / www.certif.pt

Summary of	EN12976-2	test results	Certification No.	PSK-002/2016									
Annex to Solar KEYMARK Certificate			Issued	2016-01-04									
Company	SOLE SA		Country	GREECE									
Brand (optional)	EUROSTAR ECO, HELIOTHERMO ECO		Website	www.eurostar-solar.com									
Street	LEFKTRON & LAIKON AGONON		E-mail	export@sole.com									
Postal Code	13671	ACHARNAI, ATHENS	Tel. / Fax	+30 2102389500 / 2									
System family overview													
For each storage and collector size, give number of collectors													
Collector name	125	150	200	300									
ECO S260			1										
ECO S230		1	1	2									
ECO S200	1	1	2	2									
ECO S150	1	2											
Name of system configuration													
Collector name	ECO S150	No. Collectors	1	Storage name									
125-1-S150													
Calculated annual results for "solar-only / preheat system"													
Location	Qd,sh MJ/y	Daily drawoff 80				Daily drawoff 110				Daily drawoff 140			
		Qd,hw MJ/y	QL MJ/y	Qpar MJ/y	fsol %	Qd,hw MJ/y	QL MJ/y	Qpar MJ/y	fsol %	Qd,hw MJ/y	QL MJ/y	Qpar MJ/y	fsol %
Stockholm SE	0	4478	1949	-	44	6150	2255	-	37	7821	2416	-	31
Würzburg DE	0	4289	2028	-	47	5897	2372	-	40	7506	2592	-	35
Davos CH	0	4857	2870	-	59	6654	3280	-	49	8483	3532	-	42
Athens GR	0	3343	2567	-	77	4573	3147	-	69	5834	3595	-	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 <sub>sol</sub> = QL/Qd	-	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		1000	kPa						
Testing Laboratory		Solar & Energy Systems Laboratory, NCSR "DEMOKRITOS"											
Website		www.solar.demokritos.gr											
Test report id. number		6075DE2, 6076DE2, 6075F1											
Date of test report		2015-12-03, 2015-12-03, 2015-10-20											
Test method		ISO 9459-5 (DST)											
Comments of test lab		No comments											
		<p>N.C.S.R "DEMOKRITOS" SOLAR ENERGY LABORATORY Head: Dr Vassilis Belasiotis Tel: +210 6503818 - Fax: +210 6544592 153 10 Ag. Parnakari - Attiki - Greece</p> 											

All values are subject to some uncertainty; e.g. the uncertainty on system output is typically in the range of ± 5 % to ± 15 %

Version 3.6, 2014-06-18





Summary of	EN12976-2	test results	Certification No.	PSK-002/2016										
Annex to Solar KEYMARK Certificate			Issued	2016-01-04										
Company	SOLE SA		Country	GREECE										
Brand (optional)	EUROSTAR ECO, HELIOTHERMO ECO		Website	www.eurostar-solar.com										
Street	LEFKTRON & LAIKON AGONON		E-mail	export@sole.com										
Postal Code	13671	ACHARNAI, ATHENS	Tel. / Fax	+30 2102389500 /2										
<b>System family overview</b>														
For each storage and collector size, give number of collectors														
Collector name	125	150	200	300										
ECO S260			1											
ECO S230		1	1	2										
ECO S200	1	1	2	2										
ECO S150	1	2												
Name of system configuration 125-1-S200														
Collector name	ECO S200	No. Collectors	1	Storage name										
Calculated annual results for "solar-only / preheat system"														
Location	Q <sub>d,sh</sub> MJ/y	Daily drawoff 80 l				Daily drawoff 110 l				Daily drawoff 140 l				
		Q <sub>d,hw</sub> MJ/y	Q <sub>L</sub> MJ/y	Q <sub>par</sub> MJ/y	f <sub>sol</sub> %	Q <sub>d,hw</sub> MJ/y	Q <sub>L</sub> MJ/y	Q <sub>par</sub> MJ/y	f <sub>sol</sub> %	Q <sub>d,hw</sub> MJ/y	Q <sub>L</sub> MJ/y	Q <sub>par</sub> MJ/y	f <sub>sol</sub> %	
Stockholm SE	0	4478	2148	-	48	6150	2532	-	41	7821	2740	-	35	
Würzburg DE	0	4289	2208	-	52	5897	2646	-	45	7506	2939	-	39	
Davos CH	0	4857	3217	-	66	6654	3721	-	56	8483	4068	-	48	
Athens GR	0	3343	2718	-	82	4573	3406	-	74	5834	3910	-	67	
Perf. indicators for the table above														
Q <sub>d,sh</sub>	MJ/y	Not relevant for solar domestic hot water system												
Q <sub>d</sub>	MJ/y	Annual heat demand for domestic hot water												
Q <sub>L</sub>	MJ/y	Annual heat energy delivered by the solar system												
Q <sub>par</sub>	MJ/y	Annual parasitic energy: (electricity for pumps/controllers)												
f <sub>sol</sub> = Q <sub>L</sub> /Q <sub>d</sub>	-	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									
± 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		250	kPa	Max. operating press. - tank side		1000	kPa							
Testing Laboratory		Solar & Energy Systems Laboratory, NCSR "DEMOKRITOS"												
Website		www.solar.demokritos.gr												
Test report id. number		6075DE2, 6076DE2, 6075F1												
Date of test report		2015-12-03, 2015-12-03, 2015-10-20												
Test method		ISO 9459-5 (DST)												
Comments of test lab														
No comments														

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All values are subject to some uncertainty, e.g. the uncertainty on system output is typically in the range of ± 5 % to ± 15 %

Version 3.6, 2014-06-18

Summary of	EN12976-2	test results	Certification No.	PSK-002/2016
Annex to Solar KEYMARK Certificate			Issued	2016-01-04
Company	SOLE SA		Country	GREECE
Brand (optional)	EUROSTAR ECO, HELIOTHERMO ECO		Website	www.eurostar-solar.com
Street	LEFKTRON & LAIKON AGONON		E-mail	export@sole.com
Postal Code	13671	ACHARNAI, ATHENS	Tel. / Fax	+30 2102389500 / 2

System family overview																
Collector name	For each storage and collector size, give number of collectors															
	125				150				200				300			
ECO S260										1						
ECO S230						1				1				2		
ECO S200		1				1				1		2		2		
ECO S150	1						2									

Name of system configuration			150-1-5200		
Collector name	ECO S200	No. Collectors	1	Storage name	150

Calculated annual results for "solar-only / preheat system"													
Location	Qd,sh MJ/y	Daily drawoff 110				Daily drawoff 140				Daily drawoff 170			
		Qd,hw	Q <sub>L</sub>	Q <sub>par</sub>	f <sub>sol</sub>	Qd,hw	Q <sub>L</sub>	Q <sub>par</sub>	f <sub>sol</sub>	Qd,hw	Q <sub>L</sub>	Q <sub>par</sub>	f <sub>sol</sub>
		MJ/y	MJ/y	MJ/y	%	MJ/y	MJ/y	MJ/y	%	MJ/y	MJ/y	MJ/y	%
Stockholm SE	0	6150	2545	-	42	7821	2778	-	36	9492	2933	-	31
Würzburg DE	0	5897	2658	-	45	7506	2968	-	40	9114	3185	-	35
Davos CH	0	6654	3721	-	56	8483	4100	-	48	10281	4352	-	42
Athens GR	0	4573	3406	-	75	5834	3974	-	68	7064	4384	-	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
Q <sub>L</sub>	MJ/y	Annual heat energy delivered by the solar system
Q <sub>par</sub>	MJ/y	Annual parasitic energy: (electricity for pumps/controllers)
f <sub>sol</sub> = Q <sub>L</sub> /Q <sub>d</sub>	-	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
	± 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	250	kPa	Max. operating press. - tank side	1000	kPa
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Testing Laboratory	Solar & Energy Systems Laboratory, NCSR "DEMOKRITOS"
Website	www.solar.demokritos.gr
Test report id. number	6075DE2, 6076DE2, 6075F1
Date of test report	2015-12-03, 2015-12-03, 2015-10-20
Test method	ISO 9459-5 (DST)

Comments of test lab	<p>N.C.S.R "DEMOKRITOS" SOLAR ENERGY LABORATORY Head: Dr Vassilis Bellosiotis Tel: +210 6503015 - Fax: +210 0544500 153 10 Ag. Paraskevi Attiki Greece</p> 
No comments	

All values are subject to some uncertainty: e.g. the uncertainty on system output is typically in the range of ± 5 % to ± 15 %

Version 3.6, 2014-06-18



Summary of	EN12976-2	test results	Certification No.	PSK-002/2016									
Annex to Solar KEYMARK Certificate			Issued	2016-01-04									
Company	SOLE SA		Country	GREECE									
Brand (optional)	EUROSTAR ECO, HELIOTHERMO ECO		Website	www.eurostar-solar.com									
Street	LEFKTRON & LAIKON AGONON		E-mail	export@sole.com									
Postal Code	13671	ACHARNAI, ATHENS	Tel. / Fax	+30 2102389500 / 2									
System family overview													
For each storage and collector size, give number of collectors													
Collector name	125	150	200	300									
ECO S260			1										
ECO S230		1	1	2									
ECO S200	1	1	2	2									
ECO S150	1	2											
Name of system configuration			150-1-S230										
Collector name	ECO S230	No. Collectors	1	Storage name									
Calculated annual results for "solar-only / preheat system"													
Location	Qd,sh MJ/y	Daily drawoff 110				Daily drawoff 140				Daily drawoff 170			
		Qd,hw MJ/y	QL MJ/y	Qpar MJ/y	fsol %	Qd,hw MJ/y	QL MJ/y	Qpar MJ/y	fsol %	Qd,hw MJ/y	QL MJ/y	Qpar MJ/y	fsol %
Stockholm SE	0	6150	2763	-	45	7821	3046	-	39	9492	3248	-	34
Würzburg DE	0	5897	2867	-	49	7506	3248	-	43	9114	3500	-	39
Davos CH	0	6654	4100	-	62	8483	4541	-	54	10281	4857	-	47
Athens GR	0	4573	3595	-	79	5834	4226	-	72	7064	4699	-	67
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 <sub>so</sub> = Q <sub>l</sub> /Q <sub>d</sub>	-	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								
	± 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		250	kPa	Max. operating press. - tank side		1000	kPa						
Testing Laboratory		Solar & Energy Systems Laboratory, NCSR "DEMOKRITOS"											
Website		www.solar.demokritos.gr											
Test report id. number		6075DE2, 6076DE2, 6075F1											
Date of test report		2015-12-03, 2015-12-03, 2015-10-20											
Test method		ISO 9459-5 (DST)											
Comments of test lab													
No comments													

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Summary of	EN12976-2	test results	Certification No.	PSK-002/2016									
Annex to Solar KEYMARK Certificate			Issued	2016-01-04									
Company	SOLE SA		Country	GREECE									
Brand (optional)	EUROSTAR ECO, HELIOTHERMO ECO		Website	www.eurostar-solar.com									
Street	LEFKTRON & LAIKON AGONON		E-mail	export@sole.com									
Postal Code	13671	ACHARNAI, ATHENS	Tel. / Fax	+30 2102389500 / 2									
System family overview													
For each storage and collector size, give number of collectors													
Collector name	125	150	200	300									
ECO S260			1										
ECO S230		1	1	2									
ECO S200	1	1	2	2									
ECO S150	1	2											
Name of system configuration													
Collector name	ECO S150	No. Collectors	2	Storage name									
150-2-S150													
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 MJ/y	QL MJ/y	Qpar MJ/y	fsol %	Qd,hw MJ/y	QL MJ/y	Qpar MJ/y	fsol %	Qd,hw MJ/y	QL MJ/y	Qpar MJ/y	fsol %
Stockholm SE	0	6150	2980	-	49	7821	3311	-	43	9492	3564	-	38
Würzburg DE	0	5897	3062	-	52	7506	3532	-	47	9114	3879	-	43
Davos CH	0	6654	4447	-	67	8483	5014	-	59	10281	5393	-	52
Athens GR	0	4573	3753	-	82	5834	4447	-	76	7064	5014	-	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								
	$\pm \Delta T_c$	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.											
$\Delta T_c$	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		1000	kPa						
Testing Laboratory		Solar & Energy Systems Laboratory, NCSR "DEMOKRITOS"											
Website		www.solar.demokritos.gr											
Test report id. number		6075DE2, 6076DE2, 6075F1											
Date of test report		2015-12-03, 2015-12-03, 2015-10-20											
Test method		ISO 9459-5 (DST)											
Comments of test lab		No comments											
		<p>N.C.S.R "DEMOKRITOS" SOLAR ENERGY LABORATORY Head: Dr Vassilios Belasios Tel: +210 6503815 - Fax: +210 6544509 153 10 Ag. Parakevri - Attiki - Greece</p>											

All values are subject to some uncertainty; e.g. the uncertainty on system output is typically in the range of  $\pm 5\%$  to  $\pm 15\%$

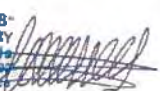
Version 3.6, 2014 06-18



Summary of	EN12976-2	test results	Certification No.	PSK-002/2016									
Annex to Solar KEYMARK Certificate			Issued	2016-01-04									
Company	SOLE SA		Country	GREECE									
Brand (optional)	EUROSTAR ECO, HELIOTHERMO ECO		Website	www.eurostar-solar.com									
Street	LEFKTRON & LAIKON AGONON		E-mail	export@sole.com									
Postal Code	13671	ACHARNAI, ATHENS	Tel. / Fax	+30 2102389500 /2									
System family overview													
For each storage and collector size, give number of collectors													
Collector name	125	150	200	300									
ECO S260			1										
ECO S230		1	1	2									
ECO S200	1	1	2	2									
ECO S150	1	2											
Name of system configuration													
Collector name	ECO S200	No. Collectors	1	Storage name									
				200									
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	f <sub>sol</sub>	Qd,hw	Ql	Qpar	f <sub>sol</sub>	Qd,hw	Ql	Qpar	f <sub>sol</sub>
	MJ/y	MJ/y	MJ/y	%	MJ/y	MJ/y	MJ/y	%	MJ/y	MJ/y	MJ/y	%	
Stockholm SE	0	7821	2804	-	36	9492	2980	-	31	11164	3106	-	28
Würzburg DE	0	7506	2986	-	40	9114	3217	-	35	10691	3406	-	32
Davos CH	0	8483	4100	-	48	10281	4384	-	43	12110	4573	-	38
Athens GR	0	5834	3974	-	68	7064	4415	-	63	8326	4762	-	57
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 <sub>sol</sub> = Q <sub>l</sub> /Q <sub>d</sub>	-	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								
± 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		250	kPa	Max. operating press. - tank side		1000	kPa						
Testing Laboratory		Solar & Energy Systems Laboratory, NCSR "DEMOKRITOS"											
Website		www.solar.demokritos.gr											
Test report id. number		6075DE2, 6076DE2, 6075F1											
Date of test report		2015-12-03, 2015-12-03, 2015-10-20											
Test method		ISO 9459-5 (DST)											
Comments of test lab													
No comments													

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<b>Summary of</b>	<b>EN12976-2</b>	<b>test results</b>	<b>Certification No.</b>	<b>PSK-002/2016</b>									
<b>Annex to Solar KEYMARK Certificate</b>			<b>Issued</b>	<b>2016-01-04</b>									
<b>Company</b>	SOLE SA		<b>Country</b>	GREECE									
<b>Brand (optional)</b>	EUROSTAR ECO, HELIOTHERMO ECO		<b>Website</b>	www.eurostar-solar.com									
<b>Street</b>	LEFKTRON & LAIKON AGONON		<b>E-mail</b>	export@sole.com									
<b>Postal Code</b>	13671	ACHARNAI, ATHENS	<b>Tel. / Fax</b>	+30 2102389500 / 2									
<b>System family overview</b>													
For each storage and collector size, give number of collectors													
<b>Collector name</b>	125	150	200	300									
ECO S260			1										
ECO S230		1	1	2									
ECO S200	1	1	2	2									
ECO S150	1	2											
<b>Name of system configuration</b> 200-1-S230													
<b>Collector name</b>	ECO S230	<b>No. Collectors</b>	1	<b>Storage name</b> 200									
<b>Calculated annual results for "solar-only / preheat system"</b>													
<b>Location</b>	<b>Q<sub>d,sh</sub></b>	<b>Daily drawoff 140 l</b>				<b>Daily drawoff 170 l</b>				<b>Daily drawoff 200 l</b>			
		Q <sub>d,hw</sub>	Q <sub>L</sub>	Q <sub>par</sub>	f <sub>sol</sub>	Q <sub>d,hw</sub>	Q <sub>L</sub>	Q <sub>par</sub>	f <sub>sol</sub>	Q <sub>d,hw</sub>	Q <sub>L</sub>	Q <sub>par</sub>	f <sub>sol</sub>
	MJ/y	MJ/y	MJ/y	MJ/y	%	MJ/y	MJ/y	MJ/y	%	MJ/y	MJ/y	MJ/y	%
Stockholm SE	0	7821	3091	-	40	9492	3311	-	35	11164	3469	-	31
Würzburg DE	0	7506	3280	-	44	9114	3564	-	39	10691	3784	-	35
Davos CH	0	8483	4573	-	54	10281	4920	-	48	12110	5172	-	43
Athens GR	0	5834	4257	-	73	7064	4762	-	67	8326	5203	-	62
<b>Perf. indicators for the table above</b>													
Q <sub>d,sh</sub>	MJ/y	Not relevant for solar domestic hot water system											
Q <sub>d</sub>	MJ/y	Annual heat demand for domestic hot water											
Q <sub>L</sub>	MJ/y	Annual heat energy delivered by the solar system											
Q <sub>par</sub>	MJ/y	Annual parasitic energy: (electricity for pumps/controllers)											
f <sub>sol</sub> = Q <sub>L</sub> /Q <sub>d</sub>	-	Solar fraction											
<b>Ref. conditions</b>		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).											
<b>Max. operating press. - collector side</b>		250	kPa	<b>Max. operating press. - tank side</b>		1000	kPa						
<b>Testing Laboratory</b>		Solar & Energy Systems Laboratory, NCSR "DEMOKRITOS"											
<b>Website</b>		www.solar.demokritos.gr											
<b>Test report id. number</b>		6075DE2, 6076DE2, 6075F1											
<b>Date of test report</b>		2015-12-03, 2015-12-03, 2015-10-20											
<b>Test method</b>		ISO 9459-5 (DST)											
<b>Comments of test lab</b>													
No comments													
 N.C.S.R "DEMOKRITOS" SOLAR ENERGY LABORATORY Head: Dr Vassilis Belesiotis Tel: +210 4503816 - Fax: +210 4544557 163 10 Ag. Paraskevi - Attiki - Greece													

All values are subject to some uncertainty; e.g. the uncertainty on system output is typically in the range of ± 5 % to ± 15 %

Version 3.6, 2014-06-18

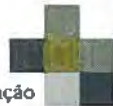


Summary of	EN12976-2	test results	Certification No.	PSK-002/2016									
Annex to Solar KEYMARK Certificate			Issued	2016-01-04									
Company	SOLE SA		Country	GREECE									
Brand (optional)	EUROSTAR ECO, HELIOTHERMO ECO		Website	www.eurostar-solar.com									
Street	LEFKTRON & LAIKON AGONON		E-mail	export@sole.com									
Postal Code	13671	ACHARNAI, ATHENS	Tel. / Fax	+30 2102389500 /2									
System family overview													
For each storage and collector size, give number of collectors													
Collector name	125	150	200	300									
ECO S260			1										
ECO S230		1	1	2									
ECO S200	1	1	2	2									
ECO S150	1	2											
Name of system configuration													
Collector name	ECO S260	No. Collectors	1	Storage name									
200-1-S260													
Calculated annual results for "solar-only / preheat system"													
Location	Q <sub>d,sh</sub> MJ/y	Daily drawoff 140 l				Daily drawoff 170 l				Daily drawoff 200 l			
		Q <sub>d,hw</sub> MJ/y	Q <sub>L</sub> MJ/y	Q <sub>par</sub> MJ/y	f <sub>sol</sub> %	Q <sub>d,hw</sub> MJ/y	Q <sub>L</sub> MJ/y	Q <sub>par</sub> MJ/y	f <sub>sol</sub> %	Q <sub>d,hw</sub> MJ/y	Q <sub>L</sub> MJ/y	Q <sub>par</sub> MJ/y	f <sub>sol</sub> %
Stockholm SE	0	7821	3138	-	40	9492	3374	-	36	11164	3595	-	32
Würzburg DE	0	7506	3280	-	44	9114	3595	-	40	10691	3816	-	36
Davos CH	0	8483	4541	-	53	10281	4857	-	47	12110	5109	-	42
Athens GR	0	5834	4257	-	73	7064	4762	-	67	8326	5172	-	62
Perf. indicators for the table above													
Q <sub>d,sh</sub>	MJ/y	Not relevant for solar domestic hot water system											
Q <sub>d</sub>	MJ/y	Annual heat demand for domestic hot water											
Q <sub>L</sub>	MJ/y	Annual heat energy delivered by the solar system											
Q <sub>par</sub>	MJ/y	Annual parasitic energy: (electricity for pumps/controllers)											
f <sub>sol</sub> = Q <sub>L</sub> /Q <sub>d</sub>	-	Solar fraction											
Ref. conditions	G	Stockholm SE	Würzburg DE	Davos CH	Athens GR								
	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		250	kPa	Max. operating press. - tank side		1000	kPa						
Testing Laboratory		Solar & Energy Systems Laboratory, NCSR "DEMOKRITOS"											
Website		www.solar.demokritos.gr											
Test report id. number		6075DE2, 6076DE2, 6075F1											
Date of test report		2015-12-03, 2015-12-03, 2015-10-20											
Test method		ISO 9459-5 (DST)											
Comments of test lab													
No comments													
<p>NCSR "DEMOKRITOS" SOLAR ENERGY LABORATORY Head: Dr. Vasilios Bellos Tel: +210 6903915 - Fax: +210 6944569 153 10 Ag. Paraskevi - Attiki</p>													

All values are subject to some uncertainty; e.g. the uncertainty on system output is typically in the range of ± 5 % to ± 15 %

Version 3.6, 2014-06-18





<b>Summary of</b>	<b>EN12976-2</b>	<b>test results</b>	<b>Certification No.</b>	<b>PSK-002/2016</b>									
<b>Annex to Solar KEYMARK Certificate</b>			<b>Issued</b>	<b>2016-01-04</b>									
<b>Company</b>	SOLE SA		<b>Country</b>	GREECE									
<b>Brand (optional)</b>	EUROSTAR ECO, HELIOTHERMO ECO		<b>Website</b>	www.eurostar-solar.com									
<b>Street</b>	LEFKTRON & LAIKON AGONON		<b>E-mail</b>	export@sole.com									
<b>Postal Code</b>	13671	ACHARNAI, ATHENS	<b>Tel. / Fax</b>	+30 2102389500 / 2									
<b>System family overview</b>													
<b>For each storage and collector size, give number of collectors</b>													
<b>Collector name</b>	<b>125</b>	<b>150</b>	<b>200</b>	<b>300</b>									
ECO S260			1										
ECO S230		1	1	2									
ECO S200	1	1	2	2									
ECO S150	1	2											
<b>Name of system configuration</b> 200-2-S200													
<b>Collector name</b>	ECO S200	<b>No. Collectors</b>	2	<b>Storage name</b>									
<b>Calculated annual results for "solar-only / preheat system"</b>													
<b>Location</b>	<b>Q<sub>d,sh</sub></b>	<b>Daily drawoff 140 l</b>				<b>Daily drawoff 170 l</b>				<b>Daily drawoff 200 l</b>			
	<b>Q<sub>d,hw</sub></b>	<b>Q<sub>L</sub></b>	<b>Q<sub>par</sub></b>	<b>f<sub>sol</sub></b>	<b>Q<sub>d,hw</sub></b>	<b>Q<sub>L</sub></b>	<b>Q<sub>par</sub></b>	<b>f<sub>sol</sub></b>	<b>Q<sub>d,hw</sub></b>	<b>Q<sub>L</sub></b>	<b>Q<sub>par</sub></b>	<b>f<sub>sol</sub></b>	
	<b>MJ/y</b>	<b>MJ/y</b>	<b>MJ/y</b>	<b>%</b>	<b>MJ/y</b>	<b>MJ/y</b>	<b>MJ/y</b>	<b>%</b>	<b>MJ/y</b>	<b>MJ/y</b>	<b>MJ/y</b>	<b>%</b>	
Stockholm SE	0	7821	3595	-	46	9492	3910	-	41	11164	4131	-	
Würzburg DE	0	7506	3784	-	50	9114	4194	-	46	10691	4510	-	
Davos CH	0	8483	5456	-	64	10281	5929	-	58	12110	6307	-	
Athens GR	0	5834	4667	-	80	7064	5330	-	75	8326	5897	-	
<b>Perf. indicators for the table above</b>													
<b>Q<sub>d,sh</sub></b>	<b>MJ/y</b>	Not relevant for solar domestic hot water system											
<b>Q<sub>d</sub></b>	<b>MJ/y</b>	Annual heat demand for domestic hot water											
<b>Q<sub>L</sub></b>	<b>MJ/y</b>	Annual heat energy delivered by the solar system											
<b>Q<sub>par</sub></b>	<b>MJ/y</b>	Annual parasitic energy: (electricity for pumps/controllers)											
<b>f<sub>sol</sub> = Q<sub>L</sub>/Q<sub>d</sub></b>	-	Solar fraction											
<b>Ref. conditions</b>		Stockholm SE	Würzburg DE	Davos CH	Athens GR								
	<b>G</b>	1,157	1,230	1,684	1,736								
	<b>T<sub>a,ave</sub></b>	7.5	9.0	3.2	18.5								
	<b>T<sub>c,ave</sub></b>	8.5	10.0	5.4	17.8								
	<b>± ΔT<sub>c</sub></b>	6.4	3.0	0.8	7.4								
<b>G</b>	<b>kWh/m<sup>2</sup></b>	Annual irradiation South, 45°											
<b>T<sub>a,ave</sub></b>	<b>°C</b>	Annual average outdoor air temperature											
<b>T<sub>c,ave</sub></b>	<b>°C</b>	Annual average mains cold water temp.											
<b>ΔT<sub>c</sub></b>	<b>K</b>	Seasonal variation of T <sub>c</sub>											
<b>Th</b>	<b>45 °C</b>	Desired hot water temperature (mixing valve temperature).											
<b>Max. operating press. - collector side</b>		250	kPa	<b>Max. operating press. - tank side</b>		1000	kPa						
<b>Testing Laboratory</b>		Solar & Energy Systems Laboratory, NCSR "DEMOKRITOS"											
<b>Website</b>		www.solar.demokritos.gr											
<b>Test report id. number</b>		6075DE2, 6076DE2, 6075F1											
<b>Date of test report</b>		2015-12-03, 2015-12-03, 2015-10-20											
<b>Test method</b>		ISO 9459-5 (DST)											
<b>Comments of test lab</b>													
No comments													

N.C.S.R. "DEMOKRITOS"  
SOLAR ENERGY LABORATORY  
Head: Dr. Vassilios Belesiotis  
Tel: +210 8503815 - Fax: +210 8544500  
153 10 Ag. Paraskevi - Attiki - Greece



Summary of	EN12976-2	test results	Certification No.	PSK-002/2016									
Annex to Solar KEYMARK Certificate			Issued	2016-01-04									
Company	SOLE SA		Country	GREECE									
Brand (optional)	EUROSTAR ECO, HELIOTHERMO ECO		Website	www.eurostar-solar.com									
Street	LEFKTRON & LAIKON AGONON		E-mail	export@sole.com									
Postal Code	13571	ACHARNAI, ATHENS	Tel. / Fax	+30 2102389500 / 2									
System family overview													
For each storage and collector size, give number of collectors													
Collector name	125	150	200	300									
ECO S260			1										
ECO S230		1	1	2									
ECO S200	1	1	2	2									
ECO S150	1	2											
Name of system configuration													
300-2-S200													
Collector name	ECO S200	No. Collectors	2	Storage name									
300													
Calculated annual results for "solar-only / preheat system"													
Location	Q <sub>d,sh</sub> MJ/y	Daily drawoff 250 l				Daily drawoff 300 l				Daily drawoff 400 l			
		Q <sub>d,hw</sub> MJ/y	Q <sub>L</sub> MJ/y	Q <sub>par</sub> MJ/y	f <sub>sol</sub> %	Q <sub>d,hw</sub> MJ/y	Q <sub>L</sub> MJ/y	Q <sub>par</sub> MJ/y	f <sub>sol</sub> %	Q <sub>d,hw</sub> MJ/y	Q <sub>L</sub> MJ/y	Q <sub>par</sub> MJ/y	f <sub>sol</sub> %
Stockholm SE	0	13939	5456	-	39	16746	5771	-	35	22327	6307	-	28
Würzburg DE	0	13371	5803	-	44	16052	6276	-	39	21413	6686	-	31
Davos CH	0	15137	8105	-	54	18165	8641	-	48	24220	9177	-	38
Athens GR	0	10407	7537	-	73	12488	8389	-	67	16651	9429	-	57
Perf. indicators for the table above													
Q <sub>d,sh</sub>	MJ/y	Not relevant for solar domestic hot water system											
Q <sub>d</sub>	MJ/y	Annual heat demand for domestic hot water											
Q <sub>L</sub>	MJ/y	Annual heat energy delivered by the solar system											
Q <sub>par</sub>	MJ/y	Annual parasitic energy: (electricity for pumps/controllers).											
f <sub>sol</sub> = Q <sub>L</sub> /Q <sub>d</sub>	-	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								
	± 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		250	kPa	Max. operating press. - tank side		1000	kPa						
Testing Laboratory		Solar & Energy Systems Laboratory, NCSR "DEMOKRITOS"											
Website		www.solar.demokritos.gr											
Test report id. number		6075DE2, 6076DE2, 6075F1											
Date of test report		2015-12-03, 2015-12-03, 2015-10-20											
Test method		ISO 9459-5 (DST)											
Comments of test lab		No comments											
		<p>N.C.S.R. "DEMOKRITOS" SOLAR ENERGY LABORATORY Head: Dr Vassilios Balasoiu Tel: +210 8543815 - Fax: +210 8541542 153 10 Ag. Paraskevi - Attiki - Greece</p>											

All values are subject to some uncertainty, e.g. the uncertainty on system output is typically in the range of ± 5 % to ± 15 %

Version 3.6, 2014-06-18



Summary of	EN12976-2	test results	Certification No.	PSK-002/2016									
Annex to Solar KEYMARK Certificate			Issued	2016-01-04									
Company	SOLE SA		Country	GREECE									
Brand (optional)	EUROSTAR ECO, HELIOTHERMO ECO		Website	www.eurostar-solar.com									
Street	LEFKTRON & LAIKON AGONON		E-mail	export@sole.com									
Postal Code	13671	ACHARNAI, ATHENS	Tel. / Fax	+30 2102389500 / 2									
<b>System family overview</b>													
For each storage and collector size, give number of collectors													
Collector name	125	150	200	300									
ECO S260			1										
ECO S230		1	1	2									
ECO S200	1	1	1	2									
ECO S150	1	2											
Name of system configuration													
Collector name	ECO S230	No. Collectors	2	Storage name									
				300									
Calculated annual results for "solar-only / preheat system"													
Location	Q <sub>d,sh</sub> MJ/y	Daily drawoff 250 l				Daily drawoff 300 l				Daily drawoff 400 l			
		Q <sub>d,hw</sub> MJ/y	Q <sub>L</sub> MJ/y	Q <sub>par</sub> MJ/y	f <sub>sol</sub> %	Q <sub>d,hw</sub> MJ/y	Q <sub>L</sub> MJ/y	Q <sub>par</sub> MJ/y	f <sub>sol</sub> %	Q <sub>d,hw</sub> MJ/y	Q <sub>L</sub> MJ/y	Q <sub>par</sub> MJ/y	f <sub>sol</sub> %
Stockholm SE	0	13939	5929	-	42	16746	6307	-	38	22327	6938	-	31
Würzburg DE	0	13371	6276	-	47	16052	6812	-	43	21413	7348	-	34
Davos CH	0	15137	8893	-	59	18165	9524	-	52	24220	10186	-	42
Athens GR	0	10407	7947	-	76	12488	8893	-	71	16651	10155	-	61
Perf. indicators for the table above													
Q <sub>d,sh</sub>	MJ/y	Not relevant for solar domestic hot water system											
Q <sub>d</sub>	MJ/y	Annual heat demand for domestic hot water											
Q <sub>L</sub>	MJ/y	Annual heat energy delivered by the solar system											
Q <sub>par</sub>	MJ/y	Annual parasitic energy: (electricity for pumps/controllers)											
f <sub>sol</sub> = Q <sub>L</sub> /Q <sub>d</sub>	-	Solar fraction											
Ref. conditions		Stockholm SE	Würzburg DE	Davos CH	Athens GR								
	G	1,157	1,230	1,584	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		250	kPa	Max. operating press. - tank side		1000	kPa						
Testing Laboratory		Solar & Energy Systems Laboratory, NCSR "DEMOKRITOS"											
Website		www.solar.demokritos.gr											
Test report id. number		6075DE2, 6076DE2, 6075F1											
Date of test report		2015-12-03, 2015-12-03, 2015-10-20											
Test method		ISO 9459-5 (DST)											
Comments of test lab													
No comments		N.C.S.R "DEMOKRITOS" SOLAR ENERGY LABORATORY Head: Dr Vassilis Gekas Tel: +210 6505515 - Fax: +210 6341500 153 10 Ag. Paraskevi - Attiki - Greece											

All values are subject to some uncertainty, e.g. the uncertainty on system output is typically in the range of ± 5 % to ± 15 %

Version 3.6, 2014-06-18



# Certificado

Certificate no.  
Certificado nº

PSK – 001/2016



Name and address of certificate holder:  
*Nome e morada do titular do certificado:*

SOLE S. A.  
Lefktron and Laikon Agonon,  
Acharnai – 13671, Athens  
GREECE

Product:  
*Produto:*

Thermal Solar Collector  
*Coletor Solar Térmico*

Type references:  
*Referências:*

ECO S150; ECO S200; ECO S230; ECO S260

Trademark(s):  
*Marca(s) comercial(is):*

ECO

Technical characteristics:  
*Características técnicas:*

Summary of EN 12975 Test Results: *Registration No. PSK-001/2016,*  
(in annex)  
*Resumo dos resultados dos ensaios realizados segundo a norma EN 12975:*  
*Registo Nº PSK-001/2016, (em anexo)*

This product is in conformity with:  
*Este produto está em conformidade com:*

EN 12975-1:2006+A1:2010, EN ISO 9806:2013

and with the Specific Keymark Scheme Rules for Solar Thermal Products  
*e com as Regras Particulares do CEN Keymark Scheme para Produtos Solares Térmicos.*

Test report(s) no. / issued by:  
*Relatórios de ensaios nº(s) / emitidos por:*

Nº 4151 DE4 / DEMOKRITOS

Additional information (if any):  
*Informação adicional (se existir):*

---

This certificate is valid until:  
*Este certificado é válido até:*

2020-11-22

and supersedes certificate no:  
*e substitui o certificado nº:*

PSK-024/2015

Date of issue:  
*Data de emissão:*

2016-01-04

Francisco Barroca  
General Manager / *Diretor Geral*

This Certificate includes one Annex with 2 (two) pages  
*Este Certificado é constituído por um Anexo com 2 (duas) páginas*





[illegible]

Annual collector output based on EN 12975 Test Results, annex to Solar KEYMARK Certificate	Licence Number	PSK-001/2016
	Issued	4/1/2016

Annual collector output kWh/module													
Collector name	Location and collector temperature (T <sub>m</sub> )												
	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	
ECO S260	2,653	1,608	924	1,871	1,151	648	1,386	794	436	1,502	840	452	
ECO S230	2,284	1,384	795	1,611	991	558	1,193	684	375	1,293	723	389	
ECO S200	1,874	1,136	652	1,321	813	458	979	561	308	1,061	593	319	
ECO S150	1,463	887	510	1,032	635	358	764	438	240	828	463	249	

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

Overview of locations				
Location	Latitude °	G <sub>tot</sub> kWh/m <sup>2</sup>	T <sub>a</sub> °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°

G <sub>tot</sub>	Annual total irradiation on collector plane	kWh/m <sup>2</sup>
T <sub>a</sub>	Mean annual ambient air temperature	°C
T <sub>m</sub>	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 (T<sub>m</sub>). A detailed description of the calculations is available at <http://www.sp.se/en/index/services/solar/ScenoCalc/Sidor/default.aspx>.





HELLENIC ELECTRONICS EQUIPMENT QUALITY ASSURANCE CENTER  
H.E.E.Q.A.C. S.A.



ACCREDITED BY ESXD FOR TESTING (07-2) & CERTIFICATION (125-2).  
NOTIFIED BODY (0848) FOR THE 2006/95/EC, 2004/108/EC & 2009/142/EC DIR.  
103 KEFALLHNIAS STR, 112 51 ATHENS - GREECE  
TEL.: +30-210-8670588 - FAX: +30-210-8647510  
e-mail: [info@heeqac.gr](mailto:info@heeqac.gr), site: [www.heeqac.gr](http://www.heeqac.gr)

## VERIFICATION OF CONFORMITY

VERIFICATION NUMBER : 400304-1  
DATE OF ISSUE : OCTOBER 10, 2015  
VALID UP TO : OCTOBER 09, 2019  
ISSUED TO : SOLE S.A., AMAROUSIOU CHALANDRIOU 26  
15125, MAROUSI, ATHENS, GREECE  
TEST ITEM : HOT WATER BOILER  
TYPE/MODEL : STS 150, STS 200, STS 300, SWH 120, SWH 150,  
SWH 200, SWH 300  
MANUFACTURER : SOLE S.A.  
APPLICABLE DIRECTIVE : LVD 2006/95/EC  
APPLICABLE STANDARDS : EN 60335-1:2012 (IEC 60335-1:2010)  
EN 60335-2-21:2003 +A1:2004 +A2:2008  
(IEC 60335-2-21:2002 +A1:2004 +A2:2008)

STATEMENT : THE TEST ITEM COMPLIES WITH THE ABOVE MENTIONED APPLICABLE STANDARDS.

### GENERAL REMARKS:

- The test results apply only to the particular sample for which the HEEQAC'S test report S/N 503638-E dated September 29, 2011 was issued.
- This verification must be read in conjunction with the above mentioned test report.
- This verification replaces and therefore cancels the verification with No. 400304 issued on October 10, 2011.
- After preparation of the necessary technical documentation as well as the declaration of conformity and the verification for compliance with other Directives, the CE marking shown below can be affixed on this product.
- This verification is based on a single evaluation of the above mentioned product. It is therefore essential for the manufacturer to ensure that the quality of his production is always in accordance with the applicable standards.



TEST LABORATORY  
FOR H.E.E.Q.A.C. S.A.  
G. CHRYSANTHAKOPOULOS  
GENERAL MANAGER

H.E.E.Q.A.C. S.A.  
HELLENIC ELECTRONICS EQUIPMENT  
QUALITY ASSURANCE CENTRE  
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VAT NO. EL094253590 TAX EXEMPT. ATHENS 15125  
Email: [info@heeqac.gr](mailto:info@heeqac.gr)

DATE OF ISSUE: OCTOBER 10, 2015



## CERTIFICATE OF PRODUCT CONFORMITY

Dubai Central Laboratory Department (DCLD) of Dubai Municipality,  
hereby attests that the product(s):

### THERMAL SOLAR SYSTEMS AND COMPONENTS – SOLAR COLLECTORS

(Details as per the attached Scope of Certification)

manufactured by:

**SOLE S.A.**

**Lefktron and Laikon Agonon, Acharnai-Athens, Greece**

have been assessed in accordance with DCLD Document Ref. No. RD-DP21-2001 (IC) "General Rules for DM third party product certification system through factory assessment" and the relevant Specific Rules, and were found in conformity with the standard specification:

**BS EN 12975-1:2006+A1:2010**

Accordingly, DCLD hereby authorizes the above manufacturer  
to affix the DCL Product Conformity Mark to the above-mentioned product(s).



**ENGR. AMIN AHMED AMIN**  
Director, Dubai Central Laboratory Department  
Dubai Municipality



Certificate No: CL16020330  
Valid Until: 22 February 2018



Current Issue Date: 23 February 2017  
Original Issue Date: 23 February 2016

The attached Scope of Certification bearing the same Certificate No. forms an integral part of this certificate.  
This certificate is subject to the Terms and Conditions of the Product Certification System  
and shall not be reproduced except in full.



## DUBAI CENTRAL LABORATORY DEPARTMENT DCL PRODUCT CONFORMITY CERTIFICATION SCHEME

### SCOPE OF CERTIFICATION FOR CERTIFICATE NO. CL16020330

<b>Certificate Issued To:</b>	SOLE S.A. Lefktron and Laikon Agonon, Acharnai-Athens, Greece
<b>Applicable Standard Specification:</b>	BS EN 12975-1:2006 +A1: 2010 – Thermal solar systems and components – Solar Collectors – Part 1: General requirements
<b>Applicable Specific Rules:</b>	RD-DP21-2178 (IC) – Specific Rules Certification of Solar Collectors as per BS EN 12975-1 Through Factory Assessment  RD-DP21-2084 (IC) – Guidelines for Factory Production control Plan for Solar Collector Manufacturers

S/N	PRODUCT DETAILS	BRAND NAME(S) / MODEL(S)	PRODUCT DESCRIPTION
1.	<p>FLAT PLATE SOLAR COLLECTORS</p> <p>CLIMASOL FAMILY</p> <p>Absorber Materials: Copper full face sheet 0.20 mm thickness welded to copper pipes with ultrasonic or laser welding</p> <p>Absorber Coating: Sputtering blue selective surface</p> <p>Insulation Materials: 40 mm Rockwool with Density of 50 kg/m<sup>3</sup> for back and 20 mm Glasswool with density of 30 kg/m<sup>3</sup> for sides</p> <p>Cover: Tempered low iron prismatic glass 4 mm glass cover</p> <p>Frame: Aluminum profile epoxy coated &amp; free of screws and rivets</p> <p>Sealing materials: EPDM rubber - silicone</p> <p>Use with anti-freeze thermal fluid</p> <p>Maximum operational pressure: 1000 kPa</p> <p>Maximum Working temperature: 150°C</p>	"SOLE, EUROSTAR, AQUASOL, OLYMPUS, SUNLIT" BRANDS	<p>CLIMASOL 175</p> <p>Gross dimensions: 1760 x 1000 x 86 mm; Collector Area: 1.76 m<sup>2</sup>; Aperture Area: 1.59 m<sup>2</sup>; Absorber Area: 1.57 m<sup>2</sup>; Collector Weight: 38 kg; Fluid content: 1.30 liters</p> <p>CLIMASOL 200</p> <p>Gross dimensions: 1970 x 970 x 86 mm; Collector Area: 1.91 m<sup>2</sup>; Aperture Area: 1.73 m<sup>2</sup>; Absorber Area: 1.71 m<sup>2</sup>; Collector Weight: 41 kg; Fluid content: 1.36 liters</p> <p>CLIMASOL 250</p> <p>Gross dimensions: 1970 x 1175 x 86 mm; Collector Area: 2.31 m<sup>2</sup>; Aperture Area: 2.12 m<sup>2</sup>; Absorber Area: 2.09 m<sup>2</sup>; Collector Weight: 49 kg; Fluid content: 1.64 liters</p> <p>CLIMASOL 270</p> <p>Gross dimensions: 2145 x 1248 x 86 mm; Collector Area: 2.68 m<sup>2</sup>; Aperture Area: 2.46 m<sup>2</sup>; Absorber Area: 2.42 m<sup>2</sup>; Collector Weight: 55 kg; Fluid content: 1.86 liters</p>



## DUBAI CENTRAL LABORATORY DEPARTMENT DCL PRODUCT CONFORMITY CERTIFICATION SCHEME

### SCOPE OF CERTIFICATION FOR CERTIFICATE NO. CL16020330

2.	<p style="text-align: center;"><b>FLAT PLATE SOLAR COLLECTORS</b></p> <p style="text-align: center;"><b>WASCO FAMILY</b></p> <p>Absorber Materials: Aluminum full face sheet 0.50 mm thickness welded to copper pipes with laser welding Absorber Coating: Sputtering blue selective surface Insulation Materials: 40 mm Rockwool with Density of 50 kg/m<sup>3</sup> for back and 20 mm Glasswool with density of 30 kg/m<sup>3</sup> for sides Cover: Tempered low iron prismatic glass 4 mm glass cover Frame: Aluminum profile epoxy coated &amp; free of screws and rivets Sealing materials: EPDM rubber - silicone Use with anti-freeze thermal fluid Maximum operational pressure: 600 kPa Maximum Working temperature: 160°C</p>	<p>"SOLE, EUROSTAR, AQUASOL, OLYMPUS, SUNLIT" BRANDS</p>	<p style="text-align: center;"><b>WASCO 175</b></p> <p>Gross dimensions: 1760 x 1000 x 86 mm; Collector Area: 1.76 m<sup>2</sup>; Aperture Area: 1.59 m<sup>2</sup>; Absorber Area: 1.57 m<sup>2</sup>; Collector Weight: 38 kg; Fluid content: 1.30 liters</p> <p style="text-align: center;"><b>WASCO 200</b></p> <p>Gross dimensions: 1970 x 970 x 86 mm; Collector Area: 1.91 m<sup>2</sup>; Aperture Area: 1.73 m<sup>2</sup>; Absorber Area: 1.71 m<sup>2</sup>; Collector Weight: 41 kg; Fluid content: 1.36 liters</p> <p style="text-align: center;"><b>WASCO 250</b></p> <p>Gross dimensions: 1970 x 1175 x 86 mm; Collector Area: 2.31 m<sup>2</sup>; Aperture Area: 2.12 m<sup>2</sup>; Absorber Area: 2.09 m<sup>2</sup>; Collector Weight: 49 kg; Fluid content: 1.64 liters</p> <p style="text-align: center;"><b>WASCO 270</b></p> <p>Gross dimensions: 2145 x 1248 x 86 mm; Collector Area: 2.68 m<sup>2</sup>; Aperture Area: 2.46 m<sup>2</sup>; Absorber Area: 2.42 m<sup>2</sup>; Collector Weight: 55 kg; Fluid content: 1.86 liters</p>
3.	<p style="text-align: center;"><b>FLAT PLATE SOLAR COLLECTORS</b></p> <p style="text-align: center;"><b>NON SELECTIVE (NS) FAMILY</b></p> <p>Absorber Materials: Aluminum full face sheet 0.40 mm thickness welded to copper pipes with laser welding Absorber Coating: Black paint non selective surface Insulation Materials: 40 mm Rockwool with Density of 50 kg.m<sup>3</sup> for back and 20 mm Glasswool with density of 30 kg/m<sup>3</sup> for sides Cover: Tempered low iron prismatic glass 4 mm glass cover Frame: Aluminum profile powder coated &amp; free of screws and rivets Sealing materials: EPDM rubber - silicone Use with anti-freeze thermal fluid Maximum operational pressure: 600 kPa Maximum Working temperature: 150°C</p>	<p>"SOLE, EUROSTAR, AQUASOL, OLYMPUS, SUNLIT" BRANDS</p>	<p style="text-align: center;"><b>NS 175</b></p> <p>Gross dimensions: 1760 x 1000 x 86 mm; Collector Area: 1.76 m<sup>2</sup>; Aperture Area: 1.59 m<sup>2</sup>; Absorber Area: 1.57 m<sup>2</sup>; Collector Weight: 38 kg; Fluid content: 1.30 liters</p> <p style="text-align: center;"><b>NS 200</b></p> <p>Gross dimensions: 1970 x 970 x 86 mm; Collector Area: 1.91 m<sup>2</sup>; Aperture Area: 1.73 m<sup>2</sup>; Absorber Area: 1.71 m<sup>2</sup>; Collector Weight: 41 kg; Fluid content: 1.36 liters</p> <p style="text-align: center;"><b>NS 250</b></p> <p>Gross dimensions: 1970 x 1175 x 86 mm; Collector Area: 2.31 m<sup>2</sup>; Aperture Area: 2.12 m<sup>2</sup>; Absorber Area: 2.09 m<sup>2</sup>; Collector Weight: 49 kg; Fluid content: 1.64 liters</p> <p style="text-align: center;"><b>NS 270</b></p> <p>Gross dimensions: 2145 x 1248 x 86 mm; Collector Area: 2.68 m<sup>2</sup>; Aperture Area: 2.46 m<sup>2</sup>; Absorber Area: 2.42 m<sup>2</sup>; Collector Weight: 55 kg; Fluid content: 1.86 liters</p>



## DUBAI CENTRAL LABORATORY DEPARTMENT DCL PRODUCT CONFORMITY CERTIFICATION SCHEME

### SCOPE OF CERTIFICATION FOR CERTIFICATE NO. CL16020330

4.	<p style="text-align: center;"><b>FLAT PLATE SOLAR COLLECTORS</b></p> <p style="text-align: center;"><b>ECO FAMILY</b></p> <p>Absorber Materials: Aluminum fins 0.50 mm thickness welded to copper pipes with laser welding</p> <p>Absorber Coating: Sputtering blue selective surface</p> <p>Insulation Materials: 40 mm Rockwool with Density of 50 kg.m3 for back and 20 mm Glasswool with density of 30 kg/m3 for sides</p> <p>Cover: Tempered low iron prismatic glass 3.2 mm glass cover</p> <p>Frame: Aluminum profile &amp; free of screws and rivets</p> <p>Sealing materials: Acrylic foam - silicone Use with anti-freeze thermal fluid</p> <p>Maximum operational pressure: 1000 kPa Maximum Working temperature: 150°C</p>	"ECO" BRAND	<p style="text-align: center;"><b>ECO S150</b></p> <p>Gross dimensions: 1540 x 960 x 81 mm; Collector Area: 1.48 m<sup>2</sup>; Aperture Area: 1.39 m<sup>2</sup>; Absorber Area: 1.33 m<sup>2</sup>; Collector Weight: 27.30 kg; Fluid content: 0.85 liter</p> <p style="text-align: center;"><b>ECO S200</b></p> <p>Gross dimensions: 1960 x 960 x 81 mm; Collector Area: 1.88 m<sup>2</sup>; Aperture Area: 1.78 m<sup>2</sup>; Absorber Area: 1.70 m<sup>2</sup>; Collector Weight: 32.0 kg; Fluid content: 0.95 liter</p> <p style="text-align: center;"><b>ECO S230</b></p> <p>Gross dimensions: 1960 x 1165 x 81 mm; Collector Area: 2.28 m<sup>2</sup>; Aperture Area: 2.17 m<sup>2</sup>; Absorber Area: 2.09 m<sup>2</sup>; Collector Weight: 38.80 kg; Fluid content: 1.20 liters</p> <p style="text-align: center;"><b>ECO S260</b></p> <p>Gross dimensions: 2135 x 1238 x 81 mm; Collector Area: 2.64 m<sup>2</sup>; Aperture Area: 2.52 m<sup>2</sup>; Absorber Area: 2.44 m<sup>2</sup>; Collector Weight: 44 kg; Fluid content: 1.30 liters</p>
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NOTE 1: The above products shall bear the DCL Conformity Mark applied on each individual product.  
NOTE 2: This document forms part of the Certificate of Product Conformity bearing the same certificate number.

Original Issue Date : 23 February 2016  
Current Issue Date : 23 February 2017  
Valid Until : 22 February 2018

**ARIF HUSAIN AL MARZOOQI**  
Head of Products Conformity Assessment Section  
Dubai Central Laboratory Department



Αριθ. Έργου: 02.02.219  
Project Nr.

Αρ.Πιστ.: I.09452/16  
Cert Nr.

**ΠΙΣΤΟΠΟΙΗΤΙΚΟ ΥΔΡΑΥΛΙΚΗΣ ΔΟΚΙΜΗΣ**  
**HYDRAULIC TEST CERTIFICATE**

**1. Πελάτης/ Customer:** SOLE S.A.

**2. Στοιχεία εξοπλισμού /Description of equipment:**

CLOSED SOLAR LOOP (Heat Exchanger, Solar Collector and interconnecting piping) of  
THERMAL SOLAR SYSTEMS & COMPONENTS EUROSTAR/HELIO THERMO ECO.

ΚΑΤΑΣΚΕΥΑΣΤΗΣ/ MANUFACTURER :	<b>SOLE S.A.</b> Lefktron & Laikon Agonon, Acharnai – 13671, Athens Greece.
ΤΥΠΟΣ/TYPE :	<b>EUROSTAR/HELIO THERMO, ECO</b> 80-1-S100; 100-1-S125; 125-1-S150; 125-1-S200; 150-1-S200, 150-1-S230; 150-2-S150; 200-1-S200; 200-1-S230; 200-1-S260; 200-2-S200; 300-2-S200; 300-2-S230
ΗΜΕΡΟΜΗΝΙΑ ΚΑΤΑΣΚΕΥΗΣ/ DATE OF MANUFACTURE:	See below
ΑΡ. ΚΑΤΑΣΚΕΥΗΣ /SERIAL No. :	<u>Solar Collectors (absorbers):</u> ECO S260 / EMTF26016088070 / 04.08.2016 ECO S230 / EMTF23016088223 / 29.08.2016 ECO S200 / EMTF20016099481 / 05.09.2016 ECO S125 / EMTF12516033010 / 17.03.2016 ECO S150 / EMTF15015055086 / 06.05.2015 ECO S100 / EMTF10014044005 / 02.04.2014 <u>Boilers:</u> ECO 300 / EC30016066006 / 18.06.2016 ECO 200 / EC20016077101 / 27.07.2016 ECO 150 / EC15016099621 / 12.09.2016 ECO 125 / EC12516099124 / 07.09.2016 ECO 100 / EC10016099025 / 07/09.2016 ECO 80 / EC8016099001 / 12.09.2016



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ΣΧΕΔΙΟ/DRAWING No. :	<ul style="list-style-type: none"> <li>a. SWH ECO Series Parametrical Drawing of 1 Collector on Flat Roof / Complete System 2-sides View on Flat Roof (40°) / 08.09.2013</li> <li>b. ECO 80-1-S125 / Complete System 2-sides View on Flat Roof (40°) / 08.09.2013</li> <li>c. ECO 80-1-S100 / Complete System 2-sides View on Flat Roof (40°) / 08.09.2013</li> <li>d. Boiler Eurostar ECO-300 Double Energy / Boiler Cross-section with internal view / 03.07.2013.</li> <li>e. Boiler Eurostar ECO-200 Double Energy / Boiler Cross-section with internal view / 03.07.2013.</li> <li>f. Boiler Eurostar ECO-150 Double Energy / Boiler Cross-section with internal view / 03.07.2013.</li> <li>g. Eurostar 125 AK – Inner Tank AK-125 / 03.07.2013</li> <li>h. Eurostar 100 AK – Inner Tank AK-100 / 03.07.2013</li> <li>i. Eurostar 80 AK – Inner Tank AK-80 / 03.07.2013</li> <li>j. Absorber ECO S-260 Blue Selective / 2Φ18D-10Φ8 FINS / 02.10.2013</li> <li>k. Absorber ECO S-230 Blue Selective / 2Φ18D-9Φ8 FINS / 02.10.2013</li> <li>l. Absorber ECO S-200 Blue Selective / 2Φ18D-7Φ8 FINS / 24.11.2013</li> <li>m. Absorber ECO S-150 Blue Selective / 2Φ18D-7Φ8 FINS / 24.11.2013</li> <li>n. Absorber ECO S-125 Blue Selective / 2Φ18D-7Φ8 FINS / 17.05.2013</li> <li>o. Absorber ECO S-100 Blue Selective / 2Φ18D-7Φ8 FINS / 20.05.2013</li> </ul>
ΠΙΕΣΗ ΣΧΕΔΙΑΣΜΟΥ/ ΜΕΓ. ΠΙΕΣΗ ΛΕΙΤΟΥΡΓΙΑΣ DESIGN PRESSURE / MAX. WORKING PRESSURE :	1500 Kpa, as per manufacturer's declaration (Closed Solar Loop)
ΠΙΕΣΗ ΔΟΚΙΜΗΣ/ TEST PRESSURE :	2250 Kpa (22.5 bar)
ΕΞΩΤΕΡΙΚΗ ΔΙΑΜΕΤΡΟΣ/ OUTSIDE DIAMETER. :	See below
ΠΑΧΟΣ/WALL THICKNESS :	Solar Heat Exchanger : 70x30x3mm, material S235 (hollow section) Inteconnecting piping : Ø15x1mm, copper tube Solar Collector: Ø8x0.4mm / Ø18x0.7mm, copper tubes.
ΟΓΚΟΣ/CAPACITY :	-



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Αριθ. Έργου: 02.02.219  
Project Nr.

Αρ.Πιστ.: I.09452/16  
Cert Nr.

3. Στοιχεία υδραυλικής δοκιμής / Pressure Test Data :

ΜΕΓΙΣΤΗ ΠΙΕΣΗ ΛΕΙΤΟΥΡΓΙΑΣ/MAX WORKING PRESSURE :	1500 Kpa – Closed Solar loop (Solar Collector and interconnecting piping and Solar Heat exchanger)
ΔΟΚΙΜΗ ΠΙΕΣΗΣ/TEST PRESSURE :	2250 Kpa (22.5 bar)
ΔΙΑΡΚΕΙΑ ΔΟΚΙΜΗΣ/TEST DURATION :	30 mins (min.)
ΜΕΣΟ ΔΟΚΙΜΗΣ/TEST MEDIUM :	Water

4. Ημερομηνία δοκιμής / Date of Hydraulic Test : **13.09.2016**
5. Επιθεωρητής / Inspector : **Konstantinos Papagiannopoulos**
6. Τόπος επιθεώρησης / Place of Inspection: **Athens, Greece**
7. Άλλοι έλεγχοι/Other Inspections : **-**
8. Παρατηρήσεις/Remarks : **Manometer WIKA 213.53 – DL2672  
Calibration Cert. DEKA S.A. No. P-57-14**
9. Αποτελέσματα/ Results : **ACCEPTABLE**

PLACE / DATE  
Athens 27.09.2016

INSPECTOR  
K. Papagiannopoulos  
**TUV HELLAS S.A.**  
Member of TUV NORD Group  
SIGNATURE

Το παρόν πιστοποιητικό εκδίδεται μετά από εξέταση του εξοπλισμού ο οποίος βρέθηκε σε αποδεκτή κατάσταση σύμφωνα με τις απαιτήσεις και καταδεικνύει τα ευρήματα της επιθεώρησης στο συγκεκριμένο χώρο και χρόνο. Δεν αποτελεί εγγύηση καθ'οιαδήποτε έννοια. Δεν επιτρέπεται η μερική ή ολική ανατύπωσή του.

This certificate is issued after equipment examination and found in acceptable condition, according to the requirements and indicates the findings of the inspection at the certain location and time. Does not constitute guaranty at any significance. Partial or total reproduction is not permitted

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Αρ. Έργου. : 02.02.219

Αρ. Πιστοποιητικού : I.12134/17

## ΠΙΣΤΟΠΟΙΗΤΙΚΟ ΥΔΡΑΥΛΙΚΗΣ ΔΟΚΙΜΗΣ

1. Πελάτης: SOLE A.E.

2. Στοιχεία εξοπλισμού:

Ηλιακοί Συλλέκτες Σειράς ECO - S260, S230, S200, S150, S125, S100.

ΚΑΤΑΣΚΕΥΑΣΤΗΣ :	<b>SOLE A.E. – ΒΙΟΜΗΧΑΝΙΑ ΗΛΙΑΚΩΝ ΣΥΣΤΗΜΑΤΩΝ</b> Λεύκτρων & Λαϊκών Αγώνων, Αχαρναί – 13671, Αθήνα.
ΤΥΠΟΣ :	<b>ΗΛΙΑΚΟΙ ΣΥΛΛΕΚΤΕΣ ECO</b> S260, S230, S200, S150, S125, S100.
ΗΜΕΡΟΜΗΝΙΑ ΚΑΤΑΣΚΕΥΗΣ:	Βλέπε παρακάτω
ΑΡΙΘΜΟΣ ΣΕΙΡΑΣ:	ECO S260 / EMTF26016088070 / 04.08.2016 ECO S230 / EMTF23016088223 / 29.08.2016 ECO S200 / EMTF20016099481 / 05.09.2016 ECO S125 / EMTF12516033010 / 17.03.2016 ECO S150 / EMTF15015055086 / 06.05.2015 ECO S100 / EMTF10014044005 / 02.04.2014
ΑΡΙΘΜΟΣ ΣΧΕΔΙΟΥ:	a. Absorber ECO S-260 Blue Selective / 2Φ18D-10Φ8 FINS / 02.10.2013 b. Absorber ECO S-230 Blue Selective / 2Φ18D-9Φ8 FINS / 02.10.2013 c. Absorber ECO S-200 Blue Selective / 2Φ18D-7Φ8 FINS / 24.11.2013 d. Absorber ECO S-150 Blue Selective / 2Φ18D-7Φ8 FINS / 24.11.2013 e. Absorber ECO S-125 Blue Selective / 2Φ18D-7Φ8 FINS / 17.05.2013 f. Absorber ECO S-100 Blue Selective / 2Φ18D-7Φ8 FINS / 20.05.2013
ΠΙΕΣΗ ΣΧΕΔΙΑΣΜΟΥ / ΜΕΓ. ΠΙΕΣΗΣ ΛΕΙΤΟΥΡΓΙΑΣ:	1500 Kpa, από δήλωση του κατασκευαστή
ΠΙΕΣΗ ΔΟΚΙΜΗΣ:	<b>2250 Kpa (22.5 bar)</b>
ΕΞΩΤΕΡΙΚΗ ΔΙΑΜΕΤΡΟΣ:	Βλέπε παρακάτω διάμετρο σωλήνωσης συλλεκτών.
ΠΑΧΟΣ (ΕΛΑΣΜΑΤΟΣ/ΣΩΛΗΝ.):	Χαλκοσωλήνες Ø8x0.4mm / Ø18x0.7mm.
ΧΩΡΗΤΙΚΟΤΗΤΑ:	-



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Αρ. Έργου. : 02.02.219

Αρ. Πιστοποιητικού : I.12134/17

### 3. Στοιχεία υδραυλικής δοκιμής:

ΜΕΓΙΣΤΗ ΠΙΕΣΗ ΛΕΙΤΟΥΡΓΙΑΣ:	1500 Κρα – (Ηλιακοί Συλλέκτες)
ΠΙΕΣΗ ΔΟΚΙΜΗΣ:	2250 Κρα (22.5 bar)
ΔΙΑΡΚΕΙΑ ΔΟΚΙΜΗΣ:	30 λεπτά
ΜΕΣΟ ΔΟΚΙΜΗΣ:	ΝΕΡΟ

4. Ημ/νια Υδραυλικής Δοκιμής : **13.09.2016**
5. Επιθεωρητής : **Κων/νος Παπαγιαννόπουλος**
6. Τόπος Επιθεώρησης : **Αθήνα**
7. Άλλοι Έλεγχοι : **-**
8. Παρατηρήσεις : Μανόμετρο WIKA 213.53 – DL2672  
Πιστοποιητικό Διακρίβωσης DEKA S.A. No. P-57-14
9. Αποτελέσματα : **ΑΠΟΔΕΚΤΑ**  
Δεν παρατηρήθηκαν παραμορφώσεις, διαρροές ή άλλου είδους αστοχίες.

Τοποθεσία / Ημερομηνία  
Αθήνα 08.05.2017

Επιθεωρητής  
**Κων/νος Παπαγιαννόπουλος**  
TUV HELLAS S.A.  
Member of TÜV NORD Group  
222, Mesogeion Av. - 15562 Athens Greece 2106624537  
Υπογραφή

Το παρόν πιστοποιητικό εκδίδεται μετά από εξέταση του εξοπλισμού ο οποίος βρέθηκε σε αποδεκτή κατάσταση σύμφωνα με τις απαιτήσεις και καταδεικνύει τα ευρήματα της επιθεώρησης στο συγκεκριμένο χώρο και χρόνο. Δεν αποτελεί εγγύηση καθ'οιαδήποτε έννοια. Δεν επιτρέπεται η μερική ή ολική ανατύπωσή του.

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Project Nr. : 02.02.219

Cert Nr.: I.12134/17

## HYDRAULIC TEST CERTIFICATE

**1. Customer:** SOLE S.A.

**2. Description of equipment:**

Solar Collectors (Absorbers) ECO series – S260, S230, S200, S150, S125, S100.

MANUFACTURER :	<b>SOLE S.A.</b> Lefktron & Laikon Agonon, Acharnai – 13671, Athens Greece.
TYPE :	<b>SOLAR COLLECTORS (Absorbers) ECO,</b> S260, S230, S200, S150, S125, S100.
DATE OF MANUFACTURE:	See below
SERIAL No. :	ECO S260 / EMTF26016088070 / 04.08.2016 ECO S230 / EMTF23016088223 / 29.08.2016 ECO S200 / EMTF20016099481 / 05.09.2016 ECO S125 / EMTF12516033010 / 17.03.2016 ECO S150 / EMTF15015055086 / 06.05.2015 ECO S100 / EMTF10014044005 / 02.04.2014
DRAWING No. :	a. Absorber ECO S-260 Blue Selective / 2Φ18D-10Φ8 FINS / 02.10.2013 b. Absorber ECO S-230 Blue Selective / 2Φ18D-9Φ8 FINS / 02.10.2013 c. Absorber ECO S-200 Blue Selective / 2Φ18D-7Φ8 FINS / 24.11.2013 d. Absorber ECO S-150 Blue Selective / 2Φ18D-7Φ8 FINS / 24.11.2013 e. Absorber ECO S-125 Blue Selective / 2Φ18D-7Φ8 FINS / 17.05.2013 f. Absorber ECO S-100 Blue Selective / 2Φ18D-7Φ8 FINS / 20.05.2013
DESIGN PRESSURE / MAX. WORKING PRESSURE :	1500 Kpa, as per manufacturer's declaration.
TEST PRESSURE. :	<b>2250 Kpa (22.5 bar)</b>
OUTSIDE DIAMETER. :	See below
WALL THICKNESS :	Copper tubes Ø8x0.4mm / Ø18x0.7mm.
CAPACITY :	-



Headquarters: TÜV HELLAS (TÜV NORD) S.A. 24, El Venizelou Str, 153 41 Ag. Paraskevi, Greece  
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Project Nr. : 02.02.219

Cert Nr.: I.12134/17

**3. Pressure Test Data :**

MAX WORKING PRESSURE :	1500 Kpa – (Solar Collectors)
TEST PRESSURE :	2250 Kpa (22.5 bar)
TEST DURATION :	30 mins (min.)
TEST MEDIUM :	Water

4. Date of Hydraulic Test : **13.09.2016**
5. Inspector : **Konstantinos Papagiannopoulos**
6. Place of Inspection : **Athens, Greece**
7. Other Inspections : **-**
8. Remarks : Manometer WIKA 213.53 – DL2672  
Calibration Cert. DEKA S.A. No. P-57-14
9. Results : **ACCEPTABLE**  
No deformations, leakages or other failures were observed.

PLACE / DATE  
Athens 08.05.2017



INSPECTION CERTIFICATE  
INSPECTOR  
K. Papagiannopoulos  
TUV HELLAS S.A.  
Member of TÜV NORD Group  
232 Messochori Ave - 15502 Athens, Greece - 2103915015

SIGNATURE

This certificate is issued after equipment examination and found in acceptable condition, according to the requirements and indicates the findings of the inspection at the certain location and time. Does not constitute guaranty at any significance. Partial or total reproduction is not permitted

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***SOLE S.A.***  
***PRODUCTS' BROCHURES***

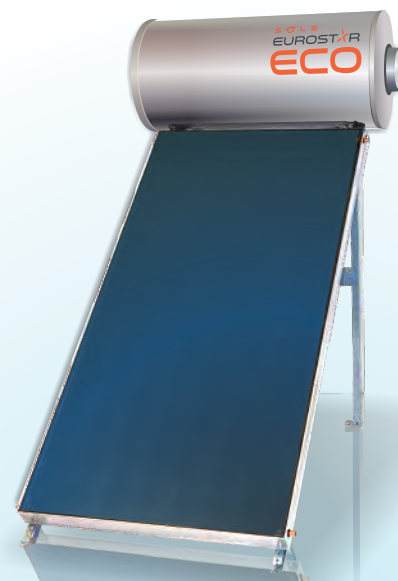
# EUROSTAR ECO

**Durable**  
withstanding **22,5 bar** pressure!!!

**Discrete**  
with a low version (hidden tank) for  
preserving architectural designs.



SOLE S.A. is the inventor of the closed circuit  
Solar Water Heater.



## Advantages

- Maximizes efficiency
- No need for refilling the solar loop
- Best aesthetic results. Low ver with hidden tank available
- Easy to inst
- Minimum maint
- Anode protection

## Commitment to the Environment

Since its foundation in 1974 SOLE S.A. has been committed to the protection of the environment and the reduction of CO<sub>2</sub> emission.

SOLE S.A. holds numerous prizes and environmental distinctions, contributing with its products to the improvement of environment in all 5 continents.

The new series of thermosiphon systems EUROSTAR ECO, have been designed in order to cope with the demands of any market all over the world specializing in very hot climates without the need for refilling the solar circuit.



The EUROSTAR ECO solar water heater is manufactured in compliance with the International Standards for Quality Assurance ISO 9001:2008, is tested according to international standards EN12976-1-2.

The collector's performance and reliability is tested according to EN 12975-2. The system has been granted with the Solar Keymark Certificate.

## ORMAN

BUILDING MATERIAL TRADING L.L.C  
AIRPORT STREET, AS AL KHAIMAH

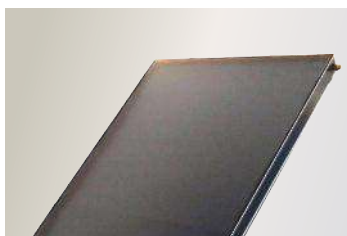
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Fax: +971 7 2277821  
Email: [info@orman.ae](mailto:info@orman.ae)  
[www.orman.ae](http://www.orman.ae)



[www.eurostar-solar.com](http://www.eurostar-solar.com)



## Eurostar EcoCollector



The EUROSTAR ECO collector casing is made of specially designed extruded aluminum profile, without any external connections, screws, nuts or rivets. The Rockwool insulation will maintain very high temperatures achieving an incredibly high efficiency.

The absorber is composed of Blue Selective Aluminum fins 0,50mm thickness, welded to copper pipes with laser welding.

The thermal liquid achieves maximum transfer of heat to the water while protecting the system against scaling, rusting, freezing and overheating.

## Eurostar EcoTank



The EUROSTAR ECO tank has a mild steel external casing, with high temperature oven powder coating for maximum protection from rain, sun and salty environment, ensuring durability and an elegant appearance.

The FREON FREE polyurethane insulation is casted under pressure in the tank, surrounding the cylinder and maintaining hot water for up to 48 hours.

The new revolutionary heat exchanger of the closed circuit assures instant hot water at very high temperature. The tank is made of low carbon steel with a double "enameling" coating (glass), oven-treated at 860°C.

The magnesium anode effectively protects the cylinder from electrolysis. The backup electric heater ensures hot water even in very cloudy days.



The eurostar eco is **eco-friendly** Thermosiphon solar water heater completely made from material that can be recycled.

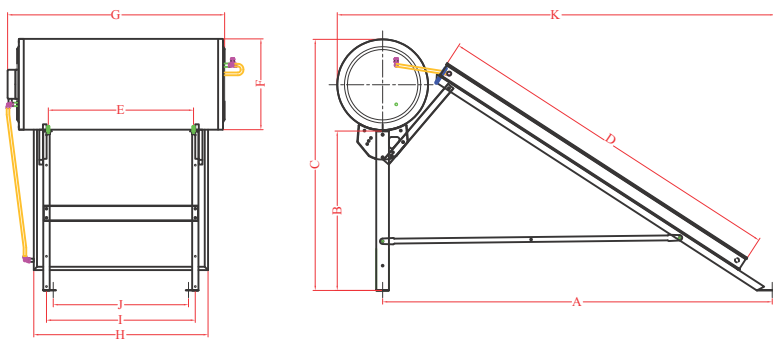
## THERMOSIPHON SYSTEMS

### EUROSTAR ECO SPECIFICATIONS

TYPE	80-1-S100	100-1-S125	125-1-S150	150-1-S200	150-1-S230	200-1-S200	200-1-S230	200-1-S260	300-2-S200	300-2-S230
SOLAR COLLECTORS										
NUMBER OF COLLECTORS	1	1	1	1	1	1	1	1	2	2
AREA OF COLLECTORS m²	0.99	1.23	1.48	1.88	2.28	1.88	2.28	2.64	3.76	4.56
DIMENSIONS mm	1026x960x81	1280x960x81	1540x960x81	1960x960x81	1960x1165x81	1960x960x81	1960x1165x81	2135x1238x81	1960x960x81	1960x1165x81
WEIGHT kg	20,00	22,00	24,00	29,50	35,50	29,50	35,50	40.00	59.00	71.00
FRAME	Aluminum profile. Free of screws and rivets.									
COVER	Tempered low iron prismatic glass 3.2 mm. 90,5% transmission.									
SEALING	Acrylic foam - Structural Silicon									
INSULATION	Rockwool 40mm (50kg/m³) back and Glass wool 20 mm (30kg/m³) sides									
ABSORBER MATERIAL	Blue Selective Aluminum fins 0,50mm thickness, welded to copper pipes with laser welding.									
ABSORPTION (α)	95% (± 0.02)									
EMISSION (ε)	5% (± 0.02)									
EFFICIENCY (η <sub>s</sub> )	0.763									
MAX. WORKING PRESSURE	1000kPa									
MAX. WORKING TEMPERATURE	150°C									
TANK										
NOMINAL CAPACITY (lt)	80	100	125	150	150	200	200	200	300	300
WEIGHT EMPTY (kg)	32	41	49	55	55	61	61	61	95	95
BOILER BODY	The boiler "body" is made from USD 37.2 steel plate. The boiler is (glass) enameled with the advanced double "direct" method "fired" at 860°C									
HEAT EXCHANGER	Internal heat exchanger made from 3.0 mm EN-10219 steel certified for testing pressure at 22,5 bar & operating pressure of 15 bar									
INSULATION	Freon free Polyurethane 40-50mm (40kg/m3) casted under pressure.									
EXTERNAL COVER	Steel sheet galvanized, powder coated, oven treated RAL 9006.									
ANODE PROTECTION	Magnesium rod									
MAX. WORKING PRESSURE	10 bar									
MAX. WORKING TEMP. OF SOLAR CIRCUIT	150°C									
MAX. WORKING PRESS. OF SOLAR CIRCUIT	15 bar									
TEST PRESSURE OF SOLAR CIRCUIT	22,5 bar									

### STANDARD HEIGHT DIMENSIONS mm.

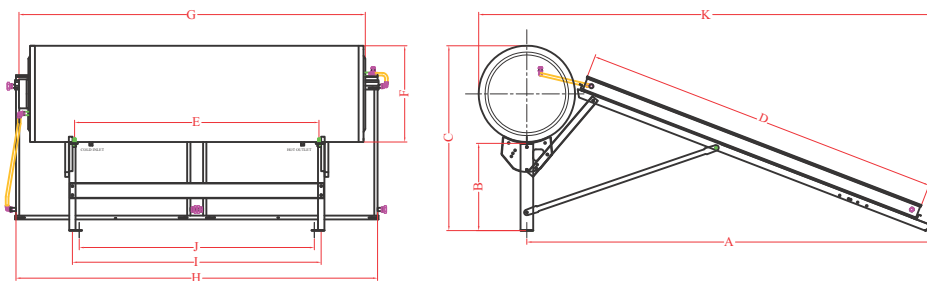
TYPE	A	B	C	D	E	F	G	H	I	J	K
80-1-S100	897	776	1216	1026	480	440	870	960	565	425	1123
100-1-S125	1092	940	1380	1280	650	440	1030	960	735	595	1317
125-1-S150	1291	1107	1547	1540	800	440	1080	960	895	745	1516
150-1-S200	1613	1377	1877	1960	800	500	1195	960	895	745	1868
150-1-S230	1613	1377	1877	1960	800	500	1195	1165	895	745	1868
200-1-S200	1613	1377	1907	1960	800	530	1215	960	895	745	1883
200-1-S230	1613	1377	1907	1960	800	530	1215	1165	895	745	1883
200-1-S260	1747	1489	2019	2135	800	530	1215	1238	895	745	2017
300-2-S200	1613	1377	1907	1960	1345	530	1905	1980	1439	1289	1883
300-2-S230	1613	1377	1907	1960	1345	530	1905	2390	1439	1289	1883



### LOW HEIGHT DIMENSIONS mm.

TYPE	A	B	C	D	E	F	G	H	I	J	K
150-1-S200	2147	878	1383	1960	800	500	1195	960	820	745	2411
200-1-S230	2147	878	1413	1960	800	530	1215	1165	820	745	2426
300-2-S200	2147	878	1413	1960	1345	530	1905	1980	1370	1295	2426

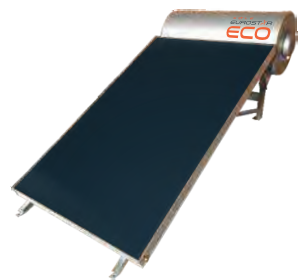
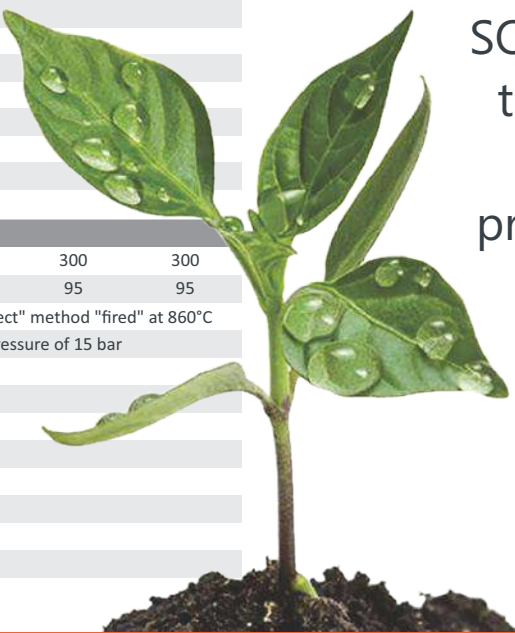
The new thermosiphon system of SOLE is also available in low height in three sizes, 150, 200 and 300ltr.



### EXTRA LOW HEIGHT DIMENSIONS mm.

TYPE	A	B	C	D	E	F	G	H	I	J	K
150-1-S200	2231	480	988	1960	800	500	1195	960	820	745	2495
200-1-S230	2231	480	1018	1960	800	530	1215	1165	820	745	2510
300-2-S200	2231	480	1018	1960	1345	530	1905	1980	1370	1295	2510

SOLE's respect for the environment starts at the production stage.







Solar Thermal  
Flat Plate Collectors  
Forced Circulation Kits

**NEW**

## COLLECTOR ECO



# ECO COLLECTOR

Type	ECO S150	ECO S200	ECO S230	ECO S260
Collector Surface	1.48 m <sup>2</sup>	1.88 m <sup>2</sup>	2.28m <sup>2</sup>	2.64m <sup>2</sup>
Aperture Surface	1.39m <sup>2</sup>	1.78m <sup>2</sup>	2.17m <sup>2</sup>	2.52m <sup>2</sup>
Absorber Surface	1.33 m <sup>2</sup>	1.70 m <sup>2</sup>	2.09m <sup>2</sup>	2.44m <sup>2</sup>
Dimensions	1540x960x81	1960x960x81	1960x1165x81mm	2135x1238x81mm
Weight	27,30kg	32,00kg	38,80kg	44,00kg
Fluid content	0,85 ltr	0,95 ltr	1,20ltr	1,30ltr

Technical Specifications	
Frame	Aluminum profile. Free of screws and rivets.
Cover	Tempered low iron prismatic glass 3.2 mm. 90,05% transmission.
Sealing	Acrylic foam - Silicon
Insulation	Rockwool 40mm (50kg/m3) back and Glass wool 20 mm (30kg/m3) sides
Absorber Material	Aluminum fins 0,50 mm thickness Welded to copper pipes with laser welding.
Absorber coating	Sputtering blue selective surface
Absorption ( $\alpha$ )	95% ( $\pm 0.02$ )
Emissivity ( $\epsilon$ )	5% ( $\pm 0.02$ )
Max. working pressure	1000kPa
Max. working temperature	150°C



MODEL
ECO SERIES
S150
S200
S230
S260

# ***SOLE S.A.***

# ***INSTALLATION MANUALS***





# **INSTALLATION & USERS MANUAL**



## **DOMESTIC SOLAR WATER HEATER**



## **THERMOSIPHON SYSTEM**

### **CLOSED CIRCUIT**

### **MODELS EUROSTAR ECO LOW HEIGHT :**

150-1-S200, 150-1-S230, 200-1-S230, 200-1-S260, 300-2-S200, 300-2-S230, 300-2-S260

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## **1. Observance of the instructions and standards.**

**1.1. It is very important to follow these installation, operating and maintenance instructions**, in order to avoid danger of death, injury, property damages, and to have your device functioning properly in the long run. The company that manufactured and/or supplied this solar system has no liability for the installer and/or the user in case these instructions have not been followed carefully.

**1.2. Whether further information or clarifications are needed, please contact the supplier of the product.**

**1.3. These solar systems have been manufactured and tested under the European standards:**

ISO 9806:2013: Energy – Solar Thermal Collectors – Test methods

EN 12975-1: Thermal solar systems and components – Solar collectors -part 1: General requirements.

EN 12975-2: Thermal solar systems and components – Solar collectors – part 2 : Test methods.

EN 12976-1: Thermal solar systems and components – Factory made systems - part 1: General requirements.

EN 12976-2: Thermal solar systems and components – Factory made systems – part 2: Test methods.

**1.4. These systems are in conformity with the applicable requirements of the following documents:**

<i>Ref. No.</i>	<i>Title</i>
EN 60335-1:2012 +A11:2014 (IEC 60335-1:2010)	Household and similar electrical appliances — Safety — Part 1: General requirement
EN 60335-2-21:2003 +A2:2008 (IEC 60335-2-21:2002 +A2:2008)	Household and similar electrical appliances — Safety — Part 2-21: Particular requirements for storage water heaters
EN 60529:1991 +A1:2000 +A2:2013 (IEC 60529:1989 +A1:1999 +A2:2013)	Degrees of protection provided by enclosures (IP code)
ENV 61024-1:1995 (IEC 61024-1:1990)	Protection of structures against lightning Part 1: General principles

The manufacturer declares that the equipment named in this document have been designed to comply with the relevant sections of the above referenced specifications.

## **2. Description of solar system and components**

### **2.1 General Description**

This solar system is a closed loop thermosiphon unit which delivers hot water for domestic use. It consists from the collector, the accumulation tank, the support system, the hydraulic accessories and the thermo-convention liquid.

Four nominal sizes of accumulation tanks are combined with four different sizes of collectors as the table below:

MODEL	TANK NOMINAL SIZES			COLLECTOR NOMINAL SIZES		
	150 ltrs	200 ltrs	300 ltrs	2,00m <sup>2</sup>	2,30m <sup>2</sup>	2,60m <sup>2</sup>
<b>150-1-200</b>	1			1		
<b>150-1-230</b>	1				1	
<b>200-1-230</b>		1			1	
<b>200-1-260</b>		1				1
<b>300-2-200</b>			1	2		
<b>300-2-230</b>			1		2	
<b>300-2-260</b>			1			2

### **2.2. Collector**

The collectors are manufactured in 3 sizes with nominal area of -2, 00m<sup>2</sup>-2.30m<sup>2</sup> -2,60m<sup>2</sup>. The absorbers of the collectors are made by copper tubes and the fins area by selective aluminum fins. The fins are welded to the tubes by laser welding. The frame of the collector is made by extruded aluminum epoxy oven painted to resist ambient conditions.



The glass cover is a “prismatic securit” glass of 3.2mm thickness for maximum penetration of solar irradiation. At the back and sides of the absorber there is sufficient insulation of rock wool and glass wool to minimize heat losses and to resist stagnation temperatures.

Technical data of collector as the table below:

	Nominal size (m <sup>2</sup> )		
	2,00	2,30	2,60
<b>Length (mm)</b>	1960	1960	2135
<b>Width (mm)</b>	960	1165	1238
<b>Depth (mm)</b>	81	81	81
<b>Weight (kg)</b>	32,0	38,8	44

Stagnation temperature: 164°C

Test pressure: 22.5 bar

Operating pressure: 15bar

### 2.3. Accumulation tank (cylinder)

The solar accumulation tank is an indirect (double circuit) hot water horizontal cylinder. The inner surface is enameled at 850°C to guarantee potable sanitary water for long life. Additionally it is protected against rusting with a large magnesium anode.

The ecologic polyurethane foam insulation guarantees minimum thermal losses even at very low ambient temperatures. The external cover of the tank can resist any extreme weather conditions for life. The internal heat exchanger with large surface guarantees the energy transfer to the domestic hot water.

The hot water exits from the hottest zone (level) of the tank. At the same time equal quantity of cold water enters the tank at the coldest zone (level). The solar tank can be optionally (accessory) equipped with immersion electric heater (electric element) for use only for emergency situations. The immersion electric heater is available in 2 kW or 3kW or 4 kW at 230 Volt. It is equipped with control thermostat set at 60° C and safety thermostat (thermal cut out) manually reset.

The safety valve only opens to discharge when the system pressure exceeds 10bar in the form of water.

Technical Data of tanks as table below:

	Nominal size		
	150	200	300
<b>Length (mm)</b>	1185	1215	1915
<b>Diameter (mm)</b>	500	530	530
<b>Weight (kg)</b>	46,7	50,8	83
<b>Capacity (ltr) (Incl. h.exchanger)</b>	142	170	276
<b>Test pressure (bar)</b>	22.5	22.5	22.5
<b>Operating pressure (bar)</b>	15	15	15
<b>Max temperature (°C)</b>	90 °C	90 °C	90 °C
<b>Cold &amp; hot water connectors (male)</b>	½"	½"	½"


### 2.4 Support system


The support system is made from galvanized pressed steel. It is designed for flat roof installation at 33°.

The support system can withstand wind velocity up to 97,2 km/hr. and weight of snow up to 64cm height.

In order to assembly the support system the following tools are needed.

- Spanner 10mm 1 X 
- Spanner 13mm 1 X 
- 2 Spanners 17mm 2 X 

- Screwdriver 1 X 

- Drill Ø10 (for fastening the system on the roof) 

The material list for each set of support system is:

	Part	MODEL						
		150-1-200	150-1-230	200-1-230	200-1-260	300-2-200	300-2-230	300-2-260
SET OF SUPPORT FRAME PARTS								
01	A11-40 :profile in Π section 878mm	2	2	2	2	2	2	2
02	D13 :profile in Π section 2150mm	2	2	2	2	2	2	2
03	Tank support 280x195mm	2	2	2	2	2	2	2
04	H :bracket in Π section 850mm	1	1	1	1	-	-	-
	H11 :bracket Π section1400mm	-	-	-	-	1	1	1
05	C :profile in Π section 550mm	2	2	2	2	2	2	2
06	X2 :bracket 1667mm	2	2	2	2	2	2	2
07	E1 :angle Z shape 2000mm	-	-	-	-	2	-	-
	E2 :angle Z shape 2310mm	-	-	-	-	-	2	2
09	Insulated long pipe Ø15mm (for close loop cold water)	2.08m	2.05m	2.05m	2.21m	2.07m	2.06m	2.44m
10	Insulated short pipe Ø 15mm (for close loop hot water)	0.50m	0.41m	0.41m	0.28m	0.40m	0.54m	0,61m
SET OF FITTINGS								
11	Compression Elbow Male ½" x Ø15	2	2	2	2	2	2	2
	Non return valve (for closed loop)	1	1	1	1	1	1	1
12	Compression Elbow Ø18 x Ø15	1	1	1	1	1	1	1
13	Compression Elbow Ø18 x Ø15	-	1	1	1	1	1	1
	Compression Union Ø18 x Ø15	1	-	-	-	-	-	-
14	Tee connector female Ø15 x ½" x Ø15	1	1	1	1	1	1	1
	Compression Elbow Female ½" x Ø15	1	1	1	-	1	-	-
15	End Cap male ½"	1	1	1	1	1	1	1
16	Copper Ring ½"	1	1	1	1	1	1	1
17	Compression End Cap Ø18	-	-	-	-	2	2	2
18	Compression Connector Ø18 x Ø18	-	-	-	-	2	2	2
19	Pressure Safety Valve 8 bar (for open loop)	1	1	1	1	1	1	1
SET OF BOLTS AND NUTS								
20	Bolt M10x16 (DIN 933/8.8)	18	18	18	18	18	18	18
21	Nut M10 (DIN 934/8)	18	18	18	18	18	18	18
22	Bolt M6x20 (DIN 933/8.8)	4	4	4	4	8	8	8
23	Washer Ø6 (DIN 9021)	4	4	4	4	8	8	8
24	Anchored Bolt M8x60 (DIN 571)	4	4	4	4	4	4	4
25	Washer Ø8 (DIN 9021)	4	4	4	4	4	4	4
26	Plastic Rawlplugs D10	4	4	4	4	4	4	4
27	Cross Recess Counter Sunk Head Bolt M8x20 (DIN 7969)	-	-	-	-	4	4	4
28	Nut M8 (DIN 934/8)	-	-	-	-	4	4	4



## 2.5. Thermo convention liquid

The thermal energy collected from the solar irradiation by the collector is transferred to the heat – exchanger of the tank by the thermo convention liquid, which is naturally re circulated by the thermosiphonic principle in the closed loop system. The heat exchanger is heating the domestic consumption water. The solution contains inhibitors for antirust protection and propylenoglycol for antifreeze protection up to -15°C. If lower temperature protection is needed please consult your supplier.

The solution is a non toxic, non-flammable chemical liquid; however normal protection measures should be taken during handling. Keep it away from children.

Eyes protection: Protective glasses must be used.

Skin protection: PVC or rubber gloves must be used.

- In case of contact with eyes, wash eyes with plenty of water for 15 minutes (with open eyelids)
- In case of contact with skin simply wash with water and soap.

### **Physical Properties:**

Phase: liquid

Color: Light red

Odor: nearly odorless

Specific gravity at 20°C : 1,03g/cm<sup>3</sup>

Freezing point: -15°C

Boiling point: 106°C

Packing: Containers of 2ltr. & 4ltr. ready for usage.

## 2.6. Packaging, Transport and Storage

The solar collectors and the solar tanks are supplied individually packaged, the collectors in carton boxes and the tanks with stretch film and expanding polystyrene. The collector model is indicated on the outside of each box and the tank model is indicated outside of each package. Depending on the number of units ordered, collectors can be supplied palletised in groups of up to 12 units. Collectors should always be during transport and storage placed in horizontal position with the glass facing on top, otherwise there is danger of water entering in the collectors from the ventilation holes at the back of the collector. They should not be stored or transported in piles of more than 12 units. The tanks can be supplied palletised in groups of up to 10 units. Alternatively, under request, the whole system can be palletised in individual pallets. The tanks should be always in vertical position during transportation and should not be stored or transported in piles of more than 2 units. It is recommended to use special safety belts during transportation in order to avoid movements and/or falling.

## **3. Warnings**

Before starting installation, the installer should read and observe carefully the following warnings in order to avoid danger of death, injury or property damages.

3.1. You may elevate on roof the parts of the solar system, ONLY when an internal staircase of enough width, exists in the building reaching the roof. Otherwise you must use a proper CRANE to elevate the parts. It is not allowed to stand at the edge of any roof (flat or inclined) and pull by ropes any part. DANGER OF DEATH.

3.2 The collectors have a large surface exposed to wind. NEVER install a system with strong winds. Choose a calm day. DANGER OF DEATH or heavy injury.

3.3. If the installation will be on an inclined roof (tiles), there is danger of slipping. Use always SAFETY BELTS (securely fastened) from a higher position of roof. DANGER OF DEATH.

3.4. After completion of the installation make sure that all bolts and nuts are fastened well and the whole system is securely fastened to the roof. The support system can withstand air velocities up to 97,2 km/hr. Make sure that the fastening on roof can withstand as well at least same air velocity. DANGER OF DEATH.

3.5. Frequently some parts of the support systems have sharp edges. Use always gloves when you are handling the support system, in order to avoid danger of injuring the hands. DANGER OF INJURY.

3.6. The collectors when exposed to solar irradiation during installation get very hot; above 120° C in 2-3 minutes. There is danger of burning the hands when touching the copper piping outlets. You must leave the carton package cover ON the glass until completion of the installation, or you must use thermo resistance gloves. DANGER OF INJURY.

3.7. If you are using hands to position the tank on the support system at least 2 people are needed for systems 120-150.

It is preferred to use a crane. In this case make sure that the pulling belts are on each side between the piping outlets of the boiler so that it cannot slip.

3.8. In cases where the solar system is large and the hot water consumption is low, the hot water in the solar tank may reach temperatures up to 90°C. In this case there is danger of burns for the user, especially for children.

It is strongly recommended to install a thermostatic mixing valve set at 55°C anywhere at the hot supply piping and before the hot outlets of the building (before taps, showers, e.t.c.)

3.9. If the solar system is equipped with the (optional) electric immersion heater, the electrical connection should be done by a fully licensed electrician following the national rules for electric installation.

The immersion heater is single phase 230 Volt of 2kW or 3 kW or 4 kW power.

There is an "earth point" on the flange of the heater which must be connected to the central "earth" of the building. In any case the support of the solar system must be "earthed" with copper wire of 16 mm<sup>2</sup> to the earthing grid of the building. This will also serve as lightning protection.

3.10 In a solar system equipped with the optional electric heater, after completion of electrical and plumbing installation test the operation of the electric heater and thermostat, ONLY AFTER FILLING the tank with city water. Otherwise the electric heater will be fused out. (destroyed)

3.11 Make sure that before filling the tank with city water the pressure safety non-return valve has been installed on the cold water inlet with the arrow pointing to the tank. This valve will open and release the pressure when by overheating or other reason it has exceeded 10 bar.

3.12. When handling the thermo-convention liquid make sure that you wear protective glasses for the eyes and gloves for the skin.

3.13. When temporarily leave the collectors on the roof during installation ALWAYS position them with glass facing the sky. Otherwise there is danger that water from rain may enter the collector from the back side through the ventilation holes. If this happens the insulation will be wet and the glass will have humidity on inside surface. Drying will take a very long time.

#### **4. Recommendations**

4.1 The cold water piping should withstand pressure of 10 bar. The hot water piping should withstand temperature of 95° C at pressure 10 bar.

4.2. The cold and hot water piping should be well insulated to eliminate heat losses and prevent as possible freezing. The insulation material should withstand weather conditions like rains, snow and solar irradiation.

4.3. On the hot water supply piping, install a reliable thermostatic mixing valve set at 55°C to prevent higher temperature hot water to reach the consumption points.

4.4. The system may only be installed in locations with lower values of  $s_k$  (snow load) 0.64m and  $v_m$  (average wind velocity) 97.2km/h

## 5. Flat roof

### Assembly instructions for systems with 1 collector:


**Models: 150-1-S200, 150-1-S230, 200-1-S230, 200-1-S260**

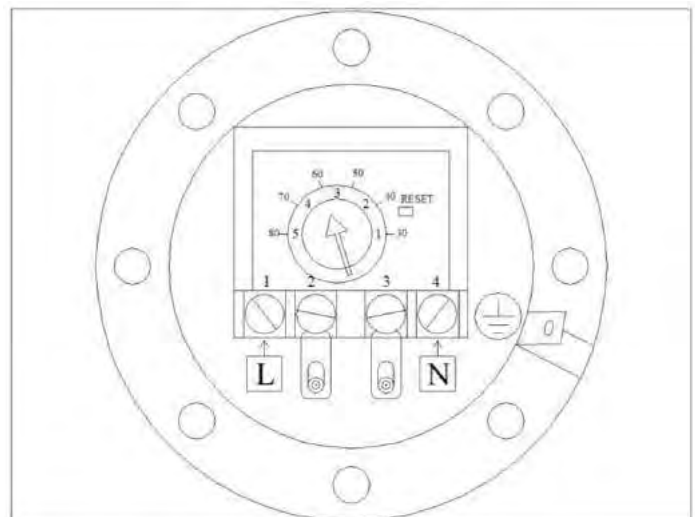
#### Assembly steps:

- 5.1. Open the pack of the support system. Identify the items from table (page 5) and the drawing next page.
- 5.2. Assembly the parts between themselves using the set of bolts and nuts included in the pack. At this stage do not fasten tight the bolts.
- 5.3. Fix collector on support as shown on drawing using the M6X20mm bolts and washers (No. 22-23). Do not fasten tight yet.
- 5.4. Position the tank on supports. Two people are needed to handle it from each end. Fasten well with the 2 bolts M10X30 the tank on the support system. (The 2 bolts are already mounted on the tank and have to be temporarily removed before placing the tank on the support).
- 5.5. Now, fasten well the collector on support and then fasten well all the parts of the support system among themselves.
- 5.6. Drill the "floor" with 10mm drill at the 4 fixing points, insert the raw-plugs provided, and fasten well the whole support system to the "floor". Make sure that the material of "floor" is suitable (concrete) for this kind of fixing, in order to withstand up to 97,2 Km/hr wind speed. If in doubt, consult your supplier, or your engineer for possible alternative way of fixing.
- 5.7. Connect the insulated copper (or plastic) pipe at closed loop system. The long pipe is for cold return to bottom of collector. The short pipe is for hot supply from top of collector. Make sure that you fasten well the "compression" fittings in order to tight the closed loop.
- 5.8. Connect the non-return pressure safety valve on the cold water inlet of tank, making sure that the arrow is pointing towards the tank (upwards) and the escape outlet is facing sideways parallel to the tank.
- 5.9. Connect cold water supply using always a shut-off water valve. (Make sure the pipes are well insulated)
- 5.10. Connect hot water outlet piping to consumption points. It is strongly recommended to install a thermostatic mixing valve set at 50-55°C on the hot water piping anywhere before the consumption points. (Make sure the pipes are well insulated).
- 5.11. Fill the tank with cold water. Leave open one "tap" of hot water, so that air will be flushed out and the tank will be completely filled up.
- 5.12. Fill up the closed loop system with thermo-convention liquid from the top pipe (point 15). Make sure that no air-bubbles are coming out so filling is completed.
- 5.13. Screw the bronze cap with the copper ring on the filling point to seal the closed loop system. The closed loop is permanently sealed.
- 5.14. Check for leakages on open or closed loop system.
- 5.15. The (optional) electric heater should be connected by a fully licensed electrician following the national standards for electric installations.

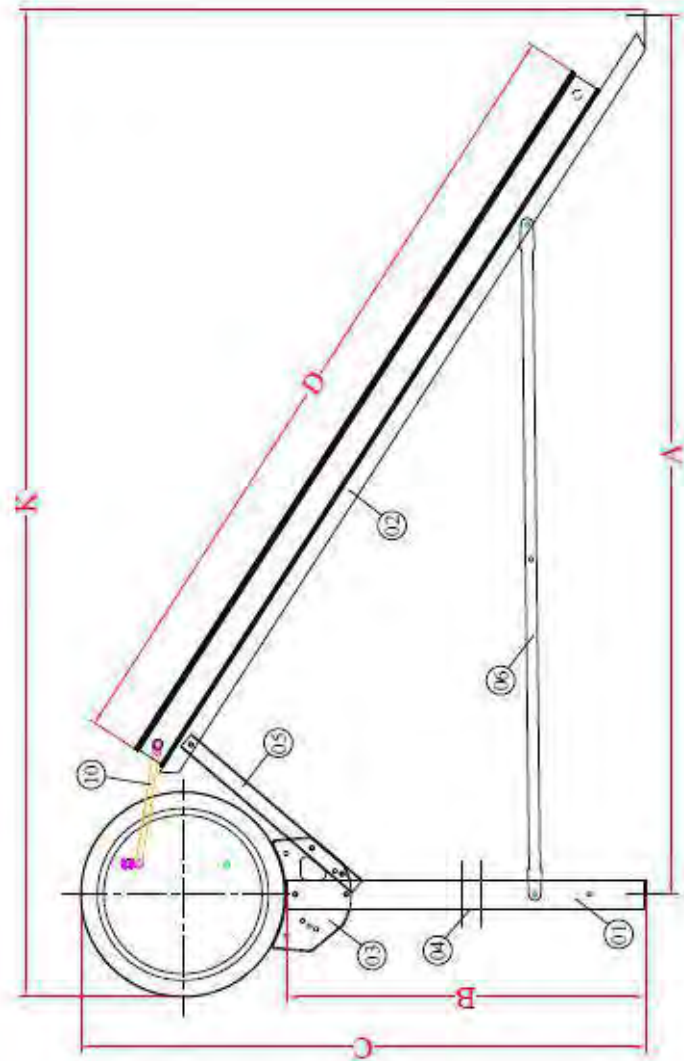
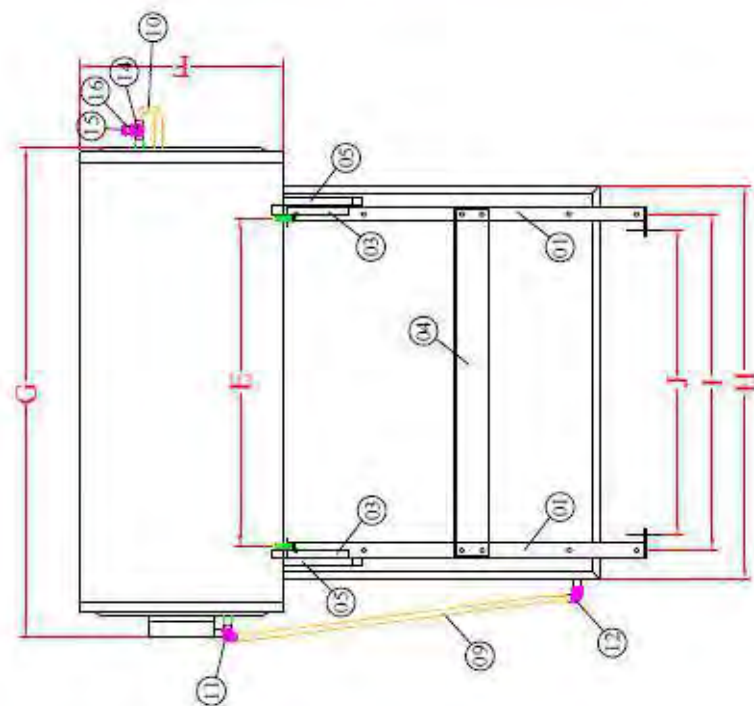
Connections points on thermostat:

No 1 : Line L (220 volt)  
No 4 : Neutral N

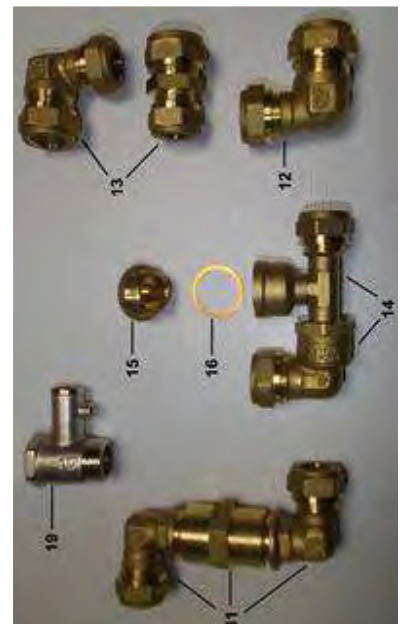
On metal flange:  : Earth







DIMENSION	ECO 150-1-200	ECO 150-1-230	ECO 200-1-230	ECO 200-1-260
A	2147mm	2147mm	2147mm	2147mm
B	878mm	878mm	878mm	878mm
C	1383mm	1383mm	1413mm	1413mm
D	1960mm	1960mm	1960mm	2135mm
E	800mm	800mm	800mm	800mm
F	500mm	500mm	530mm	530mm
G	1195mm	1195mm	1215mm	1215mm
H	960mm	1165mm	1165mm	1238mm
I	820mm	820mm	820mm	820mm
J	745mm	745mm	745mm	745mm
K	2411mm	2411mm	2426mm	2426mm



## 6. Flat roof

### Assembly instructions for systems with 2 collectors:


**Models: 300-2-S200, 300-2-S230, 300-2-S260**

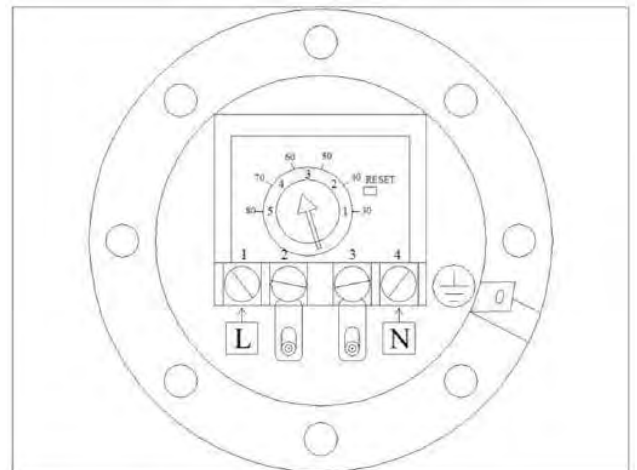
#### Assembly steps:

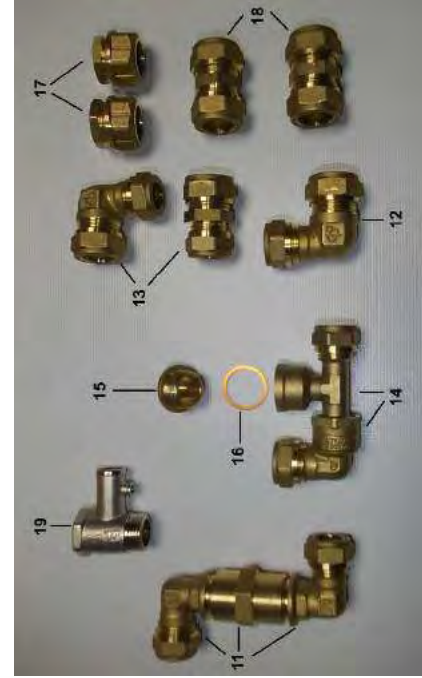
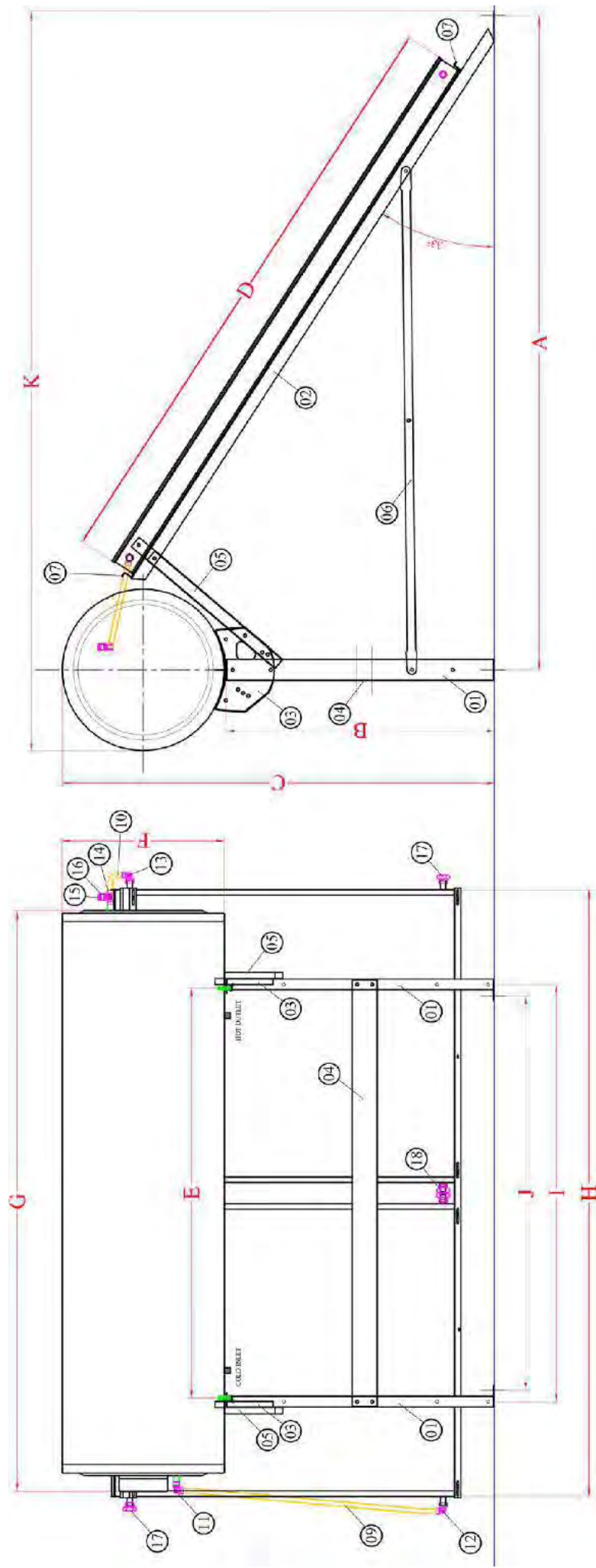
- 6.1. Open the pack of the support system. Identify the items from table (page 5) and the drawing next page.
- 6.2. Assembly the parts between themselves using the set of bolts and nuts included in the pack. At this stage do not fasten tight the bolts.
- 6.3. Fix collectors on support as shown on drawing using M6X20 bolts and washers (No 22 & 23 at table) Do not fasten tight yet.
- 6.4. Position the tank on supports. Two people for 200 ltr and four people for 300 ltr are needed to handle it from each end. Fasten well with the 2 bolts M10X30 the tank on the support system. (The 2 bolts are already mounted on the tank and have to be temporarily removed before placing the tank on the support).
- 6.5. Now, fasten well the collectors on support and then fasten well all the parts of the support system among themselves.
- 6.6. Drill the "floor" with 10mm drill at the 4 fixing points, insert the raw-plugs provided, and fasten well the whole support system to the "floor". Make sure that the material of "floor" is suitable (concrete) for this kind of fixing, in order to withstand up to 97,2 Km/hr wind speed. If in doubt, consult your supplier, or your engineer for possible alternative way of fixing.
- 6.7. Connect the insulated copper (or plastic) pipe at closed loop system. The long pipe is for cold return to bottom of collector. The short pipe is for hot supply from top of collector. Make sure that you fasten well the "compression" fittings in order to tight the closed loop. Fix and fasten well the 2 compression end caps on the 2 remaining open ends of the collectors.
- 6.8. Connect the non-return pressure safety valve on the cold water inlet of boiler making sure that the arrow is pointing towards the tank (upwards) and the escape outlet is facing sideways parallel to the tank, in order to prevent harm or burning during steam escape.
- 6.9. Connect cold water supply using always a shut-off water valve. (Make sure the pipes are well insulated).
- 6.10. Connect hot water outlet piping to consumption points. It is strongly recommended to install a thermostatic mixing valve set at 50-55°C on the hot water piping anywhere before the consumption points. (Make sure the pipes are well insulated).
- 6.11. Fill the tank with cold water. Leave open one "tap" of hot water, so that air will be flushed out and the tank will be completely filled up.
- 6.12. Fill up the closed loop system with thermo-convention liquid from the top pipe (point 15). Make sure that no air-bubbles are coming out so filling is completed.
- 6.13. Screw the bronze cap with the copper ring on the filling point to seal the closed loop system. The closed loop is permanently sealed.
- 6.14. Check for leakages on open or closed loop system.
- 6.15. The (optional) electric heater should be connected by a fully licensed electrician following the national standards for electric installations.

Connections points on thermostat:

No 1 : Line L (220 volt)  
No 4 : Neutral N

On metal flange:  : Earth





DIMENSION	ECO 300-2-200	ECO 300-2-230	ECO 300-2-260
A	2147mm	2147mm	2147mm
B	878mm	878mm	878mm
C	1413mm	1413mm	1413mm
D	1960mm	1960mm	2135mm
E	1345mm	1345mm	1345mm
F	530mm	530mm	530mm
G	1905mm	1905mm	1905mm
H	1980mm	2390mm	2536mm
I	1370mm	1370mm	1370mm
J	1295mm	1295mm	1295mm
K	2426mm	2426mm	2426mm



## **7. Check list for installer**

Before leaving from the installation, make sure that:


1. Cold and hot insulated pipes of closed loop system have a continuous ascending slope to the tank. Small partitions of the piping are allowed to be horizontal, but never descending to the tank. This will allow the air bubbles to move towards the tank, in the internal expansion tank and would not obstruct recirculation.
2. The closed loop system is operating properly. This can be identified, after one hour of sun shine by touching the hand on the hot inlet of tank (from top of collector) and at the same time on the cold outlet (to bottom of collector). There must be a significant temperature difference which means that the natural recirculation is functioning.
3. There is no leakage at the closed loop or open loop circuit.
4. All bolts and nuts of the support system have been tightened very well and that the fixing on roof is made properly to withstand strong winds.
5. Cold supply and hot return piping are properly installed and secured so that the wind will not move them. They should be properly insulated with a certified insulation material of minimum thickness 9mm and maximum thermal conductivity of 0.037 W/m<sup>2</sup>K, and well finished in order to be resistant against rain and moisture.
6. The (optional) electric heater is functioning properly and the thermostat is set maximum at 55°C to 60°C
7. You have explained to the users the operation of their solar system and the capabilities of the installed model.
8. You have signed and delivered to the owner the guarantee.

## **8. Operation instructions**

- Your solar heater is a two circuit system. The primary circuit recirculates from collectors to a heat exchanger inside the tank, thus transferring solar energy to the domestic water.
- Primary system contains antifreeze glycol for frost protection of collectors.
- Temperature of hot water depends on solar irradiation of the day, season of year, ambient temperature, cold water inlet temperature, time of day using hot water, quantity used.
- Best timing for use: 12.00 noon – 3.00p.m. and 5.00 p.m. to 8.00 p.m.
- If you need hot water early in the morning, avoid excess consumption previous evening.
- For a shower, 30-60 ltr hot water is needed.
- For filling bathtub, 120-150 ltr hot water is needed.
- If your solar system is equipped with the optional electric heater, switch on only when needed for emergency situations and for 1 to 2 hours. **NEVER** leave electric heater permanently ON. The thermostat is adjusted to 55°C-60°C.
- In the event of any failure condition a specialist should be called in.

## **9. Maintenance instructions**

For long-life of your solar heater follow below given instructions:

- At least once a year check for excessive dust on collectors. Wash with cold water at early morning before 10.00 a.m. when the glass is cold.
- Every two years replace magnesium protection anode. (contact your installer)
- Every 4 years check and paint if necessary with grey color primer the support frame.
- At extremely cold winter nights (below 0°C) leave a hot water tap inside house slightly open to prevent pipe freezing.
- If solar heater doesn't warm up with sunshine, check for leakage in primary circuit. Restore the leakage, add antifreeze. Check also for leakages in domestic hot water piping network. Restore if needed.
- When by any reason glass is broken, replace the soonest possible.
- When electric heater is not functioning check for burned fuse or for "safety" contact of thermostat activation. Press inside the button with the mark  to restore and adjust thermostat lower.

## **10. Decommissioning of the system**

- If your product has electric backup, please turn off its power supply before dismantling the solar water heater.
- Drain down the hot water cylinder
- Cut the inlet pipe to the panel first and then the outlet pipe from the top of the panel to the top of the cylinder
- Remove the tank from supports. Two people are needed to handle it from each end.
- Unfasten the collectors of support and **then unfasten** all the parts of the support system among themselves.
- Release collectors from support and disassemble the parts among themselves, remove the support system from the roof.

Recommendations:

- Recycle or reuse its component materials if possible.
- Protect your hands and eyes
- Avoid decommissioning during sunlight
- If you need further technical support contact your local distributor

[illegible]



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# **SOLAR COLLECTORS INSTALLATION MANUAL**



**MODELS: 1,75 – 2,00 – 2,50 – 2,70**

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## 1. Presentation

The present document demonstrates detailed installation instructions for the solar collectors using the support frames and accessories included in the supply.

Before proceeding with the installation of the collectors, read these instructions and make sure you have understood. If you have questions about the materials or on the assembly process described in this document, contact your supplier via telephone, fax or e-mail. Improper installation of the collectors may cause an unsatisfactory operation of the solar system, compromising its durability and even be dangerous for the people or the goods.

The instructions of this document do not exempt in any way the compliance with existing regulations and provisions of technical and administrative application at the place where the facility is located.

The installation of solar collectors without following the instructions in this document and / or regulations will invalidate the warranty of the product.

The installer will check before starting the installation that he has all the necessary parts and all the security measures have been taken in order to carry out the installation safely. The installer must use protective gloves to avoid any risk of burns or cuts during handling of collectors or its support frame.

## 2. Parts Included

The supply consists of:

One or more solar collectors

One or more support frames

Two or more fitting and connection (except for a single collector)

### 2.1. Solar Collectors

The solar collectors are supplied individually packaged in carton boxes. The collector model is indicated on the outside of each box. Depending on the number of units ordered, collectors can be supplied palletised in groups of up to 10 units. Collectors should always be during transport and storage placed with the glass facing on top, otherwise there is danger of water entering in the collectors from the ventilation holes at the back of the collector.

The main technical characteristics of the collectors are indicated below (figure no. 1)

TYPE	WEIGHT kg		DIMENSIONS					
	ALUM. ABSORBER	COPPER ABSORBER	A	B	C	D	E	F
1,75	37	38	1000	1760	1050	895	1668	2024
2,00	39.8	41	970	1970	1020	895	1878	2196
2,50	47.6	49	1175	1970	1225	895	1878	2294
2,70	54	55.1	1248	2145	1298	895	2053	2482

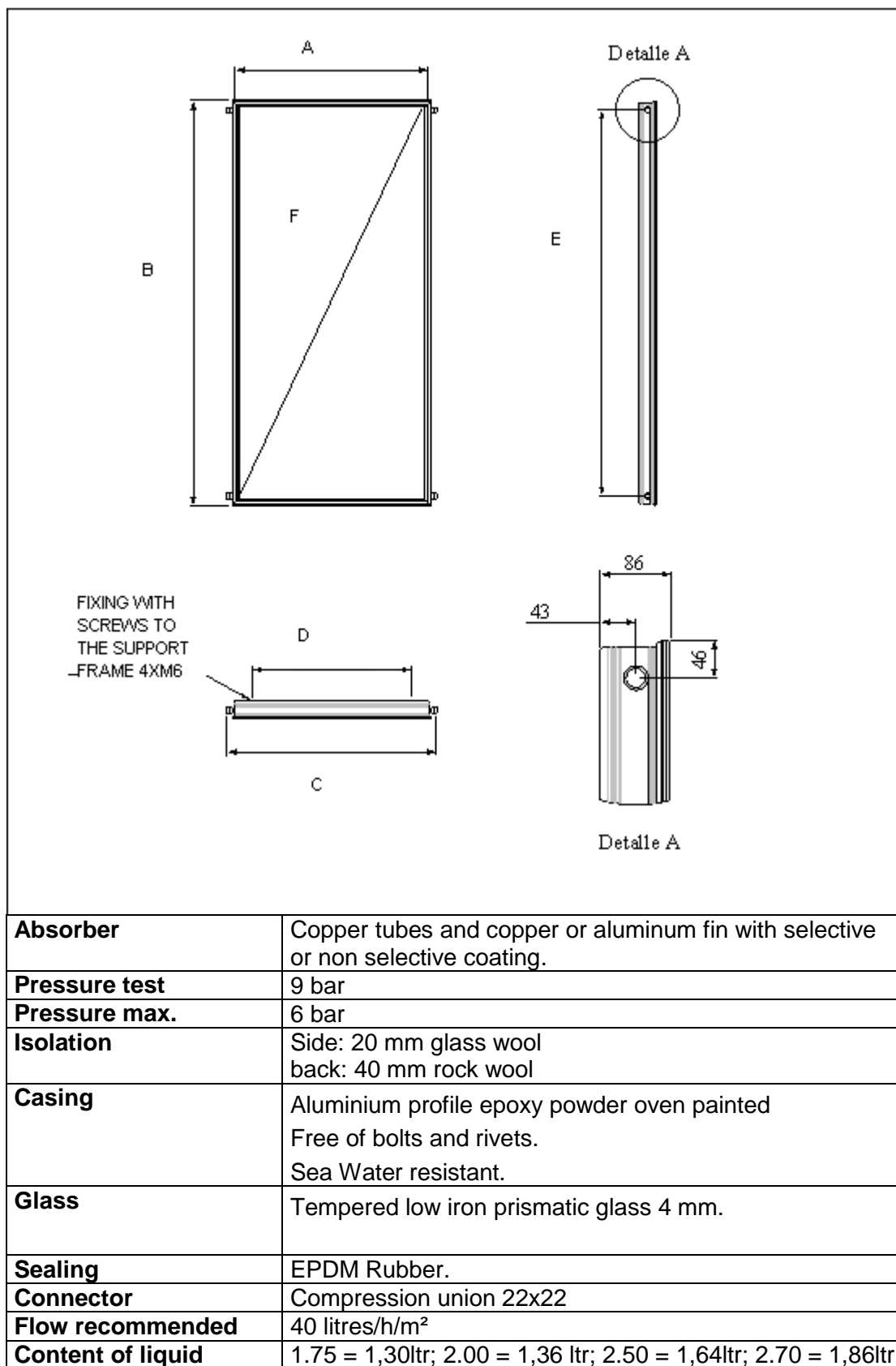


Figure 1. Characteristics of solar collector

The manufacturing of the solar collector follow strict quality criteria and is certified by ISO 9001:2008.

The collector is certified by the authorized national bodies of different countries and tested by several accredited laboratories (TUV, INETI, CSTB, Demokritos,). Our collectors are Solar Keymark, CSTBat and SRCC. Certified.

The figure below shows the characteristics of instantaneous energy efficiency curve of solar collector.

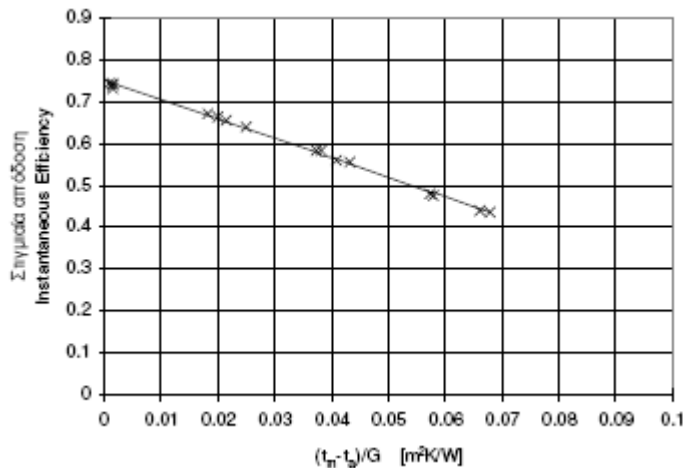


Figure 2. Efficiency curve of Selective Collector

## 2.2. Support Frame

There are two sets of support frames for a single collector (EST1) or for two collectors (EST2).

Depending on the bank of solar collectors chosen, the appropriate number of support frames will be provided for one or two collectors. Table 1 shows the sets of support frames necessary for different banks of solar collectors.

Nº of collectors in bank	1	2	3	4	5	6
EST1	1	-	1	-	1	-
EST2	-	1	1	2	2	3
Connectors	-	2	4	6	8	10

Table 1. The support frames and the connections provided depend on the number of collectors per bank

The support frames sets are composed of elements that are shown in Figures 3 and 4.



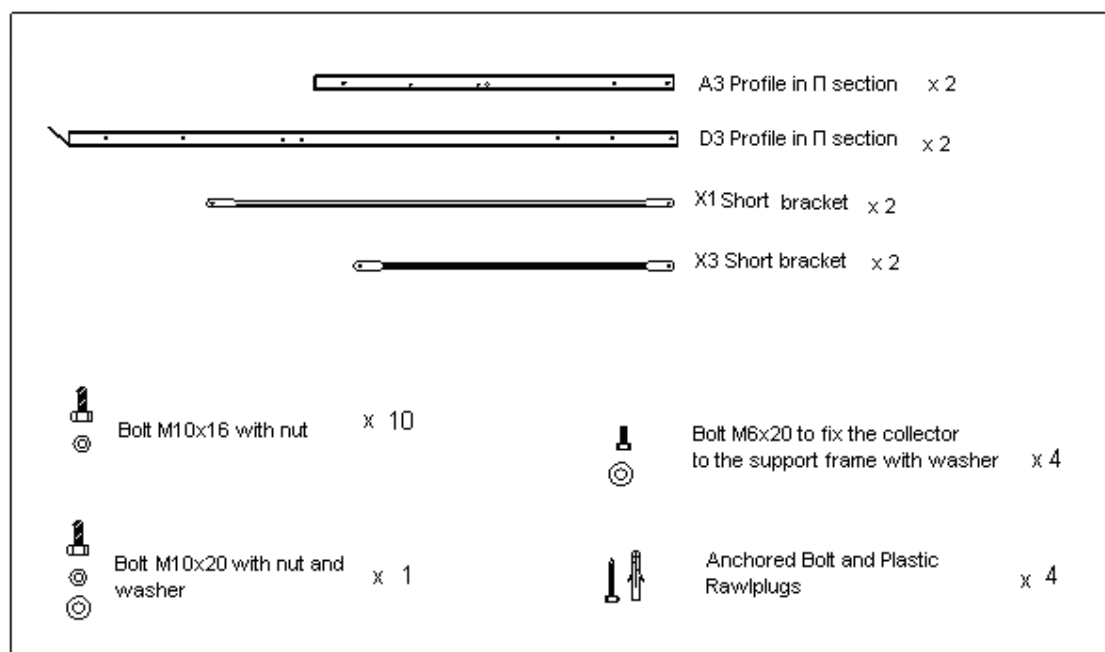


Figure 3. Support frame components EST1 for a single solar collector

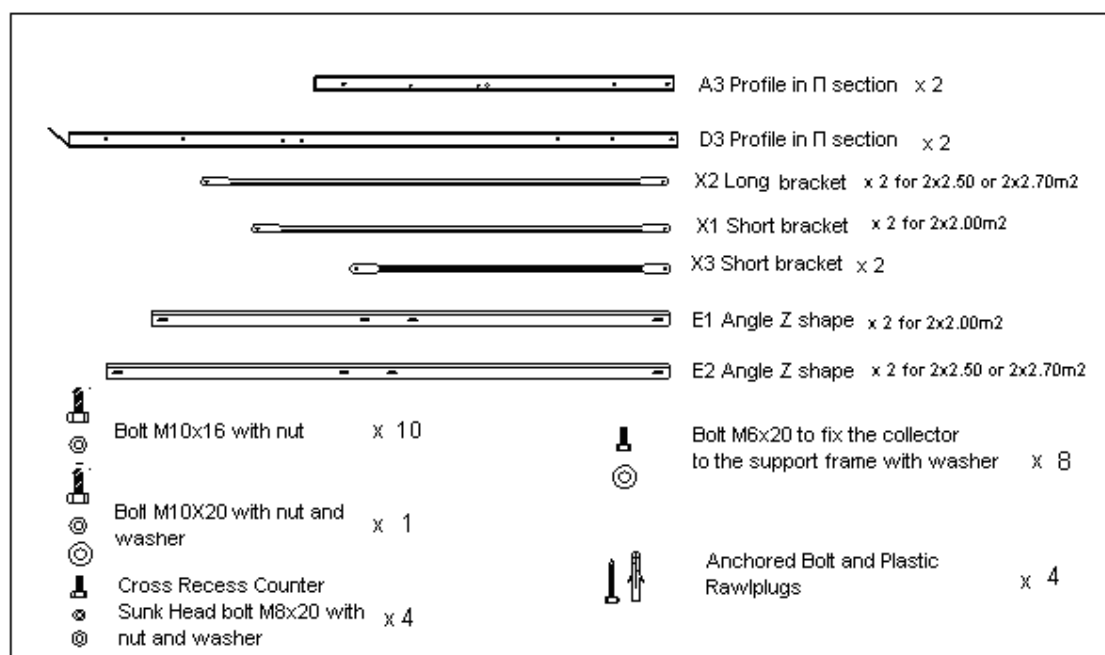


Figure 4. Support frame components EST2 for two solar collectors

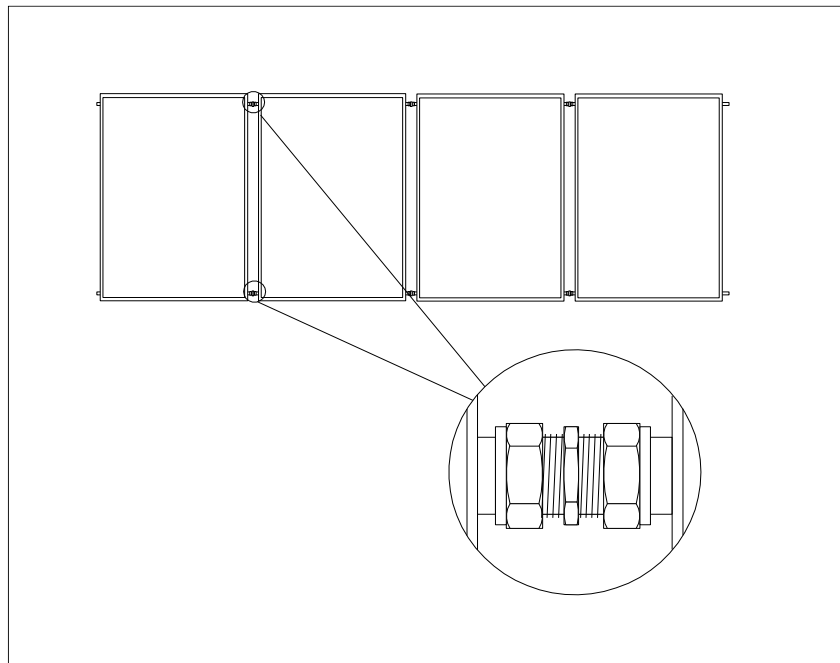
The support frames allow the installation of the solar collectors with different inclinations (45, 40, 35 or 30 degrees) using the same profiles and accessories, by choosing properly the fixing holes.

### 2.3. Connectors

The connectors supplied are conical-type compression unions with metal ring and allow the connection of two or more solar collectors in a bank, joining the top and bottom of the collectors.

This way, the collectors are hydraulically connected between them in parallel.

The number of connections provided is determined by the number of collectors in the bank, according to Table 1 above.



*Figure5. Connections*

### 3. Placement of the Collectors

The choice of location, inclination and orientation of the solar collectors has to be determined at the design stage of the installation. The installation of the solar collectors in the building should be carried out respecting the instructions of the person in charge of the project, who should have taken into consideration the effect of the orientation, inclination and possible shadows in the calculation of benefits of the solar system.

Particular attention should be paid to the minimum distance maintained between two rows of solar collectors or between an obstacle in front of a group of solar collectors and them. During the calculation of this distance one should take into consideration the latitude of the place, the inclination of the terrain and the period of use of the facility. Failure to have a more detailed specification by the designer of the facility, the distance should not be less than that shown in Figure 6.

At the time of its installation, the solar collectors should be stored in a compound covered and kept in their original packaging. During the assembly phase, avoid

keeping the solar collectors outdoors with the cover glass facing down on wet surfaces, in order to prevent entry of humidity or water in the rear of the collector.

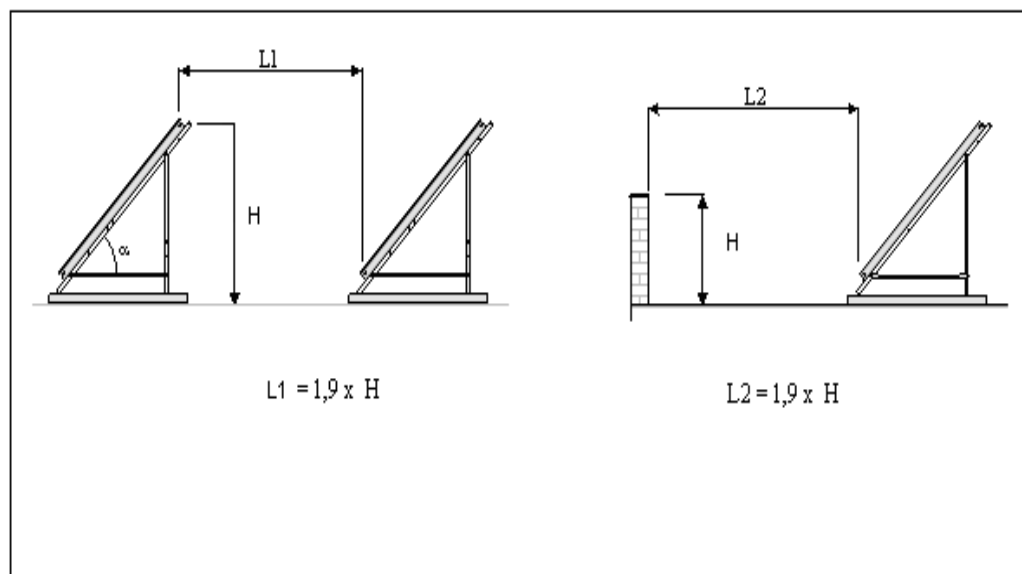


Figure 6. Distance needed in order to avoid shadows on collectors.

Once at work, in the event that the installer observes the existence of elements that can cause shadows on the solar collectors and have not been taken into account in the design of the system, as protection walls in terraces, fireplaces, outdoor air conditioning units or other elements, should inform the designer of the project or the owner of the property in order to revise or amend the calculations made for the location of the collectors, if necessary.

The system of fixing the support frame of the solar collectors to the building also must be determined in the design phase of the installation, for example by conducting benches built on a flat roof. In this case, the thickness and size of the bench should be sufficient to ensure stability of the whole in case of strong gusts of wind. In any case, the solution adopted should ensure the solidity and stability of the setting without compromising the watertight integrity of the deck. To facilitate the design of the fixing system, figures 7 to 13 show the distances between the support frames of the solar collectors.

#### 4. Banks of Collectors

The solar collectors can be connected with each other to form banks of up to 6 units in parallel, connecting the top and bottom of the collectors through the fittings included in the set.

The dimensions of pipe connections for collector arrays up to 20m<sup>2</sup> is 22mm.

It is recommended that the connections between the different banks of collectors are also conducted in parallel. However, the connection of up to two banks of solar collectors in series is allowed.

In the following figures from 6 to 13 shows the dimensions of the solar collectors from 1 to 6 units and for different angles of inclination. Additionally, there should be sufficient space around the banks of collectors to perform with comfort the hydraulic connections.

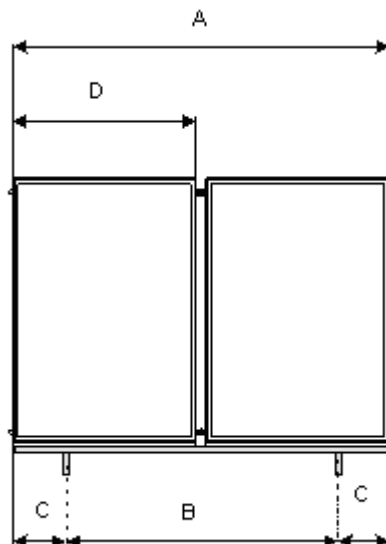


Figure 7. A Single Collector



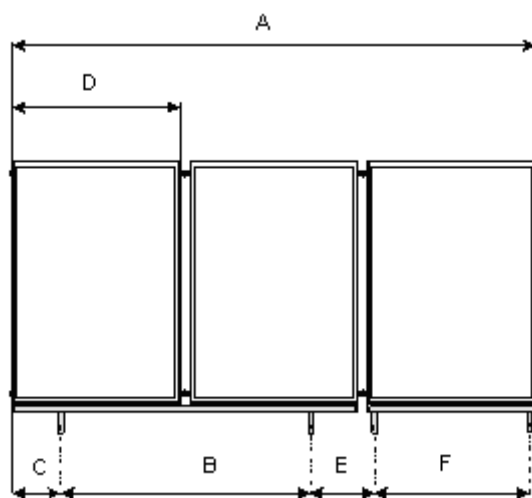
TYPE	A	B
1,75	1000 mm	895 mm
2,00	970 mm	895 mm
2,50	1175 mm	895 mm
2,70	1248 mm	895 mm

Figure 8. Bank of Two Solar Collectors



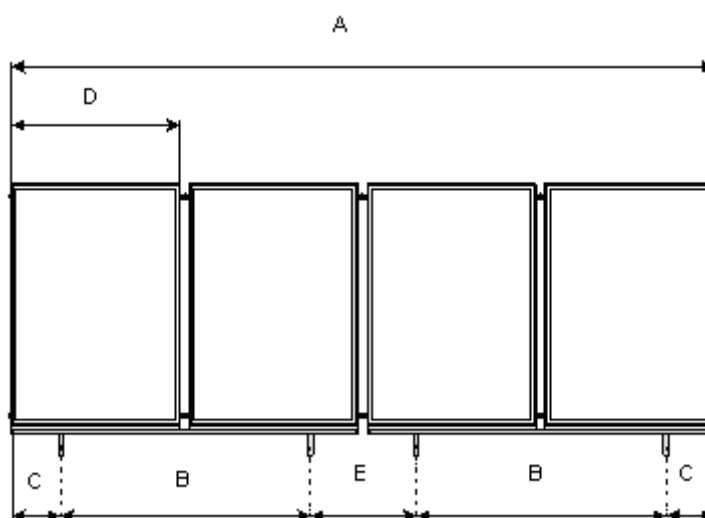
TYPE	A	B	C	D
1,75	2060 mm	895 mm	582.5 mm	1000 mm
2,00	2000 mm	895 mm	552.5 mm	970 mm
2,50	2410 mm	1440 mm	485 mm	1175 mm
2,70	2556 mm	1440 mm	558 mm	1248 mm

Figure 9. Bank of Three Solar Collectors



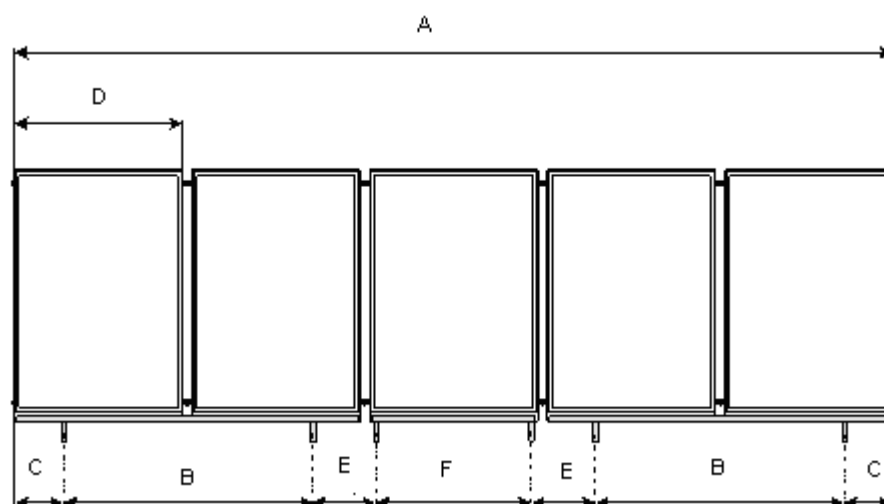
TYPE	A	B	C	D	E	F
1,75	3120 mm	895 mm	582.5 mm	1000 mm	695 mm	895 mm
2,00	3090 mm	895 mm	552.5 mm	970 mm	650 mm	895 mm
2,50	3645 mm	1440 mm	485 mm	1175 mm	685 mm	895 mm
2,70	3864 mm	1440 mm	558 mm	1248 mm	794,5 mm	895 mm

Figure 10. Bank of Four Solar Collectors



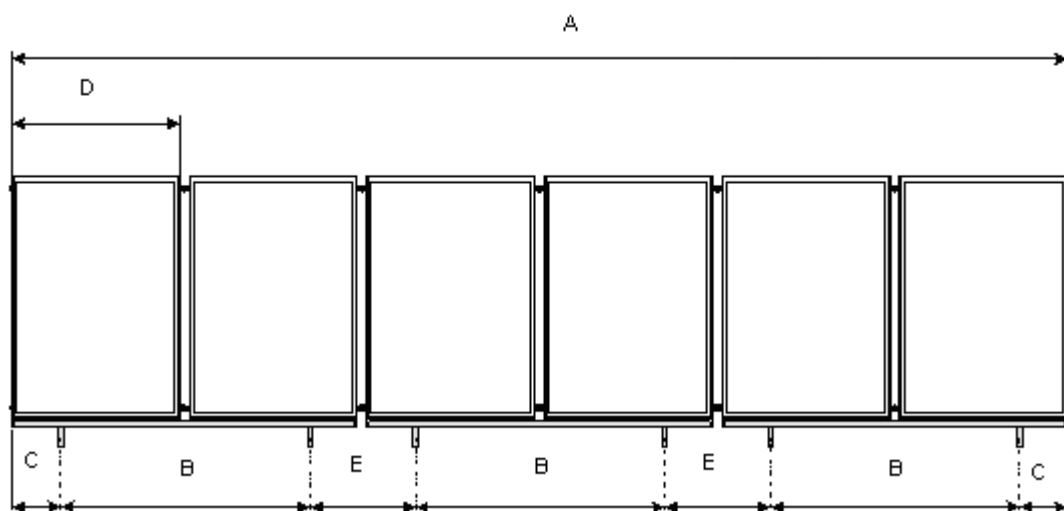
TYPE	A	B	C	D	E
1,75	4180 mm	895 mm	582.5 mm	1000 mm	1225 mm
2,00	4060 mm	895 mm	552.5 mm	970 mm	1165 mm
2,50	4880 mm	895 mm	485 mm	1175 mm	1030 mm
2,70	5172 mm	895 mm	558 mm	1248 mm	1176 mm

Figure 11. Bank of Five Solar Collectors



TYPE	A	B	C	D	E	F
1,75	5240 mm	895 mm	582.5 mm	1000 mm	695 mm	895 mm
2,00	5090 mm	1439 mm	582.5 mm	970 mm	650 mm	895 mm

Figure 12. Bank of Six Solar Collectors



TYPE	A	B	C	D	E
1,75	6300 mm	895 mm	584.5 mm	1000 mm	1225 mm

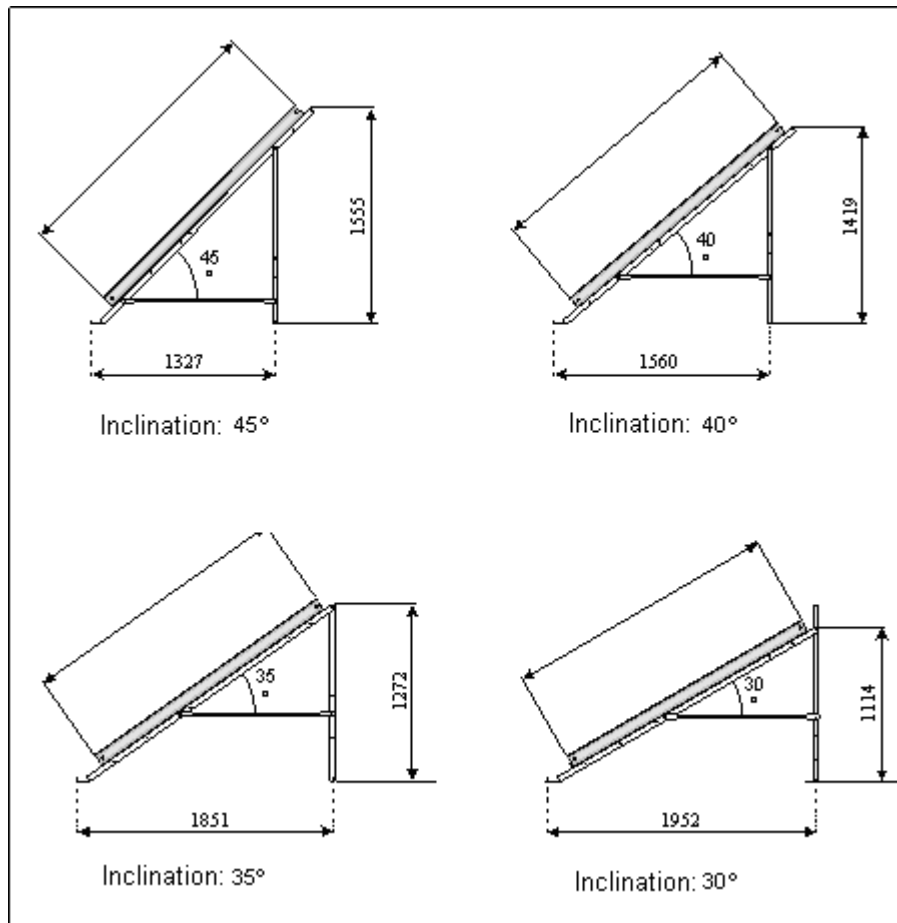


Figure 13. Dimensions of the banks of collectors depending on the inclination. (The above dimensions apply to all sizes of collectors)

## 5. Flat Roof Installation

Next it will be described the procedure for installing a bank of two solar collectors on a flat roof. The formation of more banks of collectors is done simply by adding the support frames EST1 or EST2 when necessary.

### 5.1. Installation of the longitudinal profiles D3 and the Z angles E1/E2

Place the two longitudinal profiles D3 on the floor, at the indicated distance, so that both profiles U remain outward-oriented. Place the two Z angles E1 or E2 over, in the correct position (Figure 14a, 14b & 14c) .

Screw the lower Z angle E1 or E2 to the two longitudinal profiles D3 with two sunk head bolts M8x20 with their nuts and washers and tighten.

Screw the higher Z angle E1 or E2 to the two longitudinal profiles D3 with two sunk head bolts M8x20 with their nuts and washers, without tighten it yet in order to facilitate the subsequent placement of the collectors.



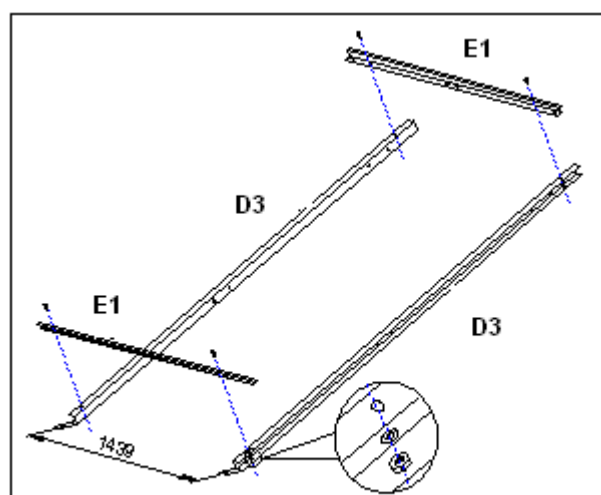


Figure 14 a (for 2x2,00m2)

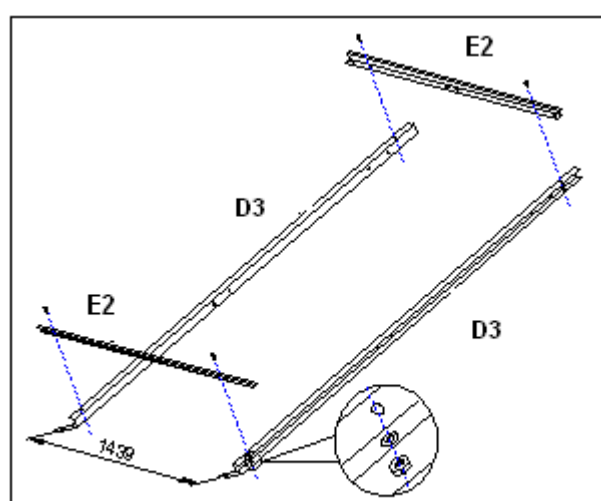


Figure 14 b (for 2x2,50m2)

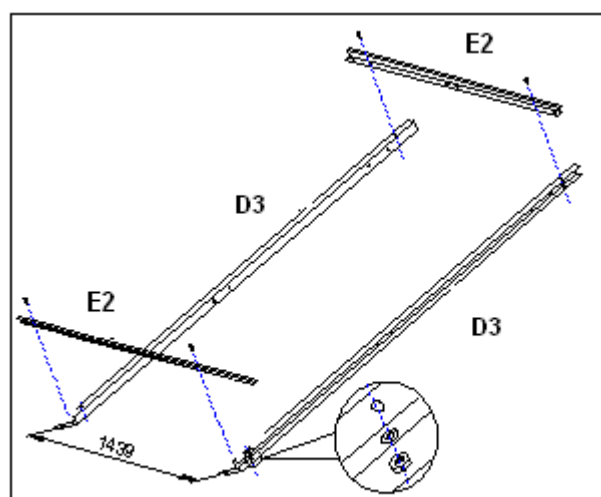


Figure 14 c (for 2x2,70 m2)

## 5.2. Installation of the vertical legs A3 and the Long cross pieces X1/X2

Place the two long crosspieces X1 or X2 forming an X, with the convex part of the profiles and link them into contact with each other through a bolt M10x20 with nut and washer, without tighten it yet.

Place the two vertical legs A3 parallel on the floor, so that both U profiles are oriented towards the interior. Screw the long crosspieces X1 or X2 as the cross-legged to the vertical legs A3 using four bolts M10x16 with its nuts. Tighten the four bolts at the ends and the bolt of the central X (Figure 15a and 15b).

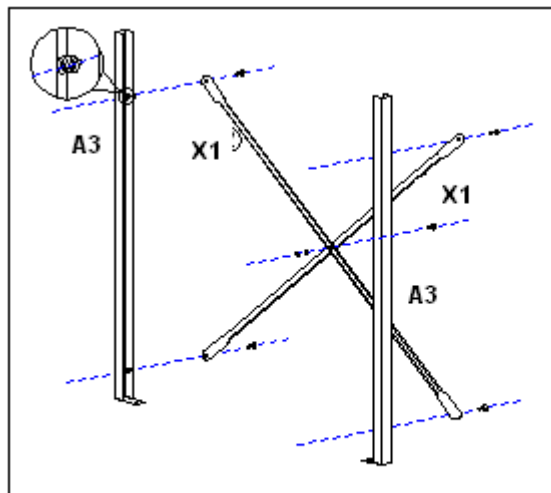


Figure 15a (for 2x2.00m2)

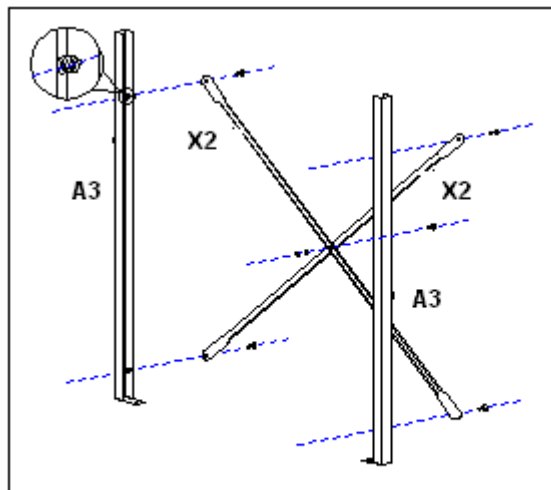


Figure 15b (for 2x2.50m2 or 2x2.70m2)

### 5.3. Installation of the vertical legs A3 and the longitudinal profiles D3

Lift the legs A3 coupled with the X formed with the long crosspieces X1 or X2 until you place them vertically.

Lift the rear part of the longitudinal profiles D3 coupled with the cross profiles E1 or E2 and join to the vertical legs A3, using two holes depending on the inclination that should be given to the collectors. Tighten with two bolts M10X16 with its nuts.

Join the short crosspieces X3 to the longitudinal profiles D3 (at its inner surface) and to the rear legs A3 (at its outer face), use the holes depending on the inclination that wants to be given to the collectors. Both profiles should be horizontal. Screw with the two bolts M10x16 in each profile, with its respective nuts.

Join the structure to the bench, using the raw plugs and anchored bolts supplied or with the fixing parts suitable to the characteristics of the support frame. In any case, the choice of the solution adopted should avoid compromising the watertight integrity of the roof. (Fig. 16).

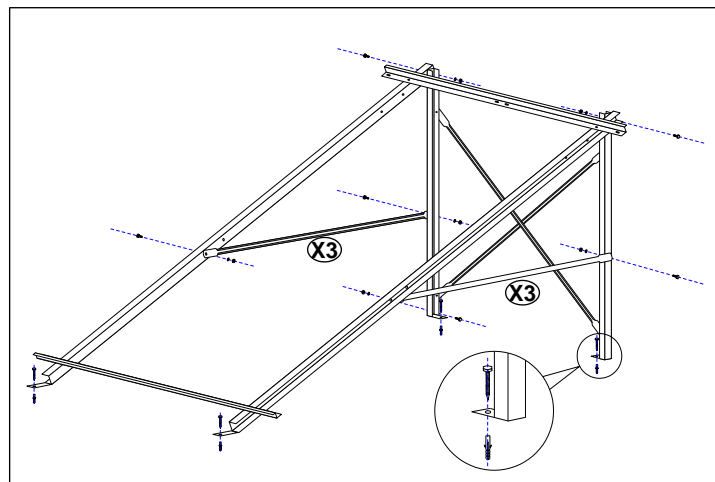
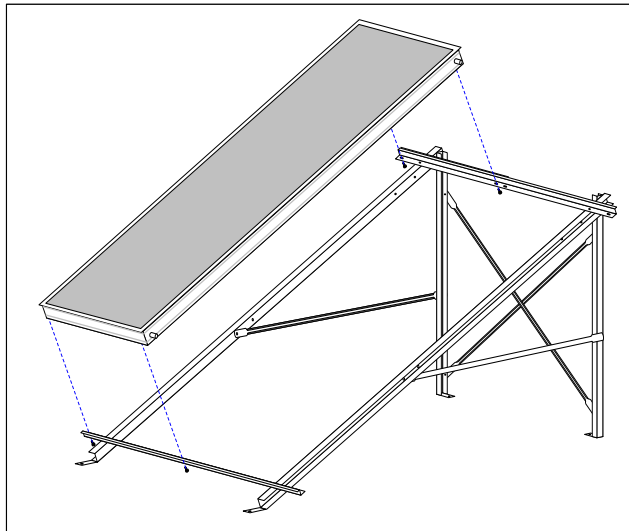


Figure 16.

### 5.4. Placement of Solar Collectors

Place one of the solar collectors in the support frame, place it first on the lower profile cross-E1 or E2 and then on the higher profile cross- E1 or E2. Adjust the position of the solar collector in the structure, so that matches the holes in the structure of the holes in the rear part of the collector (Figure 17).



*Figure  
17.*

Remove the protection caps of the collector lateral' connections and introduce the two compression union connectors (see fig. 5).

Remove the protection caps of the connections of the lateral of the second collector and place it on the structure, on the cross profiles E1 or E2 lower and upper.

Slide the second collector so that the end is introduced into the connector. Verify that the connection has been done correctly and that the holes in the structure match those holes back of the collectors. Adjust the position of the collectors if necessary.

Adjust the higher cross- E1 or E2 profile to the collectors and tighten the bolts that bind to the longitudinal profiles D3.

Screw the solar collectors to the structure, with the bolts M6x20 (four per collector) with their washers.

Make sure all bolts and the different elements of the structure are properly tightened and check the solidity of the whole and its correct fixing to the bench. The collectors and the support system can withstand wind velocity up to 120km/h and weight of snow up to 80cm height at 45 degrees.



*Figure 18*

hydraulic connections.

The bank of two solar collectors is ready to start the



## 6. Tile roof installation

The assembly of solar collectors on a tile roof is done in a manner similar to that described above, with a different position of the vertical legs A3 that have to be placed horizontally underneath the E1/E2 in a parallel manner. The crosspieces X1 or X2 and X3 shorts are not needed for tile roof installation.

The profiles D3 longitudinal and transverse E1 or E2 have to be fixed to the roof with strength and without compromising its tightness. The fixing procedure will depend on the characteristics of the roof. With the installation fittings are supplied some perforated flexible metal strips to facilitate this fixation on certain roof configurations. (See fig. 19) The collectors and the support system can withstand wind velocity up to 120km/h and weight of snow up to 80cm height at 45 degrees.

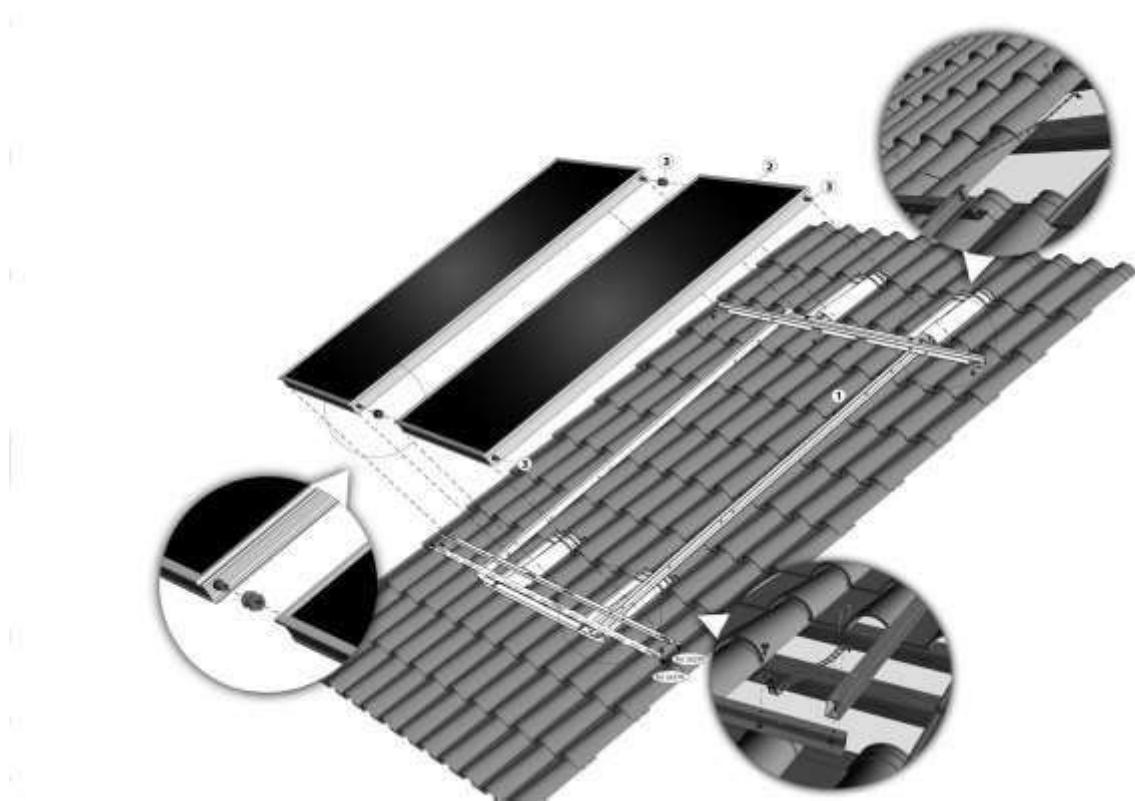


Figure 19.

## 7. Connections and Hydraulic Circuit

The collectors or different groups of solar collectors must be connected hydraulically to form a closed primary solar collection circuit. The use of copper pipes is recommended, with a wall minimum thickness of 1 mm and an adequate diameter for the circulation flow of each part.

The entry of liquid to the group of solar collectors will be from the end at the bottom of the collector. On the top end connection a plug must be installed. The output of liquid will be done by the top of collector's opposite end of each bank. On the top connection an end cap must be installed.

The route of the pipeline will be conducted so as to minimize the parts where the flow of the hot fluid runs (of the collectors towards the tank or to the interchange at the plant room).

In each group of solar collectors two stop valves should be installed at the entrance and exit to allow the hydraulic isolation of the rest of the circuit and a safety valve (figure 20).

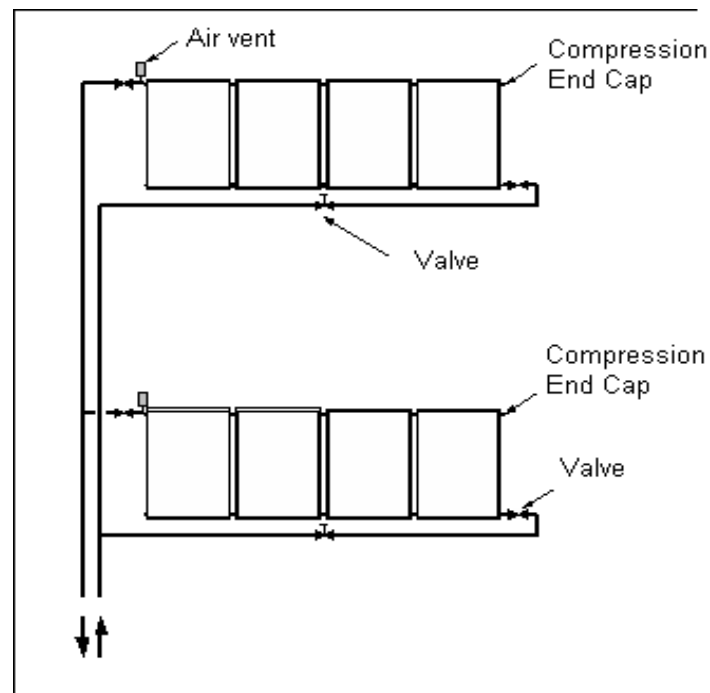


Figure 20. Group of collectors connection.

The solar collectors reach high temperatures, especially in periods of great sunshine and low energy consumption, which can cause significant expansion of the materials. The connection of various groups of solar collectors with each other and / or pipes of hydraulic circuit must be made so as to ensure that expansion does not cause excessive pressure (tensions) on the connections or on the collectors, for example by the use of flexible unions.

In all the high points of the primary circuit of the solar collectors, and particularly the output of each group of collectors, an air vent must be installed, automatic or manual. In any case, the air vent must be capable of withstanding temperatures of up to 150 ° C without deterioration. Once the air is drawn out from the circuit, the vents will remain closed.

A smooth distribution of flow between different groups of solar collectors must be ensured so that each group has a flow rate close to 100 litres / h for each collector that is part of this group (i.e. 400 litres / h for every group of 4 solar collectors). This can be achieved with appropriate design of the route of the pipeline or by installing a balancing valve in each group, properly adjusted. We recommend the second system.

The pressure drop within each collector should be taken into account when selecting the appropriate pump. (figure 21 indicates the pressure drop)

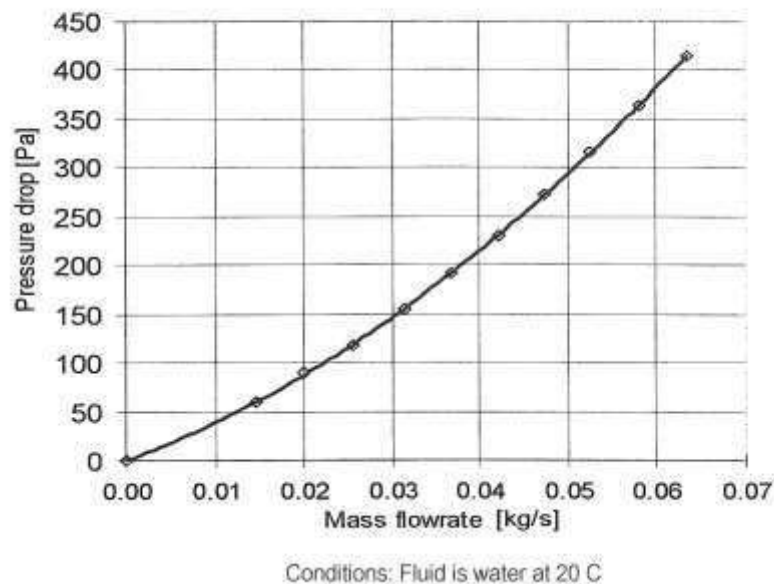


Figure 21.

The pipes must be insulated according to existing regulations. The thickness of the insulation material must be at least 30 mm for a material with conductivity equal to 0.040 W/m<sup>°K</sup>. The insulation material must be capable of withstanding pipe surface temperatures higher than 120 ° C without deterioration.

The circulating fluid must contain a sufficient amount of antifreeze liquid to avoid any risk of freezing. The freezing temperature of the fluid circuit of the solar collector should be less than the minimum temperature recorded at the site of the facility. Propylene glycol makes an excellent choice for use as a heat transfer fluid in applications where contact with potable water, food or beverages might occur. Its low toxicity, low freezing point, corrosion-inhibiting composition and high boiling point make it uniquely applicable for use in such applications. Below is a table showing the freezing temp. of propylene glycol – water fluid with respect to the ratio of pure glycol to the water.

Freezing Point								
Propylene Glycol Solution (% by <u>mass</u> )		0	10	20	30	40	50	60
Temperature	(°C)	0	-3	-8	-14	-22	-34	-48

The primary circuit of the solar collectors must be in accordance with all the necessary security measures, particularly a safety valve correctly set, an expansion tank designed to even take into account the evaporation of liquid contained in the collectors and a system of protection against overheating (heat sink or similar), if necessary.

The primary circuit of the solar collectors must have at least a thermometer and a manometer to permit recording of the temperature and the pressure of the circuit.

Before the final filling of the primary circuit, internal washing with domestic water should be carried out to remove any dirt or rests and pressure test should be carried out to verify the sealing of all, without exceeding the maximum pressure allowed by solar collectors. This is to verify that the connections between solar collectors have no leaks. If that is so, the fittings should be tightened, using two keys, so as to avoid transmitting force (tortion) to the pipes of the absorbers of the solar collectors.

During the final filling of the solar system with antifreeze fluid it must be verified that the circuit is perfectly purged and pressurized. Once this operation is finalized, the air vents should be closed.

It should be avoided to carrying out operations such as washing and filling the primary circuit while or after the solar collectors are exposed to intense sun.

## 8. Lightning Protection

National norms and regulations over lightning protection should be closely followed. In any case the support(s) of the collectors must be “earthed” with copper wire of 16mm<sup>2</sup> to the ground grid of the building. This will serve as lightning protection.

This guideline does not release in any way the installer from his responsibility against lightning protection requirements.

## 9. Permissible Wind and snow load

Permissible negative pressure for wind load is 1500 Pa

Permissible positive pressure for snow load is 2000 Pa



## **10. Care and Maintenance Program**

- The collectors should be subject to periodic visual inspections. If it appears that excessive dirt has been accumulated on the glass of the collectors, then it must be cleaned. This operation should take place during the morning, before 10:00 am or in the afternoon after the 18:00 pm, checking before that the collectors are not too hot. Otherwise, there might be a risk of damaging the collector, (especially when using a hose), or burning if manual cleaning is performed.
- If for some reason the collector's glass breaks, it should be replaced immediately. Otherwise, the interior of the collector may deteriorate due to rain, humidity or dirt.
- During each inspection, visually check the possible loss of tightness in the closed-circuit connections and the entry and exit of each collector and the connections between them. Fix if necessary or replace items (parts) in poor condition.
- The support of solar collector is made of highly resistant galvanized steel. As a precaution, check regularly their condition and repair if necessary. Verify also fixations to the tile or flat roof.
- In the event that an extended period without hot water consumption is foreseen (for example during holidays) it is recommended to cover the collectors with a blanket or a similar opaque material or empty the collectors circuit, so as to avoid unnecessary overheating. The cover of the collectors must be well fixed to avoid being gone by the wind.
- The closed circuit of the collectors should be suitably protected against frost with antifreeze liquid of the right characteristics. Particular attention should be given not to reduce the concentration of antifreeze mixture, for example by filling with water.

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***SOLE S.A.***  
***PROJECT LIST***  
***IN MIDDLE EAST***

## MAIN COLLECTIVE SOLAR INSTALLATIONS MADE BY sole IN MIDDLE EAST





	Name	Collectors type & size	Storage Capacity	Place	Year
1.	<b>THE DUNES</b> (U.S.A. EMPBASSY)	Flat plate collectors(150 m <sup>2</sup> )	16.000 ltr	Abu Dhabi	2003
2.	<b>PUBLIC BATHS IN GONABAD</b> Sanitary Hot Water	Flat plate collectors(150 m <sup>2</sup> ) (1st of 140)	12.000 ltr	Iran	2004
3.	<b>EUROPEAN BUSINESS CENTER</b> Sanitary Hot Water	Flat plate collectors (108 m <sup>2</sup> )	16.200ltr	Dubai	2007
4.	<b>BURJ KHALIFA TOWER – tallest building of the world over 828m</b> Sanitary Hot Water	Flat plate collectors (1.020m <sup>2</sup> )	80.000ltr	Dubai	2009
5.	<b>DUBAI SPORTS COMPLEX</b> Sanitary Hot Water and Swimming Pool Heating	Flat plate collectors (1.026m <sup>2</sup> )	16.000 ltr	Dubai	2010
6.	<b>RAHA VILLAS</b> Sanitary Hot Water	Flat plate collectors (730 m <sup>2</sup> )	54.400ltr	Abu Dhabi	2012
7.	<b>FISHING HARBOR</b> Sanitary Hot Water	Flat plate collectors (244 m <sup>2</sup> )	18.000ltr	Dubai	2012
8.	<b>FUTURE SCHOOLS</b> Sanitary Hot Water and Pool Heating	Flat plate collectors (270 m <sup>2</sup> )	15.000ltr	Abu Dhabi	2012
9.	<b>BLOOM GARDENS</b> Sanitary Hot Water Abu Dhabi	Flat plate collectors (403 m <sup>2</sup> )	23.900 ltr	U.A.E	2016
10.	<b>MADINAH MUNAWWARAH VILLA</b> Sanitary Hot Water and Pool Heating	Flat plate collectors (216 m <sup>2</sup> )	3.000 ltr	S. Arabia	2016
11.	<b>BURJEEL HOSPITAL MED CITY</b> Sanitary Hot Water Abu Dhabi	Flat plate collectors (338 m <sup>2</sup> )	24.800 ltr	U.A.E	2017



12.	<b>FLORA AIRPORT HOTEL</b> Sanitary Hot Water Dubai	Flat plate collectors (208 m <sup>2</sup> )	15.000 ltr	U.A.E	2017
13.	<b>SALAM CROWN PLAZA</b> Sanitary Hot Water Jeddah	Flat plate collectors (208 m <sup>2</sup> )	16.000 ltr	S. Arabia	2017
14.	<b>AL FAYA COMPLEX - BLOOM GARDENS DEVELOPMENT</b> Sanitary Hot Water Abu Dhabi	Flat plate collectors (433 m <sup>2</sup> )	32.800 ltr	U.A.E	2017
15.	<b>HSBC BANK HEADQUARTERS</b> Sanitary Hot Water Abu Dhabi	Flat plate collectors (64 m <sup>2</sup> )	4.500 ltr	U.A.E	2017

## UAE PROJECT LIST

PROJECT NAME	DESCRIPTION OF SOLAR SYSTEM	YEAR	NAME OF THE CONTRACTOR	NAME OF CONSULTANT	PICTURE
THE DUNES (U.S.A. EMBASSY) ABU DHABI	320m <sup>2</sup> Flat plate Selective collectors, support frames, pumps, expansion tank, control system storage tanks 16000ltr	MARCH 2003	J. A. JONES CONSTRUCTION CO. TEL: 00971 2 44 90 619 CONTACT NAME: Mr. Kevin	H.O.K. TEL: 00971 202 3388700 OBO (Overseas Building Organization U.S.A.) CONTACT NAME: Mr. Jay Warren	CLASSIFIED
EUROPEAN BUSINESS CENTER DUBAI	216m <sup>2</sup> Flat plate Selective collectors, support frames, pumps, expansion tank, control system storage tanks 16200ltr (54 Eurostar thermosiphon solar water heatres)	SEPTEMBER 2007	Sensaire Services LLC TEL: 00971 42823713 CONTACT NAME: Mr. S. Han Baskar		
BURJ KHALIFA	1.020m <sup>2</sup> Flat plate Selective collectors , support frames, pumps, expansion tank, control system	MAY 2009	Emirates Trading Agency - Voltas - Hitachi Plant Jv, TEL: 00971 4 3216627, CONTACT NAME: Mr. NAME: Satish G. Dandekar	HYDER CONSULTING, TEL: 00971 4 3242532, CONTACT NAME: Roy Samuels	
HAMDAN SPORTS COMPLEX	1.026m <sup>2</sup> Flat plate selective collectors , support frames, pumps, 2 tanks (16.000 ltr), expansions tanks, control system	JULY 2010	SAUDI BIN LADIN GROUP, TEL: 00971 4 2660010, CONTACT NAME: CONTACT NAME:MR. LIJIN MOHAN	ARUP GULF LIMITED, TEL: 00971 4 550 7300, CONTACT NAME: MR. TONY LOVELL	
AI RAHA GARDENS	272 THERMOSIPHON SYSTEMS (200-1-W270) 200ltr with 1 selective collector of 2,70m <sup>2</sup>	APRIL 2012	AL SHAMAT Electromechanical (MEP) Cont. Est. TEL:00971 2 6223516, CONTACT NAME MR. CONTACT NAME: PAUL ANSELL		
FISHING HARBOR	244m <sup>2</sup> Flat plate selective collectors, support frames, pumps, 10 tanks (18.000 ltr), expansions tanks, control system	AUGUST 2012	GENERAL CONTRACTING CO, TEL: 0097146725485, CONTACT NAME: NAME: MR. MICHEL PETRIDES	DESIGN & ARCHITECTURE BUREAU, TEL: 00971 4 2828800, CONTACT NAME: NAME: MR. BASHEER OSMAN	
FUTURE SCHOOLS	540m <sup>2</sup> Flat plate selective collectors, support frames, 6 buffer+6 storage tanks (15.000ltr), pumps, expansions tanks, control systems	DECEMBER 2012	Al Sabbah Electro-Mechanical Contracting, TEL. 0097137825656, NAME: MR. JAYAPRABHU	KEO, INTERNATIONAL CONSULTANS TEL. 0097124173000, CONTACT	
BLOOM GARDENS	157 THERMOSIPHON SYSTEMS (150-200-1-S260) 150-200ltr with 1 selective collector of 2,60m <sup>2</sup>	SEPTEMBER 2016	EMIRATES LINK MALTAURO LLC Tel: (+971-2) 5536456 NAME: Mr. E. WEBHE	Khatib & Alami tel: (+971-4) 4252222 Mr. Ghassan Miari	

BURJEEL HOSPITAL MED CITY	338m² Flat plate Selective collectors , 24.800 ltr storage, support frames, pumps, expansion tank, control system	MAY 2017	Commodore LLC Tel: +971 2 5509222 NAME: Mr. MARWAN HASAN	STH SOCIETY TECHNOLOGY HOUSE Tel: +971 2 6417627	
FLORA AIRPORT HOTEL L.L.C.	208m² Flat plate Selective collectors , 15.000 ltr storage, support frames, pumps, expansion tank, control system	MAY 2017	Central Contracting LLC Tel: +971 4 3544460 NAME: Eng. BADAQUI HALABI	Eng. Adnan Saffarini Tel: +971 4 2222002 NAME: Mr. Ahmed Saffarini	
AL-FAYA COMPLEX- BLOOM GARDENS DEVELOPMENT	68 THERMOSIPHON SYSTEMS (200- -1-S260) & 64 THERMOSIPHON SYSTEMS (300-2-S200)	JULY 2017	EMIRATES LINK MALTAURO LLC Tel: (+971-2) 5536456 CONTACT NAME: Mr. E. WEBHE	Khatib & Alami tel: (+971-4) 4252222 NAME: Mr. Ghassan Miari	
HSBC BANK Headquarters	63m² Flat plate Selective collectors , 4.500 ltr storage, support frames, pumps, expansion tank, control system	OCTOBER 2017	Plafond Tel: +971 4 5014800 CONTACT NAME: BERNARD SILVANO	CONIN Tel: +971 4 2662227 NAME: TARIQ QANDAH	

***SOLE S.A.***  
***PROJECT LIST***  
***WORLDWIDE***



# **BIG PROJECT LIST PRESENTATION**

# MAIN COLLECTIVE SOLAR INSTALLATIONS MADE BY SOLE

	Name	Collectors type & size	Storage Capacity	Place	Year
1.	<b>Calypso</b> Bungalows Hotel	Flat plate collectors (100m <sup>2</sup> )	5.000 ltr	Arkitsa	1975
2.	<b>Marpounda Beach</b> Hotel	Flat plate collectors (60m <sup>2</sup> )	3.000 ltr	Alonissos Island	1976
3.	<b>Galaxy</b> Hotel	Flat plate collectors (70 m <sup>2</sup> )	3.500 ltr	Alonissos Island	1975
4.	<b>Skiathos Palace</b> Hotel	Flat plate collectors (250 m <sup>2</sup> )	12.500 ltr	Skiathos Island)	1976
5.	<b>Eden Rock</b> Hotel	Flat plate collectors (100 m <sup>2</sup> )	5.000 ltr	Rhodes Island	1977
6.	<b>Filoxenia</b> Hotel	Flat plate collectors (75 m <sup>2</sup> )	3.750 ltr	Kalamata	1977
7.	<b>Marathon Beach</b> Hotel	Flat plate collectors (275 m <sup>2</sup> )	13.750 ltr	Nea Makri	1978
8.	<b>Perandoni</b> Hotel	Flat plate collectors (200 m <sup>2</sup> )	10.000 ltr	Ierapetra – Crete	1978
9.	<b>Galaxy</b> Hotel	Flat plate collectors (50 m <sup>2</sup> )	2.500 ltr	Zakinthos Island	1978
10.	<b>Loukia</b> Hotel	Flat plate collectors (80 m <sup>2</sup> )	4.000 ltr	Chania – Crete	1978
11.	<b>Venus</b> Hotel	Flat plate collectors (80 m <sup>2</sup> )	4.000 ltr	Milos Island	1978
12.	<b>Posidon</b> Camping	Flat plate collectors (60 m <sup>2</sup> )	3.000 ltr	Platamonas	1979
13.	<b>Economou</b> Camping	Flat plate collectors (60 m <sup>2</sup> )	3.000 ltr	Korinthos	1979
14.	<b>Sterling Drug</b> Hellas	Flat plate collectors (120 m <sup>2</sup> )	6.000 ltr	Pallini	1979

# MAIN COLLECTIVE SOLAR INSTALLATIONS MADE BY SOLE

	Name	Collectors type & size	Storage Capacity	Place	Year
15.	N.C.S.R. "DEMOKRITOS" Solar System Laboratory	Flat plate collectors (800 m <sup>2</sup> )	40.000 ltr	Athens	1979
16.	Valaki's Block of Flats	Flat plate collectors (100 m <sup>2</sup> )	5.000 ltr	Athens	1980
17.	Patouna's Block of Flats	Flat plate collectors (80 m <sup>2</sup> )	4.000 ltr	Athens	1980
18.	Tobazi's Residence Solar room and water heating	Flat plate collectors (25 m <sup>2</sup> )	1.250 ltr	Trapeza - AEGIO	1980
19.	Xenia – EOT Hotel	Flat plate collectors (90 m <sup>2</sup> )	4.500 ltr	Larissa	1980
20.	Olympic Stadium	Flat plate collectors (500 m <sup>2</sup> )	25.000 ltr	Athens	1981
21.	Olympiaces Diakopes Hotel	Vacuum tube collectors (400 m <sup>2</sup> )	20.000 ltr	Kos Island	1989
22.	Santa Marina Hotel	Flat plate collectors (200 m <sup>2</sup> )	10.000 ltr	Ag. Nikolaos – Crete	1983
23.	Santa Marina Hotel	Flat plate collectors (150 m <sup>2</sup> )	7.500 ltr	Chania – Crete	1983
24.	Crete Hotel	Flat plate collectors (40 m <sup>2</sup> )	2.000 ltr	Chania – Crete	1983
25.	Daidalos Hotel	Flat plate collectors (400 m <sup>2</sup> )	20.000 ltr	Kos Island	1989
26.	Daicos Hotel	Flat plate collectors (100 m <sup>2</sup> )	5.000 ltr	Kalamata	1989
27.	Minavra Hotel	Flat plate collectors (60 m <sup>2</sup> )	3.000 ltr	Vouliagmeni	1989
28.	Saropoulos – Plomari	Flat plate collectors (50 m <sup>2</sup> )	2.500 ltr	Mitilini Island	1990

# MAIN COLLECTIVE SOLAR INSTALLATIONS MADE BY SOLE

	Name	Collectors type & size	Storage Capacity	Place	Year
29.	<b>Peace &amp; Friendship Stadium</b> Cres Subsidy	Flat plate collectors (300 m <sup>2</sup> )	15.000 ltr	Athens	1992
30.	<b>Allegro S.A. Children's Clothing Manufacturer</b> Cres Subsidy	Flat plate collectors (70 m <sup>2</sup> )	3.500 ltr	Athens	1993
31	<b>Tripou – Katsouris</b> Leather Treatment Factory Cres Subsidy	Flat plate collectors (300 m <sup>2</sup> )	15.000 ltr	Athens	1993
32	<b>Achaia Clauss</b> Winery Cres Subsidy	Flat plate collectors (300 m <sup>2</sup> )	15.000 ltr	Patra	1994
33	<b>Porto Paros Hotel</b> (160 m <sup>2</sup> ) 80 ALPHA Systems	Flat plate collectors	8.000 ltr	Paros Island	1995
34	<b>SARANTIS S.A.</b> Solar Air – Conditioning 700kw	Flat plate collectors (blue selective) (2.664 m <sup>2</sup> )	9.000 ltr Buffer	Oinofita	1999
35	<b>Aziza Hotel</b>	Flat plate collectors (176 m <sup>2</sup> ) & (300 m <sup>2</sup> s / p collectors)	15.000 ltr	Hamamet – Tunisia	1999
36	<b>Mediterranee Hotel</b> Swimming Pool & Hot Water Heating	Flat plate collectors (626 m <sup>2</sup> )	31.300 ltr	Hamamet – Tunisia	1999
37	<b>El – Kanta Hotel</b> Swimming Pool & Hot Water Heating	Flat plate collectors (674 m <sup>2</sup> )	33.700 ltr	Sousse – Tunisia	1999
38	<b>Malia Bay Hotel</b>	Flat plate collectors (120 m <sup>2</sup> )	6.000 ltr	Malia – Crete	1999
39	<b>Paros Filoxenia</b>	Flat plate collectors (30 m <sup>2</sup> )	1.500 ltr	Paros Island	1999
40	<b>Rhoul Palace Hotel</b>	Flat plate collectors (30 m <sup>2</sup> & 100 m <sup>2</sup> s / p collectors)	1.500 ltr	Marrakech - Marocco	1999



# MAIN COLLECTIVE SOLAR INSTALLATIONS MADE BY SOLE

	Name	Collectors type & size	Storage Capacity	Place	Year
41	<b>CRES-</b> Space heating	Air Collectors /32m <sup>2</sup>		Greece	2000
42	<b>Berber Palace</b>	Flat plate collectors (550 m <sup>2</sup> )	27.500 ltr	Ouarzazate – Marocco	2000
43	Sports Stadium <b>Amor Doghamne</b>	Flat plate collectors (28 m <sup>2</sup> )	1.400 ltr	Gabes – Tunisia	2000
44	<b>Rethymno Village</b> Solar Air – Conditioning 105kw, Swimming Pool & Hot Water Heating	Flat plate collectors (blue selective) (440 m <sup>2</sup> )	8.000 ltr	Rethymno – Crete	2000
45	<b>Arion Palace</b> – Swimming Pool & Hot Water Heating	Flat plate collectors (blue selective) (100 m <sup>2</sup> )	5.000 ltr	Ierapetra – Crete	2000
46	<b>Vlamakis Villas</b> – Swimming Pool & Hot Water Heating	Flat plate collectors (blue selective) (362 m <sup>2</sup> )	18.100 ltr	Chania – Crete	2000
47	<b>Lentzakis Hotel</b> Solar Air – Conditioning 105kw, Swimming Pool & Hot Water Heating	Flat plate collectors (blue selective) (448 m <sup>2</sup> )	4.000 ltr	Rethymno - Crete	2000
48	<b>Club Med</b> Hotel Hot Water Heating	Flat plate collectors (black chrome selective) (1,000m <sup>2</sup> )	55.000 ltr	TUNISIA	2001
49	<b>Kalypso</b> Hotel Hot Water Heating	Flat plate collectors (blue selective) (144 m <sup>2</sup> )	7.200 ltr	Plakias – Crete	2001
50	<b>Europa Hotel</b> – Swimming Pool & Hot Water Heating	Flat plate collectors (blue selective) (132 m <sup>2</sup> )	6.600 ltr	Panormos - Crete	2001
51	<b>American Embassy</b> Sanitary Hot Water	Flat plate collectors (blue selective) (320 m <sup>2</sup> )	16.000 ltr	Abu Dhabi	2002

# MAIN COLLECTIVE SOLAR INSTALLATIONS MADE BY SOLE

	Name	Collectors type & size	Storage Capacity	Place	Year
52	<b>European Center of Law</b>	Air collectors/120m2 Compact SWH ALPHA/24m2	2.400 ltr	Sounio	2002
53	<b>Public Baths in Gonabad</b> Sanitary Hot Water	Flat plate collectors (150 m <sup>2</sup> ) (1st of 140)	12.000 ltr	Iran	2004
54	<b>CRES</b> space heating	Flat plate collectors (13.5m2)		Greece	2005
55	<b>Simien Park Lodges Hotel</b> Floor Heating	Flat plate collectors (43.20 m <sup>2</sup> )	3200ltr	Ethiopia	2005
56	<b>European Business Center</b> Sanitary Hot Water	Flat plate collectors (216 m <sup>2</sup> )	16.200ltr	Dubai	2007
57	<b>Spastics Society Athens</b> Pool Heating	Polypropylene collectors (50 m <sup>2</sup> )		Athens	2007
58	<b>Hydramis Palace Hotel</b> Sanitary Hot Water	Flat plate collectors (1.215m <sup>2</sup> )	70.000ltr	Crete	2007
59	<b>German School of Athens</b> Pool Heating	Polypropylene collectors (180 m <sup>2</sup> )		Athens	2008
60	<b>Cavo Spada Hotel</b> Sanitary Hot Water	Flat plate collectors (280m <sup>2</sup> )	17.000ltr	Crete	2008
61	<b>Tesco Super Market</b> Solar Air – Conditioning 250kw	Flat plate collectors (1.036m <sup>2</sup> )		Hungary	2009
62	<b>BURJ KHALIFA TOWER</b> <b>tallest building of the world</b> Sanitary Hot Water	Flat plate collectors (1.020m <sup>2</sup> )	80.000ltr	Dubai	2009

# MAIN COLLECTIVE SOLAR INSTALLATIONS MADE BY SOLE

	Name	Collectors type & size	Storage Capacity	Place	Year
63	<b>HAMDAN SPORTS COMPLEX</b> Sanitary Hot Water and Swimming Pool Heating	Flat plate collectors (1.026m <sup>2</sup> )	16.000 ltr	Dubai	2010
64	<b>US MILITARY BASE</b> Pool Heating	Polypropylene collectors (260 m <sup>2</sup> )		Crete	2010
65	<b>Princess of Libyan Sea Hotel</b> Sanitary Hot Water	Flat plate collectors (120 m <sup>2</sup> )	7.000ltr	Crete	2010
66	<b>Avra Hotel</b> Sanitary Hot Water	Flat plate collectors (675 m <sup>2</sup> )	40.000ltr	Crete	2010
67	<b>Kolymbari Beach Hotel</b> Sanitary Hot Water	Flat plate collectors (243 m <sup>2</sup> )	15.000ltr	Crete	2010
68	<b>Public sports complex</b> Sanitary Hot Water and Pool Heating	Vacuum tube (40 m <sup>2</sup> ) & Polypropylene collectors (416 m <sup>2</sup> )	3.000 ltr	Loutraki	2011
69	<b>CRES</b> Solar Air Conditioning 35kw	Flat plate collectors (160 m <sup>2</sup> )	60.000ltr	Athens	2011
70	<b>USJ – CAMPUS DE L'INNOVATION DE L'ECONOMIE ET DU SPORT (FRENCH UNIVERSITY)</b> Sanitary Hot Water	Flat plate collectors (240 m <sup>2</sup> )	8.000ltr	Beirut	2011

# MAIN COLLECTIVE SOLAR INSTALLATIONS MADE BY SOLE

	Name	Collectors type & size	Storage Capacity	Place	Year
71	<b>CALDERA BEACH HOTEL</b> Sanitary Hot Water	Flat plate collectors (1040 m <sup>2</sup> )	20.000ltr	Crete	2012
72	<b>AL RAHA GARDENS VILLAS</b> Sanitary Hot Water	Flat plate collectors (730 m <sup>2</sup> )	54.400ltr	Abu Dhabi	2012
73	<b>FISHING HARBOR VILLAGE</b> Sanitary Hot Water	Flat plate collectors (244 m <sup>2</sup> )	18.000ltr	Dubai	2012
74	<b>FUTURE SCHOOLS</b> Sanitary Hot Water and Pool Heating	Flat plate collectors (270 m <sup>2</sup> )	15.000ltr	ALAIN - Abu Dhabi	2012
75	<b>SWIMMING POOL COMPLEX OF AMALIADA MUNICIPALITY</b> Sanitary Hot Water and Pool Heating	Flat plate collectors (551 m <sup>2</sup> )	7.000ltr	Amaliada-Peloponnesse	2013
76	<b>KUALA LUMPUR AIRPORT</b> Sanitary Hot Water	Flat plate collectors (65 m <sup>2</sup> )	3.000ltr	Kuala Lumpur – Malaysia	2013
77	<b>SULTAN GRADENS RESORT</b>	Thermosiphon systems (104m <sup>2</sup> )	15.600ltr	Sharm El Sheikh, Egypt	2014
78	<b>NAVY OFFICERS SCHOOL</b> Sanitary Hot Water	Flat plate collectors (162 m <sup>2</sup> )	8.000ltr	Athens	2014
79	<b>THE BAY HOTEL</b> Sanitary Hot Water	Flat plate collectors (280 m <sup>2</sup> )	21.000ltr	Zakynthos	2014



# MAIN COLLECTIVE SOLAR INSTALLATIONS MADE BY SOLE

	Name	Collectors type & size	Storage Capacity	Place	Year
80	<b>MEDITERRANEAN BEACH RESORT</b> Sanitary Hot Water	Flat plate collectors (202 m <sup>2</sup> )	9.000ltr	Zakynthos	2016
81	<b>BLOOM GARDENS</b> Sanitary Hot Water	Thermosiphon systems (408m <sup>2</sup> )	24.200ltr	Abu Dhabi, U.A.E	2016
82	<b>AIRFORCE MILITARY BASE</b> Sanitary Hot Water	Flat plate collectors (41,60m <sup>2</sup> )	2.500ltr	Marathon - GREECE	2016
83	<b>BURJEEL HOSPITAL MED CITY</b> Sanitary Hot Water	Flat plate collectors (338 m <sup>2</sup> )	24.800 ltr	Abu Dhabi, U.A.E	2017
84	<b>FLORA AIRPORT HOTEL</b> Sanitary Hot Water	Flat plate collectors (208 m <sup>2</sup> )	15.000 ltr	Dubai, U.A.E	2017
85	<b>SALAM CROWN PLAZA</b> Sanitary Hot Water	Flat plate collectors (208 m <sup>2</sup> )	16.000 ltr	Jeddah, S. Arabia	2017
86	<b>AL FAYA COMPLEX – BLOOM GARDENS DEVELOPMENT</b> Sanitary Hot Water	Thermosiphon systems (433 m <sup>2</sup> )	32.800 ltr	Abu Dhabi, U.A.E	2017
87	<b>HSBC BANK Headquarters</b> Sanitary Hot Water	Flat plate collectors (63 m <sup>2</sup> )	4.500 ltr	Dubai, U.A.E	2017

# MARATHON BEACH HOTEL 1978

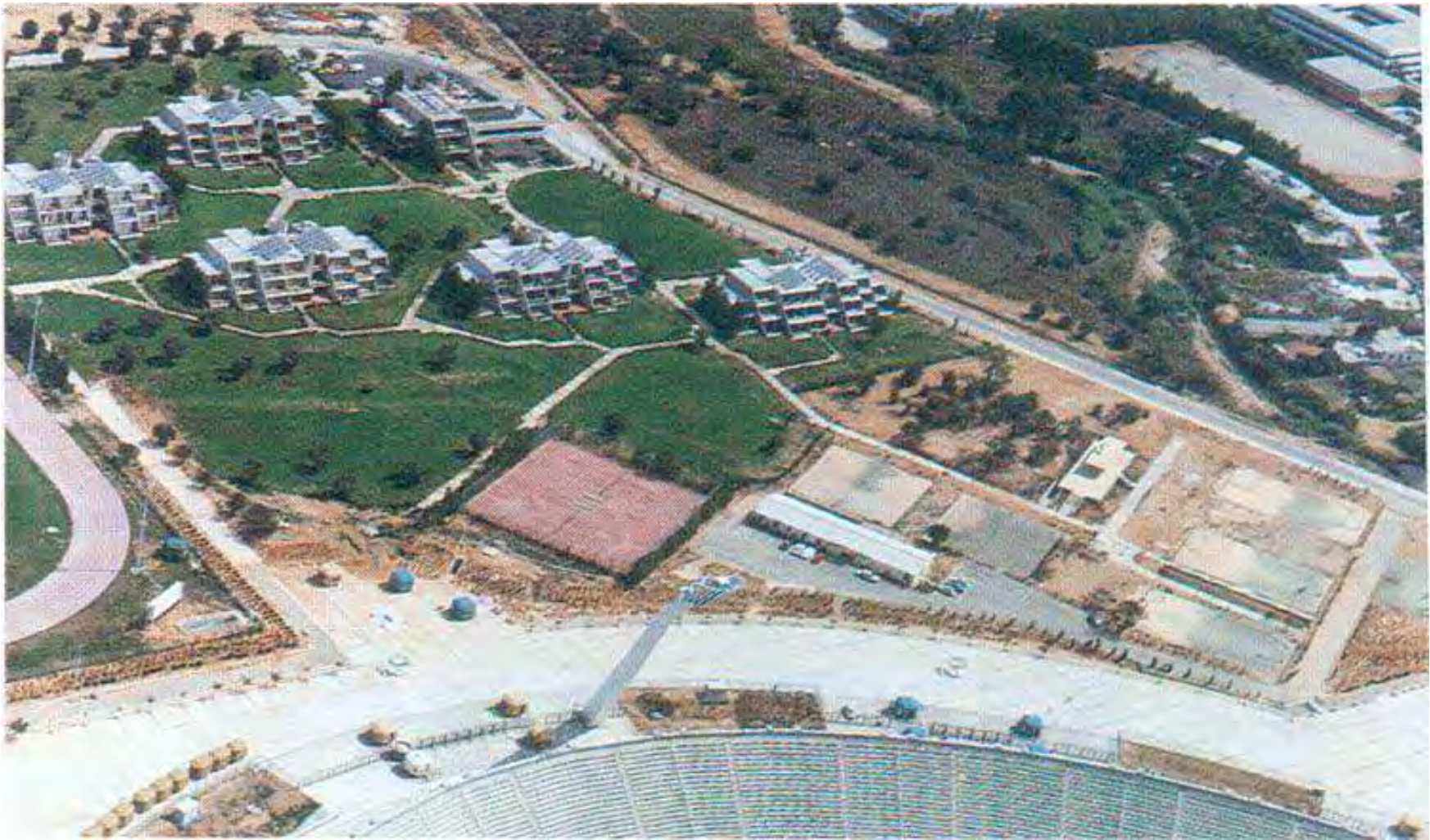
13.750LTR, FLAT PLATE COLLECTORS (275m<sup>2</sup>)





# OLYMPIC ATHENS STADIUM, 1981

25.000LTR, FLAT PLATE COLLECTORS (500m<sup>2</sup>)





# PEACE & FRIENDSHIP STADIUM, 1992

15.000LTR, FLAT PLATE COLLECTORS (300m<sup>2</sup>)



# ACHAIA CLAUSS, 1994

## 15.000LTR, FLAT PLATE COLLECTORS (300m<sup>2</sup>)





# SARANTIS S.A., 1999

SOLAR AIR CONDITIONING, FLAT PLATE COLLECTORS (2664m<sup>2</sup>),  
The solar field is the largest in Greece & the WORLD'S largest air conditioning project.





2700m<sup>2</sup>

# • CLIMASOL SELECTIVE COLLECTORS





# MEDITERANEE HOTEL HAMAMET, 1999

31.300LTR, FLAT PLATE COLLECTORS (626m<sup>2</sup>)



# RHOUL PALACE HOTEL, 1999

1.500LTR, FLAT PLATE COLLECTORS (30m<sup>2</sup>)





# RETHYMNO VILLAGE HOTEL, 2000 SOLAR AIR CONDITIONING & POOL HEATING 8.000LTR, FLAT PLATE COLLECTORS (440m<sup>2</sup>)



# EUROPA HOTEL, 2001

6.600LTR, FLAT PLATE COLLECTORS (132m<sup>2</sup>)





# SIMIEN PARK LODGES HOTEL, 2005

## ETHIOPIA, FLOOR HEATING

### FLAT PLATE COLLECTORS (43.20m<sup>2</sup>)



# TESCO SUPER MARKET, 2009 BUDAPEST, SOLAR AIR CONDITIONING 250Kw, FLAT PLATE COLLECTORS (1.036m<sup>2</sup>)



19/11/2008



# BURJ KHALIFA TOWER, DUBAI, 2009

## TALLEST BUILDING OF THE WORLD

80.000LTR, FLAT PLATE COLLECTORS ( $1.020\text{m}^2$ )



# HAMDAN SPORTS COMPLEX, 2010 DUBAI 16.600LTR, FLAT PLATE COLLECTORS (1.026m<sup>2</sup>)





# KOLYMBARI BEACH HOTEL, 2010 CHANIA-CRETE SANITARY HOT WATER 15.000ltr FLAT PLATE COLLECTORS (243m<sup>2</sup>)



# CALDERA BEACH HOTEL, 2012 CRETE, SANITARY HOT WATER 20.000ltr FLAT PLATE COLLECTORS (1.040m<sup>2</sup>)





# FISHING HARBOR VILLAGE, 2012

## DUBAI, SANITARY HOT WATER

18.000LTR, FLAT PLATE COLLECTORS (244m<sup>2</sup>)



FUTURE SCHOOLS, 2012  
ABU DHABI, SANITARY HOT WATER & POOL  
HEATING  
15.000LTR, FLAT PLATE COLLECTORS (270m<sup>2</sup>)



# SWIMMING POOL COMPLEX OF AMALIADA MUNICIPALITY, 2013

## SANITARY HOT WATER & POOL HEATING 7.000LTR, FLAT PLATE COLLECTORS (270m<sup>2</sup>)





# SULTAN GARDENS RESORT, EGYPT, 2014

## SANITARY HOT WATER

15.600LTR, FLAT PLATE COLLECTORS (104m<sup>2</sup>)





# THE BAY HOTEL, ZAKYNTHOS ISLAND, 2014

## SANITARY HOT WATER

21.000LTR, FLAT PLATE COLLECTORS (280m<sup>2</sup>)



# ***SOLE S.A.***

# ***WARRANTEE***

# WARRANTY

**SOLE S.A.** guarantees the products against bad workmanship or faulty material for a period of 5 years from date of installation. In the case where a problem in one of the products is determined, DISTRIBUTOR must be contacted directly by the end user. DISTRIBUTOR will in turn send its service technicians to repair or replace the part or subassembly or the whole product according to instructions by **SOLE**. **SOLE**'s responsibility is limited to the supply of spare parts or subassemblies or whole products free of charge. DISTRIBUTOR or its local authorized dealers will offer the labor cost and the possible transportation costs to the customer free of charge.

DISTRIBUTOR must keep a sufficient quantity of spare parts in advance. In case of a replacement of a part, DISTRIBUTOR will execute the replacement from its stock of parts and **SOLE** will send to the DISTRIBUTOR the replacement at no charge with the next shipment of parts. DISTRIBUTOR is obliged to keep the replaced parts available at its premises until they have been inspected by an executive of **SOLE**. Those faulty parts can be destroyed after inspection and certification of defects.

The above warranty is valid under the following conditions:

The end user has replaced the magnesium rod (anode bar) with the electric heating element and thermostat at the latest 30 months from the date of purchase and in turn every 30 months from thereon. This is the only maintenance this product requires. This maintenance will be paid by the end user to DISTRIBUTOR and DISTRIBUTOR will purchase these spare parts from **SOLE** or any other supplier previously approved in writing by **SOLE**.

The end user ensures that glycol (antifreeze liquid) is filled in the closed circuit (heat exchanger and collectors) at all times, to protect the system against frost.

The operating pressure of the system does not exceed 10 bar.

Exemptions:

The electric element and the thermostat of the system are covered by warranty of 2 years.

The glass of the collectors is not covered by the warranty.

Damages caused from frost are not covered by the warranty.



## DIGITAL PLATFORMS

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THIS BROCHURE IS AVAILABLE IN DIGITAL FORMAT



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