21st CENTURY GROUP LLC

"Blue E Rhythmus" - High Efficiency Vacuum Tubes

Structure

Technical Specification

Item	Class A			Class B	
		One-target	Three-target	One-target	Three-target
Absorption of Selective Coating (AM1.5)	α ≥94.5%	α ≥95.5%		α ≥92.0%	α ≥93.0%
Emission of Selective Coating (80℃±5℃)	ε ≤6.5%	ε ≤5.5%		ε ≤7.5%	ε ≤6.5%
Stagnation Temperature	≥220m^2℃/KW	≥260m^2℃/KW		≥200m^2℃/KW	≥240m^2℃/KW
Solar Irradiation for Water Temperature Rise	≤2.9MJ/ m^2	≤2.8MJ/ m^2		≤3.0MJ/ m^2	≤2.9MJ/ m^2
Coefficient of Average Heat Loss	≤0.65W/(m^2.℃)	≤0.60W/(m^2.℃)		≤0.75W/(m^2.℃)	≤0.70W/(m^2.℃)
Structure of Selective Coating	Al-N/Al	Cr-Al-N/Cu		Al-N/Al	Cr-Al-N/Cu
Vacuum	P≤3.0×10^{-3}Pa				
Maximum Strength	0.6 Mpa				
Ratio of Solar Transmission	τ ≥0.89 (AM 1.5 ISO9806-1: 1994)				

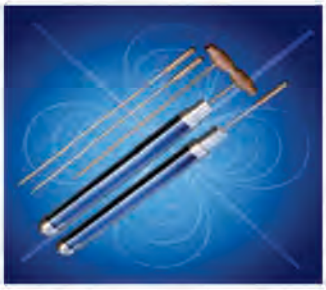
Item	Specification			
Diameter of Outer/Inner Tube	Φ47/37	Φ58/47		Φ70/58
Length of Tube	1200, 1500	1500, 1600, 1800		1500,
		1600, 1800	1920, 2000, 2100	1800
		1920	2200	
Thickness of Tube	1.60±0.15			

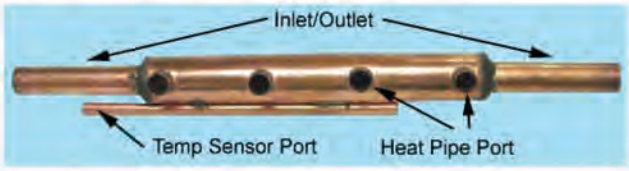
1. inside tubes
2. selective coating
3. vacuum jacket
4. outside tubes
5. supporter
6. getter
7. mirror

- Easy structure and easy replacement
- High -efficiency heat emanation. Its condenser increases the heat exchange area with water
- High-speed conducting, less heat loss
- Low starting temperature (– 60℃), high-speed conducting (6m/s),small thermal space, less heat resistance
- Degree of vacuum inside tubes up to 1.0*10 – 3Pa ensures heat preservation, One way heat conducting components ensure no heat conducting backwards in cloud day or at night, no heat loss
- Daily heat efficiency up to 60% averagely
- No pipe crack, no incrustation
- Patented conducting substance is compatible with normal metal material that results in non-condensable gas and non-stop running within 15 years and long duration for the collector

COMPONENT A – Inorganic Superconductivity Heat Tubes

Structure





Linuo inorganic superconductivity heat tubes are composed of diameter altered tubes and high efficient collecting tubes. The diameter altered tubes are made of absorption copper pipes of different diameters. They are used together with top quality "Blue E Rhythmus" evacuated tubes so as to the increasing of the absorption efficiency and advantage such as no pipe cracks, long duration.

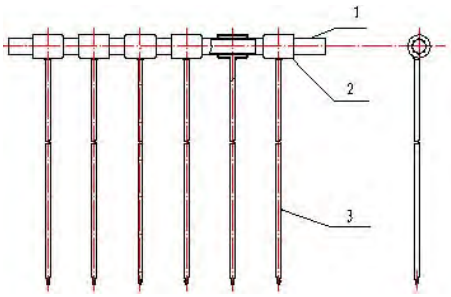
Technical Specification

Items			LNA1-Φ47/B_x Series	LNA1-Φ58/B_x Series
Vacuum tubes B_x			1200/1500/1600/1800	1500/1800
Specification of Aluminum wing			LNLY425×90	LNLY425×118
Cooper pipe	length		1200/1500/1600/1800	1500/1800
			Diameter of absorbance pipe	Φ8/Φ10/Φ12
			Thickness of absorbance pipe	0.5 mm
			Diameter of condenser	Φ14× (50-60)/Φ20× (50-60)/Φ24× (50-60)
			Thickness of condenser	1.0 mm

- Its axial heat flow density has got to 27.2Mw/m•k. Equivalent thermal co efficiency is high and can reach 32000 times of the pure silver
- Application temperature is wide. It can be used under the temperature between –60℃～1100℃. Starting temperature is low '-(60 ℃ can start), heat conducting is fast (conduct heat pace: 6m/s), Because of small volume the heat conduct very fast to the water tank
- Working medium does not decay within 110,000 hours to conduct heat inorganically, working medium and commonly used project material compatibility are good to conduct heat inorganically, no chemical reaction will take place , can guarantee the performance that the inside for a long time conducts heat

Advantages:

- Collector operates normally with low running pressure even high temperature to pipe wall or without water in tank
- No incrustation in pipe inner wall improves the quality of water and low efficiency results from incrustation



4) Stable & durable
- Water tank and heat transferring box are sealed mechanically without leak

5) Easy, safe and reliable
- Modular design, easy for installation and operation, safe and reliable, elegant appearance
- Patented conducting substance is compatible with normal metal material that results in non-condensable gas and non-stop running within 15 years and long duration for the collector

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COMPONENT B – Pipe Array (LNG) Collector

Structure



- There two types for collectors: Pipe array (LNG) and diameter altered (LNB). Pipe array (LNG) collector becomes unique for its special conducting components, which adopt female heat pipe design. It is preferred for domestic hot water systems and solar hot water projects gradually
- Female heat pipe design enables the heat transfer to be optimized with big heat transfer area and high efficiency

Technical Specification

specification			LNA1-Φ47/X_1-X_2 Series		LNA1-Φ58/ X_1-X_2 Series	
Vacuum tubes	Length X_1		1200/1500/1600/1800		1500/1800	
			Amount of tubes X_2	10-30		10-24
Aluminum	Specification		LNLY425×90		LNLY425×118	
			Amount	10-30		10-24
Cooper Pipe array	Length		1200/1500/1600/1800		1500/1800	
			Tube gap	66		75

Advantages:

1) High-speed conducting, less heat loss
   - Low starting temperature (-60℃), high-speed conducting (6m/s),small thermal space, less heat resistance
   - Degree of vacuum inside tubes up to 1.0*10 – 3Pa ensures heat preservation
   - One way heat conducting components ensure no heat conducting backwards in cloud day or at night, no heat loss

2) High efficiency and pressurization
   - Daily heat efficiency up to 60% averagely
   - The whole collector can bear pressure up to 0.8 MPA which can be connected with urban running water system directly and runs automatically

3) No pipe crack, no incrustation
   - Conducting components can be used in cold area without water freezing for the isolation of pipes and water

3) High stabilization and long duration

- The seal of this system is reliable, the water tank and the heat transfer box have used the mechanical seal, so it cannot divulge
- Even if few glass tubes damages, the single or the project system cannot fall into the paralysis condition because of the massive water leakages. The collector can still run
- The patent medium inside the cooper pipes has good compatibility with the commonly used metal material, so it does not produce the non-condensable gas; It can sustainable work for 15 years, duration is long

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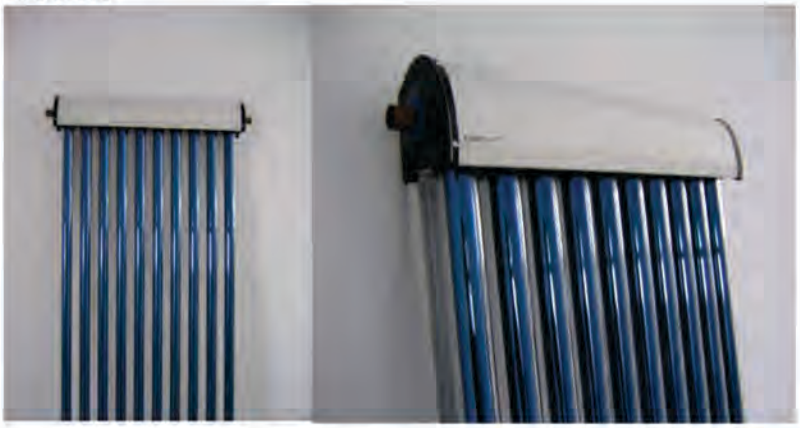
SOLAR COLLECTOR

Structure



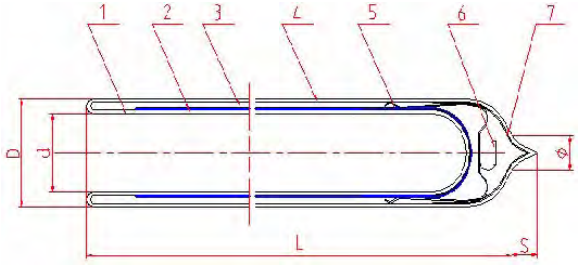
Technical Specification

Type of collector	Specification of tubes	Amount of tubes	Gap of tubes (mm)	Aperture area
KLB-RG-WF-1.0/10-47/1500	47*1500	10	66	1.0
KLB-RG-WF-1.6/16-47/1500	47*1500	16	66	1.6
KLB-RG-WF-1.8/18-47/1500	47*1500	18	66	1.8
KLB-RG-WF-2.0/20-47/1500	47*1500	20	66	2.0
KLB-RG-WF-1.8/12-58/1800	58*1800	12	75	1.8
KLB-RG-WF-2.4/16-58/1800	58*1800	16	75	2.4
KLB-RG-WF-2.7/18-58/1800	58*1800	18	75	2.7

Advantages:

1) High efficiency and low heat loss
   - Compared to common collector, the efficiency can get to more than 40%. Daily efficiency gets to 60%
   - Vacuum inside the collector can reach 1.0*10- 3Pa. It is a reasonable temperature to keep warm. Its one-way conducting technology has been praised the patent of the world. At the time of cloudy days and at night there is no heat loss caused by back flowing through vacuum tube

2) No bomb and split, no dirt
   - The working environment is between -60℃and 380 ℃. No crash no burst. The patent technology works very well
   - The tubes are separated from the water, and the heat conducting components has good performance to bear low temperature. Operation pressure is low, so there is no problem when there is no water in water tank
   - Separated from the water, there is no dirt inside the collector. So we do not need to clean it after using
   - Starting temperature is low (-60 ℃ can start), heat conducting is fast (conduct heat pace: 6m/s), Because of small volume the heat conduct very fast to the water tank
   - The whole collector can bear press to 0.8 MPA, can connect with urban running water system directly and run automatically



Advantages:

- Less heat loss and excellent heat preservation with pure copper mirror reflecting layer (hemisphere transmit rate ε ≤0.05)
- High temperature-proof absorbing layer can avoid film color change and performance attenuation (Sunlight absorbing rate α ≥0.94)