



Anderson Thermal Solutions (Suzhou) Co., LTD

# Oper-SRB V1.0 Burner Operation Manual

<b>No:</b>	Oper-SRB V1.0
<b>Subject:</b>	Self-Recuperative Burner Operation Manual
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This manual has been written for those who are already familiar with all aspects of nozzle mix burner and its add-on components. Main contents of the manual including safety rules, burner installation, commissioning, operation parameters, maintenance and troubleshooting, spare parts, etc.

### 1. Disclaimer Notice

Anderson Thermal Solutions (Suzhou) Co., Ltd. reserves the right to change the construction and/or configuration of our product at any time without informing customers. If the product or its individual modules are used for purposes other than the designated purpose, their effectiveness and suitability must be confirmed.

Anderson warrants that the product itself will not infringe any patents. Every effort has been made to make this manual as accurate and complete as possible. If you find errors or omissions, please contact us so we can correct them.

### 2. Liability And Warranty

Due to negligence, breach of warranty or other reasons, Anderson's liability for its products is limited to the provision of such replacement parts and will not be liable for any other injury, loss or expense, whether direct or indirect, including but not limited to Loss of or damage to the use of materials that sell, install, use, fail to use or repair or replace Anderson related products.

The warranty is void if: any operation explicitly prohibited in this manual, any adjustment or assembly process not recommended or authorized.

### 3. Safety Guide

Only those who were trained and qualified person can follow the manual to operate or adjust the combustion system. The fire was prohibited within a radius of 5 meters of the combustion system. Flame, non-covered light sources or heat sources shall not be brought to the combustion area unless it is related to the process. Welding in combustion control area shall be approved to ensure the safety in the area and also preventive measures should be taken into consideration.



Before starting, the operator must confirm whether the burner and gas pipeline are in normal working condition, and there is no flammable substance around the burner. The burner must be operated with fuel and oxygen or air. The ignition and operation of the burner must be performed at the specified position. The burner has been correctly and safely installed before ignition. The ignition of the burner needs to be performed after the combustion chamber is purged. If it is ignited at a low temperature, it needs to be replaced with 5 times the volume of the combustion chamber to avoid explosion.

However, it is not necessary to purge when the temperature is higher than 750°C. Air pipe or gas pipe connected with burner should be tight enough with no leakage, also the periodically check air or fuel nozzles of the burners to prevent to be blocked by dust, slag or other materials.

## ATTENTION: DANGER OF BEEN BURNT



When burner in operation, combustion is severe, so the burner must be fixed. Hoses or cables in area of the combustion system must be suitable for high temperature, to prevent high temperature failure or cause safety accidents. Burners should be periodically inspected and cleaned. Copper wire brush may be used, if necessary, to clean burner head. The burner system should be checked twice a year for safety operation.

Burner commissioning shall take care of ignition position, minimum and maximum output position. Following interlocks will cause emergency stop, including gas low pressure, high pressure or low combustion air pressure, as well as emergency stop is triggered, the main power is out, UV signal failure or kiln safety conditions (such as high temperature limit, flue system opening, etc.) will cause the burner lockout. Users need to know the maintenance interval recommended by the manufacturer and the interval specified by national laws, whichever is shorter.

### 4. Description

SRB series burner is suitable for air and natural gas combustion heating in radiant tube. The burner is composed of rear cover and burner body. The rear cover is equipped with accessories such as a gas orifice, a pressure measuring taps, a peep sight.

Spark plug is fixed on rear cover and flame rod or UV scanner to be used for flame monitoring.

The burner body has combustion air inlet and exhaust gas connection. The material for burner body is die-casting aluminum alloy and adopts a double-layer structure to reduce the temperature. Burner nozzle and recuperator are installed on the burner body, and the burner is connected to the furnace wall or the radiant tube through the installation flange on the burner body. The air inlet is equipped with an air hole plate, and the flue gas channel is equipped with a thermal insulation fiber.

Recuperator is used to recover the waste heat of the flue gas and preheat the combustion air. According to different working conditions, there are two materials available: metal and silicon carbide. A large number of fins are arranged on the inner and outer surfaces of the recuperator, and protrusions are arranged on the inner and outer surfaces of the ceramic recuperator to enhance the heat exchange efficiency. Burner structure refer to Fig 1.

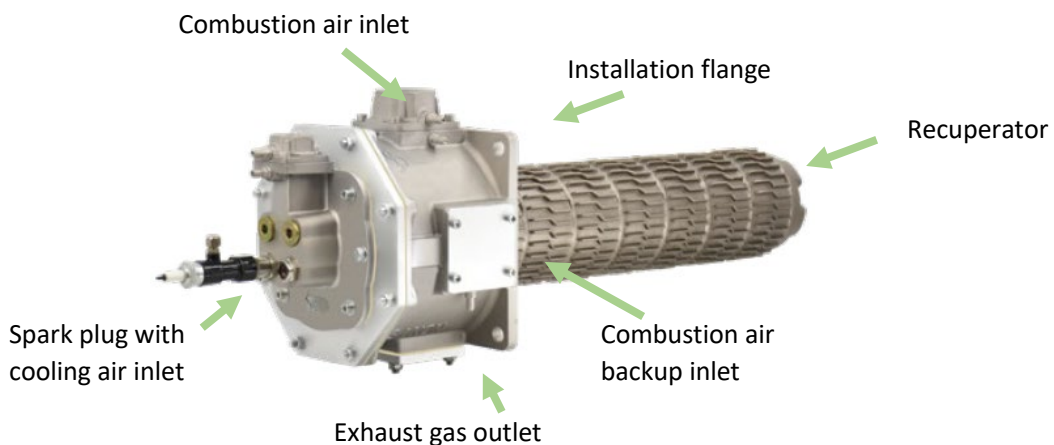


Fig 1. Burner parts (Metal recuperator as reference)

## Flame inner tube

The flame inner tube is made of silicon carbide, which can withstand higher temperatures; the standard segment spherical coupling method is used for splicing, which has a certain degree of flexibility and allows slight bending and deformation of the radiant tube. Refer to Fig 2.



Figure 2: Self-recuperative burner inner tube

<b>Attention!</b>
<ul style="list-style-type: none"> <li>– When the power outage is more than 10 minutes, remove the burner from furnace, to prevent the burner from being damaged.</li> <li>– The exhaust tube is extremely hot, please do not touch by hand.</li> <li>– Do not remove the metal gas hose or locking device when the gas is not completely shut down</li> </ul>

### 4.1 Burner data sheet

There are 5 models for SRB, Table 1 shows burner models and capacity, with gas and air inlet pressure requirement

Table 1 Burner model and capacity

Burner Model Number	Burner Input Gas	Diameter D (mm)	Gas Flow (NCMH)		Gas Pressure Required @Burner (mbar)	Combustion Air Pressure @Burner (mbar)
	kW		Minimum	Maximum	Maximum	Maximum
SRB025	25	86	0.8	2.5	100	60
SRB036	36	122	1.2	3.6	100	60
SRB060	60	140	2.0	6.0	100	60
SRB100	100	177	3.3	10.0	100	60
SRB180	180	229	6.0	18.0	100	60
SRB250	250	260	8.3	25.0	100	60

Burner dimension for each size is listed in table 2. Using SiC recuperator.

Table 2 Burner dimension

Burner Model	A	G	E(mm)	F(mm)	F'(mm)	L <sub>a</sub> (mm)	L <sub>g</sub> (mm)	T(mm)
SRB025	Rp1	Rp ½	Rp 1 ¼	178	210	60	121	10
SRB036	Rp1	Rp ½	60	240	290	60	213	14
SRB060	Rp 1½	Rp ½	60	240	290	60	213	14
SRB100	Rp 2	Rp ½	76	276	330	83	264	14
SRB180	Rp 2	Rp ¾	114	368	445	95	299	14

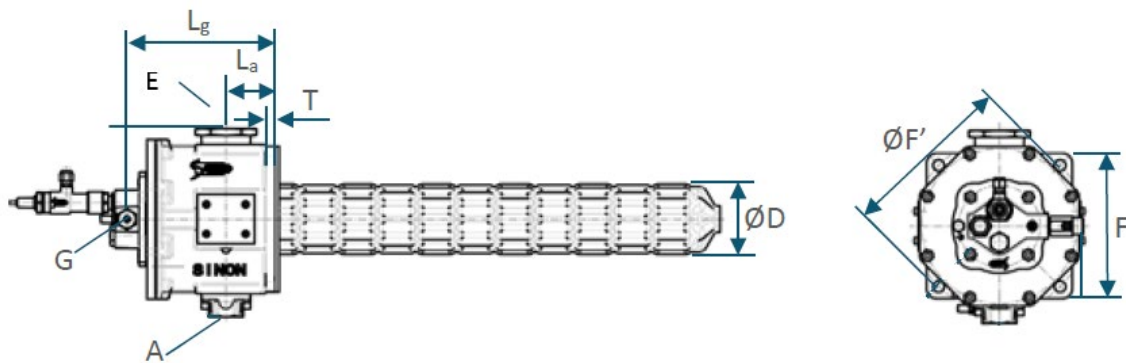


Figure 3: Burner dimension

## 4.2 Installation of the burner

### 1. Preparation before burner installation

Before install burner into radiant tube, make sure all burner parts are in good condition, no cracks on SiC recuperator and inner tube.

Check burner mounting bracket is solid and strong to support burner and radiant tube

Before the pipe is connected to the burner, it must be purged in advance to prevent welding slag or other debris from entering the burner and affecting the normal operation of the burner. If you need to perform pipeline welding after installation, make sure that no welding slag or molten material falls into the pipeline or burner during the welding process.

### 2. Burner installation

Burner orientation can be adjustable.

Once the exhaust gas outlet direction is decided, then the combustion air inlet can be installed at any horizontal or vertical position, refer to Fig 4.

The gas inlet can also be adjusted by 45 degrees, refer to Fig 5.

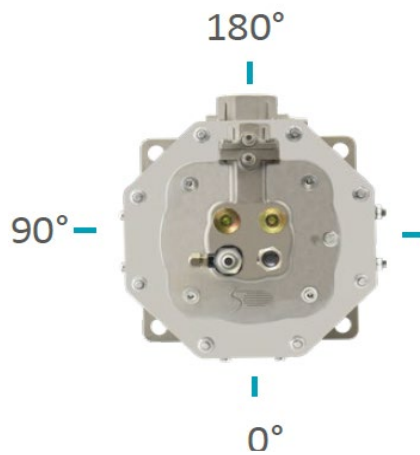


Figure 4: Burner air inlet orientation

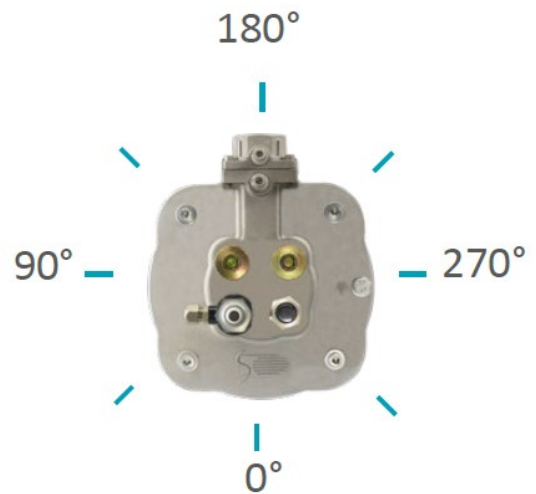


Figure 5: Gas inlet orientation

In order to ensure the accuracy of the orifice plate measurement, the burner air and gas inlet positions must ensure that there is a straight pipe section of 5 times the pipe diameter and no other resistance components;

The burner is equipped with a spark plug with cooling air, and the cooling air interface is a  $\varnothing 8$  connection. It is recommended to use a metal tubing to take the combustion air from the upstream of the air shut-off valve.

### 3. Burner operation requirement

The excess air coefficient of this series of burners must be ensured to be above 1.05, and cannot be running at gas rich mode;

According to the actual situation on site, regularly maintain the burner, check and clean the burner, recuperator and spark plug;

Regularly check the burning status of the burner, and track the flue gas data of the burner to avoid damage to the burner due to abnormal combustion

The burner can run at pulse control, with turn down ratio 2:1; while running at modulation control, the turn down ratio is 3:1.

The working temperature varies by recuperator material, please refer Table 3.

Table 3 Working temperature

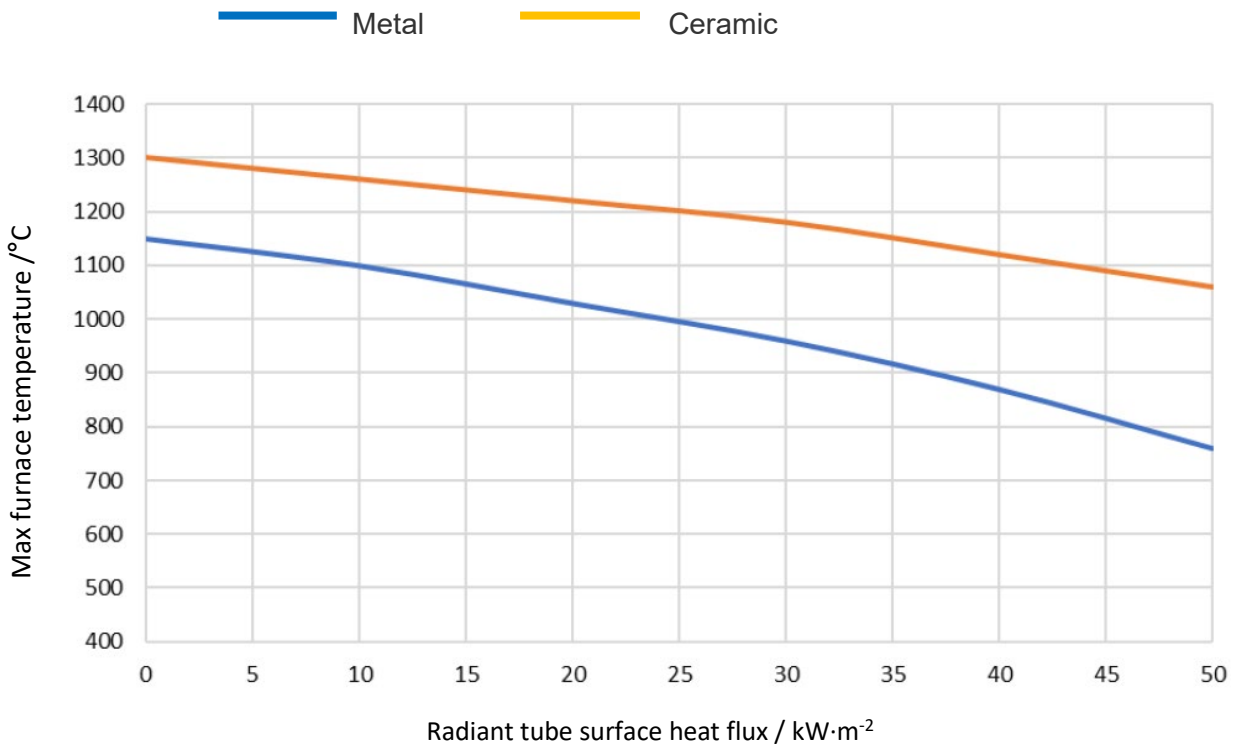
Recuperator Material	Max. Working temperature(°C)
Metal	1150
SiC	1300

When the burner runs in direct firing application, the max working temperature will be the process temperature.

When the burner runs at indirect firing application, the max working temperature will be the preheated combustion air temperature.

To ensure the burner working performance, the heat flux from radiant tube surface must be considered. Below chart shall be checked for heat flux calculation.

Chart 1 Radiant heat flux vs. furnace temperature



## 5. Burner maintenance

The burner should be inspected regularly. This is especially important after a prolonged period of shut-down.

### 5.1 Inspection of the nozzles

During the first month of operation of the burner, inspection of the nozzle must be carried out every week. During the second month, the period between inspections can be extended to two weeks. Anderson recommends that each nozzle is inspected at least once every month. Every time to check the burner, it should be pull out from furnace.



## 5.2 Inspection of the recuperator

Check if there are any cracks on recuperator during shut down. Need to replace by new recuperator as needed.

## 5.3 Inspection of the spark plug

Check soot or carbon built up on spark, clean as needed.

## 6. Spare parts

With proper use and regular servicing of the burner, we recommend the following parts:

- Quick Coupler gasket
- Outer nozzle gasket
- Spare burner nozzle
- Spare recuperator
- Spare inner tube
- Spare spark plugs



## 7.2 Half Year Audit Record

Routine audit must be made every 6 months. Please sign the following table.

Function Audit	Date	Inspector	Problem description	Next Audit Time
Flame sensor state				
Air and gas pressure				
Alarm signals				
Igniter electrode				
Control motors				
Ventilate equipment				
Interlock Function				
Shut off cock function				
Combustion air blower				

## 7.3 Yearly Audit Record

Yearly audit list as follow but not only included

Function Audit	Date	Inspector	Problem description	Next Audit Time
Leak test				
Pressure switch test				
Cable and connectors				
Burner bodies and air wings				

**Attention:** Safety audit is prohibited when burner is running, otherwise, accident could be caused!



If you have any questions. Please call us or send an e-mail to get more information

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Meanwhile, you can also visit our website [www.andtecs.com](http://www.andtecs.com) to get more product information.