

Indirect Fired Recirculating Air Heater

*RHT Series
Version 1.00*



DISCLAIMER NOTICE

In accordance with the manufacturer's policy of continual product improvement, the product presented in this brochure is subject to change without notice or obligation.

The material in this manual is believed adequate for the intended use of the product. If the product is used for purposes other than those specified herein, confirmation of validity and suitability must be obtained.

We have made every effort to make this manual as accurate and complete as possible. Should you find errors or omissions, please bring them to our attention so that we may correct them. In this way, we hope to improve our product documentation for the benefit of our customers. Please send your corrections and comments to our Marketing Communications Manager.

LIABILITY AND WARRANTY

It must be understood that Exothermics's liability for its products, whether due to breach of warranty, negligence, strict liability, or otherwise, is limited to furnishing of replacement parts and Exothermics will not be liable for any other injury, loss, damage or expenses, whether direct or consequential, including but not limited to loss of use, income of, or damage to material arising in connection with the sale, installation, use of, inability to use or the repair or replacement of Exothermics products.

Any operation expressly prohibited in this Guide, any adjustment or assembly procedures not recommended or authorized in these instructions shall void the warranty.



About this manual

AUDIENCE

This manual has been written for people who are already familiar with all aspects of an indirect fired air heater and its add-on components.

These aspects are:

- design/selection
- installation
- use
- maintenance

The audience is expected to have had previous experience with this kind of equipment.

PURPOSE

The purpose of this manual is to ensure the installation of a safe, effective, and trouble-free system.

RHT DOCUMENTS

Installations Guide No. RHT-905

- This document

RELATED DOCUMENTS

- Process air temperature switch
- Excess thermocouple.
- Burner and ancillary components

DOCUMENT CONVENTIONS

- Read this manual carefully. Make sure that you understand the structure and contents of this manual.
- Follow all the safety instructions.
- Do not deviate from any instructions or application limits in this manual without written consent from Exothermics.
- If you do not understand any part of the information in this manual, do not continue. Contact Exothermics or your local representative.

There are several special symbols in this document. You must know their meaning and importance.

The explanation of these symbols follows. Please read it thoroughly.



Danger:

Indicates hazards or unsafe practices which WILL result in severe personal injury or even death.

Only qualified and well trained personnel are allowed to carry out these instructions or procedures.

Act with great care and follow the instructions.



Warning:

Indicates hazards or unsafe practices which could result in severe personal injury or damage.

Act with great care and follow the instructions.



Caution:

Indicates hazards or unsafe practices which could result in damage to the machine or minor personal injury.

Act carefully.



Note:

Indicates an important part of the text.

Read the text thoroughly.

HOW TO GET HELP

If you need help, contact Exothermics or your local Exothermics representative.

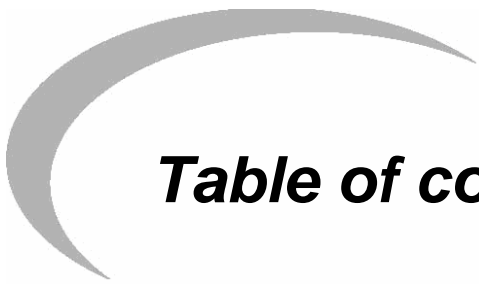


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Introduction

1

PRODUCT DESCRIPTION

The Exothermics Recirculating High Temperature (RHT) indirect fired air heater is designed to heat Recirculating ovens and dryers where the products of combustion must be isolated from the process air stream. The RHT heater is typically supplied as a standard sideplate mounted assembly for insertion into existing process ductwork. Alternatively the RHT heater can be supplied with a duct section. A complete standard heater assembly consists of:

- Stainless steel combustion chamber
- Stainless steel two pass tube bank
- Stainless steel insulated mounting plate
- Differential process air pressure switch
- Excess temperature limit thermocouple
- Packaged burner (refer to specific documentation for data, installation and operating detail)

The burner combustion products make four passes before exiting the heater at the exhaust flue connection.

GENERAL

The RHT Heater has been designed and manufactured with high quality materials and care in workmanship. The instructions in this guide have been prepared to ensure that, when followed, the heater will provide safe and efficient service.

Figure 1.1 RHT Indirect Fired Air Heater



Safety

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INTRODUCTION

SAFETY

In this chapter you will find important notices about safe operation of an indirect fired air heater.



Danger:

The indirect fired air heater covered by this manual will be fitted with a burner package designed to mix fuel with air and burn the resulting mixture. All fuel burning devices are capable of producing fires and explosions when improperly applied, installed, adjusted, controlled or maintained (refer to specific burner data).

Do not bypass any safety feature. You can cause fires and explosions.

Never try to light the burner if the burner or air heater shows signs of damage or malfunctioning.



Warning:

The indirect fired air heater is likely to have HOT surfaces. Always wear protective clothing when approaching the heater.



Note:

This manual gives information for the use of these indirect fired air heaters for their specific design purpose. Do not deviate from any instructions or application limits in this manual without written advice from Exothermics.

Read this entire manual before you attempt to start the system. If you do not understand any part of the information in this manual, contact Exothermics or your local representative.

Exothermics recommends that this heater's initial setup should be performed by an Eclipse Service Engineer.

CAPABILITIES

Adjustment, maintenance and troubleshooting of the mechanical and electrical parts of this system should be done by qualified personnel with good mechanical aptitude and experience with combustion equipment.

OPERATOR TRAINING

The best safety precaution is an alert and competent operator. Thoroughly instruct new operators so they demonstrate an adequate understanding of the equipment and its operation. Regular retraining must be scheduled to maintain a high degree of proficiency.

REPLACEMENT PARTS

Order replacement parts from Exothermics only.

Installation

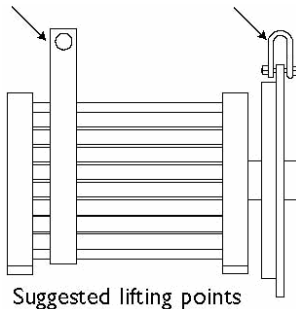
3

INTRODUCTION

HANDLING AND STORAGE

Sling passed around combustion chamber and tube banks

Shackles fitted through mounting plate holes at each corner



APPROVAL OF COMPONENTS

PRE INSTALLATION CHECKLIST

In this chapter you will find the information and instructions needed to install the indirect fired air heater.

Handling

1. Inspect the heater, being sure all components are clean and free of damage.
2. Use appropriate support and handling equipment when lifting the heater.
3. Protect the heater from weather, damage, dirt and moisture.
4. Protect the heater from excessive temperatures and humidity.

Storage

When storing the heater for an extended period Exothermics recommends placing it in a cool, clean, dry room.

Limit controls and safety equipment

All limit controls and safety equipment must comply with all applicable local codes and/or standards.

Electrical wiring

All electrical wiring must comply with all applicable local codes and/or standards.

Access

Make sure that the installation position of the RHT heater is such that it may be easily accessed for inspection and maintenance.

Environment

Make sure that the local environment matches the original operating specifications. Check the following:

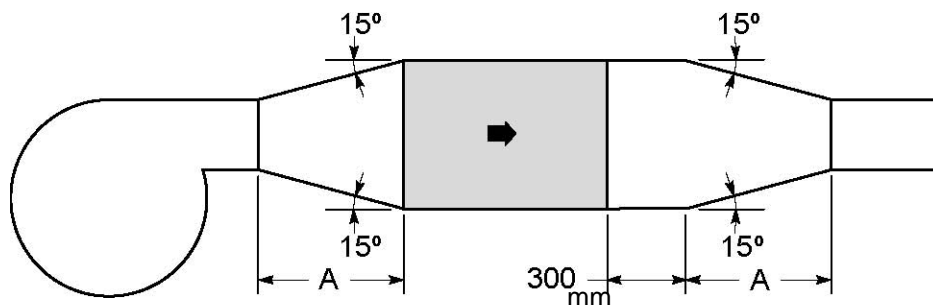
- Voltage, frequency and stability of the electrical power
- Type and supply pressure of the fuel
- Availability of enough fresh clean combustion air
- Humidity, altitude and temperature of air (process & combustion)
- Presence of damaging corrosive gases in the air (process & combustion)

Figure 3.1 Good Duct Design

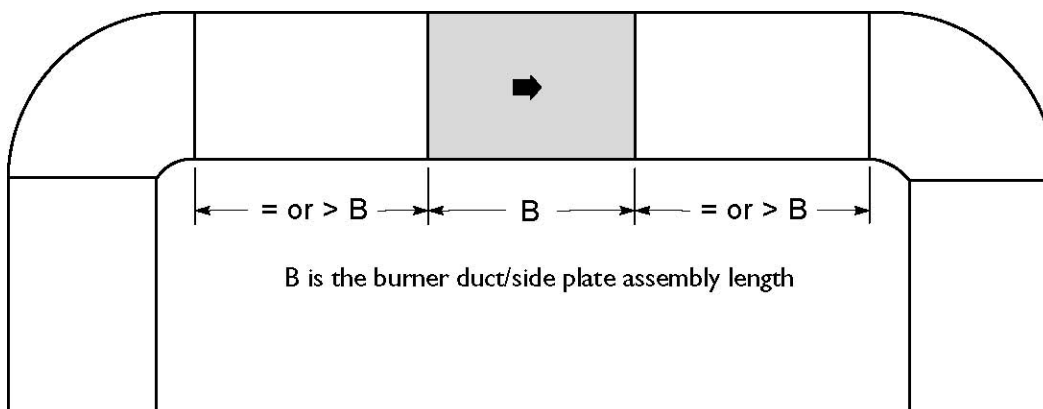


Note:

Process air over the RHT must be as uniform as possible. The diagrams below indicate good design practice. The shaded areas represent the RHT heater assembly.



A is the length sufficient to provide a 15° taper



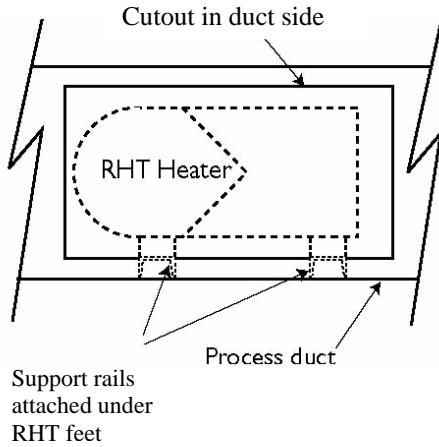
B is the burner duct/side plate assembly length



Caution:

Incorrect duct design can produce poor distribution both on and off the heater which in turn can create noise, vibration, temperature uniformity problems and possibly reduced heater life. The above diagrams are intended as a guide only. Inlet and outlet duct design is the responsibility of the customer. Exothermics can accept no responsibility for problems which may result from poorly designed ductwork.

**PROCESS DUCT SECTION
(SIDEPLATE MOUNTED
HEATER)**



Note:

The process duct section in which the heater is to be installed should be in accordance with good duct design practices to ensure an even process air distribution across the heater assembly (see Figure 3.1 page 10).



Caution:

Make sure the process duct section is of adequate size and strong enough to support the combined weights of both the heater assembly and burner.

1. Provide a side mounting flange in the process duct section to suit the fixing arrangement of the heater mounting plate (refer to contractual documentation).

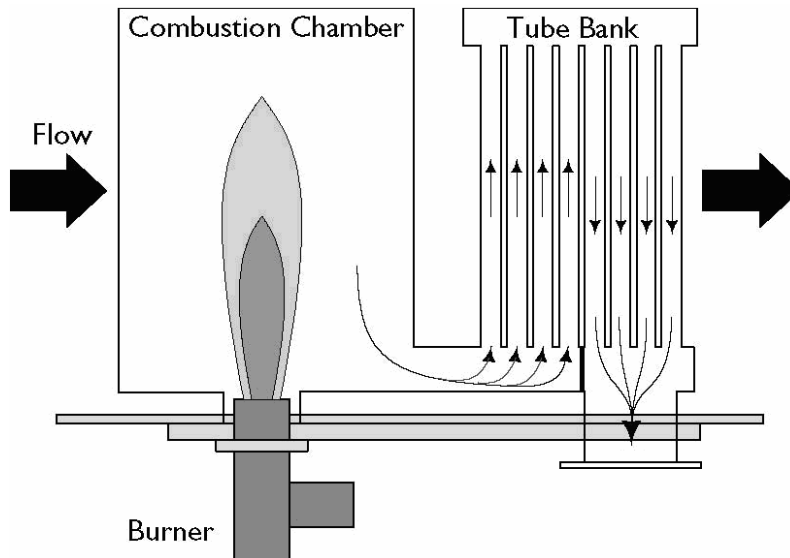


Caution:

Make sure the process duct mounting flange is on the appropriate side of the duct section such that when installed, the process air will flow pass first over the combustion chamber and then the tube bank (see Figure 3.2).

2. Provide suitable rails in the process duct section to carry the heater support feet. The rails should be designed to allow the feet to slide due to thermal expansion.

Figure 3.2 Direction of air flow



SIDEPLATE MOUNTED HEATER

1. Lift the heater into position carefully using suitable lifting equipment to avoid damage.
2. Insert the assembly into the process duct section making sure that the heater feet are located on the side rails, the mounting plate is safely located onto the prepared studs, and secure in position.



Note:

A fiberglass rope gasket should be installed between the duct flange and the heater mounting plate to form a seal.

PROFILING

Correct profiling of the combustion chamber and the tube bank is essential for optimal performance. Reference performance estimate for proper duct size.



Caution:

Check that the required profiling arrangement is in accordance with the contractual documentation.

Failure to provide suitable profiling over the entire length of the heater could reduce the life of the heater, and cause damage to equipment on site.

PROCESS DUCT SECTION (DUCT MOUNTED HEATER)



Note:

The process duct sections between which the heater duct is to be installed should be in accordance with good duct design practices to ensure an even process air distribution across the heater assembly (see Figure 3.1 page 10).



Caution:

Make sure the process duct sections between which the heater duct is to be installed, are prepared in accordance with the contractual documentation and strong enough to support the combined weights of both the duct mounted heater and burner. Reference RHT performance estimate to proper duct size, and/or profile dimensions.

DUCT MOUNTED HEATER



Caution:

The heater must be installed with the proper air flow passing first over the combustion chamber and then the tube bank (see Figure 3.2 page 11).

1. Lift the heater into position carefully using rigging holes in the face plate and a sling around the tube bundle.
2. Secure the heater assembly between the process duct sections previously prepared in accordance with the contractual documentation.



Note:

A fiberglass rope gasket should be installed between the process duct mounting flanges and the heater duct mounting flanges to form a seal.

EXHAUST FLUE

1. The RHT Heater is provided with a flange for connection to an exhaust flue.
2. The flue system must be independently supported.
3. Exothermics recommends a vertical rise from the heater exhaust outlet of approximately six feet with a flue break being provided at this point.
4. The flue system should be designed to provide a slight draught (0.25 inch W.C.) at the flue break during full fire operating conditions.

PROOF OF PROCESS AIR FLOW



Warning:

The differential pressure switch must not be overridden under any circumstances.

2. Exothermics recommends that additional protection is incorporated by wiring an auxiliary contact of the process air fan starter in the burner control loop.

EXCESS TEMPERATURE PROTECTION

1. The heater combustion chamber includes a thermocouple to monitor the combustion chamber temperature. This should be linked to an excess temperature cut-off switch as part of the installation.
2. Care should be taken to avoid damage to the thermocouple sheath during installation.
3. Ensure that the thermocouple is installed with the end of the sheath in the exhaust stream, and not touching any sheet metal.



Warning:

The excess temperature cut-off switch must not be overridden under any circumstances.

CHECKLIST AFTER INSTALLATION

1. Make sure the heater is installed with the process air passing over the combustion chamber first.
2. Make sure that there are no process air leaks in any external joints.
3. Make sure the flue system is connected and complete.
4. Make sure the burner is correctly installed (refer to appropriate burner documentation).
5. Make sure there is adequate and safe access for adjustment and maintenance purposes.

Commissioning

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INTRODUCTION

This chapter describes how to start up and adjust the RHT Heater.



Danger:

Do not bypass any safety feature. You can cause fires and explosions. Follow the safety precautions in Chapter 2, Safety.



Note:

To commission the burner refer to the appropriate burner documentation.

STEP 1: AIR FLOW & PRESSURE / TEMPERATURE SWITCH SETTING

1. Start the process air fan.
2. Verify the direction of air flow (see Figure 3.2 page 11).
3. Measure and record the differential process air pressure over the heater.
4. Adjust the differential air pressure switch to a set point approximately 10% below the measured differential pressure.
5. Check that the excess temperature switch is set to operate at 1550°F.

STEP 2: START THE BURNER

Start the burner (refer to the appropriate burner documentation)



Caution:

It is essential that the correct burner capacity for the specific RHT Heater is established prior to firing the burner.

The combustion quality should be checked using a recognized method of flue gas analysis. Flue gas samples should be measured before any flue break.

STEP 3: SET-UP THE RHT



Warning:

Always ensure that the heater is adequately purged (minimum of four volume changes, or quantity required by local code) before each attempt at lighting the burner.

1. Establish a low fire setting as described in the burner's "Installation Guide."
2. Verify burner settings as described in the "Installation Guide."
3. Drive burner to high fire and connect a manometer across the gas orifice.
4. With the burner at high fire, measure the pressure differential across the gas orifice.
5. Determine whether the installed burner is a ratio burner or a fixed air burner and follow the appropriate instructions for limiting high fire. (Continued...)

- For ratio burners such as RatioMatic or RatioAir: Gradually close the vortex damper on the combustion air inlet. The ratio-regulator will automatically cause a reduction in gas flow. Monitor the pressure across the gas orifice and continue closing the vortex damper until the differential pressure across the gas orifice matches the differential pressure specified in the burner literature corresponding to the gross gas flow indicated in the RHT performance estimate.
 - For fixed air burners such as ThermAir: Limit the maximum open position of the gas valve until the differential pressure across the gas orifice matches the differential pressure specified in the burner literature corresponding to the gross gas flow indicated in the RHT performance estimate. Connect a combustion analyzer to the flue gas and close the vortex damper on the combustion air inlet until the desired excess air is achieved.
6. Turn off the burner, return the temperature controller to automatic control, and restart the burner.
 7. Monitor the high temperature limit during the heat-up period. **DO NOT exceed 1550°F without contacting Exothermics.**
 8. Once the desired process air temperature is achieved both upstream and downstream, reset the high temperature limit to 30°F above the maximum temperature observed during the heat-up period. **DO NOT exceed 1550°F without contacting Exothermics.**

Note:



If you are not achieving the process stream temperature rise predicted in your performance estimate, please consult Exothermics to verify the maximum capacity of the burner when fired into the RHT unit. A new performance estimate can be generated to verify that under the new conditions, the unit will be within its recommended operating range.

**STEP 4:
CHECK OPERATION OF
PRESSURE / TEMPERATURE
SWITCH**

1. Check the process air differential pressure switch for correct operation by disconnecting the “+” impulse line which should cause the burner to shut down.
2. Reconnect the process air pressure switch impulse line and re-start the burner.
3. Check the high temperature limit instrument for correct operation by reducing the temperature set point until the switch trips and causes the burner to shut down.
4. Reset the high limit instrument to the original set point.



Maintenance

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INTRODUCTION

MAINTENANCE

This chapter is about preventative maintenance which is the key to a reliable, safe and efficient system.

The core of any preventative maintenance program is a list of periodic tasks.

Following are suggestions for a monthly list and a yearly list.



Note:

The monthly list and the yearly list are an average interval. If your environment is dirty, then the intervals may be shorter.

Monthly Checklist

Burner (refer to the appropriate burner documentation).

Yearly Checklist

1. Burner (refer to appropriate burner documentation).
2. Check the differential process air pressure switch setting and operation.
3. Check the excess temperature instrument setting and operation.
4. Check the area around the burner mounting flange for signs of overheating. Gasket or insulation replacement may be necessary.
5. Check that the profile dimensions are as originally shown on the performance estimate.