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## REGENERATION HEATER – INSTALLATION, OPERATION AND MAINTENANCE MANUAL

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| 00       |      | Issued      |          |         |          |
| Int. Rev | Date | Description | Prepared | Checked | Approved |

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| Customer<br>SIAD        | Document : RD.012<br><b>USE AND MAINTENANCE MANUAL</b> |  <b>Zoppas Industries</b><br><i>Heating Element Technologies</i> |
| Prepared :<br>Jay Shao  | Title :<br><br>ELECTRICAL HEATER                       |   |
| Checked :<br>Anson He   |  |   |
| Approved :<br>Jessie Yu | Revision: 0      Language: EN      Page: 1 of 11       |   |

## MANUAL OF HEATING SYSTEM AND ASSOCIATED DEVICES

| ZIH Part number | Voltage [ V ] |
|-----------------|---------------|
| 1REBEFP62001    | 400           |

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## 1. REVISION TABLE

| Revision | Date       | Revision Information |
|----------|------------|----------------------|
| 0        | 2020/05/29 | Created document     |

Table 1: Table of revision

## 2. GENERAL PURPOSE

The main purpose of this document is to describe thoroughly preventive and corrective maintenance operations as well as installation operations to be carried out in order to guarantee the correct working conditions both of heating system and its associated devices.

## 3. PRODUCT DESCRIPTION

Heating system is designed for heat Nitrogen. Nitrogen enters from N1 flange, and leave from N2 flange, which connected to the system loop.

Correct value of temperature of working fluid is regulated by PT100 suitably calibrated.

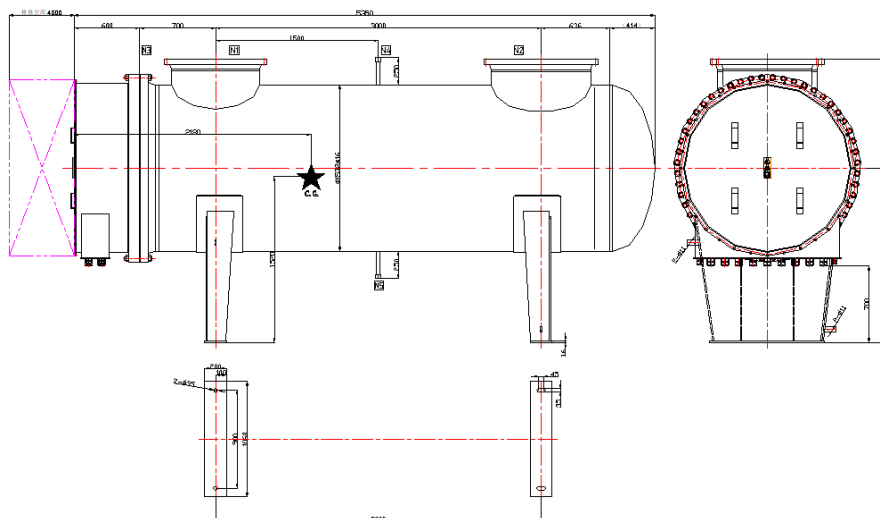



Figure 1: ELECTRICAL HEATER

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### 3.1. MAIN TECHNICAL DATA OF HEATING SYSTEM

In this chapter main technical data of heating system will be described:

- Main electrical and dimensional characteristics of heating system and its main components;
- Codification of product;
- Working and test pressure;

#### 3.1.1. MAIN DIMENSIONAL CHARACTERISTICS OF HEATING SYSTEM


Main dimensional characteristics of the electrical heater useful for its correct mounting on the system are listed below .

- Total length ~ 5350 [ mm ]
- Total width ~1725 [ mm ]
- Total height ~2600 [ mm ]
- Distance between counter flanges 3000 [ mm ]
- Diameter of holes of fixing points ~ Ø35 [ mm ]
- Weight ~ 9000 [ Kg ]

#### 3.1.2. MAIN ELECTRICAL CHARACTERISTICS OF HEATING SYSTEM

Main electrical characteristics of heating system to be taken into account for its correct working are listed below

- **Electrical power** **2160.000 [ W ]**
- N° of stages 6
- 1° stage 360.000 [ W ]
- 2° stage 360.000 [ W ]
- 3° stage 360.000 [ W ]

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- 4° stage 360.000 [ W ]
- 5° stage 360.000 [ W ]
- 6° stage 360.000 [ W ]
- Feeding tension 400 [ V ]
- Feeding current Alternative current 50/60 [Hz]
- Type of electrical connection 3 phases/Delta connection

### 3.1.3. WORKING AND TEST PRESSURE

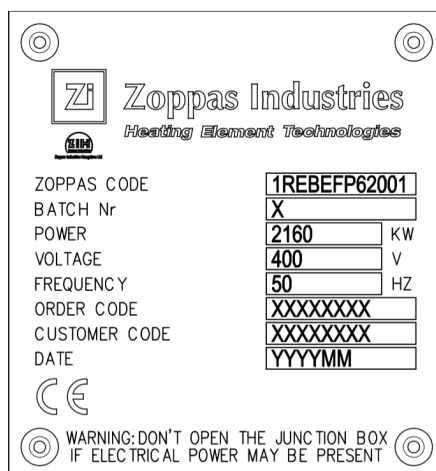
Heating system is undergone to the test hydraulic pressure equal to 10 bar.

Working hydraulic pressure of system shall not exceed Design pressure 8 bar.


### 3.1.4. CODIFICATION OF HEATING SYSTEM

Codification of product is pointed out on the appropriate label stuck to the front panel of switch board. Main information useful for identification and traceability of product printed on label are listed below:

- Product family ZIH identification number 1REBE
- Progressive ZIH identification number FP62
- Progressive ZIH number for positions 001



**Figure 2: Identification label**

|                         |  |   |
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## 3.2. MAIN COMPONENTS OF HEATING SYSTEM

Heating system is made of following main components:

- Electrical heat exchanger to be filled in with suitable medium, is equipped with main following components:
  - Flanged heater
  - Vessel
- Pressure vessels are characterized by horizontal installation.

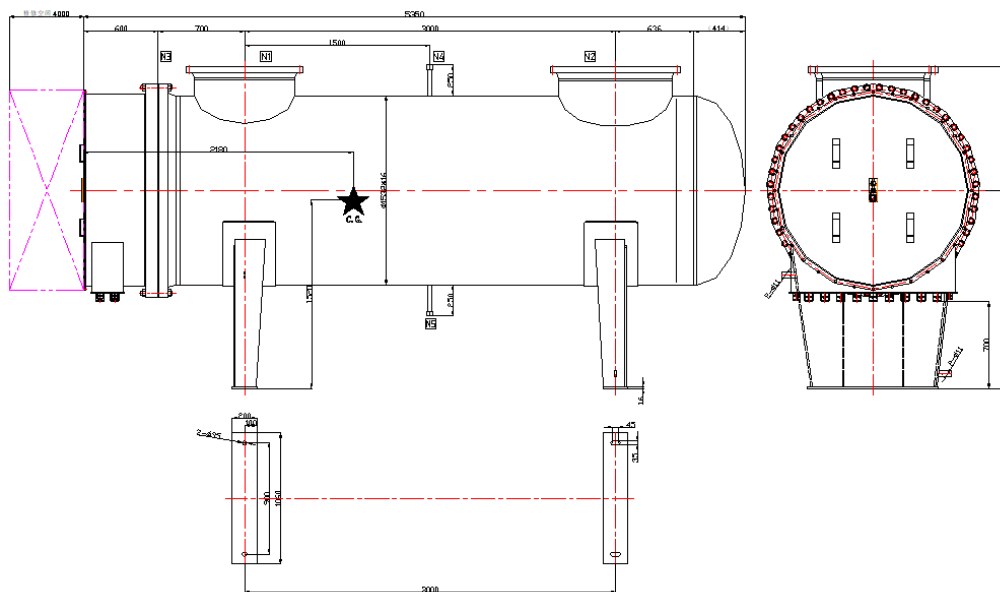



Figure 3 : ELECTRICAL heater

## 3.3. TRANSPORT, HANDLING AND STORAGE INSTRUCTIONS

Suitable package shall be used to deliver heating system in order to avoid any damages during handling and transport.

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The package shall be made up of wood box , moreover an appropriate leak clamp will be used to keep heating system stuck during handling and transport.

Wood box will be externally marked with appropriate red symbols such as ‘fragile’, ‘humidity’ danger and ‘do not flip over’. Moreover label showing all information pertaining traceability of product contained into the package ( item code, package code, production order, quantity of item, dispatching address, supplier address, etc ) shall be applied externally.



Handling operations shall be carried out carefully and by suitable devices because of weight of heating system pointed out in paragraph 3.1.1

### 3.4. SAFETY INSTRUCTIONS AND DEVICES


It is necessary to wear personal protection equipment to carry out any maintenance or handling operation. Moreover qualified personnel shall avoid any unsuitable behaviour being able to entail any risk for own health or damage heating system or its components compromising their working.



Indeed it is recommended to carry out carefully any handling or maintenance operation taking into account weight of heating system pointed out in paragraph 3.1.1.

### 3.5. CLEANING OPERATIONS

Cleaning of heating system has to be carried out with dry soft cloth paying attention not to damage components especially electrical connections inside switch board. Only stubborn stains can be removed with cloth moistened with generic degreasing solvent if necessary, paying attention not to scratch painted surfaces. Moreover jet of compressed air will be able to be used to remove dust or any other metallic debris from heater and especially from those components being wiped with difficulty by soft cloth.

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Safety labels stuck on the heating system shall not be damaged or barely readable after cleaning operations.



At the end of cleaning operations, operator shall check out visually state of main components before re-mounting heating system if previously disassembled.



Before carrying out cleaning operations the entire system must be completely de-energized and heating elements cooled down if not differently pointed out.


#### 4. INSTALLATION OF HEATING SYSTEM

Electric heaters should be installed horizontal installation. Junction box of the flange heater is facing left. Vessel bolted to the appropriate support.

Heating system will be linked to the rest of the system by interface counter-flanges after removing plastic cap. Moreover it is necessary to guarantee a minimum space equal to the entire length of flanged heater in order that maintenance operations were able to be carried out easily. Before starting up heating system and connecting it to electrical net according to wiring diagram the following phases shall be carried out:

- Check out correct grounding connections according to wiring diagram;
- Check out electrical connections of temperature control system
- Check out correct heating elements connections
- Check out correct mounting of all main components and their working in safety conditions;
- Check out power feeding cable is connected to main switch of control panel in order to shut system off when necessary.



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Installation operations shall be carried out with heating system completely de energized.



At the end of installation operations integrity of all components and presence of safety labels shall be verified.



Safety labels damaged during installation or maintenance operations shall be replaced.

## 5. USE OF HEATING SYSTEM

Heating system is designed for heating Nitrogen.

Working of heating elements and consequently temperature reached by element's surface during normal working condition is controlled by PT100.




Therefore when this kind of failure occurs heating system shall be shut off .

## 6. MAINTENANCE OPERATIONS OF HEATING SYSTEM

Any maintenance operation shall be carried out by qualified personnel, following out carefully instructions listed in this manual. Suitable devices and tools shall be used during installation and maintenance operations of each components. Installation and maintenance operations shall not entail any risk for human health of personnel or damage components compromising their working.



Therefore health and safety precautions shall be observed during all phases of overhaul or replacement of heating system or its main components by qualified personnel only.

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Suitable devices and tools shall be used during dismantling and mounting phases.



Before carrying out any maintenance operation the entire system must be completely de-energized and heating elements cooled down if not differently pointed out.



At the end of all maintenance operations electrical parameters (ohmic value, electrical continuity or voltage value ) shall be checked out by qualified personnel


All dismantling and mounting procedures are described in chapter 4.

Installation and maintenance operations will concern the entire heating system and its following components:

- Flanged heater;
- Vessel
- Safety device;

## 6.1. CORRECTIVE MAINTENANCE OPERATIONS

Corrective maintenance operations entail replacement of all components subjected to wear and for which useful working life has been reached or failure is occurred before operating life of component is over. In this chapter dismantling and mounting procedures of heating system, flanged heater and temperature control system, will be described thoroughly.

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### 6.1.1. REPLACEMENT OF FLANGED HEATER

Replacement of heating system consists of following phases:


- Shut down the heating system and ensure that heating system is completely de-energized and the system pressure has been relieved;
- Unscrew electrical feeding cables and earth cable of main supply from corresponding terminals .
- Ensure that heating elements are completely cooled;
- Screw off Flange fastener;
- Replace heating system;
- Screw on Flange fastener;
- Air-Leakage test, and then fill in the pressure medium and check out heating elements are screwed on, and gasket is sealed;
- Check out correct heating elements connections:
- Check out electrical connections of temperature control system;
- Plug electrical feeding cables and earth cable of main supply to corresponding terminals

### 6.1.2. REPLACEMENT OF TEMPERATURE CONTROL SYSTEM

PT100 should be inspected periodically and replaced when the service life is reached.

Replacement of temperature control system consists of following phases:

- Shut down the heating system and ensure heating system is completely de-energized;

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- Ensure that heating elements are completely cooled;
  - Screw off cylindrical head screws partially threaded and remove cover of connecting box;
  - Replace PT100;
  - Screw on cylindrical head screws partially threaded and fix cover of connecting box;

## 6.2. INSTRUCTION FOR DISPOSAL

All components of heating system shall be disposed and treated as waste when their service life is over. All materials used for each component do not contain any dangerous or toxic substances. Disposal operations shall be carried out according to European directives 2008/98/CE, 2002/96/C and 2002/95/CE.