



# SERVICES

Your best choice of heat treatment process, technology innovation and quality is part of our DNA.

[www.technotrat.com](http://www.technotrat.com)

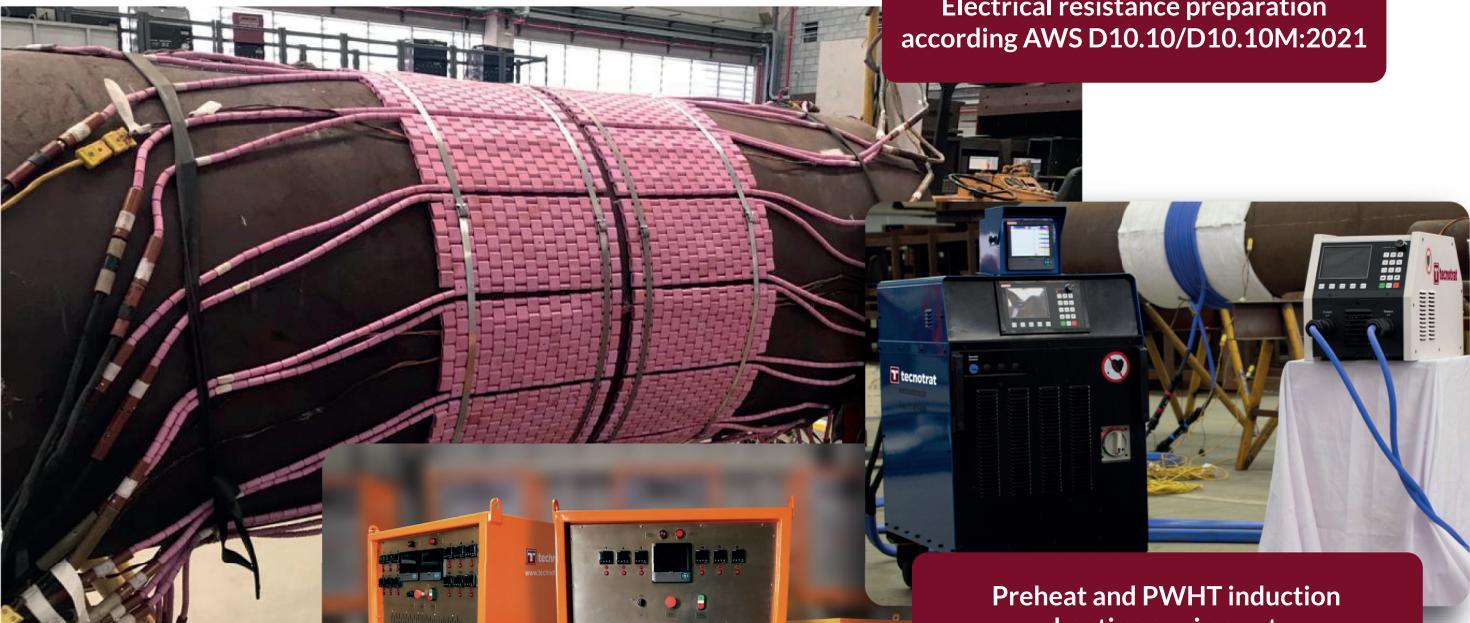


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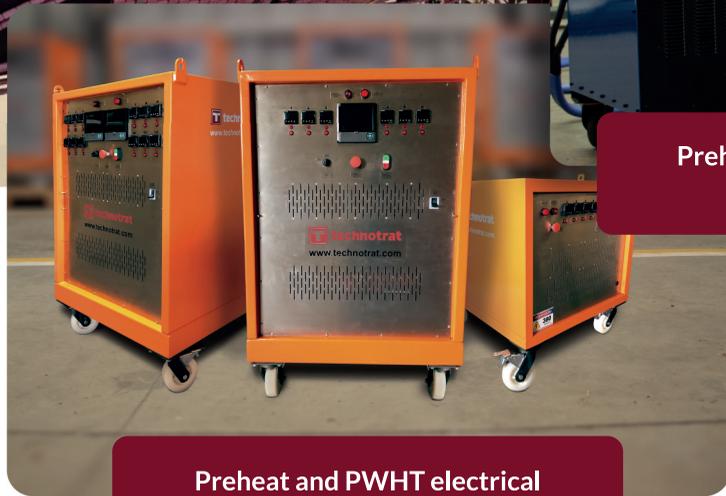
# On-site Post Weld Heat Treatment (electrical resistance and induction heating)

The post weld heat treatment, also called as stress relieving, is mandatory in some application like stress corrosion environment or according of fabrication codes and standard, the Tecnotrat process for local heating of welds in pipes and pressure vessels is performed with automatic heat treatment equipment with electrical resistance method and also with induction heating system, both heating methods are applied to reduce the residual stress, hardness in the weld and heat affected zone that happen during the welding process in the joining of material.

The process of stress relieving improve the mechanical properties of weld and adjacent areas like heat affected zone and reduce the residual stress on the base material and weld zone.



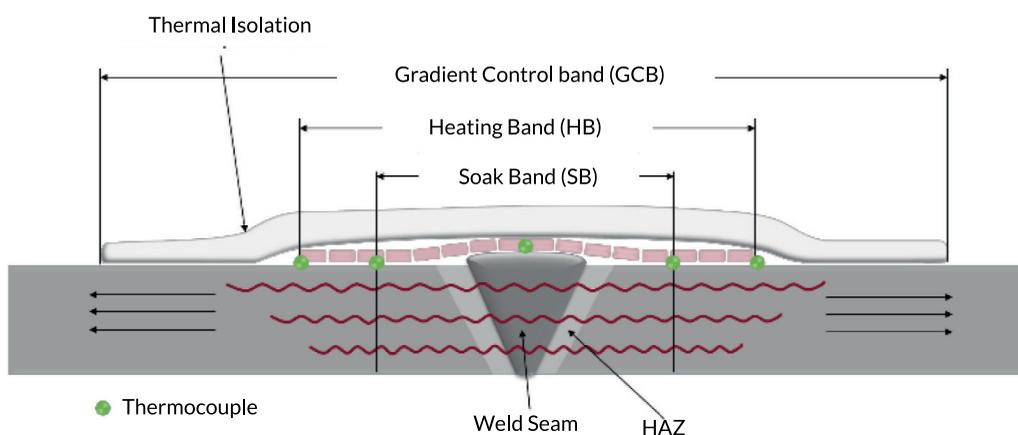
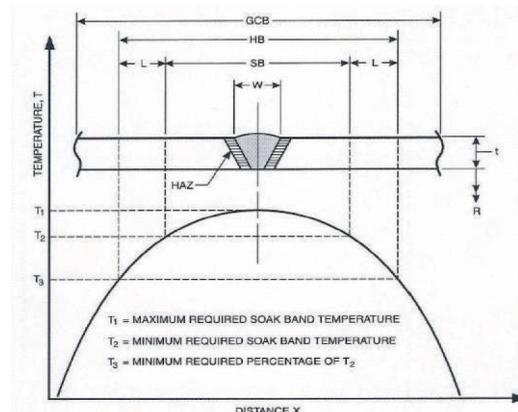
Electrical resistance preparation according AWS D10.10/D10.10M:2021



Preheat and PWHT electrical resistance heating equipment.

Preheat and PWHT induction heating equipment.

The figure on the side shows the importance to follow the heat band area recommended by standard and fabrication codes. The objectives of heating band (HB) is to assure the temperature reach the root weld and the whole HAZ (Heat Affected Zone) and adjacent area of base material with the soak band (SB) temperature.



Post Weld Heat Treatment  
Induction Heating  
30" pipe / 44 mm thickness



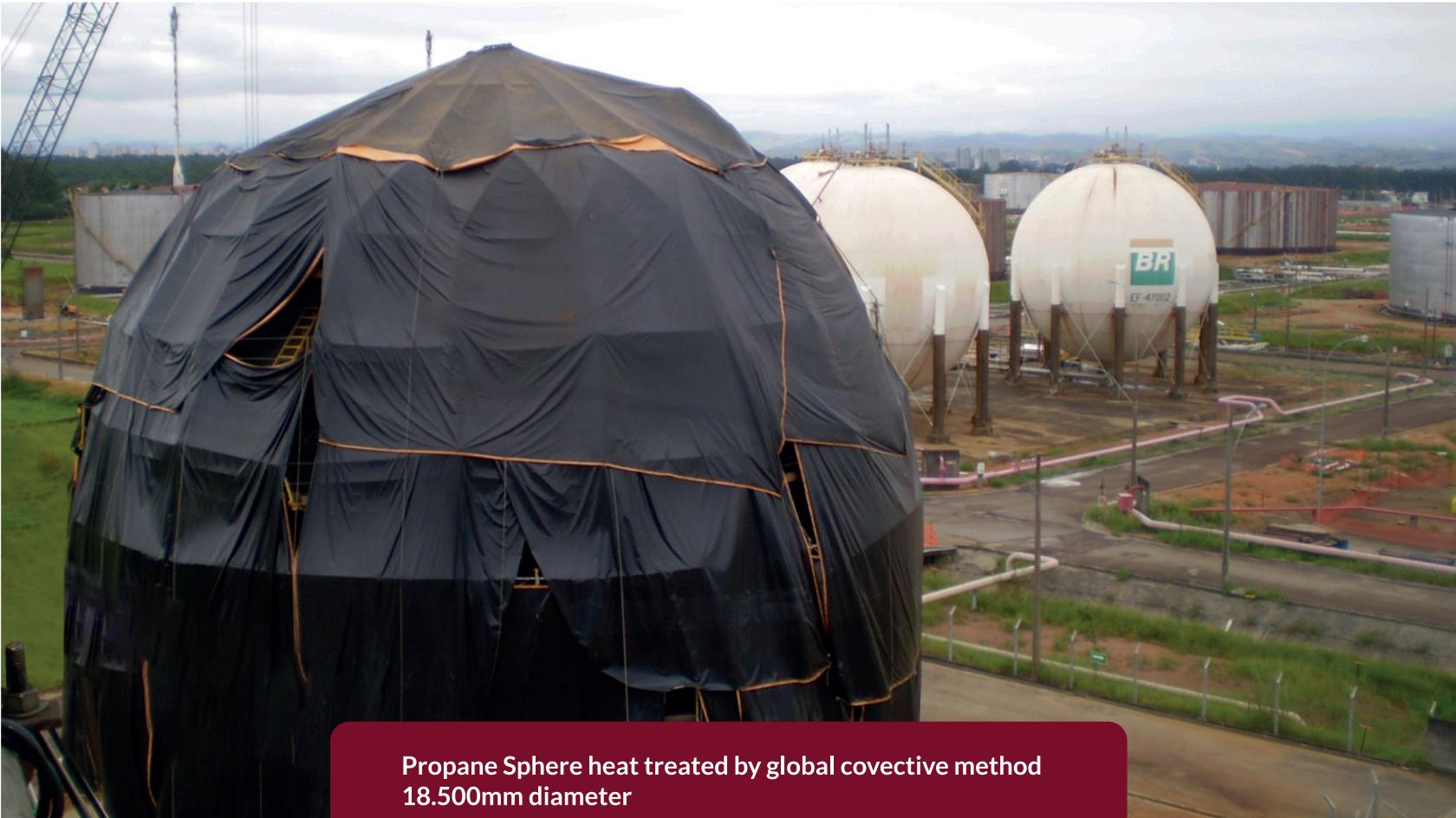
Post Weld Heat Treatment  
Resistance Heating  
30" pipe / 44 mm thickness

# Global Heat Treatment with convective method

There are cases of big pressure vessels and also spherical storage tank with requirement of post weld heat treatment, in those cases is possible to heat treatment the whole equipment heating inside with hot air by convective method using high velocity gas burner and the vessel is outside insulated and works itself as furnace, this method is according ASME Code and other international codes.



**Pressure Vessel with 4500mm diameter x 77mm thickness x 18 meters long.  
Being prepared for Global Heat Treatment with convective method.**



**Propane Sphere heat treated by global convective method  
18.500mm diameter**



The heating system is a high velocity gas burner blowing hot air at velocity up to 260mph, the fuel would be LPG or Natural Gas and the burner can introduced in the nozzle of the vessel.

The temperature control is made with thermocouples type k attached in the shell of the vessel and it heating cycle is recorded in chart recorder and the thermal insulation is made to reach the procedure requirement and also of standard and code fabrication.

# Welding Preheat

Preheating involves heating the base metal surrounding the weld joint, to a specific pre-determined minimum temperature, called the preheat temperature, prior to welding or performing tack welds. Preheat application can be either just before the welding or continuous preheat maintenance till the welding is completed.

The welding preheat is very important to raise temperature before and during the weld process. It is used for the following purposes:

- ✔ Reduce the risk of hydrogen cracking
- ✔ Reduce the hardness of the weld heat affected zone
- ✔ Reduce shrinkage stresses during cooling
- ✔ Improve the distribution of residual stresses.

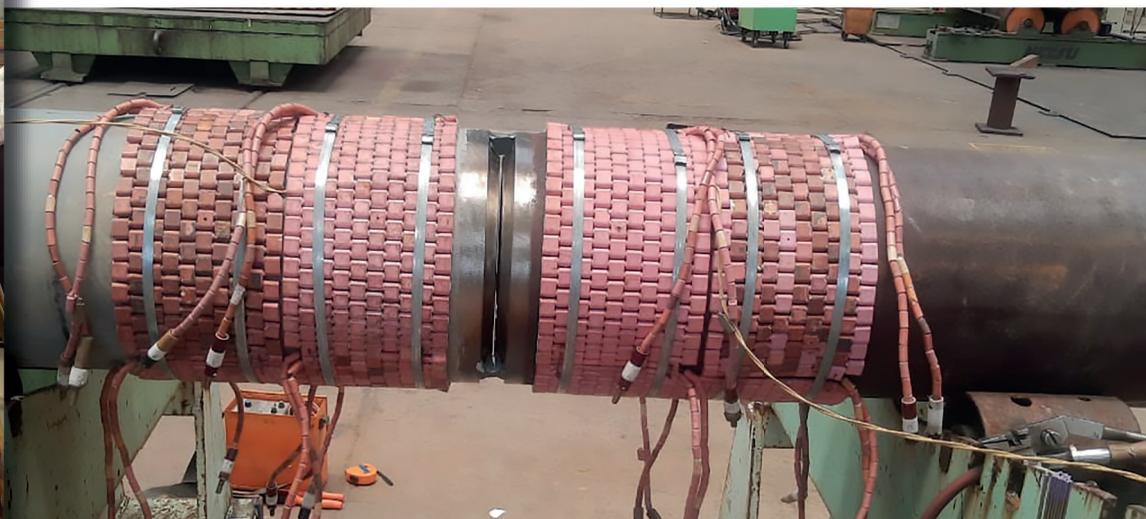


## Welding Preheat Method

Tecnotrat can make the preheat and post heating with FCP Flexible Ceramic Pad and for safety reason it works with low voltage and high power of 28 W/square inch, the electrical resistances are assembled involving the base metal surrounding the weld joint, to a specific pre-determined minimum temperature, called the preheat temperature, prior to welding or performing tack welds.

Preheat application can be either just before the welding or continuous preheat maintenance till the welding is completed.

We also provide the Induction heating method, the advantage of this method is the high rate of heating up of temperature for welding process.



	Electrical Resistance	Induction Heating
Heating	Good	Good
Temperature Control	with thermocouple	with thermocouple
Heating Speed	Medium	Very Quickly
Preparation time	Medium	Quickly

# Heating for assembly and disassembly

The process of assembly or disassembly by interference is characterized by the heating of metal parts of various types. This heating causes thermal dilation of the part allowing its assembly or disassembly by sliding.

Our heating system is used in industry, and it is an efficient and safe method of heating.

The method used can be heating by electrical resistance or by magnetic induction depending on each customer specification.

Electrical Resistance



Induction Heating

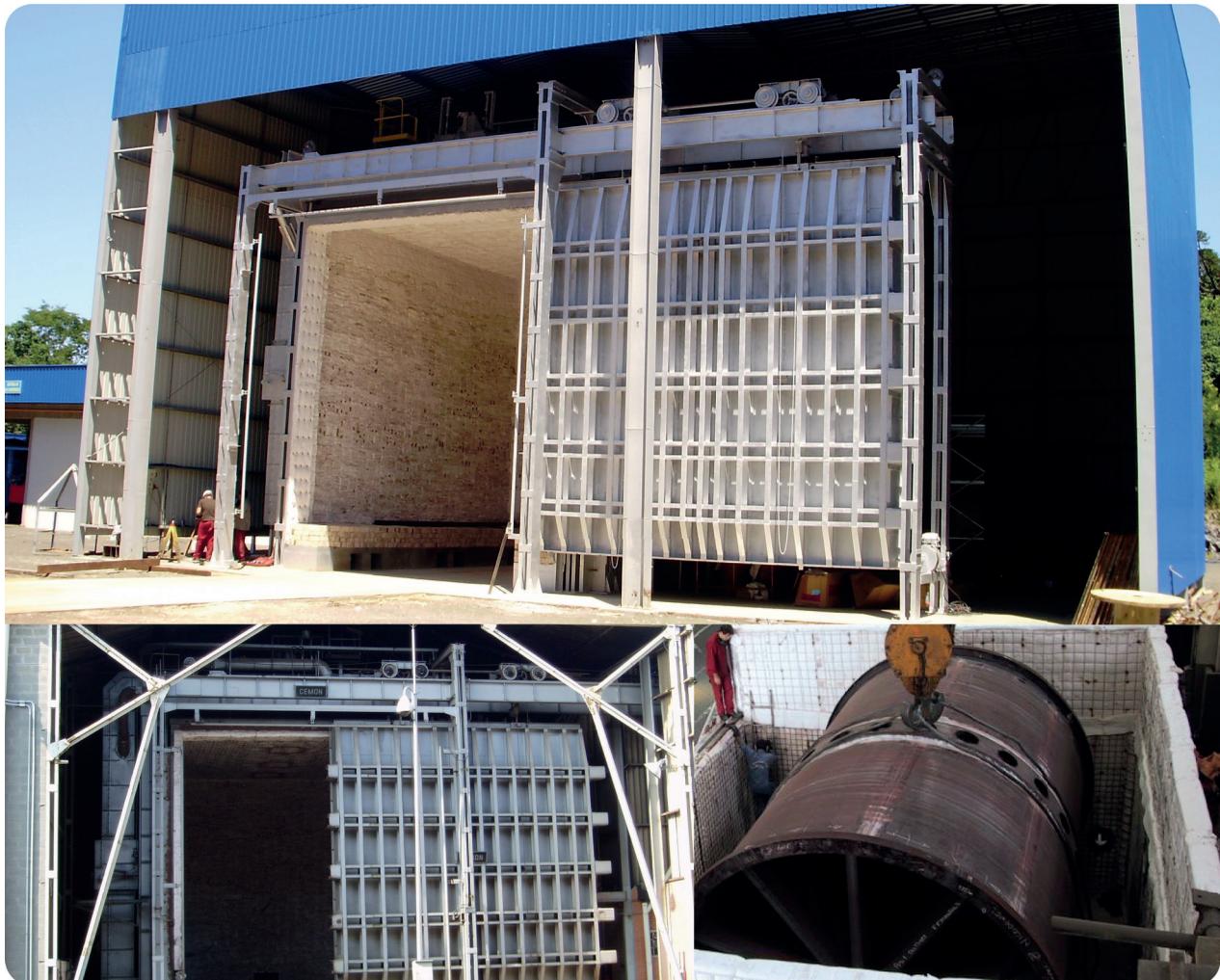


# Modular and Temporary Furnace

For large equipment that requires heat treatment after the welding process, there is the possibility of performing on site, thus avoiding high costs with its transport.

Basically, the service consists of the assembling of one temporary modular furnace with metal structures and thermal insulation, combustion air fans and high-speed burners.

All this with maximum efficiency and safety, ensuring a high-quality service and fully under control.



## Refractory Dry-out



Tecnotrat has portable equipment consisting of high-speed gas burners with convective heating method, it can work with natural gas and LPG.

The equipment consists of combustion air fans, safety valve train and high-speed gas burners.

Monolithic refractories are typically installed in the field and to achieve the desired refractory properties, the material needs to be dried to remove the water contained in the refractory to obtain the ceramic bonds within the coating. The drying process allows the refractory material installed in the final coating to reach the specified physical properties.

## Heating for Hardness Reduction in Crankshaft

Tecnotrat performs heat treatment services to reduce the localized hardness of the crankshaft movable pin.

Allowing machining and/or adapting the hardness for use, reducing the cost of replacement, downtime.



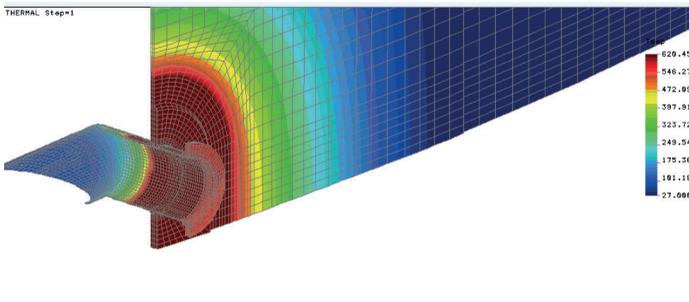
## Solution Annealing in the Field



The objective of the solution annealing in the field is to promote the dissolution of precipitated carbides at high temperature followed by rapid cooling, so that these elements remain in solid solution.

Tecnotrat has a complete heating system with electrical resistances specially developed to work at high process temperatures above 2280°F.

## Finite Element Stress Analysis



With the use of numerical modeling Tecnotrat makes available with the use of sophisticated finite element software to analyze the thermal cycle of heating, soaking and cooling through simulations with the application of heat flux representing the heating regions of the heat treatment in order to establish the best procedure to be used without generating harmful residual stresses on the equipment.

## Rental Equipment

Tecnotrat offers rental of preheating and heat treatment machines, the equipment is robust with high technology and quality, reliable we also offer technical assistance when required.



## Services

- Post Weld Heat Treatment
  - Heating by electrical resistances,
  - Induction Heating
- Preheating for welding
  - Heating by electrical resistances,
  - Induction Heating
- Annealing heat treatment
- Global stress relieve with convective method
- Temporary and modular furnace
- Thermal comfort
- Epoxy and resins cure
- Refractories dry-out
- Engineering and Consulting Services
- Maintenance and Technical Assistance
- Manpower training

## Products

- Automatic heat treatment machines for field welds
  - Heating by electrical resistances,
  - Induction Heating,
  - Preheating for welding.
- Electrical resistances
- Interconnection Cables
- Quick twisted connectors
- Instrumentation cables
- Temperature Recorders
- TAU - Thermocouple Attachment Unit
- Thermocouples
- Other materials for heating
- Modular Furnaces



We were a pioneer company in using automatic heat treatment machines in Brazil and have made constant investments in the capacity of the manpower and manufacturing, we also have our own factory and business units in various parts of Brazil and currently we have units abroad in Paraguay and the United States, so are prepared to meet the demands of our area of operation quickly.



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