

Reactor Ara Resin

Design, construction, and commissioning of resin production line

Data: 27/12/2018

Issue: 97- 1005

Attachment: 2 sheets

In the Name of God

Dear Mr. Talebi,

Hereby, we would like to inform you that following your call request, we will provide you with the necessary equipment, appropriate materials for a pilot laboratory with the price as follows:

In addition, our specialists are ready to provide any advice on how to improve, collaborate on this process, commissioning, build a pilot and set up the required laboratory, as well as provide formulations, training on the production of various alkyd resins, saturated and non- saturated polyesters, acrylic and so forth.

Also, it is worth noting that all the necessary items including design, type of equipment, and material type are available in the company's proposed system. However, if requested by the company, the following items can be changed.

1. A Reactor with a capacity of approx. 50 liters:

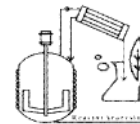
- Main wall is made from stainless steel 316L
- Press and the edge of reactor's lenses with the depth proportional to the maximum speed in the resin reaction, made of steel 316L
- Thermal fluid (oil) wall in the form of stainless steel coil lens 430L, 410L
- Cooling coil made of high-pressure Manysman stainless steel pipe class 10, 316L
- Turbo-system Torques for the fastest resin reaction, made from stainless steel 316L.

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- Flange pipes on the reactor in order to charge and circulation, light and observation are made from steel 316L and 304L
- N₂ or Co₂ or O₂ Gas Injection Tube that is made from stainless steel 316L
- Locating Pressure Gauge, Vacuum, Safety and Temperature Valve
- Side glasses on reactor, made of stainless steel 304L and 316L, and security glass.
- the outlet valve under the reactor and locating the sampling valve that is made from stainless steel 316L.
- Manhole lid that is made from stainless steel 316L.
- **Electromotor and gearbox suitable for resin, viscosity, volume and density with Yilmaz or German SEW brand**

2- Double-wall vertical column

- First wall with the required height for quick reaction a prevention system for preventing exit and throwing of glycols that is made from stainless steel 316L
- Second wall for cooling system that is made from stainless steel 304L
- Packing charge and discharge system with SideGlass of light and observation in order to better monitoring that is made from stainless steel 304L and 316L
- Flanges and fittings to the reactor and condenser with the capability of circulating and changing direction that are made from stainless steel 304L
- temperature sensor

3. Separator

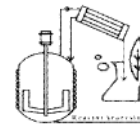
- The main wall is made from stainless steel 304L

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- Vertical lineglasses in order to visibility and better controlling of the effluent from the reaction made of steel 304L and security glass.
- Three-way and two-way on top lens in order to exposure, made of steel 304L and security glass
- Locating vacuum system, made of stainless steel 304L
- Having vent system for safety and gas outlet that is made from stainless steel 304L
- Flange pipes and fittings to reactors and condensers are made from stainless steel 304L

4. Condenser

- The inner tubes of class 10 and Manysman in number and size proportional to the reactor that are made from steel 316L
- Condenser Cooling Wall that is made from stainless steel 304L
- Having multiple baffles for maximum heat exchange efficiency, that are made from stainless steel 304L
- The beginning and the end doors of condenser in the form of Lens-Flange with the capability of easy opening and closing that are made from steel 304L and 316L
- Having vent system for safety and gas outlet, made of stainless steel 304L
- Having Tee in the beginning in order to connection to steam transfer column that is made from stainless steel 316L
- Flanges in the beginning and at the end of the condenser are made from stainless steel 304L

5. Vacuum system:

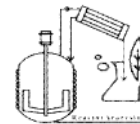
- Electromotor Vacuum pump proportional to reactor capacity and tele-vacuum system and necessary piping made from stainless steel 304L.

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- Required valves and fittings made from stainless steel 304L.

6- Boiler (the container producing hot oil), suitable for heating the entire system

- The main wall is made from fire-eater iron
- The main insulation wall is made of rock wool and colored steel cover
- Internal thermal industrial elements combined with stainless steel Manysman tubes 304L.
- Electromotor Hot Oil Pump
- Plumbing and hot oil connections are all made of stainless steel 304L.
- Steel valve for hot oil
- The source of storage and charging of thermal oil and expansion source made of stainless steel 304L.

7. Platform:

- Installed on a platform of stainless steel 304L and 316L and having heels for easy transportation and mobility.
- The price of the abovementioned equipment is 10000 \$.

If you approve and continue to collaborate, the time of construction and payment will be announced subsequently.

This price offer is valid for 3 business days.

Best Regards,

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