

NR-6 镍复合反应釜和加热系统技术方案

NR-6 Ni Lining Reactor and Its Heating System Technical
Specification**1.产品用途 Application:**

本设备主要用于钨精矿在一定温度下与氢氧化钠发生反应。

It is used for reacting of tungsten concentrate and NaOH under certain temperature.

2.产品的基本参数 Basic Parameters:

总容积 Total Volume	6 m ³
最大装料容积 Max. load volume	4.8m ³
釜体材质 Reactor Vessel Material	10mm 碳钢+3mm 镍（镍板使用爆炸复合在钢板上） 10mm carbon steel+3mm Ni (The Ni plate is explosive bonding with the steel plate)
搅拌叶片材质 Stirring Agitator Material	SS 304
工作温度 Working Temperature	90℃
电机转速 Motor Rotation Speed	60 RPM
电机功率 Motor Power	22KW
安装形式 Install Type	立式悬挂安装 Vertical hanging mount



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总体尺寸 Overall Size	Approx. 2500×2500×5200mm(W×L×H)
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4.设备各系统组成及特点 System Composition and Features:

本设备主要由釜体、搅拌机构、温度测量机构、加热系统以及电气控制系统等部分组成。

It is mainly composed of vessel, stirring device, temperature measuring device, heating system and electric control system.

4.1 釜体 Vessel

釜体为立式结构，内径约为1800mm，高度约为2600mm。釜体为双层复合钢板焊接而成，外层为碳钢，内层为耐碱腐蚀的镍板。在釜体外层焊接有半圆管，内部通导热油用于给物料加热。在釜体顶部有一个液位计接口，雷达式液位计安装在接口上用于测量内部液位高度，输出高度信号给PLC并传输到用户工控机内用于记录。

The vessel is vertical type, inner diameter is approx. 1800mm, height is approx. 2600mm. It is welded by two layer composite steel plate, the outer layer is carbon steel, the inner layer is alkaline resistant Ni plate. The bottom half of the reactor has welded outside half-tube coil, in which the high temperature oil running through to heat up the material inside the reactor.

A ultra-sonic type level transmitter is mounted at the top of the reactor, the liquid level value will send to PLC and to the User's operation room computer to record.

4.2 搅拌机构 Stirring device

搅拌机构由电机、减速机、联轴器、搅拌桨叶等组成。电机转速由减速机降低为 60RPM，联轴器将减速机轴与搅拌桨叶的轴相连。搅拌桨叶位于物料液位以下，保持物料在釜内流动，能够加快物料反应同时减少物料内固体物质沉淀。

如果由于停电，桨叶停止转动后物料沉淀，再次来电后不能直接启动电机，必须将物料排放干净后才能启动，防止电机烧坏。

It is consist of motor, gear unit, shaft connector, Agitator and etc. The gear unit reduce the motor speed to 60RPM, and the the gear unit shaft connect with the Agitator shaft through a connector.



The Agitator should always be below the liquid level, it keeps the material flow inside the reactor, the stirring makes the material reaction faster and prevents solid condensation.

If the power is off and the Agitator stops stirring, the solid material will condensate, when power restarts, the motor cannot start until all material drains out, thus to prevent the motor over-load.

4.3 温度测量机构 Temperature Measuring Device

温度测量机构由热电偶及镍测量管等组成。镍测量管固定在釜内，伸入到液面以下。热电偶放置在镍测量管内部，不直接接触物料。热电偶的温度信号传送给控制系统，控制系统来调节导热油温度，从而控制物料的温度。

It consists of thermocouple and Ni measuring tube. The Ni measuring tube is fixed inside the reactor and goes below the material liquid level. The thermocouple is placed inside the Ni tube, it has no contact with the material. The thermocouple will send the temperature signal to the control system, then the control system adjusts the conductive oil temperature to reach the desired material temperature.

4.4 加热系统 Natural gas heating system:

加热系统由天然气烧嘴、辐射管、导热油、油罐和循环泵等组成。

辐射管处在油罐内，位于液面以下。烧嘴安装在辐射管内部，将辐射管加热从而将油加热。循环泵将热油泵入反应釜的盘管内，反应釜被加热，而冷却的油又返回到油箱内，此循环过程持续往复将反应釜加热到需要的温度。反应釜有热电偶将温度信号反馈到烧嘴控制器来调节烧嘴的燃烧。

This system consists of natural gas burner, radiation tube, heat conduction oil (user prepare), oil tank and circulation pump.

The radiation tube is placed inside the oil tank below the oil level, natural gas burning inside the radiation tube to make it hot, then the oil will be heated by the hot radiation tube. The circulation pump will pump the hot oil into the coil on the reactor, the reactor is heated and the cool oil will return to the oil tank, the oil keeps circulating in the coil to heat up the reactor. The reactor has a thermocouple to feedback temperature signal to the natural gas burner controller to adjust the

burning.

4.5 电气控制系统 Electric Control System

4.5.1 使用 PLC 和触摸屏对整个系统进行控制。

To use PLC and touch screen HMI to control the whole system.

4.5.2 温度控制：使用智能控温仪控制加热温度，温度信号能够传送到用户控制室工控机中记录；

Temperature control: using the temperature controller to adjust the oil heating temperature. The temperature signal can send to User's operation room computer to record.

4.5.3 传动控制：使用按钮控制电机的启停，电机的启停状态能够在用户用户控制室工控机显示并且能够控制电机的启停；

The stirring control: to use push buttons to start and stop the motor. The motor start/stop status can show on the User's operation room computer, and the motor can be start/stop from the operation room computer.

4.5.4 PH 值控制：反应釜顶部安装有 PH 值变送器，用于实时监控釜内 PH 值，信号能够传送到用户控制室工控机中记录。用户能够设置 PH 值报警范围，釜内超出设定范围后报警提醒用户。

PH value control: the PH value transmitter mounted at the top of the reactor to measure the real-time PH value, and send signal to User's operation room computer to record. And user can set PH value alarm range, if the value not in set range, it will give alarm to the operator.

4.5.5 系统具有炉内超温、电机过载等报警功能，可实现声光报警。

This system has over temperature, motor over-load and etc. Alarm functions, and it has audible and visual alarms.

4.5.6 产生的控制电压和分配电压：220V AC, 24V DC.

Control voltage generation and distribution 220V AC, 24V DC

4.5.7 操作过程报警系统有：紧急停止按钮、开关和报警灯。

Emergency stop button, switches and indication lamps for operation and alarms

5. 设备主要部件的品牌及其主要参数: Main Component Brand and Spec.

主要部件 Main Component	品牌 Brand	主要参数 Spec.
PLC 及其 I/O 模块 PLC and I/O module	OMRON Japan	CP1H Model
触摸屏 Touch screen HMI	MCGS	
雷达液位计 Ultra-sonic level transmitter	中国 China	
PH 值变送器 PH transmitter	中国 China	
电机减速机 Gear Unit and motor	中国 China	22KW
低压电气元件 Low voltage component	德国 German	Schneider: Contactors, switches and relays
保温材料 Heat insulation	中国 China	陶瓷纤维棉 Ceramic fiber wool
热电偶 Thermocouple	中国 China	Pt, 使用温度范围: 20-300°C Pt, working range:20-300°C