Zeolite Rotary Wheel Adsorption Concentration Equipment

I. Working Process

The zeolite rotary wheel adsorption concentration equipment is an energy-saving purification device designed for large-volume, low-concentration VOC exhaust treatment. It adopts a continuous closed-loop process of "adsorption-concentration-desorption", relying on honeycomb zeolite rotary wheels to achieve efficient treatment of organic exhaust gases with no secondary pollution, suitable for various low-concentration VOC treatment scenarios.The equipment mainly consists of an exhaust gas pretreatment system, a rotary wheel concentration adsorption system, a desorption system, a cooling and drying system, and an automatic control system, with a modular design enabling continuous unmanned operation.

Core process flow: VOC-laden exhaust gases undergo pre-filtration treatment to remove dust and other impurities, then are fed into the processing zone of the zeolite rotary wheel. The wheel uses ceramic fiber as a substrate coated with hydrophobic zeolite adsorbent, which efficiently adsorbs VOC components from the exhaust. The purified clean air is discharged directly up to standard. After adsorption saturation, the rotary wheel continuously rotates to the regeneration zone, where hot air heating achieves VOC desorption, concentrating the originally large-volume, low-concentration VOC exhaust by 5~30 times into small-volume, high-concentration exhaust for subsequent incineration or deep treatment. The desorbed rotary wheel then rotates to the cooling zone, where its adsorption activity is restored after cooling and drying; the cooled air can be heated and recycled as regeneration air for energy saving. The entire process runs continuously and switches automatically without manual intervention.

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II. Core Parameters

Treatment Process: Zeolite adsorption-concentration-desorption continuous process

Adsorbent: Hydrophobic zeolite (ceramic fiber honeycomb rotary wheel substrate)

Concentration Ratio: 5~30times

VOCPurification Efficiency:≥95% (adsorption stage)

Desorption Temperature: 180~220℃ (low-temperature energy saving)

Applicable Exhaust: Large-volume, low-concentration organic exhaust gases (VOCs)

Wheel Zones: Processing zone, regeneration zone, cooling zone (continuous operation)

Control Method: PLCfully automatic control, one-key start, compatible with HMI monitoring

Operating Resistance: Low-resistance design, effectively reducing power consumption

System Composition: Exhaust pre-treatment + rotary wheel adsorption + desorption + cooling & drying + automatic control

III. Operating Instructions

1. Pre-start Check: Inspect the pre-filter, zeolite rotary wheel, desorption system, cooling system, and control system. Confirm that all components are operating normally with good sealing,

the rotary wheel is undamaged, the adsorbent has not fallen off, and the cooling and heating devices are functioning properly.

2. Start-up Operation: One-key start; the system automatically enters operating status. First activate the pre-filtration and air supply system. Once the airflow stabilizes, start the rotary wheel adsorption and automatic control system to ensure exhaust gases pass evenly through the rotary wheel processing zone.

3. Operation Monitoring: Monitor key parameters in real time via HMI, including rotary wheel speed, desorption temperature, exhaust concentration, and system resistance. If anomalies occur, the system automatically triggers an alarm, requiring immediate shutdown for inspection.

4. Routine Maintenance: Regularly clean dust and impurities from the pre-filter to avoid blockage affecting treatment performance. Regularly inspect the zeolite rotary wheel adsorption activity; if adsorption efficiency declines, appropriately adjust desorption temperature or perform regeneration treatment. Regularly check the desorption system and cooling system to ensure proper hot air circulation and adequate cooling performance. Regularly calibrate control system parameters to ensure smooth automatic switching.

5. Safety Precautions: Do not disassemble the rotary wheel or piping arbitrarily during equipment operation. Open flames are strictly prohibited near the desorption zone. During desorption, strictly control the temperature to prevent overheating that could damage the adsorbent or cause safety hazards. When shutting down, first close the desorption heating device, then turn off the fan after the rotary wheel has cooled, to ensure equipment safety.

IV. Product Advantages

1. **High efficiency and stability, excellent purification performance**: Zeolite adsorbent offers high adsorption and desorption efficiency. VOCpurification efficiency ⩾ 95%, capable of long-term stable operation, suitable for large-volume, low-concentration exhaust treatment with no secondary pollution.

2.**Energy saving, low operating costs**: Low-resistance design reduces power consumption; cooled air is recycled as regeneration air to reduce heating energy consumption. The concentration ratio can reach 5~30times, significantly reducing the size of subsequent deep treatment equipment and further lowering overall operating costs.

3.**High automation, easy operation**: PLCfully automatic control system, one-key start, enabling unmanned control of the entire adsorption, desorption, and cooling process. Equipped with HMI for easy monitoring of key operational data and reduced labor costs.

4.**Modular design, strong adaptability**: The overall modular structure is compact and can be flexibly customized to suit the specifications required for different industries and different exhaust volumes.

5.**Long service life, easy operation and maintenance**: The zeolite rotary wheel adsorbent is highly stable and can be repeatedly regenerated for long service life. Daily maintenance mainly involves cleaning and inspection, with simple operations requiring no specialized technicians on duty.

V. Applicable Industries

Widely applicable to large-volume, low-concentration VOC exhaust treatment scenarios, covering industries including **coating, printing, electronics, plastic processing, chemical, petrochemical, furniture, packaging, rubber, and pharmaceuticals**. Especially suitable for concentration treatment of spray booth exhaust, printing ink exhaust, solvent evaporation exhaust, chemical raw material exhaust, plastic molding exhaust, and other low-concentration organic exhaust gases. It is currently the preferred high-efficiency, energy-saving, and stable equipment for industrial VOC exhaust treatment.

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