Handbook of Cartridge Filter Technology and application

Under the background of continuous upgrading of industrial manufacturing and tightening of environmental protection requirements, dust control has become enterprise safetyProduction, occupational health protection and environmental compliance. With compact structure and high purification efficiency, the cartridge dust collectorHigh, easy maintenance, small space and other advantages, become welding fume, metal grinding, laser cutting, composite materialsProcessing, woodworking, sandblasting and other fine dust and micro-smoke scene of the mainstream control equipment.

This manual introduces the working principle, structural composition, technical characteristics, filter material selection and system of cartridge dust collectorDesign, installation, commissioning, operation and maintenance and typical industrial applications, for engineering and technical personnel, equipment management personnel, environmentalEnsure that the person in charge to provide complete, practical, can be directly landing technical reference to help enterprises scientific selection, reasonable design, Standardized operation and maintenance to achieve stable emission standards and safe and efficient operation.

Working principle of cartridge filter

The pleated cartridge filter is used as the core filtration unit, and the dust is discharged by gas-solid separation, pulse cleaning and dust collectionComplete cycle to achieve continuous and stable dust removal. Under the action of the negative pressure of the fan, the dust-laden air flow enters into the interior of the equipment, and large particles of dustUnder the action of gravity and inertia, the dust is directly settled to the ash hopper to complete the primary separation. The fine dust enters the filtration area with the air flowThe domain is intercepted, adsorbed and captured by the surface of the filter barrel and the filter material layer, and the clean air flows into the clean air through the internal channel of the filter barrelChamber, and finally discharged by the air outlet.

With the accumulation of dust layer on the surface of the filter, the resistance of the equipment increases gradually, when the pressure difference or time reaches the set pointWhen the pressure difference or time reaches the set value, the pulse

control system automatically starts the dust cleaning program. The high-pressure compressed air is instantaneously injected into the filter cylinder through the pulse valveThe utility model can make the filter barrel produce instantaneous expansion and high-frequency vibration, peel off the attached dust layer, and fall into the ash hopper to complete the cleaningAsh. After ash cleaning, the system automatically restores the filtering state and realizes uninterrupted continuous operation. The degree of automation of the whole processHigh, without frequent manual intervention, to maintain long-term efficient and stable purification capacity.

Structure and design features of the equipment

The overall structure of the cartridge dust collector is simple and compact, which is mainly composed of a box body, a cartridge component, an air intake system and a pulse dust cleaning systemSystem, dust collection and discharge system and electronic control system. The equipment shell is mostly made of carbon steel or stainless steel, which has good sealing performance, low cost and low costHigh structural strength, according to the needs of the site to do vertical, horizontal, modular combination of a variety of layout forms.

The filter cartridge is the core component of the equipment, which adopts the deep fold design to realize the super-large filtration area in a limited volume,under the same space, the filtration area is several times that of the traditional cloth bag, which significantly reduces the overall volume and area of the equipment. Cartridge filterWith quick assembly structure, easy to disassemble and replace, usually without special tools to complete the maintenance.

Pulse cleaning system consists of air bag, pulse valve, injection pipe, injection pressure, cleaning cycle, trigger mode can be flexibly adjusted to ensure thorough cleaning and not excessive damage to the filter material, extending the service life of the filter cartridge. Inside the air passageSet Diversion and flow-sharing structure, to avoid the air flow directly scour the cartridge, reduce local wear, so that the cartridge force and filtration moreMore uniform.

Ash Hopper and ash discharge device is responsible for collecting and discharging dust, can be configured according to the working conditions of dust collection bucket, screw conveyor, unloadingVarious forms of dust discharge, such as hoppers, screw conveyors, dischargers, etc. , to meet the cleaning needs of different sites.

Electronic control system integrated differential pressure monitoring, timing cleaning, frequency control, fault alarm and other functions to support local operationsAnd remote monitoring, improve the level of equipment intelligence and energy saving.

Types of filter media and applicable working conditions

The filter cartridge material directly determines the filtration accuracy, temperature resistance, corrosion resistance and service lifeDust characteristics, temperature, humidity, corrosion and explosion-proof requirements.

Conventional polyester fiber filter material suitable for normal temperature dry environment of ordinary dry dust, such as steel, casting, waterMud, ordinary grinding dust, etc. , high cost performance, wide range of applications.

Anti-static polyester fiber filter material in the fiber implanted conductive components, effectively eliminate the accumulation of static electricity, applicable to plastic, Plastic, flour, coal powder, chemical powder and other flammable and explosive dust scenarios.

PTFE membrane filter surface smooth, hydrophobic strong, filtering accuracy can reach sub-micron level, low emission concentration, suitableWelding dust, laser cutting dust, high humidity dust, viscous dust and other working conditions, cleaning more easily, more stable resistance.High temperature type filter material such as Nomex, glass fiber composite material, can withstand higher temperature, suitable for high temperature flue gas, heat treatmentDust, chemical high-temperature dust and other special environments.

Reasonable filter material selection can greatly improve the adaptability of the equipment, reduce the failure rate, prolong the replacement cycle, is the guaranteeDust removal system is the key link of long-term reliable operation.

Technical advantages and performance characteristics

The most prominent advantage of cartridge dust collector is high purification efficiency, the collection effect of Fine Dust is outstanding, can meet the strictThe ultra-low emission requirements of the grid are especially suitable for scenarios with high requirements for workshop cleanliness and discharge concentration. Equipment structureHighly integrated and occupying a small area, it is very suitable for the internal layout of the workshop or the working condition of space shortage.

The modular design allows the equipment to be flexibly combined according to the demand of air volume, convenient for expansion and transformation, and suitable for different productionLine and process changes. Automatic pulse cleaning with differential pressure control, so that the system resistance is always maintained in a reasonable range, operationLow energy consumption, cleaning gas more economical. The cartridge replacement is simple and fast, the daily maintenance workload is small, and the overall operation and maintenance cost is lowIn the traditional dust removal equipment.The equipment is stable and reliable, no complex fragile transmission parts inside, suitable for continuous production environment. For special workCan Do explosion-proof, flame retardant, anti-corrosion, high temperature resistance and other customized treatment, covering the vast majority of industrial dust control needs,both versatility and professionalism.

Key points of system design and selection

The design of filter cartridge dust removal system takes working condition matching as the core, and focuses on air volume, collection mode, filtering air speed, and dust removal efficiencyThe five elements of ash cleaning logic and control system ensure that the governance effect, operation cost and safety compliance are balanced.

The design of air volume is based on the intensity of dust production, the number of working stations, closed or open environment. Insufficient air volume willLead to collection is not thorough, non-organized emissions exceed the standard; excessive air volume will increase energy consumption, noise and operating costs. Fixed workIt is advisable to adopt nearby fixed-point collection, with closed cover, side suction cover, upper suction cover and other capture structures; when the operation point is not fixedFlexible suction arm and mobile dust removal cabinet can be selected to improve the flexibility of use.

The filtration velocity is the key parameter affecting the efficiency and service life, which depends on the dust size, dry and wet, viscosity and filter materialType. Too high wind speed is easy to cause the filter material abrasion, penetration and dust removal difficulty, too low wind speed will increase the volume of the equipmentInvestment. Differential pressure linkage control is preferred in ash cleaning mode, which is more intelligent, more energy-saving and more effective than pure timing ash cleaningAvoid excessive or untimely cleaning.

System piping design as short and straight as possible, reduce elbows and diameter change, reduce system resistance, to avoid dust clogging. FanFrequency conversion control should be configured to adjust air volume according to actual operating load to realize energy-saving operation. The overall layout takes into account the operation,maintenance and repair space to ensure the convenience of long-term use of equipment.

Vi. Installation, commissioning and site requirements

Before installation, the foundation level, bearing capacity and space location should be confirmed, and outdoor installation should be rainproof and waterproofSun protection, shock absorption and fixing measures. The pipe connection ensures the sealing to avoid air leakage affecting the collection effect and increasing energy consumption. InspiratoryThe mouth or suction arm should cover the entire area of operation to ensure that dust is effectively trapped prior to dispersal.

Pay attention to the direction and seal in place when installing the filter cartridge to avoid air leakage and short circuit filtering. The dust cleaning air path is firmly connected,moderate pressure adjustment, to prevent damage to the filter cylinder pressure is too high or pressure is too low ash is not completely. Electrical Control system wiring specification,complete protection function, with overload, overheating, missing phase and abnormal alarm capability.

During the commissioning phase, check the fan steering, valve action, dust cleaning sequence and signal feedbackNormal, and then gradually loaded with dust operation. Observe the operating pressure difference, emission concentration, equipment vibration and noise, and fine-tune ash cleaningParameters, so that the system to achieve the best working conditions. Explosion-proof equipment must be strictly in accordance with the specifications to complete grounding, explosion venting, SparksInstallation and testing of safety devices such as detection.

Specification for Operation Maintenance and management

Stable operation depends on regular routine maintenance, focusing on the status of the filter cartridge, dust cleaning system, fan gas path, electricityControl system and dust cleaning. Check the pulse valve, air bag, injection pipe regularly

for leakage, blockage or abnormal action to protectEnsure reliable operation of the dust cleaning system.

According to the dust concentration and frequency of use regularly check the filter plug, damage, timely replacement of aging or damage filterCylinder, to avoid filtration efficiency decline. Timely cleaning ash hopper and dust collection device, to prevent dust accumulation caused by overload or twoSecondary dust. Check the temperature of fan bearing, Belt and motor regularly to ensure that the transmission parts are well lubricated and run smoothly.

After long-term operation, the internal pipeline should be inspected and cleaned to avoid local dust accumulation causing blockage or potential safety hazards.Establish Equipment Operation Ledger, record operation parameters, maintenance content, replacement parts, easy to trace and predict the fault. RightOperator training is necessary, familiar with the start-stop process, abnormal judgment and basic maintenance, improve the level of safe operation.

Typical industrial application scenarios

Cartridge filters are widely used in industrial fine dust and micro-smoke control, and are suitable for a large number of manufacturing scenarios. WeldingThe filter cartridge dust collector can efficiently capture the metal dust produced by the receiving workshop, plasma and laser cutting stationTo protect the health of operators and meet the requirements of environmental emissions.

Metal polishing, composite material polishing, woodworking, stone processing and other dry dust, the use of filter cartridgesDust collection and purification nearby, can significantly improve the workshop environment, enhance product cleanliness, reduce equipment wear. Small piece spraySand, parts cleaning, precision casting and other processes of dust, suitable for the use of compact cartridge equipment, small footprint, efficiencyGood effect and easy maintenance.

Food, medicine, electronics and other industries with high requirements for cleanliness, the selection of high-precision membrane filter cartridges, can be highly efficientDust removal at the same time to meet health and safety requirements. For Wood, plastic, aluminum-magnesium alloy, chemical powder and other combustible dustWorking conditions, can be equipped with explosion-proof cartridge dust removal system, with anti-static filter material, explosion venting, spark detection and other measures to meetExplosion-proof safety specification.

Cartridge dust collector can be used alone, can also form a centralized system to meet a single station, multi-station, the whole productionLine, has a strong ability to adapt to the scene.

Safety precautions

In the combustible dust environment, must use explosion-proof filter dust collector, and according to the specification set up venting, flameless ventingExplosion, spark detection extinguishing, anti-static grounding and other safety devices, the use of ordinary non-explosion-proof equipment is strictly prohibited. Equipment Operation AreaOpen Flame, high temperature heat source, spark and other dangerous sources are strictly prohibited in the area. Dust accumulation on the ground and pipeline should be cleaned regularly to prevent dust cloud Okay.

Electrical components and control box should meet the corresponding explosion-proof level requirements, regular inspection of insulation, grounding and circuit integritySex, to avoid electrical spark accidents. The pressure of compressed air used for ash cleaning should be controlled in a reasonable range to prevent excessive high pressureFilter cylinder damage or potential safety hazard.

Maintenance must be carried out after shutdown, power failure and pressure relief. Ventilation and prevention should be done when entering the interior of the equipmentTo avoid choking or dust inhalation risk. Strictly comply with relevant national and industry safety standards and establish a safety management systemTo ensure the safety of personnel and equipment.

Conclusion

Filter cartridge dust collector is an efficient, reliable and economical solution for modern industrial dust controlThe advantages are particularly obvious in fine dust, micro-dust, and space-limited scenarios. Scientific selection, reasonable design, standardized installation, standardized operationDimension, is to achieve long-term stable operation of dust removal system, emissions standards, safe and efficient core protection.

This manual provides general technical guidance and application reference. The actual project should be combined with the specific process and dust characteristics of the enterpriseIn order to achieve the best treatment effect, customized design should be carried out according to the specific process, site

layout and environmental protection requirements. Enterprises can rely on professional skillsTechnical support, to create their own production needs of dust removal system to achieve green production, production safety and efficient production coordinationAnd efficient production.