Test Results of BECLEAN™ energy-saving catalytic filter bag

In July 2021, we cooperated with Kelin Environmental Protection to conduct a pilot test on the efficiency of catalytic filter bag denitrification and dioxin removal in a waste-to-energy plant in Jiangsu.

1 Experimental flue gas inlet parameters

Parameters	Unit	Value
Side-stream experiment	Nm^3/h	about 1000
Flue gas temperature	°C	160-240
CO_2	Vol%	7.93%
H2o	Vol%	25.9%
02	Vol%	6.14%
N2	Vol%	59.28%
HCI	mg/Nm^3, dry, 11%O_2	1300
SO2	mg/Nm^3, dry, 11%O_2	594
HF	mg/Nm^3, dry, 11%O_2	20
NOx	mg/Nm^3, dry, 11%O_2	200
Dust	mg/Nm^3, dry, 11%O_2	3000-10000
Cd, Ti	mg/Nm^3, dry, 11%O_2	0.2-2
Hg	mg/Nm^3, dry, 11%O_2	0.05-0.8
As, Cr, Co, Cu…	mg/Nm^3, dry, 11%O_2	1.20-9
Dioxins/Furans	ng TEQ/Nm^3, 11%O_2	0.1-5

2 Photos of the equipment in the pilot test site

Experimental device

Experimental device

Outer bag installation

Inside bag installation

3 Pilot test results

NOx removal test results

Test agency:Shanghai Industrial Boiler Research Institute Co., Ltd. Quality Supervision and Testing Center for Mechanical Industrial Boilers and Environmental Protection Products.

Test result:The NOx purification efficiency of the purification device is 71.89%, 75.40%, 81.04%, and the final converted NOx concentration is 45.34mg/m^3, 42. 10mg/m^3, 31. 97mg/m^3.

Dioxin removal test results

Test agency:Institute of Thermal Engineering, Zhejiang University

Test results:The inlet concentration of dioxins in the inlet flue gas of the test device with the catalytic function filter bag installed is 0.775ngTEQ/Nm^3, and the average concentration of dioxins after purification is reduced to 0.017ngTEQ/Nm^3, which is lower than the national emission standard of 0.1ng/TEQ-Nm^3. The overall removal efficiency of the test device was 97.8%.

Application industry of BECLEAN™ energy-saving catalytic filter bag

Waste incineration, hazardous waste disposal, biomass power generation, lime kiln, coking, gas turbine, steel sintering, and other industries

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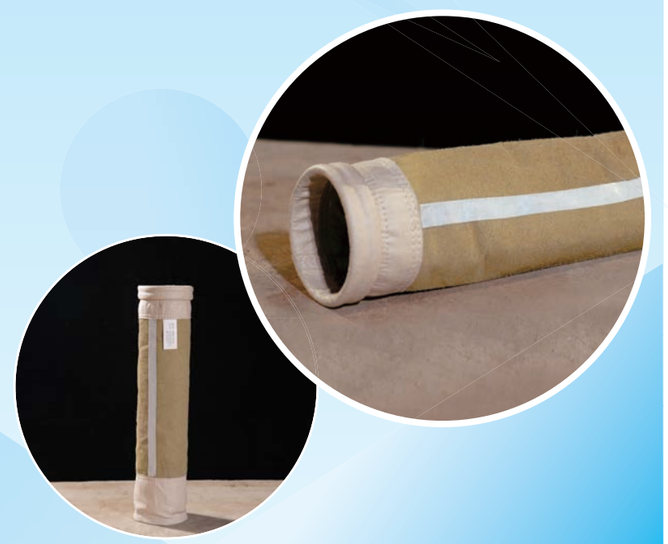
Introduction of BECLEAN™

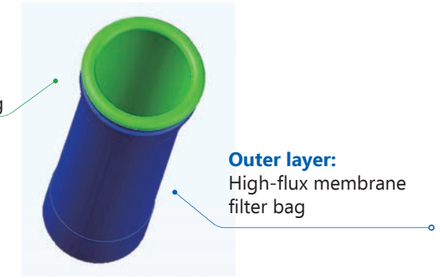
Energy-saving Catalytic Filter Bag



Yuanfuxin (Xiamen) Energy-saving New Material Technology Co., Ltd.

Introduction of BECLEAN™ energy-saving catalytic filter bag

One filter bag has multiple functions, i.e. dust removal, denitrification, dioxin removal, etc. It adopts the form of inner and outer bag, with the inner bag being a high flux catalytic filter bag and the outer bag being a high flux energy-saving filter bag, which is a low-cost, short process, safe and reliable technology to achieve ultra-low emission of nitrogen oxides, dust and dioxins.



Structure diagram of double-layer filter bag

Advantages of BECLEAN™ energy-saving catalytic filter bag

1 Medium-temperature low-dust

Double-layer filter bag. The outer bag is efficient for dust removal, and the dust concentration in the inner catalytic filter bag is less than 10mg/Nm^3; it improves the denitration efficiency, prevents catalyst poisoning, and prolongs its life.

2 High efficiency/low resistance/long service life/energy-saving

The outer bag adopts a high-flux membrane filter bag for surface filtration; the inner bag adopts a large-flux catalytic filter bag for catalytic filtration; resistance <1000Pa; dust <10mg/Nm^3; denitration efficiency 60-91% at 180-210 ℃.

3 Short process flow

Compared with the traditional ultra-low emission transformation route, the use of catalytic filter bags greatly shortens the process flow; simplifies the process, thereby improving system stability and reliability, greatly reducing system resistance, reducing operation and maintenance costs,and requiring less floor space.

4 Small amount of modification

Almost no additional floor space is required, and ultra-low emissions can be achieved only by changing bags and assisting small-scale upgrades.

5 Multi-pollutant co-processing

Auxiliary injection of desulfurizer and activated carbon can synergistically remove pollutants such as sulfur dioxide, dioxin, and heavy metals.

Core Technology of BECLEAN™ energy-saving catalytic filter bag

1 Core Technology ONE: Low temperature SCR catalyst powder

Solid acid modification

Through the modification of solid acid, the electron movement within the catalyst material is activated, and the efficiency of powder activity and denitration performance is optimized.

Targeted development of powder based on SCR catalytic technology combined with the characteristics of filter media

By adding specific components to improve the catalyst specific surface area and pore structure, the catalytic component exists in a more active polymorphic state to achieve higher removal efficiency at low temperatures.

2 Core Technology TWO: Catalytic Fiber Technology

SCR catalyst

+

PTFE resin

Electron microscope picture of catalytic fiber

PTFE catalytic fiber

3 Core Technology THREE:Patent Catalytic Fiber + In-situ Loading Catalyst Technology

Patent name: Method for Preparing Binary Denitration and Anti-Sulfur Catalyst Loaded Filter Material by One-Step In-Situ Synthesis

Patent number: ZL 2016 1 1125918.4

Patent application date: December 09, 2016

Authorization announcement date: November 27, 2018

Performance Characterization of BECLEAN™ energy-saving catalytic filter bag

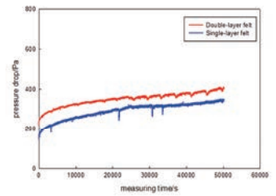
1 Catalyst Loading Firmness Test (High-temperature blowing method)

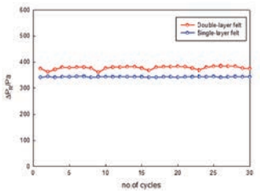
Experimental conditions	Temperature (℃)	Blowing Pressure (MPa)	Blowing Times (times)	Filter Velocity (m/min)	Concentration of Dust (g/m^3)	
	200	0.5	3000	2.0	5.0	
Indicators	Weight before blowing (g/m^2)		Weight after blowing (g/m^2)		Weight change	
One-step dipping method	Filter layer	Catalytic layer	Filter layer	Catalytic layer	Filter layer	Catalytic layer
	801	1238	/	1223	/	-15
Catalytic fiber + Filter layer	Filter layer	Catalytic layer	Filter layer	Catalytic layer	Filter layer	Catalytic layer
	810	1211	/	1210	/	1

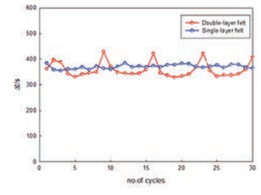
Adhesion of catalyst on the surface of filter layer after sample spraying by one-step dipping method

Add catalyst before adhesion, that is, the surface of the filter layer is clean without catalyst adhesion

2 Energy-saving filtration - VDI test of catalytic filter bag technology







Project	Double-layer felt	Single-layer felt
Initial resistance of filter material /Pa	374	340
Residual resistance/Pa at the end of 30 cycles	374	342
Time of the first cleaning cycle/s	362	384
Time of the thirtieth cleaning cycle/s	407	365
30 cycles filtration efficiency/%	99.9999	99.9999
30 cycles dustcake removing rate /%	100	100