



COMPACT FLUIDIZED BED INCINERATOR 紧凑型流化床焚烧炉

拉斯卡流化床焚烧炉技术
RASCHKA Fluidized Bed Incineration Technology

More than 70 years of experience
70 余年的相关经验

Planning and construction of fluidized bed incineration plants for:
为以下客户提供流化床焚烧炉的设计及建设：

- Energy generation
能源生产
- Energy utilization
能源利用
- Environmentally friendly thermal disposal and energy recovery
环境友好型的热能回收及废物处理

Range of capacity
处理能力

- 0,5 to 85 MW = technically and economically reasonable application range for the stationary fluidized bed combustion
从技术上和经济上考虑，固定流化床焚烧炉的合理应用范围为 0.5-85 兆瓦

More than 100 references in Europe and Asia
在欧洲和亚洲超过 100 个项目实例

INTRODUCTION 简介

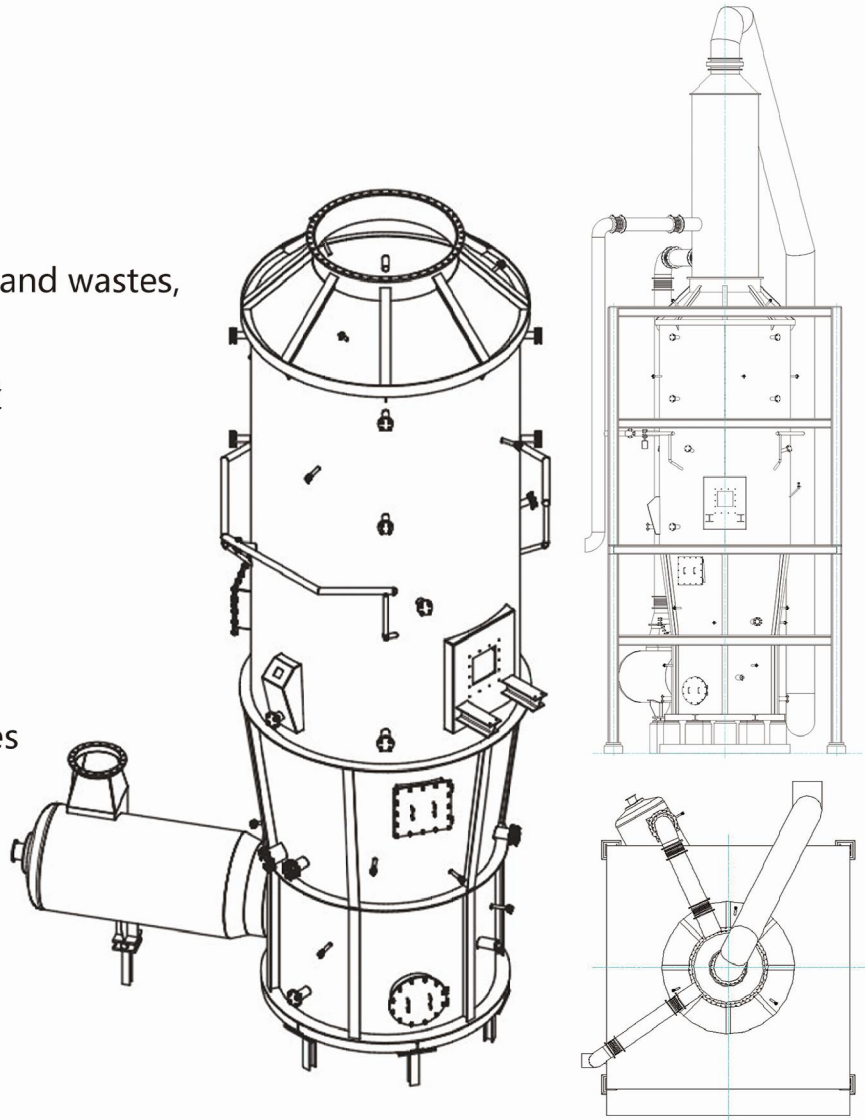
Raw materials :

处理的废弃物种类 :

liquid, pasty and solid materials, residues and wastes,
especially:

液体、糊状物及可被循环再生的固态物、残渣
及废弃物，特别是：

- Sludge
污泥
- Waste from chemical industries
化工企业产生的废物
- Waste from paper and pulp industries
造纸 / 纸浆行业产生的废物
- Inferior coal, low-grade coal
劣质或低品质的煤
- Industrial, refinery and coal slurries
化工、炼油及煤炭行业产生的三泥
- Biomass, bark
生物质燃料、树皮



RASCHKA- Conception of a Compact Fluidized Bed Incinerator 拉斯卡紧凑型流化床焚烧炉 (FBI) 的理念

(FBI ~ 1 MW thermal capacity)
(流化床焚烧炉 ~ 1兆瓦热容量)

Compact FBI Conception

紧凑型流化床焚烧炉理念

- Decentralized thermal disposal and energy recovery directly on site
分散式的现场废弃物热处置及余热回收
- Independent of large, central plants
不依赖大型工厂
- No sludge transportation
不需要污泥运输

Simple design

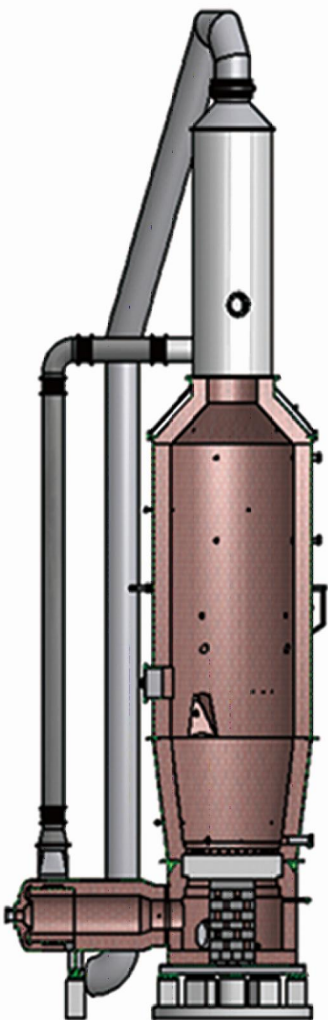
简化设计

- High availability
高适用性
- Simple operation
操作简单
- Low investment and operational costs
较低的投资及运营成本

Main components

主要构成

- Fluidized bed oven
流化床本体
- Waste heat recovery, e.g. recuperator as air pre-heater, hot water boiler
余热回收如：空气预热器或热水锅炉
- Dry flue gas cleaning
干法气体净化



Example of compact fluidized bed incinerator operational since 2008
从2008年起就有紧凑型流化床焚烧炉的运营实例

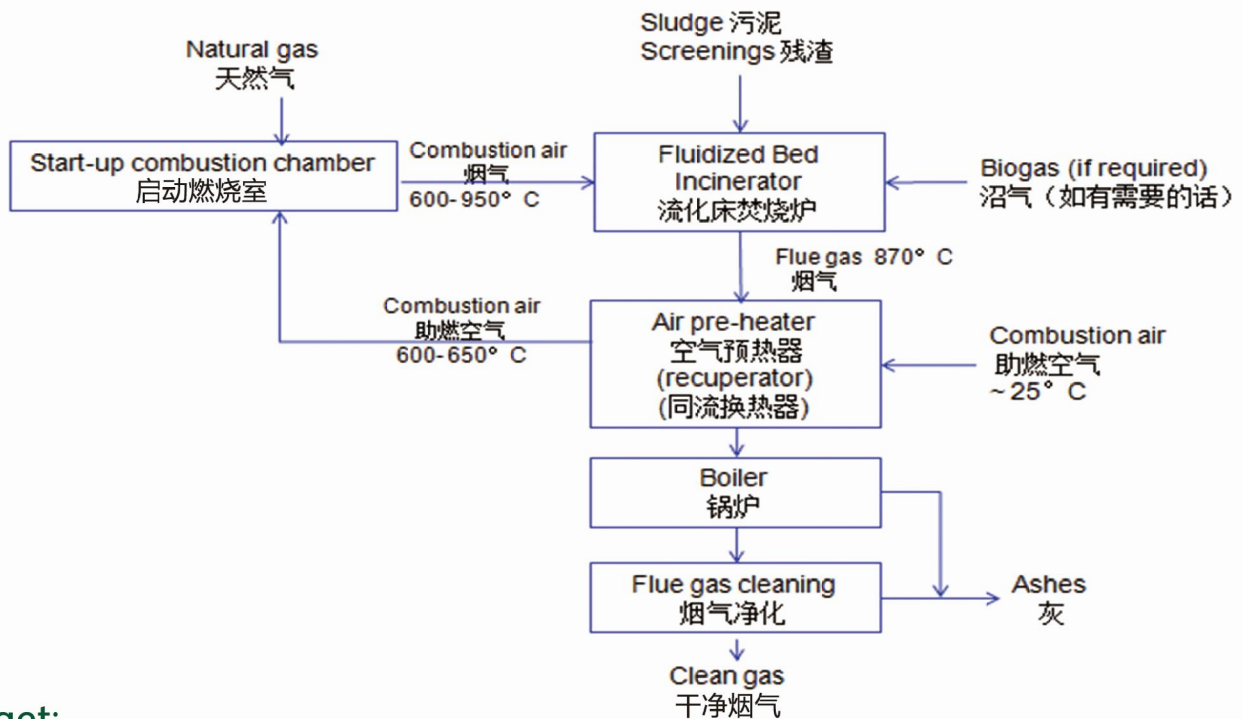
COMPACT FBI REFERENCE 紧凑型流化床焚烧炉实例

Thermal disposal of sludge and screenings and energy recovery
污泥及残渣的处置和热能回收

Fuel data 燃料数据	Unit 单位	Sludge 污泥	Screenings 残渣	
Dry solids (ds) – content 干物质含量	%	23-30	21	
Organic dry solids (ods) -content of ds- 干物质中有机物的含量	%	50	80	
Lower heating value (lhv) of ods 有机干物质的低位热值	MJ/kg	25	19	
Throughput in operation of 7'500h/yr 年运行时间 7'500小时/年	Unit 单位	Sludge 污泥	Screenings 残渣	Total 总共
throughput raw 废弃物处理能力	ton/yr	7'000-9'130	401	7'401 - 9'531
throughput raw 废弃物处理能力	kg/h	933 - 1'217	54	987 - 1'271
throughput ds 干物质处理能力	kg/h	280	11	291
throughput water 废水量	kg/h	653 - 937	43	696 - 980



PROCESS DESCRIPTION 工艺描述



Target:

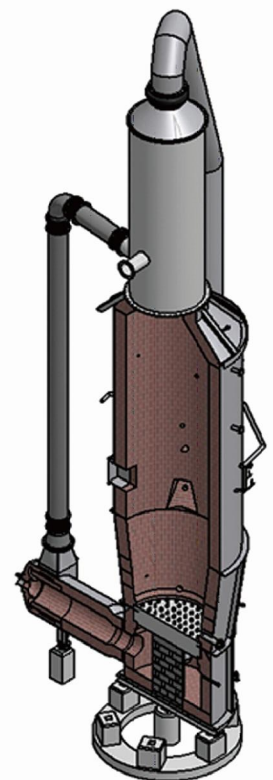
目标:

- Compact plant size with a small foot print requirement
工厂设计紧凑，占地面积小
- Simple system design
系统设计紧凑
- User friendly, reliable and high availability
系统使用方便、可靠及实用性强
- Simple, pragmatic and cost-effective solution
简单、实用及经济的解决方案

Process advantage:

工艺优点:

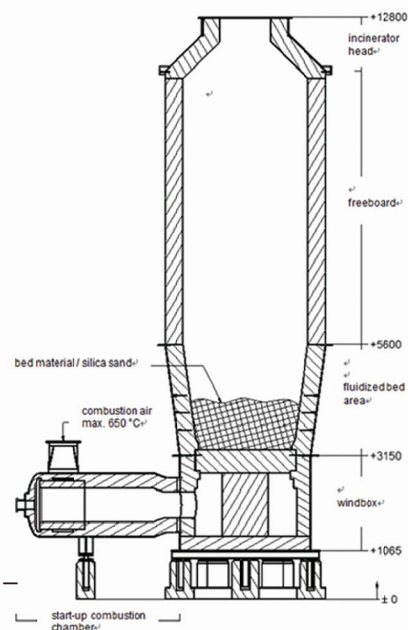
- No thermal (pre) drying
无需热干化
- No conditioning with high calorific (substitute) fuels
无需添加高热值的辅助燃料
- No improvement in the mechanical dewatering
对机械脱水没有特殊要求，无需深度脱水



PROCESS DESCRIPTION 工艺描述

Compact FBI provides:
紧凑型流化床焚烧炉为您提供:

- Recovery of energy set-free in the combustion process
回收焚烧过程中的热量
- Recirculation of energy in the process
工艺过程中的能量循环
- Pre-heating the combustion air to 600-650°C by heat exchanger utilizing hot flue gas (870°C)
通过换热器，用870°C的烟气将助燃空气预热到600-650°C
- Further heating up of the combustion air to 950°C – if required –
如有需要可把助燃空气进一步预热到950°C
- Injection of biogas in the fluidized bed – if required –
如有需要可向流化床喷沼气



Process Parameters 工艺参数 (项目实例)

Incineration at 870°C, temporary addition of natural gas and/or biogas on demand
焚烧温度为870°C，根据需要间歇性添加天然气和/或沼气

Medium 介质	Unit 单位	Design point 设计点
Combustion air 600°C 助燃空气 (600摄氏度)	m _n ³ /h	3'300-3'300
Natural gas (34MJ/m _n ³) in incinerator 焚烧炉补燃天然气 (34MJ/m _n ³)	m _n ³ /h	Up to 60 最高60
Biogas (22MJ/m _n ³) in fluidized bed (Lances) 流化床沼气喷枪 (22MJ/m _n ³)	m _n ³ /h	Up to 30 最高30
Flue gas 870°C 烟气 (870°C)		
-- Flow (wet) 流量 (湿态)	m _n ³ /h	4'000-4'700
-- N ₂	Vol.-%	56-60
-- O ₂	Vol.-%	8-9
-- CO ₂	Vol.-%	5-6
-- H ₂ O	Vol.-%	25-30
-- Ashes 灰	kg/h	139

Emissions

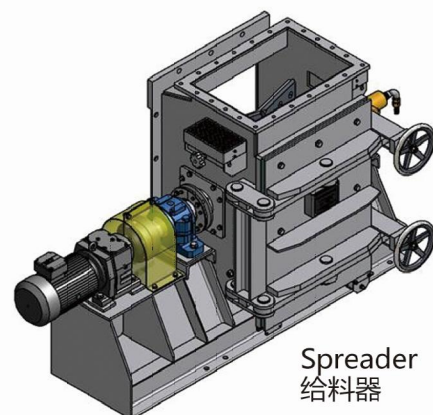
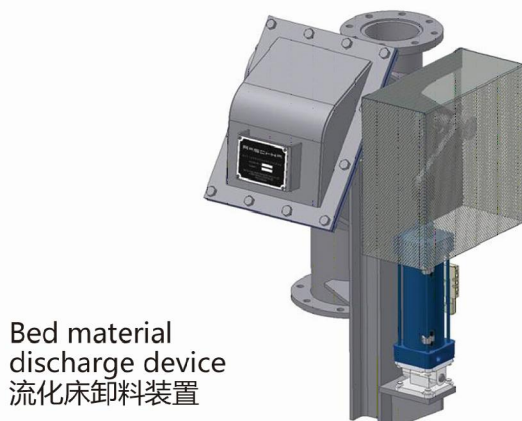
排放标准

- All emission limits of the EU-directive 2000/76/EC or 17.BImSchV are kept reliably
所有排放标准遵循欧盟2000/76/EC或17.BImSchV标准
- Additional measures in case of higher sulfur content in combustible: addition of lime to combustible
如果原料中硫含量较高，可在污泥中添加石灰
- Experience - no need for NOx reduction (such as SCR, SNCR)
无需去除氮氧化物（如SCR及SNCR）

Compact Fluidized Bed Incinerator Key Advantages

紧凑型流化床焚烧炉的主要优势

- State of the art, future-oriented solution for the decentralized, thermal disposal of residues and waste materials combined with energy recovery on site
代表未来发展趋势的、用于分散式处理废弃物、残渣并集合余热回收的先进技术
- Fully functional, reliable, easy and economical installation and operation
在安装和操作方面集功能性、可靠性、简易性及经济性于一体
- Compliance with all legal requirements regarding operating regulations and emission limits
遵循所有的法律法规要求的同时兼顾可操作性及排放要求
- Independence of large, centralized treatment facilities
不依赖大型的中央处理系统
- No transportation costs to central facilities
无运输到中央处理工厂的费用
- Avoids the need for sludge transport and reduces CO₂ emission
避免污泥运输，减少二氧化碳的排放
- Combines economics and ecology
经济学与生态学的完美结合



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