IBU | tec

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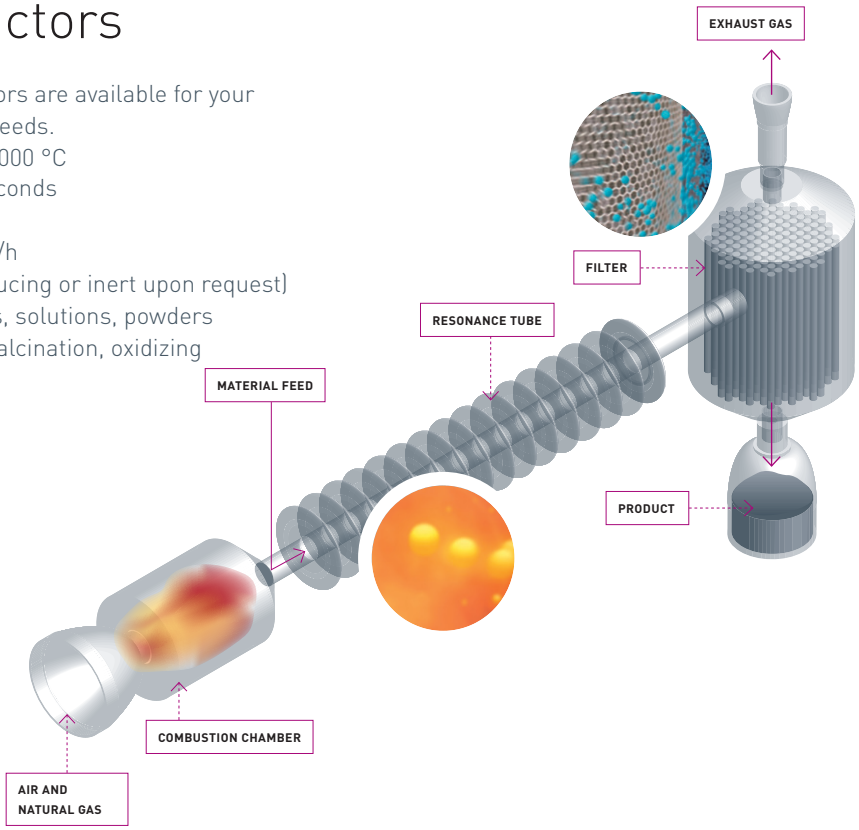
Fact sheet
Pulsation Reactors

Eight different pulsation reactors are available for your project trials and production needs.

- Temperature range 250 – 1,000 °C
- Residence time: 0.05 – 2 seconds
- Reaction mode: continuous
- Material input: up to 160 kg/h
- Atmosphere: oxidizing, (reducing or inert upon request)
- Input material: suspensions, solutions, powders
- Typical processes: drying, calcination, oxidizing



Name	Gas atmosphere	Residence time [s]	Thermal Output [kW]	Heating type	Temperature range [°C]	Raw material throughput [kg/h]	Special features
PR 10	oxidizing, (inert)	0.5 to 2	500	natural gas	250 up to 950	**up to 160**	
PR 9	oxidizing	0.1 to 1	250	natural gas	500 up to 950	**up to 160**	DeNOx
PR 8	oxidizing	0.1 to 1	250	natural gas	500 up to 950	**up to 160**	
PR 7	oxidizing	0.1 to 1	250	natural gas	500 up to 950	**up to 160**	
PR 6	oxidizing, (inert)	0.1 to 2	500	natural gas	250 up to 1,300	**up to 80**	
PR 5	oxidizing	0.1 to 1	250	natural gas	500 up to 950	**up to 160**	
PR 4	oxidizing	0.1 to 1	150	natural gas, (H2)	500 up to 950	**up to 80**	DeNOx
KM-PR	oxidizing	0.05 to 1	50	natural gas	250 up to 1,000	**0,1 to 20**	flexible, highly specialized trials with small quantities of materials, individually tailored to customer requirements

IBU-tec – Pre- & Post-Processing

Conveying and Dosing Equipment

- Screw conveyors
- Conveyor belts
- Disc conveyors
- Pneumatic conveyors
- Gravimetric dosing unit with screw feed
- Volumetric dosing screws
- Vibration chutes (Vibration conveyors, Gravimetric feeders)
- Dosing belt scale
- Membrane pumps
- Spraying lances
- Rotary feeders
- Displacement and peristaltic pumps

Exhaus Gas Treatment

- Thermal afterburners and exhaust gas cleaning
- DeNOx systems to denitrogenize the exhaust gas
- Filter systems to remove dust from the exhaust gas
- Gas scrubbers, venture-scrubbers (wet gas scrubbers) for the removal of particulates and absorbable gases (acidic and alkaline washes)
- Dust analysis in the treated gas, final police filter
- Use of adsorbents to remove acidic components

Mixing and Granulation Units

Type	Number on site	Typical size	Attainable throughput	Material type	Specifications / special characteristics
EIRICH Intensive mixer R2	1	Useable vol.: 3.5 l	N/A	Stainless steel	Laboratory mixer
EIRICH Intensive mixer R09	1	Useable vol.: 150 l	up to 300 kg/h	Stainless steel	Batch mixer, suitable for tests or production
EIRICH Intensive mixer R11	1	Useable vol.: 250 l	up to 1,000 kg/h	Carbon steel	Batch mixer, suitable for tests or production, automated
Cone mixer	2	1 x à 1,500 l 1 x à 2,500 l	up to 400 kg/h	Stainless steel	Batch mixer, suitable for tests or production
Lödige ploughshare mixer	5	3 x à 600 l 1 x à 300 l 1 x à 1,600 l	up to 600 kg/h	Stainless steel	Batch mixer, suitable for tests or production

Screening and Sorting

Type	Number on site	Attainable throughput	Mesh dimensions	Spezifications / special characteristics
Multi-deck screening machine	1	up to 1,000 kg/h	0.1 mm to 7 mm	7 decks
Vibration-screening machine	1	up to 500 kg/h	40 µm - 1,000 µm	2 decks / ultrasound cleaning
Vibration-screening machine	1	up to 350 kg/h	40 µm - 1,000 µm	2 decks / ball cleaning
Round-vibration sieve	1	up to 350 kg/h	40 µm - 1,000 µm	2 decks / ultrasound cleaning
Single deck screen	2	up to 100 kg/h	0.2 mm to 5 mm	1 deck / only for removal of oversized and undersized particles

IBU-tec – Laboratory Facilities

Experimental Kilns

- A gradient kiln of our own design is used to simulate processing conditions in industrial direct kilns (dynamic laboratory kiln, max. 1,500 °C)
- Pivot kiln (Carbolite) with a modifiable atmosphere, simulating sample movement (max. 1,100 °C)
- High-temperature microscope with automatic image analysis (HTM) for the determination of melting and expansion behavior (max. 1,600 °C)
- A large number of muffle furnaces (max. 1,600 °C)

Mineralogical Analysis

- Phase analysis using X-ray diffraction / XRD (Bruker D2 Phaser), including Rietveld analysis

Chemical Analysis

- Digestion (among others: fusion, microwave, acidic)
- Optical emissions spectroscopy (ICP-OES)
- Atomic absorption spectrometer (F-AAS)
- Complexometric titration
- Colorimetry
- Photometry
- Potentiometry
- Gravimetric analysis
- Elemental analysis

Processing Technology

- **2 agitator bead mills** (Netzsch Zeta RS & LabStar)
- **Spray drying** (GEA Niro Minor)
- Cryomilling
- Homogenization
- Dispersing
- Stirring
- Drying
- Centrifugation

Fuel Analysis

- Elemental analysis (C, H, N, S)
- Ash analysis
- Calorific value measurement
- Ash melting characteristics (HTM)

Physical Analysis

- Specific surface area (Brunauer-Emmett-Teller, BET) by N_2-Physisorption
- Pore size distribution and pore radius distribution
- Dynamic and static laser granulometry (particle size analysis / PSD)
- Sieving analysis
- Determination of particle size, particle shape, particle distribution and strength
- Color value measurement
- Density analysis
- Light microscopy with digital image analysis