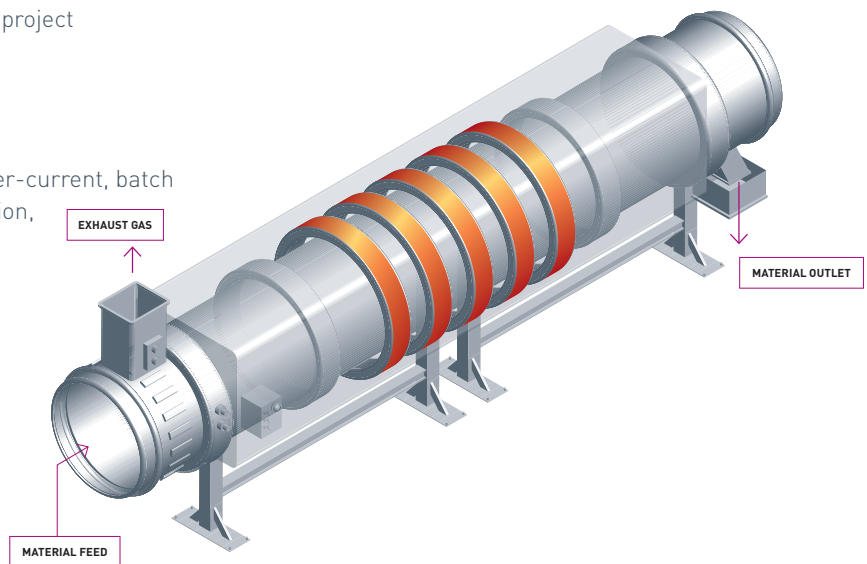


Fact sheet

Indirectly heated Rotary Kilns

Sixteen different rotary kilns are available for your project trials and production needs.

- ▶ 12 indirect heated rotary kilns
- ▶ Temperature range: 100 – 1,200°C
- ▶ Residence time: 15 – 180 minutes
- ▶ Reaction modes: continuous, co-current, counter-current, batch
- ▶ Typical Processes: pyrolysis, calcination, reduction, surface treatment of catalyst supports



Kiln name	Heated kiln length [m]	Inner diameter [m]	Heating type	Temperature range [°C]	Raw material throughput [kg/h]	Mode of operation	Special features
IDO 10	7	1	natural gas	300 – 1,150	100 – 1,000	counter-current	5 heating zones
IDO 9	7	1	natural gas	300 – 1,100	100 – 1,100	counter-current	defined gas atmosphere, 5 heating zones, afterburner
IDO 11	4.7	0.6	electrical	100 – 1,150	40 – 400	counter-current	inert and reducing, hydrogen-atmosphere, thermal oxidizer
IDO 3	4	0.5	natural gas	300 – 1,150	25 – 250	counter-current or co-current, batch operation possible	defined gas atmosphere, 6 heating zones, afterburner
IDO 6	3.75	0.45	electrical	100 – 900	15 – 150	counter-current	3 heating zones, thermal oxidizer, DeNOx
IDO 5	3.5	0.4	natural gas	300 – 1,100	10 – 100	counter-current or co-current	defined gas atmosphere, 3 heating zones, afterburner
IDO 1	3	0.4	electrical	50 – 1,150	10 – 100	counter-current or co-current, batch operation possible	defined gas atmosphere, 3 heating zones, afterburner
IDO 2	2.5	0.35	electrical	50 – 1,200	10 – 75	counter-current or co-current, batch operation possible	4 heating zones
IDO 7	2.3	0.254	electrical	100 – 1,000	3 – 30	counter-current	inert and reducing, thermal oxidizer
IDO 4	1	0.1	electrical	50 – 1,100	0.1 – 2	counter-current or co-current, batch operation possible	defined gas atmosphere, afterburner
IDO 8	1	0.1	electrical	100 – 1,400	0.1 – 2	counter-current or co-current, batch operation possible	ceramic & metal tube, defined gas atmosphere, afterburner
IDO 12	0.9	0.4	electrical	50 – 1,100	ca. 30 l/batch	batch operation only	

Pre- & Post-Processing Equipment

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

Exhaust Gas Treatment

- ▶ Thermal afterburners and exhaust gas cleaning
- ▶ DeNO_x 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	Specifications / 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

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 / ICP-iCAP)
- ▶ 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 (CHS & CHNS)
- ▶ Proximate analysis
- ▶ Ash analysis
- ▶ Calorific value measurement
- ▶ Ash melting characteristics (HTM)

Physical Analysis

- ▶ Specific surface area (Brunauer-Emmett-Teller, BET) by N₂ adsorption
- ▶ Pore size distribution and pore radius distribution
- ▶ Dynamic and static laser granulometry with a laser diffractometer, in situ (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