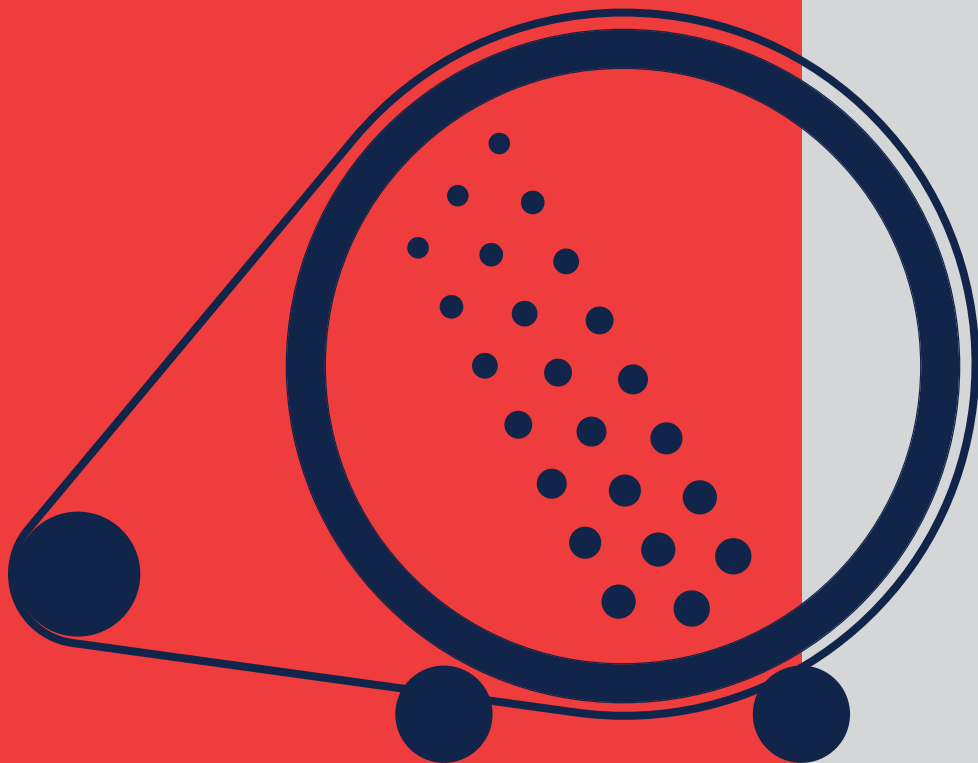




We supply high-end solutions for the sulphur industry. From melting and degassing to forming, we offer a complete lineup of equipment for the safe and reliable processing of sulphur.

ipco.com

—ADVANCED— —SULPHUR— —PROCESSING—



ADVANCED SULPHUR PROCESSING

Sulphur granulators

High capacity, low maintenance continuous drum granulation

The IPCO patented granulation process generates seed or nuclei particles of solid sulphur by freezing sprays of liquid sulphur in a water bath at controlled pressures to form the desired size range. These particles are then augered into a slowly rotating drum with appropriately placed flights attached to its inner surface. These flights create curtains of particles inside the drum as well as gently advancing the formed sulphur towards the discharge end of the drum.

These nuclei particles are progressively enlarged to the appropriate size by coating the curtains of particles with sulphur sprayed from a bank of nozzles on a header running the length of the drum. The temperature in the drum is moderated by the evaporation of water from spray nozzles located inside the drum.

Sulphur granules of SUDIC premium quality are discharged to a belt conveyor for transportation to storage and/or further handling.

Clean, safe and environmentally friendly production

A fan is used to draw a stream of air through the drum to sweep out the water vapor as well as any fugitive dust inside the drum. The dust is scrubbed out of this exhaust stream using a wet scrubber before the process air stream is released to the atmosphere.

The underflow from the wet scrubber cyclone is pumped to the same settling/dewatering tank that is used to generate the seed particles. Here the fines settle out and are augered up along with the sulphur particles generated by the seed generator sprays.

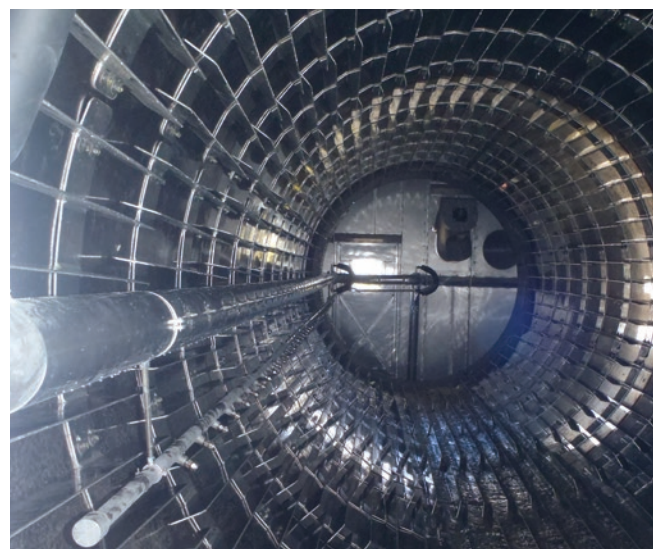
The IPCO granulation process is a fully automated process, designed to run under a variety of ambient conditions.

The PLC-based control system includes an interface that allows the operator to see the process overview, operating control status and detailed real time trend analysis. The system monitors and controls the process parameters and will automatically shut down in the event of any 'out of control' situation.

Start up and shut down of the forming unit is managed by a single click of a mouse. Data collection, reporting and storage can be tailored to meet specific requirements.

Technology specifications

Sulphur dust emissions	< 40 mg/m ³
Sulphur forming capacity	Up to 2 200 MTPD
Sulphur pressure	600–1 000 kPa(g)
Sulphur temperature	< 150 °C
Steam pressure	200 kPa(g)



Key features and benefits of the IPCO continuous drum granulation process include:

- The highest capacity granulation unit in the industry.
- Capability to vary production of new granules and control PSD while in operation.

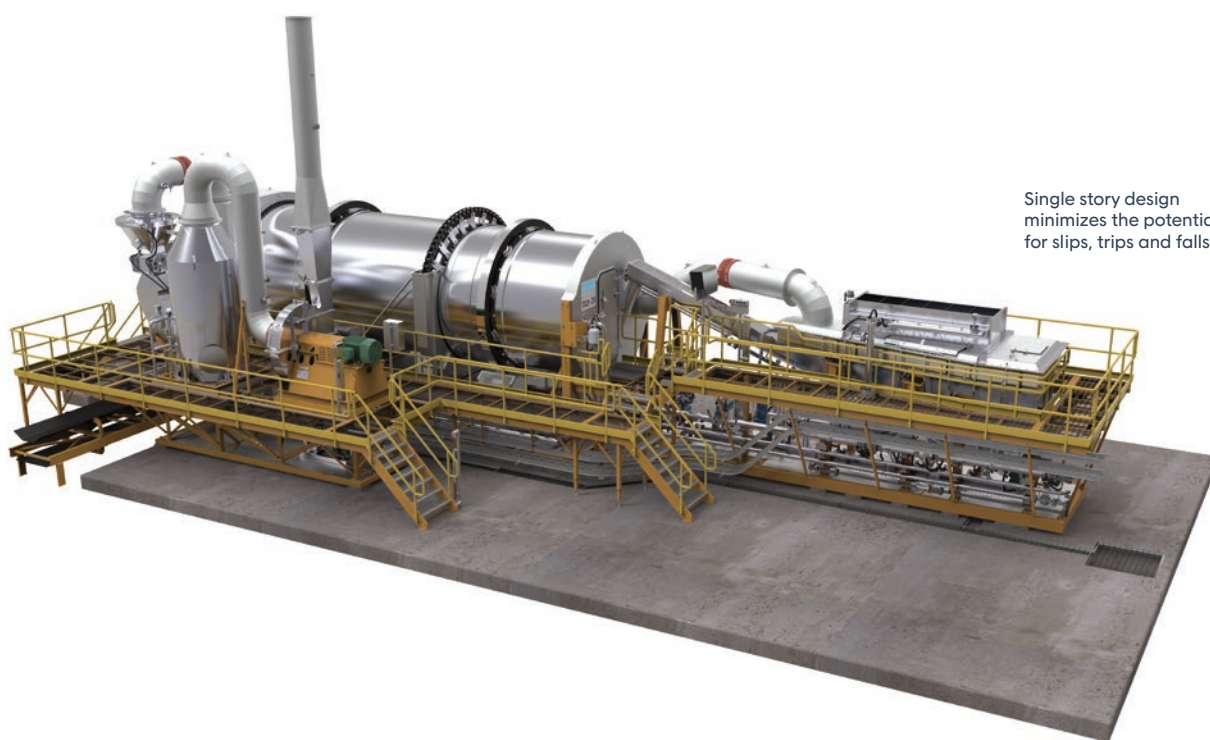
Fully automated rotating drum technology delivering fast and reliable production of high quality granules.

- Self-contained with small footprint – compact, skid-mounted unit supplied fully wired with all piping installed and simple battery connections.
- Low CAPEX – simple, effective design minimizes rotating equipment, piping, structure and overall scope of supply.
- Proven, high quality machinery and instrumentation.

- No sulphur pre-conditioning equipment required – process unaffected by high sulphur temperatures.
- Continuous operation – no need to routinely shut down to clean drum internals, scrubbers, fans or ducts.
- No solid waste streams or liquid effluents to be melted, treated or disposed of.
- Low maintenance – horizontal 0° drum minimizes stress on rotating components.
- Excellent HSE performance – lowest dust emissions, fully automated, unhindered maintenance access.
- Full performance guarantees, warranties, and technical support.

Premium granular product to SUDIC specification

The granules produced by the IPCO system meet the shape and stress level I and II friability criteria of SUDIC 'premium product' specifications (see below). A spherical shape – combined with the thin layers of molten sulphur sprayed onto the surface as the granules pass through the system – allows natural shrinkage without weakening as the product transitions from melt to solid. All other criteria are easily met, at any production rate.



Specifications

Shape	Generally spherical
Friability (Stress Level I)	<= 1%
Friability (Stress Level II)	<= 2%
Moisture (as produced) (bulk average)	<0.5%
Bulk density (loose)	Minimum 1 040 kg/m ³
Bulk density (compacted)	Minimum 1 200 kg/m ³
Angle of repose	Minimum 25°

Sulphur melters

High performance, skid-mounted melter – low maintenance, low operating costs

Efficient melting and contaminate removal

IPCO sulphur melters are versatile and compact units offering predictable, high capacity throughput and contaminate removal.

IPCO sulphur melters can handle high levels of moisture (over 5%). Sulphur with high moisture content can be handled at lower production rates, while sulphur with low moisture content can be handled at higher production rates.

Skid-mounted for easy transportation, IPCO melters benefit from self-cleaning features and an interactive process control system, ensuring maximum throughput rates and decontamination capability throughout a wide range of waste sulphur moisture and contaminate levels

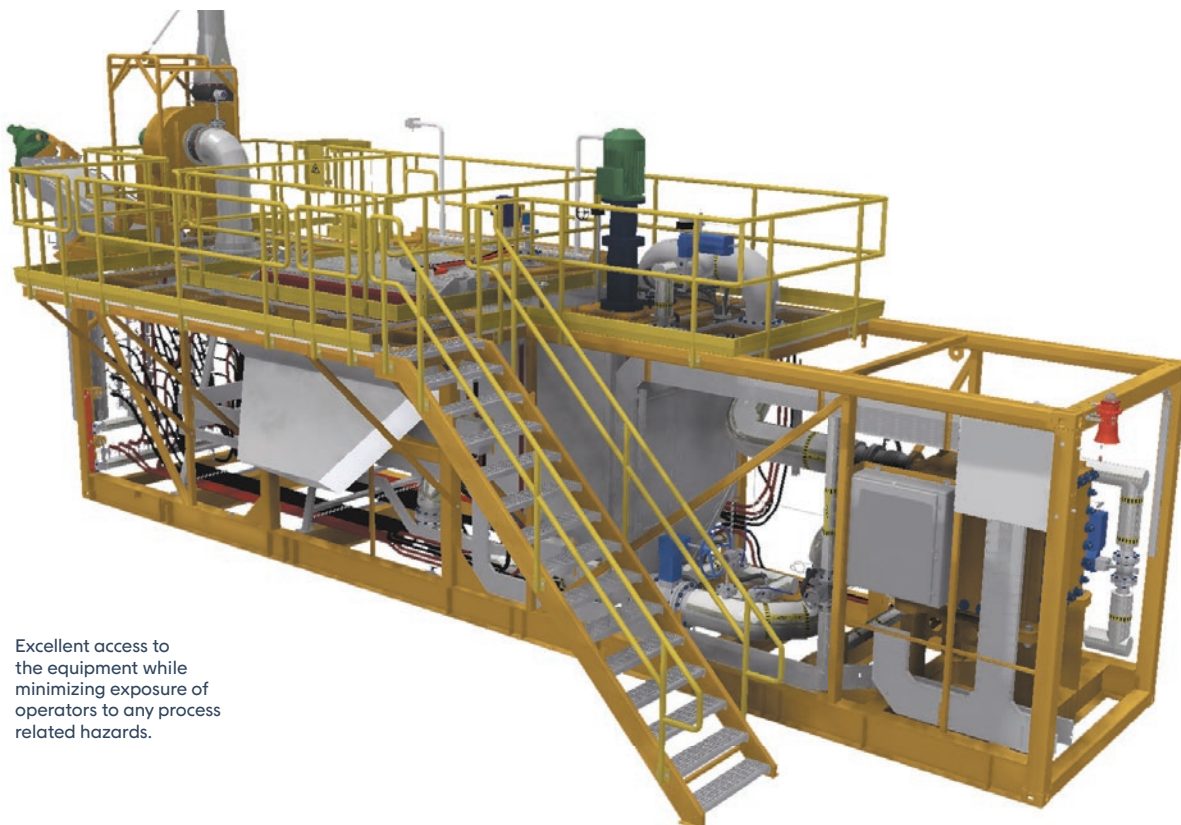
Reliable operation with minimal manpower requirements

Solid sulphur is melted in a settling tank while heated liquid sulphur is recirculated through the tank, aiding in the melting process. The heavier contaminants settle out of the molten sulphur and are continuously removed and concentrated via a screw conveyor.

A single PLC manages key parameters such as tank sulphur temperature, feed rate and tank levels through interdependent control loops. The control system maintains the process parameters within ideal ranges to get the most out of every kW of energy used.

Technology specifications

Sulphur melt rate	up to 1 500 MTPD
Sulphur discharge pressure	0–500 kPa(g)
Sulphur discharge temperature	< 150 °C
Steam pressure	800 kPa(g)



Excellent access to the equipment while minimizing exposure of operators to any process related hazards.

Designed for low cost, high productivity melting, with interactive process controls ensuring optimal performance

The result is a steady-state operation at the highest levels of productivity and efficacy. Data collection, reporting and storage will be tailored to your specific requirements:

- Predictable, maximum throughput rates.
- Efficient use of energy.
- Maximum settling capability, resulting in reduced particulates at the filters and mitigating potential for downstream contaminants.
- Reduced sulphur concentration in recovered contaminants.
- Fully instrumented and process controlled resulting in hands-free operation.
- Easy to use controls, including ESD and process trend data collection.
- Metered and data-logged melt rate.
- Low operating cost; minimal manpower requirements.
- Low maintenance cost; stainless steel construction, proven pumps, instruments and filters suitable for sulphur service, robust design.
- Environmentally and HSE friendly; low exposed molten sulphur surface area, fume hoods and dilution fans, continuous, low dusting feed system, reduced potential for sulphur spills, limited manual labour or exposure to potential hazards – no manual contaminate removal required.

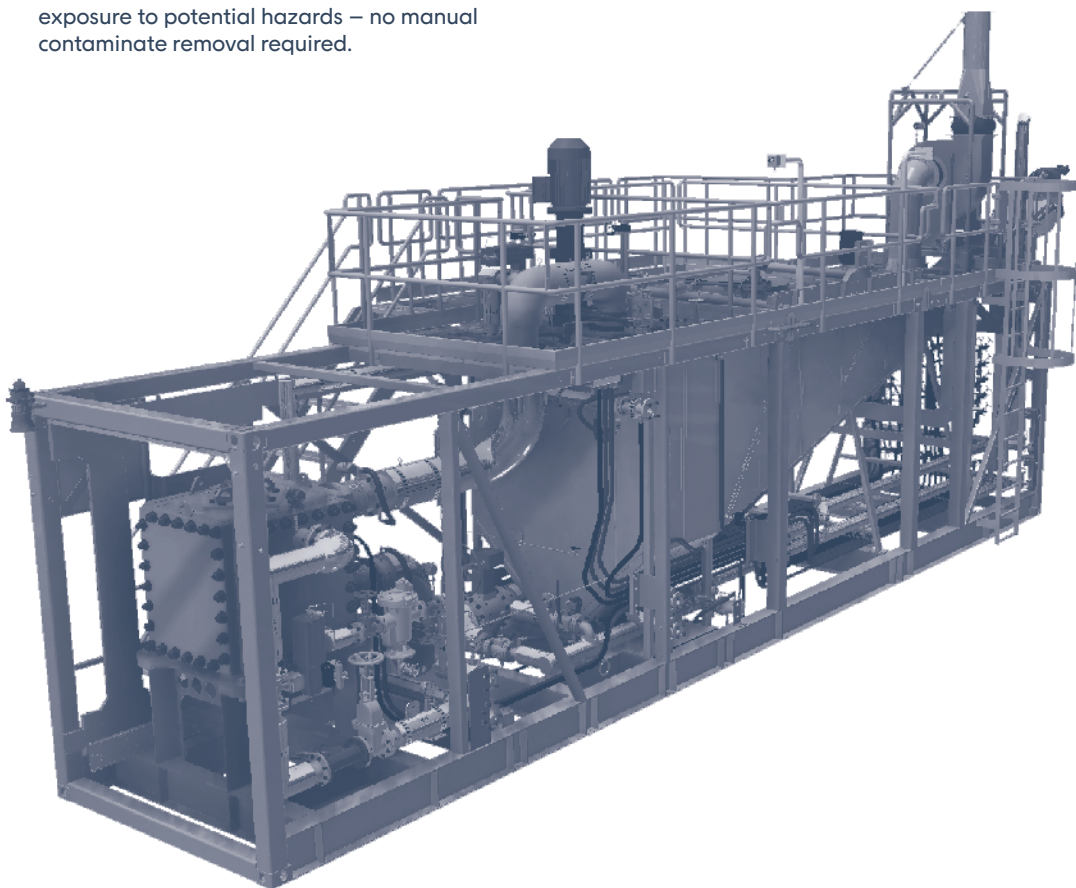
- Optional cold weather protection; insulated, fully steam traced, electrical tracing on condensate lines.
- Self-contained, compact, portable and flexible; skid-mounted, fully wired, all piping installed, single battery limit connection.

Waste (effluent) generation

The design basis for the melter assumes that the discharged waste will contain 50% sulphur and 50% contaminants. This ratio can be affected by the particle size distribution of the solids as finer material will have more particle surface area that can be 'wetted' by molten sulphur.

For finer contaminants that do not settle out in the melter, downstream filtration systems can be used.

The result is molten sulphur that meets or exceeds the purity specifications necessary for it to be re-introduced into the supply chain.



Sulphur degassers

Liquid sulphur degassing to below 10 ppm H₂S

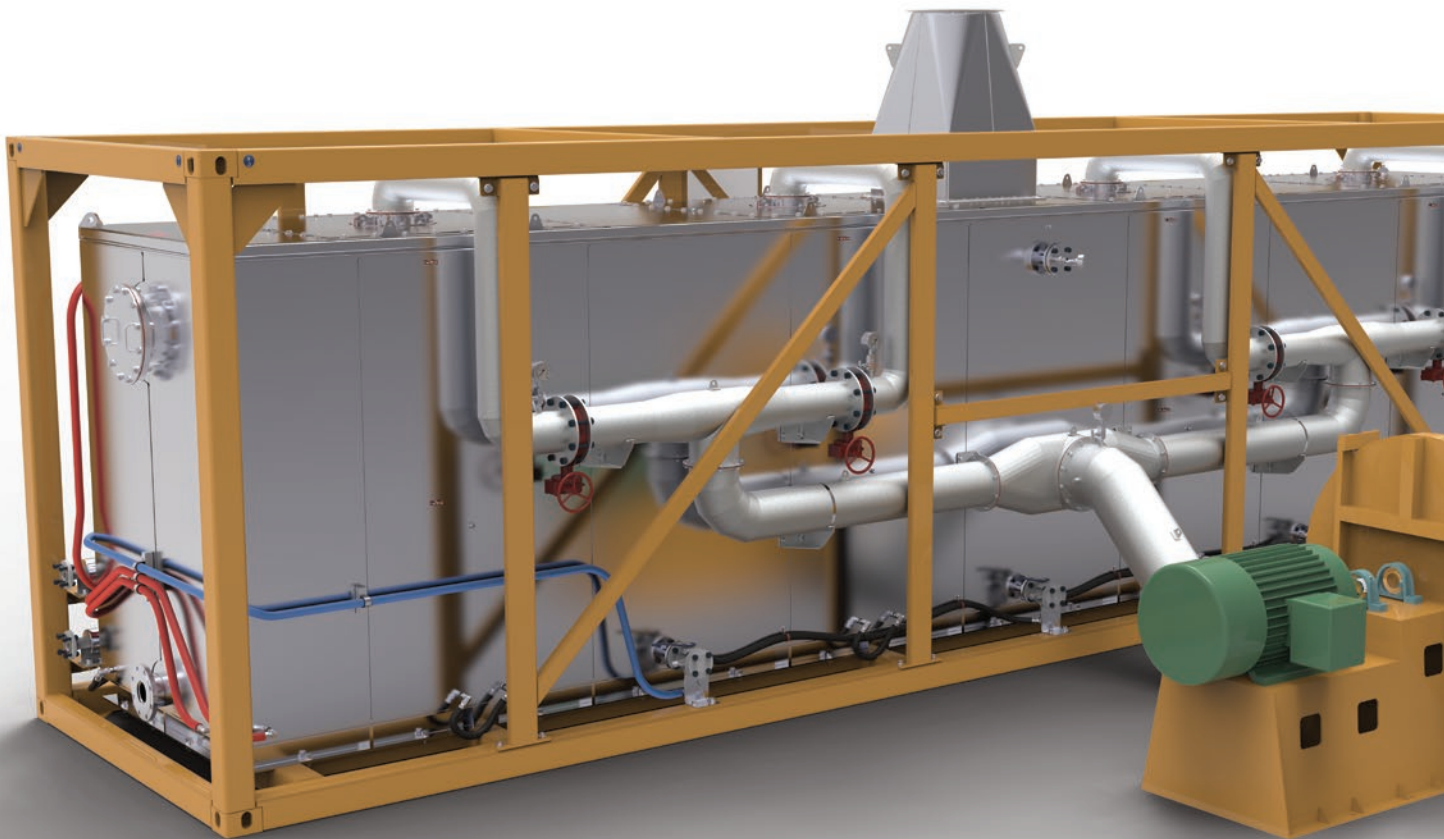
Our liquid sulphur degassers have been designed by experts in sulphur degassing technology and represent a new standard in reliable hydrogen sulfide reduction.

In today's changing sulphur industry landscape, product quality and safety are more important than ever. The IPCO sulphur degassing process offers an efficient and economical solution to the challenge of reducing poisonous hydrogen sulfide in liquid sulphur.

Designed to offer reliable operation with low running costs, these compact, self-contained units deliver continuous degassing at maximum efficiency.

Key benefits of this system include:

- Maximum degassing capability, mitigating potential for downstream regulatory violations.
- Reduced H₂S concentration in plant environments.
- Continuous flow through processing capability.
- Efficient use of energy.



Self-contained unit delivering superior environmental performance

Molten sulphur is pumped through the degassing reactor; the system as a whole is designed to provide the required residence time to ensure efficient degassing.

Tiny air bubbles are introduced by an air blower to allow for transfer of evolving H_2S gas from the molten liquid to the headspace of the sealed reactor tank.

A catalyst injection system provides a measured volume of select catalysts to quickly reduce the H_2S_x hydrogen polysulfide molecules to gaseous H_2S to facilitate complete degassing of both H_2S and H_2S_x species existing in equilibrium within the molten sulphur.

Because the reactor is under negative pressure, the air injected into the molten sulphur within the stainless steel, steam jacketed degassing tank is withdrawn from the headspace with a sweep air stream.

H_2S rich airflow exits the degassing reactor and is transferred via ducting to an appropriate effluent treatment system while the H_2S lean molten sulphur is transferred to downstream systems:

- Self-contained, compact, portable and flexible.
- Skid-mounted, fully wired, all piping installed on skid, simple battery limit connections.

- Superior environmental and HSE performance – system operates continuously under negative pressure in a fully contained system with reduced potential for spills.
- Limited manual labor or exposure to potential hazards.
- Low operating and maintenance cost – proven rotating equipment and instruments suitable for sulphur service, robust design and no moving parts inside the sulphur system.
- Easy to use controls and process trend data collection.
- Designed and constructed to meet or exceed all international standards and regulatory requirements.

We can offer advice on various effluent treatment systems including thermal oxidization and H_2S scrubbing.

Technology specifications

Sulphur degassing rate	Up to 3 000 MTPD
Steam pressure	200 kPa(g)

Break bulk shipping

Miscellaneous components shipped in a 40' sea container.



Single story design provides optimal access for operators and maintenance crews.



PHUR—PROCESSING— ADVANCED— —SULPHUR—