



Firing for your processes

## Sulphur

## Combustion of Sulphur

Sulphur throughput Realized: 30 t/h, feasible nozzle dimensions up to 45 t/h

Additionally: Gas or oil lances with a 1:10 air surplus in the sulphur burner for heating up

For small scale heating up operations: Additional damper for fail-proof combustion

More than 30 years of experience in the combustion of sulphur using the CTP-DUMAG® ultrasonic nozzles

Burner equipped with one or two burner lances for sulphur.



### Advantages

- ▲  $\text{SO}_2$  concentration concerning the constant load range  $\text{SO}_2 > 18\%$
- ▲ Stable free flame without flame holder plates at burner outlet thanks to highly turbulent CTP-DUMAG® ultrasonic atomizer nozzle – decreases contamination, maintenance rate, blackouts
- ▲ Controllable flame length and temperature distribution via burner swirl and adjustable nozzle
- ▲ No rotating parts in the hot combustion chamber
- ▲ New developed ultrasonic atomizer nozzle with increased flame stability and increased control range 1:7
- ▲ Resistant to fluctuations in viscosity in the temperature range of the lowly viscous sulphur
- ▲ Low combustion air pressure drop above the burner

### CTP-DUMAG Services

- ▲ Basic and detail engineering
- ▲ Layout of the plant
- ▲ Computational Fluid Dynamics CFD
- ▲ Delivery of a ready-for-use burner system including control and safety technology
- ▲ Heated burner lances to ensure constant viscosity of sulphur
- ▲ Delivery of valve rack with all necessary controls, including heated controls, piping system and flanges to ensure constant viscosity of sulphur
- ▲ Delivery of burner chambers for combustion of sulphur
- ▲ Burner using 100% oxygen instead of compressed air and combustion air
- ▲ Mechanical testing in the CTP-DUMAG workshop – also for large burners
- ▲ Documentation
- ▲ Supervision of erection
- ▲ commissioning
- ▲ Service and remote maintenance of the burner plant
- ▲ Revamp

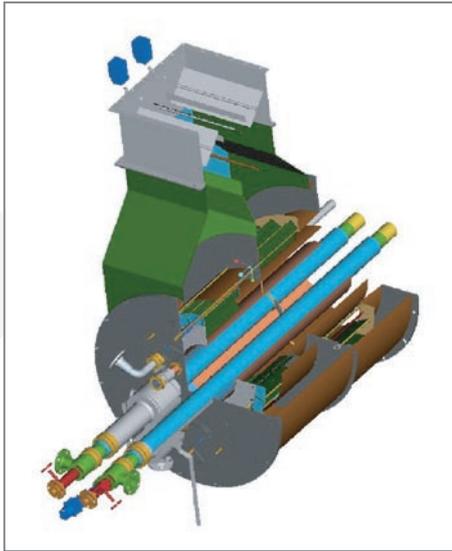


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### CTP-DUMAG – Burner for Sulphur

With gas or oil lances for start-up operation

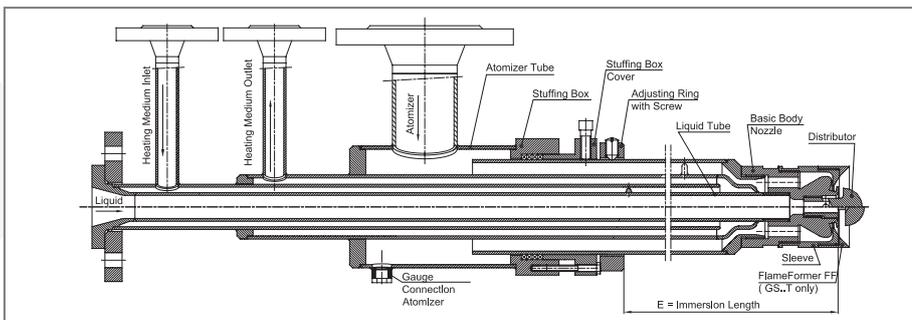


Final checks at CTP-DUMAG workshop before delivery



Sulphur burner with 2 heated sulphur lances, 3 gas lances and additional damper for combustion air for heating up with gas

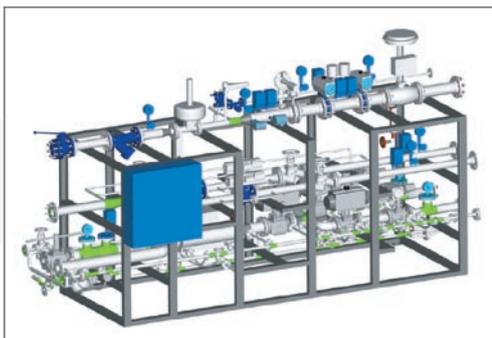
### Heating Lance



CTP-DUMAG® ultrasonic atomizer nozzle with steam-heated burner lance

Heating to a constant temperature keeps sulphur capable of flowing

### Instrument racks



Diligent lay-out of control groups



### Combustion chambers



Delivery of  
Combustion chambers



### Plants



Stable free flame without flame holder  
plates at burner outlet ...  
... thus no contamination or burner  
blackouts due to contamination  
Decreased maintenance rate



- ▲ Production plant of sulphuric acid
- ▲ SO<sub>2</sub> content in process gas >18%
- ▲ Burner capacity IB1500GS, 15MW
- ▲ Troughput 4.130kg/h Sulphur

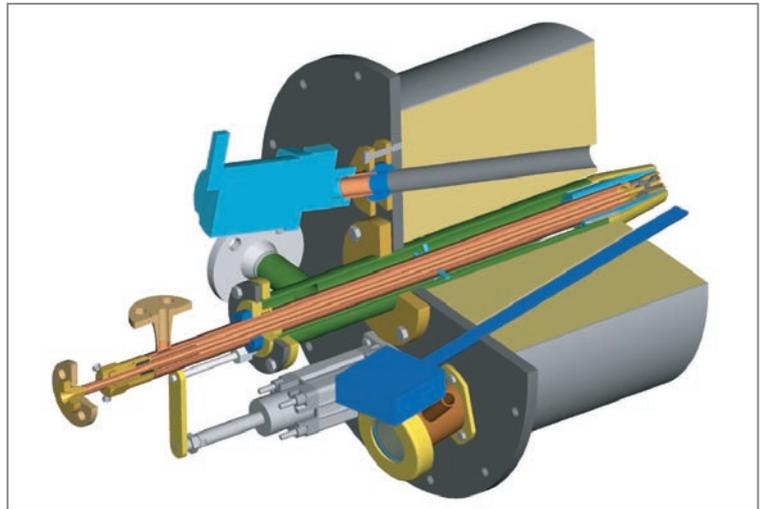


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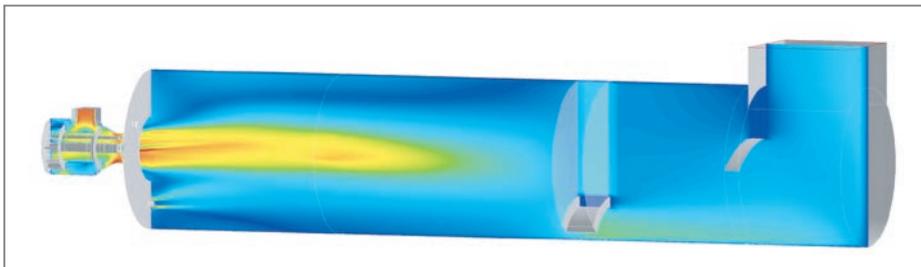
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### CTP-DUMAG Oxipy® Oxygen burner

Burner using oxygen as atomization medium,  
total replacement of combustion air by oxygen.

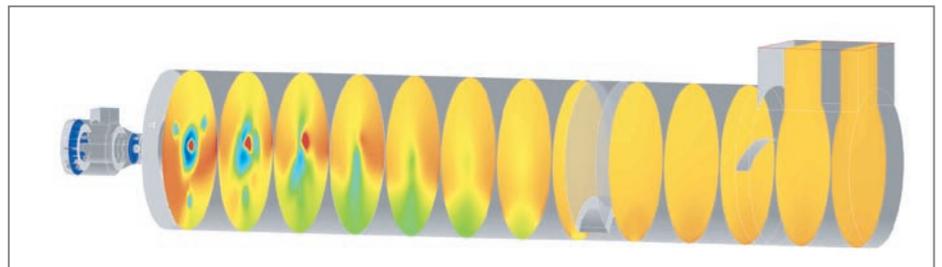


### Computational Fluid Dynamics CFD



Velocity field in the furnace:  
Contours of velocity magnitude

Contours of SO<sub>2</sub>



- ▲ Extensive CFD-model by the TU Vienna for oxidation of sulfur and sulfur containing substances to produce SO<sub>2</sub>
- ▲ Radiative heat transfer and turbulence effects
- ▲ Detailed description of liquid sulfur and spent acid evaporation
- ▲ Reaction model, capable to reproduce

- Pyrolysis of liquid sulfur
- Thermal dissociation of spent acid
- Kinetically limited reduction of SO<sub>3</sub> to SO<sub>2</sub>
- Combustion of hydrocarbons
- ▲ The model is successfully applied to practical combustion
  - Tool for optimization of existing plants
  - Support of scale-up to bigger plant sizes