



Sulphuric Acid Plant Operations Course: Sulphur Burning, Converter Control and Acid Handling



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Introduction:

Sulphuric acid plant operations, covering sulphur burning, converter control and acid handling, is a 5-day course for control room, field operating, shift supervision and process engineering staff that ends with an Acid Plant Operating Envelope and Improvement Plan. Acid plants lose output, catalyst life and permit headroom when furnace gas strength drifts, converter beds run outside their temperature window, absorber acid strength slips and coolers corrode. Nominees already run or support a sulphur-burning or metallurgical acid plant and work through case studies built on log sheets and gas analyses. CoreConcept Training Center delivers this sulphuric acid plant operations course.

Course Objectives:

- Trace gas, acid and steam flows through sulphur-burning and metallurgical off-gas contact process plants and set a performance baseline
- Operate sulphur melting, filtration and burning, air drying and off-gas cleaning sections to hold SO₂ gas strength and oxygen ratio on target
- Control converter bed inlet temperatures and inter-bed heat exchange to keep vanadium pentoxide catalyst inside its operating window
- Run drying and absorption towers in a double contact double absorption plant with stable acid strength, circulation and water balance
- Recognise stack SO₂ slip, acid mist, catalyst fouling and acid-side corrosion early and apply safeguards for acid storage and loading
- Prepare an acid plant operating envelope and improvement plan from case plant operating data

Target Audience:

- Control room operating staff responsible for furnace, converter and absorption tower control from the panel
 - Field operating staff responsible for sulphur melters, pumps, acid coolers, sampling and equipment line-ups
 - Shift supervision staff responsible for start-up, shutdown, upset response and handover in acid plants
 - Process engineering staff responsible for conversion, steam export, emissions and unit performance reporting
 - Inspection and integrity staff responsible for acid coolers, piping, towers and storage tanks
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Course Outline:

Day 1: Sulphuric Acid Plant Configurations and Current-State Baseline

- Contact Process Block Flow From Sulphur Feed to Product Acid
- Sulphur-Burning Versus Metallurgical Off-Gas Acid Plant Layouts
- Wet Sulphuric Acid Process for Wet and Dilute SO₂ Gas
- Product Acid Strengths, Oleum Grades and Customer Specifications
- Plant Baseline Survey of Throughput, Conversion and Downtime

Day 2: Sulphur Melting, Burning, Gas Cleaning and Heat Recovery

- Steam-Jacketed Sulphur Melter, Filtration and Molten Sulphur Pumping
- Sulphur Furnace Atomising Burners and Combustion Air Drying Tower
- SO₂ Gas Strength and Oxygen Ratio Control at Furnace Outlet
- Smelter Off-Gas Scrubbing, Wet Electrostatic Precipitators and Mist Removal
- Waste-Heat Boiler Feedwater, Drum Level and Superheated Steam Control

Day 3: Converter Beds, SO₂ Conversion and Absorption Tower Operation

- Vanadium Pentoxide Catalyst Activity, Ignition and Operating Temperature Window
- Multi-Bed Converter Inlet Temperatures and Inter-Bed Heat Exchangers
- Double Contact Double Absorption Flow Through Intermediate Absorption Tower
- Absorption Tower Acid Strength, Circulation and Distributor Checks
- Drying and Absorption Acid Cross-Flow and Water Balance Control

Day 4: Upsets, Emissions, Corrosion and Safe Acid Handling

- Stack SO₂ Slip, Acid Mist Plumes and Candle Filter Performance
- Catalyst Dust Fouling, Bed Pressure Drop and Screening Turnarounds
- Acid Cooler, Piping and Tower Brick Corrosion Monitoring
- Acid Storage Tank Farm Inspection, Venting and Hydrogen Hazards
- Road Tanker and Rail Car Acid Loading Safeguards

Day 5: Case Study on an Acid Plant Operating Envelope and Improvement Plan

- Case Plant Log Sheets, Gas Analyses and Acid Strength Records
 - Converter Temperature Profile and Conversion Shortfall Diagnosis
 - Absorption, Emission and Corrosion Findings Ranking by Consequence
 - Start-Up, Shutdown and Upset Response Steps for Shift Crews
 - Acid Plant Operating Envelope and Improvement Plan Completion
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Skills You Will Gain:

- Sulphur Furnace Combustion Control
- Converter Temperature Profiling
- Catalyst Bed Condition Assessment
- Absorber Acid Strength Control
- Waste-Heat Boiler Operation
- Stack Emission Troubleshooting
- Acid-Side Corrosion Surveillance
- Acid Transfer and Loading Safety

Why Attend This Course:

- Deliver an Acid Plant Operating Envelope and Improvement Plan for a case plant to the production manager and the technical services lead
- Decide when to adjust furnace gas strength, converter inlet temperatures or absorber acid strength by reading trends against the envelope
- Avoid stack SO₂ excursions, acid mist complaints, cooler leaks and loading incidents that stop production or breach permit limits
- Brief shift crews and new operators using the envelope tables, upset response steps and corrosion checklists

Conclusion:

Back at work, the participant presents the Acid Plant Operating Envelope and Improvement Plan to the production manager and technical services lead, who use it to set alarm limits, approve catalyst screening and cooler inspection scope and rank improvement actions for the next turnaround. Shift supervisors can adopt its upset response steps and loading safeguards as standing instructions. After the first operating month, the unit should review conversion, stack SO₂, acid strength excursions and open corrosion findings against the envelope and tighten the weaker limits.

Frequently Asked Questions FAQ:

What should participants know before a sulphuric acid plant operations course?

Participants should already operate or support a sulphur-burning or metallurgical sulphuric acid plant and read process flow diagrams and log sheets. Bringing anonymised converter temperatures, gas analyses or acid strength records helps them apply the case study day to their own plant.

How does sulphuric acid plant operations differ from a gas plant sulphur recovery course?

This course turns sulphur or SO_2 gas into product acid through burners, catalytic converters and absorption towers, then stores and loads it. Gas plant sulphur recovery courses remove hydrogen sulphide from gas and make elemental sulphur, which is the feed this course starts from.

Why does sulphuric acid plant converter control depend on bed inlet temperatures?

Vanadium pentoxide catalyst works only inside a temperature window. Too cold and it loses activity; too hot and it degrades while the equilibrium shifts away from SO_3 . Holding each bed inlet temperature keeps conversion high and stack SO_2 low.

What do participants take back from the sulphuric acid plant operations course?

Participants take back an Acid Plant Operating Envelope and Improvement Plan built on case data, with furnace, converter and absorber limits, ranked findings, upset response steps and loading safeguards they can adapt to their own plant.