

Air Quality Control Systems

Advanced heat exchange with integrated fume treatment

An all-in-one revolutionary approach for gas cleaning in the aluminum industry

Alstom fume treatment centres with AHEX deliver improvements in smelter energy balances whilst reducing gas cleaning footprints. This makes them flexible alternatives to conventional conditioning towers and dry scrubber reactors.

Technical Features

ENERGY RECOVERY

Saves the equivalent of 1MW in previously wasted heat per unit.

NON-CORROSIVE COOLING

AHEX cools gas below 100°C without risking corrosion to ducts and filters.

Customer Benefits

IMPROVED ENERGY BALANCE

3% to 5% anticipated.

SIMPLER and SMALLER

A simpler dry scrubber makes the installation significantly more compact than traditional solutions.

POLLUTANT CAPTURE

High efficiency aids compliance.

OTHER ECONOMIES

Smaller gas treatment footprint so less ducting and savings on space. Fewer filters and bags. Useful redundancies. Reduced maintenance costs.

R&D, DESIGN & SUPPORT

Alstom high quality solutions and ongoing customized support.

Industry is increasingly driven by its needs to conserve fuel and comply with ever-more-demanding emissions regulations. That is why Alstom's new fume treatment centres (FTCs) with AHEX offer a compelling alternative to conventional conditioning towers (CTs) and dry scrubber reactors. They cool flue gas whilst they capture tar and HF on alumina.

Yet this new solution also avoids introducing the moisture that ordinarily causes both corrosion in the conditioning tower and hydrolysis of the bag PES material in fabric filters.

Since 2000 pot amperage has effectively doubled and pot gas temperatures have climbed by 40°C to 180°C. That means traditional gas treatment centres have had to become 30% larger, reflecting an increase in the energy and materials which they consume. But, in essence, to dilute pot gases and bleed emissions into ambient air is inherently wasteful. Alstom has therefore developed a 'game-changing' alternative – combining heat exchangers with distributed dry scrubber (DDS) units.

Our new HEX heat-exchangers utilise a simple-but-ingenious arrangement of gas and water tubes that maximise heat transfer without increasing humidity. The solution therefore minimises scaling, fouling, filter-bag hydrolysis, pressure-loss and the problems ordinarily caused by ambient temperature fluctuations. Critically it also improves the energy balance of the plant by up to 5%.

Applications

FTCs with AHEX are ideal for any aluminium smelter. But this innovation may well prove to have broader applications, not least elsewhere within the metals industry.



What to Expect from Traditional Gas Cleaning

- It operates as a conventional CT with a heat exchanger
- High flue gas moisture content as a consequence of bleeding
- Corrosion throughout the CT
- Hydrolysis of bag PES¹ in the fabric filter

What to Expect from Alstom's FTC with AHEX

- An integrated heat-exchanger reactor, meaning less ducting and a significantly smaller footprint
- Simultaneous cooling of the flue gas and adsorption of polycyclic aromatic hydrocarbons (PAHs), condensed tars and HF on alumina
- No increase in humidity so significant reductions in corrosion, scaling and hydrolysis
- A simplified dry scrubbing process
- Higher efficiency in pollutant capture so lower emissions of SO₂, carcinogenic tars, gaseous fluorides, and other PAHs recognised as probable human carcinogens
- Reduced maintenance costs – saving in the order of 10% of OPEX
- Substantial recovery of waste heat which may be usefully recycled
- Wide-ranging improvements in operational efficiency

State-of-the-art R&D and support

Our highly skilled engineers and technicians are dedicated to developing this new generation of fume treatment centres with AHEX and to improving customer benefits at Alstom's R&D Execution Centre in Växjö, Sweden. The facility includes test-rigs and provides enhanced support to our customers during configuration and operational phases of a project.

((Pictures))

Validation

A full-sized demonstration unit installed since 2011 at the Alcoa Mosjøen aluminium smelter and anode plant.

Scope of Offering

BASE SCOPE

EQUIPMENT: Supply of equipment and materials

SERVICE: Engineering, advisory services for erection, advisory services for commissioning and performance tests

EXTENDED SCOPE

EQUIPMENT: Turnkey project on EPC basis

SERVICE: Operations and Maintenance contracts

Specifications

Gas operating temperature	Below 105°C; possibly even below 80°C
Water temperatures	Ingoing 60°C; outgoing 80°C to 90°C
Gas temperatures	Inlet 160°C to 190°C; outlet 90°C to 100°C
% of HF and tar collected on alumina	95%
Transfer fluid specific heat value	3300 KJ/kgK
Heat transferred to fluid	Probably in the range of 1 MW to 5 MW
Gas specific heat value	0.37 Wh/Nm ³
Differential in gas flow	50% higher for AHEX compartment ²
Differential in PAH collection (kg/h)	70% higher for AHEX compartment

Contact Info

For more information about Alstom's FTC with AHEX range, please contact your local Alstom representative.

¹ PES is repeatedly used in the PowerPoint and technical text but we have no explanation for what it abbreviates. See front page too.

² 'As the gas flow through the AHEX compartment is in the order of fifty percent higher compared with the reference compartment' (NB the failure to write this as 50%, which made it hard to find!) The bottom line of the table should be seen in the same light i.e. I lost the 'reference compartment' bit