EXHAUST GAS MANAGEMENT
MAXIMISING POTENTIAL

Exhaust Management for Semiconductor Processes

Comprehensive Range

Edwards is unique in offering the broadest range of exhaust management technologies, demonstrated in a series of products and systems designed to meet all customer requirements – from low-cost facility management to full environmental protection. We are committed to supplying exhaust management systems that match customer specific application requirements. We strive to minimise cost of ownership while introducing innovative designs to achieve greater reliability, longer service intervals, reduced space and utilities requirements and lower waste emissions.

Leading-Edge Manufacturing

Our primary manufacturing facility is located at Clevedon in the UK. The site comprises a factory with flexible production lines, assembly feed cells, just-in-time manufacturing techniques and one of the largest exhaust management research centers in the world. Additional manufacturing sites located at Chunan (Korea) and Ina (Japan) complement the global production capability. Underpinning our whole operation is a commitment to quality and world class manufacturing standards. An ISO 9001 and ISO 14001 management system, supported by TQM and Kaizen methodologies, is at the core of the operation. Product certification to the relevant international standard is conducted by ITS, the independent external test house.

Thermal Processing

The Atlas Range of inward gases combustion systems provides effective exhaust management of CVD processes must be able to handle the deposition gases and the associated powders. The fluoride wastes from cleaning gases also require suitable treatment along with the global warming gases. Abatement systems must be able to comply with these requirements in one complete unit.
The Atlas (Thermal Processing Unit) is the industry standard abatement system for CVD. One model is suitable for all CVD and etch applications. Each inlet can be configured for high level abatement of all Global Warming PFC gases, F2 or CIF3. All can accommodate total input flows up to 380 slpm. Where PFCs are not used, the Atlas (Thermal Conditioning System) provides a cost-effective means of handling both hazardous fluoride waste and deposition gases.

The Atlas Helios is an advanced solution for the abatement of high hydrogen flows designed to handle both toxic and carrier gases from Low Pressure Epitaxy and MOCVD processes.
The Atlas Kronis provides effective treatment for low k CVD process exhausts.
The HOx (Hot Oxidation System) offers an innovative electrical heated oxidation unit and the proven three-stage wet scrubber of the combustor product line, it combines superior performance for the abatement of CVD processes in facilities which do not have the ability to use fuel gas.

Gas Reactor Columns

Edwards offers a range of low-cost, point-of-use dry abatement systems for semiconductor processing. Each system uses the unique hot bed reactor technology developed for the GRC (Gas Reactor Column) range. The Inline 250 is the highest performance of any dry abatement technology for etch exhausts. It provides treatment by chemical reaction to stable inert salts and treats the widest range of gases from halogens and acids to CIF3, NF3, SF6 and other halide etch compounds. The D150 Dual GRC provides dual-cartridge operation thus minimising the cost of ownership with 100% uptime. The M150 Single GRC is a compact dry gas treatment system for removing hazardous etch and CVD emissions at the source, converting them into harmless solids within an easily changed and disposable cartridge.

Wet Scrubbers

Tempest is a point of use wet scrubber suitable for the treatment of semiconductor process tool exhausts containing water-soluble and water-reactive gases such as HCl, Cl2 and NH3 provide exhaust management at minimal cost for preservation of assets and regulatory compliance.

Pyrophoric Conditioning

For the removal of silane and pyrophoric gases to below lower explosion level (LEL) the PCS (Pyrophoric Conditioning System) offers an advanced solution. Specifically designed for the safe handling of silane, the PCS incorporates a unique particle handling system to keep ducts free from powders.

Integrated Vacuum and Exhaust Management Systems

Vacuum equipment and exhaust management devices are traditionally installed side-by-side, beneath the process tool. The Edwards Zenith range offers world leading series of process specific, fully integrated vacuum pump and exhaust management systems designed to safely handle the process exhausts from a wide range of applications. Enhanced safety, process tool compatibility, minimum footprint and reduced cost of ownership are key benefits derived from our unique approach, resulting in improved uptime, process efficiency and profitability.

TMS Temperature Management System

Edwards offers TMS (Temperature Management System) for processes involving condensable byproducts. TMS ensures that these compounds remain volatile until they enter the abatement device. The TMS is designed to heat both forelines and pump exhaust lines to the inlet of the abatement device. Moulded high surface area heaters maximize contact with pipes and are designed to maintain the temperature of the pipe between 90° and 180 °C. TMS monitoring is available as an option to provide both local and remote verification that the line is at a sufficient temperature. TMS has been successfully used in conjunction with the entire range of Edwards exhaust management equipment to alleviate the problems historically associated with solid deposition and corrosion.

Product Selection

Using our product selection guide customers have the opportunity to decide which Edwards point-of use abatement equipment is most suitable for their particular application on the basis of their exhaust gas management goals. Edwards will provide their experience and expertise to specify the exhaust management product for the chosen application.

Product Selection Guide

		Process	Typical Process Gases	Issues	Atlas TPU/Etch	Atlas TCS	Atlas Helios	Atlas Kronis	Spectra	Hox	Mistral	Tempest	GRC M1500	Gancat	PCS	WCT	WESP	TMS
					EZENITH Intergrated Systems													
					Fuel					Non Fuel					Exhaust Management			
Semiconductor	ETCH	Dielectric	CHF3/NF3/CF4/ C2F6/C4F8/SF6/ C4F6/C5F8/CH3F	Corrosive and toxic by-products High use of global warming PFC gases	●							▲						
		Conductive – poly silicon	Cl2/HBr/ SF6/ CF4/CHF3	Toxic and corrosive by-products Use of global warming PFC gases	●							▲						
		Conductive – metal	Cl2/BCl3/CF4/ CHF3	Exhaust blockages from condensing vapours Toxic and corrosive by-products	●							▲						▲
	PECVD	Silane-based oxide/ nitride/HDP	SiH4/NH3/N2O/ PH3/SiF4	Flammable/incompatible gas mixtures														●
			with PFC clean	Very high use of global warming PFC gases	●										▲		▲	▲
			with NF3 clean	Use of global warming PFCs, high quantities of fluorine produced		●					●							▲
		TEOS based oxide/BPSG	TEOS/TEB/TEP	Flammable/incompatible gas mixtures Liquid sources can condense														
			with PFC clean	Very high use of global warming PFC gases	●										▲		▲	●
			with NF3 clean	Use of global warming PFCs, high quantities of fluorine produced		●					●							●
		Low k CVD	3MS/4MS/ TMCTS	Flammable/incompatible gas mixtures Liquid sources can condense														
			with NF3 clean	Use of global warming PFCs, high quantities of fluorine produced				●									▲	●
	CVD	Metalisation – tungsten	SiH4/WF6/H2	Flammable/incompatible gas mixtures														
		Clean step	with PFC clean	Very high use of global warming PFC gases	●												▲	●
			with NF3 clean	Use of global warming PFCs high quantities of fluorine produced		●	●				●						▲	●
			with ClF3 clean	Highly toxic/corrosive gas used	●						●						▲	●
		Metalisation – titanium	TiCl4/NH3/ ClF3/Cl2	Flammable/incompatible gas mixtures Highly toxic/corrosive gases used	●						●	▲					▲	●
		High k CVD	High k precursors		●								●				▲	▲
	LPCVD	Polysilicon	SiH4/PH3/AsH3	Highly toxic/flammable gases used														
		Clean step	none			●				●					▲		▲	
			with F2/HF	Highly toxic/corrosive incompatible gases used sequentially		●					●						▲	
			with ClF3		●						●						▲	
		LPCVD Nitride	HCD/DCS/NH3	Highly toxic/flammable gases used														
		Clean step	None									●	▲			▲	▲	●
			with F2/HF	Highly toxic/corrosive incompatible gases used sequentially	●						●						▲	●
	EPITAXY	Low pressure EPI	H2/DCS/PH3/ SiH4/ AsH3/ B2H6/GeH4/HCl	Very high flows of explosive gas used Highly toxic/flammable and corrosive gases used			●											
	IMPLANT		BF3/PH3/AsH3	Highly toxic/flammable gases used									▲					

● = Full environment safety and health management
▲ = Health safety and capital asset protection

		Process	Typical Process Gases	Issues	EZENITH Integrated Systems: Fuel: Atlas TPU/Etch	Atlas TCS	Atlas Helios	Atlas Kronis	Spectra	Non Fuel: Hox	Mistral	Tempest	GRC M1500	Gancat	Exhaust Management: PCS	WCT	WESP	TMS
Emerging technologies	FLAT PANEL DISPLAY	Etch	H2/O2/CF4/Cl2/HCl/ He/SF6	Highly flammable/corrosive gases used Exhaust blockages from solids formation Use of global warming PFC gases	●												▲	
		CVD	SiH4/NH3/NF3/ F2/SF6	Pyrophoric and flammable gases used Corrosive gases used Solids management required					●								▲	▲
	MOCVD	Phosphide	H2/AsH3/PH3/TMG/ TMA/TMI	Highly toxic gases used Exhaust blockages from condensing vapours Very high flows of explosive gas used			●										▲	●
		Nitride	N2/H2/NH3/TMG/ TMA/TMI	Highly toxic gases used Very high flows of explosive gas used			●		●					●				
	SOLAR CELL	α-Si - Amorphous	SiH4/NH3/NF3/F2/ TMB/PH3/CH4	Highly flammable/corrosive/ toxic gases used Exhaust blockages from solids formation					●									
		c-Si - Crystalline	SiH4/NH3/H2/TMA	Highly flammable/corrosive/ toxic gases used Exhaust blockages from solids formation		●		●	●						▲			
		CIGS	H2Se/H2S	Highly flammable/corrosive/ toxic gases used Exhaust blockages from solids formation									●					
		TCO	H2/DEZ/TMB	Highly flammable/corrosive/ toxic gases used Exhaust blockages from solids formation					●									

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