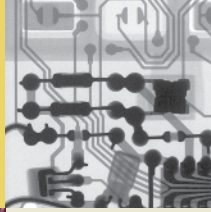




A RESOURCE FOR WORLDWIDE ELECTRONICS CUSTOMERS OF AIR PRODUCTS AND CHEMICALS, INC.



electronics update

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Air Products adds ACT® NE-168 and ACT EZSTRIP™ 511 removers

Air Products has introduced two new etch and ash removers—ACT® NE-168, engineered to meet the challenging requirements of semiconductor surface cleaning, and ACT EZSTRIP™ 511, a new stripper product designed to be compatible with copper and advanced low-k materials. The ACT product lines offer solutions in surface preparation technology, a necessary step in the semiconductor manufacturing process flow.

The ACT NE-168 formulation is a buffered, fluoride-containing stripper product that demonstrates cleaning efficacy in single-wafer tool processing, as well as in batch processing. ACT NE-168 is suitable for both logic and memory applications and is aimed at the 65nm and 45nm technology nodes.

“The improved stripper product from our ACT NE-series has risen to the technology challenge of copper and advanced low-k dielectrics. We have demonstrated that our stripper technology is tunable to meet customers’ stringent requirements,” said Arifin Budihardjo, ACT product manager-new product development. “The versatile platform of the NE-series can be built upon to enhance the formulation’s cleaning efficacy as the technology moves to the next generation,” he added.

ACT NE-168 is effective at low process temperatures, ranging from room temperature to 40° Celsius, which helps provide an extended bath life.

ACT EZSTRIP 511 is a fast-acting formulation that completely removes residue in a single wafer tool, processing in as little as 60 seconds and is targeting the 65nm and 45nm technology nodes. It has been proven to be effective in single wafer tool

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GASGUARD® BSGS systems win major recognition at SEMICON West ceremony

Air Products’ GASGUARD® Bulk Specialty Gas Systems (BSGS), which now numbers more installations than all competitors combined, received significant recognition from peers and customers at SEMICON West in July.

EuroAsia Semiconductor Magazine awarded BSGS systems, which received 18,000 votes, its Materials Improvement Award at a special ceremony at the San Francisco Museum of Modern Art. Bob Ford, BSGS manager since 1994, accepted the award for everyone on the Electronics Division team responsible for BSGS equipment and bulk electronic specialty gases.

“It’s an honor to receive this award and be recognized by customers as being the premier solutions provider for bulk specialty gases. It’s a team win,” said Ford, who has earned eight patents and authored four publications for BSGS systems. BSGS systems have won 13 patents total.

Ford said that users of BSGS equipment provide vital feedback. “Many of the enhancements to our BSGS systems are the result of customer suggestions. This is a great source of pride for all of us at Air Products because we strive to understand what our customers need from our bulk capabilities.” Since the first BSGS system was installed in 1993 at Salem, Oregon, it has become benchmark equip-



Air Products’ technicians monitors the performance of a BSGS system for White Amonia.

ment in new fabs. BSGS provides a step-change in the supply of high-volume gases for semiconductor manufacturers by lowering cost of ownership, improving product consistency and reliability, boosting productivity, enhancing safety, and offering redundancy.

Ford said Air Products has installed more BSGS systems globally than all of its competitors combined. “A major advantage of using our system, too, is that we offer customers a turnkey system, or we will own, operate and maintain their system under a multi-year contract. It’s a partnership for us and we’re willing to take responsibility. We offer our customers the total solution for their bulk gases and delivery equipment.”

The company’s BSGS systems continue to evolve, Ford said, pointing to the latest generation of equipment, multiple fab supply through a BSGS underground pipeline.

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electronic
specialty
gases

Air Products signs two major gas contracts

Air Products San Fu Gas Co. Ltd., the company's Taiwanese subsidiary, has signed major contracts with the Taiwan Semiconductor Manufacturing Company (TSMC) and Chi Mei Optoelectronics (CMO) to serve their facilities in Tainan Science Industrial Park (TSIP), one of the largest technology parks in the world.

Air Products San Fu will supply nitrogen and bulk gases to both manufacturers and build an air separation unit (ASU) in the park to support existing and growing customer demand.

Air Products San Fu will serve the TSMC Fab 14 Phase Two expansion and CMO Fab 7. TSMC Fab 14 is TSMC's second 12-inch wafer fab specializing in advanced 90- and 65-nm process technologies. The CMO Fab 7 is a Generation 7.5 TFT-LCD manufacturing facility.

"The new contracts further solidify our long-term partnership with TSMC and CMO, as well as our leading supply position in TSIP," said Corning Painter, vice president of Asia Electronics and North Asia.

"These contracts are the direct result of the investments we have made in expanding our global infrastructure and local supply over the years to better serve our customers in Asia. It is part of our long-term strategy and has positioned us so that we can quickly respond to growing customer demand and in turn grow along with our customers."

Air Products San Fu has established a leading supply position in TSIP. Its customers in the park include TSMC Fab 6 and Fab 14 Phase One; United Microelectronics Corporation (UMC) Fab12A; and CMO, Fab 3, Fab 4 and the newly signed Fabs 5 and 7.

Air Products San Fu serves its customers with large ultra-high purity (UHP) bulk gas production facilities and a pipeline with a total capacity exceeding 60,000 Nm³/Hr. Its main plant—with the world's largest UHP nitrogen generator—supplies the pipeline at 50,000 Nm³/Hr.

This plant also produces UHP liquid nitrogen and UHP liquid oxygen for other semiconductor customers. ▲

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HJTC honors Air Products' China Team

Air Products' China Electronics Team recently won the "Outstanding Supplier" award from HeJian Technology (Suzhou) Co., Ltd. (HJTC), the leading semiconductor foundry in China. The award recognizes the China Electronics Team's excellent performance in quality, delivery time, price, and after-sale service in 2005.

The award was presented at an HJTC 2006 Outstanding Suppliers Celebration attended by more than 70 representatives of the world's leading suppliers to HJTC.

HJTC presented awards in five categories: tools and equipment, raw materials, facility, in-time delivery, and supporting.

The Air Products China Electronics Team won the materials category award from among 10 gases suppliers to HJTC. This is the first time that HJTC gave awards to suppliers since its pilot run in 2003.

"This is a great recognition of our devoted efforts to form a long-term supply partnership with HJTC, our biggest customer over the last three years. It's an honor for the China team and Air Products—our safety, quality, and reliability trans-



HJTC ceremony participants from left are Jack Tseng, Taiwan account manager, China Electronics; Andy Tuan, general manager of China Electronics; J. H. Shyu, president of HJTC; and David Price, former general manager of China Electronics.

late into success for HeJian," said Andy Tuan, general manager of Air Products China Electronics.

HJTC is located in the historical city of Suzhou, about 70km from Shanghai. The company occupies 1.3 square kilometers in the modernized Suzhou Industrial Park and plans to set up multiple foundry fabs over 10 years with a total investment exceeding \$10 billion US to fulfill its goal of being China's IC industry leader.

The company set up its first 8-inch foundry fab with an investment of over \$1.6 billion US in November 2001. The 8-inch Wafer Line 1 is now fully loaded and scheduled to start up this year. ▲

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customers visit New Orleans hydrogen plant



Staff from 16 electronics customers recently visited the Air Products' liquid hydrogen facility in New Orleans (NOLA) to see how the plant has quickly re-built from Hurricane Katrina.

As part of our continuing efforts to strengthen relationships with customers, 16 Electronics Division customers recently visited the New

Orleans (NOLA) liquid hydrogen facility to see and hear for themselves the story of Hurricane Katrina and the tremendous recovery effort it has required.

The customers represented a range of disciplines from their companies including, purchasing, quality, and facility management.

The day began with a visit from Don Hutchinson, director of Economic Development for the City of New Orleans. After a bus ride to the plant through some of the devastated neighborhoods of the region, the visitors were welcomed to the facility by Joe Pietrantonio, Air Products' vice president of Global Operations.

He thanked customers for their loyalty and support and also praised the extraordinary work of employees that has enabled the NOLA facility to re-build so quickly.

Presentations from the NOLA management team—including Roy Steinle, Brian Gebbia, and Paul Noel—illustrated the impact of Hurricane

Katrina on the plant and the challenging post-hurricane recovery effort. Tom Sakach, Hydrogen product manager, and Jerry Hartman, Hydrogen logistics manager, also spoke.

Following the presentations, the group was given a guided tour of the facility, including a first-hand look at the newly repaired and enhanced levee system built around it.

The visit gave customers a better appreciation for the magnitude of the challenge that has faced our NOLA team, noted Pietrantonio.

"It also confirmed that Air Products is, indeed, the world leader in liquid hydrogen supply and that the NOLA facility is a viable supply source for their hydrogen requirements.

"Our NOLA representatives clearly showed the visiting customers that Air Products continues to dedicate its highest-caliber talent and resources to ensure the reliable supply of liquid hydrogen to their facilities." ▲

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two

BSGS wins major recognition at SEMICON West ceremony [continued from page 1]

"Any gas that we supply via BSGS can be supplied via BSGS pipeline, even difficult-to-handle ammonia." He added that most new fabs are installing pipeline BSGS systems due to the demand for large volumes of gas to manufacture increasingly larger panels of glass (2 x 2.2 meters) for flat panel TVs, as well as other applications, including LEDs.

Air Products has been awarded several recent contracts for BSGS installations and bulk gases. "Two major semiconductor manufacturers individually and as a joint venture ordered eight systems, including five to deliver silane, another difficult-to-handle gas.

"In addition to our BSGS systems, we have extensive experience in handling bulk gases such as silane. For example, we recently helped the Compressed Gas Association rewrite



Bob Ford accepted the BSGS award from EuroAsia Semiconductor Magazine.

its revised G13 silane safety standard. And we linked seven ISO units at one customer's site to supply silane, ammonia, and NF₃," Ford noted.

Early in July, in Giheung Korea, Korea Industrial Gases Ltd., a wholly owned subsidiary of Air Products, successfully brought on-stream BSGS silane gas supply for Samsung Electronics Company Ltd., the world's largest manufacturer of DRAM memory. KIG is supplying 550 slpm (standard liters per minute) of silane to two lines in the Samsung factory with special, extra-clean VIM/VAR tubing. The BSGS system includes on-line, stand-by, and pressure backup capabilities.

BSGS systems are manufactured in the U.S. and Korea, which makes them easily accessible to customers throughout the world.

AIR PRODUCTS PODCASTS:

Visit www.airproducts.com/electronics to hear product and technology representatives discuss the latest offerings from Air Products on additional podcasts.

- Low-K Product Overview
- Low-K PDEMS
- Analytical Trace Impurities Capabilities
- Chamber Cleaning 101

AP10 Controllers enhance company's gas/chemical delivery systems

The Air Products GASGUARD® AP10 Controller greatly enhances the capabilities of our portfolio of GASGUARD specialty gas and chemical delivery systems, including our bulk specialty gas systems (BSGS) used throughout the global electronics industry.

Tim Maykut, regional marketing manager for Electronics Equipment, said AP10 controllers represent the latest generation of control technology. "This leading-edge technology complements our leading edge gas and chemical delivery systems. The AP10 controllers were designed based on operating and service input from hundreds of millions of hours of experience."

The AP10 controller incorporates a standard commercially available, industrial-grade control system as its platform, explained Maykut. The control system is based on PC104 form factor technology, which provides an excellent level of reliability and functionality.

A key feature is its standard color touch screen operation that provides quick and easy access to system functions, while still providing the same level of security as legacy controllers.

The AP10 controller is the same size as the GASGUARD AP2 and AP3 controllers, and uses

the same enclosure, utilities, and configuration software. Network capabilities similar to the AP2 and AP3 models have also been retained. "This means a seamless integration of the AP10 controller into existing equipment that uses the AP2 and AP3 controllers," said Maykut. "This direct compatibility makes for easy retrofits," he added.

"Customers tell us they like the AP10 controller because it is more simplified and integrates easily with existing BSGS and our other delivery equipment. The bottom line—the AP10 controller offers increased reliability at a decreased cost." ▲

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Air Products' new GASGUARD AP10 controller has a more simple and integrated design that contributes to increased reliability and lower maintenance costs.



A universal AP10 controller—also used with other GASGUARD and CHEMGUARD® delivery equipment—simplifies BSGS system operation.

In an ongoing effort to communicate with existing and potential customers, Ford said several new BSGS-specific Podcasts and Webcasts are available on the company's website, www.airproducts.com/electronics. The pod cast subjects are BSGS Overview, BSGS Ammonia ISO, BSGS Silane Supply and BSGS NF₃ Supply. The web casts are Power Point presentations.

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Air Products signs deal with Hanyang Engineering

Air Products has signed an exclusive agreement with South Korea-based Hanyang ENG Co., Ltd. (HYE) to provide North American sales and service support for HYE's bulk chemical blending and distribution equipment used in the electronics industry. Air Products will be the direct sales agent for HYE in North America. All equipment will be designed and manufactured by HYE in Korea.

"Our new relationship with Hanyang Engineering significantly enhances Air Products' gas and chemicals equipment offering," said Joe Stockunas, general manager for Air Products' Electronics Equipment business. "In addition, this relationship will provide North American electronics manufacturers with a proven, low-cost supply of bulk chemical blending and distribution systems."

Air Products will train its gas and chemical management technicians, who provide onsite management of gas and chemical systems, to support the installation and operation of HYE equipment at North American customer sites. Air Products' new HYE equipment offering is in addition to the company's existing CHEMGUARD® line of specialty chemical delivery equipment found within its Schumacher product lines.

HYE, having served the Korean electronics market since 1988, possesses extensive experience in the supply of chemical blending and distribution equipment. The company holds a leading market share in Korea and has installed nearly 100 systems at state-of-the-art 300 mm facilities. The exclusive sales and service agreement with Air Products allows HYE to geographically expand its offering to the North American electronics market.

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Y. L. Wang, J. K. Lan, and G. J. Hwang, National University of Tainan, Taiwan; M. L. O’Neill, Air Products, and C. F. Chen, National Chiao-Tung University. *Surface & Coatings Technology 200* (2006) 3127-3133.

“Effect of Deposition Temperature and Oxygen Flow Rate on Properties of Low Dielectric Constant SiCOH Film Prepared by Plasma Enhanced Chemical Vapor Deposition Using Diethoxymethylsilane,” by Y. L. Cheng,

Y. L. Wang, G. J. Hwang, National University of Tainan, Taiwan; M. L. O’Neill and E. J. Karwacki, Air Products; and P. T. Liu and C. F. Chen, National Chiao-Tung University. *Surface & Coatings Technology 200* (2006) 3134-3139.

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The China Electronics Team attended an ESG and just-in-time (JIT) package training session.

China Electronics Team completes training on ESG Packages and JIT warehouse procedures

Air Products China Electronics team, including individuals from the warehouse, supply chain, commercial, MEGASYS, and customer service groups, recently attended a full-day training session on electronics specialty gases (ESG) packages at the Waigaoqiao (WGQ) Tech Center in Shanghai.

This classroom training provided an overview of various package preparation activities (and applicable procedures) that are done at Air Products ESG[®] manufacturing locations in the U.S. prior to sending cylinders to Asia. Much of the training focused on valve types, valve components, valve outlet connections, and important information related to valve leak integrity and basic principles associated with QC leak monitoring.

The WGQ warehouse team also received additional education about key global Air Products JIT (Just-in-Time) procedures, which included demonstrations on how to properly operate certain tools and monitors that are part of the global warehouse standard.

The warehouse team was given “hands-on” instruction on how to correct minor package defects locally in accordance with global Air Products procedures and best practices.

Morgan Zhang, China ESM warehouse manager, said, “This hands-on ESG package training is vital to helping our warehouse operations team more effectively serve customers in China. The training helped a lot with current operations and will help us provide even better service.”

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Korean MOCIE Minister visits Shihwa plant

Se-Kyun Jung, Korea’s Minister of Commerce, Industry and Energy (MOCIE), recently visited Air Products Shihwa, Korea ESM (Electronics Specialty Materials) manufacturing site with a group of inspectors, including the major leaders of government offices for the gas industry.

The minister and the government officers selected Air Products Shihwa site as the model of “Safety Excellence” in the industrial gases industry and made the visit for benchmarking purposes.

“I was deeply impressed with the safety process management of Air Products Shihwa ESM manufacturing site as well as the cleanliness of the site while the site handles various hazardous and toxic materials. ▲

Air Products add ACT[®] NE-168 and ACT EZSTRIP[™] 511 removers

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processing as well as batch processing. It also possesses a low process temperature, from room temperature to 40°C, which provides an extended bath life.

“It is an exciting and critical milestone to introduce a stripper product that is aggressive to the undesired residue and at the same time is compatible to the delicate low-k material,” said Budihardjo. “On top of this superior characteristic, this product is also environmentally friendly.” ACT EZSTRIP 511 is comprised of mainly biodegradable components that also offer competitive cost of ownership and improved cleaning efficiency. ▲

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tell me more

www.airproducts.com/electronics

company information

Air Products is a Fortune 500 company with sales over \$5 billion annually and with major operations in 30 countries around the globe. We are a leading supplier of industrial gases, related equipment and services. Our success in industrial gases has come primarily through the development of new technologies that help our customers reduce their overall costs.

news of interest:

new nitrogen plant serving Samsung fabs

Samsung is now being served by a new Air Products’ high-efficiency TN370 Series tonnage nitrogen plant that started up recently.

The new plant, which has a production capacity of 37,000 Nm³/hr of gaseous nitrogen, is located at Giheung in South Korea and is supplying Samsung’s 300-mm Flash Memory Fab and 300-mm System-LSI Fab.

It’s the first TN370 series facility that Air Products has developed and the Korea Samsung project is the first test run. The project team met its on-time and on-budget goals.

“The timely start of the plant enhances the supply reliability of Giheung franchise, which delivers a differentiation of Air Products’ leading edge technology and further demonstrates our commitment to Samsung. It’s an excellent result of the hard work and great teamwork of the Generated Gases and Korea team,” said Soo-Yon Lee, president of Korea Industrial Gases (KIG), a wholly owned subsidiary of Air Products in Korea.

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