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REGULATION 8
ORGANIC COMPOUNDS
RULE 30
SEMICONDUCTOR WAFER FABRICATION OPERATIONS

(Adopted July 6, 1983)

8-30-100 GENERAL

8-30-101 Description: The purpose of this Rule is to limit the emissions of volatile organic compounds (VOC) from semiconductor wafer fabrication operations. For the purpose of this Rule, semiconductor wafer fabrication operations are limited to the manufacture of semiconductor and other related integrated circuits. Any operation which uses VOC during semiconductor wafer fabrication, but which is exempt from the provisions of this rule, shall be subject to the provisions of Regulation 8, Rule 4, if not already subject to another rule of Regulation 8. (Amended October 7, 1998)

8-30-110 Exemption, Small Semiconductor Operation: The provisions of Section 8-30-302 shall not apply to any facility whose total combined net consumption of solvent-based photoresist and solvent-based photoresist developer is less than 24 gallons per month on a facility wide basis and provided the requirements of Section 8-30-402 and Section 8-30-502 are met. The volume of non-VOC materials, as defined in this rule, may be excluded when determining consumption.
(Amended November 23, 1988; October 7, 1998)

8-30-111 Exemption, Solvent Cleaning Devices: The provisions of Section 8-30-304, 305 and 306 shall not apply to any solvent cleaning device which does not process semiconductor wafers or wafer processing tools or with a capacity greater than 10 gallons. Such devices are subject to Regulation 8, Rule 16, Solvent Cleaning Operations. (Adopted November 23, 1988; Amended October 7, 1998)

8-30-112 Exemption, Compounds with Low Volatility: All compounds with an initial boiling point greater than 120^0C (248^0F) and where the initial boiling point exceeds the actual operating temperature by at least 100^0C (180^0F) are exempt from the requirements of Sections 8-30-304.1, 304.5, 305 and 306.
(Adopted November 23, 1988; Amended October 7, 1998)

8-30-113 Exemption, Compounds with Low VOC Content: Photoresist developers, strippers and cleaning solvents containing less than 10% VOC by weight if unheated, or less than 2.5% VOC by weight if heated, are exempt from the requirements of Sections 8-30-304, 305, 306 and 501. (Adopted October 7, 1998)

8-30-200 DEFINITIONS

8-30-201 Freeboard Height: The distance from the top of the solvent or solvent drain to the top of the sink.

8-30-202 Freeboard Ratio: The freeboard height divided by the smaller of the length or width of the sink or reservoir.

8-30-203 Deleted October 7, 1998

8-30-204 Deleted October 7, 1998

8-30-205 Deleted October 7, 1998

8-30-206 Deleted October 7, 1998

8-30-207 Photoresist Line: Equipment used to apply, cure and develop photoresist or to apply and cure other wafer coatings, excluding stripping of photoresist or other coatings. (Amended October 7, 1998)

8-30-208 Deleted October 7, 1998

8-30-209 Deleted October 7, 1998

8-30-210 Semiconductor Wafer Fabrication: Any operation performed in order to manufacture semiconductor or related solid state devices, such as semiconductor diodes and stacks, and including rectifiers, integrated microcircuits, transistors, solar cells, and light sensing and emitting devices. Semiconductor wafer fabrication

excludes crystal growth and blank wafer production, circuit separation, assembly and encapsulation. (Amended March 6, 1985; October 7, 1998)

8-30-211 Deleted October 7, 1998

8-30-212 Liquid Solvent Leak: A liquid leak of four drops or more per minute. (Adopted November 23, 1988)

8-30-213 Deleted October 7, 1998

8-30-214 Solvent Sink: A solvent sink is any container for liquids containing VOC into which semiconductor wafers or related tools are submerged or placed to remove contaminants, including water and photoresist. (Adopted October 7, 1998)

8-30-215 Photoresist: A light-sensitive resin material which is uniformly applied to semiconductor wafers, then selectively removed in a specific pattern so that the exposed wafer surface may be doped, etched or otherwise processed. (Adopted October 7, 1998)

8-30-216 Photoresist Developer: A material which is used to remove applied photoresist from a wafer in a specific surface pattern. (Adopted October 7, 1998)

8-30-217 Photoresist Stripper: A material which is used to completely remove photoresist from a wafer surface, typically after the developed photoresist has allowed selective wafer processing. (Adopted October 7, 1998)

8-30-218 Solvent-Based Photoresist: A photoresist containing 1% or more VOC by weight. (Adopted October 7, 1998)

8-30-219 Solvent-Based Photoresist Developer: A photoresist developer containing 10% or more VOC by weight if unheated, or 2.5% or more VOC by weight if heated. (Adopted October 7, 1998)

8-30-220 Volatile Organic Compounds (VOC): For the purpose of this rule, a VOC is any organic compound which would be emitted during semiconductor wafer fabrication operations and related cleaning operations, excluding the following: methane, carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, ammonium carbonate. (Adopted October 7, 1998)

8-30-221 Solvent Spray Station: A solvent cleaning station in which liquid solvent is utilized in the form of a spray. (Adopted October 7, 1998)

8-30-222 Solvent Vapor Station: A solvent cleaning station in which solvent is heated above its initial boiling point. (Adopted October 7, 1998)

8-30-223 Semiconductor Fabrication Area (Fab Area): A physically identifiable area in a semiconductor manufacturing facility where one or more specific operations in the fabrication of semiconductors or related solid state devices occurs and which is permitted as a single source. (Adopted October 7, 1998)

8-30-224 Liquid Capacity: For solvent sinks, liquid capacity is either the maximum liquid holding capacity of the container, or else a lower liquid capacity which is clearly marked on the container with a maximum fill line and which is not exceeded during operation. For solvent spray and solvent vapor stations, liquid capacity is the maximum amount of working solvent which the station may contain, excluding the capacity of fresh solvent reservoirs which contain only unused solvent and the capacity of waste solvent reservoirs which contain only spent solvent which will not be re-used. (Adopted October 7, 1998)

8-30-225 Wipe Cleaning: That method of cleaning which utilizes a material such as a rag wetted with a solvent, coupled with a physical rubbing process to remove contaminants from surfaces. (Adopted October 7, 1998)

8-30-226 Sealed Enclosure: A tool designed in such a way that no openings exist during operation through which VOC may escape from the tool. All openings, including those for loading, unloading, and inspection, shall be provided with gasketed covers. (Adopted October 7, 1998)

8-30-227 Decontamination Event: The cleaning of a semiconductor fab area for initial startup (including semiconductor product changes), after renovation, or after an emergency which has resulted in contamination of the fab area. Routine cleaning does not constitute a decontamination event. (Adopted October 7, 1998)

8-30-300 STANDARDS

8-30-301 Deleted June 15, 1994

8-30-302 Photoresist Operations Using Solvent-Based Developer: If solvent-based developer is used to process a photoresist within a specific fab area, then all exhaust gases containing VOC from both the solvent-based photoresist application and solvent-based development operations in that fab area shall be vented to an approved emission control device which captures and abates at least 90% (by weight) of VOC evaporated at the application and development operations. This requirement applies to developer applied by any method other than by immersion in a solvent sink.

(Amended November 23, 1988; October 7, 1998)

8-30-303 Deleted June 15, 1994

8-30-304 Solvent Sink Requirements: A person shall not operate a solvent sink at a semiconductor wafer fabrication facility unless the following requirements are met:

304.1 All solvent sinks containing VOC shall be provided with a cover unless the sink is abated by an approved emission control device as described in subsection 304.5. These covers must remain closed unless production, sampling, maintenance, loading or unloading procedures require operator access.

304.2 The capacity of all solvent sinks shall be clearly labeled on the sink.

304.3 Materials containing VOC, including waste solvents, shall not be stored or disposed of in a manner that will allow evaporation into the atmosphere.

304.4 Liquid solvent leaks shall be repaired immediately or the equipment shall be shut down.

304.5 All unheated solvent sinks containing VOC with a vapor pressure higher than 30 mm Hg at 20 degrees C AND all heated solvent sinks shall have a freeboard ratio greater than or equal to 0.75, unless one of the following requirements is satisfied. All sinks which are subject to a freeboard ratio requirement shall be clearly marked to indicate the liquid level corresponding to the minimum allowed freeboard ratio and this level shall not be exceeded.

304.5.1 The sink capacity does not exceed 1 liter, or;

304.5.2 The sink is abated by an approved emission control device which captures and abates at least 90% (by weight) of VOC evaporated at the sink.

(Adopted November 23, 1988; Amended October 7, 1998)

8-30-305 Solvent Spray Station Requirements: A person shall not operate a solvent spray station at a semiconductor wafer fabrication facility unless the following requirements are met:

305.1 The station shall operate as a sealed enclosure unless sampling, maintenance, loading or unloading procedures require operator access. This requirement shall not apply to spray stations abated by an approved emission control device which captures and abates at least 90% (by weight) of VOC emitted from the station.

305.2 Liquid solvent leaks shall be repaired immediately or the equipment shall be shut down.

305.3 The station shall not have VOC emissions which exceed 250 lb/month per station, as calculated in accordance with Section 8-30-504 unless the station is abated by an approved emission control device which captures and abates at least 90% (by weight) of VOC emitted from the station.

(Adopted October 7, 1998)

8-30-306 Solvent Vapor Station Requirements: A person shall not operate a solvent vapor station at a semiconductor wafer fabrication facility unless the following requirements are met:

306.1 The station shall operate as a sealed enclosure whenever the station contains solvent unless sampling, maintenance, loading or unloading procedures require operator access. This requirement shall not apply to

solvent vapor stations abated by an approved emission control device which captures and abates at least 90% (by weight) of VOC emitted from the station.

306.2 Liquid solvent leaks shall be repaired immediately or the equipment shall be shut down.

306.3 The station shall not have VOC emissions which exceed 250 lb/month per station, as calculated in accordance with Section 8-30-504 unless the station is abated by an approved emission control device which captures and abates at least 90% (by weight) of VOC emitted from the station.

(Adopted October 7, 1998)

8-30-307 Fab Area Wipe Cleaning: Effective January 1, 2000, a person shall not perform wipe cleaning of fab area walls, floors or other fab area surfaces, including fabrication tool enclosures, with a solution containing more than 10% VOC by weight. This limit shall not apply to tool mechanisms or to the interiors of tool enclosures or to the interiors of wafer processing chambers. This limit shall also not apply to decontamination events. (Adopted October 7, 1998)

8-30-400 ADMINISTRATIVE REQUIREMENTS

8-30-401 Deleted October 7, 1998

8-30-402 Small Semiconductor Operation Petition: Any person seeking to satisfy the conditions of Section 8-30-110 shall comply with the following requirements:

402.1 A written petition for exemption shall be submitted to the APCO showing the total combined net usage of solvent-based photoresist and solvent-based photoresist developer is less than 24 gallons per month for the facility.

402.2 If the APCO grants written approval, such petition will be repeated on an annual basis. (Adopted November 23, 1988; Amended October 7, 1998)

8-30-403 Deleted June 15, 1994

8-30-500 MONITORING AND RECORDS

8-30-501 Annual Reporting: Any person who uses VOC during semiconductor wafer fabrication, except as exempted in Section 8-30-113, shall report the following on an annual basis, prior to renewal of Permits to Operate:

501.1 Quantity of all chemicals and materials containing VOC used during the previous 12 months. (Amended October 7, 1998)

8-30-502 Records: Any person seeking to satisfy the conditions of Section 8-30-110 shall comply with the following requirements:

502.1 A monthly record shall be kept showing the facility wide combined net usage of solvent-based photoresist and solvent-based photoresist developer.

502.2 Such records shall be maintained and be available for inspection by the APCO for the previous 24 month period.

(Adopted November 23, 1988; Amended October 7, 1998)

8-30-503 Source Tests: Any person who operates an approved emission control device subject to Sections 8-30-302, 304, 305 or 306 shall conduct an initial source test of the abatement device to demonstrate compliance. Results of the tests shall be submitted within 90 days after start up of affected equipment. The APCO shall be contacted in writing no less than 15 days prior to testing.

(Adopted November 23, 1988; Amended October 7, 1998)

8-30-504 Solvent Spray Station and Vapor Station Emissions: Any person seeking to satisfy Sections 8-30-305.3 or 306.3 shall maintain monthly records of net solvent use at each station. However, if more than one solvent spray station or vapor station is permitted as part of a semiconductor fabrication area (fab area), then combined records may be maintained for all stations in the fab area. However, separate records shall be maintained for each class of solvent station (solvent sink, spray station or vapor station). Compliance with the 250 lb/month limit shall be evaluated for each calendar month for each station, but may be averaged for all stations of a single class which are permitted in a single fab area. (Adopted October 7, 1998)

8-30-600 MANUAL OF PROCEDURES

8-30-601 Determination of Abatement Efficiency: Abatement efficiency of VOC as specified in Section 8-30-304.5, 305.3 and 306.3 shall be measured as prescribed by any of the following methods: 1) BAAQMD Manual of Procedures, Volume IV, ST-7, 2) EPA Method 25 or 25A. A source shall be considered in violation if the VOC emissions measured by any of the test methods exceed the standards of this rule.

(Adopted November 23, 1988; Amended June 15, 1994; October 7, 1998)

8-30-602 Determination of VOC Content: Samples of materials containing VOC shall be analyzed as prescribed in BAAQMD Manual of Procedures, Volume III, Method 22 or Method 31, or in accordance with another procedure approved by the APCO.

(Adopted October 7, 1998)