

RULE 321. SOLVENT CLEANING MACHINES AND SOLVENT CLEANING. (Adopted 2/24/1975, readopted 10/23/1978, revised 6/11/1979, 7/10/1990, 4/17/1997, 7/17/1997, 9/18/1997, 9/20/2010, and 6/21/2012)

A. Applicability

This rule shall apply to any person who owns, operates, or uses any solvent cleaning machine or performs any solvent cleaning operation outside of a solvent cleaning machine during the production, repair, maintenance, or servicing of parts, products, tools, machinery, equipment, or in general work areas at any stationary source.

B. Exemptions

Except as otherwise specifically provided herein, the provisions of this rule shall not apply to the following:

1. Any solvent cleaning machine equipped with and any solvent cleaning performed with a solvent (including emulsions) that contains two percent by weight or less of each of the following:
 - a. Reactive organic compounds (as determined by Environmental Protection Agency method 24), and
 - b. Toxic air contaminants (as determined by generic solvent data, solvent manufacturer's composition data or by a gas chromatography test and a mass spectrometry test).
 - c. Any person claiming this exemption shall maintain the records specified in Sections R.1.a.1) and R.1.a.2) in a manner consistent with Section R.3 and make them available for review.
2. The cleaning of architectural coating application equipment provided that the solvent used does not exceed 950 grams of reactive organic compound per liter of material.
3. Dry cleaning operations of clothing or other fabrics covered under Rule 320, Petroleum Solvent Dry Cleaners, or California Code of Regulations Title 17, Section 93109, Airborne Toxic Control Measure for Emissions of Perchloroethylene from Dry Cleaning and Water-Repelling Operations.
4. Stripping of cured coatings, cured adhesives, cured sealants, and cured inks, except the stripping of such materials from spray application equipment.
5. Notwithstanding Section B.1, any solvent cleaning machine that uses any halogenated hazardous air pollutant solvent provided such a solvent cleaning machine is subject to 40 CFR, Part 63, Subpart T, National Emission Standards for Halogenated Solvent Cleaning (Sections 63.460 et. seq.).
6. Any equipment or operation that is subject to or specifically exempted by any of the following District rules.
 - a. Rule 325, Crude Oil Production and Separation.
 - b. Rule 326, Storage of Reactive Organic Compound Liquids.
 - c. Rule 330, Surface Coating of Metal Parts and Products.
 - d. Rule 337, Surface Coating of Aerospace Vehicles and Components.
 - e. Rule 339, Motor Vehicle and Mobile Equipment Coating Operations.

- f. Rule 343, Petroleum Storage Tank Degassing.
- g. Rule 344, Petroleum Sumps, Pits and Well Cellars.
- h. Rule 349, Polyester Resin Operations.
- i. Rule 351, Surface Coating of Wood Products.
- j. Rule 353, Adhesives and Sealants.
- k. Rule 354, Graphic Arts.

Notwithstanding this exemption, the applicable Rule 321 requirements apply if a rule for any above process specifies a solvent cleaning machine shall comply with the applicable provisions of Rule 321.

- 7. Janitorial cleaning, including graffiti removal.
- 8. Provisions of Sections H.7, I.7, K.6, and, M.1 shall not apply to the following:
 - a. Cleaning of solar cells, laser hardware, scientific instruments, high-precision optics, telescopes, microscopes, avionic equipment, and aerospace and military fluid systems; and
 - b. Cleaning in laboratory tests and analyses, including quality assurance and quality control applications, bench scale projects, or short-term (less than 2 years) research and development projects; and
 - c. Cleaning of cotton swabs to remove cottonseed oil before cleaning of high-precision optics.
 - d. In addition, the provisions of Sections H.7, I.7, and K.6 shall not apply to solvent cleaning machines employed with solvents having 900 grams of reactive organic compound per liter of material or less during the production, repair, maintenance, or servicing of electrical apparatus components, electronic components, satellites, satellite components, aerospace vehicles, aerospace vehicle components, aerospace vehicle payloads, aerospace vehicle payload components, medical devices, or silicone manufacturing.
- 9. Solvent cleaning with aerosol products shall not be subject to Section D.9 and Section M.1 provisions and the Section M.2.c prohibition on solvent atomization provided:
 - a. 160 fluid ounces or less of aerosol products are used per day, per facility, and
 - b. Records are maintained as specified in Sections R.2 and R.3, and
 - c. The aerosol products comply with volatile organic compound limits for consumer products specified in the California Code of Regulations, Title 17, Section 94507 et seq.
- 10. Provisions of Section M.1, Table 1, Solvent Cleaning Activity (c) shall not apply to the cleaning of application equipment when such equipment is used to apply a coating on a satellite or when applying a radiation-effect coating.
- 11. Section D.9 and M.2.c prohibitions on solvent atomization shall not apply to the following applications:

- a. Cleaning of the nozzle tips of automated spray equipment systems, except for robotic systems.
 - b. Cleaning with hand-held spray bottles, squirt bottles, and other closed containers having a capacity of one liter or less.
 - c. Cleaning of gas turbines or jet engines using a gas-path solvent cleaner.
- 12. De-icing of aircraft and aerospace vehicles.
- 13. Solvent cleaning with a solvent containing 50 grams of reactive organic compounds per liter of material or less shall not be subject to the Section D.9 provision.
- 14. Solvent cleaning to disinfect and decontaminate surfaces and equipment in hospitals, clinics, medical facilities, dental care facilities, and other health care facilities, including but not limited to, sanatoriums, convalescent hospitals, convalescent homes, skilled nursing facilities, nursing homes, blood banks, and bloodmobiles.
- 15. Provisions of Section M.1 shall not apply if the net aggregate amount of solvent used for all solvent cleaning subject to Rule 321 (i.e., subject to Sections D, M.2, and/or M.3 provisions) at a stationary source does not exceed 55 gallons per year. Solvents with a reactive organic compound content of 50 grams per liter of material or less do not count towards the 55 gallons per year aggregate limit. Any person claiming this exemption shall maintain records as specified in Sections R.2 and R.3.
- 16. Provisions of Section M.1 shall not apply to the following applications:
 - a. Cleaning of ultraviolet lamps used to cure ultraviolet inks coatings, adhesives, or resins.
 - b. Cleaning of mold release compounds from molds.
 - c. Cleaning of aerospace assembly and subassembly surfaces that are exposed to strong oxidizers or reducers such as nitrogen tetroxide, liquid oxygen, or hydrazine.
 - d. Cleaning of paper gaskets.
 - e. Cleaning of clutch assemblies where rubber is bonded to metal by means of an adhesive.
 - f. Cleaning of hydraulic actuating fluid from filters and filter housings.
 - g. Wipe cleaning to remove crude oil and crude oil residue from well workover, drilling operations, and other activities related to petroleum production and processing on offshore platforms, provided the solvent reactive organic compound content does not exceed 800 grams per liter of material and the reactive organic compound composite partial pressure is no more than 8 millimeters of mercury at 20 degrees Celsius.
- 17. Provisions of Sections H.7, I.7, and K.6 shall not apply to the following applications, provided the solvent reactive organic compound content does not exceed 900 grams per liter of material and the reactive organic compound composite partial pressure is no more than 5 millimeters of mercury at 20 degrees Celsius:
 - a. Cleaning associated with the manufacturing of nuts and bolts designed for automotive racing applications.
 - b. Cleaning of precision-lapped mechanical seals in pumps that handle liquefied gasses.

18. Provisions of Sections J.11.a, d, and e shall not apply to batch vapor cleaning machines with a solvent/air interface area less than 929 square centimeters (1 square foot) or a solvent capacity less than 2 gallons, provided all such solvent cleaning machines emit, in aggregate, less than 55 pounds of reactive organic compounds per month per stationary source. Any person claiming this exemption shall maintain records as specified in Sections R.1 and R.3.
19. The use of solvent for purposes other than cleaning.
20. The Section E.7 and Section J.11.a, d, and e provisions shall not apply to batch vapor cleaning machines provided:
 - a. The equipment was installed before January 1, 2007; and
 - b. The solvent/air interface area is less than 4.40 square feet or the solvent capacity is less than 2 gallons; and
 - c. The equipment is used only for cleaning electronic components; and
 - d. The total aggregate reactive organic compound emissions from all batch vapor cleaning machines subject to this exemption do not exceed 188 pounds per month per stationary source; and
 - e. The equipment is subject to a Permit to Operate to help facilitate verifications that the requirements of subparagraphs B.20.a, b, c, and d are met.
 - f. In addition, the Section J.8 requirement to have a freeboard ratio of 1.0 or greater shall not apply to solvent cleaning machines meeting the requirements in subsections a – e above, provided the solvent cleaning machines have a freeboard ratio of 0.75 or greater.
21. The Section I.3, I.4, and I.7 requirements for unheated batch cleaning machines shall not apply, provided the equipment is used in medical device manufacturing when performing incidental product cleaning in conjunction with quality assurance or quality control tests (e.g., when conducting leak testing of silicone shells) and the solvent reactive organic compound content does not exceed 900 grams per liter of material.
22. Metal lift-off and other semiconductor and microelectromechanical device manufacturing processes involving thin film deposition, vacuum deposition, and dry etching operations; including any maintenance activities associated with such operations.
23. The solvent container draining and filling provisions in Section D.12 shall not apply to solvent transfers out of a sump, provided the sump has a maximum capacity of 8 gallons or less, such sump is easily removed from the solvent cleaning machine, and the solvent is poured from the sump directly into a bulk storage container.
24. Any batch vapor cleaning machine meeting all of the following requirements shall be exempt from the Section J.8 requirement to have a freeboard ratio of 1.0:
 - a. The equipment is used only for cleaning electronic components; and
 - b. The dimensions are such that the freeboard ratio is 0.75 or greater; and
 - c. The solvent cleaning machine is equipped with the freeboard refrigeration device for which the chilled air blanket temperature (expressed in degrees Fahrenheit) at the coldest point on the vertical axis in the center of the air blanket shall be no greater than 30 percent of the initial boiling point (expressed in degrees Fahrenheit) of the solvent used or no greater than minus 4 degrees Fahrenheit; and

- d. The batch vapor cleaning machine is equipped with a superheated vapor zone where parts remain in the vapor zone for at least the minimum dwell time, as specified by the manufacturer. The temperature within the superheated vapor zone shall be at least 10 degrees Fahrenheit above the initial boiling point of the solvent being used.

C. Definitions

See Rule 102 for definitions not limited to this rule. For purposes of this rule the following definitions shall apply:

“Aerosol Product” means a hand-held, non-refillable container that expels pressurized product by means of a propellant-induced force.

“Aerospace Vehicle” means the completed unit of any aircraft, helicopter, missile, or space vehicle.

“Aerospace Vehicle Component” means any raw material, partial or completed fabricated part, assembly of parts, or completed unit of any aircraft, helicopter, missile, or space vehicle, including mockups and prototypes.

“Air Blanket” means the layer of air inside the solvent cleaning machine freeboard located above the solvent/air interface.

“Airless Solvent Cleaning Machine” means any solvent cleaning machine that is automatically operated and seals at an absolute internal pressure of 0.02 pounds per square inch absolute or less, prior to the introduction of solvent vapor into the cleaning chamber and maintains differential pressure under vacuum during all cleaning and drying cycles.

“Air-Tight Solvent Cleaning Machine” means any solvent cleaning machine that is automatically operated and seals at a differential pressure no greater than 0.5 pounds per square inch absolute during all cleaning and drying operations.

“Automated Parts Handling System” means a mechanical device that carries all parts and parts baskets at a controlled speed from the initial loading of soiled or wet parts through the removal of the cleaned or dried parts. Automated parts handling systems include, but are not limited to, hoists and conveyors.

“Batch Cleaning Machine” means a solvent cleaning machine in which individual parts or a set of parts move through the entire cleaning cycle before new parts are introduced into the solvent cleaning machine. An open-top vapor cleaning machine is a type of batch cleaning machine. A solvent cleaning machine, such as a Ferris wheel or a cross-rod degreaser, that clean multiple batch loads simultaneously and are manually or semi-continuously loaded are batch cleaning machines.

“Bench Scale Project” means a project (other than at a research and development facility) that is operated on a small scale, such as one capable of being located on a laboratory bench top.

“Carbon adsorber” means a bed of activated carbon into which an air-solvent gas-vapor stream is routed and which adsorbs the solvent on the carbon.

“Carry-out” see **“Drag-out.”**

“Circumferential Trough” means a receptacle located below the primary condenser that conveys condensed solvent and atmospheric moisture to a water separator.

“Cold Cleaning Machine” means any device or piece of equipment that contains and/or uses liquid solvent, into which parts are placed to remove soils from the surfaces of the parts or to dry the parts.

Cleaning machines that contain and use heated, nonboiling solvent to clean the parts are classified as cold cleaning machines. Cold solvent wash stations are classified as cold cleaning machines.

“Condenser” or **“Primary Condenser”** means a series of circumferential cooling coils on a vapor cleaning machine through which a chilled substance is circulated or recirculated to provide continuous condensation of rising solvent vapors and, thereby, create a concentrated solvent vapor zone.

“Condenser Flow Switch” means a safety switch connected to a thermostat that shuts off the sump heater if the condenser coolant is either not circulating or exceeds its designed operating temperature.

“Continuous Cleaning Machine” see **“In-Line Cleaning Machine.”**

“Continuous Web Cleaning Machine” means a solvent cleaning machine in which parts such as film, coils, wire, and metal strips are cleaned at speeds typically in excess of 11 feet per minute. Parts are generally uncoiled, cleaned such that the same part is simultaneously entering and exiting the solvent application area of the solvent cleaning machine, and then recoiled or cut. For the purposes of this rule, all continuous web cleaning machines are considered to be a subset of in-line solvent cleaning machines.

“Conveyorized (In-Line or Continuous) Cold Cleaning Machine” means any continuously loaded solvent cleaning machine that is not a conveyorized vapor cleaning machine.

“Conveyorized (In-Line or Continuous) Cleaning Machine” means any cold or vapor solvent cleaning machine, that uses an automated parts handling system to automatically provide a continuous supply of parts to be cleaned. Conveyorized (in-line or continuous) cleaning machines include but are not limited to vibra, monorail, mesh, belt, web, and strip cleaning machines. Strip cleaning machines clean material by drawing the strip itself through the unit for cleaning prior to coating or other fabrication processes. For the purposes of this rule **“Conveyorized (In-Line or Continuous) Cleaning Machine”** has the same meaning as **“In-Line Cleaning Machine.”**

“Conveyorized (In-Line or Continuous) Vapor Cleaning Machine” means any continuously loaded solvent cleaning machine that immerses parts in boiling solvent or in solvent vapors generated by boiling solvent. Conveyorized (in-line or continuous) cleaning machines that contain any vapor cleaning sections shall be considered to be conveyorized vapor cleaning machines for the purposes of this rule.

“Cross-Rod Solvent Cleaning Machine” means a batch solvent cleaning machine in which parts baskets are suspended from “cross-rods” as they are moved through the machine. In a cross-rod cleaning machine, parts are loaded semi-continuously, and enter and exit the machine from a single portal.

“Downtime Mode” means the time period when a solvent cleaning machine is not cleaning parts and the sump heating coils, if present, are turned off.

“Drag-out” means solvent carried out of a solvent cleaning machine that adheres to or is entrapped in the part being removed.

“Drying Tunnel” means an add-on enclosure extending from the exit area of a solvent cleaning machine that reduces drag-out losses by containing evaporating solvent.

“Dwell” means the technique of holding parts within the freeboard area but above the vapor zone of the solvent cleaning machine. Dwell occurs after cleaning to allow solvent to drain from the parts or parts baskets back into the solvent cleaning machine.

“Dwell Time” means the period of time when parts are held within the freeboard area of the solvent cleaning machine, after cleaning, to allow solvent to drain from the parts back into the solvent cleaning machine.

“Electrical Apparatus Components” means the internal components such as wires, windings, stators, rotors, magnets, contacts, relays, energizers, and connections in an apparatus that generates or transmits electrical energy including, but not limited to: alternators, generators, transformers, electric motors, cables, and circuit breakers, except for the actual cabinet in which the components are housed. Electrical components of graphic arts application equipment and hot-line tools are also included in this category.

“Electronic Components” means the portions of an assembly, including, but not limited to: circuit card assemblies, printed wire assemblies, printed circuit boards, soldered joints, ground wires, bus bars, magnetic tapes and tape drive mechanisms, discs and disc drive mechanisms, electro-optical devices (e.g., optical filters, sensor assemblies, infrared sensors, charged coupled devices, thermal electric coolers, and vacuum assemblies), solid state components, semiconductors (e.g., diodes, zeners, stacks, rectifiers, integrated microcircuits, transistors, solar cells, light sensing devices, and light-emitting devices), and other electrical fixtures, except for the actual cabinet in which the components are housed.

“Emulsion” means a suspension of small droplets of one liquid in a second liquid.

“Emission Control Device” means a device for reducing emissions of reactive organic compounds or toxic air contaminants to the atmosphere.

“Evaporation” means to change into a vapor, normally from a liquid state.

“Existing Solvent Cleaning Operation” means solvent cleaning that is being performed as of September 20, 2010.

“Existing Solvent Cleaning Machine” means any solvent cleaning machine that is installed as of September 20, 2010.

“Fluid System” means a power transmission system that uses the force of flowing liquids and gases to transmit power. Fluid systems include hydraulic systems and pneumatic systems.

“Freeboard Area” means; for a batch cleaning machine, the area within the solvent cleaning machine that extends from the solvent/air interface to the top of the solvent cleaning machine; for an in-line cleaning machine, it is the area within the solvent cleaning machine that extends from the solvent/air interface to the bottom of the entrance or exit opening, whichever is lower.

“Freeboard Height” means; for a batch cleaning machine, the distance from the solvent/air interface as measured during the idling mode or the top of the solvent drain of a remote reservoir cold cleaning machine to the top of the cleaning machine; for an in-line cleaning machine, it is the distance from the solvent/air interface to the bottom of the entrance or exit opening, whichever is lower as measured during the idling mode.

“Freeboard Ratio” means the ratio of the solvent cleaning machine freeboard height to the smaller interior dimension (length, width, or diameter) of the solvent cleaning machine.

“Freeboard Refrigeration Device (Also Called a ‘Chiller’)” means a secondary cooling coil mounted above the primary condenser that provides a chilled air blanket above the solvent vapor air-interface to cause the condensation of additional solvent vapor. A primary condenser capable of meeting the requirements of Section J.9.a or L.10.a is defined as both a freeboard refrigeration device and a primary condenser for the purposes of this rule.

“Gas-Path Solvent Cleaner” means a solvent cleaning machine (including ancillary equipment) that applies solvent to the interior of a gas turbine or jet engine for the removal of corrosion or combustion deposits.

“General Work Surface” means an area of a medical device or pharmaceutical facility where solvent cleaning is performed on work surfaces including, but not limited to, tables, countertops, and laboratory benches. General work surface shall not include items defined under janitorial cleaning.

“Guillotine Cover” means a cover that is biparting and moves in the same plane.

“Halogenated Hazardous Air Pollutant Solvent” means methylene chloride (Chemical Abstracts Service No. 75-09-2), perchloroethylene (Chemical Abstracts Service No. 127-18-4), trichloroethylene (Chemical Abstracts Service No. 79-01-6), 1,1,1-trichloroethane (Chemical Abstracts Service No. 71-55-6), carbon tetrachloride (Chemical Abstracts Service No. 56-23-5), and chloroform (Chemical Abstracts Service No. 67-66-3).

“High-Precision Optics” means any optical element used in an electro-optical device that is designed to sense, detect, or transmit light energy, including specific wavelengths of light energy and changes in light energy levels.

“High Volatility Solvent” means any solvent that is not classified as a low volatility solvent.

“Hoist” means a mechanical device that carries the parts basket and the parts to be cleaned from the loading area into the solvent cleaning machine and to the unloading area at a controlled speed. A hoist may be operated by controls or may be programmed to cycle parts through the cleaning cycle automatically.

“Idling Mode” means the time period when a solvent cleaning machine is not actively cleaning parts and the sump heating coils, if present, are turned on.

“Initial Boiling Point” means the boiling point of a liquid as defined by ASTM D 1078-05, “Standard Test Method for Distillation Range of Volatile Organic Liquids,” ASTM International.

“In-Line Cleaning Machine” or **“Continuous Cleaning Machine”** means any solvent cleaning machine that uses an automated parts handling system, typically a conveyor, to automatically provide a continuous supply of parts to be cleaned. These units are fully enclosed except for the conveyor inlet and exit portals. In-line cleaning machines can be either cold or vapor cleaning machines.

“Lip Exhaust” means a device installed at the top of the opening of a solvent cleaning machine that draws in air and solvent vapor from the freeboard area and ducts the air and vapor away from the solvent cleaning machine.

“Liquid Leak” means any solvent leak at a rate of more than three drops per minute or any visible liquid mist.

“Low Volatility Solvent” means a solvent with an initial boiling point that is greater than 120 degrees Celsius (248 degrees Fahrenheit) and with a temperature, as used, at least 100 degrees Celsius (212 degrees Fahrenheit) below the initial boiling point.

“Maintenance Cleaning” means a solvent cleaning operation or activity carried out to keep clean general work areas where manufacturing or repair activity is performed, to clean tools, machinery, molds, forms, jigs, and equipment. This definition does not include the cleaning of adhesive, coating, or ink application equipment.

“Manufacturing Process” means the process of making goods or articles by hand or by machinery.

“Medical Device” means an instrument, apparatus, implement, machine, contrivance, implant, in vitro reagent or other similar article, including any component, accessory, raw material, partial or completed fabricated part, that meets one of the following conditions:

1. It is intended for use in the diagnosis of disease or other conditions, or in the cure, mitigation, treatment, or prevention of disease; or
2. It is intended to affect the structure or any function of the body; or
3. It is defined in the National Formulary or the United States Pharmacopeia, or any supplement to them.

“Mixer” means any device that mechanically agitates the liquid solvent to enhance the cleaning process.

“Nonabsorbent Container” means any container made of nonporous material, which does not allow the migration of the liquid solvent through it.

“Nonatomized Solvent Flow” means the use of a solvent in the form of a liquid stream without atomization.

“Nonleaking Container” means a container without any liquid leaks.

“Open-Top Vapor Cleaning Machine” means a batch solvent cleaning machine that has its upper surface open to the air and boils solvent to create solvent vapor used to clean and/or dry parts.

“Primary Condenser” see **“Condenser.”**

“Radiation-Effect Coating” means a material that prevents radar detection.

“Reactive Organic Compound Composite Partial Pressure” means the sum of the partial pressures of compounds defined as reactive organic compounds. Reactive organic compound composite pressure shall be calculated as follows:

$$PP_c = \frac{\sum_{i=1}^n \left(\frac{W_i}{MW_i} \right) (VP_i)}{\left(\frac{W_w}{MW_w} \right) + \sum_{e=1}^n \left(\frac{W_e}{MW_e} \right) + \sum_{i=1}^n \left(\frac{W_i}{MW_i} \right)}$$

Where:

- W_i = Weight of the “i”th reactive organic compound, in grams
 W_w = Weight of water, in grams
 W_e = Weight of the “e”th exempt organic compound, in grams
 MW_i = Molecular weight of the “i”th reactive organic compound, in grams per grams-mole
 MW_w = Molecular weight of water, in grams per grams-mole
 MW_e = Molecular weight of the “e”th exempt compound, in grams per grams-mole
 PP_c = Reactive organic compound composite partial pressure at 20 degrees Celsius, in millimeters of mercury
 VP_i = Vapor pressure of the “i”th reactive organic compound at 20 degrees Celsius, in millimeters of mercury

“Refrigerated Freeboard Chiller” see the definition for **“Freeboard Refrigeration Device (also called a ‘Chiller’).”**

“Remote Reservoir Cold Cleaning Machine” means any device in which liquid solvent is pumped to a sink-like work area that drains solvent back into an enclosed container while parts are being cleaned, allowing no solvent to pool in the work area. A remote reservoir cold cleaning machine that uses an enclosed container that is accessible for dipping or soaking parts is also considered to be a batch cleaning machine.

“Repair Cleaning” means a solvent cleaning operation or activity carried out during a repair process.

“Repair Process” means the process of returning a damaged object or an object not operating properly to good condition.

“Research and Development Activities” means activities conducted at a research or laboratory facility whose primary purpose is to conduct research and development into new processes and products, where such source is operated under the close supervision of technically trained personnel and is not engaged in the manufacture of products for sale or exchange for commercial profit, except in a de minimis manner.

“Rotating Basket” means a perforated or wire mesh cylinder containing parts to be cleaned that is slowly rotated while proceeding through the solvent cleaning machine.

“Scientific Instrument” means an instrument (including the components, assemblies, and subassemblies used in their manufacture) and associated accessories and reagents that is used for the detection, measurement, analysis, separation, synthesis, or sequencing of various compounds.

“Semiconductor Manufacturing” means any process or operation producing semiconductor material, slicing or polishing semiconductor material, utilizing photoresist to manufacture intermediate products, or producing either semiconductor devices or related solid state devices.

“Silicone Manufacturing” means any process or operation producing a silicone raw material (e.g., polymer, fluid, gum, gel, elastomer, dispersion, or other bulk state silicone material). Silicone manufacturing also includes any on site preliminary processes or operations that occurs before a silicone raw material is produced.

“Soils” mean contaminants that are removed from the part or parts being cleaned. Soils include, but are not limited to, grease, oils, waxes, metal chips, carbon deposits, fluxes, and tars.

“Solvent” means any liquid containing any reactive organic compound or any toxic air contaminant, which is used as a diluent, thinner, dissolver, viscosity reducer, cleaning agent, drying agent, preservative, or other similar uses.

“Solvent/Air Interface” means, for a vapor cleaning machine, the location of contact between the concentrated solvent vapor layer and the air. This location of contact is defined as the mid-line height of the primary condenser coils. For a cold cleaning machine, it is the location of contact between the liquid solvent and the air.

“Solvent/Air Interface Area” means; for a vapor cleaning machine, the surface area of the solvent vapor zone that is exposed to the air; for an in-line cleaning machine, it is the total surface area of all the sumps; for a cold cleaning machine, it is the surface area of the liquid solvent that is exposed to the air, except for remote reservoir cleaning machines, in which case it is the area of the drain.

“Solvent Cleaning” means any activity, operation, or process (including, but not limited to, surface preparation, cleanup, or wipe cleaning) performed outside of a solvent cleaning machine, that uses solvent to remove uncured adhesives, uncured coatings, uncured inks, uncured polyester resin material, uncured sealant, or other contaminants, including, but not limited to, dirt, soil, oil, lubricants, coolants, moisture, fingerprints, and grease, from parts, products, tools, machinery, application equipment, and general work areas. Cleaning spray equipment used for the application of coating, adhesive, ink, polyester resin material, or sealant is also considered to be solvent cleaning irrespective of the spray material being cured.

“Solvent Cleaning Machine” means any device or piece of equipment that uses solvent liquid or vapor to remove soils, moisture, or other contaminants from the surfaces of materials. Types of solvent cleaning machines include, but are not limited to, batch cold, batch vapor, in-line cold, in-line vapor, remote reservoir, and gas-path solvent cleaners. Buckets, pails, and beakers with capacities of 3.785 liters (1.00 gallon) or less are not considered solvent cleaning machines. However, the use of such a container or

similar containers (e.g., hand-held spray bottles) with a liquid solvent for cleaning is considered to be solvent cleaning. Any device or piece of equipment used exclusively for stripping shall not be considered to be a solvent cleaning machine.

“Solvent Container” means that part of the solvent cleaning machine that is intended to hold the cleaning solvent.

“Solvent Vapor Zone” means; for a vapor cleaning machine, the area that extends from the liquid solvent surface to the level that solvent vapor is condensed. This condensation level is defined as the midline height of the primary condenser coils.

“Space Vehicle” means a vehicle designed to travel beyond the earth’s atmosphere.

“Space Vehicle Component” means any raw material, partial or completed fabricated part, assembly of parts, or completed unit of any space vehicle, including mockups and prototypes.

“Spray Pump Control Switch” means a safety switch that prevents the spray pump from operating if the vapor level falls below the design operating level.

“Sump” means the part of a solvent cleaning machine where the liquid solvent is located.

“Sump Heater Coils” mean the heating system on a cleaning machine that uses steam, electricity, or hot water to heat or boil the liquid solvent.

“Superheated Vapor System” means a system that heats the solvent vapor, either passively or actively, to a temperature above the solvent's initial boiling point. Parts are held in the superheated vapor before exiting the machine to evaporate the liquid solvent on them. Hot vapor recycle is an example of a superheated vapor system.

“Superheated Vapor Zone” means any region located within the vapor zone of a vapor cleaning machine whereby solvent vapors are heated above the solvent’s initial boiling point.

“Ultrasonics” means enhancement of the cleaning process by agitation of liquid solvents with high frequency sound wave vibrations.

“Vapor Cleaning Machine” means a batch or in-line solvent cleaning machine that boils liquid solvent generating solvent vapor that is used as a part of the cleaning or drying cycle.

“Waste Solvent Residue” means sludge that may contain dirt, oil, metal particles, and/or other undesirable waste products concentrated after heat distillation of the waste solvent either in the solvent cleaning machine itself or after distillation in a separate still.

“Water Layer” means a layer of water that floats above the denser solvent and provides control of solvent emissions. In many cases, the solvent used in batch cold cleaning machines is sold containing the appropriate amount of water to create a water cover.

“Workload” means the objects put in a solvent cleaning machine for the purpose of removing oil, grease, soil, coating, dirt, moisture, or other undesirable matter from the surface of the objects.

“Workload Area” means:

- (1) The plane geometric surface area of the top of the submerged parts basket, or
- (2) The combined plane geometric surface area(s) displaced by the submerged workload, if no basket is used.

D. General Operating Requirements. Any person who owns, operates, or uses any solvent cleaning machine or performs any solvent cleaning shall ensure such operation conforms to the following requirements:

1. All solvent, including waste solvent and waste solvent residue, and waste solvent cleaning materials such as cloth, paper, etc. shall be stored or disposed of in nonabsorbent and nonleaking containers equipped with tight-fitting covers. The covers shall be in place unless adding material to or removing material from the containers, the containers are empty, or doing maintenance/inspection of the containers. After distillation recovery of waste solvent, solvent residues shall not contain more than 20 percent of reactive organic compound by weight.
2. The solvent cleaning machine, ventilation system, and/or emission control equipment shall be installed, operated, and maintained consistent with the manufacturer's specifications.
3. The cleaning of porous or absorbent materials, such as cloth, leather, wood, or rope, is prohibited. This provision shall not apply to paper gaskets, paper filters, and medical devices.
4. All containers holding solvent shall be free of liquid leaks. Solvent cleaning machine equipment, such as covers, pumps, water separators, steam traps, or distillation units shall not have any liquid leaks, visible tears, holes, or cracks. Any such liquid leak, visible tear, hole, or crack that is detected shall be repaired within one day from discovery, or the solvent cleaning machine shall be drained of all solvent, consistent with Section D.12 provisions, and shut down until replaced or repaired. Solvent cleaning machines shall not be operated when leaking.
5. Covers and other closure devices (e.g., valves or drain plugs) designed to reduce solvent evaporation shall not be removed or opened except to process work or to perform monitoring, inspections, maintenance, or repairs that require the removal of the covers or other closure devices. Solvent cleaning machines shall not be operated when performing maintenance or repairs.
6. For solvent cleaning machine operations other than gas-path solvent cleaners and continuous web cleaning machines, solvent carry-out shall be minimized by the following methods, as applicable:
 - a. Except for remote reservoir cold cleaning machines, the workload shall be racked.
 - b. Parts having cavities, holes, or blind holes shall be tipped or rotated before being removed from the solvent cleaning machine such that the solvent in the cavities, holes, or blind holes is returned to the solvent container.
 - c. The workload shall be drained within the freeboard area so that the drained solvent is returned to the solvent container.
 - d. For cold solvent cleaning, parts shall be drained immediately after cleaning, until one of the following conditions exists:
 - 1) At least 15 seconds have elapsed; or
 - 2) Dripping of solvent ceases; or
 - 3) The parts become visibly dry.
 - e. For automated parts handling systems, the workload shall be moved in and out of the solvent cleaning machine at less than 3.4 meters per minute (11.2 feet per minute).
7. For solvent cleaning machine operations other than gas-path solvent cleaners and continuous web cleaning machines, solvent flow shall be directed downward to avoid turbulence at the solvent/air

interface and to prevent liquid solvent from splashing outside of the solvent cleaning machine. If a flexible hose or flushing device is used, flushing shall be performed only within the freeboard area of the solvent cleaning machine.

8. For solvent cleaning machine operations other than gas-path solvent cleaners, solvent flow shall not be used in a manner such that liquid solvent splashes outside the container.
9. Solvent shall not be atomized unless it is vented to an emission control system that meets the requirements of Section N.
10. Any solvent spills shall be wiped up immediately and the used absorbent material (e.g., cloth, paper, sand, sawdust, etc.) shall be stored in closed containers that are handled in accordance with Section D.1.
11. Solvent levels shall not exceed the solvent cleaning machine's fill line.
12. Draining or filling solvent containers shall be performed at a level lower than the liquid solvent surface.
13. When using a ventilation fan, it shall not be positioned in such a way as to direct air flow near a solvent cleaning machine opening.

E. Additional Operating Requirements for Batch Vapor Cleaning Machines and In-Line Vapor Cleaning Machines. Any person who owns, operates, or uses any batch vapor cleaning machine or any in-line vapor cleaning machine shall ensure the equipment operation conforms to the following requirements:

1. Except to perform monitoring, inspections, maintenance, or repairs that require the removal of the covers:
 - a. Idling mode covers shall be closed or in place when the equipment is in an idling mode.
 - b. Downtime mode covers shall be closed or in place when the equipment is in a downtime mode.
2. When starting the solvent cleaning machine, the primary condenser shall be turned on before the sump heater.
3. When shutting down the solvent cleaning machine, the sump heater shall be turned off and the solvent vapor layer allowed to collapse before the primary condenser is turned off.
4. The workload shall be cleaned in the vapor zone for at least 30 seconds or until condensation ceases.
5. Parts shall be allowed to dry within the solvent cleaning machine until the exterior surface of the parts become visually dry.
6. Solvent spray shall be kept at least 10 centimeters (3.94 inches) below the solvent/air interface.
7. The workload area shall not occupy more than half of the solvent/air interface area of the solvent cleaning machine.
8. For solvent cleaning machines equipped with water separators, water shall not be visibly detectable in the solvent phase exiting the water separator, nor shall solvent be visibly detectable in the aqueous phase leaving the separator.

9. If equipped with a superheated vapor zone:
 - a. The manufacturer's specifications for determining the minimum proper dwell time within the superheated vapor system shall be followed.
 - b. Parts and parts baskets shall remain in the vapor zone for at least the minimum proper dwell time.
 - c. The temperature within the superheated vapor zone shall be at least 10 degrees Fahrenheit above the initial boiling point of the solvent being used.

F. Additional Operating Requirements for Gas-Path Solvent Cleaners. Any person who owns, operates, or uses any gas-path solvent cleaner shall ensure the equipment operation conforms to the following requirements:

1. Cleaned parts or equipment shall be drained until dripping ceases or 15 seconds have elapsed.
2. The cover of the solvent container(s), reservoir(s) and opening(s) of a solvent collection system shall be closed at all times except to process work or to perform monitoring, inspections, maintenance, or repairs that require the removal of the covers or other closure devices.

G. General Equipment Requirements for Solvent Cleaning Machines. Any person who owns, operates, or uses any solvent cleaning machine shall ensure that it is equipped with the following:

1. A container for the solvent.
2. Except for remote reservoir cold cleaning machines using low volatility solvents, an apparatus or cover(s) to completely cover the solvent container when not processing work.
3. Except for gas-path solvent cleaners using a solvent with a reactive organic compound content of 50 grams per liter of material or less, an apparatus or a device for draining cleaned parts such that the drained solvent or drag-out is returned to the solvent container.
4. A list of the applicable operating requirements. At a minimum, the list shall include the applicable operating requirements contained in Sections D, E, and F. The list of operating requirements shall be legible and conspicuously posted or maintained on or near the equipment in such a manner that it is conveniently available to the operator for reference purposes.
5. Where solvent agitation is used, equipment that achieves agitation by use of pump recirculation, mechanical mixing (a mixer), or ultrasonics. Gas or air agitation shall not be used. When a pump-agitated solvent bath is used, the pump agitator shall be designed to produce a rolling motion of the solvent without any observable splashing against tank walls or parts being cleaned.
6. When employing solvent flow, a flexible hose or flushing device that produces only a continuous fluid stream. An atomized or shower type spray shall not be used unless it is used in an in-line or enclosed solvent cleaning machine where the spray is conducted in a totally confined space that is sealed from the atmosphere.
7. Where a hood, enclosure, lip exhaust, or a lip exhaust connected to a hood or enclosure is employed, a blower or fan such that the air ventilation rate shall not exceed 20 cubic meters per minute per square meter (65.6 cubic feet per minute per square feet) of solvent/air interface area, unless necessary to meet a National Institute for Occupational Safety and Health standard.
8. When a lip exhaust is installed or added after July 17, 1997, an emission control system that meets the requirements of Section N.

9. A workroom having an average draft rate, as measured parallel to the plane of the solvent cleaning machine opening, not exceeding 9.1 meters per minute (30 feet per minute), unless necessary to meet a National Institute for Occupational Safety and Health standard.
10. When employing an automated parts handling system, equipment such that the speed of the parts shall not exceed 3.4 meters per minute (11.2 feet per minute).

H. Additional Equipment Requirements for Remote Reservoir Cold Cleaning Machines. Any person who owns, operates, or uses any remote reservoir cold cleaning machine shall ensure that it is equipped with the following:

1. A sink or work area that is sloped sufficiently towards the drain to prevent pooling of solvent.
2. A single drain hole, not larger than 100 square centimeters (15.5 square inches) in area, for the solvent to flow from the sink into the enclosed reservoir.
3. Except when using low volatility solvents, a cover or a device, such as a valve or a drain plug, to prevent or minimize solvent vapor emissions from the solvent container when not processing work or performing monitoring, inspections, maintenance, or repairs that require the removal of the cover or device.
4. A freeboard height of 6 inches or higher.
5. When the solvent is heated above 50 degrees Celsius (122 degrees Fahrenheit), or it is agitated, or the solvent is a high volatility solvent, dimensions such that the freeboard ratio is 0.75 or greater.
6. In lieu of the freeboard height required by Section H.4 or the freeboard ratio required by Section H.5, one of the following requirements may be met:
 - a. A water layer at a minimum thickness of 2.5 centimeters (1.0 inch) on the surface of the solvent within the cleaning machine shall be used, or
 - b. An emission control system that meets the requirements of Section N shall be used.
7. Effective September 20, 2011, except when using an emission control system that meets the requirements of Section N, solvent that contains 50 grams of reactive organic compound per liter of material or less.

I. Additional Equipment Requirements for Batch Cold Cleaning Machines. Any person who owns, operates, or uses any batch cold cleaning machine other than a remote reservoir cold cleaning machine shall ensure that it is equipped with the following:

1. When using a high volatility solvent, a cover that is a sliding, rolling, or guillotine type that is designed to easily open and close. If a mechanized batch cold cleaning machine (e.g., a manually loaded or semi-continuously loaded Ferris wheel or cross-rod solvent cleaning machine) is used with a high volatility solvent, the unit shall be equipped with a downtime mode cover.
2. If using a high volatility solvent, the drainage apparatus or device required by Section G.3 shall be internal so that the cleaned parts are within the solvent cleaning machine and under the cover while draining. The drainage apparatus or device may be external where the internal type cannot fit into the cleaning system provided the drained solvent is returned to the solvent container.
3. When using a low volatility solvent that is not agitated, a freeboard height of 6 inches or higher or dimensions such that the freeboard ratio is 0.5 or greater.

4. When the solvent is heated above 50 degrees Celsius (122 degrees Fahrenheit), or it is agitated, or the solvent is a high volatility solvent, dimensions such that the freeboard ratio is 0.75 or greater.
5. In lieu of the freeboard height or freeboard ratio required by Section I.3 or the freeboard ratio required by Section I.4, one of the following requirements may be met:
 - a. A water layer at a minimum thickness of 2.5 centimeters (1.0 inch) on the surface of the solvent within the cleaning machine shall be used, or
 - b. An emission control system shall be used that meets the requirements of Section N shall be used.
6. A conspicuous mark denoting the maximum allowable solvent level conforming to the applicable freeboard requirements. This requirement does not apply if employing a water layer or an emission control system per Section I.5.
7. Effective September 20, 2011, except when using an emission control system that meets the requirements of Section N, solvent that contains 50 grams of reactive organic compound per liter of material or less.

J. Additional Equipment Requirements for Batch Vapor Cleaning Machines. Any person who owns, operates, or uses any batch vapor cleaning machine shall ensure that it is equipped with the following:

1. For open-top vapor cleaning machines, a cover that is a sliding, rolling, or guillotine type that is designed to easily open and close without disturbing the vapor zone. This requirement does not apply to open-top vapor cleaning machines equipped with top enclosures, provided:
 - a. the operator only opens the enclosure cover(s) or door(s) when the condenser is operative or when the solvent cleaning machine is shut down, and
 - b. the solvent cleaning machine solvent/air interface area is less than 1 square meter (10.8 square feet), and
 - c. the solvent cleaning machine cover is designed such that it can be opened and closed easily without disturbing the vapor zone.
2. For mechanized batch vapor cleaning machines (e.g., a manually-loaded or semi-continuously-loaded Ferris wheel or cross-rod solvent cleaning machine), idling and downtime mode covers.
3. A primary condenser situated above the boiling solvent.
4. A condenser flow switch that automatically shuts off the sump heater if the condenser coolant stops circulating or becomes warmer than its designed operating temperature.
5. A vapor level control device that automatically shuts off the sump heater if the vapor level in the vapor cleaning machine rises above the height of the primary condenser.
6. For solvent cleaning machines with solvent flow, a device such as a spray pump control switch that prevents the solvent flow pump operation unless the solvent vapor level is at the designed operating level.
7. A device that automatically shuts off the sump heat if the sump liquid solvent level drops to the sump heater coils.
8. Dimensions such that the freeboard ratio is 0.75 or greater. Effective September 20, 2011, the unit shall have dimensions such that the freeboard ratio is 1.0 or greater.

9. For solvent cleaning machines with a solvent/air interface area of 1 square meter (10.8 square feet) or greater:
 - a. A freeboard refrigeration device for which the chilled air blanket temperature (expressed in degrees Fahrenheit) at the coldest point on the vertical axis in the center of the air blanket shall be no greater than 30 percent of the initial boiling point (expressed in degrees Fahrenheit) of the solvent used or no greater than 40 degrees Fahrenheit. If the chiller operates below 32 degrees Fahrenheit, it shall be equipped with an automatic defrost; or
 - b. An enclosed design in which the cover or door opens only when the dry part is actually entering or exiting the solvent cleaning machine.
10. In lieu of the freeboard ratio required by Section J.8 or the freeboard chiller/enclosed design required by Section J.9, an emission control system that meets the requirements of Section N may be used.
11. Effective September 20, 2011, except when an emission control system that meets the requirements of Section N is employed, when using solvent containing in excess of 50 grams of reactive organic compound per liter of material:
 - a. An automated parts handling system;
 - b. A circumferential trough;
 - c. A water separator (not required for solvents that form azeotropes with water);
 - d. A freeboard refrigeration device that is operated such that the chilled air blanket temperature, measured at the center of the air blanket, is no greater than 40 percent of the initial boiling point of the solvent, in degrees Fahrenheit, for solvents that do not form azeotropes with water, or 50 percent of the initial boiling point, in degrees Fahrenheit, for solvents that form azeotropes with water; and
 - e. A superheated vapor zone where parts remain in the vapor zone for at least the minimum dwell time, as specified by the manufacturer. The temperature within the superheated vapor zone shall be at least 10 degrees Fahrenheit above the initial boiling point of the solvent being used.

K. Additional Equipment Requirements for In-Line Cold Cleaning Machines. Any person who owns, operates, or uses any batch in-line cold cleaning machine shall ensure that it is equipped with the following:

1. A rotating basket, tumbling basket, drying tunnel, or other means that prevents cleaned parts from carrying out solvent liquid or vapor.
2. Openings such that the average clearance between workload material and the edges of the solvent cleaning machine entrance and exit openings shall be less than 10 centimeters (3.94 inches) or less than 10 percent of the opening width, whichever is less.
3. Downtime mode covers. A continuous web part that completely occupies an entry and exit port when the machine is idle is considered to meet this requirement.
4. Dimensions such that the freeboard ratio is 0.75 or greater.
5. In lieu of the freeboard ratio required by Section K.4, an emission control system that meets the requirements of Section N may be used.

6. Effective September 20, 2011, except when using an emission control system that meets the requirements of Section N, solvent that contains 50 grams of reactive organic compound per liter of material or less.

L. Additional Equipment Requirements for In-Line Vapor Cleaning Machines. Any person who owns, operates, or uses any in-line vapor cleaning machine shall ensure that it is equipped with the following:

1. A rotating basket, tumbling basket, drying tunnel, or other means that prevents cleaned parts from carrying out solvent liquid or vapor.
2. Openings such that the average clearance between workload material and the edges of the solvent cleaning machine entrance and exit openings shall be less than 10 centimeters (3.94 inches) or less than 10 percent of the opening width, whichever is less.
3. Idling and downtime mode covers. A continuous web part that completely occupies an entry and exit port when the machine is idle is considered to meet this requirement.
4. A primary condenser situated above the boiling solvent.
5. A condenser flow switch that automatically shuts off the sump heater if the condenser coolant stops circulating or becomes warmer than its designed operating temperature.
6. A vapor level control device that automatically shuts off the sump heater if the vapor level in the vapor cleaning machine rises above the height of the primary condenser.
7. For solvent cleaning machines with solvent flow, a device such as a spray pump control switch that prevents the solvent flow pump operation unless the solvent vapor level is at the designed operating level.
8. A device that automatically shuts off the sump heat if the sump liquid solvent level drops to the sump heater coils.
9. Dimensions such that the freeboard ratio is 0.75 or greater. Effective September 20, 2011, the unit shall have dimensions such that the freeboard ratio is 1.0 or greater.
10. In lieu of the freeboard ratio required by Section L.9, one of the following may be met:
 - a. A freeboard refrigeration device for which the chilled air blanket temperature (expressed in degrees Fahrenheit) at the coldest point on the vertical axis in the center of the air blanket shall be no greater than 30 percent of the initial boiling point (expressed in degrees Fahrenheit) of the solvent used or no greater than 40 degrees Fahrenheit. If the chiller operates below 32 degrees Fahrenheit, it shall be equipped with an automatic defrost; or
 - b. An emission control system that meets the requirements of Section N shall be used.
11. Effective September 20, 2011, except when an emission control system that meets the requirements of Section N is employed, when using solvent containing in excess of 50 grams of reactive organic compound per liter of material:
 - a. A circumferential trough;
 - b. A water separator (not required for solvents that form azeotropes with water);

- c. A freeboard refrigeration device that is operated such that the chilled air blanket temperature, measured at the center of the air blanket, is no greater than 40 percent of the initial boiling point of the solvent, in degrees Fahrenheit, for solvents that do not form azeotropes with water, or 50 percent of the initial boiling point, in degrees Fahrenheit, for solvents that form azeotropes with water; and
- d. A superheated vapor zone where parts remain in the vapor zone for at least the minimum dwell time, as specified by the manufacturer. The temperature within the superheated vapor zone shall be at least 10 degrees Fahrenheit above the initial boiling point of the solvent being used.

M. Requirements - Solvent Cleaning.

Section M requirements apply to any person performing solvent cleaning, including, but not limited to, use of wipe cleaning cloths, cotton swabs, dabber bottles, hand-held spray bottles, squirt bottles, aerosol products, and the cleaning of application equipment. The following requirements become effective September 20, 2011 and are in addition to the general operating requirements specified in Section D.

1. **Solvent Requirements.** Except when using an emission control system that meets the requirements of Section N, no person shall use any solvent to perform solvent cleaning which exceeds the applicable grams of reactive organic compound per liter of material limit specified in Table 1.

Table 1: Reactive Organic Compound Content Limits for Solvent Cleaning

SOLVENT CLEANING ACTIVITY	ROC Limit, grams of ROC per liter of material (pounds of ROC per gallon ^a)
(a) Product Cleaning During Manufacturing Processes and Surface Preparation for Coating Application:	
(i) General	50 (0.42)
(ii) Electrical Apparatus Components & Electronic Components	900 (7.51)
(iii) Medical Devices & Pharmaceuticals	900 (7.51)
(iv) Silicone Manufacturing	900 (7.51)
(b) Repair Cleaning and Maintenance Cleaning:	
(i) General	50 (0.42)
(ii) Electrical Apparatus Components & Electronic Components	900 (7.51)
(iii) Medical Devices & Pharmaceuticals:	
(I) Tools, Equipment, & Machinery	900 (7.51)
(II) General Work Surfaces	900 (7.51)

^a English units are provided for information only.

SOLVENT CLEANING ACTIVITY	ROC Limit, grams of ROC per liter of material (pounds of ROC per gallon ^a)
(iv) Silicone Manufacturing	900 (7.51)
(c) Cleaning of Coatings Application Equipment	950 (7.93)
(d) Cleaning of the Following Items and Equipment and their Components: (i) Aerospace Vehicles; (ii) Aerospace Vehicle Payloads and Satellites; (iii) Aerospace Vehicle, Aerospace Vehicle Payload, and Satellite: (I) Transport Equipment (e.g., railcars, trucks, trailers, forklifts, and containers), and (II) Support Processing Equipment (e.g., clean rooms, tools, payload fairing fixtures, alignment jigs, fuel and oxidizer loading carts and associated transfer lines).	900 (7.51)

2. **Cleaning Devices and Methods.** Except for solvent cleaning of spray application equipment, any person performing solvent cleaning with a solvent containing more than 50 grams per liter of material shall use one or more of the following cleaning devices or methods:

- a. Wipe cleaning where solvent is dispensed to wipe cleaning materials from containers that are kept closed to prevent evaporation, except while dispensing solvent or replenishing the solvent supply;
- b. Application of solvent from hand-held spray bottles, squirt bottles, or other closed containers with a capacity of one liter or less; or
- c. Non-atomized solvent flow, dip, or flush method where pooling on surfaces being cleaned is prevented or drained, and all solvent runoff is collected in a manner that enables solvent recovery or disposal. The collection system shall be kept closed to prevent evaporation except while collecting solvent runoff or emptying the collection system.

3. **Solvent Cleaning of Spray Application Equipment.** Any person cleaning spray application equipment with a solvent containing more than 50 grams of reactive organic compound per liter of material shall use an enclosed system, or equipment that is proven to the satisfaction of the Control Officer to be equally effective as an enclosed system at controlling emissions. If an enclosed system is used, it shall totally enclose spray guns, cups, nozzles, bowls, and other parts during washing, rinsing and draining procedures, and it shall be used according to the manufacturer's recommendations and be closed when not in use.

- N. **Emission Control System Requirements.** Any person who owns, operates, or uses any emission control system required by Sections D.9, G.8, or T.2.b.4) or as an alternative compliance method as provided for in this rule shall ensure that the following requirements are met:

1. The overall efficiency (the capture system efficiency multiplied by the emission control device efficiency) of the total system shall not be less than 85 percent by weight in reducing total reactive organic compound and toxic air contaminant emissions.
2. When using a carbon adsorber, the system exhaust shall be no more than 25 parts per million of reactive organic compound by volume, calculated as carbon, over a complete adsorption cycle,
3. The emission collection system shall have a ventilation rate between 15 to 20 cubic meters per minute per square meter of solvent/air interface area (49.2 to 65.6 cubic feet per minute per square feet of solvent air interface area), unless otherwise required to meet a National Institute for Occupational Safety and Health standard.
4. An application for installation of the emission control equipment is submitted and the Control Officer grants an Authority to Construct for the equipment.
5. An initial source test is accomplished by September 20, 2011 or a later deadline established in an Authority to Construct to demonstrate compliance with the overall efficiency of the total system and/or the 25 parts per million reactive organic compound by volume limits of this rule.
6. Compliance through the use of an emission control system will not result in reactive organic compound emissions in excess of the reactive organic compound emissions which would result from compliance with Sections H.7, I.7, K.6, or M.1.

O. Alternative Operating and Equipment Requirements for an Airless Solvent Cleaning Machine or an Air-Tight Solvent Cleaning Machine. In lieu of meeting the requirements of Sections E through L, any person may use an airless solvent cleaning machine or air-tight solvent cleaning machine provided all of the following requirements are met:

1. The equipment is operated in accordance with the manufacturer's specifications and operated with a door or other pressure sealing apparatus that is in place during all cleaning and drying cycles.
2. No pressure relief device shall allow liquid solvent to drain out.
3. A differential pressure gauge shall be installed to indicate the sealed chamber pressure.
4. A list of operating requirements shall be legible and conspicuously posted or maintained on or near the equipment in such a manner that it is conveniently available to the operator for reference purposes.

P. Test Methods.

Any person who owns, operates, or uses any solvent cleaning machine or performs any solvent cleaning shall comply with the following test methods:

1. The reactive organic compound content of solvents shall be measured by the Environmental Protection Agency Reference Method 24 (40 CFR, Part 60, Appendix A-7).
2. The initial boiling point of solvents shall be determined by ASTM D 1078-05, "Standard Test Method for Distillation Range of Volatile Organic Liquids," ASTM International.
3. The capture system efficiency shall be determined in accordance with the Environmental Protection Agency method described in 40 CFR, §52.741(a)(4)(iii) when the emission control system is used for reducing emissions of reactive organic compounds. For emission control systems handling compounds that are toxic air contaminants but not reactive organic compounds, the capture system efficiency shall be determined by using the same aforementioned method

modified in a manner approved by the Control Officer to quantify the mass of liquid or gaseous reactive organic compounds and/or toxic air contaminants.

4. The emission control device efficiency shall be determined pursuant to the Environmental Protection Agency method described in 40 CFR, §52.741(a)(4)(iv) and 40 CFR, §52.741(a)(4)(vi), when the emission control system is used for reducing emissions of reactive organic compounds. For emission control systems handling any compound that is a toxic air contaminant but not a reactive organic compound, the emission control device efficiency shall be determined using:
 - a. an Environmental Protection Agency approved test method or methods, or
 - b. in the case where there is no Environmental Protection Agency approved test method, a Control Officer approved detection method applicable for each target toxics specie.
 - c. Several Environmental Protection Agency and/or Control Officer approved test methods on the emission control device efficiency may need to be employed to demonstrate that the emission control system overall efficiency is at least 85 percent by weight in reducing emissions of reactive organic compounds and/or toxic air contaminants. In addition, techniques to convert “parts per million by volume” test method results to 1) “parts per million by weight” and/or 2) “mass emission rates” (e.g., pounds per hour) shall be approved by the Control Officer.
5. The volumetric flowrate shall be determined in accordance with the Environmental Protection Agency Methods 2, 2A, 2C, 2D, 2F, or 2G (40 CFR, Part 60, Appendix A-1).
6. The average workroom draft rate shall be measured parallel to the plane of the solvent cleaning machine opening with a thermistor anemometer with an accuracy within ± 2 feet per minute and a calibration pursuant to the National Institute of Standards and Technology.
7. The identity of components in solvents shall be determined using manufacturer’s formulation data or by using ASTM E 168-06, “Standard Practices for General Techniques of Infrared Quantitative Analysis,” ASTM International, ASTM E 169-04, “Standard Practices for General Techniques of Ultraviolet-Visible Quantitative Analysis,” ASTM International, or ASTM E 260-96 (2006), “Standard Practice for Packed Column Gas Chromatography,” ASTM International.
8. Emissions of reactive organic compounds from the exhaust of an emission control system shall be measured by the Environmental Protection Agency Method 18 (40 CFR, Part 60, Appendix A-7), with gas chromatography-flame ionization detection speciation analysis for C1, C2, C3, C4, C5, C6+ species. Alternatively, the Environmental Protection Agency Method 25 or 25A in combination with Method 18 may be used.

Q. Operation and Maintenance Plan. Any person proposing to use an emission control device to comply with this rule pursuant to Section N shall submit, with the Authority to Construct application, an emission control device Operation and Maintenance Plan to the Control Officer for approval. The Operation and Maintenance Plan shall specify:

1. operation and maintenance procedures of emissions-producing operation, and
2. which records shall be kept to document these operation and maintenance procedures.
3. In addition, these records shall comply with the requirements of Section R.1.c and R.3. The Operation and Maintenance Plan shall be implemented upon approval of the Control Officer.

R. Recordkeeping Requirements.

1. Any person who owns, operates, or uses a solvent cleaning machine or performs solvent cleaning that is subject to this rule shall comply with the following requirements:
 - a. Record and maintain the following information:
 - 1) Brand name, stock identification number, and generic product class for each solvent used during the month at the stationary source.
 - 2) Material safety data sheets for each material listed in response to Section R.1.a.1).
 - 3) Purchase records for each material listed in response to Section R.1.a.1).
 - b. Record the following information for the stationary source:
 - 1) On a monthly basis, the total monthly volume (gallons) usage and reactive organic compound content (grams per liter or pounds per gallon of reactive organic compound) for each material listed in response to Section R.1.a.1).
 - 2) Records confirming compliance with the acceptable disposal methods listed in Section D.1, each time waste solvent or waste solvent residue is removed from the stationary source for disposal.
 - 3) For solvent cleaning, the type of cleaning activity for each solvent used at the stationary source in accordance with the cleaning categories specified in Table 1 of this rule.
 - 4) For each solvent cleaning machine:
 - i. Type of solvent cleaning machine.
 - ii. Brand name of each solvent used in the solvent cleaning machine and the reactive organic compound content of each solvent, as used.
 - iii. The solvent(s) initial boiling point.
 - 5) When the solvent used is a mixture of different materials that are blended by the operator, the mix ratio of the batch shall be recorded and the reactive organic compound content of the batch shall be calculated and recorded in order to determine compliance with the specified limits of reactive organic compound content, as applied.
 - c. If using an emission control system pursuant to Section N as a means of complying with this rule, the person shall maintain such records as required by the Operation and Maintenance Plan in Section Q on a daily basis. Key operating parameters and other information necessary to verify compliance with the required overall efficiency of the total system, as specified in Section N.1, shall be recorded. These parameters shall include, but not be limited to:
 - 1) Hours of operation;
 - 2) All maintenance work that requires the emission control system to be shut down;

- 3) All information needed to demonstrate continuous compliance with Section N, such as temperatures, pressures, and/or flow rates.
2. In addition to the records required by Section R.1, any person claiming the Section B.9 exemption or the Section B.15 exemption, shall maintain records in order to demonstrate compliance with the solvent usage rate aggregate limits. For Section B.9 exemption claims, daily records on a facility basis shall be maintained. For Section B.15 exemption claims, monthly and calendar year total records on a stationary source basis shall be maintained.
3. Maintain the records kept pursuant to this rule on site for at least 3 years. Thereafter, maintain such records either on site or readily available for expeditious inspection and review for an additional 2 years.

S. Reporting Requirements

Any person holding a permit for a solvent cleaning machine or solvent cleaning subject to the requirements of this rule shall submit an annual report to the District. At a minimum, the annual report shall contain the monthly records required by Section R.1.b.1), the annual totals based on each of the solvent's monthly data, the name and address of the Permittee, and the Permit to Operate number that the solvent cleaning machine and/or solvent cleaning is subject to. The report shall be due March 1 for the previous calendar year.

T. Compliance Schedule

Any person who owns, operates, or uses any solvent cleaning machine or performs any solvent cleaning subject to this rule shall meet the following compliance schedule:

1. New solvent cleaning machines and solvent cleaning operations:

Commencing September 20, 2010, any new solvent cleaning machine shall comply with this rule the first time it is operated in the District. Also commencing September 20, 2010, any new solvent cleaning shall comply with this rule the first time it is performed in the District.
2. Existing solvent cleaning machines:
 - a. For any solvent cleaning machine previously subject to the Rule 321 adopted on September 18, 1997, commencing September 20, 2010, the owner or operator shall ensure that the equipment complies with the applicable provisions of Rule 321. The provisions in Sections H.7, I.7, J.8, J.11, K.6, L.9, and L.11 have an effective date of September 20, 2011.
 - b. For any solvent cleaning machine previously exempt from the September 18, 1997 amended Rule 321 that lost its exemption by the adoption of amended Rules 102 (Definitions), 202 (Exemptions to Rule 201), and/or Rule 321 on September 20, 2010, the owner or operator of such equipment shall comply with the following:
 - 1) October 20, 2010, be in full compliance with the applicable operating requirements of Sections D, E, and F.
 - 2) By March 19, 2011, be in full compliance with the applicable recordkeeping and reporting provisions of Sections R and S.
 - 3) By September 20, 2011, be in full compliance with the applicable equipment requirements of Sections G, H, I, J, K, L, and N.
 - 4) Any lip exhaust installed after September 20, 2010 shall be vented to an emission control system that meets the requirements of Section N at the time of installation, notwithstanding the date in Sections G.8 and T.2.b.3.

3. Existing solvent cleaning operations:

The owner or operator of any facility performing solvent cleaning as of September 20, 2010 and subject to the requirements of this rule shall comply with the following:

- a. By October 20, 2010, be in full compliance with the applicable operating requirements of Section D.
- b. By March 19, 2011, be in full compliance with the applicable recordkeeping and reporting provisions of Sections R and S.
- c. By September 20, 2011, be in full compliance with the solvent cleaning requirements of Rule Section M.