

**RULE 454 DEGREASING OPERATIONS**

Adopted 6-5-79

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**100 GENERAL**

- 101 **PURPOSE:** To limit the emission of volatile organic compounds from degreasers.
- 102 **APPLICABILITY:** This rule applies to solvent degreasing operations.
- 103 **SEVERABILITY:** If a court of competent jurisdiction issues an order that any provision of this rule is invalid, it is the intent of the Board of Directors of the District that other provisions of this rule remain in full force and effect, to the extent allowed by law.
- 110 **EXEMPTIONS:**
- 110.1 The provisions of this rule do not apply to wipe cleaning.
  - 110.2 Prior to September 25, 2009, the provisions of this rule shall not apply to non-vapor degreasers which use solvents that contain 50 grams per liter or less VOCs including water and exempt compounds.
  - 110.3 Effective September 25, 2009, the provisions of this rule shall not apply to degreasers which use solvents that contain 25 grams per liter or less VOCs including water and exempt compounds, as determined by Sections 502.5 and 502.6.
  - 110.4 The provisions of Section 308.7 of this rule do not apply to open-top vapor degreasers where solvent flow complies with Section 308.10.b. and liquid solvent does not splash above the air-vapor interface.
  - 110.5 Prior to September 25, 2009, the provisions of this rule shall not apply to solvent degreasing operations that are subject to the NESHAP requirements of 40 CFR Part 63 Subpart T- Halogenated Solvents Emissions from Solvent Cleaning.
  - 110.6 The provisions of this rule shall not apply to products subject to the Air Resources Board Consumer Products Regulations as set forth at Subchapter 8.5, Article 2, Section 94507-94517 of Title 17 of the California Code of Regulations.
  - 110.7 The VOC content limits in Sections 302.2 and 302.3 do not apply to degreasing of tools, equipment and machinery, regulated under Rule 456, AEROSPACE ASSEMBLY AND COMPONENT COATING OPERATIONS, and aerospace products using solvents that comply with the surface preparation and cleanup VOC limits in Section 304.7 of Rule 456, AEROSPACE ASSEMBLY AND COMPONENT COATING OPERATIONS.
  - 110.8 The provisions of this rule shall not apply to degreasing of high-voltage microwave vacuum tubes.

**200 DEFINITIONS**

- 201 **AIRTIGHT/AIRLESS CLEANING SYSTEM:** A sealed cleaning system that has no open air/vapor or air/solvent interface, and is designed and automatically operated to minimize the discharge or leakage of solvent vapor emissions to the atmosphere during all cleaning and vacuum drying operations. The system consists of devices to condense and recover solvent and solvent vapor, and control devices to remove solvent vapors from all gas streams that vent to the atmosphere.
- 202 **CIRCUMFERENTIAL TROUGH:** A receptacle located below the primary condenser that conveys condensed solvent and atmospheric moisture to a water separator.
- 203 **CLOSED CONTAINER:** A container which has a nonabsorbent cover where the cover meets with the main body of the container without any visible gaps between the cover and the main body of the container.
- 204 **CONVEYORIZED DEGREASER:** Any continually loaded, conveyORIZED degreaser, using solvent that is maintained either above or below the initial boiling point temperature of the solvent.

- 205     **DEGREASER:** A tank, tray, drum, or other container in which objects to be cleaned are exposed to a degreasing solvent or degreasing solvent vapor.
- 206     **EXEMPT COMPOUND:** For the purposes of this rule, “exempt compound” has the same meaning as in Rule 101—GENERAL PROVISIONS AND DEFINITIONS.
- 207     **FREEBOARD HEIGHT:**  
207.1   For non-vapor degreasers, freeboard height means the distance from the top of the solvent to the top of the tank.  
207.2   For vapor degreasers, freeboard height means the distance from the solvent vapor-air interface to the top of the degreaser.
- 208     **FREEBOARD RATIO:** The freeboard height divided by the smaller of the inside length or the inside width of the degreaser's evaporative surface area.
- 209     **KEY SYSTEM OPERATING PARAMETER:**  
209.1   A variable that is critical to the operation of an emission control system and that ensures:  
        a.    Operation of the system within the system manufacturer's specifications, and  
        b.    Compliance with the overall system efficiency standard required by Section 306.  
209.2   Such variables may include, but are not limited to:  
        a.    Hours of operation,  
        b.    Temperature,  
        c.    Flow rate, and  
        d.    Pressure.
- 210     **LEAK:** A leak is:  
210.1   The dripping of liquid volatile organic compounds in excess of three drops per minute; or  
210.2   The appearance of a visible mist.
- 211     **LIP EXHAUST SYSTEM:** A system which collects solvent vapors escaping from the top of a degreaser and directs them away from operating personnel.
- 212     **LOW VOLATILITY SOLVENT:** Any solvent with an initial boiling point which is greater than 248°F (120°C).
- 213     **MAKEUP SOLVENT:** The solvent added to the degreaser to replace solvent lost through evaporation or other means.
- 214     **NESHAP:** National Emission Standards for Hazardous Air Pollutants.
- 215     **NON-VAPOR DEGREASER:** Any degreaser, including a remote reservoir degreaser, using solvent which, if heated, is maintained below the initial boiling point temperature of the solvent.
- 216     **OPEN-TOP VAPOR DEGREASER:** Any batch-loaded degreaser using solvent which is maintained above the initial boiling point temperature of the solvent. Degreasing occurs through the condensation of the resultant solvent vapor onto the surface of the workload.
- 217     **OSHA:** Occupational Safety and Health Administration.
- 218     **REFRIGERATED FREEBOARD CHILLER:** A secondary cooling coil mounted above the primary condenser which provides a chilled air blanket above the solvent vapor-air interface to cause the condensation of additional solvent vapor, thereby increasing vapor control efficiency.

- 219 **REMOTE RESERVOIR DEGREASER:** A non-vapor degreaser with a tank which is completely enclosed except for a solvent return opening no larger than 15.50 square inches (100 square centimeters) which allows used solvent to drain into it from a separate solvent sink or work area and which is not accessible for soaking workloads.
- 220 **SOLVENT:** Any liquid containing a volatile organic compound or combination of volatile organic compounds, which is used to perform solvent degreasing.
- 221 **SOLVENT DEGREASING:** The removal of contaminants with solvents from parts, products, tools, machinery, and equipment, including the subsequent drying of the items.
- 222 **STATIONARY SOURCE:** Any building, structure, facility, or emissions unit which emits or may emit any affected pollutant directly or as a fugitive emission.
- 222.1 Building, structure, facility, or emissions unit includes all pollutant emitting activities which:
- a. Belong to the same industrial grouping, and
  - b. Are located on one property, or two or more contiguous properties, and
  - c. Are under the same or common ownership, operation, or control, or which are owned or operated by entities which are under common control.
- 222.2 Pollutant emitting activities shall be considered as part of the same industrial grouping if:
- a. They belong to the same two-digit Standard Industrial Classification (SIC) code, or
  - b. They are part of a common production process, which includes industrial processes, manufacturing processes and any connected processes involving a common material.
- 223 **SUPERHEATED VAPOR ZONE:** A region located within the vapor zone of a degreaser whereby solvent vapors are heated above the solvent's boiling point.
- 224 **VOLATILE ORGANIC COMPOUND (VOC):** For the purposes of this rule, "volatile organic compound" has the same meaning as in Rule 101—GENERAL PROVISIONS AND DEFINITIONS.
- 225 **VOLATILE SOLVENT:** Any solvent which is not defined as a low volatility solvent pursuant to Section 212.
- 226 **WATER SEPARATOR:** A device that isolates water from an organic solvent or a mixture of organic solvents by a variety of means including, but not limited to, extraction, evaporation, distillation, drying, adsorption, and filtration.
- 227 **WIPE CLEANING:** A 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 metal surfaces.
- 228 **WORKLOAD:** The objects put in a degreaser for the purpose of removing oil, grease, soil, coating, dirt or other undesirable matter from the surface of the objects.

### 300 STANDARDS

- 301 **GENERAL EQUIPMENT REQUIREMENTS:** Any person who uses a degreaser shall utilize the following equipment:
- 301.1 An apparatus or cover which prevents the solvent from evaporating when not processing work in the degreaser.
- a. For non-vapor degreasers using volatile solvent, or solvent that is agitated, the cover shall be designed so that it can be opened and closed easily with one hand.

- b. For open-top vapor degreasers, the cover shall be designed such that it can be opened and closed easily without disturbing the vapor zone.
  - c. For conveyORIZED degreasers, a cover shall be provided for closing off the entrance and exit when not in use.
- 301.2 A facility for draining cleaned parts so that the drained solvent is returned to the container.
- 301.3 A permanent, conspicuous label which summarizes operating requirements contained in Sections 306 through 308 of this rule.
- 301.4 Use only solvent containers free of all liquid leaks. Auxiliary equipment such as pumps, pipelines, or flanges, shall not have any liquid leaks, visible tears, or cracks.
- 302 **NON-VAPOR DEGREASERS; EQUIPMENT REQUIREMENTS:** In addition to the applicable requirements in Section 301, a person operating a non-vapor degreaser shall also comply with the following requirements:
- 302.1 A person shall only operate non-vapor degreasers using one of the following control devices:
- a. Non-vapor degreasers shall operate with a freeboard ratio equal to or greater than 0.75 if using solvents which are:
    - 1. Agitated, or
    - 2. Heated above 122°F (50°C), or
    - 3. Volatile.
  - b. Non-vapor degreasers using only low volatility solvents which are not agitated shall operate with a freeboard height of at least 6 inches.
  - c. A water cover may be used as an acceptable alternative to Sections a and b if the solvent is insoluble in water and has a specific gravity greater than 1.
- 302.2 Prior to September 25, 2009, a person owning or operating a non-vapor degreaser shall use solvents with a VOC content of 50 grams per liter or less including water and exempt compounds, or use an airtight/airless cleaning system. The airtight/airless cleaning system shall comply with the requirements in Section 303.
- 302.3 Effective September 25, 2009, a person owning or operating a non-vapor degreaser shall use a solvent with a VOC content of 25 grams per liter or less including water and exempt compounds, or use an airtight/airless cleaning system. The airtight/airless cleaning system shall comply with the requirements in Section 303.
- 303 **AIRTIGHT/AIRLESS CLEANING SYSTEM REQUIREMENTS:** In lieu of complying with the applicable requirements in Sections 302, 304, or 307, a person may use an airtight/airless cleaning system that complies with the following requirements:
- 303.1 The airtight/airless cleaning system shall be 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;
- 303.2 The airtight/airless cleaning system shall not have a vapor leak of more than 50 parts per million measured as methane at the outlet of the airtight/airless cleaning system as indicated by a portable analyzer pursuant to Section 502.7;
- 303.3 All waste solvent shall be stored in properly identified and closed containers;
- 303.4 All associated pressure relief devices shall not allow liquid solvents to drain out; and
- 303.5 Spills during solvent transfer shall be wiped up immediately and the used wipe rags shall be stored in closed containers.
- 304 **VAPOR DEGREASERS; EQUIPMENT REQUIREMENTS:** In addition to the applicable requirements in Section 301, a person operating a vapor degreaser shall also comply with the following requirements:
- 304.1 A person shall not operate a vapor degreaser unless the vapor degreaser is equipped with:
- a. An automated parts handling system;
  - b. Circumferential primary condensing coils;
  - c. A circumferential trough;
  - d. A water separator;
  - e. A freeboard ratio of at least 1.0;

- f. A superheated vapor zone; and
  - g. A refrigerated freeboard chiller for which the chilled air blanket temperature (°F) at the coldest point on the vertical axis in the center of the air-vapor interface shall be no greater than 30% of the initial boiling point (°F) of the fresh solvent used, or 41 °F.
- 304.2 In lieu of complying with the requirements in Section 304.1, a carbon adsorption system which ventilates the air-vapor interface at a minimum rate of 15 m<sup>3</sup>/min/m<sup>2</sup>, but not greater than 20 m<sup>3</sup>/min/m<sup>2</sup>, unless necessary to meet Federal and State OSHA requirements, with a solvent vapor concentration exiting the exhaust duct of the carbon adsorber of less than 25 ppm solvent averaged over one complete adsorption cycle, and an overall collection and control efficiency of 85 percent.
- 304.3 Effective September 25, 2009, a person owning or operating a vapor degreaser shall use a solvent with a VOC content of 25 grams per liter or less including water and exempt compounds, or use an airtight/airless cleaning system. The airtight/airless cleaning system shall comply with the requirements in Section 303.
- 305 **REMOTE RESERVOIR DEGREASER:** In addition to the applicable requirements in Sections 301 and 302, a person owning or operating a remote reservoir degreaser shall comply with the following requirements:
- 305.1 Prevent solvent vapors from escaping from the solvent container by using such devices as a cover or a valve when the remote reservoir is not being used, cleaned, or repaired;
  - 305.2 Direct solvent flow in to prevent liquid solvent from splashing outside of the remote reservoir degreaser;
  - 305.3 Use only solvent containers free of all liquid leaks. Auxiliary equipment such as pumps, pipelines, or flanges, shall not have any liquid leaks, visible tears, or cracks.
- 306 **VAPOR DEGREASERS; SAFETY SWITCHES:** If a vapor degreaser is used, then the following equipment shall be utilized.
- 306.1 A device which shuts off the sump heater if the condenser coolant stops circulating or becomes warmer than specified;
  - 306.2 For spray degreasers, a device which prevents spray pump operation unless the solvent vapor level is at the designed operating level; and
  - 306.3 A manual reset device which shuts off the sump heater if the solvent vapor level rises above the designed operating level.
- 307 **CONVEYORIZED DEGREASERS:** In addition to the requirements of Sections 302 and 304, a person shall not operate a conveyORIZED degreaser unless it is equipped with both of the following control devices:
- 307.1 Either a drying tunnel or other means such as a rotating basket, sufficient to prevent cleaned parts from carrying out solvent liquid or vapor, and
  - 307.2 Minimized opening: entrances and exits should silhouette workloads so that the average clearance between parts and the edge of the degreaser opening is either less than 4 inches (10 cm) or less than 10 percent of the width of the opening.
- 308 **GENERAL OPERATING REQUIREMENTS:** Any person who uses a degreaser must conform to the following operating requirements:
- 308.1 Operate and maintain the degreaser and emission control equipment in proper working order.
  - 308.2 Do not allow any solvent to leak from any portion of the degreaser.
  - 308.3 Do not store or dispose of any solvent from the degreaser, including waste solvent, in a manner that causes or allows any volatile organic compounds emissions.
  - 308.4 If distillation recovery of waste solvent is performed, solvent residues shall not contain more than 10 percent solvent by volume after distillation.
  - 308.5 Do not remove or open any device designed to cover the solvent unless processing work in the degreaser or performing maintenance on the degreaser.
  - 308.6 Drain cleaned parts after cleaning until dripping ceases (non-vapor degreaser only).

- 308.7 If using a solvent flow, use only a continuous, fluid stream (not a fine, atomized, or shower type spray) at a pressure which does not cause liquid solvent to splash outside of the degreaser.
- 308.8 Perform solvent agitation, where necessary, by means other than air agitation.
- 308.9 Do not degrease porous or absorbent materials such as cloth, leather, wood, or rope.
- 308.10 For vapor degreasers:
- Workloads shall not occupy more than half of the degreaser's evaporative surface area, and
  - Solvent spray shall be kept at least 4 inches below the air-vapor interface.
  - When starting the degreaser, the cooling system shall be turned on before, or simultaneously with, the sump heater.
  - When shutting down the degreaser, the sump heater shall be turned off before, or simultaneously with, the cooling system.
  - The degreaser shall be covered whenever the cooling system is off.
- 308.11 Minimize solvent carryout by the following measures, as applicable:
- Rack workload to facilitate drainage;
  - Move workload in and out of the degreaser at less than 3.3 m/min (11 ft/min);
  - Degrease the workload in the vapor zone until condensation ceases;
  - Allow workload to dry within the degreaser until visually dry;
  - For manual operation, tip out any pools of solvent remaining on the workload before removing it from the degreaser.
- 308.12 All waste solvent shall be stored in properly identified and closed containers;
- 308.13 All associated pressure relief devices shall not allow liquid solvents to drain out; and
- 308.14 Spills during solvent transfer shall be wiped up immediately and the used wipe rags shall be stored in closed containers.
- 309 **LIP EXHAUST SYSTEM:** A lip exhaust system shall not be used on any degreaser, unless it is vented to emissions control equipment provided the emissions control equipment satisfies the requirements specified below. The lip exhaust shall be turned off when the degreaser is covered.
- 309.1 The emissions control equipment is approved by the Air Pollution Control Officer pursuant to Rule 201 – GENERAL PERMIT REQUIREMENTS, and
- 309.2 The emissions control equipment is designed and operated with an overall collection and control device efficiency (the collection efficiency multiplied by the control efficiency) of at least 85 percent on a mass basis, as determined pursuant to Sections 402, 502.2 and 502.3.
- 309.3 The emission collection system shall have a ventilation rate not greater than 20 cubic meters per minute per square meter over the total area of the degreaser's evaporative surface area, unless the rate must be changed to meet Federal and State OSHA requirements.
- 310 **EMISSIONS CONTROL EQUIPMENT:** Prior to September 25, 2009, as an alternative to complying with the applicable requirements of Sections 302, 304, or 307 of this rule, a person may use emissions control equipment, subject to the approval of the Air Pollution Control Officer, provided the emissions control equipment satisfies the following requirements:
- 310.1 The emissions control equipment is approved by the Air Pollution Control Officer pursuant to Rule 201 – GENERAL PERMIT REQUIREMENTS, and
- 310.2 The emissions control equipment is designed and operated with an overall collection and control device efficiency (the collection efficiency multiplied by the control efficiency) of at least 85 percent on a mass basis, as determined pursuant to Sections 402, 502.2 and 502.3.
- 310.3 The emission collection system shall have a ventilation rate not greater than 20 cubic meters per minute per square meter over the total area of the degreaser's evaporative surface area, unless the rate must be changed to meet Federal and State OSHA requirements.



**400 ADMINISTRATIVE REQUIREMENTS**

- 401 **CALCULATION FOR DETERMINATION OF VOC CONTENT OF MATERIAL INCLUDING WATER AND EXEMPT COMPOUNDS:** The volume of solvent is defined as the volume of the original solvent, plus any VOC-containing material added to the original solvent. The weight of VOC per volume of solvent shall be calculated by the following equation:

$$\frac{(W_v - W_w - W_{ec})}{(V_s)}$$

Where:  $W_v$  = weight of all volatile organic compounds.  
 $W_w$  = weight of water.  
 $W_{ec}$  = weight of exempt compounds  
 $V_s$  = volume of solvent.

- 402 **CALCULATION FOR DETERMINING PERCENT CONTROL EFFICIENCY AND VOC MASS EMISSION RATE:** The VOC mass emission rate shall be calculated both upstream and downstream of the emissions control equipment based on the VOC mass concentration and volumetric flowrate, pursuant to Sections 502.3, 502.4 and the following equations:

402.1 **VOC Mass Emission Rate:**

$$M = (Q) * (C) * \left(60 \frac{m}{hr}\right) \text{ (calculated upstream and downstream)}$$

Where:  $M$  = VOC mass emission rate (upstream/downstream), in lb/hr.  
 $Q$  = the volumetric flowrate at the inlet (upstream) or exhaust stack outlet (downstream), in standard cubic feet per minute as determined by Section 502.4.  
 $C$  = the VOC mass concentration at the inlet (upstream) or outlet (downstream), in pounds per standard cubic feet, as determined pursuant to Section 502.4.

402.2 **The percent control efficiency is calculated as follows:**

$$\%CE = \left( \frac{M_u - M_d}{M_u} \right) * 100$$

Where:  $CE$  = control efficiency.  
 $M_u$  = the upstream VOC mass emission rate, in lb/hr.  
 $M_d$  = the downstream VOC mass emission rate, in lb/hr.

- 403 **OPERATION AND MAINTENANCE PLAN:** Any person using an approved emission control device pursuant to Sections 309 and 310 must submit an Operation and Maintenance plan for the emissions control equipment to the Air Pollution Control Officer for approval. The plan shall specify operation and maintenance procedures that demonstrate continuous operation and compliance of the emissions control equipment during periods of emissions-producing operations. The plan shall specify key system operating parameters such as temperatures, pressures, and flow rates, necessary to determine compliance with this rule and shall describe in detail procedures to maintain the approved control device. The plan shall specify which records must be kept to document these operations and maintenance procedures. The records shall comply with the requirements of Section 501. The plan shall be implemented upon approval by the Air Pollution Control Officer.

**500 MONITORING AND RECORDS**

- 501 **RECORDKEEPING:** In addition to any existing permit conditions issued pursuant to Rule 201, GENERAL PERMIT REQUIREMENTS any person subject to this rule shall comply with the following requirements:
- 501.1 **List of Materials:** A list shall be maintained of all solvents currently used and/or stored at the site. The list shall include the following information:
- Cleaning material type by name/code/manufacturer.
  - The actual VOC content of cleaning material listed in Section 302, as applied including water and exempt compounds.
  - The actual mixing ratio for the cleaning material as applied.
- 501.2 **Usage Records:** Any person using cleaning materials regulated by this rule shall update and maintain the records as required by this rule as follows:
- Monthly:**
    - Records of total applied volume in gallons for each cleaning material used.
    - Record of solvent cleaning activity associated with each solvent used.
- 501.3 **Emissions Control Equipment:** Any person using an emission control system pursuant to this rule shall maintain such records on a daily basis, of key system operating parameters for emission control equipment, including, but not limited to:
- Hours of operation;
  - Routine and non-routine maintenance; and
  - The records required by Section 403 as part of the Operation and Maintenance Plan.
  - Records of test reports conducted pursuant to Section 502.
- 501.4 **Duration of Records:**
- Prior to September 25, 2010, records shall be maintained on-site for a continuous three-year period and made available for review by the Air Pollution Control Officer upon request.
  - Effective September 25, 2010, records shall be maintained on-site for a continuous five-year period and made available for review by the Air Pollution Control Officer upon request.
- 502 **TEST METHODS**
- 502.1 **DETERMINATION OF BOILING POINT:** The initial boiling point of solvents shall be determined in accordance with ASTM D 1078-05.
- 502.2 **DETERMINATION OF CONTROL EFFICIENCY:** Control efficiency of control equipment shall be determined in accordance with United States Environmental Protection Agency Method 18, 25, or 25A (whichever is applicable).
- 502.3 **DETERMINATION OF COLLECTION EFFICIENCY:** Collection efficiency shall be determined in accordance with the U.S. EPA technical guideline document, "Guidelines for Determining Capture Efficiency," dated January 9, 1995. Individual capture efficiency test runs subject to U.S. EPA technical guidelines shall be determined by:
- Applicable U.S. EPA Methods 204, 204A, 204B, 204C, 204D, 204E, and/or 204F; or
  - Any other method approved by U.S. EPA, the California Air Resources Board, and the Air Pollution Control Officer.
- 502.4 **DETERMINATION OF VOLUMETRIC FLOWRATE:** Volumetric flowrate shall be determined in accordance with United States Environmental Protection Agency Methods 2, 2A, or 2C, or 2D (whichever is applicable).
- 502.5 **DETERMINATION OF VOC CONTENT:** VOC content of solvents shall be determined in accordance with United States Environmental Protection Agency Method 24 and Sections 401 and 502.6 of this rule.
- 502.6 **DETERMINATION OF COMPOUNDS EXEMPT FROM VOC DEFINITION:** Compounds exempted from the VOC definition, as in Section 206 of this rule, shall be determined in accordance with ASTM D 4457-02 (2008) or California Air

Resources Board Method 432. If any of the perfluorocarbons or volatile cyclic and linear methyl siloxanes are being claimed as exempt compounds, the person making the claim must state in advance which compounds are present, and the United States Environmental Protection Agency approved test method used to make the determination of these compounds.

- 502.7 **DETERMINATION OF VOC LEAKS:** Vapor VOC leaks shall be determined in accordance with United States Environmental Protection Agency test Method 21.
- 502.8 **MULTIPLE TEST METHODS:** When more than one test method or set of test methods is specified for any testing, a violation of any requirement of this rule established by any one of the specified test methods or set of test methods shall constitute a violation of this rule.

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