

PERMIT TO INSTALL

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Common Abbreviations / Acronyms

Common Acronyms		Pollutant/Measurement Abbreviations	
AQD	Air Quality Division	Btu	British Thermal Unit
ANSI	American National Standards Institute	°C	Degrees Celsius
BACT	Best Available Control Technology	CO	Carbon Monoxide
CAA	Clean Air Act	dscf	Dry standard cubic foot
CEM	Continuous Emission Monitoring	dscm	Dry standard cubic meter
CFR	Code of Federal Regulations	°F	Degrees Fahrenheit
COM	Continuous Opacity Monitoring	gr	Grains
EPA	Environmental Protection Agency	Hg	Mercury
EU	Emission Unit	hr	Hour
FG	Flexible Group	H ₂ S	Hydrogen Sulfide
GACS	Gallon of Applied Coating Solids	hp	Horsepower
GC	General Condition	lb	Pound
HAP	Hazardous Air Pollutant	m	Meter
HVLP	High Volume Low Pressure *	mg	Milligram
ID	Identification	mm	Millimeter
LAER	Lowest Achievable Emission Rate	MM	Million
MACT	Maximum Achievable Control Technology	MW	Megawatts
MAERS	Michigan Air Emissions Reporting System	NO _x	Oxides of Nitrogen
MAP	Malfunction Abatement Plan	PM	Particulate Matter
MDEQ	Michigan Department of Environmental Quality	PM-10	Particulate Matter less than 10 microns diameter
MIOSHA	Michigan Occupational Safety & Health Administration	pph	Pound per hour
MSDS	Material Safety Data Sheet	ppm	Parts per million
NESHAP	National Emission Standard for Hazardous Air Pollutants	ppmv	Parts per million by volume
NSPS	New Source Performance Standards	ppmw	Parts per million by weight
NSR	New Source Review	psia	Pounds per square inch absolute
PS	Performance Specification	psig	Pounds per square inch gauge
PSD	Prevention of Significant Deterioration	scf	Standard cubic feet
PTE	Permanent Total Enclosure	sec	Seconds
PTI	Permit to Install	SO ₂	Sulfur Dioxide
RACT	Reasonable Available Control Technology	THC	Total Hydrocarbons
SC	Special Condition Number	tpy	Tons per year
SCR	Selective Catalytic Reduction	µg	Microgram
SRN	State Registration Number	VOC	Volatile Organic Compounds
TAC	Toxic Air Contaminant	yr	Year
VE	Visible Emissions		

* For High Volume Low Pressure (HVLP) applicators, the pressure measured at the HVLP gun air cap shall not exceed ten (10) pounds per square inch gauge (psig).

GENERAL CONDITIONS

1. The process or process equipment covered by this permit shall not be reconstructed, relocated, or modified, unless a Permit to Install authorizing such action is issued by the Department, except to the extent such action is exempt from the Permit to Install requirements by any applicable rule. **[R336.1201(1)]**
2. If the installation, construction, reconstruction, relocation, or modification of the equipment for which this permit has been approved has not commenced within 18 months, or has been interrupted for 18 months, this permit shall become void unless otherwise authorized by the Department. Furthermore, the permittee or the designated authorized agent, shall notify the Department via the Supervisor, Permit Section, Air Quality Division, Michigan Department of Environmental Quality, P.O. Box 30260, Lansing, Michigan 48909, if it is decided not to pursue the installation, construction, reconstruction, relocation, or modification of the equipment allowed by this Permit to Install. **[R336.1201(4)]**
3. If this Permit to Install is issued for a process or process equipment located at a stationary source that is not subject to the Renewable Operating Permit program requirements pursuant to R336.1210, operation of the process or process equipment is allowed by this permit if the equipment performs in accordance with the terms and conditions of this Permit to Install. **[R336.1201(6)(b)]**
4. The Department may, after notice and opportunity for a hearing, revoke this Permit to Install if evidence indicates the process or process equipment is not performing in accordance with the terms and conditions of this permit or is violating the Department's rules or the Clean Air Act. **[R336.1201(8), Section 5510 of Act 451, PA 1994]**
5. The terms and conditions of this Permit to Install shall apply to any person or legal entity that now or hereafter owns or operates the process or process equipment at the location authorized by this Permit to Install. If the new owner or operator submits a written request to the Department pursuant to R336.1219 and the Department approves the request, this permit will be amended to reflect the change of ownership or operational control. The request must include all of the information required by subrules (1)(a), (b), and (c) of R336.1219. The written request shall be sent to the District Supervisor, Air Quality Division, Michigan Department of Environmental Quality. **[R336.1219]**
6. Operation of this equipment shall not result in the emission of an air contaminant which causes injurious effects to human health or safety, animal life, plant life of significant economic value, or property, or which causes unreasonable interference with the comfortable enjoyment of life and property. **[R336.1901]**
7. The permittee shall provide notice of an abnormal condition, start-up, shutdown, or malfunction that results in emissions of a hazardous or toxic air pollutant which continue for more than one hour in excess of any applicable standard or limitation, or emissions of any air contaminant continuing for more than two hours in excess of an applicable standard or limitation, as required in Rule 912, to the Department. The notice shall be provided no later than two business days after start-up, shutdown, or discovery of the abnormal condition or malfunction. Written reports, if required, must be filed with the Department within 10 days after the start-up or shutdown occurred, within 10 days after the abnormal conditions or malfunction has been corrected, or within 30 days of discovery of the abnormal condition or malfunction, whichever is first. The written reports shall include all of the information required in Rule 912(5). **[R336.1912]**
8. Approval of this permit does not exempt the permittee from complying with any future applicable requirements which may be promulgated under Part 55 of 1994 PA 451, as amended or the Federal Clean Air Act.

9. Approval of this permit does not obviate the necessity of obtaining such permits or approvals from other units of government as required by law.
10. Operation of this equipment may be subject to other requirements of Part 55 of 1994 PA 451, as amended and the rules promulgated thereunder.
11. Except as provided in subrules (2) and (3) or unless the special conditions of the Permit to Install include an alternate opacity limit established pursuant to subrule (4) of R336.1301, the permittee shall not cause or permit to be discharged into the outer air from a process or process equipment a visible emission of density greater than the most stringent of the following. The grading of visible emissions shall be determined in accordance with R336.1303. **[R336.1301]**
 - a) A six-minute average of 20 percent opacity, except for one six-minute average per hour of not more than 27 percent opacity.
 - b) A visible emission limit specified by an applicable federal new source performance standard.
 - c) A visible emission limit specified as a condition of this permit to install.
12. Collected air contaminants shall be removed as necessary to maintain the equipment at the required operating efficiency. The collection and disposal of air contaminants shall be performed in a manner so as to minimize the introduction of contaminants to the outer air. Transport of collected air contaminants in Priority I and II areas requires the use of material handling methods specified in R336.1370(2). **[R336.1370]**
13. Except as allowed by Rule 285 (a), (b), and (c), the permittee shall not substitute any fuels, coatings, nor raw materials for those described in the application and allowed by this permit, nor make changes to the process or process equipment described in the application without prior notification to and approval by the Air Quality Division. **[R336.1201(1)]**
14. The Department may require the permittee to conduct acceptable performance tests, at the permittee's expense, in accordance with R336.2001 and R336.2003, under any of the conditions listed in R336.2001. **[R336.2001]**

SPECIAL CONDITIONS

Emission Unit Identification

Emission Unit ID	Emission Unit Description	Stack Identification	Reference Number
EU-LPI	Solder mask ink line with two enclosed screen coaters, two electric tack cure ovens, a developer, a final electric bake oven, and a UV oven.	SV000AB SV000C SV000D SV000E SV000F SV000G	1
EU-SES	Strip ammoniacal etching process consisting of a resist stripper, cascade water rinse, ammoniacal etch, cascade water rinse, tin stripper, and cascade water rinse all vented thru a recycle, cross-flow scrubber (to scrub ammonia); and three internally vented electric dryers.	SV000H	2
EU-DES 1	Develop etching process consisting of a developer, cascade water rinse, acid etch, cascade water rinse, resist stripper, and cascade water rinse all vented thru a recycle, cross-flow scrubber (to scrub hydrogen chloride); and two internally vented electric dryers.	SV000I	3
Changes to the equipment described in this table are subject to the requirements of R336.1201, except as allowed by R336.1278 to R336.1290.			

The following conditions apply to: EU-LPI

Emission Limits

	Pollutant	Equipment	Limit	Time Period	Testing/ Monitoring Method	Applicable Requirement
1.1a	VOCs	EU-LPI	12.4 tons per year	12-month rolling time period as determined at the end of each calendar month	SC 1.6	R336.1225, R336.1702(a)
1.1b	VOCs	EU-LPI (clean-up solvents)	5.5 tons per year	12-month rolling time period as determined at the end of each calendar month	SC 1.7	R336.1702(a)

Material Usage Limits

	Material	Limit	Time Period	Testing/ Monitoring Method	Applicable Requirement
1.2	VOCs (EU-LPI)	4.3 lb/gal (minus water) as applied	Instantaneous	SC 1.6	R336.1702(a)

Process / Operational Limits

- 1.3 All waste coatings shall be captured and stored in closed containers and shall be disposed of in an acceptable manner in compliance with all applicable rules and regulations. **[R336.1224, R336.1225, R336.1702(a), R336.1901]**

Testing

- 1.4 The VOC content, water content, and density of any coating, as applied and as received, shall be determined using federal Reference Test Method 24. Upon prior written approval by the AQD District Supervisor, the VOC content may be determined from manufacturer's formulation data. If the Method 24 and the formulation values should differ, the Method 24 results shall be used to determine compliance. **[R336.1224, R336.1225, R336.1702, R336.1901]**

Recordkeeping /Reporting /Notification

- 1.5 The permittee shall maintain a current listing from the manufacturer of the chemical composition of each coating, including the weight percent of each component. The data may consist of Material Safety Data Sheets, manufacturer's formulation data, or both. All records shall be kept on file for a period of at least five years and made available to the Department upon request. **[R336.1224, R336.1225, R336.1702, R336.1901]**

- 1.6 The permittee shall keep the following information on a monthly basis for EU-LPI:

- a) Gallons (with water) of each coating used.
- b) VOC content (minus water and with water) of each coating as applied.
- c) VOC mass emission calculations determining the monthly emission rate in tons per calendar month.
- d) VOC mass emission calculations determining the annual emission rate in tons per 12-month rolling time period as determined at the end of each calendar month.

The records shall be kept in a format acceptable to the AQD District Supervisor. All records shall be kept on file for a period of at least five years and made available to the Department upon request. **[R336.1225, R336.1702(a), R336.1901]**

- 1.7 The permittee shall keep the following information on a monthly basis for the use of purge and clean-up solvents associated with EU-LPI:

- a) Gallons of each solvent used and reclaimed.
- b) VOC content, in pounds per gallon, of each solvent used.
- c) VOC mass emission calculations determining the monthly emission rate in tons per calendar month.
- d) VOC mass emission calculations determining the annual emission rate in tons per 12-month rolling time period as determined at the end of each calendar month.

The records shall be kept in a format acceptable to the AQD District Supervisor. All records shall be kept on file for a period of at least five years and made available to the Department upon request. **[R336.1225, R336.1299, R336.1702, R336.1901]**

Stack/Vent Restrictions

	Stack & Vent ID	Maximum Diameter (inches)	Minimum Height Above Ground Level (feet)	Applicable Requirement
1.8a	SV000AB – screen coater 1 and 2	12	35	R336.1225, R336.1901, 40 CFR 52.21(c) & (d)
1.8b	SV000C – tack cure oven 1	12	40	R336.1225, R336.1901, 40 CFR 52.21(c) & (d)
1.8c	SV000D – tack cure oven 2	12	40	R336.1225, R336.1901, 40 CFR 52.21(c) & (d)
1.8d	SV000E – developer	3	27	R336.1225, R336.1901, 40 CFR 52.21(c) & (d)
1.8e	SV000F – final bake oven	12	31.4	R336.1225, R336.1901, 40 CFR 52.21(c) & (d)
1.8f	SV000G – UV oven	18	28.5	R336.1225, R336.1901, 40 CFR 52.21(c) & (d)
The exhaust gases shall be discharged unobstructed vertically upwards to the ambient air with the exception of SV000E, SV000F, and SV000G.				

The following conditions apply to: EU-SES

Emission Limits

	Pollutant	Equipment	Limit	Time Period	Testing/ Monitoring Method	Applicable Requirements
2.1	Ammonia	EU-SES	2.79 pounds per hour	Hourly	GC 14 SC 2.6	R336.1224, R336.1225, R336.1901

Material Usage Limits

2.2 The permittee shall not use more than 1800 pounds per calendar day of free ammonia contained in the ammoniacal etchant material in EU-SES. [R336.1224, R336.1225, R336.1901, 40 CFR 52.21(c) & (d)]

Process / Operational Limits

2.3 All waste materials shall be captured and stored in closed containers and shall be disposed of in an acceptable manner in compliance with all applicable rules and regulations. [R336.1224, R336.1225, R336.1901]

Equipment

2.4 The permittee shall not operate EU-SES unless the ammonia scrubber is installed, maintained, and operated in a satisfactory manner. [R336.1224, R336.1225, R336.1901, R336.1910]

2.5 The permittee shall equip and maintain the ammonia scrubber portion of EU-SES with a liquid flow indicator, a pH meter, and a gauge which measures the pressure drop across the scrubber tower. [R336.1224, R336.1225, R336.1901, R336.1910]

Testing

2.6 Within 180 days of issuance of this permit, verification of the ammonia emission rate from EU-SES, by testing at owner's expense, in accordance with Department requirements, will be required. No less than 60 days prior to testing, a complete test plan shall be submitted to the AQD. The final plan must be approved by the AQD prior to testing. Verification of the emission rate includes the submittal of a complete report of the test results to the AQD within 60 days following the last date of the test. [R336.1224, R336.1225, R336.2001, R336.2003, R336.2004]

Monitoring

2.7 The permittee shall monitor, in a satisfactory manner, the liquid flow rate, the pH, and the pressure drop for the ammonia scrubber portion of EU-SES on a continuous basis. [R336.1224, R336.1225, R336.1901, R336.1910]

Recordkeeping /Reporting /Notification

2.8 The permittee shall maintain a current listing from the manufacturer of the chemical composition of each material, including the weight percent of each component. The data may consist of Material Safety Data Sheets, manufacturer's formulation data, or both. All records shall be kept on file for a period of at least five years and made available to the Department upon request. [R336.1224, R336.1225, R336.1702, R336.1901]

2.9 The permittee shall keep the following information on a daily basis for EU-SES:

- a) Gallons of ammoniacal etchant used.
- b) Free ammonia content (lbs/gallon) of ammoniacal etchant. (Free ammonia available for use in the etchant shall be calculated as specified in Appendix A or an alternative method approved by the AQD District Supervisor.)
- c) Ammonia usage calculations determining the daily usage rate in pounds per calendar day (as gallons used per day times the free ammonia content in pounds per gallon).

The records shall be kept in a format acceptable to the AQD District Supervisor. All records shall be kept on file for a period of at least five years and made available to the Department upon request. [R336.1225, R336.1901]

2.10 The permittee shall record at least once per calendar day and keep, in a satisfactory manner, records of liquid flow rate, pH, and pressure drop for the ammonia scrubber portion of EU-SES. All records shall be kept on file for a period of at least five years and made available to the Department upon request. [R336.1225, R336.1901, R336.1910]

Stack / Vent Restrictions

	Stack & Vent ID	Maximum Diameter (inches)	Minimum Height Above Ground Level (feet)	Applicable Requirement
2.11	SV000H	12	31.3	R336.1225, R336.1901, 40 CFR 52.21(c) & (d)
The exhaust gases shall be discharged unobstructed vertically upwards to the ambient air.				

The following conditions apply to: EU-DES 1

Emission Limits

	Pollutant	Equipment	Limit	Time Period	Testing/ Monitoring Method	Applicable Requirements
3.1	Hydrogen Chloride	EU-DES 1	0.83 pounds per hour	Hourly	GC 14 SC 3.7	R336.1224, R336.1225, R336.1901

Material Usage Limits

- 3.2 The permittee shall not use more than 1500 pounds per calendar day of hydrogen chloride contained in the hydrogen chloride etchant in EU-DES 1. [R336.1224, R336.1225, R336.1901, 40 CFR 52.21(c) & (d)]
- 3.3 The permittee shall not use more than 18,000 pounds per 12-month rolling time period as determined at the end of each calendar month of VOCs contained in the resist stripper solution in EU-DES 1. [R336.1225, R336.1702(a), R336.1901, 40 CFR 52.21(c) & (d)]

Process / Operational Limits

- 3.4 All waste materials shall be captured and stored in closed containers and shall be disposed of in an acceptable manner in compliance with all applicable rules and regulations. [R336.1224, R336.1225, R336.1901]

Equipment

- 3.5 The permittee shall not operate EU-DES 1 unless the acid scrubber is installed, maintained, and operated in a satisfactory manner. [R336.1224, R336.1225, R336.1901, R336.1910]
- 3.6 The permittee shall equip and maintain the acid scrubber portion of EU-DES 1 with a liquid flow indicator and a gauge which measures the pressure drop across the scrubber tower. [R336.1224, R336.1225, R336.1901, R336.1910]

Testing

- 3.7 Within 180 days of issuance of this permit, verification of the hydrogen chloride emission rate from EU-DES 1, by testing at owner's expense, in accordance with Department requirements, will be required. No less than 60 days prior to testing, a complete test plan shall be submitted to the AQD. The final plan must be approved by the AQD prior to testing. Verification of the emission rate includes the submittal of a complete report of the test results to the AQD within 60 days following the last date of the test. [R336.1224, R336.1225, R336.2001, R336.2003, R336.2004]

Monitoring

- 3.8 The permittee shall monitor, in a satisfactory manner, the liquid flow rate and the pressure drop on a continuous basis, and the pH on a daily basis for the acid scrubber portion of EU-DES 1. [R336.1224, R336.1225, R336.1901, R336.1910]

Testing

3.9 The VOC content, water content, and density of any VOC-containing material, as received and as applied, shall be determined using federal Reference Test Method 24. Upon prior written approval by the AQD District Supervisor, the VOC content may be determined from manufacturer's formulation data. If the Method 24 and the formulation values should differ, the Method 24 results shall be used to determine compliance. **[R336.1224, R336.1225, R336.1702, R336.1901]**

Recordkeeping /Reporting /Notification

3.10 The permittee shall maintain a current listing from the manufacturer of the chemical composition of each material, including the weight percent of each component. The data may consist of Material Safety Data Sheets, manufacturer's formulation data, or both. All records shall be kept on file for a period of at least five years and made available to the Department upon request. **[R336.1224, R336.1225, R336.1702, R336.1901]**

3.11 The permittee shall keep the following information on a daily basis for EU-DES 1:

- a) Gallons of hydrogen chloride etchant used.
- b) Hydrogen chloride content (lb/gallon) of hydrogen chloride etchant.
- c) Hydrogen chloride usage calculations determining the daily usage rate in pounds per calendar day (as gallons used per day times the hydrogen chloride content in pounds per gallon).

The records shall be kept in a format acceptable to the AQD District Supervisor. All records shall be kept on file for a period of at least five years and made available to the Department upon request. **[R336.1225, R336.1901]**

3.12 The permittee shall keep the following information on a monthly basis for EU-DES 1:

- a) Gallons of resist stripper solution used.
- b) VOC content (lb/gallon) of resist stripper solution.
- c) VOC usage calculations determining the monthly usage rate in pounds per calendar month (as gallons used per month times the VOC content in pounds per gallon).
- d) VOC usage calculations determining the annual usage rate in pounds per 12-month rolling time period as determined at the end of each calendar month.

The records shall be kept in a format acceptable to the AQD District Supervisor. All records shall be kept on file for a period of at least five years and made available to the Department upon request. **[R336.1225, R336.1901]**

3.13 The permittee shall record at least once per calendar day and keep, in a satisfactory manner, records of liquid flow rates, the pH, and pressure drop for the acid scrubber portion of EU-DES 1. All records shall be kept on file for a period of at least five years and made available to the Department upon request. **[R336.1225, R336.1901, R336.1910]**

Stack / Vent Restrictions

	Stack & Vent ID	Maximum Diameter (inches)	Minimum Height Above Ground Level (feet)	Applicable Requirement
3.14	SV000I	16	35	R336.1225, R336.1901, 40 CFR 52.21(c) & (d)
The exhaust gases shall be discharged unobstructed vertically upwards to the ambient air.				

APPENDIX A

Free Ammonia Calculation Methodology

$$A_E = [(A_h/35.05 + A_c/53.59) \times 0.1703 \times r] - (0.067 \times I)$$

- Where: A_E = ammonia emission factor, pounds of NH_3 per gallon of etchant solution used, or the free ammonia available in the solution for emission.
- A_h = weight percent of ammonium hydroxide (NH_4OH) in the etchant, from the MSDS or as provided by the supplier.
- A_c = weight percent of ammonium chloride (NH_4Cl) in the etchant, from the MSDS or as provided by the supplier.
- r = density of the etchant solution, pounds per gallon, from MSDS.
- I = copper loading capacity, ounces of copper per gallon of etchant, from MSDS or site specific operating specifications.