

**MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY
AIR QUALITY DIVISION**

November 14, 2023

PERMIT TO INSTALL
466-73G

ISSUED TO
Dow Silicones Corporation

LOCATED AT
Michigan Operations
604 Building
Midland, Michigan 48686

IN THE COUNTY OF
Midland

STATE REGISTRATION NUMBER
A4043

The Air Quality Division has approved this Permit to Install, pursuant to the delegation of authority from the Michigan Department of Environment, Great Lakes, and Energy. This permit is hereby issued in accordance with and subject to Section 5505(1) of Article II, Chapter I, Part 55, Air Pollution Control, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. Pursuant to Air Pollution Control Rule 336.1201(1), this permit constitutes the permittee's authority to install the identified emission unit(s) in accordance with all administrative rules of the Department and the attached conditions. Operation of the emission unit(s) identified in this Permit to Install is allowed pursuant to Rule 336.1201(6).

DATE OF RECEIPT OF ALL INFORMATION REQUIRED BY RULE 203: October 4, 2023	
DATE PERMIT TO INSTALL APPROVED: November 14, 2023	SIGNATURE:
DATE PERMIT VOIDED:	SIGNATURE:
DATE PERMIT REVOKED:	SIGNATURE:

PERMIT TO INSTALL

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COMMON ACRONYMS

AQD	Air Quality Division
BACT	Best Available Control Technology
CAA	Clean Air Act
CAM	Compliance Assurance Monitoring
CEMS	Continuous Emission Monitoring System
CFR	Code of Federal Regulations
COMS	Continuous Opacity Monitoring System
Department/department/EGLE	Michigan Department of Environment, Great Lakes, and Energy
EU	Emission Unit
FG	Flexible Group
GACS	Gallons of Applied Coating Solids
GC	General Condition
GHGs	Greenhouse Gases
HVLP	High Volume Low Pressure*
ID	Identification
IRSL	Initial Risk Screening Level
ITSL	Initial Threshold Screening Level
LAER	Lowest Achievable Emission Rate
MACT	Maximum Achievable Control Technology
MAERS	Michigan Air Emissions Reporting System
MAP	Malfunction Abatement Plan
MSDS	Material Safety Data Sheet
NA	Not Applicable
NAAQS	National Ambient Air Quality Standards
NESHAP	National Emission Standard for Hazardous Air Pollutants
NSPS	New Source Performance Standards
NSR	New Source Review
PS	Performance Specification
PSD	Prevention of Significant Deterioration
PTE	Permanent Total Enclosure
PTI	Permit to Install
RACT	Reasonable Available Control Technology
ROP	Renewable Operating Permit
SC	Special Condition
SCR	Selective Catalytic Reduction
SNCR	Selective Non-Catalytic Reduction
SRN	State Registration Number
TBD	To Be Determined
TEQ	Toxicity Equivalence Quotient
USEPA/EPA	United States Environmental Protection Agency
VE	Visible Emissions

*For HVLP applicators, the pressure measured at the gun air cap shall not exceed 10 psig.

POLLUTANT / MEASUREMENT ABBREVIATIONS

acfm	Actual cubic feet per minute
BTU	British Thermal Unit
°C	Degrees Celsius
CO	Carbon Monoxide
CO _{2e}	Carbon Dioxide Equivalent
dscf	Dry standard cubic foot
dscm	Dry standard cubic meter
°F	Degrees Fahrenheit
gr	Grains
HAP	Hazardous Air Pollutant
Hg	Mercury
hr	Hour
HP	Horsepower
H ₂ S	Hydrogen Sulfide
kW	Kilowatt
lb	Pound
m	Meter
mg	Milligram
mm	Millimeter
MM	Million
MW	Megawatts
NMOC	Non-Methane Organic Compounds
NO _x	Oxides of Nitrogen
ng	Nanogram
PM	Particulate Matter
PM ₁₀	Particulate Matter equal to or less than 10 microns in diameter
PM _{2.5}	Particulate Matter equal to or less than 2.5 microns in diameter
pph	Pounds per hour
ppm	Parts per million
ppmv	Parts per million by volume
ppmw	Parts per million by weight
psia	Pounds per square inch absolute
psig	Pounds per square inch gauge
scf	Standard cubic feet
sec	Seconds
SO ₂	Sulfur Dioxide
TAC	Toxic Air Contaminant
Temp	Temperature
THC	Total Hydrocarbons
tpy	Tons per year
µg	Microgram
µm	Micrometer or Micron
VOC	Volatile Organic Compounds
yr	Year

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. **(R 336.1201(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 Environment, Great Lakes, and Energy, P.O. Box 30260, Lansing, Michigan 48909-7760, if it is decided not to pursue the installation, construction, reconstruction, relocation, or modification of the equipment allowed by this Permit to Install. **(R 336.1201(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 Rule 210 (R 336.1210), 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. **(R 336.1201(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. **(R 336.1201(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 Rule 219 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 Rule 219 and shall be sent to the District Supervisor, Air Quality Division, Michigan Department of Environment, Great Lakes, and Energy. **(R 336.1219)**
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. **(R 336.1901)**
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 not 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). **(R 336.1912)**
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 Rule 301, 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 Rule 303 (R 336.1303). **(R 336.1301)**
 - 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 Rule 370(2). **(R 336.1370)**
13. The Department may require the permittee to conduct acceptable performance tests, at the permittee's expense, in accordance with Rule 1001 and Rule 1003, under any of the conditions listed in Rule 1001. **(R 336.2001)**

EMISSION UNIT SPECIAL CONDITIONS

EMISSION UNIT SUMMARY TABLE

The descriptions provided below are for informational purposes and do not constitute enforceable conditions.

Emission Unit ID	Emission Unit Description (Including Process Equipment & Control Device(s))	Installation Date / Modification Date	Flexible Group ID
EU604-08	Process equipment associated with the fluorocyclics process. This emission unit is subject to the requirements of 40 CFR Part 63, Subpart FFFF. The most recent PTI for this emission unit is PTI No. 466-73G.	2000 / July 31, 2023	FGMONMACT

Changes to the equipment described in this table are subject to the requirements of R 336.1201, except as allowed by R 336.1278 to R 336.1291.

**EU604-08
 EMISSION UNIT CONDITIONS**

DESCRIPTION

Process equipment associated with the fluorocyclics process. This emission unit is subject to the requirements of 40 CFR Part 63, Subpart FFFF.

The most recent PTI for this emission unit is PTI No. 466-73G.

Flexible Group ID: FGMONMACT

POLLUTION CONTROL EQUIPMENT

- Freon-cooled condenser (7791)
- Spray tower scrubber (22753)
- Service water condenser (22713).
- Vent vapor equalization during railcar unloading operations when not venting to atmosphere through condenser 7791
- Service water condenser (22737).

I. EMISSION LIMIT(S)

Pollutant	Limit	Time Period / Operating Scenario	Equipment	Monitoring / Testing Method	Underlying Applicable Requirements
1. VOC	10.6 pph	Hourly	EU604-08	SC VI.1, VI.2, VI.3, VI.4, VI.6	R 336.1702(a)
2. VOC	8.68 tpy	Based on a 12-month rolling time period as determined at the end of each calendar month.	EU604-08	SC VI.1, VI.2, VI.3, VI.4, VI.6	R 336.1702(a)

II. MATERIAL LIMIT(S)

NA

III. PROCESS/OPERATIONAL RESTRICTION(S)

1. The permittee shall not conduct railcar unloading operations for EU604-08 unless the freon-cooled condenser (7791) is installed and operating properly. Proper operation means that the exhaust gas from the condenser shall not exceed 40.6 degrees Fahrenheit. **(R 336.1224, R 336.1225, R 336.1702(a))**
2. The permittee shall not operate EU604-08 unless the spray tower scrubber (22753) is installed and operating properly. Proper operation means the scrubber liquid flowrate shall be at least 3.0 gallons per minute.¹ **(R 336.1224, R 336.1225)**
3. The permittee shall not operate EU604-08 unless the 22737 service water condenser is installed, maintained, and operated in a manner satisfactory to the AQD District Supervisor. Proper operation means that the service water return temperature from the condenser shall not exceed 167 Fahrenheit (75.0 degrees Celsius).¹ **(R 336.1224, R 336.1225)**

4. The permittee shall not operate EU604-08 unless the 22713 service water condenser is installed, maintained, and operated in a manner satisfactory to the AQD District Supervisor. Proper operation means that the service water return temperature from the condenser shall not exceed 105 degrees Fahrenheit.¹ **(R 336.1224, R 336.1225)**

IV. DESIGN/EQUIPMENT PARAMETER(S)

1. The permittee shall equip and maintain the freon-cooled condenser (7791) with an indication device for measuring the temperature of the condenser condensate. **(R 336.1224, R 336.1225, R 336.1702, R 336.1910)**
2. The permittee shall equip and maintain the spray tower scrubber (22753) with a liquid flow indicator. **(R 336.1224, R 336.1225, R 336.1910)**
3. The permittee shall equip and maintain the service water condenser (22713) with an indication device for measuring the service water return temperature. **(R 336.1224, R 336.1225, R 336.1702, R 336.1910, 40 CFR 64.6(c)(1)(i), (ii))**
4. The permittee shall calibrate the temperature indicator for condensers 7791 and 22713 in a satisfactory manner. **(R 336.1224, R 336.1225, R 336.1702, R 336.1910, 40 CFR 64.6(c)(1)(iii))**
5. The permittee shall equip and maintain the service water condenser (22737) with an indication device for measuring the service water return temperature.¹ **(R 336.1224, R 336.1225)**
6. The permittee shall calibrate the temperature indicator for the service water condenser (22737) in a satisfactory manner. **(R 336.1224, R 336.1225, R 336.1910)**
7. The permittee shall calibrate the liquid flow indicator for the spray tower scrubber (22753) in a satisfactory manner. **(R 336.1224, R 336.1225, R 336.1910)**

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1201(3))**

1. Upon request of the AQD District Supervisor, the permittee shall verify VOC emission rates from EU604-08 by testing at owner's expense, in accordance with Department requirements. Testing shall be performed using an approved EPA Method listed in:

Pollutant	Test Method Reference
VOC	40 CFR Part 60, Appendix A

An alternate method, or a modification to the approved EPA Method, may be specified in an AQD approved Test Protocol and must meet the requirements of the federal Clean Air Act, all applicable state and federal rules and regulations, and be within the authority of the AQD to make the change. No less than 30 days prior to testing, the permittee shall submit a complete test plan to the AQD Technical Programs Unit and District Office. The AQD must approve the final plan prior to testing, including any modifications to the method in the test protocol that are proposed after initial submittal. The permittee must submit a complete report of the test results to the AQD Technical Programs Unit and District Office within 60 days following the last date of the test. **(R 336.1224, R 336.1225, R 336.1702)**

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(R 336.1201(3))**

1. The permittee shall complete all required calculations in a format acceptable to the AQD District Supervisor by the last day of the calendar month, for the previous calendar month, unless otherwise specified in any monitoring/recordkeeping special condition. **(R 336.1224, R 336.1225, R 336.1702(a))**

2. The permittee shall monitor and record, on a continuous basis during railcar unloading operations, the exit gas temperature of the freon-cooled condenser (7791) with instrumentation acceptable to the Air Quality Division. For the purpose of this condition, "on a continuous basis" is defined as an instantaneous data point recorded at least once every 15 minutes. The permittee shall keep all records on file at the facility and make them available to the Air Quality Division upon request. **(R 336.1224, R 336.1225, R 336.1702)**
3. The permittee shall monitor and record, on a per shift basis, the spray tower scrubber (22753) liquid flow rate with instrumentation acceptable to the AQD. The permittee shall keep all records on file at the facility and make them available to the Air Quality Division upon request.¹ **(R 336.1224, R 336.1225)**
4. The permittee shall monitor and record, on a per shift basis, the service water return temperature of condenser 22713 with instrumentation acceptable to the AQD. **(R 336.1224, R 336.1225, R 336.1702, 40 CFR 64.6(c)(1))**
5. The permittee shall keep records as required to demonstrate compliance with the emission limits of this permit. Emission totals shall be calculated using the method described in Appendix 1. The permittee shall keep a monthly summary of these emissions on file at the facility and make them available to the Air Quality Division upon request. Within 30 days, following the end of each calendar month, the permittee shall calculate and record emissions from the process for the previous calendar month to demonstrate compliance with the 12-month rolling time period emission totals of this permit. **(R 336.1224, R 336.1225, R 336.1702(a))**
6. The permittee shall maintain a record of all railcar unloading operations. At a minimum, this record shall include the date, time and duration of all railcar unloading operations. **(R 336.1224, R 336.1225, R 336.1702(a))**
7. The permittee shall monitor and record, on a continuous basis, the service water return temperature of condenser 22737. For the purpose of this condition, "on a continuous basis" is defined as an instantaneous data point recorded at least once every 15 minutes. The permittee shall keep all records on file at the facility and make them available to the Air Quality Division upon request.¹ **(R 336.1224, R 336.1225)**

VII. REPORTING

NA

VIII. STACK/VENT RESTRICTION(S)

The exhaust gases from the stacks listed in the table below shall be discharged unobstructed vertically upwards to the ambient air unless otherwise noted:

Stack & Vent ID	Maximum Exhaust Diameter / Dimensions (inches)	Minimum Height Above Ground (feet)	Underlying Applicable Requirements
1. SV604-007**	1.0	1.0	R 336.1225, 40 CFR 52.21 (c) & (d)
2. SV604-012*	1.5	57	R 336.1225, 40 CFR 52.21 (c) & (d)
3. SV604-043	2.0	95	R 336.1225, 40 CFR 52.21 (c) & (d)
4. SV604-044	6.0	13	R 336.1225, 40 CFR 52.21 (c) & (d)
5. SV604-045*	2.0	44	R 336.1225, 40 CFR 52.21 (c) & (d)
6. SV604-049*	2.0	44	R 336.1225, 40 CFR 52.21 (c) & (d)

Stack & Vent ID	Maximum Exhaust Diameter / Dimensions (inches)	Minimum Height Above Ground (feet)	Underlying Applicable Requirements
7. SV604-050*	2.0	40	R 336.1225, 40 CFR 52.21 (c) & (d)
8. SV604-053*	2.0	42	R 336.1225, 40 CFR 52.21 (c) & (d)

- * - Stack is equipped with a rain cap
- ** - Stack discharges downward

IX. OTHER REQUIREMENT(S)

1. The permittee shall comply with all provisions of the National Emission Standards for Hazardous Air Pollutants as specified in 40 CFR Part 63 Subparts A and FFFF, as they apply to EU604-08. **(40 CFR Part 63, Subpart FFFF)**

Footnotes:

¹ This condition is state only enforceable and was established pursuant to Rule 201(1)(b).

APPENDIX 1

Vent Calculations

Assumption: Solutions are ideal and obey Raoult's and Dalton's law.

Determine Partial Pressure [P_v]

where P_v = Vapor Pressure [$V_p(i)$] of pure component x Mole Fraction of the component in the liquid [$Y(i)$]

$$P_v = V_p(i) \times Y(i)$$

Determine the Mole Fraction of the Gas [$X(i)$]

where $X(i)$ = Partial Pressure Vapor/ Total System Pressure

$$X(i) = P_v \div P_t$$

TOTAL VENT FLOW CALCULATION, lbmol/Hr;

SCFH, standard cubic feet per minute, is based on MDEQ standard conditions of 70°F and 1 atmosphere.

$$\text{Lbs/Hr} = \text{Total Vent Flow [lbmol/Hr]} \times \text{Molecular Weight} \times \text{Mole Fraction gas [X(i)]}$$

TON/YEAR CALCULATION

$$\text{Ton/Yr} = \text{Lbs/Hr} \times \text{Hr/Batch} \times \text{Batch/Yr} \times \text{Ton/2000 Lbs}$$

VACUUM LEAK RATE (Lb/Hr), from Chemical Engineering, March 16, 1987 issue, Page 75;

$$\text{LEAK RATE, Lbs/Hr} = 0.08 \times [\text{Volume (ft}^3\text{)}]^{0.667}$$

ACHF, actual cubic feet per minute, is calculated at the vent outlet, based on atmospheric pressure and process temperature.

VOLUME VENTED DUE TO SEAL FLUID TRANSFER

$$\begin{aligned} \text{ft}^3/\text{year} &= (\text{gallons / year}) * (\text{ft}^3 / 7.48 \text{ gallons}) \\ \text{VAPOR DISPLACED BY SEAL FLUID} &= 40.11 \text{ ft}^3/\text{year} \end{aligned}$$

VOLUME VENTED DUE TO B/S LEAKAGE AS MEASURED ON FLOW INDICATOR

Number of batch still runs = B/S production ÷ 8000 lbs/batch
B/S runs = 250

Total vent through FI-2054 for year = (B/S runs) * (lb. vented / batch)

Total vent = 4500.0 lb./year

lb/year to ft³ = specific volume * lb/year

specific volume @ 1 psig = (specific vol. of air lb/ft³) (MW air / MW N₂)
(absolute pressure / actual pressure)

Specific Vol. = 12.527385 ft³/lb

N₂ vent ft³/year = Specific Vol. * total vent

N₂ vent = 56372.8 ft³/year

TOTAL VAPOR DISPLACEMENT

ft³/year = total displacement from level N₂ + displacement from TCP transfer

TOTAL VAPOR DISPLACED = 56413 ft³/year

VENT COMPOSITION DETERMINATION

Mole fraction trimer in vent = vapor pressure of trimer / total pressure

vapor mole fraction trimer = 0.00001

vent mole density =

7883 high pressure [psia] / (10.73 psia • ft³/lbmol • R) / TEMP R

mol density of vent = 0.00252 lbmol/ft³