

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

July 21, 2023

PERMIT TO INSTALL
4-04A

ISSUED TO
Dow Chemical Company

LOCATED AT
Michigan Operations
588 Building
Midland, Michigan 48686

IN THE COUNTY OF
Midland

STATE REGISTRATION NUMBER
A4033

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: May 3, 2023	
DATE PERMIT TO INSTALL APPROVED: July 21, 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 ₂ e	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
PM10	Particulate Matter equal to or less than 10 microns in diameter
PM2.5	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 condition 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
EU82-S1	Equipment in 588 Building used to produce both vinyl benzyl chloride (VBC) and benzocyclobutene (BCB). EU82-S1 is subject to the MON (40 CFR Part 63, Subpart FFFF). By virtue of being subject to Subpart FFFF, this emission unit is also subject to the equipment leak provisions of 40 CFR Part 63, Subpart H. This emission unit was permitted in 4-04A	April 19, 2005 / July 21, 2023	FG963THROX-S1, FGMONMACT-S1, FGHONFUGITIVES-S1

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.

**EU82-S1
 EMISSION UNIT CONDITIONS**

DESCRIPTION

Equipment in 588 Building used to produce both vinyl benzyl chloride (VBC) and benzocyclobutene (BCB). EU82-S1 is subject to the MON (40 CFR Part 63, Subpart FFFF). By virtue of being subject to Subpart FFFF, this emission unit is also subject to the equipment leak provisions of 40 CFR Part 63, Subpart H.

This emission unit was permitted in 4-04A.

Flexible Group ID: FG963THROX-S1 (SRN P1027), FGMONMACT-S1, FGHONFUGITIVES-S1

POLLUTION CONTROL EQUIPMENT

- FG963THROX – Process vents typically exhaust to the 963 THROX thermal treatment unit with absorber and caustic scrubber in 963 Building. (See ROP for SRN P1027)
- Emissions from the chlorine delivery system are controlled by venturi scrubber J1-166, venturi scrubber J2-166, and packed tower T-166.

I. EMISSION LIMIT(S)

NA

II. MATERIAL LIMIT(S)

Material	Limit	Time Period / Operating Scenario	Equipment	Monitoring / Testing Method	Underlying Applicable Requirements
1. Vinyl benzyl chloride (VBC)	Maximum production of 2,160,000 pounds	12-month rolling time period as determined at the end of each calendar month	EU82-S1	SC VI.1	R 336.1225 R 336.1702
2. Benzo-cyclobutene (BCB)	Maximum production of 1,200,000 pounds	12-month rolling time period as determined at the end of each calendar month	EU82-S1	SC VI.1	R 336.1225 R 336.1702

III. PROCESS/OPERATIONAL RESTRICTION(S)

NA

IV. DESIGN/EQUIPMENT PARAMETER(S)

1. The permittee shall not operate process equipment which vents to the thermal treatment unit (i.e., 963 THROX) with absorber and caustic scrubber unless the thermal treatment unit is installed, maintained, and operated in a satisfactory manner. Satisfactory operation of the thermal treatment unit with absorber and caustic scrubber includes, but is not limited to, maintaining compliance with the requirements outlined in FG963THROX-S1 (SRN P1027). Exceptions to this condition are described in SC IV.2. **(R 336.1224, R 336.1225, R 336.1702, R 336.1910)**
2. The permittee shall not bypass the 963 THROX with absorber and caustic scrubber to SV82002 for more than the following number of hours per month: **(R 336.1224, R 336.1225, R 336.1702)**
 - a. 186 hours per month during the VBC process and the column is not processing 20s cut
 - b. 387 hours per month during the BCB process and the column is not processing 20s or 50s cut.

3. The permittee shall not operate process equipment which vents to the chlorine scrubber system unless venturi scrubbers J1-166 and J2-166 and packed tower T-166 are installed, maintained, and operated in a manner satisfactory to the AQD District Supervisor. Satisfactory operation of the chlorine scrubber system includes: **(R 336.1224, R 336.1225, R 336.1910)**
 - a) Maintaining a minimum flow rate of 5 gallons per minute in Venturi Scrubber J1-166 during chlorine cylinder connection and disconnection.
 - b) Maintaining a minimum flow rate of 5 gallons per minute in Venturi Scrubber J2-166 during chlorine cylinder connection and disconnection.
 - c) Maintaining a minimum flow rate of 0.5 gallons per minute in Packed Tower T-166 during chlorine cylinder connection and disconnection.
4. The permittee shall equip and maintain scrubbers J1-166 and J2-166 and packed tower T166 with liquid flow indicators. The permittee shall calibrate the liquid flow indicators in a satisfactory manner acceptable to the AQD District Supervisor. **(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. Performance tests on FG963THROX-1 (See ROP for SRN P1027) may be required in accordance with an AQD approved test plan to verify the emission rates from portions of EU82-S1 venting to FG963THROX-1. **(R 336.2001, R 336.2003, R 336.2004)**
2. The permittee shall notify the AQD Technical Programs Unit Supervisor and the District Supervisor not less than 30 days before testing of the time and place performance tests will be conducted. **(R 336.2001(3))**

VI. MONITORING/RECORDKEEPING

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

1. The permittee shall keep, in a manner satisfactory to the AQD District Supervisor, records of the monthly and 12-month rolling production in pounds per month and pounds per year each of vinyl benzyl chloride and benzocyclobutene. **(R 336.1225, R 336.1702)**
2. The permittee shall maintain records of the time, date, and duration of each bypass event of the 963 THROX including absorber and caustic scrubber. All records shall be made available to the Department upon request. **(R 336.1224, R 336.1225, R 336.1702)**
3. When exhausting to the chlorine scrubber system, the permittee shall monitor and record, on a continuous basis, the liquid flow rates for venturi scrubbers J1-166 and J2-166 and packed tower T-166 with instrumentation acceptable to the AQD. 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 may record block average values for 15 minute or shorter periods calculated from all measured data values during each period. The permittee shall keep all records on file at the facility and make them available to the Department upon request. **(R 336.1224, R 336.1225, R 336.1910)**
4. The permittee shall implement and maintain a plan identifying the operating parameters for FG963THROX that shall be obtained from the operator or owner of FG963THROX. All operating parameter data in the plan for FG963THROX shall be obtained within 30 days of the end of the month to which it pertains. If the plan fails to provide adequate information to demonstrate 98% chlorine removal efficiency, the permittee shall amend the plan. The permittee shall also amend the plan within 45 days after receiving notification from the AQD District Supervisor that the plan does not provide adequate information to demonstrate 98% chlorine removal efficiency. The permittee shall keep the plan and recorded parameter data on file at the facility and make them available to the Department upon request. **(R 336.1910)**

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. SV82001 (Raw Material Transfer and storage vent collection blower to atmospheric)	20	55	R 336.1225, 40 CFR 52.21 (c) & (d)
2. SV82002 (Distillation/Purification system vent to atmosphere)	2	65	R 336.1225, 40 CFR 52.21 (c) & (d)
3. SV963THROX ^A	24	80	R 336.1225, 40 CFR 52.21 (c) & (d)
4. SV82003* (Intermediate and product storage chlorine scrubber vent)	6	20	R 336.1225, 40 CFR 52.21 (c) & (d)

^A This stack's requirements also appear in the conditions for FG963THROX (SRN P1027)

* This stack is not required to be discharged unobstructed vertically upwards to the ambient air.

IX. OTHER REQUIREMENT(S)

1. The permittee shall comply with all applicable provisions of the National Emission Standards for Hazardous Air Pollutants, as specified in 40 CFR Part 63, Subpart A and Subpart FFFF for Miscellaneous Organic Chemical Manufacturing by the compliance date. **(40 CFR Part 63, Subparts A and FFFF)**

Footnotes:

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