Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, MN 55155-4194

RP-D2

Option D Control Equipment

Air Quality Permit Program

Doc Type: Permit Application

This form is for a stationary source qualifying for a registration permit under Option D, and using pollution control equipment listed in Minn. R. 7011.0070 to reduce emissions.

1a) AQ Facility ID No.: _____ **1b)** AQ File No.: _____

2) Facility Name: _____

3) Information required by Minn. R. 7007.1130, Subpart 2.F; For each pollution control equipment unit, submit a copy of the portion of the manufacturer's specification or test plan with the appropriate operating parameters highlighted. See the instructions for the required operating parameters for each type of control equipment.

☐ Included ☐ Not included

4) Control Equipment Types and Efficiencies:

Equipment Type * (see instructions for further descriptions)	**Pollutant controlled**	**Collection Method/Quantity/Control Efficiency**					
		Total Enclosure		**Hood – Certified**		**Hood – Not Certified**	
		No. of Units	Efficiency	No. of Units	Efficiency	No. of Units	Efficiency
Centrifugal Collector (cyclone) (high efficiency)	PM	__	90%	__	72%	__	54%
	PM_{10}		78%		62%		46%
Centrifugal Collector (cyclone) (medium efficiency)	PM	__	80%	__	64%	__	48%
	PM_{10}		60%		48%		36%
Centrifugal Collector (cyclone) (low efficiency)	PM	__	25%	__	20%	__	15%
	PM_{10}		25%		20%		15%
Multiple Cyclone without Fly Ash Reinjection	PM	__	90%	__	72%	__	54%
	PM_{10}		72%		58%		43%
Wet Cyclone Separator or Cyclonic Scrubber	PM	__	84%	__	68%	__	51%
	PM_{10}		84%		68%		51%
Electrostatic Precipitator used for boiler fly ash control	PM	__	NA	__	NA	__	NA
	PM_{10}		40%		NA		NA
Electrostatic Precipitator used for other applications	PM	__	98%	__	78%	__	59%
	PM_{10}		94%		75%		56%
Fabric Filter	PM	__	99%	__	79%	__	59%
	PM_{10}		93%		74%		56%
Spray Tower	PM	__	85%	__	68%	__	51%
	PM_{10}		84%		68%		51%
Venturi Scrubber	PM	__	94%	__	76%	__	57%
	PM_{10}		84%		68%		51%

Equipment Type * (see instructions for further descriptions)	**Pollutant controlled**	**Collection Method/Quantity/Control Efficiency**					
		Total Enclosure		**Hood – Certified**		**Hood – Not Certified**	
		No. of Units	Efficiency	No. of Units	Efficiency	No. of Units	Efficiency
Impingement Plate Scrubber	PM	__	77%	__	62%	__	46%
	PM_{10}		77%		62%		46%
Mechanically Aided Separator	PM	__	64%	__	52%	__	39%
	PM_{10}		5%		4%		3%
Wall or Panel Filter	PM	__	85%	__	68%	__	51%
	PM_{10}		85%		68%		51%
HEPA Filter or ULPA Filter	PM	__	99.98%	__	80%	__	60%
	PM_{10}		99.98%		80%		60%
Charged Scrubber	PM	__	94%	__	76%	__	57%
	PM_{10}		84%		68%		51%
Condensation Scrubber	PM	__	94%	__	76%	__	57%
	PM_{10}		84%		68%		51%
Catalytic Afterburner (catalytic oxidation)	VOC	__	94%	__	76%	__	57%
	PM		62%		50%		37%
	PM_{10}		62%		50%		38%
	CO		94%		76%		57%
Thermal Afterburner (thermal oxidation)	VOC	__	97%	__	78%	__	58%
	PM		62%		50%		37%
	PM_{10}		62%		50%		37%
	CO		97%		78%		58%
Flaring or Direct Combustor	VOC	__	98%	__	79%	__	59%
	PM		61%		50%		37%
	PM_{10}		61%		50%		37%
	CO		98%		79%		59%

PM = particulate matter

PM_{10} = particulate matter smaller than 10 microns in diameter

VOC = volatile organic compounds

C = carbon monoxide

Form RP-D2 Instructions

1) **AQ Facility ID No. --** Fill in your Air Quality (AQ) Facility identification (ID) Number (No.) as indicated on Form RP-01, item 1a. If you do not have this information, leave it blank.

2) **Facility Name --** Enter your facility name as indicated on Form RP-01, item 2.

3) **Submittal of Required Information --** Minn. R. 7007.1130, subp. 2.F. requires that for each control device you are using to comply with the registration permit, you must submit a copy of the portion of the manufacturer's specification or test plan with the appropriate operating parameters highlighted.

4) **Control Equipment Types and Efficiencies --** Only the types of control equipment listed in this item may be counted toward emission reduction for Option D. Review the list of control equipment types for control of particulate matter (PM), particulate matter smaller than 10 microns in diameter (PM_{10}), volatile organic compounds (VOC), and carbon monoxide (CO). For each one that you use, indicate how many units are at your facility, and fill in the correct number under the "total enclosure," "hood-certified," or "hood-not certified" column. (For example, if you operate 4 high efficiency centrifugal collectors, two of which collect dust through a total enclosure, one of which collects through a certified hood, and one of which collects through an uncertified hood, you would indicate "2" as the number of units in the "total enclosure" column, "1" as the number of units in the "hood-certified" column, and "1" as the number of units in the "hood-not certified" column.)

Note: If any of your pollution control equipment collects emissions through a certified hood, you **must include Form RP-D3** with your application.

Definitions of control equipment types and operating/monitoring parameters

Type of control equipment	Description	Operating/Monitoring parameters
Centrifugal Collector (cyclone)	A device where airflow is forced to spin in a vortex through a tube "**high efficiency**," "**medium efficiency**," and "**low efficiency**" mean the physical design as described using Drawing 1 and Table 1.	· Pressure Drop
Multiple Cyclone without Fly Ash Reinjection	A cyclonic device with more than one tube where fly ash is not reinjected	
Wet Cyclone Separator or Cyclonic Scrubber	A cyclonic device that sprays water into a cyclone	· Pressure Drop · Water Pressure
Electrostatic Precipitator	A control device in which the incoming particulate matter receives an electrical charge and is then collected on a surface with the opposite electrical charge	· Voltage · Secondary current · Conditioning agent flow (if used)
Fabric Filter	A control device in which the incoming gas stream passes through a porous fabric filter forming a dust cake	· Pressure drop · For low-temperature filters - may request to do visible emission readings from filter outlet during an entire cleaning cycle
Spray Tower	A control device in which the incoming gas stream passes through a chamber in which it contacts a liquid spray	· Liquid flow rate · Pressure drop
Venturi Scrubber	A control device in which the incoming gas stream passes through a venturi into which a low pressure liquid is introduced. (A venturi is a short tube with a constricted throat.)	
Impingement Plate Scrubber	A control device in which the incoming gas stream passes a liquid spray and is then directed at high velocity into a plate	
Mechanically Aided Separator	A control device that relies on inertia for separating particles from a gas stream	§ Pressure Drop
Wall or Panel Filters	A control device in which the exiting gas stream passes through a panel of coarse fibers. Other Wall Filters means removable panels for cleaning and replacement, or liquid curtains for particulate removal that provide little resistance to air flow	Condition of the filters, including, but not limited to, alignment, saturation, and tears and holes
HEPA Filter or ULPA Filter	A high efficiency wall or panel filter designed for collection of submicron particles	
Afterburner (thermal or catalytic oxidation)	A device used to reduce VOCs to the products of combustion through catalytic (use of a catalyst) oxidation in a combustion chamber	· Inlet and outlet temperatures · Catalyst bed reactivity
Thermal Afterburner	A device used to reduce VOCs to the products of combustion through thermal (high temperature) oxidation in a combustion chamber	· Combustion temperature or · Inlet and outlet temperatures
Flaring or Direct	A device in which air, combustible organic waste gases, and	· Temperature indicating the

Type of control equipment	Description	Operating/Monitoring parameters
Combustor	supplementary fuel (if needed) react in the flame zone (e.g., at the flare tip) to destroy the VOCs	presence of a flame

Drawing 1 – Cyclone Design

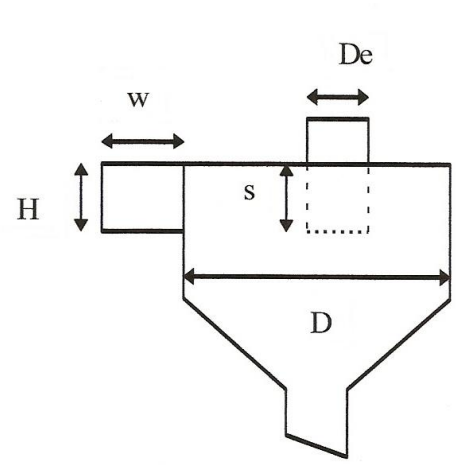

Table 1

Ratio Dimensions*	High Efficiency	Medium Efficiency	Low Efficiency
Height of inlet, H/D	£0.44	>0.44 and <0.8	³ 0.8
Width of inlet, w/D	£0.2	>0.2 and <0.375	³ 0.375
Diameter of gas exit, D_e/D	£0.4	>0.4 and <0.75	³ 0.75
Length of vortex finder, s/D	£0.5	>0.5 and <0.875	³ 0.875

*If one or more of the "ratio dimensions," as listed in Table 1, are in a different efficiency category (high, medium, low), then the lowest efficiency category shall be applied.