



**ADDITIONAL TECHNICAL INFORMATION FOR
CONTROL EQUIPMENT: SCRUBBER**

The following information will be used for the technical review of a permit to install application for a **scrubber**. This information is in addition to the general requirements outlined in the AQD document "Information for an Administratively Complete Permit to Install Application", Part 2 - Additional Supporting Information, Items A through F. All of the information may not be needed for each application. Also, this document may not be all inclusive. Additional information beyond that identified may be necessary to complete the technical review of any individual application. In the event a determination is made that new additional information is needed for a technical review, this document will be updated.

All referenced guidance documents are available at <http://www.deq.state.mi.us/aps>, or you may contact the Permit Section at 517-373-7023.

1. Make and model number of the scrubber, and any available literature.
2. Type of scrubber (packed bed, venturi, other).
3. The pressure drop and range, if it is variable.
4. The chemical composition of the scrubber liquid. If the scrubber recirculates the scrubber liquid, describe the methods, frequency and components to be monitored to ensure that the recirculating liquid performs properly.
5. The source of the scrubber liquid and the concentrations of any contaminants that may affect scrubber performance.
6. Provide a schematic diagram of the scrubber showing:
 - a) Dimensions
 - b) Inlet and outlet liquid and gas flow directions and temperatures
 - c) Liquid and gas flow rates
 - d) Internal features
 - e) Design of the demister section
7. Describe the internal construction of the scrubber, including but not limited to, its corrosion resistant properties and nozzle design.
8. The number of isolable modules, if any.
9. If there is a prequenching section, provide a detailed description, including liquid and gas flow rates and temperatures.
10. Fractional efficiency versus pressure drop curves, if available.
11. For packed bed scrubbers and scrubbers with other types of internal components, such as trays, include:
 - a) A flow diagram
 - b) Chemical composition of all streams
 - c) Flow rates of all streams (both mass and volume)
 - d) Temperatures of all streams
 - e) Gas velocities through the equipment
 - f) Pressure drop data for the equipment
 - g) Equilibrium data
 - h) Specifications of packing or other internal components
 - i) Supporting design calculations, including height and number of transfer units and mass transfer data
12. For sulfur dioxide and other acid gas scrubbers, include the following:
 - a) Percentage of exhaust gases to be treated in the scrubber, if less than 100 percent

- b) Description of the reheat section, if applicable
 - c) Description of any proposed bypass, if applicable
 - d) Acid gas inlet and outlet concentrations, in pounds per hour and parts per million by volume
 - e) Minimum mass and molar ratio of reagent to acid gas
 - f) Minimum and maximum pH of the scrubber liquid.
 - g) For sulfur dioxide scrubbers only, a description of any measures which will be taken to produce a uniform loading to the scrubber such as coal blending at a coal fired boiler.
13. Describe the method of treatment and disposal of the scrubber liquid. If the liquid is recirculated, describe the method used to treat the recycled liquid prior to reuse. If the discharge from the scrubber requires approval from other divisions of the DEQ and/or the local waste water treatment plant, indicate the status of this approval.