



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

The following information will be used for the technical review of a permit to install application for a **condenser**. 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.

NOTE: The following information applies to condensers used as either process equipment or a control device. The information in items 2-4 below should be submitted for each step in a process which uses the condenser. If the condenser is used simultaneously by another process not covered by this application, the control efficiency provided must reflect the normal operating situation which results in the lowest control efficiency.

1. Describe the condenser and the condensation method (pressure condensation, temperature condensation - surface or contact, other).
2. Provide the following calculations for the vapor stream:
 - a) Inlet vapor flow rate in standard cubic feet per minute (scfm) and influent and effluent vapor temperatures (°F) immediately before and after the condenser.
 - b) The maximum influent and effluent total volume fraction and pounds per hour of all compounds combined.
 - c) The maximum influent and effluent volume fractions, pounds per hour, vapor pressure, and condensation temperature for each compound.
3. For refrigerated or chilled condensers:
 - a) Guaranteed minimum control efficiency for each compound
 - b) Internal operating temperature
 - c) Specific heat of the coolant in Btu/lb °F, at 77°F
 - d) Composition of the coolant and flow rate
 - e) Coolant inlet and outlet temperature
 - f) Heat balance – show minimum and maximum Btu load
4. For other types of condensers:
 - a) Pressure or mechanism that causes condensation
 - b) Detailed drawings, descriptions and calculations showing the operation of the condenser and how it controls the compounds in the gas stream
5. Provide a diagram showing the location of vapor temperature indicators for the condenser. If there is not an exit vapor temperature indication device following the condenser, submit the technical and economic feasibility of installing one.