

Restore Chiller Efficiency and Lower Operating Costs with the McQuay PureCharge for Centrifugal Chillers

An oil-logged chiller robs your operating budget every day by significantly reducing the efficiency of your chiller. Refrigerant contamination can even lead to catastrophic chiller failure over time. With the McQuay PureCharge you have an effective method of eliminating contaminants from centrifugal chillers.

Contaminants Can Cause Expensive Problems

Oil Contamination of Refrigerant

An ASHRAE research project on ten randomly selected centrifugal chillers showed that all those chillers had refrigerant contaminated by oil. They studied the detrimental effects of oil on the heat transfer surfaces in chillers. The study concluded that heat transfer capacity was significantly reduced on the enhanced tube surfaces. Look at the efficiency loss numbers below and the performance charts on the back page to see the effects of oil contamination.

Percent Oil in Evaporator	Efficiency Loss
1 to 2%	2 to 4%
3 to 4%	5.5 to 8%
5 to 6%	9.5 to 11%
7 to 8%	13.5 to 15%

Moisture and Acid Problems

Moisture and oil mix together to form acids that attack the motor windings, which can lead to costly motor burnout. Bearings can seize from tubing copper ions bonding to the hot surfaces resulting in a costly but avoidable failure.

PureCharge—An Effective Solution

The PureCharge draws refrigerant from the evaporator, removes the oil and automatically returns the oil to the chiller's oil sump. Acid and moisture are also removed from the chiller's refrigerant. With a PureCharge unit installed in your chiller system, you have a cost-effective, continuous solution to maintain your chiller's efficiency and reliability.



PureCharge Benefits

- Reduced energy costs because removing oil restores chiller efficiency and capacity
 - Efficiency improvement may qualify for rebates from local utility
- Flexible—cleans both high and low pressure centrifugal chillers
- Easy to install—shipped complete
- Reliable performance—on-line, continuous decontamination of the refrigerant charge



The PureCharge is a component of your environmental responsibility program, reducing your energy usage by restoring chiller's efficiency and capacity.

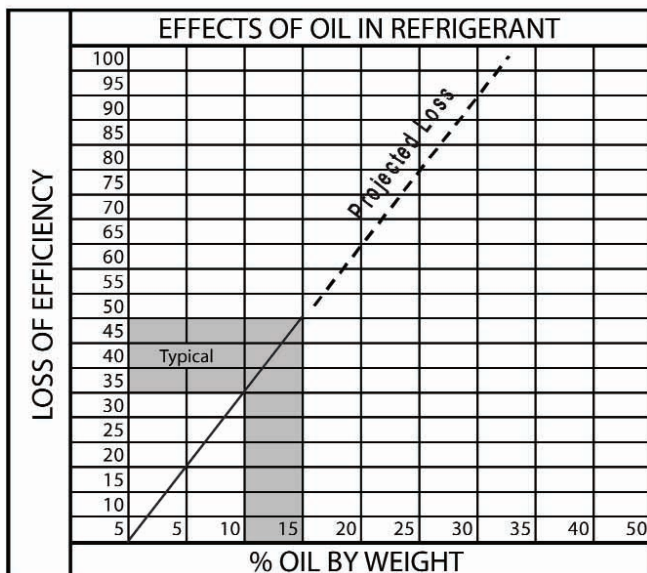
How Much is Excess Oil Costing You in Chiller Efficiency?

When a chiller operates with refrigerant contaminated with oil the results are significant and expensive:

- Power use increases
- Operating costs sharply increase
- Chiller capacity declines

Refer to the charts below on chiller performance and oil contamination levels to see how much excess oil could be costing you.

The McQuay PureCharge can remove the contaminants from the refrigerant and restore your chiller's efficiency and capacity. As a result, your operating costs are reduced.



This chart illustrates the loss of efficiency due to oil concentrations in the refrigerant.

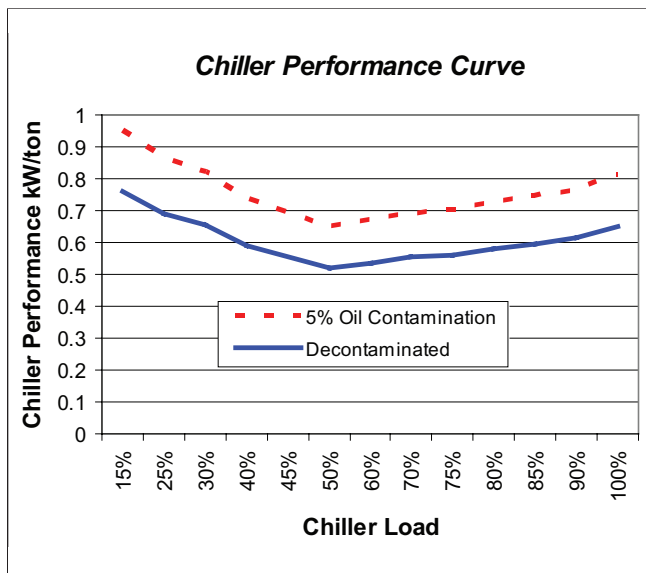
Calculating the Cost of Reduced Chiller Efficiency

Using the following parameters:

- Contamination of the refrigerant with only 5% oil results in a 10% reduction in efficiency, shown on the chart above
- 2,000 EFLH (equivalent full load hours) of chiller operation
- 0.576 kW/ton operating efficiency for a 500-ton chiller, per ASHRAE Std 90.1
- \$0.12/kWh blended rate (kWh + demand charge)

Without the PureCharge unit to remove oil contamination from the refrigerant, the loss of chiller energy efficiency costs \$6,912 annually.

$$10\% \times [2,000 \text{ EFLH} \times (0.576 \text{ kW/ton} \times 500 \text{ tons}) \times 0.12/\text{kWh}] = \$6,912$$



As you can see from this chart, chiller kW/ton performance improves significantly with decontaminated refrigerant.

PureCharge—a Part of Your Green Strategy

Installing a McQuay PureCharge unit on your chiller can be part of your green strategy. Restoring the efficiency of the chiller to original kW/ton operating levels reduces electric consumption, which in turn reduces greenhouse gas emissions. By restoring the chiller's efficiency you can reduce greenhouse gas emissions by an amount equivalent to removing 7.5 cars from the road, or the amount of electricity used by 5.4 homes. Here's the calculation:

$$2,000 \text{ EFLH} \times (0.634 - 0.576 \text{ kW/ton}) \times 500 \text{ tons} = 58,000 \text{ kWh}$$

58,000 kWh is equivalent to over 91,000 pounds of CO₂ annually, based on the EPA method of converting kWh to CO₂ pounds.

Call McQuay Factory Service or a McQuay Parts Distributor to get the oil out with the PureCharge unit. To find an office near you, visit www.mcquay.com.

