

IMERC Fact Sheet

Mercury Use in Pumps

This Fact Sheet summarizes the use of mercury in pumps, which are devices used to transport either a liquid or a gas across a pressure differential. It includes the total amount of mercury in all products that were sold in the U.S. in 2001, 2004, and 2007. Since that time, almost all manufacturers have phased-out the use of mercury-added float switches in pumps. Available data on mercury-added replacement switches for pumps sold after 2007 is included in IMERC's [Mercury Use in Switches & Relays](#) Fact Sheet.

The information in the Fact Sheet is based on data submitted to the state members of the [Interstate Mercury Education and Reduction Clearinghouse \(IMERC\)](#) including Connecticut, Louisiana, Maine, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont. The data is available online through the [IMERC Mercury-Added Products Database](#).

Mercury Components in Pumps

Mercury is typically found in certain switches contained in pumps that are used to control the flow of liquid. These pumps use the mercury switches to initiate activation of the pump when specific conditions are met, such as when a tank is full. Depending on its complexity, a pump typically employs either one or two mercury switches, and each switch may contain as little as 1 gram (0.035 ounces), or as much as 250 grams (8 ounces) of mercury. The amount of mercury in pumps that have been reported to the IMERC-member states ranges from 100 milligrams (mg) to greater than 1,000 mg of mercury, depending on the amount and type of mercury switches in the pump.

Mercury has also been used in seals that protect a pump's motor from water damage. These pumps are primarily used in deep water wells for agriculture and drinking water applications, especially in the western United States. They are used in the oil and gas industry as well.

Float switches include a float that rises in response to changes in the level of a liquid. They are most commonly found in sump pumps and bilge pumps. Particular operating conditions depend on the pump type and its primary functions. The pumps are activated when the water level is unsatisfactory (e.g., either too high or too low). The mercury is usually enclosed within the hollow cylinder or sphere that make up the floatation device. However, research indicates that most new consumer sump pumps are made without mercury. Non-mercury alternatives include dry reed switches, optic sensors, and mechanical ball switches. For more information, go to: www.newmoa.org/prevention/mercury/projects/legacy/appliances.cfm#sp.



Mercury Float Switch used in a Sump Pump
Photo Source: Vermont Agency of Natural Resources



Mercury-Containing Bilge Pump
Photo Source: Vermont Agency of Natural Resources

Control switches are typically employed to monitor liquid levels and may be used to activate an alarm system should the liquid rise to and/or above a certain threshold. This category includes tilt switches and pressure switches, which use the mercury as a conductor to complete the electrical circuit that turns the pump system on or off. These types of switches are found in fire pump controllers, spa pumps, tanks, and other commercial/industrial pumping systems.

Mercury Use in Pumps

Mercury float switches may be sold individually or as a component of another product (e.g., pumps). Eight companies have reported to the IMERC-member states that they have manufactured mercury-added pumps during one or more of the reporting years. The mercury-added component most commonly used in these pumps were float switches; however, other types of control switches, including tilt switches and leveling switches were also used.

Table 1 presents the total amount of mercury in pumps and pump systems sold in the U.S. during calendar years 2001, 2004, and 2007.¹

Table 1: Total Mercury Sold in Pumps (pounds)			
Product/Component	2001	2004	2007
Float switches	12,382 (6.2 tons)	13,410 (6.7 tons)	10,318 (5 tons)

[Note: 453.6 grams = 1 pound; all numbers are rounded to the nearest whole number.]

Table 1 illustrates that mercury use in pumps and pump systems increased 0.5 tons from approximately 6.2 tons in 2001 to approximately 6.7 tons in 2004. Although three companies decreased their combined total use of mercury in their pumps from approximately 805 pounds

¹ The data cited in this Fact Sheet is from a NEWMOA Power Point Presentation entitled, *Trends in Mercury Use in Products: Analysis of the IMERC Mercury-added Products Database*, presented at the “2009 Mercury Science & Policy Conference with a Special Focus on the Great Lakes & Northeast Regions,” on November 17, 2009: http://www.newmoa.org/prevention/mercury/conferences/sciandpolicy/presentations/Wienert_Session3B.pdf. Additional background information on these products can be found in the NEWMOA report, *Trends in Mercury Use in Products: Summary of the IMERC Mercury-added Products Database*, June 2008 at: <http://www.newmoa.org/prevention/mercury/imerc/factsheets/mercuryinproducts.pdf>.

(0.4 tons) in 2001 to approximately 745 pounds of mercury (0.3 tons) in 2004 – a decline of approximately 6 percent – two companies increased their reported total use of mercury in pumps that they sold in 2004. SJE-Rhombus, an original equipment manufacturer (OEM), reported an increase in the total use of mercury in pump switches from 2001 to 2004. Rule Industries also reported an increase in their total mercury use in pumps during this time. The increase in total mercury use from 2001 to 2004 from these two companies, accounts for the overall increase in total mercury use in pumps sold in the U.S. over this period of time.

In 2007, mercury use in pumps declined 1.7 tons, or approximately 25 percent, from 2004 to 2007. Much of this decline is due to companies having reported a phase-out of mercury-added float switches in their pumps and pump systems. Since 2001, many states have passed legislation restricting the sale of mercury-added switches and relays, including float switches and tilt switches, individually or as a component in a larger product (i.e., pumps). If more of these state laws go into effect, mercury use in this product category will likely continue to decline.

Phase-Outs & Bans on the Sale of Mercury-added Pumps

Manufacturers have used mercury switches in their pumps for many decades because mercury switches were durable and effective. However, the use of these switches in pumps has steadily declined due to concerns over the potential environmental and human health effects posed by mercury. In addition, many IMERC-member states have implemented mercury product bans and phase-outs that include mercury-added pumps; therefore, many companies have ceased manufacturing them and/or stopped selling them to these states.

The following IMERC-member states currently have [restrictions on the sale and/or distribution of mercury-containing pumps](#) due to the amount of mercury that they contain: Connecticut, Louisiana, and Rhode Island. Additional IMERC-member states, including California, Illinois, Maine, Massachusetts, Minnesota, New Hampshire, New York, and Vermont restrict the sale and/or distribution of pumps that contain a mercury switch as a component. Most of these states allow manufacturers to apply for an exemption, which, if approved, would allow them to sell mercury switch pumps in the state after the effective phase-out date.

The following is a list of pump manufacturers that have reportedly eliminated their use of mercury in their products sold in the U.S. market since 2001:

- BJM Pumps
- Franklin Electric-Water Transfer Systems
- Gorman-Rupp Company
- Rule Industries

Disposal and Recycling of Mercury-Containing Pumps

Despite the emerging trend toward mercury-free pumps, the current inventory of pumps used in wastewater and drinking water treatment plants, as well as in manufacturing and other industrial applications may include mercury switches. As the pumps age, wear, and become obsolete, proper disposal becomes a concern.

Most submerged pumps and pumping systems (including sump pumps) contain a mercury-added float switch. A wire attached to the float is a good indication that a sump pump contains a mercury switch. The mercury is located in the bulb of the float. Non-mercury float switches are not usually used for submerged pumps. They do not have attached wires; instead they have a metal guide rod that holds the mechanical switch to the pump system. Once the users have determined whether or not their pump has a mercury switch, the wire attaching the float can simply be cut, and the whole float switch can be properly disposed of.

Several of the newer bilge pumps use a rolling brass ball bearing instead of mercury to complete the electrical circuit. To determine if the bilge pump contains mercury, gently shake the bilge pump – a brass ball bearing will be easily discerned from liquid mercury because of the sound it makes inside the pump when shaken. Once it is determined that the pump has a mercury switch, the user can remove the entire pump for proper disposal.

For more information about the removal of mercury switches from pumps see:

- [Maine Department of Environmental Protection \(ME DEP\)](#)
- [Vermont Department of Environmental Conservation \(VT DEC\)](#)

Mercury control switches (e.g., tilt switches, pressure switches) may also be part of a pumping system and/or control panel. The best way to determine whether or not a pump or pumping system contains a mercury component is to contact the pump manufacturer directly.

Some states ban the disposal of all mercury-containing devices, including pumps, in solid waste landfills and incinerators. Household hazardous waste (HHW) collection programs may accept mercury-added pumps for recycling and disposal in many communities. However, most HHW programs will only accept the mercury-added switch and not the entire pump. Persons should contact their state and/or local environmental agencies to verify solid waste disposal regulations, especially those pertaining to mercury-containing components and devices. They can also check with their local municipality to find out about the specific recycling and disposal options for mercury pumps. Prior to disposal, the mercury switches should be removed by a service technician and sent to a recycler for reclamation.

Non-Mercury Alternatives

As the phase-out of the sale of pumps with mercury switches has become more widespread, pump manufacturers have responded by working with their suppliers to develop alternative non-mercury components. Non-mercury switch alternatives suitable for use in pumps include pressure switches (sensor or transmitter), dry reed switches (magnetic), mechanical switches, optical switches, temperature/thermal switches, and vacuum switches. Many factors should be considered when switching to a non-mercury device, including the relative costs, availability, product effectiveness, and desired application (i.e., different switches are suited for different types of pumps).

For more information on non-mercury alternatives for pump switches, see:

<http://sustainableproduction.org/downloads/An%20Investigation%20Hg.pdf>

Data Caveats

A number of important caveats must be considered when reviewing the data summarized in this Fact Sheet:

- The information may not represent the entire universe of mercury-containing cooking equipment sold in the U.S. The IMERC-member states continuously receive new information from mercury-added product manufacturers, and the data presented in this Fact Sheet may underestimate the total amount of mercury sold in this product category.
- The information summarizes mercury use in cooking equipment sold nationwide since 2001. It does not include mercury amalgam sold prior to January 1, 2001 or exported outside of the U.S.
- Reported data includes only mercury that is used in the product, and does not include mercury emitted during mining, manufacturing, or other points in the products' life cycle.
- This Fact Sheet focuses on mercury use in float switches used in pumps and pump systems. It does not include mercury use data for other types of mercury switches used in pumps, such as mercury tilt and mercury level switches (i.e., commonly referred to as mercury control switches). All uses of mercury switches are covered in the Fact Sheet titled, [*Mercury Use in Switches and Relays*](#).