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Onsite Solvent Recycling - An Economical Alternative to Disposal

Background

Reducing hazardous waste is an important priority for manufacturing facilities. Some companies are able to reduce the amount of hazardous waste they generate by changing processes or substituting non-hazardous or less hazardous materials for hazardous ones.

Unfortunately, this is not the answer for all companies and the use of solvent-based products continues to be a common practice. Many painting, thermoset plastic manufacturing, parts cleaning and other processes still require the use of solvent-based products resulting in a hazardous waste stream that must be properly and legally handled.

The highest volume of solvent-based wastes comes from cleaning operations. For example, a company who applies solvent-based paints and coatings must use clean solvents to flush out their spray paint application equipment and lines to prevent them from becoming clogged with hardened paint material. A homeowner uses a similar process when they use mineral spirits to clean paintbrushes.

Options for waste solvents

Once the solvent has become contaminated and is no longer capable of being used for cleanup operations, it can either be disposed as hazardous waste or it can be recycled.

Much of the solvent waste that is sent for disposal as hazardous waste is burned in cement kilns or hazardous waste incinerators. In general, solvents come from non-renewable resources, once they are incinerated, they can never be used again.

Every effort should be made to recycle these valuable materials. Since most solvents are derived from petroleum sources their costs will only continue to rise as the worldwide demand for oil products climbs and oil prices spiral higher and higher.

There is another option available. Finish Thompson offers small packaged distillation systems that can be installed onsite to safely and efficiently turn solvent-based waste into a clean reusable product.

Onsite recycling

Many processes used to recycle other waste streams like reverse osmosis or ion exchange do not work for recycling solvent waste streams. The contaminants would quickly foul the membranes and resin beds. The one method with a proven track record is distillation.

Available since the early 80's, thousands of these onsite distillation systems are being successfully used to recycle millions of gallons of waste solvent each year resulting in tremendous financial savings.

In addition to the monetary savings, onsite recycling reduces the amount of waste solvents leaving the facility by 85% to 95%, helps save a dwindling resource and reduces the emissions of the greenhouse gas carbon dioxide (generated when the solvent waste is burned in cement kilns and incinerators).

It is amazing how much clean solvent is available in the typical solvent waste stream. Most waste solvent has only 5% to 10% contaminates (paint, resins, ink, grease, oil, etc). The remaining solvent is available for recovery and reuse.

Distillation process

Distillation is the process of purifying a liquid by evaporation and condensation. Simply, distillation is the process in which a liquid is vaporized (turned to steam), condensed (turned back into a liquid) and the clean liquid is collected in a container. Nature uses a process similar to distillation to turn salt water (seawater) into fresh water (rain) through evaporation and condensation.

Solvent-based waste contains volatile material (solvents) and non-volatile material (contaminants like paint, ink, grease, fiberglass, etc.). Many of the non-volatile contaminates are dissolved in the solvent (like salt dissolved in salt water) and cannot be filtered out. Distillation is an ideal way to separate the two.

During the distillation process, the solvent-based waste is heated until it reaches the boiling point. It then evaporates (vaporizes) and passes through a condenser where heat is removed from the vapor and it turns back into a cool, clean reusable liquid. The non-volatile contaminant remains in the distillation tank and is easily removed for disposal.

The standard distillation system operates at atmospheric pressure and is used to recover solvents with boiling points up to 300º F. To safely recover solvents with boiling points above 300º F, vacuum distillation is used.

Vacuum distillation

Vacuum distillation is the distillation of a liquid under reduced pressure. The atmospheric pressure in the distillation tank is reduced making it possible to boil the liquid at a lower temperature. Liquids boil at lower temperatures under reduced pressure.

Vacuum distillation is used to safely recover higher boiling point solvents. The maximum temperature of the distillation unit's heater is limited for safety. There is a temperature at which a flammable or combustible material can ignite by temperature only. This is called the autoignition temperature. Some solvents boil at temperatures that exceed the heaters maximum temperature setting. Vacuum distillation lowers the boiling point to allow recovery within the heaters maximum setting.

Economics

New solvent can easily cost $8.00 per gallon or more. Many companies choose to purchase new solvent, use it in their cleaning operations and then dispose of it as hazardous waste. This cycle is repeated over and over throughout the year.

The installation of a Finish Thompson onsite solvent distillation system can recycle the waste solvent for as low as ten cents per gallon. Imagine paying only ten cents for a gallon of clean solvent!

An LS-55E is a good example for a cost evaluation though the results are essentially the same for any of the sizes. The LS-55E processes 55-gallons of waste solvent per batch. The typical batch takes between 6 and 8 hours.

The LS-55E has a 6.2 kW heating element and uses 90 gallons of cooling water per hour (there are options available which eliminate the cooling water requirement). This example uses utility rates of $0.07 per kWh and $0.003 per gallon of water. It can be adjusted up or down depending upon individual rates but in all cases there are significant savings.

- Electrical usage per 55-gallon batch = $0.07 (cost per kWh) x 6.2 kW (heater wattage) x 8 (hours to process a 55-gallon batch) = $3.47 of electricity per 55-gallon batch

- Water usage per 55-gallon batch = $0.003 (cost per gallon of water) x 90 (gallons of water used per hour) x 8 (hours to process a 55-gallon batch) = $2.16 of water per 55-gallon batch

- $3.47 (cost of electricity) + $2.16 (cost of water) = $5.63 total utility cost per 55-gallon batch

- $5.63 ÷ 55 gallon batch = $0.10 per gallon of solvent

It is obvious there is a tremendous savings when waste solvent is recycled onsite.

Equipment features

Finish Thompson's LS Series solvent recyclers are the ideal solution for companies with solvent-based waste streams. Designed to provide years of safe,

simple and reliable operation the equipment returns a nearly pure, completely reusable solvent at a very low cost per gallon.

Manufacturing explosion proof solvent recycling systems for over thirty years, Finish Thompson systems are suitable for recovering a wide variety of solvents including ones that are flammable or combustible.

Incorporating many unique features, they are designed to be user friendly.

The encapsulated heating element eliminates the need for heat transfer oil. This improves heat transfer, lowers energy usage and makes it maintenance free.

The waste solvent is processed in a special solvent resistant, high-temperature bag that makes residue removal as easy as pulling a garbage bag out of a garbage can. The distillation tank is coated with an industrial grade, non-stick coating in case there are any spills.

Several versions are available to handle the needs of a wide variety of applications and volumes.

To learn more about how your company can save thousands of dollars per year while being environmentally responsible contact us at 814-455-4478 or visit our website at www.finishthompson.com