

## ADVANTAGES OF AIRLESS™ VACUUM VAPOR DEGREASER

- 1) **SAFETY TO THE WORK AREA:** OSHA governs permissible exposure levels for solvents. For example, when using perchloroethylene (PCE), OSHA requires a 200 ppm maximum exposure and 25 ppm total work area level. Serec Corporation Airless™ Systems are designed to contain less than 25 ppm in the degreaser prior to opening the chamber door. EPA testing consistently measured less than 15 ppm in the Serec chamber. An independent study registered less than 1 ppm in all areas around a 65 ft<sup>3</sup> degreaser in 8 hour periods for both PCE and trichloroethylene (TCE). Non-chlorinated solvents, such as brominated and fluorinated, are also processed in the Serec technology a similar way and exhibit the same results.
- 2) **LOW EMISSIONS TO THE ENVIRONMENT:** The Serec Airless™ System is a completely closed looped system. Emissions can escape only when opening the chamber. For example, for a 100 ft<sup>3</sup> degreaser, operating 17,500 cycles/yr (2 cycles/hr, 24 hrs/day, 365 days/yr) annual emissions would be 20 lbs. of PCE, assuming a maximum PCE level of 25 ppm at the end of each cycle in the chamber. Emissions vary with solvent and process vessel size and are readily available upon request for each application.
- 3) **LOW SOLVENT USAGE:** The Serec Airless™ System typically recovers 99.9% of vapor and liquid solvent from the chamber during the drying process. The last 0.2% becomes very expensive to recover and, therefore, is purged from the vessel with air and recovered in carbon. For a 100 ft<sup>3</sup> degreaser using PCE, the Serec unit uses 0.045 lbs. PCE/cycle. For 17,500 cycles/yr, (used above) annual usage is 793 lbs. Again, emissions vary with solvent and process vessel size and are readily available upon request for each application.
- 4) **FLEXIBLE OPERATING TEMPERATURES:** Since the Serec unit operates under full vacuum, the solvent in the system is boiling at any temperature. The concentration of the vapor in the chamber, however, is dramatically effected by the temperature. The Serec Airless™ System utilizes solvents at approximately 60-90% of the boiling point temperature adding flexibility especially when processing temperature sensitive material. For PCE the Serec equipment can operate at practical temperatures ranging from 175°F to 235°F. For medium range temperatures, TCE and NPB can be used at temperature ranges from 135°F to 175°F and 120°F to 155°F. For lower temperature applications, AK225 and methylene chloride operating temperatures operate as low as 80°F to 116°F. It is recommended that the degreaser be operated at the highest temperature possible for best cleaning efficiency.



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- 5) **BETTER CLEANING EFFICIENCY:** Temperature is an important parameter when considering cleaning efficiency. The higher the temperature, the lower the viscosity of both the contaminant and solvent. Higher temperature also promotes faster solvent condensing and greater flushing volumes of solvent. The Serec Airless™ System can be optimized to operate at the highest, safest temperature for your particular cleaning equipment.
- 6) **EXCELLENT DRYING:** The Serec Airless™ System utilizes vacuum drying. Vacuum levels are so deep that solvent actually boils off the parts since heat is held in the parts. This heat source along with deep vacuum levels ensures all solvent removal from the part and chamber.
- 7) **REDUCED WASTE DISPOSAL:** The Serec Airless™ System utilizes vacuum during distilling and solvent recovery. Relatively speaking, the vacuum package required for the degreasing chamber is large when used for solvent distilling. The net result is that distilling takes place at low temperatures, and deep vacuums. This prevents fouling of the distillation tank and breakdown of the contaminants like oils and/or greases being sent to waste. The solvent remaining after distilling is generally less than 0.1%. This minimizes the amount of solvent in the waste stream, which can lower costs considerably.
- 8) **ELIMINATION OF WATER MIXING WITH SOLVENT:** The Serec Airless™ System is designed to eliminate any air/solvent vapor mixing. Traditionally in open top degreasers, water vapor condenses in the system which occurs at the chiller zone resulting moisture collection in the solvent that leads to acid formation. In the Airless™ System, if any water is on the parts, the initial evacuation of air from the chamber generally will purge the water from the system prior to injecting vapor to the system preventing any solvent moisture contact. By preventing this interaction and the resulting corrosion concerns the Airless™ System can be fabricated with common carbon steel materials reducing equipment cost.
- 9) **CAN BE USED WITH MANY SOLVENTS:** Since oxygen is removed prior to solvent vapor entering the vessel, flammable solvents can be used. Since there is no requirement on the solvent producing heavy vapors, solvents with low molecular weights can be used. Serec, for instance, has built a unit to use an alcohol.
- 10) **LOWER ENERGY COSTS:** The Serec Airless™ System uses heat and cooling only when operating. There is no wasted energy in boiling off and condensing vapors when the machine is idle. This is not the case with open top degreasers.



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- 11) **BETTER QUALITY CONTROL:** The Serec Airless™ System is fully automated. Operators can set both operating temperature and degreasing time for each cycle. The degreasing time does not start until the parts are up to a preset temperature. This assures repeatability of cleaning conditions independent of load or type of part. In addition, properly racked parts for liquid drainage often trap air when lowered into an open top degreaser. These areas often do not get exposed to enough vapor during degreasing due to the obstruction caused by the air. Vacuum assures the air is removed prior to cleaning, therefore, all areas of the parts are exposed to vapor during the cleaning cycle.
- 12) **LOWER LABOR COSTS:** Loading and unloading of an open top degreaser takes longer as the hoist speeds are reduced. The good practice of using a dwell time at the end of degreasing when using an open top degreaser increases labor costs. If soak or spray is required, labor time can be double for the multi-step processes. In the Serec Airless™ System, soak, spray, vapor degreasing, and drying are all automatic requiring no operator assistance. An added benefit to the Serec Airless™ System is that there is no restriction on hoist speed. Therefore, loading and unloading of parts is less time consuming.
- 13) **REDUCED REPORTING & PERMIT COSTS:** Serec designs systems so that emissions fall under the minimum permit requirements. Generally, this requires only the reporting of annual solvent usage. Since solvent usage is reduced 95% or more, as opposed to open top vapor degreasing, little record keeping and paperwork is required.
- 14) **REDUCED MAINTENANCE REQUIREMENTS:** The Serec Airless™ Systems are self-cleaning. Since contaminants and water are continuously removed from the system, no shutdown and clean-out of the system is required as occurs with open top degreasers.
- 15) **INCREASED CAPACITY:** In an open top degreaser, the rate at which heat is added must be kept low to prevent excess boil-up and high emissions to the environment. When large loads are placed in the open top, the vapor line consequently drops, and the operator must wait for the vapor line to rise and clean the part. The Serec Airless™ System has no such restriction and vapor flushes and cleans parts rapidly. Heat needed to raise the temperature of the parts is added rapidly by heating both the sump tanks and degreaser walls, leading to rapid cleaning.