

The Ultimate Guide To TCE Replacements

Authors:

John Hoffman, Technical Consultant for MicroCare; Mike Jones, MicroCare Vice President of International Sales; Ed Mark, Technical Consultant for MicroCare; Carroll Smiley, Technical Consultant for MicroCare; Tom Tattersall, MicroCare CEO

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TCE contributes to smog due to its release of harmful emissions into the air.



Many companies want to change from TCE (Trichloroethylene) to newer, safer cleaning fluid alternatives. TCE is a powerful and effective industrial cleaner and degreaser. However, it is hazardous to people and the planet. Therefore, many are turning to the experts at MicroCare to find a suitable substitute for trichloroethylene. There are a number of trichloroethylene replacement options available that will not only provide the cleaning performance required, but can do it safely and economically. MicroCare chemists and field engineers have the critical cleaning expertise you need and can help you smoothly transition from TCE to newer, safer TCE replacements.

The Cost of Using TCE

Many companies may still consider using TCE despite its harmfulness. TCE is less expensive than the trichloroethylene replacement cleaning fluids on the market today. TCE is also versatile and very effective in a variety of applications in many industries. These may seem like good reasons to continue using TCE. However, the hazards of using TCE surely outweigh the benefits.

Human Risk & Toxicity

TCE may cause serious illnesses including cancer. Inhalation is the most common form of workplace exposure, but skin contact is another major route of exposure in the workplace.

Limited, short-term exposure to TCE can cause non-life-threatening side effects for humans like dizziness, fatigue, headaches, upset stomach, skin rashes and irritation to the eyes and throat.

For workers exposed to TCE on a regular basis or for long periods of time, the risk is greater. Through chronic exposure, TCE may cause damage to the central nervous system, kidneys, liver, immune system, reproductive system, and to the developing fetus. TCE also causes cancer in both humans and animals.

Environmental Problems

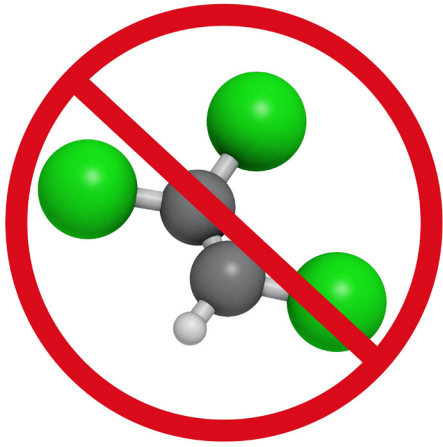
TCE is a VOC (Volatile Organic Compound) that contributes to smog due to its release of harmful emissions into the air. It can also cause soil pollution and water pollution that may be harmful to plants, fish and animals. TCE most commonly finds its way into drinking water through industrial discharge or from improper disposal of industrial wastes at landfills. It is often found in soil and groundwater pollution at Superfund sites and has triggered numerous lawsuits filed by people affected.

Extra Ventilation

TCE has a strong odor. Often workers complain about the pungent, offensive smell making their area an unpleasant place to work. To protect operators, extra air ventilation systems are often recommended to limit the fumes and improve the working atmosphere.

The Cost to Switch to a TCE Replacement

A note of caution. Be careful not to evaluate TCE replacement fluids simply by cost alone. TCE is inexpensive with the safer replacements often costing much more on a per gallon or per pound basis.



TCE is banned or severely restricted in most countries.



Some companies are switching from TCE to newer, safer cleaning fluid alternatives.



However, there are savings with the TCE replacements in other areas. For instance, many of the TCE replacement fluids, when used in a proper vapor degreaser are recycled hundreds of times with little cleaning fluid loss.

In addition, the benefits of employee well-being, a pleasant working environment and good worker morale are immeasurable.

Replacing Trichloroethylene

Many companies are looking for a substitute for trichloroethylene in their critical cleaning processes. They want a TCE replacement that is just as effective as TCE, but with a better safety profile to help protect their workers, safeguard the environment and reduce their regulatory reporting burden.

Fortunately, there are a variety of trichloroethylene replacement cleaning fluids on the market today that can fulfill all those requirements. They meet almost any industrial cleaning requirements while helping companies maintain or even improve their cleaning processes. Plus, the trichloroethylene replacements hold several other advantages.

Same or Better Cleaning: The TCE replacement fluids have been lab-tested and analyzed to ensure the cleaning results are reliable, consistent and just as good as the TCE solvent. Cleaning efficiency is maintained or improved.

Low Cost Conversion: In many cases, most of the TCE replacement fluids use your existing equipment, using the same methods. After emptying and cleaning the vapor degreaser many of the TCE replacement cleaning fluids are “dropped in” into the machinery without an appreciable change to the cleaning process.

Energy Savings: Many of the TCE replacements have a lower boiling point and heat of vaporization than TCE, requiring less energy consumption, resulting in an overall energy cost savings.

Improved Efficiency: Since many TCE replacements boil at a lower rate than TCE, parts come out of the vapor degreaser cool enough to handle. You do not need extra time for the parts to cool down. This allows workers to move on to the next production process sooner, boosting overall throughput and productivity.

Additional Advantages

Enhanced Safety: Many of the TCE replacement cleaning fluids are nonflammable for improved safety in the workplace. Their azeotropic properties ensure they are thermally stable and safe to use. This could also translate into to company insurance savings.

Healthier Workers: Many of the substitutes for nPB, PERC or TCE have better toxicity profiles and higher TLVs (Threshold Limit Values) than the legacy solvents making them safer for workers to be around.

Better Environmental Impact: Since the replacements for trichloroethylene do not carry a heavy regulatory burden like some of the legacy solvents, switching to a modern cleaning fluid helps you improve your environmental footprint. Most TCE

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replacements are not a HAP (Hazardous Air Pollutant) and may not require NESHAP (National Emission Standards for Hazardous Air Pollutants) permits.

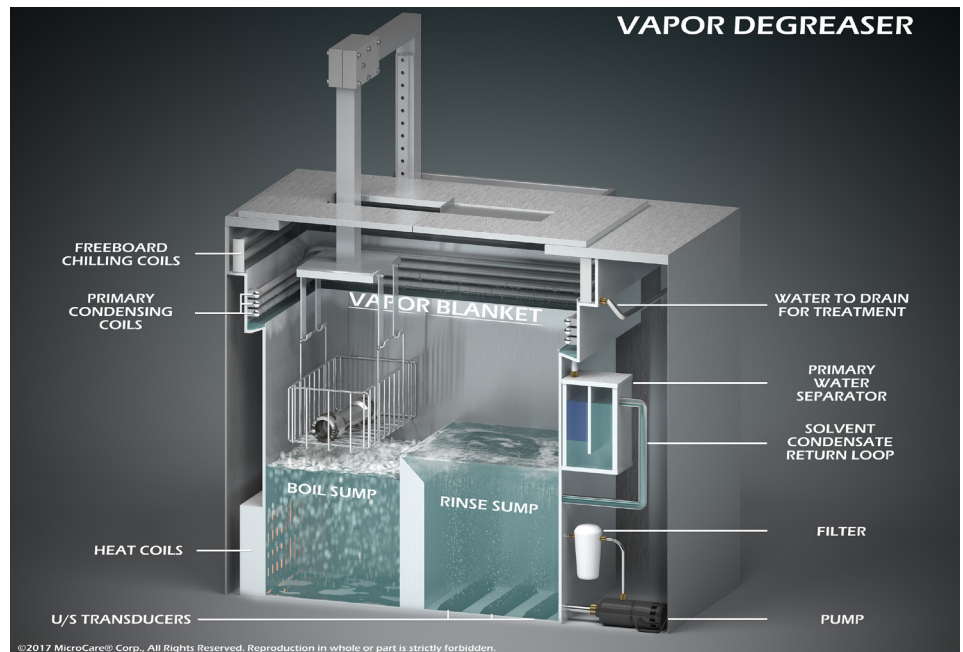
Improved Maintenance Procedures: Except under the most extreme conditions, such as if exposed to a strong base or acid, or exposed to extreme heat, the TCE replacement fluids will not “turn acid”. They do not require the stabilizers or scavengers or weekly testing required of some other legacy solvents.

Better Working Conditions: Most TCE alternatives do not have the same pungent, sweet smell associated with TCE or the other legacy solvents. Less fumes means a more pleasant work area and happier, more productive workers. In addition, since many of the next generation fluids are safer to use, PPE requirements may be less stringent, making the working environment more convenient and comfortable for employees.

Easier transport, handling and disposal: TCE replacements are easier to recycle on-site because, unlike some legacy solvents, they do not contain any stabilizers or additives. Employees do not need the same type of intensive training to manage the new fluids safely, saving time and money.



MicroCare offers effective TCE replacements.



When used in a vapor degreaser, TCE replacements recycle in the degreaser for hundreds of hours use before replacement.

Choosing the Right TCE Replacement

There are many substitutes for trichloroethylene that are people-safe, planet-safe and affordable. The best substitute for trichloroethylene for you will depend on a few different factors.

First, determine the contamination. Are you cleaning flux paste and solder residues from circuit boards? Or are you degreasing metals part in preparation for finishing? Lubricants, dust, metal particulate, fingerprints, waxes or other residues need removal prior to processing or assembly. The common need is to clean components





MicroCare technical experts can help you smoothly transition from TCE to a better cleaning fluid.

prior to painting, plating, welding or subsequent processing. The type of contamination you face will help dictate which trichloroethylene replacement cleaning fluid will work best.

Second, identify the material. What is the substrate you are cleaning? Whether it be plastic, metal, ceramic or any other type of material, there are TCE replacement cleaning fluids available. Matching the correct fluid to the substrate will ensure the fluid will safely displace soils without causing detrimental effects to the substrate or cause flash-rusting.

Finally, what is your geographic location and local regulatory restrictions? Depending on your locale regulations can be stringent. For instance, in the United States it is EPA standards and in Europe it is REACH regulations.

Work With an Expert

When trying to determine the best TCE replacement to use, it is recommended that you work with a critical cleaning expert. They will have the knowledge, training and experience to help you make the best choice for your particular cleaning project.

With hundreds of years of combined critical cleaning expertise, the MicroCare team of cleaning engineers, chemists and technical experts help companies convert from TCE to effective, safe and compliant TCE alternatives. They will evaluate the contamination and the substrate or material to make a recommendation for the best trichloroethylene replacement. The goal of our support team is that the TCE replacement fluid will deliver cleaning results as good as or better than TCE at a similar cost-per-part-cleaned.

Here are the Steps

On-Site Cleaning Audits: An on-site audit helps determine your unique requirements for a trichloroethylene replacement fluid. Understanding the applications helps us understand important information, such as fluid density and viscosity requirements, and any other constraints.

Identify Replacements: MicroCare offers a range of safer substitutes for trichloroethylene that can meet almost any industrial cleaning requirement. The alternative fluids in most cases, use the same equipment with the same methodologies.

Critical Cleaning Lab Testing: MicroCare operates a state-of-the-art critical cleaning lab where cleaning studies are performed. Sample parts with the identified soils are cleaned with the prescribed MicroCare TCE replacement cleaning fluid. The process is fully documented for easy reproduction outside the lab.

On-site Testing: After a potential TCE alternative cleaner is identified, a MicroCare regional engineer works with you to test how well the potential TCE replacement works.

Create a Custom Fluid: If the sample testing doesn't deliver the results needed, we can alter its formulation to create a custom cleaning fluid to suit your exact needs.



Effective TCE Replacement Cleaners

MicroCare offers a variety of powerful, fast-drying, residue-free cleaning fluids as substitutes for trichloroethylene. These high-purity, non-flammable, synthetic cleaning fluids offer high-performance cleaning on parts without leaving unwanted residue or causing detrimental effects to the substrates.

These fluids also are low in viscosity and surface tension, which allows them to get into tight crevices and wet all the surfaces of the parts. They also offer high solvency (“Kb Values”) which allows them to rigorously clean the surface and displace stubborn soils. Here are some to consider.

Tergo™ Metal Cleaning Fluid

- Based on sustainable HFO chemistries
- Featuring enhanced environmental benefits
- Maximum stability and ease of recycling
- Strong, aggressive cleaning (high Kb value)

Tergo™ Chlorine-Free Fluid

- An economical co-solvent system
- Excellent replacement for nPB, Perc or TCE
- High-temperature cleaning of waxes and buffing compounds
- Excellent materials compatibility

Opteon™ SF79 Fluid

- Ultra-low global warming potential (GWP)
- Uncompromised degreasing of heavy hydrocarbons
- Excellent replacement for nPB, perc and TCE

Opteon™ SF80 Fluid

- Sustainable with an ultra-low global warming potential (GWP)
- Uncompromised degreasing of heavy hydrocarbons
- Excellent replacement for nPB, perc and TCE

Vertrel™ SDG Degreaser

- The solvent of choice for maximum cleaning
- Versatile cleaner of oil, grease, hydraulic fluids and silicones
- Significantly improved safety profile over older solvents

Vertrel™ SFR Degreaser

- Excellent electronics cleaner optimized for vapor degreasing
- Ideal for removing high temperature lead-free fluxes and pastes widely used in modern electronics



About the Authors:

John Hoffman, Technical Consultant for MicroCare, has been working with customers for over 50 years to improve their critical cleaning methods and processes. He is an expert on vapor degreasing, modern cleaning fluid technologies and thermodynamics.

Mike Jones, retired Vice President of International Sales for MicroCare, has over 30 years of experience in the critical cleaning industry. He is a prolific writer and educator focusing on critical cleaning in general and vapor degreasing in particular.

Ed Mark, Technical Consultant for MicroCare boasts over 50 years of experience in the cleaning agent industry, working for DuPont, Brenntag and MicroCare. He is an expert in cleaning fluids and equipment. Ed specializes in custom designing cleaning equipment and methods for unique cleaning applications.

Carroll Smiley, Technical Consultant for MicroCare, has over 40 years of experience in critical cleaning, working in cleaning fluid production, sales and technical service. He specializes in on-site technical consultation for companies using bulk vapor degreasing cleaning processes.

Tom Tattersall, CEO for MicroCare, has helped companies improve their critical cleaning productivity and quality while maintaining safety and environmental-sustainability for over 30 years. An expert on vapor degreasing and modern cleaning fluid technologies, he holds numerous patents for cleaning-related products.



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