THERMA-KLEEN

INDUSTRIAL DRY VAPOR CLEANERS

The Science of Steam Cleaning, Literature.

Several reports (studies[2)] utilizing 248°F superheated steam have been published to test the effects on a variety of common bacteria. As the steam temperature rises that contacts microbes, the time needed to kill bacteria decreases (thermal kinetics often have an exponential impact)

In the study2, 18-hour broth cultures of Enterococci, E. Coli, CNS, and Staph aureus were used. Each culture was placed in one of 6 sterile Petri dishes. Each plate, minus the control, was exposed to 1,2,3,4 or 5 seconds of superheated 248°F steam. After being exposed to the steam, all plates were cultured for 48 hours at 99°F (37°C), then colony counts were performed.

Results

Colony Count per ml

Organism	Control	1 Sec	2 Secs	3 Secs	4 Secs	5 Secs
Enterococcusi	>1000	0	0	0	0	0
E Coli	>1000	2	0	0	0	0
CNS	>1000	3	0	0	0	0
Staph aureus	>100<1000	2	0	0	0	0

The table above illustrates that minimal colonies existed in the dish treated for 1 second, and no colonies existed in any dishes treated at 248°F (120°C) for 2 seconds or longer. This is compared to the control dish that featured over 1000 colonies for each type of bacteria except for Staph aureus, which had between 100-1000 colonies when left untreated.

The study also entailed domestic applications of steam. Common household areas including a toilet seat, toilet bowl rim, sink basin, sink faucet, bathtub, shower tile/grouting, and a showerhead. The same 248°F steam for this experiment and allowed 30 seconds of total cleaning time for each object. Surfaces were swabbed prior and post cleaning and were incubated for 48 hours at 99°F (37°C) to allow for colony growth.

Results

Site: Bathroom/WC	Pre cc/ml	Post cc/ml	% Survival
Toilet seat	150	0	0
Toilet bowl rim	500000	3000	.6
Sink Basin	500000	10000	.2
Faucet	60000	20	0.03
Bath interior	50000	300	0.6
Shower Tile/grout	500000	15000	3
Shower Head	2000	0	0

A 30 second 248°F (120°C) steam treatment in this experiment was shown to be from 97-100% effective at killing micro-organisms. The highest bacteria survival rate of 3% was found on the shower tile/grout. On other surfaces, less than 1% of bacteria remained after receiving steam treatment. With higher temperatures, the efficiency is expected to increase.

Superheated Steam Cleaning Application Efficiency[3]

University of Washington's Odegard Library, used by up to 15,000 students each day, conducted a trial comparing a superheated steam cleaning system and their existing cleaning methods. During the six week trial, custodians used a superheated steam generator to clean and sanitize restrooms, including tile, grout, walls, baseboards, plumbing fittings, and fixtures. The time took and cleanliness factors were recorded before and after cleaning, then compared to their existing cleaning routines. Superheated steam took on average 42.5 minutes per restroom, compared to 46 minutes for the existing program. Time savings were commonly attributed to less bending, scrubbing, and downtime while waiting for traditional chemicals to disinfect surfaces After cleaning, germ hot spots were measured. Superheated steam cleaned faucet handles and paper towel dispenser handles had 1/10th as many germs as when cleaned with traditional methods. Also to be considered are the less obvious benefits of steam over traditional methods, such as less exposure to chemicals, fewer chemicals to purchase and higher worker morale due to improved efficiency.

A test conducted at the University of Washington's Odegard Undergraduate Library, which is used by as many as 15,000 students daily, provides evidence of the benefits of a specialized steam vapor system used by trained custodians.

Over six weeks, custodians used the system to deep clean and sanitize restrooms (including floor tile and grout, wall areas, baseboards, fittings, and fixtures). Cleaning times and degree of cleanliness were recorded and contrasted with traditional cleaning methods. Cleaning time was reduced (42.5 minutes vs. 46 minutes) with the steam vapor system. Custodians attributed the time savings to less squatting and stooping to clean hard-to-reach places behind toilets, and under sinks and urinals. With no residual water on floors, drying time also was reduced.

Swab tests compared the degrees of cleanliness of the two cleaning methods. Steam cleaning resulted in cleaner fixtures and surfaces. Steam-cleaned faucet handles and towel dispenser handles, for example, were more than 10 times cleaner than those cleaned with traditional methods. The steam vapor method also eliminated workers' exposure to chemicals and resulted in a "pride of accomplishment factor" for the custodians.

Read more: https://asumag.com/Maintenance/university_steaming_clean/#ixzz2Ch5sG7JN
Read more: https://asumag.com/Maintenance/university_steaming_clean/#ixzz2Ch5fnagQ
Read more: https://asumag.com/Maintenance/university_steaming_clean/#ixzz2Ch5fnagQ

Resources

[1]https://www.cdc.gov/ecoli/outbreaks.html
[2]https://www.imc.cc/other/onsite/hospital-acquired-infections/
[3]https://asumag.com/Maintenance/university_steaming_clean/
[4]Steam Vapor Cleaning in Hospitals
[5]https://www.imc.cc/other/onsite/hospital-acquired-infections/
[6]https://www.foodprocessing.com/articles/2006/052.html?page=2
[7]Canadian Steam Requirements

More…

- https://www.imc.cc/other/onsite/hospital-acquired-infections/
- Basic Elements of Equipment Cleaning and Sanitizing in Food Processing and Handling Operations
- Carcinogen Scorecard – Chemicals Linked to Cancers
- Food Processing – Cleaning With High-Temperature Wet Steam
- 3 Seconds of Exposure to Superheated Steam Reduces Biofilm Accumulations by 99.95%
- Ranking US Airports by Their Germ Influence
- Study Stating 5 Second Exposure Sterilizes Surface

Hypoallergenic:

According to the Asthma & Allergy Foundation of America, allergies affect about 50 million people in the United States. And they are increasing. They affect 30% of adults and 30% of children. Indoor air pollutants are a major cause of allergy symptoms among those who suffer from allergies. Not only that, but these irritants can have terrible effects on one's health. Unhealthy levels of contaminants can lead to a whole host of health troubles, including respiratory problems and asthma. The fortunate news is that the common allergens can usually be removed by anyone of our Therma-Kleen Dry Vapor Units. Common irritants such as:

- Tree, grass & plant pollen
- Household dust mites and their waste products
- Mold
- Mildew
- Cat and dog hair and pet dander
- Bed Bugs

The first you need to know What Dry Vapor Steam Cleaning is:

Therma-Kleen Dry Vapor Steam Cleaners are technologically advanced GREEN steam cleaning machines. They emit a high temperature, dry vapor steam containing only 5% water, with temperatures up to 360° F, and pressure up to 160 psi, for high performance cleaning & sanitizing. Within the boiler, water is transformed into a very fine Nano sized dry mist and, because Therma-Kleen systems uses so little water, surfaces dry very quickly. Unrecognized is that all hard surfaces are actually porous, thus they hold pathogens and debris which cannot be cleaned with cleaning agents. The Nano size Dry Steam Vapors are so tiny that they can actually penetrate those pores and remove the embedded dirt, resulting in a cleaner and more hypoallergenic surface.

Dry Vapor steam not only cleans better and more effectively than traditional chemical cleaning methods, but also sanitizes and helps destroy and eliminate most allergens, bacteria, germs, viruses, mold, mildew, parasites and many other substances chemical can't kill. The vapor particles are much smaller than steam particles, enabling us to reach into the tiniest cracks and crevices, driving dirt and germs from areas other cleaning methods cannot reach. Dry steam vapor sanitizes and deodorizes without any chemical odor.

Can Cleaning with Dry Vapor Steam Really Improve Allergy Symptoms? Definitely. Dry Steam cleaning is the best way to get rid of dust mites, mold & mildew and other allergens in your environment. Since you can also use Dry Steam as a multiuse all-natural cleaning tool, you clean without using any sort of cleaning chemical, saving money and relieving those allergy symptoms caused by toxins within the cleaning agent. Be sure to Dry Steam your carpets, mattresses, sofas and furniture at least once a month, or every week for heavy allergy sufferers. After using Dry Steam, it is certain that you will feel a change in your environment. Not only you will breathe easier, but you will also eat, sleep and live in a much healthier place.

When it comes to allergies, nothing comes even close to beating Dry Vapor Steam cleaning to relieve allergy symptoms.

Parasites: As many already knows (or don't know), dust mites are tiny parasites/organisms found in nearly any textile or fibrous material. These microscopic insects will feed, reproduce and die in your pillows, mattresses, furniture, carpets and more. They live by feeding on your dead skin and moisture. Their waste is the primary concern for allergy sufferers: the dust mite's feces are so small and light that they become airborne when a human-moves in the bed or simply walks on the carpet. The inhalation of the dust mite feces will trigger allergic reactions; causing sneezing, watery eyes, difficulty breathing, runny nose and coughing.

Using a Dry Vapor Steam cleaner on your bed, drapes and pillows, etc. can be the solution for a much healthier life without allergy symptoms. Dry Steam will kill dust mite and their larva on contact, leaving no residues or excess water behind. Regular treatment of the mattress (every few weeks or more often for heavy allergy sufferers) can prevent the return of the dust mite colony and improve the allergy symptoms. Experts even say that treating a mattress with dry vapor steam is also the best way to kill bedbugs or keep them at bay.

Mold, Bacteria and Mildew Allergies: We just learned how using an effective Dry Steam cleaner in your environment can remove one of the biggest concerns of allergy sufferers. How about other common household pollutants like mold, bacteria and mildew? These allergens are known to produce allergy symptoms for the majority of allergy sufferers. Allergy-sufferers must understand that they really need to get rid of as many allergy triggers as possible from their environment if they want to control allergy symptoms. This is where the Dry Vapor Steam Cleaner comes in handy. Dry Steam will directly attack bacteria, mildew and mold spores, and kill to the root, on any surface, soft or hard, even when these allergens are not visible to the naked eye.

Dry Vapor Steam Machines by Therma-Kleen use very little water compared to a carpet cleaner (hot water extractors) or other cleaning devices (whose usage is measured in gallons per minute), which use hot water instead of "Dry Vapor" and are often incorrectly called "steam cleaners". A more accurate name for a carpet cleaner other than "steam cleaner" might be "hot water extractor". Poor and improper use of carpet cleaners leave behind wet and damp conditions which seep deep down and take days, if not longer to dry, which are ideal conditions for the growth of mold, mildew, harmful bacteria and other irritants.

Therma-Kleen's Dry Vapor units use only 5% moisture which dry's very quickly, leaving no residue for the growth of mold & mildew.

ADVANTAGES OF THERMA-KLEEN SYSTEMS:

No Chemicals
- No fumes to irritate
- No residue – long term irritant
- No continuing cleaning agent purchasing cost
- No worry about children or pet's exposure
- No need to worry about which cleaning/disinfectant agent to use for which problem
- No need to wait for area to dry
- No need for ventilation
- No need to wear hazard suits

Dry Vapor Kills on contact
Dry Vapor is safe
Dry Vapor uses only water

Therma-Kleen
2415 E. Huron Rd. P.O. Box 805
Au Gres, MI 48703
Ph: 989-876-8075 Fax: 989-876-6640 E-mail: sales@itc-controls.com
Web: www.itc-controls.com