



**ASPEN
PUMPS
GROUP**

OPTIMUM CHEMICAL CLEANING MAINTENANCE PROCEDURES FOR AC UNITS

*In Line with Government Guidelines
Relating to the SARS-CoV-2 Virus*

*Prepared by Dr Kajally Jobe and Fay Davis AMInstR
February 2021*



Content

3	Foreword
4	Synopsis
5	Current maintenance practices and guidelines
6	Recommendations for maintenance products and scheduling in line with current legislation
6	Introduction to current chemical products
6	Which products are suitable for SARS-CoV-2 cleaning?
7	Optimum cleaning schedules
8	Opportunities for action
9	Glossary of terms
10	References



Foreword

by Graeme Fox CEng FInstR

Head of Technical at BESA

With so much uncertainty surrounding what the correct procedures are in trying to contend with HVAC systems in relation to SARS-CoV-2, and with increasing attention being given to good IAQ and maximising efficiency levels, the publication of this report could not have come at a better time.

UK Government has set a target of Net Zero greenhouse gas emissions by 2050, so the importance of clean heat exchanger coils and filters has never been more in focus. Significant energy savings can be realised by using the right chemicals while carrying out routine PPM tasks, so proper guidance in the correct use of these chemicals for maximum efficacy is very welcome. Properly functioning coils and filters can also have a significant effect on air quality, and with the effects on human health of poor IAQ becoming increasingly understood alongside the explosion of knowledge and understanding of the importance of ventilation brought about by the Covid-19 pandemic, guidance on how best to treat those coils and filters can also have an enormous benefit to human health.

In the UK we spend an estimated 90% of our day indoors, so the quality of the air in the building is crucial if we are to maintain healthy conditions. Particulate matter in the indoor air caused by cooking and the shedding of fibres and dust from clothing and furniture, for example, can cause irritation to the nose and throat which can have serious consequences for asthma sufferers or people with heart conditions; and so clean, disinfected filters in indoor ventilation can be critical in preventing hospitals being put under pressure. As we now face preparing public buildings for general use again post pandemic, the need for disinfecting coils and filters has never been in sharper focus so I congratulate Aspen Pumps Group for this guidance paper.

BESA

Building Engineering Services Association
Rotherwick House, 3 Thomas More St,
St Katharine's & Wapping, London,
E1W 1YZ

+44 7970 318063
www.theBESA.com



Introduction

This document explores what should be considered best practice for the use of cleaning chemicals in HVAC systems as well as optimal times for Planned Preventative Maintenance [PPM.] The findings suggest what could be chemical cleaning best practice guidance.

What can be learnt from this paper?

1. Ensuring the correct products with the relevant standards are used during every PPM visit.
2. When using approved cleaning chemicals, allow for a 15 minute contact time to ensure maximum efficacy.
3. The importance of regular 3 monthly maintenance visits wherever possible.
4. Ensuring labelling on chemical cleaning products is clear and easy to understand.

Synopsis

Heating, Ventilation, Air Conditioning, and Refrigeration [HVAC/R] play an essential role in promoting healthy and comfortable spaces, along with providing critical services such as food preservation and data centre cooling. As with all mechanical equipment, regular maintenance is essential to prevent unplanned machine failure, ensure optimal indoor air quality [IAQ] and maintain efficient operations. A 2006 ASHRAE study showed that maintenance schedules (including coil cleaning), improved energy efficiency and the IAQ performance of the buildings HVAC/R systems, by up to 15%.¹





Current maintenance practices and guidelines

The Federation of European Heating, Ventilation and Air Conditioning Associations (REHVA) has emphasised in its COVID-19 guidance document², the importance of recirculation of air in buildings, which is a matter for HVAC systems balancing and conducted by professional design and commissioning engineers. This approach on its own will not ensure sustained, healthy indoor air quality and regular maintenance with approved chemicals is paramount.

As there is currently no definitive legislation which states the optimum time frame between servicing units, nor an approved cleaning methodology when using chemical cleaning products, routine cleaning schedules could be carried out irregularly and discretionarily within a 12-month period. The only formalised inspection of HVAC systems is the non-maintenance focused Energy Performance Buildings Directive (TM44 regulations),³ which was created prior to current health risks becoming a priority topic.

A recent, small survey of HVAC/R Engineers in the UK⁴ indicates that the majority of Engineers are using cleaning chemicals within their PPM. However further information around the use of correct chemicals and the regularity of maintenance, would further support best practice.

57.1%

Clean the whole unit with the remaining either cleaning just the coil or filter.

42.9%

Will clean a unit every 3 months.

21.4%

Will clean every 6 months, however, are limited to what the customer requests.

71.4%

Of respondents use cleaning chemicals for regular maintenance.

14.3%

Use pressurised water for their cleaning regime – which will not remove contaminants from the surface.



Recommendations for maintenance products and scheduling in line with current legislation

Introduction to current chemical products

Cleaning, sanitising and disinfecting surfaces to reduce the incidence of the SARS-CoV-2 virus contamination has been the central quality guideline of governments around the world.^{5,6} The role of disinfectant chemicals and detergents (which are neither a disinfectant or sanitiser), have been widely accepted by the population as the best practice for personal protection against the SARS-CoV-2 virus and other germs.⁷

Which products are suitable for SARS-CoV-2 cleaning

The SARS-CoV-2 virus, like other pathogens, can be killed and reduced on surfaces if the right chemical products, with the right efficacy standards, are used.⁸ In the UK and EU, these standards are double prefixed "BS EN" which means this is the UK version (British standards) in English of a European harmonised standard (European Norms). Even with the UK's departure from the EU, European Norms are likely to continue to provide the 'gold standard' tests for disinfectants in the UK, for the foreseeable future.⁹

Even though alcohol hand sanitisers have taken a prominent place in the combat against this SARS-CoV-2 virus, alcohols are not recommended for disinfecting contaminated surfaces because they evaporate quickly and do not allow enough contact time for effective antimicrobial action.

The latest BS EN industrial disinfectant standard for the effective removal of the SARS-CoV-2 virus on non-porous surface is the **EN 14476:2013 + A2 2019** which will kill all 7 of the known human coronaviruses:

1. 229E (alpha coronavirus).
2. NL63 (alpha coronavirus).
3. OC43 (beta coronavirus).
4. HKU1 (beta coronavirus).
5. MERS-CoV (the beta coronavirus that causes Middle East Respiratory Syndrome, or MERS).
6. SARS-CoV (the beta coronavirus that causes severe acute respiratory syndrome, or SARS).
7. SARS-CoV-2 (the novel coronavirus that causes coronavirus disease 2019, or COVID-19).

HVAC industry leading disinfectant products such as **CondensCide**, **RTU ECD** and **Gel ECD** both comply with phase 1 and 2 industrial BS EN standards including the EN 14476:2013 + A2 2019 anti-virus standard. These products have been tested to kill 99.9% of all human corona viruses, bacteria, fungi, and spores.

It is important that all parts of the air conditioning system are cleaned and disinfected. It is usually difficult to make a judgement on the type and concentration of microbial contamination on air conditioning system.

A recommendation of a full 15-minute contact time to kill and remove full spectrum of bacteria, fungi, spores, and viruses as well as the usual gunk that harbour these germs is recommended.



AdvancedGEL
ECD



CondensCide®



EasyCare®



RTU ECD®



Optimum cleaning schedules

Normal routine cleaning with detergent and water, as a minimum, would logically decrease how much of the virus and micro-organisms are on surfaces and working parts of the air conditioners, which reduces the risk of exposure. However, using products which meet the EN standards for viricidal cleaning will be more effective.

In addition to ensuring appropriate standards compliance, there are three things to look for when choosing chemical cleaning products:

A clean air filter protects the cooling coils from dust and dirt. Air filter cleaning is recommended to be done at least once a month. Regular cleaning of air filters results in proper cooling and reduce breeding conditions needed for germs to proliferate and contaminate the flowing air. Even with good filter hygiene routine, some dirt, dead skin cell and other organic matter gets deposited on the coils with time. This deposition and covering reduces the heat absorbing capacity of the coils and encourages condensation.



Dilution rate



Contact Time



Process Required





Opportunities for action

Following regular maintenance procedures and identifying the correct chemical cleaners that best fit the job and application, is paramount to ensuring that high standards are maintained. The evidence gathered in this white paper, presents an opportunity to build a clear best practice standard for the maintenance of AC systems.

What could best practice look like?

- a) Advocating for a 15-minute contact time when using cleaning chemicals and disinfectants, based on empirical evidence supplied in this white paper.
- b) Championing 3 monthly maintenance visits where possible.
- c) Ensuring that there is sufficient information through influencer channels made available to industry, about the importance of using chemicals that meet the appropriate cleaning and disinfection standards.
- d) Investigation into the supplied certification left after PPM, which could show that the products used meet the EN standards for viricidal cleaning.
- e) Ensuring that labelling is clear on all chemical cleaning products, so that their use and efficacy is easy to decipher; this would be led by the industry leading HVAC cleaning chemicals provider.

These opportunities could further cement the important role that HVAC/R plays. With cross industry agreement and collaboration on this subject, this could generate formal best practice owned and followed by everyone.





Glossary of Terms

- AC**
- Air Conditioning.
- AHU**
- Air Handling Unit.
- AOAC**
- Association of Official Analytical Chemists International.
- ASTM**
- American Society for Testing Materials.
- BS EN**
- British Standard European Norms.
- Chelating agent**
- Chemical compounds that react with metal ions in solution to form stable, water-soluble complexes. Their main function is to make water soft and reduce the interference of the metal ion with the surfactant or biocide.
- Contact time**
- This is the time stated by the manufacturer on how long the chemical is required to be left on the surface to kill the required amounts of bacteria, virus, fungi and spore. This can normally take up to 15 minutes depending on the contamination on the air conditioning system.
- Dilution rate**
- This is normally listed in the instruction on the concentrated bottle. The dilution factor should not be guessing work. It should be measured out accurately at least once, and the level marked onto the spray bottle.
- ECDC**
- European centre for Disease Prevention.
- HVAC/R**
- Heating, Ventilation, Air Conditioning, Refrigeration.
- IAQ**
- Indoor Air Quality.
- Log Units**
- A logarithmic unit expresses a quantity on a condensed scale proportionately.
- Membrane actives**
- Chemicals that interfere with the membrane structure, damaging the cellular integrity and function.
- Process required**
- The way in which a chemical must be used is specific to that product. You must ensure that you are following the manufacturer's instructions for the process.
- Redox active**
- Chemicals that can donate or receive more than the required amount of electrons needed for regular cellular functions, hence disrupting pathogens' ability to function and infect.
- Sanitising and disinfectant**
- The words sanitising and disinfecting are often used interchangeably but there are important differences between them. The main difference between the two is that sanitisers reduce the number of bacteria specifically on a surface whereas disinfectants are graded not only to kill bacteria, but other pathogens like fungi, viruses, and spores. Sanitisers usually work faster than disinfectants, which can take up to 15 minutes to kill pathogens.
- Suspension Testing**
- Suspension tests in a test tube.



References

1. November 2006; American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE) Journal Vol. 48
2. August 2020; Federation of European Heating, Ventilation and Air Conditioning Associations (REHVA) COVID-19 guidance document 3. May 2010; Chartered Institute of Building Services Engineers (CIBSE) EPBD TM44 regulations - Principal author: Roger Hitchin
4. November 2020; Aspen Pumps Group; Survey carried out on 12 UK based Engineers
5. <https://www.gov.uk/government/publications/covid-19-decontamination-in-non-healthcare-settings/covid-19-decontamination-in-non-healthcare-settings>
6. WHO, Coronavirus Disease (COVID-2019) Situation Reports. Situation Report 206, 13 August 2020. Retrieved on 22 November 2020 <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports/>
7. WHO, Coronavirus Disease (COVID-19) Advice for the Public, Last updated 4 December 2020. Retrieved on 4 December 2020 <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public>
8. Disinfectant Efficacy: How Can We Make It Effective? Last updated 28 August 2019. Retrieved on 4 December 2020 <https://www.americanpharmaceuticalreview.com/Featured-Articles/364046-Disinfectant-Efficacy-How-Can-We-Make-It-Effective/>
9. Standards EN Standards - It is worth noting that the European gold standards for the evaluation of disinfectants in test conditions differs from those taken in North America by ASTM (American Society for Testing Materials,) and the AOAC (Association of Official Analytical Chemists International) for what is accepted as the minimum requirement for disinfection. <https://www.bsigroup.com/en-GB/about-bsi/uk-national-standards-body/standards-and-eu-exit/>

Disclaimer: This document expresses expert advice and views based on the available scientific knowledge of COVID-19 available at the time of publication. It references documents and articles which were correct at the time of going to publication and all those involved in the publication exclude all and any liability for any direct, indirect, incidental damages or any other damages that could result from, or be connected with, the use of the information presented in this document.