COV-RID High Level Disinfectant Thermal Fogging Solution Tests and Thermal Fogging Trials

Knights Security Group Limited
Reg. Office: Nene House, 4 Rushmills, Northampton NN4 7YB, United Kingdom
Reg. Number: 11148897 (England) VAT Number: 354 4331 13

Contents

INTRODUCTION

OVERVIEW

With the outbreak of COVID-19 in late 2019 Knights Security Group (KSG) set about developing a method of using fog machines to thermally fog and disinfect enclosed spaces. KSG understood that the nature of fog is perfect for covering large areas in a short time, it enables the efficient coverage of all exposed surfaces. KSG were well placed to develop a solution to this because of their long history associated with the security smoke industry. KSG founder, Andrew Knights, wrote the BSIA Code of Practice on smoke security and was also responsible for the drafting of the British standard on Smoke Security.

KSG have as a result developed a High Level Disinfectant that can be deployed by a Smoke Machine (Thermal Fogger). This process enables operators to quickly and efficiently disperse a High Level Disinfectant over 100% of exposed surfaces. KSGs COV-RID High Level Disinfectant Thermal Fogging Solution (COV-RID HLD) is designed to be used in conjunction with existing cleaning protocols that historically focus on cleaning of high contact points.

The need to control the spread of viruses and bacteria is now more important than ever and the last year has highlighted that current existing cleaning and disinfectant practices need to be evolved and developed further. The current traditional cleaning practices do not meet the required level to prevent another outbreak in the future; this is a big problem that the UK and world faces.

Using thermal fogging in conjunction with existing cleaning protocols will ensure to clients, customers, friends or visitors that the premises are clean and disinfected.

TESTING

In conjunction with Scientific Services KSG has undertaken, and continues to undertake, tests on COV-RID HLD. The aim of this testing was to understand and quantify the effectiveness of using Thermal Fog machines to disinfect enclosed spaces.

Tests were first undertaken on the High Level Disinfectant developed by KSG to confirm that it was an effective disinfectant. Tests were then conducted to understand and quantify how effective thermally fogging COV-RID HLD would be.

BS EN TESTS ON COV-RID HLD

The BSEN Tests undertaken on COV-RID High Level Disinfectant Thermal Fogging Solution (COV-RID HLD) were specifically selected to provide quantifiable evidence that COV-RID HLD is an effective High Level Disinfectant.

The tests that were conducted, with their areas of focus, on COV-RID HLD are listed below:

1. Enveloped Viruses – Test BSEN14476:2013+A2:2019 (Specifically including Coronasvirus)
2. Bacteria – Test BSEN13697:2015
3. Bacteria – Test BSEN1276:2019
4. Fungal Pathogens – Test BSEN1650:2019
5. Mould – Test BSEN1650:2019

TEST - BSEN14476:2013+A2:2019

Chemical disinfectants and antiseptics - Quantitative suspension test for the evaluation of virucidal activity in the medical area.

COV-RID HLD was tested to BSEN14476:2013+A2:2019, this was conducted at two different laboratories, the Instituto de Biologia in Brazil and BluTest Laboratories in the United Kingdom. Testing at the Instituto de Biologia enabled COV-RID HLD to be tested on living Coronavirus. The testing at BluTest Laboratories provided a test on COV-RID HLD that would test its efficacy against enveloped viruses as a whole. The aim of the EN14476:2013+A2:2019 test was to prove that COV-RID HLD, when applied to surfaces, would achieve a minimum 4 log reduction of Viruses on the surfaces to which it was applied.

Test conducted by Instituto de Biologia: BSEN14476:2013+A2:2019

Testing organism: Coronavirus strain MHV Betacoronavirus

Test conducted by BluTest Laboratories: BSEN14476:2013+A2:2019

Testing organism: Vaccinia virus VR-1549 Elstree strain (P 09)

Results of BSEN14476:2013+A2:2019 Tests: For both tests, COV-RID HLD achieved a virus log reduction of greater than 4 logs when applied to the surfaces under the test conditions. COV-RID HLD as a result complies with the criteria of BSEN14776:2013+A2:2019. This product therefore is effective against all enveloped viruses as defined in BSEN14476:2013+A2:2019 shown in Fig 1.

Fig 1

Poxviridae	**Coronavirus (e.g. SARS, MERS)**
Flavivirus Hepatitis C Virus (HCV)	**Human Immunodeficiency Virus (HIV)**
Hepatitis Delta Virus(HDV)	**Human T Cell Leukemia Virus (HTLV)**
Herpesviridae	**Hepatitis B virus (HBV)**
Filoviridae (e.g. Ebola, Marburg)	**Rubella Virus**
Influenza Virus	**Measles Virus**
Paramyxoviridae	**Rabies Virus**

Full results of the BSEN14476: 2013+A2:2019 tests are presented in Appendix 1 and Appendix 2

Conclusion: These tests of COV-RID HLD showed a 99.99% reduction when tested against Coronavirus. The Instituto de Biologia and the Virology laboratory of Sao Paulo recommend using COV-RID HLD as a virucidal agent for Coronavirus and combating COVID-19. The results from the BluTest test showed that COV-RID is effective against all enveloped viruses, with a few of these enveloped viruses listed in Fig 1.

TEST - BSEN13697:2015

Chemical disinfectants and antiseptics — Quantitative non-porous surface test for the evaluation of bactericidal activity of chemical disinfectants used in food, industrial, domestic and institutional areas

Scientific Services conducted the BSEN13697:2015 test on COV-RID HLD. The aim of this test was to prove that COV-RID HLD, when applied to surfaces, would achieve a minimum 4 log reduction of bacteria after 5 minutes of contact with the surface.

Test conducted by Scientific Services: BSEN13697:2015

Testing organisms:

- Staphylococcus aureus ATCC 6538
- Pseudomonas aeruginosa ATCC 15442
- Escherichia coli ATCC 10536
- Enterococcus hirae ATCC 10541

Results of BSEN13697:2015 Test: The COV-RID HLD achieved a bacteria log reduction of greater than 4 in 5 minutes against all 4 of the testing organisms, under the test conditions stated. COV-RID HLD complies with the criteria of BSEN13697:2015 (Bacteria log 4 reduction in 5 minutes). The results are shown in Fig 2.

Fig 2

Organism	Test Suspension (N)	Water Control (Nc)	Test Result	Log Reduction
S.aureus	6.75x10 E6	1.98x10 E6	<10 (<140)	>5.30
Ps.aeruginosa	7.64x10 E6	2.47x10 E6	1.85x10 E2	4.12
E.coli	6.17x10 E6	1.68x10 E6	<10 (<140)	>5.23
E.hirae	5.83x10 E6	1.60x10 E6	<10 (<140)	>5.20

Full results of the test are presented in Appendix 3

Conclusion: The tests confirm that when COV-RID HLD is applied to surfaces it will achieve over a 4 Log reduction of bacteria. This is equal to removing 99.99% of bacteria from the surface that the COV-RID HLD is applied to.

TEST - BSEN1276:2019

Chemical disinfectants and antiseptics - Quantitative suspension test for the evaluation of bactericidal activity of chemical disinfectants and antiseptics used in food, industrial, domestic and institutional areas.

Scientific Services conducted the BSEN1276:2019 test on COV-RID HLD. The aim of this test was to prove that COV-RID HLD, when applied to surfaces, would achieve a minimum 5 log reduction of bacteria after 5 minutes of contact.

Test conducted by Scientific Services: BSEN1276:2019

Testing organisms:

- Staphylococcus aureus ATCC 6538
- Pseudomonas aeruginosa ATCC 15442
- Escherichia coli ATCC 10536
- Enterococcus hirae ATCC 10541

Results of BSEN1276:20159Test: The COV-RID HLD achieved a bacteria log reduction of greater than 5 in 5 minutes against all 4 of the testing organisms, under the test conditions stated. COV-RID HLD complies with the criteria of BSEN1276:2019 (Bacteria log 5 reduction in 5 minutes). The results are shown in Fig 3.

Fig 3

Organism	Control	Cov-Rid High Level Disinfectant	Log Reduction
Staphylococcus aureus ATCC 6538	2.72x10 E7	<10 (<140)	>6.43 (>5.28)
Escherichia coli ATCC 10536	2.45x10 E7	<10 (<140)	>6.39 (>5.24)
Enterococcus hirae ATCC 10541	2.24x10 E7	<10 (<140)	>6.35 (>5.20)
Pseudomonas aeruginosa ATCC 15442	2.95x10 E7	6.0x10 E1 (<140)	5.69 (>5.32)

Full results of the test are presented in Appendix 4

Conclusion: The tests confirm that when COV-RID HLD is applied it will achieve over a 5 Log reduction of bacteria. This is equal to removing 99.999% of bacteria from the area that the COV-RID HLD is applied to.

TEST - BSEN1650:2019

Chemical disinfectants and antiseptics. Quantitative suspension test for the evaluation of fungicidal or yeasticidal activity of chemical disinfectants and antiseptics used in food, industrial, domestic and institutional areas.

Scientific Services conducted two BSEN1650:2019 tests on the COV-RID HLD. The aim of these tests were to prove that COV-RID HLD, when applied to surfaces, would achieve a minimum 4 log reduction of fungal pathogens and Mould after 15 minutes of contact with the surface.

Test conducted by Scientific Services: BSEN1650:2019

Testing organisms:

- Candida albicans ATCC 10231
- Aspergillus brasiliensis (Niger) ATCC 16404

Results of BSEN1650:2019 Tests: The COV-RID HLD achieved a log reduction of greater than 5.35 in 15 minutes against Candida albicans, under the test conditions stated. The COV-RID HLD achieved a log reduction of 4.51 in 15 minutes against Aspergillus brasiliensis, under the test conditions stated The COV-RID HLD samples complies with the criteria of BSEN1650:2019 (Bacteria log 4 reductions in 15 minutes). The results are shown in Fig 4 and Fig 5.

Fig 4

Organism/Time	Control	Cov-Rid High Level Disinfectant	Log Reduction
Candida albicans ATCC 10231	2.22x10 E6	<10 (<140)	>5.35 (>4.20)

Fig 5

Organism/Time	Control	Cov-Rid High Level Disinfectant	Log Reduction
Aspergillus brasiliensis (Niger) ATCC 16404	1.63x10 E6	5.0x10 E1 (<140)	4.51 (>4.06)

Full results of the test are presented in Appendix 5 and Appendix 6

Conclusion: The tests confirm that when COV-RID HLD is applied to surfaces it will achieve a greater than 5 Log reduction of Fungal Pathogens; this is equal to removing 99.999% of Fungal Pathogens from the surface that the COV-RID HLD has been applied to. The tests also confirm that when COV-RID HLD is applied to surfaces it will achieve a 4 Log reduction of Mould. This is equal to removing 99.99% of Mould from the surface that the COV-RID HLD has been applied to.

CONCLUSION OF THE BSEN TESTS UNDERTAKEN ON COV-RID HLD

Conforming to all these BSEN tests COV-RID HLD has provided quantifiable evidence that it is an effective High Level Disinfectant for removing:

- Enveloped Viruses – BSEN14476:2013+A2:2019 (Specifically including Coronasvirus)
- Bacteria – BSEN13697:2015 & BSEN1276:2019
- Fungal Pathogens – BSEN1650:2019 (Candida albicans)
- Mould – BSEN1650:2019 (Aspergillus brasiliensis)

Specifically conforming to these BSEN standards KSG can quantifiably show that COV-RID HLD will remove 99.99% of all enveloped viruses including SARS-COV2, 99.999% of Bacteria and 99.999% of Fungal Pathogens.

TESTING COV-RID HLD DEPLOYED BY A THERMAL FOGGER

It was now important to understand whether when COV-RID HLD is applied into an enclosed space via a thermal fogger that it would still have the same effect as a shown in laboratory conditions and applied as a High Level Disinfectant.

COV-RID HLD showed in the BSEN tests that as a High Level Disinfectant it has great disinfecting and sanitising capabilities. Knights Security Group in partnership with Scientific Services, has gone on to undertake further tests to quantify the effectiveness of COV-RID HLD when applied via thermal fogging.

COV-RID HLD has been tested under a range of scenarios which were specifically designed and developed to rigorously test the effectiveness of Thermally Fogging COV-RID HLD into enclosed spaces. The tests were split into two stages; the first stage was to test its ability to disinfect and clean and to understand how effective COV-RID HLD would be when thermally fogged. The second stage was designed to replicate a realistic environment and situation that has been thermally fogged.

COV-RID HLD INITIAL TRIAL

The aim of the initial COV-RID fogging trial was to quantify the effectiveness of using COV-RID HLD in a Thermal Fogger as a method for disinfecting enclosed spaces. The tests were conducted across varying sampling areas and on differing surfaces within each sampling area.

Methodology: Using 55mm contact plates (TSA) initial readings of bacteria where collected from three locations in each sampling area. Within each sampling area 3 different surfaces were selected to collect samples on using the 55mm contact plates. In total 9 samples were collected across the three sampling areas before these areas were fogged with COV-RID HLD.

The three sampling areas were chosen due to their varying size, use, shape and surfaces present.

The three sampling areas and size were:

1. Car ($4m^3$)
    a. Car Boot – Carpet Surface
    b. Middle of Car – Leather Surface
    c. Front of Car – Plastic Surface
2. Bathroom ($40m^3$)
    a. Sink
    b. Bath
    c. Shower
3. Pavilion ($50m^3$)
    a. Table – Wooden Surface
    b. Window – Glass Surface
    c. Floor – Carpet Surface

After taking the initial bacteria reading using the 55mm contact plates the sampling areas were fogged with $1ml/m^3$ of COV-RID HLD Fogging Solution and then left until the fog had dissipated.

The fog was given 90 minutes to fully dissipate before readings were taken again in each location within the sampling areas using the 55mm contact plates. The contact plates were then incubated for 72 hours at 30C and the bacterial counts between each sampling area and location, pre and post fogging were compared.

Results of COV-RID HLD Thermal Fogging Initial Trial:

The results from the initial contact plates collected showed a spread of levels of bacteria across the 3 sampling areas. Initial bacteria counts, pre fogging, showed the bathroom had the highest level of bacterial count, the bacterial count was so high in the bath that it was too numerous to count. This means that there were over 350 bacteria on the contact plate taken from the bath pre fogging. The observation of this contact plate post incubating indicated that the bacteria count was considerably higher than 350, however as the contact plate can only record up to 350 this number was used in the calculation of bacteria reduction. The pavilion and car recorded similar levels of bacteria pre fogging.

The recording taken from the middle of the Car post fogging was not able to be used as the contact plate had a finger print in the middle of the contact plate. This has resulted in the recording not being included in the results.

After fogging the sampling areas with COV-RID HLD the sampling areas showed a significant reduction in the bacterial count. The results from the trials are shown in Fig 7.

Fig 7

Sampling Area	Bacterial Count before Fogging	Bacterial Count After Fogging	Reduction in Bacteria %
Car 4m3			
Car boot (Carpet)	32	7	78%
Middle of car (Leather)	33	N/A	N/A
Front of Car (Plastic)	29	2	93%
Bathroom 40m3			
Sink	165	38	77%
Bath (TNC)	350+	49	86%
Shower	238	3	99%
Pavilion 50m3			
Table (Wood)	12	0	100%
Window (Glass)	2	0	100%
Floor (Carpet)	180	58	68%

Average % Reduction of Bacteria*	**88%**

*Excluding middle of Car

Conclusion: There is a significant reduction in bacteria in the sampling areas post thermal fogging with COV-RID HLD. The average % reduction of bacteria from the sampled areas was 88% post thermal fogging with COV-RID HLD.

The results clearly show that the surface type does not affect the level of bacteria removed from the surface by COV-RID HLD. Across all surfaces there is a consistently high level of bacteria reduction, this indicates that COV-RID HLD works consistently across all surface types.

This test clearly demonstrates that using COV-RID HLD across the three sampling areas resulted in a significant reduction in the bacteria count across all surfaces and locations. These results indicate that using COV-RID HLD as part of your cleaning process would be of a significant benefit.

COV-RID HLD THERMAL FOGGING SUSTAINED EFFECTIVENESS TRIAL

Following the success of initial Thermal Fogging trial with COV-RID HLD, Knights Security Group in partnership with Scientific Services, wanted to test to see if there was a sustained reduction in bacteria post thermal fogging.

This test was designed to look at the effectiveness of COV-RID HLD at removing bacteria from surfaces over a sustained period. The test was designed to see if COV-RID HLD, once thermally fogged, would continue to remove bacteria from surfaces for a sustained period of time.

Methodology:

Using 55mm contact plates (TSA) initial readings of bacteria where collected from three locations in the sampling area that was going to be fogged with COV-RID HLD.

The sampling area was chosen because it provided a complex room structure where the fog would have to naturally manoeuvre around different shapes and objects. The sampling area was specifically chosen as it had not been cleaned or disinfected for a significant period of time. This meant the sampling area would have large quantities of bacteria. This would really test the effectiveness of using Thermal Fogging to disinfect complex areas which have lots of objects and obstructions inside them.

The sampling area and locations collected from were:

1. Sauna ($8m^3$)
    a. Wall – Wood
    b. Floor – Wood
    c. Seat – Wood

After taking the initial readings of bacteria using the 55mm contact plates the sampling area was fogged with $1ml/m^3$ of COV-RID HLD Fogging Solution and then left for 2 hours.

After 2, 4, 6 and 18 hours readings were taken from the sampling area in each location using the 55mm contact plates. The contact plates were then incubated for 72 hours at 30C and the bacterial counts between each reading were compared.

Results of the COV-RID Thermal Fogging Sustained Effectiveness Trial:

The pre fogging bacterial count from the sampling area showed a considerable difference from the Wall, Floor and Seat bacteria counts. The Wall showed a relatively low bacteria count of 18, however the Floor and Seat recordings were too numerous to count. The TSA Contact Plates record up to 350 bacteria, any recording over this quantity is not possible to accurately count. However the level of bacteria recorded on these two plates was estimated to have been in the thousands of bacteria, you could visually see significant bacterial growth on the plates indicating bacteria in the thousands. For the efficacy of the test and for scientific accuracy the bacterial count was recorded as 350 to perform statistical analysis on the data.

The full results are shown in Fig 8 and Fig 9.

Fig 8

Sampling Area	Bacteria Count before Fogging	Bacteria Count 2 Hours After Fogging	Reduction in Bacteria after 2 Hours %	Bacteria Count 4 Hours After Fogging	Reduction in Bacteria After 4 hours %	Bacterial Count 6 Hours After Fogging	Reduction in Bacteria after 6 hours %	Bacteria Count 18 Hours After Fogging	Reduction in Bacteria after 18 hours %
Sauna 8m3									
Wall	18	6	67%	0	100%	0	100%	0	100%
Floor (TNC)	350+	44	87%	32	91%	45	87%	39	89%
Seat (TNC)	350+	76	78%	50	86%	23	93%	29	92%

Fig 9

	2 Hours after Fogging	4 hours after Fogging	6 Hours after Fogging	18 Hours after fogging
Average % Reduction of Bacteria	**77%**	**92%**	**94%**	**94%**

The recordings indicate that the COV-RID HLD when thermally fogged continues to act on surfaces for a significant period after the fog has dissipated. It's important to note that the average bacteria reduction after 2 hours shows only 77% reduction. This is because the data for the Floor and Seat showed too numerous to count and as a result the analysis could only be conducted with a bacterial count of 350.

The seat and floor bacteria readings showed a consistent reduction in bacteria over the period of the test. However the bacteria readings for the floor showing a % bacteria reduction range of 87% to 91% from 2 hours to 18 hours post thermal fogging. It is highly likely that the bacteria readings from

the floor were impacted by individuals coming in out of the sampling area to take bacteria readings over the testing period.

If the data was adjusted to reflect the scientifically indicated number of bacteria pre fogging would be in the high thousands, if the data was run again with the bacteria count at 2,500 pre fogging which is regarded as a low estimate of the true number of bacteria the results of this data is shown in Fig 10.

Fig 10

	2 Hours after Fogging	4 hours after Fogging	6 Hours after Fogging	18 Hours after fogging
Average % Reduction of Bacteria	**88%**	**99%**	**99%**	**99%**

Conclusion: Both the results shown in Fig 5 and Fig 6 display a consistent reduction in the number of bacteria recorded with an increased time the surface is exposed to COV-RID HLD Fog. This highlights that the staying power of COV-RID HLD is significantly longer after the fog has dissipated and will remain working on the surfaces that it comes into contact with.

COV-RID HLD THERMAL FOGGING WITH DEEP CLEAN TRIAL

The earlier fogging trials of COV-RID HLD demonstrated the average bacteria reduction of 88% in sampling areas that were thermally fogged. The bacteria reduction increased to 94% when the sampling area was left for a sustained period.

Thermally fogging with COV-RID HLD is designed to be used in conjunction with existing cleaning protocols. Specifically the wiping down of high contact points, these high contact points pose a big threat in the transmission of Viruses and Bacteria.

To further understand the effectiveness of thermally fogging with COV-RID HLD, Knights Security Group in partnership with Scientific Services went on to undertake further tests. These tests look at the effectiveness of using Thermal Fogging with COV-RID HLD in collaboration with a full deep clean of the sampling area.

Methodology: The sampling area chosen was a bathroom in a house that was between lets. The Bathroom needed a deep clean after the previous family had moved out prior to the new moving in, as a result of this the room needed a full and total deep clean and not your traditional wipe down clean.

Using 55mm contact plates (TSA) initial bacteria readings where collected from three locations in the sampling area.

The sampling area and locations collected from were:

1. Bathroom (40m³)
    a. Bath
    b. Shower
    c. Sink

After taking the initial reading of bacteria using the 55mm contact plates the sampling area was cleaned using standard cleaning materials that included bleach. The cleaning team spent 120 minutes cleaning the Bathroom. This was a comprehensive deep clean making sure that all exposed surfaces were wiped down and deep cleaned.

After the bathroom had undergone its comprehensive deep clean bacteria readings were taken again using the 55mm contact plates. The room was then thermally fogged with COV-RID HLD and left for 90 minutes for the fog to dissipate fully.

After the 90 minutes readings were taken again in each location of the sampling area using the 55mm contact plates. The contact plates were then incubated for 72 hours at 30C and the bacterial counts between each reading were compared.

Results of COV-RID Thermal Fogging plus Deep Clean test:

The results from the initial contact plates collected showed a spread of levels of bacteria across the 3 locations in the bathroom. Initial bacteria counts pre deep clean showed the bath had the highest level of bacterial count, the bacterial count was so high in the bath that it was too numerous to count. This means that there were over 350 bacteria on the contact plate taken from the bath. The observation of this contact plate post incubating indicated that the bacteria count was considerably higher than 350, however as the contact plate can only record up to 350 this number was used in the calculation of bacteria reduction. The shower and Sink also showed high levels of bacteria readings both over 200. All these results are shown in Fig 11.

Fig 11

Deep Clean Test then Fog Test Data					
Sampling Area	**Bacterial Count before fogging**	**Bacterial count after clean**	**% reduction after clean**	**Bacteria count after clean and fog**	**% reduction after clean and fog**
Bathroom					
Bath (TNC)	350+	27	92%	2	99%
Shower	206	38	82%	3	99%
Sink	268	19	93%	7	98%
		Average	**89%**	**Average**	**99%**

The initial bacteria readings after the deep clean showed a consistent reduction in bacteria from 82% in the shower to 93% in the Sink. Across all three locations there were still levels of bacteria present,

however after the Bathroom had been thermally fogged with COV-RID HLD there was another big reduction in the Bacteria present in the Bathroom. Overall the bacteria reduction after the Bathroom had been cleaned and then thermally fogged was an average bacteria reduction of 99%.

Conclusion: The bacteria in the bathroom were almost nonexistent post fogging and deep clean with a reduction of bacteria of over 99% post fogging. This clearly demonstrates that fogging in conjunction with cleaning is an effective method of cleaning and disinfecting an enclosed space. However, the bathroom in this test had undergone a substantial deep clean that required 2 hours. This level of clean of not economical for both the time and money it requires, this standard of cleaning was above and beyond that seen with the traditional cleaning practices.

KSG BLIND TEST ON TRADITIONAL CLEANING

The earlier test undertaken highlighted the importance of understanding the effectiveness of traditional cleaning practices. To quantify the effectiveness of traditional cleaning practices that are currently being applied further testing was undertaken. Knights Security Group in partnership with Scientific Services, conducted a blind test on a sampling area that had been cleaned by an independent cleaning team.

This test was designed to look at the effectiveness of using standard cleaning practices within a chosen sampling area.

Methodology: The sampling area chosen was a bathroom in a house that has paid cleaners that come to clean the whole property every other week. The bathroom is part of a whole house clean; it is one of the many rooms and areas that need cleaning in the 90 minutes. This is standard procedure with cleaners whereby they will have a limited time to clean a large spectrum of rooms of all shapes size and uses. This test aims to provide an accurate representation of the standard of clean a bathroom would get with a traditional clean.

Prior to the cleaners arriving bacteria readings were taken in the sampling area using 55mm contact plates (TSA).

The locations collected from in the Bathroom were:

1. Bathroom (40m^3)
    a. Bath
    b. Shower
    c. Sink

After the initial bacteria readings were taken from the Bathroom using the 55mm contact plates the sampling area was cleaned by the cleaners. The cleaners were not told prior to cleaning that bacteria recordings had been taken from the Bathroom. This would prevent the cleaners from changing their cleaning style and affect the outcome of the tests. The cleaning team spent roughly 10 minutes cleaning the Bathroom. After the bathroom had been cleaned by the cleaning team bacteria readings were taken again using the 55mm contact plates.

The contact plates were then incubated for 72 hours at 30C and the bacterial counts between each reading were compared

Results of the blind test on areas cleaned using traditional cleaning techniques:

Fig 12

Blind Clean Test Data			
Sampling Area	**Bacterial Count before clean**	**Bacterial count after clean**	**Bacterial % reduction after clean**
Bathroom			
Floor	122	46	62%
Sink	67	60	10%
Shower	68	19	72%
		Average	48%

The results in the test clearly highlight that the bacteria reduction of 48% achieved by a traditional clean is significantly lower than the 89% reduction as previously seen with the 2 hour deep clean. The bacteria reduction in the sink is negligible. The sink is a high contact point that would be regularly touched and such is an area that you would want the highest bacteria reduction. The results show a lack of consistency across the different locations within the bathroom, the results also show that even the highest bacteria reduction in the shower was only 72%. The shower showed a significantly lower bacteria reduction compared with when the bathroom was fogged with no cleaning. In that earlier test the shower showed a bacteria reduction of 99% post fogging with no cleaning.

Conclusion: The traditional cleaning results clearly illustrate that the level of bacteria reduction achieved in the bathroom is not even 50% when cleaned with traditional methods. Although this test was only conducted in a small sampling area it highlights that traditional cleaning methods are not achieving the level of virus and bacteria reduction that we require in today's world.

CONCLUSION

The results within these trials clearly demonstrate that Thermally Fogging with COV-RID HLD can consistently, efficiently and effectively remove up to 99% of the bacteria from enclosed spaces. The trials have also clearly demonstrated that traditional cleaning methods failing to remove significant amounts of bacteria from exposed surface areas. Using thermal fogging in conjunction with existing cleaning protocols will guarantee that premises are disinfected for clients, customers, friends or whoever it might be using them.

APPENDIX 1

Clarice Weis Arns (PhD, Professor)
Laboratório de virologia
Instituto de Biologia/Universidade Estadual de campinas-UNICAMP
CEP:13083-862 Campinas- SP- Brasil
FONE: (19) 3521-6258 Email: arns@unicamp.br

Cidade Universitária, 29 de novembro de 2020

Dados do Patrocinador:
Grasp Sistemas e Comercio Ltda
Rua Gabinete Dannunzio, 132
São Paulo
CNPJ: 71,680,250/0001-68
Sr Denis Frate (11) 99983-8218
denis@grasp.com.br

Referente: LAUDO VIRUCIDA

1. **Produto:**
   - **COVRID_disinfectant**

     Batch: 100211_Manufacture: 07/10/2020. ativo: <50 % propane-1,2-diol

   Data chegada ao laboratório: 20/10/2020

2. **Vírus testados: Coronavírus cepa MHV** gênero *Betacoronavirus* (mesmo gênero e família das espécies SARS-CoV-1, SARS-CoV-2/COVID19, MERS e outros).

Vírus	**Linhagens Celulares**
Coronavírus MHV	Célula: NCTC clone 929 [L cell, L-929, derivative of Strain L] (ATCC® CCL-1™)

3. **Metodologia:**

   a) Os ensaios foram realizados em laboratório NB-2 (Biosafety Level 2) seguindo as Recomendações da ANVISA Art. 1 e Art. 3 da IN 04/13 e IN 12/16 e metodologias descritas nas normas ((BS EN 14476:2013+A2:2019: Chemical disinfectants and antiseptics -Quantitative suspension test for the evaluation of virucidal activity in the medical area -Test method and requirements (Phase 2/Step 1) e do Instituto Robert Koch – RKI) e obedecendo as Boas Práticas de Laboratório (BPL).
      - O meio de cultura para vírus e linhagens celulares foi utilizado o Meio Essencial Mínimo de Dulbecco (DMEM) contendo 2% a 10% de soro fetal bovino.

   b) A titulação do Coronavírus (Cepa MHV-3) foi realizada de acordo com método $DICT_{50}$ (Doses Infectantes de Cultivos Tecidos 50%). Diluições sequenciais do vírus na base 10

Clarice Weis Arns (PhD, Professor)
Laboratório de virologia
Instituto de Biologia/Universidade Estadual de campinas-UNICAMP
CEP:13083-862 Campinas- SP- Brasil
FONE: (19) 3521-6258 Email: arns@unicamp.br

Cidade Universitária, 29 de novembro de 2020

foram realizadas em quadruplicata, em microplacas 96 orifícios estéreis. A seguir foram adicionadas células L929 com uma concentração de 2 x 10^5 células/orifício. Após 48 hs verifica-se o efeito citopático (ECP) da infecção viral, em comparação com controle celular e controle viral.

c) Inicialmente o produto **COVRID desinfetante** foi testado na linhagem celular para a "Determinação da Dose Máxima Não Tóxica (DMTD)", para definir a concentração que não causa toxicidade às células.

d) A amostra **COVRID desinfetante na forma pronto para uso** foi misturada ao vírus, homogeneizada e posteriormente submetida a diferentes tempos de contato (**1, 2, 5, 10, 30 minutos, 4 e 6 horas).**

e) A mistura foi pipetada 100uL de cada amostra teste com vírus em microplacas de 96 orifícios, tituladas (10^1 a 10^{10}) e adicionadas 100uL da linhagem celular (L929) e incubadas a 37ºC em Estufa com 5% de CO_2 durante 48 horas.

f) Após 48 horas de incubação as placas foram lidas através de Microscópio ótico Invertido na busca do Efeito Citopático característico do vírus e os títulos foram calculados com base no método de Reed and Muench, 1938. Os resultados são expressos em percentual inativação viral (Tabela 1) em comparação com o controle viral (título do vírus) não tratado.

Resumo/Controles:
• Negativo: controle celular (2x10^5 células/mL) em meio DMEM, sem vírus e sem amostras teste;
• Controle de vírus: Titulação de vírus (10^1 a 10^{12}) e cultura de células em meio DMEM;
• Teste positivo: presença de vírus, **PRODUTO** e linhagem celular em meio DMEM.

Tabela 1 - Os resultados são expressos em percentual de inativação viral em comparação com o controle viral não tratado:

Log de Redução	Fator de Redução	Percentual de Inativação/Redução	
1	10	90%	
2	100	99%	
3	1000	99,9%	
4	10.000	99,99%	Virucida
5	100.000	99,999%	
6	1.000,000	99,9999%	

https://microchemlab.com/information/log-and-percent-reductions-microbiology-and-antimicrobial-testing

Clarice Weis Arns (PhD, Professor)
Laboratório de virologia
Instituto de Biologia/Universidade Estadual de campinas-UNICAMP
CEP:13083-862 Campinas- SP- Brasil
FONE: (19) 3521-6258 Email: arns@unicamp.br

Cidade Universitária, 29 de novembro de 2020

4. Resultados:

Tabela 2 - Resultados dos ensaios com Coronavírus (Cepa MHV-3) em relação ao **COVRID desinfetante** /pronto para uso e tempos de ação.

Produto	**Tempos de contato**	**Coronavírus (Cepa MHV-3) Resultado inativação em Percentual (tabela 1)**
COVRID desinfetante/ pronto para uso	1 minuto	99,9%
	2 minutos	99,9%
	5 minutos	99,9%
	10 minutos	99,9%
	30 minutos	99,99%
	4 horas	99,99%
	6 horas	99,99%

5. Conclusões:

- O produto "**COVRID desinfetante**" mostrou inibição de 99,9% a 99,99% do vírus testado, e, portanto, recomendamos o uso como agente virucida para o grupo Coronavírus e no combate a COVID-19.

Prof. Dr. Clarice Weis-Arns (ID Lattes: 8635038112182716)
(Responsável pelo Laudo)

Clarice Weis Arns (PhD, Professor)
Laboratório de virologia
Instituto de Biologia/Universidade Estadual de campinas-UNICAMP
CEP:13083-862 Campinas- SP- Brasil
FONE: (19) 3521-6258 Email: arns@unicamp.br

Cidade Universitária, 29 de novembro de 2020

Bibliografia Consultada:

ANVISA - Ministério da Saúde/Agência Nacional de Vigilância Sanitária
INSTRUÇÃO NORMATIVA Nº 4, DE 2 DE JULHO DE 2013
http://bvsms.saude.gov.br/bvs/saudelegis/anvisa/2013/int0004_02_07_2013.html

ANVISA- INSTRUÇÃO NORMATIVA Nº 12, DE 11 DE OUTUBRO DE 2016 – ANVISA.
https://alimentusconsultoria.com.br/instrucao-normativa-no-12-2016-anvisa/
https://alimentusconsultoria.com.br/instrucao-normativa-in-no-50-de-3-de-dezembro-de-2019-anvisa/

BS EN 16777:2018: Chemical disinfectants and antiseptics. Quantitative non-porous surface test without mechanical action for the evaluation of virucidal activity of chemical disinfectants used in the medical area

BS EN 14476:2013+A2:2019
Incorporating corrigendum August 2019
Chemical disinfectants and antiseptics -Quantitative suspension test for the evaluation of virucidal activity in the medical area - Test method and requirements (Phase 2/Step 1)

BS EN 16777:2018: *Chemical disinfectants and antiseptics. Quantitative non-porous surface test without mechanical action for the evaluation of virucidal activity of chemical disinfectants used in the medical area*

DIN EN 14476:2015. Chemical disinfectants and antiseptics. Virucidal quantitative suspension test for chemical disinfectants and antiseptics used in human medicine. Test method and requirements [phase 2, step 1]. Brussels 2015, CEN-Comité Européen de Normalisation.

G. Kampf D., Todt, S. Pfaender , E. Steinmann
Persistence of coronaviruses on inanimate surfaces and their inactivation with biocidal agents
Journal of Hospital Infection 104 (2020) 246e251
https://doi.org/10.1016/j.jhin.2020.01.022 0195-6701

JEFF MILLER and ROLF ULRICH
On the analysis of psychometric functions: **The Spearman–Kärber method**
Perception & Psychophysics 2001, 63 (8), 1399-1420

Rabenau HF, Schwebke I, Blumel J, Eggers M, Glebe D, Rapp I, Sauerbrei A, Steinmann E, Steinmann J, Willkommen H, Wutzler P.
Guideline of the German Association for the Control of Virus Diseases (DVV) e.V. and the **Robert Koch-Institute (RKI)** for testing chemical disinfectants for effectiveness against viruses in human medicine. Version of 1st December, 2014.
Bundesgesundheitsblatt Gesundheitsforschung Gesundheitsschutz. 2015;58: 493–504

Reed LJ, Muench H.
A simple method of estimating fifty per cent endpoints. Am J Hyg. 1938; 27:493–497.

Test Report: BS EN 14476:2013 + A2:2019 Chemical disinfectants and antiseptics – Quantitative suspension test for the evaluation of virucidal activity in the medical area- Test method and requirements (Phase 2/Step 1)

Test Laboratory	**BluTest Laboratories Ltd** 5 Robroyston Oval, Nova Business Park, Glasgow, G33 1AP

Identification of sample

Name of the product	COV-RID High-Level Disinfectant
Batch number	102414 DOM 17/12/2020
Client	Knights Security Group Limited
Client Address	Nene House, 4 Rushmills, Northampton, NN4 7YB
Project Code	BT-KSG-01
Date of Delivery	04 January 2021
Storage conditions	Ambient
Active substances	ADBAC & DDAC
Appearance	Liquid
Condition upon receipt	Undamaged

Test Method and its validation

Method	1 part interfering substance + 1 part virus suspension + 8 parts biocide were mixed and incubated at the indicated contact temperature for the indicated contact times. Assays were validated by a cytotoxicity control, interference control, neutralisation control and a formaldehyde internal standard.
Neutralisation	Dilution-neutralisation/gel filtration Eagles Minimum Essential Medium + 5.0% v/v foetal bovine serum at 4°C

Experimental Conditions

Period of analysis	22 January 2021 to 27 January 2021
Product diluents used	Sterile distilled water
Product test concentrations	10.0% v/v; 50.0% v/v; 80.0% v/v
Appearance product dilutions	No changes noted- stable
Appearance in test mixture	Sedimentation and turbidity observed at all concentrations
Contact times (minutes)	5 ± 10s
Test temperature	20°C ± 1°C
Interfering substances	0.3g/l bovine albumin
Temperature of incubation	37°C ± 1°C + 5% CO_2
Identification and passage (P) of virus	***Vaccinia virus*** **VR-1549 Elstree strain (P 09)**
Identification and passage (P) of cells	Vero Cells (P 49)

BLUTEST LABORATORIES LIMITED, 5 Robroyston Oval, Nova Business Park, Glasgow, UK, G33 1AP
Telephone: +44 (0)141 558 2782. Email: info@blutest.com. Web site: www.blutest.com.
Company Registration Number: SC364409 VAT Registration Number: GB 979 1131 96 UKAS Number: 4597

PROTOCOL SUMMARY

The basic virucidal efficacy test is set up with three concentrations of test product solution and a 5-minute contact time. Virus is exposed to disinfectant in 24-well plates, then neutralised, serially diluted and virus titred in 96-well tissue culture plates to determine the tissue culture infectious dose$_{50}$ ($TCID_{50}$) of surviving virus. *Vaccinia virus* VR-1549 Elstree strain / Vero cells are assayed in parallel in each test. $TCID_{50}$ is determined by the method of Karber[1].

Cytotoxicity control
The test product solution is measured for its effects on the host cells used to propagate the virus, to determine the sensitivity of the assay.

Interference control
The effect of the cells after treatment of the test product solution are verified to ensure the cells can show susceptibility for virus infection. This is compared against cells that have not been treated with test product.

Disinfectant suppression control VS1
Virus is added to the highest concentration of test product solution and then the mixture immediately removed and neutralised. The neutralised virus titre is then determined to assess the efficiency of the neutralisation procedure.

Disinfectant suppression control VS2
Internal control which adds virus to neutralised test product solution to assess the efficiency of the neutralisation procedure.

No column Control
Internal control on the highest contact time to assess any impact of the Microspin™ S 400 HR columns.

Virus recovery control
Virus titre is determined for virus in contact with sterile distilled water at t=0, t = 5 and at t =15. The virus titre after 5 minutes is then compared to the recovery of disinfectant-treated virus to measure the log reduction in virus titre. The virus titre at 15 minutes is compared to the reference virus inactivation control.

Reference virus inactivation control
Virus is exposed to 0.7% W/V formaldehyde and the recovery of virus determined by $TCID_{50}$ after 5 and 15 minutes, in order to assess that the test virus has retained reproducible biocide resistance. In addition, the formaldehyde cytotoxicity of neutralised formaldehyde is determined, to measure assay sensitivity.

1Kärber, G.: Beitrag zur Kollektiven Behandlung Pharmakologischer Reihenversuche. Arch. Exp. Path. Pharmak. 162 (1931): 480-487.

BLUTEST LABORATORIES LIMITED, 5 Robroyston Oval, Nova Business Park, Glasgow, UK, G33 1AP
Telephone: +44 (0)141 558 2782. Email: info@blutest.com. Web site: www.blutest.com.
Company Registration Number: SC364409 VAT Registration Number: GB 979 1131 96 UKAS Number: 4597

Vaccinia virus (VR-1549) Elstree strain Test Results

EN14476:2013 + A2:2019 Suspension test for the efficacy of COV-RID High Level Disinfectant, Batch 102414 DOM. 17/12/20, BT-KSG-01-01 from Knights Security Group Ltd. against Vaccinia virus VR-1549 under clean conditions						
Test Results						
Concentration	**10%**		**50%**		**80%**	
Exposure Time	data	$TCID_{50}$/ml	data	$TCID_{50}$/ml	data	$TCID_{50}$/ml
t = 5 mins	3.67	**1.47E+05**	0.33	**6.81E+01**	0.00	**3.16E+01**
Raw Data	666400	**1.47E+05**	200000	**6.81E+01**	000000	**3.16E+01**
log		**5.17**		**1.83**		**1.50**
log difference		**1.33**		**4.67**		**5.00**

EN14476:2013 + A2:2019 Suspension test for the efficacy of COV-RID High Level Disinfectant, Batch 102414 DOM. 17/12/20, BT-KSG-01-01 from Knights Security Group Ltd. against Vaccinia virus VR-1549 under clean conditions									
Summary Table									
Product:	Interfering substance	Concentration	Level of cytotoxicity	lg $TCID_{50}$					>4 lg reduction after 'X' Min
				0 min	5 min	15 min	30 min	60 min	
COV-RID High Level Disinfectant	3.0g/l BSA + 3.0ml/l erythrocytes	80%	1.50	3.17	1.50	n.a.	n.a.	n.a.	<5 mins
		50%	1.50	n.a.	1.83	n.a.	n.a.	n.a.	<5 mins
		10%	1.50	n.a.	5.17	n.a.	n.a.	n.a.	>5 mins
Virus Control	Clean			6.50	6.50	6.50	n.a.	n.a.	n.a.
							5 min	15 min	
Formaldehyde	PBS	0.7% (w/v)	2.50				5.00	3.50	>15 mins

BLUTEST LABORATORIES LIMITED, 5 Robroyston Oval, Nova Business Park, Glasgow, UK, G33 1AP
Tel: +44 (0)141 558 2782. Email: info@blutest.com. Web site: www.blutest.com. Company No.: SC364409. VAT No.: GB 979 1131 96. UKAS No.: 4597

Vaccinia virus (VR-1549) Elstree strain Control Data

EN14476:2013 + A2:2019 Suspension test for the efficacy of COV-RID High Level Disinfectant, Batch 102414 DOM. 17/12/20, BT-KSG-01-01 from Knights Security Group Ltd. against Vaccinia virus VR-1549 under clean conditions

Controls

Virus Recovery 0 min		Virus Recovery 5 min		Virus Recovery 15 min		Cytotoxicity		Disinfectant Suppression VS		Disinfectant Suppression VS2	
raw data	$TCID_{50}$/ml	raw data	$TCID_{50}$/ml	raw data	$TCID_{50}$/ml	raw data	$TCID_{50}$/ml	raw data	$TCID_{50}$/ml	raw data	$TCID_{50}$/ml
5.00	**3.16E+06**	5.00	**3.16E+06**	5.00	**3.16E+06**	0.00	**3.16E+01**	1.67	**1.47E+03**	5.00	**3.16E+06**
666651	**3.16E+06**	666660	**3.16E+06**	666651	**3.16E+06**	000000	**3.16E+01**	640000	**1.47E+03**	666660	**3.16E+06**
	6.50		**6.50**		**6.50**		**1.50**		**3.17**		**6.50**
									3.33		**0.00**

Formaldehyde reference inactivation controls							No column Control	
Cytotoxicity		Exposure time	0.7% Formaldehyde				5 mins	
			5 mins		15 mins		raw data	$TCID_{50}$/ml
raw data	$TCID_{50}$/ml		raw data	$TCID_{50}$/ml	raw data	$TCID_{50}$/ml	5.33	**6.81E+06**
1.00	**3.16E+02**		3.50	**1.00E+05**	2.00	**3.16E+03**	666662	**6.81E+06**
600000	**3.16E+02**		666300	**1.00E+05**	660000	**3.16E+03**		**6.83**
	2.50	log		**5.00**		**3.50**		
		log difference		**1.50**		**3.00**		

Interference control	Virus dilution						Stock Virus ($TCID_{50}$)
	-3	-4	-5	-6	-7	-8	6.50
PBS Control	1	1	1	1	0.33	0	**1.00E+08**
	3.16E+02	3.16E+02	3.16E+02	3.16E+02	6.76E+01	3.16E+01	6666663000
	2.50	**2.50**	**2.50**	**2.50**	**1.83**	**1.50**	
Raw Data	**6**	**6**	**6**	**6**	**2**	**0**	
Product	1	1	1	1	0.17	0	
	3.16E+02	3.16E+02	3.16E+02	3.16E+02	4.68E+01	3.16E+01	
	2.50	**2.50**	**2.50**	**2.50**	**1.67**	**1.50**	
Raw Data	**6**	**6**	**6**	**6**	**1**	**0**	
Log Difference	**0.00**	**0.00**	**0.00**	**0.00**	**0.16**	**0.00**	
Product Cyt Dilution	-1	-1	-1	-1	-1	-1	
PBS Dilution	Neat	Neat	Neat	Neat	Neat	Neat	

BLUTEST LABORATORIES LIMITED, 5 Robroyston Oval, Nova Business Park, Glasgow, UK, G33 1AP
Tel: +44 (0)141 558 2782. Email: info@blutest.com. Web site: www.blutest.com. Company No.: SC364409. VAT No.: GB 979 1131 96. UKAS No.: 4597

CONCLUSION

Verification of the methodology

A test is only valid if the following criteria are fulfilled:

a) The titre of the test suspension of at least 10^8 TCID50 /ml is sufficiently high to at least enable a titre reduction of 4 lg to verify the method.

b) Detectable titre reduction is at least 4 $\log_{10}$.

c) Difference of the logarithmic titre of the virus control minus the logarithmic titre of the test virus in the reference inactivation test is between:
   - Between 0.75 and 3.5 after 5 min and between 2.0 and 4.0 after 15 min for Vaccinia virus

d) Cytotoxicity of the product solution does not affect cell morphology and growth or susceptibility for the test virus in the dilutions of the test mixtures which are necessary to demonstrate a 4 $\log_{10}$ reduction of the virus.

e) The interference control result does not show a difference of > 1.0 $\log_{10}$ of virus titre for test product treated cells in comparison to the non-treated cells.

f) Neutralisation validation. This is called the disinfectant suppression test in this protocol. The disinfectant was neutralised by column chromatography through an Illustra Microspin S-400 HR column to achieve the best possible neutralisation available for this test. The difference for virus is greater than 0.5 $\log_{10}$ indicating rapid irreversible virucidal activity of the disinfectant by dilution at a concentration of 80.0% v/v for VS1. This neutralisation validation has been verified by VS2, which shows the product has been successfully neutralised.

According to EN 14476:2013 + A2:2019, **COV-RID High-Level Disinfectant POSSESSES VIRUCIDAL** activity at a concentration of **50.0% v/v and 80.0% v/v** of the working concentration as tested after **5 MINUTES** at **20°C** under **CLEAN** conditions (0.3 g/l bovine albumin) against *Vaccinia virus* VR-1549 Elstree strain / Vero cells.

This product therefore is effective against all enveloped viruses as defined in EN 14476:2013 + A2:2019 Annex A*. This therefore includes all coronaviruses and SARS-CoV-2.

Authorised signatory

Dr Chris Woodall, Director
BluTest Laboratories Ltd
Glasgow, UK
Date: 08 FEBRUARY 2021

BLUTEST LABORATORIES LIMITED, 5 Robroyston Oval, Nova Business Park, Glasgow, UK, G33 1AP
Telephone: +44 (0)141 558 2782. Email: info@blutest.com. Web site: www.blutest.com.
Company Registration Number: SC364409 VAT Registration Number: GB 979 1131 96 UKAS Number: 4597

*EN 14476 2013 + A2 2019 Annex A (informative – Enveloped viruses)

Poxviridae
Herpesviridae
Filoviridae (e.g. Ebola, Marburg)
Flavivirus
Hepatitis C Virus (HCV)
Hepatitis Delta Virus (HDV)
Influenza Virus
Paramyxoviridae
Rubella Virus
Measles Virus
Rabies Virus
Coronavirus (e.g. SARS, MERS)
Human Immunodeficiency Virus (HIV)
Human T Cell Leukemia Virus (HTLV)
Hepatitis B virus (HBV)

Reference: Van Regenmortel MHV et al.,Eds.: Virus Taxonomy, Classification and Nomenclature of Viruses, seventh report of the international committee on taxonomy of viruses. Academic Press, San Diego, 2000

BLUTEST LABORATORIES LIMITED, 5 Robroyston Oval, Nova Business Park, Glasgow, UK, G33 1AP
Telephone: +44 (0)141 558 2782. Email: info@blutest.com. Web site: www.blutest.com.
Company Registration Number: SC364409 VAT Registration Number: GB 979 1131 96 UKAS Number: 4597

APPENDIX 3

Scientific Services

Willow Farm,
Stewton,
Louth,
Lincolnshire,
LN11 8SD

Consultant Microbiologists
Animal feed Chemists

Mob: 07770 872461
Tel/Messages: 01507 328552
Email: kevinm.self@tiscali.co.uk

K123718-9

24th August 2021

LABORATORY REPORT

SOURCE: Knights Security Group Ltd

ITEMS: Cov-Rid High Level Disinfectant

TESTS: BSEN13697:2015
Concentration: Ready to use
Temperature: 20ºC
Contact time: 5 minutes
Interfering substance: Bovine Albumin 3.0g/l (dirty)
Storage conditions: Room temperature, out of direct sunlight
Active substances: Not given
Test Date: 21st August 2021

Recovery: Dilution neutralisation, using:-
Tryptone Soya Broth containing Tween 80 100ml/l, Lecithin 30g/l, Sodium thiosulphate 5g/l, L-histidine 1g/l, L-cystine 1g/l

Test organisms:	Staphylococcus aureus	ATCC 6538
	Pseudomonas aeruginosa	ATCC 15442
	Escherichia coli	ATCC 10536
	Enterococcus hirae	ATCC 10541

SUMMARY & CONCLUSIONS:

K123718-9

Cov-Rid High Level Disinfectant

Organism	Test Suspension (N)	Water Control (Nc)	Test Result	Log Reduction
S.aureus	6.75x10 E6	1.98x10 E6	<10 (<140)	>5.30
Ps.aeruginosa	7.64x10 E6	2.47x10 E6	1.85x10 E2	4.12
E.coli	6.17x10 E6	1.68x10 E6	<10 (<140)	>5.23
E.hirae	5.83x10 E6	1.60x10 E6	<10 (<140)	>5.20

All test results below 140 (1.4x10 E2) are required to be reported as <140.

The sample complies with the criteria of BSEN13697:2015 (Bacteria log 4 reduction in 5 minutes) against all four organisms, under the test conditions stated.

KMSelf

K.M.Self, M.B.I.C.Sc.,M.R.S.P.H,.A.M.S.B.

Validation Results

K123718-9

Organism	NC (Neutraliser only)	NT (Neutraliser + Cov-Rid High Level Disinfectant)
Staphylococcus aureus ATCC 6538	1.93x10 E6	1.78x10 E6
Pseudomonas aeruginosa ATCC 15442	2.36x10 E6	2.23x10 E6
Escherichia coli ATCC 10536	1.54x10 E6	1.62x10 E6
Enterococcus hirae ATCC 10541	1.75x10 E6	1.68x10 E6

Criteria

N – Nc = < 2 log

N - NC = < 2 log

NC – NT = < +/- 0.3 log

Pass: Bacteria log 4 in 5 minutes.

APPENDIX 4

Scientific Services

Willow Farm,
Stewton,
Louth,
Lincolnshire,
LN11 8SD

Consultant Microbiologists
Animal feed Chemists

Mob: 07770 872461
Tel/Messages: 01507 328552
Email: kevinm.self@tiscali.co.uk

K123714-5 24th August 2021

LABORATORY REPORT

SOURCE: Knights Security Group Ltd

ITEMS: Cov-Rid High Level Disinfectant

TESTS: BSEN1276:2019
Concentration: Neat (Ready to use)
Temperature: 20°C
Contact time: 5 minutes
Interfering substance: Bovine Albumin 3.0g/l (dirty)
Storage conditions: Room temperature, out of direct sunlight
Active substances: Not Given
Test Date: 21st August 2021

Recovery: Dilution neutralisation, using:-
Tryptone Soya Broth containing Tween 80 100ml/l, Lecithin 30g/l, Sodium thiosulphate 5g/l, L-histidine 1g/l, L-cystine 1g/l

Test organisms:		
	Staphylococcus aureus	ATCC 6538
	Escherichia coli	ATCC 10536
	Pseudomonas aeruginosa	ATCC 15442
	Enterococcus hirae	ATCC 10541

SUMMARY & CONCLUSIONS:

K123714-5

Organism	Control	Cov-Rid High Level Disinfectant	Log Reduction
Staphylococcus aureus ATCC 6538	2.72x10 E7	<10 (<140)	>6.43 (>5.28)
Escherichia coli ATCC 10536	2.45x10 E7	<10 (<140)	>6.39 (>5.24)
Enterococcus hirae ATCC 10541	2.24x10 E7	<10 (<140)	>6.35 (>5.20)
Pseudomonas aeruginosa ATCC 15442	2.95x10 E7	6.0x10 E1 (<140)	5.69 (>5.32)

All test results below 140 (1.4x10 E2) are required to be reported as <140

The sample complies with the criteria of BSEN1276:2019 (log 5 reduction) after 5 minutes contact, against all four organisms, under the test conditions stated.

KMSelf

K.M.Self, M.B.I.C.Sc.,M.R.S.P.H,.A.M.S.B.

Detailed Results K123714-5 Cov-Rid High Level Disinfectant

Staphylococcus aureus ATCC 6538

Test Suspension (N + No)

N	V_{C1}	V_{C2}		
10^{-6}	266	274	Weighted Mean = 2.72x10 E8	log = 8.43
10^{-7}	27	32	No = N/10 = 2.72x10 E7	log = 7.43

Test (Na)

V_{C1}	V_{C2}	mean		
<1	<1	<1	Na = mean x10 = <10 (<140)	log = <1 (<2.15)

Log Reduction

>6.43 (>5.28)

Validation & Controls

Validation Suspension (Nvo)

V_{C1}	V_{C2}	mean
67	74	70.5

Experimental Conditions Control (A)

V_{C1}	V_{C2}	mean
65	70	67.5

Neutraliser Toxicity Control (B)

V_{C1}	V_{C2}	mean
64	74	69

Dilution Neutralisation Control (C)

V_{C1}	V_{C2}	mean
66	71	68.5

Detailed Results K123714-5 Cov-Rid High Level Disinfectant

Escherichia coli ATCC 10536

Test Suspension (N + No)

N	V_{C1}	V_{C2}		
10^{-6}	236	250	Weighted Mean = 2.45x10 E8	log = 8.39
10^{-7}	25	27	No = N/10 = 2.45x10 E7	log = 7.39

Test (Na)

V_{C1}	V_{C2}	mean		
<1	<1	<1	Na = mean x10 = <10 (<140)	log = <1 (<2.15)

Log Reduction

>6.39 (>5.24)

Validation & Controls

Validation Suspension (Nvo)

V_{C1}	V_{C2}	mean
62	58	60

Experimental Conditions Control (A)

V_{C1}	V_{C2}	mean
61	66	63.5

Neutraliser Toxicity Control (B)

V_{C1}	V_{C2}	mean
59	64	61.5

Dilution Neutralisation Control (C)

V_{C1}	V_{C2}	mean
58	66	62

Detailed Results K123714-5 Cov-Rid High Level Disinfectant

Enterococcus hirae ATCC 10541

Test Suspension (N + No)

N	V_{C1}	V_{C2}		
10^{-6}	218	230	Weighted Mean = 2.24x10 E8	log = 8.35
10^{-7}	20	25	No = N/10 = 2.24x10 E7	log = 7.35

Test (Na)

V_{C1}	V_{C2}	mean		
<1	<1	<1	Na = mean x10 = <10 (<140)	log = <1 (<2.15)

Log Reduction

>6.35 (>5.20)

Validation & Controls

Validation Suspension (Nvo)

V_{C1}	V_{C2}	mean
52	60	56

Experimental Conditions Control (A)

V_{C1}	V_{C2}	mean
55	61	58

Neutraliser Toxicity Control (B)

V_{C1}	V_{C2}	mean
52	56	54

Dilution Neutralisation Control (C)

V_{C1}	V_{C2}	mean
51	60	55.5

Detailed Results K123714-5 Cov-Rid High Level Disinfectant

Pseudomonas aeruginosa ATCC 15442

Test Suspension (N + No)

N	V_{C1}	V_{C2}		
10^{-6}	284	302	Weighted Mean = 2.95x10 E8	log = 8.47
10^{-7}	30	34	No = N/10 = 2.95x10 E7	log = 7.47

Test (Na)

V_{C1}	V_{C2}	mean		
8	4	6	Na = mean x 10 = 6.0x10 E1 (<140)	log = 1.78 (<2.15)

Log Reduction

5.69 (>5.32)

Validation & Controls

Validation Suspension (Nvo)

V_{C1}	V_{C2}	mean
72	78	75

Experimental Conditions Control (A)

V_{C1}	V_{C2}	mean
70	74	72

Neutraliser Toxicity Control (B)

V_{C1}	V_{C2}	mean
69	76	72.5

Dilution Neutralisation Control (C)

V_{C1}	V_{C2}	mean
70	76	73

APPENDIX 5

Scientific Services

Willow Farm,
Stewton,
Louth,
Lincolnshire,
LN11 8SD

Consultant Microbiologists
Animal feed Chemists

Mob: 07770 872461
Tel/Messages: 01507 328552
Email: kevinm.self@tiscali.co.uk

K122160-1 12th December 2020

LABORATORY REPORT

SOURCE: Knights Security Group Ltd

ITEMS: Cov-Rid High Level Disinfectant
Batch: 100212, DOM: 23/10/2020

TESTS: BSEN1650:2019
Concentration: Neat (Ready to use)
Temperature: 20ºC
Contact time: 15 minutes
Interfering substance: Bovine Albumin 3.0g/l (dirty)
Storage conditions: Room temperature, out of direct sunlight
Active substances: Not given
Test Date: 8th December 2020

Recovery: Dilution neutralisation, using:-
Tryptone Soya Broth containing Tween 80 100ml/l, Lecithin 30g/l, Sodium thiosulphate 5g/l, L-histidine 1g/l, L-cystine 1g/l

Test organism: Candida albicans ATCC 10231

SUMMARY & CONCLUSIONS:

K122160-1

Organism/Time	Control	Cov-Rid High Level Disinfectant	Log Reduction
Candida albicans ATCC 10231	2.22x10 E6	<10 (<140)	>5.35 (>4.20)

All test results below 140 (1.4x10 E2) are required to be reported as <140.

The sample complies with the criteria of BSEN1650:2019 (log 4 reduction) after 15 minutes contact against Candida albicans, under the test conditions stated.

KMSelf

K.M.Self, M.B.I.C.Sc.,M.R.S.P.H,.A.M.S.B.

Detailed Results K122160-1 Cov-Rid High Level Disinfectant

Candida albicans ATCC 10231

Test Suspension (N + No)

N	V_{C1}	V_{C2}		
10^{-5}	208	232	Weighted Mean = 2.22x10 E7	log = 7.35
10^{-6}	22	26	No = N/10 = 2.22x10 E6	log = 6.35

Test (Na)

V_{C1}	V_{C2}	mean		
<1	<1	<1	Na = mean x 10 = <10 (<140)	log = <1 (<2.15)

Log Reduction

>5.35 (>4.20)

Validation & Controls

Validation Suspension (Nvo)

V_{C1}	V_{C2}	mean
54	58	56

Experimental Conditions Control (A)

V_{C1}	V_{C2}	mean
54	56	55

Neutraliser Toxicity Control (B)

V_{C1}	V_{C2}	mean
50	55	52.5

Dilution Neutralisation Control (C)

V_{C1}	V_{C2}	mean
48	58	53

APPENDIX 6

Scientific Services

Willow Farm,
Stewton,
Louth,
Lincolnshire,
LN11 8SD

Consultant Microbiologists
Animal feed Chemists

Mob: 07770 872461
Tel/Messages: 01507 328552
Email: kevinm.self@tiscali.co.uk

K123716-7 26th August 2021

LABORATORY REPORT

SOURCE: Knights Security Group Ltd

ITEMS: Cov-Rid High Level Disinfectant

TESTS: BSEN1650:2019
Concentration: Neat (Ready to use)
Temperature: 20ºC
Contact time: 15 minutes
Interfering substance: Bovine Albumin 3.0g/l (dirty)
Storage conditions: Room temperature, out of direct sunlight
Active substances: Not given
Test Date: 21st August 2021

Recovery: Dilution neutralisation, using:-
Tryptone Soya Broth containing Tween 80 100ml/l, Lecithin 30g/l, Sodium thiosulphate 5g/l, L-histidine 1g/l, L-cystine 1g/l

Test organism: Aspergillus brasiliensis (Niger) ATCC 16404

SUMMARY & CONCLUSIONS:

K123716-7

Organism/Time	Control	Cov-Rid High Level Disinfectant	Log Reduction
Aspergillus brasiliensis (Niger) ATCC 16404	1.63x10 E6	5.0x10 E1 (<140)	4.51 (>4.06)

All test results below 140 (1.4x10 E2) are required to be reported as <140.

The sample complies with the criteria of BSEN1650:2019 (log 4 reduction) after 15 minutes contact against Aspergillus brasiliensis (Niger), under the test conditions stated.

KMSelf

K.M.Self, M.B.I.C.Sc.,M.R.S.P.H,.A.M.S.B.

Detailed Results K123716-7 Cov-Rid High Level Disinfectant

Aspergillus brasiliensis (Niger) ATCC 16404

Test Suspension (N + No)

N	V_{C1}	V_{C2}		
10^{-5}	158	164	Weighted Mean = 1.63x10 E7	log = 7.21
10^{-6}	16	20	No = N/10 = 1.63x10 E6	log = 6.21

Test (Na)

V_{C1}	V_{C2}	mean		
4	6	5	Na = mean x 10 = 5.0x10 E1 (<140)	log = 1.70 (<2.15)

Log Reduction

4.51 (>4.06)

Validation & Controls

Validation Suspension (Nvo)

V_{C1}	V_{C2}	mean
42	40	41

Experimental Conditions Control (A)

V_{C1}	V_{C2}	mean
43	38	40.5

Neutraliser Toxicity Control (B)

V_{C1}	V_{C2}	mean
46	39	42.5

Dilution Neutralisation Control (C)

V_{C1}	V_{C2}	mean
36	41	38.5

APPENDIX 7

Scientific Services

Willow Farm,
Stewton,
Louth,
Lincolnshire,
LN11 8SD

Consultant Microbiologists
Animal feed Chemists

Mob: 07770 872461
Tel/Messages: 01507 328552
Email: kevinm.self@tiscali.co.uk

K121812-20 26th October 2020

LABORATORY REPORT

SOURCE: Knights Security Group Ltd

ITEMS: COV-RID High Level Disinfectant

TESTS: In use fogging trial

METHOD: 55mm contact plates (TSA) are used to recover organisms from various surfaces prior to, and after, fogging. The area is fogged using a thermal fogger with an application rate of 1ml/m^3. Fogging and sampling performed by David Knights. Contact plates incubated for 72hours @ 30C.

RESULTS:

Sampling Area	Bacterial count (before)	Bacterial count (after)
Car ($4m^3$)		
Car Boot (carpet)	32	7
Middle of car (leather)	33	NA
Front of car (plastic)	29	2
Bathroom ($40m^3$)		
Sink	165	38
Bath	Too numerous to count	49
Shower	238	3
Pavillion ($50m^3$)		
Location 1 (wood)	12	0
Location 2 (glass)	2	0
Location 3 (carpet)	180	58

KMSelf

K.M.Self, M.B.I.C.Sc.,M.R.S.P.H,.A.M.S.B.

APPENDIX 8

Scientific Services

Willow Farm,
Stewton,
Louth,
Lincolnshire,
LN11 8SD

Consultant Microbiologists
Animal feed Chemists

Mob: 07770 872461
Tel/Messages: 01507 328552
Email: kevinm.self@tiscali.co.uk

K121887-901

7th November 2020

LABORATORY REPORT

SOURCE: Knights Security Group Ltd

ITEMS: COV-RID High Level Disinfectant

TESTS: In use fogging trial

METHOD: 55mm contact plates (TSA) are used to recover organisms from various surfaces prior to, and after, fogging. The area is fogged using a thermal fogger with an application rate of 1ml/m^3. Fogging and sampling performed by David Knights. Contact plates incubated for 72hours @ 30C.

RESULTS:

Sauna (Wood Surfaces) ($8m^3$)	Bacterial count (Pre-Fog)	Bacterial count (2 hrs Post Fog)	Bacterial count (4hrs Post Fog)	Bacterial count (6 hrs Post Fog)	Bacterial count (18hrs Post Fog)
Wall	18	6	0	0	0
Floor	*Tnc	44	32	45	39
Seat	*Tnc	76	50	23	29

*Tnc = Too numerous to count.

KMSelf

K.M.Self, M.B.I.C.Sc.,M.R.S.P.H,.A.M.S.B.

APPENDIX 9

Scientific Services

Willow Farm,
Stewton,
Louth,
Lincolnshire,
LN11 8SD

Consultant Microbiologists
Animal feed Chemists

Mob: 07770 872461
Tel/Messages: 01507 328552
Email: kevinm.self@tiscali.co.uk

K121982-90 20th November 2020

LABORATORY REPORT

SOURCE: Knights Security Group Ltd

ITEMS: COV-RID High Level Disinfectant

TESTS: In use fogging trial

METHOD: 55mm contact plates (TSA) are used to recover organisms from various surfaces prior to cleaning, after deep cleaning, and after fogging. The area is fogged using a thermal fogger with an application rate of 1ml/m^3. Fogging and sampling performed by David Knights. Contact plates incubated for 72hours @ 30C.

RESULTS:

Sampling Area	Bacterial count (before cleaning)	Bacterial count (after cleaning)	Bacterial count (after fogging)
Bathroom			
Bath	Tnc*	27	2
Shower	206	38	3
Sink	268	19	7

* = Too numerous to count.

KMSelf

K.M.Self, M.B.I.C.Sc.,M.R.S.P.H,.A.M.S.B.