The Torch+™ System UV Data Sheet

Torch+ Tower

ClorDiSys Solution's Torch+TM UV Disinfection System is a high-end, highly effective UV Disinfection System for rooms. The Torch+ offers many of the same features as other high-end UV Systems at a more affordable cost. The Torch+ is a portable, high efficiency device that is designed for reliable daily use to reduce organisms at your facility with no yearly service contract required. The Torch+ system itself offers excellent process control with a built-in UV-C sensor and an iPad™ for remote control and data logging. Treatment costs under a dollar and low lamp costs further enhance the affordability.

UV output was designed to obtain greater than 99% reduction of typical viruses and bacteria in a 1-minute timeframe and on spores like C. diff in a 5-minute timeframe within an 8 ft distance. The Torch+ produces a UVC intensity of approximately 12 mJ/cm^2 per minute (200 µw/cm^2) at an 8 feet distance.

Distance	UV-C Intensity	Dosage per minute
4 ft	378 µw/cm^2	22.68 mJ/cm^2
8 ft	200 µw/cm^2	12 mJ/cm^2
10 ft	128 µw/cm^2	7.68 mJ/cm^2

Background:

- On average, 5% of hospital patients develop an HAI, and 10% of ICU patients develop HAIs (Grohskopf 2002).
- 1.7 Million Americans contract an HAI every year. 99,000 of these patients die from the complications of an HAI (Srinivasan 2009).
- On average, hospital stays with infections due to medical care were 19.2 days longer and the cost was nearly $43,000 greater than stays without infections (Lucado 2010).
- CAUTIs, the most common HAI, account for 33% of all HAIs. CLABSIs and VAPs each account for 14%, meaning >60% are device-associated (Cass 2013)
- 33% of Operating Rooms responded as to having an infection or outbreak in the last six months (ICT 2013).
- 41% of patient rooms had at least one surface contaminated with MRSA and/or C. difficile (Faires 2013).

- Up to 60% of hospital uniforms are colonized with potentially pathogenic bacteria (Wiener-Well 2011).
- For healthcare workers entering a room containing a patient with MRSA infection, the bacteria would be found on the healthcare worker's clothes approximately 70 percent of the time, even if the healthcare worker did not touch the patient (Pyrek 2012).

Features:

Effective:

- The Torch+ utilizes 8 high-output UV-C bulbs to achieve efficient, fast disinfection times. UV-C output was designed to obtain a greater than 99% reduction of typical viruses and bacteria in a 1minute timeframe and on spores like C-diff in 5 minutes at a distance of 8 feet.
- The center of the Torch+ is open so that each of the 8 UV-C bulbs can radiate its light 360 degrees.
- The UV-C bulbs are angled to increase the dosage applied to the ceiling. Ceilings do not receive the same level of cleaning that floors get, so angling the bulbs allows the room to get a more complete disinfection.
- An integrated UV intensity sensor monitors both the intensity and overall UV-C dosage.

Economical:

The Torch+ is designed to be the lowest cost, high output, all-inclusive UV-C generator available.

- The Torch+ is priced much lower than similar UV-C Room Disinfection Systems.
- There are no required service or maintenance contracts with the Torch.
- The Torch+ has an average operational cost of 5¢ per hour of use.
- Premium solid state ballasts and quartz glass bulbs are used, which helps to extend the useable life of the UV-C bulbs to over 16,000 hours and reduce operational costs.
- In addition to their long lifespan, replacement UV-C bulbs are much less expensive than bulbs from other manufacturers to further reduce operational costs

Easy to Operate:

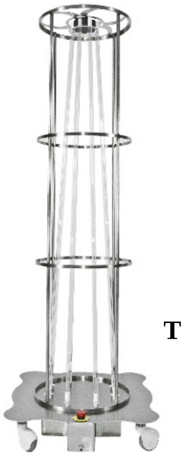
- The Torch+ is operated via iPad™ for control and monitoring from any location.
- Data from the iPad™ is emailed to a supervisor following every use, for enhanced record keeping.
- UV-C Sensor logs and trends exposure data, room number, and user information.
- The Torch+ draws only 6 amps of power, allowing it to be plugged into any outlet.
- Easily operated with minimal training.
- No special room preparation is required.
- No chemicals to store and handle

Safe to Operate:

Torch+ Emergency

- 4 motion sensors to abort the UV exposure if motion is sensed in room.
- Each Torch+ comes with an iPad™ such that it can be started from outside the room to further enhance the safety of the user.
- Each Torch tower has an emergency stop button to inhibit a cycle or abort the process if pressed if the process is started while someone is still in the room.
- No disposal of chemicals or clean up required after use.
- No special lamp recycling required.
- The bulbs used in the Torch are Low Ozone emitting bulbs, similar to traditional overhead bulbs.
- The Torch+ UV Disinfection System must be manually reset if safety device is tripped. This prevents inadvertent restart of UV exposure as a further safety precaution.

Specifications:



Torch+

- Torch+ Tower
  68" H x 23" D x 23" W (1727mm H x 584mm D x 584mm W)
  110-240 VAC, 6 Amps, 50/60 HZ
  71 lbs (32 kg)
- Lamps are rated for 16,000 hours.
- Lamp type: 4-pin, low pressure, UVC Germicidal, low ozone
- Lamp quantity: 8
- Power cable: 15 feet, hospital grade
- Produces an intensity of approximately 12 mJ/cm^2 per minute (200 μw/cm^2) at an 8-ft. distance.
- 3" diameter hospital grade wheels, resilient monoprene.

Design Features:

Protective Cover – A heavy duty cover is supplied with the Torch+ Tower to cover it when moving it around or storing it to better protect the lamps from damage.

Lamp Guard – A stainless steel protective lattice is incorporated into the Torch+ Tower to help protect the lamps from accidental breakage due to bumping hazards or items falling on it when the Protective Cover is not in place.

Bulbs:

ClorDiSys Solutions utilizes quartz lamps in the Torch+ UV System. Quartz is the premier material for UV producing lamps. ClorDiSys utilizes standard bulb lengths and ballasts. Our bulbs offer the best electrical efficiency by converting up to 40% of electrical power into to UV power. Our bulbs have a warm-up time of approx. 30 - 60 sec. With our LongLife+™ coating process, our low pressure mercury lamps have an operating life of up to 16,000 hours, maintaining an end-of-life UV-C output of 80%.

Used Bulb Waste Disposal

Our germicidal lamps are Toxicity Characteristic Leaching Procedure (TCLP) compliant. Lamps that PASS the TCLP test are considered as non-hazardous waste by the EPA.

In 1990 the EPA developed the TCLP test to simulate the effect of disposing waste in conventional landfills under complex environmental conditions. The method is designed to determine the mobility of toxic material in liquid, solid and multiphasic waste. The EPA developed the TCLP to determine the toxicity of waste. The TCLP test does NOT measure the total mercury content but rather the potential of mercury to leach into groundwater if the waste is disposed of in a landfill. TCLP is designed to simulate the leaching that the waste will undergo if disposed of in a sanitary landfill. This test includes mercury, lead, cadmium, and other hazardous materials. Passing this test for mercury, for instance, requires a yield of less than 0.2 milligrams per liter upon completion of the test.

While lamps that pass TCLP may be classified as non-hazardous waste by the EPA, ClorDiSys Solutions and Clean Hospitals strongly encourage the recycling of spent germicidal lamps. Please contact your local environmental agency for assistance with lamp recycling or visit www.lamprecycle.org.

Appendix 1 – About UV-C

For the past 100 years science has recognized the bactericide effects of the ultraviolet area of the electromagnetic spectrum. Below are some key contributions over the years:

1855 Arloing and Daclaux demonstrated sunlight killed Bacillus anthracis and Tyrothrix scaber

1877 Downes and Blunt reported bacteria were inactivated by sunlight – violet blue spectrum most effective

1889 Widmark confirmed UV rays from arc lamps were responsible for inactivation

1892 Geisler used a prism and heliostat to show sunlight and electric arc lamps are lethal to Bacillus Typhosus

1903 Banard and Morgan determined UV spectrum 226-328 nm is biocidal

1932 Ehris and Noethling isolated biocidal spectrum to 253.7 nm

1957 Riley proves effectiveness for Tb control

1994 CDC acknowledges UV effectiveness for Tb control

1999 WHO recommends UVGI for Tb control

2014 UV-C used as part of the terminal cleaning procedure within the Nebraska Biocontainment Unit upon ebola patient discharge

2020 UV-C Disinfection recommended for the disinfection of N95 masks and other PPE during SARS-CoV-2 pandemic.

The specific wavelengths responsible for the biocidal properties are situated between 240 - 280 nanometers (nm) with a peak wavelength at 265 nm. They are known as UV-C (see figure 1 & 2).

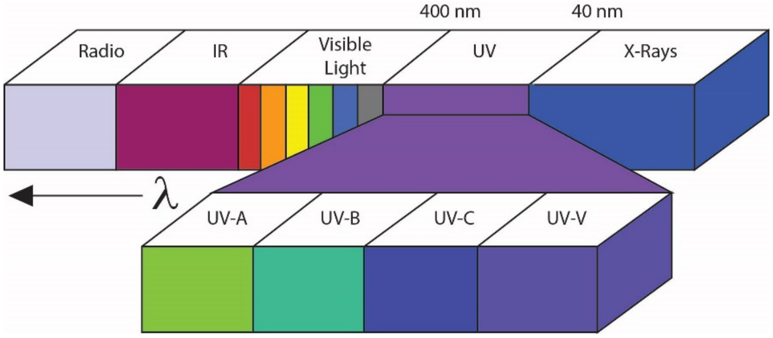


Fig. 1 - UV-C in the spectrum of electromagnetic radiation.

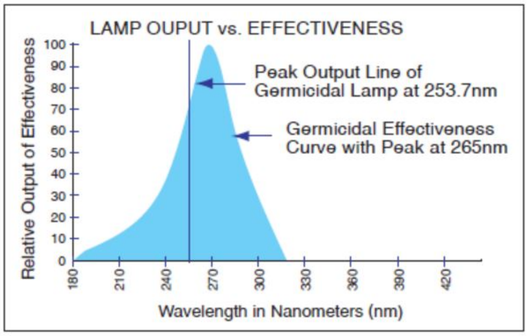


Fig. 2 - spectral energy distribution curve for germicidal action and spectral power distribution for low and medium pressure UV lamps.

UV-Action:

ClorDiSys' low-pressure, mercury-arc germicidal lamps are specially designed to produce the highest amounts of UV radiation - where 90% of energy is typically generated at 254nm. This radiation is very close to the peak of the germicidal effectiveness curve of 265nm, the most lethal wavelength to microorganisms. (See figure 2).

Our germicidal lamps are used extensively in the air purification markets and have been utilized in applications such as food and beverage, medical, HVAC (Heating, Ventilation and Air Conditioning), and pharmaceutical disinfection.

Our bulbs generate energy in the UV spectrum to destroy microorganisms: Microorganisms include several distinct groups of disease-causing germs, i.e. viruses, bacteria, fungi, algae and protozoa. The target of UV disinfection is the genetic material – nucleic acid. As UV light penetrates through the cell and is absorbed by the nucleic acids, a rearrangement of the genetic information occurs, interfering with the cells ability to reproduce. A cell that can't reproduce is considered dead; since it is unable to multiply to infectious numbers within a host. The maximum absorption of UV light by the nucleic acid, DNA, occurs at a wavelength of 265nm. The germicidal lamp emitting UV at 254nm is operating very close to the optimized wavelength the optimized wavelength for maximum absorption by nucleic acids.

Advantages of UV Radiation

Our process is environmentally friendly such that there are no dangerous or toxic chemicals that require specialized storage and/or handling and there are no concerns of overdosing. Since no chemicals are added to the air/water there are no process byproducts to be concerned with. Our equipment is cost effective with low initial capital cost and low operating costs. The process is effective since UV radiation offers immediate treatment process with no requirements for holding tanks or long retention/exposure times.

Safety

As UV-C provides radiation, it is not safe to be in the room while disinfection is taking place. UV-C is classified as “reasonably anticipated to be a human carcinogen” by the National Toxicology Program. It presents a hazard to skin and eyes, so direct exposure to UV-C is always to be avoided. UV-C is blocked by a number of materials, including glass (but not quartz glass) and most clear plastics, so it is possible to safely observe a UV-C system if you are looking through a window.

The process is environmentally friendly in that there are no dangerous or toxic chemicals that require specialized storage or handling. Since no chemicals are added to the air/water, there are no process byproducts to be concerned with. The UV bulbs do not require special handling or disposal either, making the system a green alternative to chemical disinfectants. UV-C provides residue free disinfection, so there is no concern over dangerous residues that need to be wiped down or neutralized after the disinfection occurs.

There has been concern with regard to the residual odors that have been noted after rooms are disinfected with ultraviolet light. Sometimes this smell is associated with ozone, a harmful gas. In reality, this odor is due to UV-C reacting with human dead skin cells and hair from dust in the room.
Up to 80% of airborne dust in homes, offices, and other indoor environments is made up of dead human skin and hair. Skin and hair cells consist of keratin, a protein, while hair also contains cysteine, an amino acid. When high energy UV-C light hits keratin/cysteine molecules, it has enough power to break their internal chemical bonds creating smaller, sulfur-containing compounds that fall into the categories of thiols. The human nose is extremely sensitive to thiols and can detect them at concentrations as low as 1 part per billion. Concentrations of thiol molecules after a UV-C disinfection are negligible when compared to the published acceptable exposure limit. This means that any odor present after a UV-C disinfection is not dangerous, making the room immediately safe to enter after a UV-C disinfection has been performed.

Ultraviolet Dose

The degree of inactivation by ultraviolet radiation is directly related to the UV dose applied. The UV dose is the product of UV intensity [I] (expressed as energy per unit surface area) and exposure time [T]. Therefore: DOSE = I x T

This dose is commonly expressed as millijoule per square centimeter (mJ/cm^2).

The reduction of micro-organisms is classified using a logarithmic scale. A single log reduction is a 90% reduction of organisms. A two log reduction is a 99% reduction of organisms, followed by a three log reduction (99.9%), etc. The UV-C exposure dosage needed for each level of reduction is shown in the table along with the published reference where the data came from.

The Torch+ produces an intensity of approximately 12 mJ/cm^2 per minute (200 μw/cm^2) at a 8-ft. distance.

UV Dose (mJ/cm^2) for Various Reduction Levels

Spore	90%	99%	99.9%	99.99%	99.999%	99.9999%	Reference
Bacillus anthracis spores – Anthrax spores	24.32	48.64	72.96	97.28			UV-Light.co.UK
Bacillus magaterium sp. spores	2.73	5.46	8.19	10.92			UV-Light.co.UK
Bacillus subtilis ATCC6633(spores	36	48.6	61	78			Chang et al. 1985
Clostridioides difficile (C. diff) spores	6.0	12.0	18.0	24.0			UV-Light.co.UK
Bacterium							
Aeromonas salmonicida	1.5	2.7	3.1	5.9			Liltved and Landfald 1996
Aeromonas hydrophila ATCC7966	1.1	2.6	3.9	5	6.7	8.6	Wilson et al. 1992
Bacillus anthracis – Anthrax	4.52	9.04	13.56	18.08			UV-Light.co.UK
Bacillus magaterium sp. (veg.)	1.3	2.6	3.9	5.2			UV-Light.co.UK
Bacillus paratyphusus	3.2	6.4	9.6	12.8			UV-Light.co.UK
Bacillus subtilis	5.8	11.6	17.4	23.2			UV-Light.co.UK
Campylobacter jejuni ATCC 43429	1.6	3.4	4	4.6	5.9		Wilson et al. 1992
Citrobacter diversus	5	7	9	11.5	13		Giese and Darby 2000
Citrobacter freundii	5	9	13				Giese and Darby 2000
Clostridium tetani	13.0	22.0					Light Sources Inc. 2014
Corynebacterium diphtheriae	3.37	6.74	10.11	13.48			UV-Light.co.UK
Ebertelia typhosa	2.14	4.28	6.42	8.56			UV-Light.co.UK
Escherichia coli O157:H7 CCUG 29193	3.5	4.7	5.5	7			Sommer et al. 2000
Escherichia coli O157:H7	<2	<2	2.5	4	8	17	Yaun et al. 2003
Halobacterium elongate ATCC33173	0.4	0.7	1				Martin et al. 2000
Halobacterium salinarum ATCC43214	12	15	17.5	20			Martin et al. 2000
Klebsiella pneumoniae	12	15	17.5	20			Giese and Darby 2000
Klebsiella terrigena ATCC33257	4.6	6.7	8.9	11			Wilson et al. 1992

UV Dose (mJ/cm^2) for Various Reduction Levels

Spore	90%	99%	99.9%	99.99%	99.999%	99.9999%	Reference
Legionella pneumophila ATCC33152	1.9	3.8	5.8	7.7	9.6		Oguma et al. 2004
Leptospiracanicola – infectious Jaundice	3.15	6.3	9.45	12.6			UV-Light.co.UK
Micrococcus candidus	6.05	12.1	18.15	24.2			UV-Light.co.UK
Micrococcus sphaeroides	1.0	2.0	3.0	4.0			UV-Light.co.UK
Mycobacterium tuberculosis	6.2	12.4	18.6	24.8			UV-Light.co.UK
MRSA	3.2	6.4	9.6	12.8			UV-Light.co.UK
Neisseria catarrhalis	4.4	8.8	13.2	17.6			UV-Light.co.UK
Phytomonas tumefaciens	4.4	8.8	13.2	17.6			UV-Light.co.UK
Proteus vulgaris	3.0	6.0	9.0	12.0			UV-Light.co.UK
Pseudomonas stutzeri	100	150	195	230			Joux et al. 1999
Pseudomonas aeruginosa	5.5	11.0	16.5	22.0			UV-Light.co.UK
Pseudomonas fluorescens	3.5	7.0	10.5	14.0			UV-Light.co.UK
Salmonella anatum (from human feces)	7.5	12	15				Tosa and Hirata 1998
Salmonella derby (from human feces)	3.5	7.5					Tosa and Hirata 1998
Salmonella enteritidis	4.0	8.0	12.0	16.0			UV-Light.co.UK
Salmonella infantis (from human feces)	2	4	6				Tosa and Hirata 1998
Salmonela paratyphi – Enteric fever	3.2	6.4	9.6	12.8			UV-Light.co.UK
Salmonella typhosa – Typhoid fever	2.15	4.3	6.45	8.6			UV-Light.co.UK
Salmonella typhimurium	8.0	16.0	24.0	32.0			UV-Light.co.UK
Sarcina lutea	19.7	39.4	59.1	78.8			UV-Light.co.UK
Serratia marcescens	2.42	4.84	7.26	9.68			UV-Light.co.UK
Shigella dyseteriae – Dysentery	2.2	4.4	6.6	8.8			UV-Light.co.UK
Shigella flexneri – Dysentery	1.7	3.4	5.1	6.8			UV-Light.co.UK
Shigella paradysenteriae	1.68	3.3	5.04	6.72			UV-Light.co.UK
Shigella sonnei ATCC9290	3.2	4.9	6.5	8.2			Chang et al. 1985
Spirillum rubrum	4.4	8.8	13.2	17.6			UV-Light.co.UK
Staphylococcus albus	1.84	3.68	5.52	7.36			UV-Light.co.UK
Staphylococcus aureus	2.6	5.2	7.8	10.4			UV-Light.co.UK
Staphylococcus hemolyticus	2.16	4.32	6.48	8.64			UV-Light.co.UK
Staphylococcus lactis	6.15	12.3	18.45	24.6			UV-Light.co.UK
Streptococcus faecalis ATCC29212	6.6	8.8	9.9	11.2			Chang et al. 1985
Streptococcus viridans	2.0	4.0	6.0	8.0			UV-Light.co.UK
Vibrio anguillarum	0.5	1.2	1.5	2			Liltved and Landfald 1996
Vibrio comma – Cholera	3.375	6.75	10.125	13.5			UV-Light.co.UK
Vibrio natriegens	37.5	75	100	130	150		Joux et al. 1999
Yersinia enterocolitica ATCC27729	1.7	2.8	3.7	4.6			Wilson et al. 1992
Yersinia ruckeri	1	2	3	5			Liltved and Landfald 1996
Yeasts							
Brewers yeast	3.3	6.6	9.9	13.2			UV-Light.co.UK
Common yeast cake	6.0	12.0	18.0	24.0			UV-Light.co.UK
Saccharomyces carevisiae	6.0	12.0	18.0	24.0			UV-Light.co.UK

UV Dose (mJ/cm^2) for Various Reduction Levels

Spore	90%	99%	99.9%	99.99%	99.999%	99.9999%	Reference
Saccharomyces ellipsoideus	6.0	12.0	18.0	24.0			UV-Light.co.UK
Saccharomyces spores	8.0	16.0	24.0	32.0			UV-Light.co.UK
Molds							
Aspergillius flavus	60.0	120.0	180.0	240.0			UV-Light.co.UK
Aspergillius glaucus	44.0	88.0	132.0	176.0			UV-Light.co.UK
Aspergillius niger	132.0	264.0	396.0	528.0			UV-Light.co.UK
Mucor racemosus A	17.0	34.0	51.0	68.0			UV-Light.co.UK
Mucor racemosus B	17.0	34.0	51.0	68.0			UV-Light.co.UK
Oospora lactis	5.0	10.0	15.0	20.0			UV-Light.co.UK
Penicillium digitatum	44.0	88.0	132.0	176.0			UV-Light.co.UK
Penicillium expansum	13.0	26.0	39.0	52.0			UV-Light.co.UK
Penicillium roqueforti	13.0	26.0	39.0	52.0			UV-Light.co.UK
Rhisopus nigricans	111.0	222.0	333.0	444.0			UV-Light.co.UK
Protozoan							
Chlorella Vulgaris	13.0	26.0	39.0	52.0			UV-Light.co.UK
Cryptosporidium hominis	3	5.8					Johnson et al. 2005
Cryptosporidium parvum	2.4	<5	5.2	9.5			Craik et al. 2001
Cryptosporidium parvum, oocysts, tissue culture assay	1.3	2.3	3.2				Shin et al. 2000
Encephalitozoon cuniculi, microsporidia	4	9	13				Marshall et al. 2003
Encephalitozoon hellem, microsporidia	8	12	18				Marshall et al. 2003
Encephalitozoon intestinalis, microsporidia	<3	3	<6	6			Huffman et al. 2002
Giardia lamblia	<10	~10	<20				Campbell et al. 2002
Giardia muris	<10	<10	<25	~60			Belosevic et al. 2001
Nematode Eggs	45.0	90.0	135.0	180.0			UV-Light.co.UK
Paramecium	11.0	22.0	33.0	44.0			UV-Light.co.UK

The following table shows the reduction values for various viruses.

UV Dose (mJ/cm^2) for Various Reduction Levels

Virus	Host	90%	99%	99.9%	99.99%	99.999%	99.9999%	Reference
Adenovirus type 15	A549 cell line (ATCC CCL-	40	80	122	165	210		Thompson et al. 2003
Adenovirus type 2	PLC / PRF / 5	40	78	119	160	195	235	Gerba et al. 2002
B40-8 (Phage)	B. Fragilis	11	17	23	29	35	41	Sommer et al. 2001
Bacteriophage – E. Coli		2.6	5.2	7.8	104.0			UV-Light.co.UK
Calicivirus canine	MDCK cell line	7	15	22	30	36		Husman et al. 2004
Calicivirus feline	CRFK cell line	5	15	23	30	39		Thurston-Enriquez et al. 2003
Coxsackievirus B3	BGM cell line	8	16	24.5	32.5			Gerba et al. 2002
Coxsackievirus B5	BGM cell line	9.5	18	27	36			Gerba et al. 2002
Echovirus I	BGM cell line	8	16.5	25	33			Gerba et al. 2002
Echovirus II	BGM cell line	7	14	20.5	28			Gerba et al. 2002
Hepatitis A HM175	FRhK-4 cell	5.1	13.7	22	29.6			Wilson et al. 1992
Infectious Hepatitis		5.8	11.6	17.4	232.0			UV-Light.co.UK
Influenza		3.4	6.8	10.2	136.0			UV-Light.co.UK
MS2 (Phage)	*E. coli*		45	75	100	125	155	Thompson et al. 2003
Norovirus		10	16	22	26	30		Lee et al. 2008
Parvovirus		2.2	4.6					Cornelis et al. 1982
PHI X 174 (Phage)	*E. coli* WG 5	3	5	7.5	10	12.5	15	Sommer et al. 2001
Poliovirus – Poliomyelitis		3.15	6.3	9.45	126.0			UV-Light.co.UK
Poliovirus 1	CaCo2 cell-line (ATCC HTB37)	7	17	28	37			Thompson et al. 2003
PRD-1 (Phage)	S. typhimurium	9.9	17.2	23.5	30.1			Meng and Gerba 1996
Reovirus Type 1 Lang strain	N/A	16	36					Harris et al. 1987
Reovirus-3	Mouse L-60	11.2	22.4					Rauth 1965
Rotavirus	MA104 cells	20	80	140	200			Caballero et al. 2004
Rotavirus SA-11	MA-104 cell	9.1	19	26	36	48		Wilson et al. 1992
SARS-CoV-2	N/A		5				22	Boston University, 2020
Staphylococcus aureus phage A	*Staphylococcus aureus* 994	8	17	25	36	47		Sommer et al. 1989
Tobacco mosaic	N/A	240.0	440.0					Light Sources Inc. 2014

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Appendix 2 – Persistence of Bacteria

(As compiled via a Google Search)

Persistence of Clinically Relevant Bacteria on Dry Inanimate Surfaces[1]	
Organism	**Persistence**
Acinetobacter spp.	3 days - 5 months
Bordetella pertussis	3-5 days
Campylobacter jejuni	Up to 6 days
Clostridium difficile (spores)	5 months
Chlamydia pneumoniae	Up to 30 hours
Chlamydia psittaci	15 days
Corynebacterium diphtheria	7 days – 6 months
Corynebacterium pseudotuberculosis	1-8 days
Escherichia coli	1.5 hours – 16 months
Enterococcus spp. including VRE and VSE	5 days – 4 months
Haemophilus influenza	12 days
Helicobacter pylori	Up to 90 minutes
Klebsiella spp.	2 hours – 30 months
Listeria spp.	1 day – 4 months
Mycobacterium bovis	Up to 2 months
Mycobacterium tuberculosis	1 day – 4 months
Neisseria gonorrhoeae	1-3 days
Proteus vulgaris	1-2 days
Pseudomonas aeruginosa	6 hours – 16 months; 5 weeks on dry floor
Salmonella typhi	6 hours – 4 weeks
Salmonella typhimurium	10 days – 4.2 years
Salmonella spp.	1 day
Serratia marcescens	3 days – 2 months; 5 weeks on dry floor
Shigella spp.	2 days – 5 months
Staphylococcus aureus, including MRSA	7 days – 7 months
Streptococcus pneumoniae	1-20 days
Streptococcus pyogenes	3 days – 6.5 months
Vibrio cholera	1-7 days

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