KOOPTECH®

UV-C DB90.1 BOX
UV-C DB60.0 BOX
For Optical and Sunglasses

RELIABLE REDUCTION of BACTERIA, VIRUSES and FUNGI

KOOPTECH® – CINEMA

RELIABLE REDUCTION of BACTERIA, VIRUSES and FUNGI

Kooptech® UV-C DB.90.1 and DB60.0 Boxs are a universal solution for the reduction of bacteria, viruses and fungi with UV-C irradiation.

UV-C Box can be used with a variety of items, optical and sunglassses being among them.

Similarily to any other public place, optical stores may become a center of unintentional transmission of infections between Clients and staff. This results directly from repeated try-ons of not-disinfected glasses, exposed to aerosols exhaled through nose and mouth, direct contact with human skin and vicinity of uncovered surfaces of the eyes.

Therefore, it is recommended that they are treated with UV-C germicidal irradiation that can further decrease the risk of exposure to pathogens that cause infections[1]. UV-C irradiation has been successfully used for many years for disinfection* purposes in water treatment and surface and air disinfection.

Optimal placement of lamps inside the **UV-C DB90.1 DB60.0 Boxs** and the use of a highly reflective coating creates a uniform UV-C irradiation inside the box and maximizes the efficacy of UV-C irradiation on the glasses.

<u>**UV-C DB.90.1 and DB60.0 Boxs has been certified by accredited laboratory.**</u>

UV-C Disinfection Box is aesthetic and compact. Displayed in the right place, not only it fulfills its disinfecting function, but also increases the sense of safety and builds confidence in Clients.

The operation is simple and does not require any specialized training.
The device is ready for use immediately after connecting to the power.

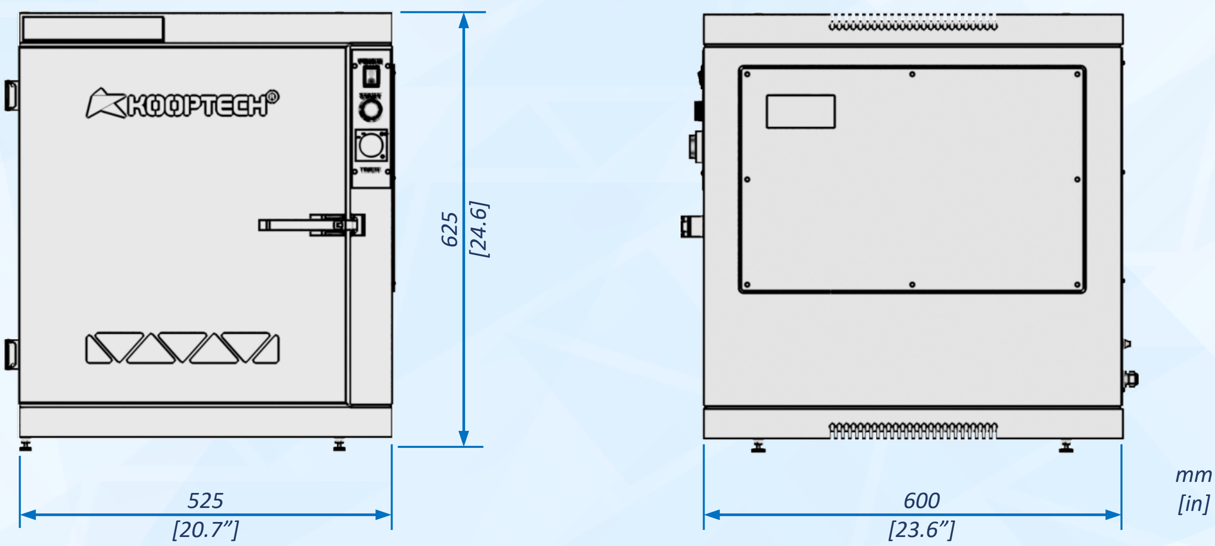
*All references to 'disinfection' are referring generally to the reduction of pathogenic bioburden and are not intended to refer to any specific definition of the term as may be used for other purposes by the U.S. Food and Drug Administration or the U.S. Environmental Protection Agency.

TECHNICAL SPECIFICATION

parameter	Kooptech® UV-C DB90.1 Box
dimensions (W x H x D)	20.7” x 24.6” x 23.6” (525 mm x 625 mm x 600 mm)
weight (without baskets)	77.2 lbs. (35.0 kg)
nominal supply voltage	1-phase, 110 VAC or 230 VAC (selectable), 50-60 Hz
connection power	90 W
power connection cable length	4.9 ft (1.5 m)
cycle time	adjustable – from 1 min to 3 min
max ambient temperature	95°F (35°C)
max ambient humidity	80% (no condensation)
UV-C lamps specification	6x 15 W T8 UV-C (254 nm germicidal lamps)
UV-C lamps life	9 000 hrs*
minimum UV-C irradiance 100 mm away from the lamps	10 W/m^2

*With Philips TUV T8 15W UV-C lamps, at depreciation of UV-C output by -10% (based on manufacturer’s data)

- **external dimensions**

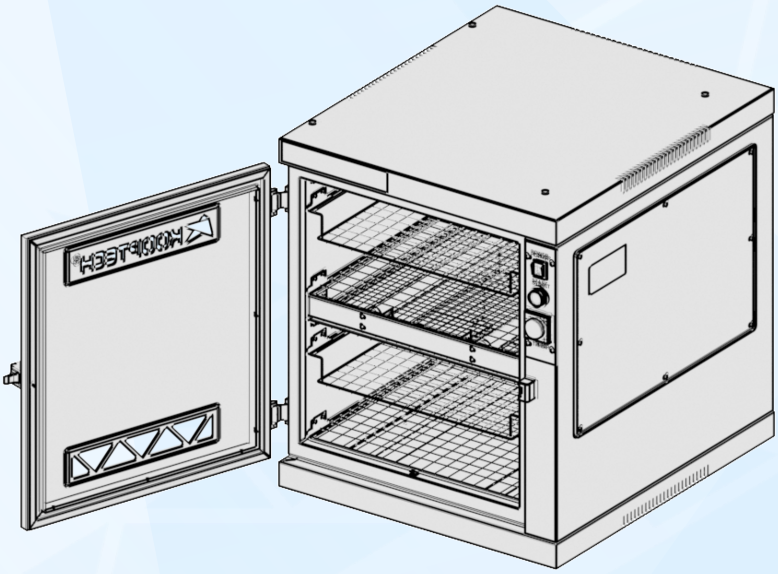


KOOPTECH® UV-C DB90.1 BOX

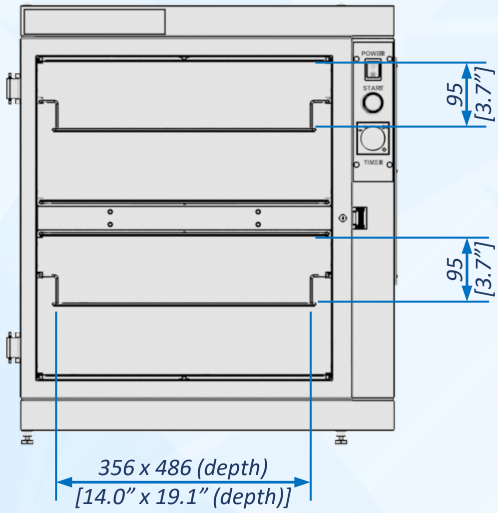
The Kooptech® UV-C DB90.1 Box can be used for disinfection of other items.

UV-C Box is equipped with 2 removable Trays that can be used for keeping various items inside the Box.**

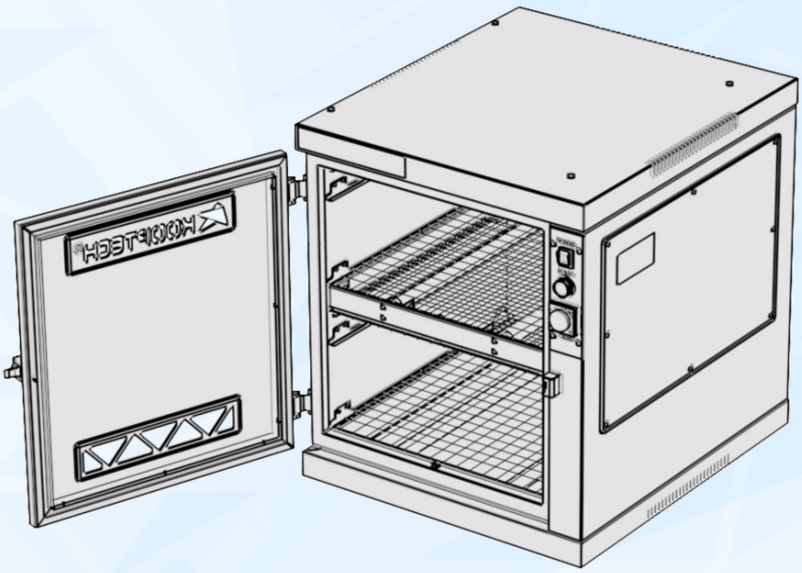
Available disinfection space with Trays inside the Box



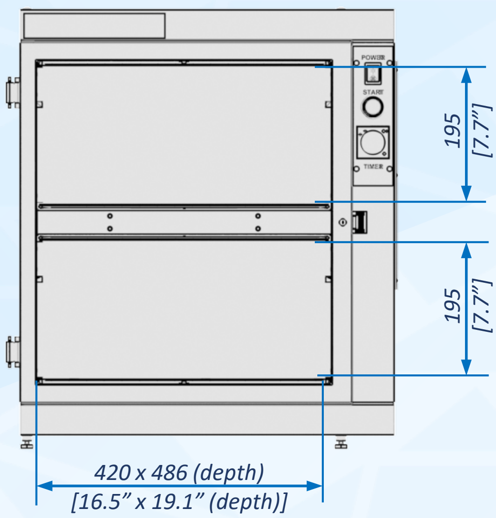
max load per tray
8.8 lbs (4 kg)



Available disinfection space with Trays removed

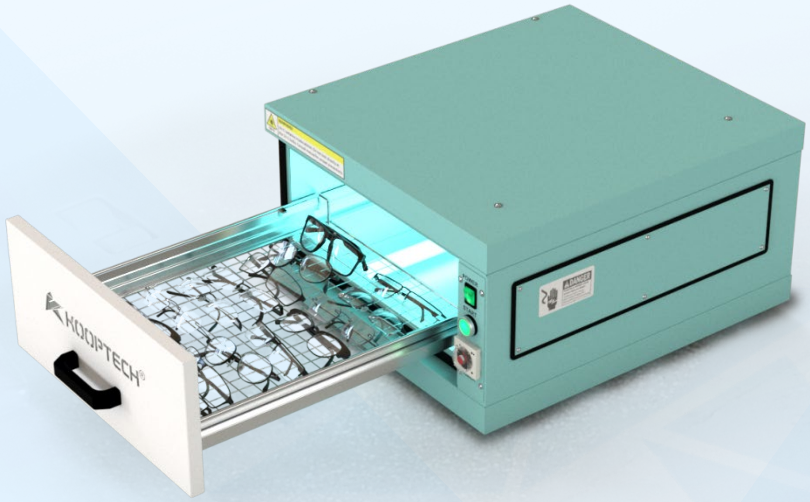


max load per tray
8.8 lbs (4 kg)



** Applicable to items that may be safely exposed to UV-C irradiation; effectiveness of disinfection depends on surface properties of the items placed inside the UV-C DB90.1 Box as well as on the orientation of the surfaces and amount of UV-C light reaching these surfaces.

KOOPTECH® UV-C DB60.0 BOX

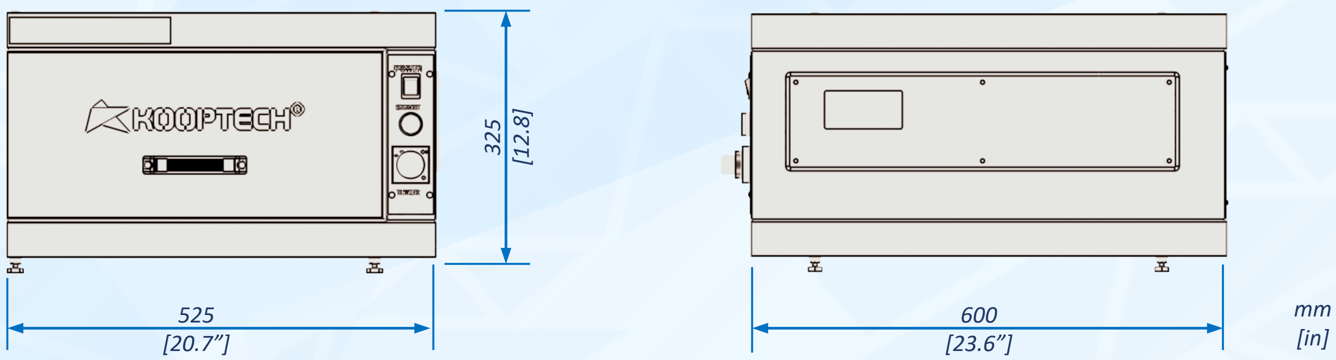


TECHNICAL SPECIFICATION

parameter	Kooptech® UV-C DB60.0 Box
dimensions (W x H x D)	20.7” x 12.8” x 23.6” (525 mm x 325 mm x 600 mm)
weight (without baskets)	55.1 lbs. (25.0 kg)
nominal supply voltage	1-phase, 110 VAC or 230 VAC (selectable), 50-60 Hz
connection power	60 W
power connection cable length	4.9 ft (1.5 m)
cycle time	adjustable – from 1 min to 3 min
max ambient temperature	95°F (35°C)
max ambient humidity	80% (no condensation)
UV-C lamps specification	4x 15 W T8 UV-C (254 nm germicidal lamps)
UV-C lamps life	9 000 hrs*
minimum UV-C irradiance 100 mm away from the lamps	10 W/m^2

*With Philips TUV T8 15W UV-C lamps, at depreciation of UV-C output by -10% (based on manufacturer’s data)

- **external dimensions**



MANUFACTURER

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customerservice@ushio.com

GERMICIDAL EFFECT

The typical value of UV-C irradiation inside the **UV-C DB90.1 Box**, at a distance of 100 mm away from the lamps, is 10 W/m² (1 mW/cm²). With a typical treatment time of 150 seconds, **the effective dose of UV-C irradiation is then equal to 1500 J/m² (150 mJ/cm²).**

Based on data published by IUVA, the table on next pages presents examples of bacteria, viruses and fungi, and effective doses of UV-C 254 nm irradiation required for various levels of reduction of microorganisms (highlighted are values below the typical **150 mJ/cm²** of the **Kooptech® UV-C DB90.1**).

microbe	**typical values for surface treatment**				
	K [m²/J]	**dose [mJ/cm²] for reduction by**			
		90%	**99%**	**99.9%**	**99.99%**
bacteria (veg.)	0.14045	2	3	5	7
viruses	0.03156	7	15	22	29
bacterial spores	0.01823	13	25	38	51
fungal cells/yeast	0.00700	33	66	99	132
fungal spores	0.00789	29	58	88	117

Developed based on International Ultraviolet Association Inc. resources[2]

Kooptech® UV-C DB90.1 Box provides an average dose of min. 150 mJ/cm² - **higher than typical doses required for 99.99% reduction of microbes**

GERMICIDAL EFFECT

BACTERIA	fluence (dose) in [mJ/cm²] for a log reduction / percentage reduction without photoreactivation				reference
	1	2	3	4	
	90.0%	99.0%	99.9%	99.99%	
Aeromonas hydrophila (ATCC7966)	1.1	2.5	4.0	5.5	Wilson et al. 1992
Aeromonas salmonicida (AL 2017)	1.5	2.7	3.1	5.9	Liltved and Landfald 1996
Arthrobacter nicotinovorans (ATCC 49919)	8	10	12	14	Clauß 2006
Bacillus cereus (veg. bacteria, ATCC 11778)	6	7	8	12	Clauß 2006
Burkholderia mallei (M13)	1.2	2.7	4.1	5.5	Rose and O'Connell 2009
Brucella melitensis (ATCC 23456)	2.8	5.3	7.8	10.3	Rose and O'Connell 2009
Burkholderia pseudomallei (ATCC 11688)	1.7	3.5	5.5	7.4	Rose and O'Connell 2009
Brucella suis (KS528)	2.7	5.3	7.9	10.5	Rose and O'Connell 2009
Campylobacter jejuni (ATCC 43429)	1.0	2.1	3.4	4.6	Wilson et al. 1992
Citrobacter diversus	5	7	9	11.5	Giese and Darby 2000
Citrobacter freundii	5	9	13		Giese and Darby 2000
Enterococcus faecium (Vancomycin-resistant)	7	9	11	13	McKinney and Prude 2012
Enterococcus faecalis (DSM 20478)	7.1	8.7	13 + tailing		Chen et al. 2015
Escherichia coli (ATCC 700891)	7.3	10	12	13	Quek and Hu 2009
Faecal coliforms	6	9	13	22	Maya et al. 2003
Francisella tularensis (NY98)	1.4	3.8	6.3	8.7	Rose and O'Connell 2009
Faecal streptococci	9	14	22	30	Maya et al. 2003
Halobacterium elongata (ATCC 33173)	0.4	0.7	1.0		Martin et al. 2000
Halobacterium salibarum (ATCC 43214)	12	15	18	20	Martin et al. 2000
Helicobacter pylori (ATCC 43504)	4.5	5.7	6.7	7.5	Hayes et al. 2006
Klebsiella pneumoniae	5	7	10	12	Giese and Darby 2000
Klebsiella terrigena)ATCC 33257)	3.6	6.4	9.3	12	Wilson et al. 1992
Legionella longbeachae (ATCC 33462)	1.4	3.0	4.7	6.3	Cervero-Arago et al. 2014
Legionella pneumophila (ATCC 43660)	3.0	5.0	7.2	9.3	Wilson et al. 1992
Leptospira (biflexa serovar patoc, Patoc I)	2.3	3.8	5.1	6.7	Stamm and Charon 1988
Listeria monocytogenes	2.2	3.0	3.2	4.1	Collins 1971
Mycobacterium avium (D55A01)	6.4	9.4	12	15	Hayes et al. 2008
Mycobacterium avium hominissuis (HMC02, WT)	7.7	12	17	22	Shin et al. 2008
Mycobacterium bovis (BCG)	2.2	4.4			Collins 1971
Mycobacterium intracellulare (ATCC 13950)	7.4	11	15	19	Hayes et al. 2008
Mycobacterium terrae (ATCC 15755)	3.7	9.3	16		Bohrerova and Linden 2006b
Mycobacterium tuberculosis	2.2	4.3			Collins 1971
Pseudomonas aeruginosa (ATCC 9027)	3.8	6.5	10	17	Abshire and Dunton 1981
Salmonella spp.	<2	2	3.5	7	Yaun et al. 2003
Salmonella typhimurium (ATCC 6539)	2.6	4.5	5.8	7	Chang et al. 1985
Shewanella algae	0.9	1.7	2.4	3.2	Qiu et al. 2004
Shewanella oneidensis (MR4)	0.7	1.4	2.1	2.8	Qiu et al. 2004
Shewanella putrefaciens (200)	0.5	0.8	1.1	1.4	Qiu et al. 2004
Shigella dysenteriae (ATCC 29027)	0.1	1.0	1.9	2.8	Wilson et al. 1992
Shigella sonnei (ATCC 9290)	3.2	4.9	6.5	8.2	Chang et al. 1985
Staphylococcus albus	1.1	3.2	4.0	4.8	Collins 1971
Staphylococcus aureus (ATCC BAA-1556)	4.5	7.2	8.8	10	McKinney and Prude 2012
Streptococcus faecalis (ATCC 29212)	6.6	8.6	9.8	11.1	Chang et al. 1985

GERMICIDAL EFFECT (continued)

BACTERIA (continued)	fluence (dose) in [mJ/cm²] for a log reduction / percentage reduction without photoreactivation				reference
	1	2	3	4	
	90.0%	99.0%	99.9%	99.99%	
Vibrio anguillarum	0.5	1.2	1.5	2.0	Liltved and Landfald 1996
Vibrio cholerae (classical OGAWA 154)	0.8	1.4	2.3	3.9	Banerjee et al. 1977
Yersinia enterocolitica (ATCC 27729)	1.6	2.7	4.0	5.1	Wilson et al. 1992
Yersinia pestis (A1122)	1.4	2.6	3.7	4.9	Rose and O'Connell 2009

Developed based on Malayeri A. H. et al., Fluence (UV Dose) Required to Achieve Incremental Log Inactivation of Bacteria, Protozoa, Viruses and Algae, source: iuva.org; only results from LP 254 nm lamps presented in the table; in case of more results from one family of microorganisms, values for the most resistance microorganism were selected;

VIRUSES	fluence (dose) in [mJ/cm²] for a log reduction / percentage reduction without photoreactivation				reference
	1	2	3	4	
	90.0%	99.0%	99.9%	99.99%	
Adenovirus, type 1 (host: PLC/PRF/5 & HeLa cell line)	35	69	103	138	Nwachuku et al. 2005
Adenovirus, type 2 (host: PLC/PRF/5)	40	78	119	160	Gerba et al. 2002
Adenovirus, type 2 (host: human lung cell line)	35	55	75	100	Ballester & Malley 2004
Adenovirus, type 2 (host: A549 cell line, CCL-185)	26	100	135	168	Boczek et al. 2016
Adenovirus, type 4; ATCC VR-1572 (host: PLC/PRF/5 ATCC CRL-8024)	10	34	69	116	Gerrity et al. 2008
Adenovirus, type 5 (host: A549 cell line, CCL-185)	51	101	151		Rattanakul et al. 2014
Adenovirus, type 6 (host: PLC/PRF/5 & HeLa cell line)	39	77	115	154	Nwachuku et al. 2005
Adenovirus, type 40 (host: HEK293)	35	70	105	139	Guo et al. 2010
Adenovirus, type 41 (host: HEK293)	45	91	136	182	Guo et al. 2010
Calicivirus feline (host: CRFK cell line)	7	16	25		de Roda Husman et al. 2004
Coronavirus	0.7	1.3	2.0	2.6	Walker 2007
Coronaviridae (Berne virus)	0.7	1.4	2.2	2.9	Weiss 1986
Coronavirus (Murine, MHV)	1.5	3	4.5	6	Hirano 1978
Coronavirus (SARS, Cov-P9)	4	8	12	16	Duan 2003
Coronavirus (SARS, Hanoi)	13.4	26.8	40.2	53.5	Kariwa 2004
Coxsackievirus, B3 (host: BGM cell line)	8	16	25	33	Gerba et al. 2002
Coxsackievirus, B4 (host: BGM cell line)	7	13	18	24	Shin et al. 2005
Coxsackievirus, B5 (host: BGM cell line)	9.5	18	27	36	Gerba et al. 2002
Echovirus I (host: BGM cell line)	8	17	25	33	Gerba et al. 2002
Echovirus II (host: BGM cell line)	7	14	21	28	Gerba et al. 2002
Hepatitis A HM175 (host: FRhK-4 cell)	5.4	15	25	35	Wilson et al. 1992
Influenza	3.4	6.8	10.2	13.6	UV-Light.co.uk
JC polyomavirus (host: SVG-A cells)	60	124	171		Calgua et al. 2014
Myoviridae (host: E. coli C)	1.8	3.6	5.1	6.7	Shin et al. 2005
Picornaviridae aphthovirus AS 1 (host: BHK-21)	31	63	94	125	Nuanualsuwan et al. 2008
Poliovirus, type 1 (host: BGM cell line)	8	16	23	31	Gerba et al. 2002
Reovirus, type 1 Lang strain	16	36			Harris et al. 1987
Rotavirus SA-11 (host: MA 104 cell line)	9	19	26	36	Wilson et al. 1992
Siphoviridae (host: E. coli C)	1.8	3.6	5.7	7.5	Shin et al. 2005

Developed based on Malayeri A. H. et al., Fluence (UV Dose) Required to Achieve Incremental Log Inactivation of Bacteria, Protozoa, Viruses and Algae, source: iuva.org, and Kowalski W. J., Walsh T. J., Petraitis V. 2020 COVID-19 Coronavirus Ultraviolet Susceptibility; only results from LP 254 nm lamps presented in the table; in case of more results from one family of microorganisms, values for the most resistance microorganism were selected;

GERMICIDAL EFFECT (continued)

SPORES	fluence (dose) in [mJ/cm^2] for a log reduction / percentage reduction without photoreactivation				reference
	1	2	3	4	
	90.0%	99.0%	99.9%	99.99%	
Aspergillus brasiliensis	122	226	293		Taylor-Edmonds et al. 2015
Bacillus anthracis (Sterne)	28	37	52		Nicholson & Galeano 2003
Bacillus atrophaeus (ATCC 9372)	22	38	55	71	Zhang et al. 2014
Bacillus cereus (ATCC 11778)	52	93	140		Clauß 2006
Bacillus pumilus (ATCC 27142)	68	138	204	272	Boczek et al. 2016
Bacillus subtilis (ATCC 6633)	36	48	59	77	Chang et al. 1985
Cylindrospermum (spores)	14	26	43		Singh 1975
Clostridium pasteurianum (ATCC 6013)	3.4	5.3	6.7	8.4	Clauß 2006
Encephalitozoon intestinalis	2.8	5.6	8.4		John et al. 2003
Penicillium expansum (ATCC 36200)	11	38	49	65	Clauß 2006
Streptomyces griseus (10137)	8.5	13	15	18	Clauß 2006
Thermoactinomyces vulgaris (ATCC 43649)	55	90	115	140	Clauß 2006

Developed based on Malayeri A. H. et al., Fluence (UV Dose) Required to Achieve Incremental Log Inactivation of Bacteria, Protozoa, Viruses and Algae, source: iuva.org; only results from LP 254 nm lamps presented in the table; in case of more results from one family of microorganisms, values for the most resistance microorganism were selected;

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