

In September 2020, R-Zero engaged an independent clinical testing lab, to validate the efficacy of its flagship UV-C disinfection system, Arc, against human coronavirus, feline calicivirus (FCV), MRSA and E. coli carriers. R-Zero selected microorganisms endemic to the environments Arc will be used in, ensuring partners understand Arc’s efficacy against the pathogens most important to them. The following represents the results of that testing.

Evaluation of Virucidal Efficacy of Three UV Devices Versus Two Viral Strains (Study ID Number: 2005308-404)

TESTING LABORATORY: [Bioscience Laboratories, Inc](#) is an EPA and FDA GLP-Compliant, ISO 17025 Accredited Testing Laboratory (American Association for Laboratory Accreditation, certificate number 3945.01). Tests were conducted at the Bioscience laboratory, 1755 South 19th Avenue, Bozeman, MT 59718.

TEST METHOD: Testing was designed to simulate the consumer use and was based upon the procedures outlined in the American Society of Test Materials (ASTM) test methods designated:

- **ASTM E1053-20**, *Standard Test Practice to Assess Virucidal Activity of Chemicals Intended for Disinfection of Inanimate, Nonporous Environmental Surface.*
- **ASTM E3135-18**, *Standard Practice for Determining Antimicrobial Efficacy of Ultraviolet Germicidal Irradiation Against Microorganisms on Carriers with Simulated Soil*

PRODUCT TESTED: R-Zero Arc

- (UV light device, 78 inches tall, with wheels, with four long-range sensors and eight maximum output bulbs)

STUDY COMPLETE: 9/20/2020

STUDY CONCLUSIONS:

Under the conditions of this evaluation, R-Zero Arc reduced the infectivity of *Human Coronavirus*, strain 229E (ATCC #VR-740) and *Feline Calicivirus*, strain F9 (FCV; ATCC #VR-782) by an average of 99.99% following a 7 minutes exposure at a distance of 8 feet.

Evaluation of Virucidal Efficacy of Three UV Devices Versus Two Viral Strains (Study ID Number: 2005308-404)					
Microorganism Species (ATCC #)	Distance (feet)	Exposure Time (minutes)	Log Reduction	Percent Reduction	Average Percent Reduction
<i>Human Coronavirus</i> , strain 229E (ATCC #VR-740)	8	7	≥ 3.833	≥99.99	≥99.99%
			≥ 3.833	≥99.99	
			≥ 3.833	≥99.99	
<i>Feline Calicivirus</i> , strain F9, EPA-approved surrogate for Human Norovirus (FCV; ATCC #VR-782)	8	7	4.917	>99.99	>99.99%
			4.833	>99.99	
			4.833	>99.99	

**Evaluation of Antibacterial Efficacy of Three UV Devices Versus Two Bacterial Strains
(Study ID Number: 2006455-204)**

TESTING LABORATORY: [Bioscience Laboratories, Inc.](#) is an EPA and FDA GLP-Compliant, ISO 17025 Accredited Testing Laboratory (American Association for Laboratory Accreditation, certificate number 3945.01). Tests were conducted at the Bioscience laboratory, 1755 South 19th Avenue, Bozeman, MT 59718.

- Tests were conducted at the Bioscience laboratory, 1755 South 19th SAvenue, Bozeman, MT 59718.

TEST METHOD: Testing was designed to simulate the consumer use and was based upon the procedures outlined in the American Society of Test Materials (ASTM) test methods designated:

- **ASTM E3135-18**, *Standard Practice for Determining Antimicrobial Efficacy of Ultraviolet Germicidal Irradiation Against Microorganisms on Carriers with Simulated Soil*

PRODUCT TESTED: R-Zero Arc

- (UV light device, 78 inches tall, with wheels, with four long-range sensors and eight maximum output bulbs)

STUDY COMPLETE: 11/12/2020

STUDY CONCLUSIONS:

Under the conditions of this evaluation, R-Zero Arc reduced the microbial populations of *Escherichia coli* (ATCC #25922) and *Staphylococcus aureus* MRSA (ATCC #33591) by an average of 99.99% following a 7 minutes exposure at a distance of 8 feet.

Evaluation of Antibacterial Efficacy of Three UV Devices Versus Two Bacterial Strains (Study ID Number: 2006455-204)					
Microorganism Species (ATCC #)	Distance (feet)	Time (minutes)	Mean CFU/Carrier (C) n=3	Percent Reduction	Average Percent Reduction
<i>Escherichia coli</i> (ATCC #25922)	8	7	1.95 x 10 ⁶	99.99	99.99%
			1.95 x 10 ⁶	99.99	
			1.95 x 10 ⁶	99.99	
<i>Staphylococcus aureus</i> MRSA (ATCC #33591)	8	7	2.03 x 10 ⁶	99.99	99.99%
			2.03 x 10 ⁶	99.99	
			1.64 x 10 ⁷	99.99	