Microbiology Standards

The Simple Way to Ensure Accurate Results, Every Time

Vitroids™ and LENTICULE® discs

Defined CFU range and low standard deviation

Fast, reliable and easy to use

NCTC
National Collection of Type Cultures

NCPF
National Collection of Pathogenic Fungi

CECT
Vniversitat de València
Derived from CECT® strains

Produced in double accredited laboratory fulfilling
ISO/IEC 17025 and
ISO 17034

MilliporeSigma is the U.S. and Canada Life Science business of Merck KGaA, Darmstadt, Germany.

Millipore®
Preparation, Separation, Filtration & Monitoring Products

The Simple Way to Ensure Accurate Results, Every Time

Certified Reference Microorganisms

Why use CRMs in Microbiology?

In pharmaceutical, food, water, and environmental microbiology, laboratory results are an important part of a wider process that helps to confirm that samples are of an acceptable microbiological quality, are safe and comply with relevant legislation or guidelines. Quality control is an essential element of a laboratory's quality assurance system and characterized authenticated reference materials are necessary for effective quality control.

The same is true of microbiological testing; the one factor that is repeatedly overlooked is careful sourcing of biological resources such as the quality control strains. Incorrect quality control materials may indicate that test results are acceptable when, in fact, there is a problem with the samples being tested. Alternatively, control results may indicate that a test is not performing correctly, instigating unnecessary investigations and repeat testing.

Ready-to-use microbiological controls minimize the need for maintaining control strains in the test laboratory and guarantee that an authenticated control culture is used for every quality control test. Such control materials must be fit-for-purpose, bearing in mind that for pharmaceutical, food, water, and environmental samples, the ability to accurately and reliably enumerate microorganisms—often at relatively low numbers—is essential. It is also important that controls can be applied to the wide range of different matrices that are often tested in a single laboratory.

The application of a unique preservation technology involving controlled-drying of authenticated cultures of internationally accepted microbiology control strains has resulted in the production of single-use discs containing microorganisms, designed for use in pharmaceutical, food, water and environmental testing laboratories. These quality control materials, LENTICULE® discs (developed by UK Health Security Agency, UKHSA) and Vitroids™ (developed by us), are now manufactured by our company under conditions compliant with ISO 17034.[1] The discs contain pure cultures of bacteria, yeasts, or molds in a solid water-soluble matrix. Comprehensive certificates of analysis provide details about the mean number of colony forming units (CFU) per disc, the method used to determine the product data, and the number of subcultures from the original strains provided under licence by NCTC® and CECT®.

Single-use controls manufactured directly from cultures provided by recognized Biological Resource Centres (BRCs) such as NCTC® for LENTICULE discs and CECT® for Vitroids, mean that laboratories can be confident about the authenticity of their strains and the suitability of their quality control materials; factors that are of increasing importance as laboratories become more automated and new technologies emerge and are rapidly adopted in routine microbiology settings.

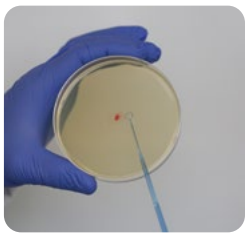
What are Vitroids™ and LENTICULE® discs?

Vitroids™ and LENTICULE® discs contain viable microorganisms in a certified quantity (generally accredited according ISO/IEC 17025,[9] General requirements for the competence of testing and calibration laboratories), produced under reproducible conditions compliant with ISO 17034:2016 using authenticated strains from NCTC®, NCPF® and CECT®. Consisting of pure cultures of bacteria, fungi, or yeasts in a solid water soluble matrix, they are stable for at least 16 months and are in a viable state with a shelf life of 16-24 months. The within-batch variation for every product is very low. Each batch is provided with a comprehensive certificate of analysis that specifies the mean number of colony forming units (CFU), an expanded uncertainty about the mean, details about the method used to determine the product data and the number of passages (subcultures) from the original strain (maximum 3 passages from original strain).

Applications

- Daily quality control
- Performance testing of media acc. ISO 11133[2]
- Validation of new methods (e.g. acc. ISO 16140 series[3,4,5,6,7,8])
- Materials for proficiency testing or ring trials
- Method development
- Staff training
- Starter cultures

Stability



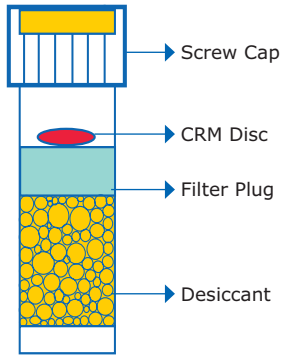
Certified Reference Microorganisms in this unique format are very stable and in most cases will remain so for many years at -20 °C. The numbers of CFUs do not change, the organisms need no recovery time and have no lag phase. Even a short period at ambient temperature, such as during shipment, is not an issue for product stability.

Improved Stability, Performance, and Ease of Use

Utilization of new technology has allowed us to make major improvements in the field of Microbiological Reference Materials. The main areas of development are stability, temperature resistance, adjusting the narrow defined CFU range, rehydration time, and better within batch reproducibility. In addition, each disc is certified according to ISO 17034[1] and ISO/IEC 17025.[9]

Preparation

Most solid and liquid media or rehydration buffers can be used. Discs can be rehydrated in as little as 100 µL buffer, or in larger volumes, e.g. 100 mL medium. It is also possible to add the disc to a cooled molten medium used for pour plate techniques. The rehydration process takes approximately 10 minutes. On solid media, the disc forms a droplet that can be spread with a sterile loop. In liquid media, the disc dissolves very quickly.



Vitroids™ and LENTICULEs® disc packaging

Packaging

The discs are packed individually in vials. The vials have a special screw-cap with seal and contain a desiccant at the bottom. The vials are packed in a mylar bag with a zip.

Strains

LENTICULE® discs are prepared from a traceable culture obtained freeze-dried from the National Collection of Type Cultures (NCTC®) or National Collection of Pathogenic Fungi (NCPF®) and are manufactured under license and control from UKHSA.

Vitroids™ are derived from a traceable culture obtained freeze-dried from CECT and produced according to our patented technology. Both NCTC® and CECT® strains are conveniently matched to WDCM numbers and have CFU ranges that closely align with ISO 11133[2] (Preparation, production, storage, and performance testing of culture media).

References

1. General requirements for the competence of reference material producers (ISO 17034:2016)
2. Microbiology of food, animal feed and water - Preparation, production, storage and performance testing of culture media (ISO 11133:2014, Corrected version 2014-11-01 + Amd. 1:2018 + Amd. 2:2020)
3. Microbiology of the food chain, Method validation Part 1: Vocabulary ISO 16140-1:2016
4. Microbiology of the food chain, Method validation Part 2: Protocol for the validation of alternative (proprietary) methods against a reference method (ISO 16140-2:2016)
5. Microbiology of the food chain, Method validation Part 3: Protocol for the verification of reference methods and validated alternative methods in a single laboratory (ISO 16140-3:2021)
6. Microbiology of the food chain, Method validation Part 4: Protocol for method validation in a single laboratory (ISO 16140-4:2020)
7. Microbiology of the food chain, Method validation Part 5: Protocol for factorial interlaboratory validation for non-proprietary methods (ISO 16140-5:2020)
8. Microbiology of the food chain, Method validation Part 6: Protocol for the validation of alternative (proprietary) methods for microbiological confirmation and typing procedures (ISO 16140-6:2019)
9. General requirements for the competence of testing and calibration laboratories (ISO/IEC 17025:2017)

Test strains used for performance testing

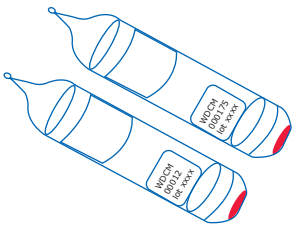
Traditional Way

Costs:

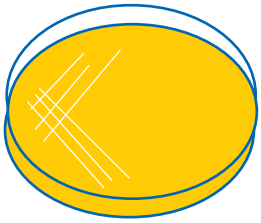
- Lyphilized cultures
- Reagents
- Consumables
- Energy

Time needs:

- Hands on time
- Documentation
- incubation

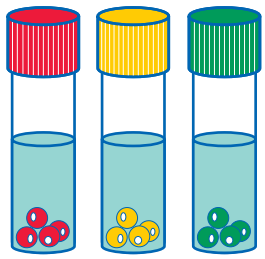


Lyophilised culture, reference strain



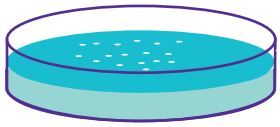
Reconstitution, incubation 18-72

-> check purity and character-istics



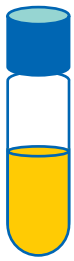
Store reference stock cultures

(eg. With cryopreservative on beads)



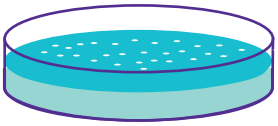
Grow for 24 hours (working culture)

-> check purity and morphology



Overnight culture 24 hours

Dilutions for final inoculum

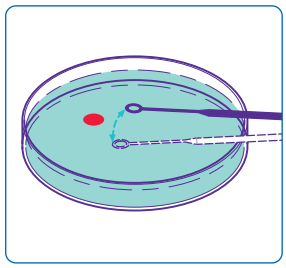


Enumerate the colony forming units on reference media and test medium after 18-24 hours

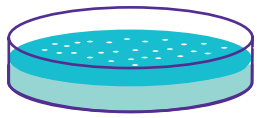
New Way

Using Vitroids™ and LENTICULE® discs:

- More accuracy
- Save time & costs
- Easy handling
- No stock culture maintenance
- Less documentation



Tap and tip onto culture plate or into buffer or liquid media. **Wait 10 minutes!** Streak out, pour it or filter it



Enumerate the colony forming units after 18-24 hours

Save Time and Costs

Using Vitroids™ and LENTICULE® discs is time saving because it removes the need for preparing stock cultures. The organisms do not require recovery time or pre-enrichment step. In addition the product concentrations are designed in a range where no or only minimal dilutions are needed. The discs readily dissolve in liquid media and on agar plates resulting in easy handling and a very economical solution.

Time Savings

Traditional Methods	Hands on time
Choose and purchase test organisms	5.0 min
Resuscitation and purity check	22.8 min
Preparation of reference stocks	4.4 min
Preparation of stock cultures	10.0 min
Preparation of working cultures	0.7 min
Preparation of over-night culture	0.7 min
Preparation of suspensions (inocula) for the test	7.6 min
Testing of inoculum, serial dilutions	13.8 min
Quantitative/Qualitative Testing	✓
Hands on time	**65.0 min**

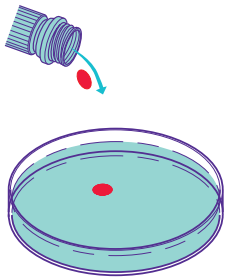
Certified reference material with required final inoculum	Hands on time
Choose and purchase test organisms	5.0 min
Remove the tubes from the freezer	0.7 min
Allow the discs to reach ambient temperature (15 min)	0.0 min
Open the tube and remove the discs by inverting the tube over the medium/buffer to be used	0.7 min
Leave at room temperature to rehydrate (15 min)	0.0 min
Quantitative/Qualitative Testing	
Hands on time	**6.4 min**

Examples for Inoculation

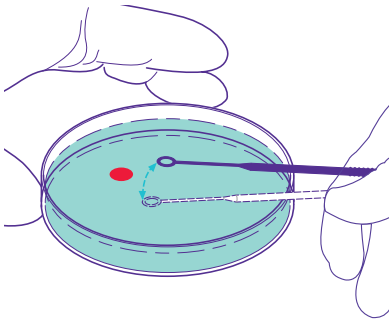
Vitroids™ and LENTICULE® discs are as available as small water-soluble discs, making your inoculum preparation exceptionally easy.

The discs can be used to directly inoculate solid media by following these steps:

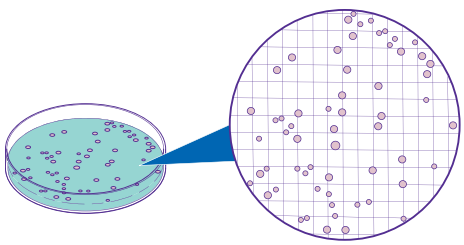
1. Take the tube(s) containing the disc(s) from the freezer and allow it to reach ambient temperature (5 to 10 minutes) before use. Do not refreeze. Use the disc(s) within one hour of transferring to ambient temperature.
2. Open the tube and remove the discs by inverting the tube over the solid medium.



3. Leave the discs on the surface of the medium at room temperature to rehydrate. After 10 to 15 minutes ensure that the disc is completely dissolved.



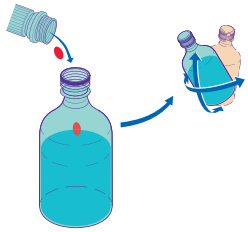
4. Spread the drop over the entire plate.
5. Test and incubate the sample following routine enumeration procedures.



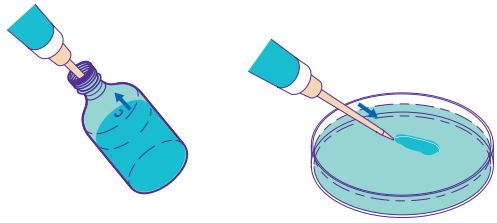
The discs can be rehydrated in buffer / liquid media before use :

If the disc has a higher concentration or is used to inoculate liquid media, the Vitroids™ and LENTICULE® discs can be rehydrated in liquid medium or buffer, respectively. Do not rehydrate the discs directly in distilled water.

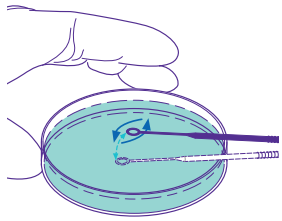
1. Remove the tube(s) from the freezer and allow the disc(s) to reach ambient temperature (5 to 10 minutes) before use. Do not refreeze. Use the disc(s) within one hour after transferring to ambient temperature.
2. Open the tube and remove the discs by inverting the tube over the buffer or medium to be used. Shake gently and leave inoculated buffer/media at room temperature for 10 to 15 minutes. Shake gently again.



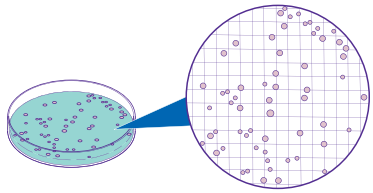
3. Apply the inoculum onto an agar plate.



4. Spread the drop over the entire plate



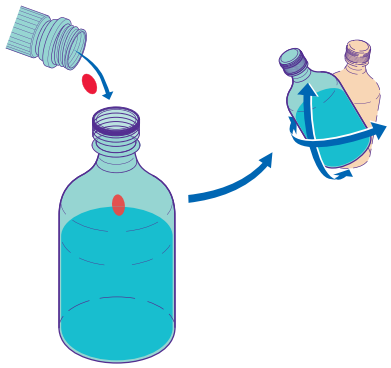
5. Test and incubate the sample following routine enumeration procedures.



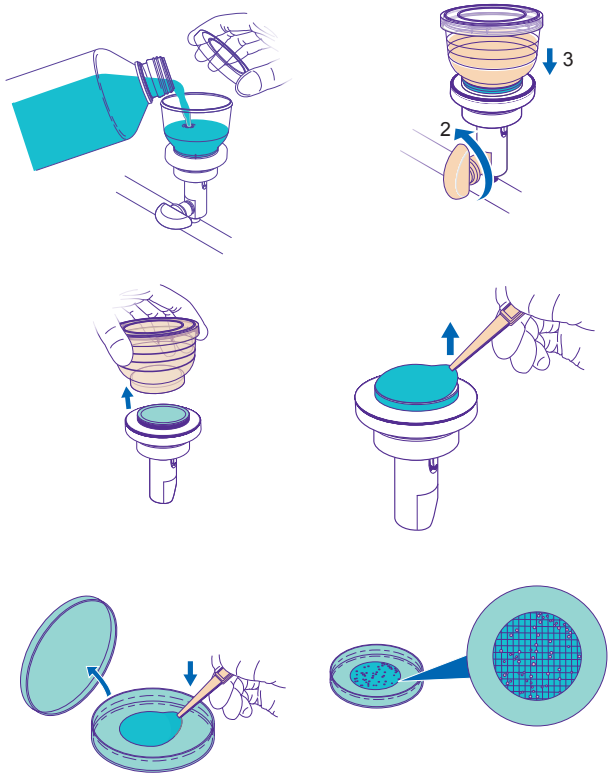
Procedure to use the discs for membrane filtration:

If the discs are used for membrane filtration, the Vitroids™ and LENTICULE® discs can be rehydrated in sterilized tap water or buffer or dilution solvent, respectively. Do not rehydrate the discs directly in distilled water.

1. Remove the tube(s) from the freezer and allow the disc(s) to reach ambient temperature (5 to 10 minutes) before use. Do not refreeze. Use the disc(s) within one hour after transferring to ambient temperature.
2. Open the tube and remove the discs by inverting the tube over the buffer or medium to be used. Shake gently and leave inoculated buffer/media at room temperature for 10 to 15 minutes. Shake gently again.



3. Test and incubate the sample following routine enumeration procedures.



Certificate of Analysis (CoA)

Our Certified Reference Microorganisms come with a Certificate of Analysis (CoA) as well as certain data to characterize the reference strain, its cfu count uncertainty, and traceability information.

Characterization: For characterization, the homogeneity and stability assessment, separately performed for each CRM, is given on the certificate, along with the geometric mean value of the cfu count including the method used to perform the test. These are the metrological measurement data of the CRM. The identification method is also stated, based on classical microbiological or biochemical tests and MALDI-TOF-MS analysis.

Uncertainty: Standard deviation of the cfu number is determined and, from this, an expanded uncertainty and an expected range (+/- 2SD) calculated. The calculation is explained in detail on the CoA. At least 95% of the CFU values of the discs are guaranteed to lie within the expected range. These values take into account all possible errors from production up to the analysis of the CRMs.

Traceability: Each CRM needs to be traceable, in our case back to a batch of a specific reference strain from NCTC®, NCPF® or CECT®, our national culture collection partners. The number of passages, the traceability of identification and the metrological measurement data are documented in the certificate.

Instructions: The CoA also states the intended uses and gives details about the possible reconstitution and inoculation methods.

The certificate has a specific accreditation stamp from the Swiss Accreditation Service SAS, designating our company as a reference material producer under no. SRMS 0001 in accordance with international standard ISO 17034. At its end, each certificate is signed by the responsible production manager and the responsible QC approver.

Millipore®

www.sigmaaldrich.com

Certified reference material – Vitroids™
Reference material certificate

Clostridium sporogenes WDCM 00008 VT000082

Product no.: **VT000082**

Lot no.: **BCCK2303**

Description of CRM: Vitroids™ are disc-shaped, microbiological reference materials. Each disc contains a quantified number of microorganisms (colony forming units; cfu), immobilized in a solid water soluble matrix.

Expiry date: **MAR 2025**

Storage: **-20 ± 5 °C**; store the mylar bag containing the plastic vials with the Vitroids™ unopened

Starting material: **CECT 485 batch 04-09-2014** (freeze-dried microorganism in a glass ampoule)

No. of passages: **2** (upon receipt from cell culture collection CECT)

Sample: *Clostridium sporogenes* WDCM 00008 VT000082		
Certified value (geometric mean value)	Expanded uncertainty (log_{10} value)	Expected range
2.7E+01 cfu per disc	0.033	**1.3E+01 - 5.6E+01 cfu per disc**
Conditions:	**Trypcase soy agar / anaerobic / 37 °C / 48 hrs**	
Date of testing:	27 MAR 2023	

cfu: colony forming units
The reference values are calculated by (US EPA Environmental Systems Monitoring Laboratory in Cincinnati) EMSL-CIN's computer program "BIWEIGHT". The measurement of uncertainty originates from the generated biweight standard deviation (SD) resulting from the biweight geometric mean value obtained during homogeneity testing. The expected range takes into account media batch to batch variability, which is done by multiplying the biweight standard deviation by 1.6.

Metrological traceability: Details see "Certification process details" on page 2.

Measurement method: The certified value is established by plate counting in accordance with ISO/IEC 17025[1].

Intended, correct use & handling instructions: Please follow the instructions given in "General instructions for intended uses of this reference material" on page 3.

Health and safety information: Please refer to the Safety Data Sheet (link on page 3) for detailed information about the nature of any hazard and appropriate precautions to be taken.

Accreditation: Sigma-Aldrich Production GmbH is accredited by the Swiss Accreditation Service SAS as reference material producer under no. SRMS 0001 in accordance with international standard ISO 17034 [2].

Certificate issue date: **24 APR 2023**

SWISS ACCREDITATION sas.admin.ch SRMS 0001

ISO 17034
SRMS 0001

Dr. Thomas Bührer – CRM Operations

Dr. Philipp Zell – Approving Officer

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www.sigmaaldrich.com
Sigma-Aldrich Production GmbH is a subsidiary of Merck KGaA, Darmstadt, Germany.

Commitment to Greener Alternative Products: Vitroids™ and LENTICULE® discs

Streamline your media testing workflow with our Vitroids™ and LENTICULE® discs, designed for accuracy and efficiency while reducing your environmental footprint.

Why Choose Our Greener Solutions?

- **Reduced Environmental Impact:** Our centralized production process achieves an impressive 82% reduction in material usage and a 97% decrease in energy consumption compared to testing the performance of a medium with 5 self-produced control strains once a week over a period of 5 years. This ensures that your testing materials are both effective and more sustainable.
- **Ready-to-Use Convenience:** Our CRMs eliminate the need for extensive preparation and incubation steps, reducing the time required per test from 72 hours to 24 hours compared to lyophilized reference strains from culture collections. With our solutions, you can streamline your workflow while minimizing waste.
- **Sustainable Packaging:** All fiber-based packaging is 100% recycled and is certified for zero-deforestation. We believe that every step counts in our journey toward providing Greener Alternative Products.

By choosing Vitroids™ and LENTICULE® discs means prioritizing quality in microbiological testing while contributing to your lab's sustainable goals.

For more information on our Greener Alternative Products and sustainability commitment, visit us at **https://www.sigmaaldrich.com/DE/en/life-science/ssbi**

Product Improvement Highlights

	Emissions & Energy Reduction of energy consumption compared to the scenario where each customer incubates and tests their own strains.	**97%** reduction
	Materials Reduction of materials through centralized manufacturing at Merck Darmstadt Germany.	**82%** reduction
	Usability & Innovation Reduction of time required per test due to elimination of preparation steps and incubation phases	**24** instead of **72 hours**

Previous Packaging

45% packaging reduction

New Packaging

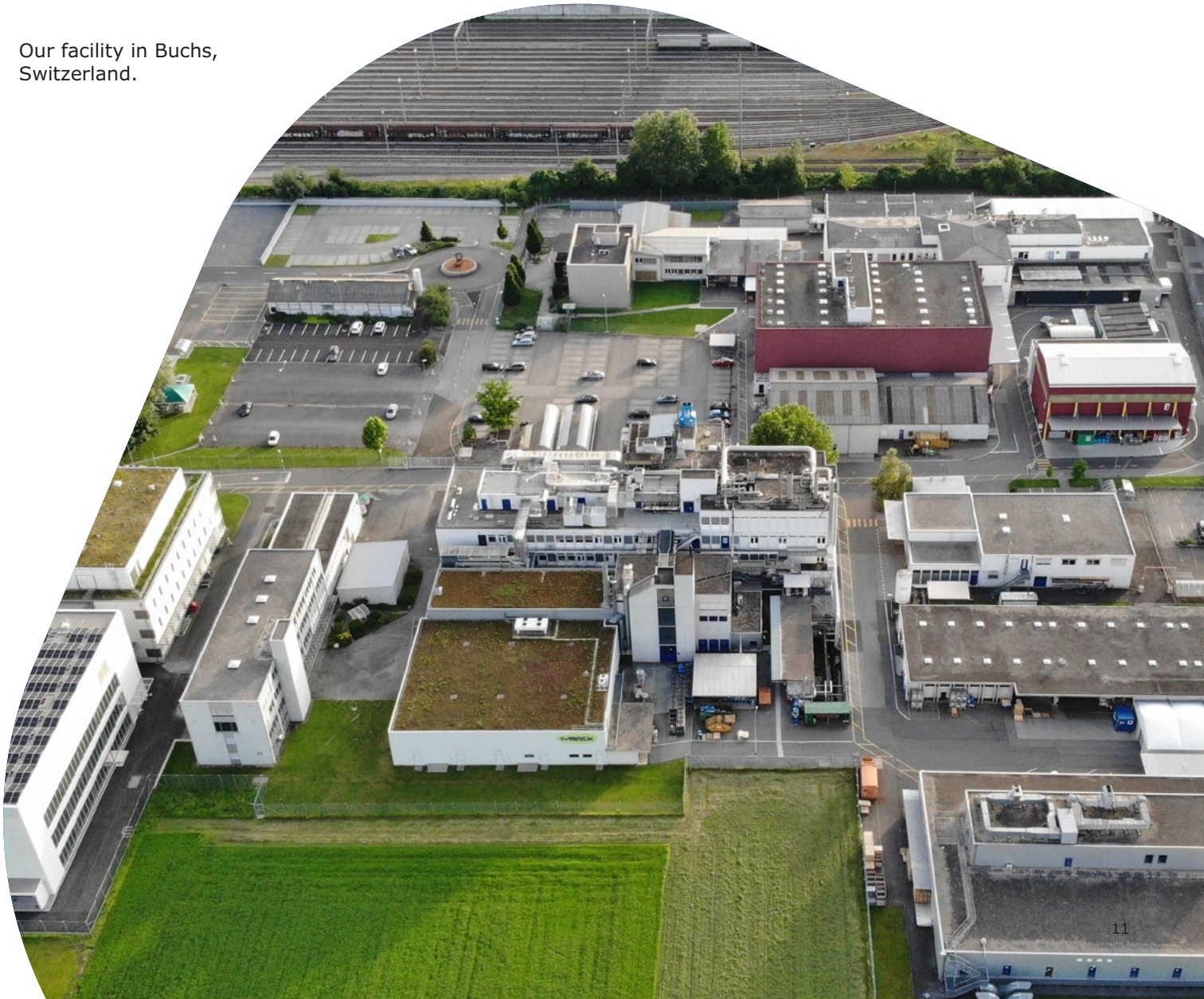
A Strong Partnership

UKHSA's NCTC® is a national BRC that preserves, maintains and regularly updates a specific collection of bacterial strains, ensuring there are no changes to physical characteristics, such as morphology and nutritional requirements, the genome and the proteome. It is one of several BRCs that provide authenticated biological reference and control strains. In addition, the UKHSA also developed the LENTICULE® disc that enables a laboratory to have an on demand source of a control for quantitative microbiology.

With increased worldwide demand for the accreditation of testing labs, as well as the development of fast, automated methods in microbiology, the use of Microbial Certified Reference Materials has increased substantially. With this in mind, it is an appropriate time to entrust the manufacture and distribution of these products to an ISO accredited manufacturing company such as ours, enabling the UKHSA organization to focus on research and development for new products to add to this portfolio. This R&D is further enhanced by an exciting project by UKHSA, in collaboration with the Wellcome Trust Sanger Institute, to provide whole genome sequences using long-read technology for 3000 bacteria of clinical importance.

An integral part of this partnership is our creation of a dedicated manufacturing facility in Buchs, Switzerland to provide the growth and development of Certified Reference Microorganisms, both for now and for the future. It will enable more scientists worldwide to easily access the NCTC®/NCPF® CRMs through our global supply chain.

Our facility in Buchs, Switzerland.



Certified Reference Microorganisms Portfolio

Cat. No.	Species	L/V*	Origin	Strain No.	CFU Range	CRM	WDCM	Equivalent ATCC strain
VT000617-10EA	*Aerococcus viridans*	V	CECT®	978	50,000-150,000	x	00061	11563
VT070943-10EA	*Alicyclobacillus acidoterrestris*	V	CECT®	7094	80-130	x	-	49025
VT070946-10EA	*Alicyclobacillus acidoterrestris*	V	CECT®	7094	1,000-10,000	x	-	49025
VT000532-10EA	*Aspergillus brasiliensis* (formerly *Aspergillus niger*)	V	CECT®	2574	15-80	x	00053	16404
VT001833-10EA	*Aspergillus caesiellus* (*restrictus*)	V	CECT®	20807	80-130	x	00183	42693
CRM07464L-10EA	*Bacillus cereus*	L	NCTC®	7464	30-120	x	-	10876
CRM07464M-10EA	*Bacillus cereus*	L	NCTC®	7464	500-50,000	x	-	10876
VT000012-10EA	*Bacillus cereus*	V	CECT®	193	15-80	x	00001	11778
VT000013-10EA	*Bacillus cereus*	V	CECT®	193	80-130	x	00001	11778
VT000016-10EA	*Bacillus cereus*	V	CECT®	193	1,000-10,000	x	00001	11778
VT000032-10EA	*Bacillus spizizenii* (formerly *Bacillus subtilis* subsp. *Spizizenii*)	V	CECT®	356	15-80	x	00003	6633
VT000033-10EA	Bacillus spizizenii (formerly *Bacillus subtilis* subsp. *Spizizenii*)	V	CECT®	356	80-130	x	00003	6633
VT000036-10EA	*Bacillus spizizenii (formerly Bacillus subtilis subsp. Spizizenii)*	V	CECT®	356	1,000-10,000	x	00003	6633
VT000037-10EA	*Bacillus spizizenii (formerly Bacillus subtilis subsp. Spizizenii)*	V	CECT®	356	50,000-150,000	x	00003	6633
VT000716-10EA	*Brochothrix thermosphacta*	V	CECT®	847	1,000-10,000	x	00071	11509
VT099522-10EA	*Burkholderia cenocepacia*	V	CECT®	9952	15-80	x	-	BAA-245
VT041372-10EA	*Burkholderia cepacia*	V	CECT®	4137	15-80	x	-	25416
VT041376-10EA	*Burkholderia cepacia*	V	CECT®	4137	1,000-10,000	x	-	25416
VT099542-10EA	*Burkholderia multivorans*	V	CECT®	9954	15-80	x		BAA-247
RMF03255L-10EA	*Candida albicans*	L	NCPF®	3255	30-120	x	00055	2091
RMF03255H-10EA	*Candida albicans*	L	NCPF®	3255	>100,000	x	00055	2091
VT000542-10EA	*Candida albicans*	V	CECT®	1394	15-80	x	00054	10231
VT000543-10EA	*Candida albicans*	V	CECT®	1394	80-130	x	00054	10231
VT000546-10EA	*Candida albicans*	V	CECT®	1394	1,000-10,000	x	00054	10231
RM09750L-10EA	*Citrobacter freundii*	L	NCTC®	9750	30-120	x	-	8090
VT004014-10EA	*Citrobacter freundii*	V	CECT®	401	130-300	x	-	8090
VT004016-10EA	*Citrobacter freundii*	V	CECT®	401	1,000-10,000	x	-	8090
VT000062-10EA	*Citrobacter freundii*	V	CECT®	7467	15-80	x	00006	43864
VT000063-10EA	*Citrobacter freundii*	V	CECT®	7467	80-130	x	00006	43864
VT000066-10EA	*Citrobacter freundii*	V	CECT®	7467	1,000-10,000	x	00006	43864
VT000067-10EA	*Citrobacter freundii*	V	CECT®	7464	50,000-150,000	x	00006	43864
CRM00506L-10EA	*Clostridium bifermentans*	L	NCTC®	506	30-120	x	00079	-
CRM13170L-10EA	*Clostridium perfringens*	L	NCTC®	13170	30-120	x	00201	-
CRM13170M-10EA	*Clostridium perfringens*	L	NCTC®	13170	500-50,000	x	00201	-
VT000082-10EA	*Clostridium sporogenes*	V	CECT®	485	15-80	x	00008	19404
VT002132-10EA	*Cronobacter muytjensii*	V	CECT	9143	15-80	x	00213	51329
VT002136-10EA	*Cronobacter muytjensii*	V	CECT	9143	1,000-10,000	x	00213	51329
CRM11467L-10EA	*Cronobacter sakazakii*	L	NCTC®	11467	30-120	x	00214	29544
VT002142-10EA	*Cronobacter sakazakii*	V	CECT	858	15-80	x	00214	29544
VT002146-10EA	*Cronobacter sakazakii*	V	CECT	858	1'000-10'000	x	00214	29544
CRM10006L-10EA	*Enterobacter aerogenes*	L	NCTC®	10006	30-120	x	00175	13048
CRM10006M-10EA	*Enterobacter aerogenes*	L	NCTC®	10006	500-50,000	x	00175	13048
VT001752-10EA	*Enterobacter aerogenes*	V	CECT®	684	15-80	x	00175	13048
VT001753-10EA	*Enterobacter aerogenes*	V	CECT®	684	80-130	x	00175	13048
VT001754-10EA	*Enterobacter aerogenes*	V	CECT®	684	130-300	x	00175	13048
VT001756-10EA	*Enterobacter aerogenes*	V	CECT®	684	1,000-10,000	x	00175	13048
VT000834-10EA	*Enterobacter cloacae*	V	CECT®	194	130-300	x	00083	13047

* L/V = Vitroids™/LENTICULE® discs

Cat. No.	Species	L/V*	Origin	Strain No.	CFU Range	CRM	WDCM	Equivalent ATCC strain
VT000836-10EA	*Enterobacter cloacae*	V	CECT®	194	1,000-10,000	x	00083	13047
CRM00775L-10EA	*Enterococcus faecalis*	L	NCTC®	775	30-120	x	00009	19433
CRM00775M-10EA	*Enterococcus faecalis*	L	NCTC®	775	500-50,000	x	00009	19433
CRM00775H-10EA	*Enterococcus faecalis*	L	NCTC®	775	>100,000	x	00009	19433
VT000092-10EA	*Enterococcus faecalis*	V	CECT®	481	15-80	x	00009	19433
VT000093-10EA	*Enterococcus faecalis*	V	CECT®	481	80-130	x	00009	19433
VT000094-10EA	*Enterococcus faecalis*	V	CECT®	481	130-300	x	00009	19433
VT000096-10EA	*Enterococcus faecalis*	V	CECT®	481	1,000-10,000	x	00009	19433
VT000097-10EA	*Enterococcus faecalis*	V	CECT®	775	50,000-150,000	x	00009	19433
VT000877-10EA	*Enterococcus faecalis*	V	CECT®	795	50,000-150,000	x	00087	29212
VT000872-10EA	*Enterococcus faecalis*	V	CECT®	12697	15-80	x	00087	29212
VT000873-10EA	*Enterococcus faecalis*	V	CECT®	12697	80-130	x	00087	29212
VT000876-10EA	*Enterococcus faecalis*	V	CECT®	12697	1,000-10,000	x	00087	29212
VT000105-10EA	*Enterococcus faecium*	V	CECT®	410	1,000-10,000	x	00010	19434
VT001773-10EA	*Enterococcus faecium*	V	CECT®	8108	80-130	x	00177	6057
VT000907-10EA	*Escherichia coli*	V	CECT®	515	50,000-150,000	x	00090	11775
CRM09001L-10EA	*Escherichia coli*	L	NCTC®	9001	30-120	x	00090	11775
CRM09001M-10EA	*Escherichia coli*	L	NCTC®	9001	500-50,000	x	00090	11775
CRM09001H-10EA	*Escherichia coli*	L	NCTC®	9001	>100,000	x	00090	11775
VT000902-10EA	*Escherichia coli*	V	CECT®	515	15-80	x	00090	11775
VT000903-10EA	*Escherichia coli*	V	CECT®	515	80-130	x	00090	11775
VT000904-10EA	*Escherichia coli*	V	CECT®	515	130-300	x	00090	11775
VT000905-10EA	*Escherichia coli*	V	CECT®	515	600-1400	x	00090	11775
VT000906-10EA	*Escherichia coli*	V	CECT®	515	1,000-10,000	x	00090	11775
CRM13216L-10EA	*Escherichia coli*	L	NCTC®	13216	30-120	x	00202	-
VT000122-10EA	*Escherichia coli*	V	CECT®	516	15-80	x	00012	8739
VT000123-10EA	*Escherichia coli*	V	CECT®	516	80-130	x	00012	8739
VT000126-10EA	*Escherichia coli*	V	CECT®	516	1,000-10,000	x	00012	8739
VT000127-10EA	*Escherichia coli*	V	CECT®	516	50,000-150,000	x	00012	8739
VT000132-10EA	*Escherichia coli*	V	CECT®	434	15-80	x	00013	25922
VT000133-10EA	*Escherichia coli*	V	CECT®	434	80-130	x	00013	25922
VT000136-10EA	*Escherichia coli*	V	CECT®	434	1,000-10,000	x	00013	25922
VT000137-10EA	*Escherichia coli*	V	CECT®	434	50000-150000	x	00013	25922
VT001793-10EA	*Escherichia coli*	V	CECT®	8296	80-130	x	00179	-
VT001796-10EA	*Escherichia coli*	V	CECT®	8296	1,000-10,000	x	00179	-
VT002023-10EA	*Escherichia coli*	V	CECT®	9153	80-130	x	00202	-
VT002026-10EA	*Escherichia coli*	V	CECT®	9153	1,000-10,000	x	00202	-
VT000143-10EA	*Escherichia coli 0157:H7 (non-toxigenic)*	V	CECT®	4972	80-130	x	00014	700728
VT000146-10EA	*Escherichia coli 0157:H7 (non-toxigenic)*	V	CECT®	4972	1,000-10,000	x	00014	700728
CRM12900L-10EA	*Escherichia coli 0157:H7 (non-toxigenic)*	L	NCTC®	12900	30-120	x	00014	700728
CRM11368M-10EA	*Fluoribacter bozemanae (formerly Legionella bozemanii)*	L	NCTC®	11386	500-50,000	x	-	33217
VT025046-10EA	*Heterotrophic Organisms*	V			1,000-10,000	x	-	-
CRM08167L-10EA	*Klebsiella oxytoca*	L	NCTC®	8167	30-120	x	-	-
VT000971-10EA	*Klebsiella pneumoniae*	V	CECT®	143	15-80	x	00097	13883
VT000975-10EA	*Klebsiella pneumoniae*	V	CECT®	143	1,000-10,000	x	00097	13883
VT000163-10EA	*Lactococcus lactis subsp. Lactis*	V	CECT®	185	80-130	x	00016	9936/19435
VT000167-10EA	*Lactococcus lactis subsp. lactis*	V	CECT®	185	50,000-150,000	x	00016	9936/19435
VT000153-10EA	*Lactobacillus sakei subsp. Sakei*	V	CECT®	906	80-130	x	00015	15521
VT000157-10EA	*Lactobacillus sakei subsp. Sakei*	V	CECT®	906	50,000-150,000	x	00015	15521
VT001063-10EA	*Legionella anisa*	V	CECT®	8177	80-130	x	00106	35292

* L/V = Vitroids™/LENTICULE® discs

Cat. No.	Species	L/V*	Origin	Strain No.	CFU Range	CRM	WDCM	Equivalent ATCC strain
VT001066-10EA	*Legionella anisa*	V	CECT®	8177	1,000-10,000	x	00106	35292
VT001067-10EA	*Legionella anisa*	V	CECT®	8177	≥100,000	x	00106	35292
VT001076-10EA	*Legionella pneumophila* serogroup 1	V	CECT®	7109	1,000-10,000	x	00107	33152
CRM12821L-10EA	*Legionella pneumophila (serogroup 1)*	L	NCTC®	12821	30-120	x	00205	-
CRM12821M-10EA	*Legionella pneumophila (serogroup 1)*	L	NCTC®	12821	500-50,000	x	00205	-
VT002057-10EA	*Legionella pneumophila (serogroup 1)*	V	CECT®	8734	>50,000	x	00205	-
VT000176-10EA	*Listeria innocua serotype 6a*	V	CECT®	910	1,000-10,000	x	00017	33090
CRM11994L-10EA	*Listeria monocytogenes*	L	NCTC®	11994	30-120	x	00019	-
CRM11994M-10EA	*Listeria monocytogenes*	L	NCTC®	11994	500-50,000	x	00019	-
VT001092-10EA	*Listeria monocytogenes serovar l/2a*	V	CECT®	5873	15-80	x	00109	35152
VT001093-10EA	*Listeria monocytogenes serovar l/2a*	V	CECT®	5873	80-130	x	00109	35152
VT001096-10EA	*Listeria monocytogenes serovar l/2a*	V	CECT®	5873	1,000-10,000	x	00109	35152
VT000212-10EA	*Listeria monocytogones serovar 4b*	V	CECT®	935	15-80	x	00021	13932
VT000213-10EA	*Listeria monocytogones serovar 4b*	V	CECT®	935	80-130	x	00021	13932
VT000216-10EA	*Listeria monocytogones serovar 4b*	V	CECT®	935	1,000-10,000	x	00021	13932
VT000217-10EA	*Listeria monocytogones serovar 4b*	V	CECT®	935	50,000-150,000	x	00021	13932
VT001813-10EA	*Mucor racemosus*	V	CECT®	20821	80-130	x	00181	42647
VT000232-10EA	*Proteus mirabilis*	V	CECT®	4168	15-80	x	00023	29906
VT000233-10EA	*Proteus mirabilis*	V	CECT®	4168	80-130	x	00023	29906
VT000237-10EA	*Proteus mirabilis*	V	CECT®	4168	50,000-150,000	x	00023	29906
CRM10662L-10EA	*Pseudomonas aeruginosa*	L	NCTC®	10662	30-120	x	00114	25668
CRM10662M-10EA	*Pseudomonas aeruginosa*	L	NCTC®	10662	500-50,000	x	00114	25668
VT001142-10EA	*Pseudomonas aeruginosa*	V	CECT®	118	15-80	x	00114	25668
VT001143-10EA	*Pseudomonas aeruginosa*	V	CECT®	118	80-130	x	00114	25668
VT001145-10EA	*Pseudomonas aeruginosa*	V	CECT®	118	1,000-10,000	x	00114	25668
VT000243-10EA	*Pseudomonas aeruginosa*	V	CECT®	110	80-130	x	00024	10145
VT000246-10EA	*Pseudomonas aeruginosa*	V	CECT®	110	1,000-10,000	x	00024	10145
VT000256-10EA	*Pseudomonas aeruginosa*	V	CECT®	108	1,000-10,000	x	00025	27853
VT000257-10EA	*Pseudomonas aeruginosa*	V	CECT®	108	50,000-150,000	x	00025	27853
VT000262-10EA	*Pseudomonas paraaeruginosa (formerly Pseudomonas aeruginosa)*	V	CECT®	111	15-80	x	00026	9027
VT000263-10EA	*Pseudomonas paraaeruginosa (formerly Pseudomonas aeruginosa)*	V	CECT®	111	80-130	x	00026	9027
VT000264-10EA	*Pseudomonas paraaeruginosa (formerly Pseudomonas aeruginosa)*	V	CECT®	111	130-300	x	00026	9027
VT000266-10EA	*Pseudomonas paraaeruginosa (formerly Pseudomonas aeruginosa)*	V	CECT®	111	1,000-10,000	x	00026	9027
VT000267-10EA	*Pseudomonas paraaeruginosa (formerly Pseudomonas aeruginosa)*	V	CECT®	111	50,000-150,000	x	00026	9027
VT001153-10EA	*Pseudomonas fluorescens*	V	CECT®	378	80-130	x	00115	13525
VT001156-10EA	*Pseudomonas fluorescens*	V	CECT®	378	1,000-10,000	x	00115	13525
CRM09528L-10EA	*Raoultella planticola (formerly Klebsiella aerogenes)*	L	NCTC®	9528	30-120	x	-	-
CRM09528M-10EA	*Raoultella planticola (formerly Klebsiella aerogenes)*	L	NCTC®	9528	500-50,000	x	-	-
RMF03191L-10EA	*Saccharomyces cerevisiae*	L	NCPF®	3191	30-120	x	-	9763
RMF03191M-10EA	*Saccharomyces cerevisiae*	L	NCPF®	3191	500-50,000	x	-	9763
VT000583-10EA	Saccharomyces cerevisiae	V	CECT	1383	80-130	x	00058	9763
CRM12023L-10EA	*Salmonella enterica serovar Typhimurium*	L	NCTC®	12023	30-120	x	00031	14028
VT000302-10EA	*Salmonella enterica subsp. Enterica serovar Enteritidis*	V	CECT®	4300	15-80	x	00030	13076
VT000306-10EA	*Salmonella enterica subsp. Enterica serovar Enteritidis*	V	CECT®	4300	1,000-10,000	x	00030	13076

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Cat. No.	Species	L/V*	Origin	Strain No.	CFU Range	CRM	WDCM	Equivalent ATCC strain
VT000307-10EA	*Salmonella enterica subsp. Enterica serovar Enteritidis*	V	CECT®	4300	50,000-150,000	x	00030	13076
VT000303-10EA	*Salmonella enterica subsp. Enterica serovar Enteritidis*	V	CECT®	4300	80-130	x	00030	13076
VT000312-10EA	*Salmonella enterica subsp. Enterica serovar Typhimurium*	V	CECT®	4594	15-80	x	31	14028
VT000313-10EA	*Salmonella enterica subsp. Enterica serovar Typhimurium*	V	CECT®	4594	80-130	x	31	14028
VT000316-10EA	*Salmonella enterica subsp. Enterica serovar Typhimurium*	V	CECT®	4594	1,000-10,000	x	31	14028
VT000317-10EA	*Salmonella enterica subsp. Enterica serovar Typhimurium*	V	CECT®	4594	50,000-150,000	x	31	14028
VT000292-10EA	*Salmonella enterica subsp. Enterica serovar Abony*	V	CECT®	545	15-80	x	29	BAA-2162
CRM06676L-10EA	*Salmonella enteritidis*	L	NCTC®	6676	30-120	x	-	-
CRM07832L-10EA	*Salmonella nottingham*	L	NCTC®	7832	30-120	x	-	-
CRM06571L-10EA	*Staphylococcus aureus subsp. aureus*	L	NCTC®	6571	30-120	x	00035	9144
CRM06571M-10EA	*Staphylococcus aureus subsp. aureus*	L	NCTC®	6571	500-50,000	x	00035	9144
VT000357-10EA	*Staphylococcus aureus subsp. aureus*	V	CECT®	59	50,000-150,000	x	00035	9144
VT000342-10EA	*Staphylococcus aureus subsp. aureus*	V	CECT®	435	15-80	x	00034	25923
VT000343-10EA	*Staphylococcus aureus subsp. aureus*	V	CECT®	435	80-130	x	00034	25923
VT000346-10EA	*Staphylococcus aureus subsp. aureus*	V	CECT®	435	1,000-10,000	x	00034	25923
VT000347-10EA	*Staphylococcus aureus subsp. aureus*	V	CECT®	435	50,000-150,000	x	00034	25923
VT000322-10EA	*Staphylococcus aureus subsp. aureus*	V	CECT®	239	15-80	x	00032	6538
VT000323-10EA	*Staphylococcus aureus subsp. aureus*	V	CECT®	239	80-130	x	00032	6538
VT000324-10EA	*Staphylococcus aureus subsp. aureus*	V	CECT®	239	130-300	x	00032	6538
VT000326-10EA	*Staphylococcus aureus subsp. aureus*	V	CECT®	239	1,000-10,000	x	00032	6538
VT000327-10EA	*Staphylococcus aureus subsp. aureus*	V	CECT®	239	50,000-150,000	x	00032	6538
CRM11047L-10EA	*Staphylococcus enpidermidis*	L	NCTC®	11047	30-120	x	00132	14990
VT000366-10EA	*Staphylococcus epidermidis*	V	CECT®	231	1,000-10,000	x	00036	12228
VT001596-10EA	*Staphylococcus saprophyticus*	V	CECT®	235	1,000-10,000	x	00159	15305
CRM11371M-10EA	*Tatlockia micdadei (formerly Legionella micdadei)*	L	NCTC®	11371	500-50,000	x	-	33218
RM10903Q-10EA	*Vibrio parahaemolyticus*	L	NCTC®	10703	>100	x	-	-
VT001823-10EA	*Wallemia mellicola* (formerly Wallemia sebi)	V	CECT®	20820	80-130	x	00182	42694

Negative Controls

Cat. No.	Description
RQC0001-10EA	Negative Control for Vitroids™ discs, no growth

* L/V = Vitroids™/LENTICULE® discs

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