Certified Reference Microorganisms

The Simple Way to Ensure Accurate Results, Every Time

Vitroids™ and LENTICULE® Discs

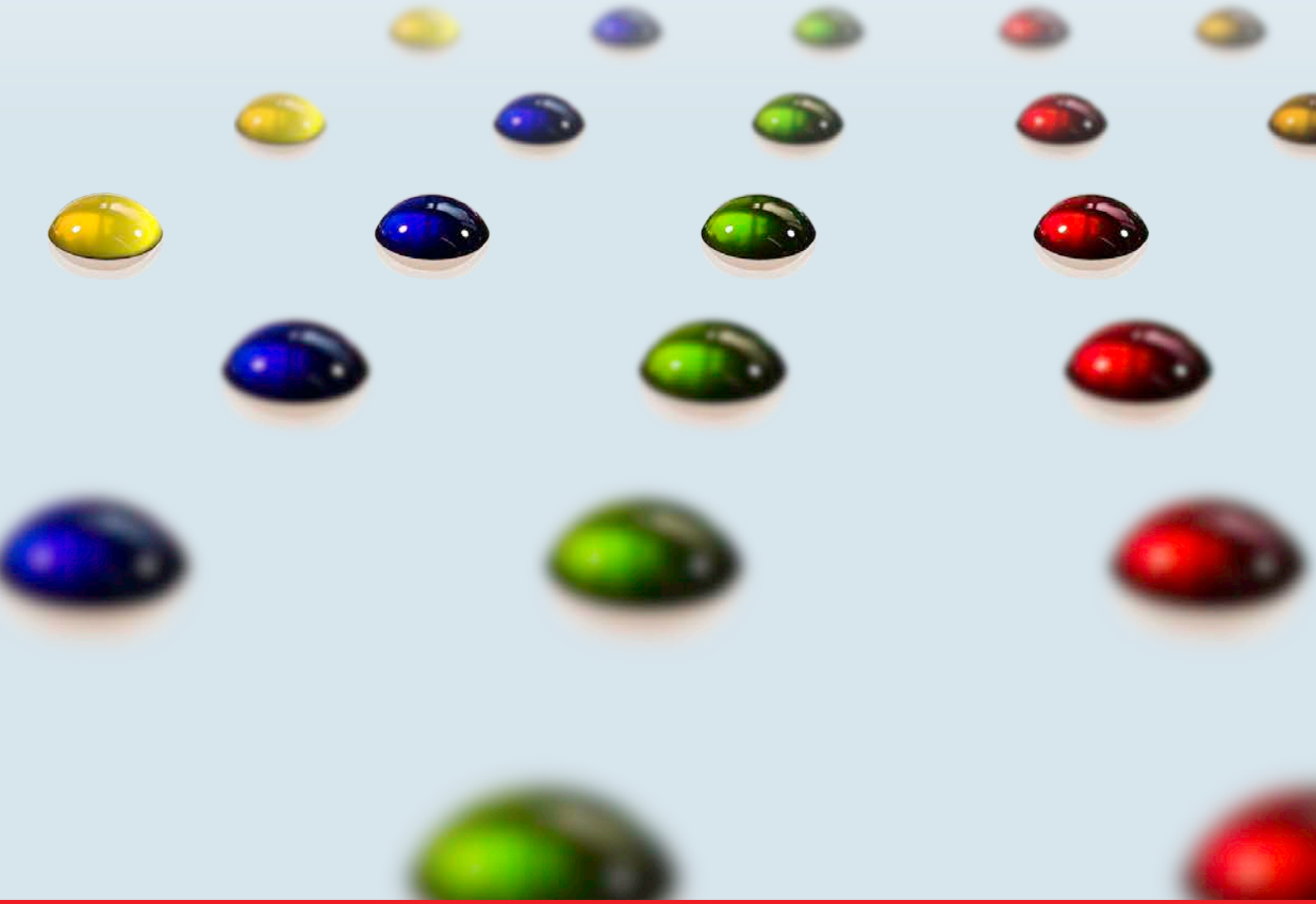
- Defined CFU range and low standard deviation (ISO/IEC 17025)
- Fast, reliable and easy to use

Expended Vitroid range

NCTC National Collection of Type Cultures Operated by Public Health England

NCPF National Collection of Pathogenic Fungi Operated by Public Health England

CECT Derived from CECT® strains



The Simple Way to Ensure Accurate Results, Every Time

Certified Reference Microorganisms

Why use CRMs in Microbiology?

In 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 characterised 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 minimise 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 food, water and environmental samples the ability to accurately enumerate bacteria, yeasts and moulds and reliably detect relatively low numbers of pathogenic organisms is essential. It is also important that controls can be applied to the wide range of different food and water 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 food, water and environmental testing laboratories. These quality control materials, LENTICULE® discs (developed by Public Health England, PHE) and Vitroids™ (developed by RTC), are now available from Sigma Aldrich, and are manufactured under conditions compliant with ISO Guide 34:2009 (General requirements for the competence of reference material producers).

The discs contain pure cultures of bacteria, yeasts or moulds in a solid water-soluble matrix. Comprehensive certificates of analysis specify the mean number of colony forming units (CFU) per disc, details about 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 recognised Biological Resource Centres (BRCs) such as NCTC® and CECT® 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), produced under reproducible conditions compliant with ISO Guide 34:2009 using authenticated strains from NCTC®, NCPF® and CECT®. Consisting of pure cultures of bacteria or fungi in a solid water soluble matrix, they are stable for at least one year and are in a viable state with a shelf life of 1-3 years. The within batch variation for every product is very low (in some cases less than 4% standard deviation). 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.

Applications

- QC to assure the quality of test results (water, food, beverage, environmental etc)
- Performance testing of media acc. ISO 11133
- Validation of new methods
- 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.

Save Time and Costs

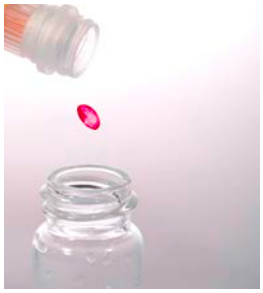
Using Vitroids™ and LENTICULE® discs is time saving because it removes the need for preparing stock cultures. The organisms need no recovery time and no pre-enrichment step. In addition the product concentrations are designed in a range where no or only minimal dilutions are needed. The discs readily dissolve in liquid media and on agar plates resulting in easy handling and a very economical solution.

What is New Compared to Existing Reference Strain Products?

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 Guide 34 and ISO/IEC 17025.

Preparation

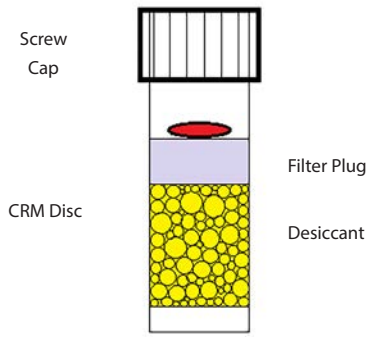
Most solid and liquid medium or rehydration buffer can be used. Discs can be rehydrated in as little as 100 µL buffer, or in larger volumes, e.g. 100 mL medium. It is also possible to add the disc to a cooled molten medium used for pour plate techniques. The rehydration process takes approximately 10 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.



Packaging

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

Vitroids™ and Lenticules® disc packaging



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 by Sigma-Aldrich® under license and control from Public Health England.

Vitroids™ are derived from a traceable culture obtained freeze-dried from CECT and produced according a Sigma-Aldrich patented technology. Both NCTC and CECT strains are conveniently matched to WDCM numbers and have cfu ranges that closely align with ISO 11133.

A New Partnership

Public Health England'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 PHE 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 Sigma-Aldrich, enabling the PHE 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 PHE, in collaboration with the Wellcome Trust Sanger Institute (WTSI), to provide whole genome sequences using long-read technology for 3000 bacteria of clinical importance.

An integral part of this new partnership is Sigma-Aldrich's creation of a new, 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 the global supply chain of Sigma-Aldrich®.

The Benefit of Combined Experience

In recent years Sigma-Aldrich, in partnership with Zurich University of Applied Sciences (ZHAW), has gained a great deal of experience developing an excellent range of Certified Reference Microorganisms (CRM) called Vitroids™. The process was standardized and CRM quality improved to a level superior to today's standard. Since 2008, knowledge has been acquired to extend production according to ISO guide 34 and certification according to ISO/IEC 17025 to the field of microbiology. With two manufacturing and development sites, one in Laramie, Wyoming U.S.A. and the new one in Buchs, Switzerland, fufills this growing demand for microbial CRMs. Combining the know-how and capabilities of Sigma-Aldrich and PHE will benefit microbiologists all over the world.

The Sigma-Aldrich facility in Buchs, Switzerland.

Certified Reference Microorganisms portfolio

Cat. No.	Species	L/V*	Origin	Strain No.	CFU Range	CRM	WDCM
VT091112-10EA	*Acinetobacter baumanni*	V	CECT®	911	50-80	X	—
VT091114-10EA	*Acinetobacter baumanni*	V	CECT®	911	130-270	X	—
VT091115-10EA	*Acinetobacter baumanni*	V	CECT®	911	600-1'400	X	—
VT000532-10EA	*Aspergillus brasiliensis*	V	CECT®	2574	50-80	X	00053
VT000533-10EA	*Aspergillus brasiliensis*	V	CECT®	2574	80-120	X	00053
RMF02275L-10EA	*Aspergillus brasiliensis (formerly Aspergillus niger)*	L	NCPF®®	2275	30-120		00053
VT000013-10EA	*Bacillus cereus*	V	CECT®	193	80-120	X	00001
CRM07464L-10EA	*Bacillus cereus*	L	NCTC®	7464	30-120	X	—
CRM07464M-10EA	*Bacillus cereus*	L	NCTC®	7464	500 - 5 x 10^4	X	—
VT000036-10EA	*Bacillus subtilis*	V	CECT®	356	3'000-7'000	X	00003
VT000032-10EA	*Bacillus subtilis*	V	CECT®	356	50-80	X	00003
RM11351Q-10EA	*Campylobacter jejuni*	L	NCTC®	11351	>100		—
RMF03255H-10EA	*Candida albicans*	L	NCPF®	3255	2 x 10^4		00055
RMF03255L-10EA	*Candida albicans*	L	NCPF®	3255	30-120		00055
VT000543-10EA	*Candida albicans*	V	CECT®	1394	80-120	X	00054
VT000545-10EA	*Candida albicans*	V	CECT®	1394	600-1'400	X	00054
VT000546-10EA	*Candida albicans*	V	CECT®	1394	3'000-7'000	X	00054
RM09750L-10EA	*Citrobacter freundii*	L	NCTC®	9750	30-120		—
VT004014-10EA	*Citrobacter freundii*	V	CECT®	401	130-270	X	—
VT004016-10EA	*Citrobacter freundii*	V	CECT®	401	3'000 - 7'000	X	—
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 - 5 x 10^4	X	00201
VT000082-10EA	*Clostridium sporogenes*	V	CECT®	485	50-80	X	00008
CRM11467L-10EA	*Cronobacter sakazakii*	L	NCTC®	11467	30-120	X	00214
CRM10006L-10EA	*Enterobacter aerogenes*	L	NCTC®	10006	30-120	X	00175
CRM10006M-10EA	*Enterobacter aerogenes*	L	NCTC®	10006	500 - 5 x 10^4	X	00175
VT001752-10EA	*Enterobacter aerogenes*	V	CECT®	684	50-80	X	00175
VT001753-10EA	*Enterobacter aerogenes*	V	CECT®	684	80-120	X	00175
VT001754-10EA	*Enterobacter aerogenes*	V	CECT®	684	130-270	X	00175
VT001755-10EA	*Enterobacter aerogenes*	V	CECT®	684	600-1'400	X	00175
VT001756-10EA	*Enterobacter aerogenes*	V	CECT®	684	3'000-7'000	X	00175
VT000834-10EA	*Enterobacter aerogenes*	V	CECT®	194	130-270	X	00083
CRM00775H-10EA	*Enterococcus faecalis*	L	NCTC®	775	>10^5	X	00009
CRM00775L-10EA	*Enterococcus faecalis*	L	NCTC®	775	30-120	X	00009
CRM00775M-10EA	*Enterococcus faecalis*	L	NCTC®	775	500 - 5 x 10^4	X	00009
VT000095-10EA	*Enterococcus faecalis*	V	CECT®	481	600-1'400	X	00009
VT000092-10EA	*Enterococcus faecalis*	V	CECT®	481	50-80	X	00009
VT000093-10EA	*Enterococcus faecalis*	V	CECT®	481	80-120	X	00009
VT000094-10EA	*Enterococcus faecalis*	V	CECT®	481	130-270	X	00009
VT000096-10EA	*Enterococcus faecalis*	V	CECT®	481	3'000-7'000	X	00009
VT000102-10EA	*Enterococcus faecium*	V	CECT®	410	50-80	X	00010
VT000104-10EA	*Enterococcus faecium*	V	CECT®	410	130-270	X	00010
VT000105-10EA	*Enterococcus faecium*	V	CECT®	410	600-1'400	X	00010
CRM13216L-10EA	*Escherichia coli*	L	NCTC®	13216	30-120	X	00202
CRM09001H-10EA	*Escherichia coli*	L	NCTC®	9001	>10^5	X	00090
CRM09001L-10EA	*Escherichia coli*	L	NCTC®	9001	30-120	X	00090
CRM09001M-10EA	*Escherichia coli*	L	NCTC®	9001	500 - 5 x 10^4	X	00090
VT000133-10EA	*Escherichia Coli*	V	CECT®	434	80-120	X	00013
VT000902-10EA	*Escherichia coli*	V	CECT®	515	50-80	X	00090
VT000904-10EA	*Escherichia coli*	V	CECT®	515	130-270	X	00090
VT000905-10EA	*Escherichia coli*	V	CECT®	515	600-1'400	X	00090
VT000906-10EA	*Escherichia coli*	V	CECT®	515	3'000-7'000	X	00090
VT000909-10EA	*Escherichia coli*	V	CECT®	515	Variable	X	00090
VT000902-10EA	*Escherichia coli*	V	CECT®	515	50-80	X	00090
VT000136-10EA	*Escherichia coli*	V	CECT®	434	3'000-7'000	X	00013
VT000122-10EA	*Escherichia coli*	V	CECT®	516	50-80	X	00012
VT000127-10EA	*Escherichia coli*	V	CECT®	516	50'000-150'000	X	00012
CRM12900L-10EA	*Escherichia coli O157 (NT)*	L	NCTC®	12900	30-120	X	00014
VT072766-10EA	*Fluoribacer bozemanae*	V	CECT®	7276	3'000-7'000	X	—
VT072767-10EA	*Fluoribacer bozemanae*	V	CECT®	7276	50'000-150'000	X	—
CRM08167L-10EA	*Klebsiella oxytoca*	L	NCTC®	8167	30-120	X	—
VT000971-10EA	*Klebsiella pneumoniae*	V	CECT®	143	15-40	X	00097

* L for Lenticule® technology products ; V for Vitroids™ technology products.

Certified Reference Microorganisms portfolio

Cat. No.	Species	L/V*	Origin	Strain No.	CFU Range	CRM	WDCM
VT000975-10EA	*Klebsiella pneumoniae*	V	CECT®	143	600-1'400	X	00097
CRM11368M-10EA	*Legionella bozemanii*	L	NCTC®	11368	500 - 5 x 10^4	X	—
CRM11371M-10EA	*Legionella micdadei*	L	NCTC®	11371	500 - 5 x 10^4	X	—
VT001077-10EA	*Legionella pneumophila*	V	CECT®	7109	50'000-150'000	X	00107
CRM12821L-10EA	*Legionella pneumophila*	L	NCTC®	12821	30-120	X	00205
CRM12821M-10EA	*Legionella pneumophila*	L	NCTC®	12821	500 - 5 x 10^4	X	00205
VT002057-10EA	*Legionella pneumophila (serogroup 1)*	V	CECT®	8734	50'000-150'000	X	00205
CRM11288L-10EA	*Listeria innocua*	L	NCTC®	11288	30-120	X	00017
CRM11994L-10EA	*Listeria monocytogenes*	L	NCTC®	11994	30-120	X	00019
CRM11994M-10EA	*Listeria monocytogenes*	L	NCTC®	11994	500 - 5 x 10^4	X	00019
VT004835-10EA	*Proteus hauseri*	V	CECT®	484	600-1'400	X	—
VT000233-10EA	*Proteus mirabilis*	V	CECT®	4168	80-120	X	—
VT000237-10EA	*Proteus mirabilis*	V	CECT®	4168	50'000-150'000	X	—
CRM10662L-10EA	*Pseudomonas aeruginosa*	L	NCTC®	10662	30-120	X	00114
CRM10662M-10EA	*Pseudomonas aeruginosa*	L	NCTC®	10662	500 - 5 x 10^4	X	00114
VT000244-10EA	*Pseudomonas aeruginosa*	V	CECT®	110	130-270	X	00024
VT000249-10EA	*Pseudomonas aeruginosa*	V	CECT®	110	variable	X	00024
VT001142-10EA	*Pseudomonas aeruginosa*	V	CECT®	118	50-80	X	00025
VT001143-10EA	*Pseudomonas aeruginosa*	V	CECT®	118	80-120	X	00025
VT001145-10EA	*Pseudomonas aeruginosa*	V	CECT®	118	600-1'400	X	00025
VT000261-10EA	*Pseudomonas aeruginosa*	V	CECT®	111	15 - 40	X	00026
VT000262-10EA	*Pseudomonas aeruginosa*	V	CECT®	111	50-80	X	00026
VT000262-10EA	*Pseudomonas aeruginosa*	V	CECT®	111	50-80	X	00026
VT000263-10EA	*Pseudomonas aeruginosa*	V	CECT®	111	80-120	X	00026
VT000264-10EA	*Pseudomonas aeruginosa*	V	CECT®	111	130-270	X	00026
VT000265-10EA	*Pseudomonas aeruginosa*	V	CECT®	111	600-1'400	X	00026
VT000266-10EA	*Pseudomonas aeruginosa*	V	CECT®	111	3'000-7'000	X	00026
VT000267-10EA	*Pseudomonas aeruginosa*	V	CECT®	111	50'000-150'000	X	00026
CRM09528L-10EA	*Raoultella planticola (formerly Klebsiella aerogenes)*	L	NCTC®	9528	30-120	X	—
CRM09528M-10EA	*Raoultella planticola (formerly Klebsiella aerogenes)*	L	NCTC®	9528	500 - 5 x 10^4	X	—
RMF03191M-10EA	*Saccharomyces cerevisiae*	L	NCPF®	3191	500 - 5 x 10^4		—
RMF03191L-10EA	*Saccharomyces cerevisiae*	L	NCPF®	3191	30-120		—
VT000312-10EA	*Salmonella enterica subsp. Enterica serovar Typhimurium*	V	CECT®	4594	50-80	X	00031
VT000313-10EA	*Salmonella enterica subsp. Enterica serovar Typhimurium*	V	CECT®	4594	80-120	X	00031
VT000292-10EA	*Salmonella enterica subsp. Enterica serovar Typhimurium*	V	CECT®	545	50-80	X	00029
VT000303-10EA	*Salmonella enterica subsp. Enterica serovar Typhimurium*	V	CECT®	4300	80-120	X	—
CRM06676L-10EA	*Salmonella enteritidis*	L	NCTC®	6676	30-120	X	—
CRM07832L-10EA	*Salmonella Nottingham*	L	NCTC®	7832	30-120	X	—
CRM12023L-10EA	*Salmonella Typhimurium*	L	NCTC®	12023	30-120	X	00031
CRM06571L-10EA	*Staphylococcus aureus*	L	NCTC®	6571	30-120	X	00035
VT000322-10EA	*Staphylococcus aureus susp. Aureus*	V	CECT®	239	50-80	X	00032
VT000322-10EA	*Staphylococcus aureus susp. Aureus*	V	CECT®	239	50-80	X	00032
VT000323-10EA	*Staphylococcus aureus susp. Aureus*	V	CECT®	239	80-120	X	00032
VT000324-10EA	*Staphylococcus aureus susp. Aureus*	V	CECT®	239	130-270	X	00032
VT000325-10EA	*Staphylococcus aureus susp. Aureus*	V	CECT®	239	600-1'400	X	00032
VT000326-10EA	*Staphylococcus aureus susp. Aureus*	V	CECT®	239	3'000-7'000	X	00032
CRM06571M-10EA	*Staphylococcus aureus*	L	NCTC®	6571	500 - 5 x 10^4	X	00035
CRM11047L-10EA	*Staphylococcus epidermidis*	L	NCTC®	11047	30-120	X	00132
RM11218Q-10EA	*Vibrio furnissi*	L	NCTC®	11218	>100		00186
RM10903Q-10EA	*Vibrio parahaemolyticus*	L	NCTC®	10903	>100		00037
RM11176L-10EA	*Yersinia enterocolitica*	L	NCTC®	11176	30-120		—

* L for Lenticule® technology products ; V for Vitroids™ technology products.

Negative Controls

Cat.Number	Description
RMBLANK0-10EA	Negative Control for Lenticule® discs, no growth
RQC0001-10EA	Negative Control for Vitroids™ discs, no growth

NCTC National Collection of Type Cultures — Operated by Public Health England

NCPF National Collection of Pathogenic Fungi — Operated by Public Health England

CECT — Derived from CECT® strains

LENTICULE® discs are manufactured by Sigma-Aldrich® under licence from Public Health England.

sigma-aldrich.com/mibi-crm

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