

Microbiology Standards

The Simple Way to Ensure Accurate Results, Every Time

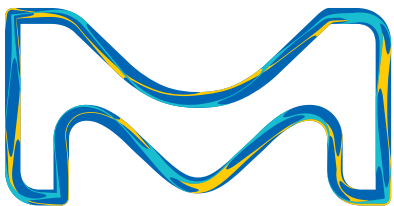
Vitroids™ and LENTICULE® Discs

Defined CFU range and low standard deviation

Fast, reliable and easy to use



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



The Life Science business of Merck operates as MilliporeSigma in the U.S. and Canada.

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® 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 17025,⁹ 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).

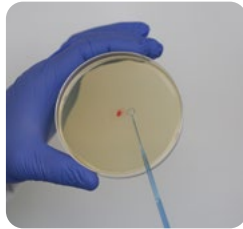


Applications

- Daily quality control
- Performance testing of media acc. ISO 11133²
- 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.



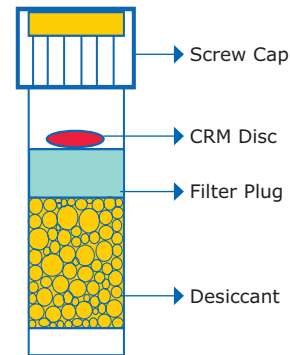
Improved Stability, Performance, and Ease of Use (and re-locate stability section below)

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 17034¹ 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 11133² (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

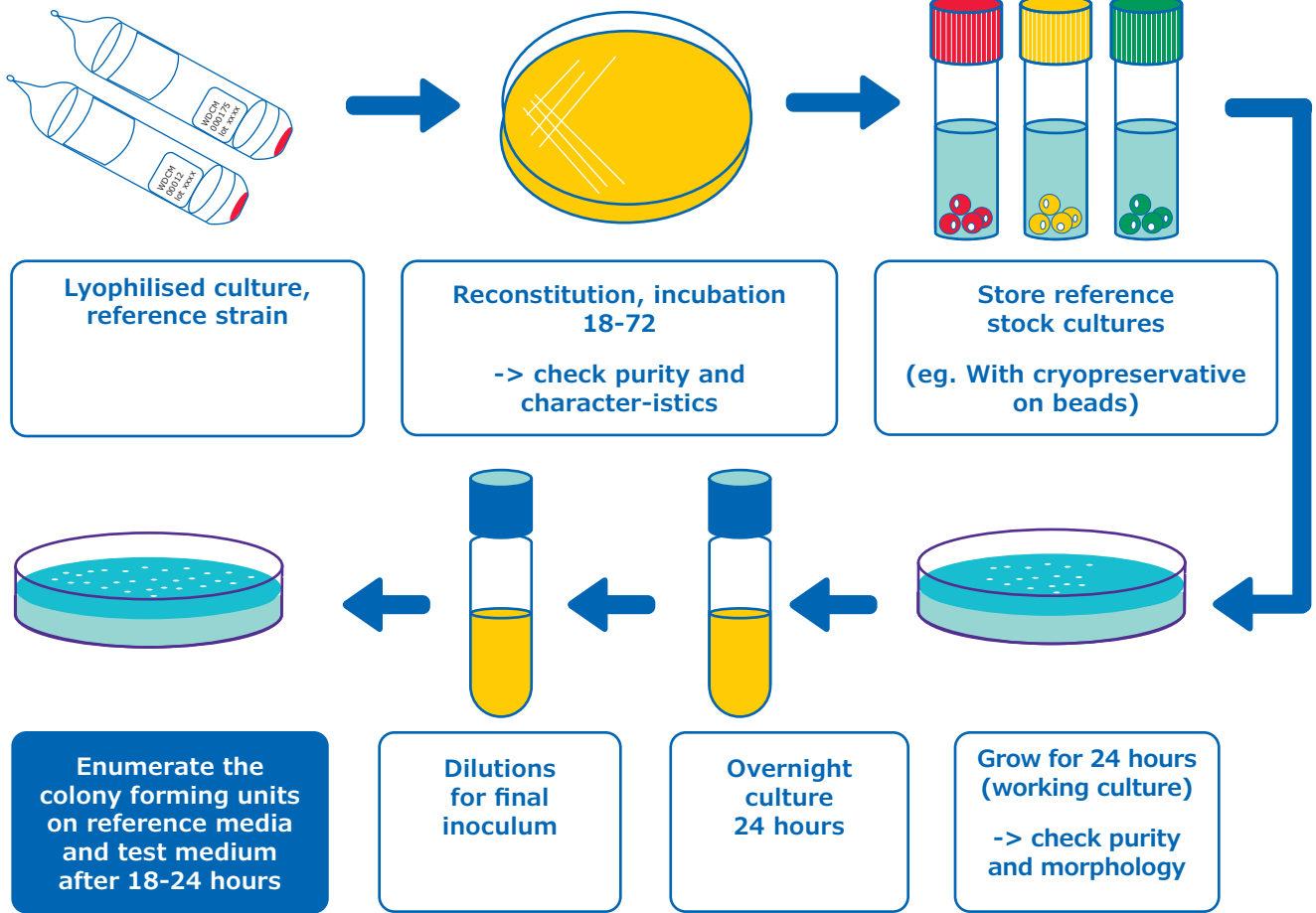
Traditional Way

Costs:

- Lyophilized cultures
- Reagents
- Consumables
- Energy

Time needs:

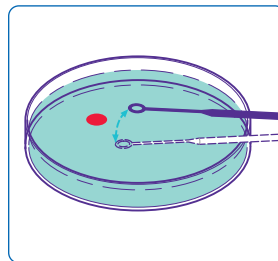
- Hands on time
- Documentation
- incubation



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

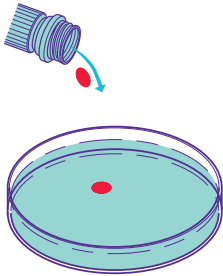
Certified reference material with required final inoculum	Hands on time
Choose and purchase test organisms	5.0 min
Remove the tubes from the freezer	0.7 min
Allow the discs to reach ambient temperature (15 min)	0.0 min
Open the tube and remove the discs by inverting the tube over the medium/buffer to 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

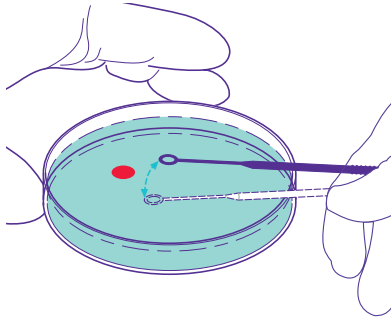
Vitroids™ and LENTICULE® discs are as available as small water-soluble discs, making your inoculum preparation exceptionally easy.

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

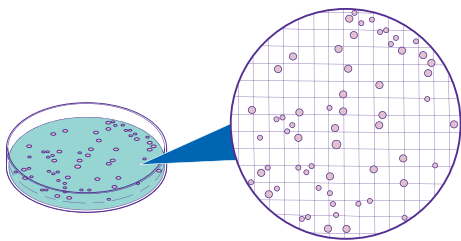
1. Take the tube(s) containing the disc(s) from the freezer and allow it to reach ambient temperature (5 to 10 minutes) before use. Do not refreeze. Use the disc(s) within one hour of transferring to ambient temperature.
2. Open the tube and remove the discs by inverting the tube over the solid medium.



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.



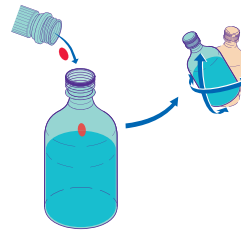
4. Spread the drop over the entire plate.
5. Test and incubate the sample following routine enumeration procedures.



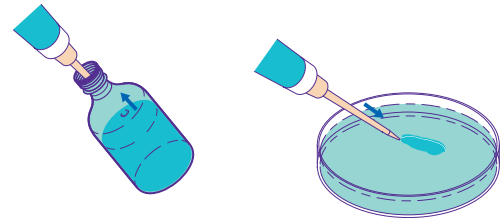
The discs can be rehydrated in buffer / liquid media before use :

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.

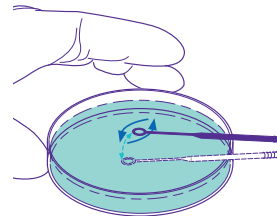
1. Remove the tube(s) from the freezer and allow the disc(s) to reach ambient temperature (5 to 10 minutes) before use. Do not refreeze. Use the disc(s) within one hour after transferring to ambient temperature.
2. Open the tube and remove the discs by inverting the tube over the buffer or medium to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



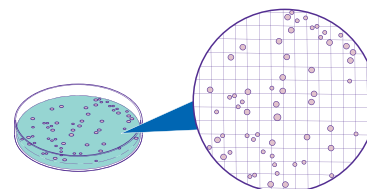
3. Apply the inoculum onto an agar plate.



4. Spread the drop over the entire plate



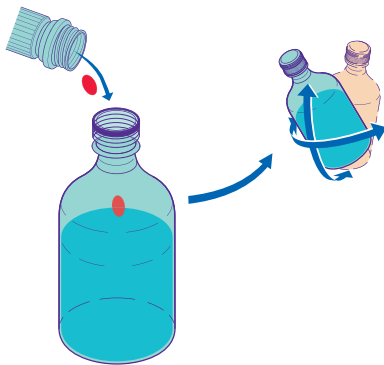
5. Test and incubate the sample following routine enumeration procedures.



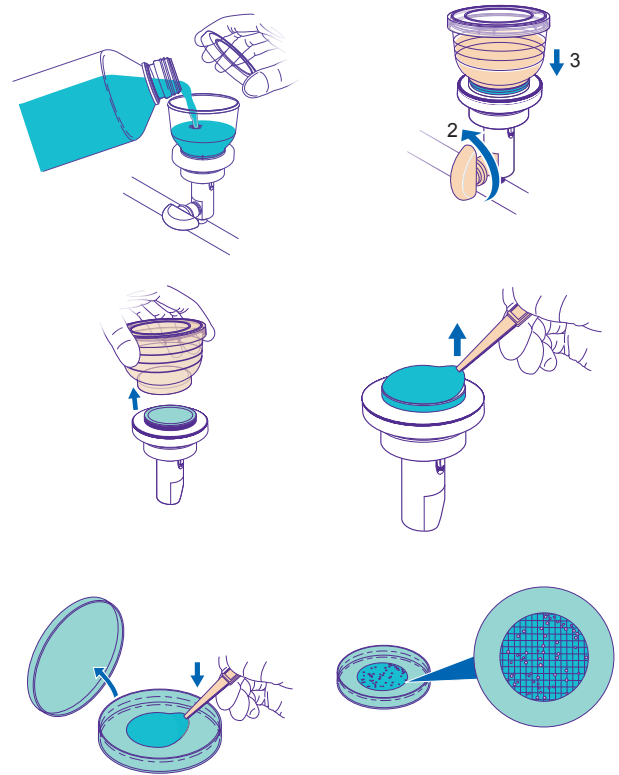
Procedure to use the discs for membrane filtration:

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.

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: <i>Clostridium sporogenes</i> 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	
<p>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.</p>		

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**



**ISO 17034
SRMS 0001**



Dr. Thomas Bührer – CRM Operations



Dr. Philipp Zell – Approving Officer



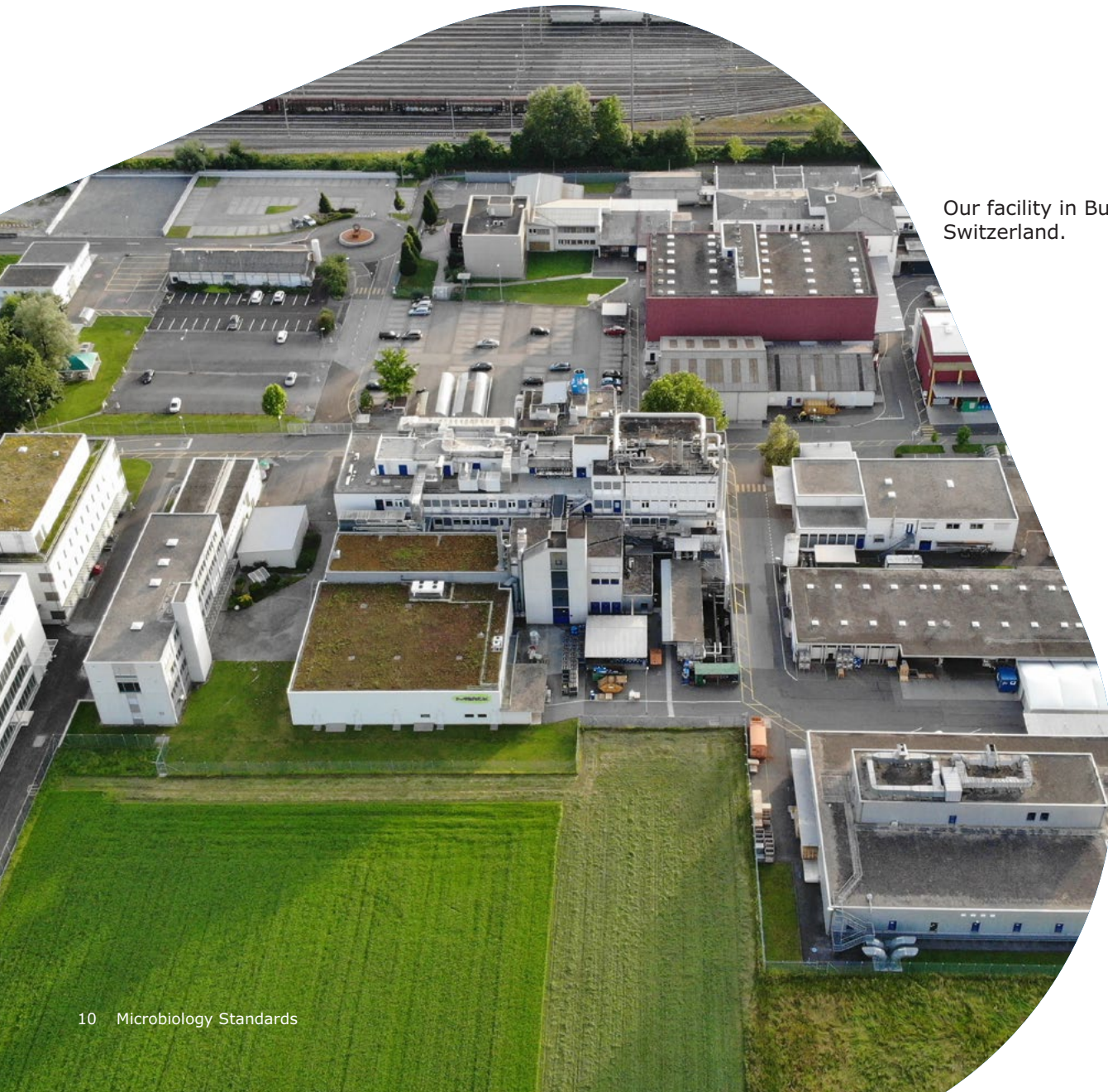
A Strong Partnership

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.	Coming soon	Species	L/V*	Origin	Strain No.	CFU Range	CRM	WDCM	Equivalent ATCC strain
VT000617-10EA	●	<i>Aerococcus viridans</i>	V	CECT®	978	50,000-150,000	x	00061	11563
VT070943-10EA		<i>Alicyclobacillus acidoterrestris</i>	V	CECT®	7094	80-130	x	-	49025
VT070946-10EA		<i>Alicyclobacillus acidoterrestris</i>	V	CECT®	7094	1,000-10,000	x	-	49025
VT000532-10EA		<i>Aspergillus brasiliensis</i> (formerly <i>Aspergillus niger</i>)	V	CECT®	2574	15-80	x	00053	16404
VT001833-10EA	●	<i>Aspergillus caesiellus (restrictus)</i>	V	CECT®	20807	80-130		00183	42693
CRM07464L-10EA		<i>Bacillus cereus</i>	L	NCTC®	7464	30-120	x	-	10876
CRM07464M-10EA		<i>Bacillus cereus</i>	L	NCTC®	7464	500-50,000	x	-	10876
VT000012-10EA		<i>Bacillus cereus</i>	V	CECT®	193	15-80	x	00001	11778
VT000013-10EA		<i>Bacillus cereus</i>	V	CECT®	193	80-130	x	00001	11778
VT000016-10EA	●	<i>Bacillus cereus</i>	V	CECT®	193	1,000-10,000	x	00001	11778
VT000032-10EA		<i>Bacillus spizizenii</i> (formerly <i>Bacillus subtilis</i> subsp. <i>Spizizenii</i>)	V	CECT®	356	15-80	x	00003	6633
VT000033-10EA		<i>Bacillus spizizenii</i> (formerly <i>Bacillus subtilis</i> subsp. <i>Spizizenii</i>)	V	CECT®	356	80-130	x	00003	6633
VT000036-10EA		<i>Bacillus spizizenii</i> (formerly <i>Bacillus subtilis</i> subsp. <i>Spizizenii</i>)	V	CECT®	356	1,000-10,000	x	00003	6633
VT000037-10EA		<i>Bacillus spizizenii</i> (formerly <i>Bacillus subtilis</i> subsp. <i>Spizizenii</i>)	V	CECT®	356	50,000-150,000	x	00003	6633
VT099522-10EA		<i>Burkholderia cenocepacia</i>	V	CECT®	9952	15-80	x	-	BAA-245
VT041372-10EA		<i>Burkholderia cepacia</i>	V	CECT®	4137	15-80	x	-	25416
VT041376-10EA		<i>Burkholderia cepacia</i>	V	CECT®	4137	1,000-10,000	x	-	25416
VT099542-10EA		<i>Burkholderia multivorans</i>	V	CECT®	9954	15-80	x		BAA-247
RMF03255L-10EA		<i>Candida albicans</i>	L	NCPF®	3255	30-120		00055	2091
RMF03255H-10EA	●	<i>Candida albicans</i>	L	NCPF®	3255	>100,000		00055	2091
VT000542-10EA		<i>Candida albicans</i>	V	CECT®	1394	15-80	x	00054	10231
VT000543-10EA		<i>Candida albicans</i>	V	CECT®	1394	80-130	x	00054	10231
VT000546-10EA		<i>Candida albicans</i>	V	CECT®	1394	1,000-10,000	x	00054	10231
RM09750L-10EA		<i>Citrobacter freundii</i>	L	NCTC®	9750	30-120		-	8090
VT004014-10EA		<i>Citrobacter freundii</i>	V	CECT®	401	130-300	x	-	8090
VT004016-10EA		<i>Citrobacter freundii</i>	V	CECT®	401	1,000-10,000	x	-	8090
VT000062-10EA	●	<i>Citrobacter freundii</i>	V	CECT®	7467	15-80	x	00006	43864
VT000063-10EA	●	<i>Citrobacter freundii</i>	V	CECT®	7467	80-130	x	00006	43864
VT000066-10EA		<i>Citrobacter freundii</i>	V	CECT®	7467	1,000-10,000	x	00006	43864
VT000067-10EA		<i>Citrobacter freundii</i>	V	CECT®	7464	50,000-150,000	x	00006	43864
CRM00506L-10EA		<i>Clostridium bifermentans</i>	L	NCTC®	506	30-120	x	00079	-
CRM13170L-10EA		<i>Clostridium perfringens</i>	L	NCTC®	13170	30-120	x	00201	-
CRM13170M-10EA		<i>Clostridium perfringens</i>	L	NCTC®	13170	500-50,000	x	00201	-
VT000082-10EA		<i>Clostridium sporogenes</i>	V	CECT®	485	15-80	x	00008	19404
CRM11467L-10EA		<i>Cronobacter sakazakii</i>	L	NCTC®	11467	30-120	x	00214	29544
CRM10006L-10EA		<i>Enterobacter aerogenes</i>	L	NCTC®	10006	30-120	x	00175	13048
CRM10006M-10EA		<i>Enterobacter aerogenes</i>	L	NCTC®	10006	500-50,000	x	00175	13048
VT001752-10EA		<i>Enterobacter aerogenes</i>	V	CECT®	684	15-80	x	00175	13048
VT001753-10EA		<i>Enterobacter aerogenes</i>	V	CECT®	684	80-130	x	00175	13048
VT001754-10EA		<i>Enterobacter aerogenes</i>	V	CECT®	684	130-300	x	00175	13048
VT001756-10EA		<i>Enterobacter aerogenes</i>	V	CECT®	684	1,000-10,000	x	00175	13048
VT000834-10EA		<i>Enterobacter cloacae</i>	V	CECT®	194	130-300	x	00083	13047
VT000836-10EA	●	<i>Enterobacter cloacae</i>	V	CECT®	194	1,000-10,000	x	00083	13047

* L/V = Vitroids™/Lenticule® discs

Cat. No.	Coming soon	Species	L/V*	Origin	Strain No.	CFU Range	CRM	WDCM	Equivalent ATCC strain
CRM00775L-10EA		<i>Enterococcus faecalis</i>	L	NCTC®	775	30-120	x	00009	19433
CRM00775M-10EA		<i>Enterococcus faecalis</i>	L	NCTC®	775	500-50,000	x	00009	19433
CRM00775H-10EA		<i>Enterococcus faecalis</i>	L	NCTC®	775	>100,000	x	00009	19433
VT000092-10EA		<i>Enterococcus faecalis</i>	V	CECT®	481	15-80	x	00009	19433
VT000093-10EA		<i>Enterococcus faecalis</i>	V	CECT®	481	80-130	x	00009	19433
VT000094-10EA		<i>Enterococcus faecalis</i>	V	CECT®	481	130-300	x	00009	19433
VT000096-10EA		<i>Enterococcus faecalis</i>	V	CECT®	481	1,000-10,000	x	00009	19433
VT000097-10EA		<i>Enterococcus faecalis</i>	V	CECT®	775	50,000-150,000	x	00009	19433
VT000877-10EA		<i>Enterococcus faecalis</i>	V	CECT®	795	50,000-150,000	x	00087	29212
VT000872-10EA	●	<i>Enterococcus faecalis</i>	V	CECT®	12697	15-80	x	00087	29212
VT000873-10EA		<i>Enterococcus faecalis</i>	V	CECT®	12697	80-130	x	00087	29212
VT000876-10EA		<i>Enterococcus faecalis</i>	V	CECT®	12697	1,000-10,000	x	00087	29212
VT000105-10EA		<i>Enterococcus faecium</i>	V	CECT®	410	1,000-10,000	x	00010	19434
CRM09001L-10EA		<i>Escherichia coli</i>	L	NCTC®	9001	30-120	x	00090	11775
CRM09001M-10EA		<i>Escherichia coli</i>	L	NCTC®	9001	500-50,000	x	00090	11775
CRM09001H-10EA		<i>Escherichia coli</i>	L	NCTC®	9001	>100,000	x	00090	11775
VT000902-10EA		<i>Escherichia coli</i>	V	CECT®	515	15-80	x	00090	11775
VT000903-10EA		<i>Escherichia coli</i>	V	CECT®	515	80-130	x	00090	11775
VT000904-10EA		<i>Escherichia coli</i>	V	CECT®	515	130-300	x	00090	11775
VT000905-10EA		<i>Escherichia coli</i>	V	CECT®	515	600-1400	x	00090	11775
VT000906-10EA		<i>Escherichia coli</i>	V	CECT®	515	1,000-10,000	x	00090	11775
CRM13216L-10EA		<i>Escherichia coli</i>	L	NCTC®	13216	30-120	x	00202	-
VT000122-10EA		<i>Escherichia coli</i>	V	CECT®	516	15-80	x	00012	8739
VT000123-10EA		<i>Escherichia coli</i>	V	CECT®	516	80-130	x	00012	8739
VT000126-10EA		<i>Escherichia coli</i>	V	CECT®	516	1,000-10,000	x	00012	8739
VT000127-10EA		<i>Escherichia coli</i>	V	CECT®	516	50,000-150,000	x	00012	8739
VT000132-10EA		<i>Escherichia coli</i>	V	CECT®	434	15-80	x	00013	25922
VT000133-10EA		<i>Escherichia coli</i>	V	CECT®	434	80-130	x	00013	25922
VT000136-10EA		<i>Escherichia coli</i>	V	CECT®	434	1,000-10,000	x	00013	25922
VT000137-10EA		<i>Escherichia coli</i>	V	CECT®	434	50000-150000	x	00013	25922
VT001793-10EA		<i>Escherichia coli</i>	V	CECT®	8296	80-130	x	00179	-
VT001796-10EA		<i>Escherichia coli</i>	V	CECT®	8296	1,000-10,000	x	00179	-
VT002023-10EA		<i>Escherichia coli</i>	V	CECT®	9153	80-130	x	00202	-
VT002026-10EA	●	<i>Escherichia coli</i>	V	CECT®	9153	1,000-10,000	x	00202	-
VT000143-10EA	●	<i>Escherichia coli</i> 0157:H7 (non-toxigenic)	V	CECT®	4972	80-130	x	00014	700728
VT000146-10EA	●	<i>Escherichia coli</i> 0157:H7 (non-toxigenic)	V	CECT®	4972	1,000-10,000	x	00014	700728
CRM12900L-10EA		<i>Escherichia coli</i> 0157:H7 (non-toxigenic)	L	NCTC®	12900	30-120	x	00014	700728
VT072767-10EA	●	<i>Fluoribacter bozemanæ</i> (formerly <i>Legionella bozemanii</i>)	V	CECT®	7276	>100,000	x	-	33217
CRM11368M-10EA		<i>Fluoribacter bozemanæ</i> (formerly <i>Legionella bozemanii</i>)	L	NCTC®	11386	500-50,000	x	-	33217
VT025046-10EA		<i>Heterotrophic Organisms</i>	V			1,000-10,000	x	-	-
CRM08167L-10EA		<i>Klebsiella oxytoca</i>	L	NCTC®	8167	30-120	x	-	-
VT000971-10EA		<i>Klebsiella pneumoniae</i>	V	CECT®	143	15-80	x	00097	13883
VT000975-10EA		<i>Klebsiella pneumoniae</i>	V	CECT®	143	1,000-10,000	x	00097	13883
VT000163-10EA		<i>Lactococcus lactis</i> subsp. <i>Lactis</i>	V	CECT®	185	80-130	x	00016	9936/19435
VT000167-10EA		<i>Lactococcus lactis</i> subsp. <i>lactis</i>	V	CECT®	185	50,000-150,000	x	00016	9936/19435
VT001063-10EA	●	<i>Legionella anisa</i>	V	CECT®	8177	80-130	x	00106	35292

* L/V = Vitroids™/Lenticule® discs

Cat. No.	Coming soon	Species	L/V*	Origin	Strain No.	CFU Range	CRM	WDCM	Equivalent ATCC strain
CRM12821L-10EA		<i>Legionella pneumophila</i> (serogroup 1)	L	NCTC®	12821	30-120	x	00205	-
CRM12821M-10EA		<i>Legionella pneumophila</i> (serogroup 1)	L	NCTC®	12821	500-50,000	x	00205	-
VT002057-10EA		<i>Legionella pneumophila</i> (serogroup 1)	V	CECT®	8734	>50,000	x	00205	-
VT000176-10EA		<i>Listeria innocua</i> serotype 6a	V	CECT®	910	1,000-10,000	x	00017	33090
CRM11994L-10EA		<i>Listeria monocytogenes</i>	L	NCTC®	11994	30-120	x	00019	-
CRM11994M-10EA		<i>Listeria monocytogenes</i>	L	NCTC®	11994	500-50,000	x	00019	-
VT001092-10EA		<i>Listeria monocytogenes</i> serovar I/2a	V	CECT®	5873	15-80	x	00109	35152
VT001093-10EA		<i>Listeria monocytogenes</i> serovar I/2a	V	CECT®	5873	80-130	x	00109	35152
VT001096-10EA		<i>Listeria monocytogenes</i> serovar I/2a	V	CECT®	5873	1,000-10,000	x	00109	35152
VT000212-10EA		<i>Listeria monocytogenes</i> serovar 4b	V	CECT®	935	15-80	x	00021	13932
VT000213-10EA		<i>Listeria monocytogenes</i> serovar 4b	V	CECT®	935	80-130	x	00021	13932
VT000216-10EA		<i>Listeria monocytogenes</i> serovar 4b	V	CECT®	935	1,000-10,000	x	00021	13932
VT000217-10EA		<i>Listeria monocytogenes</i> serovar 4b	V	CECT®	935	50,000-150,000	x	00021	13932
VT000232-10EA		<i>Proteus mirabilis</i>	V	CECT®	4168	15-80	x	00023	29906
VT000233-10EA	●	<i>Proteus mirabilis</i>	V	CECT®	4168	80-130	x	00023	29906
VT000237-10EA	●	<i>Proteus mirabilis</i>	V	CECT®	4168	50,000-150,000	x	00023	29906
CRM10662L-10EA		<i>Pseudomonas aeruginosa</i>	L	NCTC®	10662	30-120	x	00114	25668
CRM10662M-10EA		<i>Pseudomonas aeruginosa</i>	L	NCTC®	10662	500-50,000	x	00114	25668
VT001142-10EA		<i>Pseudomonas aeruginosa</i>	V	CECT®	118	15-80	x	00114	25668
VT001143-10EA		<i>Pseudomonas aeruginosa</i>	V	CECT®	118	80-130	x	00114	25668
VT001145-10EA		<i>Pseudomonas aeruginosa</i>	V	CECT®	118	1,000-10,000	x	00114	25668
VT000256-10EA		<i>Pseudomonas aeruginosa</i>	V	CECT®	108	1,000-10,000	x	00025	27853
VT000257-10EA		<i>Pseudomonas aeruginosa</i>	V	CECT®	108	50,000-150,000	x	00025	27853
VT000262-10EA		<i>Pseudomonas paraaeruginosa</i> (formerly <i>Pseudomonas aeruginosa</i>)	V	CECT®	111	15-80	x	00026	9027
VT000263-10EA		<i>Pseudomonas paraaeruginosa</i> (formerly <i>Pseudomonas aeruginosa</i>)	V	CECT®	111	80-130	x	00026	9027
VT000264-10EA		<i>Pseudomonas paraaeruginosa</i> (formerly <i>Pseudomonas aeruginosa</i>)	V	CECT®	111	130-300	x	00026	9027
VT000266-10EA		<i>Pseudomonas paraaeruginosa</i> (formerly <i>Pseudomonas aeruginosa</i>)	V	CECT®	111	1,000-10,000	x	00026	9027
VT000267-10EA		<i>Pseudomonas paraaeruginosa</i> (formerly <i>Pseudomonas aeruginosa</i>)	V	CECT®	111	50,000-150,000	x	00026	9027
VT001153-10EA		<i>Pseudomonas fluorescens</i>	V	CECT®	378	80-130	x	00115	13525
VT001156-10EA	●	<i>Pseudomonas fluorescens</i>	V	CECT®	378	1,000-10,000	x	00115	13525
CRM09528L-10EA		<i>Raoultella planticola</i> (formerly <i>Klebsiella aerogenes</i>)	L	NCTC®	9528	30-120	x	-	-
CRM09528M-10EA		<i>Raoultella planticola</i> (formerly <i>Klebsiella aerogenes</i>)	L	NCTC®	9528	500-50,000	x	-	-
RMF03191L-10EA		<i>Saccharomyces cerevisiae</i>	L	NCPF®	3191	30-120		-	9763
RMF03191M-10EA		<i>Saccharomyces cerevisiae</i>	L	NCPF®	3191	500-50,000		-	9763
CRM12023L-10EA		<i>Salmonella enterica</i> serovar Typhimurium	L	NCTC®	12023	30-120	x	00031	14028
VT000302-10EA		<i>Salmonella enterica</i> subsp. <i>Enterica</i> serovar Enteritidis	V	CECT®	4300	15-80	x	00030	13076
VT000306-10EA		<i>Salmonella enterica</i> subsp. <i>Enterica</i> serovar Enteritidis	V	CECT®	4300	1,000-10,000	x	00030	13076
VT000307-10EA		<i>Salmonella enterica</i> subsp. <i>Enterica</i> serovar Enteritidis	V	CECT®	4300	50,000-150,000	x	00030	13076
VT000303-10EA		<i>Salmonella enterica</i> subsp. <i>Enterica</i> serovar Enteritidis	V	CECT®	4300	80-130	x	00030	13076
CRM06676L-10EA		<i>Salmonella enteritidis</i>	L	NCTC®	6676	30-120	x	-	-

* L/V = Vitroids™/Lenticule® discs

Cat. No.	Coming soon	Species	L/V*	Origin	Strain No.	CFU Range	CRM	WDCM	Equivalent ATCC strain
CRM07832L-10EA		<i>Salmonella nottingham</i>	L	NCTC®	7832	30-120	x	-	-
CRM06571L-10EA		<i>Staphylococcus aureus subsp. aureus</i>	L	NCTC®	6571	30-120	x	00035	9144
CRM06571M-10EA		<i>Staphylococcus aureus subsp. aureus</i>	L	NCTC®	6571	500-50,000	x	00035	9144
VT000357-10EA		<i>Staphylococcus aureus subsp. aureus</i>	V	CECT®	59	50,000-150,000	x	00035	9144
VT000342-10EA		<i>Staphylococcus aureus subsp. aureus</i>	V	CECT®	435	15-80	x	00034	25923
VT000343-10EA		<i>Staphylococcus aureus subsp. aureus</i>	V	CECT®	435	80-130	x	00034	25923
VT000346-10EA		<i>Staphylococcus aureus subsp. aureus</i>	V	CECT®	435	1,000-10,000	x	00034	25923
VT000347-10EA		<i>Staphylococcus aureus subsp. aureus</i>	V	CECT®	435	50,000-150,000	x	00034	25923
VT000322-10EA		<i>Staphylococcus aureus subsp. aureus</i>	V	CECT®	239	15-80	x	00032	6538
VT000323-10EA		<i>Staphylococcus aureus subsp. aureus</i>	V	CECT®	239	80-130	x	00032	6538
VT000324-10EA		<i>Staphylococcus aureus subsp. aureus</i>	V	CECT®	239	130-300	x	00032	6538
VT000326-10EA		<i>Staphylococcus aureus subsp. aureus</i>	V	CECT®	239	1,000-10,000	x	00032	6538
VT000327-10EA		<i>Staphylococcus aureus subsp. aureus</i>	V	CECT®	239	50,000-150,000	x	00032	6538
CRM11047L-10EA		<i>Staphylococcus epidermidis</i>	L	NCTC®	11047	30-120	x	00132	14990
VT000366-10EA		<i>Staphylococcus epidermidis</i>	V	CECT®	231	1,000-10,000	x	00036	12228
VT001596-10EA		<i>Staphylococcus saprophyticus</i>	V	CECT®	235	1,000-10,000	x	00159	15305
CRM11371M-10EA		<i>Tatlockia micdadei</i> (formerly <i>Legionella micdadei</i>)	L	NCTC®	11371	500-50,000	x	-	33218
RM10903Q-10EA		<i>Vibrio parahaemolyticus</i>	L	NCTC®	10703	>100		-	-

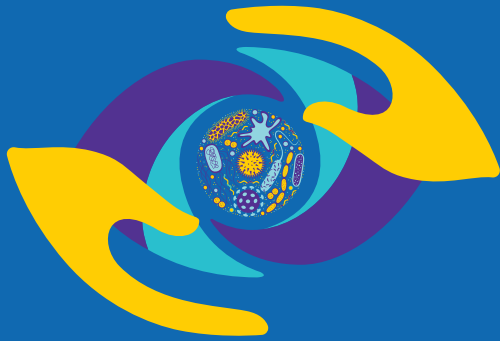
Negative Controls

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

* L/V = Vitroids™/Lenticule® discs

Cat. No.	Comming soon	Species	L/V*	Origin	Strain No.	CFU Range	WDCM	Equivalent ATCC strain
VT000716-10EA	x	Brochothrix thermosphacta	V	CECT®	847	1,000-10,000	00071	11509
VT000582-10EA	x	Clostridium perfringens	V	CECT	7468	15-80	00080	12916
VT000803-10EA	x	Clostridium perfringens	V	CECT®	7468	80-130	00080	12916
VT002132-10EA	x	Cronobacter muytjensii	V	CECT	9143	15-80	00213	51329
VT002136-10EA	x	Cronobacter muytjensii	V	CECT	9143	1,000-10,000	00213	51329
VT002142-10EA	x	Cronobacter sakazakii	V	CECT	858	15-80	00214	29544
VT002146-10EA	x	Cronobacter sakazakii	V	CECT	858	1'000-10'000	00214	29544
VT001773-10EA	x	Enterococcus faecium	V	CECT®	8108	80-130	00177	6057
VT000907-10EA	x	Escherichia coli	V	CECT®	515	50,000-150,000	00090	11775
VT000153-10EA	x	Lactobacillus sakei subsp. Sakei	V	CECT®	906	80-130	00015	15521
VT000157-10EA	x	Lactobacillus sakei subsp. Sakei	V	CECT®	906	50,000-150,000	00015	15521
VT001066-10EA	x	Legionella anisa	V	CECT®	8177	1,000-10,000	00106	35292
VT001067-10EA	x	Legionella anisa	V	CECT®	8177	≥100,000	00106	35292
VT001807-10EA	x	Legionella pneumophila	V	CECT®	8343	>100,000	00180	33156
VT001073-10EA	x	Legionella pneumophila serogroup 1	V	CECT®	7109	80-130	00107	33152
VT001076-10EA	x	Legionella pneumophila serogroup 1	V	CECT®	7109	1,000-10,000	00107	33152
VT001803-10EA	x	Legionella pneumophila subsp. fraseri serovar 4	V	CECT®	8343	80-130	00180	33156
VT001806-10EA	x	Legionella pneumophila subsp. fraseri serovar 4	V	CECT®	8343	1,000-10,000	00180	33156
VT001813-10EA	x	Mucor racemosus	V	CECT®	20821	80-130	00181	42647
VT000243-10EA	x	Pseudomonas aeruginosa	V	CECT®	110	80-130	00024	10145
VT000246-10EA	x	Pseudomonas aeruginosa	V	CECT®	110	1,000-10,000	00024	10145
VT000583-10EA	x	Saccharomyces cerevisiae	V	CECT	1383	80-130	00058	9763
VT001823-10EA	x	Wallemia mellicola (formerly Wallemia sebi)	V	CECT®	20820	80-130	00182	42694

* L/V = Vitroids™/Lenticule® discs

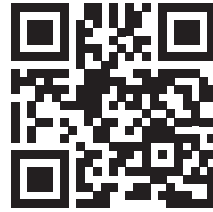


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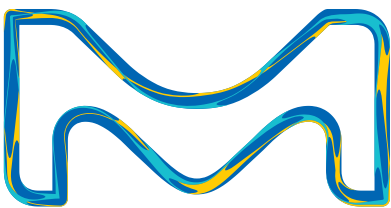
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Microbial quality control in food according to EN ISO 11133

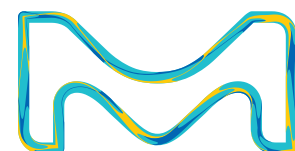
Culture media and certified reference materials

As a worldwide leading provider of industrial microbiology solutions, we address the needs of customers in industries where consumer safety is a major concern. Food manufacturing is particularly sensitive due to the potentially grave consequences that product contamination may have on the health of consumers. To minimize the risk, increasingly stringent standards are being set around the globe to regulate the production of food.

With the food industry frequently facing new or changed guidelines, staying up-to-date with regulatory requirements is challenging. The EN ISO 11133:2014 standard entitled "Microbiology of food, animal feed and water — Preparation, production, storage and performance testing of culture media" describes the general methodology and specifications for the preparation and performance testing of culture media for laboratory testing, while newer ISO standards for specific microorganisms published after 2014 may contain updated culture media formulations and/or quality control (QC) procedures.

For tests according to ISO 11133:2014, culture media and reference materials must fulfil specific quality requirements. Our range of regulatory compliant culture media makes it easier for you to stay compliant and remain one step ahead in microbial testing.

This flyer lists our most commonly used culture media for compliance with ISO 11133 (in GranuCult® prime, NutriSelect® prime or Chromocult® format) and the corresponding QC strains, available as convenient ready-to-use Vitroids™ and LENTICULE® discs.



Dehydrated culture media

Our broad range of high-quality dehydrated culture media products for the food industry ensures you will find the right medium for your needs and achieve accurate testing results. We have recently restructured our portfolio, as a consequence of which our dehydrated culture media fall under two main trademarks and three QC levels. This makes it easier for you to find the right medium with the required regulatory compliance.

The NutriSelect® brand covers our broad range of powdered culture media, while the GranuCult® brand represents our superior granulated culture media. The three QC levels **basic, plus and prime** as new brand extensions clearly indicate the degree to which these culture media are compliant. The prime level covers the full compliance spectrum according to F&B and pharma standards and includes QC release under ISO 17025 accreditation for culture media described in F&B standards.

Certified Reference Materials

Authenticated reference materials are necessary for effective QC in the laboratory, and this includes biological resources such as microbial QC strains. 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 test. Such control materials must be fit-for-purpose, bearing in mind that for food 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.

A unique preservation technology involving the controlled drying of authenticated cultures of internationally accepted control strains has resulted in the production of single-use discs containing microorganisms that are suitable for quality testing of culture media according to ISO 11133. These quality control materials, the LENTICULE® and Vitroids™ discs, are manufactured in our ISO/IEC 17025 and ISO 17034 accredited lab in Buchs, Switzerland. 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 license by NCTC® and CECT®. The products are designed with a range of CFU concentrations to ensure either no or only minimal dilution steps are required, thereby saving time and reducing the likelihood of cross-contamination.

Culture media and control stain product information

The following table lists most of the culture media mentioned in ISO 11133 in alphabetical order. The first column describes the culture media product, the second its catalogue number. In the following columns, the control strains that are mandatory according to 11133 and the suggested microbiological CRMs are shown. The table also helps to find the products with the best suited CFU range for the corresponding test.

Note that the table contains neither all our media and strains available nor all the media and strains mentioned in ISO 11133. It lists a selection of the most commonly used media and the recommended strains. Our full portfolio can be found on our website [SigmaAldrich.com/culture-media](https://www.sigmaaldrich.com/culture-media)

[SigmaAldrich.com/mibi-crm](https://www.sigmaaldrich.com/mibi-crm)

Culture media	Cat. No.	Control strain acc. ISO	Test method*	WDCM	Suggested CRM	CFU range
BAIRD-PARKER agar (base) acc. ISO 6888 and FDA-BAM, GranuCult® prime	105406	<i>Staphylococcus aureus</i>	prod. quant.	00034	VT000343	80-130
		<i>Escherichia coli</i>	sel. qual.	00012	VT000127	50,000-150,000
		<i>Staphylococcus saprophyticus</i>	spec. qual.	00159	VT001596	1,000-10,000
BHI (Brain Heart Infusion) broth acc. ISO 6888, GranuCult® prime	110493	<i>Staphylococcus aureus</i>	prod. qual.	00034	VT000342	15-80
Bismuth sulfite (BS) agar acc. to WILSON and BLAIR acc. ISO 6579 and FDA-BAM, NutriSelect® prime	100191	<i>Salmonella</i> Enteritidis / Typhimurium	prod. quant.	00031	VT000313	80-130
		<i>Escherichia coli</i>	sel. qual.	00012	VT000127	50,000-150,000
		<i>Enterococcus faecalis</i>	sel. qual.	00009	VT000097	50,000-150,000
BRILA (Brilliant-green bile Lactose) broth acc. ISO 4831, ISO 4832 and FDA-BAM, GranuCult® prime	105454	<i>Escherichia coli</i>	prod. qual.	00012	VT000122	15-80
		<i>Enterococcus faecalis</i>	sel. qual.	00009	VT000097	50,000-150,000
Buffered Peptone Water acc. ISO 6579, 19250, ISO 21528, ISO 22964, ISO 6887, FDA-BAM and EP, GranuCult® prime	107228	<i>Salmonella</i> Enteritidis / Typhimurium	prod. qual.	00031	VT000312	15-80
		<i>Escherichia coli</i>	prod. qual.	00012	VT000122	15-80
		<i>Staphylococcus aureus</i>	prod. quant.	00034	VT000342	15-80
		<i>Listeria monocytogenes 4b</i>	prod. quant.	00021	VT000212	15-80

Culture media	Cat. No.	Control strain acc. ISO	Test method*	WDCM	Suggested CRM	CFU range
Coliform agar acc.to ISO 9308-1, Chromocult®	110426	<i>Escherichia coli</i>	prod. quant.	00012	VT000123	80-130
		<i>Enterobacter aerogenes</i>	prod. quant.	00175	VT001753	80-130
		<i>Citrobacter freundii</i>	prod. quant.	00006	VT000063	80-130
		<i>Enterococcus faecalis</i>	sel. qual.	00009	VT000097	50,000-150,000
		<i>Pseudomonas aeruginosa</i>	spec. qual.	00025	VT000256	1,000-10,000
FRASER broth (base) acc. ISO 11290, GranuCult® prime	110398	<i>Listeria monocytogenes</i>	prod. qual.	00021	VT000212	15-80
		<i>Escherichia coli</i>	sel. qual.	00012	VT000127	50,000-150,000
		<i>Enterococcus faecalis</i>	sel. qual.	00009	VT000097	50,000-150,000
GIOLITTI-CANTONI broth (base) acc. ISO 6888, GranuCult® prime	110675	<i>Staphylococcus aureus</i>	prod. qual.	00034	VT000342	15-80
		<i>Escherichia coli</i>	sel. qual.	00012	VT000127	50,000-150,000
Glucose OF (Oxidative/ Fermentative) medium (base) acc. ISO 21528 and FDA-BAM, GranuCult® prime	103865	<i>Escherichia coli</i>	prod. quant.	00012	VT000123	80 - 130
		<i>Pseudomonas aeruginosa</i>	spec. qual.	00025	VT000256	1,000-10,000
Half FRASER (Demi FRASER) broth (base) with antibiotics acc. ISO 11290, GranuCult® prime	100025	<i>Listeria monocytogenes</i>	prod. qual.	00021	VT000212	15-80
		<i>Escherichia coli</i>	sel. qual.	00012	VT000127	50,000-150,000
		<i>Enterococcus faecalis</i>	sel. qual.	00009	VT000097	50,000-150,000
Lauryl Sulfate broth acc. ISO 4831, ISO 7251 and FDA-BAM, GranuCult® prime	110266	<i>Escherichia coli</i>	prod. qual.	00012	VT000122	15-80
		<i>Citrobacter freundii</i>	prod. qual.	00006	VT000062	15-80
		<i>Enterococcus faecalis</i>	sel. qual.	00009	VT000097	50,000-150,000
Listeria agar (base) acc. OTTAVIANI and AGOSTI acc. ISO 11290, Chromocult®	100427	<i>Listeria monocytogenes</i>	prod. quant.	00021	VT000213	80-130
		<i>Escherichia coli</i>	sel. qual.	00012	VT000127	50,000-150,000
		<i>Enterococcus faecalis</i>	sel. qual.	00009	VT000097	50,000-150,000
MKTn (MULLER-KAUFFMANN Tetrathionate Novobiocin) broth (base) acc. ISO 6579, GranuCult® prime	105878	<i>Salmonella</i> Enteritidis	prod. qual.	00030	VT000302	15-80
		<i>Escherichia coli</i>	sel. qual.	00012	VT000127	50,000-150,000
		<i>Pseudomonas aeruginosa</i>	sel. qual.	00025	VT000257	50,000-150,000
		<i>Enterococcus faecalis</i>	sel. qual.	00009	VT000097	50,000-150,000
MMGA (Mineral Modified Glutamate) agar acc. ISO 16649, GranuCult® prime	109045	<i>Escherichia coli</i>	prod. quant.	00012	VT000123	80-130
		<i>Enterococcus faecalis</i>	sel. qual.	00009	VT000097	50,000-150,000
		<i>Citrobacter freundii</i>	spec. qual.	00006	VT000066	1,000-10,000
		<i>Pseudomonas aeruginosa</i>	spec. qual.	00025	VT000256	1,000-10,000
		<i>Escherichia coli</i>	prod. qual.	00202	CRM13216L	30-120
MSRV (Modified Semi-solid RAPPAPORT-VASSILIADIS) medium (Base) acc. ISO 6579, NutriSelect® prime	109878	<i>Salmonella</i> Enteritidis	prod. qual.	00030	VT000302	15-80
		<i>Escherichia coli</i>	sel. qual.	00012	VT000127	50,000-150,000
		<i>Enterococcus faecalis</i>	sel. qual.	00009	VT000097	50,000-150,000
MYP (Mannitol egg yolk polymyxin) agar (base) acc. ISO 7932, ISO 21871 and FDA-BAM, GranuCult® prime	105267	<i>Bacillus cereus</i>	prod. quant.	00001	VT000013	80-130
		<i>Escherichia coli</i>	sel. qual.	00012	VT000127	50,000-150,000
		<i>Bacillus subtilis</i> subsp. <i>spizizenii</i>	spec. qual.	00003	VT000036	1,000-10,000
Nutrient agar acc. ISO 6579, ISO 10273 and ISO 21528, GranuCult® prime	105450	<i>Salmonella</i> Enteritidis	prod. quant.	00030	VT000303	80-130
		<i>Escherichia coli</i>	prod. qual.	00012	VT000123	80-130
PEMBA (Polymyxin Pyruvate Egg yolk Mannitol Bromothymolblue Agar) (base) acc. ISO 21871, GranuCult® prime	120589	<i>Bacillus cereus</i>	prod. qual.	00001	VT000013	80-130
		<i>Escherichia coli</i>	sel. qual.	00012	VT000127	50,000-150,000
		<i>Bacillus subtilis</i> subsp. <i>spizizenii</i>	spec. qual.	00003	VT000036	1,000-10,000
Peptone salt solution (Maximum recovery diluent) acc. ISO 6887 and ISO 8199, GranuCult® prime	112535	<i>Escherichia coli</i>	prod. quant.	00012	VT000122	15-80
		<i>Staphylococcus aureus</i>	prod. quant.	00034	VT000342	15-80
Plate Count agar acc. ISO 4833, ISO 17410 and FDA-BAM, GranuCult® prime	105463	<i>Bacillus subtilis</i> subsp. <i>spizizenii</i>	prod. quant.	00003	VT000033	80-130
		<i>Escherichia coli</i>	prod. quant.	00012	VT000123	80-130
		<i>Staphylococcus aureus</i>	prod. quant.	00034	VT000343	80-130
Plate Count skimmed milk agar acc. ISO 4833 and ISO 17410, GranuCult® prime	115338	<i>Bacillus subtilis</i> subsp. <i>spizizenii</i>	prod. quant.	00003	VT000033	80-130
		<i>Escherichia coli</i>	prod. quant.	00012	VT000123	80-130
		<i>Staphylococcus aureus</i>	prod. quant.	00034	VT000343	80-130

Culture media	Cat. No.	Control strain acc. ISO	Test method*	WDCM	Suggested CRM	CFU range
Pseudomonas CFC/CN agar (base) acc. ISO 13720 and ISO 16266, GranuCult® prime	107620	<i>Pseudomonas aeruginosa</i>	prod. quant.	00024	VT000243	80-130
		<i>Escherichia coli</i>	sel. qual.	00012	VT000127	50,000-150,000
		<i>Enterococcus faecalis</i>	sel. qual.	00009	VT000097	50,000-150,000
RVS (RAPPAPORT-VASSILIADIS-Soya) broth (base) acc. ISO 6579, GranuCult® prime	107700	<i>Salmonella</i> Typhimurium	prod. qual.	00031	VT000312	15-80
		<i>Escherichia coli</i>	sel. qual.	00012	VT000127	50,000-150,000
		<i>Pseudomonas aeruginosa</i>	sel. qual.	00025	VT000257	50,000-150,000
		<i>Enterococcus faecalis</i>	sel. qual.	00009	VT000097	50,000-150,000
Selenite Cystine (SC) broth acc. ISO 6579 and FDA-BAM (contains sodium selenite), GranuCult® prime	100212	<i>Salmonella</i> Typhimurium	prod. qual.	00031	VT000312	15-80
		<i>Pseudomonas aeruginosa</i>	sel. qual.	00012	VT000127	50,000-150,000
		<i>Escherichia coli</i>	sel. qual.	00025	VT000257	50,000-150,000
		<i>Enterococcus faecalis</i>	sel. qual.	00009	VT000097	50,000-150,000
Sorbitol MacCONKEY (SMAC) agar acc. ISO 16654 and FDA-BAM, GranuCult® prime	100213	<i>Escherichia coli</i> O157:H7	prod. qual.	00014	VT000143	80-130
		<i>Staphylococcus aureus</i>	sel. qual.	00034	VT000347	50,000-150,000
		<i>Escherichia coli</i>	sel. qual.	00012	VT000127	50,000-150,000
TBX (Tryptone Bile X-glucuronide) agar acc. ISO 16649, Chromocult®	116122	<i>Escherichia coli</i>	prod. quant.	00012,	VT000123	80-130
		<i>Escherichia coli</i>	prod. quant.	00202	VT002023	80-130
		<i>Enterococcus faecalis</i>	sel. qual.	00009	VT000097	50,000-150,000
		<i>Citrobacter freundii</i>	spec. qual.	00006	VT000066	1,000-10,000
		<i>Pseudomonas aeruginosa</i>	spec. qual.	00025	VT000256	1,000-10,000
Tryptic Soy agar acc. EP, USP, JP, ISO and FDA-BAM, GranuCult® prime	105458	<i>Bacillus cereus</i>	prod. quant.	00001	VT000013	80-130
		<i>Bacillus subtilis</i> subsp. <i>spizizenii</i>	prod. quant.	00003	VT000033	80-130
		<i>Escherichia coli</i>	prod. quant.	00012	VT000123	80-130
		<i>Listeria monocytogenes</i>	prod. quant.	00021	VT000213	80-130
		<i>Staphylococcus aureus</i>	prod. quant.	00034	VT000343	80-130
VRB (Violet Red Bile Lactose) agar acc. ISO 4832 and FDA-BAM, GranuCult® prime	101406	<i>Escherichia coli</i>	prod. quant.	00012	VT000123	80-130
		<i>Enterococcus faecalis</i>	sel. qual.	00009	VT000097	50,000-150,000
		<i>Pseudomonas aeruginosa</i>	spec. qual.	00025	VT000256	1,000-10,000
VRBD (Violet Red Bile Dextrose) agar acc. EP, USP, JP and ISO 21528, GranuCult® prime	110275	<i>Escherichia coli</i>	prod. quant.	00012	VT000123	80-130
		<i>Salmonella</i> Enteritidis	prod. quant.	00030	VT000303	80-130
		<i>Enterococcus faecalis</i>	sel. qual.	00009	VT000097	50,000-150,000
XLD (Xylose Lysine Deoxycholate) agar acc. ISO 6579, GranuCult® prime	105287	<i>Salmonella</i> Enteritidis	prod. quant.	00030	VT000303	80-130
		<i>Escherichia coli</i>	sel. qual.	00012	VT000127	50,000-150,000
		<i>Enterococcus faecalis</i>	sel. qual.	00009	VT000097	50,000-150,000
Yeast Extract agar acc. ISO 6222, GranuCult® prime	113116	<i>Escherichia coli</i>	prod. quant.	00012	VT000123	80-130
		<i>Bacillus subtilis</i> subsp. <i>spizizenii</i>	prod. quant.	00003	VT000033	80-130

***abbreviations:**

prod. = productivity
sel. = selectivity
quant. = quantitative

qual. = qualitative
spec. = specificity
WDCM = World Data Centre for Microorganisms

CRM = Certified Reference Materials
CFU = Colony Forming Units



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