



# Microbiology

## Microbiological Quality Control

Whatman offers a broad range of high-quality products for microbiological quality control in the food and beverage, pharmaceutical and water testing industries.

We develop solutions for microbiological applications and set today's standards in many areas. This is a result of long-term relationships with our customers who provide input to new ideas and product improvements.



# Membrane Filtration

The technical requirements for membrane filters used in microbiological quality control are subject to strict national and international standards.

At the same time, the requirements of the market are changing continually as a result of the introduction of new products, such as soft drinks, alcoholic mixed drinks or pharmaceuticals.

Whatman offers a wide and versatile range of membrane filter products with a very high level of consistent quality.

## MicroPlus and ME Membranes

### Membranes for Microbiological Control

To protect the consumer, the absence of microbial contamination in foods and beverages, pharmaceuticals and cosmetics must be assured.

In these products the microorganism counts are very low and are therefore determined quantitatively via enrichment methods. Production processes are monitored continuously at their critical points (tanks, pipelines, filling units) as are the finished products. The membrane filtration method is the optimal analytical method for doing this.

#### Method

The liquid is filtered through a membrane. The microorganisms collect on the membrane surface. The filter is incubated on a nutrient medium and the individual colonies can then be evaluated. The method is also suitable for large sample volumes and low microorganism counts.

### Reliability

Our quality control and product design offers users decisive advantages. The membrane filters are strictly controlled and fulfill or exceed the requirements according to DIN, ASTM, HIMA and ISO.

### Test Parameters

The following parameters of all membranes used for microbiological quality control are tested systematically in order to ensure the same high-quality from batch to batch: bubble point; flow rate for bacterial retention; recovery rate.

## MicroPlus Membranes

### Features and Benefits

- Special membrane filters made from cellulose nitrate developed for microbiological quality control
- High mechanical strength
- High flow rate
- Ideal for samples with a high particle content and viscous samples
- Sterile, individually packed
- Pore size 0.45 µm
- All membrane filters have a high-contrast grid (3.1 mm)
- Type STL in dispenser boxes with 100 numbered membrane filters for easy removal and safe handling with the Membrane-Butler (supplied in 4 boxes each with 100 membrane filters)

## ME Membranes

### Features and Benefits

- Economical
- Specifically for aqueous solutions
- Hydrophilic
- For use up to 125° C

## Ordering Information - MicroPlus and ME Membranes

Catalog Number	Description	Color/Grid	Diameter (mm)	Quantity/Pack
10 407 112	MicroPlus-21 STL	White/Black	47	4 x 100
10 407 114	MicroPlus-21 STL	White/Black	50	4 x 100
10 407 713	MicroPlus-21 ST	White/Black	47	1 x 100
10 407 714	MicroPlus-21 ST	White/Black	50	1 x 100
10 407 132	MicroPlus-31 STL	Black/White	47	4 x 100
10 407 134	MicroPlus-31 STL	Black/White	50	4 x 100
10 407 734	MicroPlus-31 ST	Black/White	50	1 x 100
10 407 170	MicroPlus-41 STL	Green/Black	47	4 x 100
10 407 172	MicroPlus-41 STL	Green/Black	50	4 x 100 contd >

Catalog Number	Description	Color/Grid	Diameter (mm)	Quantity/Pack
ME (mixed cellulose ester)				
10 407 312	ME 25/21 STL	White/Black	47	4 x 100
10 407 314	ME 25/21 STL	White/Black	50	4 x 100
10 406 870	ME 25/21 ST	White/Black	47	1 x 100
10 406 872	ME 25/21 ST	White/Black	50	1 x 100
10 407 332	ME 25/31 STL	Black/White	47	4 x 100
10 407 334	ME 25/31 STL	Black/White	50	4 x 100
10 407 370	ME 25/41 STL	Green/Black	47	4 x 100
10 407 372	ME 25/41 STL	Green/Black	50	4 x 100
10 409 470	ME 25/41 ST	Green/Black	47	1 x 100
10 409 472	ME 25/41 ST	Green/Black	50	1 x 100

STL - Sterile: for use with Whatman Membrane-Butler  
 ST - Single sterile packed

## Microbiological Monitors

### Presterilized and Very Versatile

Microbiological monitors are ideal for monitoring contaminants in liquid samples from raw materials to finished products.

After the filtration is complete, 2 mL of microbiological media is added and the unit is converted into a Petri dish for culturing the contaminants collected.

Microbiological monitors from Whatman offer significant workload reduction. The presterilized and ready-to-use units for filtration and subsequent incubation of microbiological samples eliminate many time consuming daily activities in the laboratory.

### Features and Benefits

- Sterilized and ready for use
- Easy handling
- Effective time savings - up to 70%
- Black membranes for better contrast
- Comprehensive range of media



56 mm and 47 mm Monitors

### Monitor Workflow

Microbiological monitors have been developed specifically for membrane filter methods for aqueous samples of up to 100 mL. It has never been so easy to identify microorganisms.

1. Add sample and filter
2. Remove the funnel
3. After filtration simply add 2 mL of microbiological media
4. Replace the lid and incubate the unit



1



2



3



4

### Ordering Information - Microbiological Monitors

Description	Size (mm)	Pore Size (µm)	Quantity/Pack	Catalog Number
Monitor, 100 mL, White/Black Grid	56	0.2	50	10 497 603
Monitor, 100 mL, White/Black Grid	56	0.45	50	10 497 600
Monitor, 100 mL, White/Black Grid	56	0.45	50	10 497 601
Monitor, 100 mL, White/Black Grid	56	0.8	50	10 497 602
Monitor, 100 mL, White/Black Grid	47	0.2	50	10 497 511
Monitor, 100 mL, White/Black Grid	47	0.45	50	10 497 500
Monitor, 100 mL, White/Black Grid*	47	0.45	50	10 497 501
Monitor, 100 mL, White/Black Grid	47	0.45	50	10 497 502
Monitor, 100 mL, White/Black Grid	47	0.8	50	10 497 503

\* Individually wrapped

## Analytical Funnels

### Ready-to-use Filtration Units for Microbiology

Whatman analytical funnels are ready-to-use 100 mL filtration units with removable membrane and culturing devices.

After filtration, the membrane of the analytical funnel can be used for a wide range of qualitative and quantitative biological analyses.

#### Features and Benefits

- Saves up to 50% in time with no flaming and sterilization required
- Minimizes the risk of cross contamination
- Easy release of membrane



#### Analytical Funnel Workflow

1. Perform sample filtration
2. Remove the upper part from the base
3. Place the base on the membrane lifting device
4. Separate the membrane from the pad and transfer the membrane into a Petri dish with sterile pad



1



2



3



4

## Ordering Information - Analytical Funnels

Description	Pore Size (µm)	Quantity/Pack	Catalog Number
47 mm diameter			
White/Black Grid	0.2	50	10 497 507
White/Black Grid*	0.2	50	10 497 510
White/Black Grid	0.45	50	10 497 504
White/Black Grid*	0.45	50	10 497 506
Black/White Grid	0.45	50	10 497 508
Black/White Grid*	0.45	50	10 497 509

\* Individually packaged

## MBS I

### Microbiological Filtration System

MBS I is the ideal system for optimal microbiological control using membranes. The overall procedure time is reduced to a minimum. The design of the system, which consists of an electrical membrane dispenser, a funnel dispenser and a vacuum manifold, leads to more reproducible results.

The special sealing technique guarantees easy handling and a good integrity of the funnel and membrane during filtration. This reduces any cross contamination to a minimum.

#### Features and Benefits

- Simple to use
- Safe sealing mechanism
- Shorter preparation time
- High reproducibility
- Less waste and better economy due to 50 autoclave cycles
- Large funnel capacity for foaming liquids
- Easier to validate
- Risk of cross contamination is minimized



MBS 1 - Bringing a System into Your Quality Control

**A Unique Combination of Comfort and Progress**

The combination of the funnel dispenser and the Membrane-Butler E in the MBS I system is unique. When a funnel is taken from the dispenser, the butler automatically dispenses a membrane from the sterile pack ready to use.

**Find the Right Funnel**

The autoclavable plastic funnel for the MBS I is a true innovation. Unlike tedious flaming of stainless steel filtration equipment for sterilization, the new funnel is simple to use and ensures perfect sterility. The new funnels are provided sterile in a magazine and save time especially when a large number of samples need to be processed by one apparatus.

The funnels (350 mL) are of high grade polypropylene and can be autoclaved up to 50 times. For applications in which funnels are only used once, the system offers another solution: a 100 mL funnel which is presterilized and supplied ready for immediate use. A special closure mechanism at the extraction edge ensures that the funnel seals tightly with the membrane.

**MBS I Workflow**

1. When taking a new presterilized funnel, the membrane is dispensed automatically
2. Membrane is placed onto the filter base and the funnel installed
3. Liquid is poured into the funnel and vacuum is applied
4. Easy removal of the membrane after filtration



Sealing Mechanism MBS I



1



2



3



4

**MicroPlus Membrane Filter - The Plus for Stability**

MicroPlus membrane filters from Whatman are the ideal addition to the MBS I for the beverage industry. Wherever viscous or particle loaded solutions are being filtered, MicroPlus filters with their matchless stability and non blocking design are the best choice. Filtration speed due to optimized through-flow, ease of use and high reproducibility contribute to the unmatched quality of MicroPlus.

**Ordering Information - MBS I**

Product	Description	Quantity/Pack	Catalog Number
AS 220	2-Place Vacuum Filtration Manifold	1	10 445 890
Steel frit		1	10 445 863
Dispenser for funnels	For 100 mL and 350 mL Funnel	1	10 445 870
Funnel - 100 mL	Plastic Funnel of PP (autoclavable)	20	10 445 861
Funnel - 100 mL	Plastic Funnel of ABS*	20	10 445 865
Funnel - 350 mL	Plastic Funnel of PP (autoclavable)	20	10 445 866
Autoclaving bags	For Autoclaving Funnels	20	10 445 868
Tower	For Stacking Two Membrane-Butler E	1	10 477 112
Membrane-Butler E	Dispenser for Membranes	1	10 477 110
PZ 001	Forceps, Stainless Steel	1	10 477 602

\*Acrylonitrile butadiene styrene

**Membrane-Butler**

**Membrane Filter Dispenser for Microbiological Control**

Membrane filters for microbiological checks must be handled carefully to ensure that they remain sterile and that quantitative results are being obtained.

The Membrane-Butler offers optimal handling for all MicroPlus and ME membrane filters with the type name 'STL'. The dispenser box is placed in the Membrane-Butler, the sterile packaging is inserted into the roller system and the system is ready. With each turn (Manual Butler) or by pressing the push button or the foot pedal (Butler E) a membrane filter is ejected from its sterile packaging and can be removed easily with forceps.

**Features and Benefits**

- High reliability
- Simple handling with foot switch and stepper motor (applies only to Butler E)
- Cross contamination risks are minimized
- Membrane dispensed rapidly
- Ideal for use on sterile benches
- Compact dimensions for portable use



Removing a Sterile Membrane from Butler E



Manual Dispenser for Single Sterile Membranes

**Ordering Information - Membrane-Butler**

Catalog Number	Description	Use	Quantity/Pack
10 477 100	Membrane-Butler	Manual dispenser	1
10 477 110	Membrane-Butler E	Electrical dispenser	1
10 477 112	Butler Tower	For two Butler E	1
10 477 113	Foot Pedal	For Butler E automatic dispensing	1

MBS II

**Microbiological Filtration System**

Membrane filtration is a common method of quantifying microorganisms in liquids. However, in other filtration systems, the handling is not always easy. The ready-to-use MBS II from Whatman is easy to use and reduces the risk of cross contamination.

MBS II has been developed specifically for microbiological quality control in the pharmaceutical industry. This means that the filtration system is perfectly suited for bio-burden tests on raw materials, preparations and non-sterile end products. Water investigations and checks on water for injection purposes are also preferred applications for MBS II.

MBS II saves valuable laboratory time, allowing for increased dedication to more demanding laboratory tasks and to an increase in laboratory productivity. The filtration unit allows for variable vacuum arrangement with high filtration speed and consistently high recovery rates.

**Features and Benefits**

- Rapidity - ready-to-use filtration unit shortens the preparation time
- Sterility - minimizes the risk of cross contamination
- Reliability - easier handling means more reliable usage
- Compatibility - used with most agar Petri dish formats
- Security - in accordance with EP and USP requirements
- Safety - sterile venting during filtration



MBS II - Filtration Unit with Sterile Vent

**MBS II Workflow**

1. Filtration of the sample with the MBS II filtration funnel
2. Detach the filtration unit
3. Remove the membrane from the filtration unit
4. Transfer the membrane onto the appropriate media



1



2



3



4

The handling of the system is particularly practical with the filtration funnel and membrane combined to form a sterile filtration unit. When filtration is finished, the membrane is transferred to an agar plate or a Petri dish with a simple double-click, ensuring reproducible results. The MBS II system also offers less danger of cross contamination in comparison to other filtration methods.

### Ordering Information - MBS II

Product	Description	Quantity/Pack	Catalog Number
MBS II-Filtration Unit; ready-to-use, 100 mL	Nitrocellulose, 0.45 µm, White, Black Grid	24	10 445 900
PP - funnel with built-in membrane	Nitrocellulose, 0.45 µm, Black, White Grid	24	10 445 901
AS 230	Mixed Ester Cellulose, 0.2 µm, White, Black Grid	24	10 445 902
Validation Guide	Regenerated Cellulose 0.45 µm, White	24	10 445 904
Validation Guide	2-place Vacuum Filtration Manifold	1	10 445 990
Validation Guide	Quality Control Tools for MBS II, English	1	10 445 999
Validation Guide	Quality Control Tools for MBS II, German	1	10 455 998

PP - Polypropylene

## Media

### Liquid Media

Ready-to-use media considerably reduce the preparation time in quality control laboratories and also effectively reduce the risks of cross contamination. Whatman is cooperating closely with quality assurance managers in the industry in the development of its own media and test kits.

This intensive product development has produced a range of products that is being used to monitor production plants and conduct microbiological checks on raw materials through to final product release in laboratories in more than 40 countries.

#### Features and Benefits

- Wide range of products satisfies even special customer requirements
- Optimal media stability, sterility and reproducibility
- Less time-consuming, higher productivity
- Manufacturing process and product checks according to the requirements of pharmacopoeia throughout the world
- Batch-specific quality certificate in each pack

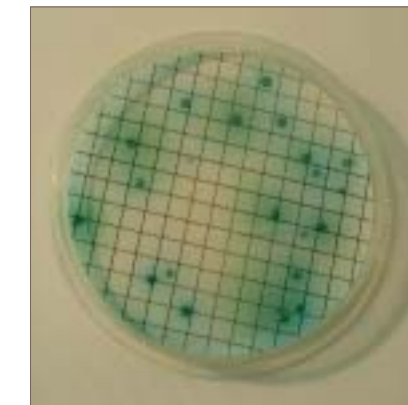
### Media Variety and Flexibility

Do you use ready-to-use media in 2 mL ampoules? Are you looking for nutrient media or agar plates that are specifically suited to the cultivation of colonies after microfiltration? Would you perhaps like to fill your own agar plates? No matter what your specific needs, our extensive range of ready-to-use or prepared media products is available for just about any application.

Liquid media products come with a host of advantages, too. Aseptic preparation of nutrient media saves you valuable time and keeps costs to a minimum. All media undergo detailed quality control checks in accordance with recognized methods, guaranteeing uniform media preparation at all times. Lastly, our more comprehensive end product tests ensure optimal growth as well as stable and sterile media.



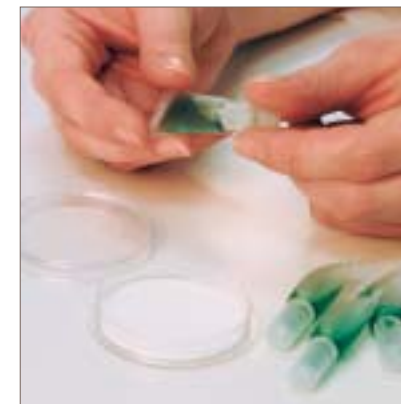
Brilliant Green Bile Broth



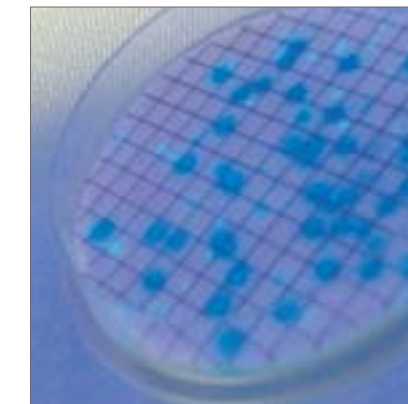
Pseudomonas Media:  
Typical Growth of *Pseudomonas aeruginosa* ATCC 10145



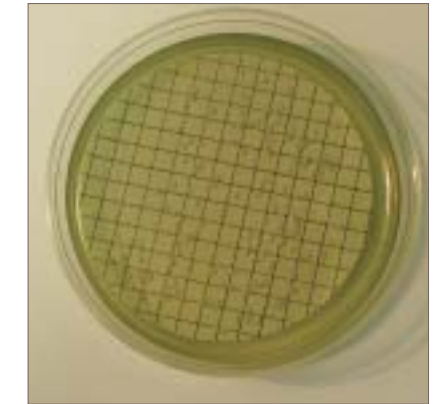
EC-Broth: Vial Left: Control; Vial Right: Broth Inoculated with *Escherichia coli* ATCC 25922



2 mL Ampouled Media



MI-Media: Pure Culture of *Escherichia coli* ATCC 25922 with UV Light



M-Green Yeast and Mold Agar: Typical Fungal Growth on Agar with White Membrane Filter

Whatman goes to great lengths to ensure that all legal regulations are met, much the same way we observe the standards of the pharmaceutical industry. We put this assurance in writing, too. Each package is accompanied by a batch-specific quality certificate.

## Dilution Bottles

Our pre-filled and sterile dilution vials are designed for sample dilution of water, dairy products, foods and pharmaceuticals prior to microbiological testing. Final pH for all solutions is 7.2 pH  $\pm$  0.2 pH at 25° C. They come in an easy open, flip-top container with a tamper-evident seal.

Butterfield's Phosphate Buffer contains monobasic potassium phosphate and is used extensively in the food, dairy and pharmaceutical industries. Offered in 90 mL and 99 mL volumes for easy 1:10 dilutions. It is recommended as a general diluent in laboratory procedures by the Federal Drug Administration and in the Bacteriological Analytical Manual. This product is prepared according to Standard Methods for the Examination of Water and Wastewater for use in water testing.

Phosphate Buffer with Magnesium Chloride is used as the diluent for the preparation of dilutions in plate counts in the dairy and food industries. It is recommended by the APHA for the recovery of injured microorganisms from dairy and food samples. Contains deionized water, monopotassium phosphate and magnesium chloride.

## Media Descriptions

### Brilliant Green Bile Broth 2%

BGBB contains two inhibitors of both gram-positive and selected gram-negative organisms, namely, oxgall and brilliant green dye. Fermentation is detected by gas production.

### Cetrimide Broth

*Pseudomonas aeruginosa* is characterized by the production of pyocyanin (a blue green, water soluble, non-fluorescent, phenazine pigment) which is stimulated by the inclusion of magnesium chloride and potassium sulfate in the broth.

Cetrimide (N-cetyl-NNN-trimethylammonium bromide) is added to inhibit bacteria other than *Pseudomonas aeruginosa*. Its action as a quaternary ammonium cationic detergent causes nitrogen and phosphorous to be released from bacterial cells other than *Pseudomonas aeruginosa*.

### EC Broth

EC Broth contains casein peptone as a source of nutrients. Lactose provides the carbohydrate fermented by coliform bacteria and *Escherichia coli*. In addition, lactose-positive bacteria metabolize lactose with gas formation. Gram-positive bacteria are inhibited by the mixture of bile salts.

### EC Broth with MUG

The presence of the fluorescence using a long-wave UV light source confirms the presence of *Escherichia coli* and no further confirmation is required. MUG detects anaerogenic strains, which may not be detected in the conventional procedure. Lactose is a source of energy. Casein peptone provides additional nutrients. The mixture of bile salts is inhibiting for gram-positive bacteria, particularly bacilli and fecal streptococci. The substrate 4-methylumbelliferyl-b-D-glucuronide is hydrolyzed by an enzyme, b-glucuronidase, possessed by most *Escherichia coli* and a few strains of *Salmonella*, *Shigella* and *Yersinia*, to produce a fluorescent end product, 4-methylumbelliferone.

### Enterococcus Broth

Enterococcus broth is a modified version of the improved media described by Slanetz and Bartley with TTC. The membrane filtration method is simple to perform, does not require confirmation and permits a direct count of enterococci in 48 hours.

### Eugon Broth

Eugon media was developed to obtain eugonic (luxuriant) growth of fastidious microorganisms. The unenriched media supports rapid growth of lactobacilli associated with cured meat products, dairy products and other food. The high concentration of Dextrose is the energy source for rapid growth of bacteria. *L-cystine* and sodium sulfite are added to stimulate growth. Sodium chloride maintains the osmotic balance of the media. The high carbohydrate content along with high sulfur (cystine) content improves growth with chromogenicity.

### HPC Broth with TTC

HPC is used to determine total count at incubation temperatures of 35° C. All bacteria develop on HPC with indicator media and produce a red color as a result of the precipitation of formazan following the reduction of 2,3,5-triphenyltetrazolium chloride (TTC) by bacteria.

### KF-*Streptococcus* Broth

KF-*Streptococcus* Broth is selective for the determination of fecal streptococci in polluted surface waters. Maltose and lactose are fermentable carbohydrates, sodium azide is the selective agent and brom cresol purple is the indicator dye.

### Lauryl Sulfate or Lauryl Tryptose Broth

This media was developed for the detection of coliform organisms by the American Public Health Association (APHA). It is now the standard medium of choice in the presumptive phase of the standard coliform MPN test for the microbiological examination of water.

### Mannitol Salt Broth

Because of the amount of peptones and beef extract, Mannitol Salt is a nutrient rich medium. Most bacteria (other than staphylococci) are inhibited by the high concentration of sodium chloride. Organisms capable of fermenting mannitol, e.g. *Staphylococcus aureus*, cause a pH change in the media. With phenol red as the pH indicator the colonies appear with a yellow coloration.

### Membrane Lauryl Sulfate Broth

This media was developed for the detection of coliform organisms and is now the media of choice for the enumeration of total coliforms and *Escherichia coli* in the United Kingdom. This media replaced membrane enriched broth containing 0.4% Teepol 610.

**M-Endo Coliform Broth**

M-Endo is a red colored media, which needs to be stored in the dark to prevent discoloration. Gram-positive bacteria are inhibited on this media by the desoxycholate and lauryl sulfate. The addition of ethanol increases the antibacterial nature of the formulation. Lactose fermenting organisms form aldehydes, which react with Schiff's reagent (basic fuchsin and sodium sulfite) to give red colored zones around the colonies. Coliform colonies are therefore red with a characteristic metallic sheen.

**M-FC Broth**

Allows the development of fecal coliforms at elevated temperatures (44.5° C).

**M-FC with Rosolic Acid**

M-FC with Rosolic Acid acts and functions in the same way as m-FC Broth. Rosolic acid inhibits bacterial growth in general, except for fecal coliforms.

**M-Green Select Broth**

M-Green Select Broth is an improved modification of the liquid media, m-Green Yeast and Mold Broth and was developed to improve efficiency of detection and enumeration of fungi in sugar based drinks using the membrane filtration method. This medium has a low pH, which inhibits bacterial growth. The addition of Chloramphenicol further inhibits the growth of bacteria to allow for the development and enumeration of yeast and mold. The addition of bromocresol green, which diffuses into fungal colonies as an alkaline reaction, allows them to be easily identified. Metabolic by-products from the developing colonies diffuse into the surrounding medium, further reducing the pH which aids in the inhibition of bacterial growth, but also produces an acid reaction that causes residual bromocresol green to change to yellow.

**M-Green Yeast and Mold**

M-Green is an improved modification of the liquid media, m-Yeast and Mold Broth and was developed to improve efficiency of detection and enumeration of fungi in sugar based drinks using the membrane filtration method. This medium has a low pH, which inhibits bacterial growth. The addition of bromocresol green, which diffuses into fungal colonies as an alkaline reaction, allows them to be easily identified. Metabolic by-products from the developing colonies diffuse into the surrounding medium, further reducing the pH which aids in the inhibition of bacterial growth, but also produces an acid reaction that causes residual bromocresol green to change to yellow.

**MI Broth and MI Agar**

MI Broth detects the presence of coliform bacteria by the production of  $\beta$ -galactosidase, which cleaves the substrate MUGal to produce 4-Methylumbelliferone, which fluoresces on exposure to UV light. Non-coliforms do not produce this enzyme and therefore do not fluoresce on the medium. *Escherichia coli* is detected by the compound IBDG. The  $\beta$ -glucuronidase produced by *Escherichia coli* cleaves the substrate to produce a blue indigo color in the colonies. As *Escherichia coli* is also a total coliform, and also produces  $\beta$ -galactosidase, it will also fluoresce. The antibiotic cefsulodin is added to inhibit the growth of gram-positive bacteria and some non-coliform gram-negative bacteria that can cause false positive reactions.

**MRS Broth**

MRS medium supports luxuriant growth of all lactobacilli, even the slow growing species.

**M-TGE Total Count Media**

All bacteria develop on TGE media and produce a range of different colored and sized colonies.

**Orange Serum Media**

Organisms known to grow in single strength and concentrated juices are lactic acid and acetic acid bacteria and yeast. *Lactobacilli*, *Leuconostoc* and yeast have all been identified as spoilage organisms by numerous authors. Orange serum at pH 5.4 to 5.6 has been reported to yield maximum counts of all types of spoilage organisms in mixed cultures and in single culture comparison tests.

**Potato Dextrose Broth and Agar Media**

Potato Dextrose Broth is recommended in Standard Methods as the media that gives the most consistent and highest counts for the recoveries of yeast and mold in dairy products. The inclusion of potato extract encourages the growth and development of fungi. Sterile tartaric acid may be added to lower the pH to  $3.5 \pm 0.2$  to further inhibit the growth of conflicting bacteria.

**Pseudomonas Broth**

*Pseudomonas aeruginosa* is characterized by the production of pyocyanin (a blue green, water soluble, non-fluorescent, phenazine pigment) which is stimulated by the inclusion of magnesium chloride and potassium sulfate in the broth. Irgasan, an antimicrobial agent, selectively inhibits gram-positive and gram-negative bacteria other than pseudomonads. Glycerol serves as both an energy source and helps in the promotion of pyocyanin.

**R2 Broth**

R2 broth can be used to determine heterotrophic plate count at 35° C. When incubated at lower temperatures (25–30° C) for longer periods of 72–96 hours, it can also be used to recover environmentally stressed organisms, or those that are chlorine tolerant.

**Sabouraud Dextrose Broth**

Peptone in the media is used as a nitrogen source for the development of fungi. Dextrose acts as an energy source for the growth of microorganisms. The low pH is favorable for the development of fungi, especially dermatophytes, but at the same time inhibits the development of contaminating bacteria from clinical specimens.

**Standard Methods Agar**

All bacteria develop on Standard Methods and produce a range of different colored and sized colonies.

**Total Count Media with TTC**

All bacteria develop on Total Count Media with indicator and produce a red color as a result of the precipitation of formazan following the reduction of 2,3,5-triphenyltetrazolium chloride (TTC) by bacteria.

**Trypticase Soy Broth – Single Strength**

General-purpose medium used in qualitative procedures for the cultivation of fastidious and non-fastidious microorganisms. Trypticase Soy Broth – Single Strength complies with the demands of the DIN Norm 10167 for the detection of *Escherichia coli* serotype 0157:H7 in foods and FDA-BAM for the isolation of enterohemorrhagic *Escherichia coli* (EHEC). In addition the media conforms to the formula of the U.S. Pharmacopoeia.

**Trypticase Soy Broth – Double Strength**

TSB broth is a medium that will support the growth of a wide variety of microorganisms including aerobic, facultative and anaerobic bacteria and fungi.

**Wallerstein Nutrient Broth (WL) and WLDifferential Broth (WLD)**

Use of the medium at pH 5.5 and incubation at 25° C will give reliable counts for brewer's yeast. Adjustment of the pH to 6.5 and incubation at 30° C allows for the selective growth of baker's and distiller's yeast.

**Ordering Information - Liquid Media**

Description	Use	Quantity/ Pack	Catalog Number
2 mL Ampoules			
Cetrimide Broth	<i>Pseudomonas aeruginosa</i>	50	10 496 146
Enterococcus Broth	Isolation and enumeration of enterococci	50	10 496 120
Eugon Broth	Wide variety of microorganisms	50	10 496 126
HPC Broth with TTC	Heterotrophic plate counts	50	10 496 151
KF- <i>Streptococcus</i> Broth	Isolation and enumeration of fecal streptococci	50	10 496 125
Mannitol Salt Broth	Selective isolation and enumeration of staphylococci	50	10 496 121
Membrane Lauryl Sulfate Broth	Presumptive identification of coliforms and <i>E. coli</i>	50	10 496 187
M-Endo Coliform Broth	Enumeration of coliforms	50	10 496 103
M-FC Broth	Coliform detection in water pollution	50	10 496 124
M-FC Broth with Rosolic Acid	Fecal coliform detection	50	10 496 114
M-Green Select Broth	Enumeration of yeasts and mold in soft drinks and fruit juices	50	10 496 116
M-Green Yeast and Mold	Enumeration of yeast and mold in soft drinks and fruit juices	50	10 496 101
MI Broth	Coliform detection according to Surface Water Treatment Rule (USEPA) and Total Coliform Rule (USEPA)	50	10 496 192
MRS Broth	Isolation and cultivation of lactobacilli	50	10 496 112
M-TGE Total Count Media	Non-selective development and enumeration of all aerobic bacteria	50	10 496 102
Orange Serum Media	Acid-tolerant microorganisms	50	10 496 104
<i>Pseudomonas</i> Broth	Isolation of <i>Pseudomonas</i>	50	10 496 119
R2 Broth	Heterotrophic plate counts	50	10 496 161
Total Count TTC Indicator	Colony count	50	10 496 113
Wallerstein Nutrient Broth (WL)	Cultivation and enumeration of yeast	50	10 496 108
WL Differential Broth (WLD)	Bacterial counts	50	10 496 109
Liquid Media in 9 mL Tubes			
Brilliant Green Bile Broth 2%	Coliform detection	20	10 496 710
EC Broth	Coliform detection @ 37° C and <i>E. coli</i> @ 44.5° C	20	10 496 714
EC Broth with MUG	<i>E. coli</i> in water and food samples by fluorogenic procedure	20	10 496 709
Lauryl Sulfate/Tryptose Broth	Coliform detection	20	10 496 722
Bottled Media			
M-Endo Coliform Broth - 50 mL	Coliforms	8	10 496 700

contd >

Description	Use	Quantity/ Pack	Catalog Number
MI Broth - 50 mL	Coliform detection according to Surface Water Treatment Rule (USEPA) and Total Coliform Rule (USEPA)	1	10 496 851
MI Agar - 50 mL	Coliform detection	1	10 496 847
Orange Serum Agar - 100 mL	Acid-tolerant microorganisms	1	10 496 713
Potato Dextrose Agar - 100 mL	Cultivation and enumeration of yeast and mold	1	10 496 731
Standard Methods Agar - 100 mL	Microbiological plate counts	1	10 496 706
Trypticase Soy Broth Single Strength - 100 mL	Cultivation of fastidious and non-fastidious microorganisms	1	10 496 707
Trypticase Soy Broth Double Strength - 100 mL	Cultivation of fastidious and non-fastidious microorganisms	1	10 496 708
Dilution Bottles			
Butterfield's Buffer	Potassium Phosphate	99 mL	10 498 503
Butterfield's Buffer	Potassium Phosphate	90 mL	10 498 504
Phosphate Buffer	Potassium Phosphate with Magnesium Chloride	99 mL	10 498 505
Petri Dishes			
Petri Dishes with Sterile Pads	47 mm diameter	100	10 498 544
Petri Dishes with Sterile Pads	50 mm diameter	50	10 445 905

NutriDisk® Nutrient Pads

**Dehydrated Media for Microbiological Testing**

NutriDisk is an alternative to traditional Agar plates. Colony counting identifications and selective microbial determinations can be carried out particularly easily with NutriDisk.

A cellulose pad is impregnated with a dehydrated nutrient base that becomes a nutrient medium when moistened with sterile water. The pad is a stable carrier that does not alter the nutrient medium or influence the growth of the microorganisms in any way. Growth is usually more uniform and quicker than on conventional agar nutrient plates.



Hydrating the Nutrient Pad

**One Method, Many Advantages**

**New Packaging Format**

NutriDisk is now supplied without membranes giving you more flexibility to choose your required membrane. The sterile NutriDisks are available in 10 packs of 10 pieces.

**Versatile Applications**

NutriDisk is available with a wide range of different nutrient media formulations to provide a broad spectrum of applications covering all fields of microbiological analysis.

**Reduced Risk of Contamination**

Simple handling, compact assembly and the ready-to-use nutrient media offer a high degree of safety from contamination.

**Exact Results**

Cellulose pad, nutrient media formulation and impregnation process are monitored by us so that your results are always comparable, both within a single batch and from batch to batch.

**Long Shelf Life**

If stored dry at room temperature, NutriDisk has a shelf life of one year.

**Standard NutriDisk Products**

**Azide NutriDisk**

Selective medium for the detection of fecal streptococci in water, food, and other test materials.

**Note:** Streptococci form small dark red colonies.

- Recommended incubation condition: 24-48 hours at 37° C
- Recommended membrane filter: white, gridded, 0.45 µm

**Caso NutriDisk**

For the determination of the colony count and for the detection of predominant or subtly damaged microorganisms in pharmaceuticals, cosmetics and other products.

- Recommended incubation condition: 48 hours at 37° C
- Recommended membrane filter: green, gridded, 0.45 µm

**Cetrimide NutriDisk**

Selective medium for the determination of *Pseudomonas aeruginosa* in water, pharmaceuticals and cosmetics, as well as other test material (USP, DIN).

**Note:** *Ps. aeruginosa* forms blue colonies with blue halo.

- Recommended incubation condition: 48 hours at 37° C
- Recommended membrane filter: white, gridded, 0.45 µm

**Endo NutriDisk**

Selective medium for the detection of *E. coli* and coliform bacteria in water, foods and other substances (DEV, APHA).

**Note:** *E. coli* develops dark red colonies with a greenish-metallic surface sheen.

- Recommended incubation condition: 24 hours at 35° C
- Recommended membrane filter: white, gridded, 0.45 µm

**M-FC NutriDisk**

Selective medium for the detection of *E. coli* and faecal coliforms in water, foods and other substances.

**Note:** As a rule *E. coli* already develops blue colonies after 16 hours.

- Recommended incubation condition: 16-24 hours at 44° C
- Recommended membrane filter: white, gridded, 0.45 µm

**Orange Serum NutriDisk**

For the detection of acidophilic and acid tolerant microorganisms in beverages and foods (APHA).

**Note:** Anaerobic incubation also initiates growth of the fastidious lactobacilli.

- Recommended incubation condition: 48-72 hours at 30° C
- Recommended membrane filter: green, gridded, 0.45 µm

**Plate Count NutriDisk**

For the determination of the colony count of water, milk, foods, etc. (DLC, APHA).

- Recommended incubation condition: 48-72 hours at 30° C
- Recommended membrane filter: green, gridded, 0.45 µm

**Sabouraud NutriDisk**

For the detection of yeasts and molds in pharmaceuticals, cosmetics, packaging material, for isolating dermatophytes and for pure cultures (USP).

- Recommended incubation condition: 48-120 hours at 25-30° C
- Recommended membrane filter: black, gridded, 1.2 µm

**Schaufus Pottinger NutriDisk**

For the detection of yeasts and molds in beverages and sugar.

**Note:** Sugar fermenters develop yellowish colonies, non-acid formers are blue-green (ICUMSA).

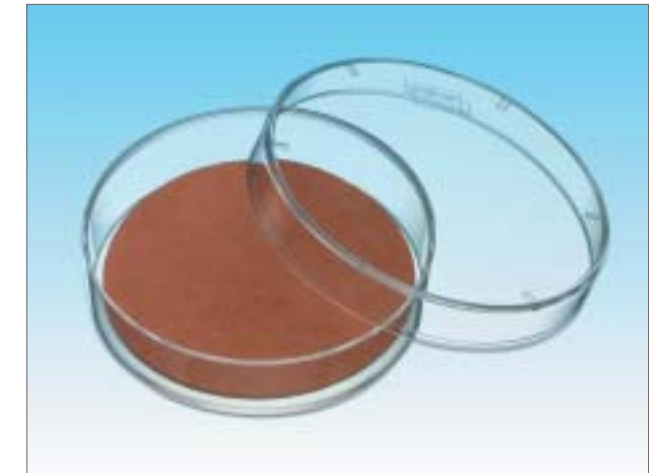
- Recommended incubation condition: 48-72 hours at 30° C
- Recommended membrane filter: green, gridded, 1.2 µm

**Standard TTC-NutriDisk**

For the determination of the colony count of water and waste water, with triphenyltetrazoliumchloride (TTC).

**Note:** As all bacteria develop pink colonies (formazane formation from TTC) routine tests are optically easy to evaluate.

- Recommended incubation condition: 48-72 hours at 20° C or 48 hours at 30° C
- Recommended membrane filter: green, gridded, 0.45 µm



Orange Serum NutriDisk

**Tergitol-TTC NutriDisk**

Selective medium for the detection of *E. coli* and coliform bacteria in water, foods and other substances.

**Note:** After 12-16 hours (early recognition) *E. coli* develops small yellowish, later orange colonies surrounded by a yellow halo.

- Recommended incubation condition: 12-24 hours at 37° C
- Recommended membrane filter: white, gridded, 0.45 µm

**Wort NutriDisk**

For the detection of yeasts and molds in beverages, foods and other products.

- Recommended incubation condition: 48-72 hours at 25° C
- Recommended membrane filter: black, gridded, 0.6 µm

Growth or positive reaction to selective medium should be regarded with suspicion. For safe diagnosis further comparative material is necessary (e.g. 'IMVIC-Test'). Respect the national epidemics control law.

**Ordering Information - NutriDisk**

NutriDisk Grade	Catalog Number	Recommended Membranes for NutriDisk								MicroPlus -21	MicroPlus -41
		ME 25/21	ME 25/41	ME 26/31	ME 27/31	ME 27/41	ME 28/31	ME 28/41			
Azide	10 434 165	x								x	
Caso	10 434 166		x								x
Cetrimide	10 434 167	x								x	
Endo	10 434 162	x								x	
M-FC	10 434 168	x								x	
Orange Serum	10 434 160		x								x
Plate Count	10 434 163		x								x
Sabouraud	10 434 169				(x)		(x)	x			
Schaufus Pottinger	10 434 161				(x)	(x)	(x)	x			
Standard TTC	10 434 164		x								x
Tergitol TTC	10 434 170	x								x	
Wort	10 434 159			x							

(x): Alternatives

**Ordering Information - Recommended Membranes for NutriDisk**

Membrane Type	Description	Catalog Numbers			
		St, 47mm	St, 50mm	StI, 47mm	StI, 50mm
ME 25/21	0.45 µm, White, Gridded	10 406 870	10 406 872	10 407 312	10 407 314
ME 25/41	0.45 µm, Green, Gridded	10 409 470	10 409 472	10 407 370	10 407 372
ME 26/31	0.6 µm, Black, Gridded	10 409 870	10 409 872	-	10 409 834
ME 27/31	0.8 µm, Black, Gridded	10 409 270	-	-	10 407 345
ME 27/41	0.8 µm, Green, Gridded	-	10 405 672	-	10 407 615
ME 28/31	1.2 µm, Black, Gridded	-	10 408 372	-	10 407 374
ME 28/41	1.2 µm, Green, Gridded	-	10 408 472	-	-
MicroPlus-21	0.45 µm, White, Gridded	10 407 713	10 407 714	10 407 112	10 407 114
MicroPlus-41	0.45 µm, Green, Gridded	-	-	10 407 170	10 407 172

Swabs

**Hygiene Monitoring: Every Microorganism Under Control**

Hygiene is essential in the food industry. The microbiological contamination of surface areas in production plants and laboratories must be monitored and controlled on a daily basis. SwabChecks from Whatman offer a rapid and reliable solution.

**SwabCheck™**

**The SwabCheck Principle**

The surface is wiped with a cellulose swab and any bacteria collected are transferred via the swab into a tube containing a special medium with an indicator dye, which is then incubated. Even a single bacterium is sufficient to cause a color change. This means that SwabChecks are about 1000 times more sensitive than the conventional ATP method. This accuracy is particularly important in the food industry. With this simple method, it is possible to identify microorganisms such as *Listeria monocytogenes*, which must not be present in any concentration in food and beverages.

**Features and Benefits**

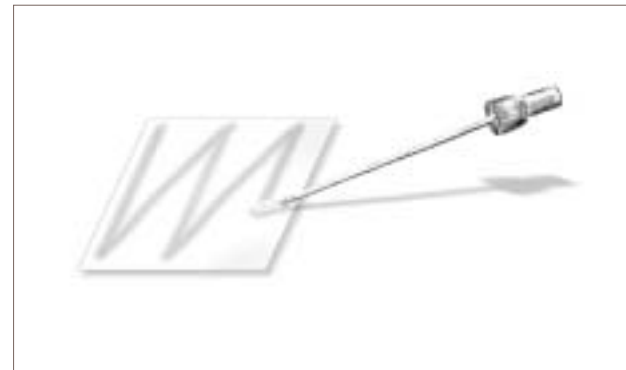
- The right test for each type of contamination
- Qualitative and semi-quantitative hygiene control
- Sterile packed and ready-for-use
- Easy to handle
- Rapid results
- Long shelf-life



**SwabCheck Use**

Handling is easy. Open the sterile pack, remove the swab and wipe it over an area of about 10 x 10 cm. Then twist off the cap of the medium tube and insert the swab so that the cap fits tightly. Label the sample tube and incubate at appropriate temperature.

A change in color indicates the presence of the microorganism in question. The quicker the color change occurs, the higher the bioburden. If no color change has been observed after the maximum incubation period has elapsed, then the corresponding microorganism is not present. Whatman offers SwabChecks in packs of 25 pieces. Shelf-life of 12 months.



**Swab Products**

**Neutralizing Buffer Swabs**

Neutralizing buffer swabs are used in the monitoring of surfaces for total bacterial count. Neutralizing buffer inactivates the bactericidal and bacteriostatic effects of chlorine and quaternary ammonium detergents. However, neutralizing buffer exhibits no toxic effects on microorganisms. This permits the transfer of swabbed organisms to the laboratory without loss in viability. Neutralizing buffer is not designed to culture and enumerate microorganisms.



Total Count Swab Kit

**Buffer Swabs**

Used for the collection of surface contamination from flat or convoluted surfaces prior to transport to a laboratory for culture and enumeration. Buffer swabs contain no bacteriostatic or bactericidal compounds and cannot suppress the action of detergents.

**SwabCheck**

Used as an indication of hygiene on contact surfaces. SwabCheck changes color from purple to yellow. The color change is based on acid reaction with the indicator. The more rapid the color change, the higher the level of bacteria in the sample. SwabCheck is useful in determining the sanitation levels of preparation surface, filling ports and processing areas in beverage and food processing plants, dairies, restaurants and healthcare facilities.

**Coliform SwabCheck**

*Escherichia coli* and Coliforms are used traditionally as indicator organisms for fecal contamination in water and other environmental samples. Detection of these organisms usually points to poor hygiene at some stage in the production process or pollution of water at source. The presence of coliforms is indicated by a color change from red to yellow. The more rapid the color change the higher the level of coliform bacteria.

**Hygiene SwabCheck**

Easy to use: The Hygiene SwabCheck shows an obvious color change from red to yellow. The time taken for this change is an indication of the level of contamination. This should be used in conjunction with known specification levels of your process/product. Rapid screening hygiene test is a same day test that will detect gross bacterial and fungal contamination of work surfaces, equipment machinery or other sampling sites.

**Listeria SwabCheck**

Listeria Isolation SwabCheck is designed to be used alongside traditional selective methods to improve the quality system and minimize the risk of *Listeria* contamination. This simple to use diagnostic test can be applied anywhere in the environment and on foodstuffs where the presence of *Listeria* species would be critical. *Listeria sp* and specifically *Listeria monocytogenes* are rapidly becoming the most important pathogen in the food industry; regulatory bodies from around the world are insisting that all food products are *Listeria* free. *Listeria* Isolation SwabCheck works on an enhanced Esculin media formulation. The hydrolysis of esculin gives a distinctive black/brown precipitate. Inhibitors and antibiotics are present in the media, which will inhibit the growth of non- *Listeria* species.

**SwabCheck *Escherichia coli***

Used for the detection of *Escherichia coli* on surfaces. The presence of fluorescence using a long-wave UV light source confirms the presence of *Escherichia coli*, and any further confirmation is not required. MUG detects anaerogenic strain that may not be detected in the conventional procedure. Lactose is a source of energy. Casein peptone provides additional nutrients. The mixture of bile salts is inhibiting for gram-positive bacteria, particularly bacilli and fecal. The substrate 4-methylumbelliferyl- $\beta$ -D-glucuronide is hydrolyzed by an enzyme,  $\beta$ -glucuronidase, possessed by most *Escherichia coli* and a few strains of *Salmonella*, *Shigella* and *Yersinia*, to produce a fluorescent end product, 4-methylumbelliferone. The presence of *Escherichia coli* is detected by the appearance of fluorescence throughout the tube.

**Total Count Swab Kit**

Used for the non-selective development and enumeration of all aerobic bacteria on surfaces in accordance with HACCP. The kit includes the swabs and culture medium, packaged with a membrane device, providing a quantitative result. All bacteria develop on TGE media and produce a range of different colored and sized colonies. It is not possible using TGE to presumptively identify any bacteria. Identification can only be undertaken using traditional microbiology techniques following initial colony development.



Coliform SwabCheck



Hygiene SwabCheck



Listeria SwabCheck

**Yeast and Mold Swab Kit**

Used for the enumeration of yeast and molds on surfaces in accordance with HACCP. The kit includes the swabs and culture medium, packaged with a membrane device, providing a quantitative result. M-Green yeast and mold is an improved modification of the liquid medium, and was developed to improve efficiency of detection and enumeration of fungi in sugar based drinks using the membrane filtration method. This medium has a low pH, which inhibits bacterial growth. The addition of bromocresol green, which diffuses into fungal colonies as an alkaline reaction, allows them to be easily identified. Metabolic by-products from the developing colonies diffuse into the surrounding medium, further reducing the pH that aids in the inhibition of bacterial growth, but also produces an acid reaction that causes residual bromocresol green to change to yellow. Green opaque colonies against a yellow background are indicative of the growth of yeasts. Mold colonies are green and filamentous.



Yeast and Mold Swab Kit

**Polywipe Sponge**

Used for the recovery of microorganisms from a surface. Polywipe is a blue sponge that is premoistened with neutralizing buffer to neutralize the effects of surface disinfectants. The sponge material is selected to be free of the preservatives found in commercially available sponges, which can inhibit microorganism growth. Polywipe sponges are biocide free and tested for zero toxicity to microorganisms. Each sponge is individually wrapped in a peel pouch and gamma irradiated to ensure sterility. Each box of 50 sponges are packed with 50 sterile gloves to allow aseptic handling and 50 sterile sampling bags to allow the sponge to be hydrated.



Polywipe Sponge

**Technical Specifications - Swabs and SwabChecks**

Quality Control and Recommended Incubation Conditions:	Formulation:
<b>Neutralizing Buffer Swabs</b>	
Positive control: Undertaken on cultured organisms after transfer to standard methods agar plates from neutralizing buffer. <i>Escherichia coli</i> ATCC 25922, incubated at 35° C for 24 hours.	Per liter of water adjusted to pH 7.2 ± 0.5 Monopotassium phosphate 42.5 g Sodium thiosulfate 160 mg Aryl sulfonate complex 5.0 g
Negative control: Not undertaken.	
Sterility test: 7 days plated sterility test.	

contd >

Quality Control and Recommended Incubation Conditions:	Formulation:
<b>SwabCheck</b>	
Positive control: <i>Escherichia coli</i> ATCC 25922, 24-48 hours at 35-37° C.	Proprietary
Negative control: Not undertaken.	
Sterility: 7 days plated sterility test.	
<b>Buffer Swabs</b>	
Undertaken on cultured organisms after transfer to standard methods agar plates from the buffer solution.	Make to 1 liter and adjust pH to 7.2 ± 0.5 Stock solution 1.25 ml/l
Positive control: <i>Escherichia coli</i> ATCC 25922, incubated at 35° C for 24 hours.	Potassium di-hydrogen phosphate 34 g
Negative control: Not undertaken.	
Sterility: 7 days plated sterility test.	
<b>ColiCheck</b>	
Positive control: <i>Escherichia coli</i> ATCC 25922, incubated at 35° C for 48 hours.	Per liter of water and adjusted to pH 6.8 ± 0.2 Beef extract 3.0 g
Negative control: Sterile water incubated at 35° C for 48 hours.	Pancreatic Digest of Gelatin 5.0 g
Sterility test: 14 days plated sterility test.	Lactose 7.5 g Pancreatic Digest of Casein 10.0 g Dipotassium phosphate 1.375 g Monopotassium phosphate 1.375 g Sodium chloride 2.5 g Sodium lauryl sulfate 50 mg Bromocresol purple 8.5 mg
<b>ColiCheck with MUG</b>	
Positive control: <i>Escherichia coli</i> ATCC 25922, incubated at 35° C for 48 hours. Checked for fluorescence at 366 nm.	Per liter of water and adjusted to pH 6.8 ± 0.2 Beef extract 3.0 g
Negative control: Sterile water incubated at 35° C for 48 hours.	Pancreatic Digest of Gelatin 5.0 g
Sterility test: 14 days plated sterility test.	Lactose 7.5 g Pancreatic Digest of Casein 10.0 g Dipotassium phosphate 1.375 g Monopotassium phosphate 1.375 g Sodium chloride 2.5 g Sodium lauryl sulfate 50 mg Bromocresol purple 8.5 mg MUG 125 mg
Organisms Characteristics:	
<i>E. coli</i> ATCC 25922 Growth	
<i>E. aerogenes</i> ATCC 13048 Growth	
<i>E. faecalis</i> ATCC 29212 Inhibited	
Organisms Coloring:	
<i>E. coli</i> ATCC 25922 Yellow, fluorescence	
<i>E. aerogenes</i> ATCC 13048 Yellow, no fluorescence	
<i>E. faecalis</i> ATCC 29212 Red, no fluorescence	
<b>SwabCheck <i>Escherichia coli</i></b>	
Positive control: <i>Escherichia coli</i> ATCC 25922, 24-48 hours at 35-37° C.	Per liter of water adjusted to pH 6.9 ± 0.2
Negative control: <i>Enterobacter aerogenes</i> ATCC 13048, 24-48 hours at 35-37° C.	Pancreatic Digest of Casein 20.0 g
Growth but not fluorescence.	Lactose 5.0 g Bile Salts Mixture 1.5 g Dipotassium Phosphate 4.0 g Monopotassium Phosphate 1.5 g Sodium Chloride 5.0 g 4-methylumbelliferyl-β-D-glucuronide 50 mg
Sterility: 7 days plated sterility test.	

contd >

Quality Control and Recommended Incubation Conditions:	Formulation:
<b>Total Count Swab Kit</b>	
Positive control: <i>Escherichia coli</i> ATCC 25922, 24-48 hours at 35° C.	Per liter of water and adjusted to pH 7.0 ± 0.2
Negative control: Not undertaken.	Pancreatic Digest of Casein 10.0 g
Sterility: 7 days plated sterility test.	Yeast extract 5.0 g
	Dextrose 2.0 g
<b>Yeast and Mold Swab Kit</b>	
Positive control: <i>Candida albicans</i> ATCC 10231, 48 hours at 25-30° C.	Per liter of water adjusted to pH 4.6 ± 0.2
Negative control: Not undertaken.	Dipeptone 10.0 g
Sterility: 7 days plated sterility test.	Yeast extract 9.0 g
	Dextrose 50.0 g
	Magnesium sulfate 2.1 g
	Potassium phosphate 2.0 g
	Drastase 50 mg
	Thiamine 50 mg
	Bromocresol green 26 mg

**Ordering Information - Swabs and SwabChecks**

Description	Quantity/Pack	Catalog Number
Neutralizing Buffer Swabs, 4 mL	125	10 498 303
Neutralizing Buffer Swabs, 4 mL	500	10 498 304
Buffer Swabs, 4 mL	125	10 498 305
Buffer Swabs, 4 mL	500	10 498 306
SwabCheck, 4 mL	125	10 498 404
SwabCheck, 4 mL	500	10 498 405
SwabCheck, <i>E. coli</i> , 4 mL	125	10 498 402
Total Count Swab Kit	30	10 498 315
Yeast and Mold Swab Kit	30	10 498 316
Coliform SwabCheck	25	10 498 406
Hygiene SwabCheck	25	10 498 407
Listeria SwabCheck	25	10 498 408
Polywipe Sponges Single Packed	50	10 498 521

Rapid Test

**Contamination Testing**

The Lactobacillus Rapid Test is based on the membrane filtration method. In addition the quantitative results are available within 24 hours.

**Lactobacillus Rapid Test**

For the rapid detection of *Lactobacillus* contamination in soft drinks. In the spoilage of soft drinks, carbonated soft drinks in particular, *Lactobacilli* play an important role. In the LST-45 test the membrane filter is incubated on a nutrient medium and the colonies are then colored blue with a reagent solution. Even dense growth can be easily recognized. After a maximum of 24 hours, even a single colony can be detected on the membrane filter. Package includes: 50 membrane filters, reagent solution and special nutrient media pads for 50 tests.

**Yeast Rapid Test**

For the rapid detection of yeast contamination in soft drinks. Yeast concentrations of 1000 yeast cells/mL can be detected in only 8 hours. The membrane filter is incubated on a nutrient medium and colored blue with reagent solution. After only 24 hours incubation, even a single colony can be detected. Package includes: 50 membrane filters, reagent solution and special nutrient pads for 50 tests.

**ColiCheck**

Used for the presumptive identification of coliforms in water samples by a presence/absence technique. Bromocresol purple is a pH indicator that demonstrates a color change from purple to yellow in the presence of acid. Lactose fermenting organisms produce acid, which initiates the color change. The presence of coliforms is detected with greater sensitivity by use of a relatively large sample volume (100 mL) in a single bottle.

**ColiCheck with MUG**

Used for the presumptive identification of coliforms and the determination of the presence of *Escherichia coli* in water samples by a presence/absence technique. The addition of MUG (4-methylumbelliferyl-β-D-glucuronide) which is a fluorogenic enzyme allows the media to selectively identify *Escherichia coli*. MUG is hydrolyzed by the *Escherichia coli* specific enzyme β-glucuronidase to release 4-Methylumbelliferone which fluoresces under ultraviolet light (approx. 366 nm wavelength).



Yeast and Lactobacillus Rapid Test



ColiCheck with MUG

**Ordering Information - Rapid Test**

	Quantity/Pack	Catalog Number
Lactobacillus Rapid Test (LST-45)*	50	10 433 410
Yeast Rapid Test (HST-45)*	50	10 433 406
ColiCheck Test Kit with Sample Bottles	30	10 496 744
ColiCheck with MUG Test Kit with Sample Bottles	30	10 496 745

\* Package includes: 50 membrane filters, reagent solution and special nutrient media pads for 50 tests

## Membrane Filtration Accessories

Whatman offers a line of analytical funnels and vacuum filtration equipment for use in microbiological testing processes.

### Vacuum Filtration Equipment

#### MV 050 Series

All MV series vacuum filtration devices are made of stainless steel, which is especially suitable for microbiological applications.

The system can be used up to 200° C, is autoclavable and can be sterilized by dry heat up to 180° C.

#### Applications

- Microbiology (e.g. *Escherichia coli* detection), biochemistry, hydrobiology
- Drinks (e.g. cold sludge in beer), foodstuffs (e.g. ice cream), pharmaceuticals, cosmetics, water, wastewater
- Residue analysis, precipitate analysis, contamination tests



MV 050/0



MV 050A/0

#### Multiple Vacuum Filtration Apparatus

##### AS 300 and 600 Series

The stainless steel manifold for 3 or 6 filtration units is fitted with stainless steel units. The apparatus can be autoclaved and sterilized by dry heat at up to 180° C. Suitable only for vacuum operation. If flushing tubes are used, do not exceed 1.3 bar (300 mbar over-pressure).



AS 300/3



AS 610/3

#### Applications

- Microbiological quality control
- Residue analyses
- Serial filtration carried out rapidly and easily with a common drainage outlet

### Accessories for Vacuum Filtration Apparatus

#### Vacuum and Pressure Pumps

The vacuum pumps are required especially in the fields of microbiological quality control, analyses, medicine and production technology. The pumps are used for pumping gases, taking samples (even liquids in a vacuum) and evacuating vessels.

#### Features and Benefits

- AC models
- Contamination free pumping of air, gases and vapors
- High performance and minimum size
- Extremely quiet and smooth running
- Suitable for liquids in vacuum (VP007 only)
- Equipped with thermo switch and standard fuse
- Simple to use
- Maintenance free
- Oil-free membrane pumps



Vacuum Pump VP003



Vacuum Pump VP007

#### Witt's bottle WT 100

For filtrate collection in an inserted container. The bottle is made of borosilicate glass. It has a replaceable round lid and side-mounted tubing nozzle for vacuum tubing 8 mm (inside diameter).



Witt's Bottle WT 100

#### Forceps PZ 001

The stainless steel forceps with smooth angled jaws (104 mm long) are ideal for handling membrane filters. They are autoclavable and can be flame sterilized with ethanol.



Forceps PZ 001

**Technical Data - Vacuum Filtration - Stainless Steel Apparatus**

<b>Apparatus Selection:</b>	
MV 050 Series	
- Filter Size:	47/50 mm
- Filter Volume:	100 or 500 mL
- Filter Area:	12.5 cm <sup>2</sup>
- Pre filter:	40 mm dia.
- Vacuum Connection:	Rubber stopper
- Filter Support:	Sieve (frit as accessory)
<b>Materials Selection:</b>	
Upper and Lower Parts:	Stainless steel 1.4301
Cover:	Stainless steel 1.4301
Frit:	Stainless steel 1.4571
Sieve:	Stainless steel 1 4301
Seals:	PTFE and silicone
Clamps:	Aluminum
<b>Apparatus Selection:</b>	
AS 300 and 600 Series - Multiple Vacuum Filtration Apparatus	
- Filter Volume:	100 or 500 mL
- Manifold:	3 or 6 stopcocks and lower parts for individual choice of filter units
- Filter Support:	Sieve (frit as accessory)
- Vacuum connection:	Tubing nozzle 9 mm (inside diameter)

Multiple filtration apparatus complete and ready for use  
Filters and prefilters sold separately

**Performance Data - Vacuum and Pressure Pumps**

	Delivery (l/min)	Vacuum (mbar absolute)	Pressure (bar)	Weight (kg)
VP003	3.6 m <sup>3</sup> /hr	<100	4	11
VP007	1.7 m <sup>3</sup> /hr	350	1.1	7

**Technical Data - Witt's Bottle WT 100**

Size:	100 mm diameter
Height:	160 mm
Capacity:	1000 mL
Vacuum Connection:	Tubing nozzle 8 mm (inside diameter)

**Ordering Information - Vacuum Filtration - Stainless Steel Apparatus**

Product	Funnel Volume (mL)	Rapid Closure Clamp	Height x Diameter* mm	Quantity/Pack	Catalog Number
MV 050 Series					
MV 050A/2	100	yes	230 x 60	1	10 440 220
MV 050/0	500	-	320 x 110	1	10 440 000
MV 050A/0	500	yes	320 x 110	1	10 440 020
AS 300 and 600 Series - Multiple Vacuum Filtration Apparatus (Unit from MV Series)					
Three-Place Filtration					
AS 300/5	100	-	230 x 60	1	10 445 850
AS 300/3	500	-	320 x 110	1	10 445 830
AS 310/3	500	yes	320 x 110	1	10 445 835
Stainless Steel Filter Funnel Manifold				1	10 498 761
Six-Place Filtration					
AS 600/5	100	-	230 x 60	1	10 444 850
AS 600/3	500	-	320 x 110	1	10 444 830
AS 610/3	500	yes	320 x 110	1	10 444 835
Stainless Steel Filter Funnel Manifold				1	10 498 762

\* Without clamp

**Ordering Information - Vacuum and Pressure Pumps**

	Catalog Number
VP003	10 470 300
VP007	10 470 310

**Ordering Information - Accessories**

Product	Quantity/Pack	Catalog Number
ML 050/0/03 - Steel Frit with Ring	1	10 464 103
Witt's Bottle WT 100	1	10 477 601
Suction Flask SF100 - 1000 mL	1	10 477 600
Rubber Tubing - SV 006: 1 m length; 8 mm inside diameter; 18 mm outside diameter	1	10 471 700
Forceps PZ 001 - Stainless Steel	1	10 477 602