

GeneDisc® Technologies

For the Rapid Detection and Identification of Beer Spoilage Bacteria

Beer is quite restrictive to bacterial growth due to its characteristics (low pH, ethanol concentration, low oxygen content), but a few bacterial genera, including *Lactobacillus*, *Pediococcus*, *Pectinatus*, and *Megasphaera*, can generate off-flavors, turbidity and acidity. Related bacterial beer spoilage can generate high economic losses and impact brand image.

Furthermore, labor intensive and lengthy investigations after spoilage detection can increase these risks as spoilage can originate from a wide variety of sources throughout the brewing process. These investigations can generate increased losses as higher volume of spoiled product could be produced or production could be interrupted for a long period.

Pall GeneDisc Technologies help industries to reduce these risks by enabling the following:

- Implementation of decision making tests at key control points of the process
- Fast investigations after spoilage detection

GeneDisc System Benefits

Rapid — Pall's GeneDisc method allows a simultaneous detection and identification of beer spoilage bacteria in a few days and colony identification in 2 hours.

Easy to use — GeneDisc solutions are designed for routine use. Implementing PCR (Polymerase Chain Reaction) has never been this easy.

Modular — Scalable PCR system with 1 to 8 units adapts to evolving testing needs.

A Solution Designed for Breweries

Accelerated decision-making – GeneDisc technology allows for early preventive controls to reduce risk of product spoilage.

Fast corrective actions implementation – Reduce negative financial impact of spoilage with rapid root cause analysis in case of contamination.

Cost-effective and informative method – Lower analytical cost as one single run allows the simultaneous detection and identification of 21 major beer spoilage microorganisms:

- *Lactobacillus brevis*
- *Lactobacillus lindneri*
- *Lactobacillus backii*
- *Lactobacillus collinoides* and *L. paracollinoides*
- *Lactobacillus* group: *L. casei*, *L. paracasei*, *L. coryniformis*, *L. rossiae*, *L. parabuchneri* (= *frigidus*), *L. perolens* and *L. plantarum*
- *Pediococcus* (*P. damnosus*, *P. inopinatus*, *P. clausenii*)
- *Pectinatus* (*P. cerevisiiphilus*, *P. frisingensis*, *P. haikarae*, *P. portalensis*)
- *Megasphaera* spp. (*M. cerevisiae*, *M. elsdenii*)



Reliable approach – Our approach is based on the detection of stable genes. GeneDisc method overcomes limitations of resistance genes based methods and can be used for all product types (e.g. radler style beers), with reliable results not influenced by resistance gene variability or by detection of genes not necessarily related to bacteria spoilage ability.

Reliable results – To ensure result accuracy, each sample analysis includes an internal positive control. In addition, results from internal and external studies demonstrated the method was able to accurately detect the presence of beer spoilage bacteria even at low contamination levels in beer samples.

Easy to use – GeneDisc method allows clear beer spoilage bacteria detection and identification from various sample types including in-process and final product samples.

Beer Spoilage Bacteria ID

| Bacteria Genus | Description | Can Generate Turbidity | Main Associated Off-flavors |
|----------------------|----------------|------------------------|---|
| <i>Lactobacillus</i> | Gram + bacilli | Yes | Lactic acids |
| <i>Pediococcus</i> | Gram + cocci | Yes | Diacetyl |
| <i>Pectinatus</i> | Firmicutes | Yes | Sulphur compounds (e.g. H ₂ S) |
| <i>Megasphaera</i> | Firmicutes | Yes | Valeric and isovaleric acids |

How the System Works



Technical Information

| | |
|---------------------------------------|--|
| Enrichment Time | With common broths (e.g. MRS or NBB) |
| Sample Preparation Time | < 1 hour for 48 samples with Extraction Pack Food 1 |
| Hands-on Time | About 45 minutes for 48 samples (<1 min/sample) |
| PCR Cycle Time | < 1 hour |
| Limit of Detection (after enrichment) | <ul style="list-style-type: none"> • 25 GU/PCR well for <i>Pectinatus</i> spp., <i>L. backii</i>, <i>L. brevis</i>, <i>L. lindneri</i>, <i>L. collinoides</i> & <i>paracollinoides</i> • 50 GU/PCR well for <i>Pediococcus</i> spp. • 100 GU/PCR well for <i>Megasphaera</i> spp., <i>Lactobacillus</i> group |
| Compatible with | <ul style="list-style-type: none"> • Filterable samples (e.g. filled product, water) • Unfilterable samples (e.g. green beer, wort, yeast propagation) |
| Internal Positive Control | Ensure PCR reaction is not affected by the presence of inhibitors for each sample DNA extract |

Ordering Information

| Part Number | Description | Samples/pack |
|--------------------|---------------------------------|--------------|
| Equipment | | |
| EGDUL1A230 (EU) | GeneDisc Ultra-Lyser | - |
| EGDUL1A120 (US) | GeneDisc Ultra-Lyser | - |
| EGDCV3A | GeneDisc Cyclor Base Unit | - |
| EGDSV3A | GeneDisc Cyclor Sub Unit | - |
| Consumables | | |
| PF00D1100 | Extraction Pack Food 1 | 100 |
| GBSPOBC206006 | GeneDisc Beer Spoilage Bacteria | 36 |

We also offer a full product range for pathogen detection in food and water as well as detection and identification of *Alicyclobacillus* in beverages.

Quantitative tests for pathogens in water (*Legionella*, *E. coli*, *Enterococcus*...) are also available.

For more information including part numbers please contact us.

Further Readings

- Application Bulletin: FBABGDBEEREN, Implement High Value-added Quality Control in Breweries with the GeneDisc System.
- Poster: Fast and Reliable Detection of Beer Spoilage Bacteria for Routine Analysis – Field Results, Ziehl J. *et al.*, Pall Corporation and BITBURGER BRAUGRUPPE GmbH.
- Poster: Practical Application of qPCR for Monitoring and Improving Brewery Sanitation, Fyfe L. *et al.*, Craft Brew Alliance and Pall Corporation.
- Poster: Performance Evaluation of the GeneDisc Method for Detection of Beer Spoilage Bacteria, Bonilla S. *et al.*, Pall Corporation.
- Poster: Implementation of Real-time PCR to Ensure Bacteria Free Yeast Propagations in a Mid-sized Craft Brewery, Bailey B., Tröegs Brewing Co.



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