

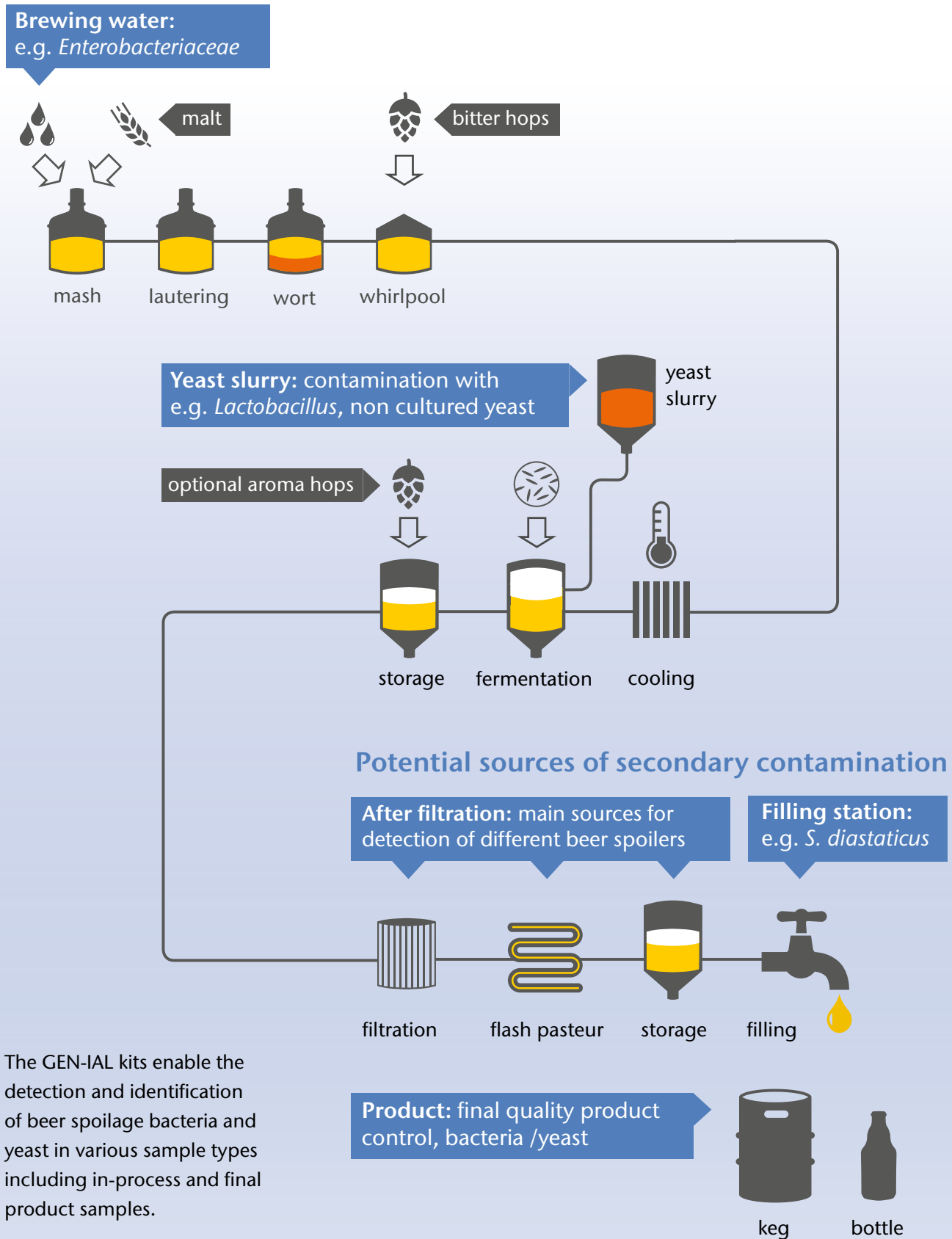
# Real-time PCR beer screening – for a quick and GEN-IAL® result

- For yeast propagation, in-process control and/or for online final product control
- Avoid product recalls
- Reduce the risk of spoilage



# 5 potential sources of microbiological spoilage in beer brewing

## Potential sources of primary contamination



The GEN-IAL kits enable the detection and identification of beer spoilage bacteria and yeast in various sample types including in-process and final product samples.

## Faster and more sensitive results with real-time PCR – customize your routine analysis

Either extremely fast or maximal sensitive detection or specific identification is possible by combining different methods of sample preparation and detection with real-time PCR.

### Approaches for microbiological analysis in beer

Time requirement: ~ 2 hrs

#### Centrifugation

- Centrifugation, qPCR: 2 hours from sample to result
- Fast screening approach for specific applications
- New** • Kit for detection of bacteria and (wild) yeast in yeast containing samples (yeast propagation or fermentation tank)



- + Extremely fast
- + Screening and/or identification
- + Only two hours to result
- Volume maximum 30 mL
- Sensitivity maximum 10 - 100 cfu/30 mL (without enrichment)

Time requirement: ~ 2 hrs

#### Filtration and qPCR

- Filtration, qPCR: 2 hours from sample to result
- Fast screening approach for specific applications



- + Extremely fast
- + Screening and/or identification
- + Only two hours to result
- Volume maximum 1 L (depending on sample type)
- Sensitivity maximum 100 cfus

Time requirement: ~ 50 hrs

#### Enrichment and qPCR

- Pre-enrichment and qPCR: 2 days and 2 hours from sample to result
- Modern established approach for beverage analytic



- + Fast
- + Screening and/or identification
- + Ensure absence of low cfu/sample volume

Time requirement: ~ 50 hrs

#### Polymer binding and qPCR

- Sampling via polymer, pre-enrichment and qPCR
- Very sensitive approach for highest demands



- + Highest sensitivity
- + Up to 30 liter sample adsorption: kegs, in-process control, several bottles
- + Pre-enrichment of polymer ensures absence of few cfu/sample volume

## PolyBIND® – the new approach to adsorb and concentrate spoilage bacteria from large volumes

The separation and enrichment of microorganisms from large sample volumes or viscous liquids is still challenging in the beverage industry.

### Capturing bacteria with PolyBIND® (Art. No. PB 0050)

For the first time, the newly developed PolyBIND® particles enable the quick and easy isolation of

### Matrices

#### Beers:

Pils, Kölsch, mixed beer drinks (e.g. Radler, Lemon), malt beer, IPA beers, Pale Ale, Ale, sour beer, stout, wheat beer, Kellerbier, Belgian beer, dark beers

#### Wines:

white wine, red wine

#### Soft drinks:

coke, apple juice, orange juice clear, milk

microorganisms and viruses from large sample volumes and highly viscous or solid-loaded liquids. PolyBIND® binds bacteria by adsorption. Using the sampling device Granusim 14.2, several bottles or one keg up to 30 liters can be analyzed. Subsequent incubation in a medium of choice, allows state-of-the-art sampling for high demands/sensitivity of microbiological beverage testing.

### Detection limit

The detection limit is 10 - 100 cells/analyzed volume.

### PolyBIND® binding capacity and efficiency

The binding capacity of different microorganisms is between 10<sup>5</sup> and 10<sup>6</sup> cfu/100 mg PolyBIND®.

The binding efficiency depends on the pH-value of the liquid. The more acidic, the higher the binding efficiency. Optimal pH-values: 3 - 5. Sugar ingredients do not influence the binding efficiency.

## New Precoated PCR strips – a unique solution for convenient handling

Different combinations of screening and identification possibilities are available, thus allowing a cost effective and customized routine analysis.

The QuickGEN kits contain 8-well strips which are precoated with the reagents for up to 4 different parameters per tube. 8-well strips detecting one to four parameters can be used for 8 samples/ reactions. As extension of this multiplexing each tube of a 8-well strip may contain different parameters – this allows a multiplex panel for up to 4 x 8 parameters for one sample in a 8-well strip.

Templates are available for MyGo Pro and qTOWER<sup>3</sup>. These prepared templates contain the settings for dedicated kits and allow a direct start of the real-time PCR without the need to program the settings:

- 1 Open the template of dedicated kit/parameter
- 2 Add the sample names
- 3 Start run

High	White	Low
Agilent MX3005P	Roche Lightcycler® 480 II	IT-IS MyGo Pro*
Applied Bioscience ABI 7500 or higher	BioRad CFX96™	Agilent AriaMX
ThermoFisher QuantStudio®5 or higher	Analytik Jena qTOWER <sup>3</sup>	BioRad CFX96™

\* 4plex assays for MyGo Pro requires a specific kit (QPP1SD0048lowMG and QPP1T0048lowMG).

## 1. Group specific screening

An initial screening gives a group specific answer of for example yeast and bacteria in one assay.

QTPYB0096\* In a mixture of groups and specific parameters, two samples can be run on one strip, therefore 24 samples per kit can be analyzed for:

Tube	Sample	FAM	HEX	ROX
1	NTC	–	–	Inhibition control
2	PTC	Positive control	–	–
3	1	<i>Enterobacteriaceae</i>	<i>Lactobacillus/Pediococcus</i>	<i>Pediococcus</i>
4	1	Wild yeast 1	Bottom fermented yeast	Inhibition control
5	1	Wild yeast 2	Top fermented yeast	Acetic acid bacteria
6	2	<i>Enterobacteriaceae</i>	<i>Lactobacillus/Pediococcus</i>	<i>Pediococcus</i>
7	2	Wild yeast 1	Bottom fermented yeast	Inhibition control
8	2	Wild yeast2	Top fermented yeast	Acetic acid bacteria

## 2. Screening and differentiation in one assay

The most relevant beer spoilage bacteria and yeast can be identified in one assay for example with QTPBD 0096\* – 12 strips of 8 wells allows for the detection of the most relevant spoilage organisms for 12 samples in one assay.

Well	FAM	HEX	ROX
1	NTC	NTC	IAC
2	<i>Enterobacteriaceae</i>	<i>P. anomala</i>	<i>Saccharomyces cerevisiae</i> var. <i>diastaticus</i>
3	<i>P. damnosus</i>	<i>P. acidilactici/pentosaceus/parvulus/inopinatus</i>	<i>P. clausenii</i>
4	<i>Pectinatus</i> spp.	<i>Megasphaera</i> spp.	<i>L. rossiae</i>
5	<i>L. brevis/L.parabrevis/L.brevisimilis</i>	<i>L. lindneri</i>	<i>L. cas ei/L.paracasei</i>
6	<i>L. buchneri/L. parabuchneri</i>	<i>L. collinoides/L. paracollinoides</i>	<i>L. perolens/L. harbinensis</i>
7	<i>L. plantarum/L. paraplantarum</i>	<i>L. coryniformis</i>	IAC
8	<i>L. acetotolerans</i>	<i>L. backii</i>	PTC

New

## 3. Detection and identification of yeast or bacteria only

Several kits are available for the detection of specific bacteria or yeast only.

QYDIF0096\* – 12 strips allow the identification of 12 yeast species.

Tube	FAM	HEX
1	NTC	Inhibition control
2	<i>Rhodotorula</i> spp.	<i>Saccharomyces exiguus</i>
3	<i>Candida</i> spp.	<i>Saccharomyces cerevisiae</i> var. <i>diastaticus</i>
4	<i>Saccharomycodes ludwigii</i>	<i>Debaromyces hansenii</i>
5	<i>Torulasporea delbrückii</i>	<i>Saccharomyces cerevisiae</i> var. <i>diastaticus</i>
6	<i>Kluyveromyces marxianus</i>	<i>Hanseniaspora</i> spp.
7	<i>Dekkera</i> spp.	Inhibition control
8	<i>Pichia</i> spp.	PTC

\* Available for low, high and white tube profiles.






## GEN-IAL® – products for beer analysis

New



Product	Description	No. of tests/amount	Art. No.
<b>Beer</b>			
<b>DNA preparation</b>			
GEN-IAL® Simplex® Easy DNA kit	DNA preparation of beverage samples	100 preparations	SE 0100
GEN-IAL® QuickGEN* Sample preparation filtration	DNA preparation of beverage samples, filtration	100 preparations	FSE 0100
<b>DNA preparation with centrifugation without enrichment</b>			
GEN-IAL® QuickGEN* Sample preparation centrifugation	DNA preparation of beverage samples, centrifugation	100 preparations	CSE 0100
GEN-IAL® QuickGEN* Sample preparation in yeast	For beverage samples mainly containing yeast	100 preparations	CSY0100
<b>Beer – bacteria &amp; yeast</b>			
<b>Qualitative multiplex real-time PCR</b>			
GEN-IAL® QuickGEN* First-Beer Differentiation PCR Kit	Multiplex detection (30 species) and identification (19 species) of relevant beer spoilers	96 reactions	QTPBD0096 high
GEN-IAL® QuickGEN* First-Beer Differentiation PCR Kit	Multiplex detection (30 species) and identification (19 species) of relevant beer spoilers	96 reactions	QTPBD0096 low
GEN-IAL® QuickGEN* First-Beer Differentiation PCR Kit	Multiplex detection (30 species) and identification (19 species) of relevant beer spoilers	96 reactions	QTPBD0096 white
GEN-IAL® QuickGEN* First-Beer yeast and bacteria differentiation	Multiplex detection and identification of beverage spoiling bacteria and yeasts	96 reactions	QTPYB0096 high
GEN-IAL® QuickGEN* First-Beer yeast and bacteria differentiation	Multiplex detection and identification of beverage spoiling bacteria and yeasts	96 reactions	QTPYB0096 low
GEN-IAL® QuickGEN* First-Beer yeast and bacteria differentiation	Multiplex detection and identification of beverage spoiling bacteria and yeasts	96 reactions	QTPYB0096 white
GEN-IAL® P1 Screening	DNA screening and differentiation of beer spoiling bacteria and yeasts ( <i>Lactobacillus</i> , <i>Pediococcus</i> / <i>Megasphaera</i> , <i>Pectinatus</i> /yeast)	50 reactions	PP1T 0050
GEN-IAL® QuickGEN* P1 Screening	DNA screening and differentiation of beer spoiling bacteria and yeasts ( <i>Lactobacillus</i> , <i>Pediococcus</i> / <i>Megasphaera</i> , <i>Pectinatus</i> /yeast)	50 reactions	QPP1T 0050
GEN-IAL® QuickGEN* P1 Screening	DNA screening and differentiation of beer spoiling bacteria and yeasts ( <i>Lactobacillus</i> , <i>Pediococcus</i> / <i>Megasphaera</i> , <i>Pectinatus</i> /yeast)	48 reactions	QPP1T0048 high
GEN-IAL® QuickGEN* P1 Screening	DNA screening and differentiation of beer spoiling bacteria and yeasts ( <i>Lactobacillus</i> , <i>Pediococcus</i> / <i>Megasphaera</i> , <i>Pectinatus</i> /yeast)	48 reactions	QPP1T0048 low
GEN-IAL® QuickGEN* P1 Screening	DNA screening and differentiation of beer spoiling bacteria and yeasts ( <i>Lactobacillus</i> , <i>Pediococcus</i> / <i>Megasphaera</i> , <i>Pectinatus</i> /yeast)	48 reactions	QPP1T0048 low MG
GEN-IAL® QuickGEN* P1 Screening	DNA screening and differentiation of beer spoiling bacteria and yeasts ( <i>Lactobacillus</i> , <i>Pediococcus</i> / <i>Megasphaera</i> , <i>Pectinatus</i> /yeast)	48 reactions	QPP1T0048 white
GEN-IAL® QuickGEN* P1 Screening	DNA screening and differentiation of beer spoiling bacteria and <i>Saccharomyces cerevisiae</i> var. <i>diastaticus</i>	50 reactions	QPP1SD 0050
GEN-IAL® QuickGEN* P1 Screening	DNA screening and differentiation of beer spoiling bacteria and <i>Saccharomyces cerevisiae</i> var. <i>diastaticus</i>	48 reactions	QPP1SD0048 high
GEN-IAL® QuickGEN* P1 Screening	DNA screening and differentiation of beer spoiling bacteria and <i>Saccharomyces cerevisiae</i> var. <i>diastaticus</i>	48 reactions	QPP1SD0048 low
GEN-IAL® QuickGEN* P1 Screening	DNA screening and differentiation of beer spoiling bacteria and <i>Saccharomyces cerevisiae</i> var. <i>diastaticus</i>	48 reactions	QPP1SD0048 low MG
GEN-IAL® QuickGEN* P1 Screening	DNA screening and differentiation of beer spoiling bacteria and <i>Saccharomyces cerevisiae</i> var. <i>diastaticus</i>	48 reactions	QPP1SD0048 white
GEN-IAL® QuickGEN* P1 Screening	DNA screening and differentiation of beer spoiling bacteria and hop resistance genes horA/horC	48 reactions	QPP1HR0048 high
GEN-IAL® QuickGEN* P1 Screening	DNA screening and differentiation of beer spoiling bacteria and hop resistance genes hor A/hor C	48 reactions	QPP1HR0048 low
GEN-IAL® QuickGEN* P1 Screening	DNA screening and differentiation of beer spoiling bacteria and hop resistance genes hor A/hor C	48 reactions	QPP1HR0048 low MG
GEN-IAL® QuickGEN* P1 Screening	DNA screening and differentiation of beer spoiling bacteria and hop resistance genes hor A/hor C	48 reactions	QPP1HR0048 white
GEN-IAL® QuickGEN* First-Biofilm	Specific DNA detection of <i>Lactococcus lactis</i> , <i>Leuconostoc mesenteroides</i> and <i>Pichia anomala</i>	50 reactions	QTPBF0050

## GEN-IAL® – products for beer analysis

Product	Description	No. of tests/amount	Art. No.
<b>Beer – bacteria</b>			
<b>Qualitative real-time PCR</b>			
GEN-IAL® Pectinatus spp./Megasphaera spp.	Specific DNA detection and differentiation of <i>Pectinatus</i> and <i>Megasphaera</i>	50 reactions	TPPMD 0050
GEN-IAL® Pectinatus spp./Megasphaera spp.	Specific DNA detection and differentiation of <i>Pectinatus</i> and <i>Megasphaera</i>	48 reactions	QTPPMD0048 low
GEN-IAL® Enterobacteriaceae	DNA detection of <i>Enterobacteriaceae</i>	50 reactions	TPENT0050
<b>Beer – resistance genes</b>			
<b>Qualitative real-time PCR</b>			
GEN-IAL® QuickGEN* hop resistance genes hor A and hor C/hit A and orf5	Specific DNA detection of hop resistance genes	50 reactions	QTPHR 0050
<b>Beer – yeast</b>			
<b>Qualitative real-time PCR</b>			
 GEN-IAL® QuickGEN* First-Yeast PCR Kit Wild Yeast 1	DNA screening and differentiation of wild yeast 1	50 reactions	QTPWY10050
 GEN-IAL® QuickGEN* First-Yeast PCR Kit Wild Yeast 2	DNA screening and differentiation of wild yeast 2	50 reactions	QTPWY20050
 GEN-IAL® QuickGEN* First-Yeast PCR Kit Wild Yeast	DNA screening and differentiation of wild yeast 1 and 2	96 reactions	QTPWY0096 high
 GEN-IAL® QuickGEN* First-Yeast PCR Kit Wild Yeast	DNA screening and differentiation of wild yeast 1 and 2	96 reactions	QTPWY0096 low
 GEN-IAL® QuickGEN* First-Yeast PCR Kit Wild Yeast	DNA screening and differentiation of wild yeast 1 and 2	96 reactions	QTPWY0096 white
GEN-IAL® QuickGEN* First-Yeast differentiation PCR Kit	DNA screening and differentiation of 12 yeasts	96 reactions	QYDIF0096 high
GEN-IAL® QuickGEN* First-Yeast differentiation PCR Kit	DNA screening and differentiation of 12 yeasts	96 reactions	QYDIF0096 low
GEN-IAL® QuickGEN* First-Yeast differentiation PCR Kit	DNA screening and differentiation of 12 yeasts	96 reactions	QYDIF0096 white
GEN-IAL® Dekkera anomala	Specific DNA detection of <i>Dekkera anomala</i>	50 reactions	TPYDA 0050
GEN-IAL® Pichia anomala	Specific DNA detection of <i>Pichia anomala</i> ( <i>Wickerhamomyces anomalus</i> )	50 reactions	TPYPA 0050
GEN-IAL® Saccharomyces diastaticus	Specific DNA detection of <i>Saccharomyces cerevisiae</i> var. <i>diastaticus</i>	50 reactions	TPYSD 0050
GEN-IAL® Pichia membranaefaciens	Specific DNA detection of <i>Pichia membranaefaciens</i>	50 reactions	TPYPM 0050
GEN-IAL® Bottom fermented yeas	Specific DNA detection of bottom fermented yeast	50 reactions	TPYUG 0050
GEN-IAL® QUICK GEN* Bottom fermented yeast	Specific DNA detection of bottom fermented yeast	48 reactions	QTPYUG0048 high
GEN-IAL® QUICK GEN* Bottom fermented yeast	Specific DNA detection of bottom fermented yeast	48 reactions	QTPYUG0048 low
GEN-IAL® QUICK GEN* Bottom fermented yeast	Specific DNA detection of bottom fermented yeast	48 reactions	QTPYUG0048 white
GEN-IAL® Top fermented yeast	Specific DNA detection of top fermented yeast	50 reactions	TPYOG 0050
GEN-IAL® QUICK GEN* Top fermented yeast	Specific DNA detection of top fermented yeast	48 reactions	QTPYOG0048 high
GEN-IAL® QUICK GEN* Top fermented yeast	Specific DNA detection of top fermented yeast	48 reactions	QTPYOG0048 low
GEN-IAL® QUICK GEN* Top fermented yeast	Specific DNA detection of top fermented yeast	48 reactions	QTPYOG0048 white
<b>GEN-IAL® accessories</b>			
<b>Real-time PCR</b>			
GEN-IAL® Dekkera bruxellensis Standards	DNA standards for <i>Dekkera bruxellensis</i> quantification	200.000 cfu	DBST 0100
Color Compensation Kit LightCycler® 480	Color compensation kit for multiplex assays	5 reactions	PP1TCC 0005
Color Compensation Kit LightCycler® 2.0	Color compensation kit for multiplex assays	5 reactions	CCFH 0005
Washing solution	Washing solution for SEW 0100	43 ml	WS 0100

**Wild yeast 1:** *Dekkera anomala*, *Dekkera bruxellensis*, *Dekkera custersiana*, *Dekkera naardenensis*, *Debaromyces hansenii*, *Hanseniaspora guillermondii*, *Hanseniaspora osmophila*, *Hanseniaspora uvarum*, *Issotchenkia orientalis*, *Kazachstania Exigua*, *Kluyveromyces marxianus*, *Metschnikowia pulcherrina*, *Pichia Anomala*, *Pichia fermentans*, *Pichia membranaefaciens*, *Saccharomyces Cerevisiae* var. *diastaticus*, *Saccharomyces ludwigii*, *Torulasporea delbrückii*

**Wild yeast 2:** *Candida glabrata*, *Candida albicans*, *Candida kefir*, *Candida intermedia*, *Candida parapsilosis*, *Candida sake*, *Candida tropicalis*, *Naumovozyma dairenensis*, *Pichia guillermondii*, *Zygosaccharomyces bailii*, *Zygosaccharomyces rouxii*

\* QuickGEN kits deliver a rapid, easy one-step DNA lysis and amplification method. Pre-enriched samples as well as centrifuged or filtrated samples may be used with CSE 0100, CSY 0100 or FSE 0100 and subsequent QuickGEN detection kits.

## Benefits

### + DNA Extraction – easy one-step DNA lysis method

- One DNA extraction method for the detection of bacteria and yeast

### + Real-time PCR assays

- Ready to use consumables – tube stripes pre-coated with lyticase, primer and probes (depending on the thermocycler, different versions of kits are available, further information is available on request)
- Simultaneous detection of the most relevant beer spoiling bacteria and yeast in one assay
- Internal amplification control (IAC)

### + New: qPCR program templates – no more programming of the thermocycler

- The qPCR thermocycler MyGo Pro is an affordable device which is suitable and recommended for the use with the GEN-IAL beverage kits
- Ready to download qPCR templates (settings for thermoprofile, dyes and samples) enable a most easy workflow, especially in combination with the new line of QuickGEN kits with pre-coated tubes

Contact your R-Biopharm sales representative for more information.