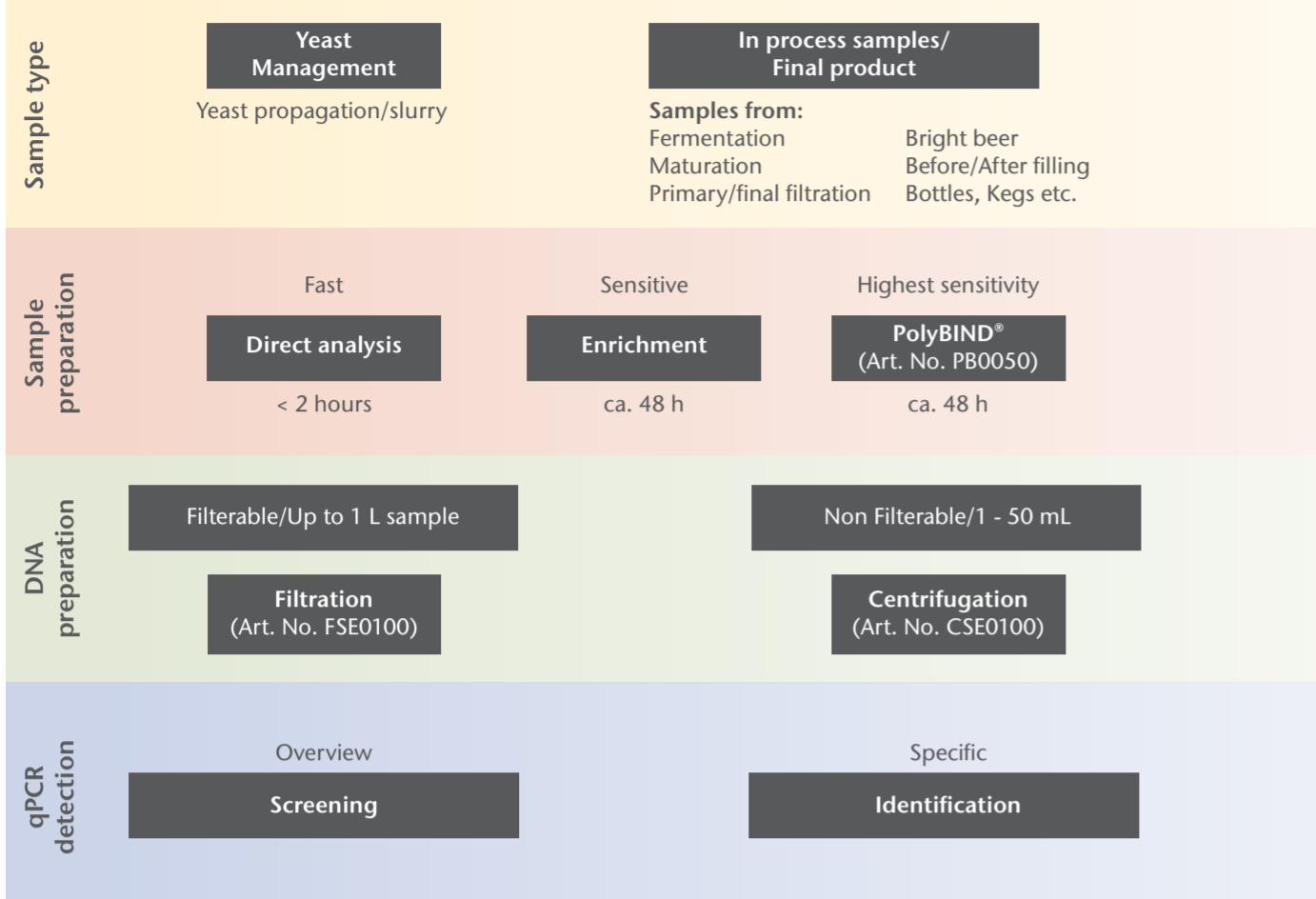
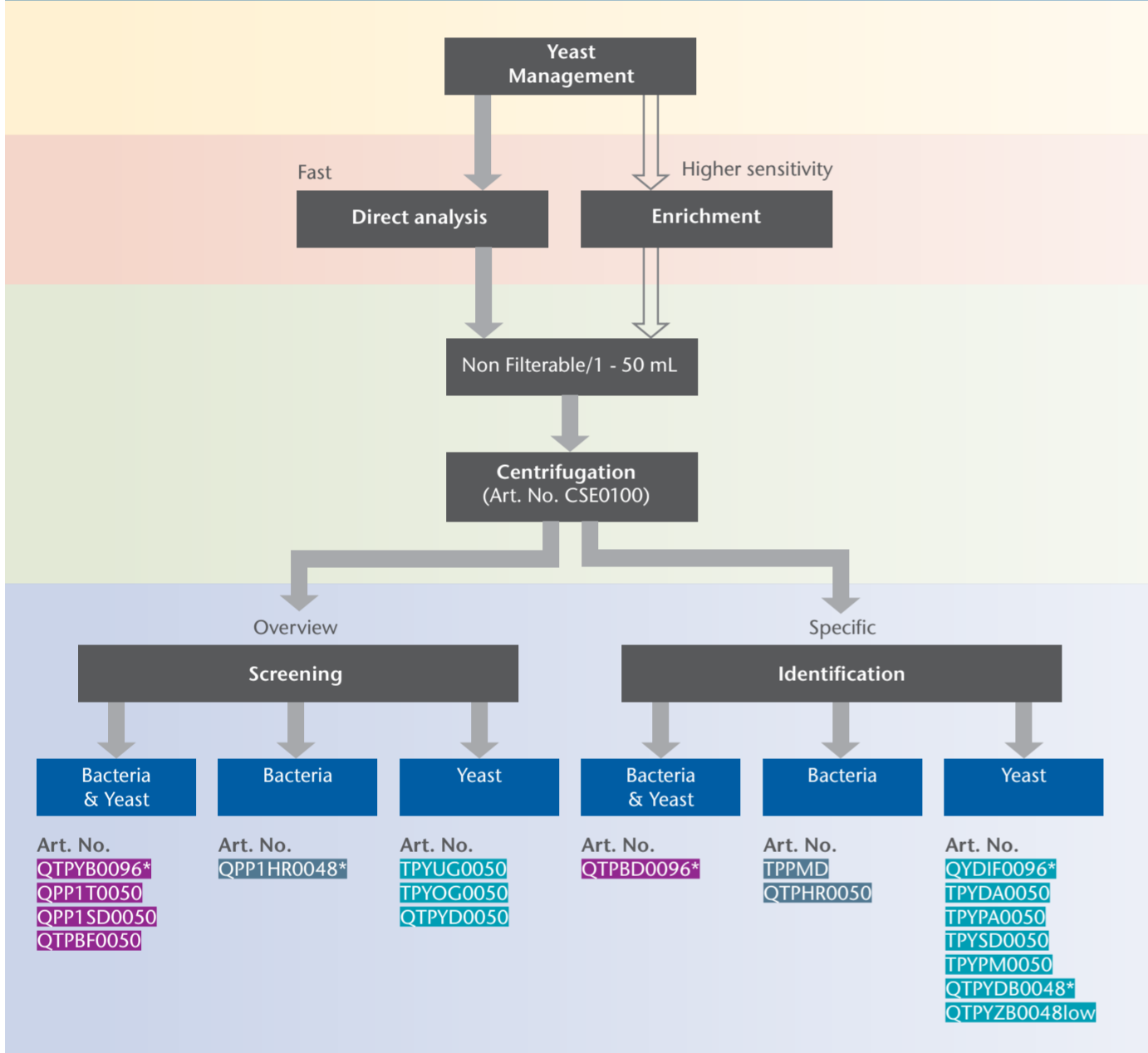


Suggested algorithm for the detection of beer spoilage organisms using GEN-IAL qPCR kits

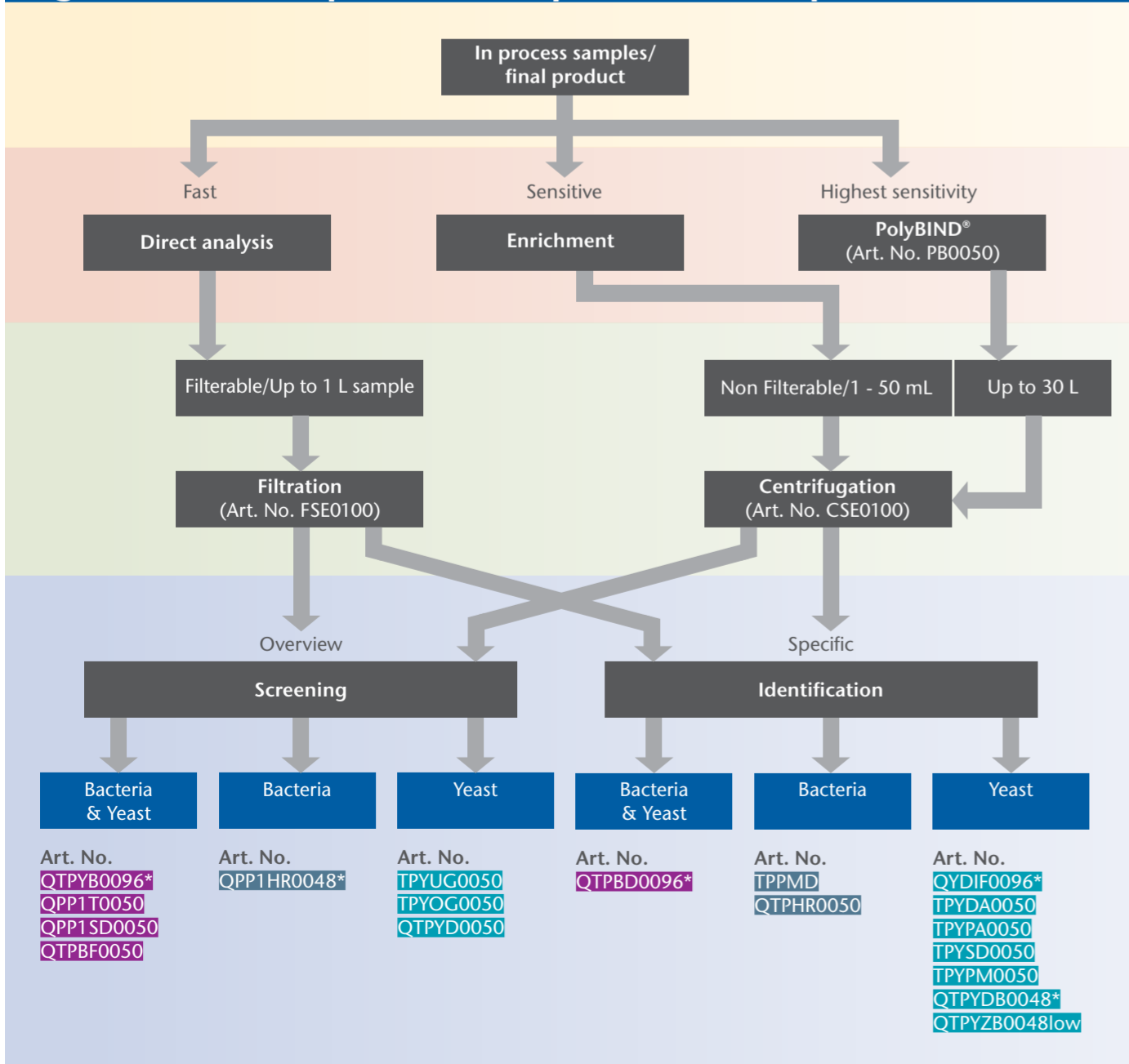
General possibilities



Algorithm for yeast management samples



Algorithm for in process samples and final product



DNA sample preparation

DNA extraction kit	Intended use	Method	Sample volume
CSE 0100 GEN-IAL® QuickGEN Sample preparation centrifugation	Enriched or non-filterable samples & colonies	Centrifugation	1 - 50 mL sample
FSE 0100 GEN-IAL® QuickGEN Sample preparation filtration	All filterable samples with and without enrichment	Filtration	Up to 1 L sample

1. Group specific screening + differentiation of bacteria and yeast

Art. No./Test kit	Channel / Target				Comments
	FAM	ROX	HEX	Cy5	
QPP1T0050 GEN-IAL® QuickGEN P1 Screening	<i>Lactobacillus</i> spp., <i>Pediococcus</i> spp.	<i>Megasphaera</i> spp., <i>Pectinatus</i> spp.	Yeast	IAC	Possible 1st screening step: Group wise detection of all relevant beer spoilage organisms
QTPYB0096* GEN-IAL® QuickGEN First-Beer Yeast and Bacteria Differentiation	Enterobacteriaceae, wild yeast 1, wild yeast 2	Acetic acid bacteria, <i>Pediococcus</i> IAC	<i>Lactobacilli</i> , <i>Pediococci</i> , Bottom-fermented yeast, Top-fermented yeast		For 24 samples; Tubes are pre-coated with the qPCR reagents and contain lyticase – for easier handling and a more convenient lysis step.
QTPBF0050 GEN-IAL® QuickGEN First-Biofilm	<i>Lactococcus lactis</i> , <i>Leuconostoc mesenteroides</i>	IAC	<i>Pichia anomala</i>		Biofilm forming species
QPP1SD0050 GEN-IAL® QuickGEN P1	<i>Lactobacillus</i> spp., <i>Pediococcus</i> spp.	<i>Megasphaera</i> spp., <i>Pectinatus</i> spp.	<i>S. diastaticus</i>	IAC	Group wise detection of all relevant beer spoilage bacteria and <i>S. diastaticus</i> , The latter can cause a secondary fermentation

2. Screening of bacteria

Art. No./Test kit	Channel / Target				Comments
	FAM	ROX	HEX	Cy5	
QPP1HR0048* GEN-IAL® QuickGEN P1 Screening	<i>Lactobacillus</i> spp., <i>Pediococcus</i> spp.	<i>Megasphaera</i> spp., <i>Pectinatus</i> spp.	Hop resistance genes <i>horA/horC</i>	IAC	Additional risk assessment for hop resistance

3. Screening of yeast

Art. No./Test kit	Target		Comments
	FAM	HEX	
QTPYD0050 GEN-IAL® QuickGEN First-Yeast PCR Kit Dekkera spp.	<i>Dekkera</i> spp.	IAC	Including: <i>D. bruxellensis</i> , <i>D. anomala</i> , <i>D. custersiana</i> , <i>D. naardensis</i> & <i>D. nanus</i>
TPYUG0050 GEN-IAL® Bottom fermented yeast	Bottom fermenting yeast	IAC	Detection of bottom-fermenting yeasts to monitor the purity of yeasts in the quality control process
TPYOG0050 GEN-IAL® Top fermented yeast	Top fermenting yeast	IAC	Detection of top-fermenting yeasts to monitor the purity of yeasts in the quality control process

4. Identification of bacteria and yeast in one assay

Art. No./Test kit	Target			Comments
	FAM	ROX	HEX	
QTPBD0096* GEN-IAL® QuickGEN First-Beer Differentiation PCR Kit	Enterobacteriaceae, <i>P. damnosus</i> , <i>Pectinatus</i> spp., <i>L. brevis</i> / <i>L. brevisimilis</i> / <i>L. parabravis</i> , <i>L. buchneri</i> / <i>L. parabuchneri</i> , <i>L. plantarum</i> / <i>L. paraplantarum</i> , <i>L. acetotolerans</i>	IAC, PTC <i>S. diastaticus</i> , <i>P. clausenii</i> , <i>L. rossiae</i> , <i>L. casei</i> / <i>L. paracasei</i> , <i>L. perolens</i> / <i>L. harbinensis</i> ,	<i>Pichia anomala</i> , <i>Pediococcus</i> spp. (<i>P. acidilactici</i> , <i>P. parvulus</i> , <i>P. inopinatus</i> , <i>P. pentosaceus</i>), <i>Megasphaera</i> spp., <i>L. lindneri</i> , <i>L. collinoideis</i> / <i>L. paracollinoideis</i> , <i>L. coryniformis</i> , <i>L. backii</i>	Detection of 30 species and identification of 19 species For 12 samples; Tubes are pre-coated with the qPCR reagents and contain lyticase – for easier handling and a more convenient lysis step

5. Identification of bacteria only

Art. No./Test kit	Target			Comments
	FAM	ROX	HEX	
QTPHR0050 GEN-IAL® QuickGEN hop resistance genes <i>horA</i> and <i>horC</i> / <i>hitA</i> and <i>orf5</i> TaqMan™	<i>hor A</i> / <i>hor C</i>	IAC	<i>hit A</i> , ORF 5	Hop resistance genes as genetic markers for beer-spoilage microorganisms
TPPMD0050 GEN-IAL® <i>Pectinatus</i> spp./ <i>Megasphaera</i> spp.	<i>Pectinatus</i> spp.	IAC	<i>Megasphaera</i> spp.	Strictly anaerobic bacteria with high beer spoilage potential

6. Identification of yeast only

Art. No./Test kit	Target		Comments
	FAM	HEX	
QYDJF0096* GEN-IAL® QuickGEN First yeast differentiation PCR Kit	<i>Rhodotorula</i> spp., <i>Candida</i> spp., <i>Saccharomyces ludwigii</i> , <i>Torulopsis delbrückii</i> , <i>Kluyveromyces marxianus</i> , <i>Dekkera</i> spp., <i>Pichia</i> spp.	IAC, PTC <i>Saccharomyces exiguus</i> , <i>Saccharomyces diastaticus</i> , <i>Saccharomyces bayanus</i> , <i>Hanseniaspora</i> spp., <i>Debaromyces hansenii</i> , <i>S. pastorianus</i>	12 yeast species For 12 samples; Tubes are pre-coated with the qPCR reagents and contain lyticase – for easier handling and a more convenient lysis step
TPYDA0050 GEN-IAL® <i>Dekkera anomala</i>	<i>Dekkera anomala</i>	IAC	
TPYPA0050 GEN-IAL® <i>Pichia anomala</i>	<i>Pichia anomala</i> (<i>Wickerhamomyces anomalus</i>)	IAC	
TPYSD0050 GEN-IAL® <i>Saccharomyces diastaticus</i>	<i>Saccharomyces diastaticus</i>	IAC	Can cause a secondary fermentation due to its amylolytic property.
TPYPM0050 GEN-IAL® <i>Pichia membranaefaciens</i>	<i>Pichia membranaefaciens</i>	IAC	
QTPYB0048* GEN-IAL® QuickGEN First-Yeast PCR Kit <i>Dekkera bruxellensis</i>	<i>Dekkera bruxellensis</i>	IAC	Pre-coated tubes containing the qPCR reagents as well as lyticase – for easier handling and a more convenient lysis step
QTPYZB0048 GEN-IAL® QuickGEN First-Yeast PCR Kit <i>Zygosaccharomyces bailii</i>	<i>Zygosaccharomyces bailii</i>	IAC	Troublesome spoiling yeast species due to its exceptional tolerance to various stressful conditions Pre-coated tubes containing the qPCR reagents as well as lyticase – for easier handling and a more convenient lysis step

* Different kits are available for different real-time thermocyclers:

Tube profile	Real-time device
high profile	ABI 7500, Agilent MX3005P
low profile	Agilent Aria MX, Biorad CFX96, MyGo Pro
white strips	Biorad CFX96, LightCycler® 480 II

Other block cycler devices may be suitable as well. Information is available on request.