

# Your needs, our capabilities

Supporting you from product concept  
through commercialization

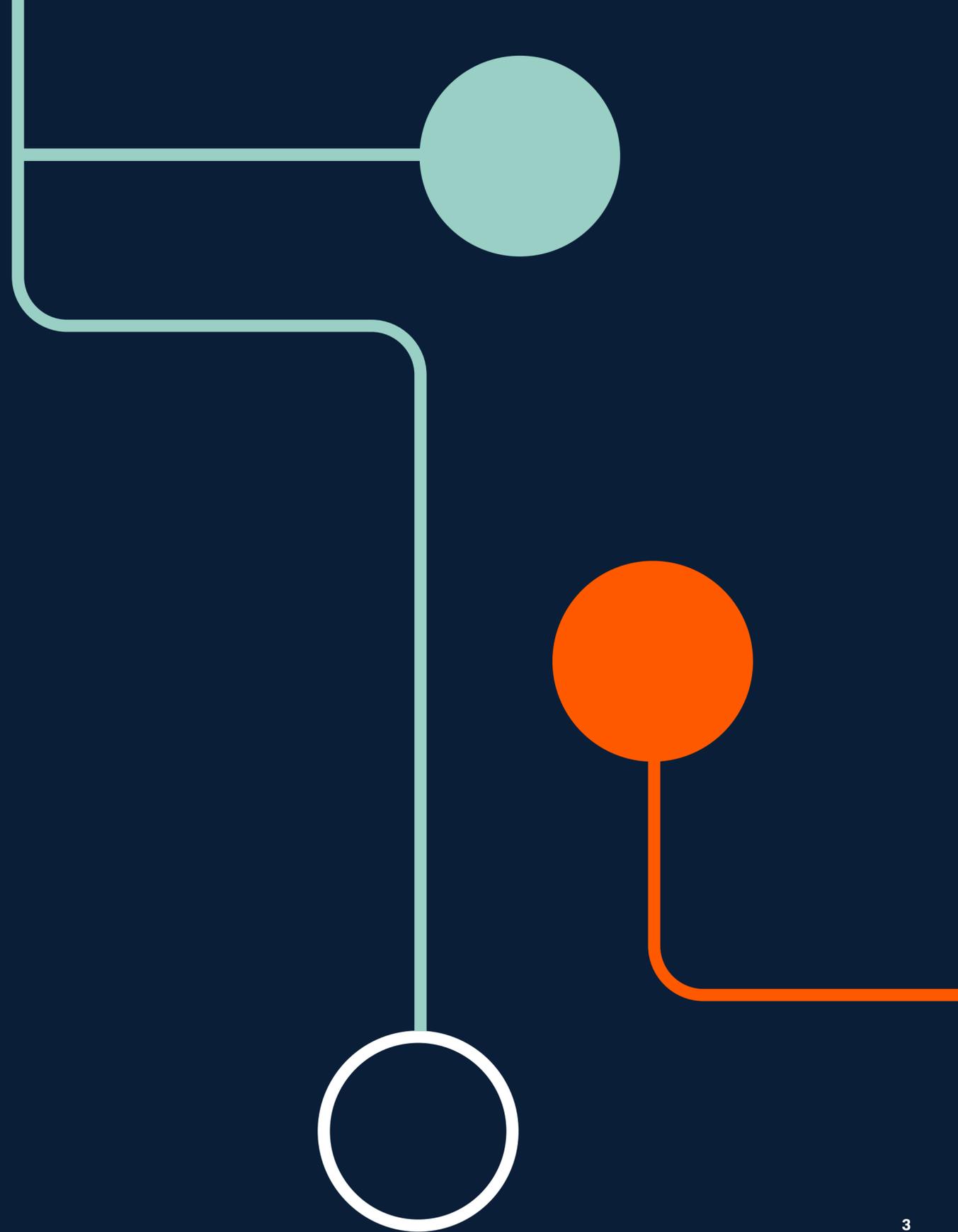


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01

# Custom and contract manufacturing



# A collaboration with Cytiva offers real benefits

Many of Cytiva's renowned portfolio of Amersham™ and Whatman™ products are used as tools and/or components in a range of applications in life sciences, diagnostics, pharmaceuticals, and environmental sciences. In addition, Cytiva can provide the extensive capabilities offered by our ISO-certified manufacturing centres and process rigour, including Design For Six Sigma (DFSS) and Lean manufacturing. Taken together, the portfolio and capabilities of Cytiva offer a leading custom and contract manufacturing operation that provides all aspects of the manufacturing process to an assured quality.



## Fields of expertise

- Filtration
- Separation
- Molecular biology
- Protein biochemistry
- Engineering
- Custom design
- Diagnostic components



## Contract manufacturing

- Assay validation
- Formulation
- Kitting capability
  - Assembly and packaging
- Analytical services
- Final product testing
- Lean Six Sigma manufacturing



## Custom manufacturing

- Customization of our standard catalogue portfolio
- Bulk supply
- Room temperature assay stabilization
  - Individual reagents
  - Complete multiplex assays



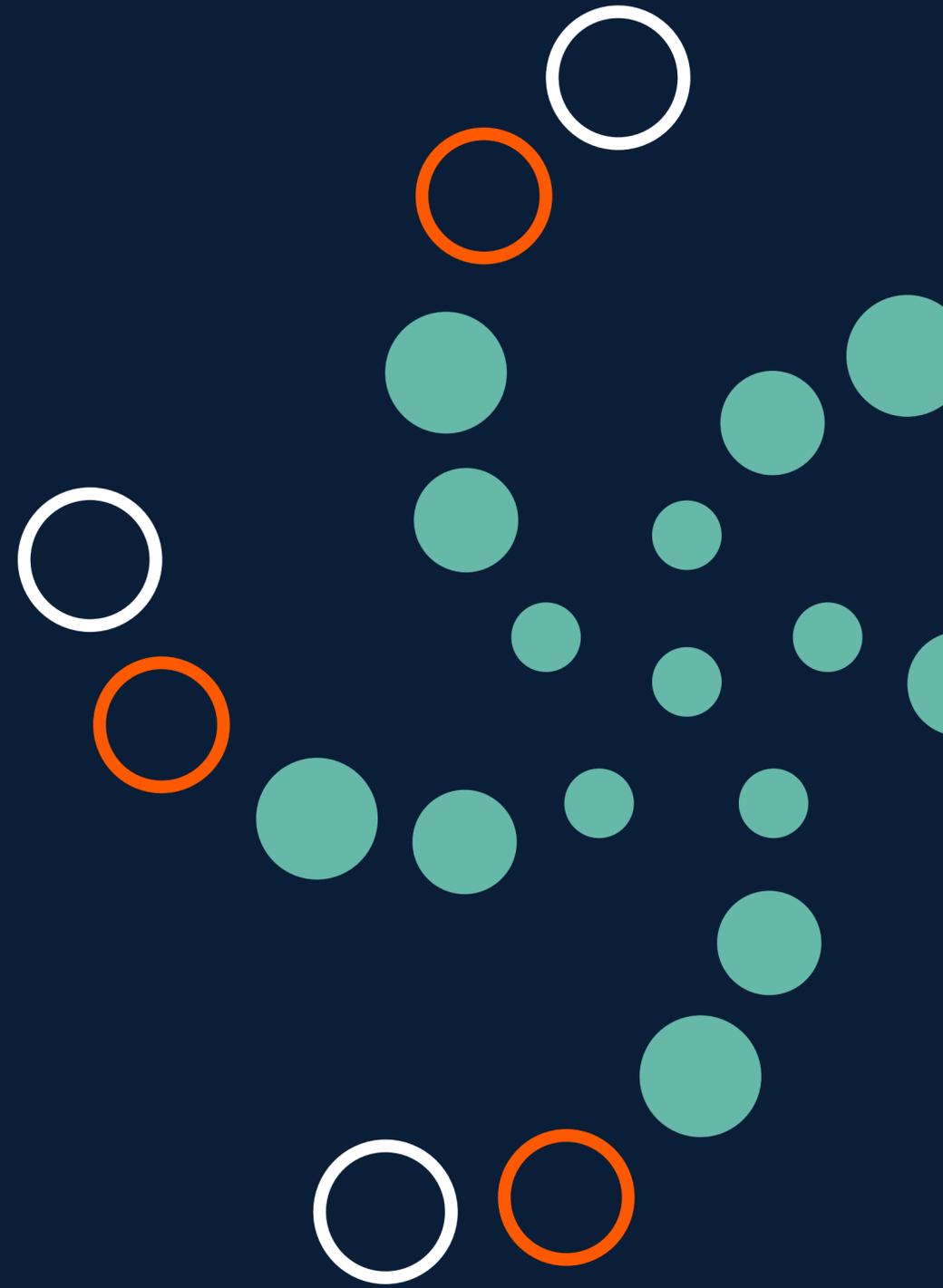
## Certifications

- For our quality management systems
- ISO 9001: 2008
  - ISO 13485: 2003

**Choosing Cytiva for your manufacturing needs enables you to tailor the experience, portfolio, processes, and proven quality of Cytiva to your immediate and future needs.**

02

**Extensive  
capabilities...  
supporting  
a breadth  
of applications**





CAD = computer-aided design; QA = quality assurance; RA = regulatory affairs; PTFE = polytetrafluoroethylene; NC = nitrocellulose; PES = polyethersulfone; PC = polycarbonate; TEM = track-etched membrane; PVDF = polyvinylidene fluoride; RTG = Ready-To-Go

03

# Custom encapsulated filters

# All filters

**Cytiva encapsulated filters, which are designed to filter liquids or gases, contain filtration medium encased in plastic using a proprietary process. Multiple formats are available, including disc (syringe), capsule, and multiwell plates (microplates).**

Use the decision tree on page 10 to select the optimal filter format for your needs. We can also provide custom media, please see page 22.

Custom filter options include:

- Filtration medium
- Connectors: inlet and outlet dimensions
- Housing material and color
- Labeling and packaging



Capsule filters for fast filtration of large sample volumes

# Disc and capsule filters

## Capabilities

- Clean room environment
  - Welding
    - Ultrasonic
    - Spin
    - UV
  - Thermal bonding
  - Product integrity testing
    - Tensile stress
    - Compression
    - Hydrostatic burst
  - Custom labeling
    - Hot stamping
    - Pad printing
- Custom options<sup>‡</sup>**

  - Media, including but not limited to
    - High flow PES
    - PTFE
    - Hydrophilic nylon
    - Hydrophobic glass microfiber
    - Granulated media
  - Inlet and outlet dimensions
    - SB; 1/2, SB; HB; MNPT; FNPT
    - ML; MLL; FLL; MSF

SB = stepped barb for 6 to 10 mm (1/4–3/8") tubing;  
 1/2 SB = stepped barb for 10 to 12 mm (3/8–1/2") tubing;  
 MNPT = male national pipe thread (6 mm = 1/4");  
 FNPT = female national pipe thread (10 mm = 3/8");  
 HB = hose barb (12 mm = 1/2");  
 ML = male luer; MLL = male luer lock; FLL = female luer lock;  
 MSF = male slip fitting  
<sup>‡</sup>Dependent on disc or capsule configuration

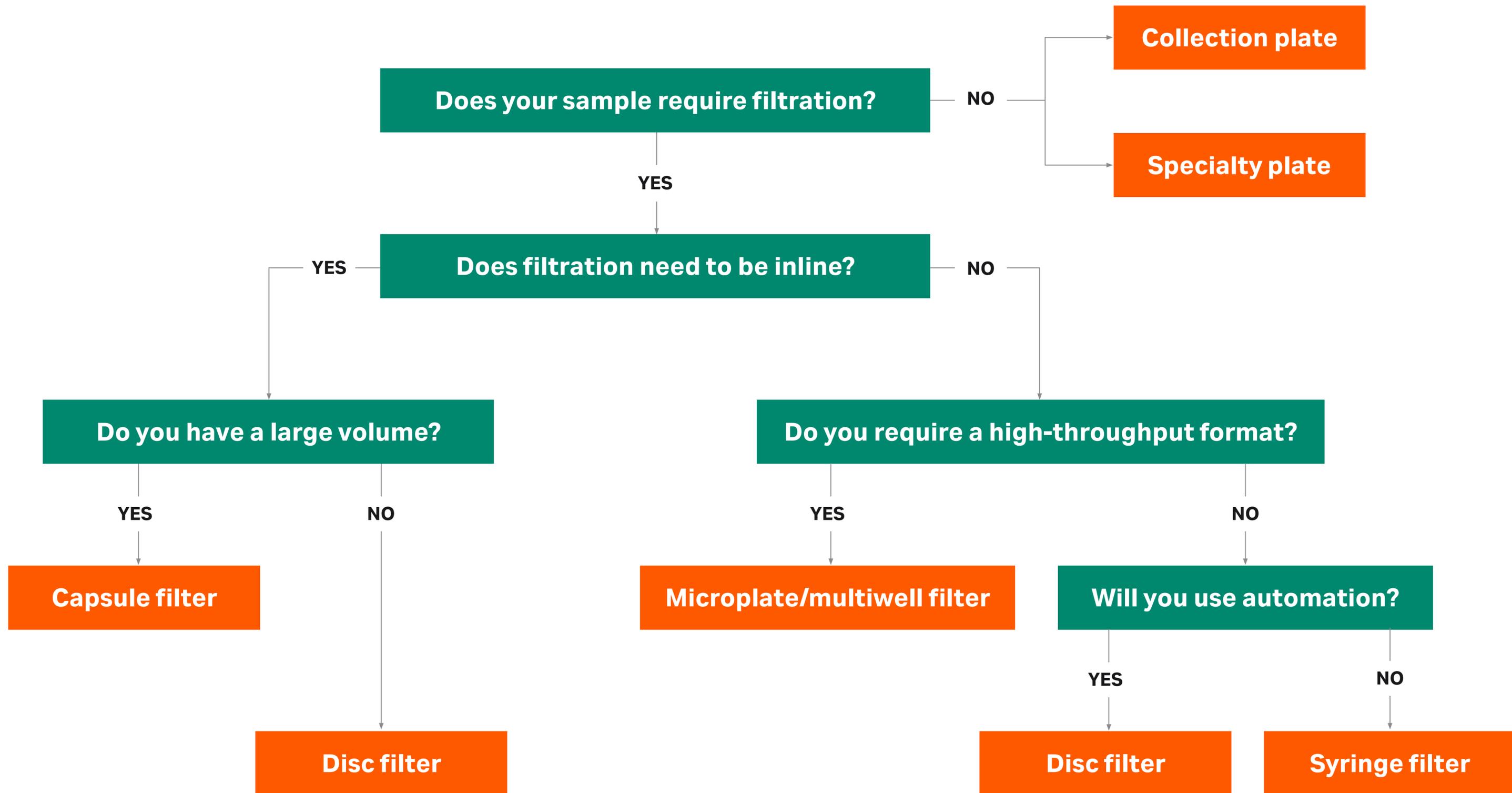
Features	Disc filters	Capsule filters
Housing	Polypropylene	Polypropylene
Sterilization options	Autoclave Ethylene oxide Gamma irradiation	Autoclave Ethylene oxide Gamma irradiation <sup>†</sup>
Filter diameter	4–60 mm	36, 75, and 150 mm
Effective filtration area	0.1–25 cm <sup>2*</sup>	500–2000 cm <sup>2*</sup>
Operating pressure	30–65 psi/2.1–4.5 bar	60 psi/4.1 bar
Custom options	Disc filters from 4–60 mm can be customized with a range of media and connectors	Three capsule sizes can be customized with a range of media and connectors

\* May vary; dependent on filtration medium

<sup>†</sup> Dependent on medium



Disc filters for filtration of small and medium sample volumes



# Microplates

Cytiva can manufacture customized microplates for your high-throughput applications. Utilising our proprietary process, your chosen filtration medium can be encapsulated in microplates to ensure no crosstalk or contamination between wells.

## Capabilities

- Coating facilities
  - Dedicated
  - Environmentally controlled
- Plate filling
  - Automated
- Shipping
  - Controlled temperature
- Run capacity
  - 100–1200 plates per run
- OD variation across plate
  - CoV < 5%
- Nonspecific binding
  - < 0.1 OD units

## Microplate applications

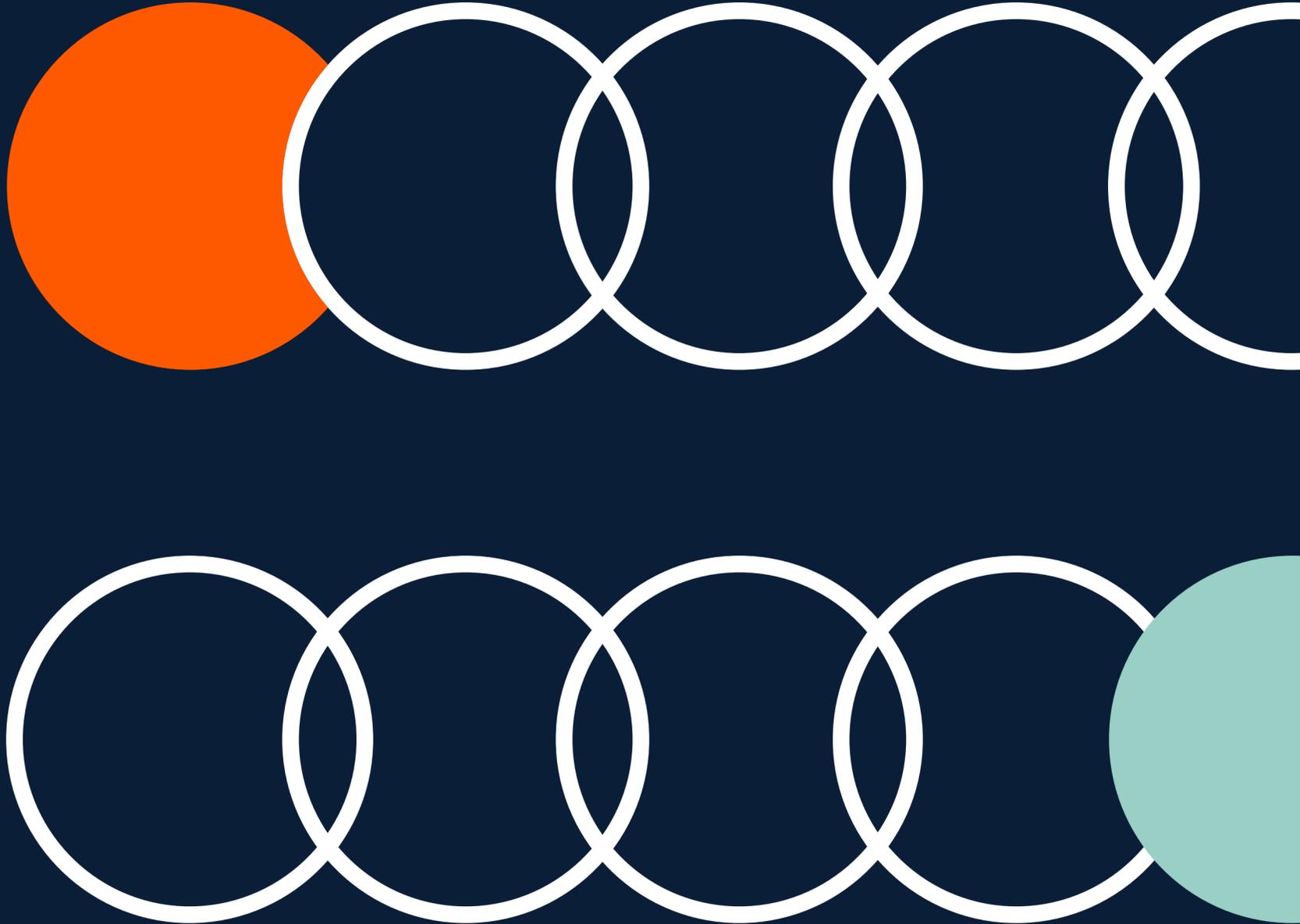
- Drug discovery
- Nucleic acid sample preparation
- Immunology (ELISA)
- Sample collection and storage
- HPLC sample preparation
- Cell harvest/capture

Features (by category)	Custom options (UNIFILTER™)
<p><b>All microplates (filter or not)</b></p> <ul style="list-style-type: none"> <li>• High-throughput applications               <ul style="list-style-type: none"> <li>– Automated (robotics)</li> <li>– Manual (centrifuge)</li> </ul> </li> </ul> <p><b>UNIFILTER microplates</b></p> <ul style="list-style-type: none"> <li>• Encapsulated filter media               <ul style="list-style-type: none"> <li>– Proprietary process</li> <li>– No crosstalk between wells</li> </ul> </li> <li>• Accessories</li> </ul> <p>Collection and analysis</p> <ul style="list-style-type: none"> <li>▪ UNIPLATE microplates: 24-, 48-, 96-, 384-well</li> <li>– Other               <ul style="list-style-type: none"> <li>▪ Cap mats, lids, and seals</li> </ul> </li> </ul> <p><b>Specialty microplates (no filters)</b></p> <ul style="list-style-type: none"> <li>• Fluorescence and microscopic analysis               <ul style="list-style-type: none"> <li>– Glass bottom microplates                   <ul style="list-style-type: none"> <li>▪ Suitable for FRET and GFP</li> <li>▪ 96-well, 300 µL volume</li> </ul> </li> <li>– Clear View microplates                   <ul style="list-style-type: none"> <li>▪ Optically clear</li> <li>▪ Grow, observe, count, and assay cells in a single microplate</li> </ul> </li> </ul> </li> </ul>	<p><b>Plate material</b></p> <ul style="list-style-type: none"> <li>• Polystyrene, natural, and glass-filled polypropylene, Barex™, and MultiChem™</li> </ul> <p><b>Color</b></p> <ul style="list-style-type: none"> <li>• Polystyrene: white, black, and clear</li> <li>• Polypropylene: semi-clear</li> </ul> <p><b>Well bottom shape</b></p> <ul style="list-style-type: none"> <li>• Round, square to round, flat, "V", and filter</li> </ul> <p><b>Media</b></p> <ul style="list-style-type: none"> <li>• Gel filtration and ion exchange chromatography media (resin)</li> <li>• Cellulose acetate</li> <li>• Nylon</li> <li>• PVDF</li> <li>• Nitrocellulose</li> <li>• Glass fiber</li> </ul> <p><b>Surface coating</b></p> <ul style="list-style-type: none"> <li>• Tissue culture treatment for cell adhesion</li> </ul> <p><b>Plate well configurations</b></p> <ul style="list-style-type: none"> <li>• ANSI/SBS1 standards               <ul style="list-style-type: none"> <li>– 384-well: 100 µL volume</li> <li>– 96-well: 150, 350, 800, and 2000 µL</li> <li>– 24-well: 10 mL</li> </ul> </li> </ul>

FRET = fluorescence resonance energy transfer; GFP = green fluorescent protein; PVDF = polyvinylidene fluoride; ELISA = enzyme-linked immunosorbent assay; HPLC = high-performance liquid chromatography; CoV = coefficient of variation; OD = optical density

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# Custom design services



# Design for manufacture

## Design concept, optimization, development, and manufacturing...translating your concept into a manufactured product

Cytiva has extensive, innovative capabilities for design concept, optimization, and development of custom components, products, solutions, and platforms. By working with our custom design team from early in your conceptual stages, we can support your design for optimal manufacturing.

Our custom design services function comprises an inter-disciplinary team of engineers, biochemists, biologists, and filtration and separation experts.

### Capabilities

- Design for manufacture
- Design history support
  - Traceability
- Re-engineering
- 3-D CAD
- Rapid prototyping
  - 3-D printing
    - Produces prototypes in hours
    - Accuracy: 0.025 to 0.05 mm
  - CNC machining
- ISO 8 class clean room assembly
  - 2000 m<sup>2</sup> of available space
- Ultrasonic and UV welding
- Thermal bonding
- Custom labeling
  - Hot stamping
  - Pad printing

CNC = computer numerical control

### Our design process

The benefits of our custom design process include

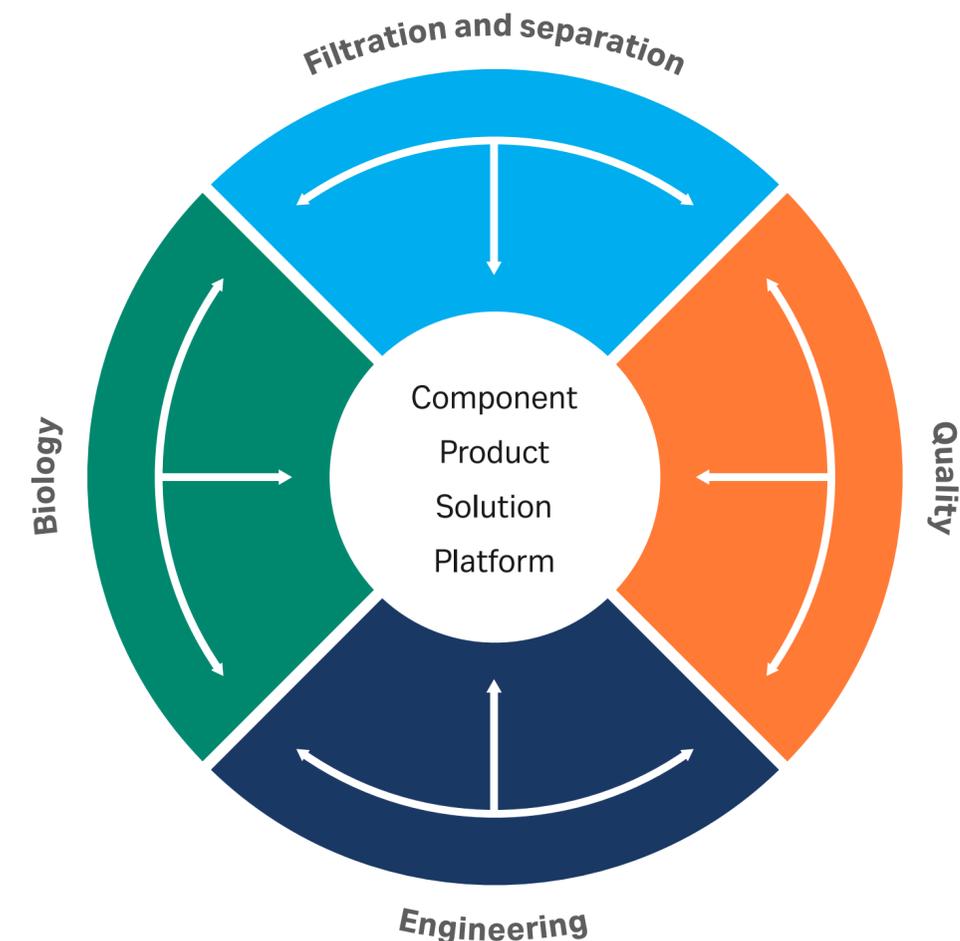
- Design complexities are resolved early in the process
- Prototypes are generated for functional proof-of-principle testing
- Costs of product development cycles are reduced, and time-to-market of new products is shortened
- Design development is optimized for manufacturing

### Custom design services

- Components for diagnostics
- Environmental monitoring
- Custom labware and plasticware
- Automation

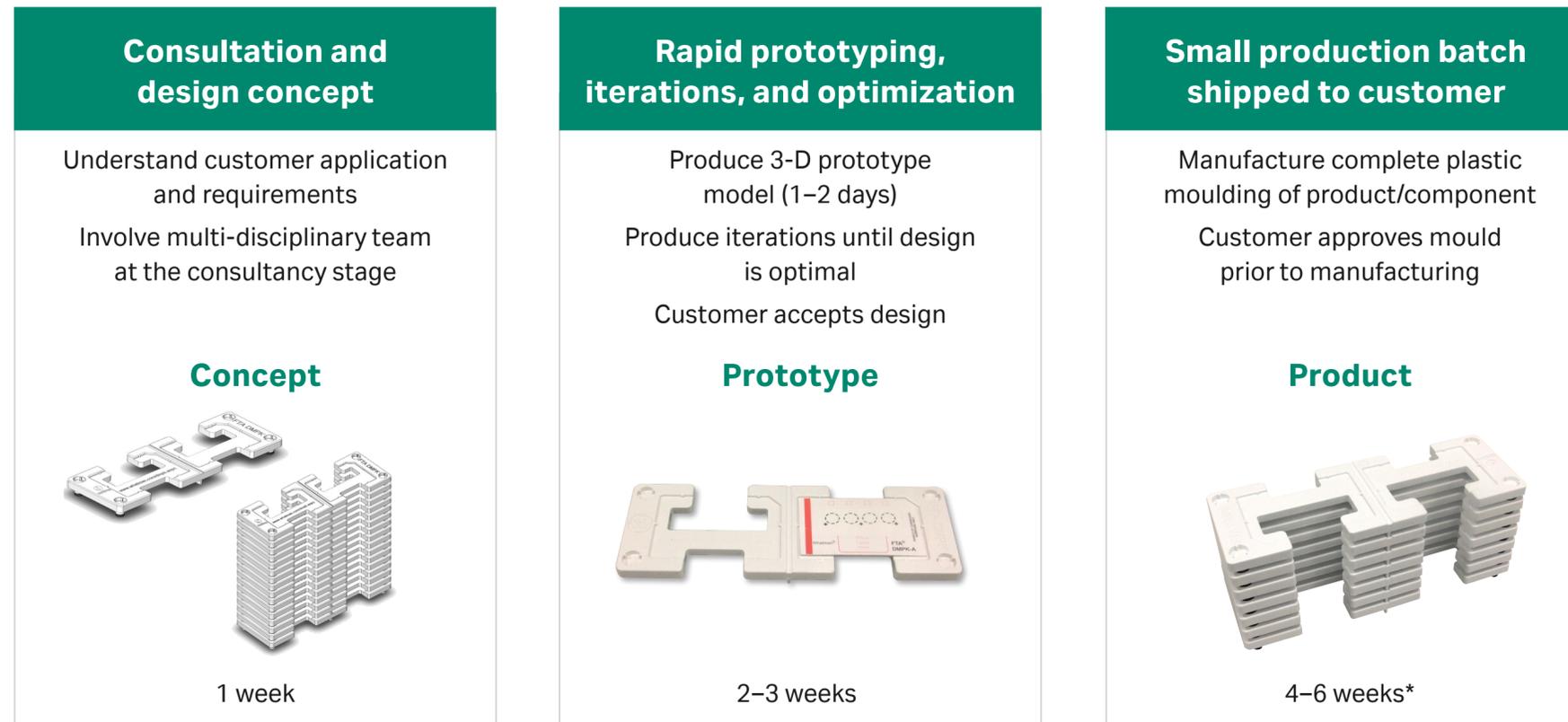
Examples

- Components for lateral-flow and flow-through immunodiagnostic assays
- Microplate/multiwell format for molecular diagnostic assays



# Case study

Our design process in practice for the development of sample handling spotting racks.



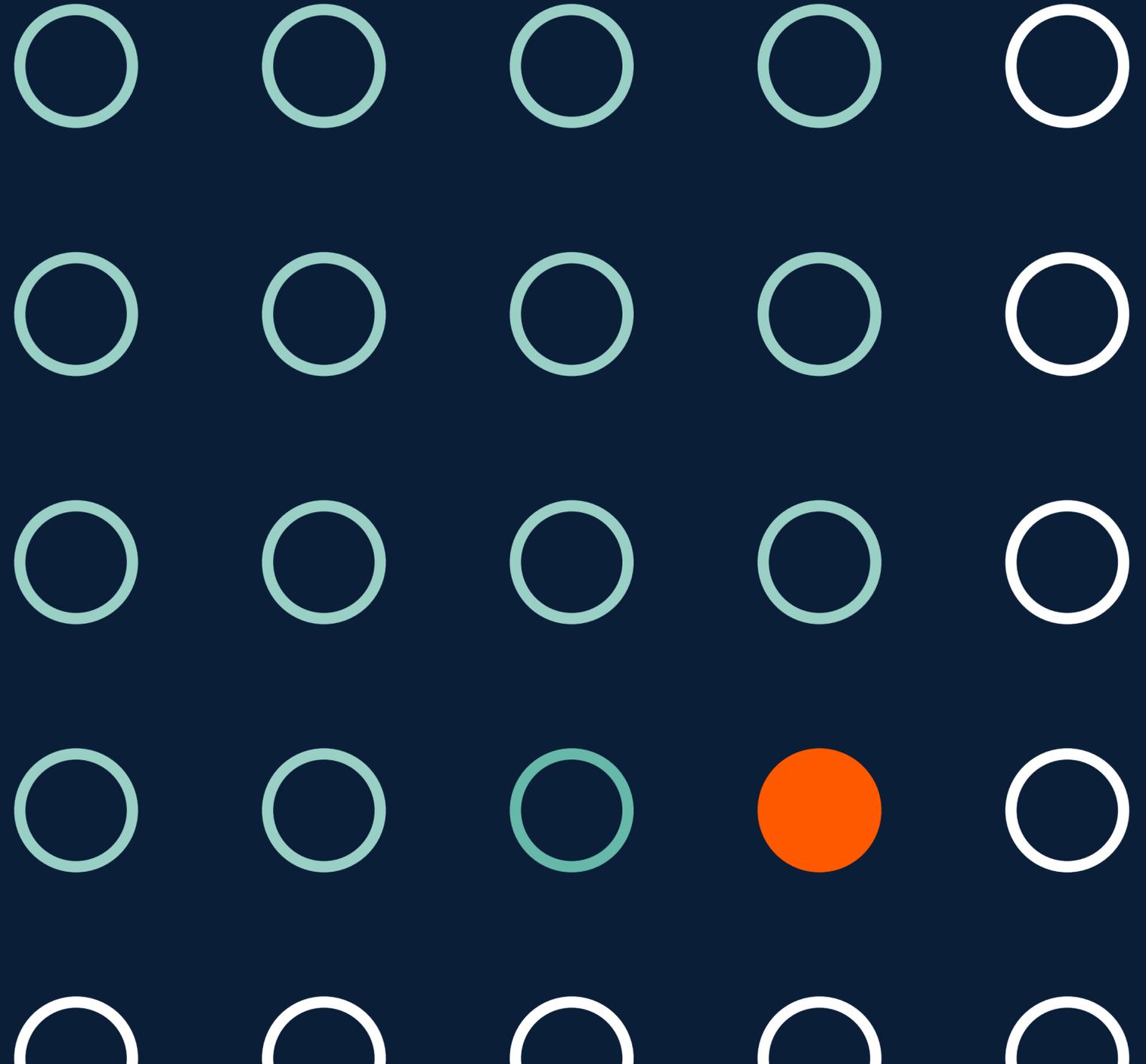
\* For a simple design, as in this case



ProJet™ HD 3000 3-D printer.  
Image reprinted with permission from the manufacturer.

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# Custom reagents



# Proven tools for molecular biology

**We understand that your specific needs for certain products may fall outside of our standard configurations, formulations, and concentrations. With this in mind, we can customize a comprehensive range of protein and nucleic acid sample preparation, labeling, and detection products with a proven track record of performance and reliability. If desired, we can incorporate these products into the manufacturing of kits that you design.**

Further, for high-throughput applications that consume large volumes of reagents, our custom bulk products, including reagents, nucleotides, Cy amidites, enzymes, and CyDyes, deliver performance with lot-to-lot consistency ensured.

## Capabilities

- Reagent stabilization
- Biomolecule labeling and detection
- Bulk supply of reagents
- Extensive organic synthesis
- Large-scale fermentation
- Automated bottling and packaging
- Quality Assurance
- Lean Six Sigma manufacturing
- Technical consultancy

## Applications

- Custom reagents for:
  - Proteomics and protein analysis
  - Genomics and molecular biology
  - Bioassays and cellular assays
  - Components for diagnostics
- Kit assembly of these reagents/components (please see page 18)

## Custom reagents

Nucleotides*	CyDye fluorescence reagents	Sequencing and Ready-To-Go (RTG) products	Enzymes	AutoScreen 96-well plates
<ul style="list-style-type: none"> <li>• Free from DNase and RNase</li> <li>• Greater than 99% triphosphate purity</li> <li>• Buffer-free and ready to use solutions in multiple formats</li> <li>• Functionally tested for long PCR and sequencing</li> </ul>	<ul style="list-style-type: none"> <li>• For protein and nucleic acid labeling</li> <li>• Cy2, Cy3, Cy5, Cy5.5, and Cy7</li> <li>• pH- and photo-stable</li> <li>• High quantum yields</li> <li>• For example, we can provide Cy amidites</li> </ul>	<ul style="list-style-type: none"> <li>• Bulk dispensing, packaging, and shipping</li> </ul>	<ul style="list-style-type: none"> <li>• For PCR and other applications</li> <li>• Bulk dispensing, packaging, and shipping</li> </ul>	<ul style="list-style-type: none"> <li>• Filter plates containing DNA Grade Sephadex G-50</li> <li>• For purification of sequencing reactions and other size exclusion applications</li> </ul>

\* Inquire for ISO 13485 grade nucleotides



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# Contract manufacturing



# A collaboration with Cytiva offers real benefits

From simple buffers to multi-component kits, large or small batch sizes, we have over 50 years' experience manufacturing products for use in pharmaceuticals, diagnostic applications, and life science research, that will meet your specific requirements.

We will design and manufacture to your specifications. We can provide:

- Sourcing and validating raw material
- Custom design services
- Custom formulations, volumes, and concentrations
- Custom packaging and labeling
- Custom testing and documentation
- Secured supply and delivery according to your own forecast
- Scale-up capabilities to meet all of your needs
- Stability studies

## Capabilities

- Technical and regulatory consultancy
- Kit design
- Project management
- Product manufacturing
  - Formulation
  - Dispensing
  - Lyophilisation
- Analytical services for testing
  - TOF-MS, LC-MS, NMR, HPLC, UV, IR, and DSC
- Design and manufacture of final packaging

TOF-MS = Time-of-flight mass spectrometry; LC-MS = liquid chromatography-mass spectrometry; NMR = nuclear magnetic resonance; HPLC = high-performance liquid chromatography; UV = ultraviolet; IR = infrared; DSC = differential scanning calorimetry



Example of a Cy labeled product

Formulation	Dispensing	Lyophilisation
<p><b>Components</b></p> <ul style="list-style-type: none"> <li>• Single</li> <li>• Multiple</li> </ul> <p><b>Volumes</b></p> <ul style="list-style-type: none"> <li>• Liquid: <math>\mu</math>L to 1000 L</li> <li>• Suspensions/slurries: up to 50 L</li> </ul> <p><b>Heating of solutions</b></p> <ul style="list-style-type: none"> <li>• Nontoxic: up to 20 L</li> <li>• Toxic: up to 5 L</li> </ul> <p><b>Autoclaving</b></p> <ul style="list-style-type: none"> <li>• Up to 200 L</li> </ul>	<p><b>Dispensed into</b></p> <ul style="list-style-type: none"> <li>• Vials</li> <li>• Bottles</li> <li>• Tubes</li> <li>• Microplates</li> </ul> <p><b>Volume</b></p> <ul style="list-style-type: none"> <li>• From <math>\mu</math>L to hundreds of mL</li> </ul> <p><b>Dispensing tolerance</b></p> <ul style="list-style-type: none"> <li>• To 0.01%</li> </ul> <p><b>Facilities</b></p> <ul style="list-style-type: none"> <li>• Dedicated for temperature-, light-, or moisture-sensitive materials</li> </ul> <p><b>Slurries</b></p> <ul style="list-style-type: none"> <li>• Dispensed into columns</li> </ul> <p><b>Liquids*</b></p> <ul style="list-style-type: none"> <li>• Up to 10 000 vials/day</li> <li>• 96- or 384-well microplates; 6–30 min/plate</li> <li>• Bung, cap, and label up to 3000 vials/day<sup>†</sup></li> </ul>	<p><b>Throughput</b></p> <ul style="list-style-type: none"> <li>• 200 to 13 000 vials/day<sup>†</sup></li> </ul> <p><b>Volume</b></p> <ul style="list-style-type: none"> <li>• Max: up to 70 mL/bottle</li> </ul> <p><b>Lyophilized in/on</b></p> <ul style="list-style-type: none"> <li>• Vials</li> <li>• Bottles</li> <li>• Microplates</li> <li>• Membranes</li> </ul>

\* Dependent on equipment and on sample viscosity

† Dependent on sample volume

07

# Custom Ready-To-Go



# Stabilize and simplify

**Cytiva's Ready-To-Go (RTG) technology is proven and established for stabilization of individual enzymes/reagents and complete multiplex assays, building on our 10 years' development and manufacturing experience in this field.**

The patented technology stabilizes individual proteins and reagents, as well as complete multiplex assays by providing a molecular environment that protects against conformational changes in protein structure. The result is a product that is stable at room temperature.

## Custom RTG applications

- Component reagents for molecular diagnostics and immunodiagnostics
- Food testing
- Environmental testing
- Biothreat/biodefense

## Capabilities

- Freeze drying/lyophilization
- Proof-of-principle facility
  - HEPA filtered air
  - Humidity and temperature control
  - UV scrubbers
  - Dry nitrogen dispensing cabinet
- Validation and small-scale production of up to 30 plates
- Clean room environment
- Dedicated team
  - Consultation and development
- Custom formulation
  - Enzyme
  - Reagent mixture
  - Complete assay: to date, up to 30 components in a multiplex assay
- Pre-dispensed into
  - Microplates
    - 96- and 384-well (96-well perforated option)
  - Tubes (0.75–2 mL)
  - Custom formats
- Product sealing
  - Controlled environment
- Product testing
  - Visual inspection
  - Stability
  - Accelerated shelf life studies
  - Glass transition temperature
  - Karl Fisher Moisture analysis (tolerance: < 4%)



Pipette your aqueous mix into the tube and the RTG cake dissolves in seconds.

## Benefits of RTG technology

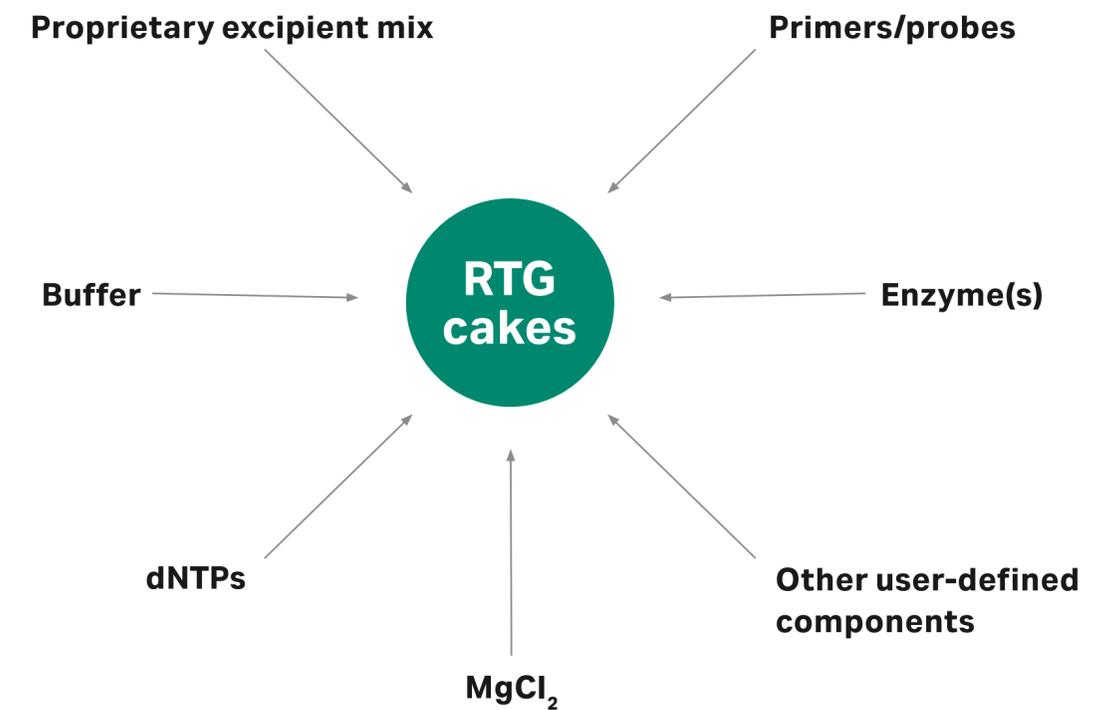
Stabilization	<p><b>Sample integrity is maintained</b></p> <ul style="list-style-type: none"> <li>• Provides up to 2 years room temperature stability (no activity loss)*</li> <li>• Is stable at a wide range of temperatures</li> </ul>
Simplification	<p><b>Pre-dispensed, single-dose reagents</b></p> <ul style="list-style-type: none"> <li>• Requires fewer pipetting steps</li> <li>• Requires less sample handling</li> <li>• Improves data quality</li> <li>• Supports reduced training requirements</li> <li>• Is compatible with downstream applications and automation</li> </ul>
Shipping	<p><b>No need for a logistics specialist</b></p> <ul style="list-style-type: none"> <li>• Does not require dry or wet ice shipment</li> <li>• Simplifies shipping across countries</li> <li>• Provides significant cost savings</li> </ul>
Storage	<p><b>No need for refrigerator or freezer storage</b></p> <ul style="list-style-type: none"> <li>• Supports applications for field use</li> <li>• Enables storage in remote or low accessibility regions</li> <li>• Enables storage in locations with insufficient infrastructure</li> <li>• Provides significant cost savings</li> </ul>

\* Based on Cytiva's standard RTG portfolio



Packaging of RTG cakes in a 96-well plate

## Add your sample and you are ready to go, from individual enzymes/reagents to complete multiplex assays!



Example of an amplification-based custom RTG formulation

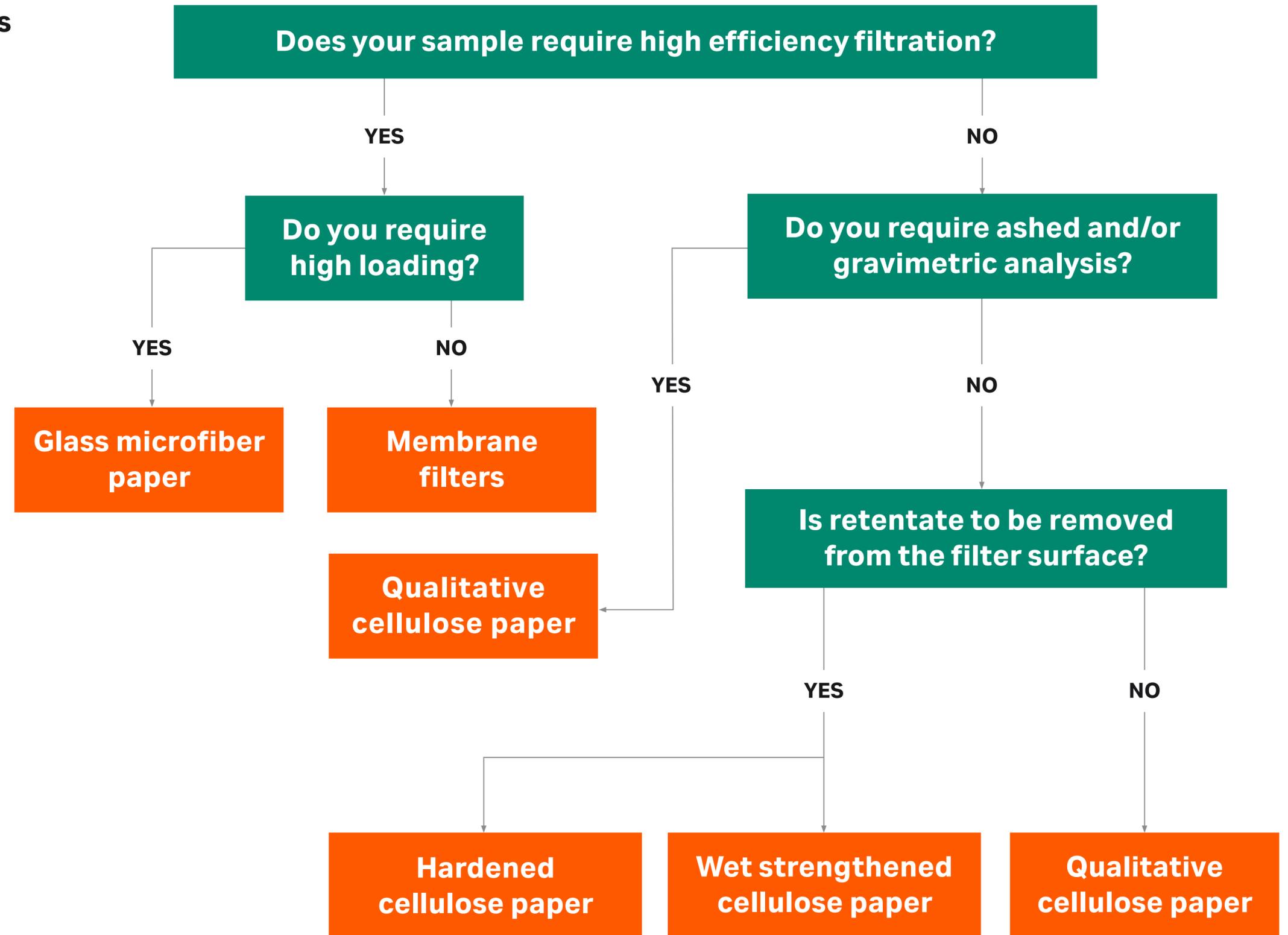
08

# Filtration media



**Cytiva offers a wide range of membranes and filtration media, including cellulose and glass fiber, for customization into a range of filtration formats.**

Use the decision tree to select the optimal filtration medium for your needs. Papers (cellulose and glass fiber) are discussed on page 24; membranes are discussed on page 26.



# Papers: cellulose and glass fiber

Our high-quality Whatman cellulose and glass fiber (GF) products are used globally in the filtration of liquids and gases in the pharmaceutical, diagnostic, and food and beverage industries, as well as in environmental analysis and academia. Our papers may be used in the following applications: diagnostics, DNA archiving, laboratory filtration, sample preparation, and air safety. These applications and uses are summarized in the table to the right.



Cellulose papers

Application*	Use
Laboratory filtration	Filter circles Whatman GD/X™ syringe filters
Components for diagnostic assays	Blood separation, sample application, reaction pad, and absorbent sink
Neonatal screening	Blood collection, 903
DNA collection, storage, archiving	Specimen collection, including blood and buccal
Tools for medical media	Medical media
Environmental analysis	Pollution monitoring

\*All applications use cellulose. All except neonatal screening also use glass microfiber.

## Options for custom paper production

Material	Grades and properties	Conversion†
<p><b>Cellulose</b></p> <ul style="list-style-type: none"> <li>• Cotton*               <ul style="list-style-type: none"> <li>– Highest purity source of cellulose                   <ul style="list-style-type: none"> <li>▪ 99.9% alpha cellulose</li> </ul> </li> </ul> </li> </ul> <p><b>Glass fiber</b></p> <ul style="list-style-type: none"> <li>• Borosilicate</li> <li>• Low sodium</li> <li>• Quartz</li> <li>• Graded density media</li> </ul> <p><b>Manufacturing specifications</b></p> <ul style="list-style-type: none"> <li>• Airflow</li> <li>• Grammage</li> <li>• Thickness</li> <li>• Mechanical strength</li> <li>• Particle retention</li> <li>• Wicking rate</li> <li>• Filtration performance</li> <li>• Surface characteristics</li> </ul>	<p><b>Cellulose</b></p> <ul style="list-style-type: none"> <li>• Properties               <ul style="list-style-type: none"> <li>– Grammage: 40–700 gsm(+/- 10%)</li> <li>– Thickness: 80–3000 µm</li> </ul> </li> <li>• Paper grades               <ul style="list-style-type: none"> <li>– Qualitative</li> <li>– Wet strengthened</li> <li>– Quantitative‡</li> <li>– Technical</li> <li>– Hardened paper</li> </ul> </li> </ul> <p><b>Glass fiber</b></p> <ul style="list-style-type: none"> <li>• Grammage: 16–300 gsm (+/- 10%)</li> <li>• Thickness: 80–3000 µm</li> <li>• Particle retention range: 0.7–2.7 µm</li> <li>• Heat resistant to 500°C</li> </ul>	<p>“Parent” reels cut to different widths</p> <p><b>Cutting</b></p> <ul style="list-style-type: none"> <li>• Sheet length: 430–790 mm</li> <li>• Sheet width: 460–1500 mm</li> </ul> <p><b>Slitting</b></p> <ul style="list-style-type: none"> <li>• Slitting: 6–1500 mm</li> <li>• Tolerances up to +/- 0.5 mm</li> <li>• Max rewind diameter: 1300 mm</li> </ul> <p><b>Punching</b></p> <ul style="list-style-type: none"> <li>• Circles: 10–500 mm diameter</li> <li>• Shapes and patterns possible</li> </ul>

\* Cotton linter and specialty wood pulps are available

† Dependent on instrument

‡ Accurate ash content quantitation: 0.006%-0.015%

## Paper treatment options

Our paper products can be post-treated to your needs with respect to strength, hydrophobicity, and oleophobicity. Definitions of the different techniques are provided below. The table describes the specific post-treatment options that you can request for your customized product.

### Controlled impregnation

A surface chemistry is added to a substrate to enhance mechanical properties and/or to capture specific target molecules.

### Acid treatment (cellulose paper)

Nitric acid treatment reduces ash content, which hardens the paper and reduces impurities.

### Calendering (glass fiber sheets)

Consolidation of sheets by cold or hot pressing smoothes the paper product.

### Firing (glass sheets)

Firing of glass sheets ensures that a product complies with organic content requirements.

### Lamination

A nonchemical process strengthens paper.

## Paper treatment

Controlled impregnation	Lamination	Glass fiber sheets	Cellulose fiber sheets
<ul style="list-style-type: none"> <li>• Max width: 300 mm</li> </ul> <p><b>On-line</b></p> <ul style="list-style-type: none"> <li>• GF substrates               <ul style="list-style-type: none"> <li>– Liquid PVA, acrylic binders, oleophobic and hydrophobic agents</li> </ul> </li> </ul> <p><b>Off-line</b></p> <ul style="list-style-type: none"> <li>• Cellulose and GF substrates               <ul style="list-style-type: none"> <li>– Water-based chemicals (e.g., FTA and silicone)</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Max width: 100 mm</li> <li>• Min wet strength: 2N/15 mm</li> </ul>	<p><b>Calendering</b></p> <ul style="list-style-type: none"> <li>• Sheet width: 500–1020 mm</li> <li>• Grammage: 20–40 gsm</li> </ul> <p><b>Firing</b></p> <ul style="list-style-type: none"> <li>• Max sheet size: 550 × 850 mm</li> <li>• &lt; 1% loss on ignition</li> </ul>	<ul style="list-style-type: none"> <li>• Acid treatment               <ul style="list-style-type: none"> <li>– Sheet width: 400–860 mm</li> </ul> </li> </ul>

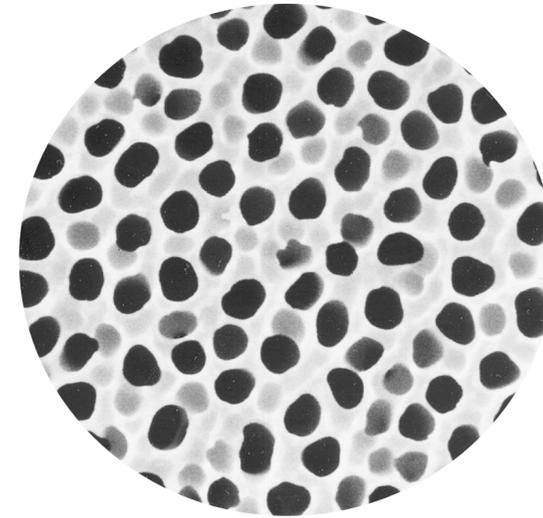
# Membranes

Cytiva provides a range of Whatman membranes whose advanced technical specifications make them an outstanding choice for a wide range of applications. Use the decision tree on page 28 to select the optimal membrane type for your application. Our true pore and polymer membranes are summarized below. The table on page 27 includes details for specific custom options.

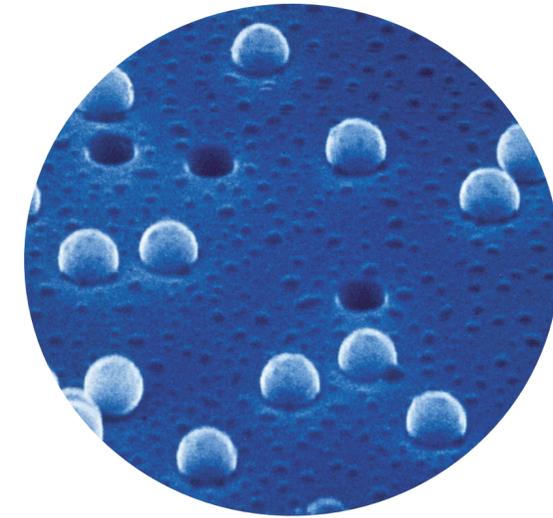
**Our true pore matrices offer accurately controlled pore sizes. Our polymer membrane matrices offer controlled pore size distribution.**

## Membrane applications

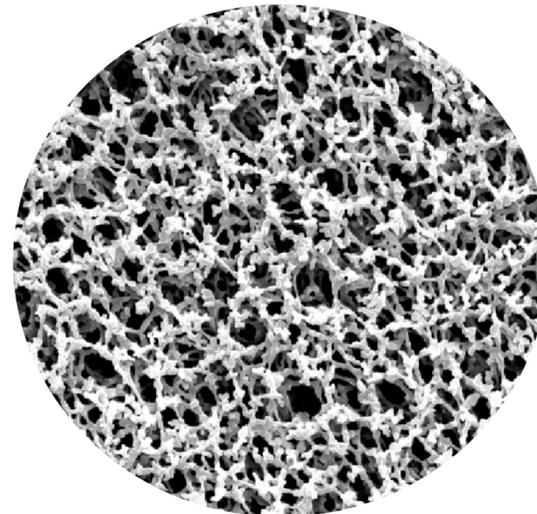
- Western blotting
- Immunodiagnosics
  - Lateral-flow
  - Flow-through
  - Dipstick (colorimetric)
- Filtration



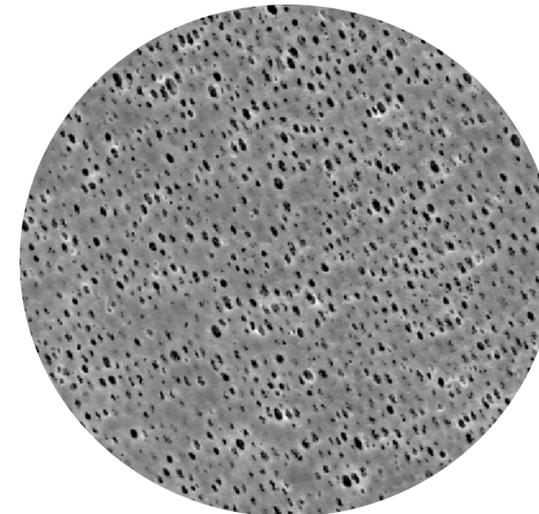
Anopore membrane with true pore honeycomb structure



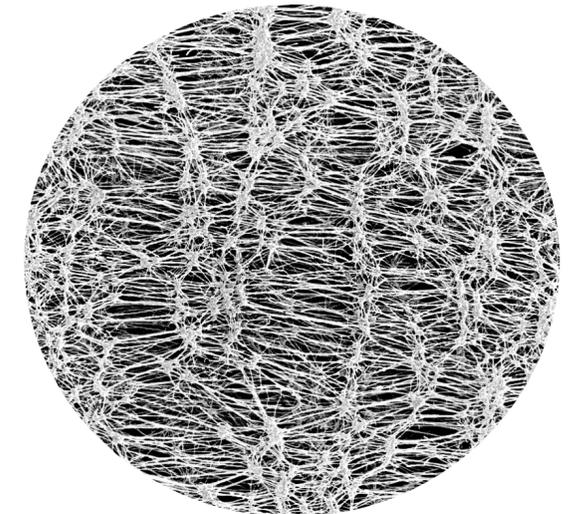
Track-etched membrane with latex beads



Mixed cellulose ester membrane



Polyamide (nylon) membrane



PTFE membrane

True pore membranes	Material	Pore sizes (µm)
Anopore (AP)	Aluminium oxide	0.02, 0.1, 0.2 <sup>†</sup>
Track-etched membranes (TEM)	Polycarbonate (PC)* <ul style="list-style-type: none"> <li>Clear PC, PVP-treated, PVP-free; also available gold-coated, black-stained</li> </ul> Polyester (PET)* <ul style="list-style-type: none"> <li>Clear PVP-treated</li> </ul>	0.02 to 14

Polymer membranes	Material	Pore sizes (µm)
Cellulose Acetate (CA)	Pure CA	0.2, 0.45, 1.0 <sup>†</sup>
Mixed Cellulose Ester (ME)	Nitrocellulose <ul style="list-style-type: none"> <li>Added cellulose acetate enhances mechanical strength</li> </ul>	0.2 to 3.0 <sup>†</sup>
Nitrocellulose (NC)	Pure NC <ul style="list-style-type: none"> <li>Also available with reinforcing polyester-fleece</li> </ul>	0.1 to 12.0 <sup>†</sup>
Regenerated Cellulose (RC)	Pure cellulose <ul style="list-style-type: none"> <li>No wetting agents</li> </ul>	0.2, 0.45, 1.0 <sup>†</sup>
Nylon	Polyamide Hexamethylenediamine	0.2, 0.45, 0.8, 1.0
Polyethersulfone (PES)	PES	0.8
Polypropylene (PP)	PP	0.2, 0.45
Polytetrafluoroethylene (PTFE)	PTFE <ul style="list-style-type: none"> <li>Hydrophobic, hydrophilic, and oleophobic</li> </ul>	0.2 to 5
Hydrophobic PVDF	Polyvinylidene fluoride (PVDF)	0.2, 0.45

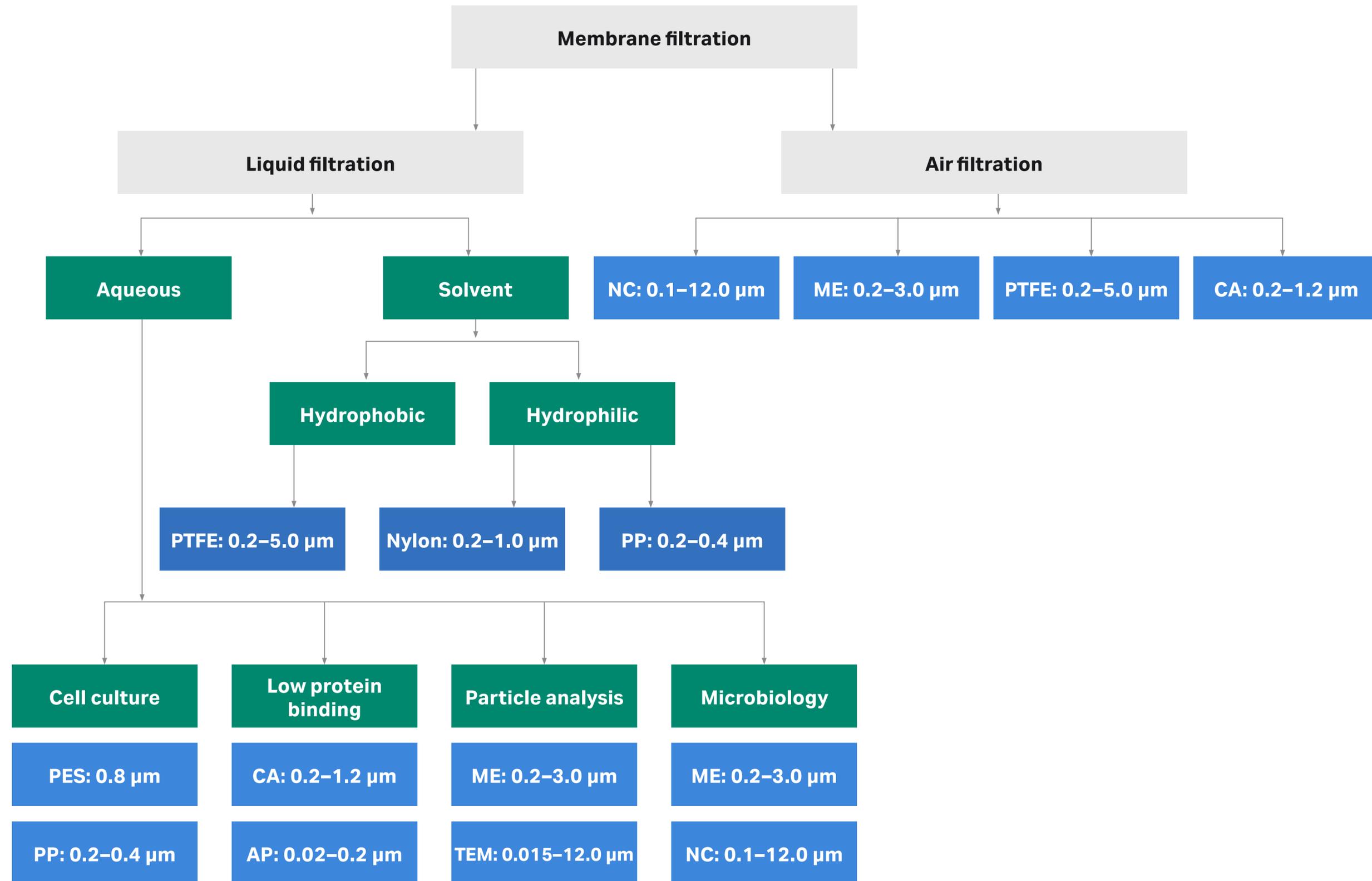
\* Both PC and PET membranes are available in different pore densities ranging from  $1 \times 10^5$  to  $6 \times 10^8$  pores/cm<sup>2</sup>

<sup>†</sup> Other pore sizes possible

Capabilities (manufacturing)	Capabilities (membranes)*	Capabilities (conversion) <sup>†</sup>	Treatments (membranes)
<b>Casting</b> <ul style="list-style-type: none"> <li>Dry</li> <li>Wet</li> </ul>	<b>Manufacturing specifications</b> <ul style="list-style-type: none"> <li>Pore size</li> <li>Thickness</li> <li>Water flow rate</li> <li>Capillary rise/flow time</li> <li>Burst strength</li> <li>Porosity</li> <li>Protein binding</li> <li>Leachables</li> <li>Autoclavable</li> <li>Bubble point (unbacked only)</li> <li>Flow-through (unbacked only)</li> <li>Scanning electron microscope use</li> </ul>	<b>Sheet cutting</b> <p>Dimensions</p> <ul style="list-style-type: none"> <li>Min: 10 × 10 mm</li> <li>Max: 640 × 1200 mm</li> </ul> <b>Slitting</b> <ul style="list-style-type: none"> <li>Precision slitting: 6–1500 mm</li> <li>Tolerances: up to +/- 0.5 mm</li> <li>Max rewind diameter: 1200 mm</li> </ul> <b>Punching</b> <ul style="list-style-type: none"> <li>Circles: 6–500 mm diameter</li> <li>Shapes and patterns possible</li> </ul>	<b>Backing</b> <ul style="list-style-type: none"> <li>Unbacked</li> <li>Foil-backed</li> <li>PTFE-backed <ul style="list-style-type: none"> <li>Polyester, polypropylene, or Halar™</li> </ul> </li> </ul> <b>Supported</b> <b>Impregnation</b> <b>Lamination</b> <b>Coloring</b> <b>Printing</b> <b>Sterilization</b> <b>Functionalize membranes</b> <ul style="list-style-type: none"> <li>For specific diagnostic applications</li> </ul>

\* General manufacturing limits may differ for membrane grades as limiting factor is master reel width

<sup>†</sup> Dependent on membrane grade



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# Immunodiagnosics

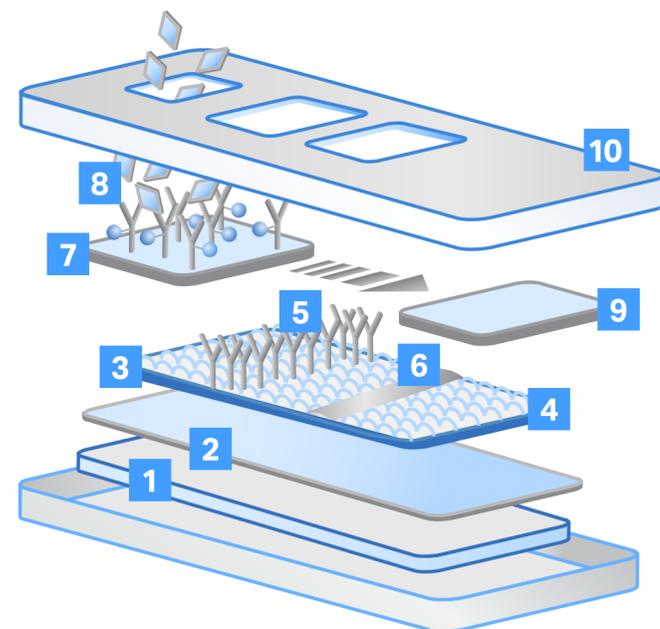


**Cytiva is an established and proven technology component provider for immunodiagnostic assays; specifically lateral-flow, flow-through, and dipstick diagnostic assays. We have an extensive capability to produce a vast array of cellulose and glass fiber substrates and nitrocellulose membranes to an assured quality, ensuring accurate and reproducible results.**

## Lateral-flow assay

A typical single-step, lateral-flow immunoassay, shown on the right, requires only the addition of a sample. The sample flows along the housing by capillary action, where it passes through a pretreated area of antibody or antigen. A positive test is typically indicated with a colored band.

As shown in the figure, multiple components of membrane and paper comprise such a test. Please see the table on page 31 for appropriate Cytiva products, from our wide range of novel conjugate release products that improve performance, to Whatman FUSION 5, which can perform five functions of a lateral-flow test.



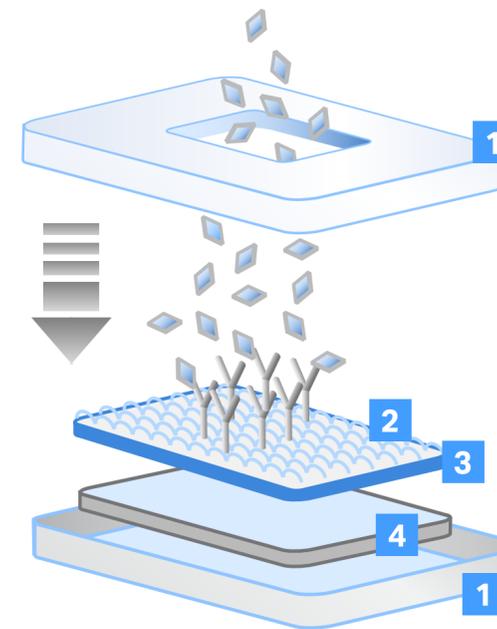
### Key to illustration

- 1 Plastic backing
- 2 Adhesive
- 3 Reaction membrane
- 4 Blocking agent
- 5 Test line
- 6 Control line
- 7 Conjugate release pad
- 8 Labeled conjugate
- 9 Absorbent
- 10 Housing



## Flow-through assay

Sample is applied directly to the reactive membrane and is allowed to wick through into an absorbent paper below. The membrane of choice for flow-through tests is a paper cast nitrocellulose, such as the FT family (please see the table on page 31).



### Key to illustration

- 1 Plastic housing
- 2 Blocking agent
- 3 Nitrocellulose membrane
- 4 Absorbent

## Dipstick assay

Dipstick colorimetric assays, in which a cellulose pad is impregnated with a color reagent, are widely used in everything from urine testing to environmental assays. The base cellulose is a key part of the system, and the correct choice of absorbancy, wicking rate, and wet strength is critical to producing a working assay.

The Cytiva range of cellulose materials for colorimetric assays offers highly consistent and inert substrates for absorption of the active chemicals required for development of dipstick tests. Please see the table on page 35 for appropriate choices of materials.

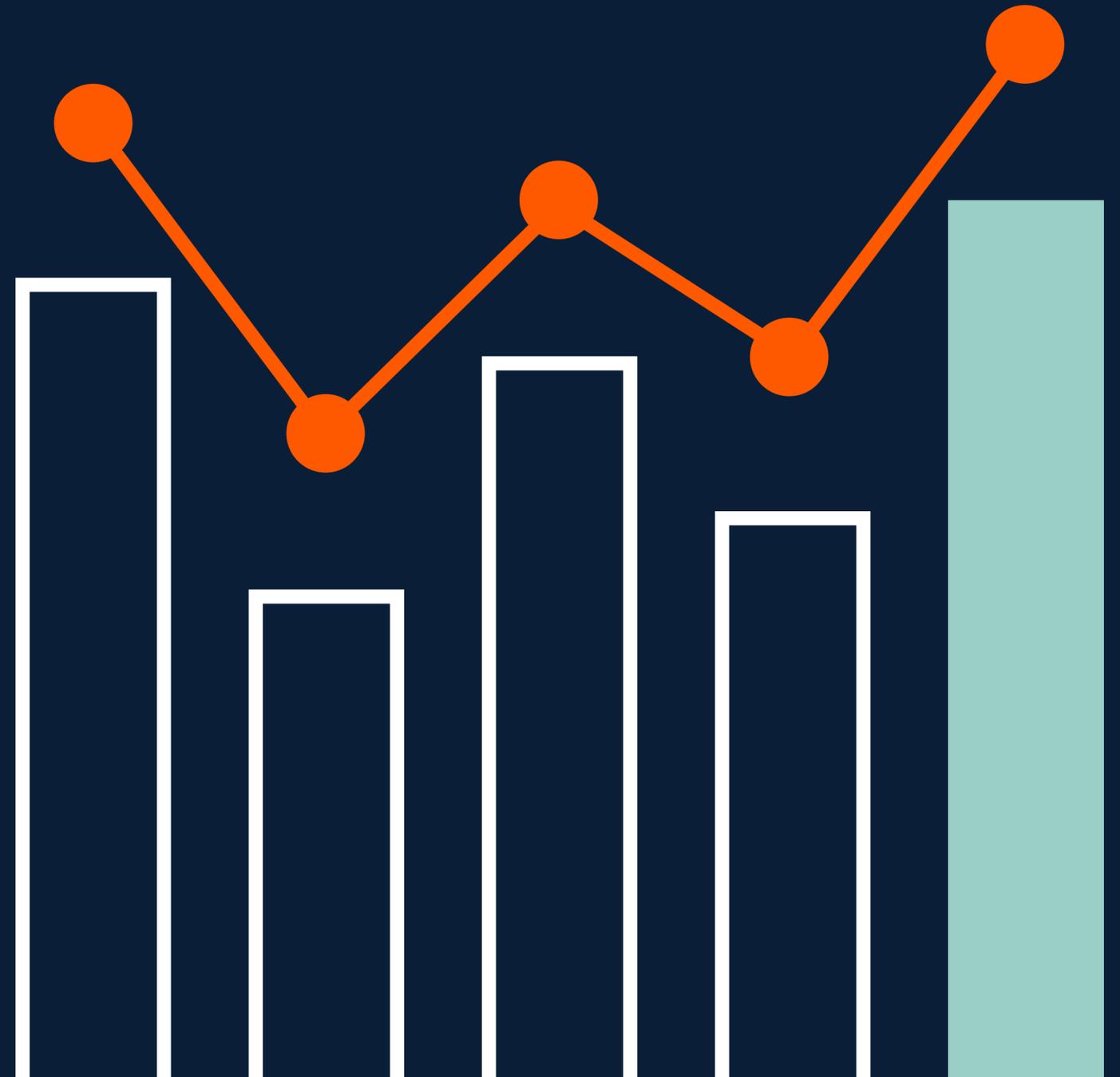


# Cytiva products for custom immunodiagnostic components

	Lateral Flow					Flow Through			
	Reaction membrane	Blood separation	Conjugate release	Sample wick	Absorbent	Nitrocellulose membrane	Blood separation	Absorbent	Colorimetric assays (dipstick)
CF1				•					•
CF2									•
CF3				•	•				•
CF4				•	•			•	•
470				•	•				•
CF7					•			•	•
CF10					•				•
300					•			•	
900					•			•	
23SL									•
FUSION 5	•	•	•	•	•		•		
VF1		•		•			•		
VF2		•		•			•		
LF1		•		•					
MF1		•		•					
GF/DVA				•					
Standard 14			•	•					
Standard 17			•	•					
PRIMA	•								
AE	•								
FF	•								
FT						•			
BA						•			

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# Molecular diagnostics



**The rapidly growing field of molecular diagnostics, which utilizes nucleic acid, protein, or metabolite biomolecules, plays an important role in the identification and early detection of many human conditions and disease states.**

**Capabilities**

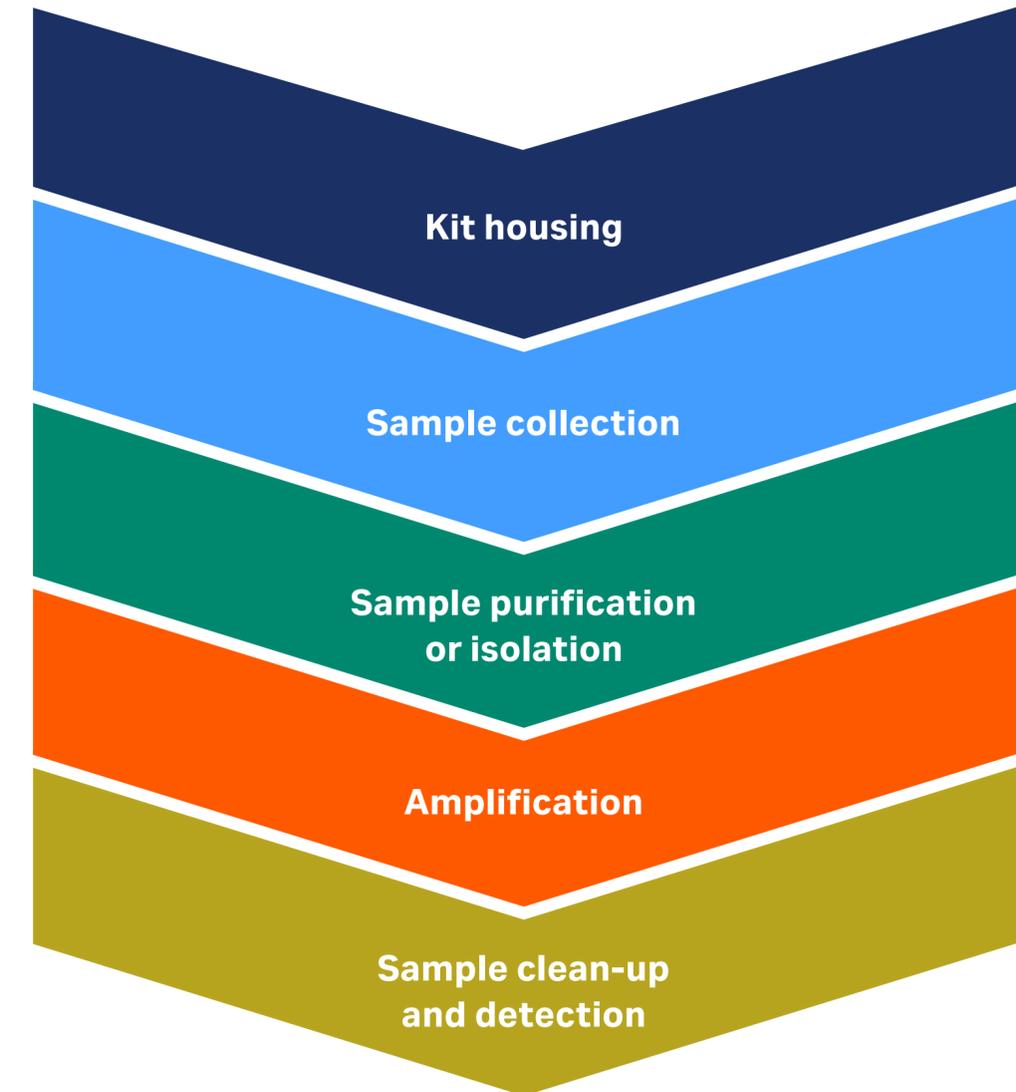
- Project management of interdisciplinary functions
- Design for manufacture
- Customization of Whatman and Amersham brand products
- Kit assembly
  - Assemble required components

**Portfolio**

Kit housing	Sample collection	Sample purification or isolation	Amplification	Sample clean-up and detection
Choice of housing material and kit design	<ul style="list-style-type: none"> <li>• Untreated cellulose fiber</li> <li>• Omniswab</li> <li>• EasiCollect</li> </ul>	<ul style="list-style-type: none"> <li>• Mag beads</li> <li>• MultiTrap™ plates</li> <li>• SpinTrap™ columns</li> <li>• TriplePrep™ Kit</li> </ul>	<ul style="list-style-type: none"> <li>• PCR</li> <li>• RT-PCR</li> <li>• TempliPhi™</li> <li>• GenomiPhi™</li> <li>• Ligases</li> <li>• Custom RTG</li> </ul>	<ul style="list-style-type: none"> <li>• ExoSAP-IT™</li> <li>• AutoScreen plates</li> <li>• Cy amidites</li> <li>• CyDyes</li> <li>• Hyperfilm™</li> </ul>

The accuracy, sensitivity, and speed of molecular biology techniques are key drivers behind the development of molecular diagnostic tests, for which Cytiva has a breadth of capabilities and an in-depth portfolio to support diagnostic kit manufacturers.

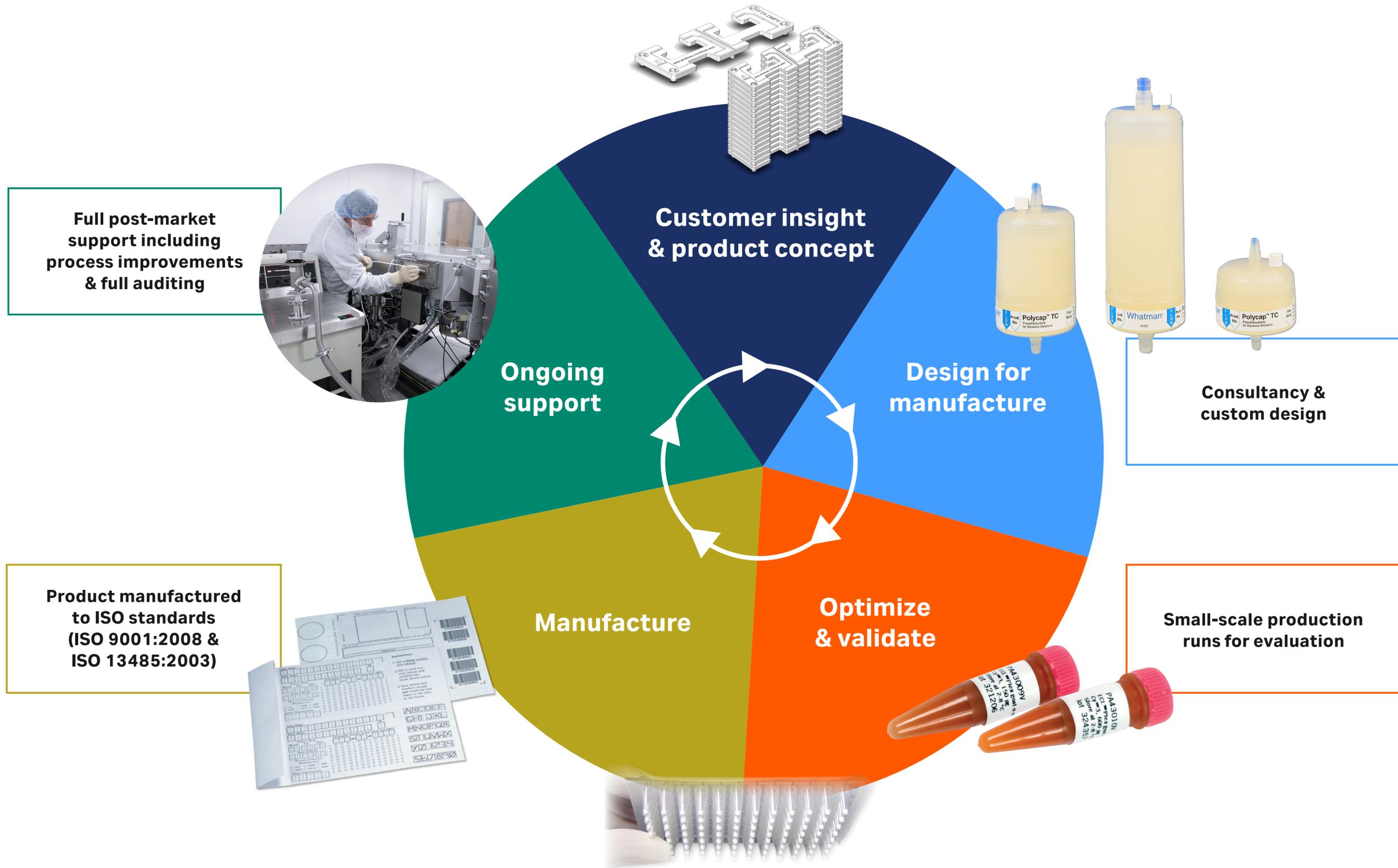
A generic nucleic acid-based molecular diagnostic workflow is represented below, with the relevant capabilities and portfolio of Cytiva indicated.



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# Your needs, our capabilities





## **cytiva.com/custom**

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