ASSESSING AND PREPARING FOR FUTURE REQUIREMENTS AND STANDARDS OF PHARMACEUTICAL SOLUTION BAGS

ABRASP Conference December 7, 2021

RENOLIT

Rely on it.

TOGETHER
TOWARDS
HEALTH

LET'S SHAPE THE FUTURE OF HEALTHCARE

Peter Robben
Global Product Manager
RENOLIT Healthcare

Diego Morais
General Manager
RENOLIT Chile SpA

RENOLIT
Rely on it.

TOGETHER
TOWARDS
HEALTH

WE ARE PART OF THE RENOLIT GROUP

The **RENOLIT Group** stands for partnership-based service, an international focus and innovative, high-quality, reliable products.

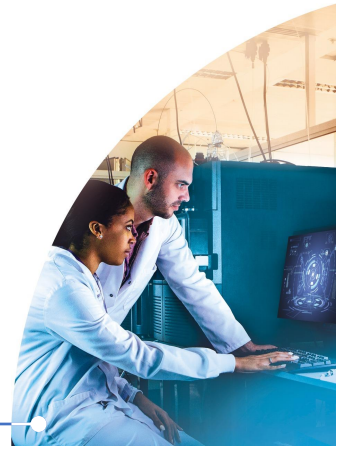
RENOLIT

Rely on it.

TOGETHER
TOWARDS
HEALTH

OUR NEW STRATEGY
AND ITS FOUR CORNER STONES

COOPERATION



INNOVATION

SUSTAINABILITY

WORLDWIDE

RENOLIT
Rely on it.

TOGETHER
TOWARDS
HEALTH

LOOK NO FURTHER –
WE ARE YOUR GLOBAL SPARRING PARTNER

1 RENOLIT SE – HEADQUARTERS and RENOLIT SE (Thansau)

2 RENOLIT Nederland B.V. and RENOLIT Amsterdam Innovation Center

3 American RENOLIT Corporation – LA and RENOLIT California Innovation Center

4 RENOLIT Chile SpA

5 RENOLIT Healthcare Beijing and RENOLIT Beijing Innovation Center

RENOLIT
Rely on it.

TOGETHER
TOWARDS
HEALTH

OUR MOST COMPREHENSIVE HEALTHCARE PORTFOLIO EVER

APPLICATION FIELDS

Blood &
blood components

Biotechnology

Nutrition

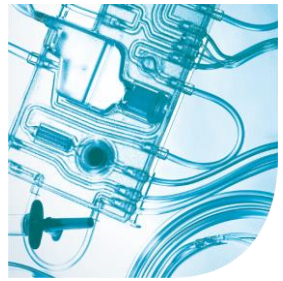
IV &
pharmacological
applications

Dialysis

Further exciting
areas are in
development

COMPLEMENTARY

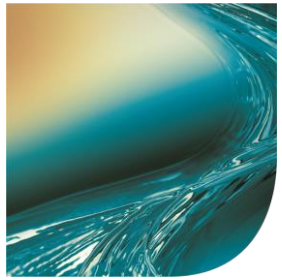
Ports & caps



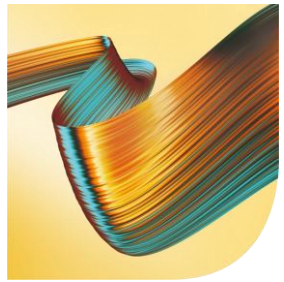
Barrier films &
secondary
packaging

SERVICES

Custom-made
solutions



EMT equipment
lease



Tailor-made films

RENOLIT
Rely on it.

TOGETHER
TOWARDS
HEALTH

FLEXIBLE BAGS FOR PHARMACEUTICAL SOLUTIONS

OUTLINE

- **Overview** of the polymeric materials typically used.
- **Guidance** for selection of polymeric components for use in bags:
  - Film
  - Tubing
  - Ports
- **Requirements** for suppliers of polymeric components used in the construction of bags for pharmaceutical solutions.

TOGETHER
TOWARDS
HEALTH

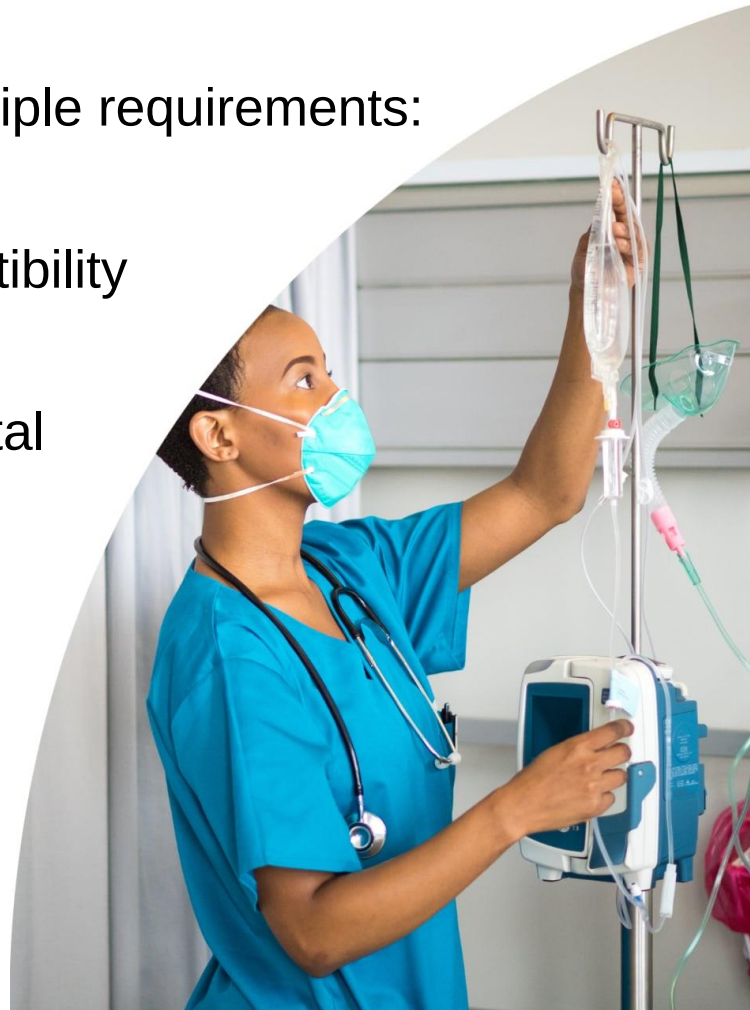
MATERIAL SELECTION CRITERIA

TOGETHER TOWARDS HEALTH

MATERIAL SELECTION CRITERIA

BAGS FOR PHARMACEUTICAL SOLUTIONS

- Typically comprised of film, ports and / or tubing.
- Subject to multiple steps:
  - Manufacturing of components (film, tubing, ports, label, …)
  - Assembly (bag sealing)
  - Filling
  - Closing
  - Overwrapping
  - Sterilization
  - Transport & storage
- Subject to multiple requirements:
  - Shelf life
  - Drug compatibility
  - Cleanliness
  - Environmental
  - In-use per-formance
  - Validation
  - Change Control
  - …



TOGETHER
TOWARDS
HEALTH

MATERIAL SELECTION CRITERIA

MANY OPTIONS FOR SELECTION OF COMPONENTS FOR FLEXIBLE BAGS

- Broad range of material options available
- Different performance and properties
- Shape/form
- Multilayer structure of film and tubing
- Port design

COMMON POLYMERS USED IN FLEXIBLE BAGS FOR PHARMA-CEUTICAL SOLUTIONS

- PP
- PE
- EVA
- PVC
- PVDF, FEP
- EVOH
- PA
- SEBS
- PET
- Tie layer copolymers
- …

TOGETHER
TOWARDS
HEALTH

MATERIAL SELECTION CRITERIA

KEY MATERIAL-RELATED PROPERTIES

- Sterilization resistance: steam, radiation or ETO
- Operational temperature
- API compatibility
- Gas permeability (WVTR, OTR, CO_2TR)
- Bag manufacturing technology

RENOLIT
Rely on it.

MATERIAL SELECTION CRITERIA

	PVC[1]	PP[2]	EVA [3]	PE
Operational temperature	-30° – 90°C	-20° – 100°C	-196° – 80°C	-80° – 80°C
Sealing technology	HF	Heat FFS	HF	Heat
Sterilization of filled bags	Steam	Steam	–	–
Sterilization of empty bags	–	–	EtO, Radiation	Radiation
Fluid bags	Terminal steam sterilization	Terminal steam sterilization	Aseptic filling	Aseptic filling
Typical pharmaceutical use	IV, Dialysis	IV, Dialysis, Nutrition	Nutrition	Biotech SUS
API compatibility	-- to ++	++	0 to ++	++
M/C bags peelable seal	no	yes	no	no
WVTR	high	medium	high	medium
OTR	high	high	high	high

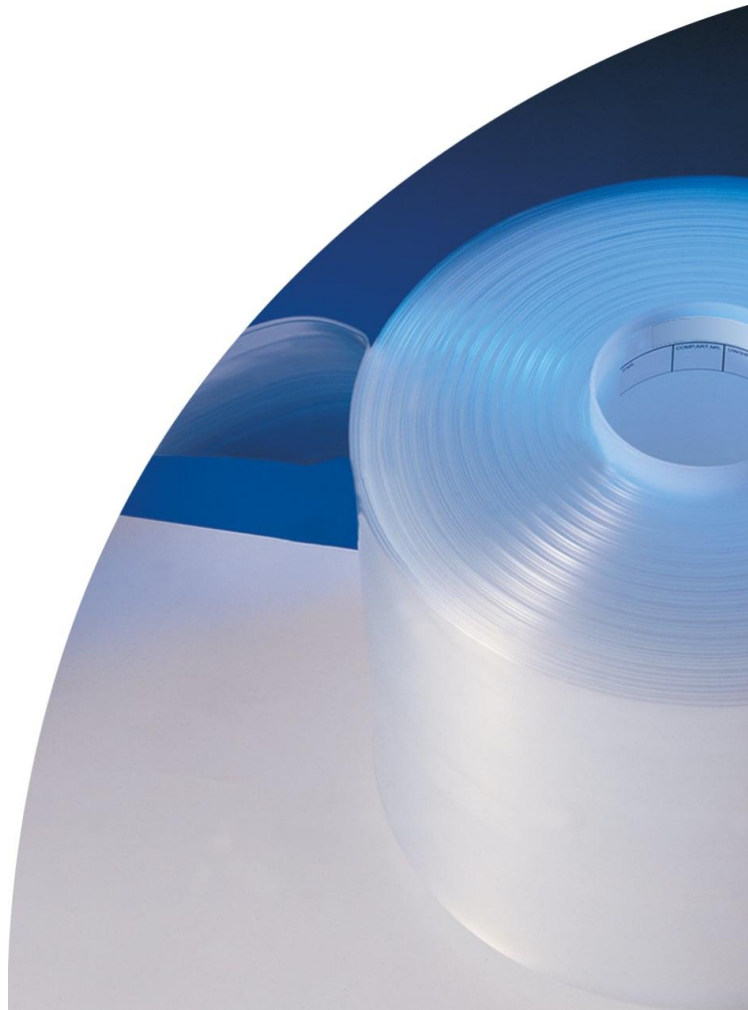
[1] Plasticizer selection influences PVC properties: gas permeability, hardness / flexibility, appearance (optical, odor), fluid compatibility / E&L
[2] PP films are typically multi-layer structures and including other polymers
[3] EVA properties vary with copolymer content

TOGETHER
TOWARDS
HEALTH

MATERIAL SELECTION CRITERIA

FILM

- Multilayer structure
  - Combination of different polymers
  - Tailored properties/performance
    - Peelable seals for multi-chamber bags
    - O_2/CO_2/UV barrier
- Double wound, single wound or tubular,
  - Different bag manufacturing equipment
  - Different film production processes
- Typical film thickness for fluid bags
  - PP 0.18 – 0.25 mm
  - EVA 0.30 – 0.40 mm
  - PVC 0.25 – 0.40 mm

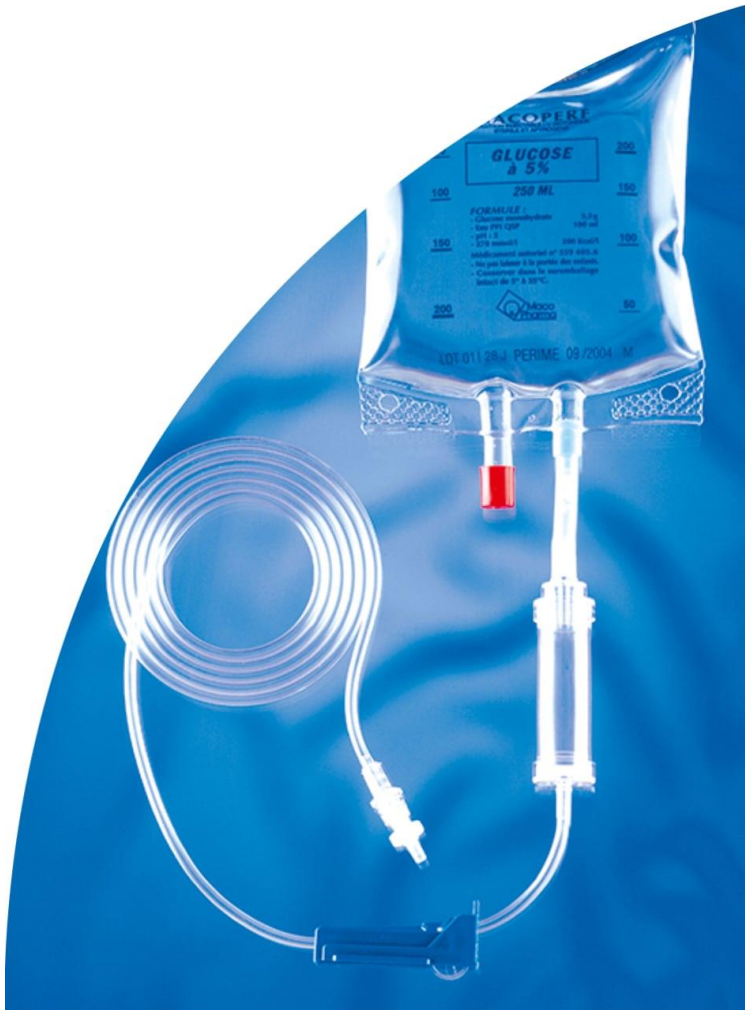


TOGETHER
TOWARDS
HEALTH

MATERIAL SELECTION CRITERIA

PORT SYSTEM

- Tubing with ports
  - Port assembled in tubing
  - Adhesive bonding PC to PVC
  - Heat bonding during steam sterilization
    - PC to PVC
    - PC to PP multilayer tube
    - PP to PP mono/multilayer tube
  - Option for variety in ports
- Bag port system
  - Port sealed to the film
  - Port closed (sealed) after filling
  - Less variety in ports; bag making machine modification
  - In general lower cost



TOGETHER
TOWARDS
HEALTH

SUPPLIER SELECTION CRITERIA

TOGETHER
TOWARDS
HEALTH

SUPPLIER SELECTION CRITERIA: **QUALITY MANAGEMENT**

THERE IS A LOT MORE THAN MATERIAL PERFORMANCE AND PRICING…

- Pharma-oriented Quality Management System
  - ISO 13485, ISO 15378 certification
  - Periodic customer audits
  - Validation process
  - Management of changes
    - Customer notifications
  - Management of non-conformances
  - Traceability
  - CoC / CoAs
  - ….
- Cleanliness
  - Component surface exposed to environment during production
    - ISO class 7 cleanroom production minimum preferred.

TOGETHER
TOWARDS
HEALTH

SUPPLIER SELECTION CRITERIA: **REGULATORY SUPPORT**

THERE IS A LOT MORE THAN MATERIAL PERFORMANCE AND PRICING…

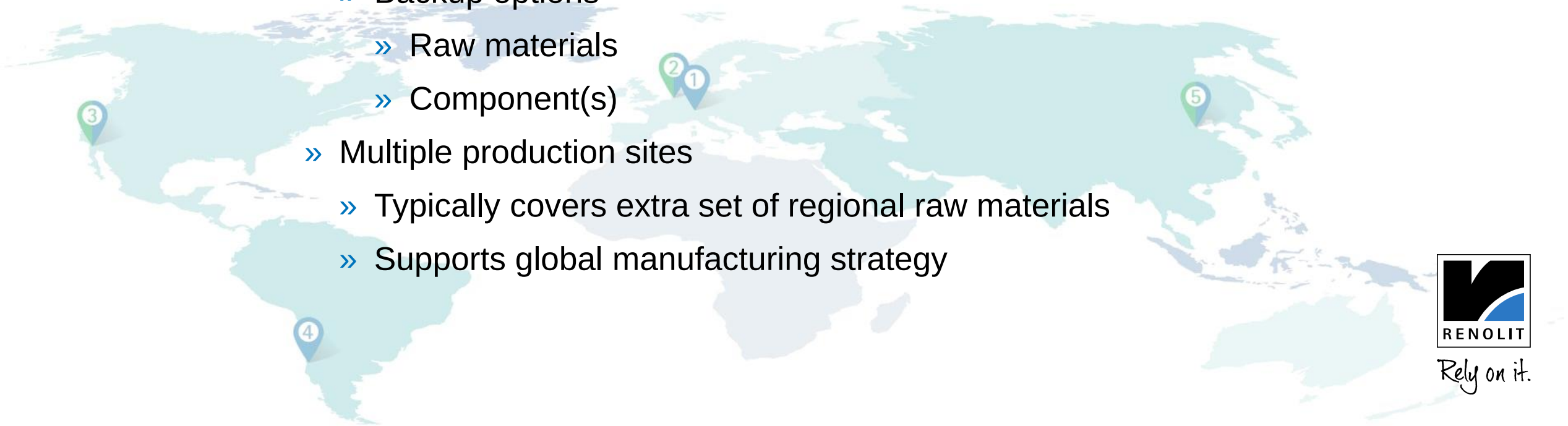
- Regulatory support
  - DMF
  - Statements on (absence of) substances of concern
  - Pharmacopoeia compliance
  - ….
- Technical support
  - Processing, performance troubleshooting
  - Relevant biocompatibility reports
    - ISO 10993
    - Ph.Eur., JP, USP, …
  - Physical/chemical properties
  - E&L
    - USP 661.1
    - BPOG (Single-use bioprocessing)

TOGETHER
TOWARDS
HEALTH

SUPPLIER SELECTION CRITERIA:
SECURITY OF SUPPLY

THERE IS A LOT MORE THAN MATERIAL PERFORMANCE AND PRICING…

- Security of supply
  - IT HAPPENS
  - Backup options
    - Raw materials
    - Component(s)
- Multiple production sites
  - Typically covers extra set of regional raw materials
  - Supports global manufacturing strategy

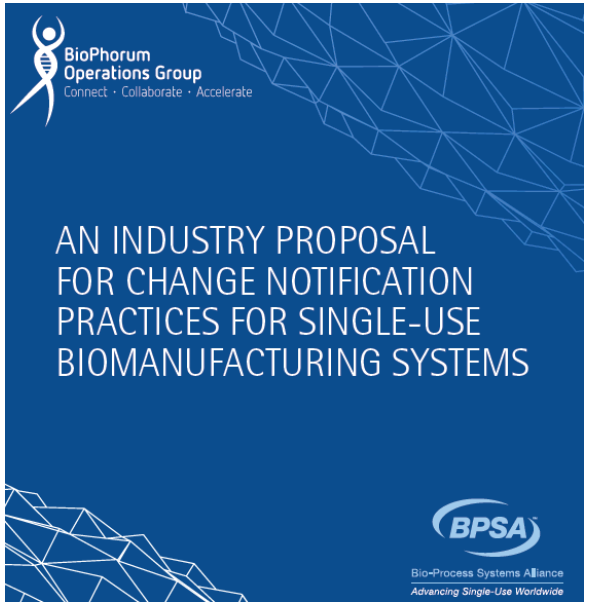


RENOLIT
Rely on it.

SUPPLIER SELECTION CRITERIA: **CHANGE MANAGEMENT**

THERE IS A LOT MORE THAN MATERIAL PERFORMANCE AND PRICING…

- Consistent, reliable supply is ideal. BUT change happens.
- Supplier Change Management is fundamental
  - Change control and notification process in place
  - Timeliness of notification
    - Last buy options
    - Alternative products ready to go
- Supplier understanding of the pharmaceutical industry is essential
- Transparency/open communication always helps
- BPSA/BPOG Change Notification guide for Single-Use Bioprocessing Systems



TOGETHER
TOWARDS
HEALTH

MATERIAL AND SUPPLIER SELECTION CRITERIA

SUMMARY

» Pharmaceutical Solution Bags are not simple	▶ Conduct a broad assessment of material and supplier requirements.
» Many material options available	▶ Engage with suppliers early in the product development process
» It’s more than a piece of plastic	▶ Suppliers with a strong pharmaceutical experience and pharma industry business orientation are ideal.
» Changes can be long and complex	▶ Design with supply security embedded from the beginning.


TOGETHER
TOWARDS
HEALTH
TOGETHER WE TAKE
HEALTHCARE TO THE NEXT LEVEL
THANK YOU FOR YOUR ATTENTION
RENOLIT
Rely on it.