



Tyvek.

DuPont™ Tyvek® Medical Packaging Transition Project 2013 Progress Report

June 2013

Presenters



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Global Marketing Director



Bruce A. Yost, Ph.D.
Global Technical Director



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Regulatory Affairs Director



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Packaging Engineer & MDM Specialist

Agenda

- ■ Transition Project Overview
- ■ Regulatory Update
- ■ Technical Milestones Reached as of June 2013
- ■ Preparing for Full Commercialization
- ■ Closing Remarks
- ■ Q&As

Project Objective – To Ensure Continuity and Flexibility of Future Supply

- ■ Goal of the Transition Protocol is to demonstrate functional equivalence

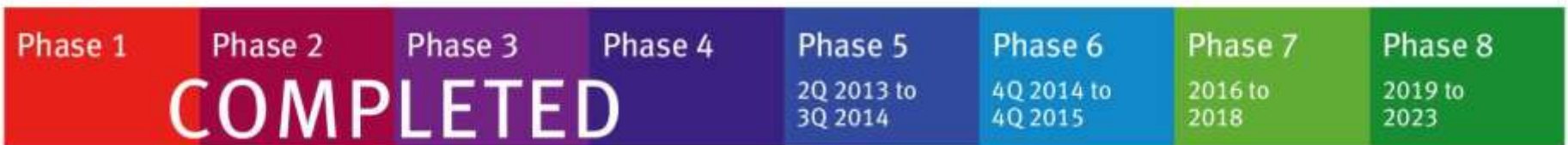
- ■ Functional equivalence means that the attribute you are measuring may be different, even statistically, but it still meets functional and performance requirements, so that it will perform similarly to current Tyvek® in your process and applications

- ■ More than \$30 Million investment by DuPont covering:
 - Global regulatory and industry support
 - Raw materials for multiple line and polymer testing
 - Developmental package creation and testing
 - Transition Protocol package creation and testing
 - Third-party laboratory testing
 - Phantom Protocol
 - Product Stewardship

Components of DuPont™ Tyvek® Medical Packaging Transition Project (MPTP)

- U.S. Food and Drug Administration (FDA) Transition Protocol
- Phantom Protocol
- Product Stewardship

MEDICAL PACKAGING TRANSITION PROJECT (MPTP) TIMELINE



Progress Possible Through Industry Collaboration

- Amcor Flexibles
 - ATMI LifeSciences
 - Barger, a division of Placon
 - Beacon Converters, Inc.
 - Bischof + Klein GmbH & Co.
 - E-BEAM Services, Inc.
 - Encaplast srl
 - Faxcim Corporation
 - Ferric, Inc.
 - Mangar Medical Packaging
 - MEDIPACK AG
 - NAMSA
 - Nelson Laboratories
 - Nordion
 - Oliver-Tolas® Healthcare Packaging
 - PeelMaster Packaging Corporation
 - Perfecseal, Inc.
 - Printpack Inc., Medical Packaging Division
 - Rollprint Packaging Products, Inc.
 - Sealed Air Nelipak
 - SteriPack Asia Sdn. Bhd
- Medical Device Manufacturers (MDMs) around the world who are participating in the MPTP

Key Regulatory Activities as of June 2013

■ ■ United States

- U.S. FDA Transition Protocol Amendments made and accepted by the Center for Developments and Radiological Health (CDRH) at the U.S. FDA in October 2012

■ ■ Europe

- 4 largest Notified Bodies, which issued guidance letters for European compliance, received copy of U.S. FDA Transition Protocol Amendments and no issues have been reported. These Notified Bodies are:
 - BSI Assurance UK Ltd
 - SGS United Kingdom Ltd
 - TÜV Rheinland® LGA Products GmbH
 - TÜV SÜD Product Service GmbH

Key Regulatory Activities as of June 2013

■ ■ ■ Japan

- The MPTP was reviewed in a 3-party consultative meeting held on September 19, 2012. Participants included:
 - Ministry of Health, Labour and Welfare (MHLW) and the Pharmaceutical and Medical Device Agency (PMDA)
 - Association of Registered Certification Bodies (ARCB) under PAL
 - Japan Federation of Medical Device Association (JFMDA)
- Published meeting minutes reference the official Japanese guidance (Yakushokuki) describing the process of reporting partial changes made to medical devices under a **minor change notification**
- The plan is to review MPTP data with the 3 parties; meeting minutes will be published
- For devices to be sold in Japanese domestic market, MDMs will apply their specific change management process following the official Japanese guidance (Yakushokuki)

Key Regulatory Activities as of June 2013

■ ■ ■ China

- Criteria established for determining functional equivalence of specification and miscellaneous properties
- SFDA–Jinan is currently performing testing on Transition Protocol materials, including:
 - Basis weight
 - Mullen burst
 - Delamination
 - Hydrostatic head
 - Gurley Hill porosity
 - Microbial barrier
 - Tensile strength, MD/CD
- SFDA –Jinan to issue final report later this year with results of functional equivalence

Global Members of the DuPont Medical and Pharmaceutical Protection Regulatory Team



**Michael H. Scholla,
Ph.D.**
Global Regulatory
Director and Acting
North American
Regulatory Director



Thierry Wagner
EMEA Regulatory
Director



Ichiro Ikeda
Asian Regulatory
Director



Park Qian
Regulatory Affairs
Manager, China

Technical Milestones Reached as of June 2013

- Completed Developmental material assessments
- Successfully produced and tested Transition Protocol material
- Shipped materials to participating Sterile Packaging Manufacturers (SPMs) for conversion
- Participating MDMs have begun creating packages
- Publishable cell descriptor information collected and compiled; now available
- Conducted formal DuPont Product Stewardship review
- Nelson Laboratories and NAMSA ready for MPTP testing

Effects of Sterilization and Aging on Mechanical and Microbial Barrier Properties—Developmental Materials

Developmental 1073B and 1059B materials

- Represent the different manufacturing lines and polymers
- Control = Tyvek® 1073B or Tyvek® 1059B

Sterilization

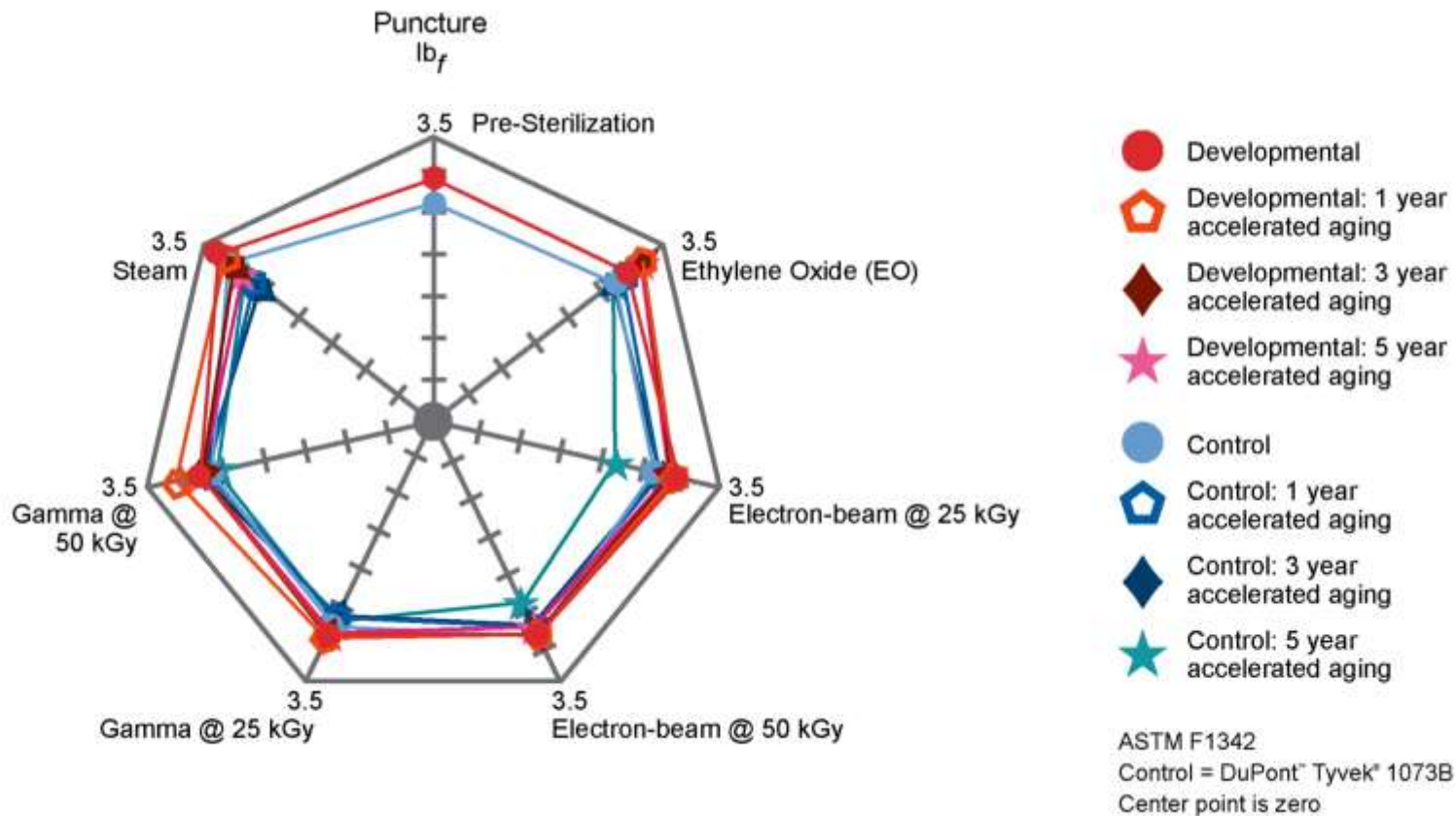
- EO (2X)
- Gamma (25 kGy, 50 kGy)
- Electron-beam (25 kGy, 50 kGy)
- Steam (127°C for 30 minutes)

Test environments

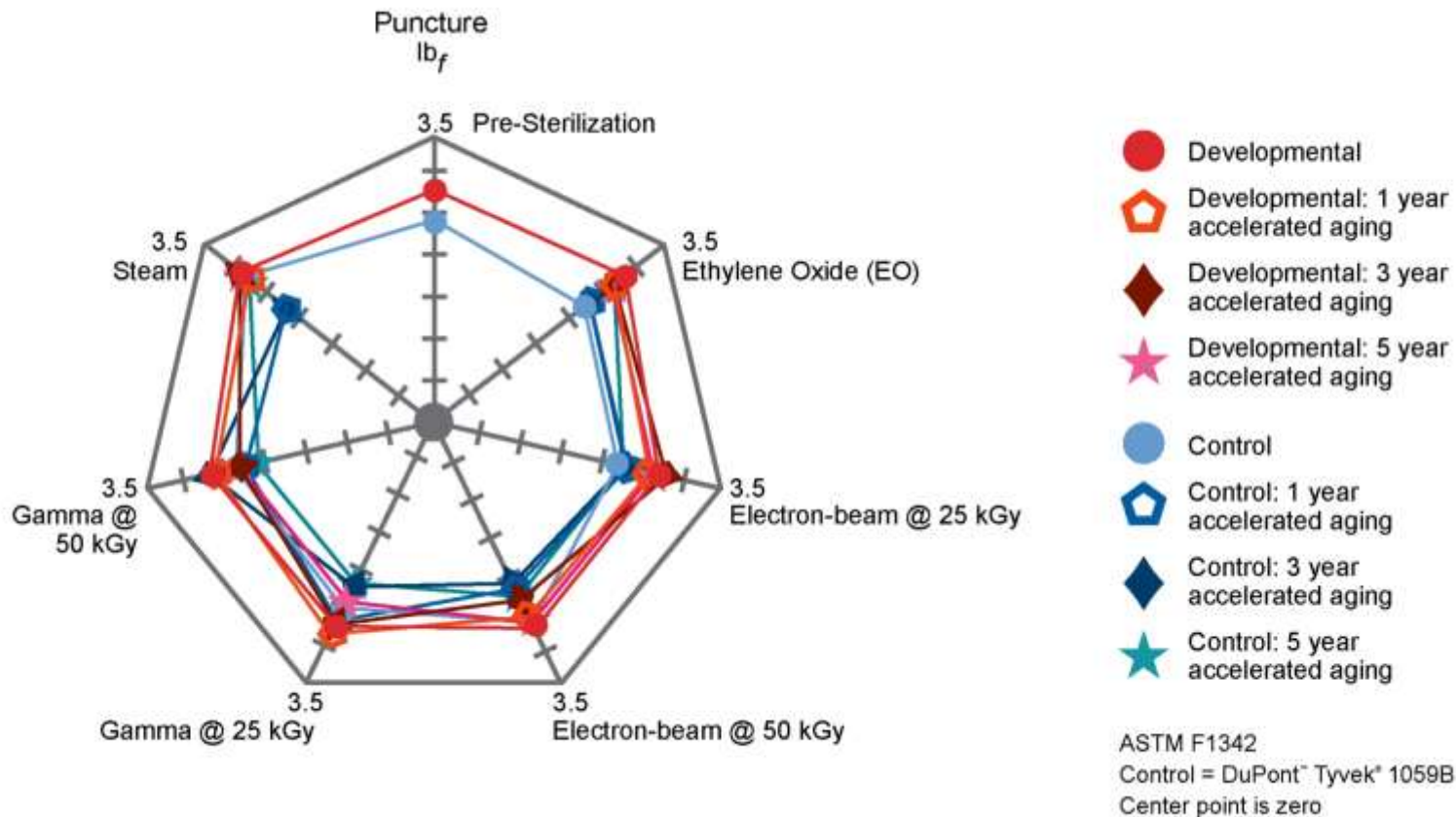
- Pre-sterilization
- Post-sterilization
- Accelerated aging (1, 3, 5 years)

**ALL TESTING
COMPLETE**

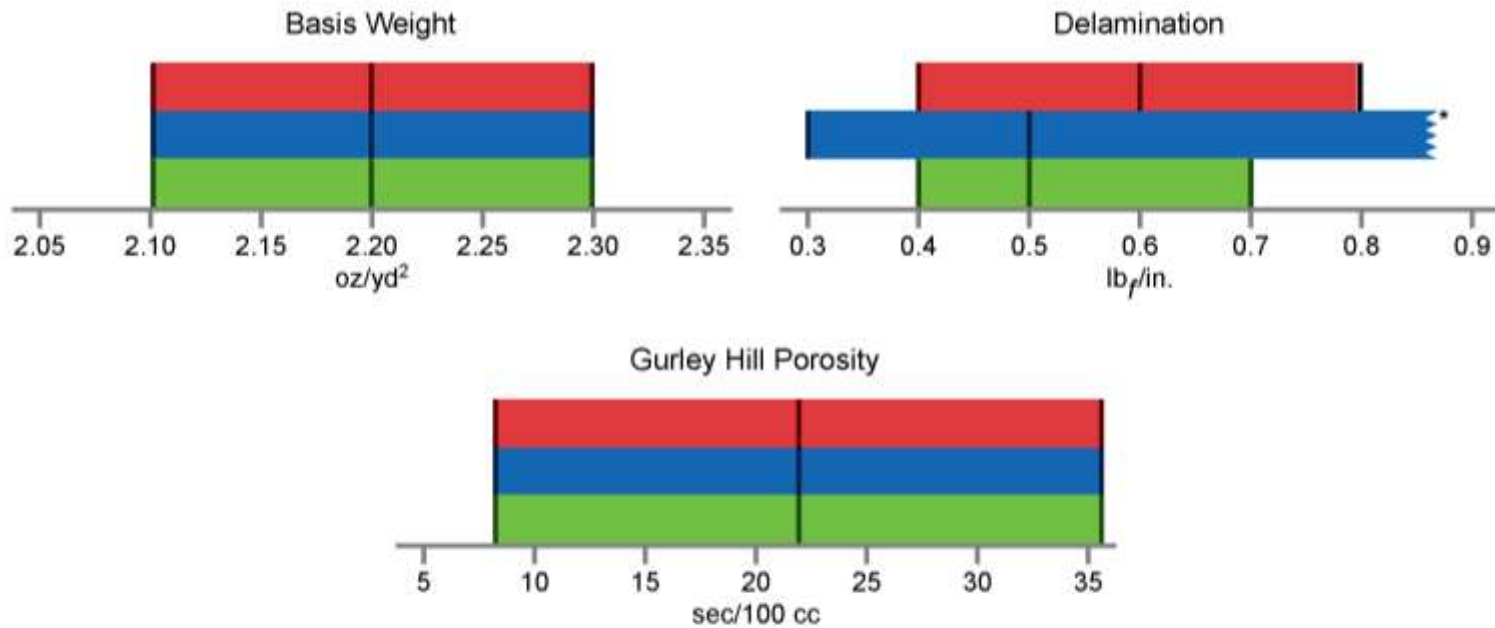
1073B Developmental Materials vs. Control Material



1059B Developmental Materials vs. Control Material



1073B Transition Protocol Material

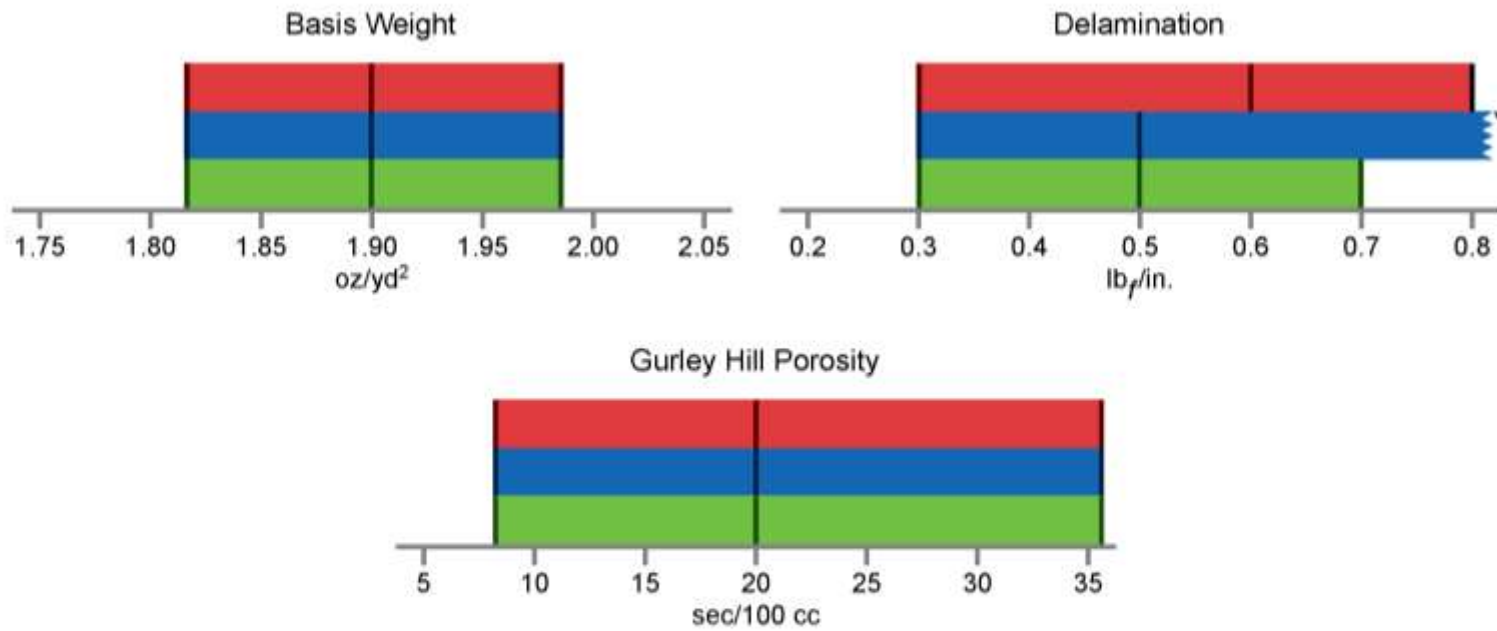


■ Current DuPont™ Tyvek® 1073B
 ■ Target
 ■ Transition Protocol material

Transition Protocol typical values represent data from 200 rolls across different line and polymer combinations from a limited number of manufacturing campaigns. Values will be refreshed, as necessary, upon data collection from additional campaigns and long-term variability discernment.

*Based on customer feedback, upper limit was not specified.

1059B Transition Protocol Material

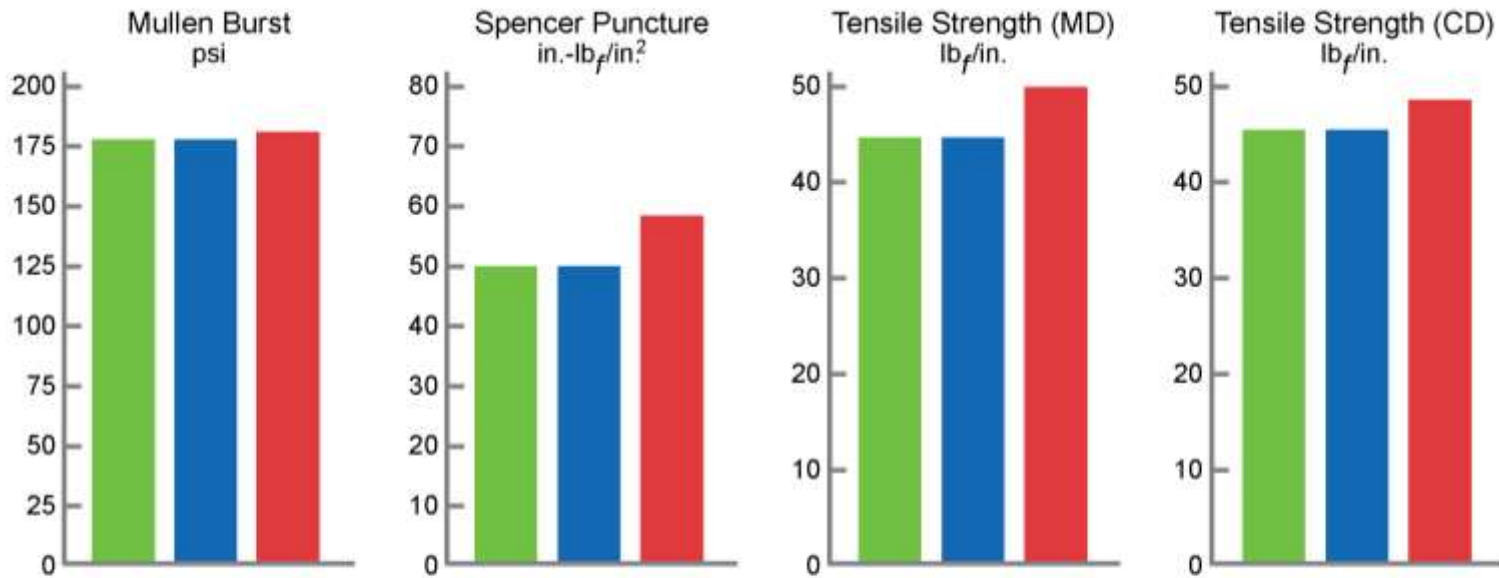


Current DuPont™ Tyvek® 1059B
 Target
 Transition Protocol material

Transition Protocol typical values represent data from 100 rolls across different line and polymer combinations from a limited number of manufacturing campaigns. Values will be refreshed, as necessary, upon data collection from additional campaigns and long-term variability discernment.

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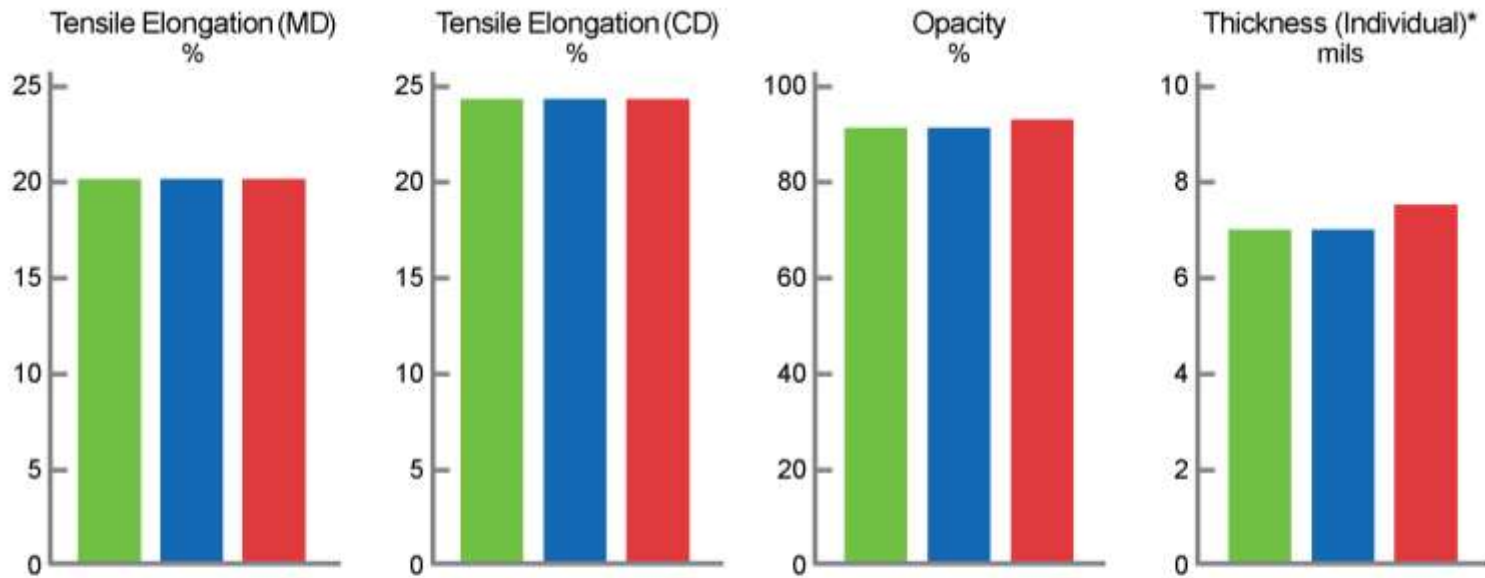
1073B Transition Protocol Material



■ Current DuPont™ Tyvek® 1073B
 ■ Target
 ■ Transition Protocol material

Transition Protocol typical values represent data from 200 rolls across different line and polymer combinations from a limited number of manufacturing campaigns. Values will be refreshed, as necessary, upon data collection from additional campaigns and long-term variability discernment.

1073B Transition Protocol Materials

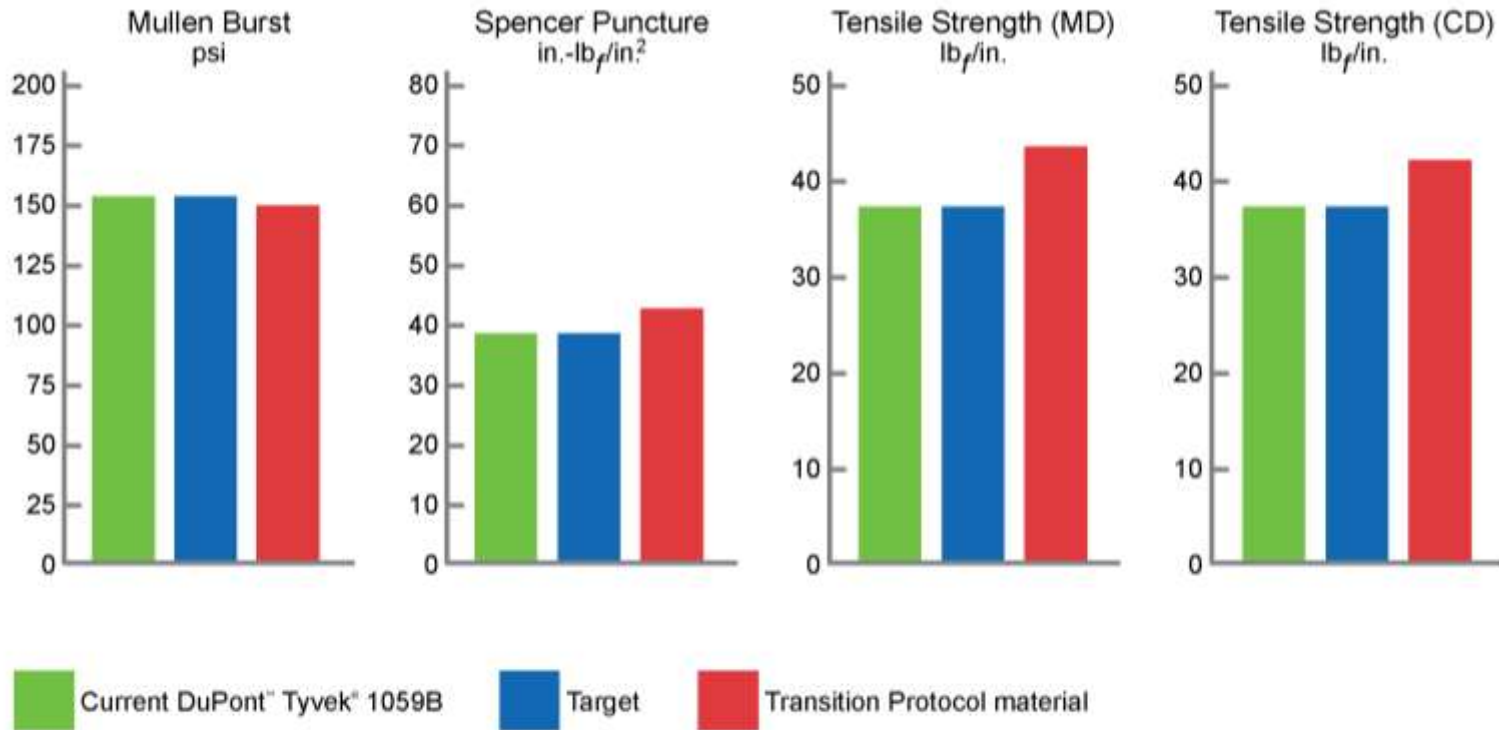


■ Current DuPont™ Tyvek® 1073B ■ Target ■ Transition Protocol material

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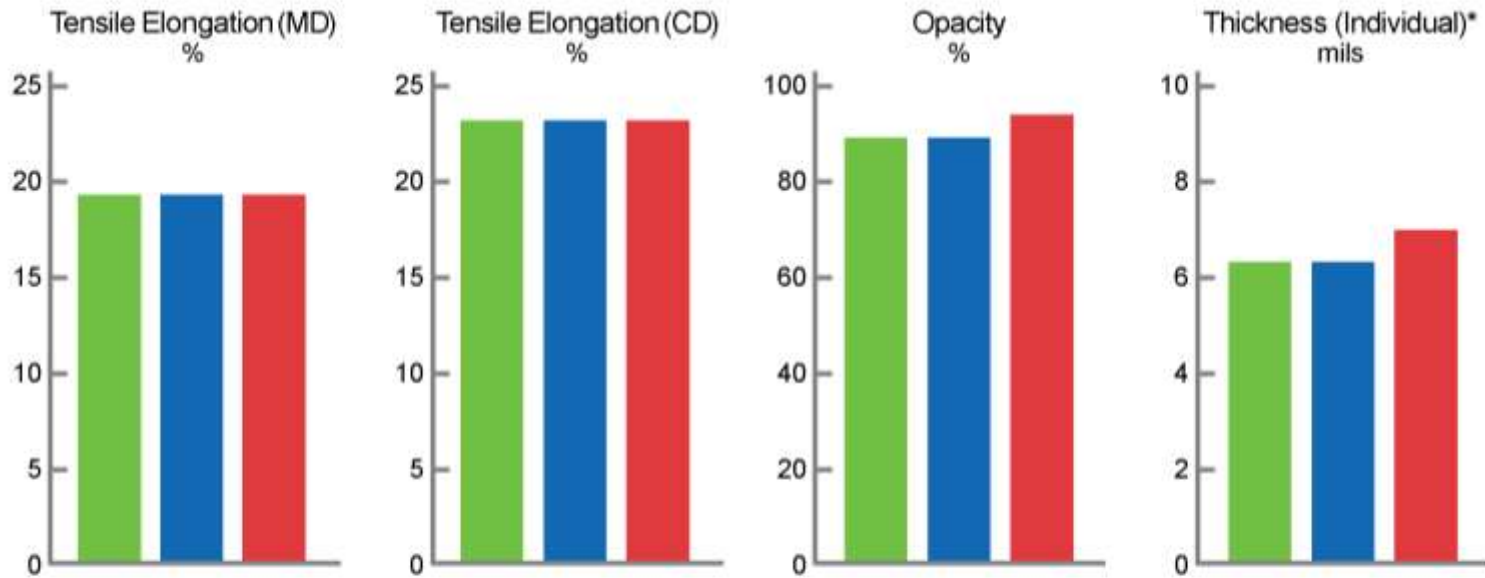
*Thickness variability target is equal to or less than incumbent product.

1059B Transition Protocol Materials



Transition Protocol typical values represent data from 100 rolls across different line and polymer combinations from a limited number of manufacturing campaigns. Values will be refreshed, as necessary, upon data collection from additional campaigns and long-term variability discernment.

1059B Transition Protocol Material



■ Current DuPont™ Tyvek® 1059B
 ■ Target
 ■ Transition Protocol material

Transition Protocol typical values represent data from 100 rolls across different line and polymer combinations from a limited number of manufacturing campaigns. Values will be refreshed, as necessary, upon data collection from additional campaigns and long-term variability discernment.

*Thickness variability target is equal to or less than incumbent product.

1073B and 1059B Transition Protocol Materials

Property	Comparable Test Method	Units	Current Typical Value Tyvek® 1073B	Transition Protocol Target Value Tyvek® 1073B	1073B Transition Protocol Typical Value	Current Typical Value Tyvek® 1059B	Transition Protocol Target Value Tyvek® 1059B	1059B Transition Protocol Typical Value
Microbial Barrier	ASTM F1608	LRV	>5	>5	>5	>4	>4	>4
Microbial Barrier	ASTM F2638	% pMax	<0.3	<0.3	<0.3	<0.5	<0.5	<0.5

Notes: 1073B and 1059B Transition Protocol typical values represent data across different line and polymer combinations from a limited number of manufacturing campaigns. Values will be refreshed, as necessary, upon data collection from additional campaigns and long-term variability discernment.

Package Creation and Testing

- Qualified designs and validated processes
- Sealing conditions
 - Upper
 - Lower
 - Nominal
- Test environments
 - Pre-sterilization
 - Post-sterilization
 - Accelerated aging (1, 3, 5, 7 and 10 years)
 - Real-time aging (1, 3, 5 and 10 years)
- Package testing
 - Visual inspection (ASTM F1886M)
 - Package integrity (ASTM F1929)
 - Seal strength (ASTM F88)
 - Microbial barrier (ASTM F2638)
- Paired data set comparisons

Effects of Sterilization and Aging on Mechanical and Microbial Barrier Properties—Transition Protocol Materials

- Transition Protocol 1073B and 1059B materials
 - Represent the different manufacturing lines and polymers
 - Control = Tyvek® 1073B or Tyvek® 1059B
- Sterilization
 - EO (2X)
 - Gamma (25 kGy, 50 kGy, 100 kGy)
 - Electron-beam (25 kGy, 50 kGy, 100 kGy)
 - Steam (127°C for 30 minutes)
 - Low-temperature oxidation (2 methods)
- Test environments
 - Pre-sterilization
 - Post-sterilization
 - Accelerated aging (1, 3, 5, 7, 10 years)
 - Real-time aging (1, 3, 5, 7, 10 years)

Product Stewardship Testing Underway on Transition Protocol Material

- ■ Cytotoxicity
- ■ Endotoxins
- ■ Skin irritation and sensitization
- ■ Bioburden
- ■ U.S. and European Pharmacopeia/Food Contact
- ■ Extractables and leachables

Product Stewardship –Final Results for All Polymer Sources

- U.S. Food Contact
 - 21 CFR 177.1520 – **Meet Test Requirements**
- European Pharmacopeia
 - EP 3.1.5 – **Meet Test Requirements**
 - EP 3.1.3 – **Meet Test Requirements**

Additional Data to Be Generated Per Industry Requests

- ■ Particle generation
- ■ Chemical resistance (ISO 11607)
- ■ Steam and low-temperature oxidative sterilization behaviors
- ■ Dimensional stability study (steam–freeze–thaw–freeze–thaw)
- ■ DSC, FTIR
- ■ Surface energy
- ■ Dynamic/static coefficient of friction
- ■ Printing (flexo and thermal)
- ■ Low-intensity UV stability
- ■ Parker (surface) smoothness (both sides)
- ■ Baseline color and color after aging

Preparing for Commercialization

■ ■ Information to assist with Risk Assessments

- Regulatory guidance
- Developmental material data
- MPTP Cell Descriptor tool
- Executive Summary Reports

■ ■ Controlled sales of Transition Protocol material

■ ■ Expected timing for full commercialization of Transition Protocol material

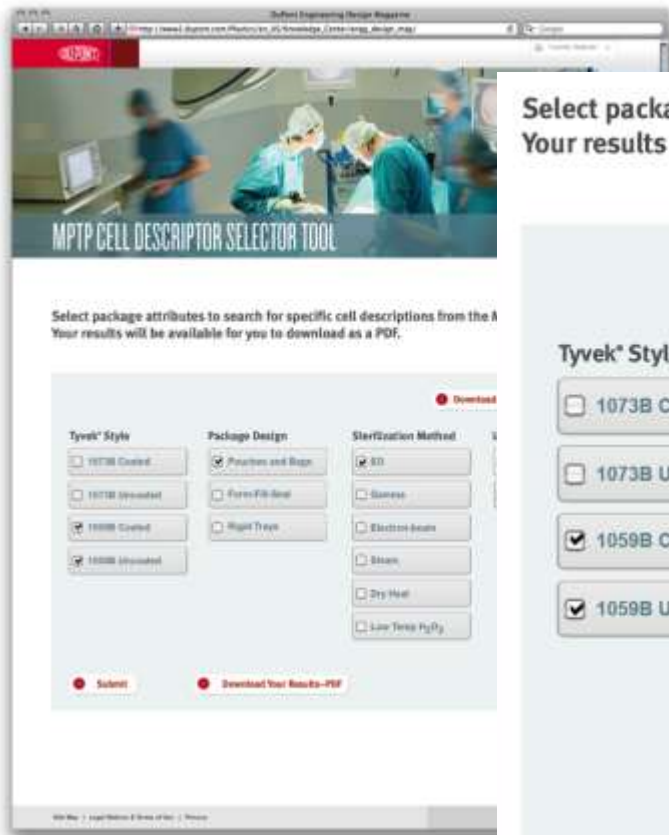
U.S. FDA Transition Protocol Test Matrix

		Style	Pouches and Bags					Form-Fill-Seal						Rigid Trays												
EO	Coated	1073B	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21			
EO	Uncoated	1073B	22	23	24	25	26	27																		
Gamma	Coated	1073B	28		29		30		31		32		33		34		35		36		37		38		39	
Gamma	Uncoated	1073B	40		41		42																			
Electron-beam	Coated	1073B							43		44		45													
Electron-beam	Uncoated	1073B	46		47		48																			
EO	Coated	1059B							49		50		51													
EO	Uncoated	1059B	52	53	54	55	56	57	58		59		60													

Phantom Protocol Test Matrix

		Style	Pouches and Bags	Form-Fill-Seal	Rigid Trays		
EO	Coated	1073B	X74	X75	X71	X78	
EO	Uncoated	1073B	X61				
Gamma	Coated	1073B			X62	X63	
Gamma	Uncoated	1073B					
Electron-beam	Coated	1073B					
Electron-beam	Uncoated	1073B					
EO	Coated	1059B					
EO	Uncoated	1059B	X77				
Steam	Coated	1073B			X65	X66	X67
Steam	Uncoated	1073B	X69	X70			
Dry Heat	Coated	1073B			X68		
Low Temp. H ₂ O ₂	Coated	1073B	X76				
Gamma	Coated	1059B		X72			
Electron-beam	Coated	1059B		X73			

MPTP Cell Descriptor Tool—at www.Transition.Tyvek.com



Select package attributes to search for specific cell descriptions from the MPTP test matrix. Your results will be available for you to download as a PDF.

[Download All Cell Descriptions-PDF](#)

Tyvek* Style	Package Design	Sterilization Method	Units
<input type="checkbox"/> 1073B Coated	<input checked="" type="checkbox"/> Pouches and Bags	<input checked="" type="checkbox"/> EO	<input checked="" type="checkbox"/> English
<input type="checkbox"/> 1073B Uncoated	<input type="checkbox"/> Form-Fill-Seal	<input type="checkbox"/> Gamma	<input type="checkbox"/> Metric
<input checked="" type="checkbox"/> 1059B Coated	<input type="checkbox"/> Rigid Trays	<input type="checkbox"/> Electron-beam	
<input checked="" type="checkbox"/> 1059B Uncoated		<input type="checkbox"/> Steam	
		<input type="checkbox"/> Dry Heat	
		<input type="checkbox"/> Low Temp H ₂ O ₂	

[Submit](#) [Download Your Results-PDF](#)

Example Result from Search of MPTP Cell Descriptor Tool

DuPont™ Tyvek® 1059B – Uncoated – Pouch – EO

English Units

Package Configuration

Chevron peel pouch

Top Web

DuPont™ Tyvek® 1059B
Perfecseal® Uncoated

Bottom Web

Perfecflex® 35793-E
48-gauge PET/1.5 mil PE Film

Sterilization

EO **deep** draw

Number of cycles: **2**

Total time *per cycle* (**including** pre- and post-conditioning):
20 hours and **0** minutes

EO exposure time *per cycle*: **2** hours and **0** minutes

EO concentration: **500 ppm**

Maximum temperature: **145°F**

Maximum relative humidity: **100%**

Maximum pressure rate change: **0.65 psi/min**

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MPTP Cell Descriptor Tool—at www.Transition.Tyvek.com



Select package attributes to search for specific cell descriptions from the MPTP test matrix. Your results will be available for you to download as a PDF.

Select package attributes to search for specific cell descriptions from the MPTP test matrix. Your results will be available for you to download as a PDF.

Search

Tyvek* Style	Package Design	Sterilization Method
<input checked="" type="checkbox"/> 1073B Coated	<input type="checkbox"/> Pouches and Bags	<input type="checkbox"/> EO
<input type="checkbox"/> 1073B Uncoated	<input type="checkbox"/> Form-Fill-Seal	<input checked="" type="checkbox"/> Gamma
<input type="checkbox"/> 1059B Coated	<input checked="" type="checkbox"/> Rigid Trays	<input type="checkbox"/> Electron-beam
<input type="checkbox"/> 1059B Uncoated		<input type="checkbox"/> Steam
		<input type="checkbox"/> Dry Heat
		<input type="checkbox"/> Low Temp H ₂ O ₂

Submit **Download Your Results—PDF**

Download All Cell Descriptions—PDF

Tyvek* Style	Package Design	Sterilization Method	Units
<input checked="" type="checkbox"/> 1073B Coated	<input type="checkbox"/> Pouches and Bags	<input type="checkbox"/> EO	<input type="checkbox"/> English
<input type="checkbox"/> 1073B Uncoated	<input type="checkbox"/> Form-Fill-Seal	<input checked="" type="checkbox"/> Gamma	<input checked="" type="checkbox"/> Metric
<input type="checkbox"/> 1059B Coated	<input checked="" type="checkbox"/> Rigid Trays	<input type="checkbox"/> Electron-beam	
<input type="checkbox"/> 1059B Uncoated		<input type="checkbox"/> Steam	
		<input type="checkbox"/> Dry Heat	
		<input type="checkbox"/> Low Temp H ₂ O ₂	

Submit **Download Your Results—PDF**

Example Result from Search of MPTP Cell Descriptor Tool

DuPont™ Tyvek® 1073B – Coated – Thermoformed tray – Gamma

Metric Units:

Package Configuration

Thermoformed tray with coated lid

Top Web

DuPont™ Tyvek® 1073B
Oliver-Tolas® XHale® 10MP Coated

Bottom Web

800 micron PETG tray

Sterilization

Gamma

Number of Exposures: **2**

Minimum total dose of **54 kGy**

Maximum total dose of **72 kGy**

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Executive Summary Reports

Summary of the passes and fails for seal strength, package integrity, microbial barrier and visual inspection


Summary Report Number	Estimated Timing
1 — Pre-sterilization and Post-sterilization, T=0	1Q 2014
2 — Accelerated Aging (1, 3, and 5 Years) and Real-time Aging (1 Year)	1Q 2015
3 — Real-time Aging (3 Years) and Accelerated Aging (7 and 10 Years)*	4Q 2016
4 — Real-time Aging (5 Years)	4Q 2018
5 — Real-time Aging (10 Years)*	4Q 2023


*Eleven cells designated for extended accelerated aging (7 and 10 years) and real-time aging (10 years).

Executive Summary Reports— Pass/Fail Summary for Seal Strength

Table 1. Seal Strength Cell Summary, Sealing Condition = Low, Pre-Sterilization

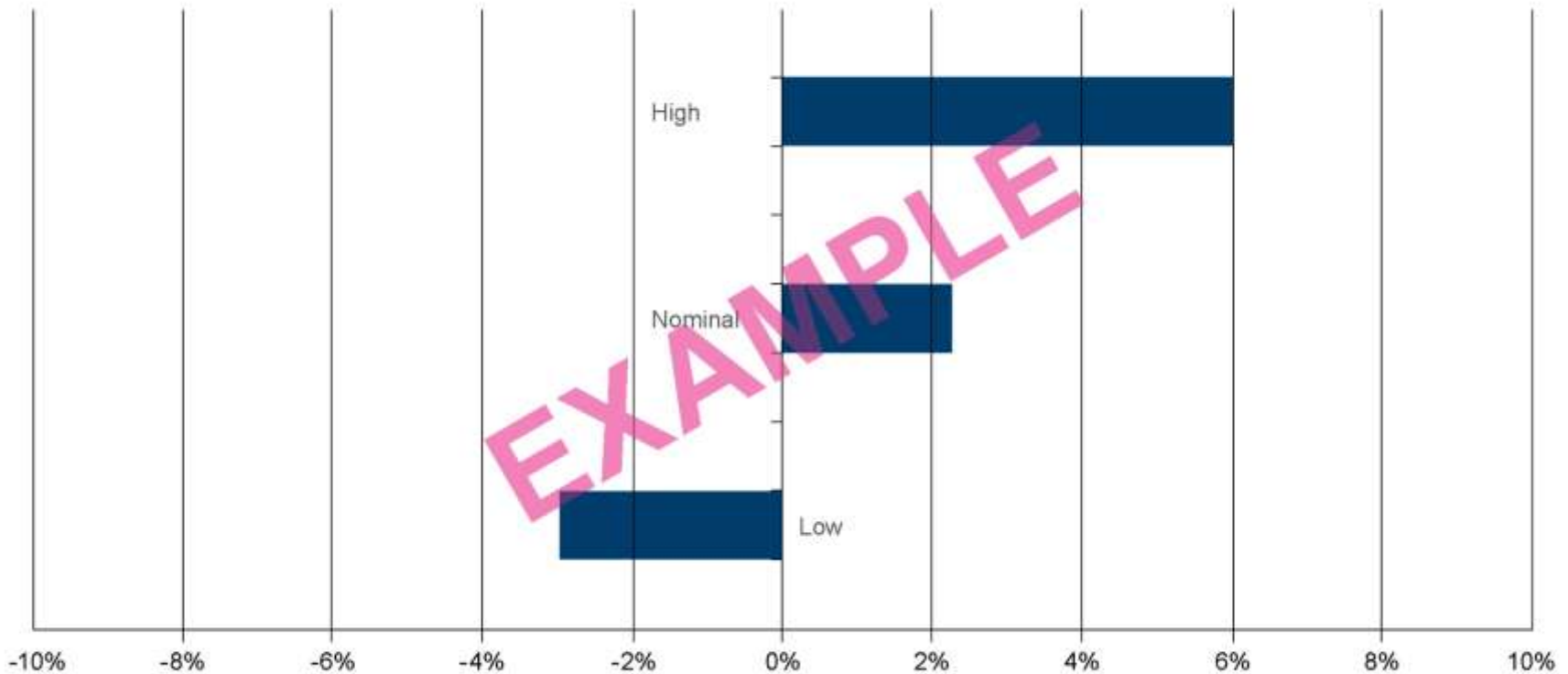
Tyvek® Style	Coating Type	Sterilization Type	MPTP Cells					
			Pouches and Bags		Form-Fill-Seal		Rigid Trays	
			Pass	Fail	Pass	Fail	Pass	Fail
1073B	Coated	EO						
		Gamma						
		Electron-beam						
		Steam						
		Dry Heat						
		Low Temp H ₂ O ₂						
	Uncoated	EO						
		Gamma						
		Electron-beam						
		Steam						
1059B	Coated	EO						
		Gamma						
		Electron-beam						
	Uncoated	EO						

 Number of MPTP cells will be indicated in each box, as appropriate

 There are no cells in the MPTP for this category

Executive Summary Reports— Change in Mean Seal Strengths

Figure 1. % Change in Mean Seal Strengths, Test* vs. Control**— Coated 1073B Pouches and Bags, Pre-Sterilization



*Test = Transition Protocol material

**Control = Current Tyvek® 1073B

Controlled Sales of Transition Protocol Material

- ■ Make Transition Protocol material available in advance of full commercialization (estimated 1Q 2015) to:
 - Support MDM efforts to complete internal risk assessments prior to commercialization
 - Enable MDMs to qualify material for new device packaging
 - NOT intended for packaging of existing commercial devices until applicable regulations in the country of sale are met

Transition Protocol Material Controlled Sales Process

- ■ Material will be available to SPMs beginning in mid- to late July
- ■ MDMs will purchase through their SPMs
- ■ DuPont will randomly fill orders from all line/polymer combinations
- ■ There will be complete traceability:
 - Unique identifiers (e.g., SKUs) from DuPont to SPMs
 - DuPont labeling and documentation will appropriately identify materials

MEDICAL PACKAGING TRANSITION PROJECT (MPTP) TIMELINE

Phase 5 2Q 2013 to 3Q 2014	Phase 6 4Q 2014 to 4Q 2015	Phase 7 2016 to 2018	Phase 8 2019 to 2023
<p>Complete Product Stewardship process</p> <p>MPTP package creation & sterilization</p> <p>Initiate MPTP package data generation & collection</p> <p>Begin controlled sales of Transition Protocol material</p> <p>Publish specification and miscellaneous</p>	<p>Submittal of MPTP package data to regulatory agencies</p> <p>Execute functional equivalence testing</p> <p>Full new regulatory functional equivalence</p> <p>Complete accelerated aging for Years 7 & 10</p> <p>Executive summary of package evaluation—pre- and post-sterilization</p>	<p>Complete real-time aging for Year 1</p> <p>Submit regulatory reports to agencies</p> <p>Executive summary of package evaluation—real-time aging Year 3</p> <p>Executive summary of package evaluation—real-time aging Year 5</p>	<p>Complete real-time aging for Year 10</p> <p>Executive summary of package evaluation—real-time aging Year 10</p>
<p>MPTP package creation & sterilization</p>	<p>Full commercial launch of new materials begins after regulatory affirmation of functional equivalence</p>	<p>Complete real-time aging for Year 1</p>	
<p>Publish specification and miscellaneous Transition Protocol material properties</p>			
<p>Complete accelerated aging for Years 7 & 10</p>			
<p>Executive summary of package evaluation—pre- and post-sterilization</p>			

Commercialization of Transition Protocol Material

■ ■ What can MDMs do to be ready?

- Initiate your change management process, including risk assessments and associated documentation
- Use controlled sales material to complete any additional testing as determined by your own risk assessments
- Ensure that you are ready to accept Transition Protocol material when it becomes commercially available (estimated 1Q 2015)
 - Discuss your plan and forecasted needs with your SPMs
- Discuss any questions or concerns with members of the global DuPont Medical and Pharmaceutical Protection Team

DuPont Medical and Pharmaceutical Protection — Global MDM Support Team



Jose Arevalo
North America and
Central America



Leslie Love
North America



Karen Polkinghorne
North America



Nicole Kaller
EMEA



Helmut Scheckenbach
EMEA



Eric Schmohl
EMEA



Joong Siong Bong
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Coy Li
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Daniel Lim
ASEAN



Norihiko Matsuda
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- ■ Tyvek® Rx eNewsletter
- ■ Face-to-face seminars
- ■ Trade and technical forums
- ■ Individual meetings with SPMs and MDMs



A Note of Appreciation

- ■ Thank you for your business, your continued support and your confidence in DuPont
- ■ We are committed to support you throughout this transition
- ■ Together, we can continue to meet the needs of a growing population for safe and sustainable medical packaging



Tyvek®

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Thank you!

Thank you for attending today's Webcast: U.S. FDA Agreed Upon Protocol Testing Underway for Tyvek® Transition Project!

Today's webcast will be archived for one year for on-demand viewing within this environment.

For any additional questions, please contact us:

Daphne Allen, Editor, *Pharmaceutical & Medical Packaging News* at daphne.allen@ubm.com

Or a member of the DuPont team at www.Transition.Tyvek.com

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