SPECTROCERTIFIED® THIN-FILM SAMPLE SUPPORT WINDOW MATERIALS

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QUICK REFERENCE CHART FOR XRF SAMPLE CUPS

RoHS COMPLIANT XRF SAMPLE CUPS AND THIN-FILM WINDOWS

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SPECTROMEMBRANE THIN-FILMS

CONTINUOUS ROLLS AND PRECUT CIRCLES

SPECTROPELLET FILM





A thin-film sample support window is a substance used for retaining liquid, powdered, slurry or solid specimens in XRF Sample Cups. Of the many different types of materials available, few possess the necessary combination of consistency and chemical and physical properties to serve x-ray spectrochemical needs.

Typical Thickness Variations

Variations	Uniformity of Thickness	Orientation
Between packages	≤ 1 – 2 %	Multiaxially orientated; minimizes effects of preferred orientation
Between lots	≤ ± 5%	

Physical Characteristics

Thin-Film Sample Support Substance	Melting Point, °C (°F)	Density, gm/cc	Structural Formula
Etnom™	270 (518)	1.36	$C_{14}H_{10}O_4$
Prolene®	165 (329)	0.91	C_3H_6
Mylar®, Hostaphan®	260 (500)	1.38	$C_{10}H_8O_4$
Polypropylene	160 (320)	0.91	C_3H_6
Polyester	210 (410)	0.93	$C_{10}H_8O_4$
Polyimide (Kapton®)	None reported	1.42	$C_{20}H_{10}O_5N_2$
Polycarbonate	267 (513)	1.37	C_2H_3F

Purity

(Refer to "Chemical Resistance Chart" for Additional Information)

Thin-Film Window Substance	Trace Impurities, PPM
Mylar®, Polyester, Hostaphan®	Ca, P, Sb, Fe, Zn
Prolene®, Polypropylene	Ca, P, Fe, Cu, Zr, Ti, Al
Etnom™	Si, Ca, P, Zn, Sb
Polyimide (Kapton®)	None reported of significant value
Polycarbonate	Unknown

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SPECTROMEMBRANE THIN-FILMS

HOW TO SELECT A THIN-FILM SAMPLE SUPPORT WINDOW MATERIAL

Selection of a suitable thin-film sample support material is principally based on serving two requirements: the degree of effectiveness in passing radiation and resistance to chemical attack by the sample especially in liquid state. Additional concerns are sample retention strength, applications in evacuated or pressurized conditions, integration time, excitation potential and related heat generation.

1. TRANSMITTANCE OF SPECTRAL LINES

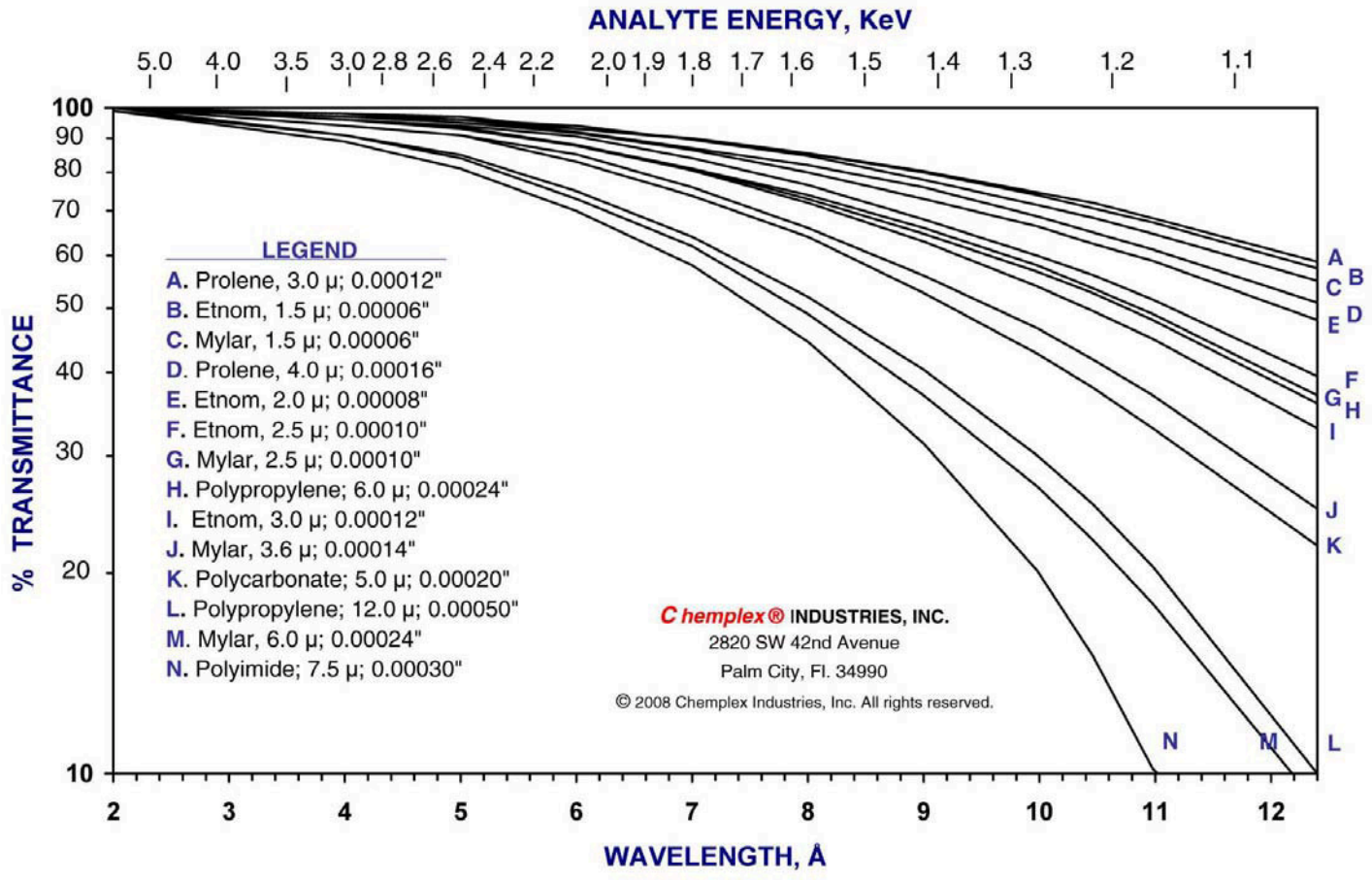
The transmittance properties of a thin-film are functions of gauge thickness, density and mass attenuation coefficients of the constituent chemical elements in accordance with the following formula:

$$I / I_o = \exp [-(\mu/d)\ (d)]$$

Where,

I / I_o	=	percent transmitted spectral line energy
μ/d	=	mass attenuation coefficient
dt	=	area concentration

The following graphic representation of the above formula is the most frequently used visual aid in comparing % Transmittance values of various thin-film substances and gauges. Simply refer the spectral line of the element in the sample of analytical interest having the lowest energy, KeV, (or shortest wavelength, Ångstrom) to each of the curves representing thin-film materials and gauges. Compare their transmittance percentages and select the thin-film offering the highest % Transmittance value.



2. CHEMICAL RESISTANCE

In conjunction with selecting a thin-film providing a high % Transmittance value, evaluate the resistance of a thin-film sample support substance to chemical attack by a sample material from the following table. Liquid sample substances are more prone to degrading a thin-film than solids.

RESISTANCE OF THIN-FILM SUBSTANCES TO CHEMICAL ATTACK

CHEMICAL	MYLAR	POLYCARBONATE	ETNOM	POLYPROPYLENE	POLYIMIDE (KAPTON)	PROLENE	ULTRA-POLYESTER
Acid, dilute or weak	G	G	G	E	N	G	G
Acids, conc.	G	G	G	E	N	E	G
Alcohols, aliphatic	N	G	G	E	G	E	N
Aldehydes	U	F	F	E	E	E	U
Alkalies, conc.	N	N	G	E	E	E	N
Esters	N	N	F	G	G	G	N
Ethers	F	N	F	N	U	N	F
Hydrocarbon, aliphatic	G	N	E	G	E	G	G
Hydrocarbon, aromatic	N	N	E	N	E	N	N
Hydrocarbon, halogenated	F	N	F	N	F	N	F
Ketones	N	N	G	G	G	G	N
Oxidizing agents	F	N	F	F	N	F	F

E=**Excellent**, G=**Good**, F=Fair, N=Not recommended, U=Unknown

Shaded columns represent thin-film window materials determined "Unsuitable for analyzing sulfur in diesel fuel, gasoline and other petroleum products containing aromatic hydrocarbons," ASTM D-4294-03 and ASTM D-6445-99 (2004), in addition to other independent testing.

IMPORTANT: The chemical resistance of thin-films contained in the above table is provided as a matter of information purpose only and is not intended to preclude actual testing and suitability of use and applications. The responsibility of acceptance and safety resides totally with the user.

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SPECTROMEMBRANE® THIN-FILM SAMPLE SUPPORT CARRIER FRAMES

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THIN-FILM CHEMICAL RESISTANCE TABLE

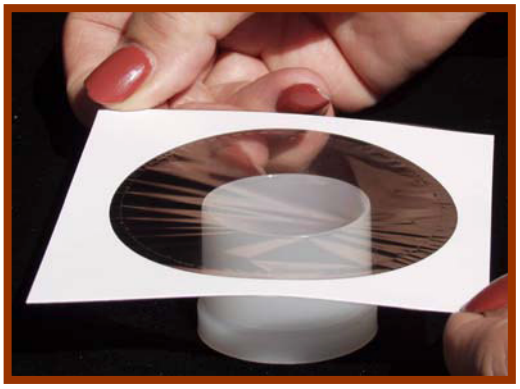
CONTINUOUS ROLLS AND PRECUT CIRCLES

THIN-FILM WINDOWS (*Technical Data*)

SpectroMembrane® Thin-Film Sample Support Carrier Frames consist of a thin-film sample support substance attached to a frame that serves as a carrier. In affixing a thin-film substance to an XRF Sample Cup, the thin-film material is not directly handled; contamination possibility is completely eliminated. Nearing or at the completion of attachment, the thin-film automatically detaches from the carrier frame leaving a taut wrinkle-free sample support.



NO WASTE
NO STATIC CLING
NO CONTAMINATION
NO EXPERIENCE NECESSARY



Step 1.
Place SpectroMembrane® Over XRF Sample Cup

Step 2.
Press Snap-On Ring or Sleeve over SpectroMembrane® and tear away Carrier Frame



SpectroMembrane® is packaged 100 units per package to match the same packaging as 100 XRF Sample Cup Sets per package. When ordering sample cups, simply order the same number of SpectroMembrane packages.

SPECIFICATIONS AND ORDERING INFORMATION

AVAILABLE IN 2.5" (63.5 mm) DIAMETER CIRCLES, FOR 32 mm DIAMETER XRF SAMPLE CUPS, AND 3.0" (76.2 mm) DIAMETER CIRCLES FOR OVER 32 mm DIAMETER XRF SAMPLE CUPS. PACKAGED 100 SPECTROMEMBRANES/PKG.

CAT. N0.	THIN-FILM SUBSTANCE	GAUGE (Thickness)	CIRCLE DIAMETER	SUGGESTED CHEMPLEX XRF SAMPLE CUP CATALOG USE
3011*	Mylar®	2.5 µ; 0.00010"; 0.10 mil; 0.00254 mm	2.5" (63.5mm)	1060, 1065, 1330,1430, 1530, 1730, 1830, 1930, 2131, 2132 and 3100 Series
3012*		2.5 µ; 0.00010"; 0.10 mil; 0.00254 mm	3.0" (76.2mm)	1070,1075,1080,1085,1095,1340,1440, 1440L, 1540,1740, 1840, 1850, 1940, 2135, 2140, 2143, 2145
3013*		3.6 µ; 0.00014"; 0.14 mil; 0.00356 mm	2.5" (63.5mm)	1060, 1065, 1330,1430, 1530, 1730, 1830, 1930, 2131, 2132 and 3100 Series
3014*		3.6 µ; 0.00014"; 0.14 mil; 0.00356 mm	3.0" (76.2mm)	1070,1075,1080,1085,1095,1340,1440, 1440L, 1540,1740, 1840, 1850, 1940, 2135, 2140, 2143, 2145
3015*		6.0 µ; 0.00024"; 0.24 mil; 0.00610 mm	2.5" (63.5mm)	1060, 1065, 1330,1430, 1530, 1730, 1830, 1930, 2131, 2132 and 3100 Series
3016*		6.0 µ; 0.00024"; 0.24 mil; 0.00610 mm	3.0" (76.2mm)	1070,1075,1080,1085,1095,1340,1440, 1440L, 1540,1740, 1840, 1850, 1940, 2135, 2140, 2143, 2145
3017*	Prolene®	4.0 µ; 0.00016"; 0.16 mil; 0.00406 mm	2.5" (63.5mm)	1060, 1065, 1330,1430, 1530, 1730, 1830, 1930, 2131, 2132 and 3100 Series
3017A*		3.0 µ; 0.00012"; 0.12mil; 0.00305 mm		
3018*		4.0 µ; 0.00016"; 0.16 mil; 0.00406 mm	3.0" (76.2mm)	1070,1075,1080,1085,1095,1340,1440, 1440L, 1540,1740, 1840, 1850, 1940, 2135, 2140, 2143, 2145
3018A*		3.0 µ; 0.00012"; 0.12mil; 0.00305 mm		
3019*	Polypropylene	6.0 µ; 0.00024"; 0.24 mil; 0.00610 mm	2.5" (63.5mm)	1060, 1065, 1330,1430, 1530, 1730, 1830, 1930, 2131, 2132 and 3100 Series
3020*		6.0 µ; 0.00024"; 0.24 mil; 0.00610 mm	3.0" (76.2mm)	1070,1075,1080,1085,1095,1340,1440, 1440L, 1540,1740, 1840, 1850, 1940, 2135, 2140, 2143, 2145
3021	Polyimide (Kapton®)	7.5 µ; 0.00030"; 0.30 mil; 0.00762 mm	2.5" (63.5mm)	1060, 1065, 1330,1430, 1530, 1730, 1830, 1930, 2131, 2132 and 3100 Series
3022		7.5 µ; 0.00030"; 0.30 mil; 0.00762 mm	3.0" (76.2mm)	1070,1075,1080,1085,1095,1340,1440, 1440L, 1540,1740, 1840, 1850, 1940, 2135, 2140, 2143, 2145
3023*	Polypropylene	12.0 µ; 0.00050"; 0.50 mil; 0.0127 mm	2.5" (63.5mm)	1060, 1065, 1330,1430, 1530, 1730, 1830, 1930, 2131, 2132 and 3100 Series
3024*		12.0 µ; 0.00050"; 0.50 mil; 0.0127 mm	3.0" (76.2mm)	1070,1075,1080,1085,1095,1340,1440, 1440L, 1540,1740, 1840, 1850, 1940, 2135, 2140, 2143, 2145
3025	Etnom™ **(Resistant to Aliphatic and Aromatic Hydrocarbons in Diesel Fuel and Gasoline)**	3.0 µ; 0.00012"; 0.12mil; 0.00305 mm	2.5" (63.5mm)	1060, 1065, 1330,1430, 1530, 1730, 1830, 1930, 2131, 2132 and 3100 Series
3026		3.0 µ; 0.00012"; 0.12mil; 0.00305 mm	3.0" (76.2mm)	1070,1075,1080,1085,1095,1340,1440, 1440L, 1540,1740, 1840, 1850, 1940, 2135, 2140, 2143, 2145
3029		2.5µ; 0.00010; 0.10mil; 0.00254 mm	2.5" (63.5mm)	1060, 1065, 1330,1430, 1530, 1730, 1830, 1930, 2131, 2132 and 3100 Series
3030		2.5 µ; 0.00010"; 0.10mil; 0.00254 mm	3.0" (76.2mm)	1070,1075,1080,1085,1095,1340,1440, 1440L, 1540,1740, 1840, 1850, 1940, 2135, 2140, 2143, 2145
3031		2.0 µ; 0.00008"; 0.08mil; 0.00203 mm	2.5" (63.5mm)	1060, 1065, 1330,1430, 1530, 1730, 1830, 1930, 2131, 2132 and 3100 Series
3032		2.0 µ; 0.00008"; 0.08mil; 0.00203 mm	3.0" (76.2mm)	1070,1075,1080,1085,1095,1340,1440, 1440L, 1540,1740, 1840, 1850, 1940, 2135, 2140, 2143, 2145

Reg. US Patent No: 6,009,766, Dr Monte J. Solazzi, and other patents in applications

* Represent thin-film window materials determined "Unsuitable for analyzing sulfur in diesel fuel, gasoline and other petroleum products containing aromatic hydrocarbons," ASTM D-4294-03 and ASTM D-6445-99 (2004), in addition to other independent testing.

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THIN-FILM CHEMICAL RESISTANCE TABLE

SPECTROMEMBRANE THIN-FILMS

THIN-FILM WINDOWS (*Technical Data*)

THIN-FILM SAMPLE SUPPORT WINDOWS IN CONTINUOUS ROLLS AND PRECUT CIRCLES

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Thin-Film Sample Supports are available in Continuous Rolls and Pre-Cut Circles. Fabrication of all thin-films is performed under environmentally controlled conditions to avoid the potential possibility of inadvertently introducing trace levels of contaminates and individually shrink-wrapped to preserve the original integrity.



SPECIFICATIONS AND ORDERING INFORMATION

Continuous Rolls:

(3" wide x 300' long; 7.6cm x 91.4 m)

CATALOG NUMBER	THIN-FILM SUBSTANCE	GAUGE
090	Ultra-Polyester	1.5 µ; 0.00006"; 0.06mil; 0.00152mm
095	Etnom	1.5 µ; 0.00006"; 0.06mil; 0.00152mm
100	Mylar®; Hostaphan®	2.5 µ; 0.00010"; 0.10 mil;0.00254mm
150	Mylar®; Hostaphan®	3.6 µ; 0.00014"; 0.14 mil; 0.00356mm
250	Mylar®; Hostaphan®	6.0 µ; 0.00024"; 0.24 mil; 0.00610mm
416	Prolene®	4.0 µ; 0.00016"; 0.16 mil; 0.00406mm
425	Polypropylene	6.0 µ; 0.00024"; 0.24 mil; 0.00610mm
440	Polyimide (Kapton®)	7.5 µ; 0.00030"; 0.30 mil; 0.00762mm
442*	Polyimide (Kapton®)	7.5 µ; 0.00030"; 0.30 mil; 0.00762mm
475	Polypropylene	12.0 µ; 0.00050"; 0.50 mil; 0.0127mm

Supplied in 50' (15.2m) lengths

Precut Circles: (500 pieces/box)

(2.5" Diameter; 63.5mm)

CATALOG NUMBER	THIN-FILM SUBSTANCE	GAUGE
106	Mylar®; Hostaphan®	2.5 µ; 0.00010"; 0.10 mil; 0.00254mm
156	Mylar®; Hostaphan®	3.6 µ; 0.00014"; 0.14 mil; 0.00356mm
256	Mylar®; Hostaphan®	6.0 µ; 0.00024"; 0.24 mil; 0.00610mm
426	Prolene®	4.0 µ; 0.00016"; 0.16 mil; 0.00406mm
436	Polypropylene	6.0 µ; 0.00024"; 0.24 mil; 0.00610mm
446	Polyimide (Kapton®)	7.5 µ; 0.00030"; 0.30 mil; 0.00762mm
476	Polypropylene	12.0 µ; 0.00050"; 0.50 mil; 0.0127mm

Precut Circles: (1000 pieces/box)

(2.5" Diameter; 63.5mm)

CATALOG NUMBER	THIN-FILM SUBSTANCE	GAUGE
107	Mylar®; Hostaphan®	2.5 µ; 0.00010"; 0.10 mil; 0.00254mm
157	Mylar®; Hostaphan®	3.6 µ; 0.00014"; 0.14 mil; 0.00356mm
257	Mylar®; Hostaphan®	6.0 µ; 0.00024"; 0.24 mil; 0.00610mm
427	Prolene®	4.0 µ; 0.00016"; 0.16 mil; 0.00406mm
437	Polypropylene	6.0 µ; 0.00024"; 0.24 mil; 0.00610mm
447	Polyimide (Kapton®)	7.5 µ; 0.00030"; 0.30 mil; 0.00762mm
477	Polypropylene	12.0 µ; 0.00050"; 0.50 mil; 0.0127mm

NOTE:
Ultra polyester, Mylar, polypropylene, Prolene and polycarbonate are “unsuitable for analyzing sulfur in diesel fuel, gasoline and other petroleum products containing aromatics”; ASTM D-4294-03 and ASTM D-6445-99 (2004) and other independent testing.

Refer to Chemical Resistance Table and % Transmission Values for comparing all thin-film windows.

IMPORTANT:

The possibility of pinholes, pores and variations existing in any thin-film sample support substance regardless of form and packaging may present leakage of a sample with subsequent contamination and damage to the analytical instrumentation and its components. It is strongly recommended that each item used be subject to judicious testing, use and applications and evaluation prior to actual use. The responsibility of acceptance and safety resides totally with the user. Chemplex Industries, Inc. assumes no liability or guarantees that thin-film sample supports will perform in accordance with its suggested use.

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REMINDER TO ORDER XRF SAMPLE CUPS

FREE samples of Chemplex Thin-Film Sample Supports are available for testing and evaluation purposes. Contact sales@chemplex.com or telephone our sales department at (772) 283-2700; our toll-free telephone number in USA is (800) 4 Chemplex.

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XRF GAS PERMEABLE PRESSURE DIFFERENTIAL EQUALIZATION MEMBRANE

Chemplex® INDUSTRIES, INC.

X-RAY Spectrochemical Sample Preparation Equipment & Accessories

MICROPOROUS POLYPROPYLENE FILM

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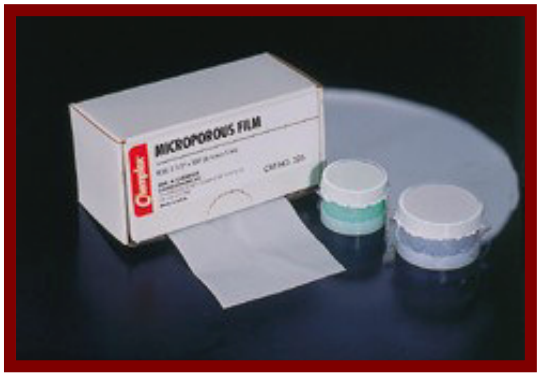
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1500 SERIES XRF SAMPLE CUPS

1600 SERIES SAMPLE CUP CAPS

SAMPLE CUP ACCESSORIES



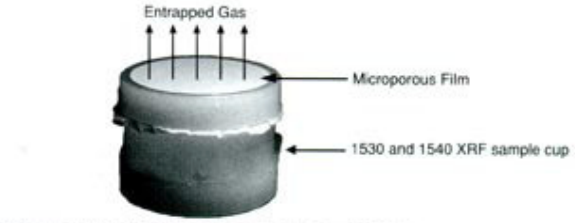
Microporous Film is a gas permeable thin membrane used in conjunction with Series 1500 XRF Sample Cups to establish pressure equalization in inert gas and vacuum environmental analytical conditions.

When Microporous Film is attached to the flanged open end of a Series 1500 XRF Sample Cup, the tortuous pore channels permit gaseous elements to penetrate. The pore size prohibits crystalline particles to pass. Any entrapped gas or air within the sealed sample cup is evacuated leaving the thin-film sample support substance on the opposite end flat and free of convolutions or distension attributed to pressure differentials. Use the optionally available Palm Held or Snap-On Ring Fastener.

- **MICROPOROUS FILM IN PRE-CUT CIRCLES**
- **100 CIRCLES/PACKAGE CORRESPONDS TO 100 SAMPLE CUPS/PACKAGE**



FAST • EASY-T0-USE • NO TRIMMING
NO WASTE • NO CONTAMINATION



Microporous film maintains pressure equalization in inert gas and vacuum environments

Properties	Typical Values
Porosity, %	55
Pore Size, µ x µ	0.21 x 0.05
Thickness, µ (inches; mm)	25 (0.001”; 0.0254mm)
Softening Temperature, °C	Approx. 155
Melting Temperature, °C	165

SPECIFICATIONS AND ORDERING INFORMATION

Microporous Film in Continuous Rolls and Easy-to-Use Pre-Cut Circles

CATALOG NUMBER	DESCRIPTION	Packaging
325*	Microporous Film, Continuous Roll	2.5” wide x 200” long (6.4cm x 5.1m)
325C	Microporous Film, Pre-Cut Circles	2.5” (76mm) diameter; 100 circles/Pkg

- Supplied in unserrated edge boxes.

REMINDER TO ORDER THIN-FILM SAMPLE SUPPORTS

REMINDER TO ORDER CHEMPLEX 1500 SERIES XRF SAMPLE CUPS