



Life Sciences

## Vivid™ Lateral Flow Nitrocellulose Membranes

### *Consistent membrane for increased assay reproducibility and sensitivity*

- ▶ **Strong consistency** – Membrane provides high sensitivity and low background in diagnostic assays due to its consistent nature.
- ▶ **High duplication rate** – Exhibits tight Coefficient of Variation (CVs) for wicking time and thickness resulting in reproducibility from lot to lot.
- ▶ **Increased sensitivity** – Provides high sensitivity with dilute concentrations of target analytes.
- ▶ **Consistent reproducibility** – Provides protein binding levels which are highly consistent to facilitate reliable assay performance.
- ▶ **Clear results** – Demonstrates low background levels which enable crisp capture lines and easy-to-read results.
- ▶ **Dependable performance** – Constructed of pure nitrocellulose that does not contain interfering substances or post-treatments that affect assay performance.

- ▶ **No manufacturing defects** – Controlled surface quality of the membrane ensures freedom from defects, discoloration, and dust.

#### *Vivid 170 Laminated Cards*

- ▶ **Low waste involvement** – Polyester backing improves handling and durability in the manufacturing process to minimize material scrap due to breakage.
- ▶ **Eliminate test strip variation** – Pre-laminated cards reduce the potential for membrane misalignment and trapped air between the nitrocellulose membrane and the card stock.
- ▶ **Simplified processes** – Pre-laminated cards make your processes related to purchasing, research, and manufacturing easier.

*Filtration. Separation. Solution.<sup>SM</sup>*

## Applications

- ▶ Vivid 90 Lateral Flow Nitrocellulose (LFNC) membrane is optimal for lateral flow assays requiring medium to fast wicking times.
- ▶ Vivid 170 LFNC membrane is best suited for lateral flow assays requiring a slower wicking time resulting in increased sensitivity.
- ▶ Vivid 170 LFNC laminated cards are optimal for both quick evaluation of various lateral flow materials and simplifying the manufacturing of lateral flow assays.

## Specifications

### Materials of Construction

Membrane: Nitrocellulose

### Backing

Vivid 90 and 170: Polyester

Vivid 170 Laminated Card: Polystyrene

### Typical Membrane Thickness

7.87 +/- 0.79 mils (200 +/- 20  $\mu\text{m}$ )

### Typical Wicking Rate

Vivid 90: 70-110 sec/4 cm

Vivid 170: 150-225 sec/4 cm

### Typical Protein Binding

> 45  $\mu\text{g}/\text{cm}^2$  of BSA

### Vivid 170 Laminated Card

#### Card Dimensions

300 mm x 60 mm (+/- 2 mm)

#### Zone Dimensions

Zone A: 15 mm (+/- 0.35 mm)

Zone B (Nitrocellulose Zone): 25 mm (+/- 0.35 mm)

Zone C: 20 mm (+/- 0.35 mm)

#### Curving

$\leq 6.35$  mm

## Performance

Nitrocellulose membranes are the heart of lateral flow assays and require highly consistent measurements for both wicking rate and thickness. Variations in either can have detrimental effects on assay sensitivity, reproducibility, and reagent consumption. Vivid LFNC membranes are manufactured to ensure that these key consistency measures are tightly controlled with CVs for the critical membrane parameters between 5-12%, depending on the parameter.

## Thickness

Signal generation at the test and control lines and tensile strength are largely influenced by the thickness of the reaction membrane. Variation in thickness across or down a roll of nitrocellulose membrane can have negative effects in both the manufacturing environment and final assay performance.

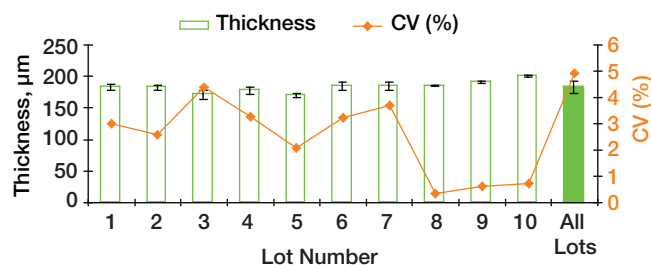
To help ensure assay reproducibility, as well as aid in the handling of the membrane, the variability in thickness of Vivid LFNC membranes is tightly controlled. The CVs are  $\leq 5\%$  for both intra- and inter-lot measurements (Figure 1).

Figure 1

Vivid 90 LFNC Membrane Thickness CVs Are Tightly Controlled



Tightly Controlled Thickness Specifications Minimize Lot-to-Lot Variability for Vivid 170 LFNC Membrane

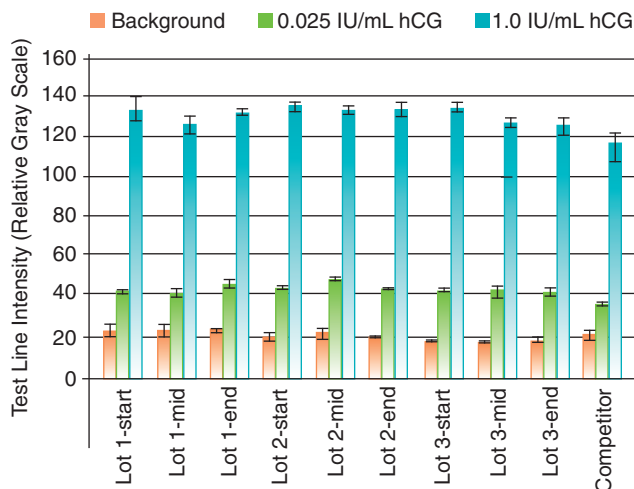


To demonstrate reproducibility both intra- and inter-lot, 10 production lots were tested throughout the roll for thickness values. The tightly controlled values for thickness of the Vivid 170 LFNC membrane demonstrates a highly controlled manufacturing process. The CV values range between 0.5-5% and the average CV value for all 10 lots is less than 5%.

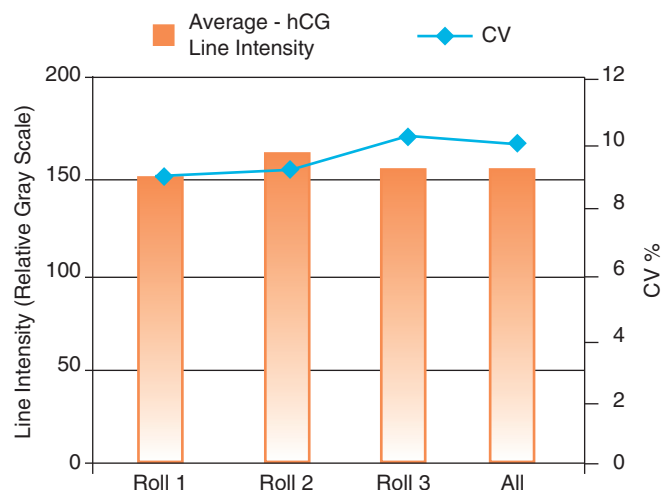
The low CVs in thickness also help to ensure the generation of crisp capture lines (Figure 2). Tightly controlling the thickness helps to minimize the spreading of reagents and detection particles, ultimately contributing to the generation of brighter, more exact lines.

**Figure 2**

Vivid 90 LFNC Membrane Exhibits Highly Consistent hCG Assay Performance



Vivid 170 LFNC Membrane Exhibits Highly Consistent Assay Performance



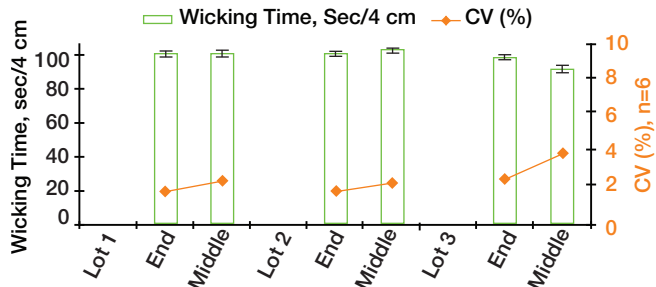
**Wicking**

Ensuring that assay sensitivity is maintained relates, in part, to the consistency of the wicking rate of the nitrocellulose membrane. By maintaining a uniform sample front that travels along the membrane at a consistent speed, the target analyte is maintained in a homogenous concentration. This ensures that the target analyte present in the sample has adequate time to bind to the capture antibody resulting in reproducible results from lot to lot.

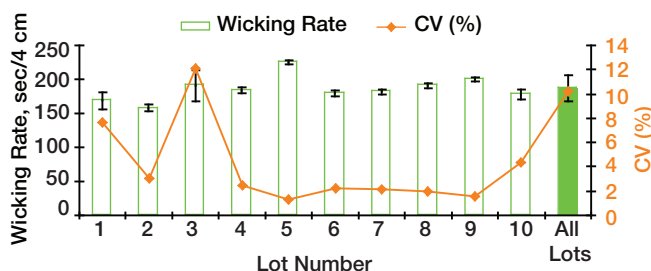
The wicking rate of the Vivid 90 LFNC membrane exhibits CVs for intra- and inter-lot consistency measures of  $\leq 10\%$  (Figure 3).

**Figure 3**

Vivid 90 LFNC Membrane Wicking Time Tightly Controlled



Low Variability in Vivid 170 LFNC Membrane Wicking Rates Helps Maintain Assay Sensitivity



The wicking rate was measured throughout the roll on 10 production lots of Vivid 170 LFNC membrane to ensure intra- and inter-lot consistency. The wicking rate CV values are between 2-12% and the average CV of all 10 lots is 10%.

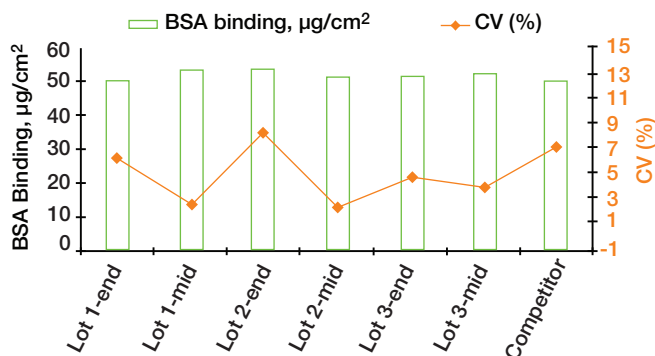
**Protein Binding**

Protein binding is a critical aspect of LFNC membrane performance. To achieve optimum assay results, the membrane must sufficiently bind proteins at the capture lines but not non-specifically bind the target analytes in the sample. Assay reproducibility is facilitated by consistent levels of protein binding which translates to achieving the desired amount of antibody binding at the capture lines. If there is variability in protein binding at the capture lines, the assay sensitivity and crispness of the capture line can be compromised.

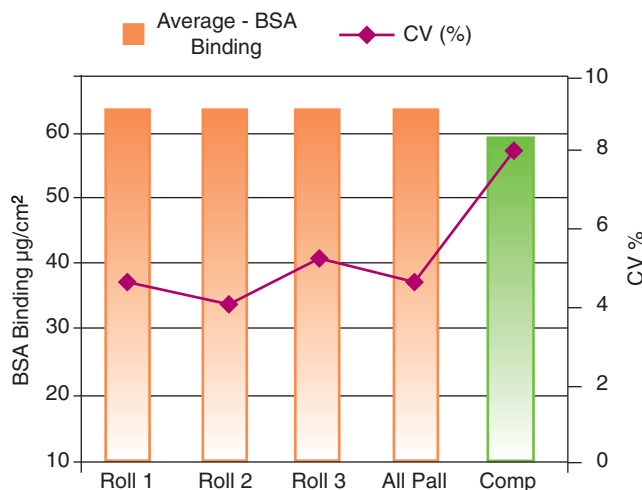
Over time, LFNC membranes can adsorb water and organic solvents from the surrounding environment, which can increase the relative level of hydrophobicity of the membrane. Increased hydrophobicity is indicative of increases in protein binding which can negatively effect the long-term performance of the assay. In an extended shelf life study, Vivid 90 LFNC membrane demonstrated no change in protein binding indicating stability of the membrane (Figure 4).

**Figure 4**

Vivid 90 LFNC Membrane:  
Protein Binding Tightly Controlled



Vivid 170 Nitrocellulose Membrane Exhibits More Consistent BSA Binding Than Competitive Membranes



## Quantitation

Lateral flow assays have been used for decades in qualitative point-of-care testing to detect the presence or absence of a target analyte (i.e. hCG for pregnancy determination). Although widely used, qualitative tests can have inconclusive results due to the reliance on reading a series of lines or dots. For that reason, many tests are now being moved to a quantitative format where a numerical read-out or printed word appears.

## Ordering Information

### Vivid Lateral Flow Nitrocellulose Membranes

Part Number	Description	Pkg
VIV902503R	Vivid 90 membrane, 25 mm x 3 m roll	1/pkg
VIV902550R	Vivid 90 membrane, 25 mm x 50 m roll	1/pkg
VIV9025100R	Vivid 90 membrane, 25 mm x 100 m roll	1/pkg
VIV170SAMP	Vivid 170 membrane, 25 mm x 300 mm strip	1/pkg
VIV1702503R	Vivid 170 membrane, 25 mm x 3 m roll	1/pkg
VIV1702550R	Vivid 170 membrane, 25 mm x 50 m roll	1/pkg
VIV170CARD	Vivid 170 Laminated Card, 30 mm x 60 mm	50/pkg

Custom roll and sheet sizes available upon request. Please contact your local sales office for additional information.

## Related Literature

- ▶ PN 33549, Vivid Plasma Separation Membrane Data Sheet
- ▶ PN 33522, Media Guide Catalog

## Related Products

- ▶ **Vivid Plasma Separation Membrane** provides a one-step separation of plasma from whole blood. Plasma yields are  $\geq 80\%$  with low hemolysis in less than two minutes.
- ▶ **White Blood Cell Isolation Medium** isolates leukocytes from whole blood samples. The nucleic acid content can be extracted for further analysis in molecular detection applications.
- ▶ **Conjugate Pads** are available in a variety of thicknesses and materials of construction to optimize assay performance.
- ▶ **Absorbent Pads** are constructed of pure cellulose fibers and are available in a variety of absorbencies depending on the sample type and volume.



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