Vikuiti™ Rear Projection Film

Data Sheet October 2006

1. Description

The Vikuiti™ Rear Projection Film is designed to be laminated onto transparent substrates for use as rear projection screen. The film provides excellent contrast and colour at all viewing angles, even at ambient light. Thanks to the removable optical adhesive, reflections at the interface substrate-film are minimized. Therefore, this solution is optically superior to this of a separate display behind a transparent substrate. Since the film can be cut to any shape the basis for many creative solutions is given. The Vikuiti™ Rear Projection Film in operation can be a real eye catcher – even in daylight.

Features	Benefits
Wide Viewing Angle	Bright sharp images at all angles, no “hot spots”
High Contrast under Ambient Conditions	Comfortable viewing in bright areas
High Resolution	XGA, SXGA, and UXGA compatible
Low Color and Speckle	No annoying artifacts
Low Color Shift	Lifelike color rendition
Can be cut easily	Any screen shapes are possible
With optically matched adhesive	Can be laminated to transparent substrate and will minimize reflections
Easily removable	No additional tools for removal needed. No residues

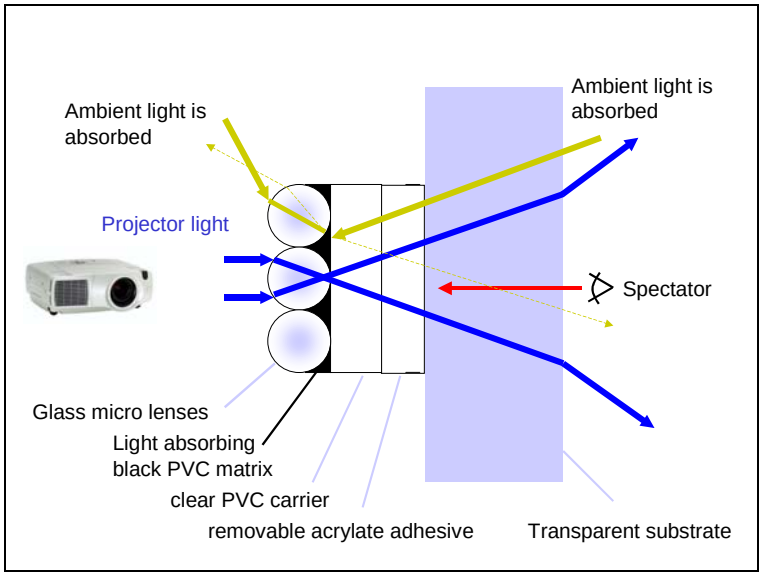
2. Product Construction

Thickness (film + adhesive)	0.3 mm
Film	PVC with incorporated micro glass beads
Adhesive	Acrylate; can be laminated dry but should be laminated wet to avoid air entrapment
Liner	Siliconized paper
Material width	1.2m

3. How it works

The Vikuiti™ Rear projection film combines the focusing power of an optical lens with a black, light-absorbing layer to produce high contrast images, even in brightly-lit environments.

Millions of microscopic glass beads focus the projected light so it exits at just one small point. The black layer then absorbs the ambient light, producing a high contrast image



4. Environmental Durability

Conditions	Values
Temperature Cycling	-40°C/60°C
High Temp./High Humidity	60°C - 80% RH
High Temperature	60°C
Low Temperature	-40°C

Long-term durability data is not yet available. However, in several test installations, degradation in image quality or de-lamination has not been observed so far – six months after installation. Minor shrinkage (less than 1mm), however, was noticed at a seam where two larger sheets were laminated on glass next to each other.

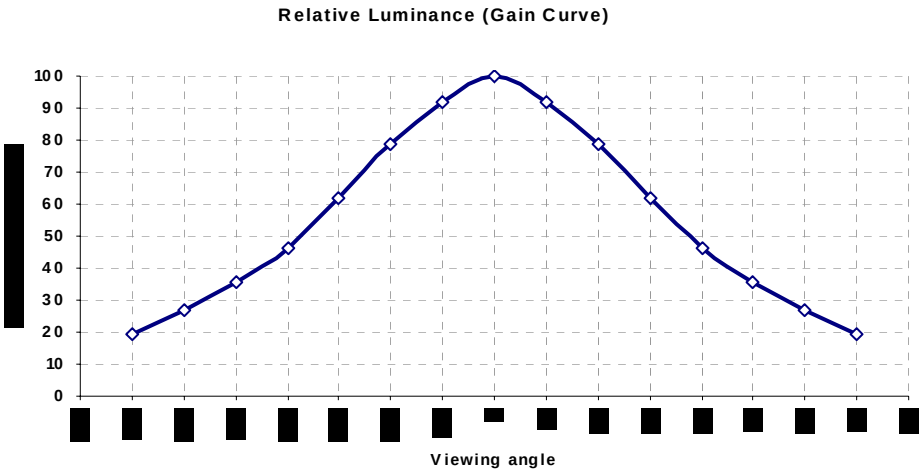
5. Adhesion

The Vikuiti™ Rear Projection Film is equipped with a removable adhesive. After wet film lamination, the residual water evaporates within the following days. The peel force for separating the film from the substrate increases within that time period. Therefore, removing the film from the substrate shortly after lamination is usually possible without significant deformation of the film. Film removal after a longer time period is also easily possible, however because of the higher than initial peel forces, the film will deform and can typically not be re-used.

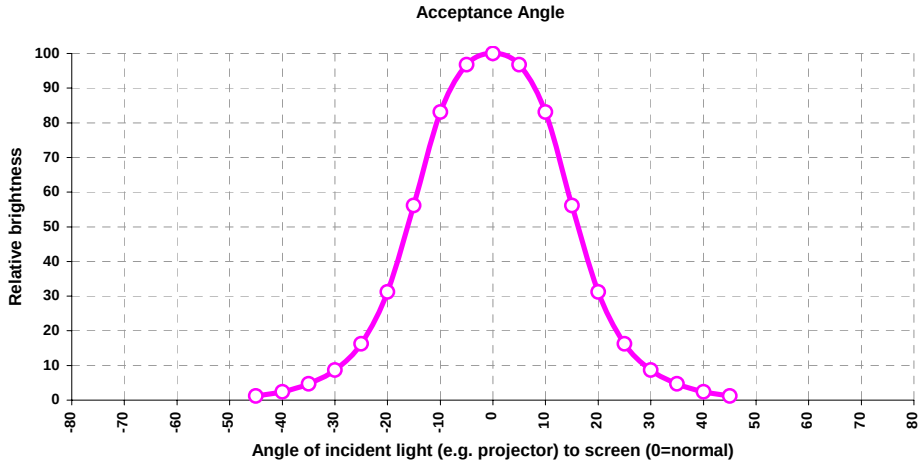
Property	Value	Test method
180° peel force on glass	1,7N/ 25.4mm No residues Film stretches	25.4mm (1”) wide stripe; applied wet; measured after 10 days; 300mm/min peel speed

6. Optical Properties

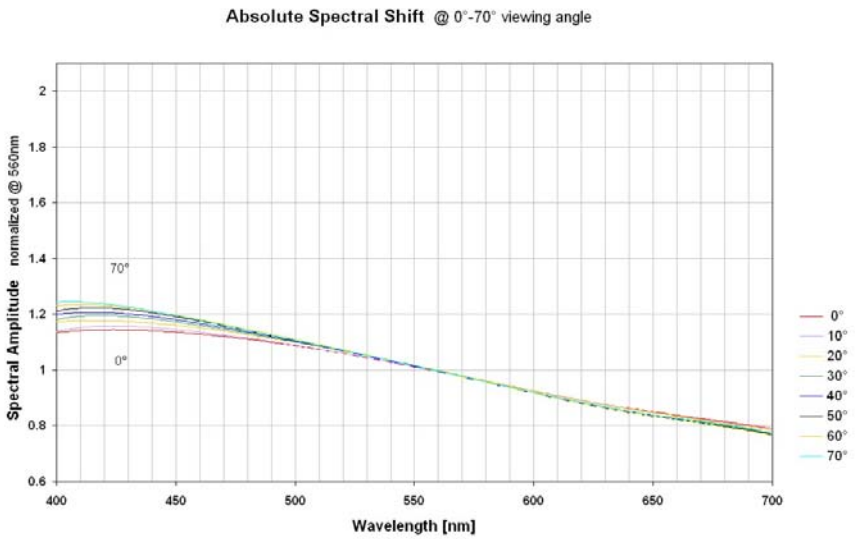
Screen Properties	Values
On Axis Gain	~ 1.1
Nominal Viewing Angle Vertical/Horizontal	35°/35°
Diffuse Transmission	~ 47%
Inter Character Contrast Ratio @ 500 lux	~ 150:1
lp/mm @ Depth of Modulation = 0.30	~ 7.13
Color Shift	u´ ~ 0.007 v´ ~ 0.003



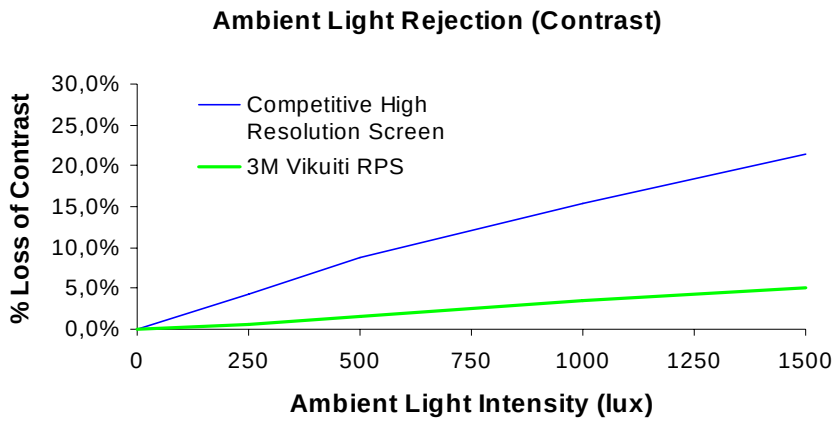
High half gain angle



Spot lights on the rear side of the screen do not reduce the contrast significantly, if they are located such that their light does not fall onto the screen backside with angles < 30°. On the other hand, this means that the projector light should fall onto the screen with incident angles less than 15° from the normal.



Very little spectral shift as a function of viewing angle. Compare with other screens!



High contrast even at ambient light

7. Addendum:
a.) Contrast measurement example:

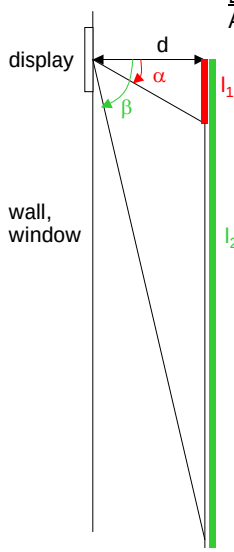
Separate monitor (85cd/m²) behind 8mm thick glass compared to Vikuiti™ Rear Projection Film (RPF) laminated to glass back side.

Luminance was measured on-axis, both, at darkness and in bright environment (5800 lux). Results:

	0 lux (dark)			5800 lux (bright daylight)		
	Separate monitor	Vikuiti RPF 380 lux signal (backside)	Vikuiti RPF 1000 lux signal (backside)	Separate monitor	Vikuiti RPF 380 lux signal (backside)	Vikuiti RPF 1000 lux signal (backside)
View angle 0°	cd/m²	cd/m²	cd/m²	cd/m²	cd/m²	cd/m²
white	85	85	283	195	105	308
black (projector on)	0,5	0,5	1,6	125	21	26
Contrast (w/b)	**170:1**	**170:1**	**177:1**	**1,6:1**	**5,0:1**	**11,8:1**

• Much higher contrast with Vikuiti RPF compared to standard computer monitor in bright daylight. (Here: 12:1 vs. 1,6:1 => Factor 7 better)
• With higher lumen projectors the contrast ratio under daylight conditions can be significantly increased.
• With projectors of higher contrast ratio, the display contrast ratio at darkness can be improved - but not at daylight (without data).

b.) The relevance of the viewing angle for a display in POS:



Example:
A pedestrian walks at a distance of d= 2m along a window.

Which is the time period in which he can watch a video on a display with a given viewing angle α , while walking?

l = d * tan α
distance: 2m
walking speed: 3 km/h

Viewing angle	length	time
30°	1.2 m	1.4 sec
45°	2 m	2.4 sec
80°	11.3 m	13,6 sec

=> A large viewing angle is very important for POS in retail windows

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