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3M Display Materials & Systems Division

Application Guide January 2020

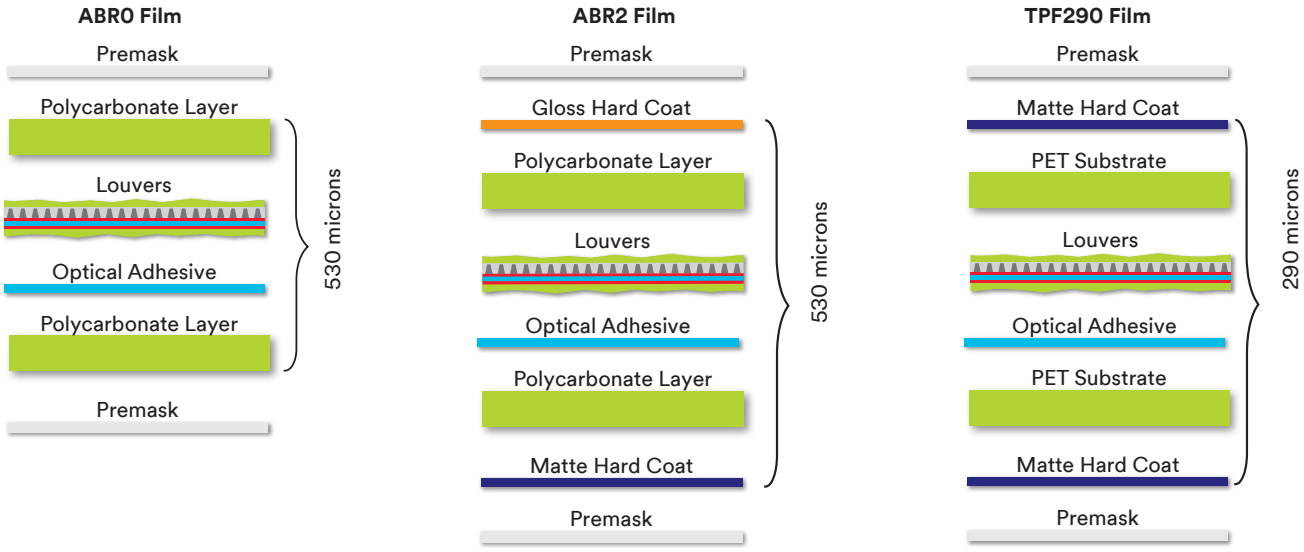
3M™ Light Control Films

Description

Utilizing 3M's proven and effective manufacturing technologies, 3M light control films feature a continuous matrix of black louvers embedded within the film. Primarily intended to limit viewing from off-axis positions for privacy reasons, it can also provide contrast enhancement and greater sunlight readability. It is also useful in reducing stray light, such as eliminating nighttime reflections in automotive instrumentation and aerospace avionics applications.

Construction

Illustrations are not necessarily drawn to scale, and all dimensions are nominal.



The film is available in several versions. Illustrated above are ABR0, ABR2, and TPF290 films. ABR2 film has an abrasion resistant matte hard coat on the top surface, and a glossy hard coat on the bottom surface. TPF290 has an abrasion resistant matte hard coat on both surfaces. ABR0 film has neither the top nor bottom hard coat layers.

Typical Configuration

The most common application is to mount the 3M light control film on the outside of the display. Certain displays will allow mounting of the 3M light control film underneath either the touch screen or in the backlight of a Liquid Crystal Display. Feasibility should be determined by experimentation or by consulting your panel supplier. See illustration below.

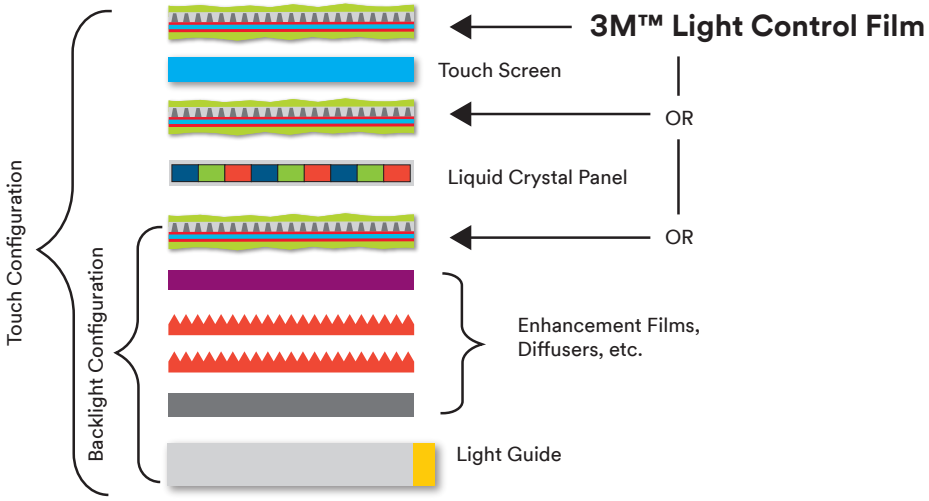
Lamination and Bonding

ABR2 or TPF290 films are recommended when bonding to the exterior surface of the display. ABR0 film is recommended for applications where the film is laminated internally or bonded to another surface such as glass. To prevent scratching or damaging 3M light control film, the protective liners should remain on the film during the fabrication or converting operations. Bonding techniques and specifications are the responsibility of the integrator. In addition, 3M light control film is usually mounted with the louvers running vertically, to limit the viewing angle from the sides (in the horizontal plane). However, applications involving contrast enhancement, sunlight readability, or reflection abatement, usually require limiting ambient light from above. In these cases, 3M light control film would then be mounted with its louvers oriented horizontally.

Moiré Prevention

Moiré is the shadowy appearance of stripes or lines, curved or straight that can occur in an LCD due to the optical interaction of regularly spaced elements within the display. The regularly spaced louvers of 3M light control film may cause this optical interaction with the pixel grid Liquid Crystal Display panel, and thus result in moiré. If encountered, moiré can be greatly reduced or eliminated by converting the 3M light control film at a slight bias offset angle. Experimentation has shown that an offset bias angle of 1 to 12 degrees will usually take care of the problem.

The direction of the louvers can be determined by looking closely at the film, where very fine, closely spaced streaks or lines can be noticed. These are the louvers. To help you determine the film orientation view of the film off-axis from the side.



3M light control films can go above or below the touch screen, or below the liquid crystal panel.

General Converting, Assembly and Handling Recommendations

During converting operations, both the front and rear protective liners should remain on the film. Die cutting is the recommended form of converting and will result in the cleanest edges; shear cutting and laser cutting may also be acceptable. Whatever method used, you should ensure that the part has clean, crisp edges without any raggedness or other damage.

If installed behind the liquid crystal panel, the part should be precisely cut to provide a close fit in the cavity, yet not so close as to experience binding or warping problems from thermal expansion. Also, the part should be left free-floating in the cavity to avoid warping or buckling. If necessary, the part may be tacked down along one edge or 2 adjacent corners with a double-coated optically clear tape, such as 3M 468MP. Designs incorporating mounting tabs or holes mated to mounting pins are also popular.

Remove both protective liners by tacking near an edge or corner with a piece of aggressive tape and pulling gently.

Be aware that handling any polymer film can generate electrostatic charges that can attract dust and debris.

Remove any loose debris from the film by using compressed air.

Avoid fingerprints and debris by wearing clean latex gloves and holding the product at the edges.

Keep the area very clean to lessen the likelihood of debris contamination. Maintaining class 1000 clean room conditions is recommended.

Using anti-static measures, such as ionized air blowers whenever possible, is recommended.

As always, protect the film, especially the edges, from any undue shock or stress.

Shelf Life and Storage (prior to application)

Material should be stored in its original packaging, laying in a horizontal orientation, away from direct sunlight. Heavy objects should not be placed on top of it to avoid damaging the product. Ambient temperature and humidity should be controlled to 10–30°C at 35–65% relative humidity.

Availability

For availability, please contact our customer service group at 1-800-553-9215, DMSDcustomerservice@mmm.com. Or visit our website www.3m.com/displayfilms.

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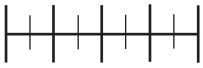
dZ **Requester:** Kristin Wincek **Creator:** deZinnia_26678 **File Name:** AppGuide_Light_Control_Films_75050141359.indd **Structure #:** NA **Date:** 04/09/20	**Printed Colors – Front:** C M Y K **Printed Colors – Back:** C M Y K **Match Colors:**
Scale:  1 Inch	**This artwork has been created as requested by 3M. 3M is responsible for the artwork AS APPROVED and assumes full responsibility for its correctness.**