Instruction Bulletin 2.4 (UK)
Release (UK-C) September, 2001

Design of Cabinets for Light Boxes and Channel Letters Using 3M™ Light Enhancement Film 3635-100

Description

3M™ Light Enhancement Film 3635-100 is an opaque, matte white film. It has low absorption and high efficiency for the diffuse reflection of light (patents applied for). Film 3635-100 can be applied to the interior surfaces of lighted cabinets to increase light output. This may increase the sign luminance, reduce hot spots or reduce the amount of electrical power required to illuminate a sign or channel letter faces.

Cabinet Design Considerations

Film 3635-100 can be applied to the cabinet components before assembly, during the assembly procedures or after the cabinet is completed. The protective top covering of the film helps protect the front surface during the manufacturing process. Test the light enhancement film in the manufacturing process to ensure proper results. Some alteration of processes may be required to successfully use light enhancement film in your specific application.

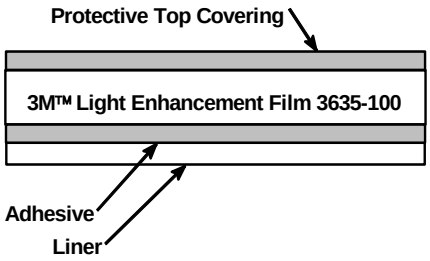

Figure 1.
Profile of 3M™ Light Enhancement Film 3635-100

There are several key elements to designing a successful application with light enhancement film. These elements are common to all applications of adhesive-backed, vinyl films with extra consideration for the high performance front surface of light enhancement film. They are:

- Selecting the substrate
- Preparing the substrate before applying the film
- Applying the film (before or after the manufacturing process)
- Processing the film during manufacturing
- Preparing the final assembly for startup
- Cleaning, repair and maintenance

Film 3635-100 should cover all possible interior opaque surfaces in single sided, internally illuminated cabinets.

Substrate Selection

Light Enhancement Film 3635-100 may be applied to most smooth substrates used in the sign industry today. The exceptions are:

- Plastics with a low surface energy such as polypropylene
- Paints with non-stick additives such as silicone

In addition, certain substrates have some limitations:

- Painted surfaces must be fully cured
- Steel must be properly coated to prevent corrosion
- Polycarbonate substrates may require drying by baking before use. Refer to the manufacturers' instructions.
- Some of the solar-grade coatings may cause adhesive failure and must be checked lot by lot. Refer to Product Bulletin 3635-100 or contact your local 3M Technical representative.

Substrate Preparation

All substrates must be properly cleaned and prepared prior to application of Film Series 3635-100 to the substrate to ensure good adhesion. Failure to properly prepare the surface may result in premature failure of light enhancement film and void the warranty.

Refer to Instruction Bulletin 5.1 *Preparation of Non-Vehicular Substrates Prior to Application of Films and Sheetings*. You may need to test the adhesion of the film to a sample of the substrate and/or dry the substrate prior to use.

Light Enhancement Film in the Cabinet Assembly Process

3M™ Light Enhancement Film 3635-100 can be applied to substrate surfaces before cabinet or channel letter components are assembled.

- The film can be applied using the dry method or by the wet method using detergent and water. If the wet method of film application is used, wait at least 24 hours with the materials at room temperature before further processing to allow the water to dry.
- DO NOT REMOVE the protective top covering until the cabinet assembly is completed. This covering provides some protection for the high efficiency front surface of the light enhancement film.

Test Manufacturing Processes

Each manufacturer has unique equipment and processes for building light boxes and channel letters. We recommend that light enhancement film be tested in the process prior to manufacturing.

Film Light Enhancement Film Series 3635-100 has been successfully pre-applied in the following processes:

- Coil stock put through channel letter machines
- Router cut substrates
- Plasma cut substrates
- Water jet cut substrates
- Thermoformed on plastics
- Roll formed substrates
- Stapled through, stamped, etc.

Tolerances on Automated Equipment

When setting up the tolerances on automated processing equipment, always adjust for the total thickness of the applied light enhancement film construction including the protective covering, which is 0.216 to 0.241mm.

Welding Considerations

Plasma cutters and welders may require that a small piece of light enhancement film be removed from an edge of the substrate to allow the arc to initiate. Test the process first if any welding or other high temperature joining or processing is involved in the manufacturing process. Remove film from the areas to obtain the best bond and avoid burning or browning the film with heat. If this occurs, remove the section of discolored film, properly clean the surface, and patch the area with a new piece of light enhancement film (see Surface Preparation).

Ventilation

⚠ Caution

In operations involving high heat or energy, such as thermoforming or plasma cutting, always provide adequate ventilation to remove emissions from the film that result.

Failure to provide adequate ventilation can result in operator over exposure.

Consult with a certified industrial hygienist and with a heating and cooling contractor to make sure air flow is sufficient to keep worker exposure below the limits in the 3M Material Safety Data Sheet.

Routing Considerations

Two styles of bits may be used to route aluminium substrates: an upward spiral bit and a downward spiral bit. In order to shear the film rather than ripping it, position the substrate so the film is on the opposite side of the router bit's spiral. For example, if you are using an upward spiral bit, position the substrate with the film side down, and if you are using a downward spiral bit, position the substrate with the film side up.

Thermoforming

When thermoforming with light enhancement film, refer to Instruction Bulletin 5.16, *Vacuum Thermoforming of 3M™ Scotchcal™ Translucent Film Series 3630 Applied to Rigid Plastic Substrates*. Even though light enhancement film is not a translucent film, the same techniques and issues apply.

Film Application

The two most frequently used application methods are hand application and automated roll lamination. With the hand application method, Light Enhancement Film 3635-100 may be applied with the wet method or the dry method. Roll lamination is a dry process.

Refer to Instruction Bulletin 5.5, *Hand Application of Markings with Pressure Sensitive Adhesives to Flat and Curved Surfaces*, and Instruction Bulletin 5.7, *Application of Translucent Pressure Sensitive Films to Flat Rigid Plastics*. Although light enhancement film is not a translucent film, the wet method described in these Instruction Bulletins can be used. If the wet method is used, the application must dry for 24 hours before thermoforming or processing through automated equipment.

Application Temperature

The minimum application temperature for Film 3635-100 is 4.5°C. The air, film, and substrate must be at or above this temperature for a successful application.

Wrinkles and Bubbles

Film 3635-100 is used on the interior of sign cabinets and channel letters where the film is not viewed by the public. Therefore, some bubbles and wrinkles in the film application are acceptable if the film is adhered properly. Wrinkles and bubbles do not adversely affect the high efficiency light reflectance of light enhancement film.

Protective Top Covering

Remove the protective top covering after final assembly. See Finishing the Application.

Finishing the Application

After film 3M™ Light Enhancement Film 3635-100 has been applied and the box is complete, remove the film's protective top covering. If the covering was removed before this point, clean all film surfaces according to the recommendations in the Cleaning, Repair and Maintenance section. Any dirt or fingerprints picked up through handling in the manufacturing process reduces the efficiency of the film.

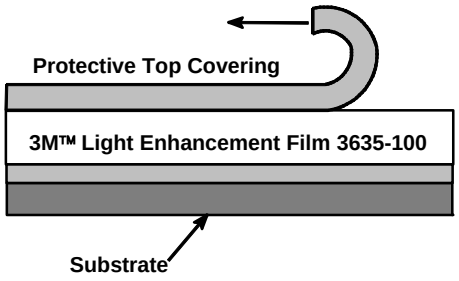

Figure 2. Removing Protective Top Covering from 3M™ Light Enhancement Film 3635-100

Resqueegee all the edges of the film with a 3M Plastic Applicator PA-1 wrapped in a low friction sleeve; this is an essential step.

Cleaning, Repair and Maintenance

Cleaning

Film 3635-100 can be cleaned with almost any cleaner such as the kind used for high quality painted surfaces. The cleaner must be wet, non-abrasive, without strong solvents, alcohol and have a pH value between 3 and 11 (neither strongly acidic nor strongly alkaline). Always test the cleaner in a small inconspicuous area first.

The film must be cleaned a minimum of once per year, and more frequently in dirty environments, to maintain efficiency.

Patching Light Enhancement Film

If the film is damaged, you can restore efficiency to the lighting by patching the film. If the cabinet is also damaged, the damaged area must be smooth, clean and in sound mechanical condition. Clean the damaged surface following the surface preparation procedures in Instruction Bulletin 5.1, *Preparation of Non-vehicular Substrate Prior to Application*. Cut a piece of light enhancement film to cover the area. Apply the piece over the damaged section. Squeegee the edges.

Shelf Life, Shipping, and Storage

- Film 3635-100 has a shelf life of 2 years after receipt from 3M.
- Store the film in a clean dry area, in the original container, out of direct sunlight and at less than 38°C.
- Keep rolls wrapped after opening the packaging.
- Do not lay sharp or heavy objects on the film or stack unprotected rolls.
- See Instruction Bulletin 6.5 for details. Refer to the 3M Related Literature section for further information.

Related 3M Literature

Listed below is related 3M technical literature that may be of interest.

Subject	**Instruction Bulletins**
3M Light Enhancement Film 3635-100	3635-100
Design of markings	2.1
Scoring and cutting	4.1
Premasking/prespacing	4.3
Surface preparation, non vehicular	5.1
Application to flat and curved surfaces, markings with pressure sensitive adhesive	5.5
Application of translucent pressure sensitive and changeable films - to flat rigid plastic signs - to flat glass	 5.7 5.8
Thermoforming	5.16
Storage, maintenance, removal	6.5
Warranty of Products	-

Health & Safety

Refer to the package label and the Material Safety Data Sheet for health, safety, and handling information on the products referenced in this bulletin. For 3M products, if necessary, you may contact our Toxicology/Product Responsibility Department on 01344 858000.

Important Notice to Purchaser

The 3M products described in this publication are covered by a 3M warranty and limitation of liability.

3M's warranty provides that if 3M finds that goods are defective in material or workmanship they will be replaced or the price refunded at 3M's option but note that 3M does not accept liability for other direct losses (except for personal injury or death) or consequential losses relating to defective products or from information supplied by 3M.

Purchasers and users of 3M products, and not 3M supplying companies, are always solely responsible for deciding on the suitability of the 3M product for their required or intended use.

Technical Assistance

For help on specific questions relating to 3M Commercial Graphics Division Products, contact your local Technical Service Representative.

Commercial Graphics Department
3M United Kingdom PLC
3M Centre
Cain Road
Bracknell
Berkshire
RG12 8HT

Tel: 01344 857850
Fax: 01344 857939
e-mail: commgraphics.uk@mmm.com
www.3m.com/uk/graphicsolutions
www.scotchprint.com/uk

Sales Assistance

Commercial Graphics Group
3M United Kingdom PLC
3M House
28 Great Jackson Street
Manchester
M15 4PA

Tel: (0161) 237 6394
Free Fax: (0800) 378127
e-mail: commgraphics.uk@mmm.com
www.3m.com/uk/graphicsolutions
www.scotchprint.com/uk