Science. Applied to Life.™

Commercial Solutions Division

# 3M™ Dual-Color Film

## Series 3635-200

## Product Description

3M™ Dual-Color Film Series 3635-200 are perforated light management films to create durable, permanent channel letters, signs and displays.

Dual-color films can create the special effect of a color/image by day (not lighted) and a different color by night (backlit). The films have a maximum transmission value of 15.9%.

### Product Line

| | | |
|---|---|---|
| Illuminated signage | 3635-210 | white, perforated, matte, permanent adhesive. Wide selection out of large color range. Special colors available on request. |
| | 3635-222 | black, perforated, matte, permanent adhesive (clear). |

## Product Characteristics

These are indicative values for unprocessed products.
Contact your 3M representative for a custom specification.

### Physical & Application

| | | |
|---|---|---|
| Material | calendered vinyl (polymeric) | |
| Surface finish | matte | |
| Thickness (film) | 110 µm (0.11 mm) | |
| Adhesive type | solvent acrylic, pressure-sensitive | |
| Adhesive appearance | clear | |
| Liner | Kraft paper | |
| Adhesion | approx. 13 N/25 mm | FTM 1: 180° peel, substrate: glass; cond: 24 h 23°C/50%RH |
| Application method | dry only! | |
| Applied shrinkage | < 0.4 mm | FTM 14 |
| Application temperature (minimum air and substrate) | +16°C | for flat surfaces |
| Service temperature (after application) | -60°C to +107°C | (not for extended periods of time at the extremes) |
| Surface type | flat | |
| Substrate type | glass, PMMA, PC*, PETG*, ABS<br>*Might require drying with heat before use | |
| Graphic removal | Hard to remove from supported substrates. | |

The values above are the results of illustrative lab test measurements and shall not be considered as a commitment from 3M.

### Storage

| | |
|---|---|
| Shelf life | Use within two years from the date of manufacture on the sealed original box. Use within one year after opening the box. |
| Storage conditions | +4°C to +40°C, out of sunlight, original container in clean and dry area. |

The shelf life as defined above remains an indicative and maximum data, subject to many external and non-controllable factors. It may never be interpreted as warranty.

### Flammability

Flammability standards are different from country to country. Ask your local 3M contact for details, please.

## Durability

The durabilities mentioned in the table below are the results of illustrative lab tests. The values show the best performance expected from these products, provided that the film will be processed and applied professionally according to 3M's recommendations.
The durability statements do not constitute warranties of quality, life and characteristics.
The durability of products is also influenced by:

- the type of substrate and thorough preparation of the surface (with 3M™ Surface Preparation System)
- application procedures
- environmental factors
- the method and the frequency of cleaning

Unprocessed film

The following durability data are given for unprocessed film only!

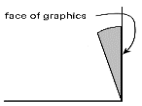
Climatic zones

Graphic durability is largely determined by the climate and the angle of exposure. Find below a table showing the durability of a product according to the angle of exposure and the geographical location of the application.

| | |
|---|---|
| Zone 1 | Northern Europe, Italy (north of Rome), Russia |
| Zone 2 | Mediterranean area without North Africa, South Africa |
| Zone 3 | Gulf area, Africa |

Exposure types

Vertical:




The face of the graphic is ±10° from vertical.

| **Vertical outdoor exposure** white/black | **Zone 1** | **Zone 2** | **Zone 3** |
|---|---|---|---|
| | 7 years | 6 years | 5 years |

3M™ Performance Guarantee and MCS™ Warranty

In addition, 3M provides a guarantee/warranty on a finished applied graphic within the framework of 3M™ Performance Guarantee and/or 3M™ MCS™ warranty programs.

For detailed graphic construction and application options along with specific Warranty periods, please see the Warranty matrices and Warranty information on 3M Graphic Solutions/Warranties.
Visit www.3mgraphics.com for getting more details about 3M's comprehensive graphic solutions.

## Limitations of End Uses

3M specifically does not recommend or warrant the following uses, but please contact us to discuss your needs to recommend other products.

Graphics applied to

- 2nd surface to 3M™ Panagraphics™ III Wide Width Flexible Substrate not recommended.
- low surface energy substrates or substrates with low surface energy coating.
- other than flat surfaces.
- stainless steel.
- surfaces that are not clean and smooth.

Important Notice

- 3M Commercial Solutions products are not tested against automotive manufacturer specifications!
- Non vertical applications will have a significant decrease in durability!
- Thermoforming of applied film is not recommended!

## Graphics Manufacturing

Graphic protection can improve the appearance, performance and durability of printed graphics. Any printed graphic exposed to abrasive conditions (including vehicles), harsh cleaners or chemicals must include graphic protection in order to be warranted.

When to use an overprint clear or overlaminate

See instruction bulletin GPO 'graphic protection options' for further information about selection and use of protective overlaminates and printable clears.

> Product Bulletin Graphic Protection Options <

Shipping finished graphics

Flat, or rolled film side out on 130 mm (5 inch) or larger core. These methods help to prevent the liner from wrinkling or application tape, if used, from popping off.

## Converting Information

### Inkjet Printing

A too high total physical ink amount on the film results in media characteristic changes, inadequate drying, overlaminate lifting, and/or poor graphic performance. The maximum recommended total ink coverage for this film is 270%.

**Adequately Dry Graphics**

Inadequate drying can result in graphic failure including curling, increased shrinkage and adhesion failure, which are not covered under any 3M warranty.
Poorly dried film becomes soft and stretchy, and the adhesive becomes too aggressive.
Even if your printer has a dryer, it may not adequate dry latex and solvent inks in the short period of time it spends passing through the heater.

**Recommendations to improve the drying of solvent inks**

Dry the graphic unrolled or at least as a loose wound roll standing upright. To further increase air circulation place the spooled film roll on a grid, and place a fan beneath the grid.

If you only spool open the film, adequate drying could still take a week, depending on the environment.

Build enough time into your process to ensure adequate drying of the graphic. 3M recommends at least a minimum drying time of 24 hrs before further processing. Test: Fold a piece of film with maximum ink laydown of the graphic onto itself. Apply 140 g/cm² for 15 minutes, release and check for effects like sticking or dull spots. These are clear indications that further curing or drying is needed.

**Notice: Latex inks are different**

Unlike solvent inks, spooling and letting latex printed graphics sit does not help to cure the ink, but does allow the graphic manufacturer to see if any oily spots are generated which may interfere with proper adhesion of overlaminates.
To ensure proper latex ink drying, use the following recommendations:
Media Presets: HP media presets contain all the needed settings to print on a specific media.
Download and use media presets from the following page: www.hp.com/go/mediasolutionslocator.

Environmental Conditions: HP media presets have been specially designed and tested for each printer-media combination. Recommended environmental conditions: +20°C to +25°C, Humidity 40% - 60% RH

**Important notice for HP 831/871 and HP 881/891**

The amount of ink printed is the main key for proper overlaminate adhesion. Select a media preset using 100% or less ink density.

**Post-processing of latex printed graphics immediately after printing**

Latex inks should emerge from the printer fully dried. Post-air drying of a wet print will not enable drying, since latex ink drying requires that the dried ink is heated above the film formation temperature of the latex inside the printer.
For immediately post-processing of latex printed graphics follow strictly the recommendations given above (Section: Latex inks are different) and test the proper drying with the following performance tests:

Visual Test: Check the image immediately after printing. The sample should not be wet or sticky to the touch, or have an 'oily' feel when it emerges from the printer.
Rubbing Test: After the visual inspection, wipe the printed sample with a white wet paper towel. Fully-dried ink should resist wiping and should not show any stains on the white cloth. If the ink is easily removed by wet rubbing, then it is not dried.
Stacking Test: In some cases, the top surface will appear dry after printing but within a few minutes ink may migrate to the surface leaving an oily aspect. To ensure proper drying, stack at least 12 sheets liner to printed side and let sit for one hour.
After 1 hour, remove the stack and check for "oily" stains, wet surfaces or glossiness changes on high ink laydown areas on each sheet. If any of these occur, then the ink is not properly dried.

If a sample is not properly dried on the printer, reprint the image under a condition that allows complete drying. Common improvement steps are:
- Increasing the drying temperature in 5 degree steps.
- Increasing the number of passes to slow down printing.
- Reducing the amount of ink printed (media preset with lower ink densities).

**Allow the converted graphic to build sufficient bond prior to application/installation**

Give laminated samples time before applying them. The adhesion bond between the laminate and the printed base film will increase with time. 24 hours minimum for room temperature laminated graphics.
8 hours minimum for graphics laminated with heated rolls (one or two). Lamination temperature: +40°C to +60°C. Lamination speed: maximum 2 meter/minute.

## Converting Information

### Screen Printing

Formulations and processing conditions can affect ink durability. Refer to the 3M Product and Instruction Bulletins for your ink for limitations and proper usage. Graphic protection can improve the appearance, performance and durability of your graphic.

A clear coat also prevents chalking on unprinted films. Use equipment designed to handle high viscosity materials and make sure the coating is evenly applied to the specifications given in the clear's Instruction Bulletin.

Abrasion and Loss of Gloss

Abrasion damage and loss of gloss are not covered by any 3M warranty. This is considered normal wear and tear.

## Application

See product bulletin ATR ‘application tape recommendations’ for information about selection and use of suitable application tapes for this product, please.

> Product Bulletin Application Tape Recommendations <

Refer to Instruction Bulletin 5.1 ‘select and prepare substrates for graphic application’, for general application information.

>Instruction Bulletin 5.1 'select and prepare substrates for graphic application'<

## Maintenance and Cleaning

Use a cleaner designed for high-quality painted surfaces. The cleaner must be wet, non-abrasive, without strong solvents, and have a pH value between 3 and 11 (neither strongly acidic nor strongly alkaline).

Refer to Instruction Bulletin 6.5 ‘storage, handling, maintenance and removal of films and sheetings’, for general maintenance and cleaning information.

>Instruction Bulletin 6.5 'Storage, Handling, Maintenance and Removal of Films and Sheetings'<

## Important Safety Remark

Application to glass

The application of colored or printed film onto glass with sunlight exposure can lead to glass breakage through thermal expansion of the glass. The local conditions must be examined for the danger of glass break by uneven heat absorption through sun exposure. Type of glass (insulation glass, float glass, LSG, toughened safety glass, semi-tempered glass, etc.), glass dimension, joint condition, flexibility of the sealant, quality of the edge finishing, geographical orientation and partial shadow during sun exposure are the determining factors. Light color designs and application on the outside of the window are to be preferred. A free non-applied framework of 4 mm around the entire window front can help to dissipate the absorbed warmth. According to common knowledge a thermal crack can occur at temperature differences of approx. 130°C (toughened safety glass), approx. 40°C (float glass) or approx. 110°C (semi-tempered glass). Coldest place is usually under the framework in the embedded joined window part, the warmest place is typically on the darkest place in the format. Because of the many above mentioned factors, glass breakage cannot be fully predicted, therefore 3M does not accept liability for glass breakage when using this film for window graphics.

## Remarks

This bulletin provides technical information only.

Important notice

All questions of warranty and liability relating to this product are governed by the terms and conditions of the sale, subject, where applicable, to the prevailing law.

Before using, the user must determine the suitability of the product for its required or intended use, and the user assumes all risk and liability whatsoever in connection therewith.

As outdoor graphics age, natural weathering occurs causing a gradual reduction in gloss, slight color changes, some lifting of the graphic at the edges or around rivets, and ultimately a minor amount of cracking.

These changes are not evidence of product failure and are not covered by a 3M warranty.

Additional information

Visit the web site of your local subsidiary at www.3Mgraphics.com for getting:

- more details about 3M™ MCS™ Warranty and 3M™ Performance Guarantee
- additional instruction bulletins
- a complete product overview about materials 3M is offering

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