Commercial Solutions Division

3M™ DI-NOC™ Architectural Finishes

EX Series

Product Description

3M™ DI-NOC™ EX Series Architectural Finishes are durable, dimensionally stable, and weather resistant surface finishes for exterior applications. These decorative surface finishes offer the warmth of wood grain, sleek feel of metal, cool essence of natural stone and pure colors. They can be applied directly on smooth, non-porous application surfaces, such as aluminum, galvanized steel, and painted metal. DI-NOC EX Series is designed to maintain consistent finish and color, despite UV exposure and other conditions.

This film uses 3M™ Comply™ technology.
3M™ Comply™ are air release channels allowing fast and easy, bubble-free application of films.

Product Line

Fine Wood/Woodgrain	Metallic	Single Color	Abstract
FW-233EX	PA-1854EX	PS-090EX	AE-1632EX
FW-618E	PA-038EX	PS-957EX	AE-1634EX
FW-625EX	PA-039EX	PS-959EX	AE-1635EX
FW-887EX	PA-181EX	PS-976EX	ST-442EX
FW-1122EX	PA-187EX		ST-736EX
FW-1214EX	PA-389EX		
FW-657EX			
FW-960EX			
FW-1140EX			

24 exterior designs are available with 1 roll minimum order quantity. Additional DI-NOC EX designs are available by special order. Please contact your 3M representative for further information.

Product Characteristics

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

Physical & Application

Material	PVC	
Surface finish	depends on design	
Thickness (film)	200 µm (varies between film constructions)	
Adhesive type	acrylic, pressure-sensitive, permanent	
Liner	Silicone coated poly paper	
Adhesion	N/25 mm	FTM 1: 180° peel, substrate: see listed below; cond: 24 h 23°C/50%RH

Substrate	Adhesion
Anodized Aluminium	36
Colored Aluminium	31
Painted Aluminium	36
Aluminium Composite Panel	36
Galvanized Steel	40
Painted Steel	36
DI-NOC™ Film	22

Application method	dry only!	
Applied shrinkage	< 0.4 mm	FTM 14
Application temperature (minimum air and substrate)	+12°C to +38°C	
Surface type	flat to simple curved, moderate compound curves and corrugations depending on product pattern	
Substrate type	metal and other smooth, flat, hard, non-porous exterior application surfaces except for 3-dimensional surfaces and deep channels	
Graphic removal	Good to remove with heat (+80°C to +100°C)	
	No liability is given for ease or speed of removal of any graphic. Pay attention to adequate air and substrate temperature.	
	Product removal may damage the substrate or its finish.	

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

Chemical Resistance

Product applied to an aluminium panel, conditioned for 72 hours and then immersed in the chemical agents.

Chemical Agent	Exposure Time	Result
Water	24 hours	No
Chloride (10%)	24 hours	No
Hydrogen Peroxide	72 hours	No
Sodium Hydroxide (10%)	24 hours	No
Ethanol	24 hours	No
Isopropyl Alcohol	72 hours	No
Ethyl Acetate	5 minutes	Deterioration observed
Methyl Ethyl Ketone	5 minutes	Deterioration observed
Acetone	72 hours	Deterioration observed
Toluene	5 minutes	Deterioration observed

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 +32°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.

Primer

Generally, on flat surfaces primer is not required. Only if the surface energy of the substrate is low or on critical surfaces with sharp radius, edges where 3M DI-NOC is stretched, primers should be used. For high surfaces energy substrates such as metal or paint no primer is required. Primer is required at any overlaps of the film and wherever the material is stretched.

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
- application procedures
- environmental factors
- the method and the frequency of cleaning

Unprocessed film — The following durability data are given for unprocessed film only!

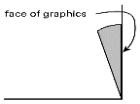
Climatic zones

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	**Zone 1**	**Zone 2**	**Zone 3**
	10 years	7 years	4 years

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.

Films applied to

- vehicles outdoor exposure
- surfaces that are not clean and smooth
- surfaces with poor paint to substrate adhesion

Important Notice

- also when 3M DI-NOC Architectural Finishes EX is used horizontally, it can be exposed to abrasion which is greater than normal. This can lead to premature wear and/or damage to the film. In these cases 3M™ DI-NOC™ Architectural Finishes Abrasion Resistant Series is recommended. 3M does not recommend the use of an overlaminate.
- a significant decrease in durability may be experienced if films are exposed other than vertically. Such non-vertical application should be based on 3M tests results and approval to determine acceptability. Application performance statements are based upon representative values obtained from testing throughout Japan/Europe. However, actual performance will be determined by substrate selection and preparation, exposure conditions and maintenance of the marking.
- the use of primer on critical surfaces may promote adhesion to substrate. Verification of individual cases is necessary to find out which promoter is the best to use (all-over or partial).

Graphic removal from

- signs or existing graphics that must remain intact.

Graphics subjected to

- gasoline vapors or spills.

Important Notice

- 3M Commercial Solutions products are not tested against automotive manufacturer specifications!

Converting Information

3M DI-NOC Architectural Finishes EX is normally applied in sheets directly from the roll. In case people want to cut or screen-print that is possible but not the primary intention of the film.

Electronic Cutting

The variable characteristics of electronically controlled cutting equipment require users to verify their specific requirements.

The film is not designed for the purpose of e-cutting and not warranted, however, should you wish to electrocut this material 3M would advise the following:

Sharpness of knife blade

Dull blades impart a serrated look to the edge of the cut film.

Weight of knife blade

The ideal weight slightly scores the liner. Too little weight does not cut completely through the film and the adhesive. Excessive weight cuts the liner and causes the blade to drag, accelerating wear and creating a serrated cut edge on the film.

Avoid cutting sharp corners as these can tear during the application process.

Test any application tape used to ensure that this does not cause the film layers to separate during installation.

Weeding

It is recommended to weed 3M DI-NOC Architectural Finishes EX immediately after cutting. This is to minimize the effect of possible adhesive flow 24 hours or more after cutting.
Note: 3M DI-NOC is not treated with antistatic charges.

When weeding check removability of small pieces. Being a multilayer film, separation can occur when weeding. This may increase weeding time on small parts.

Temperature and relative humidity

Temperature and relative humidity are minor considerations, but avoid extreme or rapid fluctuating conditions.

Roll storage

Store the film in the same environment as the cutting equipment.

Further information

For more details refer to our instruction bulletin 4.1 ‘Sheeting, Scoring, Film Cutting’, please.

>Instruction Bulletin 4.1'Sheeting, Scoring, Film cutting'<

Converting Information

Whilst 3M DI-NOC Series PS can be screen printed or PIJ printed, other products such as the Controltac™ series of films, for example, are more suitable for this process.

Screen Printing / Digital Printing

Screen printing or PIJ printing is not warranted, however, should you wish to print DI-NOC 3M recommends to use 3M™ Screen Printing Inks Series 1900 or PIJ printing systems such as UV, solvent or latex based inks.

To protect the graphic 3M recommends to clear coat using 3M™ Screen Print Dirt Resistant Gloss Clear 1920DR or laminate with 3M™ Scotchcal™ Gloss Overlaminate 8518 or 3M™ Scotchcal™ Matte Overlaminate 8520.

The 4-color half tone printing is neither recommended nor warranted.

Converting Information

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%.

Inkjet Printing

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.

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.

Application

3M™ SCPS-55 is recommended for prespacing of cut letters.

Preparation of Substrates

3M recommends applying DI-NOC products at +12°C to +38°C.
The application method must be dry only due to Comply™ adhesive.

Refer to Instruction Bulletin DI-NOC for general application information.

>Instruction Bulletin DI-NOC A Guide for Interior and Exterior Dry Application<

Maintenance and Cleaning

For cleaning of applied 3M DI-NOC Architectural Finishes EX use a soft textile with detergent and water. 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).
For heavy dirt accumulation use detergent and water at +70°C to +80°C.

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' <

LEED®v4 Credits

DI-NOC™ EX Series can contribute to credits under LEED®v4. Please note that each application is different. It is the sole responsibility of the end user to evaluate and determine whether LEED®v4 credits are applicable. Refer to Customer Information DI-NOC LEED®v4 credits.

> Customer Information DI-NOC 'LEED®v4 credits' <

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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