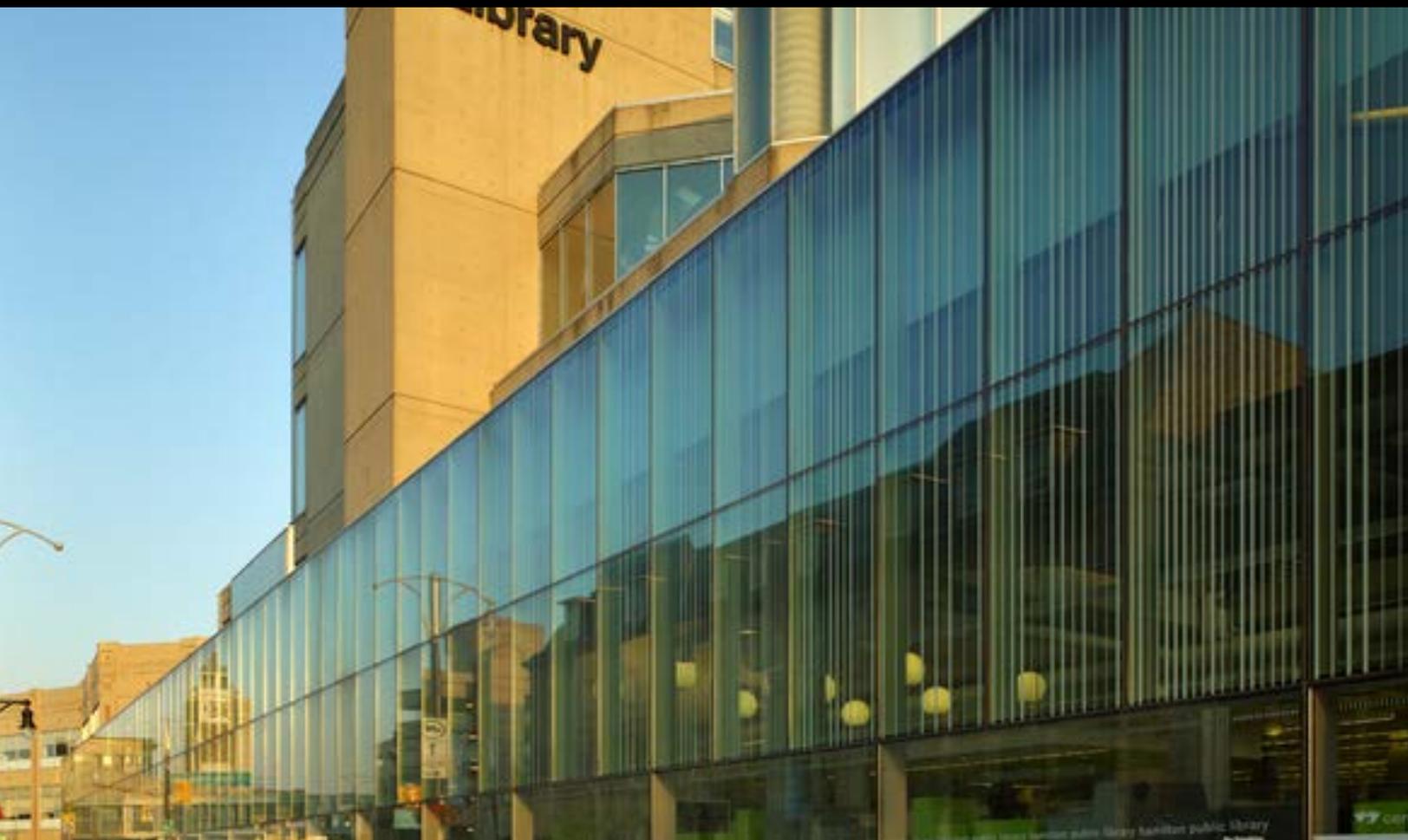


VIRACON®
GLASS IS EVERYTHING™



T E C H T A L K

CERAMIC FRIT AND INK VISUAL CHARACTERISTICS

CERAMIC FRIT AND INK VISUAL CHARACTERISTICS

This Tech Talk provides recommendations to minimize undesirable aesthetic outcomes when designing with ceramic frit or ink.

Introduction

When using silk-screen, spandrel or DigitalDistinctions™ in architectural building applications, the design details require careful consideration to avoid an unintended aesthetic result such as a moiré pattern or an uneven, checkerboard appearance.

What is Moiré?

Moiré is an optical phenomenon that typically appears as a wavy, rippled or circular pattern. It is formed when two regularly spaced, non-aligned patterns overlap. Moiré is not a defect in the glass, silk-screen or digital printing process but rather a pattern formed by the eye.

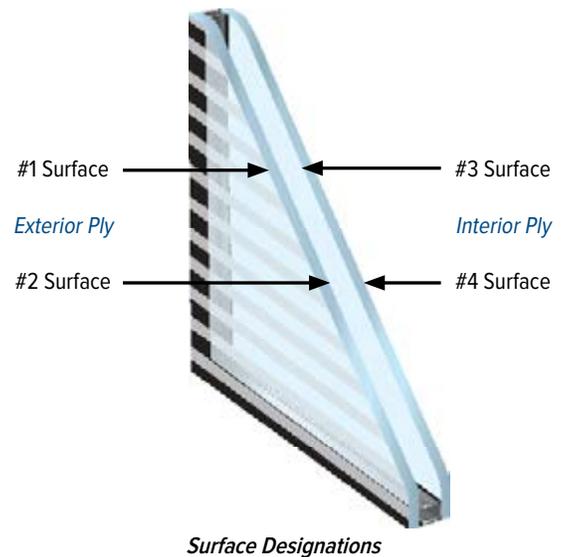


Moiré Example

Although it is impossible to identify when a moiré pattern may appear, the following architectural glass applications, colors and patterns are generally more prone to exhibiting moiré patterns.

APPLICATIONS

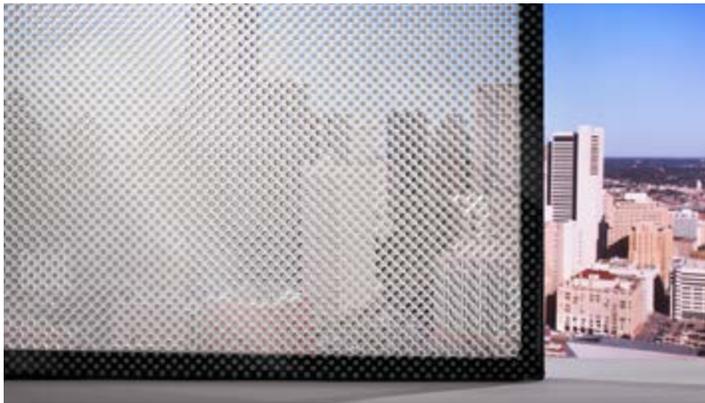
Insulating glass units utilize two plies of glass separated by a space. Glass reflects light from each of its surfaces so a pattern applied to the #2 surface will cast a shadow on the #3 surface. The misalignment between the pattern and its shadow may cause a moiré pattern to appear.



Moiré potential is further increased with spandrel applications. When full coverage ceramic frit is applied to the #4 surface, the appearance of the shadow cast on the #3 surface is enhanced. The same is true with a shadowbox application where a metal panel, or alternate material, is installed behind the insulating glass unit.

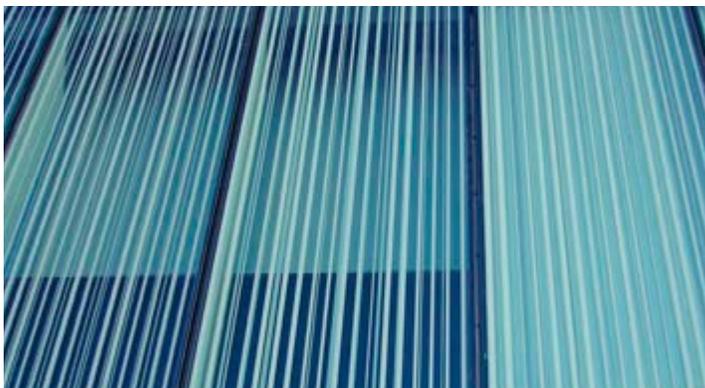
DUAL SURFACE DESIGNS

Placing a pattern on two surfaces within an insulating unit is often considered however extreme caution should be taken as dual surface designs also increase moiré potential. They are especially problematic when the pattern on one surface is the exact inverse of the pattern on the alternate surface such as 40% coverage 1/8" dots on surface #2 and 60% coverage 1/8" holes on surface #3. Due to viewing angles, weather conditions, sun angles and manufacturing tolerances, the two patterns and their shadows will always exhibit some misalignment and will be susceptible to forming a moiré pattern.



Sample with Dots #2 and Holes #3

A dual surface design with less moiré risk can be achieved by utilizing a random pattern on both surfaces. This minimizes repetitive misalignment, thus reducing the potential for moiré to appear. Shown here is an example with randomly spaced vertical lines of varying width applied to the #2 and #3 surface of an insulating glass unit.



Hamilton Farmers Market and Central Public Library

COLORS

The potential for moiré is also influenced by color selection. When light colored patterns are utilized on the #2 surface, the visibility of the pattern's shadow on the #3 surface is accentuated due to the contrast between the #2 surface pattern and its #3 surface shadow. The shadow on the #3 surface will typically appear dark gray. The increased contrast increases the potential for moiré, especially in cases where the #4 surface full coverage spandrel is also a white or light gray color.

Selecting a darker color for the #2 surface pattern or #4 surface full coverage spandrel can help minimize the contrast and decrease moiré potential.

Properly Using Spandrel Glass

Viracon's spandrel glass has been developed specifically to clad spandrel areas of a building façade and Viracon does not recommend using this product for any other application. If used in another application the potential for creating an uneven or checkerboard appearance increases.

APPLICATION

The proper application for ceramic fritted spandrel glass is to install it in an opening that has a uniformly colored insulation or back-pan that eliminates the possibility of read-through or viewing the glass in transmission. When done properly, the glass may only be viewed from the exterior of the building, with daylight reflecting from the glass surface

Spandrel Glass is not for vision wall areas. We do not recommend using spandrel glass in any application where it can be viewed with daylight or artificial light on the opposite side such as interior partitions, mechanical rooms, screen walls or glazing in a parking garage.

Glass by its nature is highly transparent and it is impossible to make it uniformly opaque. The application of the ceramic frit to the glass surface is achieved by conveying the glass under a rubber application roller. The application of the frit to the glass surface results in striations from the roll that are highly visible when viewing the glass in transmission (with light on the opposite side).



Spandrel Glass Sample

CONFIGURING A SPANDREL GLASS UNIT

Due to the inherent striations, variations in paint opacity and thickness, Viracon's full coverage ceramic frit should not be applied to an odd numbered surface. Placing the frit on an even numbered sur-

face minimizes potentially objectionable aesthetics by allowing the frit to be viewed from the exterior of the building with daylight reflecting from the glass surface.

Mock-up Requirement

Due to the complexity of designing with ceramic frit and ink, Viracon requires evaluation of a full-size mock-up when utilizing the following products:

- DigitalDistinctions
- Custom Silk-screen Patterns
- Custom Ceramic Frit Colors

In addition, a mock-up is recommended for any application where moiré potential may be a concern.

The mock-up should be installed at the building site and viewed under a variety of lighting and temperature conditions.

Conclusion

When using silk-screen, spandrel or DigitalDistinctions™ in architectural building applications, it is important to carefully consider each design detail. Reviewing all elements including the type of pattern, pattern color, spandrel color and placement of these within the glass are more likely to provide the desired aesthetic outcome. Specifying a mock-up and viewing it on-site can further assist with avoiding unintended visual characteristics.



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