

# STRUCTURAL SUPPORT

## INTRODUCTION

This fabrication bulletin addresses the proper support of horizontal DuPont™ Corian® solid surface installations.

## OVERVIEW

The support structure is a key element in successful horizontal Corian® solid surface installations. The structural support should provide level, rigid support. Improper support may lead to product warp or failure. Often the support structure is not provided by the fabricator, but it is the responsibility of the fabricator to ensure that proper structural support is provided before installing the horizontal Corian® solid surface.

## A. TYPES OF SUPPORT

Horizontal Corian® solid surface installations must be supported on a strong, continuous perimeter support frame that will keep it flat for the useful life of the top. Varying layouts, applied loads and overhangs place different challenges on support systems.

There are two important aspects to support. The first is the structural support. This provides the rigidity and strength to prevent the horizontal surface from flexing. The structural support consists of the load bearing structure between the horizontal surface and the main load bearing surface in the room such as the floor. The structural support may be fabricated specifically for support, or may be existing cabinets. Suitable materials for building structural frames include:

- Moisture-resistant plywood on edge
- Square metal tube stock or angle iron
- Framing lumber on edge (moisture-resistant if necessary).

Other materials may be used as long as the design incorporating the proposed material passes the test outlined in *Section B. Span Design*.

Spacers are the second aspect of support. Spacers are installed between the main structural support and the horizontal Corian® solid surface top. In general spacers do not have sufficient structural rigidity and only transfer loads to the structural support structure. The spacers are useful in that they accommodate support strips, etc. and can raise the horizontal surface to provide clearance for

cabinet drawers. The spacer may be installed directly on the support structure, or may be attached to the Corian® solid surface top in the shop and used to help support the top during transport. The two most commonly used materials for spacers are moisture-resistant MDF and moisture-resistant plywood. Particleboard is NOT an acceptable spacer or support material.

In many cases the fabricator is not responsible for the design and/or construction of the main structural support. However, the fabricator is responsible for ensuring that the support provided is adequate for the intended use. The support structure must be level, provide support over any spans, support any cutouts, and provide support for any permanent loads that will be installed on the Corian® surface. A general rule is that the support structure should be able to support any loads that will be installed before the Corian® solid surface top is installed. Corian® solid surface is a decorative surface; it should not be part of the load bearing design.

A horizontal Corian® surface may be placed directly onto millwork, metal bases or other support structure if they provide all required structural elements such as:

- all units are fixed together securely, creating a single structure
- are all in the same plane
- provide strong continuous perimeter support with cross supports where necessary
- provide support over voids or spans
- have full perimeter support for all cutouts
- hold tops high enough for any drawers and doors to clear the front edge.

The spacer, or in the case of direct attachment the support, must have intimate continuous support with the underside of the horizontal Corian® surface. If shimming is needed it must always be done between the spacer frame and support structure.

The Corian® surface must be attached to the spacer frame or support with silicone. Contact cement is not an acceptable adhesive.

## STRUCTURAL SUPPORT

Full underlayment is not recommended and should only be used in specific instances where no heat source is present and structural design dictates additional support. In most cases full underlayment should not be used. Frame support provides better heat dispersion as shown in Figure A-1. The underlayment acts as an insulator and may cause the surface to exceed temperature design limits. Dustcovers in cabinets can act like underlayment and should be neatly removed unless the customer objects.

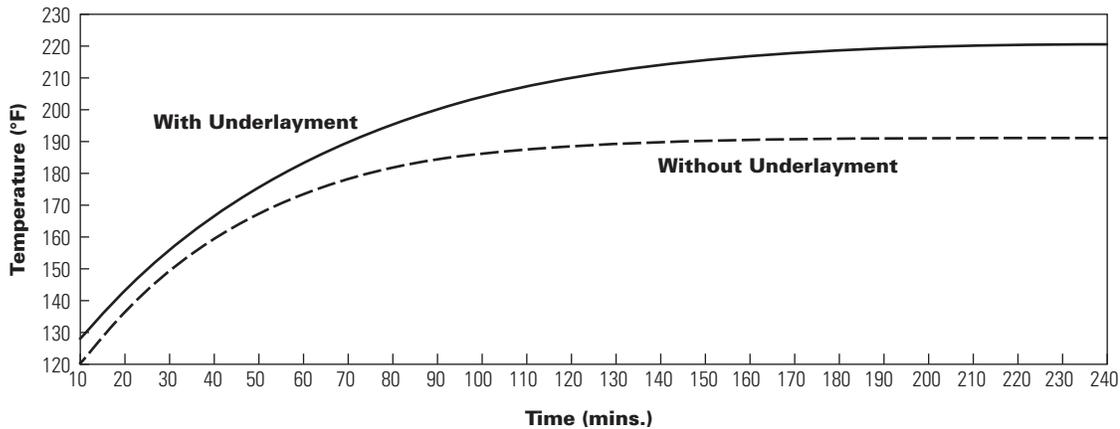


Figure A-1

Support structures can vary widely, from commonly used cabinets to unique structures that require engineering design. The following guidance focuses on establishing the requirements for adequate support. The fabricator is responsible for ensuring the support structure and any spacers meet the requirements.

These requirements are for a “zero-load” design, i.e., there are no permanent installations of heavy equipment or appliances on the surface. If there will be permanent installations of heavy equipment (seen most often in commercial environments) that equipment requires dedicated support.

For all support structures discussed below, there should be an allowance for expansion and contraction of the support materials from heat or humidity. There should be a minimum  $\frac{1}{8}$ " gap between the support structure and any edge build-ups.

### B. SPAN DESIGN

DuPont™ Corian® solid surface tops having a span must have proper support. The span must be able to hold a 300-lb. (136-kg) weight in the center of the span without deflecting more than  $\frac{1}{8}$ " (3 mm) over 10 feet (3 m). This guidance is for a “zero load” design. Any permanent loads should have dedicated support directly under the load, do not rely on support between spans.

#### To Test Support Design:

1. Apply 300-lb. (136-kg) weight at center span

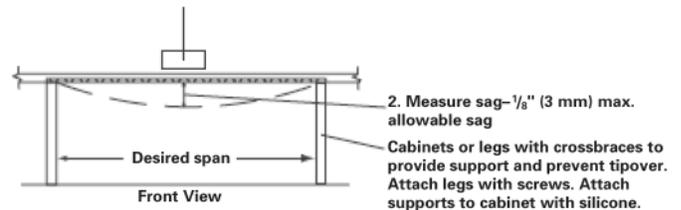


Figure B-1

### C. CONSTRUCTING SPACER FRAMES

Spacer frames are useful to raise the top off the structural support and create room for edge details as well as clearance for any drawers or doors in cabinets. If attached in the shop they also help provide support during transport. With the exception of the metal frame design, which may be of sufficient rigidity to act as a primary structural support, the spacer frames discussed require a dedicated support structure (which may be cabinetry) to provide full perimeter structural support. Spacer frames may be either installed on the support frame before installation of the Corian® top or attached to the top with silicone adhesive prior to transport. Attaching the spacer to the top prior to transport will help support the top during transportation and installation.

## Wood Strips

Steps to completion:

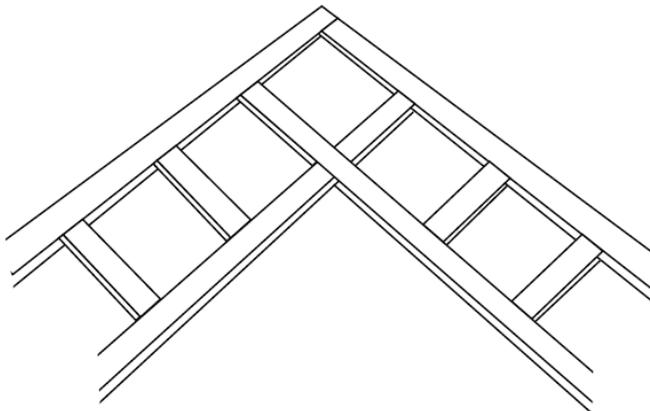
1. Plan front-to-back support strips to coincide with cutouts and periodic supports in a perimeter ladder structure.
2. Seam the stiles using wooden biscuit seams, serrated dowels or rabbeted seams screwed and glued.
3. Notch front and back rail to accept reinforcement strip.

## All Solid Sheeting (Constructed Ladder System)

Shown in Figure C-1, a constructed ladder system may be made from moisture-resistant MDF or moisture-resistant plywood.

Steps to completion:

1. Rip raw sheet material into 3"–4" (76 mm–102 mm) strips.
2. Plan front-to-back support to coincide with all cutouts and periodic supports in a perimeter ladder structure as illustrated below.
3. Notch front and back rails to accept reinforcement strip.
4. Join the stiles using screwed or glued wooden biscuit seams, serrated dowels or rabbeted seams.



Ladder Frame Inside Corner

Figure C-1

## All Solid Sheeting (Routed Ladder System)

Shown in Figure C-2, a routed ladder system may be made from moisture-resistant MDF or moisture-resistant plywood.

Steps to completion:

1. Measure material to length and width from template (remembering to modify width to accommodate buildup, reinforced seams, etc.)

2. Mark on solid core sheets all sink and appliance cutouts, as well as all divisional supports and seam reinforcement.
3. Using the markings created in Step 2; draw a frame plan on the solid core sheet.

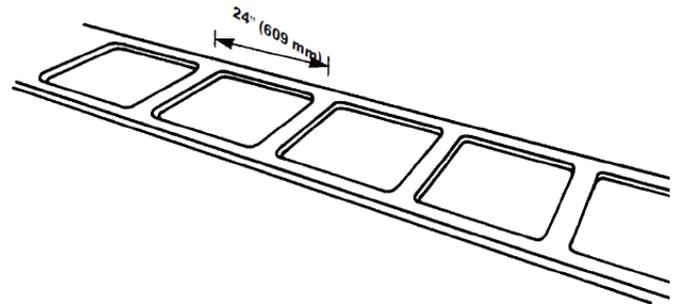


Figure C-2

4. Using a 3-hp router with a single-flute plunge bit and premade router guides (templates), rout out the appliance cutouts and the routed stiles to form a ladder frame structure. Notch the front and back rails to accept reinforcement strips. A CNC router can also be used to fabricate this type of ladder frame.

## All Metal Square Tube Stock Support Frame

Steps to completion:

1. Measure and cut tube stock to length from measuring either the template or the underside of the countertop.
2. Make allowances for seam supports by using thinner tube stock.
3. Place proper support for cutouts.
4. Fasten frame together by welding or by using angle brackets and screws.

## “Third Rail” Build Up Strip

A third rail support strip may be used. This rail runs parallel to the front and back rail. Any front-to-back, or inside corner support must take preference, ALWAYS install front-to-back supports for cutouts and inside corners first. Then fill in the gaps with the third rail.

## D. FABRICATING AND INSTALLING OVERHANG COUNTERTOPS

As a general guideline, support is required for overhangs of DuPont™ Corian® solid surface extending more than 6" (152 mm) in 1/2" (12mm) material and overhangs extending more than 12" (305 mm) in 3/4" (19 mm) material. Adding thick edges makes the overhang stronger.

# STRUCTURAL SUPPORT

24" (609 mm) Max.

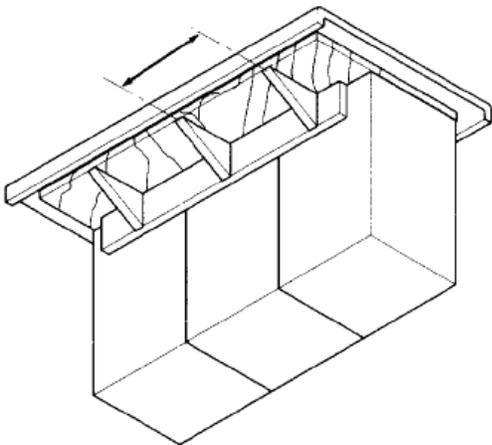


Figure D-1

Refer to Table D-1 to determine the type(s) of support to use.

## D.1. Overhang support types

Table D-1

| Overhangs Extending                            | Suggested Support   |
|--|---|
| <b>1/2" (12 mm) DuPont™ Corian® Countertop</b> |   |
| 0" to 6" (150 mm)                              | No additional support required for zero load  |
| 6" (152 mm) to 12" (305 mm)                    | Plywood Underlayment or Brackets or 1" Square Metal Tube Stock – follow span and load guidelines  |
| 12" (305 mm) to 18" (457 mm)                   | Plywood Underlayment and Brackets or 1" Square Metal Tube Stock – follow span and load guidelines |
| 18" (457 mm) and over                          | Legs or Columns – follow span and load guidelines   |
| <b>3/4" (19 mm) DuPont™ Corian® Countertop</b> |   |
| 0" to 12" (305 mm)                             | No additional support required for zero load  |
| 12" (305 mm) to 18" (457 mm)                   | Plywood Underlayment and Brackets or 1" Square Metal Tube Stock – follow span and load guidelines |
| 18" (457 mm) and over                          | Legs or Columns – follow span and load guidelines   |

**The above guidelines are a starting point. Other support systems may be used if they pass the test outlined in Section D.2.**

### Seamed Overhang Countertops

It is recommended to position seams over adequate support and as far from the edge as possible rather than in the

overhang. The seam must be at least 3" (76 mm) in from the edge of the cabinet and it is preferable to locate the seam as far from the edge of the cabinet as possible. All seams must be reinforced, so be sure the design allows the use of seam support.

## D.2. Overhang support test

Other support designs may be acceptable. Fabricators can check the acceptability of their designs by running the following test:

1. Install a 25" (634mm) wide section of Corian® countertop.
2. Install the proposed support.
3. Hang a 100-lb. (45.4 kg.) weight from the clamp between the supports and 1" (25 mm) from the edge of the overhang.
4. Measure the deflection caused by the weight (measure near the clamp). The maximum allowable deflection is 1/4" (6 mm).

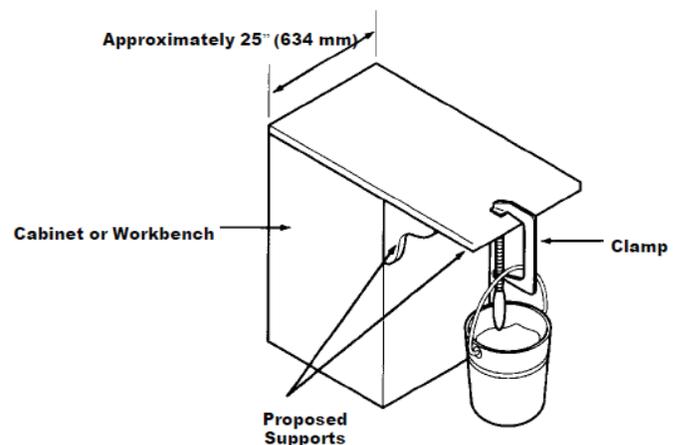


Figure D-2

## D.3. Overhang fabrication

### Overhang support construction:

#### Plywood Underlayment

Steps to completion:

1. Position 3/4" or 1" (19 mm or 25 mm) A-C grade plywood over the entire support structure with the "A" side facing the floor, and secure to the support structure with the proper fasteners.
2. Cut out the plywood in the cabinet area, leaving 3" (76 mm) to 4" (102 mm) wide webs over the support members.
3. Leave 1/8" (3 mm) minimum clearance between the plywood and built-up edge.

**Do not use full underlayment over the cabinets. Full underlayment can cause the Corian® solid surface to overheat if a heat source is present, exceeding design parameters.**

## STRUCTURAL SUPPORT

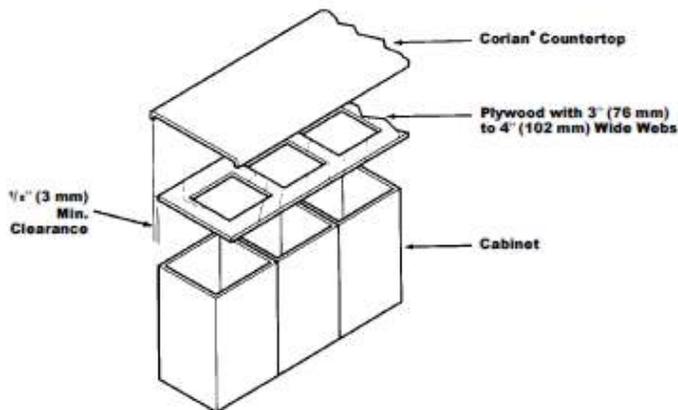


Figure D-3

### Brackets

Steps to completion:

1. Determine the number of brackets to fabricate by measuring the cabinet. Brackets should be installed at equally spaced intervals of 24" (609 mm) or less.
2. Use a backer plate for the brackets if the side of the cabinet is not sufficient to support the weight of the overhang.
3. Pre-made brackets may be purchased from the cabinet manufacturer.

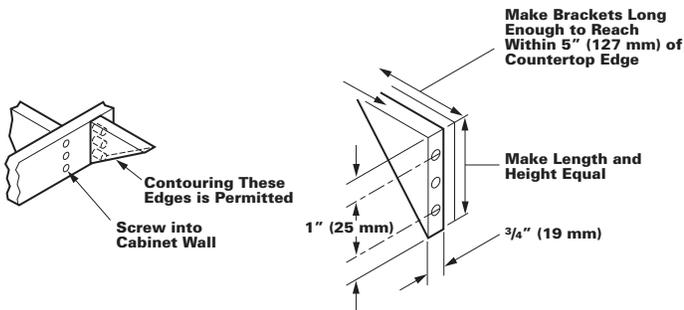


Figure D-4

### Seamed Overhangs

Steps to completion:

1. Construct the plywood underlayment following the procedure previously described.
2. Fabricate the seamed countertop, putting the seam over the cabinet, running parallel to and a minimum of 3" (76 mm) and preferably more from the front of the cabinet.
3. Position reinforcing strips or edge buildups of DuPont™ Corian® solid surface under each end of the seam; then reinforce between the edge buildups.
4. Apply DuPont™ Joint Adhesive or DuPont™ Joint Adhesive 2.0., making sure that all seams in the edge are completely filled.

If required, there can be a “front-to-back” seam perpendicular to the front of the overhang. This seam must have a seam reinforcement strip if made with DuPont™ Joint Adhesive (Seam reinforcement is suggested but not required when seaming with DuPont™ Joint Adhesive 2.0) and there should be a support bracket directly below the seam.

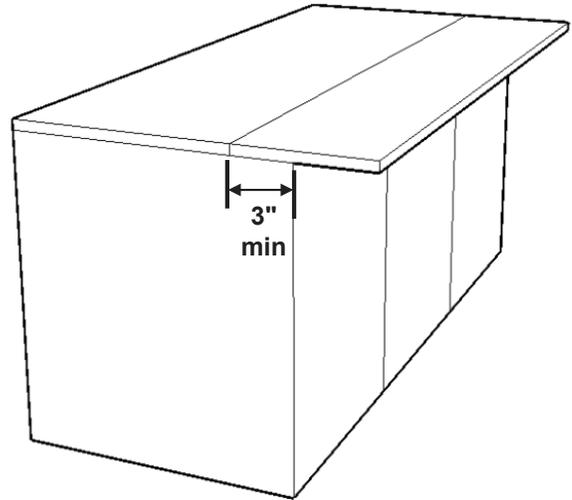


Figure D-5

### HELPFUL HINTS:

*All seamed overhangs must be supported by at least the plywood underlayment and the seams must be reinforced.*

*Any edge design is acceptable; however, a built-up edge makes the overhang stronger.*

*Leave at least 1/8" (3 mm) between the plywood and the built-up edge.*

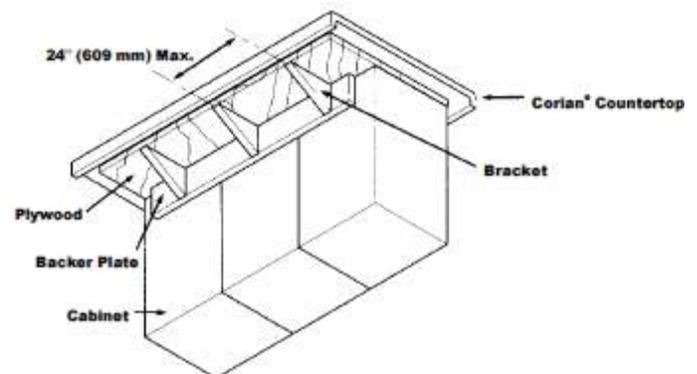


Figure D-6

## D.4. Overhang Installation

### Install the Supports:

#### *Plywood Underlayment:*

Steps to completion:

1. Fasten the plywood support to the cabinet with wood screws, making sure the "A" side faces the floor.
2. Install the screws every 4" (102 mm) to 6" (152 mm). Do not use nails.

#### *Brackets:*

Steps to completion:

1. Fasten the brackets to the back of the cabinet with screws, or
2. Fasten the backer plates to the cabinet frame with wood screws. Install the screws 1" (25 mm) from the top, 1" (25 mm) from the bottom and in the center of each backer plate.
3. Use a backer plate to support brackets if cabinets are not sufficient to support the weight of the countertop.

#### *Plywood Underlayment and Brackets:*

Steps to completion:

1. Follow the above procedures; however, fasten the brackets and backer plates to the cabinet before attaching the plywood.

### Adhere the countertop to the underlayment:

#### *Plywood Underlayment:*

Steps to completion:

1. Use one dab of silicone adhesive every 12" (305 mm) to 18" (457 mm) to secure the DuPont™ Corian® countertop to the plywood.
2. Stain/urethane, paint or cover the plywood with Corian® solid surface if desired.

### Decorative Corian® solid surface brackets

Corian® solid surface may be used as a decorative bracket. It should not be used to satisfy the structural requirements in Table D-1. If structural brackets are required the bracket may be clad with Corian® solid surface, but the Corian® solid surface should not be part of the load bearing design.

#### *Decorative (non-structural) brackets of Corian® solid surface:*

Steps to completion:

1. Follow the procedure for gluing plywood underlayment.
2. Use one dab of silicone adhesive 1" (25 mm) from the tip of each bracket. Apply dabs of silicone every 12" (305 mm) to 18" (457 mm) to the upper edges of the cabinets.

### Cladding structural brackets with Corian® solid surface

Steps to completion:

1. Install the structural brackets.
2. Adhere Corian® solid surface cladding with silicone adhesive. The cladding can be hard seamed so it slides over the bracket. Leave a minimum of 1/16" (1.5 mm) clearance between the bracket and the Corian® cladding as well as at the underside of the horizontal top and the cabinet. The decorative cladding should not be hard seamed to either the top or cabinet.

## E. SUPPORTING INSIDE CORNERS OVER CAROUSEL CABINETS

Most carousel style cabinets provide inadequate support for inside corners in Corian® solid surface countertops and proper support needs to be added. Several methods of supporting these corners are provided below.

One support method uses 1" x 6" (25 mm x 152 mm) wood (or 3/4" [19 mm] plywood or MDF strip) resting on one edge of the cabinet and running to the back edge of the cabinet (or a support strip attached to the back wall).

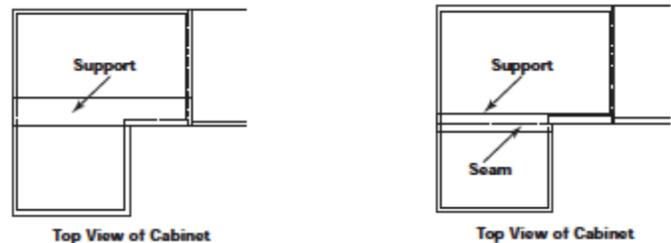


Figure E-1

If a seam is made through or near the inside corner, the support must also include the seam reinforcement if made with DuPont™ Joint Adhesive (Seam reinforcement is suggested but not required when seaming with DuPont™ Joint Adhesive 2.0). Follow the guidelines for installing seam reinforcements.

The reinforcement strip should form part of the front edge buildup as shown in Figure E-1, and should be supported by the back edge of the cabinet (or a wood strip attached to the back wall).

## STRUCTURAL SUPPORT

There may be other support methods that can provide adequate support. Metal tubing and bars can be used when space is limited. See Figure E-2.

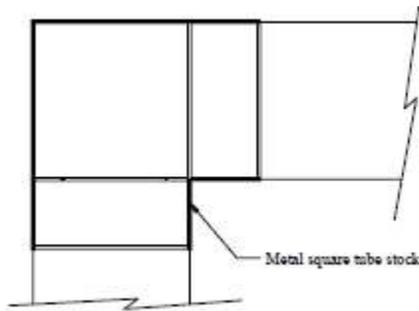


Figure E-2

To test a design, apply a 100-pound (45-kg) weight to the inside corner as shown in Figure E-3. The maximum deflection allowed is  $\frac{1}{8}$ " (3 mm).

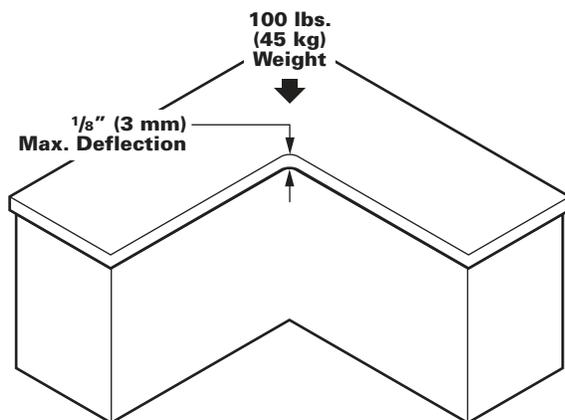


Figure E-3

*This information is based on technical data that E.I. du Pont de Nemours and Company and its affiliates ("DuPont") believe to be reliable, and is intended for use by persons having technical skill and at their own discretion and risk. DuPont cannot and does not warrant that this information is absolutely current or accurate, although every effort is made to ensure that it is kept as current and accurate as possible. Because conditions of use are outside DuPont's control, DuPont makes no representations or warranties, express or implied, with respect to the information, or any part thereof, including any warranties of title, non-infringement of copyright or patent rights of others, merchantability, or fitness or suitability for any purpose and assumes no liability or responsibility for the accuracy, completeness, or usefulness of any information. This information should not be relied upon to create specifications, designs, or installation guidelines. The persons responsible for the use and handling of the product are responsible for ensuring the design, fabrication, or installation methods and process present no health or safety hazards. Do not attempt to perform specification, design, fabrication, or installation work without proper training or without the proper personal protection equipment. Nothing herein is to be taken as a license to operate under or a recommendation to infringe any patents. DuPont shall have no liability for the use of or results obtained from such information, whether or not based on DuPont's negligence. DuPont shall not be liable for (i) any damages, including claims relating to the specification, design, fabrication, installation, or combination of this product with any other product(s), and (ii) special, direct, indirect or consequential damages. DuPont reserves the right to make changes to this information and to this disclaimer. DuPont encourages you to review this information and this disclaimer periodically for any updates or changes. Your continued access or use of this information shall be deemed your acceptance of this disclaimer and any changes and the reasonableness of these standards for notice of changes.*

© E.I. du Pont de Nemours and Company 2015. The DuPont Oval, DuPont™, The miracles of science™, and Corian® are trademarks or registered trademarks of E.I. du Pont de Nemours and Company ("DuPont") or its affiliates. All rights reserved.