

STRUCTURAL SUPPORT

Introduction

This fabrication bulletin addresses the proper support of horizontal 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 worktop. 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 external to the worktop. This provides the rigidity and strength to prevent the horizontal worktop from flexing. The structural support consists of the load bearing structure between the worktop 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 support include:

- Moisture-resistant plywood on edge
- Square metal tube stock or angle iron
- Framing timber 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*.

The worktop underlayment frame is the second aspect of support. The worktop underlayment frame is installed between the main structural support and the horizontal Corian® Solid Surface material. In general underlayment does not have sufficient structural rigidity and only transfers load to the structural support external to the worktop. Underlayment frames are useful as they accommodate reinforcement strips, cut-out blocks and can raise the horizontal surface to provide clearance for cabinet drawers. The underlayment frame may be

installed directly on the external support structure, or may be attached to the Corian® Solid Surface material in the workshop and used to help support the worktop during transport. The two most commonly used materials for underlayment frames are moisture-resistant MDF and moisture-resistant plywood. Please consider MDF is less rigid than plywood, for this reason we recommend plywood is used as underlayment in overhang areas. If MDF is used in overhangs greater thickness of board and/or more steel box tube will be needed when compared with plywood. Particleboard is NOT an acceptable underlayment or structural support material.

In many cases the fabricator is not responsible for the design and/or construction of the main structural support external to the worktop. However, the fabricator is responsible for ensuring that the support provided is adequate for the intended use. The external support structure must be level, provide support over any spans, support any cut-outs, and provide support for any additional permanent loads that will be sat on the Corian® worktop. A general rule is that the external support structure should be able to support any additional permanent loads 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.

Horizontal Corian® material may be placed directly onto joinery, metal framing or other support arrangements 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 cut-outs
- hold tops high enough for any drawers and doors to clear the front edge

The underlayment frame, or in the case of direct attachment the support arrangement must have direct continuous contact with the underside of the horizontal Corian® material.

The Corian® surface must be attached to the underlayment frame or support arrangement with silicone, polyurethane (PU) sealant or other highly flexible adhesives with sufficient thickness to maintain flexibility (typically 1.5 mm). Contact cement is not an acceptable adhesive.

If shimming is needed it must always be done between the underlayment frame and external support structure. If no underlayment is used the levelling adjustment must be to the support arrangement to allow the Corian® material to remain bonded in direct contact.

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 underlayment provides areas without underlayment and therefore better heat dispersion of the Corian® material as shown in Figure A-1. The underlayment acts as an insulator and may cause the surface to exceed temperature design limits. Solid tops in cabinets can act like underlayment and should be neatly removed unless the customer objects.

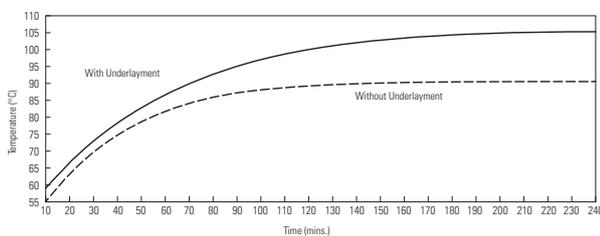


Figure A-1

Support structures external to the worktop 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 external support structure and any underlayment frame meets 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 additional 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 3 mm gap between the support structure and any edge build-ups.

B. Span Design

Corian® Solid Surface worktops having a span must have proper additional support. The additional support intended must be able to hold a 136 kg weight in the centre of the span without deflecting more than 3 mm over 3 m. This guidance is for a “zero load” design. Any permanent loads being sat on the worktop should have dedicated support directly under the load, do not rely on support between spans.

In some instances it may be possible to combine the needed additional support for the span within a rebated underlayment frame. An example would be steel box tubing within rebated PLY/MDF underlayment. As an example in this case the intended additional steel support structure would be tested as shown in Figure B-1.

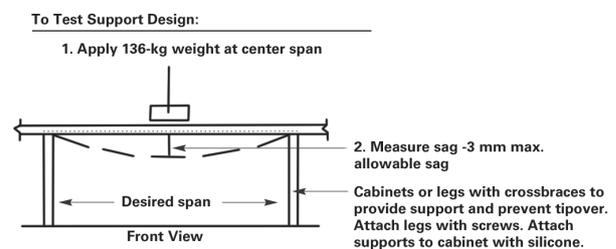


Figure B-1

C. Constructing Underlayment Frames

Underlayment frames are useful to raise the Corian® material off the external structural support and create room for edge details as well as clearance for any drawers or doors in cabinets. If attached in the workshop 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 following underlayment frames discussed require a dedicated external support structure (which may be cabinetry) to provide full perimeter structural support. Underlayment frames may be either installed on the external support before installation of the Corian® material or attached to the material with silicone adhesive prior to transport. Attaching the underlayment to the material prior to transport will help support the top during transportation and enable the silicone bonding to be executed in factory conditions for quality.

Wood Strips

Steps to completion:

1. Plan front-to-back support strips to coincide with cut-outs and cabinet supports in a perimeter ladder structure ensuring at maximum 600 mm centres between each front-to-back strip.
2. Join the front-to-back strips using wooden biscuit, serrated dowels or rebated seams screwed and glued to the long front and back rail strips to create the frame.
3. Rebate the front and back rails to accept Corian® reinforcement for seams.

MDF/Plywood Sheeting (Constructed Ladder System)

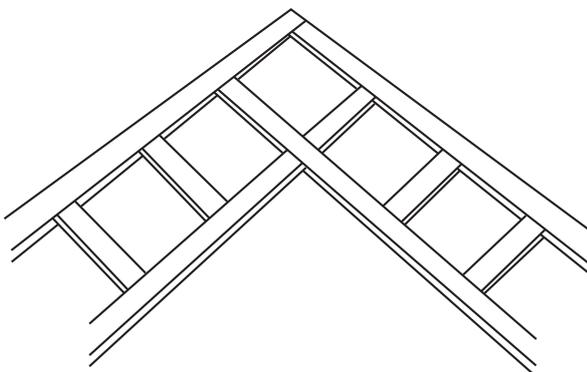
Shown in Figure C-1, a constructed ladder system may be made from moisture-resistant MDF or moisture-resistant plywood.

Steps to completion:

1. Rip raw sheet material into 75 mm–100 mm strips.
2. Plan front-to-back support to coincide with all cut-outs and cabinet supports in a perimeter ladder structure ensuring at maximum 600 mm centres between each front-to-back strip as illustrated below.
3. Rebate front and back rails to accept Corian® reinforcement for seams.
4. Join the front-to-back strips using wooden biscuit, serrated dowels or rebated seams screwed and glued to the long front and back rail strips to create the frame.

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 cut-outs and inside corners first. Then fill in the gaps with the third rail.



Ladder Frame Inside Corner

Figure C-1

MDF/Plywood 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 Corian® fascia edge build-up, reinforced seams, etc.).
2. Mark on underlayment sheets all sink and appliance cut-outs, as well as all divisional supports and seam reinforcement.
3. Using the markings created in Step 2; draw a frame plan on the underlayment sheet.

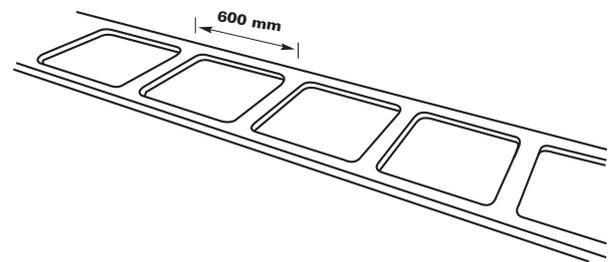


Figure C-2

4. Using a 2200 W router with a plunge capable straight router cutter and premade router templates, rout out the appliance cut-outs and the routed apertures to form a ladder frame structure. Rebate the front and back rails to accept Corian® reinforcement for seams. 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 worktop.
2. Make allowances for seam supports by using thinner tube stock or if necessary designing a thicker worktop if thicker tube stock is required structurally.
3. Place proper support for cut-outs.
4. Fasten frame together by welding or by using angle brackets and screws.

D. Fabricating and Installing Overhanging Worktops

As a general guideline, support is required for overhangs of Corian® Solid Surface extending more than 150 mm in 12mm material and overhangs extending more than 300 mm in 19 mm material. Adding thick fascia build-up edges makes the overhang stronger.

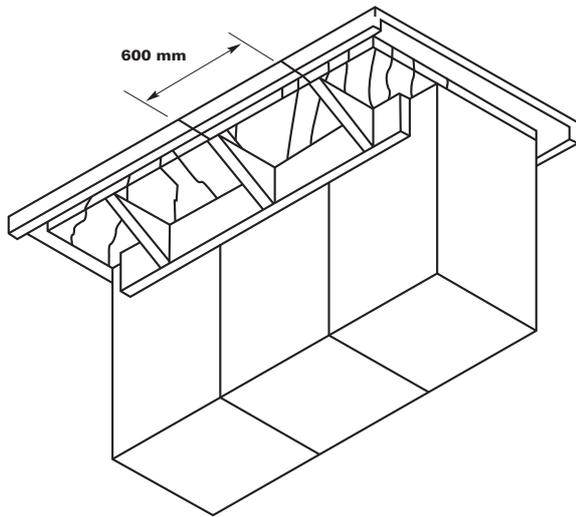


Figure D-1

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

D.1. Overhang support types

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 Worktops

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 75 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. Depending on adhesive and use the seam may need to be reinforced, so be sure the design allows the use of seam reinforcement where necessary.

TABLE D-1

OVERHANGS EXTENDING	SUGGESTED SUPPORT	HELPFUL HINTS
12 mm Corian® Material		
0 mm to 150 mm	No additional support required for zero load	Ensure good adhesion to all areas of cabinetry with silicone or use within sheet mechanical fixings.
150 mm to 300 mm	Plywood Underlayment (25mm at 300mm overhang) or Brackets or 25 mm Square Steel Tube Stock with 3mm thick sidewall – follow span and load guidelines	For all overhang supporting underlayment material follow a minimum of 1/3 length within overhang and 2/3 length or more over the supported area (i.e. the cabinetry).
300 mm to 450 mm	Plywood Underlayment and Brackets or 25 mm Square Steel Tube Stock with 3mm thick sidewall – follow span and load guidelines	For all overhang supporting underlayment material follow a minimum of 1/3 length within overhang and 2/3 length or more over the supported area (i.e. the cabinetry).
450 mm and over	Legs or Columns – follow span and load guidelines	
19 mm Corian® Material		
0 mm to 300 mm	No additional support required for zero load	Ensure good adhesion to external cabinetry with silicone or use within sheet mechanical fixings.
300 mm to 450 mm	Plywood Underlayment and Brackets or 25 mm Square Steel Tube Stock with 3mm thick sidewall – follow span and load guidelines	For all overhang supporting underlayment material follow a minimum of 1/3 length within overhang and 2/3 length or more over the externally supported area (i.e. the cabinetry).
450 mm and over	Legs or Columns – follow span and load guidelines	

Seam Reinforcement Guidelines

Due to improvements in adhesive formulations, guidelines on seam reinforcement have changed.

- Seam reinforcement is required when using DuPont™ Joint Adhesive for all horizontal applications.
- Seam reinforcement is not required when using Corian® Joint Adhesive for horizontal applications in general dry residential and commercial applications.

Specialty applications may have different guidelines. For example, food serveries would require seam reinforcement for all adhesives where heavy equipment may be placed on the seam or near hot/wet applications such as heat lamps or hot food wells.

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. Create a 634mm wide mock-up section of Corian® worktop with the proposed support structure.
2. Hang a 45 kg weight between the supports and 25 mm from the edge of the overhang.
3. Measure the deflection caused by the weight (measure near the clamp). The maximum allowable deflection is 6 mm, or less if required by the project.

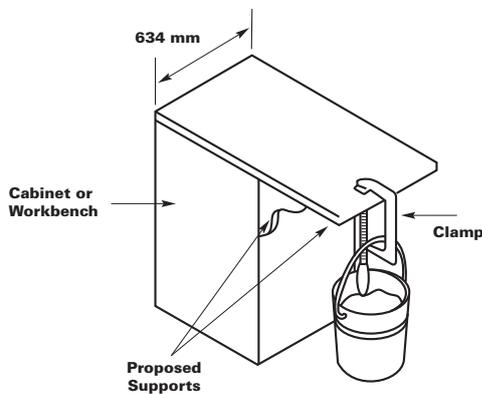


Figure D-2

D.3. Overhang fabrication

Overhang support construction:

Plywood Underlayment

Steps to completion:

1. Position 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 75 mm to 100 mm wide webs over the support members.
3. Leave 3 mm minimum clearance between the plywood and built-up edge.

Do not use full underlayment over the cabinets unless the overhang requires this for strength. A good starting point is if the overhang amount is 1/3 the continuous underlayment amount over the cabinet needs to be a minimum of 2/3. So if the overhang is 200mm the full underlayment is 600mm minimum in total length supporting the overhang. Remember if there are additional loads (i.e. permanent equipment) on the worktop they need dedicated support.

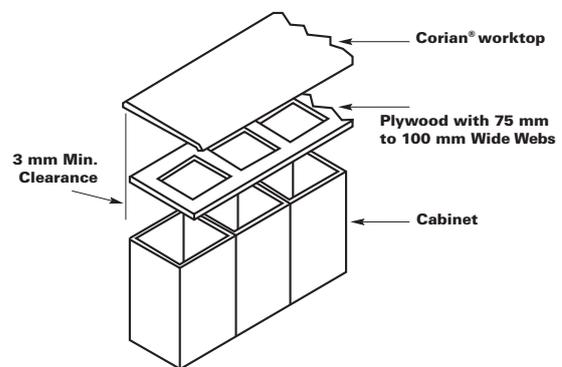


Figure D-3

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 600 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.

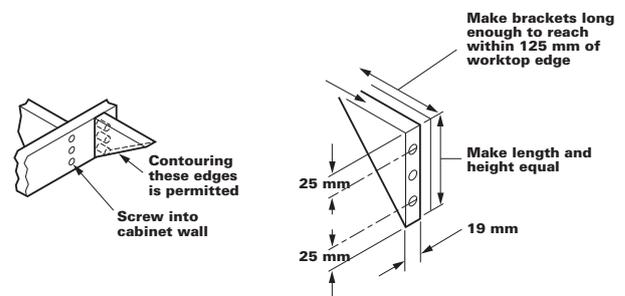


Figure D-4

Seamed Overhangs

Steps to completion:

1. Construct the plywood underlayment following the procedure previously described.
2. Fabricate the seamed worktop, putting the seam over the cabinet, running parallel to and a minimum of 75 mm and preferably more from the front of the cabinet.
3. Position reinforcing strips or edge build-ups of Corian® Solid Surface under each end of the seam; then reinforce between the edge build-ups.
4. Apply DuPont™ Joint Adhesive or Corian® Joint Adhesive, 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 and there should be a support bracket directly below the seam.

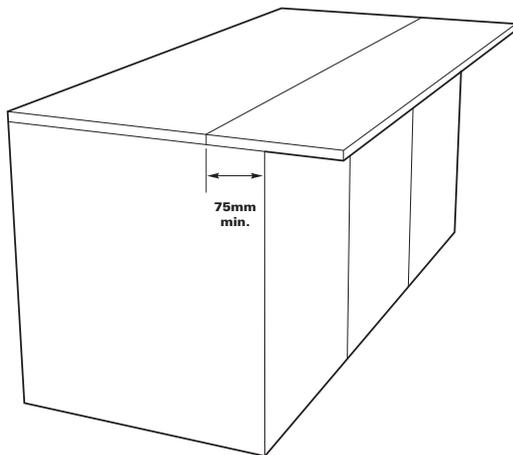


Figure D-5

HELPFUL HINTS

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

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

Leave at least 3 mm between the plywood and the built-up edge.

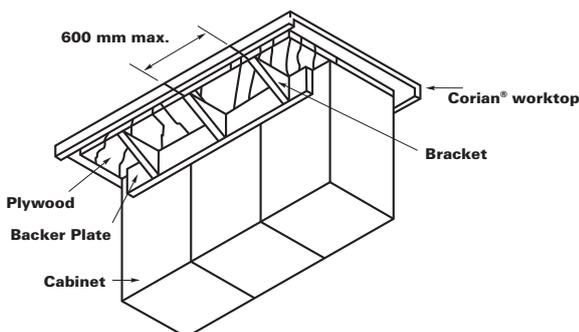


Figure D-6

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 100 mm to 150 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 25 mm from the top, 25 mm from the bottom and in the centre of each backer plate.
3. Use a backer plate to support brackets if cabinets are not sufficient to support the weight of the worktop.

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/MDF.
2. Adhere the Corian® to the underlayment if not already bonded in the workshop.

Plywood Underlayment

Steps to completion:

1. Use one dab of silicone adhesive every 300 mm to 450 mm to secure the Corian® material 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 to adhere plywood underlayment.
2. Use one dab of silicone adhesive 25 mm from the tip of each bracket. Apply dabs of silicone every 300 mm to 450 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 1.5 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 worktops and proper support needs to be added. Several methods of supporting these corners are provided below.

One support method uses 25 mm x 150 mm wood (or 19 mm plywood strip) resting on one edge of the cabinet and running to the back edge of the cabinet (or a batten attached to the back wall).

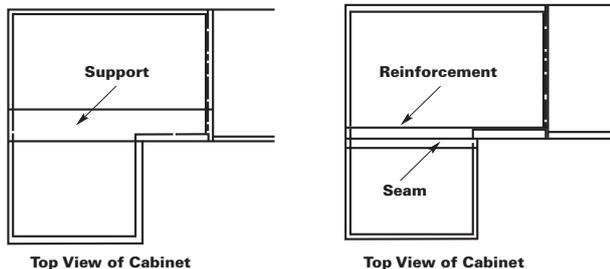


Figure E-1

If a seam is made through or near the inside corner, the support must also include the seam reinforcement. Follow the guidelines for installing seam reinforcements described in *Corian® Solid Surface Fabrication/Installation Fundamentals – Seaming* (K-25292).

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

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.

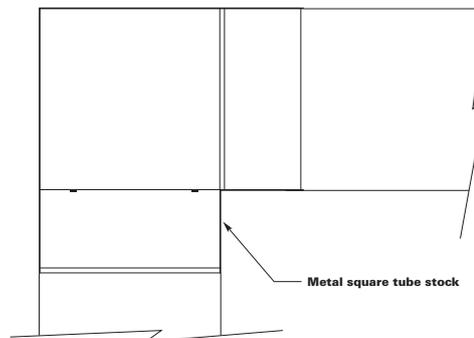


Figure E-2

To test a design, apply a 45 kg weight to the inside corner as shown in Figure E-3. The maximum deflection allowed is 3 mm.

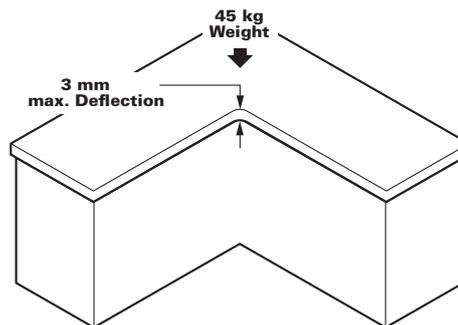


Figure E-3

F. Referenced Document

Corian® Solid Surface Fabrication/Installation Fundamentals – Seaming (K-25292).