Laminate with Protec+® Technical Data sheet

Formica® laminate, with Protec+® antimicrobial surface technology, has enhanced machine directional postformability to provide fabrication yield benefits, with the majority of decors having the capability to typically bend down to an 8mm internal radius (IR) for solid colours and 6mm IR for stones, abstract patterns and woodgrains.

Applications

Formica® laminate with Protec+® is widely used for benchtops, countertops, vanity units, cabinet doors, store fixtures, bars, partitions and wall linings (applied to substrate) and other applications where good appearance, durability and resistance to stains are required. The antimicrobial properties make it a hygienic choice for medical/aged care facilities, food preparation/service areas, communal spaces such as sports centres/libraries and education projects.

Formica laminate has good colour retention and dimensional stability in normal interior applications. However, prolonged exposure to sunlight may cause shrinkage and/or some change in colour. Formica laminate is therefore not recommended for external applications or interior applications with prolonged exposure to direct sunlight.

When specifying

Surfacing shall be Formica laminate as distributed by Laminex New Zealand. Colours and/or patterns shall be ..... in Velour finish

Product characteristics

Sizes (Nominal)	3600mm x 1500mm 3600mm x 750mm 1800mm x 1500mm 1800mm x 750mm
Thickness	0.7mm (nominal)
Weight	1.0kg/m^2 approx.
Finish	Velour, Gloss
Colours and pattern range	Refer to current product availability chart.

3rd party certifications

Formica Protec+ has been independently certified as food contact safe, providing sustained antibacterial and antifungal protection which does not wash off or leach out of the surface. It is safe for use in food preparation and processing activities and can be in direct contact with food, provided that good hygiene practices are followed.

Formica Protec+ has been independently tested in accordance with a number of leading standards, including: ISO 22196:2011, JIS Z 2801 and ASTM G21, which measure antibacterial activity and fungal resistance.

Formica Protec+ laminate is an ecospecifier Global GreenTag™ GreenRate Level B certified product and can contribute to Green Star® points.

Product performance

High pressure decorative laminates		
Inspection requirements		
Attribute	**Requirement**	
General inspection	Viewing distance	750 to 900mm
	Lighting conditions	Intensity 800 – 1000 lux over the whole area
	Lighting type	Overhead white fluorescent lights, of colour temperature approximately 5000K
Colour and pattern consistency	When inspected in daylight or under D65 standard illumination, and under tungsten illumination, there shall be no significant difference from the approved reference sample held by Laminex New Zealand.	
Surface finish	When inspected at different viewing angles, there shall be no significant difference from the approved reference sample held by Laminex New Zealand.	
Visual inspection	Dirt, spots and similar	Maximum 1mm^2/m^2 and is proportional to the sheet size. Total admissible area of contamination may be surface defects concentrated in one spot or dispersed over an unlimited quantity of smaller defects.
	Fibres, hairs and scratches	Maximum 10mm/m^2 and is proportional to the sheet size. Total admissible area of contamination may be surface defects concentrated in one spot or dispersed over an unlimited quantity of smaller defects.

Dimensional tolerances (ISO 4586-1:2004, Clause no.)			
Typical properties	**Clause**	**Units**	**Values**
Thickness	6.3	mm (max)	0.63 mm tolerance ±0.03mm (span of 0.06mm)
			In-sheet tolerance ±0.015mm (span of 0.03mm)
Edge defects	6.4.3	mm	≤10mm
Broken corners	6.4.4	-	≤10mm – no more than 1 per sheet
Flatness	6.4.6	mm (max)	Length – 75mm Width – 10mm
Length and width	6.4.7	mm	+ 10mm / -0mm
Straightness of edges	6.4.8	mm/m (max)	1.5mm/m
Squareness	6.4.9	mm/m (max)	1.5mm/m

Product performance continued

High pressure decorative laminates					
Performance properties (ISO 4586-2:2004, clause no.)					
Typical properties	**Clause**	**Attribute**	**Units**	**Values**	
Resistance to surface wear	6	Wear resistance	Revolutions (min)	Initial wear ≥ 150	
				Average wear ≥ 350	
Resistance to impact by small diameter ball	12	Force	N (min)	≥ 20	
Resistance to scratching	15	Force	N (min)	≥ 2.0	
		Rating		3 – Textured finishes	
Resistance to dry heat at 180°C	8	Appearance	Rating (min) (Not worse than)	4 – Slight change of gloss and/ or colour, only visible at certain viewing angles	
Resistance to wet heat at 100°C	9	Appearance	Not worse than	4 – Slight change of gloss and/ or colour, only visible at certain viewing angles	
Resistance to steam	10	Appearance	Not worse than	3 – Moderate change of gloss and/ or colour	
Resistance to immersion in boiling water	7	Mass increase	% (max)	≤19	
		Thickness increase	% (max)	≤22	
		Appearance	Not worse than	3 – Moderate change of gloss and/ or colour	
Dimensional stability at elevated temperature	11 Method A	Cumulative dimensional change	% (max) L	0.7% with grain	
			% (max) T	1.2% across grain	
Resistance to staining (See 'Staining agent - chemical group listings' section)	16 Method A	Appearance	Rating (min)	Groups 1 & 2	5 – No visible change
				Groups 3 & 4	3 – Moderate change of gloss and/or colour
Lightfastness When tested in contrast with Blue wool 6 Ref: ISO 105-A02	17 Method A	Contrast	Grey scale rating	4 to 5	
Resistance to cigarette burns	18 Method A	Appearance	Rating (min)	3 – Moderate change of gloss and/ or moderate brown stain	
Resistance to cracking under stress	14	Appearance	Not worse than	4 - Hairline cracks only visible under x6 magnification	
Formaldehyde emissions (gas analysis method)	EN717 part 2	Panel emission	mg/m^{2}hr	≤1.0	

Product performance continued

High pressure decorative laminates		
Staining agent – Chemical group listing Performance properties (ISO 4586-2:2004, Clause 16, Method A)		
Staining agent	**Test conditions**	**Contact time**
Group 1		
*Acetone	16.1.5.1 Procedure A Apply staining agent at ambient temperature	16 hours to 24 hours
Trichlorethane		
Other organic solvents		
Toothpaste		
Hand cream		
Urine		
Alcoholic beverages		
Natural fruit and vegetable juices		
Lemonade and fruit drinks		
Meats and sausages		
Animal and vegetable fats and oils		
Water		
Yeast suspension in water		
Salt (NaCl) solutions		
Mustard		
Lyes, soap solutions		
Cleaning solution • 23% dodecylbenzene sulfonate • 10% alkyl aryl polyglycol ether • 67% water		
Phenol and chloramine T disinfectants		
Stain or paint remover based on organic solvents		
Citric acid (10% solution)		
Group 2		
*Coffee (120g of coffee per litre of water)	16.1.5.1 Procedure A Apply staining agent at approx. 80°C	16 hours
Black tea (9g of tea per litre of water)		
Milk (all types)		
Cola beverages	16.1.5.1 Procedure A Apply staining agent at ambient temperature	
Wine vinegar		
Alkaline-based cleaning agents diluted to 10% concentration with water		
Hydrogen peroxide (3% solution)		
Ammonia (10% solution of commercial concentration)		
Nail varnish		
Nail varnish remover		
Lipstick		
Water colours		
Laundry marking inks		
Ball point inks		

Product performance continued

High pressure decorative laminates		
Staining agent – Chemical group listing Performance Properties (ISO 4586-2:2004, Clause 16, Method A)		
Staining agent	**Test conditions**	**Contact time**
Group 3[a]		
*Sodium hydroxide (25% solution)	16.1.5.1 Procedure A Apply staining agent at ambient temperature	10 mins
*Hydrogen peroxide (30% solution)		
Concentrated vinegar (30% acetic acid)		
Bleaching agents and sanitary cleaners containing them		
Hydrochloric acid based cleaning agents (≤3% HCl)		
Acid-based metal cleaners		
Mercurochrome (2,7-dibromo-4-hydroxymercurifluorescein, disodium salt)		
*Shoe polish		
Hair colouring and bleaching agents		
Tincture of iodine (or 10% povidone iodine)		
Boric acid		
Lacquers and adhesives (except fast-curing materials)		
Amidosulfonic acid descaling agents (<10% solution)		
Group 4		
*Citric acid (10% solution)	16.1.5.1 Procedure B Uniformly bonded to PB	20 mins
Acetic acid (5% solution)		

* If the product under test meets the specification requirements when tested with each of the six staining agents marked with an asterisk, then it is deemed to comply with the specification for stain resistance.

a Acids and alkalis, in concentrations stronger than those shown in group 3, which can be contained in commercial cleaning agents, can cause surface damage or marking, even with very short contact times. Any spillage of such materials shall be washed off immediately.

Protec+ antimicrobial surface

Formica laminate with Protec+ antimicrobial surface technology prevents growth of bacteria and inhibits fungus on decorative surfaces. Formica Protec+ provides enhanced antimicrobial protection for the expected life of the laminate surface, backed by a seven year warranty. It is important to maintain a clean work surface so as not to compromise the effectiveness of the antibacterial and antifungal properties of the laminate.

High pressure decorative laminate		
Protec+® properties		
Attribute	**Clause**	**Values**
Antibacterial activity and effectiveness (28 hours)	JIS Z 2801:2012 Referred to in ISO 22196: 2011	PASS = R value > 2.0 orders of magnitude difference between a treated sample and an untreated control or other inert surface Bacterial strains tested: Staphylococcus aureus (ATCC 6538P) Escherichia coli (ATCC 8739) Methicillin resistant Staphylococcus aureus (NCTC 12493) Pseudomonas aeruginosa (ATCC 15442) Salmonella chloeraesius (ATCC 10708)
Antifungal (Incubation condition: 30°C for 28 days at 90% relative humidity)	ASTM G21-09	Rating ≤ 1 1 = Traces of growth (less than 10%) 0 = None Fungal strains tested: Aspergillius niger (ATCC 9642) Penicillium pinophilum (ATCC 11797) Chaetomium globosum (ATCC 6205) Gliocladium virens (ATCC 9645) Aureobasidium pullulans (ATCC 15233)
Compliance with the demands of food contact materials	Testing methods according to the rules and regulations of the EC and EU community	Certificate of compliance

Fire properties

The Group Number Classification is generated from tests carried out and data reduced in accordance with the test procedure described in ISO 5660 2002-Reaction to fire test - Part 1: Heat Release and Part 2: Smoke Production Rate, for the purposes of determination of the Group Code Verification method C/VM2 Appendix A.

Formica laminate bonded to Lakepine® MDF or Superfine® Particleboard Group Number Classification: 3.

Fabrication – preforming procedures board substrate bend profile

Formica laminate should be fully supported by substrate when glued. Do not bond directly to plaster, plasterboard or concrete. The correct profile on particleboard or medium density fibreboard can be obtained by using specially shaped router blades. The profile should be uniform along the full length of the board with none of the following faults:

1. High spots
2. Bumps
3. Low spots
4. Ridges
5. No surface dust or chips.

For consistent results it is recommended the profile has some lead-in conditioning, be smooth and have a gentle taper and/or step leading into the profile from the board surface.

It is also generally good practice to pass a sanding block over the back of the laminate and the substrate to smooth and inspect for bumps and dents before proceeding to the next fabrication stage.

Gluing tips

For the best bonding result, always follow the adhesive manufacturer's directions for correct fabrication instructions.

Laminates have an inherent tendency to display undulations. To minimise this effect the following recommendations may assist to provide the best results.

Contact adhesives

Contact adhesives are suitable for gluing the laminate to the boards in conjunction with static post-forming machines.

Glue line should be evenly applied to both contact surfaces avoiding lumps of glue, sawdust, chips, etc., as they may telegraph through or fracture the laminate when pressure is applied during bonding and forming.

Cross linking PVA (CPVA) system

CPVA is a water based adhesive that when applied to a substrate causes the fibre to swell. Adding heat to the process produces steam, which exacerbates the swelling. This swelling/unevenness can telegraph through to the surface of the laminate sheet.

Using too much glue will amplify unevenness because of the higher water content.

Avoid glue lumps, unevenly distributed glue, sawdust, chips etc, as they may telegraph through to the decorative surface, fracture the laminate when pressure is applied during bonding and forming.

Whether contact adhesive or CPVA, it is important to follow the instructions provided by the adhesive manufacturer.

Bonding tips

Low temperatures and pressures on the bonding press equipment will provide best results. The lower the pressure, the better the laminate surface appearance will be.

Keep press surfaces clean so dents and contamination are not transferred to the laminate's decorative surface. Using a flat surface or pad such as a 3mm MDF to press against the decorative surface provides for smoother results.

Note: It is important to note that for a given press pressure the actual pressure applied to the work piece is dependent on the size of the piece. At the same gauge pressure, a large piece will be exposed to less pressure than a smaller piece.

To achieve a consistent finish, calculate the pressure requirement for each work piece size using information available from the equipment supplier, or use spacer boards to ensure even pressure is distributed across the press plates and work piece. Maintain glue applicators to avoid contamination. Contamination may result in pressing imperfections, causing telegraphing through to the decorative surface of the laminate. Similarly, maintain pressing surfaces free of dents and lumps.

Postforming

Formica laminate has very good operating tolerance between the heat required to bend and the additional heat exposure required before the laminate blisters. The average tolerance between heat exposure and time to bend is approximately 24 to 28 seconds referencing time taken to reach 163°C. The time to blister is an additional >15 seconds.

Determining the heat-up rate control and heating stability becomes more important the thinner the laminate and the tighter the radius. Formica laminate is postformable laminate in accordance with AS/NZS 2924.1 & 2 and ISO 4586.1 & 2. Laminate postforming conditions are required to heat the laminate so that the time taken to reach 163°C is one second per 0.025mm of thickness accurate to ± 2 seconds.

Use a micrometre when determining the panel thickness.

For example:

Laminate thickness (mm)	Required heatup rate to 163°C ± 2 sec
0.60	24
0.62	24.8
0.63	25.2
0.64	25.6
0.65	26
0.66	26.4
0.67	26.8
0.68	27.2

Formica laminate formability is tested in accordance with the conditions detailed in AS/NZS 2924.2, clause 19, method A and ISO 4586.2, clause 19 method A. When forming at these conditions, a high yield can be maintained within the capability and condition of the forming equipment.

The majority of Formica laminates have the capability, for fabricators with well maintained, high end precision post-forming equipment, to bend around prepared profiles of 8mm for solid colours and 4.5mm for stone, abstract and woodgrain designs, in the machine direction. Note: See the following table for postforming guidelines.

For those with equipment or processes unable to utilise the Formica laminate tight radii capability, improved yield recovery can be achieved at radii within the capability of such equipment and processes.

Forming in the cross direction is not recommended and is at the discretion of the fabricator.

Control of common postforming variables using techniques such as: preforming processes, preconditioning, temperature control, elimination of drafts and proper equipment adjustment and maintenance, can improve bending success.

Where possible bending from the centre of the sheet is best.

High pressure decorative laminates								
Postform bending performance Performance properties (ISO 4586-2:2004, Clause no.)								
Typical properties	**Clause**	**Attribute**	**Units**	**Values**				
				Range		**Solid colours**	**Stone, print, woodgrain**	
Regular forming	19 Method A	Bending radius	mm (max)	Internal radius	MD	10mm	7mm	
				Cove bend	MD	10mm	10mm	
	Applicable décors: **Solid colours:** Antique Wiluna White, Antler, Asphalt, Baikal, Black, Bud, Crystal White, Deep Anthracite, Just Blue, Malibu, Memphis Green, Pomegranate, Sarum Grey, Storm, Warm White, Leaf Green. **Prints:** Blackstone, Bliss Cinder, Brushed Silver, Brushed Zinc, Ebony Oxide, Endless Indigo, Silver Shadow, Fini Wenge, Flinders Black, New Stainless Steel, Prestige Walnut.							
Tight forming	19 Method A	Bending radius	mm (max)	Internal radius	MD	8mm	6mm	
				Cove bend	MD	8mm	8mm	
	Applicable décors: All decors, except those nominated for “Regular forming”.							
Resistance to blistering	20 Method A	Time to blister (Tempilaq to blister time)	sec	≥15				

Laminex New Zealand can provide laminate postforming capability information. However, as there are a variety of processes and equipment available and used by our customers, each fabricator will need to determine the points of consistency and capability for their own installed processes and equipment.

Terminology describing postforming equipment as follows:

- Static post-forming relates to the work piece being held in a fixed position during the forming process.
- Flow-thru relates to the heating zone and pressure bending zone being in a fixed position and the work piece travelling past these zones during the forming process.

Postforming process guidelines for equipment categories

SECTION 1: Precision control specialised tight radius postforming equipment

Generally associated with:

- Flow-thru post-forming containing a bank of three or more individually thermally controlled heating lamps. Glue applicators and precision constant pressure bending roller zone of more than one metre in length.
- Static post-forming using the precision heat controlled bar with controllable positioning through the bend whilst maintaining consistent pressure to follow the profile.

Profile tips

If the heat-up rate of the laminate is too rapid, overshoots, or if heat applied is variable, random failure due to blistering may occur. As a safeguard against this it is recommended that regular heat up time checks are undertaken to track machine performance and temperature control fluctuations (i.e. overshoot, undershoot and stability). Similarly, if the forming machine doesn’t follow the profile, small cracks at the top and bottom of the profile will result. Cracks can also result if the laminate does not adhere uniformly to the profile. The sheet thickness, ambient temperature, drafts close to the work piece, board temperature or speed of movement of forming may affect uniform heating and overall heating time over the distance of the profile.

Making the bend

The ends of the laminate sheet 8cm either side of the centre line of the bend should be filed smooth to remove any edge

chips or small cracks. Removal of these will help prevent any larger cracks from extending into the sheet when bending.

Accurately locate the laminate and board in the forming machine so that the bend is made in the correct position, not attempting to pull the laminate around the profile under too much tension.

If too much tension is developed on the bend, tension cracks along both top and bottom radius may occur. This cracking is usually evident immediately after the top is removed from the machine. Too little pressure will leave a gap between the laminate and the board, leaving this susceptible to impact cracking.

SECTION 2: Manual and semi-automatic (static) postforming equipment

Generally associated with:

- Semi-automatic flow-thru post-forming equipment containing radiant heating elements, generally on/off control and fixed bending bars.
- Manual and semi-automatic static post-forming equipment containing a bank of radiant (generally ceramic) heating elements, sometimes an IR temperature sensor, either manual or automatically activated bending bars or a mat to push laminate over the work piece profile.

Due to the diverse processes and equipment available within the category of manual and semi-automatic (static) equipment, different heat-up rates and processes are mentioned within this section.

It is known that postforming a tight or small radius on a short bed flow-thru and semi-automatic or manual equipment is difficult to achieve or maintain performance consistency. For this reason it is the requirement of the fabricator to determine the capability and performance setting of their installed equipment and associated postforming processes to obtain consistency of yield.

Forming

There are three main steps involved in bending Formica laminate.

Step 1.
Heat the area to be profiled to the required bending temperature.

Step 2.
Bend immediately while still at the correct temperature.

Step 3.
Cooling of laminate to set formed shape.

Heating

The most common type of heater consists of a series of ceramic heater segments which are coupled together to form a continuous bar. In most cases these heaters are set up in banks to allow three heat zones along the machine.

Temperature variations during heating can affect the heat up time range and lead to possible failures when bending. As a safeguard against this, regular heat up time checks should be undertaken at each individual heating element. The most common method of heat up checking is by placing sample pieces of laminate (for example 250mm x 75mm) at the three stations mentioned above.

Apply Tempilaq to each piece, time to melt (should be approximately 30 seconds) and then time to blister. If there is a variation in blister time between any of the laminate samples of five seconds or more, then adjustment of the heater bar may be necessary. Refer to the machine manufacturer for guidance.

Heater setup procedure

Step 1.
Elements must be centred over the bend to be made.

Step 2.
Usually the heater elements are closer to the work surface at each end than at the centre. The reason for this situation is to compensate for the heat loss around each end of the machine.

Step 3.
Heater height above the laminate surface is determined by the time it takes the laminate surface to reach a temperature of 163°C which should be between 24 to 28 seconds. Formica laminate is manufactured in accordance with AS/NZS 2924.1 & AS/NZS 2924.2 and ISO 4586.1 & ISO 4586.2. Laminate postforming conditions are required to heat the laminate so that the time taken to reach 163ºC is one second per 0.025mm of thickness accurate to ± 2 seconds. This can be controlled by either adjusting the element's temperature, the height above the laminate's surface or speed of motor drive conveyor. In the case of a continuous forming type machine the surface temperature can be determined by using a temperature indication crayon or liquid, eg. Tempilaq.

Step 4.
For a wide bend, the elements can be gently moved backward and forward to give a greater heat spread and maintain a surface temperature to achieve 163°C in 24-28 seconds.

Bending time

Bending times in the order of 30-50 seconds are generally accepted as practical. To establish bending time, use the following method:

Step 1.
Taking an offcut from a part of the sheet adjacent to the area to be formed, determine the blister time (a bubble raised on the heated surface) with a stopwatch. (Normally around 40-60 seconds as a guide).

Step 2.
Bend time (Time to obtain forming temperature.)

Bend time = 60% of blister time, eg. If the blister time was 60 seconds then bend time would be 60 x 60% = 36 seconds.

If any tightness on bending is detected, there is the potential to increase the heating time but maintain below blister as determined above.

Note: The pattern, colour, sheet thickness, as well as room, board temperature or speed of movement of forming (continuous type machine) may affect the heating time due to the differences in heat absorption.

Bend range is normally around 26 seconds if all previous steps have been performed. If no offcut of the material to be formed is available, then the bend time can be approximated by heating the area to be bent to the required bending temperature of 163°C at a heat up time to Tempilaq melt of 28 seconds. Allow a further five seconds for the core material to reach temperature then make the bend.

Again, if any tightness is detected, extend the heating time. The operating window can be widened if necessary by slowing the heating time such that a surface temperature of 163°C is reached in 40 seconds. The slower heating rate will lengthen the blister time and bending can be achieved at 47 seconds heat time.

Making the bend

The ends of the laminate sheet 8cm either side of the centre line of the bend should be filed smooth to remove any edge chips or small cracks. These may start larger cracks extending into the sheet when bending.

The laminate should then be glued flat and pressed down and rolled, leaving the laminate for the bend clear of the boards. If using a contact adhesive, ensure adhesive is sufficiently dry and all solvents evaporated before making the bend.

Ensure no adhesive lumps are wedged between the laminate and top of the profile that can cause fractures. The laminate and board should then be accurately located in the forming machine so that the bend is made in the correct position, not pulling the laminate around the profile under too much tension.

The sheet is formed immediately after the correct heat up procedure is completed and is then held in position while the area of the bend is allowed to cool down. Usually 15-20 seconds is sufficient to permanently set the laminate in position and shape.

Step 1.
Temperature should have reached bend temperature along full bending length.

Step 2.
If too much bar tension (ie. the benchtop core is placed in the machine too far forward) on the bend, tension cracks along both top and bottom radius may occur.

This cracking is usually evident immediately after the top is removed from the machine.

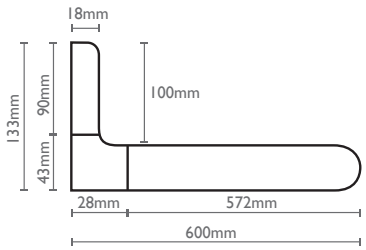
Step 3.
Too little pressure will leave a gap between the laminate and the board, leaving this susceptible to impact cracking. Use of a hand roller may be required to press the moulded laminate onto the boards so that contact adhesive can bond properly.

Cove splashbacks or stand-ups

When a splashback or up-stand is required, it is necessary to lay out the top to determine the correct dimensions for each section of the benchtop.

Assuming the total width of the benchtop including splashback is 600mm with the overall height of the splashback being 100mm from the top of the benchtop.

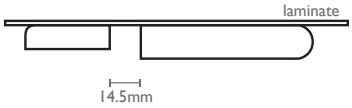
Fig. 1.



Having determined the dimensions of each component, prepare the blanks and laminate, then bond together ensuring that a spacer block is used to guarantee an exact dimension between the benchtop blank and splashback component.

Example: Use 14.5mm wide spacer for a 19mm diameter coving rod.

Fig. 2.



Example: 19mm Diameter coving rod

After bonding both components to the laminate, care should be taken when rolling to ensure edge cracking does not occur between the splashback and benchtop component. Should the splashback be of a different thickness to the benchtop, then accurate packers must be employed to ensure an even thickness between both components.

The top is now ready for post-forming. It is important that all other forming functions are completed prior to the coving operation. Premature forming of the cove section may result in insufficient room in the machine to carry out the front edge forming.

Forming the cove section

Once all other forming sections have been completed, heat up the cove rod on your machine.

Step 1.
Invert the benchtop and align the 14.5mm grooved section with the machine indexers provided in the recessed aluminium channel, so the section to be coved will fall directly over the coving rod. Pull firmly so as to align the back edge of the benchtop component with the inside of the coving rod. This will ensure correct alignment of the benchtop. Remove the indexers before applying platen pressure.

Step 2.
Lower the top platen of the press. Apply 163°C Tempilaq to a section of the groove, ensuring that a melt time of approximately 28 seconds is achieved. Once the Tempilaq commences to melt, slight hand pressure should be applied to the splashback component, it will usually fall down under its own weight. When the splashback component has formed to 90 degrees and is hard against the machine frame, clamp splashback in position with clamps provided with the machine.

This total operation should take no more than 45 seconds. Should the time be faster or slower, then adjustment of the heat setting on the coving rod will be required.

Step 3.
Now fit the timber coving profile in position. Glue and fix in both directions with screws or staples ensuring the cover section remains hard against the machine frame. A gap filling adhesive like foaming PUR will help fill any voids.

Warning: It is essential there are no voids left between the laminate and cove rod as any impact will crack the laminate. Speed is essential during the fixing of the timber coving profile as extensive delay in removing the benchtop from the machine may result in scorching or blistering of the laminate. Should large tops be required for fabrication where long delays would be obvious, then it is suggested that a special table be constructed to enable the fixing of the timber coving profile away from the post-forming machine.

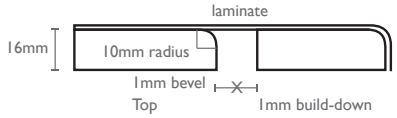
Step 4.
Once the coving profile has been fixed into position, it is important to check that the splashback is square to the benchtop. Usually the cove section will want to fall away. Avoiding this will require the fixing of temporary plates to each end of the blank to hold it square until the adhesive dries along the timber coving profile and the laminate cools.

Extended drop-fronts benchtops

Some specifications require the fabrication of extended drop-down front edges usually between 200mm and 250mm deep. These applications are usually used in motel and hotel vanity units, reception counters, etc.

It is therefore important to be aware of the formula required to achieve this result. Details of the mathematical specification for 16mm and 33mm thickness benchtops are as follows:

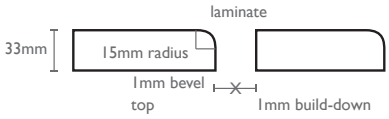
a. 16mm thickness benchtop with 10mm radius.



'X' = 2 x π x Radius ÷ 4 + (Substrate Thickness – Radius) – Radius
Radius – Radius
Example: 2 x 3.143 x 10mm ÷ 4 + 6 - 10
= 11.7 at 'X'

Then allow 0.5 to 1mm for additional clearance which would give a suggested dimension at "X" of 12.5mm.

b. 33mm thickness benchtop with 15mm radius.



'X' – 2 x 3.143 x 15mm ÷ 4 + 18 - 15
= 26.6 at 'X' say at 'X' of 27.5mm

In all cases it is important that the 1mm bevel be applied to the bottom of the front edge of the benchtop section. This bevel enables additional clearance for the drop-down component to clear when being bent into position.

Note: a. The rate of forming depends primarily upon the amount of energy fed in, the thickness of the laminate, the radius of curvature to be formed and whether the laminate is to be formed parallel to, or across, the direction of its sanding. But when a laminate must be formed around a 10mm radius across the direction of sanding, the bend time (of 60% of the blister time) should be adhered to. The laminate will always bend more easily in a direction parallel to the direction of sanding. **b.** The formed laminate must be cooled in its shape to prevent it from springing back. In electrically heated equipment this is achieved with a draught of cool air or by a wet sponge.

General site work notes & in-situ installations

Topic	Guideline	
Pre-conditioning	Prior to fabrication, laminate and substrate material should be allowed to reach moisture equilibrium under the same conditions for 48 hours.	
	The recommended environment to achieve this is 20-25°C and 50% relative humidity.	
Storage	Always store sheets face to face with a sheet of protective paper between the faces.	
	Bulk stocks should be stacked flat and completely supported.	
	Avoid low humidity and extreme temperature.	
	Avoid prolonged daily exposure to sunlight as fading or colour change may occur. Use curtains or blinds to prevent direct exposure.	
Fabrication	Laminates can be bonded to a variety of substrates including particleboard, medium density fibreboard, plywood, hardboard, core stock, paper honeycomb and aluminium.	
	The substrate surface must be of sound strength and free of sanding defects to ensure good adhesion to laminate and to minimise “telegraphing” of defects.	
	Do not bond laminates directly to plaster, plasterboard, solid timber or concrete.	
	Laminates of less than 2mm thickness should be bonded fully supported to substrate.	
	To obtain maximum dimensional stability, unframed panels should have a backing sheet bonded to rear surface.	
	Ensure sufficient adhesive and mechanical pressure is used to provide a first class bond. We recommend a minimum pressure of 3kg/cm^2 for contact adhesives and 6kg/cm^2 for hard setting glues.	
Joins	Where two fabricated components are to be joined apply a complete spread of PUR or epoxy adhesive to both surfaces of the components before clamping them together. Close the join and allow excess adhesive or sealant to squeeze out. Secure the join using work top connectors and clean away excess adhesive with appropriate solvent. Adjust the levels by lightly tapping with a smooth faced hammer.	
	Whenever possible, avoid placement of joins close to sink areas. This can minimise the risk of water damage to joins. Don’t place boiling jugs or leave water puddles on joins as it may penetrate the join.	
	Where external joins are formed with postformed components, it is important to dull any sharp edges using fine sand paper to prevent injury from accidental contact.	
Handling	Keep work area clean to avoid marring and scratching.	
	Avoid contact with abrasive surfaces or grit. Lift sheets carefully, do not slide on the decorative surface.	
	Do not use as a work surface.	
Sawing	Hand sawing	A fine tooth panel saw gives the best result because of the relatively small set of the teeth.
		The back stroke should be light and the cutting stroke at approximately 45° to the face of the board. Keep the saw sharp.
	Machine sawing	Tungsten carbide circular saws with 3-4 teeth per 25mm with only a slight set and a saw blade tip speed of 3000 metres/minute will give a clean cut.
		For long production runs tungsten carbide tipped blades 300mm to 350mm in diameter and operating at 3000 to 3500 RPM are recommended to achieve this.
		Always cut with face up to minimise surface chipping.
	Jigsawing	A clean cut can be achieved with a jigsaw using hardened blades with average teeth and slow feed speed. Non-carbide blades will dull quickly.
		Ensure sheet is adequately supported while cutting.
		Jigsaws cut with an upward stroke, therefore, in this instance cut from the back of the sheet.
		Metal cutting band saws with 32 teeth per 25mm are ideal for shapes.

General site work notes & in-situ installations continued

Topic	Guideline	
Drilling	High-speed twist drills, either hand or power operated, will cut clean holes.	
	Because of the hard melamine surface, a small pilot hole should be drilled for carpenter's bits.	
	Fast cut types give the best results.	
	For larger holes, 18mm diameter and over, a centre bit should be used.	
Routing	Portable routing	Portable routers with twin fluted tungsten carbide cutters and replaceable tips are recommended for on-site edge trimming or cut-outs for sinks, basins, etc.
Screwing	Where mechanical fixing of any laminate sheeting is required always use round head screws and cup washers.	
	Drill the hole slightly larger than the shank of the screw to allow for laminate movement.	
	Do not over tighten screws as this may cause the laminate surface to fracture.	
	Nails should never be used.	
Planing	Hand planing	A perfect edge finish can be made with a hand plane. Use specially hardened plane irons, such as the Titan high-speed type, which require less sharpening than standard irons.
	Machine planing	Vertical spindle moulding machines with tungsten-tipped cutters operating at 6000 RPM are ideal for edge finishing and for making perfect mitres without any edge chipping.

Mounting bowls

There are two ways to mount bowls in High Pressure Laminate.

Top mount

This is when a cut out is made in the benchtop and the bowl is sealed around the perimeter and fixed in place normally with brackets under the substrate.

Benefits:

- Simple to install either in the factory or onsite.
- Provides a robust edge that will absorb impact from hard objects impacting on the edge. Note: not all Stainless Steel bowls are of the same quality Steel.
- Easy to replace if the bowl requires changing.

Draw backs:

- There will always be a lip which prevents wiping directly into the sink, this varies depending on sink material and manufacturer.
- May not look as appealing as more sink visible on the surface.

Undermount

The option of undermounting is at the discretion of the Benchtop manufacturer who may employ different undermounting options.

Bowl and drainer units:

- HPL and bowl materials expand and contract at different rates.
- A flexible adhesive is required at the intersection of the two to allow for movement.
- A minimum 2mm thickness is requested by the adhesive suppliers.
- Because this is not a rigid join there is some compression with the adhesive and if impacted will split the laminate.

Single bowls:

Due to the size of the bowl and flexibility of the sides these can be installed using a ridged adhesive. (at manufactures discretion)

This eliminates the flexibility at the intersection of bowl and HPL.

Benefits:

- There is no lip or raised edge resting on the work surface.
- Anything on the bench can be wiped directly into the sink.
- Neat and tidy visual appearance.

Draw backs:

- The edge of the Laminate can split or chip if impacted with a solid object.
- In high use situations the edge of the laminate can show signs of wear.
- Poor quality bowl edges may telegraph through the Laminate.
- Difficult to replace if damaged.

Conclusion:

In high wear situations or where there is risk of damage to the edge of the laminate, **a top mounted bowl is recommended**.

Trouble shooting / problem solving

Postforming issues		
Issue	**Problem**	**Cause**
Cracking	Heat source	Not enough heat.
		Incorrect heater position.
		Inconsistent heat applied (cold spot).
		Incorrect heat up rate (did not use Tempilaq or similar).
		Heat up rate not adjusted in consideration of laminate thickness, room temperature or substrate temperature.
	Substrate	Irregular profile radius.
		Poor profile machining (high spots, low spots, bumps or ridges).
		Contamination (sawdust or chips).
		Cold substrate takes heat away from laminate.
	Glue line	Uneven glue application (glue lumps, contaminated with sawdust or chips).
	Equipment	Poor alignment.
		Laminate under too much tension during bend.
		Radius too tight for capability of equipment.
	Laminate	Ends of laminate sheet not filed smooth 8cm either side of bend centre line (edge crack propagation).
		Incorrect grade (non-postformable).
		Laminate too old (poor stock rotation).
		Laminate exposed to extremes of temperature; moisture or humidity during storage.
Blistering	Heat source	Too much heat.
		Inconsistent heat applied (hot spot).
		Incorrect heat up rate (did not use Tempilaq or similar).
Glue line delamination	Adhesive	Not enough adhesive.
		Inconsistent glue coverage (low spot).
		Incorrect adhesive used.
		Contact adhesive not allowed enough drying time and solvents to evaporate.
		Contact adhesives left too long before contact and solvents have completely evaporated.
	Equipment	Not enough pressure applied to bend.
		Not allowed to cool in position (spring back).
Change of gloss	Heat source	Too much heat.

Trouble shooting / problem solving continued

Post-fabrication or post-installation issues		
Issue	**Problem**	**Cause**
Cracking	Cut out and internal L-shaped sections	Internal corners must have a small (2-3mm) chip free radius.
		Ensure that machined edges of cut outs are sanded smooth and that the top edge of the laminate is arrised to eliminate the possibility of stress.
Impact cracking	Gap between the laminate and the substrate	Too little pressure when bending.
Surface imperfections	Adhesive	Water based glue causes substrate fibre to swell.
	Glue line	Uneven glue application (glue lumps, contaminated with sawdust or chips).
	Indentations	Contamination under protective film pressed into laminate surface.
	Telegraphing	Uneven glue application.
	Equipment	Press pressure too high for work piece.
Joint gap (shrinkage / expansion of laminate or substrate)	Environment	Laminate and substrate should be allowed to equilibrate for up to 48 hours before fabrication.
		If installation location is to have air conditioning then this should be in operation before laminate is installed.
	Adhesive	Sufficient glue and pressure must be used to ensure a first class bond, or alternatively use a hard setting glue such as urea or epoxy both sides of any join and around each laminate panel perimeter.
	Fabrication	Avoid placement of joins close to sink areas to minimise the risk of water ingress and damage.

Limitations

Application	Recommendation
External use	Not for external use. Internal use only.
Window sills	Formica laminate has good colour retention and dimensional stability in normal interior applications. However, prolonged exposure to sunlight may cause shrinkage and/or some change in colour. Formica laminate is therefore not recommended for interior applications with prolonged exposure to direct sunlight.
Wall linings	Do not bond directly to plaster, plasterboard or concrete.
Cutting board	Do not cut directly on the laminate surface.
Laboratory benchtop	Formica laminate is not recommended for laboratory benchtops. However, Laminex New Zealand does have a range of laboratory suitable chemical resistant products, specially designed for this application.
Cold forming	Formica laminate can be cold rolled to a 150mm radius. However, bonding the laminate requires support to prevent spring back. Adhesive failure can result in the laminate fracturing in situ, creating sharp and dangerous fragments similar to shards of glass. It is for this reason cold forming is not recommended.
Shelf life	Providing it is not exposed to extremes of temperature or high humidity, Formica laminate should have a shelf life of up to 12 months, however, it is strongly recommended that stocks be rotated as often as possible.
Cross directional bending (CD)	Forming a profile in the cross direction (CD) /end roll is not recommended. As a guide, CD bending for solid colours 10mm. Stone, abstract and woodgrain designs 6mm. Choosing to form an end roll in the CD is the decision of the fabricator.
Protec+	The Protec+ laminate surface is not a substitute for maintaining a clean work surface. Effectiveness of the antibacterial and antifungal properties is compromised if a layer of dirt or grime prevents direct contact between the bacteria or fungus, and the laminate surface.

Maintenance and cleaning guidelines

General Care	Recommendation
General maintenance warning	Do not use strong acidic, alkaline cleaners or bleach for normal cleaning as these might etch the surface.
	Avoid commercial cleaning agents as they can contain higher concentrations of stronger potentially damaging chemicals.
	Keep waxes and polishes well away as they dull the natural shine of the laminate.
General surface cleaning	A damp cloth will remove spills and greasy spots. Rub with a clean dry cloth to bring back brightness.
	Occasionally clean with mild dishwashing detergent.
	To remove heavy build-up of dirt, use cleaners such as: Mr Muscle® glass cleaner or Ajax® Spray 'n' Wipe.
Stubborn surface stains	If a stain cannot be removed with the above cleaners, try methylated spirits or dab the stain with a diluted bleach mixture (one part bleach to eight parts water); leave for three minutes then wash off with water and dry. Finish off with Mr Muscle® glass cleaner or Ajax® Spray 'n' Wipe.
Surface spills	Formica laminate surfaces resist staining from most household chemicals. However, some spills require immediate action, such as: beetroot, grape and berry juices, first aid preparations, concentrated bleach, oven cleaners, dishwasher detergents, artificial dyes, hair colouring and solvent based pen ink. Specialty glues such as super glue must also be removed straight away with acetone (nail polish remover).
Surface scratches	High gloss surfaces and darker colours will show scratches more readily than lighter colours, hence require more care and maintenance than lighter colours or lower gloss finishes. • Avoid scourers and abrasive cleaners as they will damage the surface. • Do not cut directly on the laminate surface. • Do not drag or slide objects (including: utensils, knives and unglazed pottery) across the laminate surface. Always place and lift objects from the surface.
Surface heat resistance	Don't place hot objects, electrical appliances or pots straight from the oven or cooktop onto the Formica laminate surface.

Special note: Oven and hot plate surrounds

Laminate can be used on benchtops around ovens or hot plates, however it is recommended that any cut outs for hot plates have an appropriate heat absorbing tape applied to the perimeter of the cut out to help avoid cracking.

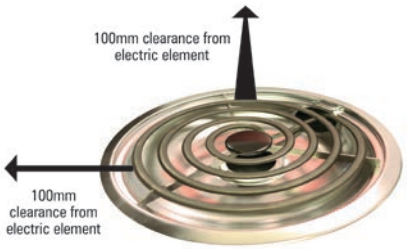
Regarding oven surrounds there are some basic requirements which need to be followed.

Splashback compliance

Formica laminate is suitable to use as a splashback behind electric and gas cook tops when adhered to a suitable substrate.

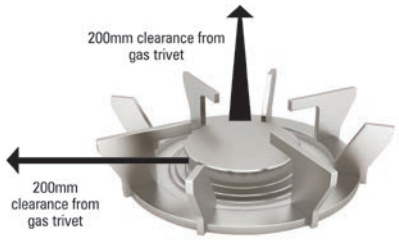
Electric cook top

Formica laminate can be used as a splashback material behind an electric cook top provided that it is kept at a distance of at least 100mm from the periphery of the nearest heating element.



Gas cook top

Formica laminate can be used as a splashback material behind a gas cook top provided that it is kept at a distance of at least 200mm from the periphery of the nearest gas ring.



Note: 1. All gas appliance installations must comply with AS/NZS 5601.1: Gas Installations. **2.** All electric cooktop installations must be in accordance with the cook top manufacturer's instructions.

Concluding statements

- The expectation of appearance and decision of acceptability is that of the fabricator in accordance with standards outlined in this publication.
- Appropriate OH&S techniques and work practices are the responsibility of the fabricator.
- This information is intended as a guide and may not apply to all situations.
- The data in this technical data sheet is believed to be accurate to the best of our knowledge, but users should carry out their own assessment of the product to satisfy themselves that it is suitable for their requirements.