Pyroguard
A Saverto Company

Operating Procedure

Vertical saw guide

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1 Introduction

The purpose of this operating procedure is to provide detailed information on the use of a vertical saw to cut multi-laminate Pyroguard glasses.

2 Considerations when cutting multi-laminates on a saw

Pyroguard Rapide, Pyroguard Rapide Plus and Pyroguard Advance multi-laminates must be cut with a diamond-tipped saw blade, normally on a specialist-built vertical saw, with cooling water to avoid thermal cracks.

Once the cutting has started, each cut must be completed without interruption, as the cutting fluid (water) may dissolve components of the interlayer and will subsequently produce stains on the surface of the glass.

It is good practice to clamp the glass at the top of the cut once the blade is halfway through the vertical cut. This will prevent vibration along the cut edge and prevent venting into the body of the glass. The clamp should only be applied at 'finger-tight' pressure.

For best results the glass should be against the saw with the glass fully supported to prevent vibration.

The saw blade must be cooled by cutting fluid (water) during the sawing process. During this operation, the temperature of the water should not show a difference exceeding +/-10°C from the ambient temperature. If the temperature difference is higher, there is a risk that cracks may appear in the glass during the cutting.

Pyroguard advise that the type of saw blades to be used are diamond castellated. The castellated tooling allows the interlayer to escape during the cut (Figure 1). We also recommend requesting low noise blades.

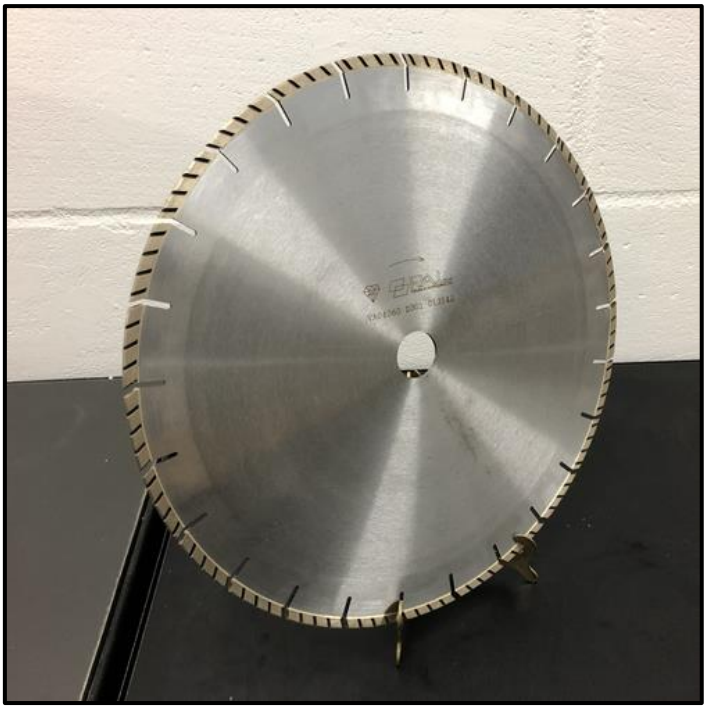


Figure 1 Example cutting tool (Source: https://palmachinery.co.uk/tooling-accessories/)

The following suppliers are familiar with this application.

P.A.L. Tooling & Accessories (UK)
https://palmachinery.co.uk/tooling-accessories/
GTR (FRANCE)
https://www.sngtr.fr/
SuperCut (ITALY)
https://www.supercut-autoglass.com/

Poor cutting edge quality can lead to breakages during handling and shipping.

3 Operating procedure

3.1 Safe operating – mandatory requirements

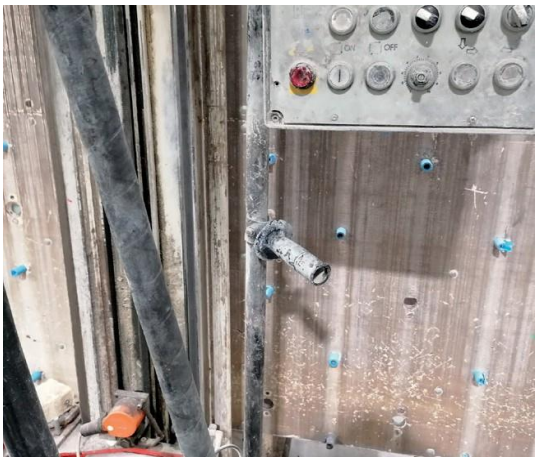
	PPE must be worn at all times whist carrying out this procedure: • Safety glasses • Safety boots • Wrist guards • Safety gloves **Note: site specific safety procedures may exceed these requirements**

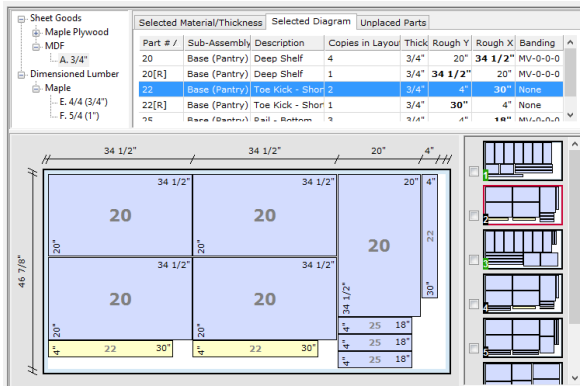
3.2 Prechecks

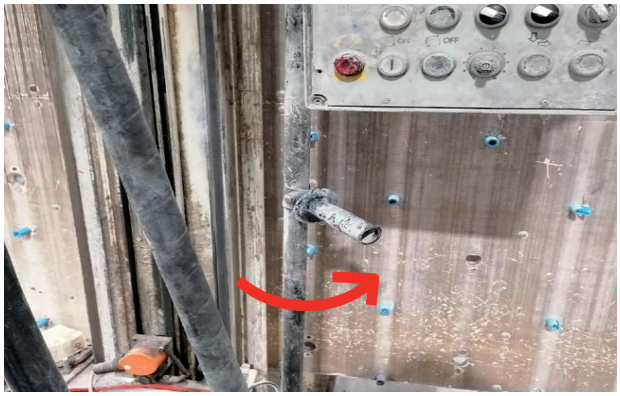
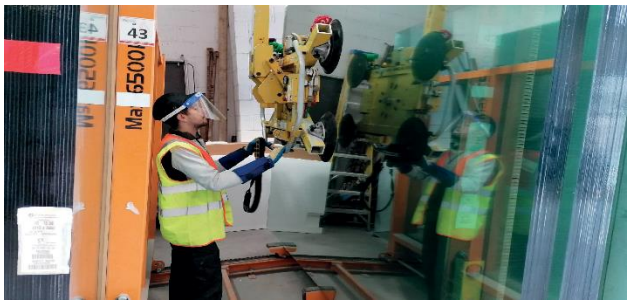
	Check for: • Exposed / Loose electrical wire • Broken / Damaged components • Damaged water-lines • Hydraulic leaks • Seized hydraulics or chains
	Worn cutting blades should be replaced with new (as in image to the left; no edge defects or warping)

3.3 Procedure (using example of Putsch Saw)

	Power on machine at main supply, the control panel will only function if the main power is on.
	Check that the emergency stop button & other controls function. Oil the rollers, track guide and chain to prevent the cutting head or rollers from seizing.
	Move the glass sheet with the crane & place the glass onto the rollers and adjuster pads of the saw, release the vacuum lifter & store the crane away in a safe place. Butt the glass to the stop block at the bottom corner of the vertical back board. To prevent flexing and vibration in the glass, use wooden wedges to support the top edge of the glass. For best results the glass should be against the saw backboard with the glass fully supported on its face to prevent vibration.

	Slide the cutter head to the required measurement using a measuring tape. This can be done using either the one installed on the machine, or a hand tape butted against the edge of the cutting blade.
	Pull the lock bar, locking the cutter head at the measurement indicated on the measuring tape, an electrical connection is made to power-on the control panel.
	Turn the water on. Use the lowest water flow rate possible to avoid washing away the interlayer of the glass. The saw blade must be cooled effectively by cutting fluid (water) throughout the sawing process. During this operation, the temperature of the water should not show a difference exceeding +/-10°C from the ambient temperature. If the temperature difference is higher, there is a risk that cracks may appear in the glass during the cutting.

	Push the start button for the blade to start rotating allowing the cutter head to extend toward the glass. Allow the cutter head to automatically begin moving down while the blade cuts the glass. Turn the cutter head speed control knob, to increase or decrease the rate at which the glass is cut.
	Make vertical and horizontal cuts. Use plastic wedges (➔) to maintain the gap along each cut run as the saw proceeds. This will avoid a stress break when the saw reaches the edge of the glass. It is good practice to clamp the glass at the top of the cut once the blade is halfway through a vertical cut. This will prevent vibration along the cut edge and prevent venting into the body of the glass. The clamp should only be applied at 'finger-tight' pressure.
	Cutting optimisation. Fire-rated glasses are very valuable, steps should be taken to reduce the amount of wastage. Cutting optimatsation software can play a role to reduce wastage and reduce the build up of off-cut stock.

	When the blade reaches the bottom of the glass, ensure the glass has been completely cut through. If the cut is complete, the operative pushes the stop button for the blade to stop rotating the cutter head retracts from the glass.
	Slide the cutter head away to remove the glass from the vertical back board. Immediately wipe down the glass edges especially if the pane is to be left standing on the saw for any length of time. The cut glass can now be moved away from the saw using the below lifting methods.
	Large glass sizes: Machine operator uses vac lifter to take the glass off the saw and move it to the washing area. Small glass sizes: Removed off the machine using manual handling methods to take the glass off the saw and move it to the washing area. After each cut the vertical back board needs to be washed down glass rests and checked for damage. Replace if required.

4 Cutting results

It should be possible to achieve a good quality cut using the method detailed in section 3. The saw should be well maintained, operators well trained and the cutting parameters optimized.

Poor cutting edge quality can lead to breakages during handling and shipping.

Good	Only minor defects on the glass edge with none or only few teeth marks extending into the glass by more than 1 mm. No visible interlayer washout.	
Bad	Fault: interlayer uniformly below the line of the glass edge (>1mm). Reason: interlayer has been washed out either during the cutting or washing process. Solution: use less water when cutting and washing or direct water away from the cut edge.	
	Fault: delamination on edge. Reason: water ingress (only on one edge - stored on a damp surface or edge not dried). Solution: store on dry surface, dry glass edge immediately.	
	Fault: corner of glass cleaved. Reason: the chances of this happening can be reduced by clamping the cut and using shims in the cut. This prevents the glasses vibrating towards the end of the cut. Solution: check blade quality.	

5 Cleaning after cutting and washing

Avoid placing recently cut panes on stillages on a wet surface or with damp or absorbent material at the base of the glass. Wooden setting blocks are a good option as they will allow air to circulate and the base of the glass to dry.

Once cut, immediately dry the edges and place the panes on a dry surface.

Once the glass has been cut, it is important to dry the edges and immediately clean away any residue marks on the glass. The residue marks can be removed by using a general glass cleaning fluid and a fine grade steel wool (‘type 0000’).

Immediately clean any residue marks on the glass.

All Pyroguard Advance and Pyroguard Rapide Plus glass products, especially those which have been saw-cut, should be washed and dried as soon as possible after cutting to remove any chance of surface and interlayer damage. We recommend using the minimal amount of water when saw cutting and we advise against putting panes though a washing machine as this extends the time the glass is exposed to water. Instead, we recommend cleaning the residue left after cutting by hand, using a suitable glass cleaner. We advise against using high pressure washers or, if used, ensuring that the glass edges are not targeted by the jet.

Use of an airgun to dry the glass is not recommended as this can force water into the interlayer edges. Dry with a clean cloth and use a squeegee to remove most of the water.

Allow the glass edges to dry completely before applying PAL tape, if required. Some processors find that a vacuum cleaner (e.g. Numatic 110V WV470-2 Commercial Wet & Dry Vacuum Cleaner) with an adapted nozzle is a good tool to dry the glass edges.

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