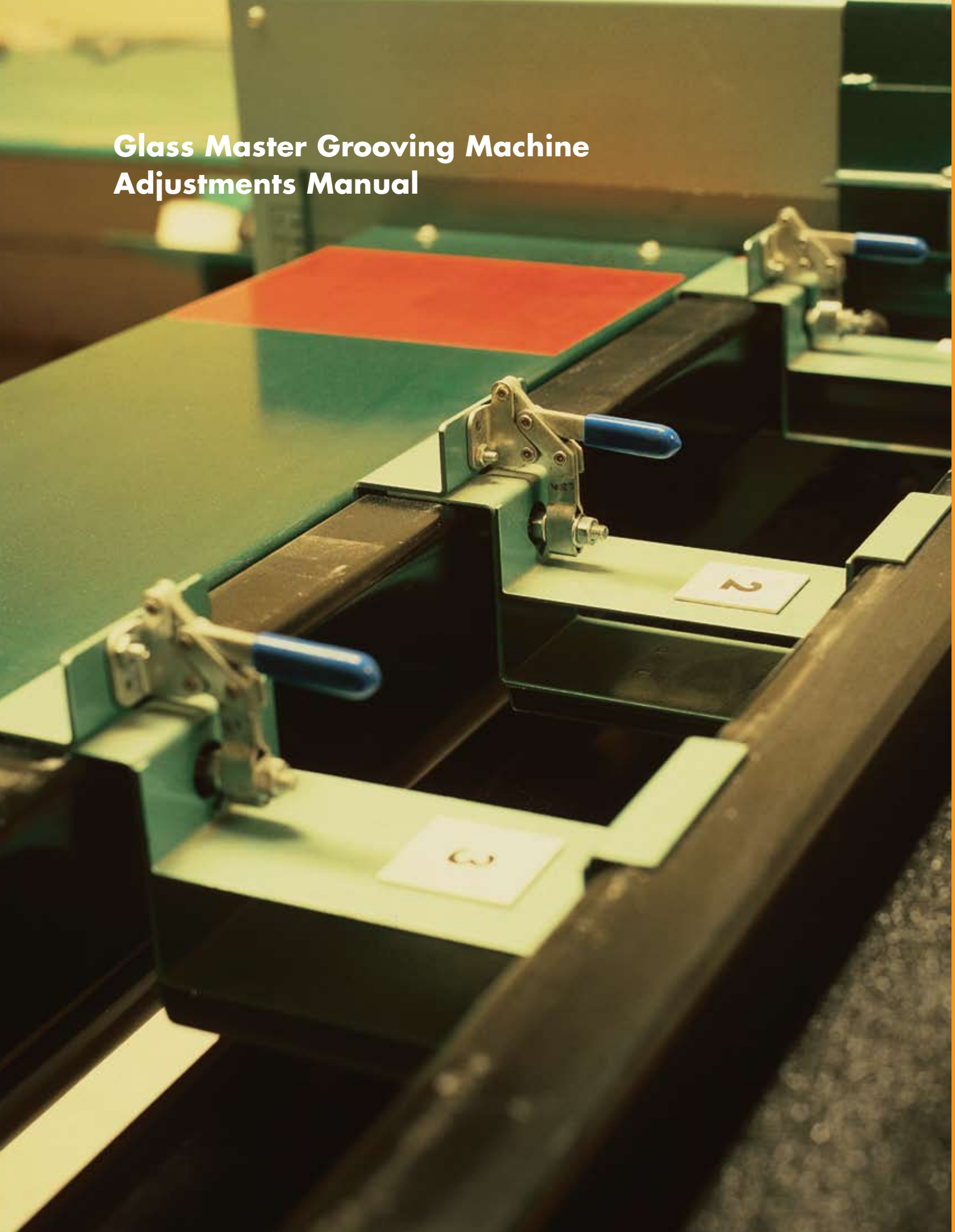
Glass Master Grooving Machine Adjustments Manual



Machine Adjustments Manual

Table of Contents

Introduction and Scope

Proper adjustment of grooving machines is essential to producing quality air duct board sections at lowest possible contractor cost. Several models have been produced by Glass Master since machines were first introduced into the air handling market. However, the basic design concept remains the same today as when first produced. Regardless of the model or year of production, the basic mechanical principles of adjustment discussed in the following pages still apply. The E-215 machine is the base upon which all other models are manufactured. E-215 machines in use far outnumber all other models in use at this time.

For the purpose of simplicity, this manual focuses on adjustment and maintenance procedures applying to the E-215 base model. Also included is brief information on how other glass master models differ from the E-215.Two basic types of fabrication can be preformed by all glass master grooving machines: Shiplap and V-groove configurations. Both types of fabrication are included in this work, although the V-groove method is not recommended if modular duct construction principles are to be used. Also, since the initial production of Glass Master machines, additional tools have been introduced to achieve specific purposes. All tools will be discussed at length. Evaluation of cut duct boards, grooving machine maintenance, repair, and trouble-shooting, are also included.

Initial Inspection

Initially, the user should perform a visual inspection of the machine. Remove all cutting tools and examine rollers first. The E-215 incorporates a series of six rollers to pull the fiber glass duct board past a set of stationary cutting knives. Two sets of pinch rolls, one set in front and one in back, grip the board to move it through the machine. Two support rollers are stationed between the pinch rollers to keep the duct board level. Figure 1 shows the left end plate removed to reveal rollers and drive train. Note that all rollers are "driven." Check to see that there are no rollers that can be turned freely by hand. If you can turn any of the six rollers more than ⅛ of a revolution it indicates too much chain slack. You should also inspect the grit surface of the two upper drive rollers, making sure the rollers are able to drive the duct board straight through. Inspection of the foot switch, plug, and electrical cords are also very important.

Note:

Electrical repairs should only be made by qualified personel.

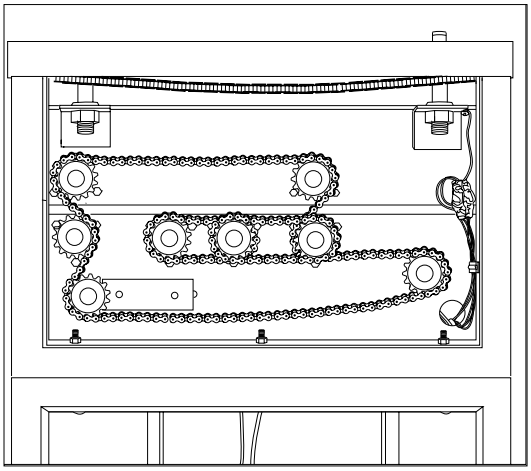


Fig. 1. E-215 drive chain

Roller Adjustment, Maintenance, and Repair

If one or more rollers does turn by hand, examine drive gears to be sure locking Allen screws are tight against keys and that key slots are in place (see Figure 2). Make sure the sprockets are in line when re-tightening. To avoid premature wear, all gears should be operating in the same plane.

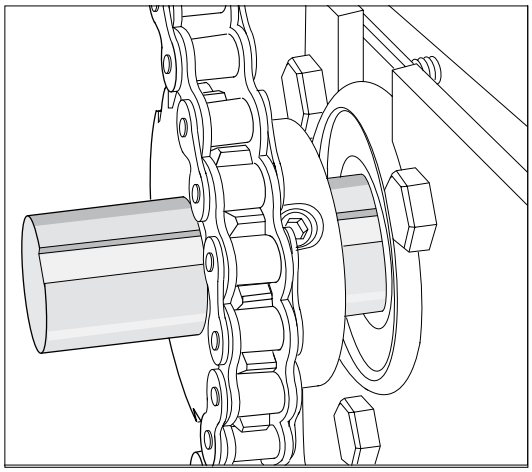


Fig. 2. Key slots and Allen screw

Resurfacing pinch rollers

On early models, the top pinch roller in front and the top pinch roller in back were coated at the Glass Master factory with an abrasive substance (crushed nutshell held in place by epoxy paint). This helped the rollers grip the airstream surface of the duct board and pull it past the stationary knives. However, normal usage wears the grit off these rollers. As more and more grit is worn off and the drive rollers become smoother, the duct board often will not pass through the machine in a straight line. The board will invariably begin to slip to the right or left, wasting material and needlessly adding to fabrication cost.

When this occurs, fabricators often attempt to correct the problem by closing the gap between the pinch rollers. **This is not recommended.** Closing the pinch roller gap can cause irreparable damage to the duct board; the glass fibers are literally crushed, the board becomes limp, and the foil wrinkles and begins to come loose from the fiber glass.

Resurfacing the pinch rollers is easily done in the field. This is best accomplished using rolls of industrial grade emery cloth and spray adhesive available from Glass Master. **No other roll resurfacing method is recommended.** The correct resurfacing procedure is as follows:

1. Thoroughly clean the pinch roll to be resurfaced.
2. Apply spray adhesive evenly to the pinch roller from one end to the other.
3. Unroll the emery cloth and secure it to one end of the cleaned roller with a pop rivet.
4. Apply spray adhesive to the underside of the emery cloth. When the adhesive is tacky, wind the roll spirally and evenly along the entire length of the roller, making sure wraps of emery cloth are tightly butted together. When you reach the other end of the roll, secure the emery cloth with a pop rivet. Complete instructions and technical assistance is available from Glass Master or your Knauf Rep.

Note:

Only the top front and top back rollers should be abrasive-coated, using emery cloth and spray adhesive by means of the method previously described. If the bottom pinch rollers or the leveling rollers are coated, this will damage the foil facing of the duct board. Also changing the spacing between pinch rollers does nothing to change the depth of the knife cuts.

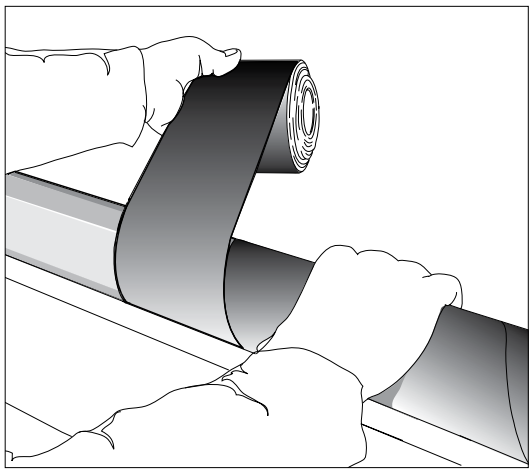


Figure 3. Resurfacing drive roller with emery cloth so that no gaps occur between wraps

Roller Adjustment, Maintenance, and Repair

Pinch roller spacing

Spacing between the pinch rollers is critical. Roller spacing should never be closed down tighter than the spacing set at the Glass Master machine factory. Those factory spacing are:

For 1" duct board	5/8"	(16 mm)
For 1½" duct board	15/16"	(24 mm)
For 2" duct board	1¼"	(32 mm)

With a good, gritty surface on the upper drive rollers, they can be spaced even farther apart and still pull the duct board straight through the machine without damaging it.

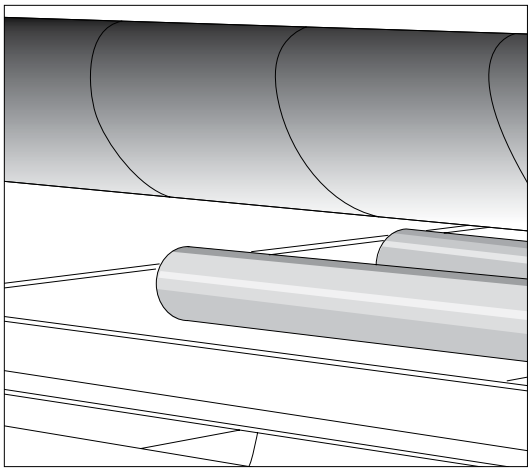


Fig. 4.
Factory pinch roller spacing must be maintained

Spacing adjustment:

Proper adjustment of the distance between pinch rollers can be accomplished easily. **First**, loosen the chain idler (seen in the bottom left corner of Figure 1). It is attached to the left roller plate. Loosen the two 9/16" (14 mm) bolts holding the idler. These bolts are located on the inside of the left end below the four bottom rollers and the tool bar. **Important:** Loosen these two bolts, make required adjustments, then pull outward and tighten both bolts.

On the top of the machine there are ¾" (18mm) bolts on the front edges of both end panels. If your E-215 has four bolts, four separate roller spacing adjustments must be made, two at each end of the machine. If your E-215 has two such bolts, both front and rear rollers can be adjusted simultaneously. Roller spacing should be maintained at the specified factory spacing for the duct board thickness in use(see page 4) along the entire length of the machine.

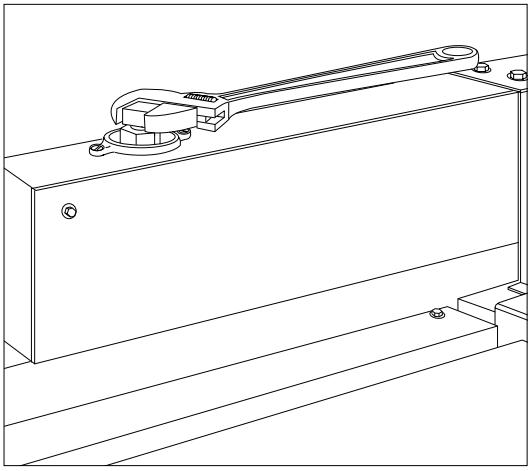


Fig. 5. Pinch roller height adjustment bolt

The Glass Master E-215 was designed to groove duct board up to 2" (51 mm) thick. If boards thicker than 1" (25 mm) are to be grooved, the chain mechanism which drives all rollers must be adjusted to provide more slack in the chain as the rollers are moved farther apart.

1. Adjust rollers for desired duct board thickness.
2. Take up slack in chain and tighten chain idler.

Roller Adjustment, Maintenance, and Repair

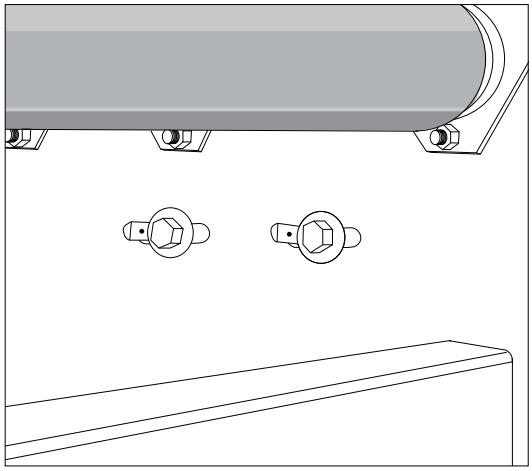


Fig. 6. Idler arm adjustment bolts

In order to ensure even cuts along the entire length of the tool bars and to prevent rollers from developing warp and sag, later Glass Master E-215 machines have Teflon® "Y" braces added to the roller on which the tool blades ride.

Lubrication

The Glass Master E-215 machine transmission is filled at the factory. While an oil inspection plug is located on the machine transmission, it should not be necessary to check the oil level.

Lubricating the drive chain is not recommended; this causes glass fibers to stick to the chain, causing premature wear.

Adjusting the Tool Bar

The Glass Master E-215 machine is constructed with two tubular steel tool bars. The cutting tools are positioned between, and rest on, the tool bars for fabrication. The vertical position of the tool bars directly affects the depth of all cuts. Proper positioning of the tool bar is absolutely essential. Tool bars are mounted on a plate that can be moved up or down on each end of the machine.

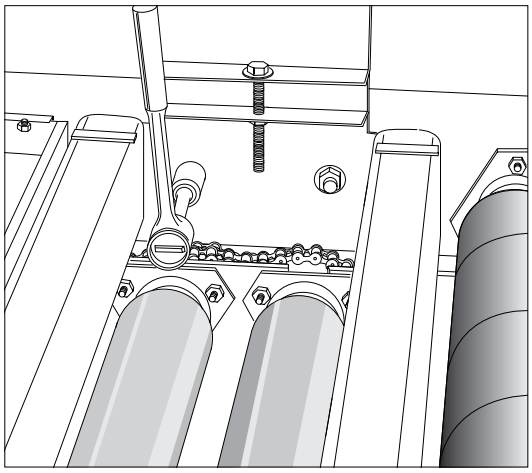


Fig. 7. Tool bar mounting bracket nuts

Adjustment of Individual Tools

First, loosen the two 9/16" (16 mm) nuts on the mounting bracket. Next, to raise or lower one end of the tool bars, tighten or loosen the vertical 9/16" (16 mm) bolt just to the right of the wrench in figure 7.The other end of the tool bars are constructed exactly the same. Both ends of the tool bars must be adjusted in exactly the same manner to keep the tool bars level along the length of the machine. Care must also be taken to ensure that the front tool bar is kept level with the rear tool bar in the depth of the machine. Proper height of the tool bars is determined by using either the A (#8) or G (#5) tool. The blades on these tools are attached by two screws which can be loosened to allow fine blade adjustment. Position the blade half way in the slotted holes to allow for future fine tuning, then set the tool on the bar (see Figure 8). **Do not lock it down.**

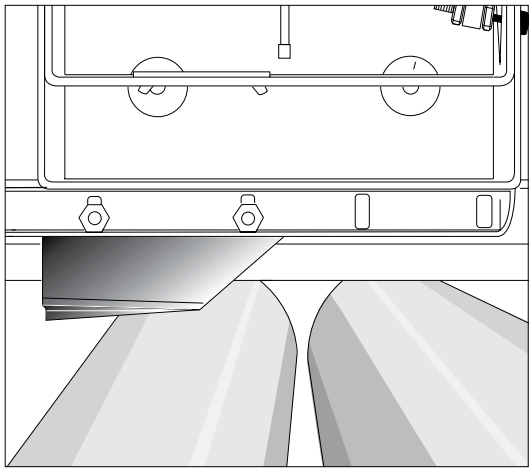


Fig. 8
Using A (#8) or G (#5) tool to adjust tool bar height

The bottom of the tool blade should rest firmly on the cutting roller so that it actually drags on the roller as it turns (see Figure 8). Adjust the tool bar vertically until the front edge of the tool holder rises slightly off the tool bar (see Figure 9). Tighten the two 9/16" (16mm) bolts on the mounting bracket and repeat this process at the other end of the tool bars. Check to make sure the tools are not set so low that they cut or tear the foil facing of the duct board.

With the tool bars properly adjusted in this position, adjustment of the other tools is quite simple.

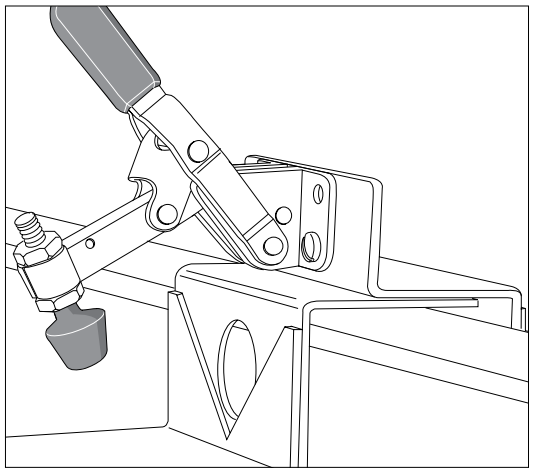


Fig. 9 Lowering tool bar until front edge of tool holder is off the tool bar slightly.

Note:

Some newer Glass Master grooving machines feature tool bars that do not require adjustment and are welded into place. Adjustment for duct board thickness is made by changing tool assemblies.

Adjustment of Individual Tools

The Glass Master E-215 machine has been tooled to cut either modified shiplap or V-groove cuts. For modified shiplap configuration, fabrication tools #1, #2, #3, #4, #5, #R1, #8, and SCO or A, B, C, D, E, F, G, and SCO were shipped with the machine.

Tools #1, and #R1 (A, E):

These two tools are designed to cut the female shiplap. Adjustment is very simple: Set all the tools to cut one half the thickness of the duct board. Loosen the two screws in the blade holder and move the blade vertically until half of the board thickness is removed (see Figure 10). If more or less than half the thickness of the fiber glass is removed, the duct section will not fold up to form a perfect rectangle or square. Very little attention is normally paid to the depth of this cut in the field, yet unless these blades are properly adjusted it is difficult to put two sections of duct together and maintain a straight duct run.

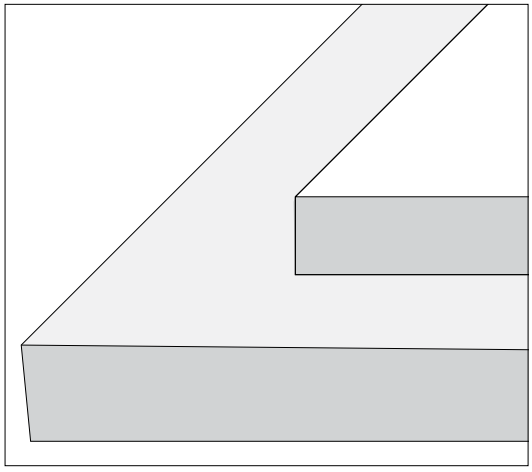


Fig. 10. Proper depth of cut for female shiplap

Tools B, C, D (#3, #2, #3)

These three tools are used to cut right and left hand shiplaps so that folding the duct board can be accomplished. Tools B and D (#3) are exactly the same. Tool C (#2) is the reverse of Tools B and D.(#3). Adjustment of all three tools is exactly the same. Grooves formed by these tools must be cut precisely. If cut too shallow, the boards cannot easily be folded and the finished duct section will not stand with 90° corners. If cut too deeply, the duct will be wobbly and flimsy and the foil facing can be damaged or cut. Fine adjustment is accomplished by loosening the four screws, which hold the two separate blades to the tool holder, and moving them vertically to achieve the proper cut.

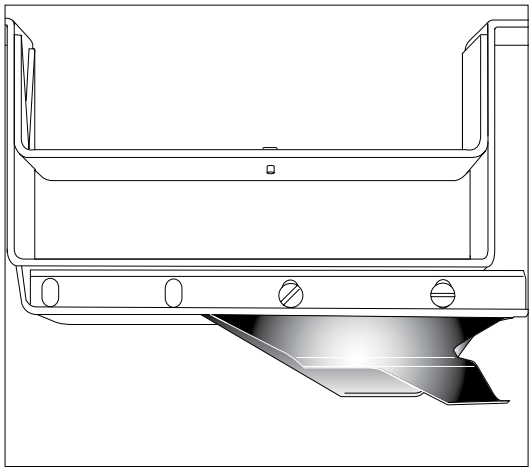


Fig. 11. Adjustment screws on tools B, C, D (#3, #2, #3 also #4)

Adjustment of Individual Tools

Position the blade with a single bend so that it makes light contact with the roller as it turns. Position the trailing blade so that it cuts flush with the molded shiplap, or about one half the thickness of the duct board. When the blades are correctly positioned, the glass fibers in the bottom of the deepest groove should be approximately 1⁄8" or less allowing easy folding and closing of duct section.

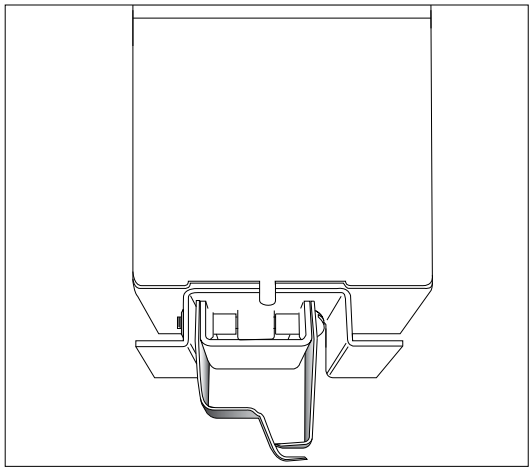


Fig. 12. Set trailing blade to cut flush with factory molded shiplap

A perfect cut is seen in Figure 13. Note that there remains approximately ⅛" (3mm) of fiber glass in the bottom of the deepest groove, and that the next groove is cut even with the factory formed female shiplap. With this type of cut, a duct section will fold together with just enough resistance to make the completed section stand straight with 90° corners.

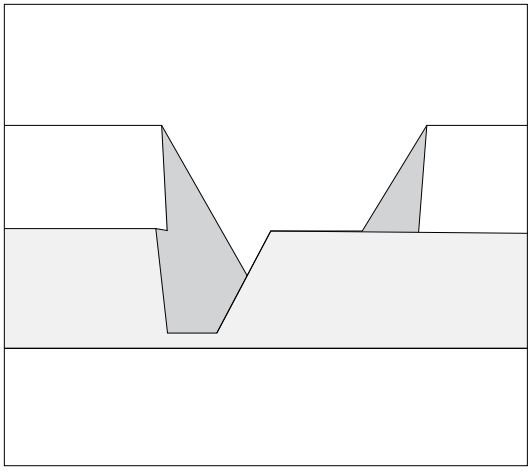


Fig. 13. Proper cut depth using tools B, C, D (#3, #2, #3 also #4)

Tools G and A (#5 and #8):

Correct adjustment of these two tools takes a little more care to achieve and to maintain than most other tools. These tools are used to form staple flaps and to make end caps. All of the fiber glass must be cleaned off the foil facing. When this blade is not set properly the results can be field crews and shop personnel doing the work of the machine by hand. Labor dollars are spent unnecessarily because machine operators do not adjust this tool properly. For proper adjustment, set the blade so that it presses down firmly on the cutting roller.

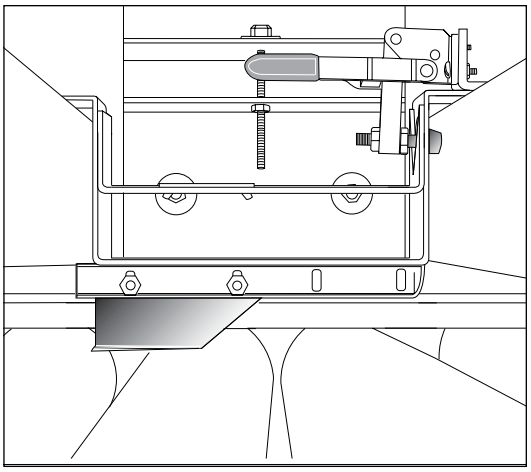


Fig. 14. Tools G (#5) and A (#8) must press firmly on the cutting roller.

Adjustment of Individual Tools

After the original blade is worn or broken, the replacement blade is often put back by placing screws in the wrong holes so that the blade actually rests between the leveling rollers. No amount of adjustment can produce a clean staple flap if the blade does not make constant firm contact with the cutting roller. If blades are to be installed on the Glass Master E-215 machine, use the two inside holes to set them. If blades are to be installed on Glass Master 300-SM, E-200, or E-410 machines, use the two outside holes.

Note:
The Glass Master E-200 requires different G (#5) and A (#8) blades. The 300-SM requires an extracting blade. For information, contact Glass Master or your Knauf representative.

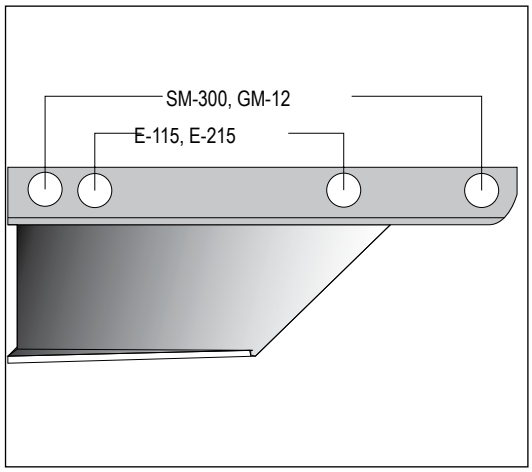


Fig. 15. Proper replacement blade position,
Tools G (#5) and A (#8)

Loosen the two screws holding the blade and adjust it so that, when the holder is set into the tool bar, the front edge of the tool holder will press down slightly before it is locked in place. The added spring will cause the blade to clean all the fiber glass while leaving the foil facing unharmed.

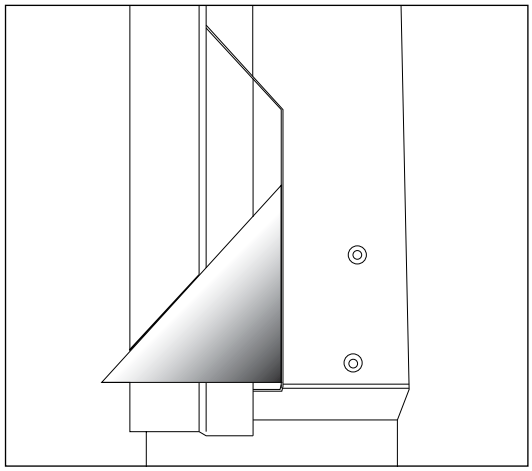


Fig. 16. Oxydized finish will be worn off properly positioned blade

Adjustment of Individual Tools

90° V-Groove tools

In V-groove fabrication, the 90° tools are used to replace the cuts made by the tools used in the modified shiplap method. Adjustment of V-grooves is easily accomplished because there is more tolerance for adjustment error. The V-groove method is commonly used for fabricating insulation board for installation on sheet metal duct exterior surfaces in addition to applications calling for forming the entire duct from fiber glass boards.

The method is not recommended when following modular duct construction principles; many fittings cannot be successfully fabricated from V-grooved duct board.

Two screws fasten the one-piece blade to the tool holder. Loosen the screws and adjust the blade up or down until it rests lightly on the cutting roller. Corners will easily fold, and the duct will stand straight with 90° corners.

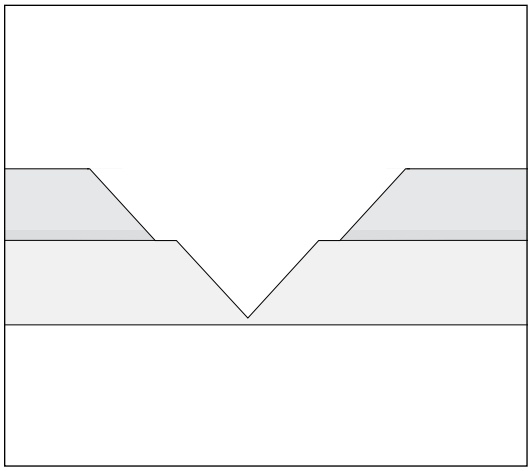


Fig. 17. Proper V-groove cut when using 90° blades. A perfect cut is seen above. Note that there remains approximately ⅛" (3 mm) of fiber glass in the bottom of the groove.

Straight Cut-off (SCO) Tools:

These are used to cut all the way through the fiber glass and the foil facing at the end of a stretch-out. Very little adjustment is necessary, since a straight vertical cut is produced. However, duct board sections are often ruined by the use of dull cut-off blades. The reinforcing scrim in the duct board foil facing is difficult to cut, and the SCO tool is used to cut every section of duct board that passes through the machine. Therefore, the SCO blade wears out about twice as fast as most of the other blades, and should be replaced or sharpened as soon as it no longer produces a clean cut.

There are two adjustment screws, but all that is necessary is to pull the blade to its lowest position and tighten .

Adjustment of Individual Tools

Blade Life and Replacement

Although all tool blades will eventually need to be replaced, some wear out faster than others. It has been estimated that a single set of tool blades can last through twelve to fourteen truckloads of fiber glass duct board. This is not true for all blades in a set, however; as noted above, SCO tool blades wear out faster and should be replaced about twice as often as other blades. The same is true for blades of tools G (#5) and A (#8). Dull blades place excessive stress on the duct board, sometimes causing the duct board to turn sideways in the machine. This wastes material and adds to cost.

Only short-term gain can be accomplished by attempting to sharpen tool blades. All Glass Master tool blades are hardened at the factory; sharpening with a grinder or file seldom produces a satisfactory edge. It is an excellent idea always to retain a spare set of blades, especially for G (#5), A (#8), and SCO tools.

Visual inspection of dull blades will reveal worn and ragged edges. However, a better method for detecting dull blades is to look closely at sections of grooved duct board. When the edges of cuts become wavy and end cuts are ragged, there is strong evidence of worn blades. Blades begin to follow the grain of the fiber glass as they pass through the duct board instead of cutting through the grain.

Tab Settings

Inside dimensions of fabricated fiber glass duct are determined by measuring between sets of tabs positioned on top of the individual tools. E-215 tool holders are shipped from the factory with dimensions properly set, but early tab systems were adhered to the surface of the tool holders only with spray adhesive. After repeated usage, tabs can slip causing actual duct dimensions to vary. Every shop should measure the finished groove section of duct board to determine if actual duct dimensions are accurate. If not, adjust the tabs accordingly. After determining the proper tab setting, pop-rivet the tabs to the tool holders to ensure against future slippage. All currently produced Glass Master tool holders are manufactured with tabs pop-riveted to the tool holders.

Tooling arrangements

Different tooling arrangements can be used to accomplish different purposes. The machine owner who uses the Glass Master to fabricate only one type of duct may not be taking fullest advantage of the productive capabilities of the machine and may not be using raw material cost-effectively. Tooling can be arranged to produce one-piece duct, two-piece "L" duct, two-piece "U" duct, four-piece duct, end caps, and other specialty products such as triangles.

Greatest use of drop-off can be achieved when a combination of these is produced from a single board. Duct board optimization programs are available from Glass Master.

A section of one-piece fiber glass duct can be fabricated faster than any other possible tooling arrangement, regardless of whether the modified shiplap or V-groove method is used. However, if only one-piece duct is fabricated, a significant amount of drop-off remains. Utilization of drop-off can be accomplished by fabricating end caps, two-piece "L" duct, and two-piece "U" duct.

Since every square foot of drop-off costs the same as the rest of the duct board, utilization of every square foot is highly desirable. Careful board utilization pays dividends.

Standard Tooling

In the Standard tooling set-up, the staple flap is fabricated by the next-to-last (G, or #5 + SCO) tool (SCO being the last tool). As noted, proper adjustment of G (#5) and A (#8) tools is not easy to achieve and to maintain. This is especially true of the G (#5) tool in the Standard tooling set-up. When properly adjusted, the G (#5) tool will cut all the glass fibers off the staple flap, leaving the facing bare and undamaged. However, the Standard tooling set-up places the G (#5) tool, which makes the most difficult cut, in the weakest area of the tool bars. It is also the most difficult tool to move and reset, yet it must be moved every time the duct dimension changes.

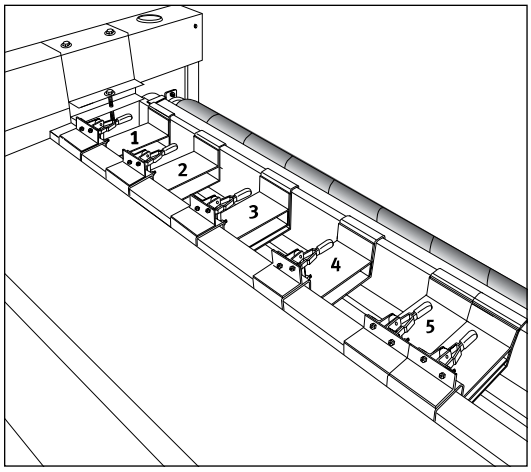


Fig. 18. Standard Tooling Arrangement

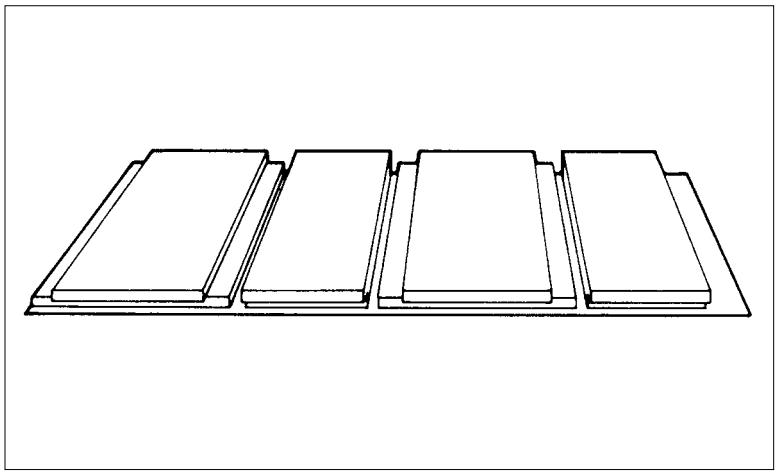


Fig 21. Standard tooling cut on insulation board.

Tooling arrangements

Preferred (Reverse) Tooling

This is the recommended method of tool arrangement in the industry. The A (#8) tool is the reverse of the G (#5) tool; it is positioned first in line and never moves. It is stationed at the strongest area of the tool bars -- where they are fastened to the bulkhead of the machine. This produces the staple flap at the left side of the duct board as it passes through the machine, forming a consistently clean staple flap requiring less hand labor to remove glass fibers. Cut-off is made next to the R1 tool (which is the reverse of the #1, or F, tool) where ½" of the thickness of the fiber glass remains adhered to the foil facing. This results in a cleaner cut-off. It is much easier to set the A (#8) tool properly and lock it in place, never having to move it, than it is to work with the problems presented by the G (#5) tool.

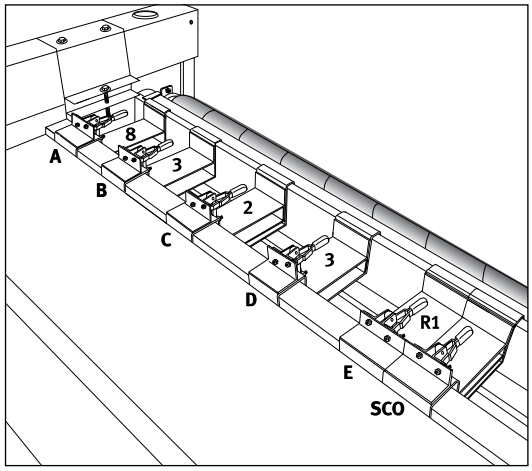


Fig. 19. Reverse Tooling Arrangement

There is an added benefit for operators using Close Master machines to close and tape the longitudinal seams of duct sections. If Preferred tooling is used, the factory female end of the duct section (the end on which the foil facing is adhered to the fiber glass) enters the Glass Master machine first. If the Standard tooling set-up is used, the male end with its loose foil facing flap enters the Close Master machine first, often leaving the operator with a partially closed duct module because the closure tape is not picked up immediately.

For this reason, reverse tooling must be used for closing modules with the Close Master machine.

The tools maybe # 8, 3, 2, 3, R1 or A, B, C, D, E, SCO.

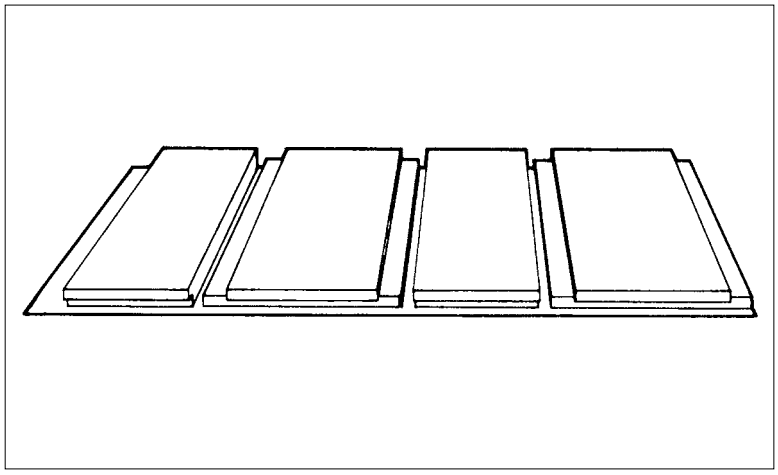


Fig 22. Reverse tooling cut

Tooling arrangements

Tools should be arranged and spaced according to the following charts to accomplish these cuts. These dimensions are critical for correct fitting fabrication. The example shown will produce a 10" x 8" (254 mm x 203 mm) duct module.

Tool arrangements for one-piece duct

Preferred (Reverse)

A	8"	B	10"	C	8"	D	10"	E	SCO
8	8"	3	10"	2	8"	3	10"	R1	SCO

Standard

1	10"	2	8"	3	10"	4	8"	5	SCO

Tool arrangements for two-piece "U" style duct

Preferred (Reverse)

F	10"	B	8"	C	10"	E	SCO
Filler cap:		A	8"	G	SCO		
1	10"	3	8"	2	10"	R1	SCO
Filler cap:		8	8"	5	SCO		

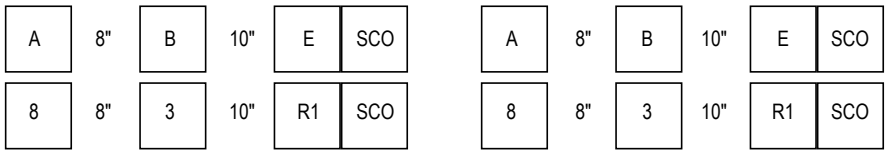
Standard

1	8"	2	10"	3	8"	R1	SCO
Filler cap:		8	10"	5	SCO		

Tooling arrangements

Tool arrangements for two-piece "L" style duct (two sections required)

Preferred (Reverse)



Standard

Tooling arrangements

V-Groove Tooling

All of the possible tooling arrangements for modified shiplap can be accomplished utilizing the V-groove concept with the exception of four-piece duct. The two major problems with the V-groove concept are that fittings are more difficult to fabricate (some are not possible) and the finished duct system has less structural integrity than with the modified shiplap method. The machine shown in Figure 24 is set up to fabricate an 8" x 10" (203mm x 254mm) one-piece duct section.

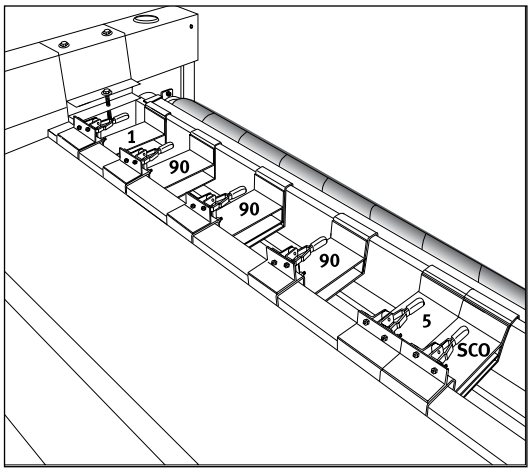
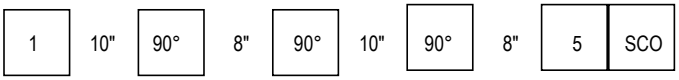


Fig. 24. V-Groove Tooling Arrangement

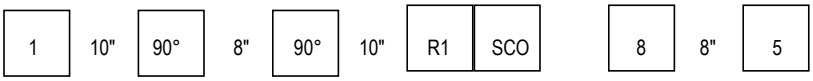
V-Groove Tooling Set-up

Tool arrangements for the other possibilities using the V-groove concept.

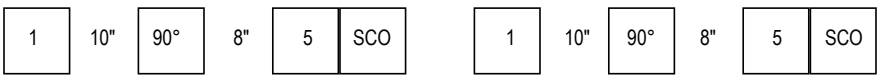
V-Groove tooling for one-piece duct



V-groove tooling for two-piece "U" style duct (2 pieces)



V-groove tooling for two-piece "L" style duct (2 pieces required)



Reverse tooling can be utilized with either shiplap or V-groove cutting methods. All one-piece, two-piece "L", and two-piece "U", plus end caps, can be made using Reverse tooling.

Parts Replacement

Some modifications are available in recent Glass Master machine components. As mentioned in the section on roller repair, replacement emery cloth and spray adhesive are available. Straight cut-off tools have been redesigned and shiplap blades have been slightly changed. Newer tools have slotted screw holes and are made of heavier gauge metal. Many older tools become bent and may be hard to set and adjust. To remedy the problem with older tools, replacement rubber headed bolts and modified clamps are also available. More significant changes have been made to the tool holders. For further information, consult your distributor or Glass Master Corporation.

Replacement parts and blades may be obtained from your local distributor or from:

Glass Master Corporation, 2420 McIver Lane, Suite 101, Carrollton, TX 75006-6500

Toll free phone: (800) 874-9135. Fax: 972-247-0477.Web site : www.glass-master . com

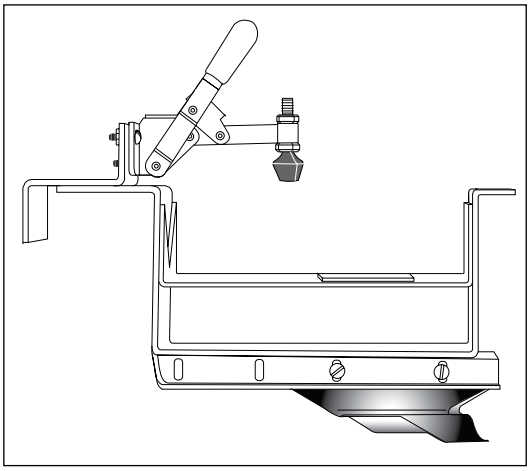
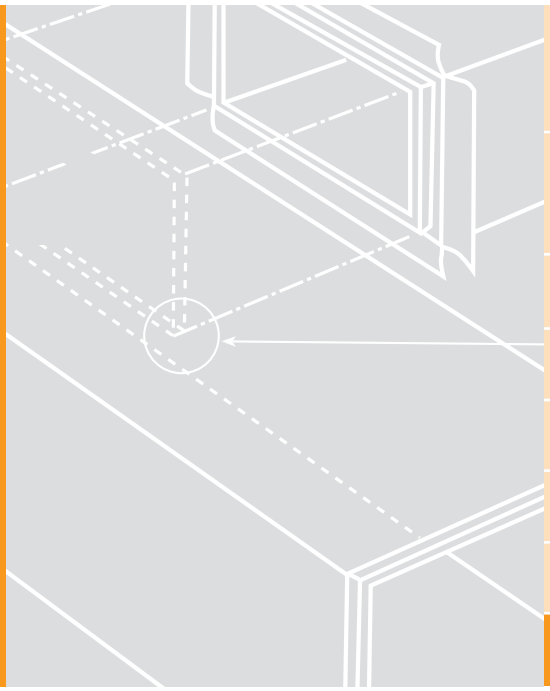


Fig. 23. New tool with slotted screw holes, heavy gauge metal

KNAUF INSULATION



Knauf Insulation GmbH
One Knauf Drive
Shelbyville, IN 46176

Sales and Marketing	(800) 825-4434, ext. 8283
Technical Support	(800) 825-4434, ext. 8212
Customer Service	(866) 445-2365
Fax	(317) 398-3675
World Wide Web	www.KnaufInsulation.com

NOTES
Knauf Insulation GmbH complies with ISO 9002 in the prevention, detection and correction of problems in production and service areas.

PRESERVING OUR WORLD'S ENERGY RESOURCES®

At Knauf, we manufacture a wide variety of products that serve a common goal, helping to make the most of our planet's energy resources. A family-owned global company, we understand and are committed to high standards in quality, performance and environmental responsibility. Every step we take today toward energy conservation helps ensure better lives for generations to come.

U.S. GREEN BUILDING COUNCIL MEMBER

LEED Eligible Product
Use of this product may help building projects meet green building standards as set by the Leadership in Energy and Environmental Design (LEED) Green Building Rating System.
Credit 4.1 - 4.2 Recycled Content
Credit 5.1 - 5.2 Regional Materials