

Steam Box Plan

Effective April 2021



Review full instructions prior to use for important safety information.
Always check Rockler.com to confirm that you are using the most recent version of instructions for your product.

GENERAL SAFETY WARNINGS

This product is designed only for specific applications as defined in the instructions and should not be modified or used for any manner not described in these instructions. Use only recommended accessories. Before using the Steam Box Plan: **READ, UNDERSTAND and FOLLOW ALL INSTRUCTIONS AND SAFETY WARNINGS. KEEP THESE INSTRUCTIONS READILY AVAILABLE FOR FUTURE REFERENCE.**

- > Always confirm that you are using the most recent version of the Instructions and safety warnings for your product (see the Instructions link on the product page at Rockler.com).
- > Before using another tool with this product, always read, understand and follow the instructions and safety warnings in the owner's manual for that tool. If you do not have the owner's manual, obtain one from the tool's manufacturer before using it with this product.
- > Before using any chemical with this product, always read, understand and follow all safety warnings and guidelines in the manufacturer's Safety Data Sheet (SDS; formerly called "MSDS"), especially regarding:
 - How to safely use the chemical, including potential hazards and recommended first aid measures;
 - Personal safety equipment required to safely use the chemical (e.g. gloves, eye protection, mask/respirator, etc.);
 - Proper and safe handling, storage and disposal of the chemical.
- > Before using this product, review and verify that all tools to be used with it have safety equipment installed and are in proper working order as defined by the tool's owner's manual.
- > Do not use this product until you have read and are confident you understand:
 - Product Specific Safety Warnings (p. 3);
 - Parts List (p. 4);
 - Introduction (p. 5);
 - Steam Box Construction (pp. 5 - 6);
 - Steam Box Sizing (p. 6);
 - Basic Operation (pp. 6 - 7).
- > The user assumes all risk and responsibility for the proper and safe use of this product and for ensuring product suitability for the intended application.
- > It is the sole responsibility of the purchaser of this product to ensure that any anyone you allow to use this product reads and complies with all instructions and safety precautions outlined in this manual prior to use.
- > Follow all standard shop safety practices, including:
 - Keep children and bystanders away from the tool operating area;
 - Do **NOT** use power tools in explosive environments, or in the presence of flammable liquids, fumes or dust;
 - **TURN OFF AND UNPLUG** all power tools **BEFORE** making any adjustments or changing accessories;
 - Remain alert and use good judgment. Do not use this product if you are in any way impaired by medications, alcohol, drugs or fatigue;
 - Keep your work area well lit and clean;
 - Dress appropriately. Secure loose clothing, remove all jewelry and tie up long hair before using this product;
 - **ALWAYS** wear safety glasses, hearing protection and respiratory protection that complies with NIOSH/OSHA/ANSI safety standards;
 - Use dust collection tools and dust face masks to reduce exposure to dust;
 - Use safety equipment such as featherboards, push sticks and push blocks, etc., when appropriate;
 - Maintain proper footing at all times and do not overreach;
 - Do **NOT** force woodworking tools.
- > These warnings and instructions do **NOT** represent the total of all information available regarding tool safety, use and technique. Always seek out opportunities to learn more and improve your skills and knowledge.

⚠ WARNING: Drilling, sawing, sanding or machining wood products can expose you to wood dust, a substance known of the State of California to cause cancer. Avoid inhaling wood dust or use a dust mask or other safeguards for personal protection. For more information go to www.P65Warnings.ca.gov/wood.

⚠ DANGER

Danger indicates a hazardous situation that, if not avoided, will result in death or serious injury.

⚠ WARNING

Warning indicates a hazardous situation that, if not avoided, could result in death or serious injury.

⚠ CAUTION

Caution indicates a hazardous situation that, if not avoided, may result in minor or moderate injury or property damage.

NOTICE

Notice indicates important or helpful information and/or user tips.

PRODUCT SPECIFIC SAFETY WARNINGS

WARNING

ELECTRICAL/GROUNDING

- > Connect only to a properly grounded three-prong outlet. If you are in doubt as to whether the outlet is properly grounded, check with a qualified electrician or service person. Improper connection of the equipment-grounding conductor can result in a risk of electric shock.
- > The tool plug must fit into the outlet. Do not modify the plug provided with the unit – if it will not fit the outlet, have a proper outlet installed by a qualified electrician. Do **NOT** use an adapter plug.
- > To reduce the risk of electric shock, do **NOT** use with a damaged cord or plug.
- > Avoid physical contact with grounded surfaces such as pipes, heating elements, stoves and refrigerators. The risk of electric shock increases if your body is grounded.
- > Do **NOT** pull by cord, use cord as a handle, close a door on cord, or pull cord around sharp edges or corners. Do **NOT** run appliance over cord. Keep cord away from heated surfaces.
- > Do **NOT** unplug by pulling on cord. To unplug, grasp the plug, not the cord.
- > Do **NOT** handle plug with wet hands.
- > Do **NOT** submerge the unit in water.
- > To prevent short-circuiting, cover exposed outlets and switches and do not subject them to steam.
- > If an extension cord is necessary, use only three-wire extension cords that have three-prong grounding plugs and three-pole receptacles that accept the tool's plug. Make sure the extension cord is in good condition. Extension cords up to 25' long must be at least 16-gauge. If the cord is from 25' to 50' long, it must be 12-gauge. Cords between 50' and 100' long must be 10-gauge.
- > Make sure that the circuit is protected at the main source by a 15A rated circuit-breaker in accordance with UL489.

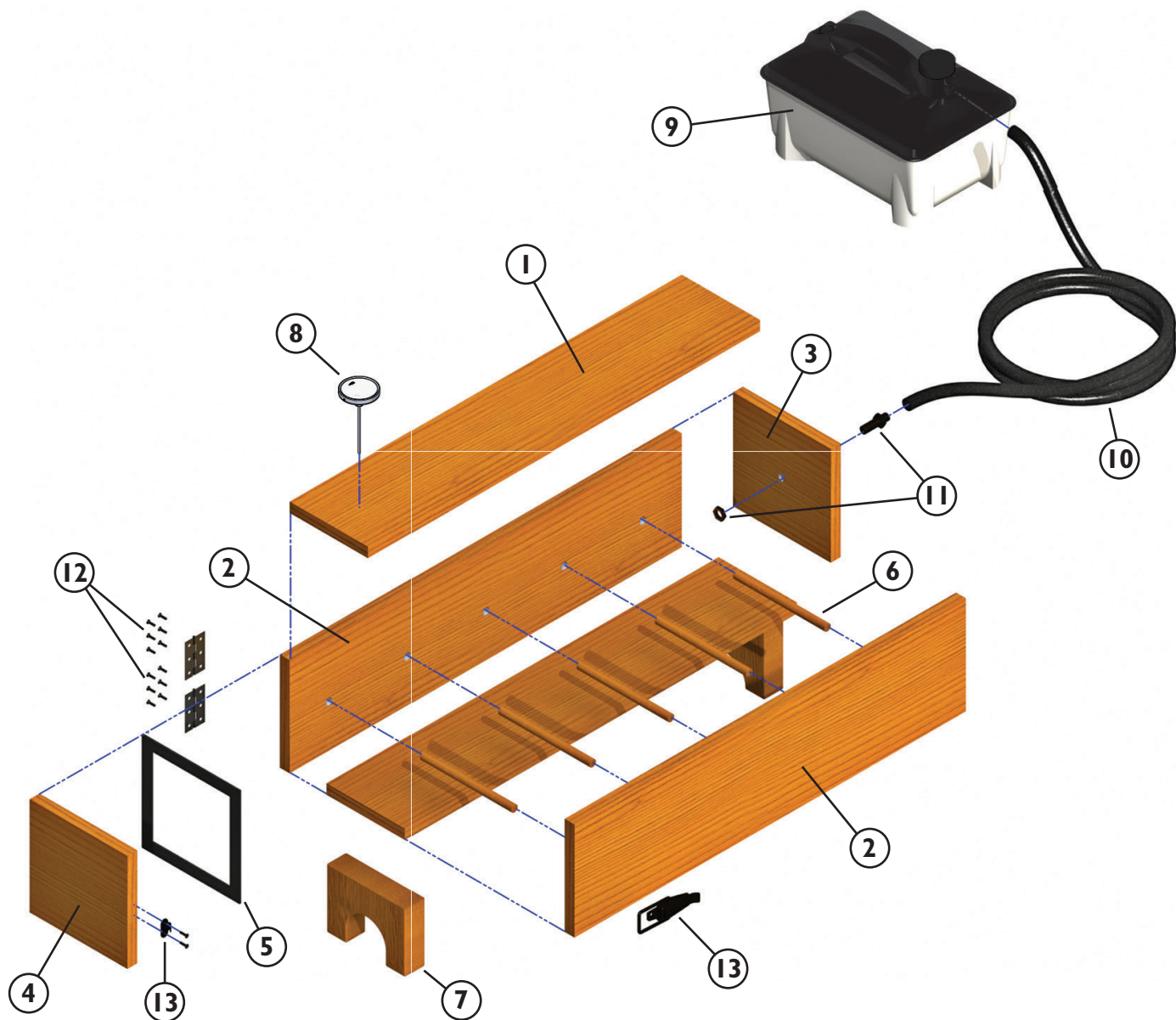
SAFE USE

- > **HOT LIQUID AND STEAM CAN SERIOUSLY SCALD OR BURN UNPROTECTED SKIN.** Steam can condense into boiling-hot droplets. When operating the unit or handling steamed workpieces, keep hands and face away from steam sources and **ALWAYS** wear suitable protective clothing and thick, heat-resistant gloves.

- > Never leave the unit unattended when it's in use. Keep children and pets out of the area.
- > Never point the hose adapter or accessories at people, animals or objects sensitive to temperature. Never direct steam toward electrical appliances.
- > Always position the unit securely in a horizontal position (e.g., on the floor). If you must move the unit during use, exercise extreme caution. The steam unit, hose and accessories can be very hot. Carry the unit only by its handle, and always wear suitable protective clothing and gloves.
- > Never over-twist or make kinks in the steam hose, and never block the valve.
- > Do not stand on or place objects on the unit or steam hose.
- > Always unplug the unit before filling, refilling or emptying the unit. Always unplug the unit when it is not in use. Do not switch the unit on when empty.
- > When refilling, first unplug the unit and allow it to cool for at least 2 minutes. Beware of steam when removing the cap. Always wear suitable protective clothing and gloves.
- > Hot steam and boiling water might be emitted if the safety valve is activated because of too much pressure resulting from incorrect operation of the unit.
- > Just before the unit achieves full steam production, a small amount of bubbling and water will occur at the hose adapter. Beware of hot water discharge prior to steam emission
- > Use only pure water without agents or additives when filling or refilling the unit. Never overfill.
- > When finished using the unit, allow it to cool completely before emptying. Always store the unit empty.
- > Do **NOT** use the unit as a space heater.

STEAM BOX CONSTRUCTION

- > Use plywood or hardwood that can stand up to moisture and heat.
- > To avoid dangerous pressure buildup, include pressure-release holes in your steam box.

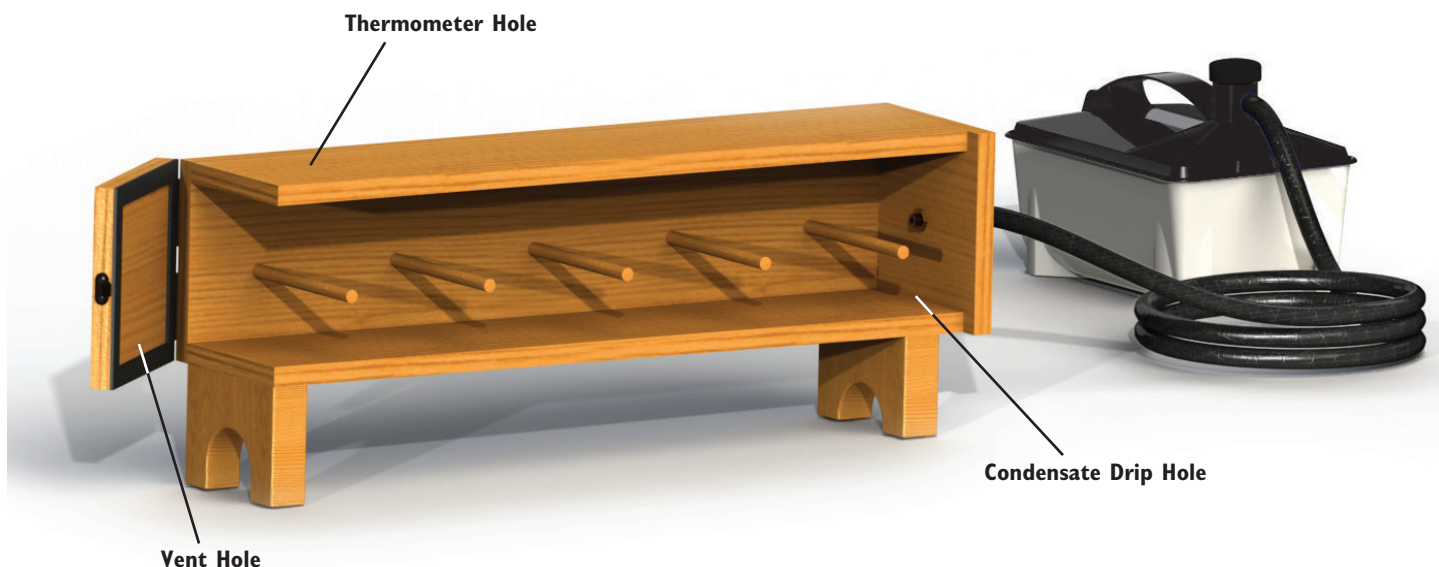


STEAM BOX PARTS LIST

	Quantity
1 Top/Bottom	2
2 Sides	2
3 Rear Cap	1
4 Door	1
5 Gasket/Seal	1
6 Support Dowels	5
7 Feet	2
8 Thermometer	2

HARDWARE KIT PARTS LIST

9 Steam Generator	
10 Steam Hose	
11 Brass Fitting	
12 Hinges	
13 Latch/Clasp	



Introduction

Low pressure steam is an age-old method of softening wooden components for bending them into curved shapes. The heat and high moisture soften the fibers of the wood, allowing it to bend in the shape of a press or form. As the wood cools, it retains the shape that it was formed into with only minor spring-back. The key elements for steam bending are a shaped form, a steam source, and an enclosed steam box. This Rockler® steam kit contains the portable steam generator and hardware necessary to construct a steam box using your wood.

Steam Box Construction

Your steam box should be as small as possible while still accommodating all of your workpieces. The smaller the box, the less steam energy it takes to bring it to temperature and keep it there. The box should also have a flow-through design so that steam enters at one end and exits at the other end, but is relatively tight so that most of the steam and heat remain within the box. Here are some tips for constructing a steam box:

General

- The box can be constructed from either solid wood or plywood (exterior grade preferred).
- The box should be sloped upward slightly on a set of legs so that condensed water runs to the back, but also so the steam flows toward the front.

- Assembling the box using simple butt-joints with screws (without glue) will allow you to disassemble the box and reuse some parts for making other sizes.

Steam and Support

- Drill a 9/16" hole in the center of the Rear Cap to install the brass steam fitting.
- For maximum cross-flow of the steam while maintaining good steam capacity, build the box as tight as possible, and drill a small vent hole in the lower face of the front door.
- A meat thermometer can be used to monitor the internal box temperature.
- Dowels are used to elevate the workpiece off the bottom of the box.
- Heat rises, so the workpiece should be elevated to be near the top of the box.
- Wooden dowel stock is available from Rockler or most home centers. Don't use metal rods.
- The dowel holes can be through-holes, but stopped holes will keep the dowels captured between the sides without fasteners, and also prevent steam from leaking out.

Rear Cap and Door

- Note that the Rear Cap (where the steam line connects) butts to the outside of the box instead of being captured between the sides.
- This allows you to remove the Rear Cap (and therefore the brass fitting) without taking the rest of the box apart.
- Make sure you install the brass fitting into the Rear Cap before securing the Rear Cap to the rest of the steam box.
- For best results, seal the door with 1/8" weather stripping.
- Using the provided hinges and quick acting latch allows you to remove one workpiece at a time without losing too much heat from the box.

Steam Box Sizing

The practical limitation on the size of the steam box is how much steam you have available to heat it, and the efficiency of the box for heating up and staying hot. Individual results will vary, but boxes larger than 6" x 6" x 4' or thicker materials may require compensation to achieve sufficient steam energy, as described in the following sections.

Thicker Materials

The general rule of thumb is that each inch of material thickness requires 1 hour of steaming. For thicker materials this may exceed the length of time a single steam generator can supply steam without refilling. To increase the length of time that steam is available without cooling down while fresh water is being heated, use two steam generators with staggered start times so that one generator is producing steam while the other is heating the water.

Larger Steam Boxes

The larger the steam box, the greater the volume of steam required to maintain the temperature. A simple solution is to use two steam generators at the same time for a greater volume. However, there are a few other things that can be done to extend the efficiency of the existing steam:

- Heating up the steam box itself can take a significant volume of your steam energy. You can pre-heat the steam box and then replenish your steam generator while you load the workpieces into the box for final steaming.
- To reduce the amount of steam energy lost to heating the box, reduce the thickness of the box material and insulate the exterior of the box. However, make sure to use insulation capable of sustaining at least 212°F (100°C).

Basic Operation

1. Make sure the steam generator is unplugged from electrical power.
2. Fill the steam generator with water to the "Max" indicator on the side (approximately 5.3 quarts). Use hot water to decrease the initial heating time.
3. Connect the flexible steam hose between the steam generator and the brass fitting on your steam box.
4. Connect the steam generator to electrical power.



⚠WARNING

Just before the unit achieves full steam production, a small amount of bubbling and water will occur at the hose adapter. Beware of hot water discharge prior to steam emission.

5. While the steam generator is heating the water, load your steam box with the material to be steamed. If you are steaming more than one piece, make sure there is enough air space between pieces for steam to reach all sides of the material.
6. Close the door on the steam box and observe the temperature of the box. When the internal temperature reaches 212°F (100°C), count the length of steaming time based on the approximation of 1-hour per inch of thickness of wood. The steaming time may vary depending on the species of wood, the degree of bending required, and the actual thickness.
7. When the steaming is complete, you need to work quickly to get the workpiece into your forms while it is still hot. Leave the remaining workpieces in your steam box until you are ready to clamp them in the forms.

Check Rockler.com for updates. If you have further questions, please contact our Technical Support Department at 1-800-260-9663 or support@rockler.com

Notes

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