How to Build a Maple Sap Chiller

Adam Wild, 2025

Chilling maple sap helps to preserve quality, enabling producers to store sap longer and process it when convenient. This flexibility is especially helpful for part-time producers and those managing large operations. Chilling also enables longer, more efficient boils. Research at the Cornell University Uihlein Maple Research Forest concluded that glycol chillers are an effective way to chill maple sap, maintaining freshness and reducing spoilage. The use of glycol chillers provides simplicity and lower cost in comparison to refrigerant systems. In addition, glycol chillers provide more options for chilling sap such as use of plate heat exchangers and utilizing an existing tank. Building your own chiller, as outlined in this document, is the most cost-effective option. For more information on different methods for chilling sap and on how to select a commercial glycol chiller, see the extension bulletin titled, "Chilling Maple Sap" (Wild, 2025) at www.CornellMaple.com. It is recommended to read that document prior to this document.

Figure 1. A DIY glycol chilling unit made from a window AC unit and a plastic cooler. The chilling coil from the front of the AC unit is immersed in glycol solution inside of the cooler. A new thermostat is installed within the aluminum box. The chiller unit sits on a wooden base with castor wheels for easy transport.

DIY: Making Your Own Glycol Chiller

Researchers at the Cornell University Uihlein Maple Research Forest successfully produced a cost-effective way to build a do-it-yourself (DIY) glycol chiller for maple sap by modifying a window air conditioning (AC) unit in combination with a picnic cooler (Figure 1). This method is not new to homebrewers.

We made three DIY window AC glycol-chilling units to use during the 2025 maple season at the Uihlein Forest. Three AC units were procured for testing: a used 5,000 BTU/h unit that a family member was giving away for free; a used 14,300 BTU/h unit that was purchased for $100 in November; and a new 14,500 BTU/h unit that was purchased for $390. See Table 1 for material costs for building a glycol chiller from a window AC unit. Background information and step-by-step instructions follow.

Table 1. Material list and costs for building a glycol chiller from a window AC unit.

Item	Purpose	Cost
Window AC unit	Main component with chilling coil and compressor. Must be a functioning unit.	\$0 - older 5,000 BTU unit donated \$100 - used 14,300 BTU unit \$390 - new 14,500 BTU unit New units can cost up to \$850.
Plastic picnic cooler	Insulated tank filled with glycol solution into which the chilling coil from the AC unit is immersed	\$0 - salvaged from along the roadside \$0 - traded quart of syrup for used cooler \$75 - new large 17.5-gallon cooler
Temperature controller for AC unit	INKBIRD ITC-1000 used to turn AC unit on and off to control the temperature of glycol solution	\$20
Castor wheels	Optional – used for making a moveable base for chilling unit	\$15
Scrap wood	Used for making a 2ft x 2ft base for the chilling unit (wheels attached). Size depending on cooler and AC unit	\$0 - salvaged scraps from workshop \$20 - new
Temperature controller for sap	Optional – Turns glycol pump on and off depending on the temperature of the maple sap (INKBIRD ITC 308)	\$30 - without Wi-Fi connection option \$50 - with Wi-Fi connection for remote monitoring
Submersible pump	Used for circulating chilled glycol through heat exchanger or chilling plate in sap tank	\$18-\$75 depending on size and flow rate
Miscellaneous parts	Pipe wrap insulation, cable ties, wire nuts, etc.	\$10
Food-grade inhibited propylene glycol	DowFrost™ – used to make 35% glycol-water solution. Need enough solution to fill picnic cooler	\$38/gallon × 7 gallons* = \$266 *The amount of DowFrost™ needed for use with a 17.5-gal cooler. This amount will vary with the size of the cooler.
Total Cost		**\$300–\$1,400**

Note: This parts list does not include the plumbing connection from the chiller to the sap tank, nor the cost of the selected heat exchanger.

Window air conditioners are relatively inexpensive and can be purchased new from major retailers for $150 to $850 depending on their cooling capacity. Used units can be purchased for significantly less or acquired for free; ask friends and family members for a unit they are not using. Fall and winter are great times to pick up a used unit for a low price. Based on our project materials (Table 1), a glycol chiller can be made for around $0.01-$0.07 per BTU.

Note that BTU/h ratings of air conditioners' capacity to cool air are not equivalent to their capacity to cool glycol, a liquid. In our testing, actual cooling capacity with chilled glycol was about half of the window air conditioner's rating. Window AC units range from 5,000 – 24,000 BTU/h for air, or 2,500 – 12,000 BTU/h for glycol. For more information on BTUs and how to calculate BTU needs for your maple operation, reference the Cornell Maple Program extension bulletin titled, "Chilling Maple Sap" (Wild, 2025). Note also that AC units rated for more than 15,000 BTU/h require a 230-volt outlet while smaller units can run on 120-volt outlets. The same is true for commercial glycol chillers.

How AC Units Work

AC units use a compressor to pump refrigerant through a chilling (evaporator) coil in the front of the unit, absorbing heat from the air passing over the coil and thus cooling the air in the room. As the refrigerant enters the chilling coil, it expands as a gas and cools the coil. The refrigerant is then pushed to a condenser coil in the back of the AC unit where heat is removed and expelled. The refrigerant, now in liquid form, is pushed back into the chilling coil.

To make a glycol chiller, the chilling coil is carefully inserted into a picnic cooler filled with glycol-water solution. The chilling coil cools the glycol solution that is then pumped through a heat exchanger that is in contact with maple sap. The plastic cooler works great as a small tank to hold the glycol solution, and the insulation of the cooler helps maintain the temperature of the solution.

Steps for Building Your Own Glycol Chiller

Note:

- This is not an exhaustive manual. Some personal intuition and common sense are required.
- Build at your own risk. Build in a safe working environment.
- Always make sure the unit is unplugged while working.
- Do not attempt if you are not comfortable carrying out the steps outlined.

STEP 1: Test the AC unit

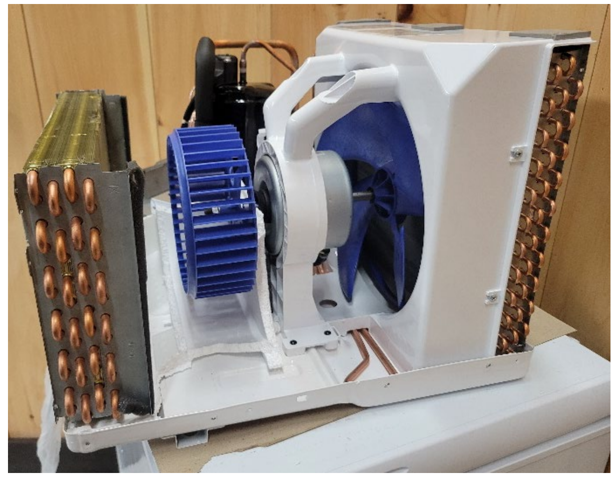


Figure 1. Window AC unit with outer housing removed. The chilling coil is the metal part on the far left with the curvy copper lines coming out of it. To the right, of the chilling coil, you can see the blue blower fan. The black tower behind the blower fan is the compressor. The blue blade fan further to the right is the cooling fan. On the far right with more curvy copper lines coming out is the condensing coil.

- Plug in the AC unit and make sure that it is operational and blows cold air. Once you have determined the unit works properly, unplug the unit before proceeding to Step 2.
- If the compressor is not working, turn it to the highest cooling function and listen for the compressor to kick on. The air blowing out should get colder. Note: if the room is already at or below the unit's set temperature, the compressor may not kick on. Try lowering the thermostat as much as possible to prompt the compressor, or, if needed, remove the front panel on the AC unit to find the temperature probe clipped into the front of the condensing coil. Remove the temperature probe from the coil and warm it in your hands to trick the sensor into prompting the compressor.
- If the compressor does not start after testing, you must procure a working unit before continuing to Step 2.

STEP 2: Remove the outer housing on AC unit

- Remove the outer housing of the AC unit. Do not discard, as you will need it in Step 7.
- Once the housing is removed, there will likely be foam insulation that will need to be removed to access the cooling coil and fans. The foam can be discarded.
- The cooling coil will be inserted into a picnic cooler in Step 5, so give attention now to the bottom of the AC unit that will likely need to be trimmed back to allow the cooler to get as close to the unit as possible to avoid overextending the copper lines.
- The outer housing will be reinstalled later. You will probably need to trim back the front to fit closer to the picnic cooler. Tape any cut metal edges to protect yourself from sharp edges. The front panel cover can be discarded.
- Find or build a platform to sit the AC unit and cooler on for moving around as one unit. If desired, castor wheels can be mounted on the platform for easy transport of the unit.

STEP 3: Remove the blower wheel fan

- The blower wheel fan is not needed and can be removed. Leaving it in place is okay, but it will most likely rub up against the cooler or hinder placement of the cooler. The larger fan needs to stay within the unit as it is used for pushing away heat from the condenser coil on the back of the unit.
- Make sure nothing touches the shaft of the blower wheel as it is the same motor shaft as the larger fan and will spin while the unit is in operation. For this reason, you may need to cut back the shaft from the blower wheel to allow the cooler to fit closer to the unit.

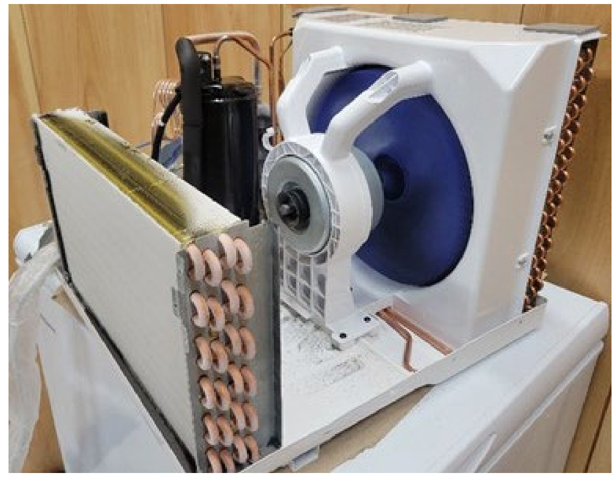


Figure 3. Window AC unit with outer housing removed. The unit is working as evidenced by the frost accumulating on the chilling plate. Note that the blower wheel is removed and the shaft cut back.

STEP 4: Disconnect the temperature sensor

AC units are usually programmed with thermostats that do not let them cool to below 60 °F. You will most likely want your glycol solution to be chilled down to around 25 °F. For this reason, you will need to rewire a new temperature controller with a temperature probe in the glycol solution.

- Remove the temperature sensor by gently pulling the wire from the front of the chilling coil.
- Disconnect the other end of the wire from the thermostat.
- Remove the entire thermostat/circuit board from the electric box

Figure 4. Thermostat on the front of the coiling coil (above). Components from the AC unit that are not needed: circuit board, thermostat, and blower wheel (below).

STEP 5: Carefully insert the chilling coil into the picnic cooler

<u>Be extremely careful not to break a copper line.</u> If a line breaks, the refrigerant will leak out and the AC unit will no longer be usable. Take your time with this step and consider employing the help of a second person. Do not overextend the copper lines.

- To insert the chilling coil from the AC unit into the cooler, gently pull the chilling coil away from the AC unit. The chilling coil is connected via flexible copper lines, allowing some movement (Figure 4).
- Cut a notch in the top of the cooler or the cooler lid for the copper lines to sit in and allow the lid to close. Make sure the coil is supported on the bottom. This can be achieved by cutting the notch deep enough for the lines to rest in or by using a brick or stone along the bottom of the cooler.
- Note: Do not notch too deeply as that will limit the volume of glycol solution. The notch will also provide a place for the copper lines to rest while allowing the cooler lid to close. The greater the volume of glycol solution, the more capacity to hold cold temperature. This allows the compressor to cycle less often. It is better for the longevity of the compressor for it to start less often and run for longer lengths of time than to cycle on and off frequently, running for shorter lengths.
- Once the cooler is notched, carefully insert the coil into the cooler.

Figure 5. Chilling coil inserted into picnic cooler. Notice the notch in the top of the cooler for the copper lines to sit in while allowing the lid to close.

STEP 6: Install new temperature controller

As mentioned in Step 4, a new temperature controller needs to be installed, and the unit rewired. **Note:** One must have some electrical knowledge or the ability to consult an electrician to perform this step. All AC units are wired differently so complete instructions cannot be provided here.

Figure 6. Capacitor held in hand. Circuit board behind the capacitor.

AC unit wiring and controls usually have different fan speeds and the option to run the fan without the compressor. These options are not needed for a glycol chiller. For a glycol chiller, the AC unit should be rewired so that whenever power is provided, the compressor turns on and the fan runs at high speed.

- If your AC unit has a circuit board, it can be removed.

- There should be a wire diagram somewhere on the unit or on the circuit board. Look for the wires that control the compressor and the wires that run the fan motor. Note: AC units have a capacitor (round cylinder) that helps to maintain power loads during start up and operation. This capacitor must stay connected to the unit. The fan motor should have 2-3 hot wires for different speeds (low, medium, high). You will only use the fan at high speed. Find the fan's high speed wire based on the wire diagram. Cap off and tape over the remaining fan motor wire(s) as they will not be used. Identify the hot wire for the compressor and the neutral wires for the fan and the compressor. The neutral wires run through the capacitor. <u>Keep them connected to the capacitor.</u> Utilize the neutral wires coming out of the capacitor as your neutral wires for powering the unit.
- The following section provides two options for rewiring the AC unit for glycol chilling. Read each option and select the one you feel most comfortable using. Our trials used Option Two.

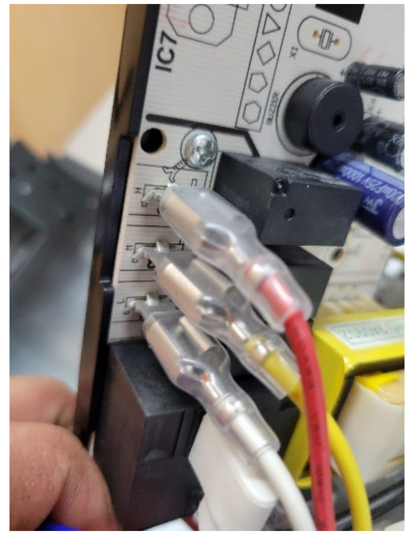


Figure 7. High, medium, and low speed wires for the fan connected to the circuit board. They can all be removed. Only the hot wire is utilized. The low and medium can be capped.

Option One:

Attach the hot wires from the fan's high-speed function and the compressor to the hot wire of the power supply cord and connect the neutral wires from the capacitor for the fan and compressor to the neutral wire of the power supply cord. This will allow for the fan and compressor to turn on and run constantly once the unit is plugged in.

Figure 8. Wire diagram needed for powering AC unit through Inkbird ITC 1000 temperature controller.

A plug-in temperature controller (e.g., INKBIRD 308 series) can be used to regulate the unit to chill the glycol to a set temperature. The controller's temperature probe will be inserted into the glycol solution. The desired temperature set on the controller will turn the AC unit on to chill down the glycol, and turn it off once the desired temperature has been reached. Note: Make sure the temperature controller is rated to handle the rated amps from the AC unit.

Option Two:

Direct-wiring a temperature controller to the AC unit creates a cleaner, more finished-looking unit, and is also slightly cheaper. For our AC unit chillers, we directly rewired the compressor and fan to an INKBIRD ITC-1000 dual-stage temperature controller complete with a temperature probe in the glycol solution. Consult the wiring instructions that come with the temperature controller for how to wire the controller. The INKBIRD ITC-1000 can be installed in an electric box on the outer housing of the AC unit for ease of access to adjust the glycol temperature. It is best to set the controller so that the unit will not turn back on until the solution has warmed up to 3 degrees above the desired temperature to prevent the compressor from constantly turning on and off.

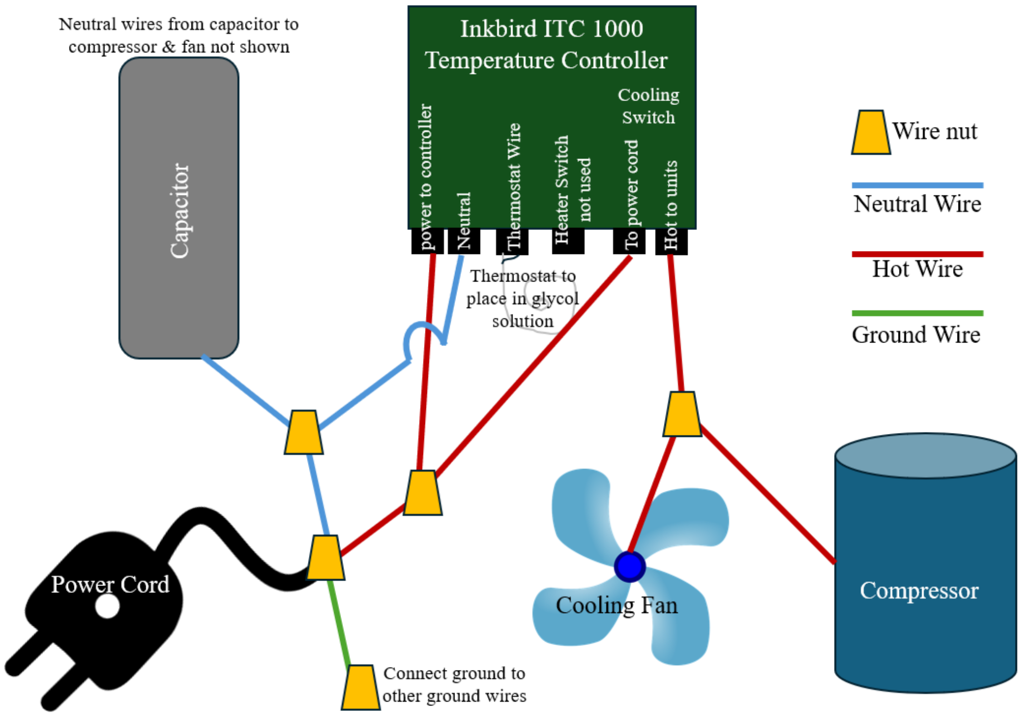


Figure 9. New temperature controller wired to the AC unit.

STEP 7: Reinstall the housing and fill the cooler with glycol solution

Figure 10. Outer housing and thermostat installed. Note where the housing meets up again the cooler it was trimmed back to fit closer. A cutting blade on an angle grinder was used to trim the metal. Electrical tape was used to cover the sharp metal edges after cutting.

- Install pipe insulation around the copper lines feeding into the cooler and add foam into the notch you made in the cooler to keep it insulated. These steps are not required but help with efficiency.
- Reinstall the outer housing on the AC unit to prevent anyone from sticking their hands near the fan and other moving

components. Trim the front of the housing as needed to fit close to the cooler (Figure 10).

- Fill the cooler with glycol solution. A 35-40% glycol-water solution is most likely best (refer to Wild, 2025 for information on glycol concentrations). Note: 1-3 more gallons of glycol solution will likely be needed once the glycol is pumped through the lines and the heat exchanger.
- Make sure that the temperature probe is placed where it will produce an accurate reading of the glycol solution. Depending on flow rates, the glycol temperature can stratify with colder solution settling to the bottom. If your temperature probe sits on the bottom of the cooler, it may read cold enough temperatures to turn off the compressor while the top half of the glycol solution is still much warmer. <u>We found it best to position the temperature probe in the top 1-2 inches of the glycol solution.</u>

At this point, you should have a functioning glycol chilling unit.

STEP 8: Install the glycol pump and connect circulation lines

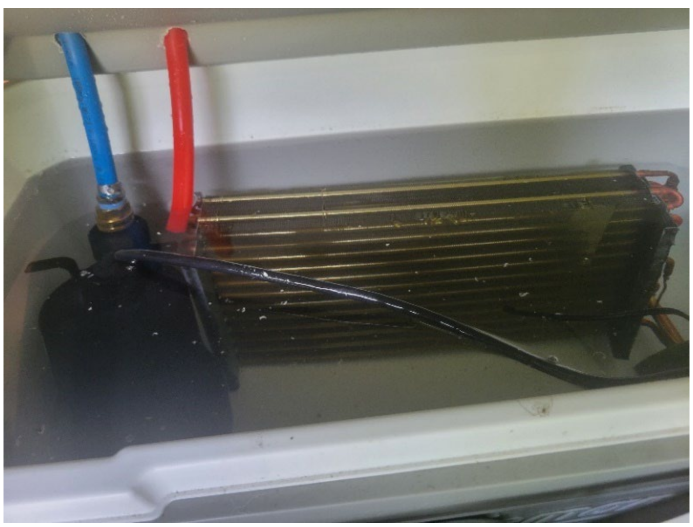


Figure 11. Glycol-water solution filled within cooler. Submersible pump installed along with supply and return lines.

To utilize your glycol chiller in your maple operation, a pump needs to be connected to move the chilled glycol from the cooler through the heat exchanger. There are different options for pumps. We found the simplest and least expensive option is to put a submersible pump inside the cooler. We tested circulation pumps, but priming the pump was a challenge.

Make sure that the pump you choose is powerful enough to lift the glycol solution to the height needed in your application. For example, if you are pumping into a chilling plate on an elevated tank, you will need to be able to push the glycol solution up and back out of the tank to return to the glycol unit. The viscosity and density of chilled glycol is higher than water, so it is best to oversize the pump lifting capacity. We used a 1/4-horsepower submersible pump with a 25-foot lifting capacity and a flow rate of 27 GPM (gallons per minute).

- Drill two ¾-inch holes in the lid of your cooler to pass the glycol lines through: one for the supply line connected to the submersible pump, the other for the return line that will return the glycol back into the cooler in a loop from the heat exchanger. Note: Ideally, place the return line on the opposite side of the pump near the chilling coil so that the pump is not picking up the returned warmer glycol.

- Plumb the lines from chiller to the heat exchanger. We used ½-inch PEX tubing for the glycol lines.
- Add pipe wrap insulation to all the lines to increase efficiency.

STEP 9: Install the temperature controller in sap tank (Optional)

There are many ways to control the temperature of sap in a tank. A temperature controller is helpful whether you are using a DIY glycol chiller, a commercial chiller, or a refrigerant system. There are direct wire options and zone controllers used in home heating systems that could be implemented. Zone controllers could be used in conjunction with a flow switch that would turn on the glycol pump once sap starts flowing. This could be most useful for a heat exchanger application.

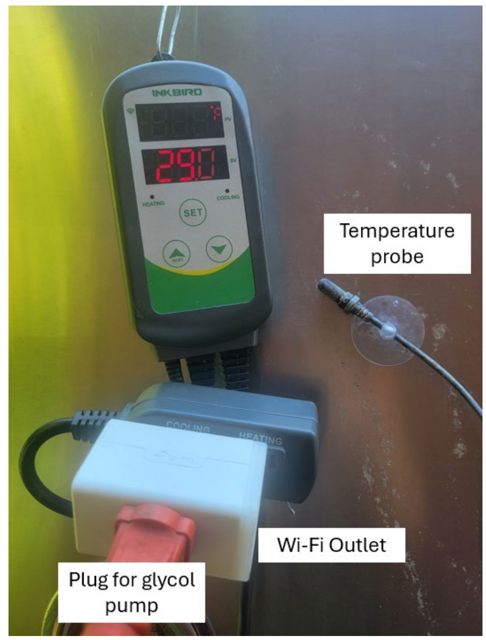


Figure 12. Temperature controller with glycol pump connected and Wi-Fi outlet for remote control. Temperature probe inserts into sap tank.

If you do not want to use a temperature controller, one method is to have the glycol pump run through your chilling plate anytime there is sap in the tank. To do this, set the temperature of the glycol solution in the glycol tank/cooler to the desired temperature of the maple sap. The glycol will then continue to circulate through the heat exchanger in contact with the sap until the sap and glycol equalize in temperature. This method works, but it is not the most efficient method.

An easy way to add temperature control is to utilize a plug-in controller such as an INKBIRD ITC-308 ($30-$50; Figure 7). These controllers are commonly used for aquariums and by brewers. The controller uses a temperature probe that can be inserted into the sap tank. A plug-in controller has an electrical outlet for powering on a chiller or heater at the set temperature. The glycol pump can be plugged directly into the outlet on the INKBIRD temperature controller. The controller will turn the glycol circulation pump on and off as needed to chill the maple sap. In this set-up, the chiller unit can be set to always keep the glycol solution cool. While the glycol is not circulating, the chiller will not need to run too much if the picnic cooler is well-insulated, making this method much more efficient than the previous method described.

The INKBIRD ITC-308 can be purchased with the ability to connect to Wi-Fi. With Wi-Fi connection and an app on your phone, you can remotely monitor the temperature of the maple sap. This unit saves data and displays a graph allowing you to monitor the temperature over time. The set temperature can also be adjusted remotely from the app. We found the INKBIRD ITC-308 with Wi-Fi connection to be simple to set up, convenient, and very effective.

STEP 10: Add Agitation to the Sap Tank

Having a steadily homogenized temperature of the sap is ideal. An agitator within the sap tank mixes the sap and helps move chilled sap away from the chilling plate. Without an agitator, the sap will not cool as quickly, and sap that sits away from the chilling plate will stay warmer longer and potentially even spoil. Additionally, sap that stays next to the chilling plate for too long may freeze up.

Most dairy tanks come with an agitator. In a dairy operation, the agitators are usually connected to a controller that turns the paddle on and off in intervals. This is important for milk quality to prevent churning which separates the fat and reduces quality of the milk. This is not a concern in maple sap. You could connect your agitator to a controller, but we found it easiest to wire the agitator motor to plug directly into an electrical outlet and run continuously while we were chilling sap. We cut the receptacle (female) end off an extension cord and wired it to the motor so that it could be plugged directly into an outlet for direct power. We also utilized a Wi-Fi plug to remotely turn the motor on and off.

STEP 11: Add Remote Operation (Optional)

If Wi-Fi access is available at your sugarhouse, it opens the possibility for monitoring and controlling your sap chilling system remotely with relatively low-cost technology. At the Uihlein Forest, our reverse osmosis unit can be controlled remotely, so having the ability to also chill maple sap concentrate remotely is important.

Note: Utilizing the INKBIRD temperature controller with the Wi-Fi option allowed for remote monitoring of the temperature of the sap. The glycol pump could be controlled by raising and lowering the set temperature of the sap on the INKBIRD controller remotely.

We tested utilizing Wi-Fi outlets (also called smart plugs) as a tool for remote operation. An app on a smartphone connects you via Wi-Fi to the internet. Once connected, the app on your phone can be used to switch power on and off to the electrical plug that powers your chiller or other equipment. We purchased each Wi-Fi outlet for $7.50 in 2024. We used them to tun the glycol pump and tank agitator on and off.

Some Wi-Fi outlets can set timers, schedules, and monitor energy usage. During the 2025 maple season, our agitator motor used 65.7 kWh of electricity, and the glycol pump used

167.2 kWh. Total costs for running the pump and agitator based on average electricity rates in NY in April 2025 ($0.2567 / kWh (NYSERDA, 2025)) were approximately $16.87 for the agitator motor and $42.92 for the glycol pump for the whole season.

The Wi-Fi remote operation worked well and allowed for monitoring and control while in the woods or at home. Wi-Fi outlets could have other useful applications in your sugarhouse, such as for the remote management of pumps, fans, heaters, lights, and more.

Testing DIY Glycol Chillers for Effectiveness

Before and during the 2025 maple season in northern New York, we tested our DIY chillers to determine effectiveness and ability to chill water or maple sap. In all tests, the temperature of the water or sap was tested periodically to measure the rate of chilling. Water was used in some tests to simulate maple sap outside of the production season.

All three DIY glycol-chilling systems that we made from AC units were extremely effective at chilling the glycol solution. Most glycol chillers are rated for half the BTU/h of a water chiller. Similar results were found when comparing the BTU/h ratings of the window air conditioners to their glycol chilling capacity as shown below.

Unit testing included the following applications:

- Test: 5,000 BTU/h window AC chiller connected to a stainless steel wine chilling plate with 5.2 square feet of cooling surface submerged in 100 gallons of water in a stainless steel tank. This test was run with a 40% glycol solution at 20 °F.
    - Results: The water temperature dropped 8.5 °F (from 45 °F to 36.5 °F) over 3 hours (Figure 9, Right). In total, this reduction in temperature required 7,089 BTUs of energy. Over 3 hours, that measures 2,363 BTUs per hour or just under 50% of the 5,000 BTU/h rating of the AC unit.
- Test: Commercial chiller attached to a stainless steel 20-plate heat exchanger with 7.3 square feet of cooling surface utilized with an RO pumping water through the heat exchanger at a rate of 1.0 gallons per minute.
    - Results: The water temperature dropped 7.1 °F (from 40.8 to 33.7 °F). Dropping the temperature much further would have iced up the water. Further testing is needed to see if the temperature differential can be increased with different starting temperatures, different glycol temperatures, and different glycol flow rates.
- Test: 14,000 BTU/h window AC chiller attached to the refrigerant lines of a 1,500-gallon insulated stainless steel dairy tank (Figure 9, Left) donated from Upper Hudson Maple Producers Association. Chilled glycol was pumped through the chilling plates of the tank which was filled with 500 gallons of water. The starting

temperature of the water was 43 °F. The temperature of the chilling unit was set to maintain the glycol at either 20 or 25 °F. The agitator in the dairy tank ran continuously.

  - Results: The chilling unit operated at approximately 5,000-6,000 BTU/h – less than 50% of the AC unit's rating – when operated with a 50% glycol solution.

- Test: Two 14,000 BTU/h window AC unit glycol chillers attached to the refrigerant lines of the 1,500-gallon dairy tank described above. Maple sap was concentrated to 22 °Brix and set to chill to 29 °F. At this temperature, a small amount of slush started to form. Most days, around 500-800 gallons of concentrate needed to be chilled.
  - Results: When chilling different volumes and temperatures of sap, both units together provided 8,500-9,500 BTU/h total cooling capacity when operating in an ambient temperature of 60 °F. This cooling capacity is a third of the unit's marketed cooling capacity for air conditioning, yet it was very effective at chilling maple sap. Temperature of 800 gallons of sap dropped 15 °F within 10 hours, a suitable time frame.
- Test: Commercial glycol chiller rated for 16,000 BTU/h at 28 °F attached to the refrigerant lines of the 1,500-gallon dairy tank described above. Maple sap was concentrated to 22 °Brix and set to chill to 29 °F. Most days, around 500-800 gallons of concentrate needed to be chilled.
  - Results: The glycol chiller performed at 12,000-16,000 BTU/h and was able to chill the concentrate effectively within 8-12 hours depending on the temperature of the concentrate leaving the RO and the ambient temperature outside the tank (located outside).

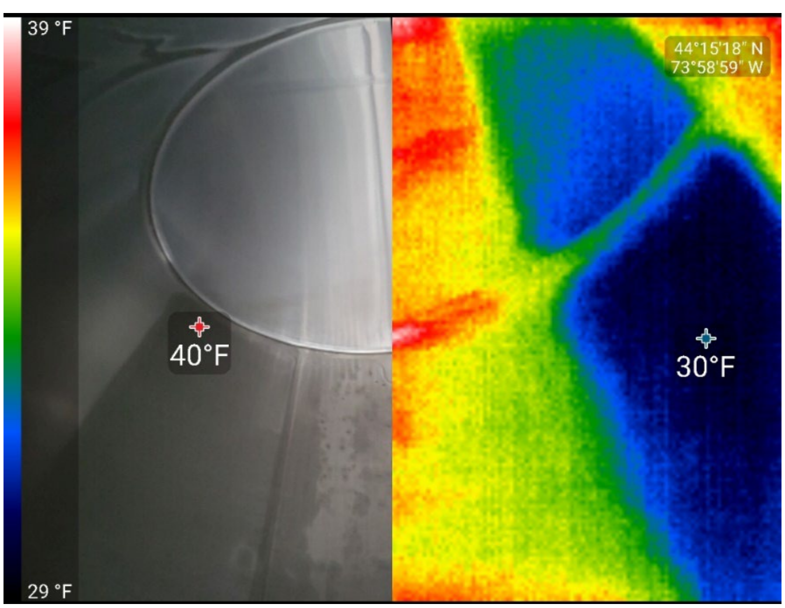
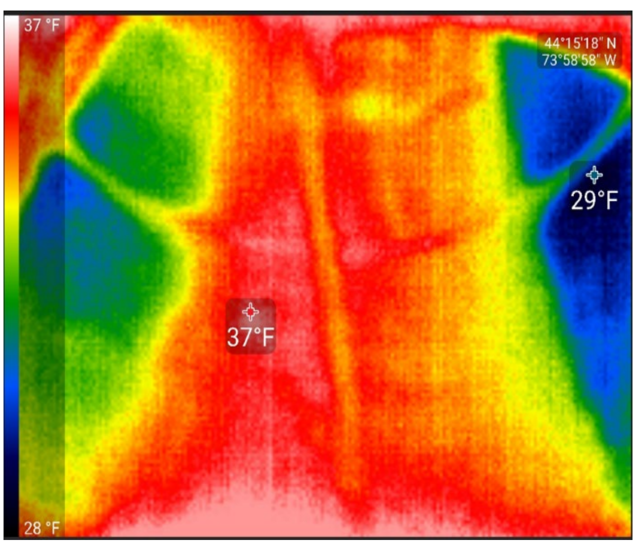


Figure 13. Thermal image of the inside of the dairy tank with chilling plates. With thermal imaging, you can see where the chilling plate runs along the back wall and bottom right of the tank. There is another chilling plate on the bottom of the tank that was not connected when this image was taken, so the thermal reading in that area of the tank was 40 °F. A third chilling plate is located, but not visible, on the left side of the tank; here a standard camera was used for context.

Figure 12. Left: Larger DIY chiller connected to cooling plates on a 1500-gallon insulated dairy tank. The lines were designed to pump refrigerant through the cooling plate, but here are used to pump glycol through the plates. Right: Smaller DIY chiller connected to a cooling plate submerged in an open-top sap tank. Chilled glycol is pumped from the chiller through the cooling plate and back. A temperature controller on the back wall measures the temperature of the liquid in the tank and turns the pump on and off when the set temperature is reached.



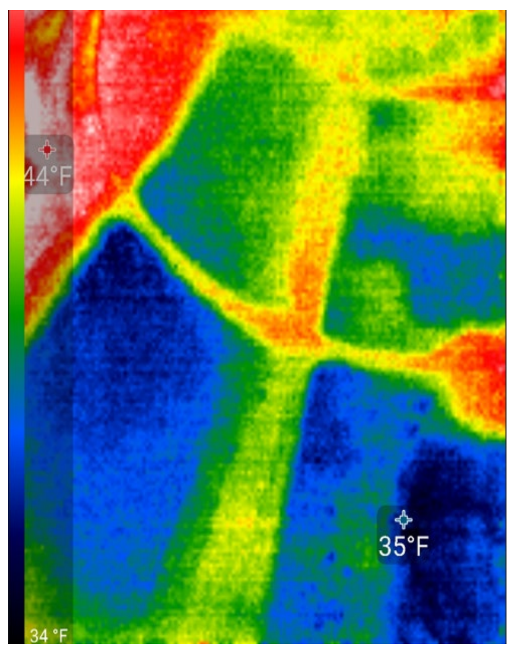


Figure 13. Thermal images inside of the empty dairy tank as cold glycol is pumped through the chilling plates (blue areas). Left: glycol was only pumped through the outer chilling plates. The bottom chilling plate (red area) was not connected to the chiller when the photo was taken. Right: the back corner of the same tank as chilled glycol was just starting to pump through both chilling plates.

Additional Thoughts on DIY Glycol Chillers

5,000 BTUs per hour of glycol chilling is sufficient for many small to moderate size maple operations that may only need to chill down 300 gallons or less of concentrated sap. The use of a 24,000 (or two 12,000) BTU/h window AC unit(s) should provide somewhere around 8,000-12,000 BTUs of glycol chilling per hour and would be more effective for producers needing to chill around 800 gallons of sap or concentrate in a single day.

An additional option is to connect two DIY glycol chillers to the same tank as we did with our large 1,500-gallon concentrate tank in the tests described above. This is less costly than buying a larger chiller. Most insulated dairy tanks have two chilling plates inside of the tank: one on the bottom and another that comes partway up either side of the tank as shown in Figure 8. Each plate has its own supply and return lines, so a separate chiller can be hooked to each chilling plate. On days when the temperature of the sap does not need to be lowered as much or days where there is not as much sap, you would only need to run one of the two chillers. This set-up also provides a backup chiller ready for use in case one chiller fails.

Two, 24,000 BTU/h window AC units could be used for those with over 10,000 taps and the need to chill down 1,500 gallons of concentrate in day. Although we have not tested this setup, one could build an even larger chiller by utilizing a split system central air conditioning system. These units are usually sold as separate compressors from the evaporative/cooling coils. The compressor units usually come pre-charged with refrigerant for up to 15 ft of line to the evaporative/cooling coil. One would not need additional refrigerant, but the lines would need to be vacuumed out before connection. This project would be a little more expensive and complex than the using window AC units, but may be a good option for maple producers with more than 10,000 taps.

Conclusion

- DIY glycol chillers are effective tools for chilling maple sap and preventing spoilage.
- Making a glycol chiller from a used window AC unit is more cost-effective than other options on the market.
- Research trials sufficiently evidenced DIY glycol chillers' effectiveness, such that their use at the Uihlein Maple Research Forest will continue, both for further study and to aid in commercial production of maple syrup.

For More Information:

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Acknowledgements:

Primary funding for this project was provided through a grant by the Northern New York Agriculture Development Program. Thank you to the Upper Hudson Maple Syrup Producers Association for donating the 1,500-gallon chiller tank for testing. Thank you to Greg Lapan for delivering the tank to the Uihlein Forest, to Alan Miller for providing engineering expertise and guidance, to Kara Lynn Dunn of the Northern NY Agriculture Development Program, and Aaron Wightman of the Cornell Maple Program for reviewing the document. Ailis Clyne of the Cornell Maple Program provided formatting and significant editorial comments.

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Funding for this project was made possible by a grant from the Northern New York Agricultural Development Program (NNYADP). Contents are solely the responsibility of the authors and do not necessarily represent the official views of the NNYADP.