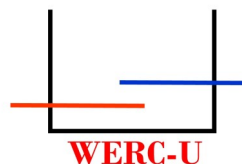


Manufacturing instructions for

Atmospheric-Pressure Heat-Recovery Vat (APHRV)

by Waste Energy Resources Co.

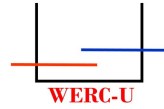
**500 Ketchikan Avenue
Fairbanks, Alaska 99701
wereboilerpot@gmail.com
www.were-u.com**



Copyright—Bernard L. Sliney, Jr. & Laurel A. Sliney dba

Waste Energy Resources Company (WERC)

All rights reserved worldwide.



The Atmospheric-Pressure Heat Recovery Vat (APHRV) is a revolutionary idea that allows you to take the excess heat from your woodstove and spread it throughout your home using your existing hydronic heating system.

This technology is available to configure to meet your needs using this booklet. Anyone from a homeowner with skills to a mechanical systems professional can take these plans and make an APHRV for a particular building. I don't sell you the materials to create the APHRV. This booklet gives you instructions and suggestions on how best to configure the system, but you have a lot of decisions to make to get a fully functional, wholly adaptable system that meets your needs, which only you can decide.

At its most basic, the APHRV is an open, metal, water-filled pot/tub/vessel that sits on a heated woodstove. The vessel has an inlet- and outlet-pipe and a loose-fitting lid that maintains atmospheric pressure in the pot while slowing evaporation. The vessel is attached to a pump for water circulation. The circulating water moves through a heat exchanger that transfers the heat to your structure's existing hydronic-heating system.

It is not advisable to directly connect this atmospheric-pressure system with a forced hydronic boiler system without a separating heat exchanger because boiler pressure will cause flooding at the APHRV. The water in the atmospheric system should not interact with the fluid in the hydronic system. The only interaction between the two systems is the heat conducted from the atmospheric vessel to the hydronic system at the point of the heat exchanger. From a plumber's perspective, this is a zone that adds heat to the system rather than taking it away. See example configurations on Pages 7,8 9 and 10.

My original prototype was an 8-gallon, restaurant-grade, stainless steel stockpot that I took to my local welder and had him cut holes in the sides and weld in 1-1/2" Schedule 40 stainless-steel pipes (see Figure 1—Page 3 and Photos 1&2—Page 11). The pipe ends were cut at 45-degree angles to reduce cavitation in the pot. My woodstove sits next to my boiler in a section of the household not frequented by guests, so it didn't have to be pretty. But I didn't stop with that basic design. I added a second pot for more volume and eventually created a 30-gallon tub that matches the top of my woodstove fitted around the chimney that comes out of the top of my woodstove (see Figure 2, Page 4 and Photo #4—Page 12), so that I could get the greatest efficiency from my woodstove's excess heat.

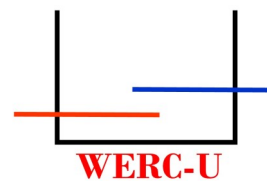
Continued



I replaced the pipes with two Schedule-40 female-to-female 1-1/2" stainless-steel couplings coming out of the back of the tub so the tub's appearance would be more clean and attractive and piping could be adapted to the most efficient configuration for any particular APHRV design. I prefer stainless steel because it doesn't oxidize and I live in a region where the water has a high mineral content, but aluminum has a better heat-transfer coefficient. I've had suggestions that copper or brass would be more attractive and allow the APHRV to be proudly displayed on the woodstove in the living room.

Feel free to take a picture of your finished APHRV installation and email it to us. We may include it on our website at a future date.

WERC-U



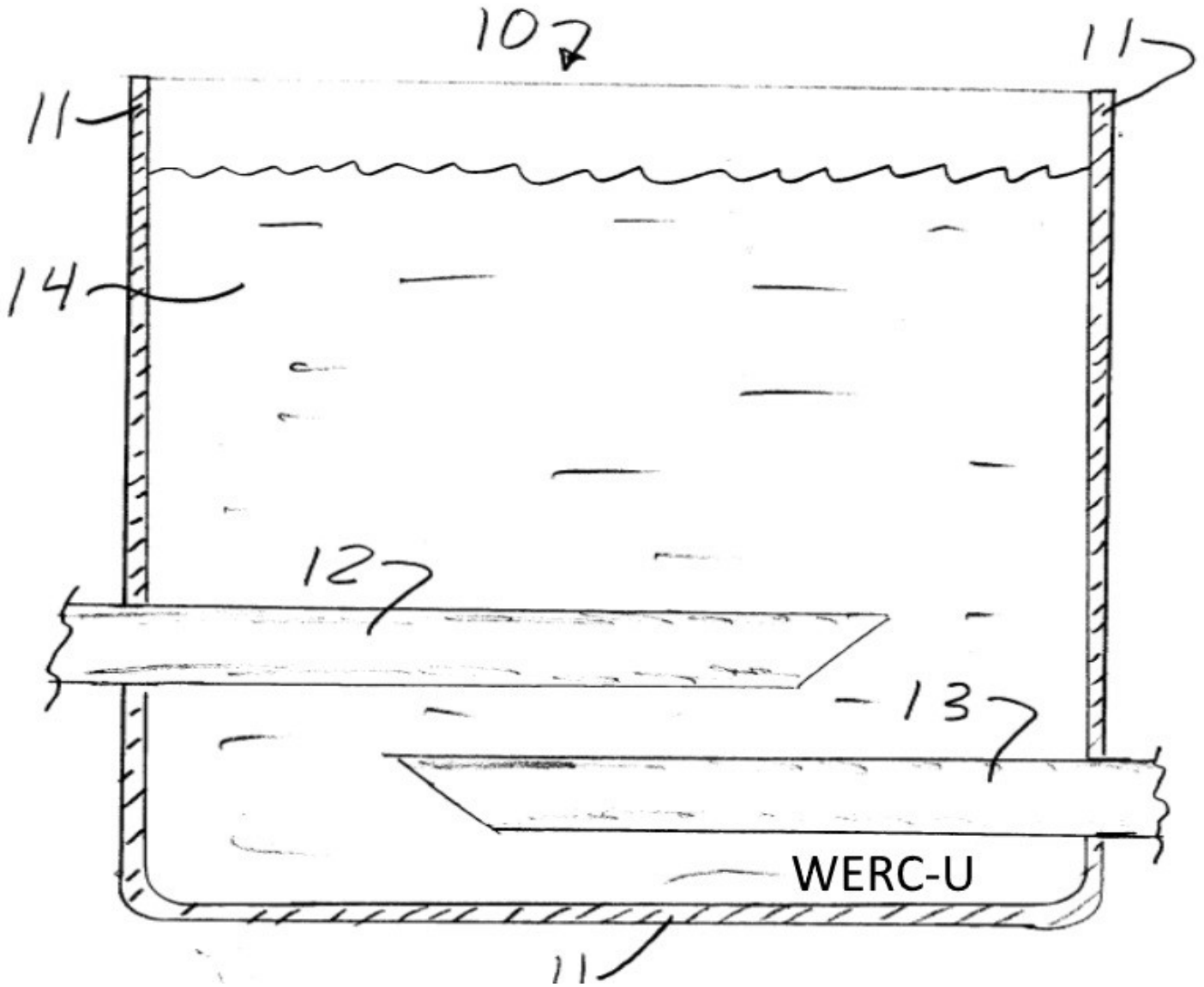
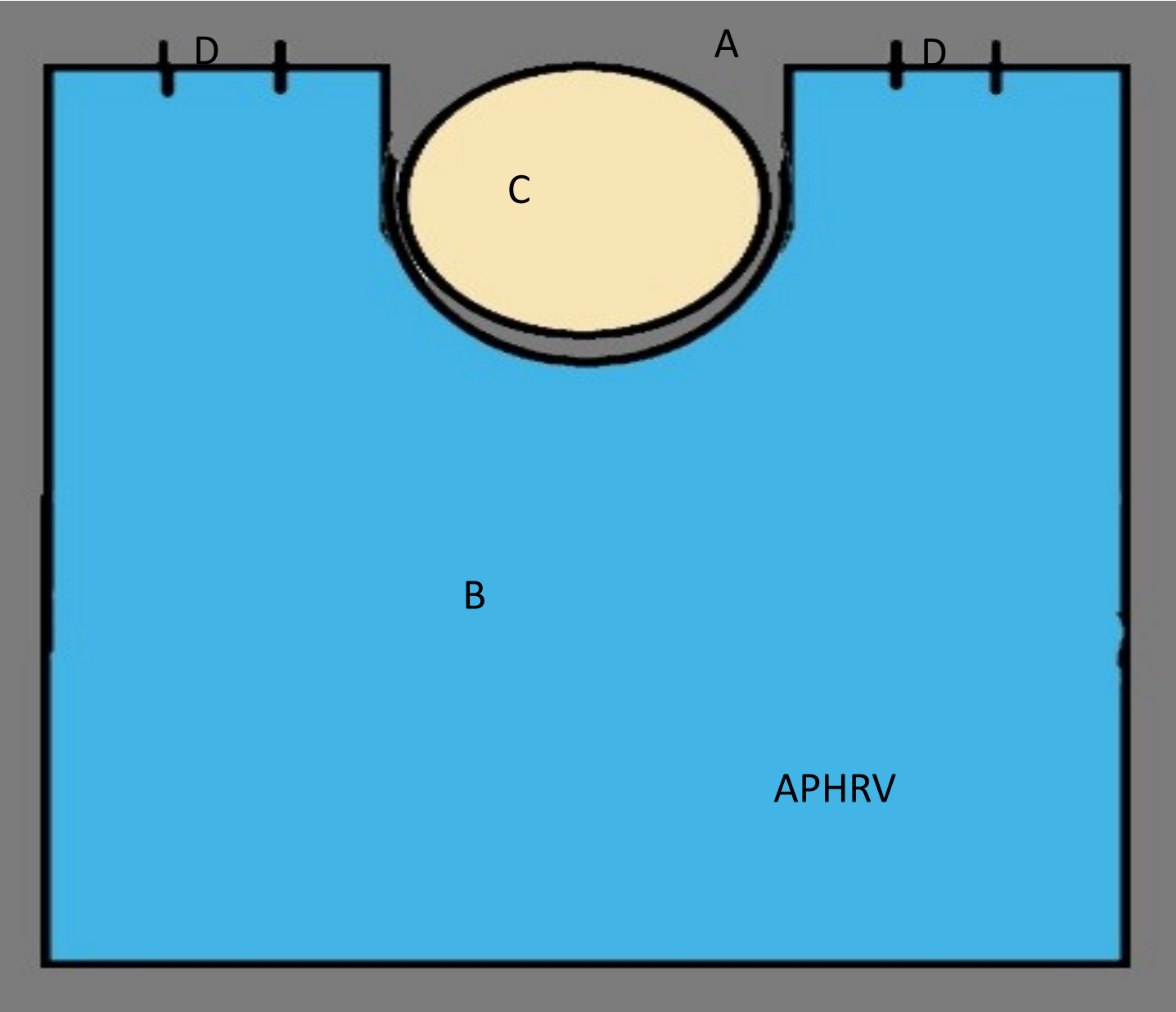


Figure 1 Legend

Lid	10
APHRV	11
Inlet Pipe	12
Outlet Pipe	13
Liquid (i.e. water)	14

Figure 2



Legend

- A = Woodstove
- B = APHRV
- C = Chimney
- D = Couplings

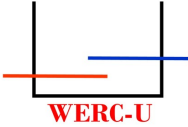
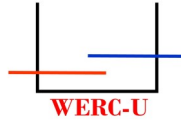
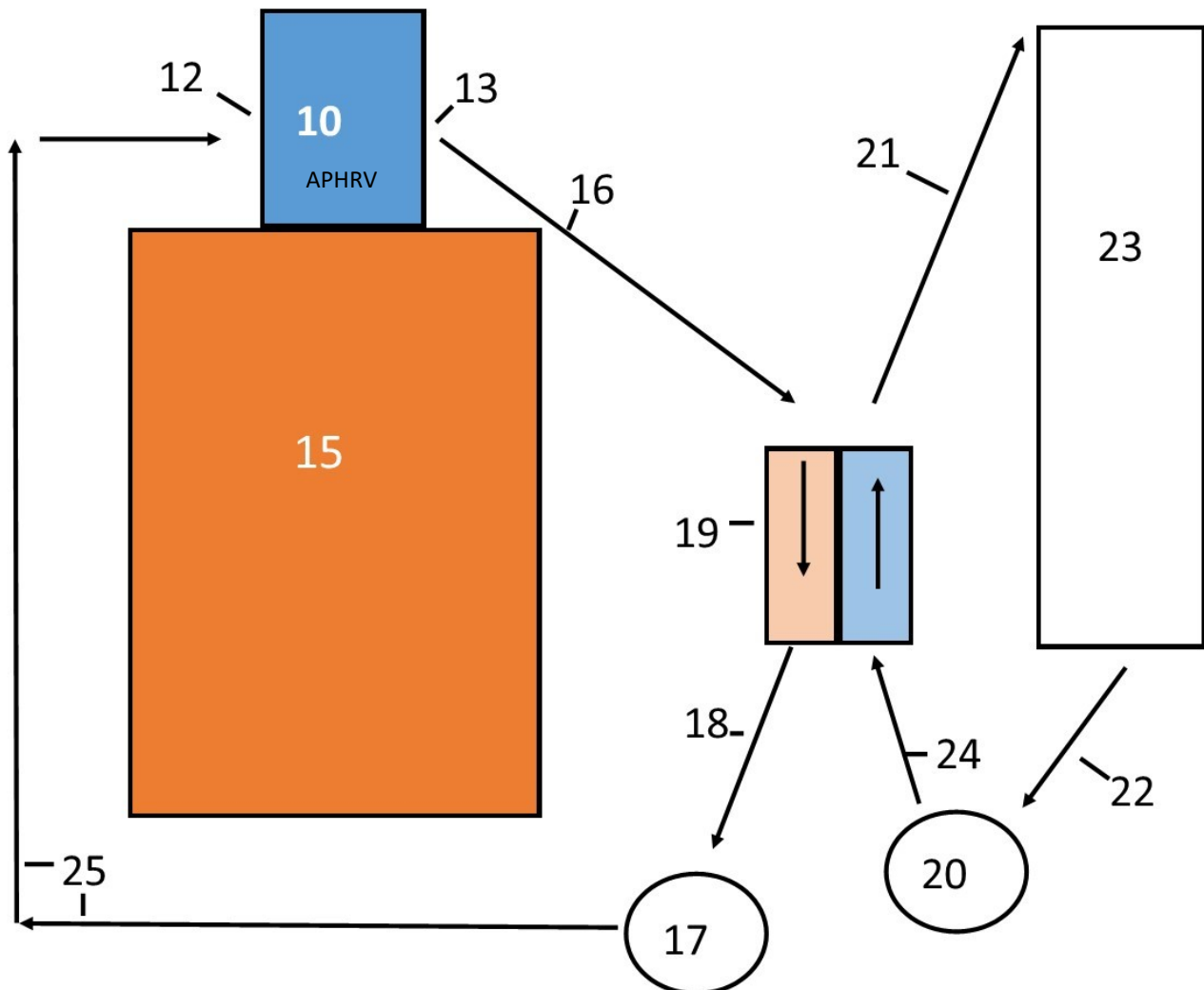


Figure 3



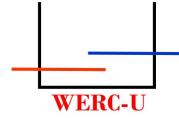
Legend Figure 3	
WERC-U- ©	10
Inlet	12
Outlet	13
Woodstove	15
Transit Pipe	16
Pump	17
Transit Pipe	18
Heat Exchanger*	19*
Pump	20
Transit Pipe	21
Transit Pipe	22
Forced Hydronic Radiator/Hot Tub/ Buffer Tank/Forced Air	23
Transit Pipe	24
Transit Pipe	25

*One side of the heat exchanger is atmospheric pressure, the other side is forced hydronic.





What You Will Need



(A basic parts list)

A woodstove—a hot flat top is best, but you can adapt this design to meet your particular needs.

A APHRV with a loose-fitting lid (the lid slows evaporation).

-Size matters. At the same temperature, you will get more heat from an 8-gallon pot than from a 4-gallon pot.

Pipes or couplings welded into the APHRV for connection to the pump and heat exchanger.

-Size matters. The more volume you can move from the APHRV through the heat exchanger, the more heat will be transferred to your forced-hydrionic system.

A pump to circulate the water from the pot to the heat exchanger.

-I suggest a low-energy “smart” pump, but my original design was from spare parts from my garage, so it’s not essential, just a best practice.

Heat exchanger (see Photo 3, Page 12):

-Not all heat exchangers are created equal. You want to use an efficient heat exchanger that is well-insulated and sized to improve the heat transfer ratio.

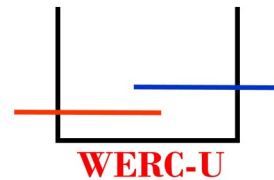
Heat exchanger circulating pump:

- This moves the heat from the heat exchanger to whatever space you are heating (please see Example Configurations on Pages 7, 8, 9 and 10 for different design applications.)

Transit pipes.



WERC-U



Example Configurations

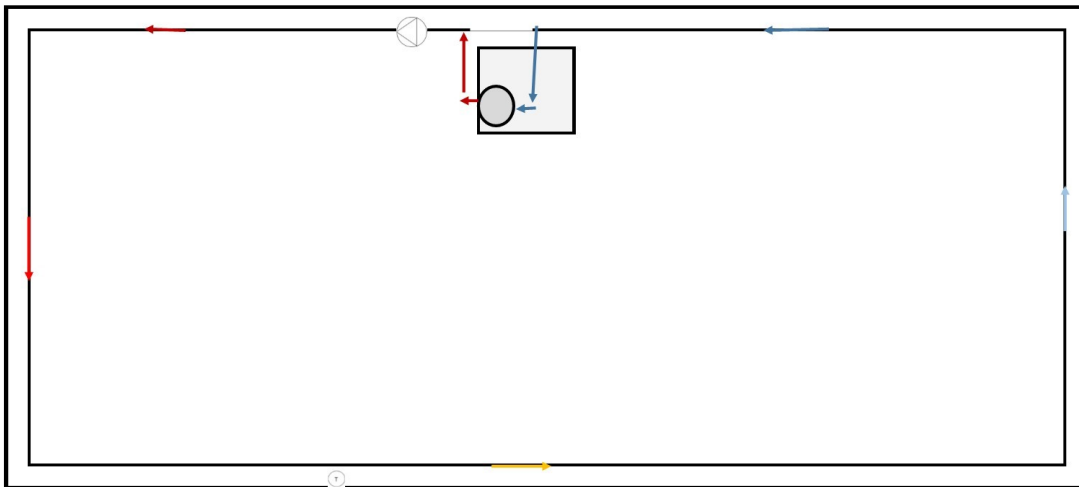


Most Basic Design

Single Pot—No Alternative Heat Source
 Atmospheric Pressure Hydronic System
 Designed by Bernard L. Sliney, Jr.
 Drafted by Laurel A. Sliney
 © 2018 All Rights Reserved Worldwide
 Patent Pending Application US 62/762,041

LEGEND

- WERC-U™
- Pump (12vDC or 120vAC)
- Woodstove
- Thermostat
- Hydronic Baseboard

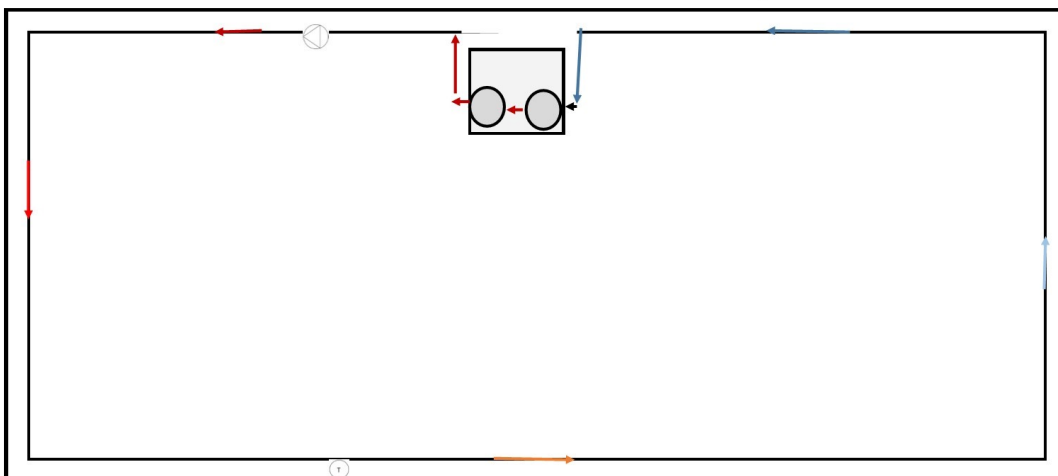


Enhanced Basic Design

Double Pot—No Alternative Heat Source
 Atmospheric pressure hydronic system
 Designed by Bernard L. Sliney, Jr.
 Drafted by Laurel A. Sliney
 © 2018 All Rights Reserved Worldwide
 Patent Pending Application US 62/762,041

LEGEND

- WERC-U™
- Pump (12vDC or 120vAC)
- Woodstove
- Thermostat
- Hydronic Baseboard





Woodstove Only Hydronic Design

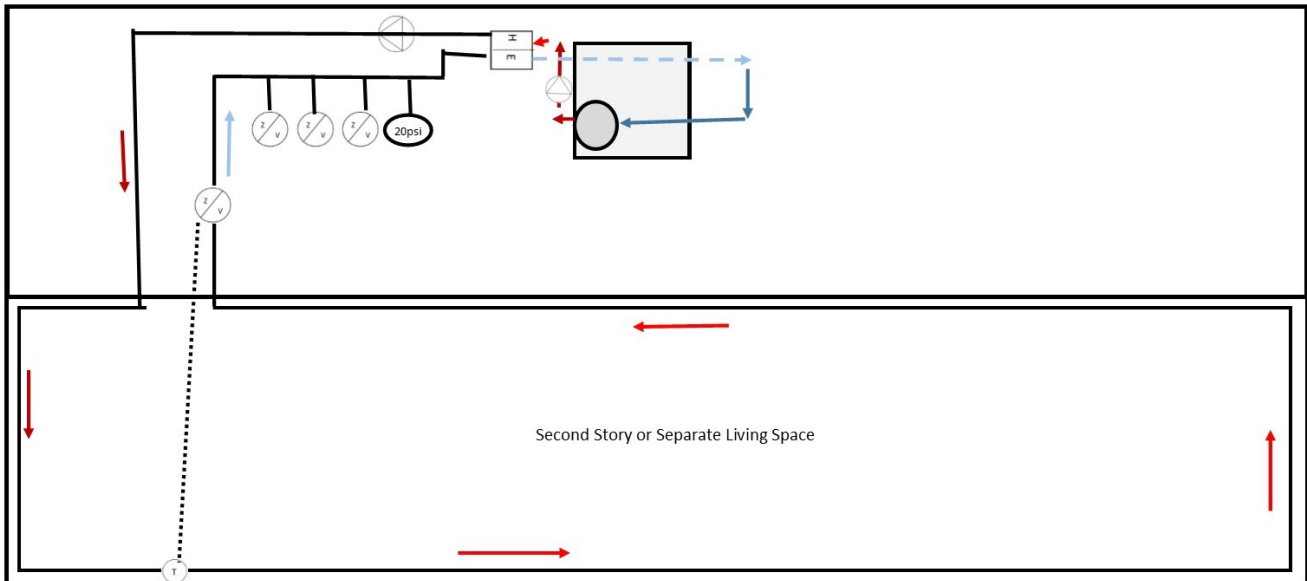
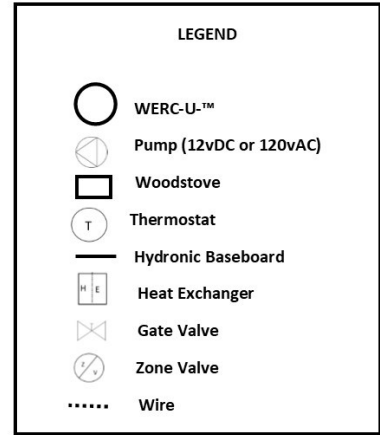
Atmospheric Heat Exchange System with
Forced Hydronic Heat Exchange System

Designed by Bernard L. Sliney Jr.

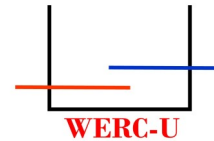
Drafted by Laurel A. Sliney

© 2018 All Rights Reserved Worldwide

Patent Number US 62/762,041



WERC-U





Woodstove Primary Hydronic Design

Atmosphere Heat Exchange System with
Forced Hydronic Heat Exchange System

Designed by Bernard L. Sliney, Jr.

Drafted by Laurel A. Sliney

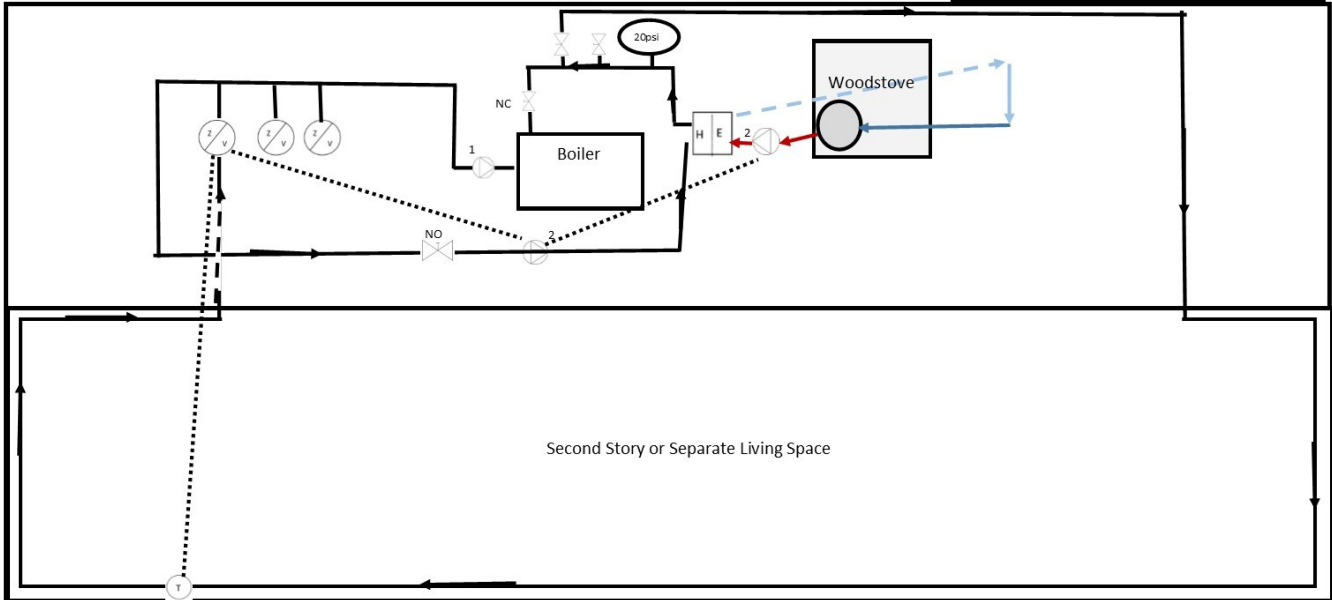
© 2018 All Rights Reserved Worldwide

Patent Pending Application US 62/762,041

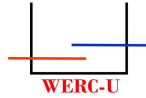
- Pump
- 1 = Oil-fired off
- 2 = Wood-fired on
- Gate Valves
- NO = Normally Open
- NC = Normally Closed

LEGEND

- WERC-U™
- Pump (12vDC or 120vAC)
- Woodstove
- Thermostat
- Hydronic Baseboard
- Heat Exchanger
- Gate Valve
- Zone Valve
- Wire



WERC-U



Woodstove Only Domestic Hot Water Design



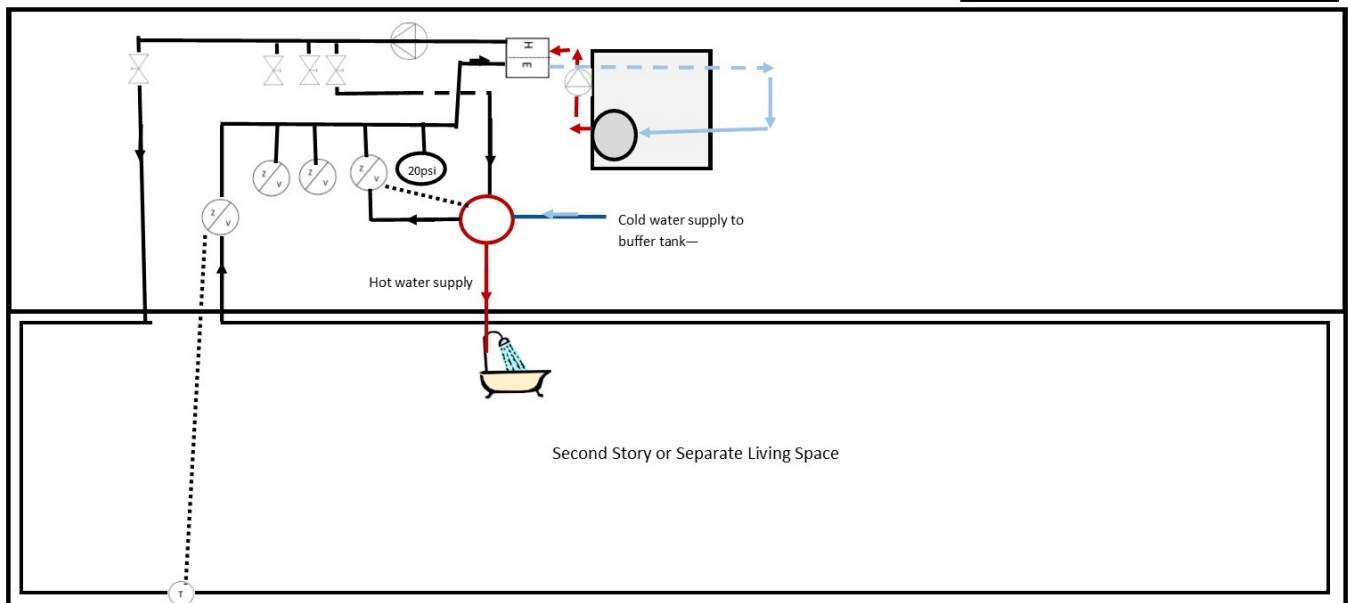
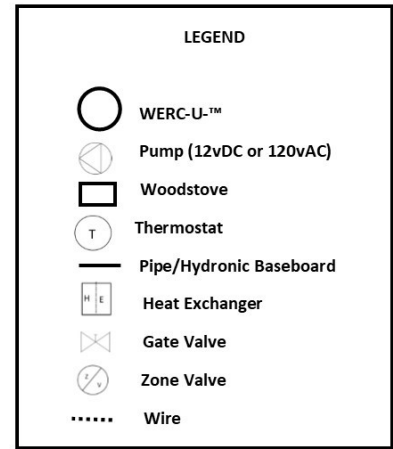
Atmospheric Heat Exchange System with
Forced Hydronic Heat Exchange System

Designed by Bernard L. Sliney Jr.

Drafted by Laurel A. Sliney

© 2018 All Rights Reserved Worldwide

Patent Pending Application US 62/762,041



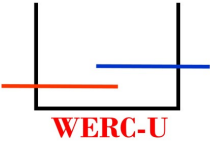
WERC-U



Photo # 1



Photo #2



WERC-U

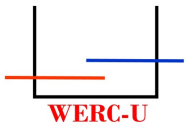


Photo #3

Photo #4



WERC-U





I recommend involving a plumber, electrician, welder and hydronic heating technician (or qualified contractor) in the customizing, manufacture and installation of this system. I have 30 years of hydronic heating and electrical construction experience that I drew on in designing the APHRV.

This system is designed to work with a heated woodstove. Please consult the woodstove’s documentation for how to operate the woodstove.

This system only works with liquid in the APHRV. Please do not try to operate the system without liquid (i.e., water) in the tub. You’ll ruin your pumps.

The pumps require electricity to operate. Electricity can be drawn from a power grid, solar panels, DC battery banks, etc. Please consult an electrician for best practices that meet your particular needs.

Waste Energy Resources Company does not build the individual system and is not responsible for errors in manufacturing or workmanship. We provide the APHRV design and example configurations only. No manufacture warranty is granted or implied.

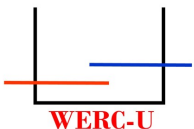
Do not – under any circumstances – try to seal the APHRV. This system is meant to be used as an atmospheric system. It is not meant to be pressurized. If you seal the system, when the water is heated, it will increase pressure and risk turning water into steam. This could create a potentially dangerous situation. Do not – under any circumstances – try to seal the APHRV. All warranties, stated or implied, are void if you violate this safety provision.

I recommend you familiarize yourself with all applicable codes pertaining to plumbing, electrical, welding, and heating – or consult professionals who are familiar with these codes.

Do not build the APHRV so that the tub and the water it contains exceeds the woodstove manufacturer’s recommended weight-load limits. An alternative would be to design the APHRV with legs to make it a free-standing surface-contact system. Be aware of the weight-load limitations of your structure as well. Again, consultation with professionals is recommended.

Continued

WERC-U





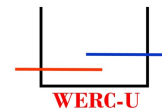
Please familiarize yourself with the attached License Agreement. We sell the license to use the APHRV plans for a single instance for \$20 USD. Although we offer several options for how the APHRV might be used, use of this booklet constitutes agreement to purchase a additional license for each instance of the system you wish to install. So, for example, you use the APHRV product in your home. If you use the APHRV plans to install a similar system in your cabin and a third system in your business, you would need to pay us for each use of the plans. Hydronic-heating professionals might wish to install these systems in many locations, but each installation requires a separate license purchase of \$100. This compensates me for use of my intellectual property.

Note that every APHRV should be identified with the logo on the front of the vessel.



Please feel free to take a photograph of your finished design and email it to us wercboilerpot@gmail.com. We might feature it on the website at some later date.

WERC-U





WERC-U LICENSE TERMS

IF YOU LIVE IN (OR IF YOUR PRINCIPAL PLACE OF BUSINESS IS IN) THE UNITED STATES, PLEASE READ THE BINDING ARBITRATION CLAUSE AND CLASS ACTION WAIVER IN SECTION 6. IT AFFECTS HOW DISPUTES ARE RESOLVED.

Thank you for choosing WERC-U!

This is a license agreement ("Agreement") between you (or, based on where you live or where your principal place of business is located, collectively "you") and Waste Energy Resources Company, 500 Ketchikan Ave., Alaska 99701, US (WERC). WERC is the designer and owner of the designs for the Atmospheric-Pressure Heat Recovery Vat APHRV. You can produce or have produced the APHRV from the drawings available under this Agreement ("Plans") by a manufacturer of your choosing. WERC does not provide the manufacture of the APHRV or guarantee or warrant the manufacturer you select to make the APHRV.

This Agreement describes your rights and the conditions upon which you may use the Plans. You should review the entire Agreement, including any supplemental license terms that accompany the Plans and any linked terms provided on the WERC-U.com web page, because all of the terms are important and together create this Agreement that applies to you.

By accepting this Agreement or using the Plans, you agree to all of these terms. If you do not accept and comply with these terms, you may not use the Plans or its features. Realize that WERC has a patent(s) pending and holds the copyright for this booklet, and in addition to this Agreement you may not use the Plans other than permitted by this Agreement or otherwise cause patent infringement of WERC rights.

1. Overview.

- a. **Applicability.** This Agreement applies to the Plans obtained from the web page for WERC-U. **Once you accept these Agreement terms you then can pay for one (1) copy of the Plans and have a manufacturer of your choice build the APHRV device from these Plans.** You may use these Plans only one (1) time to build one APHRV. If you desire to have an additional APHRV made, you must pay for another use of said set of Plans. The Plans available may be altered from time to time by WERC-U such that you should obtain the latest improvements by buying the most recent version of the Plans. The improved APHRV as shown in these revised Plans also may have a patent(s) pending.
- b. **Additional terms.** WERC does not select the manufacturer you choose to build the APHRV, does not do any installation of the APHRV, and does not warrant the function of the APHRV.

2. Use Rights.

- a. **License.** The Plans are licensed to you, not sold. Under this Agreement, WERC grants you the right to install and run one (1) instance of the Plans to have the device manufactured (the "Licensed Device"), for use by you, so long as you comply with all the terms of this Agreement. Updating or upgrading the Licensed Device beyond what is in the Plans voids and revokes your license to the Plans and WERC does not warranty or guarantee performance of such altered device.
- b. **Device.** In this Agreement, "Device" means a APHRV made using the Plans and is a Licensed Device if paid for and used in accord with this Agreement. Before you may use the Device, the manufacturer must mark the Device made according to the Plans on the front of the finished piece with an at least one-inch WERC-U logo as displayed to the right of this paragraph.



- c. Restrictions.** WERC reserves all rights (such as rights under intellectual property laws, including but not limited to patents, trademarks, copyrights) not expressly granted in this Agreement. For example, this Agreement does not give you any right to, and you may not:
- (i) use or virtualize features of the Plans separately;
 - (ii) publish, copy (other than the permitted for manufacture), rent, lease, or lend the Plans;
 - (iii) transfer the Plans (except as permitted by this Agreement to have a Device manufactured one time);
 - (iv) work around any technical restrictions or limitations in the Plans; and
 - (v) make the Plans available for use by multiple users.
- 3. Updates.** You may obtain updates of the Plans only from WERC through its web page and paying a fee for each use.
- 4. Geographic and Export Restrictions.** If you are from a geographic region outside the United States, then you may activate the Plans only in that region by agreeing to this Agreement and paying any required differential fee. You must also comply with all domestic and international export laws and regulations that apply to the use of the APHRV.
- 5. Support.**
- For the APHRV generally, contact your Device manufacturer or installer for support options.

6. Binding Arbitration and Class Action Waiver if You Live in (or if Your Principal Place of Business is in) the United States.

WERC hopes we never have a dispute, but if we do, you and WERC agree to try for 60 days to resolve it informally. If we can't, you and we agree to **binding individual arbitration before the American Arbitration Association ("AAA") under the Federal Arbitration Act ("FAA"), and not to sue in court in front of a judge or jury.** Instead, a neutral arbitrator will decide and the arbitrator's decision will be final except for a limited right of appeal under the FAA. **Class action lawsuits, class-wide arbitrations, private attorney-general actions, and any other proceeding where someone acts in a representative capacity aren't allowed nor are combining individual proceedings without the consent of all parties.** "We," "our," and "us" includes WERC, the Device manufacturer, and you.

- a. Disputes covered—everything except IP.** The term "dispute" is as broad as it can be. It includes any claim or controversy between you and WERC, concerning the Plans, its price, or this Agreement, under any legal theory including contract, warranty, tort, statute, or regulation, **except disputes relating to the enforcement or validity of our intellectual property rights.**
- b. Mail a Notice of Dispute first.** If you have a dispute and WERC representatives can't resolve it, send a Notice of Dispute by U.S. Mail to either the manufacture; or if your dispute is with WERC, mail it to WERC, (address page 1 above). Tell us your name, address, how to contact you, what the problem is, and what you want. We'll do the same if we have a dispute with you. After 60 days, you or we may start an arbitration proceeding if the dispute is unresolved. Realize that WERC has no control of and are not responsible for the manufacturer that you use or its use of the Plans. You must contact them for any of those concerns.



- c. **Small claims court option.** Instead of mailing a Notice of Dispute, and if you meet the court's requirements, you may sue WERC in small claims court in your county of residence (or if a business your principal place of business) or WERC principal place of Fairbanks, Alaska USA if your dispute is with WERC.

We hope you'll mail a Notice of Dispute and give us 60 days to try to work it out, but you don't have to before going to small claims court.

- d. **Arbitration procedure.** The AAA will conduct any arbitration under its Commercial Arbitration Rules (or if you are an individual and use the Plans for personal or household use, or if the value of the dispute is \$75,000 USD or less whether or not you are an individual or how you use the Plans, its Consumer Arbitration Rules). In a dispute involving \$25,000 USD or less, any hearing will be telephonic unless the arbitrator finds good cause to hold an in-person hearing instead. Any in-person hearing will take place in your county of residence (of if a business your principal place of business) or WERC principal place of business—Fairbanks, Alaska. The arbitrator may award the same damages to you individually as a court could. The arbitrator may award declaratory or injunctive relief only to you individually to satisfy your individual claim.
- e. **Arbitration fees and payments.**
- (i) **Disputes involving \$75,000 USD or less.** The manufacturer is your choice so that WERC has no connection with any dispute between you and the manufacturer. If your dispute is with WERC, and you reject our last written settlement offer made before the arbitrator was appointed, your dispute goes all the way to an arbitrator's decision (called an "award"). The arbitrator will determine the amounts unless you and we agree on them.
 - (ii) **Disputes involving more than \$75,000 USD.** The AAA rules will govern payment of filing fees and the AAA's and arbitrator's fees and expenses.
 - (iii) **Disputes involving any amount.** If you start an arbitration WERC will seek our AAA or arbitrator's fees and expenses, or your filing fees be reimbursed to WERC, and especially if the arbitrator finds the arbitration frivolous or brought for an improper purpose. If WERC starts arbitration proceedings, WERC will pay all filing, AAA, and arbitrator's fees and expenses. WERC will seek our attorney's fees or expenses from you in any arbitration if awarded by the arbitrator. Fees and expenses are not counted in determining how much a dispute involves.
- f. **Must file within one year.** You and WERC must file in small claims court or arbitration any claim or dispute (except intellectual property disputes — see Section 6.a.) within one year from when it first could be filed. Otherwise, it's permanently barred.
- g. **Severability.** If the class action waiver is found to be illegal or unenforceable as to all or some parts of a dispute, those parts won't be arbitrated but will proceed in court, with the rest proceeding in arbitration. If any other provision of Section 6 is found to be illegal or unenforceable, that provision will be severed but the rest of Section 6 still applies.



- h. Conflict with AAA rules.** This Agreement governs if it conflicts with the AAA's Commercial Arbitration Rules or Consumer Arbitration Rules.
 - i. WERC as party or third-party beneficiary.** Because WERC does not supply the Device, WERC is not a party to any dispute between you and the manufacturer. Under certain conditions for the Plans WERC may be a third-party beneficiary of your separate agreement with the manufacturer to resolve disputes through informal negotiation and arbitration or terms of that agreement.
- 7. Governing Law.** The laws of the state or country of WERC – Fairbanks, Alaska, US - govern all claims and disputes concerning the Plans, its price, or this Agreement, including breach of contract claims and claims under consumer protection laws, unfair competition laws, implied warranty laws, for unjust enrichment, and in tort, regardless of conflict of law principles. In the United States, the FAA governs all provisions relating to arbitration.
- 8. Consumer Rights, Regional Variations.** This Agreement describes certain legal rights. You may have other rights, including consumer rights, under the laws of your state or country. You may also have rights with respect to the manufacturer you selected to make the Device. This Agreement does not change those other rights if the laws of your state or country do not permit it to do so.
- 9. Additional Notices.**
- a. Limited rights versions.** If the Plans you acquired is marked or otherwise intended for a specific or limited use, then you may only use it as specified. You may not use such versions of the Plans in any unauthorized manner as such use voids this Agreement and any device is not licensed.

 - (i) NFR.** You may not resell any Plans as all Plans are understood as “NFR” or “Not for Resale”.
 - (ii) No Warranty. Plans are provided “AS IS,” and no warranty, implied or express (including the Limited Warranty), applies to these Plans.** If these Plans are altered by you or your manufacturer, WERC is not responsible for any damage thereby caused to you. If you provide WERC comments, suggestions or other feedback about the Plans (“submission”), you grant WERC and its partner’s rights to use the submission in any way and for any purpose.
 - (iii) WERC excludes all implied warranties and conditions, including those of merchantability, fitness for a particular purpose, and non-infringement. If your local law does not allow the exclusion of implied warranties, then any implied warranties, guarantees, or conditions are limited as much as your local law allows. You can recover only the remedies this Agreement allows.**
 - (iv) You may not recover under any other part of this Agreement, or under any theory, any damages or other remedy, including lost profits or direct, consequential, special, indirect, or incidental damages.** The damage exclusions and remedy limitations in this Agreement apply even if repair, replacement or a refund does not fully compensate you for any losses, if WERC knew or should have known about the possibility of the damages, or if the remedy fails of its essential purpose. Some states and countries do not allow the exclusion or limitation of incidental, consequential, or other damages, so those limitations or exclusions may not apply to you. **If your local law allows you to recover damages from WERC even though this Agreement does not, you cannot recover more than you paid for the Plans.**



10. **Entire Agreement.** This Agreement (together with the notice on WERC's web page, or other terms accompanying any Plans that are provided by WERC and that you use), and the terms contained in web links for the APHRV or listed in this Agreement, are the entire agreement for the Plans and any Licensed Device.
11. By paying the required fee to purchase this booklet, you are agreeing to all of these terms.

WERC-U

