TEMPORARILY BOILERS - CONTINGENCY PLAN CHECK OFF SHEET

Steven Taylor

As always one of the most important issues is to have a contingency plan set in place. A rental may be needed for an emergency, planned shutdown, or increase in steam/hot water demand.

You will need to run the following connections to an external wall

1. Steam or hot water supply line

2. Fuel line (Natural gas or Oil)

3. Make up water line

4. Condensate/hot water return line

5. Power (Panel box) for external hook up

6. Blow down or drain line

7. Inclement weather protection

8. Boiler exhaust outlet

9. Proximity to foot traffic

10. Vehicle traffic

11. Noise restrictions

12. Startup steam release/Hot water equipment loading

If all of the piping and connections are stubbed out to a convenient location, both time and money will be saved during an outage.

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Issues to address when hooking up a temporary boiler

1. Steam or hot water supply line (pipe sizing is critical) More often than not these lines are not sized properly. Example: The customer has a 3" line so they run 3" to the temporary boiler which on the surface sounds right. But they did not calculate the line loss in the five 90-degree elbows, block valve and 175' of pipe. That 3" line should have been 4" and if they are running low pressure it would need to be 6" or even 8". Run the calculations or have someone run them for you and save a lot of headaches.

2. Fuel line (Natural gas or Oil) (pipe sizing is critical) Same issue with more variables. They tie into the regulator feeding their boiler and don't understand why the temporary boiler won't keep up so they blame the boiler. When we start investigating, we find they had 4' of pipe from the outlet of their regulator to their gas train. They ran 60' of pipe with four 90-degree elbows and a bull head tee. They started out with 20" of gas which is what we need at our gas train, and we did, before we lit the burner off. As soon as we started driving the firing rate up the pressure starts dropping and we can only get 30% firing rate before we ran out of gas.

Another issue on natural gas is what other users are pulling from the line/regulator you are connecting to. The common response is that they will be taking their boiler off line when the temporary boiler is fired up. They did not calculate that the technician will be firing the temporary boiler at full rate and this site can't use the steam so it is vented. The additional load on the gas line drops out one of the plant boilers causing an upset in the steam flow and pressure.

Same issue with fuel oil. They have ¾" lines feeding their fuel pump so they run ¾" to the temporary boiler, 100' away. Line losses starve the fuel pump and the boiler shuts down on the low oil pressure safety limit.

3. Make up water line (pipe sizing is critical) You have to take into consideration the total makeup water flow. If you have 100% condensate return in a steam system then you would automatically assume very low make up water. But if the temporary system has a water softener then you have to calculate the backwash flow rate of the water softener. Same issue if you have 100% make up. You have to add the backwash flow rate to the maximum flow rate of the water softener in order to size the line and flow properly.

4. Condensate/hot water return line—Hot water supply and return lines are pretty simple. Take in the line losses, size the pipe and make sure the circulating pump is adequate. Simple right? Not necessarily. What if the building is 80' in elevation below the temporary boiler or vice versa? Didn't take that into the calculation when sizing the circulation pump? Now the pump is undersized by 35 psi. (80 divided by 2.31 = 34.63 psi)

Condensate return lines—Different system with different issues. If all of the condensate is pushed back by high pressure steam traps then it is fairly simple. But what about the secondary gravity return that is being pumped into the existing deaerator via a second connection? Simple right? Tie that line in with the high-pressure condensate return and send it back to the temporary deaerator in the same line. Happens all the time. But never works. The back pressure on the high pressure return line over comes the pump on the gravity return and then the return is overflowing in the boiler room. Site mechanic automatically blames the deaerator. "The deaerator is pushing condensate back into the boiler room. Something is wrong with it."
Again, size it properly on the front end and make sure you take into account all the sources on each line.

5. Power (Panel box) for external hook up—Calculate all of the power loads associate with the temporary boiler. Heat trace gets left out all the time so make sure you account for it.

6. Blow down or drain line (pipe sizing is critical)—On a how water project this is very simple. Locate a drain and route the piping to it.

Steam systems are a different animal. You have high temperature waste water from the actual boiler blow down, drains from everything and backwash from the water softener. They have to be ran in separate lines. Remember that the backwash from the water softener is brine water.

7. Inclement weather protection—This is Alaska. It is **impossible** to run to much heat trace or install to much insulation. Anything that can freeze, will. Including blowdown lines. Drain lines will freeze before you can get the water drained out of the unit. Heat trace and insulate everything.
Makeup air inlet—In sub zero weather you should duct the makeup air for the boiler to the outside of the trailer and install a duct heater. Drawing all of that combustion air through the trailer is asking for trouble. At the same time, you can't draw that really cold air directly into the boiler. Be prepared to temper it.

8. Boiler exhaust outlet—Watch the proximity to other buildings. If you set the boiler in an alley with 10 story buildings all around you will have combustion issues. Down drafts can be detrimental to exhaust flows.
Watch for air intakes above the boiler. Rooftop makeup air units are notorious for drawing boiler exhaust gases into buildings.

9. Proximity to foot traffic—This is especially important at colleges, universities, high schools, etc. If they can climb over it, they will. I watched a college kid climb a fence we put up to keep traffic away from the area and then straddle an 8" steam line mounted 3' off the ground, just before we put steam on that line. When ever possible run your lines overhead so that they have to get really serious to injure themselves.

10. Vehicle traffic—If vehicles can travel through the area, they will. Doesn't matter that you have moveable barriers up, caution tape or signs for stupid people to stay out. Someone will drive through the area and run over that 4" flexible gas line that the contractor convinced you would be just fine because nobody drives through there.

11. Noise restrictions—If it is a University how close will the equipment be to a Professors class room or the President's office? They don't care that you have to run another 200' of utilities to hook the unit up around the corner from their window. They don't want to see it. Get permission.

12. Startup steam release/Hot water equipment loading—During startup the Technician will need to take the boiler to full firing rate in order to properly set combustion. Arrangements need to be made to either use the steam or release it through a vent system. In hot water applications there will need to be a way to put a load on the boiler system.

Contact WARE today to discuss a contingency plan.

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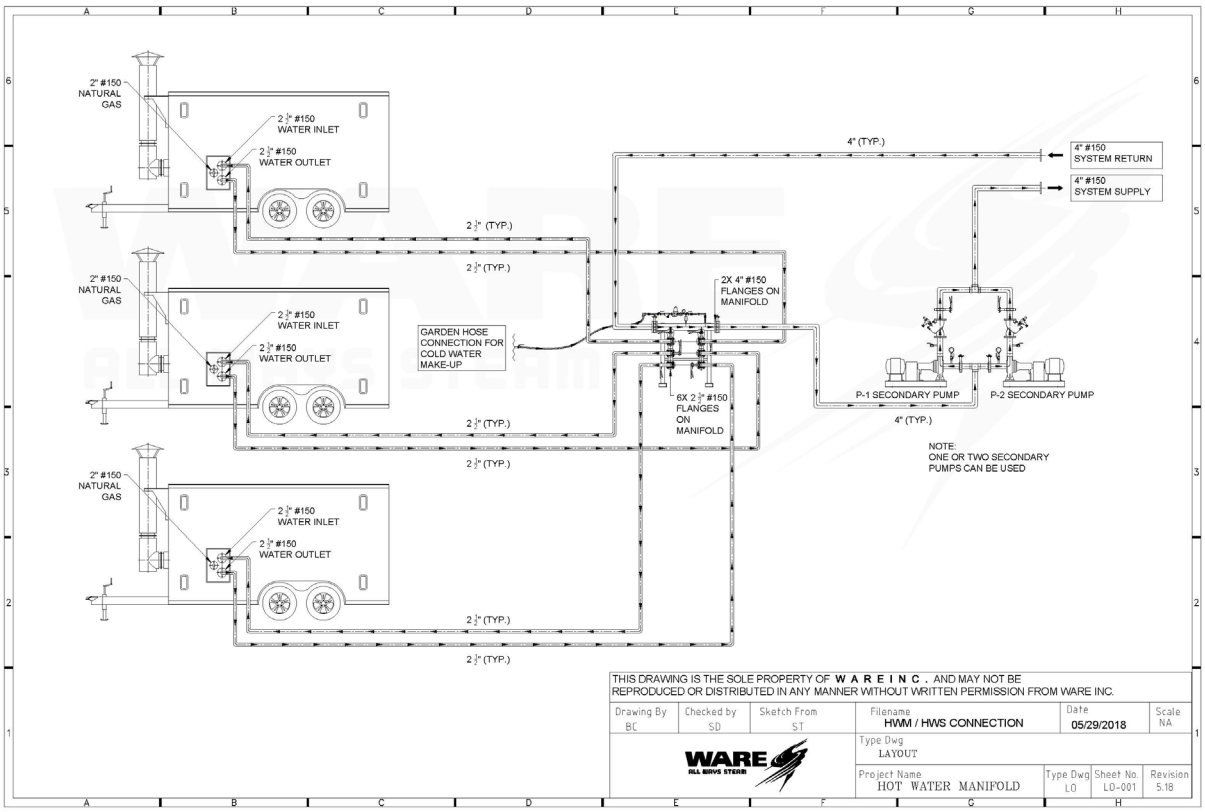
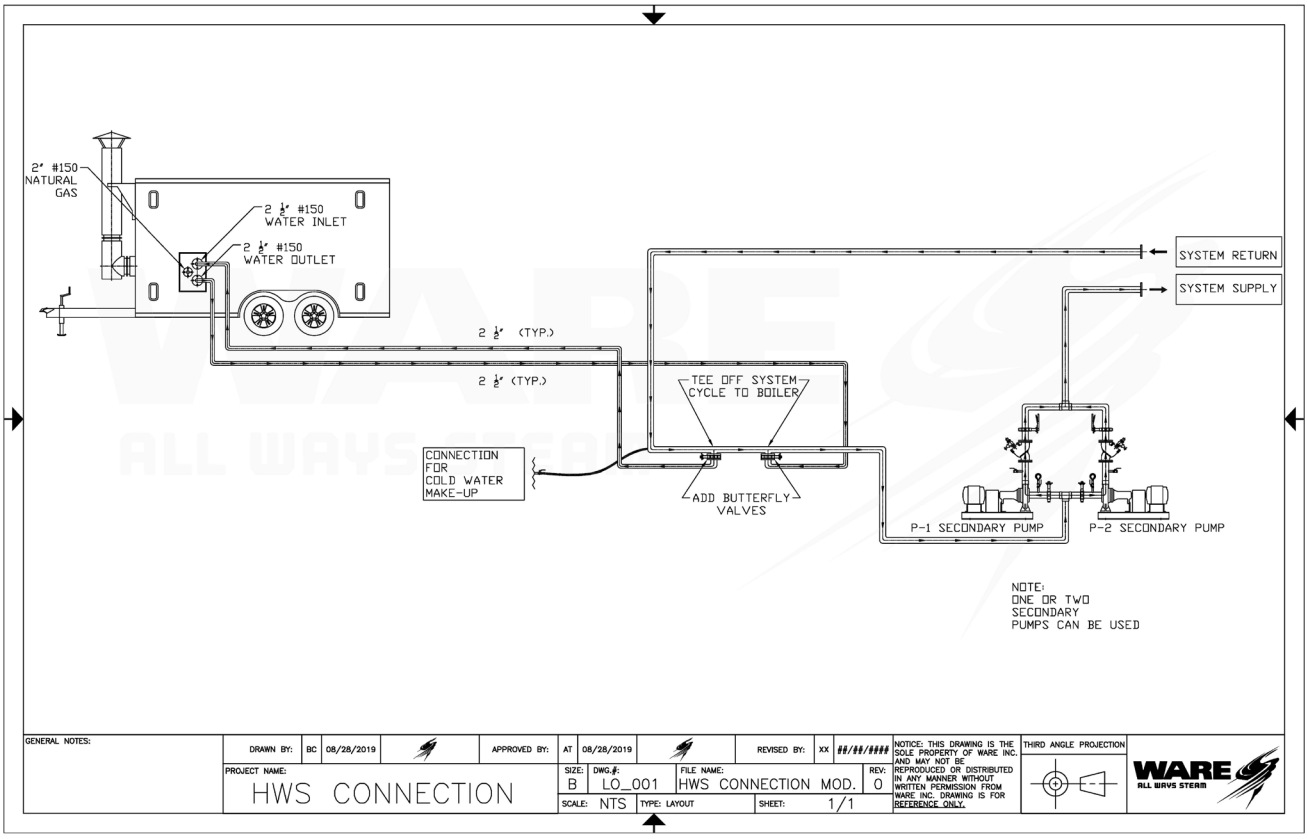
PRE-STARTUP CHECK LIST

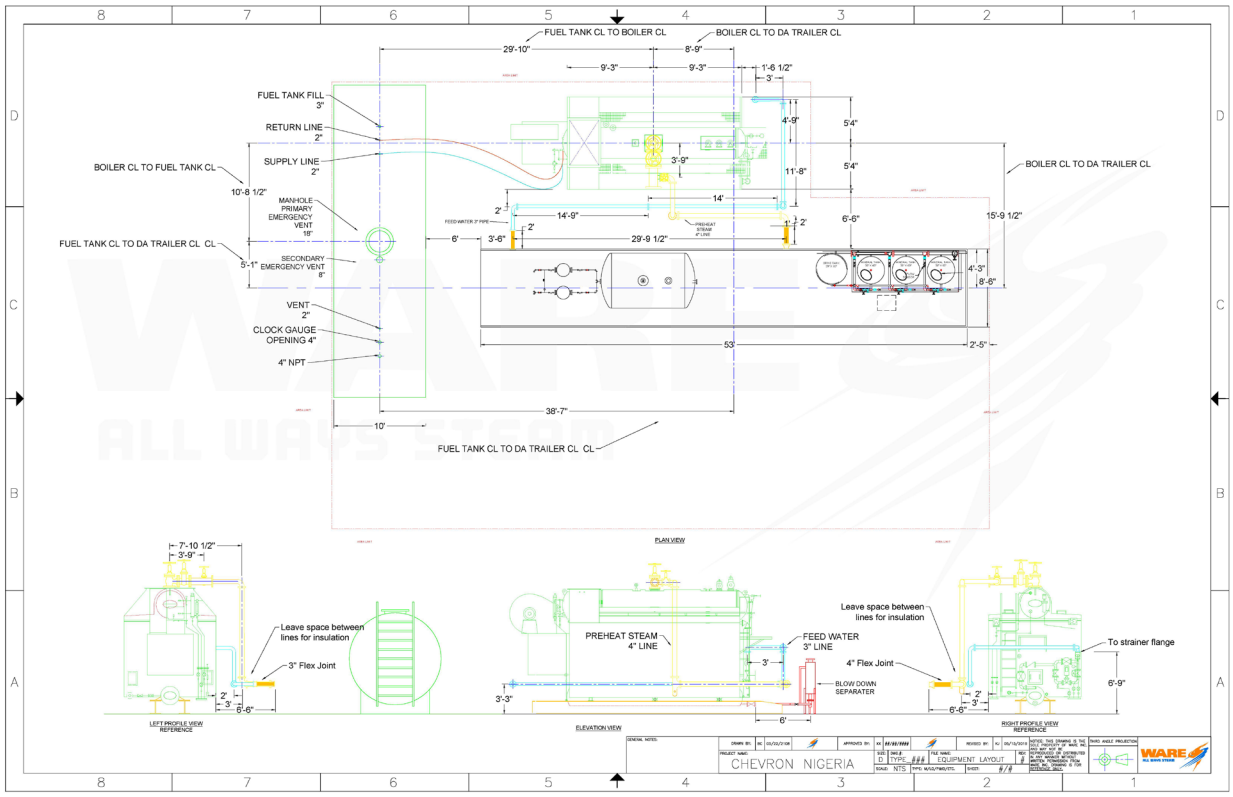
Below is a brief check list covering typical items frequently overlooked during the installation process. These items can cause start-up delays and extra expense to you.

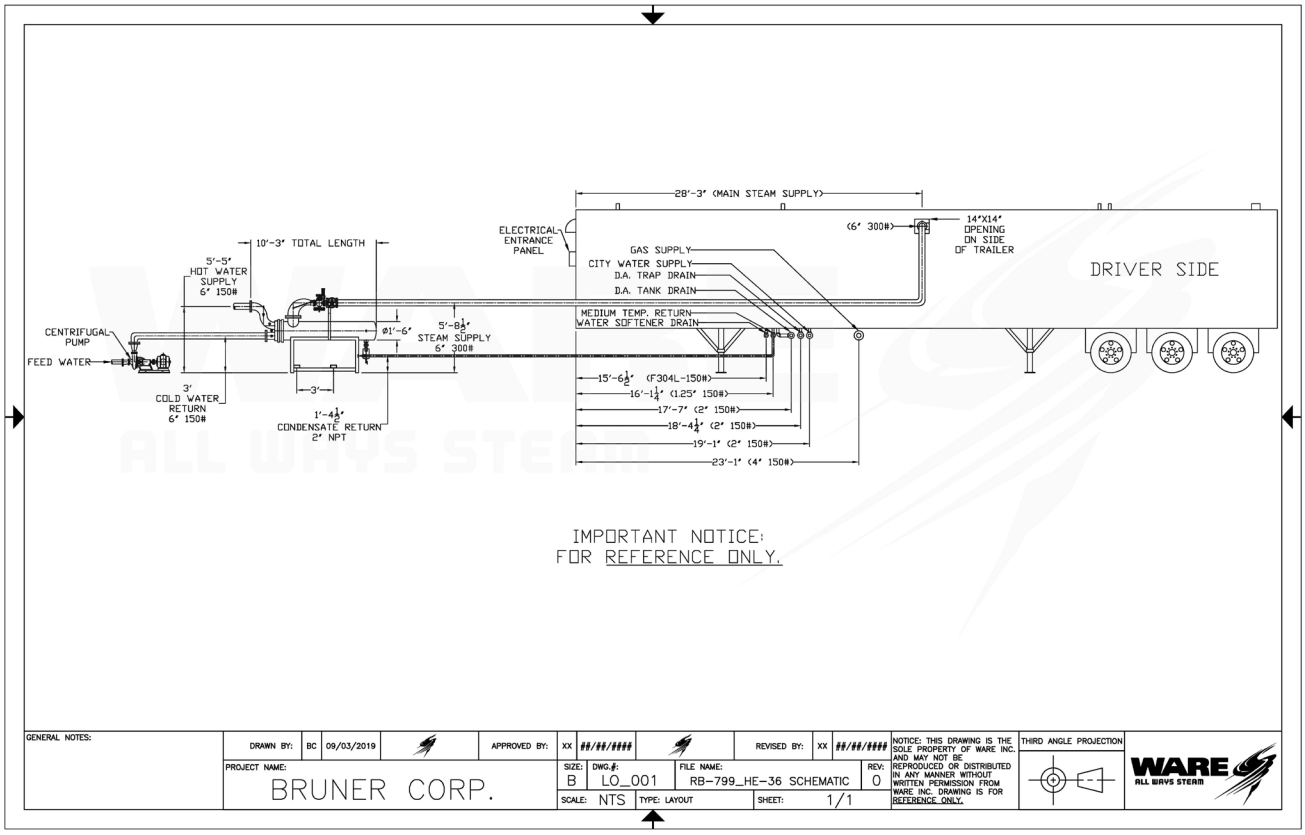
- ☐ Has the equipment been blocked and leveled?
- ☐ Has gas or oil supply piping been checked for ample pressure and capacity, regulators installed, (including strainers) and lines cleaned?
- ☐ Have arrangements been made for boiler chemicals and a feed water treatment consultant notified?
- ☐ Is ample electrical capacity (voltage/amperage) available and has it been checked?
- ☐ Has water supply piping been checked for capacity and pressure?
- ☐ Have inclement weather protection issues been addressed? (Rain, freezing temperatures, stack cover during boiler outages)
- ☐ Have provisions been made for venting or utilizing full load steam during startup?
- ☐ Has the appropriate boiler inspector been notified for operating permits?
- ☐ Are there any emission permit requirements?
- ☐ Are the equipment blowdown and drain lines piped to a safe location?

Boiler Connection Schematics






FUEL TANK CL TO BOILER CL
BOILER CL TO DA TRAILER CL
FUEL TANK FILL 3"
RETURN LINE 2"
SUPPLY LINE 2"
BOILER CL TO FUEL TANK CL
MANHOLE PRIMARY EMERGENCY VENT 18"
FUEL TANK CL TO DA TRAILER CL CL
SECONDARY EMERGENCY VENT 8"
VENT 2"
CLOCK GAUGE OPENING 4"
4" NPT
FUEL TANK CL TO DA TRAILER CL CL
PLAN VIEW
Leave space between lines for insulation
3" Flex Joint
PREHEAT STEAM 4" LINE
FEED WATER 3" LINE
BLOW DOWN SEPARATER
4" Flex Joint
To strainer flange
LEFT PROFILE VIEW REFERENCE
ELEVATION VIEW
RIGHT PROFILE VIEW REFERENCE
CHEVRON NIGERIA
EQUIPMENT LAYOUT


28'-3" (MAIN STEAM SUPPLY)
10'-3" TOTAL LENGTH
ELECTRICAL ENTRANCE PANEL
(6" 300#)
14"X14" OPENING ON SIDE OF TRAILER
DRIVER SIDE
5'-5" HOT WATER SUPPLY 6" 150#
GAS SUPPLY
CITY WATER SUPPLY
D.A. TRAP DRAIN
D.A. TANK DRAIN
MEDIUM TEMP. RETURN WATER SOFTENER DRAIN
CENTRIFUGAL PUMP
FEED WATER
Ø1'-6"
5'-8½" STEAM SUPPLY 6" 300#
3" COLD WATER RETURN 6" 150#
1'-4½" CONDENSATE RETURN 2" NPT
15'-6½" (F304L-150#)
16'-1¼" (1.25" 150#)
17'-7" (2" 150#)
18'-4¼" (2" 150#)
19'-1" (2" 150#)
23'-1" (4" 150#)
IMPORTANT NOTICE:
FOR REFERENCE ONLY.
GENERAL NOTES:
DRAWN BY: BC 09/03/2019
APPROVED BY: XX ##/##/####
REVISED BY: XX ##/##/####
PROJECT NAME: BRUNER CORP.
SIZE: B DWG.#: LO_001 FILE NAME: RB-799_HE-36 SCHEMATIC REV: 0
SCALE: NTS TYPE: LAYOUT SHEET: 1/1
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THIRD ANGLE PROJECTION
WARE ALL WAYS STEAM

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