Plot a graph of the Supply Water Temperature vs. Outdoor Temperature for the Heating Curve selected on your system. To plot the graph you need to know the following :

1. The Supply Water Temperature at Outdoor Design Temperature. (The maximum temperature allowed through floor – normally 130˚F/54˚C). This can be found from the Heat Curve (normally 0.6) for the 30354 Indoor/Outdoor controller as per Figure 1, or use the value entered for 31320 Indoor Controller, see next page for an example.
2. The Outdoor Design Temperature (the coldest outdoor temperature for a normal winter) This can be found from the Heatloss calculations)
3. The Warm Weather Shut Off. This can be found on settings for 30354 controller (Occupied Setting as per Figure 1) or the value entered on the 31320 controller – normally 70˚F (21˚C).
4. The Temperature Difference at design temperature – normally 20˚F (-7˚C). This can be found on the Heatloss calculations.

Please see next page for example on how to draw the graph (Figure 3).

Example for 30354 Indoor/Outdoor

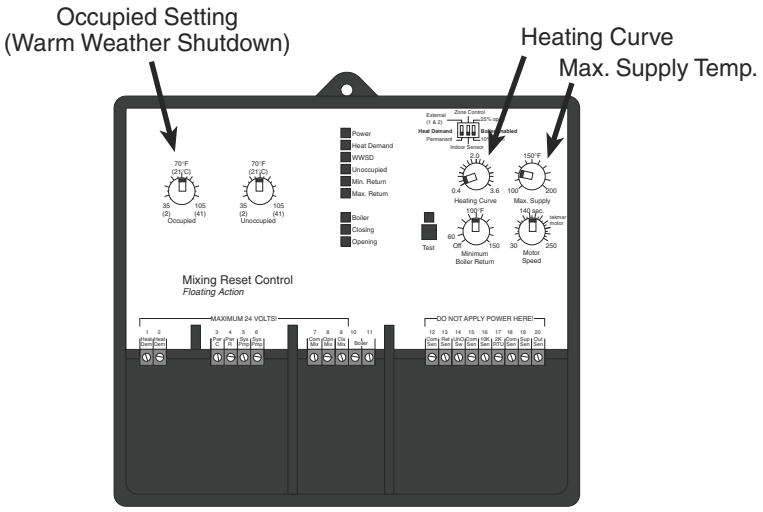


Figure 1. 30354 Controller

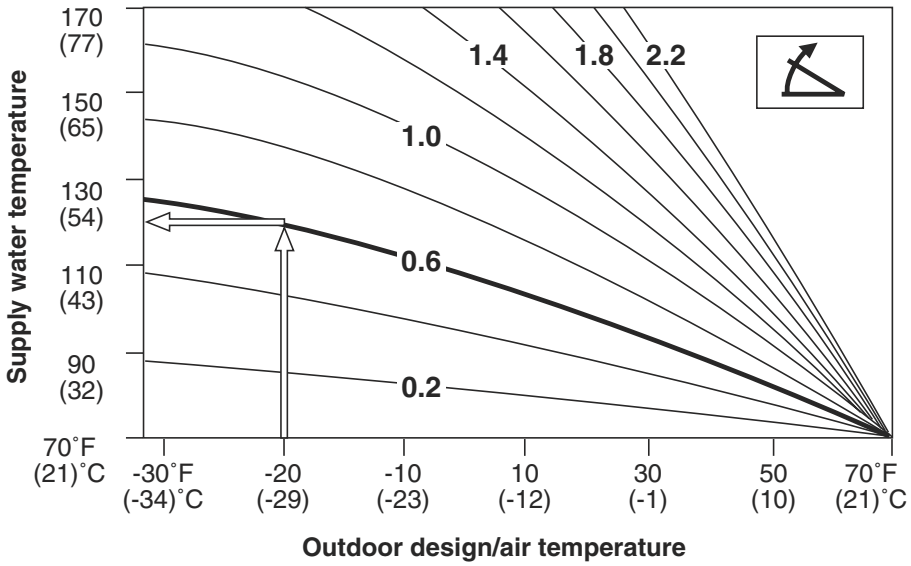


Figure 2. Typical Heating Curve

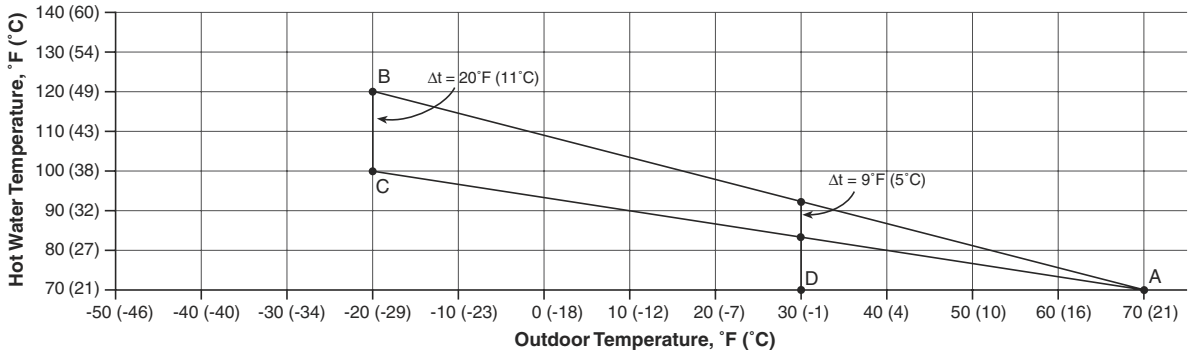


Figure 3. Water Temperature vs. Outdoor Temperature showing approximate temperature difference

Controller

From Figure 1, Heat Curve = 0.6
Outdoor Design Temperature = -20°F (-29°C) (eg. Lethbridge, Alberta)
From Figure 2, Max Supply Water Temp = 120°F (49°C)

Plotting Graph
- Point A = Warm Weather Shutdown (Occupied Setting) = 70°F (21°C)
- Point B = Max Supply Temp = 120°F (49°C)
- Point C = Max Supply Temp - ΔT = 120 – 20 = 100°F (49 – 11 = 38°C)
- Point D = Outside Temperature at Outdoor Sensor during balancing = 30°F (-1°C)
- Therefore ΔT for that day = 9°F (5°C)

Once you have drawn the graph you then measure the outdoor temperature where Outdoor Sensor is located or you can look it up on the 31320 controller display.

From this temperature (Point D in Figure 3) you draw a line vertically from that point to where it meets the 2 lines originating at the Warm Weather Shutoff Point. The difference in temperature between these 2 lines is the difference you require at the manifolds.

To achieve the balancing you need to adjust the flow settings on each of the manifolds until the temperature on the return pipe from the floor is the same. To do this you must start with the room with the largest heatloss and longest loop length. This should be set at Setting 12. Shut off the rest of the loops and then open the next module and adjust the setting on the module until it is the same return temperature as the first loop. Leave the module at that setting and open the next module and adjust its setting to get the same return temperature. Repeat this for all modules on that manifold.

Repeat this process at each manifold. When this has been done, go to the manifold which is furthest away from the mixing device and adjust the balancing valve at the manifold until the temperature drop is the equal to the temperature difference from the graph at the Outside Temperature. Leave the valve at this setting and repeat for the other manifolds.

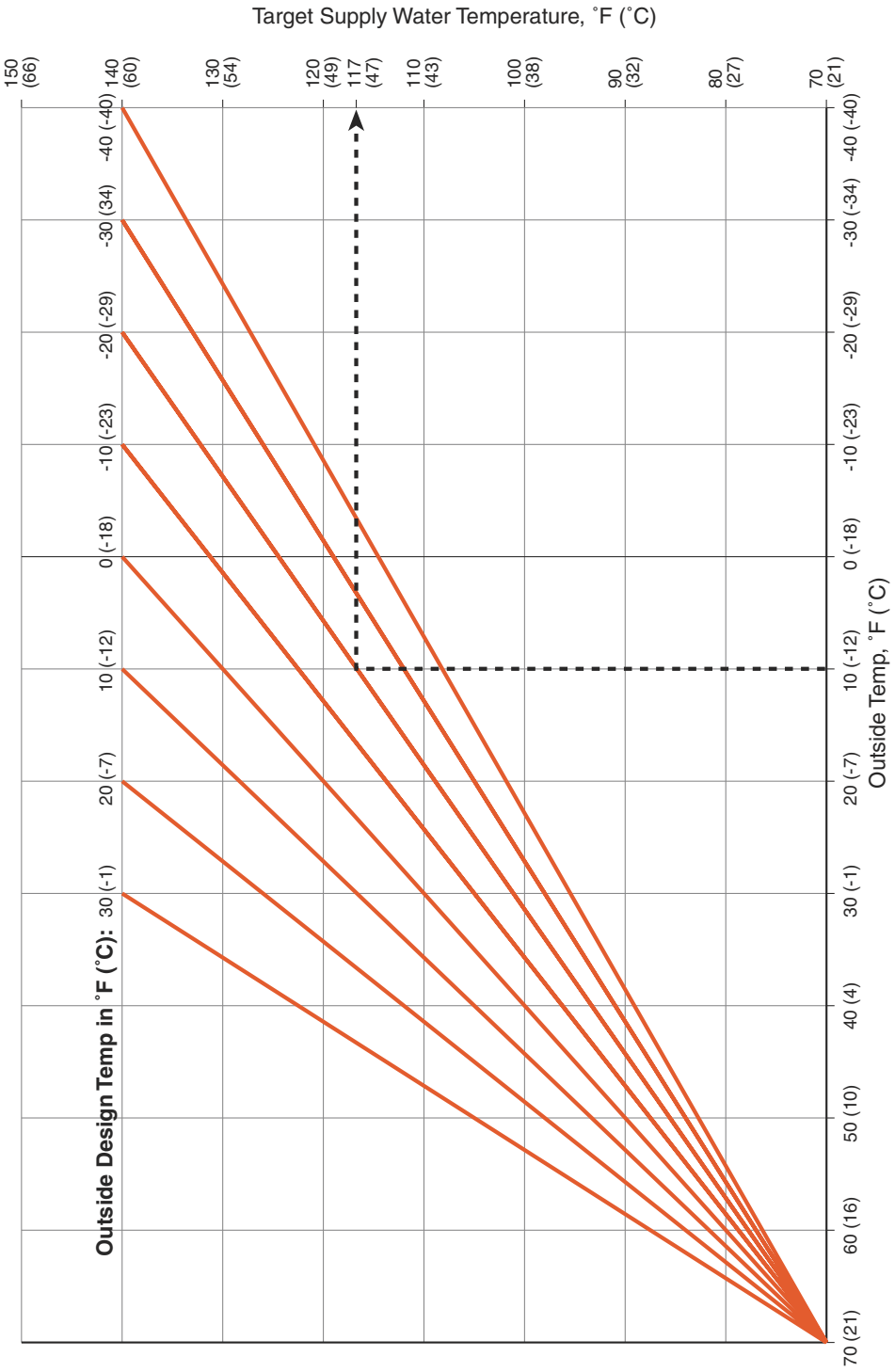


Figure 4. Calculating target supply water temperature

To find the target temperature for a 31320 controller:
1. Select the appropriate heat curve for your location (according to the outside design temperature).
2. From the controller check the current outside temperature.
3. Draw a line from the current outside temperature to where it intersects the heat curve for your location.
4. Draw a line horizontally to read the target water temperature for these conditions.

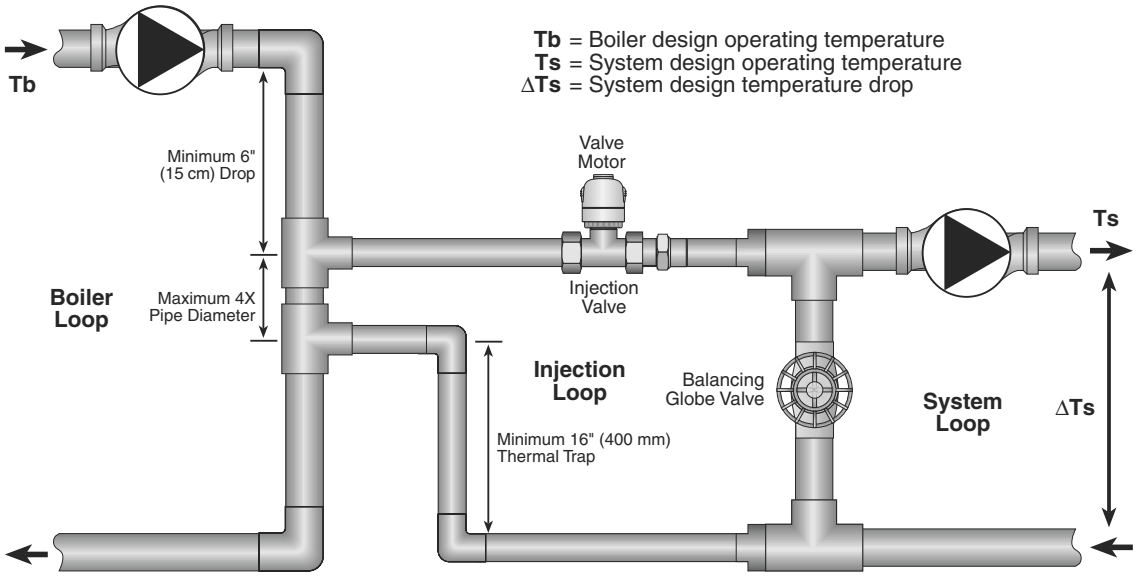
Example:
Outside design temperature = -20˚F (-29˚C)
Current outside temperature = 10˚F (-12˚C)
Target supply water temperature = 117˚F (47˚C)

Setting up 31320 controller injection system

1. Ensure the slab is up to temperature before setting the balancing valve for the injection circuit.
2. Ensure boiler is at operating temperature
3. Create heat demand situation at the controller by turning up thermostats or opening window etc.
4. Calculate the target supply water temperature using Figure 4 on the previous page
5. Remove the motor from the injection zone valve
6. Ensure there are some wild loops in the system so the mixed water is being cooled.
7. Fully close the balancing globe valve and gradually open the balancing valve until you obtain the target supply water temperature. The supply water temperature can be read on the controller display.
8. Replace motor on injection zone valve and remove handle from the balancing valve.

The following items are essential for creating a balanced system

1. The bypass pipe size must always be larger than the injection loop pipe size.
2. You must always use a globe valve for balancing.
3. The pressure drop across the injection loop should be as low as possible. This is achieved by ensuring that the distance between the flow and return on the injection loop are no more than 4 pipe diameters apart and that the injection loop is perpendicular to the boiler and system loops.
4. There should always be thermal drop on the injection loop return.



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