

## Do's & Don'ts For One-Pipe Steam Systems

We have been asked numerous questions about all types of steam systems over the years. The subjects range from what causes water hammer in steam systems, to the proper sizing of traps and pressure reducing stations, to selecting boiler feed tanks and condensate pumps. The following is a list of some common "do's" and "don'ts" when working on a one-pipe steam system.

**DON'T** size a replacement boiler by using the heat loss calculation method, the label method, the "looks a lot like" method or any other rules of thumb method.

**DO** size a replacement boiler by counting all of the radiation in the house. The total becomes the Net EDR (equivalent direct radiation) rating of your replacement boiler. Steam doesn't care about heat losses—or anything else—except the amount of cold metal attached to the boiler. If the boiler is too small, part of the building will never heat. If it is too big, the new boiler will short cycle like mad, consume bodacious amounts of fuel and create service calls.

**DON'T** assume that you can pipe the boiler exactly the same way as the old boiler.

**DO** pipe the boiler according to the instructions from the boiler manufacturer. New boilers are very different from older boilers. The sections are narrower, the exit holes are smaller and there are fewer of them, and the steam chest is almost non-existent. So pipe them according to the directions and you will save yourself a lot of headaches.

**DON'T** just throw in a couple of bottles of cleaning chemicals when you are finished piping the new boiler.

**DO** skim the boiler according to the boiler manufacturer's instructions. Oil from the foundry as well as the cutting oils used out in the field will create surface tension on the top of the water in the boiler.

This sets up a foaming/priming condition that creates very wet steam. The results are water hammer, lack of heat and unhappy customers.

**DON'T** use small radiator vents as end-of-main vents! Worse, don't use a pipe plug.

**DO** use the largest main vents that you can get. By venting the air from the main separately and quickly, you will significantly improve the balance of the system. By using a large vent, the steam will head toward the end of the main before it starts filling the risers. This provides balance to a one-pipe system.

**DON'T** size the horizontal run-out to a one-pipe riser based on the inventory method of pipe sizing.

**DO** use a steam pipe-sizing chart that tells you the exact pipe size needed to support the amount of radiation connected to that riser. The pipe that connects the steam main to an up-feed riser is called a horizontal run-out. Its job is to simultaneously supply steam to the riser while allowing condensate, which is coming back from the radiators, to gravity drain back into the steam main. If the steam is moving too fast, the condensate won't be able to drain back into the main: instead, the steam will drive it towards the radiator vents.

**DON'T** use adjustable vents on radiators based upon the radiator's location.

**DO** use adjustable vents based upon the size of the radiator. When coal fired systems were converted to oil or gas, they found the system operated differently. To adjust to this new "on & off" type system, they had to balance the air venting of

the larger radiators versus the smaller radiators. It had nothing to do with the location of the radiator. That problem was eliminated by installing at least one large-capacity main vent at the end of each main. Then the adjustable vents would simply control the venting rate of the larger radiators compared to the smaller radiators.

**DON'T** raise the setting of the pressuretrol, thinking it will solve a heating problem!

**DO** keep the pressuretrol or vaporstat set as low as possible because:

■ Low pressure steam moves faster than high-pressure steam. If you want the steam to reach the end of the main quickly, lower the pressure and make sure you install a large capacity main air vent.

■ All radiator vents have a "drop-away" pressure rating. This is the maximum pressure that the float inside the vent can fall down against, re-opening the vent. If the pressuretrol setting is too high, once the vent closes it won't be able to re-open to vent any remaining air in the radiator.

■ One-pipe steam radiators were sized to heat the house on the coldest day of the year with less than 1 psi of steam. For every square foot of EDR, the radiator will emit 240 BTU/H when the room temperature is 70°F and the steam temperature is 215°F.

*If you have any questions regarding steam systems, please contact your local Hoffman Specialty/McDonnell & Miller representative. Your Steam Team representative has been thoroughly trained in the art of steam heating.*

**Compliments of:**