



SERVICE PROFILE

Steam Blowing

Steam Blowing

Steam lines are blown prior to starting up a new unit to remove any foreign matter that may be remaining in the equipment and steam piping after erection is completed. If such foreign matter were allowed to enter the plant steam system during operation, considerable damage could result.

Debris

As mentioned, construction debris left in piping can cause severe damage to the equipment and instrumentation downstream (e.g., turbine blades, control valves, etc.). In

addition to “regular” construction debris—weld slag, sand, oil, dust, and rust—steam piping also contains a layer known as mill scale.

Theory

During steam blowing, the piping is blown with enough velocity to ensure it will experience sufficient cleaning force for adequate removal of debris and scale. Typically, during the steam blow, the force of the steam is at least 20% higher than would be experienced for all plant operating conditions ($CFR \geq 1.2$). Thus, any potentially damaging particles will be blown out of the piping prior to plant operation.



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The CFR of a particular design is calculated using the following formula:

$$CFR = \frac{\dot{q}_c^2 \times U_c}{\dot{q}_o^2 \times U_o}$$

Where: \dot{q}_c = mass flow rate of the steam during cleaning
 \dot{q}_o = design mass flow rate during normal operations
 U_c = Specific volume of the steam at pipe inlet during the cleaning
 U_o = Specific volume of the system fluid at the pipe inlet during normal operations

HP (Cyclic) Blow Method

In the cyclic blow method, the boiler is fired to gradually pressurize the system until a predetermined pressure is reached. Once achieved, a quick-opening valve is opened and the contained steam is released directly into atmosphere through the temporary piping and silencer; a transonic velocity is applied with a high mass flow rate. In order to employ the cyclic blow method, temporary piping has to be properly engineered, including stress analysis calculations.

LP (Continuous) Blow Method

The low-pressure steam blow technique has become standard practice for cleaning most steam system circuits. This method requires the steam generators to be continuously fired to generate steam velocities exceeding the velocities generated during normal plant operations. To control pre-determined steam conditions at the piping inlet, an orifice plate or sacrificial valve is used. The LP continuous blow method is used for both targeted and service steam blows.

Cleanliness

In order to provide a quantitative measure of system cleanliness, a technique of detecting particles in the steam exiting the blow is used. The emerging steam is monitored for particles by quantifying impacts on a polished metal plate commonly known as a target. Guidelines state the allowable quantity and size of particle impacts on the target.

Engineering

FourQuest Energy optimizes pipe cleaning with its quality engineering and by utilizing the best equipment available. Excellent coordination and logistics, as well as close involvement with other workers, can prevent space and equipment conflicts and the potential need for re-work. Determining pipe sizing and design, pipe routing, steam conditions, noise level, thermal cycling, water quenching, and condensate generation are all factors that—with our proper planning—will ensure a successful steam blow operation.



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