JONAS, Inc.

Specializing in Sampling of Water, Steam and Industrial Gases

1404 S. Main Chapel Way
Suite 104, BX405
Gambrills, MD 21054, USA
Phone: (301) 934-5605
Fax: (301) 934-5606
Email: jonasinc@steamcycle.com
Web: www.steamcycle.com

Jonas, Inc. Procedure No. 010700-01 Rev. 06/21

DESIGN, INSTALLATION, AND OPERATION OF JONAS, INC. ISOKINETIC SAMPLING SYSTEMS

The Isokinetic Sampling Nozzles for steam, water, and other fluids are isokinetic when the flow velocity into the Nozzle tip is the same as the flow velocity in the pipe in which the fluid is sampled, at the tip location. When the pipe flow changes, the sample flow may need adjustment.

1. Each nozzle is designed with considerations of vortex shedding, resonance vibration, erosion, and strength of the attachment to the pipe, conforming to the ASME rules. The Nozzles are designed for the plant operating conditions specified by the buyer. Nozzle design and material selection is approved by the buyer or user prior to fabrication. Design drawings, design reports, and material test reports for each Nozzle are provided to the user or buyer in the Documentation. All pressure retaining Nozzle welds are inspected visually and by dye penetrant testing. All valves supplied by Jonas, Inc. are leak tested by their manufacturer.

   The installer or user should not modify the Nozzle design, installation, or operation without Jonas, Inc. written approval.

2. **Weld-in Nozzle:** For specific instructions regarding weld-in Nozzles, refer to Procedure No. 010700-02, “Welding of Jonas, Inc. Sampling Nozzle using Class 6000 or Class 9000 Weld Boss”, or Procedure No. 010700-03, “Welding of Jonas, Inc. Sampling Nozzle with Integral Boss”.

3. **Flanged Nozzle:** Ensure the gasket surface of the mating flange is parallel to the pipe. The hole in the flange and the hole in the pipe must have the same centerline, which must be perpendicular to the gasket plane of the flange; otherwise, damage to the Nozzle may occur during installation.

4. The installation of the Sampling Nozzle is the responsibility of the user, and should be done in accordance with all applicable Codes and Procedures. The mechanics and welders installing the Nozzles should be qualified.

5. After installation, the pipe attachment – nozzle – isolation valve assembly should be hydrotested prior to service in accordance with all applicable Codes and Procedures.

6. Whenever possible, it is recommended that the Nozzle be installed after any steam or air blow is performed to prevent damage to the Nozzle.

7. For superheated steam applications, it is not recommended to install the Nozzle in locations where the steam temperature is not at least 100F above the saturation temperature.

8. It is not recommended to install the Nozzle immediately after desuperheaters, in locations where there are large temperature changes, or where there is high carry-over of sodium hydroxide. Where these conditions exist, there should be more frequent inspection of the Nozzle, valves, and welded tubing up to the primary cooler. If installed downstream of desuperheating sprays, the Nozzle location should be far enough downstream where complete mixing has occurred. In units that have experienced cracking of steam piping, the root cause of the cracking should be considered in the Nozzle design and material selection.

9. Thermal Insulation – Except for Nozzles installed in low temperature, uninsulated pipes, the Nozzle attachment (including weld boss and Nozzle-to-boss weld, if applicable) and tubing up to the primary cooler should be thermally insulated.

10. The preferred location for the installation of the Nozzle is in long vertical sections of the pipe, away from all flow disturbances (bends, valves, etc.). Ideally, the Nozzle should be at least 35 pipe internal diameters downstream and 4 pipe diameters upstream of any flow disturbances. If this is not possible, place the Nozzle in such a position that the ratio of its distance from the upstream disturbance to the downstream disturbance is about 9:1. If a long vertical section of pipe is not available, the Nozzle may be installed in a long horizontal section in the 10 to 2 o=clock position. **THE NOZZLE OPENING SHOULD FACE UPSTREAM**.

11. The selection of the isolation valves should ensure that there is a minimum change of cross-section between the bore of the Sampling Nozzle and the orifice of the valve. The valves should also provide minimum restriction to sample flow.
12. The length of sample line between the Nozzle and the primary cooler (where used) should be as short as possible (not longer than 20 ft.) to minimize the pressure drop and reduce the possibility of impurity deposition in the sample line. The ID of this sample tubing should be as close to the Nozzle bore size as possible to minimize changes in cross-sectional area.
13. The sample tubing should form a coil (see Figure 1) or a series of bends after the isolation valves, to allow for any movement or expansion of the pipe.
14. At the isokinetic sampling rate, the size of the condensed sample line after the cooler should be selected to obtain a minimum flow velocity of 5 to 6 ft/sec (turbulent flow) in the sampling line. This will reduce the possibility of impurity deposition in the sampling line. Typically the required tube size after the primary sample cooler is ¼ inch OD, 0.049 inch wall thickness 316 SS tube.
15. There should be at least 6 hours of isokinetic sample flow to stabilize the sampling system before taking a sample for analysis. Continuous flow is preferred.
16. Because of the required small sizes of the Nozzle bore and valves, the valve closing and opening must be done without excessive force and bending of the assembly must be avoided. When first in use, check for leaks, vibration, valve closing and opening, and personnel safety issues.
17. The Nozzle, boss or flange, valves, valve connecting pieces, tubing, and all welds should be periodically inspected for cracking, and other forms of damage. For sampling wet steam and liquid water, the piping section after the Nozzle should be periodically inspected for thinning by flow-accelerated corrosion (erosion-corrosion) and for installations sampling liquid water also for cavitation.
18. For steam cycles where steam is contaminated with sodium hydroxide or chloride, inspection for cracking, particularly in the weld areas should be performed more frequently.
19. Periodic cleaning of the cooling water side of the coolers may be required to maintain proper heat transfer. The frequency of cleaning depends upon the scaling properties of the cooling water.

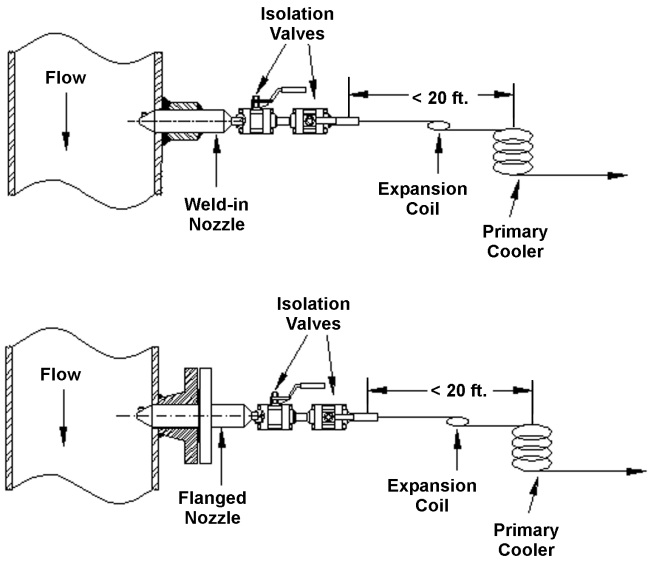

Figure 1. Installation of weld-in Nozzle (top) and flanged Nozzle (bottom)