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9. SONICAIR NOZZLE

9.1 DESCRIPTION (REFER TO FIGURE 9.1)

The Sonicair nozzle consists of a single part. Air and liquid ports and a cartridge heater cavity are located on the top of the nozzle. The discharge tip is located on the bottom of the nozzle.

Sonicair nozzles are made of stainless steel and are available in a variety of bore and end cap sizes/configurations. Handle the nozzles carefully to avoid damage. Depending on IVEK Part Number the nozzle follows these specifications:

Part Number	Length (Overall)	Width	Thick
142644	122.9mm (4.83”)	31.5mm (1.24”)	9.53mm (0.37”)
142658	123.2mm (4.85”)	31.5mm (1.24”)	9.27mm (0.36”)
350001	45.7mm (1.8”)	31.5mm (1.24”)	9.53mm (0.37”)
350024	107.18mm (4.21”) Tab ##1# 53.3mm (2.09”) Tab ##2#	31.5mm (1.24”)	9.27mm (0.36”)
350026	211.3mm (8.31”)	31.5mm (1.24”)	9.27mm (0.36”)

9.2 OPERATION

Sonicair nozzles atomize liquids into a uniform spray pattern. The rate of liquid discharged is controlled by the IVEK Pump Module used to provide liquid to the nozzle.

Sonicair nozzles are available in a variety of insert and end cap sizes to best meet the customer's needs. (Nozzles and tubing are an important part of the dispensing system and must be considered when the system is being designed.)

9.2.1 Spray Pattern

The droplets of the spray created by the Sonicair typically range in size from 5-50 microns. Droplet size can be affected by liquid characteristics such as temperature, viscosity and surface tension. There are a number of factors that can help change the spray pattern; among these are nozzle temperature and rate of liquid and air flow provided to the nozzle. The Sonicair typically produces a conical spray pattern.

The insert size and end cap size also affect the spray pattern provided by the nozzle. Refer to section 9.8 for the insert and end cap options.

For Part Number 350001: The insert is available with either a thru hole or a counter drilled hole. The thru hole style insert is the specified diameter all the way through the insert. The combinations of the insert size, insert type and end cap size determine the coverage characteristics. Refer to section 9.8 for the insert and end cap options. Figure 9.2 illustrates the different insert types.

9.2.2 Filtration

Some liquids may require filtration prior to pumping them through the IVEK Sonicair nozzle.

9.3 INSTALLATION

The Sonicair nozzle must be supplied with compressed air (or other gas) filtered to at least 5 micron maximum particle size.

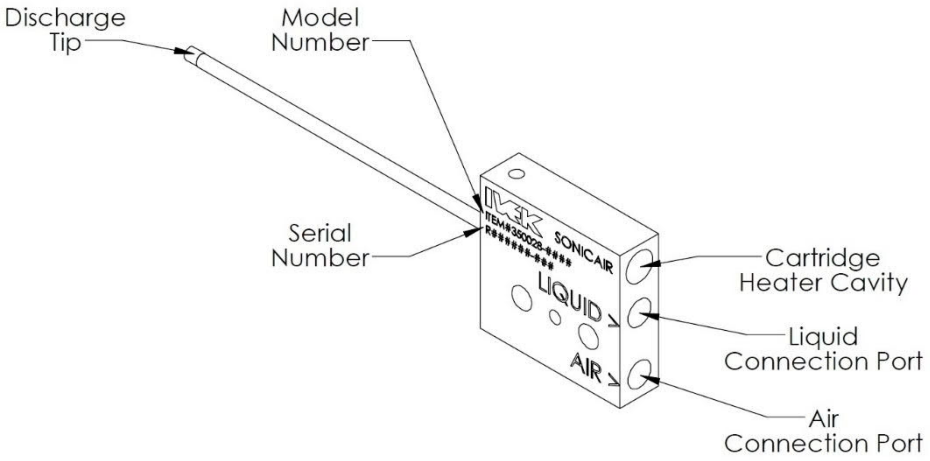

Figure 1: Typical Sonicair Nozzle configuration

The air supply should be pressure regulated from 0.21 -2.1 Bar (3-30 psi) depending on the application. 1/8" O.D. air supply tubing can be connected to the Sonicair port hole labeled 'AIR' using a 1/4 - 28 flangeless ferrule and nut fitting.

9.3.1 Priming The Nozzle

After the liquid supply tubing is primed and there is no air in the line connect the tubing to the nozzle and turn on the atomization air supply. Make sure that there is air flowing through the nozzle. *If there is no airflow or restricted airflow the liquid can migrate up the airline and produce residual atomization.* This is known as "flooding" the nozzle.

If heating of the nozzle is necessary, activate the heater controller. The temperature of the nozzle should be regulated between 93°C and 120°C (200°F and 250°F).

Prime the Sonicair nozzle with a liquid flow rate not exceeding 25 microliters per second.

The purpose of priming the nozzle with a low flow rate is to prevent flooding of the atomization chamber which may lead to residual atomization.

9.4 OPTIONS

9.4.1 Heating (Refer to figure 9.2)

WARNING

The thermocouple must be securely fastened to the heated device. Failure to do so may cause the device to overheat.

The heater and heated device get very hot. Special care should be taken when handling these devices.

Fittings and tubing used in heated applications should be capable of withstanding temperatures of 125° C (250° F). IVEK recommends the use of fittings made from PEEK and PFA Teflon or Tefzel tubing. If your application requires heating of the nozzle; inserts heater cartridge, insert stainless steel tubing assemblies, and attach a thermocouple to the Sonicair device. Secure the heater cartridge to the Sonicair nozzle using the heater cartridge clip. The heater cartridge should be 6.35mm [0.250"] OD and 35 mm [1.375"] long. The thermocouple should be attached to the device with a #6 - 32 screw and washer. Refer to Chapter 11 for information relating to the heater components.

CAUTION

The Stainless Steel Adapters must be torqued to 0.34 to 0.45N-m (3 to 4in-lbs). Exceeding torque specification can permanently damage internal components.

NOTE

If this torque specification is expected to be exceeded due to installation constraints, consider a Sonicair Nozzle with the dowel pin option. Please contact IVEK Corporation for additional information.

9.4.2. Dowel Pin

For part numbers starting with 350001, a pin can be inserted through the Sonicair nozzle body to help keep the cannula in position. This is recommended when the tightening torque of a liquid connection fitting is expected to exceed 0.34 to 0.45N-m (3 to 4in-lbs). The dowel pin increases the fitting torque allowance by approximately 50%.

9.5 MAINTENANCE

Liquid containing certain dissolved components (e.g. proteins) should not remain in the nozzle for extended periods of time. Contact IVEK Corporation for more information.

9.5.1 Cleaning

In most situations a Sonicair nozzle can be adequately cleaned by flushing it with an appropriate cleaning solvent followed with a clean water rinse.

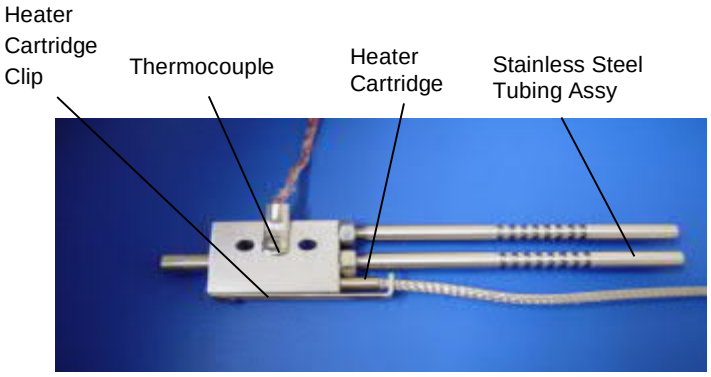

Figure 9.2 Heated Sonicair Nozzle Setup

If you have questions about cleaning procedures with regards to your specific application, contact IVEK Corporation. To remove a blockage:

1. Loosen the material blocking the nozzle using a cleaning wire.0254mm (,001") smaller than the inside diameter of the nozzle, end cap or insert (whichever is smaller). Enter the nozzle from the outlet side (end cap) of the tip.
2. Backflush the nozzle with the tip immersed in an appropriate liquid to remove any materials that have been dislodged.

Part #	**Description**
192780-01	Wire, Cleaning, Tungsten; .0030"
192780-02	Wire, Cleaning, Tungsten; .0039"
192780-03	Wire, Cleaning, Tungsten; .0049"
192780-04	Wire, Cleaning, Tungsten; .0027"

9.5.2 Storage

Make sure the nozzles are dry before storing in a safe dry location.

9.6 PROBLEM GUIDE

Table 9.1 contains a list of problems you may encounter in using the Sonicair nozzle along with possible causes and solutions.

9.7 SPECIFICATIONS

Nozzle Material: 316 Stainless Steel

9.8 MODEL NUMBER

The model number provides important information about the specifics of your Sonicair Nozzle. Refer to this number when calling IVEK Technical support. The model number for your Sonicair Nozzle is located in the Title Page section of this manual.

Model Number	**Tabulations**	**Tabulations**	**Tabulations**	**Tabulations**
142644	**##** **Cannula Insert Size** **1 – 0.25mm** **2 – 0.38mm** **3 - .050mm** **4 – 1.00mm C'Bore** **5 – 1.00mm Thru**	**##** **End Cap Size** **1 – 0.31mm** **2 – 0.46mm** **3 – 0.58mm** **4 – 1.08mm**		
142658	**##** **End Cap Size** **1 – 0.50mm dia. Orifice** **2 – 1.00mm dia. Orifice**	**##** **Cannula Insert Size** **5 – 0.50mm dia. Orifice** **6 – 1.00mm dia. Orifice**		

350001	**###** **End Cap Size** **1 – 0.25mm dia. Orifice** **2 – 0.38mm dia. Orifice** **3 – 0.50mm dia. Orifice** **4 – 1.00mm dia. Orifice**	**###** **Cannula Insert Size** **1 – C'Drilled 0.25mm dia. Orifice** **2 – C'Drilled 0.38mm dia. Orifice** **3 – C'Drilled 0.50mm dia. Orifice** **4 – C'Drilled 1.00mm dia. Orifice** **5 – Thru Hole 0.50mm dia. Orifice** **6 – Thru Hole 1.00mm dia. Orifice**	**###** **Dowel Pin** **0 – No Pin** **1 – Dowel Pin**	
350024	**####** **End Cap Size** **1 – 0.50mm dia. Orifice**	**####** **Cannula Insert Size** **1 – 0.50mm I.D. for 73.88mm** **2 – 0.50mm I.D. for 20mm**	**####** **Nozzle Length** **1 – 73.88mm** **2 – 20mm**	**####** **Future Use** **0 – N/A**
350026	**###** **End Cap Size** **1 – 1 mm dia. Orifice**	**###** **Cannula Insert Size** **1 – 0.5 mm dia. Orifice**		

9.9 ILLUSTRATED PARTS BREAKDOWN

The Sonicair Nozzle has no replaceable parts. Please contact IVEK Sales for information on ordering replacement Sonicair Nozzles. The following optional parts are available as shown in Figure 9.2.

Part #	Description
142559-01	Retainer, Heater Cartridge, Sonicair; 46mm Long, 2mm Slot
142559-03	Retainer, Heater Cartridge, Sonicair; 49mm Long, 2mm Slot
810008-051R	Thermocouple, Type "T" Wshr, W/ Connector; 5 Ft, #6
810008-101R	Thermocouple, Type "T" Wshr, W/ Connector; 10 Ft, #6
810008-171R	Thermocouple, Type "T" Wshr, W/ Connector; 17 Ft, #6
800011-1	Heater Cartridge, 0.25" Dia. x 1.375" Length, 120VAC, 100W
800011-2	Heater Cartridge, 0.25" Dia. x 1.375" Length, 240VAC, 100W
800082-01	Heater Cartridge, 0.25" Dia. x 1.50" L; 120V, 100W, 14", Gnd
800082-02	Heater Cartridge, 0.25" Dia. x 1.50" L; 240V, 100W, 14", Gnd
142696	Fitting Adaptor Assembly Ex. Heated, Sonicair Nozzle

NOTE

Use Heater Cartridge Retainer Item # 142559-01 with Heater Cartridge Item Numbers 800011-1 and 800011-2.
Use Heater Cartridge Retainer Item # 142559-03 with Heater Cartridge Item Numbers 800082-01 and 800082-02.

Table 9.1 Common Operational Problems And Solutions

PROBLEM	PROBABLE CAUSE	POSSIBLE SOLUTION
Residual Atomization	The temperature at the nozzle is too high.	Reduce temperature setting or confirm thermocouple connection
	Air is entrapped somewhere in the output line.	Remove nozzle and purge air from line. Replace pump to nozzle tubing with a rigid wall tubing.
	Liquid has migrated into the air chamber and/or the air line.	Soak nozzle in cleaning liquid or Change air line
Liquid foaming at the nozzle	Liquid is not degassed properly.	Degas liquid
Inconsistent Atomization exiting the nozzle	Liquid is not degassed properly.	Degas liquid
Inconsistent Atomization exiting the nozzle	Sonicair air pressure too low	Confirm air regulator is functioning
Inconsistent Atomization exiting the nozzle	Liquid temperature too low	Adjust temperature
	Nozzle temperature unstable	Confirm thermocouple connection and temperature setting
Inconsistant/Inaccurate dispenses or inconsistant Spray Pattern	Air entrapped in output lines.	Remove nozzle and purge air from line or Degas liquid
	Liquid has migrated into air chamber and/or the airline(flooded nozzle)	Change/Clean airline
		Soak nozzle in cleaning liquid
	Excessive back pressure in the outlet line.	Reduce airflow to the nozzle. This may contribute to a peristaltic effect which in turn produces oozing of material into the nozzle.
	Air in liquid	Degas liquid or Check fluid seals and fittings
	Nozzle temperature too low or unstable	Confirm thermocouple connection and temperature setting. Adjust if necessary
	Sonicair air pressure too high	Confirm air regulator is functioning. Adjust if necessary
Spray is concentrated on one side	Improper fixturing of the target and/or nozzle	Adjust fixturing
	Sonicair air pressure too low	Adjust air flow
	Nozzle temperature too low	Confirm thermocouple connection and temperature setting. Adjust if necessary
	Partially blocked orifice	Soak nozzle in cleaning liquid and check for particulates.
Liquid flowing back towards the pump	Excessive Sonicair pressure	Confirm air regulator is functioning. Adjust if necessary
	Nozzle orifice is blocked	Soak nozzle in cleaning liquid and check for particulates. **If none of the above solves the problem, contact IVEK technical support for assistance.**