OPERATION & SAFETY INSTRUCTIONS

HAZLOC VORTEX A/C

Models 7215, 7225, 7235, 7270, 7515, 7525, 7535, 7570
(Includes all BSP versions of models listed above)

IMPORTANT

Please read all instructions BEFORE attempting to use this product

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GENERAL SAFETY CONSIDERATIONS

WARNING: COMPRESSED AIR COULD CAUSE DEATH, BLINDNESS OR INJURY

1. Do not operate a HazLoc Vortex A/C at compressed air pressures above 100 psig (7 Bar).
2. Do not operate at compressed air temperatures above 120°F (49°C).
3. Avoid direct contact with compressed air.
4. Do not direct compressed air at any person.
5. When using compressed air, wear safety glasses with side shields.

WARNING! Explosion Hazard: Substitution of components may impair suitability for Class I Division 2.

Introduction

The Hazardous Location Vortex A/C ("HazLoc Vortex A/C") is designed to cool industrial control cabinets located in hazardous locations, using only filtered and dried compressed air to generate the cooling. The HazLoc Vortex A/C shall only be used in conjunction with a properly sized enclosure purge and pressurization system that must be able to vent the additional air introduced by the HazLoc Vortex A/C. (The purge and pressurization system must be selected and supplied by the end user.)

The cooling air produced by the HazLoc Vortex A/C in the enclosure is vented into the hazardous area (outside of the enclosure) through the purge system's spark arrestor vent. The spark arrestor vent must be properly sized to accept the additional cold air flow generated by the HazLoc Vortex A/C to prevent over-pressurization of the enclosure.

It is the end user's responsibility to ensure that the correct spark arrestor vent is used and that the purge system functions properly when integrated with the HazLoc Vortex A/C.

DO NOT operate the HazLoc Vortex A/C on a sealed and unvented enclosure as pressure in the enclosure will increase and damage or injury could result. The HazLoc Vortex A/C has a built-in mechanical thermostat(s) that requires no electricity.

Compressed Air Supply

The compressed air system's intake must originate in a non-hazardous area. Compressed air piping must be fabricated from noncombustible materials suitable for the conditions present. The pressurized air supply provided to the HazLoc Vortex A/C must be of the same quality as that used to purge and pressurize the enclosure it is installed on. Models 7270 and 7570 will require up to 70 scfm (1980 slpm) of compressed air at 90 to 100 psig (6 to 7 bar) when both stages of the unit are operating at full capacity.

The compressed air supply must be filtered (5 micron maximum) to remove water and dirt. For Models, 75xx, a 5 micron filter is supplied for this purpose (Vortec model 701S-24A, -36A or -40A). If oil is present in the compressed air supply, remove the oil using an optional 0.01 micron coalescing filter (Vortec model 701S-48 or 701S-54). If an oil removal filter is necessary, install it downstream of the 5 micron filter. Locate the filters in a non-hazardous location to facilitate easy filter element changes. Change the filter elements as needed (see Maintenance).

It is highly recommended to dry the compressed air (to remove water vapor) using a refrigerated air dryer. Failure to dry the air adequately may result in frost or ice forming internally and resulting in decreased cooling air flow and cooling capacity.

Supply compressed air to the HazLoc Vortex A/C with 3/8" schedule 40 pipe when the pipe length is less than 10 feet (3m). If pipe length exceeds 10 feet (3m) but is less than 30 feet (9m), use 1⁄2" pipe. If pipe length exceeds 30 feet (9m) but is less than 100 feet (30m), use 3⁄4" pipe. Use appropriate pipe adapter fittings when terminating the supply pipe at the HazLoc Vortex A/C. (The model 701S-40A compressed air filter that is supplied with the model 7570 has 3/4"-14 NPT ports. The model 703S-40A compressed air filter that is supplied with the 7570BSP has 3/4"-14 BSP ports.).

Maintenance

The only maintenance involved with the HazLoc Vortex A/C is normal element changes to the compressed air filter. The filter element should be changed when there is a decrease in performance or when pressure drop across the filter exceeds 5 psig (0.3 bar).

The compressed air supply to the unit must be shut off before changing the filter element. The compressed air filter should be located in a nonhazardous area so that normal filter element maintenance can be carried out without risk of hazardous substances entering the enclosure. If the compressed air filter must be located in the hazardous area, electric power to the enclosure must be shut off while performing filter maintenance and then routine purge system startup procedures should be followed when filter maintenance is complete and before power is applied to the enclosure.

The HazLoc Vortex A/C has only two moving parts (the mechanical thermostat/valve and the check valve) which are not serviceable in the field. Do not disturb the setting of the thermostat. Evidence of tampering with the thermostat may void the warranty.

If it is suspected that the compressed air filter has not been maintained after an extended period of operation, there may be pipe scale or foreign material in the HazLoc Vortex A/C. If the unit is not cooling sufficiently, there may be pipe scale or foreign material in the orifices of the generator(s) in the unit.

1. To check, shut off all electric power to the protected enclosure and follow any purge system shutdown procedures. Shut off the compressed air supply to the HazLoc Vortex A/C. Before opening the enclosure door, allow sufficient time for any internal components to cool down completely.
2. Detach the 5/8” (16 mm) ID vinyl tubing from the check valve assembly (assemblies, for dual units) and remove the check valve assembly (assemblies) from the cold air outlet fitting(s) of the HazLoc Vortex A/C.
3. Remove the brass cold air outlet fitting(s) from the bottom of the unit (with a 1” (25 mm) open end wrench).
4. Remove the O-ring(s). Then remove the red, blue or brown generator(s).
5. Inspect the six slots in each generator for foreign material and clean if necessary.
6. Clean the cavity in the HazLoc Vortex A/C that the generator(s) were located in if necessary.
7. Reassemble the generator(s), O-ring(s) and cold air outlet fitting(s) in reverse order. Tighten the cold air outlet(s) to at least 100 inch pounds (11 newton meters) torque.
8. Attach the check valve assembly (assemblies) to the cold outlet fitting(s) making sure the air flow through the check valve(s) are in the proper direction. Tighten all pipe connections securely. Reattach the 5/8” (16mm) vinyl tubing to the check valve outlet(s). Open the compressed air supply valve(s) to the HazLoc Vortex A/C. Follow purge system startup procedures before applying electric power to the enclosure.

Installation

To maintain the hazardous location rating, the HazLoc Vortex A/C MUST be installed in one of the following configurations on the enclosure (please refer to the HazLoc Vortex A/C Assembly illustrations):

a. Top mounted in an upright and vertical orientation, on a flat horizontal surface

b. Side mounted, on a flat vertical surface of the enclosure, the compressed air inlet pointing up on Models 7xx5, with the stainless steel shroud facing to the floor. For Models 7x70, when side mounted, the compressed air inlet must be pointing down, and the stainless steel shroud facing the floor. If side mounted, locate the Vortex A/C so that it is near the top of the enclosure.

1. The HazLoc Vortex A/C must be installed on the top of the enclosure on a flat horizontal surface of a Type 4X enclosure. Alternately, the HazLoc Vortex A/C can be mounted on the side of the enclosure. When the unit is side mounted (on a flat vertical surface of a Type 4X enclosure), the compressed air inlet for Models 7xx5 must be pointing up, and the stainless steel shroud must face down; and for Models 7x70 (dual unit), the compressed air inlet must be pointing down, and the stainless steel shroud must face down toward the floor.
   If side mounted, it is best if the unit is located near the top of the enclosure.
2. Find a location for the HazLoc Vortex A/C on your enclosure so that there is sufficient clearance for the internal mechanical thermostat(s) and cold air outlet(s) and check valve assembly (assemblies), and, so that the entire mounting “footprint” of the HazLoc Vortex A/C is supported by the enclosure. Position the unit so that the stainless steel shroud on the back of the unit is away from personnel, if possible. Also, position so that no internal enclosure components obstruct air flow around the mechanical thermostat(s). The HazLoc Vortex A/C should be located adjacent to the purge system’s spark arrestor vent. This will allow the mechanical thermostat(s) to sense temperature of the airflow exiting the vent and respond faster to the temperature changes in the enclosure.
3. Cut a 1 15/16" (49 mm) diameter hole (1 1/2" knockout size) for the single units, and two holes on 4” (102 mm) centers for the dual unit in the selected location of the flat horizontal (or vertical) surface of the enclosure. De-burr any sharp edges around the hole.
4. Remove the 1 1/2" electrical locknut(s) from the HazLoc Vortex A/C. Insert the threaded portion(s) of the HazLoc Vortex A/C into the 1 15/16" (49 mm) hole(s) in the enclosure. (Be careful not to damage the mechanical thermostat(s) during installation.)
5. From inside the enclosure, screw the 1 1/2" electrical locknut(s) onto the threads of the HazLoc Vortex A/C. Tighten the locknut(s) securely to compress the 1/8" (3 mm) thick sealing gasket(s) that are located between the enclosure surface and the HazLoc Vortex A/C.
6. Attach the Check Valve assembly (assemblies) to the cold air outlet(s) of the HazLoc Vortex A/C (3/8”-18 NPT thread) inside the enclosure. The Check Valve(s) can be attached to the HazLoc Vortex A/C with the supplied 3/8" NPT straight pipe nipple(s) OR with the supplied 3/8" NPT pipe elbow(s). The orientation of the Check Valve assembly is not important, it will function in any position, however, the airflow direction through the Check Valve(s) is important. Attach the Check Valve(s) so that the arrow on the Valve(s) point away from the HazLoc Vortex A/C. Suitability of the Check Valve(s), provided with the HazLoc Vortex A/C, to prevent air from leaking out from the purged and pressurized enclosure must be verified during installation.
7. Mount the Cold Air Muffler(s) inside the enclosure near the HazLoc Vortex A/C. (You will need a surface area of approximately 2" x 9" (50 mm x 230 mm) to mount each muffler.) (The Muffler(s) can be mounted in any orientation: horizontal or vertical.) Using the supplied Muffler Mounting Clamp(s) (with double sided tape), attach the Clamp(s) at the desired location(s). (Clean the mounting surfaces so that the double sided tape bonds securely.)
8. If desired, the Clamp(s) can be permanently mounted to the enclosure using the supplied mounting hardware. Two 5/32" (4 mm) diameter holes positioned on 3⁄4" (19 mm) centers must be drilled to mount each Muffler Clamp with the supplied plastic push-rivets.
9. Snap the Cold Air Muffler(s) into the Mounting Clamp(s).
10. Cut a sufficient length of the 5/8" (16 mm) inside diameter vinyl tubing from the supplied #7000-75 Cold Air Ducting Kit(s) to connect the outlet(s) of the Check Valve(s) to the Cold Air Muffler(s). Attach the length(s) of vinyl tubing

securely onto the hose barbs of the Check Valve(s) and the Muffler(s). Ensure that the vinyl tubing has no sharp bends or kinks. Direction of cold air flow through the Muffler(s) is not important.

11. Attach all (or a portion of) the remaining supplied vinyl tubing of the Cold Air Ducting Kit(s) to the opposite hose barb connection(s) on the Cold Air Muffler(s). Holes can be punched or drilled into this 5/8" (16 mm) tubing to distribute the cold air evenly inside your enclosure, or, the entire cold air output can be directed to a heat sensitive component. If the end of the 5/8" (16 mm) vinyl tubing is plugged, at least 25 x 1/8" (3 mm) diameter holes should be punched or drilled into the tubing to allow the cold air to escape. Use the self-adhesive tubing clamps provided with each kit to locate and hold the vinyl tubing in place.
12. Connect the compressed air filter (supplied with 75xx models) to the compressed air inlet on the side of the HazLoc Vortex A/C with a length of 3/8” pipe (not supplied). Install the compressed air filter as close as possible to the HazLoc Vortex A/C, in a location where the temperature does not exceed 125°F (52°C). Allow the filter to hang at the side of the enclosure as shown in the installation drawing. Use an 11/16” (18 mm) wrench to hold the air fitting on the side of the HazLoc Vortex A/C stationary while tightening the pipe connections. Note the air flow direction arrow on top of the filter. See Maintenance section for recommendations on location of the compressed air filter.
13. Connect the compressed air supply to the inlet of the air filter. See “Compressed Air Supply”.

Operation

It is recommended to operate the HazLoc Vortex A/C at 90 to 100 psig (6-7 bar) compressed air pressure. If compressed air pressure exceeds 100 psig (7 bar), it is essential to regulate the pressure down to 100 psig (7 bar) with Vortec’s model 208R or 208RX pressure regulator. Operation at pressures less than 90 psig (6 bar) and above 100 psig (7 bar) will affect the operation. When properly sized for the application, the HazLoc Vortex A/C will maintain the internal enclosure temperature between 75-100°F (24-38°C). Enclosure temperatures can momentarily reach 125°F (52°C) during initial start-up and after long periods of inactivity. Variations in heat load and compressed air conditions can affect thermostat operation. The mechanical thermostat will regulate an internal valve to minimize compressed air usage and maintain enclosure temperatures within the range specified. In some applications, the HazLoc Vortex A/C may run continuously at lower air usage with the benefit of always keeping the enclosure under slight internal pressure. In other applications, the HazLoc Vortex A/C may cycle on and off to maintain enclosure temperatures. When the HazLoc Vortex A/C is not cooling, the Check Valve(s) shutting off the air passage from the enclosure interior to the exterior and allowing the purge/pressurization system to maintain slight pressure in the enclosure. Do not apply excessive heat or a flame to the mechanical thermostat(s) to “test” them for operation. Damage to the product may result that is not covered under the warranty.

NOTICE: The thermostat’s reaction to temperature change depends on several factors: the internal and external heat loads, enclosure size and proximity to the heat source. When the internal heat load is zero (or very low) and when external temperatures are below 50°F (10°C), the thermostat will take longer to react to air temperature increases. There will be a lag between the rising air temperature and when the thermostat reacts, which can result in temperatures inside the enclosure exceeding 125°F (52°C). When air and thermostat temperatures equalize, the reaction to temperature change is improved and the lag is minimized.

Troubleshooting

Insufficient cooling may be caused by the following:

1. Undersized compressed air line size.
2. Compressed air pressure at the product is too low.
3. Partial or complete blockage of internal compressed air path(s), due to dirt.
4. Water vapor in the compressed air supply.
5. Loose cold air outlet fitting(s). This may occur if not tightened properly after being disassembled for cleaning.

If trouble persists, please contact Vortec at 1-800-441-7475.

Limited Warranty

HazLoc Vortex A/C compressed air enclosure cooling products manufactured by ITW Air Management will be replaced or repaired if found to be defective due to manufacture within ten years from the date of invoice. Refer to our website www.vortec.com for full warranty details and limitations. ITW Air Management makes no specific warranty of merchantability or warrant of fitness for a particular purpose.

Elevated Surface Temperatures

Because the HazLoc Vortex A/C operates using the vortex principle, hot exhaust air is generated and released at low pressure from the opening in the stainless steel shroud on the back of the unit. This exhaust air can reach temperatures up to 225°F (107°C) under normal conditions. (Normal conditions are compressed air inlet pressure of 90 to 100 psig (6-7 bar) and compressed air inlet temperature of 70°F (21°C)). The HazLoc Vortex A/C models can be operated at compressed air temperatures that do not exceed 120°F (49°C). The HazLoc Vortex A/C models have a Temperature Class of T4.

Sizing the Spark Arrestor Vent to the HazLoc Vortex A/C

As stated in the introduction, the HazLoc Vortex A/C must be used in conjunction with an enclosure purge and pressurization system. The purge system must have a spark arrestor vent that allows the cold air flow (produced by the HazLoc Vortex A/C) and the pressurization air flow to safely escape the protected enclosure, without creating too little or too much pressure in the enclosure. Add the pressurization air flow to the cold air flow as found in the table below to determine the total air flow through the spark arrestor vent.

HAZLOC VORTEX A/C COLD AIR FLOW (AT 90 TO 100 PSIG (6-7 BAR) OPERATING PRESSURE)	
Vortec Model	Cold Air Flow
7515, 7215, 7515BSP, 7215BSP	7 ft^3/minute (198 liters/minute)
7525, 7225, 7525BSP, 7225BSP	14 ft^3/minute (396 liters/minute)
7535, 7235, 7535BSP, 7235BSP	23.5 ft^3/minute (665 liters/minute)
7570, 7270, 7570BSP, 7270BSP	47 ft^3/minute (1330 liters/minute)

Contact the purge system manufacturer or Vortec if assistance is needed in selecting the correct spark arrestor vent to allow proper purging and pressurization.

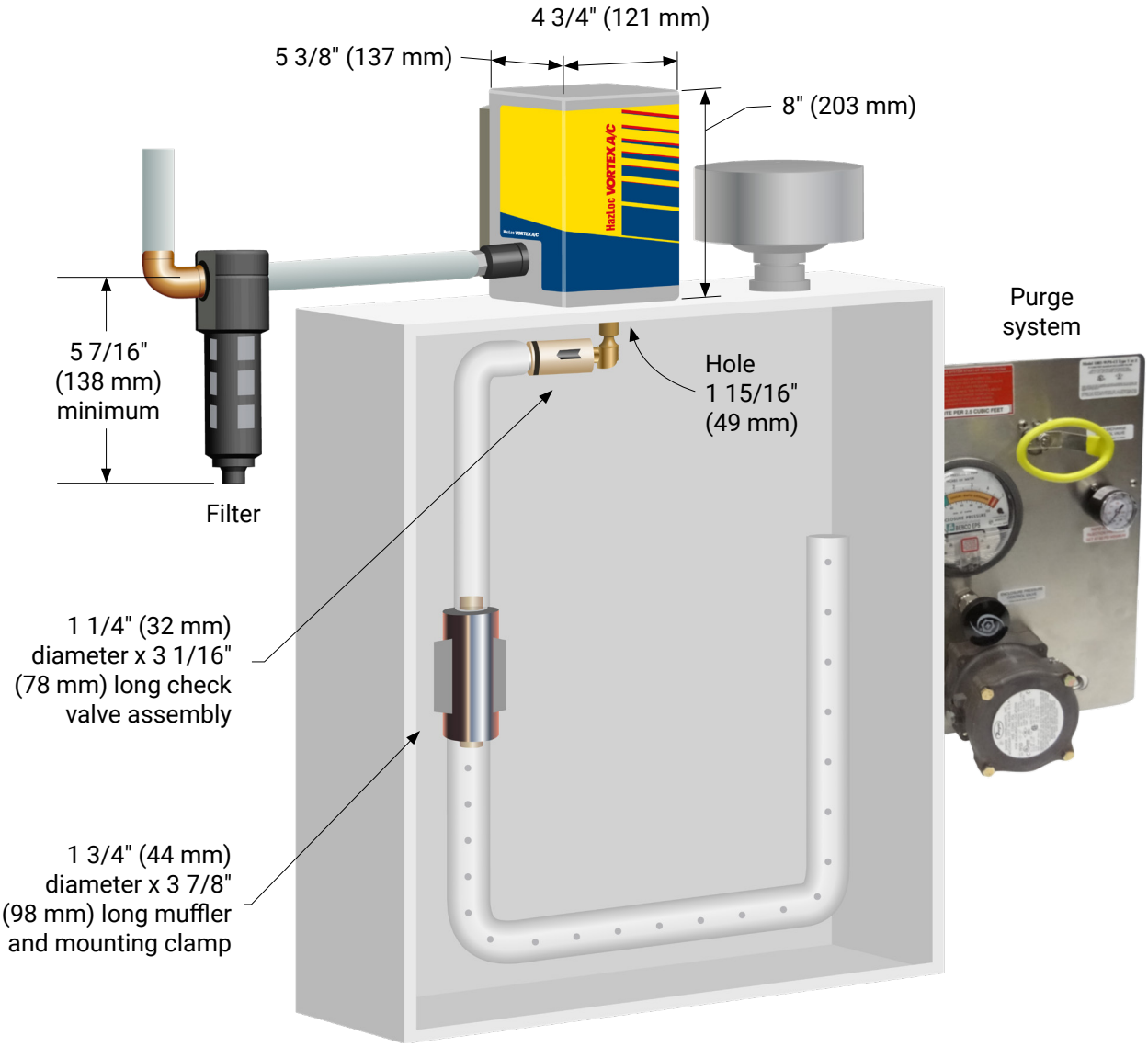
Two Stage Cooling (Models 7270 and 7570, and BSP versions)

Under normal operation, the first stage cooler (the cold air outlet that is nearest to the compressed air inlet) will activate first. This will either reduce the rate of temperature rise in the enclosure, or, it will begin to reduce the enclosure temperature, depending on the total heat load in the enclosure. If the total heat load is significant and the temperature continues to rise, the second stage cooler will activate, doubling the amount of cooling air. In locating the two Cold Air Ducting Kits, consideration should be given to the two stage cooling capability of the unit. The dual cold air outlets and Cold Air Ducting Kits provide for increased flexibility in directing refrigerated air into the enclosure. For example, the first stage cooler's output could be directed at a primary source of heat within the enclosure (PLC's, VFD's, transformers, etc.) and the second stage ducting could be punched or drilled (as described earlier) and routed for overall cold air distribution throughout the enclosure.

HazLoc Vortex A/C Assembly

(Drawings shown below are not to scale)

Models 7515, 7525, 7535, 7215, 7225, 7235



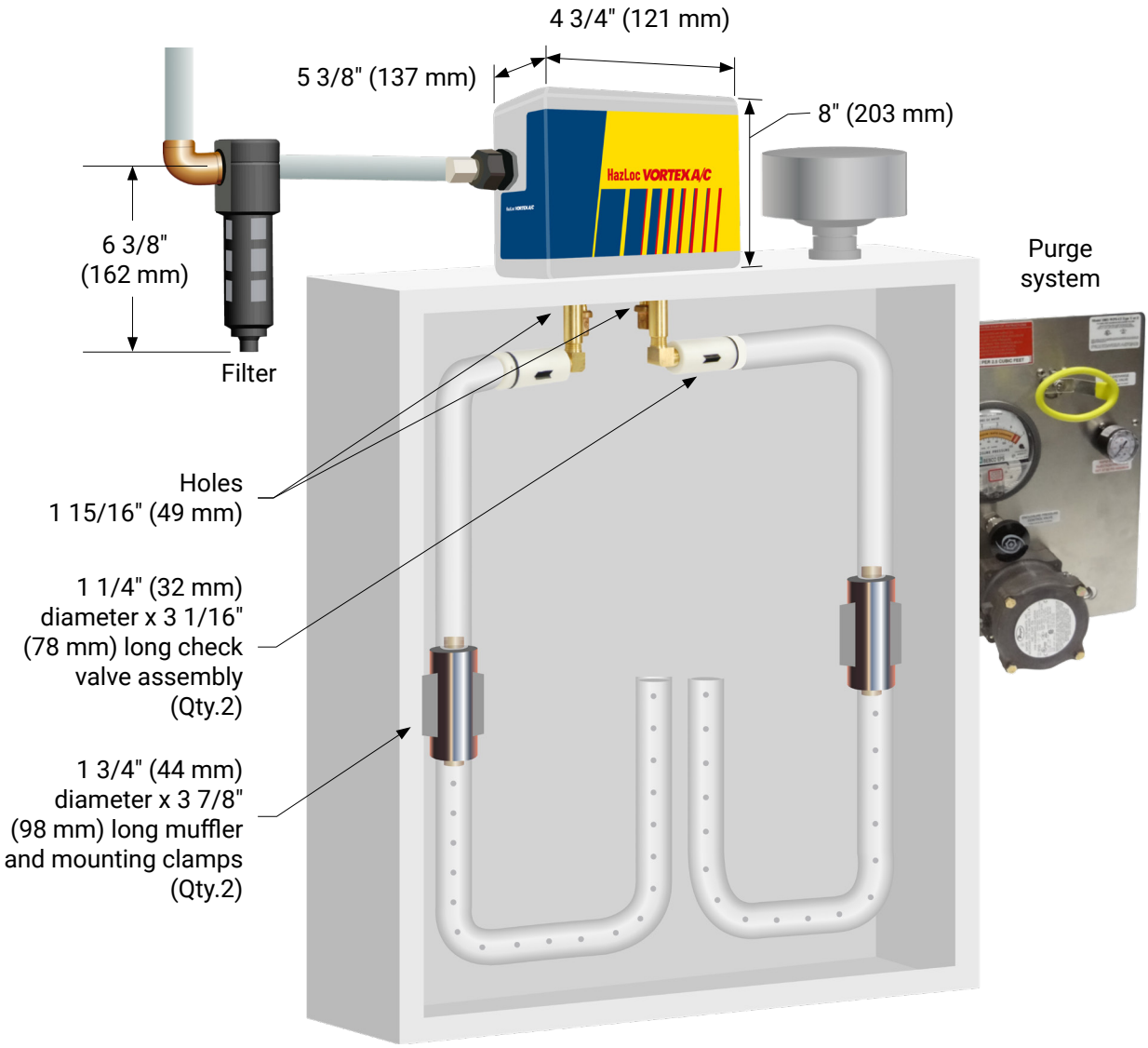
SHOWN TOP MOUNTED ON CUSTOMER'S ENCLOSURE

PURGE SYSTEM SHOWN FOR REFERENCE ONLY

HazLoc Vortex A/C Assembly

(Drawings shown below are not to scale)

Models 7570, 7270, 7570BSP and 7270BSP



SHOWN TOP MOUNTED ON CUSTOMER'S ENCLOSURE

PURGE SYSTEM SHOWN FOR REFERENCE ONLY

Table 1: Filter Recommendations

FILTER AND REPLACEMENT PART ITEM NUMBERS		
Vortec Model	Oil Removal Filter	Replacement Generator Kits (5 pcs)
7515	701S-48	208GK-15H
7525	701S-48	208GK-25H
7535	701S-54	208GK-35H
7370, 7470	701S-54	208GK-35H

Table 2: Determining Compressed Air Line Size

1. Calculate total product compressed air consumption (SCFM, SLPM).
2. Determine length of compressed air line required for connection to main supply.
3. Locate pipe length in left column and read to the right to find the compressed air requirements.
4. Locate pipe size at top of column.

MAXIMUM AIRFLOW (SCFM) THROUGH PIPE AT 5 PSIG PRESSURE DROP (100 PSIG AND 70°F)									
Pipe Length (Feet)	Pipe Size (Nominal) - Schedule 40								
	1/4	3/8	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2
10	29	65	120	254	480	978	1483	2863	4536
20	21	46	85	180	340	692	1049	2024	3208
30	17	37	70	147	277	565	856	1653	2619
40	15	32	60	127	240	489	792	1431	2268
50	13	29	54	114	215	437	663	1280	2029
60	12	26	49	104	196	399	606	1169	1852
70	11	25	46	96	181	370	561	1082	1715
80	10	23	43	90	170	346	524	1012	1604
90	10	22	40	85	160	326	494	954	1512
100	9	21	38	80	152	309	469	905	1435

MAXIMUM AIRFLOW (SLPM) THROUGH PIPE AT 0.3 BAR PRESSURE DROP (6.9 BAR AND 21°C)									
Pipe Length (Meters)	Pipe Size (Nominal) - Schedule 40								
	1/4	3/8	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2
3	821	1840	3396	7188	13584	27677	42117	81023	128369
6	594	1302	2406	5094	9622	19584	29687	57279	90786
9	481	1047	1981	4160	7839	15990	24225	46780	74188
12	425	906	1698	3594	6792	13839	20999	40497	64184
15	368	821	1528	3226	6085	12367	18763	36224	57421
18	340	736	1387	2943	5547	11292	17150	33083	52412
21	311	708	1302	2717	5122	10471	15877	30621	48535
24	283	651	1217	2547	4811	9792	14829	28640	45393
27	269	623	1132	2406	4528	9226	13980	26998	42790
31	255	594	1075	2264	4302	8745	13273	25612	40611

Rubber hose maximum airflow rating: 1/2” I.D. rubber hose = 3/8” pipe; 3/4” I.D. rubber hose = 1/2” pipe