Cabinet Cooler Vortex Size 2
Handbook

ML471

CONTENTS:

1 GENERAL INSTRUCTIONS

When a Cabinet Cooler is required all potential sources of heat generation should be considered. Example: When an enclosure is in direct sunlight installing a sunshade and possibly thermal insulation would reduce the solar heating considerably.
If a Cabinet Cooler is required, the following must be considered.

Principle of Operation
The Cabinet Cooler (Vortex type) works by using a compressed air supply and spinning the air into a chamber at very high RPM. This splits the air into a hot and cold fraction. The hot fraction of air is exhausted outside the enclosure. The cold fraction is vented into the enclosure and ultimately must be vented out of the enclosure.

2 SPECIFICATION

Power Supply:	110 Vac or 230 Vac (as per model ordered) 50/60Hz AVC-0000-002 230 Vac Version AVC-0000-010 110 Vac Version
Air Supply:	60 – 100 psi 4 – 7 barg 75scfm, 2124Nl/min at 100psi, 7barg Maximum of 40ºC, 104ºF [For version with Tamb -20ºC to +40ºC] Maximum of 55ºC, 131ºF [For version with Tamb -20ºC to +55ºC]
Cooling Capacity	1495 W at 100psi, 7barg Note: Ambient temperature of up to +55ºC will reduce the cooling capacity.
Temperature Control:	Electronic +/-2ºC, +/-3.6ºF
Maximum Air Outlet Temperature	130ºC/ 266ºF
Weight	4.2kg, 9.25lbs
Hazardous Area T Class	T4 at 55ºC, 131ºF or at 40ºC, 104ºF ambient (as ordered) When housed inside IP54/NEMA 4 enclosure or better.

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3 CERTIFICATION DATA

Cabinet Vortex Coolers are certified under ATEX Non-electrical Conformity Certificate EXVERITAS 19 ATEX 0577 X against BS EN ISO 80079-36:2016 Non-electrical equipment for explosive atmospheres - Basic methods and requirements. Vortex Coolers are suitable for use in Hazardous Areas where Equipment Group II Category 2G is required, when installed within a pressurized enclosure and the following instructions are adhered to.

WARNING
The device adjuster screw located beneath the air silencer (muffler) has been pinned to limit the maximum exit air temperature. Any un-authorised adjustment of the 'slotted' valve will automatically invalidate the use of this product in a hazardous area.

After assembly of the Cabinet Cooler on to an Ex p, X, Y, or Z enclosure this Cooler/muffler must be replaced onto the exhaust of the Vortex Tube which is located in the Hazardous Area, in such manner that can only be removed by the use of a tool.

It is responsibility of the user to ensure that the Cabinet Vortex Cooler is sufficiently earthed to the enclosure ensuring that any static charge created is discharged safety to the enclosure.

4 APPLICATION SUITABILITY

- As the Cabinet Cooler displaces air care should be given on installations where movement of dust may be an issue, (Zone 21 & 22 or Class II).
- The following materials are used in the construction of Cabinet Cooler.
  If substances that will adversely affect any of these materials are present in the surrounding environment, please consult Expo Technologies for further guidance.

  Materials of construction:
  - Stainless Steel
  - Mild (carbon) Steel
  - Brass
  - Copper
  - Polyamide
  - Epoxy Resin
  - ABS
  - PVC

- This equipment is designed for use under normal industrial conditions of ambient temperature, humidity and vibration. Please consult EXPO before installing this equipment in conditions that may cause stresses beyond normal industrial conditions.
- The Cabinet Cooler is not silent in operation.

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5 INSTALLATION

General Notes

When installing a Cabinet Cooler into a Pressurized Enclosure the following issues should be considered.

- For use in Zone 1 (Category 2) applications, the user shall ensure that the maximum regulator pressure, even under fault condition, does not exceed 7 barg.
- A second Relief Valve unit may be required to exhaust the cold fraction entering the Pressurized Enclosure. This second Relief Valve unit will need to be set at a higher lift off pressure than the Relief Valve unit supplied with the MiniPurge Control Unit. This is to ensure that the operation of the MiniPurge is not interfered with.
- The second Relief Valve unit must also be capable of exhausting the full flow rate of the cold fraction. This is typically between 20-80% of the air supply dependant on setting at time of commissioning.
- The MiniPurge must control the operation of the Cabinet Cooler by way of the purge complete signal. The MiniPurge must go through a purge cycle before the Cabinet Cooler receives either a supply of compressed air or electrical power. This will prevent the MiniPurge considering the cold fraction as the purge flow which would be incorrect. The solenoid valve will obtain its power once the purge time has elapsed.
- Cabinet Cooler assemblies supplied by Expo have a solenoid valve to control the compressed air supply. In addition, a thermostatic control is included and a one way air valve fitted to the cold fraction.
- The one way air valve is to prevent the enclosure losing pressure when the Cabinet Cooler is not in operation.
- If a customer is to install a Cabinet Cooler themselves into an Expo Pressurized Enclosure that has already been certified by Expo then Expo requires;
  Documents, drawings, circuits etc, recording this addition so that we can issue an amendment to the overall certificate. This may incur additional costs.
- To install the Cabinet Cooler refer to the general assembly drawing for overall dimensions.
- Drill a hole on the top face of the enclosure, the one way valve must be vertical.
  It is possible to mount the Vortex tube in the side wall, although this is not the preferred option.
- Unscrew the hot air exhaust muffler and remove the gland.
- Fix gland into the drilled hole.
- Now insert the vortex tube through the gland and tighten the gland up to hold the Cabinet Cooler in place.
- Now replace the hot air exhaust muffler and place supplied label adjacent to the muffler on the outside of the enclosure.
- The temperature sensor can now be positioned within the enclosure. This could be on a specific device or in the top of the enclosure where the temperature will normally be at its greatest.
- The wiring and pneumatic pipe work can now be fitted.
- To avoid electric charging, steps must be taken to ensure the equipotential bonding is maintained between the cabinet vortex cooler, cabinet and earth.
- The vortex cabinet cooler control electronics and valve shall be either be placed in a safe area or protected by a suitable protection concept with the required ATEX category for area classification.
- As the maximum temperature of hot air outlet is 130ºC a “Hot Surface Do Not Touch” warning label shall be attached at the vicinity of the vortex cooler.

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6 COMMISSIONING

Always ensure that there is adequate exhaust and pressure relief provided for the enclosure. If this is not provided the enclosure will become over pressurized and may operate outside of its Test Pressure specification and possibly become a hazard.

General Notes

Compressed air supply.

The air supply temperature should not exceed 40ºC, 104ºF or 55ºC, 131ºF, depending on the model. Solar shading or thermal insulation of air supply pipe work may be required.

Air supplies are plagued with condensed water vapour and droplets in the air lines. This condensation leads to rust and dirt in the air lines. Also, some compressors will allow oil or oil vapour to enter the air line.

It is important that the electrical equipment within the Pressurized Enclosure is not contaminated. Small orifices within the Cabinet Cooler may become clogged with rust, dirt and water droplets. A 5 micron filter will separate 99% of foreign material from the air supply, allowing virtually maintenance free operation. The use of an oil filter with an effective filtration of 0.01 micron will remove the oil droplets for an even cleaner air supply.

Keep in mind that the current line or hose might contain water, dirt or oil and should be blown out before installation. Also, pipe thread sealant or tape must be carefully applied to avoid clogging product orifices.

When the temperature of the air inside the Cabinet drops to 0ºC, 32ºF, the water vapour in the air will start to freeze. If this poses a problem with ice clogging the orifices of the generator inside the tube, an air dryer must be used to lower the dew point to keep out the water vapour. An air dryer rated at -19ºC, -2ºF will produce a dew point low enough to eliminate the water vapour freezing in the orifices of the generator.

- The installation of the electrical connections shall be inspected for correct installation before the unit is put into service.
- The Cabinet Cooler has the temperature setting, factory set to 20ºC, 68ºF
- If the customer wishes to change this then the adjustment resistor is shown on the drawing provided. This does not have an indexed scale.
- The Cabinet Cooler can now be operated. Once a purge cycle has been completed the Cabinet Cooler will become active. As soon as the sensor detects the set temperature has been exceeded the Solenoid Valve will open and the Cabinet Cooler will operate.
- Air will be vented from the Hot air Muffler and out of the enclosure Relief Valve.
- The Solenoid Valve will close once the set temperature has been reached.

7 MAINTENANCE

The Cabinet Cooler has no moving parts. Clean, compressed air moving through the tube will not cause wear on the parts and will provide the same service for an indefinite period.

Occasionally, dirt, water or oil may enter the tube from the compressed air supply and hinder the performance. When this happens, simply take the unit apart, clean the parts, and reassemble, tightly replacing the cold end cap to properly seat the generator.

The Solenoid Valve is also maintenance free and should be replaced if a fault does occur.

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8 FAULT FINDING

- The most common fault is a lack of air supply due to either low air supply pressure or poor flow rate. Poor flow is because of too small pipe work, long pipe lengths or small fittings.
- Occasionally dirty or very wet air causes ice build up within the enclosure, leading to intermittent operation and water within the enclosure.
- If the system does not work at all check the fuse has not blown.
- Ensure the temperature setting has not been tampered with.
- Ensure the air exhausts are not blocked.

9 DRAWINGS AND DOCUMENTS

TITLE	Drawing Number
Cabinet Cooler Assembly	AVC-0000-002
ATEX Non-Electrical Conformity Certificate	EXVERITAS 19 ATEX 0577 X

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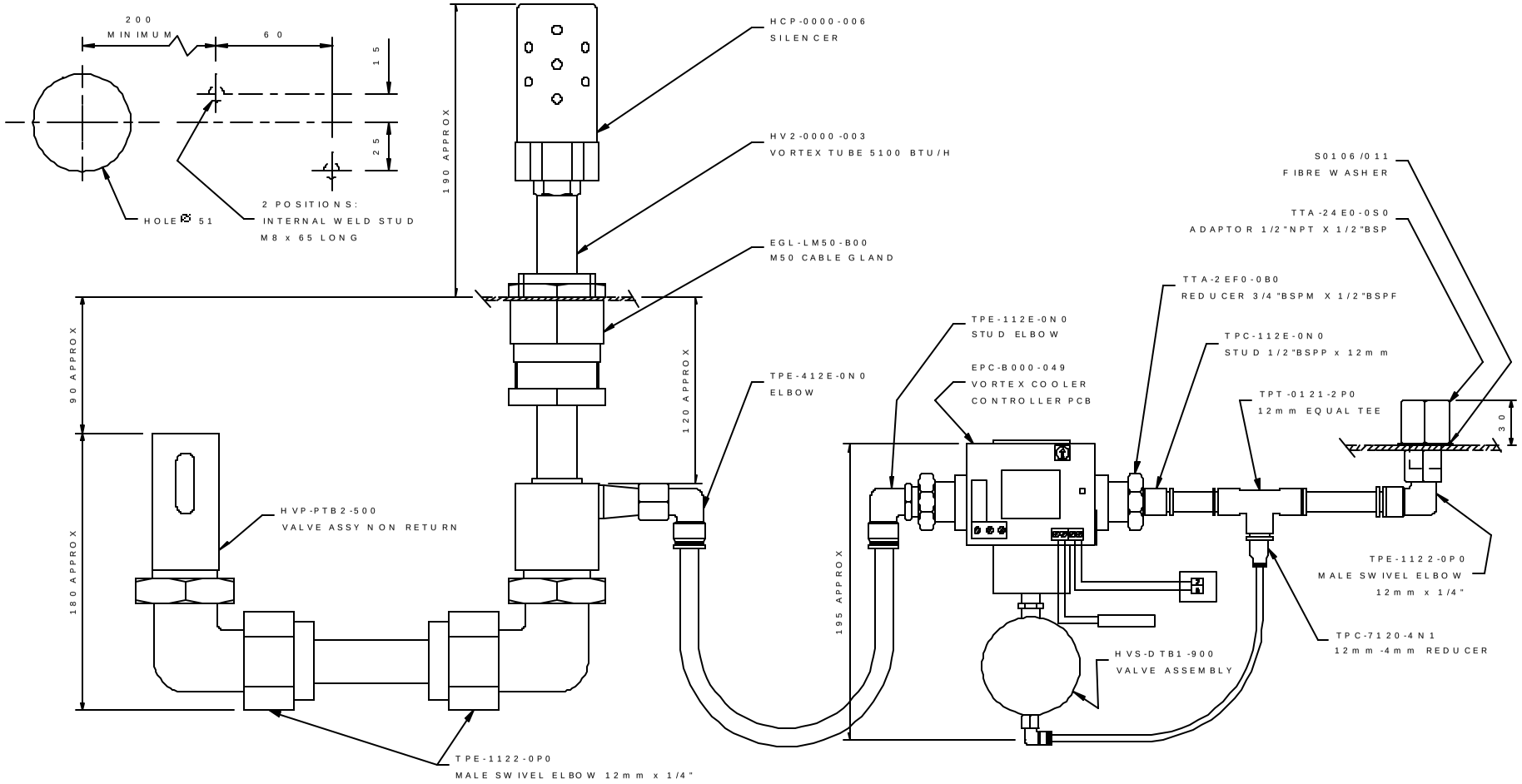
3rd ANGLE PROJECTION

DIMENSIONS IN mm
DO NOT SCALE

UNSPECIFIED TOLERANCES
NO DEC PLACE ±0.5
1 DEC PLACE ±0.2
2 DEC PLACE ±0.1
FLATNESS TO BE LESS THAN 0.4mm OVER ANY 100mm LENGTH

DETAILS OF TUBE CUT-OUT AND 2/2 VALVE FIXING STUDS.

THE VALVE FIXING STUDS MAY LOCATED TO SUIT ORIENTATION. e.g. AIR SUPPLY IN FROM THE LEFT INSTEAD OF VIEW SHOWN WITH AIR SUPPLY IN FROM THE RIGHT.



APP'D	PAO	ISSUE:	1	2			MATERIAL
CHK'D	BRD	MOD.No:	DRAWN	4602			
DR'WN	MJP	DATE:	08/07/02	13/1/09			FINISH
		APPROVED:	PAO	JPdB			
		DRAWING STATUS:					

Expo Technologies Limited SURREY KT7 0RH UNITED KINGDOM

TITLE: LARGE VORTEX COOLER ASSEMBLY

JOB No: | CUSTOMER:

SCALE: N.T.S

DRAWING No.: AVC-0000-002

SHEET No. 1 OF 1

1. ATEX Non-Electrical Conformity Certificate

2. Equipment intended for use in potentially explosive atmospheres - Directive 2014/34/EU

3. Certificate Number : ExVeritas 19 ATEX 0577 X

4. Equipment : Cabinet Vortex Coolers Types 1, 2, 3 & 4.

5. Manufacturer : Expo Technologies Limited

6. Address : Unit 2, The Summit, Hanworth Road, Sunbury on Thames, TW16 5DB

7. This equipment and any acceptable variation thereto are specified in the schedule to this certificate and the documents therein referred to. The examination and test results are recorded in confidential report no: EXV2164/A/1

9. Compliance has been assured by compliance with the standards, at their latest editions, listed below:

BS EN ISO 80079-36

10. ExVeritas takes no responsibility for the validity of any information or data supplied by the manufacturer on which parts of the ATEX assessment may be based upon.

11. The marking of this equipment or protective system shall include the following:

Ex II 2 G Ex h IIC T4 Gb T_{amb} -20 ºC to +55 ºC

UKAS PRODUCT CERTIFICATION

No. 8613

On behalf of ExVeritas

Stephen D'Henin
Certification Manager

12. **Schedule**

13. **Certificate Number**

ExVeritas 19 ATEX 0577 X

14. **Equipment Description**

The Expo Technologies Cabinet Vortex Cooler provides cooling for pressurized enclosures using compressed air. Cooling may be required either to remove heat generated by the contents of the enclosure and or to compensate for high ambient temperatures.

The Cabinet Vortex Coolers are of the following types:

Vortex Cooler Type	Electrical Rating	Model	Ingress Protection Rating
Type 1	110 Vac or 230 Vac or 24 Vdc	AVC-XXXX-XXX	IP40
Type 2	110 Vac or 230 Vac or 24 Vdc	AVC-XXXX-XXX	IP66
Type 3	110 Vac or 230 Vac or 24 Vdc	AVC-XXXX-XXX	IP66
Type 4	110 Vac or 230 Vac or 24 Vdc	AVC-XXXX-XXX	IP40

15. **Descriptive Documents**

15.1 **Associated Report and Certificate History:**

Report Number	Cert Issue Date	Issue	Comment
EXV2164/A/1	05.11.2019	0	Initial issue of the Prime Certificate

15.2 **Technical File number**

The technical file documents are held in Exveritas file number: TF2164

15.3 **Compliance Drawings**

Number	Issue	Description
SD8361	1	Type 1
SD8360	1	Type 2
SD8439	1	Type 3
SD8440	1	Type 4

16. **Special conditions of Certification**

- To avoid electrostatic charging steps must be taken to ensure the equipotential bonding is maintained between the cabinet vortex cooler, cabinet and earth.
- The cabinet vortex cooler control electronics shall either be placed in the safe area or protected by a suitable protection concept with the required ATEX Category for the area classification.
- The maximum inlet air pressure to the cabinet vortex cooler shall not exceed 7 Bar even under a fault condition.
- The maximum inlet air temperature shall not exceed + 55 °C.

17. **Conditions of Certification**

The Vortex Cooler shall include labelling with the following markings:

Manufacturer	: Expo Technologies Limited
Manufacturer's Address	: Unit 2, The Summit, Hanworth Road, Sunbury on Thames, TW16 5DB
Cabinet Vortex Cooler Type	: Type X
Electrical Rating	: Max Volts: XXXVac/dc (controller)
Coding	: Ⓔx II 2 G Ex h IIC T4 Gb T_{amb} -20 °C to +55 °C
Serial Number	: XXXX
Year of Manufacture	: XXXX
Exveritas Certificate Number	: ExVeritas 19 ATEX 0577 X

Notes:

- A label shall be attached on the enclosure at the vicinity of the vortex cooler showing Manufacturer, Manufacturer's address, vortex type, coding and certificate number.
- A label shall be attached to the vortex cooler showing the serial number, year of manufacture and the electrical rating.

17. **Essential health and safety requirements**

Covered by application of the standards listed in section 9 of this certificate and the assessment conducted in the test report listed in section 15.1 of this certificate.

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