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Aerionics, Inc. (150765)
FINDINGS REPORT

SCOPE OF WORK
Witness Testing | Macurco™ DMK-1 Duct Mount Kit

REPORT NUMBER
103871973CHI-001A

REFERENCE LISTING REPORT NUMBER
Intertek Testing Services NA, Inc.
Arlington Heights, IL [Chicago]
Model(s): CM-6, CM-12
Description: Commercial Carbon Monoxide Detector/Monitor
ETL Report No.: 103237711CHI-001

STANDARD(S)
Outline of Investigation for Carbon Monoxide Detectors for Duct Application

Standard for Gas and Vapor Detectors and Sensors; UL 2075:2013 Ed. 2

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April 24, 2019

Intertek Report No. 103871973CHI-001A
Intertek Project No. G103871973
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Subject: Witness Testing | Macurco™ DMK-1 Duct Mount Kit

Dear Mr. Christiansen,

This letter report represents the results of our witnessed evaluation of the Macurco™ DMK-1 Duct Mount Kit for use with the CM-6 or CM-12 Commercial Carbon Monoxide Detectors/Monitors to the specific requirements contained in the following Outline of Investigation and Standard as witnessed at your Sioux Falls, SD facility:

Outline of Investigation for
Carbon Monoxide Detectors for Duct Application

UL 2075:2013 Ed. 2
Standard for Gas and Vapor Detectors and Sensors

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SECTION 1
SCOPE

In cases where a published National Standard does not cover a product submitted for investigation or certification, an Outline of Investigation by a Nationally Recognized Testing Laboratory [NRTL] may be used. This Outline shall contain basic requirements for such products.

When the first submittal of a new type of product is received, a NRTL can evaluate the product for compliance with the appropriate requirements selected from related Standards, NRTL's technical experience with the basic hazards involved using Hazard Based Safety Engineering principles, and appropriate safety requirements of other organizations. The product evaluation which results in the first Listing (or other type of certification, such as Classification) of the new type of product then becomes the basis for the NRTL's requirements for subsequent product submittals for the new product category and the requirements are documented in an Outline of Investigation.

These requirements cover air duct carbon monoxide detectors or monitors intended for indoor use within or protruding into a duct or mounted in a housing with sampling tubes extending into or traversing a duct. Air duct carbon monoxide detectors or monitors are intended to be installed in ducts where the maximum air temperature inside the duct does not exceed 100°F (38°C), nor does the minimum temperature become less than 32°F (0°C) unless evaluated and Listed for more severe installation, in accordance with the Standard for Gas and Vapor Detectors and Sensors [UL 2075], the National Fire Alarm and Signaling Code [NFPA 72], the Standard for the Installation of Air Conditioning and Ventilating Systems [NFPA 90A] and Standard for the Installation of Warm Air Heating and Air Conditioning and Systems [NFPA 90B].

An air duct carbon monoxide detector/monitor unit, as covered by these requirements, is intended to detect carbon monoxide (CO) for the primary purpose of notification of occupants and controlling blowers and dampers of air conditioning and ventilating systems to reduce the risk of acute and lethal exposure from the distribution of gaseous products. Each unit consists of an assembly of electrical components, including a sensing means to detect carbon monoxide (sensing head), sampling tubes or equivalent (based on design), provision for connection to a source of power, and means for generating a signal (with or without concentration level information relayed) when carbon monoxide is detected. It is allowable that remote control circuits may be provided. A detector/monitor shall be powered from a commercial power source, separate power supply, or be connected to a control unit as part of a fire protection signaling system. Duct detectors/monitors are not intended as a substitute for open area protection.

These requirements cover detectors/monitors:

a) Intended to control air conditioning and ventilating systems,

b) Intended for control of releasing devices, such as dampers, exhaust ventilation fans and shut-offs to gas fuel commercial equipment

or

c) Both (a) and (b).

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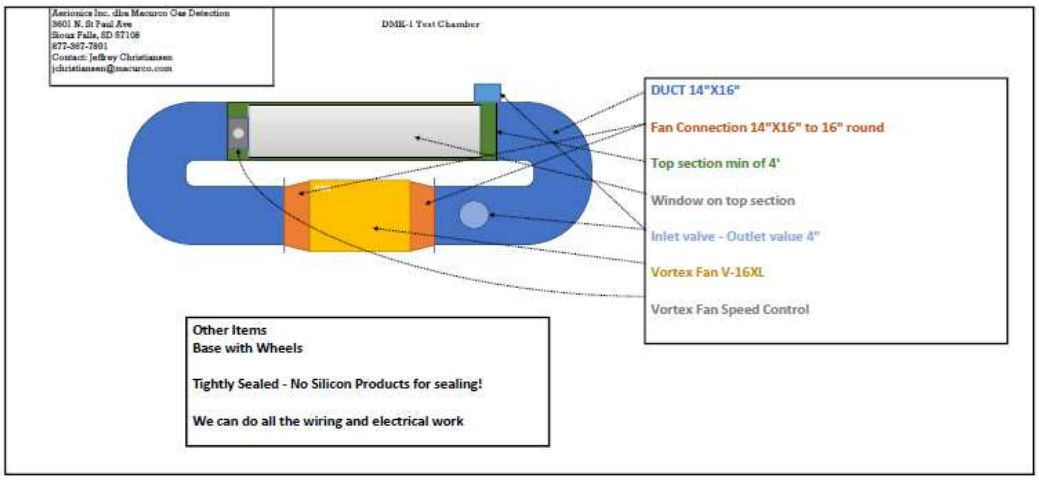
A product that contains features, characteristics, components, materials, or systems new or different from those covered by the requirements, and that involves a risk of fire or of electric shock or injury to persons shall be evaluated using appropriate additional component and end-product requirements to maintain the level of safety as originally anticipated by the intent of this standard. A product whose features, characteristics, components, materials, or systems conflicting with specific requirements or provisions set forth herein do not comply with this standard. Revision of requirements may be proposed and adopted in conformance with the methods employed for development, revision, and implementation of these requirements.

A small sealed duct tunnel to limit toxic gas volumes of carbon monoxide was built and utilized for testing as shown below.



A Macurco Trac-XP Model TXP-T40 was calibrated and used as a control in the carbon monoxide air duct tunnel.

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The following limited test program was performed and witnessed on the Macurco DMK-1 Duct Mount Kit(s) employing a representative ETL Listed Model CM-6 carbon monoxide detector(s)/monitor(s).

- Pressure Differential (Per the Manufacturer's Installation Guide; 0.01 – 1.11" H_2O) Refer to Section 3.4 of the DMK-1 Installation Guide included herein as Annex 3.

- Stability— False Alarm Immunity (170 – 2,650 FPM)

  There shall be no false alarms of an air duct carbon monoxide detector when two representative samples, mounted as intended to the oncoming air flow, are subjected to a change in duct air velocity from 0 fpm to 2,550 ±150 fpm.

- Sensitivity (170 – 2,650 FPM)
  UL 2075 §15.1 (b)
  UL 2034 §39.1 (200 ppm)

  Each duct detector assembly shall operate for alarm response between 7.5 to 35 minutes (2.5 – 10% COHb) to carbon monoxide when subjected to exposure at concentration of 200 ppm using calibrated carbon monoxide gas and the air duct tunnel equipment described herein when test velocities of 170; 500; 1,050 and 2,550 feet per minute were used.

  Prior to conducting these tests, the air flow monitoring data is to be recorded for each velocity and each sampling tube configuration at which the test is to be run using a calibrated hot-wire anemometer.

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SUMMARY

Intertek wishes to inform you that we have completed our witness evaluation and testing on two (2) randomly selected low-voltage ETL Listed CM-6 carbon monoxide detectors/monitors. We further completed a review of the DMK-1 Duct Mount Kit installation guide.

We have outlined our findings below for your convenience. Each item is identified by the section of the applicable Outline of Investigation, Standard or support documentation reviewed. Complete details of the public domain Standard requirements may be referenced in the identified sections therein.

SECTION 2
FINDINGS

§X.X; Pressure Differential (Per the Manufacturer's Installation Guide; 0.01 – 1.11" H_2O)
CONFORMING

Evaluation of the DMK-1 Duct Mount Kit using a calibrated digital manometer yielded a pressure differential between of 0.13" H_2O when the air velocity was increased to the maximum of 2,804 FPM.

Refer to Section 3.4 of the DMK-1 Installation Guide included herein as Annex 2.

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§Y.Y; Stability— False Alarm Immunity (170 – 2,650 FPM)
CONFORMING

There were no false alarms nor false displays of concentration on the two (2) representative samples of the CM-6 carbon monoxide detectors/monitors when installed in the air duct tunnel, mounted as intended to the oncoming air flow, and subjected to ten (10) cycles changes in the duct air velocity between 0 fpm to 2,550 ±150 fpm holding for a minimum of 30 seconds at both 0 and 2,550 and cycling up the range over approximately 30 seconds in duration.

UL 2075 §15.1 (b) | UL 2034 §39.1 (200 ppm); Sensitivity (170 – 2,650 FPM)
CONFORMING

Each of two (2) randomly selected production CM-6 low-voltage carbon monoxide detectors/monitors shall operate (alarm signal) for alarm response between 7.5 to 35 minutes (2.5 – 10% COHb) to carbon monoxide when subjected to exposure at concentration of 200 ppm using calibrated carbon monoxide gas. Calibrated carbon monoxide bottled gas injection occurred into a port in the air duct tunnel loop up-stream of the detector/monitor when test velocities of 170; 500; 1,050 and 2,550 feet per minute were used.

$$\%COHb_t = \%COHb_o[e^{-(t/239B)}] + 218[1-e^{-(t/239B)}][0.0003 + (CO_{ppm}/1316)]$$

$\%COHb_t$	2.44333	10.0441	2.47295	10.0655
$\%COHb_o$	0	0	0	0
t_{min}	10.0	50.0	7.5	35.0
CO_{ppm}	150	150	200	200
$B_{Heavy\ Work\ Effort}$	0.0404	0.0404	0.0404	0.0404

Prior to conducting each velocity test, the air flow monitoring data was to be recorded for each velocity using a calibrated hot-wire anemometer.

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SECTION 3
PROJECT STATUS & ACTION

Issuance of this letter report completes our evaluation and testing covered under Intertek Project No. G103871973.

If there are any questions regarding the results contained in this Report, or any of the other services offered by Intertek for which your organization may have testing or Certification need, please do not hesitate to contact your dedicated Intertek Sales Executive; Darryl Engel.

Completed by:	Vince Mori	Reviewed by:	Erinc Eslik
Title:	Global Chief Engineer	Title:	Engineering Team Leader
Signature:		Signature	
Date	2019, 04-24	Date:	2019, 04-25

Please note: this Letter Report does not represent authorization for the use of any Intertek certification marks.

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Annex 1

The Macurco DMK-1 is an air tight enclosure that provides a means to mount a Macurco CM-6 Low Voltage or CM-12 Line Voltage gas detector to an air duct. By duct mounting a Macurco gas detector it is able to monitor the air inside of the duct and provide early detection of your target gas moving through the HVAC system. The DMK-1 used with Macurco gas detectors can provide automatic control to prevent recirculation of these gases into additional areas by the air handling systems, fans and blowers in commercial and residential applications. The clear cover allows full view of the detector's displays and status lights.

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Annex 2
DMK-1-Data-Sheet

Macurco™ Duct Mount Kit DMK-1

MACURCO GAS DETECTION

For monitoring gas concentrations in ventilation ducts

Duct Mounted Gas Detection

The Macurco DMK-1 is an air tight enclosure that provides a means to mount any Macurco gas detector to an air duct. By duct mounting a Macurco gas detector it is able to monitor the air inside of the duct and provide early detection of carbon monoxide or other gases moving through the HVAC system. The DMK-1 used with Macurco gas detectors can provide automatic control to prevent recirculation of these gases into additional areas by the air handling systems, fans and blowers in commercial and residential applications.

Features

- Provides detection and monitoring of gas concentrations in ventilation ducts
- Clear cover allows view of detector, displays and status lights
- Air tight enclosure

Included with the DMK-1

- Enclosure with cover, gasket and screws
- Strain relief, nut and seal for wiring exit hole
- Exhaust tube
- Foam compression seals
- A full size drill hole position template

AERIONICS

Not included with the DMK-1

- Macuroo Gas Detector
- Input sampling tube: available in various lengths from HVAC and Security distributors
- Single gang type detectors, CM-E1 and GD-2B, will need a 4" single gang mud-ring not included

Manufactured by Aerionics, Inc. Sioux Falls, SD – Phone: 1-877-367-7891 – Email: info@aerionicsinc.com – www.macurco.com

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Annex 3
Macurco DMK-1 Installation Guide

MACURCO
GAS DETECTION

Macurco™ DMK-1
Duct Mount Kit
Installation Guide

IMPORTANT: Keep these user instructions for reference.