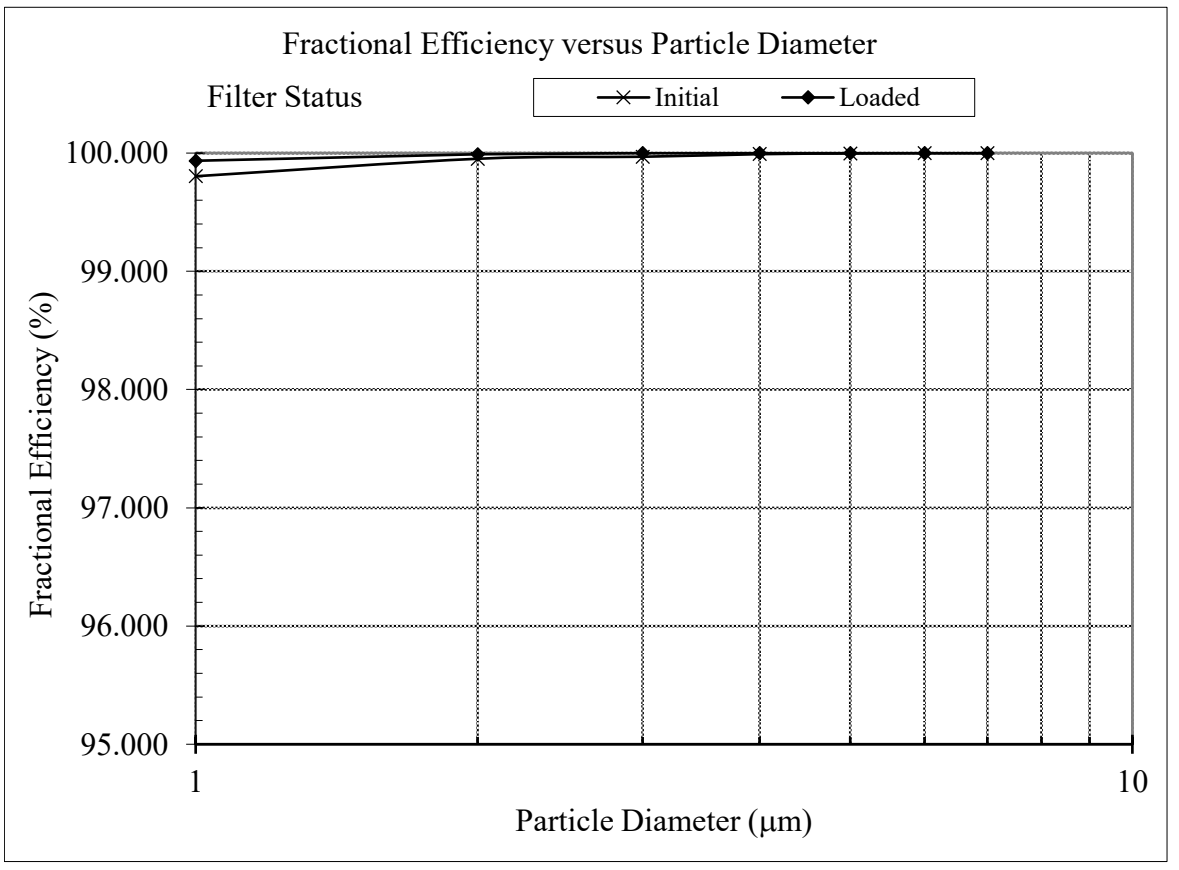
LMS Technologies, Inc.
4570 West 77th Street, Suite 102, Edina, MN 55435
(612) 832-5353, Fax: (612) 832-5354

Date :	March 30, 1998	Velocity: 10 FPM	
Filter ID :	(Polyester felt 16oz.)	Requested by: Tetratec	
Test Type :	Fractional Efficiency	Manufacturer: Tetratec	
Test Aerosol :	KCL, Neutralized	Loading Dust: SAE Ultrafine	

Filter Status	Initial	Loaded	
Δp (" H_2O)	0.868	1.068	
Size Range (μm)	Fractional Efficiency (%)		Ave. Size (um)
0.3-0.5	99.804	99.935	0.4
0.5-0.7	99.952	99.990	0.6
0.7-1.0	99.969	100.000	0.85
1.0-2.0	99.991	100.000	1.5
2.0-3.0	99.997	100.000	2.5
3.0-5.0	100.000	100.000	4.0
>5.0	100.000	100.000	5.0

$$F_{eff} = \frac{C_{up} - C_{down}}{C_{up}} x100\%$$

F_{eff} = Fractional Efficiency
C_{up} = Particle Concentration Upstream of Filter
C_{down} =Particle Concentration Downstream of Filter



PCCSSB000061

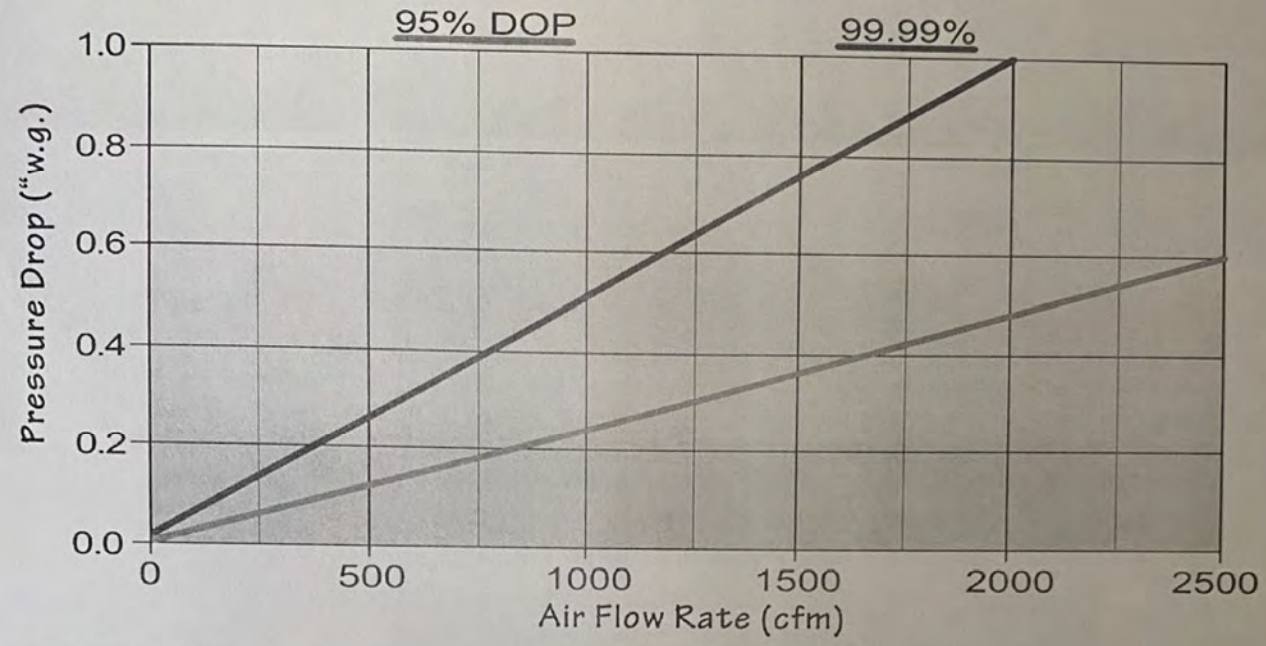
TEST SUPERVISOR
MICK FLOM

ENGINEERING APPROVAL
K.C.KWOK, PH.D.

National FILTER Media

HVP HEPA Filter

AIR FLOW VS. PRESSURE DROP



Performance Data

Model Number	Efficiency	Rated Airflow	Initial Resistance
FP-H13HEPA-2424115-WG	99.99% @ 0.3 micron	2000 cfm	.98" w.g.
FP-H13HEPA-1224115-WG	99.99% @ 0.3 micron	1000 cfm	.98" w.g.
FP-H13HEPA-2323115-WG	99.99% @ 0.3 micron	2000 cfm	1.05" w.g.
FP-H13HEPA-1223115-WG	99.99% @ 0.3 micron	1000 cfm	1.05" w.g.

Dimensions Data

Size	Actual Dimensions (H X W X D)	Approx. Weight (lbs)	Media Area (sq. ft.)
24" x 24" x 11½"	24" x 24" x 11½"	26	425
12" x 24" x 11½"	12" x 24" x 11½"	13	169
23⅜" x 23⅜" x 11½"	23⅜" x 23⅜" x 11½"	26	398
11⅜" x 23⅜" x 11½"	11⅜" x 23⅜" x 11½"	13	157

PCCSSB000062

NFM S/ 196-287-010 - 100% Polyester Felt with expanded PTFE membrane

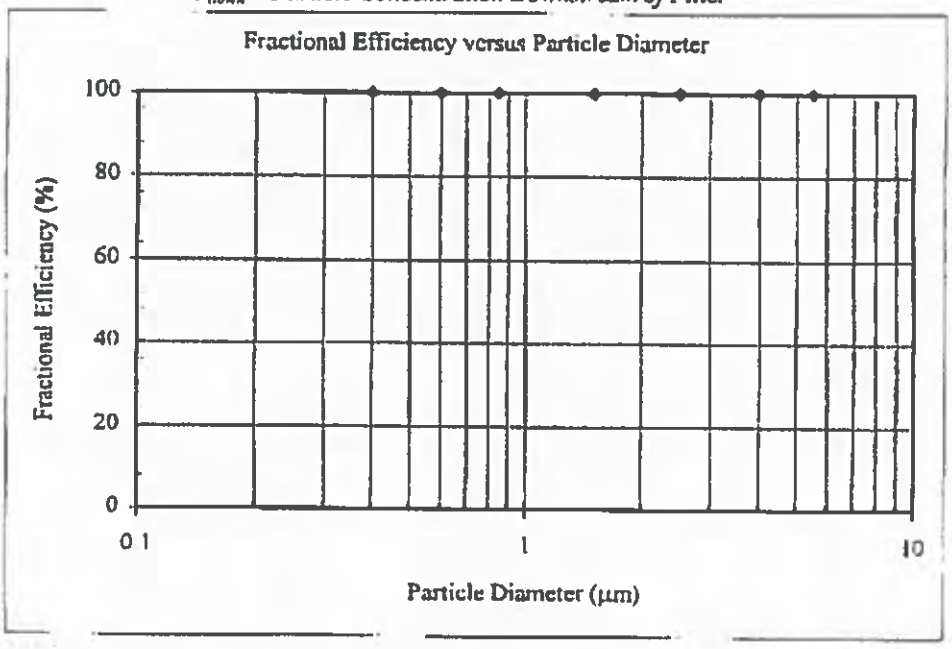
Velocity (fpm)	10.5
Δp (" H_2O)	0.681
Size Range (µm)	Fractional Efficiency (%)
0.3-0.5	99.998
0.5-0.7	100.000
0.7-1.0	100.000
1.0-2.0	100.000
2.0-3.0	100.000
3.0-5.0	100.000
>5.0	100.000

$$F_{eff} = \frac{C_{up} - C_{down}}{C_{down}} x100\%$$

F_{eff} = *Fractional Efficiency*

C_{up} = *Particle Concentration Upstream of Filter*

C_{down} = *Particle Concentration Downstream of Filter*



Donaldson Company, Inc.
Industrial Air Filtration
1400 West 94th Street
Bloomington, MN
55431-2370

Mailing Address:
P.O. Box 1299
Minneapolis, MN
55440-1299 U.S.A.

Tel 952-887-3847
Fax 952-698-2479
www.Donaldson.com
www.donaldsontorit.com

Effective Date: July 14, 2021

Donaldson Company, Inc. Emissions Statement on Performance Filter Medias for PCC Structural

Donaldson Company, Inc. offers an extensive variety of dust collectors and filter media designs to the market to address the wide variety of dust control applications and project needs.

Donaldson generally expects average (filterable) particulate emissions in the discharge gas stream from a Continuous-Duty Baghouse or Cartridge Dust Collector using Donaldson Torit performance filter media (reference attached performance media filter list) will not exceed 0.002 grains per dry standard cubic foot for 2.5 to 10 micron particulate. This outlet emission level represents a mass efficiency of no less than 99.9% based on an inlet loading greater than 2 grains per dry standard cubic foot. This level of performance expectation excludes any contributions to emissions from condensable materials (*which will pass through filter media in a vapor state*), and it assumes filters are selected and installed properly and are operated and maintained in accordance with industry best practice and in accordance with the manufacturer's Installation, Operation, and Maintenance manuals for the collector.

Factors which may contribute to unexpected collector emissions include: misuse, accident, abuse, modification, improper installation or operation, inadequate maintenance, and operation beyond recommended selection/sizing guidance or useful life. Emissions may also occur as a result of damage to collectors or filters due to accidents, fires, corrosion, abrasion, or other physical abuse.

Emission performance is also influenced by the style or size of collector selected, by the selection of filter media, and by choices in accessories or features for collectors.

The below list of Donaldson Torit filter elements are covered in this emissions statement:

Donaldson Company, Inc.
Industrial Air Filtration
1400 West 94th Street
Bloomington, MN
55431-2370

Mailing Address:
P.O. Box 1299
Minneapolis, MN
55440-1299 U.S.A.

Tel 952-887-3847
Fax 952-698-2479
www.Donaldson.com
www.donaldsontorit.com

Part Number	Collector Type	Filter Type	Filter Description
P030664-016-210	232RFW10	Bag	Dura-Life 4.85 D x 121L
P282660-016-210	Fabric Filters NW	Bag	PTFE Tetra-Tex on 16 oz Polyester, 4.695 D x 124 L
P282705-016-210	Fabric Filters NW	Bag	Dura-Life 4.625 OD x 124 L, w/ 4" cuff
P030805-016-210	Farr D60125-404	Bag	Dura-Life 4.625 D x 124 L
P282659-016-210	Filter Tech	Bag	Dura-Life 5.875 D x 121L
P283866-016-210	KBL-15501 / PCC 5047	Bag	Polyester Singed 4.854 OD x 124.5 L
P282846-016-210		Bag	Polyester Singed 6.048 OD x 134 L
P282847-016-210		Bag	Polyester Singed 4.536 OD x 124.25 L
P282848-016-210		Bag	Polyester Singed 4.775 OD x 124 L
P033571-016-210		Bag	Polyester Singed 4.62 OD x 125 L
P034545-016-210		Bag	Polyester Singed 4.78" OD X 124.00" L
P191522-016-436	DF	Cartridge	Ultra-Web FR NL 12.74 D x 26 L
P030925-016-436	DF	Cartridge	Ultra-Web FR 12.74 D x 26 L
P151244-016-436	DF - EAC	Cartridge	Ultra-Web 12.74 D x 26 L
P191527-016-436	DF - EAC	Cartridge	Ultra-Web NL 12.74 D x 26 L
P031789-016-436	DF - EAC	Cartridge	Ultra-Web SB 12.74 D x 26 L
P034301-016-436	DFE	Cartridge	Ultra-Web 13.74 x 13.74 x 26 L
P034302-016-436	DFE	Cartridge	Ultra-Web NL 13.74 x 13.74 x 26 L
P034303-016-436	DFE	Cartridge	Ultra-Web FR 13.74 x 13.74 x 26 L
P034310-016-436	DFE	Cartridge	Ultra-Web SB 13.74 x 13.74 x 26 L
P191889-016-436	DFO	Cartridge	Ultra-Web (11.4 x 14.4) x 26 L
P191920-016-436	DFO	Cartridge	Ultra-Web FR (11.4 x 14.4) x 26 L
P199475-016-436	DFO	Cartridge	Ultra-Web NL FR (11.4 x 14.4) x 26 L
P199474-016-436	DFO	Cartridge	Ultra-Web NL (11.4 x 14.4) x 26 L
P190818-016-436	DFT	Cartridge	Ultra-Web FR 13.84 D x 26 L
P191521-016-436	DFT	Cartridge	Ultra-Web NL FR 13.84 D x 26 L
P191526-016-436	DFT	Cartridge	Ultra-Web NL 13.84 D x 26 L
P030904-016-436	DFT	Cartridge	UltraWeb 12.84" OD X 26" L
P190817-016-436	DFT	Cartridge	UltraWeb 13.84" OD X 26" L
P031592-016-002	Farr Gold Series	Cartridge	Now Obsolete – See P281755
P281755-016-002	Farr Gold Series	Cartridge	Ultra-Web, Open/Closed, Rect Flange 14.7 D x 39 L
P191865-016-340	Farr Tenkay	Cartridge	Ultra-Web 12.74 D x 26 L
P191827-016-340	Farr Tenkay	Cartridge	Ultra-Web FR 12.74 D x 26 L
P031336-016-340	Farr Tenkay/ 16-FSD-6	Cartridge	Ultra-Web, Open/Closed, Rect Flange 12.74 D x 34 L
P031412-016-340	Robovent	Cartridge	Ultra-Web, Open/Closed, Round Flange 12.74 D x 36 L
P527079-016-340	Small TD	Cartridge	Ultra-Web FR 7.9 D x 16 L
P527078-016-436	VLB	Cartridge	Ultra-Web FR 12.74 D x 26 L
P282217-016-210	Fabric Filters NW	Pleated Bag	Torit Tex BOTTOM LOAD 4.875 OD x 83.8 L
P033421-016-210	FS/RSD	Pleated Bag	Ultra-Web SB 5.8 D x 41.4 L
P283117-016-210		Pleated Bag	Ultra-Web SB TOP LOAD 7.47 OD x 54 L
P031984-016-210		Pleated Bag	Ultra-Web SB TOP LOAD 5.67" OD X 61.30" L

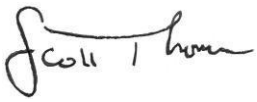
Donaldson Company, Inc.
Industrial Air Filtration
1400 West 94th Street
Bloomington, MN
55431-2370

Mailing Address:
P.O. Box 1299
Minneapolis, MN
55440-1299 U.S.A.

Tel 952-887-3847
Fax 952-698-2479
www.Donaldson.com
www.donaldsontorit.com

Important Notice: Many factors beyond the control of Donaldson can affect the use and performance of Donaldson products in a particular application, including the conditions under which the product is used. Since these factors are uniquely within the user's knowledge and control, it is essential the user evaluate the Donaldson products to determine whether the product is fit for the particular purpose and suitable for the user's application. This Emissions Statement shall not be construed as or relied upon as a health and safety statement. Donaldson does not require or recommend exhausting emissions into the indoor environment without consultation with a qualified professional to evaluate and address all attendant health and safety risks. It shall be the end user's continued and sole responsibility to provide a safe and healthful environment for its employees.

Donaldson's terms and conditions of sale, as stated in our current quotation, contain the sole obligation and exclusive remedy for any issues that arise regarding information that Donaldson provides in this statement.



Scott Thomas
Regional Sales Director

AEROSTAR A-SERIES HEPA & ULPA

PRODUCT OVERVIEW

- Available in 95%, 99.97%, 99.99%, 99.995%, 99.999% efficiencies
- Standard and High Capacity designs available
- Available in 6" and 12" depths
- HVAC supply and exhaust application for protection of people, processes, equipment & the environment
  - Health Care
  - Pharmacy
  - Chemical manufacturing
  - Food Processing
  - Laboratories
  - Aerospace
  - Contamination clean-up
  - Gun Ranges
- Available options
  - Single Header
  - 304 Stainless Steel
  - Double Turn Flange

WHY THE A-SERIES HEPA & ULPA?

- Aluminum Separator Type HEPA & ULPA filter for HVAC systems, available in box style and double turn flange
- Aluminum separators ensure even pleat spacing & uniform airflow
- Remove a broad range of airborne contaminants, including fine dust, smoke, soot, pollen and radioactive isotopes
- 100% relative humidity and lightweight design
- Maximum temperature - 220˚F
- Rugged 18 gauge galvanized steel for 12" box frames and lightweight extruded aluminum for 6" panel frames
- Also available with headered galvanized frame, stainless steel box frame and double turn flange
- Filters are individually tested and labeled with efficiency, part number, tested CFM and a unique serial number to validate HEPA efficiency performance
- Filters with efficiencies of 99.99% and higher are scanned for leaks according to IEST-RP-CC034 latest revision
- Filters are constructed in accordance with IEST-RP-CC001 latest revision

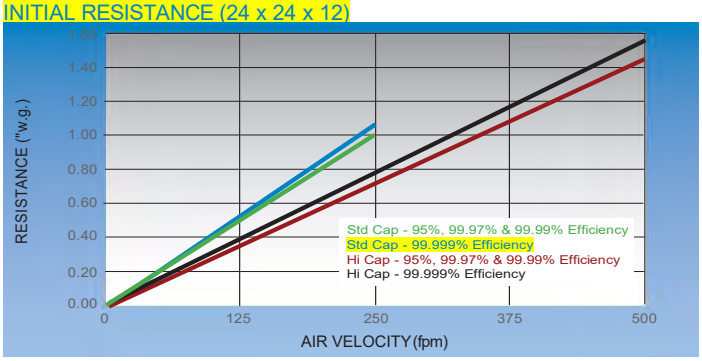
AEROSTAR® A-SERIES HEPA & ULPA

PERFORMANCE DATA (24 x 24 x 12, GALVANIZED)

CAPACITY	FILTER DEPTH	EFFICIENCIES	INITIAL RESISTANCE ("w.g.)		FINAL RESISTANCE ("w.g.)
			250 fpm	500 fpm	
Standard	12"	95%* 99.97%** 99.99%	0.50 1.0 1.0	- - -	2.0
High	12"	95%* 99.97%** 99.99%	- - -	1.0 1.45 1.45	3.0

*Not Tested or Scanned **Not Scanned

INITIAL RESISTANCE (24 x 24 x 12)



PRODUCT DATA - STANDARD CAPACITY

ENGINEERING SPECIFICATIONS

1.0 Performance Characteristics

1.1 Filters shall be Aerostar® A-Series HEPA / ULPA manufactured by Filtration Group. The size of the filter shall be H x W x D". Overall dimensions shall be correct to within +0", - 1/8".

1.2 Filters shall be 100% tested and certified to have an efficiency of not less than
- for HEPA filter 99.97% and 99.99% at 0.3 µm
- for ULPA filter 99.999% at MPPS

1.3 The clean filter static pressure drop shall be no greater than 1.00" Max for Standard Capacity HEPA / ULPAs where the air flow is 1000 SCFM on a 24 x 24 x 11.5-inch full size filter. The clean filter static pressure drop shall be no greater than 1.45" Max for High Capacity HEPAs where the air flow is 2000 SCFM on a
24 x 24 x 11.5-inch full size filter. Air flow is determined as the face area x 250 feet per minute face speed for standard capacity and the face area x 500 feet per minute face speed for high capacity.

1.4 Underwriters Laboratories classified to UL 900

2.0 Physical Characteristics

2.1 The filter frame shall be manufactured in galvanized steel or extruded aluminum and the corners shall be joined together so that any contamination of the filter by metal shavings is prevented. Sharp edges where the corners are joined together will not be accepted.

2.2 The media pack will consist of HEPA / ULPA Grade media folded over a series of aluminum foil corrugations. The foil is 0.00125-inches thick with hemmed edges.

2.3 Filter media shall be micro glass fiber type folded into closely spaced pleats with aluminum foil separators. The media pack shall be sealed on all sides to form a completely leak free seal with the frame. Two-part polyurethane is used on the top and bottom panels to encapsulate each pleat edge.

2.4 Gasket seal filters shall be provided within a 1/4" x 3/4" closed cell urethane gasket. Gasket joints to use a ball-and-socket joint and filled with foam adhesive to ensure a leak free seal.

2.5 Filter labels shall have the following information:
• Efficiency • Tested air flow • Serial number
• Initial resistance at tested air flow • Part number

3.0 Quality System

3.1 Manufacturer shall provide documentation from an external certification body that the manufacturing location is ISO 9001 Registered.

3.2 If requested manufacturer shall make available a copy of their Corporate Quality Manual.

3.3 If requested the manufacturer shall make available printed performance test results or Certificate of Test. (letter of compliance).

Air and Energy Systems, Inc.

P. O. BOX 1218
MATTHEWS, N.C. 28106
PHONE: 704-814-9221
FACSIMILE: 704-814-9750
E-MAIL: aes_inc@alltel.net

August 16, 2016

PCC Structurals, Inc.
SSB
13040 SE 84th Avenue
Clackmas, Oregon 97015

Re: Thermal Oxidizer

To Whom It May Concern:

Air and Energy Systems warrants for one (1) full year that its Model #16-593-2.0 Thermal Oxidizer will provide 98.5% destruction of wax burnout smoke at a loading rate of 100 lb/hr of wax residue that is remaining in ceramic molds after autoclaving.

- Rate of Effluent from Furnace 100/lb/hr
- Afterburner Temperature Set Point 1500°F
- Dwell Time .54 seconds
- Maximum Load Rate 140 lb./hr

This warranty does not cover parts that have not been autoclaved or SLAs.

Sincerely,

AIR AND ENERGY SYSTEMS, INC.

William J. Dudley
President

WJD/phs

Air and Energy Systems, Inc.

P. O. BOX 1218
MATTHEWS, N.C. 28106
PHONE: 704-814-9221
FACSIMILE: 704-814-9750
WEBSITE: AIRANDENERGYINC.COM

July 8, 2019

PCC Structurals, Inc.
SSB
13040 SE 84th Avenue
Clackamas, Oregon 97015

Re: Thermal Oxidizer-Flash Fire Furnace 19-919-FF-A -2

To Whom It May Concern:

Air and Energy Systems warrants the design and operation of its Model #19-919-AB- 2Thermal Oxidizer will provide 98.5% destruction for a maximum load of 75 pounds of wax in Burnout Furnace 19-919-FF-2, burning at a maximum rate of 1.25 lbs/min.

- Rate of Effluent from Furnace 75 lb/hr
- Afterburner Temperature Set Point 1500°F
- Dwell Time .54 seconds minimum
- Maximum Load Rate 100/hr

This warranty does not cover parts that have not been autoclaved.

Thermal Oxidizer is guaranteed to perform as long as properly maintained and controlled by PCC Structurals.

Sincerely,

AIR AND ENERGY SYSTEMS, INC.

William J. Dudley
President

WJD/rbs

June 27, 2017

Michael Hwang
SSBO Plant – 13340 SE 84th
Clackamas, OR 97015

RE: OBG Mold Burnout Furnace with Afterburner
FILE: 65778 Letter of Efficiency

Dear Michael

This letter will serve as an official document to accompany the Afterburner data report supplied with the OBG Mold Burnout Furnaces.

The OBG Afterburner is guaranteed to produce a 98% control efficiency rating for VOC's and particulate from the combustion of wax and plastic polymers in the main combustion chamber of the furnaces. This of course is based on the specified wax and plastic polymer load rating of the afterburner systems:

Category III with supplemental Air Injection afterburner – smoke from 40.0 lbs of wax and a maximum burn rate of 7.0 lbs/min – smoke from 22.5 lbs of plastic polymer and a maximum burn rate of 4.5 lbs/min.

Very truly yours,
O'BRIEN & GERE, INC. OF NORTH AMERICA

Raymond E. Whitmore
Project / Engineering Manage

Document1

7600 Morgan Road
Liverpool, NY 13090

p 315-637-2234
f 315-637-2819

OBG
www.obg.com