

# PRODUCT APPLICATION GUIDE

A technical bulletin for engineers, contractors and students in the air movement and control industry.

## The Right Test Standard For Pollution Control Units

The following information is intended as a guide to understanding pollution control units and the importance of why UL 1978 Standard for Grease Ducts should be used when specifying a pollution control unit. Read on to learn more.

The engineers and food service consultants who select and specify kitchen systems carry a great deal of responsibility. That's why it's important to specify certified products designed for optimal performance, reliability and safety.

### About Pollution Control Units

Pollution Control Units (PCU), also known as Air Purification Units or Exhaust Filtration Systems, have been in use in commercial kitchen exhaust systems for many years. However, due to new requirements of many municipalities and local Authorities Having Jurisdiction (AHJ), they are quickly becoming an increasingly integral part of commercial kitchen exhaust systems. Using PCUs help reduce the release of grease particulate and odor from cooking operations into the surrounding space and atmosphere. They are useful in multi-purpose buildings where the kitchen exhaust can be routed horizontally through a side wall near street level rather than needing to install long runs of vertical ductwork to reach a rooftop exhaust fan. In addition, eliminating grease and odor from the exhaust air is desirable to the occupants of nearby buildings as it prevents the buildup of grease on roofs, walls, sidewalks, and cars.

A PCU serves three main purposes. Its first purpose is to exhaust grease laden air from the commercial

kitchen space through a Type I kitchen hood. Initial filtration of the grease laden air ideally occurs at the kitchen hood. The PCU is connected to the kitchen hood by a fully-welded or listed grease duct running from the hood to the PCU. The air is pulled through the duct and PCU by an exhaust fan at the PCU outlet. Secondly, as the air is pulled through the PCU, multiple stages of increasingly efficient filtration remove grease particulate from the exhaust airstream.



Lastly, the air passes through a media that neutralizes the cooking odor.

### PCUs as They Relate to Codes and Standards

The International Mechanical Code (IMC) requires that a Type I hood be used where the appliances produce grease or smoke. The hood is then connected to the duct by liquid-tight welded or brazed joints. The duct run from the hood collar to the exhaust fan is also to be constructed such that all joints and seams are of a continuous liquid-tight weld or braze, unless the duct is a factory-built grease duct that is listed in accordance with UL 1978 – Standard for Grease Ducts. It then follows that if grease laden air is to be exhausted through a PCU to an exhaust fan, that the PCU should actually be part of the grease duct. As

such, PCUs should also be required to have fully welded or brazed joints, or be listed in accordance with UL 1978.

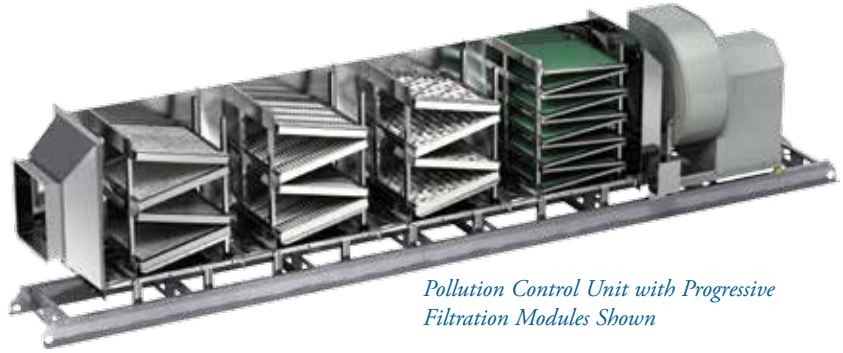
### UL vs. ETL — Evaluation and Listing of PCUs

When PCUs were first developed, there was not a specific standard to which the products could be evaluated (and at the time of this writing there still is not a standard for PCUs). This leaves the determination of what tests are required for listing to independent third parties such as UL and ETL.

Underwriters' Laboratories viewed PCUs as a grease duct and determined that evaluating PCUs to the heat related tests from UL 1978 – Standard for Grease Ducts were the proper tests to obtain an UL Listing for PCUs. (Page 3)

ETL determined that evaluating PCUs to the heat related tests from UL 710 - Standard for Exhaust Hoods for Commercial Cooking Equipment, listed of page 3, were adequate to obtain an ETL Listing for PCUs.

There are stark differences between the tests required to obtain listings to each of the standards. Reviewing the comparison on page 3, it becomes apparent that the tests for UL 1978 are more rigorous and better suited to evaluate grease duct, whereas UL 710 was



*Pollution Control Unit with Progressive Filtration Modules Shown*

developed for listing exhaust hoods. Grease duct is to function as an air tight and liquid tight conduit for grease laden kitchen exhaust air. As such, it should have sound structural integrity, prevent the leakage of any grease or smoke to the exterior of the duct, as well as contain any fire within the duct, even when subjected to the extreme temperatures associated with grease fires.

### Summary

Knowing that PCUs are, in fact, an extension of the grease duct, it follows that UL 1978 is clearly the correct standard to use for the safety evaluation of PCUs.

There are several manufacturers of PCUs. The specifications for most PCU manufacturers state that the unit is listed to UL 710 – Standard for Exhaust Hoods for Commercial Cooking Equipment. Only a few manufacturers specify that their PCUs are listed to UL 1978 – Standard for Grease Ducts. Based on the increased rigor of UL 1978 for fire safety, we recommend that all PCUs be tested and evaluated to UL 1978. **Specify with confidence, choose a UL 1978 PCU.**



*Abnormal Temperature Test  
PCU must completely contain all smoke and flame to pass UL 1978 test standard. Greenheck unit passed all UL 1978 est criteria.*

UL 1978	UL 710
<p style="text-align: center;"><b>Temperature Test 500°F</b></p>	<p style="text-align: center;"><b>Temperature Test</b></p>
<ol style="list-style-type: none"> <li>1. A flue gas generator injects heat into the duct/PCU system to be tested.</li> <li>2. The energy input is substantial enough (925 Btu/hr.) to produce an airstream temperature of approximately 500°F.</li> <li>3. This temperature is then held until equilibrium is reached (usually approximately 1.5 hours).</li> <li>4. The maximum temperature rise on any part of the duct cannot exceed 480°F for galvanized steel and 1310°F for 430 stainless steel.</li> </ol>	<ol style="list-style-type: none"> <li>1. An appliance is set below the hood/duct and adjusted to the desired surface temperature (varies depending on appliance).</li> <li>2. The appliance is brought to equilibrium (fairly quickly).</li> <li>3. The hood/duct components cannot rise by more than a maximum of 480°F for galvanized steel and 1310°F for 430 stainless steel.</li> </ol>
<p style="text-align: center;"><b>Abnormal Temperature Test — 2000°F</b></p>	<p style="text-align: center;"><b>Cooking Smoke and Flare Up Test</b></p>
<ol style="list-style-type: none"> <li>1. Immediately following the Temperature Test, the heat input from the flue gas generator is increased such that the airstream temperature is approximately 2000°F.</li> <li>2. There is an enclosure surrounding the duct at which the surface temperature cannot exceed 175° above the ambient air temperature. This is used to determine clearance to combustible surfaces.</li> <li>3. The energy input and 2000°F airstream temperature is maintained for 30 minutes.</li> <li>4. During the test and after 30 minutes, the duct/PCU cannot leak any smoke, air, grease, or flame.</li> <li>5. The structural integrity of the assembly must remain intact.</li> </ol>	<ol style="list-style-type: none"> <li>1. No evidence of smoke or flame escaping from the hood/duct is allowed.</li> <li>2. The air exhaust rate is set to the minimum amount desired by the equipment manufacturer.</li> <li>3. The appliance is brought to equilibrium and food product containing fat is cooked.</li> <li>4. This is commonly known as a Capture and Containment Test.</li> <li>5. It is used for determining acceptable minimum exhaust rates for kitchen hoods — not for grease ducts.</li> </ol>
<p style="text-align: center;"><b>Leakage Test</b></p>	<p style="text-align: center;"><b>Abnormal Flare Up Test</b></p>
<ol style="list-style-type: none"> <li>1. The entire interior of the grease duct/PCU is to be coated with animal lard (0.3 lbs./sq. ft.).</li> <li>2. Two lbs of pork lard are to be melted, ignited, and left to burn out under the inlet to the duct/PCU.</li> <li>3. No leakage of grease, oil, smoke, or flame is allowed at any of the joints or access doors of the duct/PCU.</li> </ol>	<ol style="list-style-type: none"> <li>1. The desired hood exhaust rate is to be established.</li> <li>2. One pint of vegetable oil is brought to ignition on top of an appliance and below the test hood.</li> <li>3. The vegetable oil is left to burn out completely.</li> <li>4. The exhaust airstream cannot exceed 375°F and flames cannot enter the hood exhaust collar.</li> <li>5. Hood parts shall not be damaged such that they present an electrical or fire risk.</li> </ol>
<p style="text-align: center;"><b>Gasket Text</b></p>	<p style="text-align: center;"><b>Fan Failure Test</b></p>
<ol style="list-style-type: none"> <li>1. All gaskets/seals used on joints and access doors are subjected to tensile strength, ultimate elongation and volume change tests.</li> <li>2. Representative samples are “aged” or immersed in vegetable oil.</li> <li>3. “Virgin” and “aged” samples are subjected to the tests above.</li> <li>4. Elongation of “aged” samples cannot decrease by more than 50% from “virgin” samples.</li> <li>5. Tensile strength of “aged” samples cannot decrease by more than 50% from “virgin” samples.</li> <li>6. Volume change of “aged” samples shall be from -1% to 50% of the volume of the “virgin” samples.</li> </ol>	<ol style="list-style-type: none"> <li>1. This test is the same as the Abnormal Flare Up Test, except the exhaust fan is not operational.</li> <li>2. One pint of vegetable oil is brought to ignition on top of an appliance and below the test hood.</li> <li>3. The vegetable oil is left to burn out completely.</li> <li>4. The exhaust airstream cannot exceed 375°F and flames cannot enter the hood exhaust collar.</li> <li>5. Hood parts shall not be damaged such that they present an electrical or fire risk.</li> </ol>



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