GREENHECK
Codes and Standards
CS/101-00
PRODUCT APPLICATION GUIDE
A technical bulletin for engineers, contractors and students in the air movement and control industry.

UL - product safety certification in air movement and control

Underwriters Laboratories Inc.®

The UL product safety certification organization is dedicated to product safety, just as AMCA is dedicated to the certification of performance ratings for our industry. Most of us are familiar with UL Listings only as they pertain to electrical appliances, not as they apply to fans, kitchen systems, and dampers. This article is a summary of what you should know about UL and the air movement industry.

UL History and Mission

The UL Mark has been around for more than 100 years. Underwriters Laboratories was established in 1894 as a not-for-profit organization with the mission to reduce bodily injury, loss of life and property damage resulting from product related mishaps. That mission is two-fold.

One: Standards for Safety. There is a need for standards. Without commonly accepted standards for product safety, the value of product testing is limited. UL representatives work with industry organizations, manufacturers, and the government to establish realistic, workable safety standards, both within this country and internationally.

Two: Product and Component Testing. The second and the most visible of UL's activities is product and component testing. Its scope has grown to include over 12,000 products tested in four separate laboratories totaling over one million square feet of floor space. Products include many types of materials, equipment, constructions and systems that are investigated scientifically to evaluate their electrical, fire and safety hazards.

In addition to testing and certifying products as complete units, UL investigates individual components. All tested and recognized components are listed in the UL Recognized Component Directory.

Follow-up Inspections

After a manufacturer has a product or products UL Listed, UL inspectors make unannounced visits to the factories where these products are produced. During these visits they review the manufacturers' production controls and record keeping, witness production tests, and inspect completed products as well as the components. The unannounced visits assure that UL Marks are applied only to products that meet UL requirements. A minimum of four visits per year are made to all manufacturers producing UL Listed products.

UL Listings Defined

This section focuses on the individual UL Listings, the standards, and testing behind these listings. The UL Listings discussed in the section are limited to product types as manufactured by Greenheck and its competitors with similar products. This information is useful in making determinations on what listings are available and can be specified for the different product types.

Caution: Do not assume that all products will automatically be UL Listed and bear the UL Mark. Your requirements should be specified.

UL 705 - Power Ventilators

UL 705 is intended to assure the buyer of the safety of electrical components and connections within power ventilators (roof and wall-mounted) and

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duct fans (straight-through type). This standard is limited to fans for commercial or industrial use for connection to permanently installed wiring systems that meet NFPA 70 and the National Electrical Code (NEC). This listing does not include fans used where heat, grease, corrosive or flammable atmospheres, where dust, material, or refuse are present.

Tests under this standard relate to the extremes of current, temperature, fuses, motor windings, bearing temperatures, and water that the fan could be subjected to. Most fans and non-tempered make-up air units are offered with UL 705.

UL 762 - Power Ventilators for Restaurant Exhaust Appliances

UL 762 is a subject, or sub-section, of UL 705. UL 762 concerns the safety of roof or wall-mounted power ventilators used with restaurant exhaust appliances, where heat and grease are typically encountered in the airstream.
These fans must also be installed in accordance with NFPA 96.

Basic testing is the same as for UL 705 and additional testing includes operating the fan in a high temperature airstream without warpage, deterioration, or damage that would cause the fan to operate unsafely plus grease flare-up tests. Greenheck products with UL 762 include most centrifugal roof upblast and sidewall fans, utility fans and housed centrifugal fans.

UL Power Ventilators for Smoke Control Systems

Fans installed as part of a smoke control system are listed under this standard. They must be installed in accordance with NFPA 92A. (Recommended Practice for Smoke Control Systems) and 92B (Guide for Smoke Management Systems in malls, atriums, and large areas).

Testing includes operation at 500ºF for a minimum of four hours, and 1000ºF for a minimum of fifteen minutes. Fans available with this listing include axial and centrifugal roof upblast fans, and axial inline fans.

UL 507 - Electric Fans

This standard applies to two categories of non-industrial fans and blowers. One, those used for air circulation, such as desk and ceiling fans, and two, fans used for ventilation, such as attic, wall, window, and household hood fans. Fans in this category must be installed in accordance with NEC.

Testing is similar to UL 705 with additional starting current test, humidity conditioning test, and test for use with optional speed controls. Greenheck ceiling and cabinet fans are available with UL 507.

UL 710 - Exhaust Hoods for Commercial Cooking Equipment

Exhaust hoods installed over commercial cooking equipment are covered by this standard. Hoods are either UL Listed with fire dampers or listed without fire dampers. Hoods with fire dampers protect duct work and maintain duct temperatures below 375°F.

Test conditions include high temperatures, cooking smoke and flare-ups, abnormal flare-ups, burnout, fan failure and fire.

All of Greenheck's kitchen hoods, with the exception of Models GC and GO, are available with UL 710.

UL 555 - Fire Dampers

Fire dampers meeting the following qualifications are listed under this standard: One, rated for fire resistance at 1-1/2 or 3 hours, two, intended for use in HVAC duct systems passing through fire resistive walls, partitions, or floors, and three, installed in accordance with NFPA 90A, They must also be installed in accordance with applicable local codes such as the UBC, BOCA, and the Southern Building Code.

Testing includes repeated operation, salt spray, dust loading, fire endurance, and hose stream. All Greenheck static-rated fire damper models and dynamic-rated fire dampers are listed or classified under UL 555. Combination fire/ smoke dampers are also classified under UL 555S. Greenheck ceiling radiation dampers are certified under UL 555C.

UL 555S - Leakage Rated Fire Dampers for use in smoke control systems

This standard governs smoke dampers which are intended to prevent the spread of smoke when HVAC systems shut down during a fire emergency

and those which control the movement of smoke within a building when the HVAC system functions in a smoke control mode. Also, leakage rated dampers are intended for installation in accordance with NFPA 90A.

Testing includes salt spray, dust loading, repeated operation, elevated temperature, leakage, and operation while under airflow. All Greenheck smoke dampers and combination fire smoke dampers are classified under UL 555S.

UL 555C - Standard for Ceiling Dampers

This standard covers ceiling dampers that are intended for installation in hourly rated fire resistive ceilings (ceilings either under floors or roofs). Testing includes fire endurance tests, closing reliability, dust loading, and salt-spray testing. All Greenheck ceiling radiation dampers are covered by UL 555C.

UL 1812 - Standard for ducted heat recovery ventilators

The standard covers ducted heat recovery ventilators intended to remove air from buildings, replace it with outside air, and in the process, transfer heat from the warmer to the colder air.

Units are intended to be connected to duct systems that interconnect rooms or spaces within buildings for exhausting the indoor air and/or distributing the outdoor air. UL 1812 requires units to be tested for construction, performance, and some manufacturing and production tests.

Some of the tests that are performed include, input tests, motor overload tests, dielectric voltage-withstand tests, insulation resistance test, overvoltage and undervoltage tests, short circuit, rain and gasket. All of Greenheck's standard energy recovery ventilators are included in this listing.

UL 1995 - Standard for heating and cooling equipment

This standard covers the heating (electric) and cooling portions of the energy recovery product line. Although Greenheck's Energy Recovery Ventilators are actually listed under UL 1812, most of the electrical testing performed on these units is required by UL 1995. UL 1995 and UL 1812 are somewhat interchangeable as far as energy recovery is concerned. However, the testing for UL 1995 is focused more on the electric heaters used for pre- and post-heating and the unit control centers.

Some tests performed include continuity of operation, limit control cutout tests, heating operation test, and abnormal temperature testing.

Additional UL considerations

Product Construction: In addition to the testing as outlined for each listing, UL also judges products by their construction. In other words, listings won't be granted unless products are formed and assembled so that they will have the strength and rigidity necessary to resist the abuses to which they may be subjected without increasing the risk of fire, electric shock, or injury to personnel.

Motors: In order for fans to qualify for UL Listings, the manufacturer must furnish to UL a complete outline of all the motors to be used with that product. This outline of motors is specific to each fan model and fan manufacturer.

Motors must be listed by motor manufacturer, manufacturers' model number, speed, horsepower and enclosure type. UL Marks can only be applied to a specific fan model using a motor on the specific outline for that product.

So what does this all mean? It means that customers must accept standard motors when UL Listings are required. It may also limit a customer specifying motors of a given brand or motors with special features.

One example of the above are fans requiring explosion proof motors. UL does not have a program for listing explosion proof fans. Therefore, explosion proof motors will not appear on the motor approved list. Another example is fans that have the motor in the air stream, such as sidewall propeller fans. UL only permits the use of totally enclosed motors for this application.

You can use Greenheck CAPS to select fan and motor combinations to assure that a given product is available with a UL Listing.

UL Marks and label information

(You can also reference www.UL.com for further information on the UL Mark.)

The only way a customer can verify the product he received is UL Listed or Classified, is to look for the UL Mark on each product. UL allows the Mark, and the label that contains the Mark, to be applied in various sizes, methods and layout. Following are examples of the most common UL Marks used on air movement products and information that appears on the label. Please pay particular attention to the label example showing additional information.

This is the basic and most common UL Mark.. UL Marks must be applied in a legible size.

This is the Canadian UL Mark. Many Greenheck products having U.S. approval are also evaluated to Canadian safety requirements (which may differ from U.S. requirements).

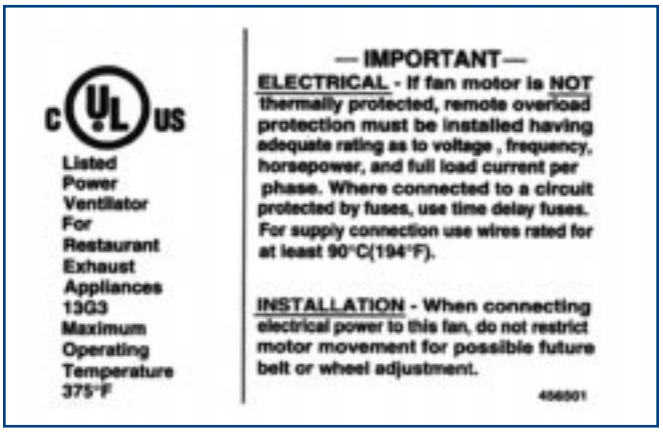
For products that are both U.S. and Canadian Listed, this Mark will appear to the left of the U.S. mark.

In early 1998, the following mark was introduced for products complying with both U.S. and Canadian requirements. The separate Marks previously shown are still permitted.

UL Classified Marks are applied to products that are evaluated for specific properties, a limited range of hazards, or products suitable for use under limited or special conditions.

Products such as fire dampers and fire doors fall into the classified category. Classified Marks can also pertain to the individual U.S. or Canadian Marks.

This is an example of the label applied to a Greenheck product with a UL 762 Listing. Labels applied show the Mark, as previously discussed, plus the word Listed and the subject of that listing.



In this example, the subject is Power Ventilator for Restaurant Exhaust Appliances. It's important to note that UL 762 is not printed, only the subject. The code 13G3 shown is the control number assigned to Greenheck by UL for this subject. The additional information on electrical and installation must also be shown. However, the manufacturer can choose to print this on a separate label. Greenheck assigns part numbers to each label (#456501 in example) in order to control that only the product, (and their selected options, such as motors) that qualify will receive the label.

This is just one example of the many label formats and information. Other products and UL listings may require additional information. For instance, the label applied to classified fire dampers must include individual serial numbers and reference to specific installation instructions.

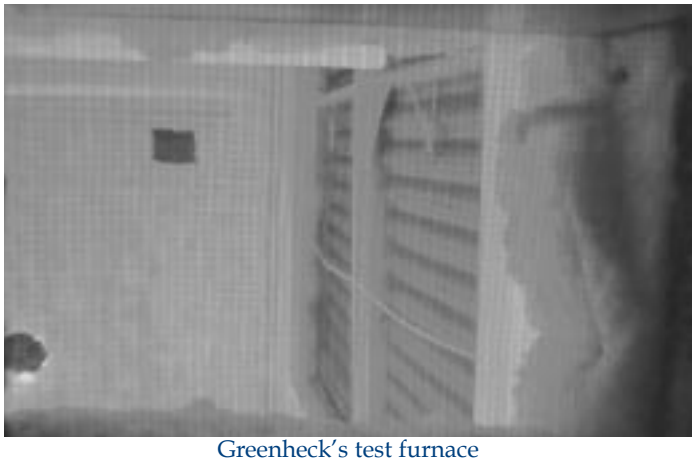
Greenheck's' Commitment

Visitors that tour Greenheck facilities can clearly see our commitment to product testing for both performance and safety. Greenheck has test facilities, equipment and personnel dedicated to the testing required by UL. Because of this commitment, Greenheck has the advantage of being part of UL's Client Test Data Program. In order to become a member of this program, UL conducts an extremely thorough audit of facilities, equipment, manpower, training programs, compliance records and history on previous certified products. As members of this program Greenheck is allowed to do its own UL testing for specific UL standards. Test data and all supporting evidence is sent to UL for their approval. In addition, having these facilities and equipment allows Greenheck to have tests witnessed at Greenheck facilities by UL personnel.

Greenheck has a clear advantage when it comes to motor testing. To our understanding, Greenheck is the only fan manufacturer in the United States with a dedicated motor test area. (For UL 507 and UL 705 testing). This laboratory is fully equipped with various test stands and dedicated data acquisition systems for complete motor testing.

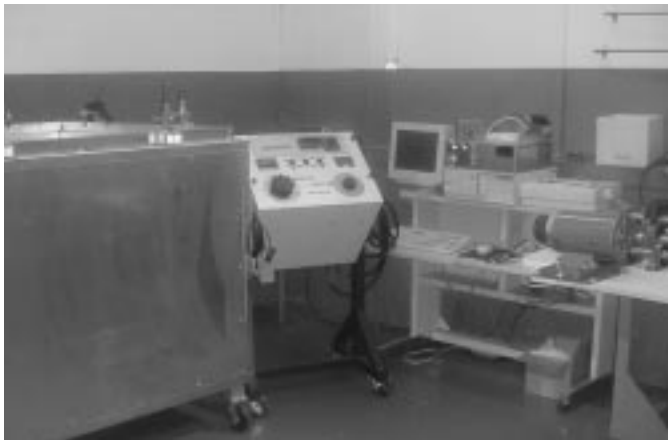
Another example of Greenheck's commitment is a UL approved test furnace. We are the only manufacturer with a UL approved fire test furnace which allows us to test life safety products efficiently and get new listed damper products to market sooner.

Photo of recent test on an inline smoke fan



Greenheck's test furnace

Greenheck is also the leader when it comes to UL testing on Power Ventilators for Smoke Control Systems. Tests recently completed at Greenheck, and witnessed by UL personnel, establishes Greenheck as the first in the industry with a UL Listed inline fan for smoke control systems. Greenheck's' TBI inline fans are listed for 500ºF for a minimum of four hours, 750ºF for a minimum of two hours, and 1000ºF for a minimum of 15 minutes.



The Greenheck motor test lab

As you can see, Greenheck is dedicated to providing the broadest offering of UL Listed quality products in the industry...products that withstand rigorous testing, ensuring your customers safe, reliable product. If safety is a concern, Underwriters Laboratories and Greenheck product is the answer.

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