



How New UL Fire Life Safety Damper Qualifications Impact Building Code Officials

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Fire and life safety dampers manufactured after July 1, 2002 must be tested and qualified to new UL requirements. Some damper manufacturers already have fire, smoke, and combination fire smoke dampers qualified to the new and upgraded UL Standards. Because these dampers are significantly more reliable, it is important that building code officials understand the new standards and keep the changes in mind.

Background

Although fire dampers have been used since the early 1950's, it was not until the late 1960's that the industry acknowledged any performance standards for these products. Underwriters Laboratory (UL), an independent, not-for-profit product safety testing and certification organization, first published *UL Standard 555 Fire Dampers* in 1968. *UL Standard 555S Leakage Rated Dampers for Use in Smoke Control Systems*, which established requirements for Smoke dampers, was published in 1983. UL has continued testing products for public safety and the two standards for dampers have changed and developed over the years.

In June 1999, UL 555, *Fire Dampers*, 6th edition and UL 555S *Smoke Dampers*, 4th edition were issued. These two UL Standards define the qualifications for all fire dampers and smoke dampers required by building codes in current use throughout the USA. The June 1999 editions also establish specific requirements for Combination Fire Smoke Dampers.

In addition to establishing the new category, Combination Fire Smoke Dampers, the June 1999 editions of UL 555 & 555S significantly changed and upgraded most testing requirements for qualification of smoke and fire dampers. UL listings of almost all smoke and fire dampers qualified under earlier versions of these standards will expire as of June 30, 2002. Commencing July 1, 2002, damper manufacturers may not apply UL labels or claim UL listing of smoke and fire dampers unless they have been qualified to the requirements of the June 1999 versions of these UL Standards.

Why the changes?

Throughout the 1980s and the 1990s, the concept of engineered smoke control using air pressure differences produced by building HVAC systems became an accepted practice. The National Fire Protection Association (NFPA) published *NFPA 92A Smoke Control Systems* in 1988. This publication provides guidance to HVAC engineers who are designing smoke control systems. NFPA 92A required that some HVAC systems continue to operate during fire or smoke

emergencies. (Normally HVAC systems are shut down automatically during any fire or smoke emergency.)

The terms **Static** and **Dynamic** were adopted to describe these two functionally different HVAC systems. Static HVAC systems are those required to shut down automatically during fire emergencies. Dynamic HVAC systems are those that continue to operate during the early phases of a fire emergency and, by doing so, provide important smoke control functions.

As HVAC and fire protection engineers gained experience with dynamic HVAC systems, questions arose regarding the reliability of smoke and fire dampers. In response to their concerns, ASHRAE's Technical Committee on Control of Fire and Smoke funded a research project. The research work for ASHRAE's RP 680 was completed in 1995 and 1996 and identified several deficiencies in the existing UL Standards 555 & 555S. A cooperative effort involving ASHRAE, UL, and AMCA (AMCA is the damper industry's trade association) produced a total overhaul of these standards - UL555 6th edition and UL 555S 4th edition, issued June 1, 1999. The effective date for compliance by damper manufacturers was originally June 1, 2001. In 2000, this effective date was extended to July 1, 2002.

How does this change affect building code officials?

Because some damper manufacturers have smoke and fire dampers qualified to these new UL Standards available for use now, HVAC engineers are changing their specifications and will require that these more reliable smoke and fire dampers be furnished in construction projects that were bid as early as October 2001. HVAC engineers want their clients to have more reliable fire life safety dampers as soon as they are commercially available. If during the plan review process, the engineer's specifications do not require smoke and fire dampers qualified to UL555S 4th edition and UL555 6th edition, the code official can require that this omission be corrected before the plans are issued.

Building code officials will also have the task of dealing with some UL listed smoke and fire damper products that ship before July 1, 2002 but will not be installed until after that date. Technically these products will not be qualified to the current UL Standards at the time they are being installed. It will be the responsibility of the local authority having jurisdiction as to whether those dampers can be installed. UL does not make it mandatory for dampers installed before the deadline to be retrofitted. However, manufacturers cannot manufacture product that does not meet the new UL standards after July 1, 2002.

Summary of changes to UL 555 and UL 555S

Dampers rated to function at 165 F, 212 F, 250 F, 350 F and other elevated temperatures must now be tested at these elevated temperatures. This includes leakage testing, testing to establish airflow velocity and pressure ratings, and fire temperature closure tests. Previously most of this testing was done at room or ambient temperatures.

Levels of qualification have been established for airflow velocity and differential pressure. These levels of qualification require testing at higher pressures and velocities to provide a safety factor and ensure reliability. Dampers intended for use in dynamic HVAC systems, which include combination fire smoke dampers, smoke dampers, and dynamic fire dampers, have pressure and velocity qualification levels as follows:

- Airflow Velocity Rating Levels of 2000, 3000, and 4000 fpm
- Pressure Rating Levels of 4, 6, and 8 in. wg

Under previous standards no safety factors, minimum velocity, or pressure rating levels were required. While dampers had pressure and velocity ratings, these ratings could be much lower than normal HVAC system conditions. It was, and is, difficult for HVAC engineers and code officials to verify that smoke and fire dampers qualified under earlier UL Standards have appropriate velocity and pressure ratings for their intended application. This deficiency has been corrected by the 1999 versions of the standards.

All airflow, pressure, and leakage ratings must be established with airflow in either direction through the damper. Previously these ratings could be established with airflow in only one direction. If the damper was installed backwards, or if airflow reversed during a fire emergency, the damper's ratings were suspect.

Cycling requirements have been significantly increased. Dampers must be qualified with specific electric or pneumatic actuators (which must now be furnished as a part of a damper assembly when it is shipped from the factory). Each damper/actuator assembly must complete 20,000 cycles prior to the other testing required by the new standards. Only damper/actuator assemblies that have completed the 20,000 cycles can be used when testing to qualify for temperature, pressure, and airflow ratings. Previously only 5,000 cycles were required and separate (un-cycled) damper/actuator assemblies could then be used for other qualification tests.

Awareness of the new UL standards will help assure all buildings currently in the planning process will utilize the new and most reliable fire life safety dampers.