RUSKIN®

3900 Dr. Greaves Rd. • Kansas City, MO 64030 • (816) 761-7476 • FAX (816) 765-8955

UNDERWRITERS LABORATORIES' STANDARD UL 555

BACKGROUND INFORMATION

The UL 555 Fire Damper test standard originated in 1966 to ensure fire dampers would function properly in fire conditions. The original standard has been revised several times to address new discoveries in fire protection and developing technology since 1966. The most recent revision was June, 1999 when the Standard for Fire Dampers UL 555 Sixth Edition was published. Major changes in this most recent revision include "Dynamic" closure against heated airflow and pressure. This is the result of current technology using air flow and air pressure to control smoke spread in buildings.

The UL 555 standard for fire dampers includes significant test criteria.

- **Operational reliability**
  To ensure operation through 250 cycles for dampers for use without actuators, or 20,000 cycles for dampers with actuators and cycle testing following salt spray exposure.
- **Fire test**
  For either 1 1/2 or 3 hours to determine the hourly classification of the damper assembly.
- **Hose stream test**
  To verify the damper assembly and associated installation components remain intact during explosive fire conditions.
- **Dynamic closure**
  To verify the damper assembly will close against heated air flow velocity of at least 2000 fpm and 4 inches of water. (Not required for dampers classified for static "fans off" systems).

APPLICATION

Today's building design often includes HVAC Smoke Control Technology using the fans to create air flow or pressure differentials to control the movement of smoke when fire is present. Early editions of UL 555 did not include closure against air flow and pressure testing. Fire dampers not designed for use in dynamic air flow conditions may not close when the HVAC system continues to operate during alarm. This has been proven both in laboratory and field testing.

Since UL 555 classified dynamic fire dampers are for use in both dynamic and static HVAC systems they are the preferred choice in new and renovation construction. Fire protection engineers and authorities having jurisdiction realize dynamic fire dampers will close if the HVAC system does not shut down during alarm. In static systems the dynamic fire dampers provide added protection in the event of equipment malfunction.

Static fire dampers should only be specified in HVAC systems designed with "fans off" during alarm.

CODE REQUIREMENTS

The major model building codes in the United States (The Uniform Building Code, The BOCA National Building Code, The Standard Building Code and the International Building Code) recognize the importance of UL555 and 555S. The codes mandate the installation of fire and fire/smoke dampers, where required, that comply with these Standards. The codes also differentiate between the use of static and dynamic fire dampers.

	UL 555 TEST CRITERIA			FOR USE IN		
DAMPER TYPE	**Operational**	**Fire**	**Hose Stream**	**Dynamic Closure**	**All Systems**	**Static Systems Only**
Dynamic	**X**	**X**	**X**	**X**	**X**	
Static	**X**	**X**	**X**			**X**

Ruskin offers UL classified combination Fire and Smoke Dampers tested in accordance with UL 555 and UL 555S. These dampers meet and exceed the stringent test criteria for both test standards.

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UNDERWRITERS LABORATORIES' STANDARD UL 555S

In September, 1983, Underwriters Laboratories issued Standard UL 555S – Leakage Rated Dampers for Use in Smoke Control Systems. Resulting from ten years of smoke damper examination and testing, the standard establishes reliability testing procedures and provides classification of leakage and temperature for smoke dampers.

UL qualification and leakage classification of a damper design require the manufacturer to demonstrate that all damper sizes offered – from the smallest to the largest damper – provide air leakage resistance within the leakage classification. This is accomplished by testing a minimum of three damper configurations:

- Minimum width by maximum height
- Minimum height by maximum width
- Maximum width by maximum height

Each damper configuration must pass stringent testing for the following:

- **Operational reliability**
  To ensure the damper will operate after a test of 20,000 cycles and against heated airflow of at least 2000 fpm and 4 inches of water.
- **Temperature resistance**
  The assembly must function after resisting 1/2 hour exposure to elevated temperatures in increments of 100°F and the minimum temperature is to be 250°F.
- **Air leakage resistance**
  The damper must prevent air leakage efficiently after operational reliability and temperature resistance tests.

UL defines leakage classes by the maximum allowable leakage through a closed damper at 4" water gage measured in cfm per square foot of damper area. Leakage classes, which are I through III (with 1 the lowest leakage), and temperature classifications are detailed in the table below.

LEAKAGE RATED (SMOKE) DAMPERS AND THEIR ACTUATORS

Because smoke control systems are expected to operate during the first 30 to 45 minutes of a fire emergency, dampers and their actuators alike may be required to operate at elevated temperatures. UL qualifies the damper and its actuator for performance after 30 minute exposure to elevated temperatures. Elevated temperature categories begin at 250°F and increase in increments of 100°F. Ruskin smoke damper and actuator assemblies qualify at 250°F or 350°F.

SPECIFYING LEAKAGE RATED (SMOKE) DAMPERS

UL 555S serves as a basis from which the engineer responsible for smoke control system design – whether new or retrofit – can select and specify the appropriate smoke dampers. Many existing building codes as well as NFPA90A and NFPA92A require UL 555S classified smoke dampers. To ensure proper damper selection and application, the designer must incorporate UL 555S requirements in specifications to ensure system conformity with these and future code changes. For recommendations on how to design a smoke control system, see NFPA92A.

LEAKAGE CLASS	MAXIMUM LEAKAGE (CFM/FT2 at 4" W.G.)	TEMPERATURE CATEGORIES
I	8	250°F 350°F
II	20	250°F 350°F
III	80	250°F 350°F

Ruskin offers both smoke dampers and combination fire and smoke dampers qualified within each leakage class to satisfy differing design requirements.