

## THE ENERTECH EDGE

### Fire & Air: The Damper Series

By Kent Maune

## UL 555 and UL 555S Dynamic Standards and Testing

### Introduction

In 1999, Underwriters Laboratories (UL) updated the dynamic testing requirements for **UL 555 Fire Dampers** and **UL 555S Smoke Dampers**, effective June 2001. These revisions strengthened performance verification, eliminated misleading claims, and ensured that all life safety dampers could reliably operate under true **dynamic (fans-on)** conditions.

### UL 555 – Dynamic Fire Damper Testing

#### Fire Endurance (Flame Exposure)

- 1½ Hour – 1,792°F → No Change
- 3 Hour – 1,925°F → No Change

#### Hose Stream Test (Simulated Explosive Fire Forces)

- 1½ Hour – 30 psi → No Change
- 3 Hour – 40 psi → No Change



Fire Endurance



Hose Stream Test

### Cycle Testing (Operational Reliability)

- With actuator: Increased from 1,000 to 20,000 cycles
- Without actuator: 250 cycles → No Change

### Dynamic Closure Test (Closure Against Airflow and Static Pressure)

- Closure temperature: from ambient → now elevated temperature airflow
- Air velocity: from any velocity → now minimum 2,400 fpm
- Static pressure: from 4 in. w.g. → now 4.5 in. w.g.

*“These revisions strengthened performance verification, eliminated misleading claims, and ensured that all life safety dampers could reliably operate under true dynamic (fans-on) conditions.”*

### UL 555S – Dynamic Smoke Damper Testing

#### Cycle Testing (Operational Reliability)

- Two-position actuator: from 5,000 → now 20,000 cycles
- Modulating actuator: 100,000 repositioning cycles → No Change

## Temperature Degradation Test

- Verifies reliable operation during early fire stages to allow evacuation
- Operate 3 cycles after 30-minute exposure at 250°F or 350°F, with no airflow → No Change

## Operational Test (Function Against Airflow)

- Previous: 3 cycles at ambient airflow, any velocity, 4 in. w.g. closure pressure
- New: 3 cycles at elevated airflow temperature (250°F or 350°F), 2,400 fpm velocity, and 4.5 in. w.g., with full open/close within 75 seconds after 15-minute exposure

## Leakage Test

- Ambient: Classes I, II, III, or IV at 1 in. w.g. and 4 in. w.g.
- Elevated temperature (250°F or 350°F): only Class I or II permitted
- **Note:** Leakage Class IV eliminated from UL 555S

## Actuator Installation

- Previously: Factory or field installation acceptable
- Now: Must be **factory-installed** per UL classification

## UL 555S – Dynamic Smoke Damper Testing

Velocity (fpm)	Static Pressure (in. w.g.)	Assembly Temp. (°F)*
2,400	4.5	250
3,400	6.5	350
4,400	8.5	350

\*Temperature ratings apply only to smoke dampers.

## Summary

The 1999 UL 555 and UL 555S updates marked a major step forward in damper certification and performance verification. While challenging for manufacturers, these changes produced more reliable, higher-performing life safety products.

## Actuator Installation

1. Elimination of Leakage Class IV from UL 555S
2. Factory-only actuator installation, ensuring consistent compliance
3. Dynamic testing at elevated temperature, velocity, and pressure, requiring larger or more robust actuators
4. Increased actuator cycling requirements (up to four times higher) to verify long-term operational reliability

These enhanced standards ensure that dampers perform as intended during real fire and smoke events, protecting both life and property.

Kent Maune is Senior Product Manager, Life Safety and Control Dampers, for United Enertech. His experience during more than 35 years in the HVAC industry (dampers and louvers) includes engineering, R & D, operations, sales, and extensive experience in the development and marketing of life safety product lines. He has also developed and conducted training seminars for code officials, engineers, fire marshals, architects, and sheet metal contractors on fire/smoke damper installation, options, and variations. Kent is a member of NFPA (National Fire Protection Association) and a chair of CARC (Code Action Review Committee). [kmaune@unitedenertech.com](mailto:kmaune@unitedenertech.com)