

## TFD80 TUNNEL VENTILATION FIRE/SMOKE DAMPER

### APPLICATION

Model TFD80 heavy duty flanged-frame fire and smoke damper maintains the highest standards of life safety for ventilation in modern tunnel transit systems. The TFD80 is designed for effective operation during normal ventilation conditions and provides a reliable means of smoke control during emergency situations.

### ACTUATION

Electric or Pneumatic, quarter-turn, rotary actuators, as required. Double-Acting or Spring-Return. For open/close or modulating applications. Mounted internal or external to the airstream.

### LIMIT SWITCHES

Elevated temperature model Proximity switches for remote and local indication of damper blade position.

### INSTALLATION

Standard or project-specific drilling pattern available in flanges. Mounting angles and structural framing available to meet seismic requirements.

### PERFORMANCE & RATINGS

#### FIRE

4-hour fire damper per BS476: Part 20 for both horizontal and vertical installations.

#### PRESSURE CAPABILITY

24 in. wg (6.0 kPa)

#### VELOCITY

4000 fpm (20.3 m/s)

#### TEMPERATURE

250°F (121°C) continuous  
 482°F (250°C) for 1 hour (NFPA 130, 502)  
 572°F (300° C) for 2-hours

#### PRESSURE DROP

AMCA Standard 500-D pressure drop less than 0.08 in. wg (20 Pa) at 2000 fpm (10.2 m/s).

#### LEAKAGE

UL 555S Class I leakage.

#### BLADE FATIGUE

8.5 million pressure reverse cycles tested at +/- 24 in. wg (6.0 kPa) using true air-pressure test on a 84.65" x 39.37" (2150 x 1000) assembly with mullion and actuator.

**NOTE:** Dimensions shown in parentheses ( ) indicate millimeters.



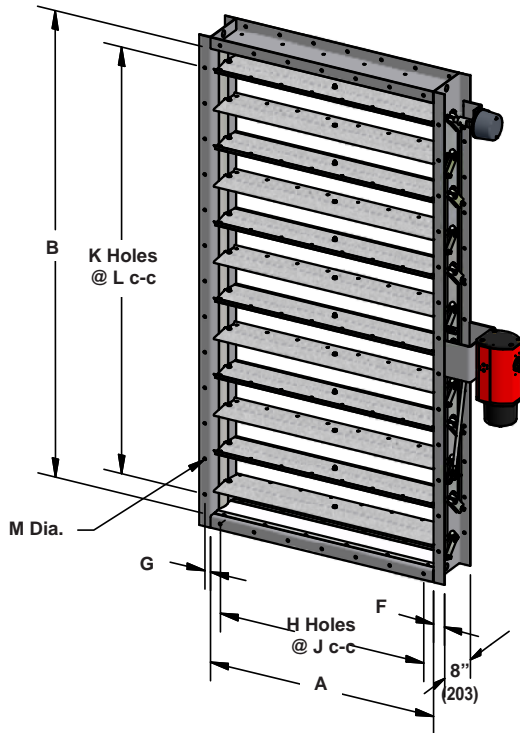
Ruskin TFD80 shown with internally-mounted actuator protected by a thermal enclosure. Includes factory supplied and mounted terminal box, conduit, and blade-mounted proximity switch.

### CERTIFICATIONS

- ✓ Southwest Research Institute Fire Tested to BS476:20
- ✓ Hong Kong FSD Letter of No Objection

	Frame Depth	Frame Material	Frame Thickness	Flange Width	Blade Type	Blade Material	Shaft Type	Shaft Material	Bearings	Linkage	Blade Seal	Jamb Seal
<b>Standard Construction</b>	8" (203)	Galv. Steel	12 ga. (2.8)	2" (51)	Double-Skin Airfoil	Galv. Steel	Full-length or Stub shafts, as required	304SS	Stainless steel sleeve	Adjustable, external 300-series stainless steel concealed in frame	Silicone mechanically fastened to blade edge	Full-perimeter, flexible stainless steel
<b>Optional Construction</b>	Per Installation Requirement	304SS 316SS	10 ga. (3.5) 1/4" (6.4)	Per Installation Requirement (Available w/extended flange one-side)		304SS 316SS	Full-length or Stub shafts, as required	316SS	Same	Same	304SS	Same

## TFD80 DIMENSIONAL DATA



Single Module				Maximum Size Using Single Actuator	
A (width I.D.)		B (height I.D.)		A (width I.D.)	B (height I.D.)
Min.	Max.	Min.	Max.		
12.00" (305)	86.61" (2200)	12.00" (305)	84.65" (2150)	177.17 (4500)	84.65" (2150)

(unlimited assembly configurations available with multiple actuators)  
**NOTE:** Dimensions in inches, parentheses ( ) indicate millimeters.

TFD80 shown with optional bolt holes and with factory supplied and mounted pneumatic actuator and proximity switch.

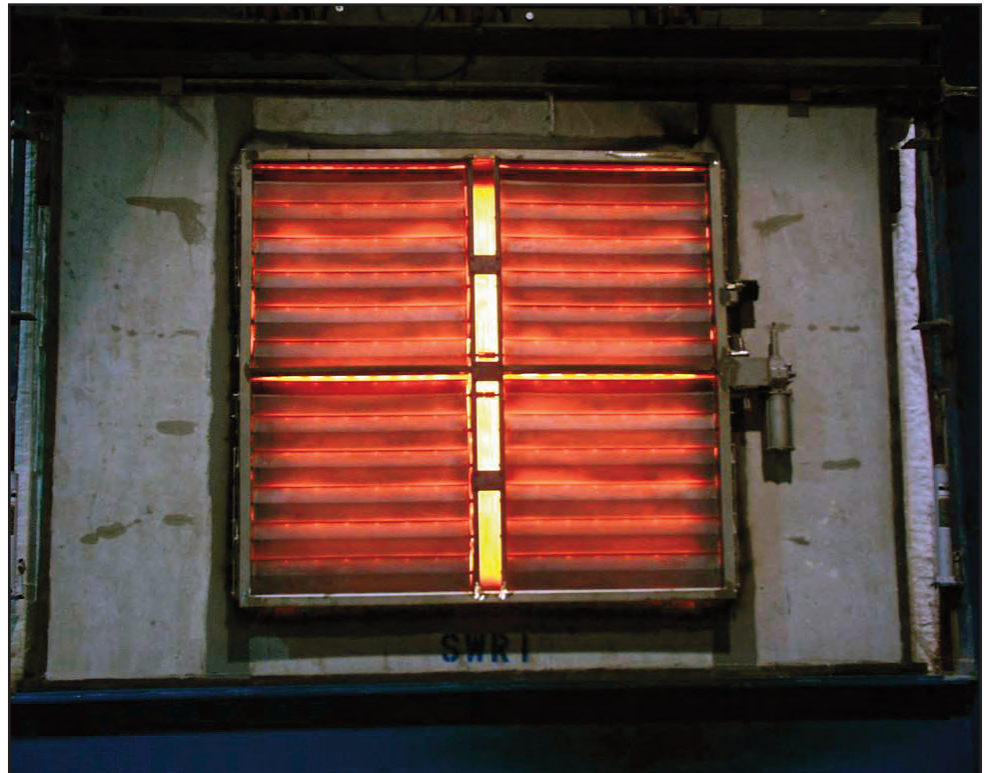
## RUSKIN MODEL TFD80: DESIGNED AND TESTED FOR LIFE-SAFETY APPLICATIONS

Testing to the requirements of a project specification is mandatory for Life Safety equipment used for emergency ventilation in transit tunnel systems. These products must prove, under controlled conditions, that they will perform when subjected to an environment that goes beyond normal operations. Ruskin's TFD80 has proven to be a world-leader in performance for effective and reliable operation under emergency situations.

Ruskin's AMCA Accredited Test Laboratory is one of the finest and all-inclusive testing facilities in the world. With four (4) testing chambers and a capacity up to 140,000 cfm (4000 m<sup>3</sup>/min.). Ruskin's high pressure test chamber can generate up to 24 in. wg (6.0 kPa) for evaluating the structural integrity of dampers.

Ruskin's elevated temperature oven can also accommodate a maximum sized TFD80 single module for testing at temperatures to 750°F (400°C).

With our qualified and experienced engineers and technicians, Ruskin's testing capabilities support decades of testimonials confirming that our products are designed and manufactured to meet the unique specifications for emergency ventilation in transit tunnel systems.



## RUSKIN MODEL TFD80: THE PROVEN PERFORMER

A product is more than the sum of its design and construction. A product must meet performance criteria as specified for the application with sufficient safety margins to guarantee the product's effective operation and function over its life expectancy. Our decades of tunnel ventilation experience and product innovation have resulted in Ruskin's TFD80 having the best overall performance of any tunnel ventilation damper in the market today. Engineers and contractors alike have come to know that the TFD80 will provide years of maintenance-free service in the most stringent conditions and will provide reliable and consistent performance during smoke extraction emergencies where Life Safety is paramount.



Above: Ruskin model TFD80 (3000mm x 2000mm) built for the Clem Jones Tunnel Project in Brisbane QLD, Australia. Below: TFD80 dampers are installed in the Clem Jones Tunnel ceiling for Emergency Smoke Extraction.



### ***Ruskin Model TFD80: Supporting Life-Safety Systems in Tunnels Around the World***

- New York City Transit Authority, New York City, USA
- BAA Heathrow, London, England
- Pan Chiao Extension, Taipei, Taiwan
- MARTA East Line, Atlanta, Georgia, USA
- Monterey Subway, Monterey, Mexico
- DART Tunnel, Dallas, Texas, USA
- Western Harbor Tunnel, Hong Kong
- KCRC East Rail, Hong Kong
- TKO 653 Tunnel Project, Hong Kong
- KMRT Red and Orange Lines, Kaohsiung, Taiwan
- Los Angeles International Airport, Los Angeles, California, USA
- Clem Jones Tunnel, Brisbane QLD, Australia
- Sydney Harbor Tunnel, Sydney NSW, Australia
- Dubai Metro, Red and Green Lines, Dubai UAE
- Massachusetts Bay Transportation Authority, USA
- Airport Link Northern Busway, Brisbane QLD, Australia
- Washington Dulles International Airport, Dulles, Virginia
- McCarran International Airport, Las Vegas, Nevada, USA

### ***Ruskin Model TFD80: Versatility of Design***

The versatile design of Ruskin's model TFD80 can be readily configured to meet the wide variety of applications and damper installations as detailed in transit tunnel specifications. The TFD80, in standard configuration, is suitable for tunnel applications with pressures up to 24 in. wg (6.0 kPa) and velocities up to 4000 fpm (20.3 m/s). The TFD80 can also be designed with construction capable of effective operation at higher pressures and velocities if more stringent requirements are specified. Corrosion resistance requirements can be satisfied with 304-grade or 316-grade stainless steel or by the application of special paint finishes as called for in the project specification. The flexibility in design of the TFD80 fire/smoke damper makes this product an excellent choice for a variety of applications and environments.



# RUSKIN MODEL TFD80: TUNNEL VENTILATION FIRE/SMOKE DAMPER

## STANDARD SPECIFICATION

Furnish and install at locations shown on plans or as described in schedules, tunnel ventilation fire/smoke dampers meeting or exceeding the following specifications.

Damper shall be of heavy duty construction with the frame a minimum of 8" x 2" x 12 ga (200 x 50 x 2.8) galvanized steel channel. Bearings shall be stainless steel fitted into the frame and retained by axle collar for removal during normal maintenance. Grinding or drilling shall not be necessary. Damper blades shall be airfoil shaped, double-skin construction of minimum 16ga (1.6) galvanized steel manufactured with interlocking blade-to-blade design. The use of riveting shall be contained to one edge of the blade skin only. Remaining blade edge will utilize a folded interlocking edge for mating to adjacent blade. Axles shall be 304SS and shall be full-length or stub as required. Axle shall be plug welded to one side only or bolted through, allowing proper thermal expansion of the airfoil blade. Dampers shall be equipped with full perimeter flexible stainless steel seals around the internal head, jamps, and sill of the damper. Seals shall minimize airflow turbulence and reduce debris build-up as commonly caused by conventional blade stops. Blade seals shall be mechanically fastened to blade edge. All full-perimeter head/jamb/sill seals, bearings, and linkage shall be of stainless steel and linkage shall be out of the airstream concealed in the frame. Exposed (blade face mounted) linkage is not acceptable.

Each ventilator fire/smoke damper shall be a minimum 4-hour rated to British Standard 476 Part 20 and shall further be tested to Underwriters Laboratories Standard 555S for leakage. Damper leakage shall be 3.0 cfm/ft<sup>2</sup> @ 1.0 in. wg (0.015 m<sup>3</sup>/sec/m<sup>2</sup>) or less.

Pressure drop through damper shall be less than 0.08 in. wg (20 Pa) at 2000 fpm (10.2 m/s). As part of the damper qualification, dampers shall have demonstrated a capacity to operate (cycle close-open-close) under system operating conditions of pressures to 10 in. wg (2.5 kPa) in the closed position and 2000 fpm (10.2 m/s) air velocity in the open position.

Tunnel ventilation damper shall also be qualified to a minimum of 8.5 million pressure reversals (repetitive piston pressures) at 24 in. wg (6.0 kPa). Damper shall be suitable for system velocities up to 4000 fpm (20.3 m/s). Testing shall be conducted on an actual damper sample with a minimum of five (5) blades under full air pressure application. Single blade deflection testing by mechanical means or evaluation by structural calculation is not acceptable. Test sample will be a minimum assembly of 84.65" x 39.37" (2150 x 1000). Damper assembly shall be subjected to actual pressure reversals on each side of the damper by means of high pressure fans oscillated with release valves simulating instantaneous pressure reversals caused by passing trains (NFPA-130).

All damper accessories shall be tested for operation at 572°F (300°C) for a minimum period of 2 hours and confirm the ability to operate at ambient temperature after removal and cooling from the elevated temperature test. Appropriate actuators shall be installed by damper manufacturer at time of damper fabrication. Damper and actuator shall be supplied by a single entity. Damper and actuator assembly shall be factory cycled ten (10) times prior to shipment to assure proper operation. Dampers shall be Ruskin model TFD80.



Multiple-module installation with internally-mounted actuators and limit switches.



Single module TFD80 with externally mounted actuator and limit switch.