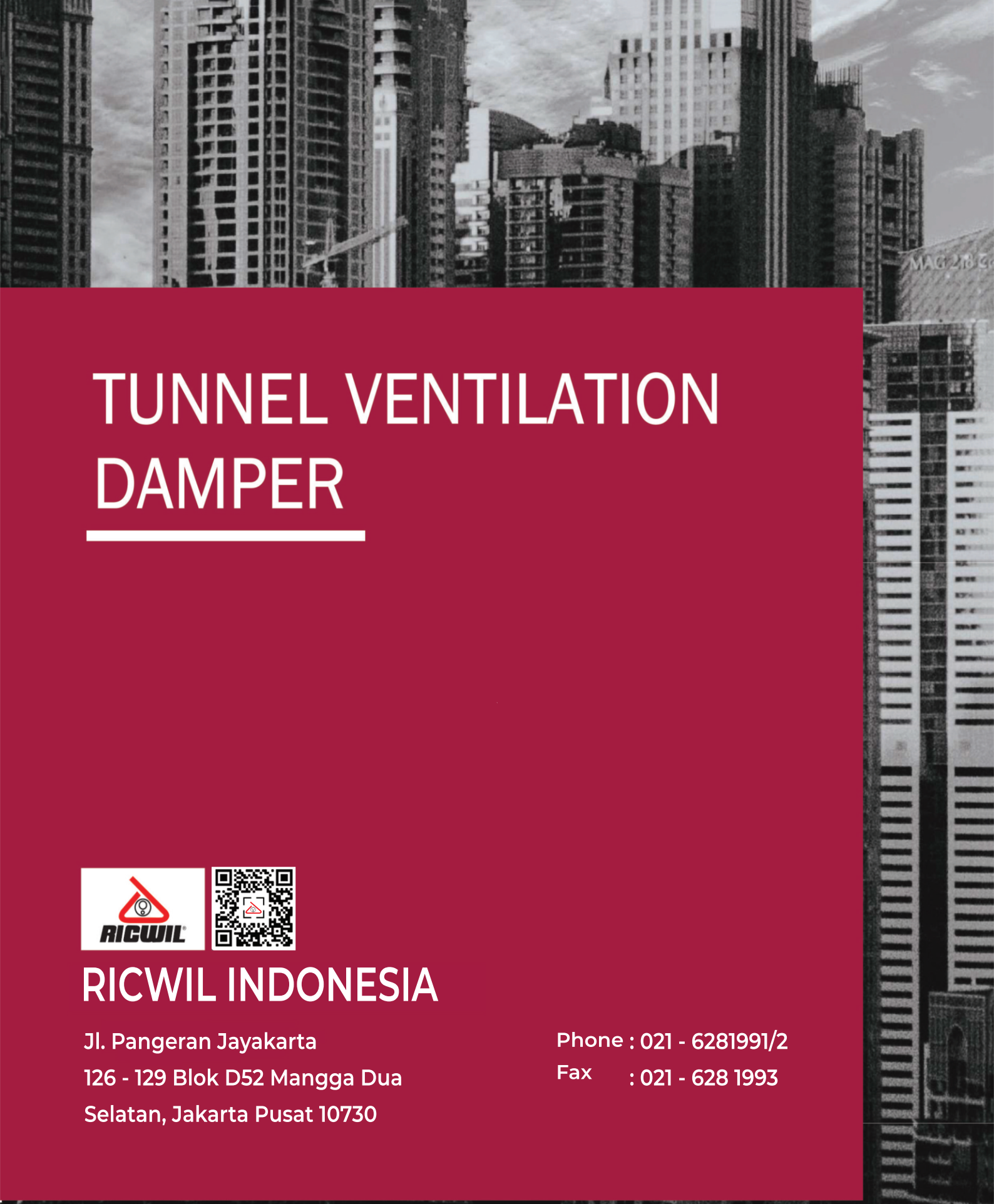

TUNNEL VENTILATION DAMPER

RICWIL INDONESIA

Jl. Pangeran Jayakarta
126 - 129 Blok D52 Mangga Dua
Selatan, Jakarta Pusat 10730

Phone : 021 - 6281991/2
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Tunnel Damper Basic

Commuters do not often think of disaster scenarios when they travel through transportation tunnels, but the engineers behind the scenes are acutely aware of just what can go wrong when the proper safety precautions aren't in place. Whether it's a tunnel for vehicular traffic, subways, or a train, tunnel dampers are essential for maintaining life safety in the event of an emergency.

The main concern for disaster preparedness is a fire. Unfortunately, we have seen such disasters take place around the globe, but the industry has learned from those tragic events.

An essential component to a safe transportation tunnel is the dampers. As with any fire, when a fire erupts in a tunnel, the greatest concern is the smoke. Essentially, the dampers allow you to isolate certain sections of a tunnel so people can escape from a fire without being overtaken by smoke.

How Do Fire Dampers Work?

The dampers are connected to fire detectors (heat, smoke, etc.) so the safety systems are triggered automatically. It is usually connected to a control room where there are crews observing and ready to act in the event that the automated system fails. When the detection system is triggered, the dampers adjacent to the area where there a fire are opened while the other dampers are closed. In this way, the smoke is extracted near the fire and it allows people in the tunnel to evacuate without much exposure to the smoke. In many cases, reversible flow fans are installed to help pull the smoke out of the tunnel as well.

Tunnel Damper Certification Standards

For train tunnels in the United States, dampers need to withstand 250°C for two hour. Vehicular transportation tunnels have the same temperature requirement, but may have reduced requirements for pressure

Maintenance Issues

A key component you should consider when purchasing tunnel dampers is the maintenance. Do you have the appropriate staff to perform maintenance? We always suggest scheduling routine preventative maintenance to ensure that the dampers are cycled every so often. To say it would be disappointing would be an understatement if you find out one of the actuators has failed during an emergency.

Tunnel dampers provide a high standard for life safety ventilation in the transit systems. They provide normal ventilation and smoke control during emergency situations. Eldridge can provide the right Flamgard damper for your next tunnel project. Give us a call today.

Fresh Air Dampers for High Temperature Environments

Damper control is crucial for proper ventilation in your facility. Depending on the type of damper you choose, it may be vital for safety, such as fire or noxious gas isolation. They are also important for controlling temperatures in industrial HVAC Systems to keep interiors cool and comfortable for workers.

No matter what type of dampers you need, consider the temperatures they are regularly exposed to.

Extreme temperatures require specialized dampers for your industrial ventilation system. These dampers may be configured differently or made of specific materials to withstand high and low temperature applications.

Industrial dampers are designed to be heavy-duty and withstand a lot of use. Many dampers will last 20 years before needing replacement. However, this all depends on choosing the right dampers for your application!

Using traditional dampers in high temperature environments can cause your dampers to degrade faster, leaving your facility vulnerable to safety concerns for air quality, fire, and hazardous gases. Talk to our ventilation specialists about temperatures your dampers will be exposed to ensure you receive the best options for your needs.

Our team offers years of knowledge and field experience to find the most practical damper solutions for your industrial ventilation system. During a site visit, we can evaluate your facility's needs. Working with our experts means you know you'll get the most practical and cost-effective dampers for your ventilation system.
Contact us today for damper supply, ventilation system design, or retrofitting your current system with new and improved dampers.

CERTIFICATE


Certificate Of Registration

This is to certify that management system of

PT. RICWIL INDONESIA

Has been formally assessed by PT. Tafa Sertifikasi Indonesia and found to comply with requirements of

SNI ISO 14001 : 2015

Environmental Management System - Requirement

Scope of Certification :

General Contractor of Building, Installation of Mechanical & Electrical, Installation of Piping, Other Construction Work, Manufacture & Supplier of Mechanical & Electrical Insulation (From Polyurethane Product & Jacketing) and Retail Material for Other Construction.

Registration site :

Jl. Pangeran Jayakarta Komplek Ruko 126 - 129 Blok D Nomor 52, Kelurahan Mangga Dua Selatan, Kecamatan Sawah Besar, Kota Adm. Jakarta Pusat, Provinsi DKI Jakarta

Original Issued Date : 12 June 2020 Certification Expiry Date : 11 June 2023

Certification Issued Date : 12 June 2020 Reg Number : EMS20118

Authorized Signature

President Director

PT. Tafa Sertifikasi Indonesia

Jl. Pondok Cabe Raya, Pondok Cabe Mutiara B-16, Tangerang Selatan, Banten, Indonesia 15418

To verify the validity of this certificate please scan the barcode above or visit www.tsicertification.com or send Email to : info@tsicertification.co.id or call : +62 21-74775110


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Original Issued Date : 12 June 2020 Certification Expiry Date : 11 June 2023

Certification Issued Date : 12 June 2020 Reg Number : QMS20319

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President Director

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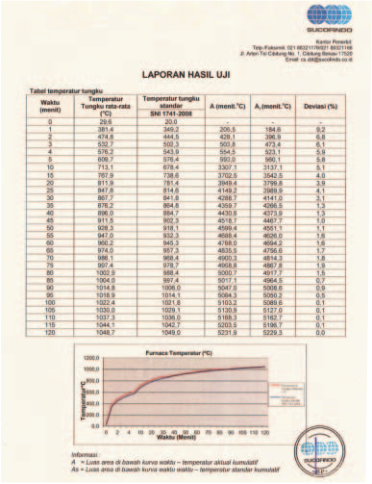

LAPORAN HASIL UJI

Tabel temperatur tungku

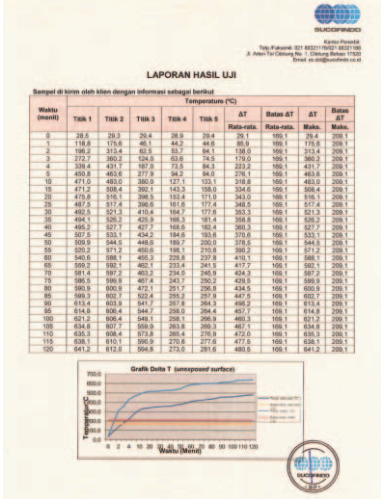
Waktu (menit)	Temperatur Tungku rata-rata (°C)	Temperatur tungku standar SNI 1741-2008	A (menit.°C)	A_s (menit.°C)	Deviasi (%)
0	29.6	20.0			
1	391.4	349.2	205.5	184.6	9.2
2	474.8	444.5	428.1	396.9	6.8
3	532.7	502.3	503.8	473.4	6.1
4	576.2	543.9	554.5	523.1	5.9
5	609.7	576.4	593.0	560.1	5.9
10	713.1	678.4	1307.1	1137.1	15.1
15	781.9	738.6	3702.5	3542.5	4.0
20	811.5	781.4	3949.4	3799.8	3.9
25	847.8	814.6	4149.2	3989.9	4.1
30	867.7	841.8	4289.7	4141.0	3.1
35	878.2	864.8	4359.7	4266.5	1.3
40	898.0	884.7	4430.8	4373.9	1.3
45	911.5	902.3	4515.7	4467.7	1.0
50	928.3	918.1	4599.4	4551.1	1.1
55	947.0	932.3	4688.4	4626.0	1.6
60	966.2	945.3	4785.8	4694.2	1.9
65	974.0	957.3	4835.6	4756.6	1.7
70	986.1	968.4	4900.3	4814.3	1.8
75	997.4	978.7	4958.8	4867.8	1.9
80	1002.9	988.4	5000.7	4917.7	1.7
85	1004.0	997.4	5017.1	4964.5	0.7
90	1014.9	1006.0	5047.8	5008.6	0.9
95	1018.9	1014.1	5084.2	5050.2	0.5
100	1022.4	1021.8	5103.2	5089.6	0.1
105	1030.0	1029.1	5139.9	5127.0	0.1
110	1037.3	1036.0	5169.3	5162.7	0.1
115	1044.1	1042.7	5203.5	5196.7	0.1
120	1048.7	1049.0	5231.9	5229.3	0.0

Furnace Temperatur (°C)

Informasi :

A = Luas area di bawah kurva waktu – temperatur aktual kumulatif

As = Luas area di bawah kurva waktu – temperatur standar kumulatif


LAPORAN HASIL UJI

Sampel di kirim oleh klien dengan informasi sebagai berikut

Temperature (°C)

Waktu (menit)	Titik 1	Titik 2	Titik 3	Titik 4	Titik 5	ΔT Rata-rata.	Batas ΔT Rata-rata.	ΔT Maks.	Batas ΔT Maks.
0	28.5	29.3	29.4	28.9	29.4	29.1	169.1	29.4	209.1
1	118.8	119.6	46.1	44.2	44.8	85.9	169.1	119.6	209.1
2	196.2	313.4	62.5	53.7	64.1	138.0	169.1	313.4	209.1
3	272.7	360.2	124.8	63.6	74.5	179.0	169.1	360.2	209.1
4	339.4	431.7	187.8	73.5	84.3	223.2	169.1	431.7	209.1
5	400.8	483.6	277.9	94.2	94.0	278.1	169.1	483.6	209.1
10	471.0	483.0	380.9	127.1	123.1	318.8	169.1	483.0	209.1
15	471.2	508.4	392.1	143.3	158.0	334.6	169.1	508.4	209.1
20	470.8	516.1	396.5	153.4	171.0	343.0	169.1	516.1	209.1
25	487.5	517.4	396.6	161.6	177.4	348.5	169.1	517.4	209.1
30	492.5	521.3	410.4	164.7	177.6	353.3	169.1	521.3	209.1
35	494.1	526.2	425.9	169.3	181.4	358.8	169.1	526.2	209.1
40	496.2	527.7	447.7	169.6	182.4	360.3	169.1	527.7	209.1
45	507.5	533.1	434.2	184.6	193.8	370.8	169.1	533.1	209.1
50	509.9	544.5	448.0	193.7	200.0	378.6	169.1	544.5	209.1
55	520.2	571.3	450.8	198.1	210.8	390.2	169.1	571.2	209.1
60	540.6	588.1	455.3	220.8	227.8	410.1	169.1	588.1	209.1
65	559.2	592.1	462.1	233.4	241.5	417.7	169.1	592.1	209.1
70	581.4	597.3	463.2	234.0	245.5	424.3	169.1	597.2	209.1
75	586.5	599.8	467.4	241.7	250.2	429.8	169.1	599.8	209.1
80	590.9	600.9	472.1	251.7	256.8	434.5	169.1	600.9	209.1
85	589.3	602.7	522.4	265.2	257.9	447.0	169.1	602.7	209.1
90	613.4	603.8	541.7	267.8	264.3	498.2	169.1	613.4	209.1
95	614.8	606.4	544.2	298.0	294.4	457.7	169.1	614.8	209.1
100	621.2	606.4	549.1	258.1	266.9	460.3	169.1	621.2	209.1
105	638.1	607.7	559.9	263.8	269.3	467.1	169.1	634.8	209.1
110	635.3	608.4	573.8	265.4	276.9	472.0	169.1	635.3	209.1
115	638.1	610.1	590.9	270.8	277.6	477.5	169.1	638.1	209.1
120	641.2	612.0	594.8	273.0	281.8	480.5	169.1	641.2	209.1

Grafik Delta T (unexposed surface)

TUNNEL VENTILATION DAMPER

ACTUATION
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
2-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.

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

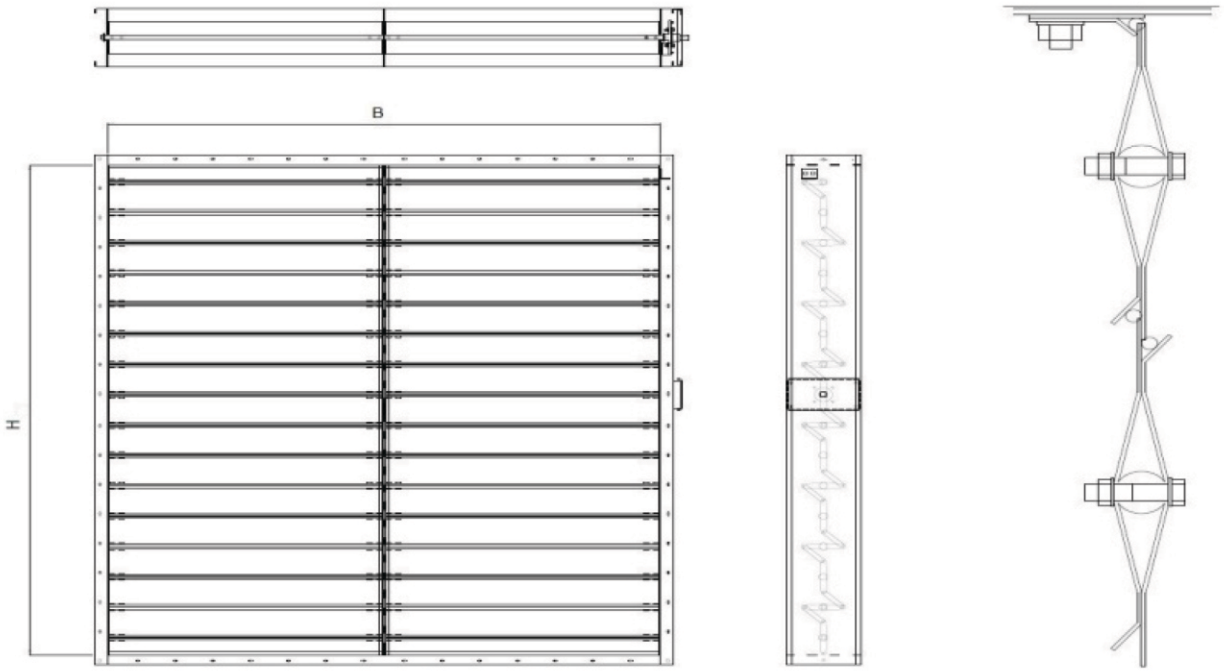
CERTIFICATIONS

✓ Southwest Research Institute Fire Tested to BS476:20

NOTE: Dimensions shown in parentheses ( ) indicate millimeters.

	Frame Depth	Frame Material	Frame Thickness	Flange Width	Blade Type	Blade Material	Shaft Type	Shaft Material	Bearings	Linkage	Blade Seal	Jamb Seal
Standard Construction	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
Optional Construction	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

TUNNEL VENTILATION DAMPER



Material Specification

Linkage
Heavy duty-opposed action with linkage bearings.

Blade Side Seals
Roll formed from 75 x 0.3 mm hardened and ground grade 316 stainless steel. Forming gives an approximate 8 mm convex profile compressed by the blades which seals the gap between the blade and the inside of the case.

Actuator Mounting Angles
Formed angle sections welded to damper case, pre-punched for actuator mounting plate.

Bearings
Flanged oilite/oil impregnated sintered bronze bearing as standard. Other bearings can be provided upon request.

Shafts
Shafts Ø 20 mm through blade and bearings. Bolted to blades with nuts and spring lock washers.

Finish
Generally natural. All welds on damper face to be ground flush. Welds and cut edges zinc rich painted for galvanized mild steel construction.

Guards
Fitted over the external drive linkage as an option for all motorized dampers.

Case
2 or 3 mm thick-formed channel section, 300mm or 210mm deep with 50mm flanges. Case sections are fully welded externally. Mullions fitted into case above 1100mm wide are stitch welded.

Blades
1.2 or 2.0 mm thick formed sections spot welding together resulting in a double skin aerofoil section fitted over Ø 20 mm shaft. Opposed action linkage geometry allows blades to interlock forming a fireproof barrier. Blades are bolted to shafts.

Landing Angles
15mm x 40mm x 3mm full width bolted to case and adjustable to ensure tight seal after damper installation.

Drilling
Standard drilling patterns available, other flanges drillings available upon request.

TUNNEL VENTILATION DAMPER

Material

Damper can be manufactured from:

- Hot Dipped Galvanized Mild Steel to BS EN 10327:2004 Z27
- Stainless steel grade 304 to ASTMA
- Stainless steel grade 316L to ASTMA
- Other materials at customer's request

Actuation

Available with a variety of actuators and accessories:

- Pneumatic, semi-rotary spring return type
- Electric semi rotary spring return type
- Pneumatic, semi-rotary, double acting type
- Electric, semi-rotary, double acting type
- Fusible link rated at 68°C
- Micro switches or Proximity switches for open and closed position indication
- Positioners suitable for modulating control with potentiometer feedback

Table 1: Dimensions in mm (standard sizes – fire rated)

Infinitely variable between stated limits.
Above these sizes multiple modules are offered.

Standard Size (Fire Rated)	Single Module	Double module driven by one actuator
Minimum B	150mm	2201mm
Maximum B	2200mm	4550mm
Minimum H	150mm	150mm
Maximum H	2500mm	2500mm

Table 2: Dimensions in mm (standard sizes – non fire rated)

Infinitely variable between stated limits.
Above these sizes multiple modules are offered.

Standard Size (Non Fire Rated)	Single Module	Double module driven by one actuator
Minimum B	150mm	3151mm
Maximum B	3150mm	6450mm
Minimum H	150mm	150mm
Maximum H	2500mm	2500mm

Specification Text

Generation Construction

The dampers shall be of opposed blade multi-leaf design with the blades being encased in a fabricated channel frame. The damper shall be suitable for operation in the vertical or horizontal orientation with the airflow in either direction. The damper frame sections shall be minimum of 210 mm deep, with flanges for mounting to ductwork or structural openings.

The frame section shall be continuously welded at corners to form a rigid frame in which the blades are housed. The rigidity shall be such that the blades are correctly aligned so that there is no chattering or binding resulting in dependable operation. Flanges will be 50 mm wide as standard.

The damper blades shall be opposed blade action and shall be manufactured to provide a double skin aerofoil section with intermeshing tip-to-tip configuration. Blades shall be fitted with Kerlane tip seal.

Mullions shall be fitted into the damper case to limit the blade length to a maximum of 1100 mm.

The blade width dimension shall be such that when fully open it shall not extend beyond the damper case, and when closed there will be a minimum of 8 mm blade-to-blade overlap.

The blades shall be bolted to the shaft. Shaft diameter shall be 20 mm diameter. The clearance between blade ends and inside case sides shall be sealed using stainless steel sprung side seals.

The shaft ends shall be housed in oilite/oil impregnated sintered bronze bearings. The bearings at each end of the blade shall be contained within the casing. The bearings shall be removable. Principal welds should be continuously welded except where unacceptable distortion would occur.

All external flange face welds are to be ground flush.

Each damper shall incorporate lifting points in the case.

The damper manufacturer shall be registered to Quality Assurance Standard ISO 9001: 2008 and accept responsibility for mechanical testing of the units before leaving the factory to the satisfaction of the clients inspector.

Control and Operation – Actuated

Each damper shall be suitable for being driven by an electric or pneumatic actuator via an extended drive shaft. The actuator shall be supplied, fitted and tested by the damper manufacturer.