Project: Fonderie Horne **Reference: EF-1 and EF-1-2 (2 single fan units)**

Fan Model: TS3L300D12

Running Fan: 1 / Redundant Fans: 0

Fan Construction

- All Fans Certified by AMCA Standards - Fans have been tested in accordance with AMCA 210 (Air Performance) and AMCA 300 (Sound Performance) in an AMCA certified test chamber.
- Full Scaled Fan Performance Tested and Certified in AMCA Approved Test Chamber
- Up to 150,000 Hour L10 Bearing Life
- Fans Balanced to 0.5 mils Peak-Peak Vibration
- Seven Year Warranty on fan parts, not including labor (See Warranty Statement for details)
- Extended Motor Leads and Grease Fittings for Easy Installation and Maintenance
- System Fully Sealed with Chemical Resistant Gaskets
- 316 Stainless Steel Hardware
- Mixed flow induced dilution high plume fan, AMCA Arrangement 4, AMCA 99 Class "C" Spark Resistance

Fan Color

- Color – Standard Steel Gray

Fan Coating

- Severe Duty Vinyl Ester Coating - 24 mils
- Interior – Cor-Cote VEN GF, 24 Mils
- Exterior – Cor-Cote VEN GF, 24 Mils

Outlet (Nozzle/Silencer)

- Nozzle - TS3 Standard Nozzle - Large
- Wind Band Assembly - Standard Entrainment Windband
- Inline Silencer - No Selection Requested and Not Included

Motor

- Motor Horsepower – 30 HP (Premium Efficiency)
- Motor Voltage – 575 Volt w/ Shaft Grounding Kit, 120V space heaters, thermistors, low temperature grease
- Motor Phase – 3 Ph
- Frequency – 60 Hz
- Motor RPM – 1200 RPM
- Frame Size – 326T
- Motor Manufacturer – Toshiba

Disconnects

- Switch -60 AMP, NEMA 3R, Knife type, CSA switch
- Interlock - Electrical Interlock

Plenum

- Internal Water Drainage Systems
- Internal and External Lifting Lugs on All Fans
- Description – Single Fan Bottom Inlet Single Wall
- Configuration – 1X1
- Dimensions
    - Length - 59 in.
    - Width - 59 in.
    - Height - 42 in.

Plenum Coating

- Color – Standard Steel Gray
- Severe Duty Vinyl Ester Coating - 24 mils
- Interior – Cor-Cote VEN GF, 24 Mils
- Exterior – Cor-Cote VEN GF, 24 Mils

Vortex Breaker

- Description – Not Required for Bottom inlet single fan plenums

Isolation Dampers Qty (1) / Fan System

- Description – 316SS, Opposed Blade, Un-Coated (Spec M)
- Dimensions
    - Width – 46 in.
    - Height – 46 in.
    - Depth – 8 in.
- Actuator – AFBUP-S, Electronic Actuator, Belimo, 24-240V, 2 Pos, End Sw
- Transformer – 575V to 115V transformer

Bypass Dampers Qty (2) / Fan System

- Description – 316SS, Opposed Blade, Un-Coated (Spec P)
- Dimensions
    - Width – 36 in.
    - Height – 24 in.
    - Depth – 8 in.
- Actuator – 316SS, Hand Quadrant Actuator
- Transformer – Not required for hand quadrant actuator

Rain Hood

- Rain Hood – Rain Hood for TS3, FRPP

Roof Curb

- Description – Supplied by others (TS3 single fan requires a 58" square curb)

Weights (all weights are for a single item)

- Nozzle Assembly – 253 lbs.
- Motor – 631 lbs.
- Fan and Housing – 1400 lbs. (includes motor weight)
- Plenum – 727 lbs.

Strobic Air Corporation
A Cincinnati Fan Company
140 W Orvilla Rd.
Lansdale, PA 19446
Phone: (215) 723-4700 | Fax: (215) 723-7401
www.choosetristack.com | www.strobicair.com

Project: Fonderie Horne - Fan Reference: EF-1 and EF-1-2
Fans: 1 (operating) / 0 (redundant)

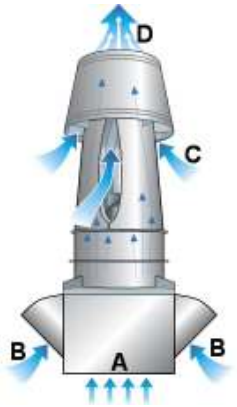
Tri-Stack™

A: Inlet Flow
29450 cfm

B: Bypass Flow
2033 cfm

C: Entrained Flow
11020 cfm

D: Total System Flow
42503 cfm



Operating Conditions

Inlet Static Pressure: **1 in w.g.**	Inlet Flow per Fan: **29450 cfm**	Inlet Flow Total: **29450 cfm**
Inlet Air Temperature: **70 deg F**	Ambient Air Temp.: **-40 deg F**	Altitude at Site: **0 ft**
Inlet Air Density: **0.075 lb/cu ft**	Ambient Air Dens: **0.0947 lb/cu ft**	Operating Frequency: **60 Hz**

Fan Performance Data - (single fan)

Fan Model: **TS3L300D12**

Fan Flow Rate: **31483 cfm**	Nozzle Velocity: **5830 fpm**	Effective Stack Height:
Total Flow: **42503 cfm**	Wind Band Area: **11.05 sq. ft**	10 mph Wind: **77 ft**
Operating Speed: **1200 rpm**	Min. Motor Hp: **30 hp**	15 mph Wind: **56 ft**
Dilution Ratio: **144 %**	Corrected BHP: **26.38 hp**	

Altitude and Temperature Corrections

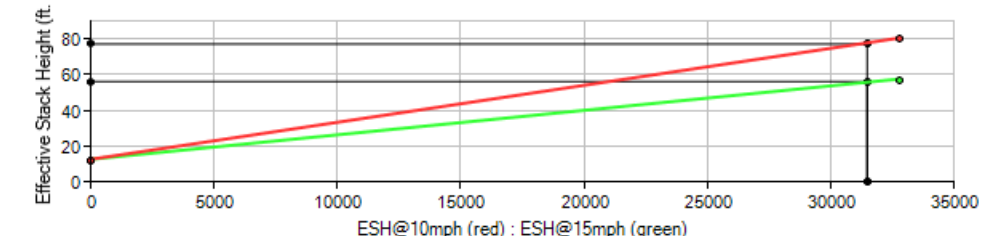
Mixed Air Density:	Mixed Air Temperature:	Corrected Static Pressure:
0.0763 lb/cu ft	**61 deg F**	**1.02 in w.g.**

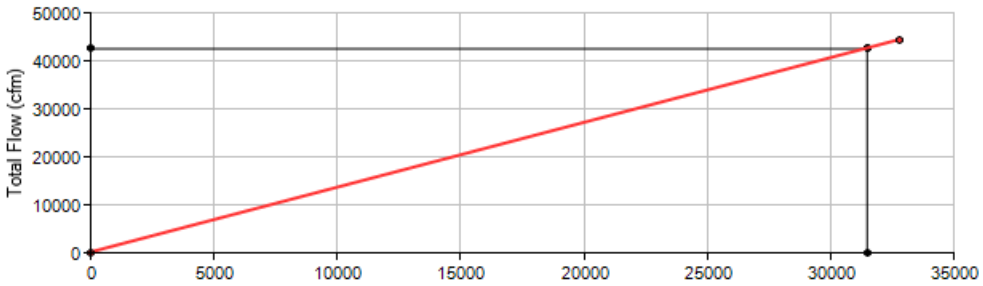
Comments

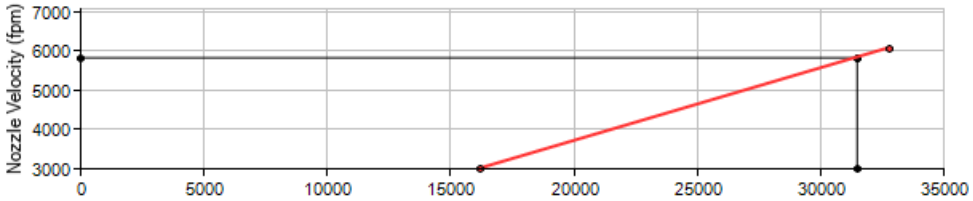
1. Number of fans running does not include redundant fan.
2. Inlet static pressure had been derated for discharge nozzle, windband, airfoil isolation damper, and outlet silencer
3. Inlet static pressure had been derated for system effects through the mixing box, based on the factory-recommended duct configurations.
4. Consult factory for additional derations when duct configurations do not meet factory guidelines.
5. Add an additional 0.15 inches static pressure for gravity isolation dampers (usable on single fan mixing boxes only).
6. Effective stack height from roof line is given for fan without a mixing box, mounted on an 18 inch high curb.
7. Stack height calculated using Briggs equation, per ASHRAE Fundamentals (1997).

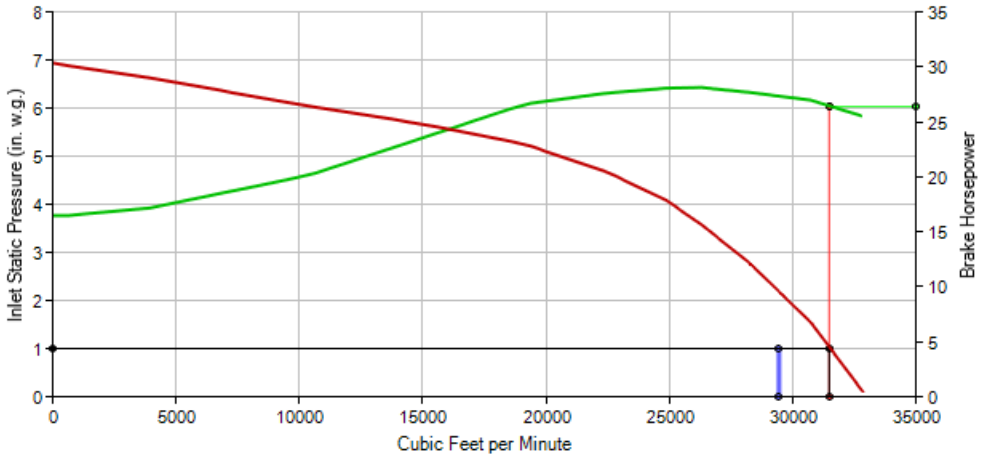
Fan Model: TS3L300D12
Reference: EF-1 and EF-1-2

Speed: 1200 RPM
Mixed Air Density: 0.0763 lb/cu ft









Inlet Static Pressure has been Derated for Discharge Nozzle, Windband, Airfoil Isolation Damper, and Outlet Silencer, as well as System Effects Based on Factory-Recommended Duct Configurations. Add an additional 0.15 inches for Gravity Isolation Dampers (On Single Fan Plenums Only).
Consult Factory for Additional Deration for Duct Configurations that do not meet Factory Guidelines.
Effective Stack Height at Stated Wind Speed from Roof Line for Fan w/o Mixing Box, mounted on an 18 inch high curb. Add height of mixing box.

Fan Outlet Sound Data For Fan Model TS3L300D12.
Number of Fans Running: 1 - no silencer, at 60Hz

Frequency	**63 Hz**	**125 Hz**	**250 Hz**	**500 Hz**	**1000 Hz**	**2000 Hz**	**4000 Hz**	**8000 Hz**
Outlet Sound Power Levels	88	96	96	95	94	90	88	78
Corrected Outlet Sound Power Levels	88	96	96	95	94	90	88	78

Corrections for 10 ft Distance	-17	-17	-17	-17	-17	-17	-17	-17
Sound Levels (10 ft)	71	79	79	78	77	73	71	61
'A' Scale Corrections	-26	-16	-9	-3	0	1	1	-1
dB'A' Spectrum (10 ft)	45	63	70	75	77	74	72	60

Net Sound Level at 10 ft: 81dB'A' (at 60Hz)

Frequency	**63 Hz**	**125 Hz**	**250 Hz**	**500 Hz**	**1000 Hz**	**2000 Hz**	**4000 Hz**	**8000 Hz**
Outlet Sound Power Levels	88	96	96	95	94	90	88	78
Corrected Outlet Sound Power Levels	88	96	96	95	94	90	88	78

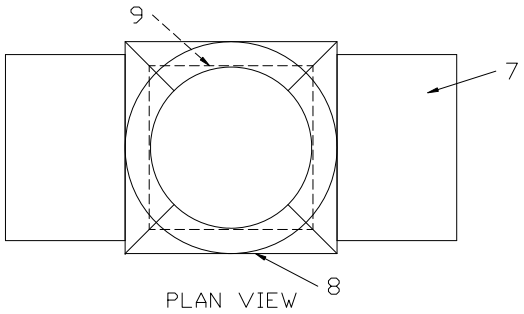
Corrections for 50 ft Distance	-31	-31	-31	-31	-31	-31	-31	-31
Sound Levels (50 ft)	57	65	65	64	63	59	57	47
'A' Scale Corrections	-26	-16	-9	-3	0	1	1	-1
dB'A' Spectrum (50 ft)	31	49	56	61	63	60	58	46

Net Sound Level at 50 ft: 67dB'A' (at 60Hz)

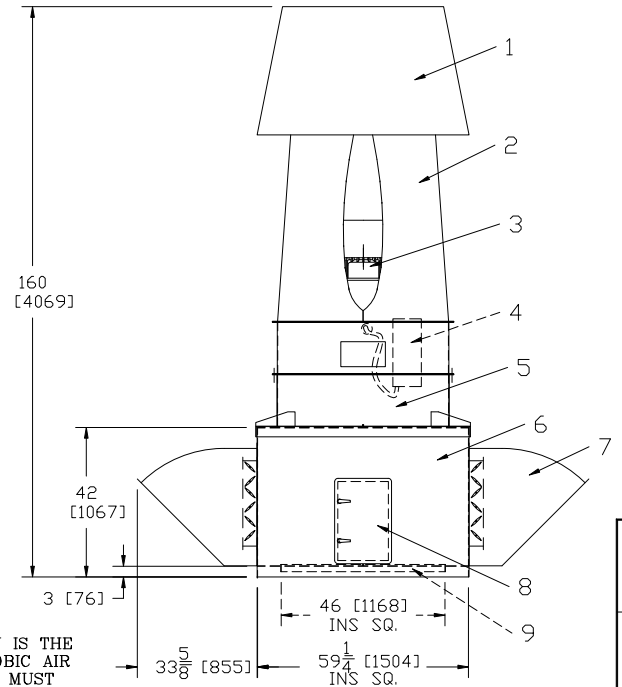
Not all inline and silencer nozzle combinations have been tested in conjunction with each other for sound performance. The results of the additional attenuation of both sets of silencers in this arrangement is conservatively estimated based off of similar applications. Please contact Strobic Air for additional information regarding sound values.

Last revised date October, 2015

FAN UNITS: EF-**1** AND EF-**1**-2



PLAN VIEW



REVISION			
LTR.	DESCRIPTION	DRAWN	CHECKED
A	REVISED HEIGHT DIMENSION	2/20/07	BMF
B	CHANGED PLENUM SIZE	10/19/07	BJM
C	CHANGED INLET SIZE	3/17/10	BJM

NOTES:
1. ENTRAINMENT WINDBAND
2. TRI-STACK(TM) NOZZLE
3. MOTOR
4. DISCONNECT SWITCH
5. FAN HOUSING
6. SINGLE-WALLED MIXING PLENUM
7. BYPASS DAMPER WITH RAINHOOD (TYP-2)
8. ACCESS DOOR
9. 46" SQ. DUCT OPENING

TOTAL WEIGHT: 2380 LBS. [1080 KG]

ADDITIONAL NOTES:
A) A 3" FLANGE IS ADDED TO THE PERIMETER BASE OF THE PLENUM FOR MOUNTING TO A STRUCTURAL BASE (CONCRETE CURB, STRUCTURAL STEEL, ETC.).
B) STROBIC AIR RECOMMENDS THAT DUCT INLET CONDITIONS FOLLOW SMACNA GUIDELINES TO MINIMIZE SYSTEM EFFECT.
C) FOR FAN MODELS TS3S100B9, TS3S150A12, TS3L150A12, TS3S200B12, & TS3L200B12, OVERALL FAN HEIGHT WILL DECREASE BY 2".
D) WEIGHT CALCULATED USING FAN MODEL TS3L300D12. ACTUAL WEIGHTS MAY VARY FROM THIS VALUE.

DIMENSIONS GIVEN IN INCHES [MILLIMETERS]

NOTE: BECAUSE WE ARE CONSTANTLY STRIVING TO IMPROVE OUR PRODUCTS, WE RESERVE THE RIGHT TO PROVIDE VERSIONS OF THESE PRODUCTS WITH SLIGHT VARIATIONS FROM THOSE ILLUSTRATED HERE.

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UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE = .XX ±0.06 .XXX=	CONTRACT NO.		TS-3 TRI-STACK FAN ON A BOTTOM INLET PLENUM
	APPROVALS	DATE	STROBIC AIR CORPORATION A SUBSIDIARY OF MET-PRO CORP. HARLEYSVILLE, PA 19438
MATERIAL	DRAWN E.C.A.	6/17/03	
	CHECKED		
	APR'VD		
FINISH	U.S. PATENT NO. 6,431,974 U.S. PATENT NO. 6,112,850 U.S. PATENT NO. 4,806,076 CANADIAN PATENT NO. 1,277,171		SIZE B | CODE IDENT. NO. TS3_S_BI_RN | DRAWING NO. 061703E-9 REV C SCALE: N.T.S. | SHEET 1 OF 1

SUBMITTAL REVIEW

The Strobic Safety Design Response Team has reviewed the equipment selections in the attached submittal for compliance with the American National Standards Institute Z9.5 (1992), "Standard for Laboratory Ventilation". All scheduled performance requirements are supplied by the owner's representative. Designed in conformance with AMCA 99, AMCA 211, AMCA 311 & ASHRAE handbook.

Discharge Velocity: The review indicates the equipment performance meets the minimum discharge velocity requirements of 3000 fpm.

Wind Analysis: Strobic has assumed that the owner's representative has conducted or reviewed the need for a study of the air flow patterns around the building / site (wind analysis) similar to the procedures outlined in the ASHRAE Handbook (1999), Chapter 43, and has also performed or reviewed the need for a Dispersion Analysis. The performance data in this submittal is presented in a format that notes both effective stack height (plume rise) and wind band dispersion, for easy verification of these analyses by the owner's representative.

Equipment Height: Where architectural screen heights and adjacent building heights are known, Strobic has reviewed the equipment heights for conformity to ANSI Z9.5.

Redundancy Requirements: Redundancy requirements were reviewed where system operations were supplied by the owner's representative.

System Effects: Inlet velocities and potential system effects immediately adjacent to the plenum supplied with this equipment were not reviewed. Factory supplied connections have been sized for the fan's flow rate. It is recommended that this size be maintained and free from bends for at least 3 diameters up stream of the fan to avoid system effects. If inlet velocities exceed 1500 fpm or if elbows are located near the duct connection, system effects and reduced fan performances could result. Strobic certifies the fan flow and pressure performance stated in this submittal are de-rated for losses through plenum (at duct inlet velocities of up to 1500 fpm), isolation damper, fan and outlet stack arrangements supplied by the factory only.

Vibration Isolation: Vibration isolation is normally not required with curb installations. If fans are hard mounted on a structural base, we recommend a full perimeter support with waffle pad isolation. However, a review of the roof structure should be conducted by the owner's representative for structural rigidity and possible resonance at the fan frequency, particularly at 900 rpm. When adjustable speed drives are employed, it may be necessary to avoid certain frequencies where resonance with ductwork, roof and other structural members may occur. Strobic recommends that the start-up services by the drive manufacturer be employed after the building controls are fully installed to assist in air balance, drive control logic, vibration and motor overload avoidance.

Motors: The motors supplied with this equipment are designed for standard 230/460 volt applications and have been prewired at the factory to the voltage specified by the owner's representative. Input voltage to the motor must be supplied to within 10% of the nameplate volts. Otherwise, damage to the motor could result. Standard motors are usable on a 208 volt system; however, the minimum supply voltage requirement is 207 volts. Supplying these motors with lower voltage may produce insufficient motor torque with the motor unable to achieve full speed. Low or high voltage (beyond the +/-10% range) can also cause motor overheating, increased amp draw (even with higher voltages), reduced motor life, and damage not covered by warranty. If low or high voltage is suspected, contact the factory for special motors designed for your voltage before the order is released to production.

Sound Levels: The published sound power levels presented in this submittal are based on actual tests conducted on a like-size fan in accordance with AMCA 300 procedures. The resultant sound levels are calculated based on formulas shown in the Strobic Engineering Guide. Cautionary Note: These formulas and explanations are simplified in the interest of brevity. They are accurate enough for most laboratory situations. However, these calculations are not intended to replace a more sophisticated analysis where it may be needed, particularly atmospheric effects and where site structures may cause reflected sound effects. When attenuators are employed, resultant airborne path sound levels may be lower than radiated stack sound levels and may require further analysis in critical neighborhood exposures.

UL705 Certification: All systems are certified, tested and labeled under UL 705.

Factory Certification: All fans are tested at the factory for vibration, amperage draw and mechanical integrity. A permanent record of these tests is maintained at the factory and is available upon written request.

Seismic Requirements: Although Strobic Air fans have been tested to resist a 125 mph crosswind without the need for guy wires (when installed according to factory specifications), Strobic Air drawings are not seismic recommendations. It may be necessary to have a licensed professional engineer review the local building code requirements where the equipment is to be installed.

Strobic Air Corporation
140 W Orvilla Rd, Lansdale, PA 19446
Tel: 215-723-4700 • Fax: 215-723-7401
tristack@strobicair.com • www.strobicair.com

STANDARD STATEMENT OF TRI-STACK™ 7-YEAR FAN WARRANTY AND LIMITATION OF LIABILITY

At Strobic Air, we want you to benefit from a well-crafted and highly reliable system that you can utilize for years to come. We use the latest engineering and technical know-how to design and build Strobic Fans and Control Systems. In fact, we are so proud of how we engineer and build our products that we offer one of the most comprehensive warranties around.

Strobic Air warrants that Tri-Stack™ products shall be shipped free from defects in materials and workmanship, and will operate in accordance with our proposals, specifications and nameplate data under proper conditions, installation, rated load, environment and usage for a period of 84 months (7 Years) from date of shipment from Strobic Air's location.

Strobic Air (Seller) is limited to the repair or replacement of the original parts. Buyer shall bear the costs of access (including removal and replacement of systems, structures or other parts of Buyer's facility), de-installation, installation, decontamination and transportation of defective Products to Seller. New or refurbished parts will be furnished FOB factory to Buyer's location at Seller's designated shipping point, freight allowed to Buyer's Location or ExWorks for shipments outside the conterminous United States.

These warranties and remedies are conditioned upon (a) the proper storage, installation, operation and maintenance of products and conformance with the proper operation instruction manuals provided by Seller or its suppliers or subcontractors, (b) Buyer keeping proper records of operation and maintenance during the warranty period and providing Seller access to those records, and (c) modification or repair of products only as authorized by Seller in writing. Seller does not warrant products or any repaired or replacement parts against normal wear and tear or damage caused by misuse, accident or use against the advice of Seller. Any modification or repair of any products not authorized by Seller shall render the warranty null and void.

Electrical components, excluding motors, are warranted only to the extent warranted by the original manufacturer. To the extent that Seller is entitled to pass through a warranty of the original equipment manufacturer of the electrical goods sold, Seller will pass through such warranties to Buyer. Strobic Air makes every effort to utilize materials that resist rust, but the warranty on Metal and Stainless Steel Components DOES NOT COVER RUST, OXIDATION, FADING or other BLEMISHES unless it also results in a loss of structural integrity or a failure of these components.

Any repair, replacement or reperformance by Seller hereunder shall not extend the applicable warranty period. The Parties shall mutually agree on the specifications of any test to determine presence of a defect. Seller shall have no liability for defects that arise after the warranty period has expired.

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FAN AND PLENUM COATING

Tri-Stack™ Fume Hood Exhaust Systems with direct drive, mill & chemical motors

The Sherwin-Williams Company

Industrial & Marine Coatings

SeaGuard Marine & Specialty Coatings

COR-COTE® VEN GF

Strobic Air Corporation [Laboratory Exhaust Equipment Coating Specifications]

High Performance Interior Corrosion Resistant Coating System

A multi-functional epoxy novolac based vinyl ester reinforced with laminar graphite fillers for applications where exposure to hydrofluoric or hydrofluosilicic acids are encountered.

Surface Preparation & Comments

- Abrasive blast clean to Sa2.5 (ISO 8501-1:1988) or SSPC-SP10. If oxidation has occurred between blasting and application, the surface should be reblasted to the specified visual standard. Surface defects revealed by the blast cleaning process, should be ground, filled, or treated in the appropriate manner
- A sharp, angular surface profile of 2-3 mils (50-75 microns) is recommended.

Area Size: 1 ft²

#	Product Name	Coat Type	VS (%)	Application Method	DFT (mil)	Overcoating Interval€Min - Max (73°F)	Pot Life at 73ºF (25ºC) (73°F)	PSR (ft²/gal)
1	Cor-Cote VEN GF	Full Coat	100% Reactive	Airless Spray, Brush, Roller, Air Spray	16.0-24.0	3 Hr - 6 Day	30 - 60 Min	64 - 80

Sherwin-Williams Cor-Cote VEN GF graphite filled vinyl ester is a multi-functional epoxy novolac based vinyl ester. It provides resistance to many aromatic and aliphatic solvents, organic and mineral acids, and excellent resistance to thermal degradation. It employs laminar graphite fillers in place of silica based fillers for applications where exposure to hydrofluoric or hydrofluosilicic acids are encountered. This resistance makes Cor-Cote VEN GF the material of choice for protection of fume hoods, fan blades, condenser housing and other chemical process equipment with hydrofluoric or hydrofluosilicic acids applications.

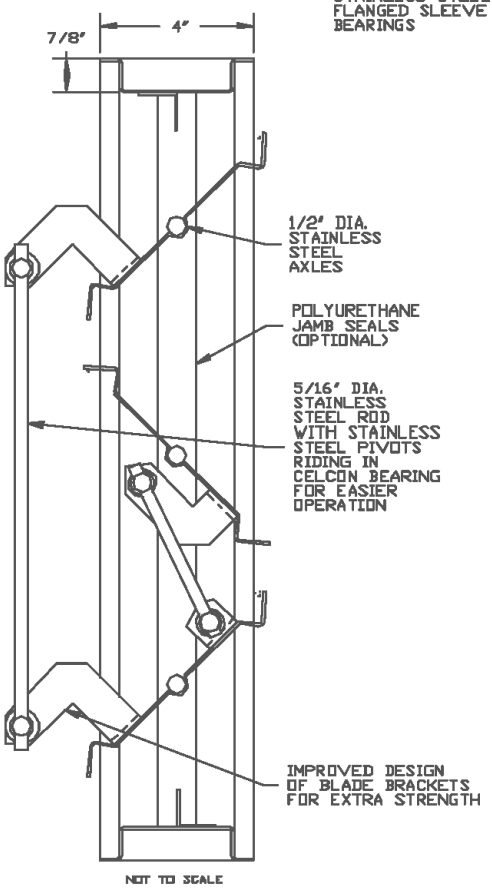
For specific chemical resistance requirements please consult Strobic Air Corporation's technical department.

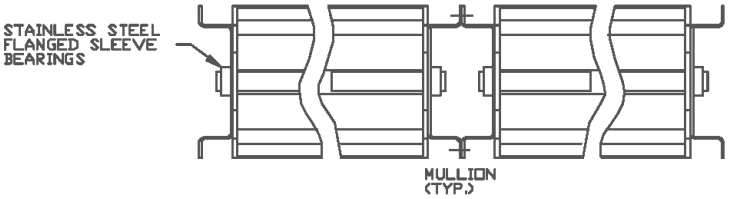
SPEC M **316**SS ISOLATION DAMPER

ARROW
STAINLESS STEEL CONTROL DAMPERS

SERIES 182

PARALLEL OR OPPOSED BLADES - WITH OR WITHOUT SEALS





SPECIFICATIONS

FRAME: HAT-SHAPED CHANNEL, 4" DEEP, 18 GA. STAINLESS STEEL HAT SHAPED CHANNEL FOR GREATER RIGIDITY AND STRENGTH.

SIZES: MADE TO EXACT SIZE AS REQUIRED:
MAXIMUM PANEL: 48" W X 96" H
MINIMUM PANEL: 6" W X 8 3/4" H

OPTIONAL

DRIVE SHAFTS: EXTENDABLE TO 8" BEYOND FRAME, MORE THAN 8" USING EXTERIOR BEARING SUPPORT.
FLANGED FRAMES:
WIDER FRAMES: FRAMES WIDER THAN 4".
SEALS: AVAILABLE WITH NEOPRENE JAMB AND BLADE EDGE SEALS, OR STAINLESS STEEL JAMB SEALS, OR POLYURETHANE JAMB AND BLADE SEALS.
UNI-MOUNT BRACKETS: FOR ALL INTERNALLY MOUNTED PNEUMATIC OR ELECTRIC OPERATORS. GALVANIZED STEEL CONSTRUCTION, SPECIFY TYPE AND N.O. OR N.C.
BEARINGS: BRONZE, NYLON, CELCON, BALL, ETC.
MIXING/FACE & BYPASS DAMPERS
JACKSHAFTING: CARBON STEEL (PAINTED) IS STANDARD. STAINLESS STEEL IS AVAILABLE.
OTHER ALLOY: TYPE 316 STAINLESS STEEL, 2B FINISH.

NOMINAL DEDUCTIONS WILL BE MADE TO THE OPENING SIZE GIVEN.

ITEM	QTY.	WIDTH	HEIGHT	PAR.	OPP.	SEALS	ACTUATOR MODEL	INT.	EXT.	N.C.	N.O.	TAG
		DAMPER SIZE (O.D.)						LOCATION		FUNCTION		

UNION MADE

ARROW UNITED INDUSTRIES
A DIVISION OF MESTEK, INC.
314 RIVERSIDE DRIVE
WYALUSING, PA 18853
TEL:(570)746-1888 FAX:(570)746-9286

AGENT: _____

ARCH./ENG.:
CONTR.:
PROJECT:
EDR: ECN: JOB:
DATE: DWN.: DWG.:

671-.1-FEBRUARY-2000

NFBUP, NFBUP-S, NFXUP, NFXUP-S

On/Off, Spring Return, 24 to 240 VAC

BELIMO

Torque min. 90 in-lb, for control of air dampers

Application

For On/Off, fail-safe control of dampers in HVAC systems. Actuator sizing should be done in accordance with the damper manufacturer's specifications. Control is On/Off from an auxiliary contact, or a manual switch.

The actuator is mounted directly to a damper shaft up to 1.05" in diameter by means of its universal clamp. A crank arm and several mounting brackets are available for applications where the actuator cannot be direct coupled to the damper shaft.

Operation

The NFB and NFX series actuators provide true spring return operation for reliable fail-safe application and positive close off on air tight dampers. The spring return system provides constant torque to the damper with, and without, power applied to the actuator.

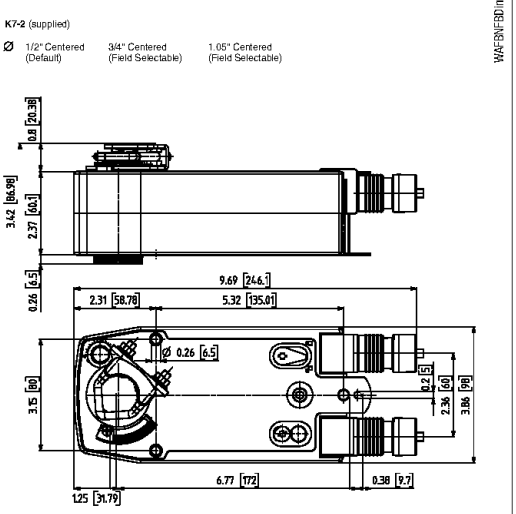
The NFB and NFX series provides 95° of rotation and is provided with a graduated position indicator showing 0° to 95°.

The actuator may be stalled anywhere in its normal rotation without the need of mechanical end switches.

The NFBUP-S and NFXUP-S versions are provided with two built-in auxiliary switches. These SPDT switches provide safety interfacing or signaling, for example, for fan start-up. The switching function at the fail-safe position is fixed at +10°, the other switch function is adjustable between +10° to +90°. The NFBUP, NFBUP-S, NFXUP and NFXUP-S actuator is shipped at +5° (5° from full fail-safe) to provide automatic compression against damper gaskets for tight shut-off.

Technical Data		NFBUP, NFBUP-S, NFXUP, NFXUP-S
Power supply		24...240 VAC -20% / +10%, 50/60 Hz 24...125 VDC ±10%
Power consumption	running	6 W
	holding	2.5 W
Transformer sizing		6 VA @ 24 VAC (class 2 power source) 6.5 VA @ 120 VAC 9.5 VA @ 240 VAC
Electrical connection		
NFBUP...		3 ft, 18 GA appliance cable, 1/2" conduit connector **-S models:** Two 3 ft, 18 gauge appliance cables with 1/2" conduit connectors
NFXUP...		3 ft [1m], 10 ft [3m] or 16 ft [5m] 18 GA appliance cable, with or without 1/2" conduit connector **-S models:** two 3 ft [1m], 10 ft [3m] or 16 ft [5m] appliance cables with or without 1/2" conduit connectors
Overload protection		electronic throughout 0 to 95° rotation
Control		on/off
Torque		90 in-lb [10 Nm] minimum
Direction of rotation	spring	reversible with CW/CCW mounting
Mechanical angle of rotation		95° (adjustable with mechanical end stop, 35° to 95°)
Running time	motor	< 75 seconds
	spring	20 seconds @ -4°F to 122°F [-20°C to 50°C]; < 60 seconds @ -22°F [-30°C]
Position indication		visual indicator, 0° to 95° (0° is full spring return position)
Manual override		5 mm hex crank (3/16" Allen), supplied
Humidity		max. 95% RH non-condensing
Ambient temperature		-22°F to 122°F [-30°C to 50°C]
Storage temperature		-40°F to 176°F [-40°C to 80°C]
Housing		Nema 2, IP54, Enclosure Type2
Housing material		zinc coated metal and plastic casing
Agency listings †		cULus acc. to UL60730-1A/-2-14, CAN/CSA E60730-1:02, CE acc. to 2004/108/EC & 2006/95/EC
Noise level		<50dB(A) motor @ 75 seconds ≤62dB(A) spring return
Servicing		maintenance free
Quality standard		ISO 9001
Weight		4.15 lbs (1.9 kg), 4.4 lbs (2.0 kg) with switches
† Rated Impulse Voltage 4kV, Type of action 1.AA (1.AA.B for -S version), Control Pollution Degree 3.		
NFBUP-S, NFXUP-S		
Auxiliary switches		2 x SPDT 3A (0.5A) @ 250 VAC, UL approved one set at +10°, one adjustable 10° to 90°

Dimensions (Inches [mm])



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Accessories

AV 8-25	Shaft extension
IND-AFB	Damper position indicator
K7-2	Universal clamp for up to 1.05" dia jackshafts
KH-AFB	Crank arm
TF-CC US	Conduit fitting
Tool-06	8mm and 10 mm wrench
ZG-100	Universal mounting bracket
ZG-101	Universal mounting bracket
ZG-118	Mounting bracket for Barber Colman® MA 3../4.., Honeywell® Mod III or IV or Johnson® Series 100 replacement or new crank arm type installations
ZG-AFB	Crank arm adaptor kit
ZG-AFB118	Crank arm adaptor kit
ZS-100	Weather shield (metal)
ZS-150	Weather shield (polycarbonate)
ZS-260	Explosion-proof housing
ZS-300	NEMA 4X housing

Note: When using NFBUP, NFBUP-S, NFXUP, NFXUP-S actuators, only use accessories listed on this page.

For actuator wiring information and diagrams, refer to Belimo Wiring Guide.

Typical Specification

On/Off spring return damper actuators shall be direct coupled type which require no crank arm and linkage and be capable of direct mounting to a jackshaft up to a 1.05" diameter. The actuators must be designed so that they may be used for either clockwise or counterclockwise fail-safe operation. Actuators shall be protected from overload at all angles of rotation. If required, two SPDT auxiliary switch shall be provided having the capability of one being adjustable. Actuators with auxiliary switches must be constructed to meet the requirements for Double Insulation so an electrical ground is not required to meet agency listings. Actuators shall be cULus Approved and have a 5 year warranty, and be manufactured under ISO 9001 International Quality Control Standards. Actuators shall be as manufactured by Belimo.

Wiring Diagrams

INSTALLATION NOTES

1 Provide overload protection and disconnect as required.

2 ***CAUTION** Equipment Damage!*
Actuators may be connected in parallel.
Power consumption and input impedance must be observed.

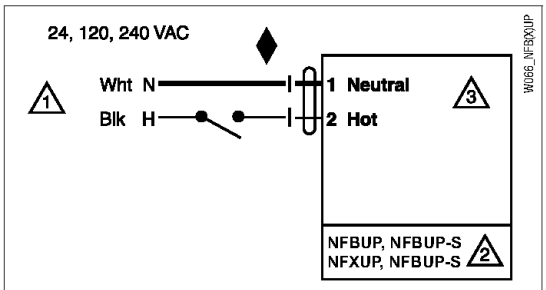
3 No ground connection is required.

4 For end position indication, interlock control, fan startup, etc., NFBUP-S and NFXUP-S incorporates two built-in auxiliary switches: 2 x SPDT, 3A (0.5A) @250 VAC, UL Approved, one switch is fixed at +10°, one is adjustable 10° to 90°.

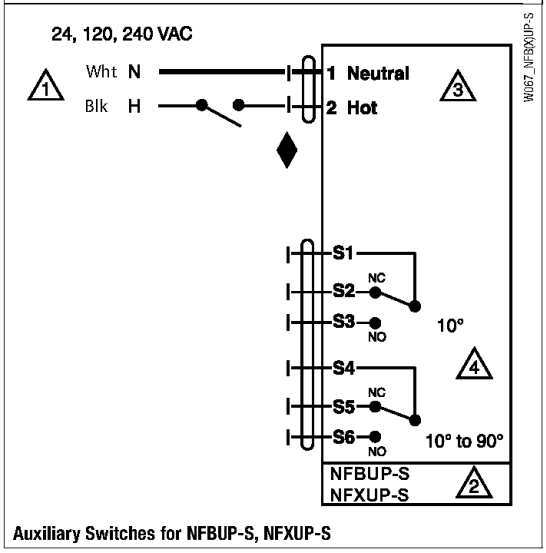
APPLICATION NOTES

Meets cULus requirements without the need of an electrical ground connection.

***WARNING** Live Electrical Components!*
During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.



On/Off wiring for NFBUP, NFXUP



Auxiliary Switches for NFBUP-S, NFXUP-S

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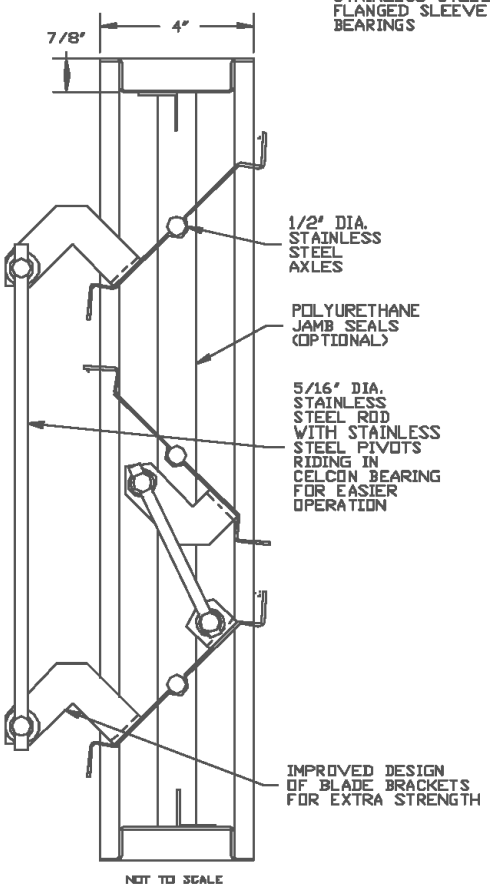
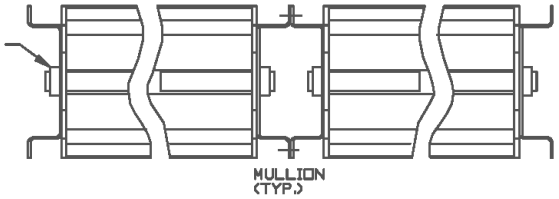
SPEC P **316**SS BYPASS DAMPER

ARROW
STAINLESS STEEL CONTROL DAMPERS

SERIES 182

PARALLEL OR OPPOSED BLADES - WITH OR WITHOUT SEALS





SPECIFICATIONS

FRAME: HAT-SHAPED CHANNEL, 4" DEEP, 18 GA. STAINLESS STEEL HAT SHAPED CHANNEL FOR GREATER RIGIDITY AND STRENGTH.

SIZES: MADE TO EXACT SIZE AS REQUIRED:
MAXIMUM PANEL: 48" W X 96" H
MINIMUM PANEL: 6" W X 8 3/4" H

OPTIONAL

DRIVE SHAFTS: EXTENDABLE TO 8" BEYOND FRAME, MORE THAN 8" USING EXTERIOR BEARING SUPPORT.
FLANGED FRAMES:
WIDER FRAMES: FRAMES WIDER THAN 4".
SEALS: AVAILABLE WITH NEOPRENE JAMB AND BLADE EDGE SEALS, OR STAINLESS STEEL JAMB SEALS, OR POLYURETHANE JAMB AND BLADE SEALS.
UNI-MOUNT BRACKETS: FOR ALL INTERNALLY MOUNTED PNEUMATIC OR ELECTRIC OPERATORS. GALVANIZED STEEL CONSTRUCTION, SPECIFY TYPE AND N.O. OR N.C.
BEARINGS: BRONZE, NYLON, CELCON, BALL, ETC.
MIXING/FACE & BYPASS DAMPERS
JACKSHAFTING: CARBON STEEL (PAINTED) IS STANDARD. STAINLESS STEEL IS AVAILABLE.
OTHER ALLOY: TYPE 316 STAINLESS STEEL, 2B FINISH.

NOMINAL DEDUCTIONS WILL BE MADE TO THE OPENING SIZE GIVEN.

ITEM	QTY.	WIDTH	HEIGHT	PAR.	OPP.	SEALS	ACTUATOR MODEL	INT.	EXT.	N.C.	N.O.	TAG
		DAMPER SIZE (O.D.)						LOCATION		FUNCTION		

UNION MADE

ARROW UNITED INDUSTRIES
A DIVISION OF MESTEK, INC.
314 RIVERSIDE DRIVE
WYALUSING, PA 18853
TEL:(570)746-1888 FAX:(570)746-9286

AGENT: _____

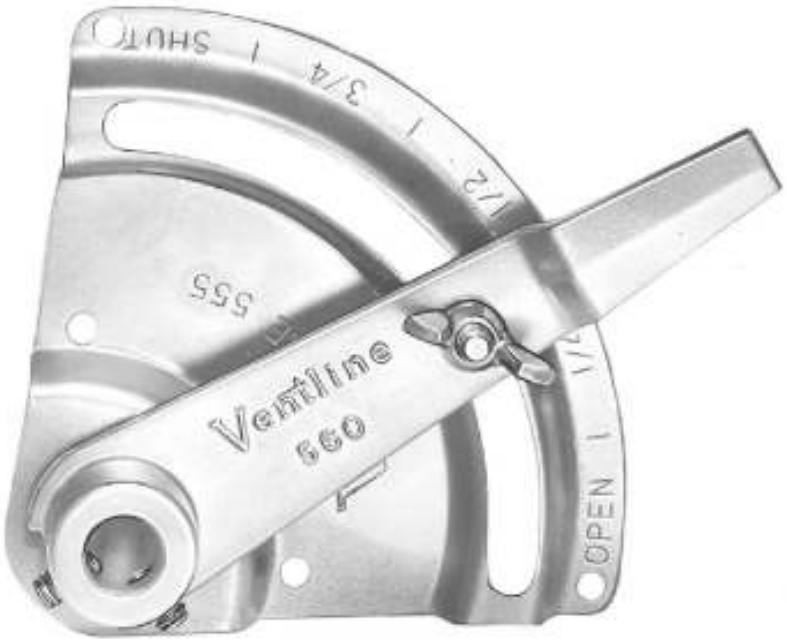
ARCH./ENG.:
CONTR.:
PROJECT:
EDR: ECN: JOB:
DATE: DWN.: DWG.:

671-.1-FEBRUARY-2000

BYPASS DAMPER ACTUATOR, **316**SS

560 QUADRANT FOR USE WITH ½" ROUND ROD

This quadrant is the only one we manufacture to accommodate ½" round rod. The heavy die cast handle is designed with two ¼" socket head set screws to tighten against the bearing pin to insure no slippage. *Weight per 100, 50 lbs.*



560 QUADRANTS