FANPEDIA
BY TWIN CITY FAN

TCF
TWIN CITY FAN

FAN BASICS

FAN COMPONENTS

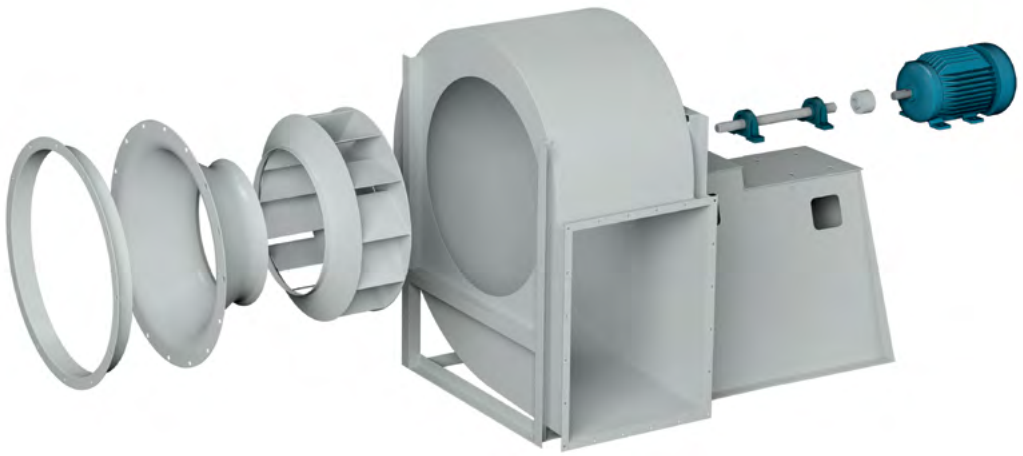
FAN CONSTRUCTION

ACCESSORIES

TECHNICAL DESCRIPTIONS

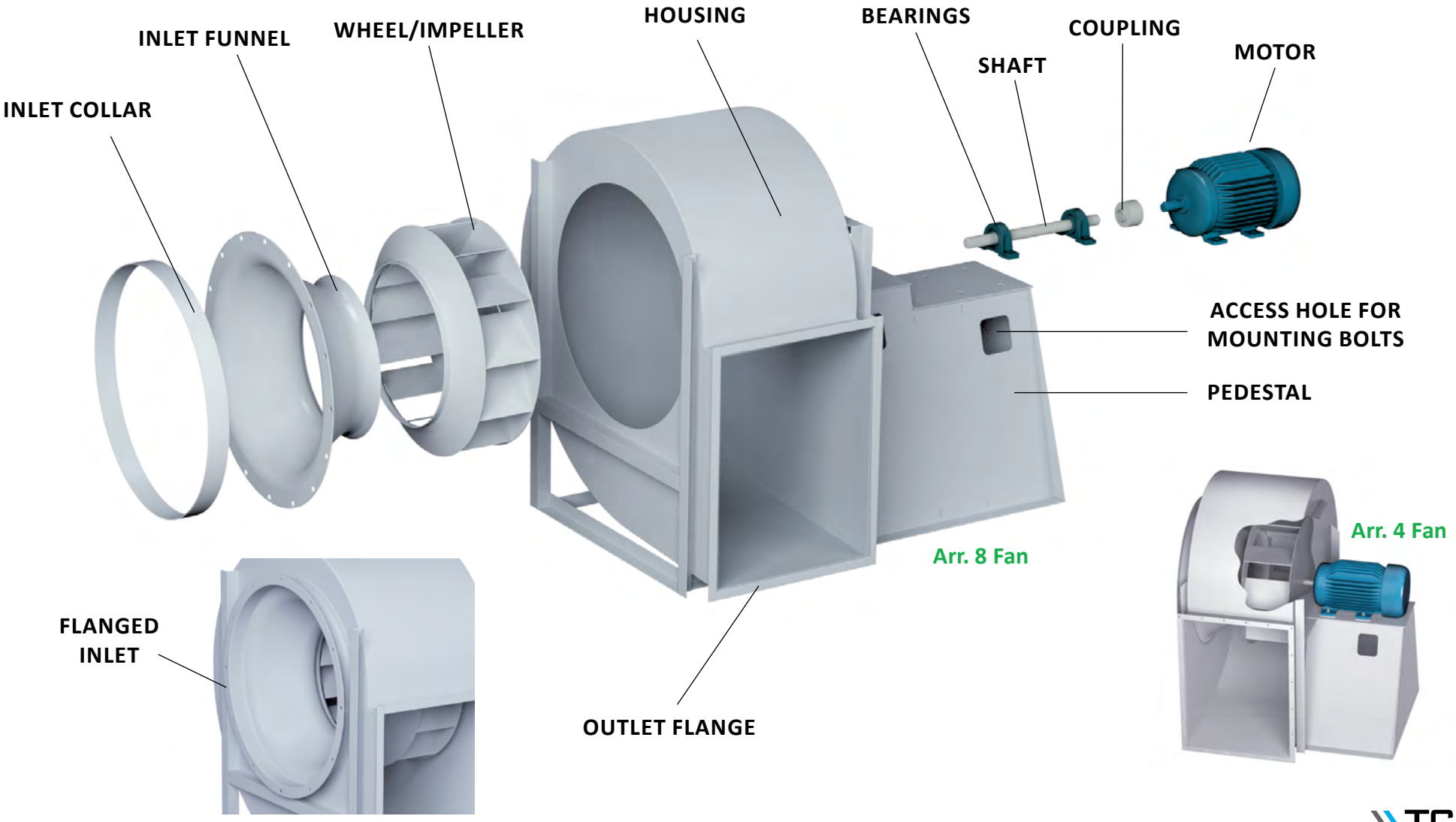
FANPEDIA
BY TWIN CITY FAN

TCF
TWIN CITY FAN

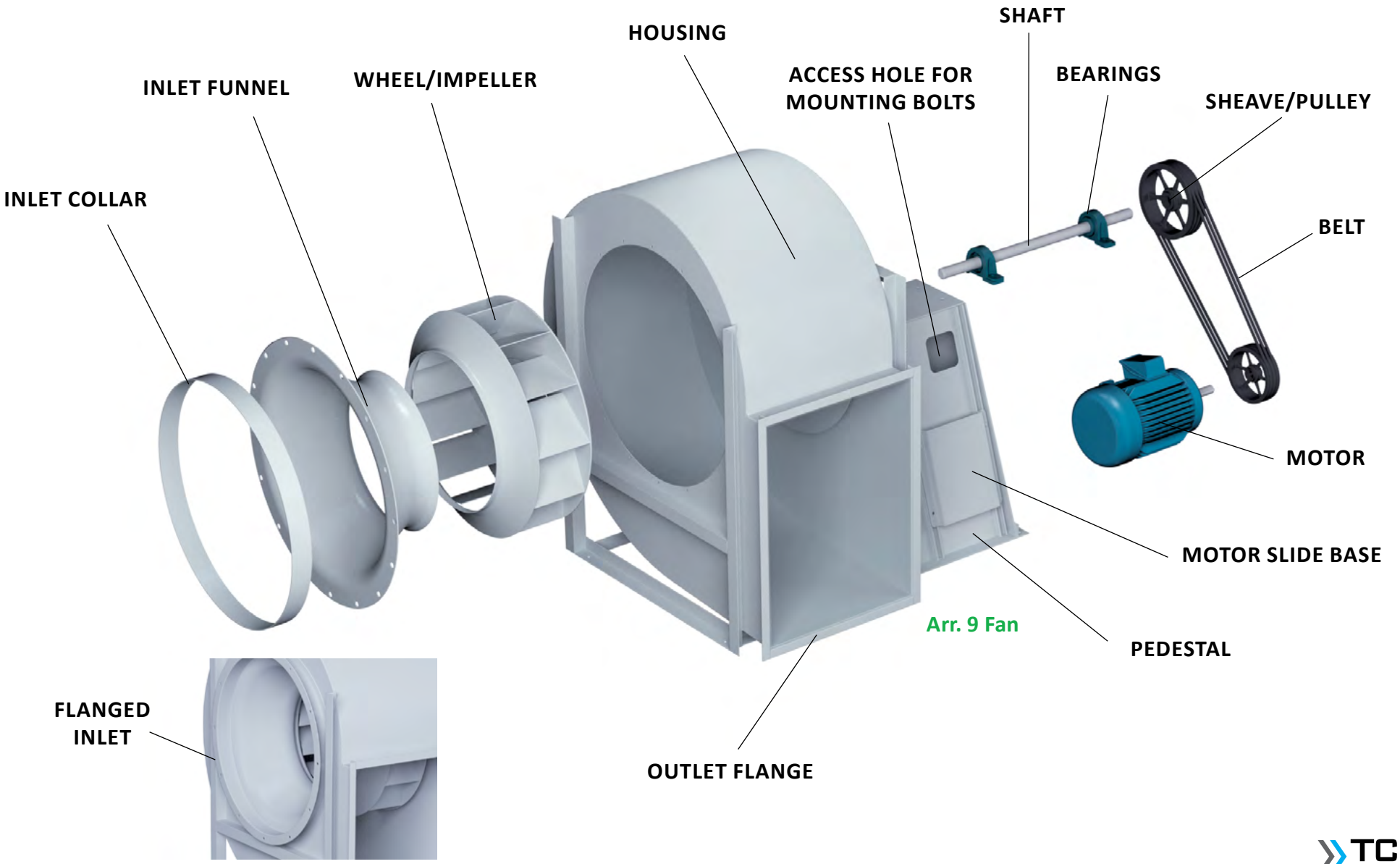


FAN BASICS

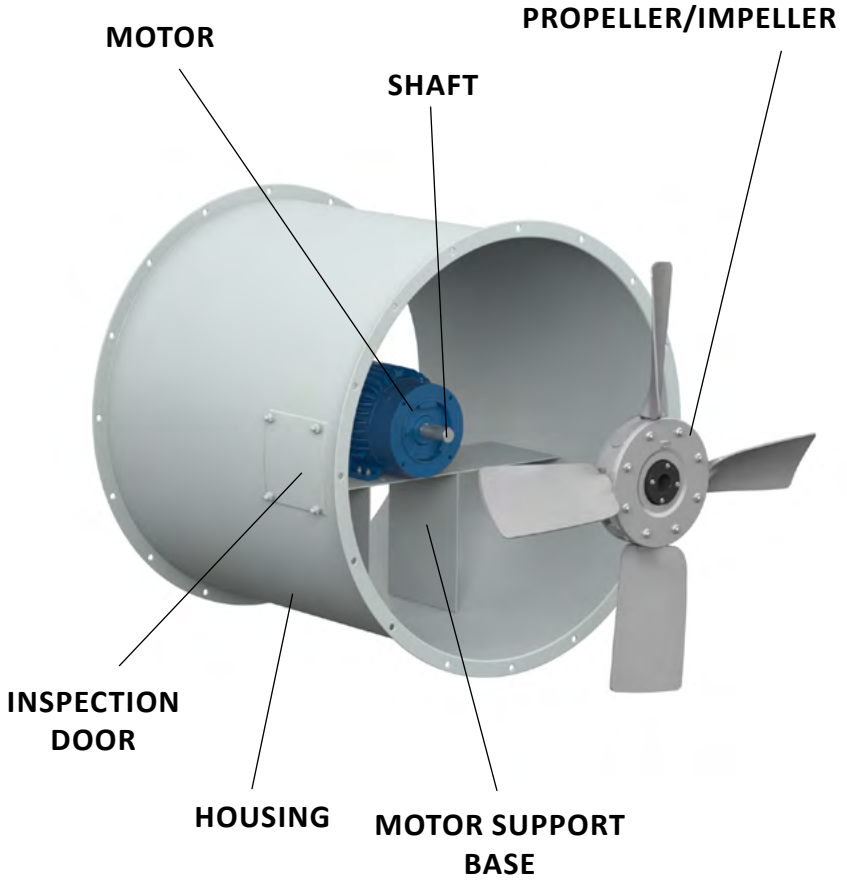
DIRECT DRIVE CENTRIFUGAL FANS



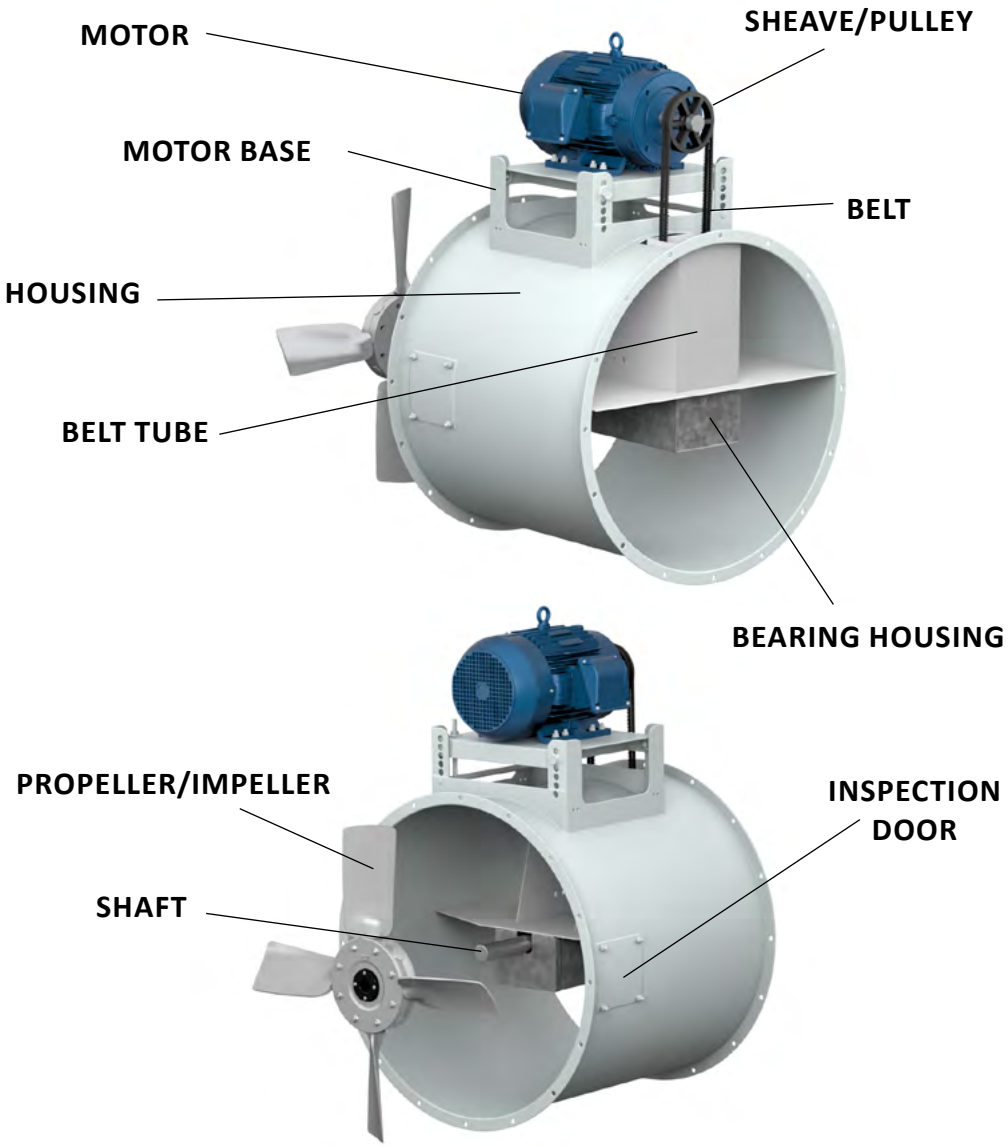
BELT DRIVEN CENTRIFUGAL FANS



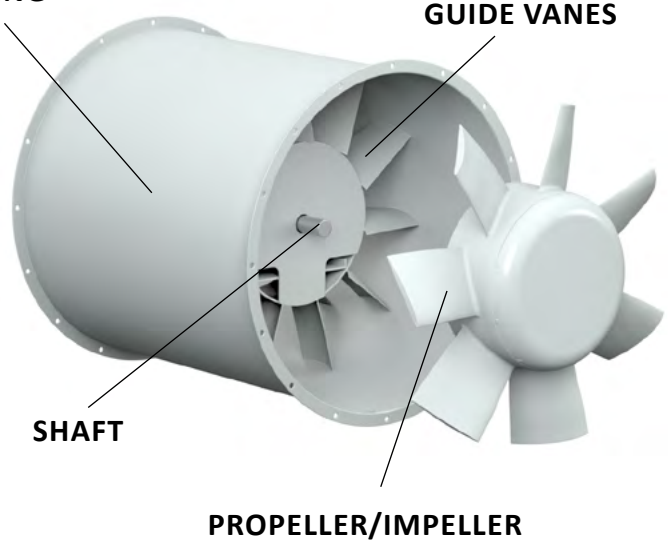
DIRECT DRIVE TUBEAXIAL FANS

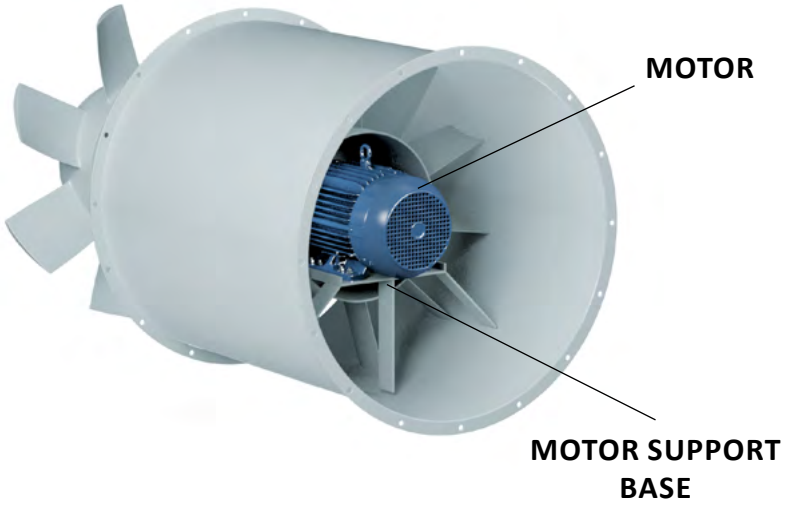


BELT DRIVEN TUBEAXIAL FANS

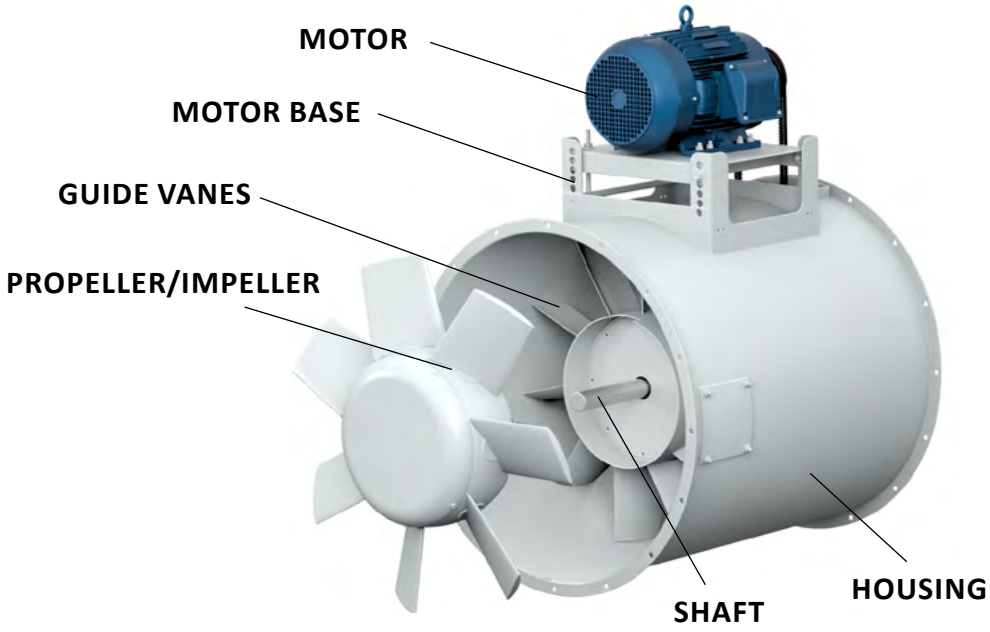


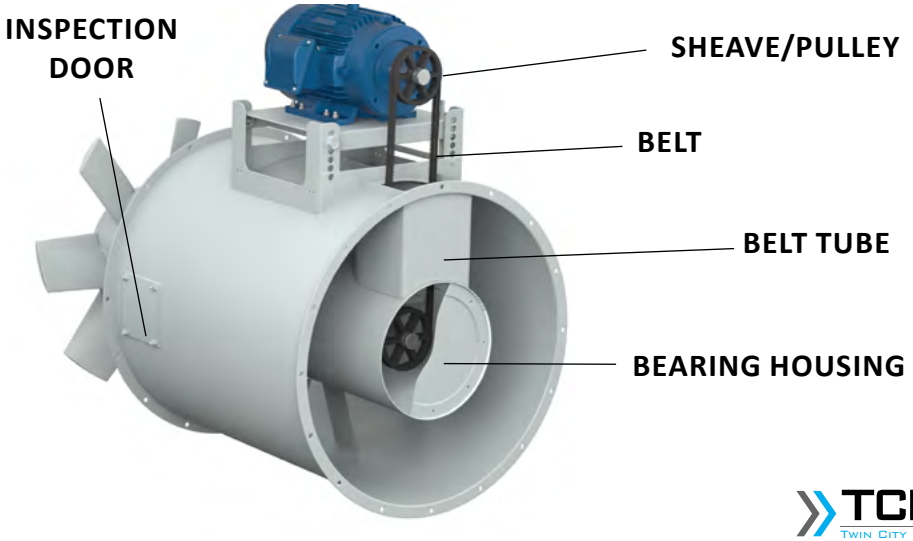
DIRECT DRIVE VANEAXIAL FANS



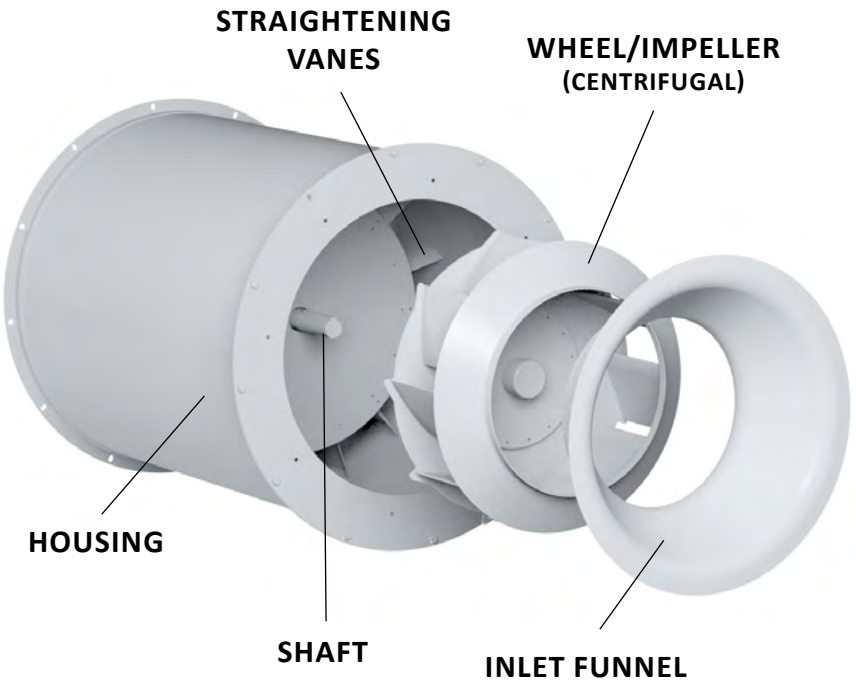


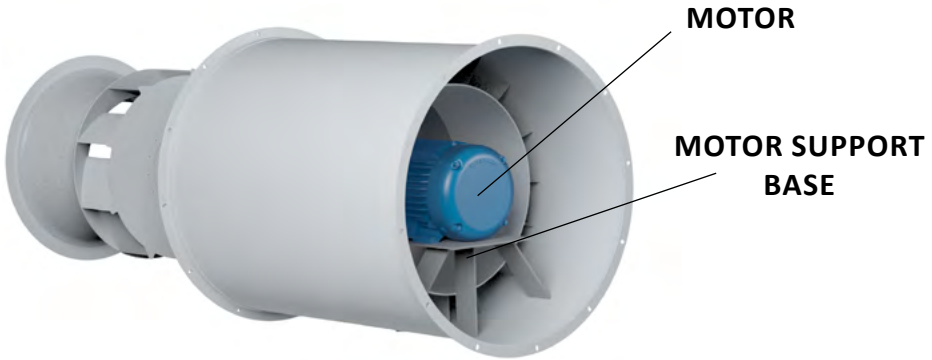
BELT DRIVEN VANEAXIAL FANS



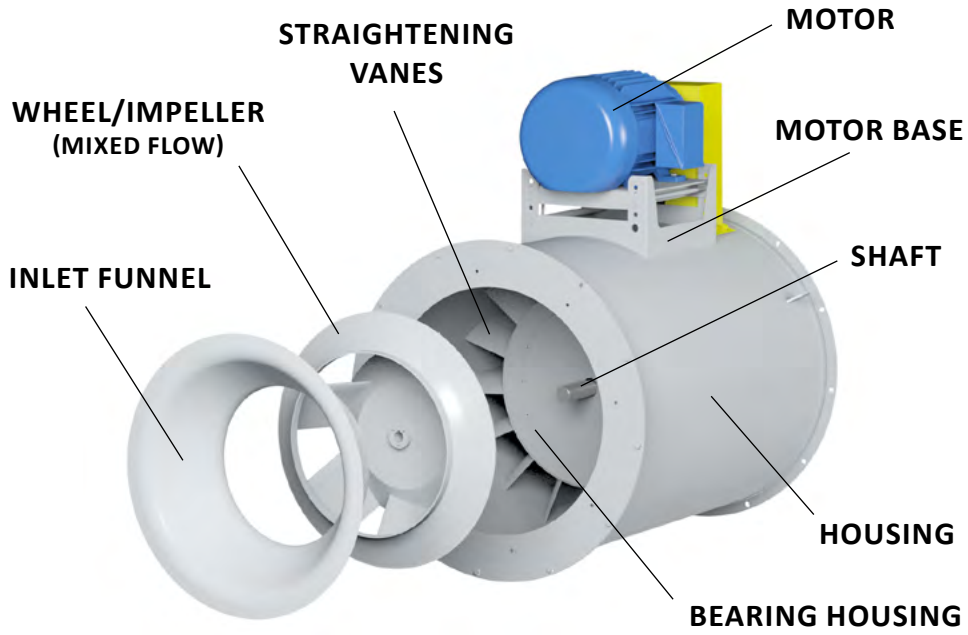


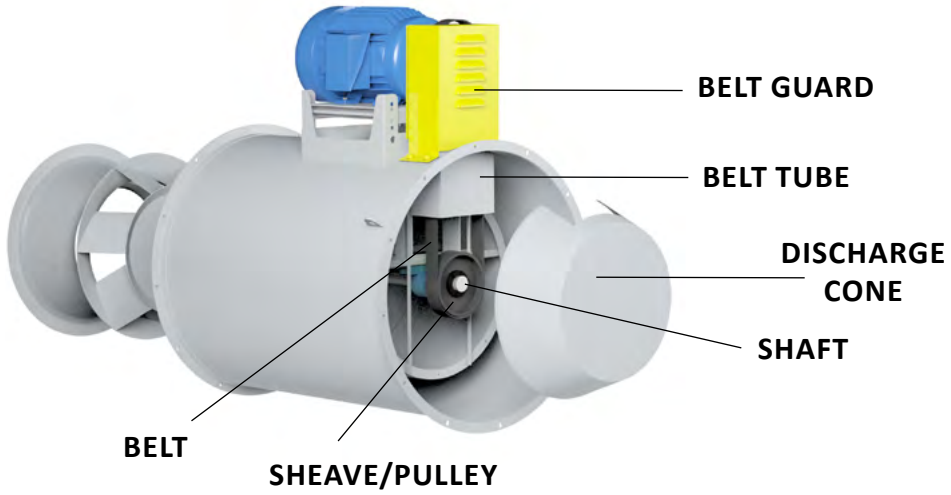
DIRECT DRIVE INLINE CENTRIFUGAL & MIXED FLOW FANS



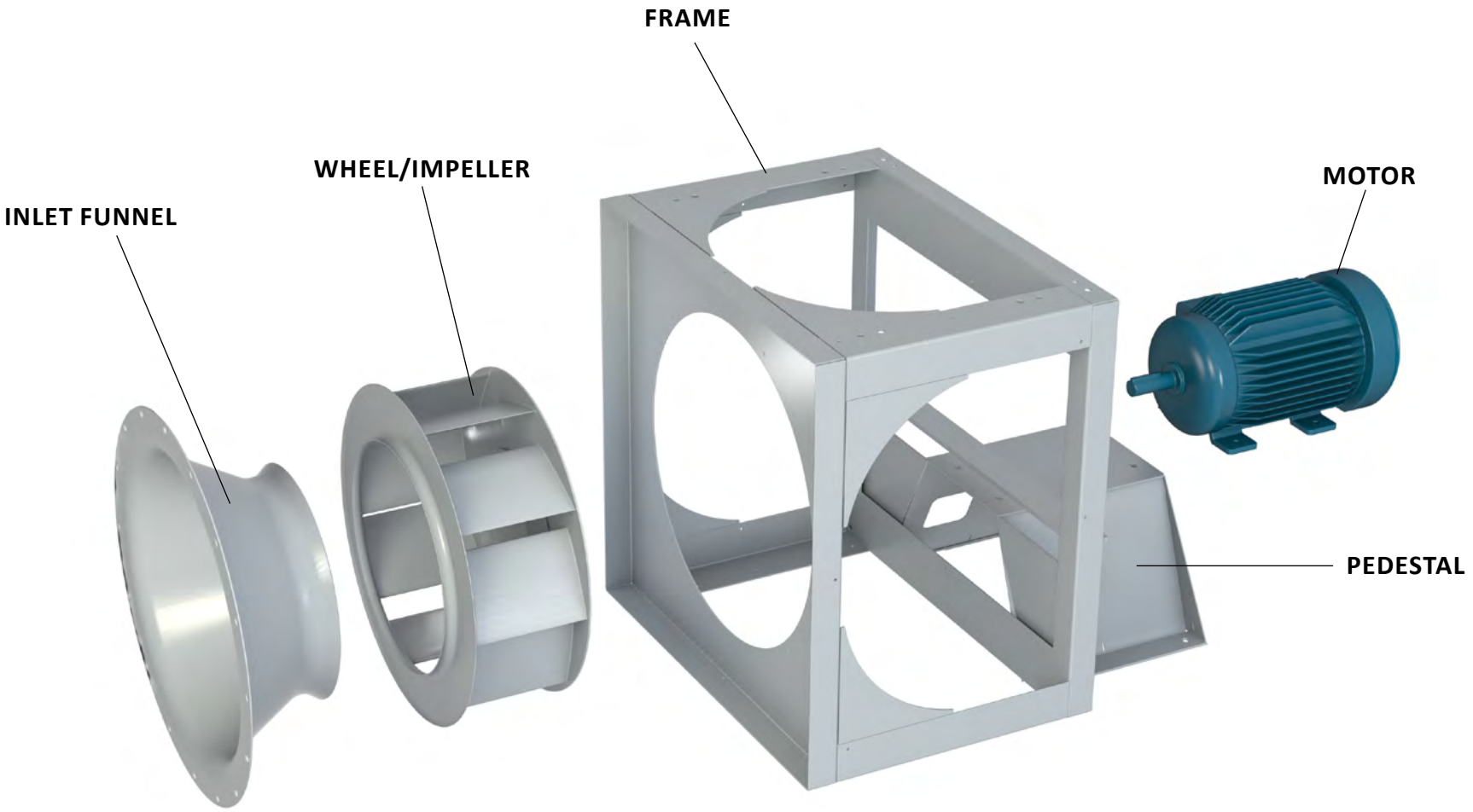


BELT DRIVEN INLINE CENTRIFUGAL & MIXED FLOW FANS

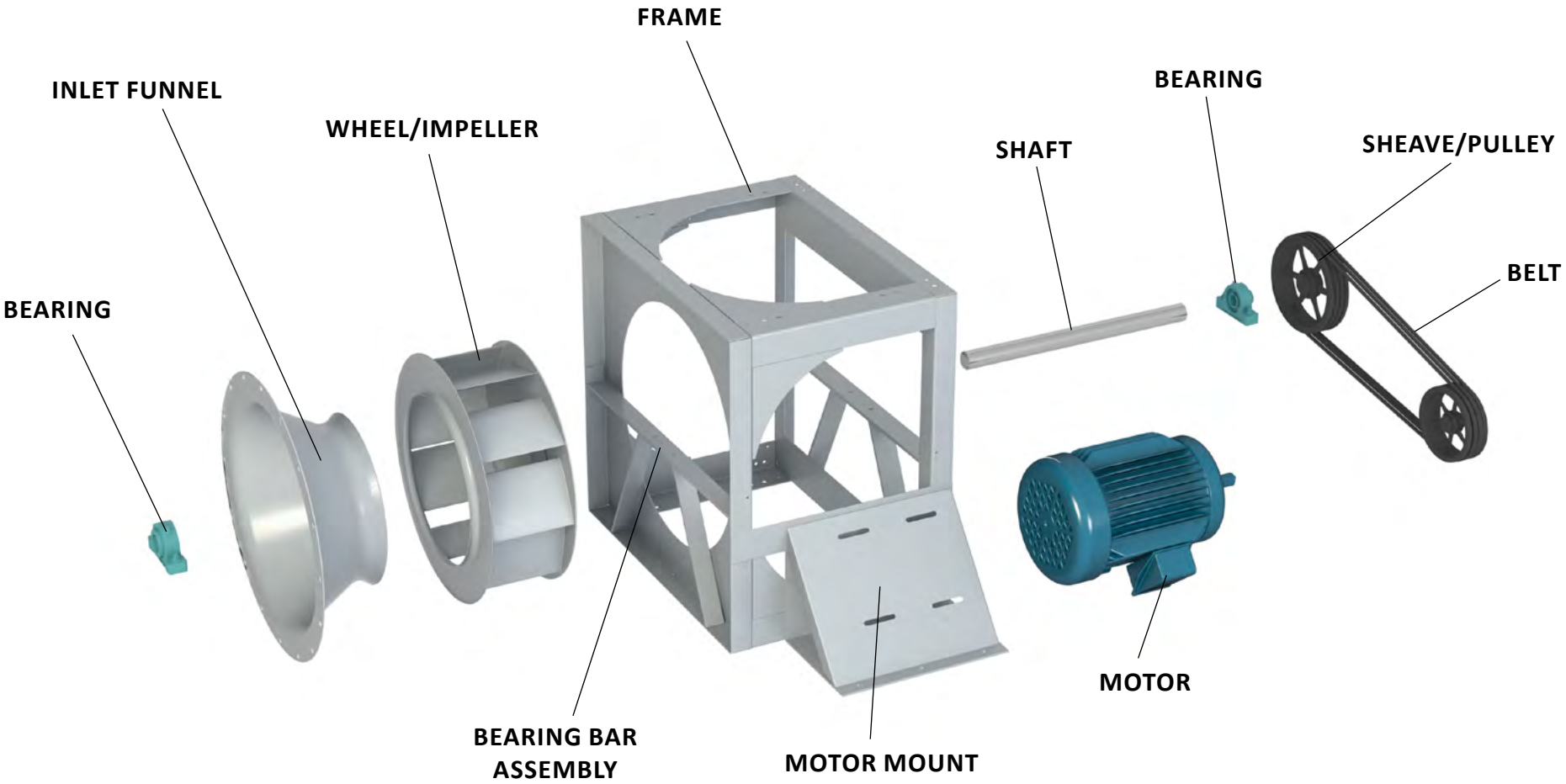




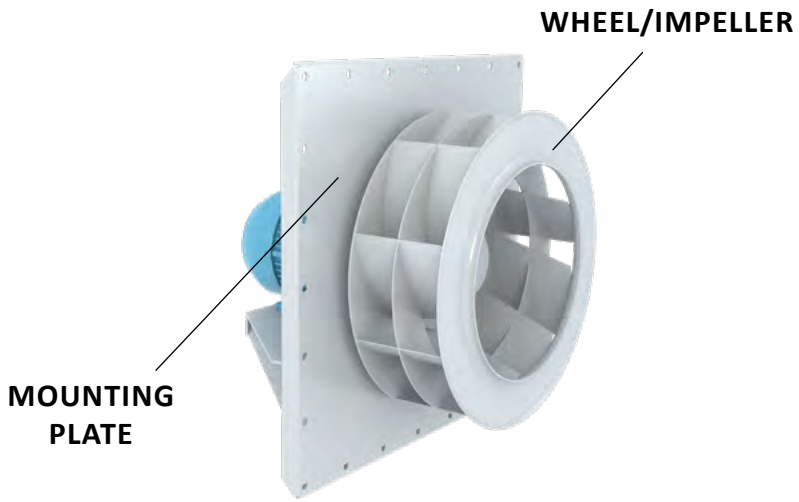
DIRECT DRIVE PLENUM FANS

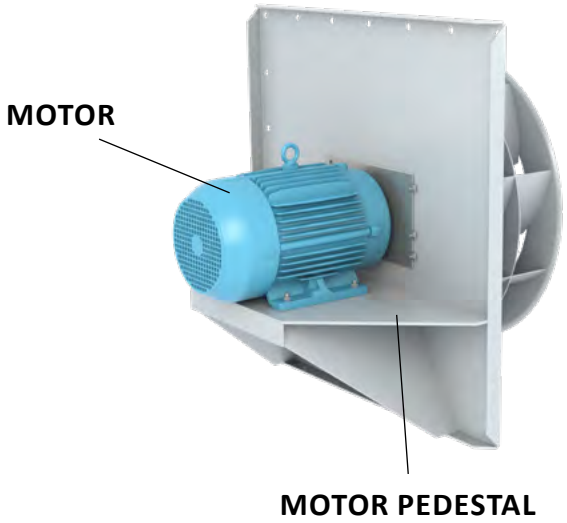


BELT DRIVEN PLENUM FANS

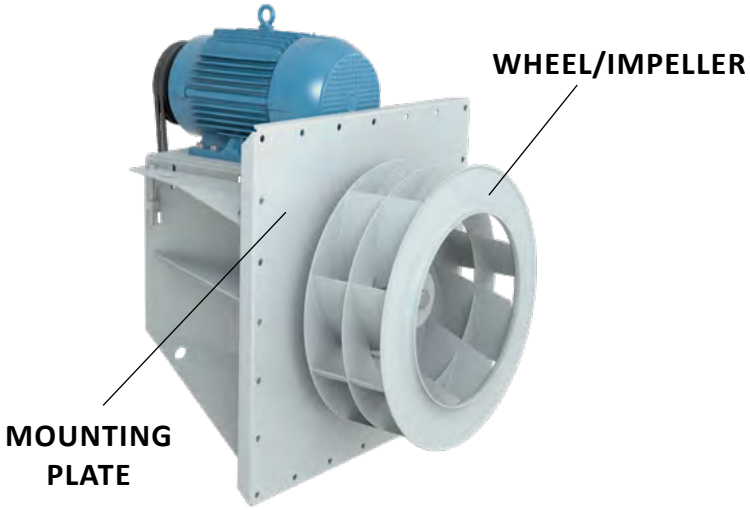


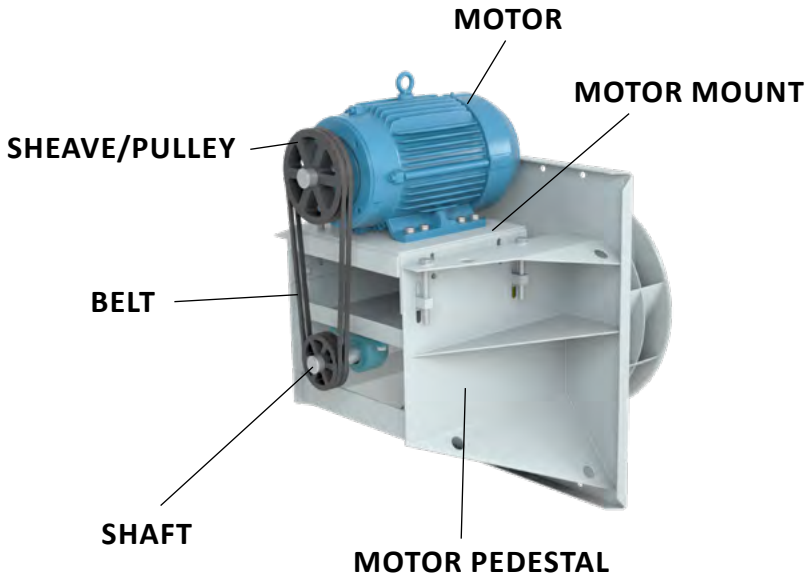
DIRECT DRIVE PLUG FANS



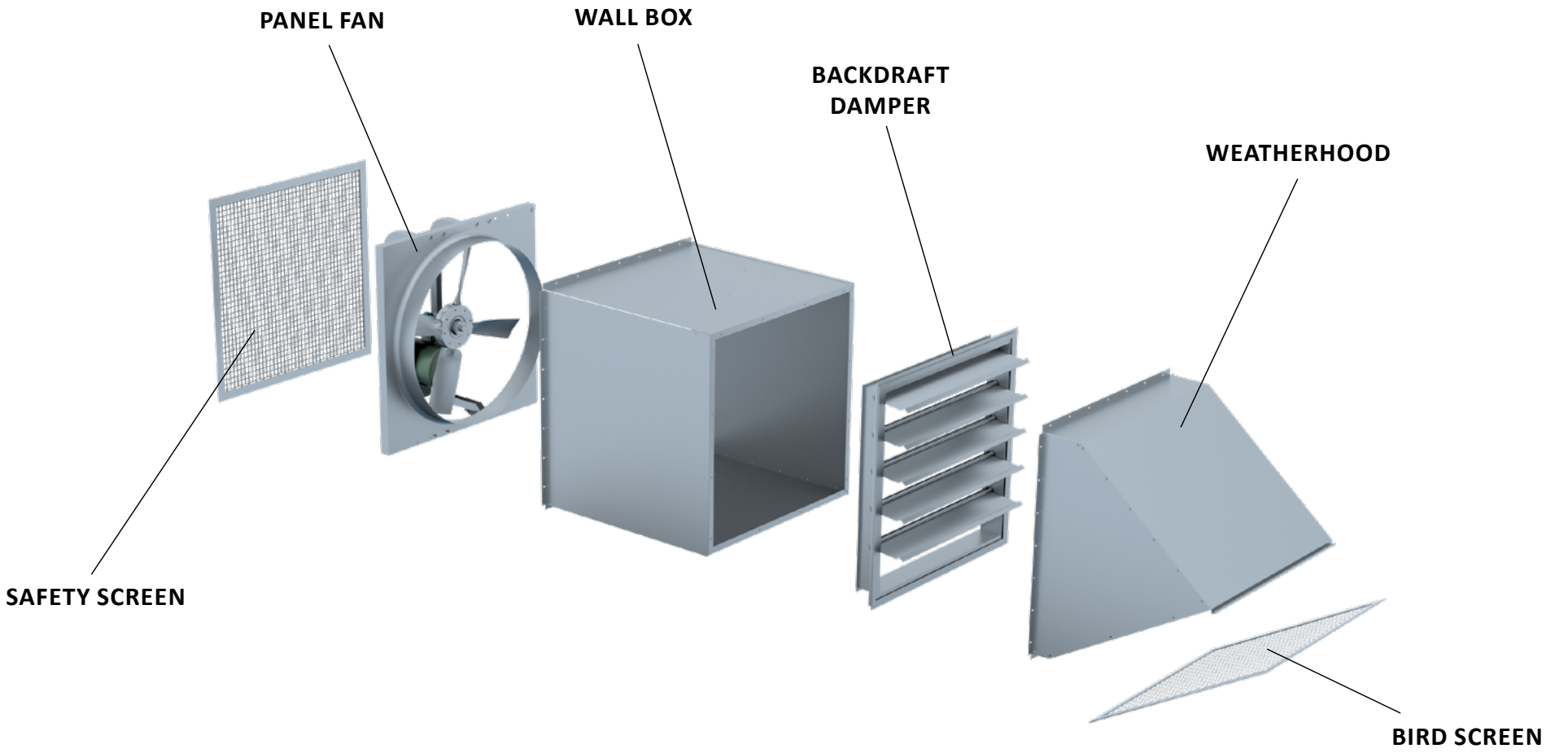


BELT DRIVEN PLUG FANS



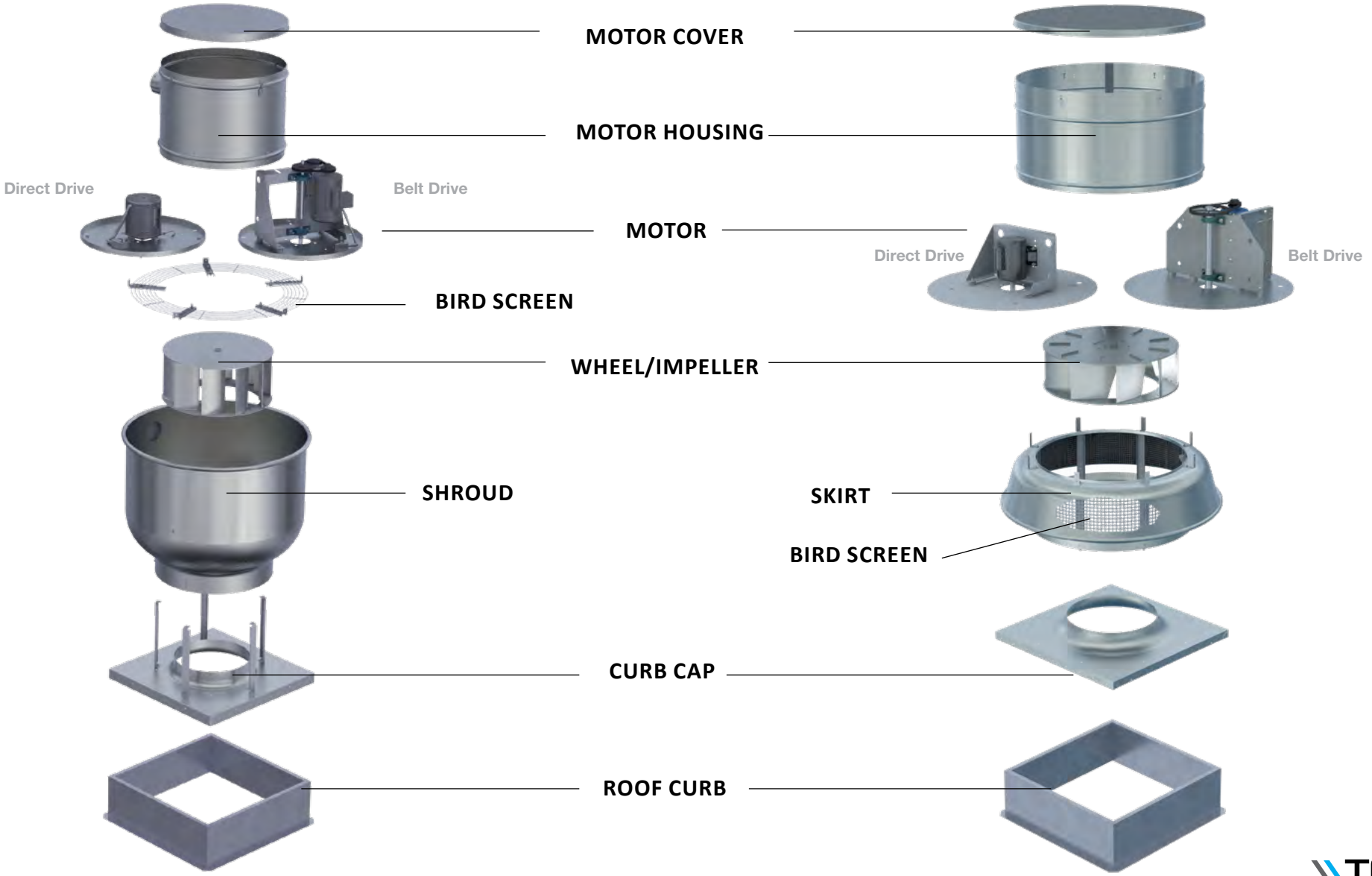


WALL PANEL FAN



FAN BASICS
Centrifugal Roof Exhausters

UPBLAST CENTRIFUGAL ROOF EXHAUSTER



DOWNBLAST CENTRIFUGAL ROOF EXHAUSTER

ARRANGEMENTS
Centrifugal Fans

Single Width, Single Inlet (SWSI)

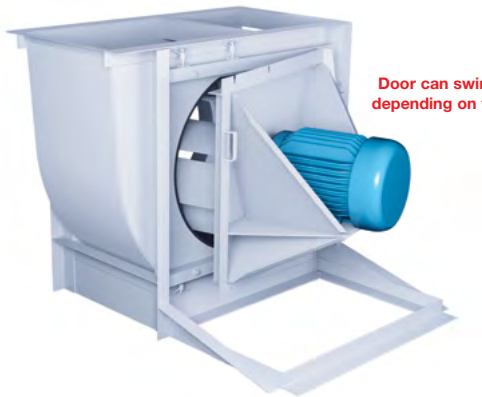
Arrangement 1
Belt Drive or Direct Drive
Motor Mounted on Floor or Fan Base

Arrangement 3
Belt Drive
Motor Mounted on Floor or Fan Base

Arrangement 3F
Belt Drive
Extended Angle **F**rame to Mount Motor
(Fan welded to frame/base - typically not suitable for spring isolators)

Arrangement 3SI
Direct Drive or Belt Drive
Single Width Fan with
Integral (attached) Inlet Box
(independent bearing pedestal)

Arrangement 4
Direct Drive
Wheel Mounted to Motor Shaft



Arrangement 4S
Direct Drive - **S**wingout Construction
Wheel Mounted to Motor Shaft

ARRANGEMENTS
Centrifugal Fans

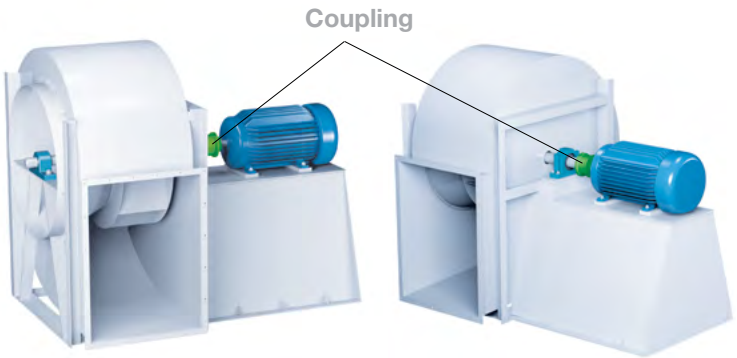
Single Width, Single Inlet (SWSI)

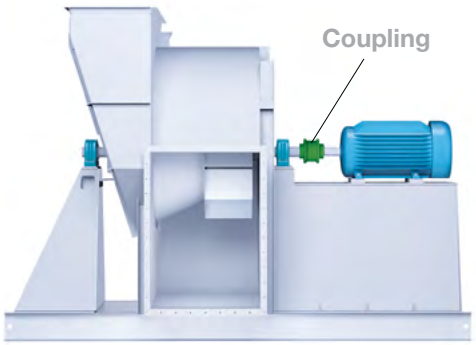
Note #1: Both the 4VI & 4HI can use
- *C-Face mounted motor*
- *Foot mounted motor*
- *Foot /C-Face mounted combo motor*

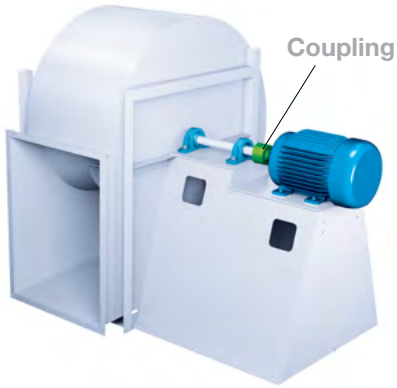
Note #2: The entire fan is supported by the inlet flange only

Arrangement 4VI
Direct Drive - **V**ertical **I**nlet Mounted
Wheel Mounted to Motor Shaft

Arrangement 4HI
Direct Drive - **H**orizontal **I**nlet Mounted
Wheel Mounted to Motor Shaft







Arrangement 7
Direct Drive
Motor Coupled to Fan Shaft
(Similar to Arr. 3 but with Motor Pedestal)

Arrangement 7SI
Direct Drive – **S**ingle Width Fan
Integral (attached) Inlet Box
Motor Coupled to Fan Shaft
Common Fan Base included

Arrangement 8
Direct Drive
Motor Coupled to Fan Shaft

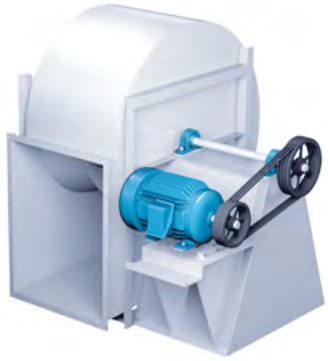
ARRANGEMENTS
Centrifugal Fans

Single Width, Single Inlet (SWSI)

Arrangement 9
Belt Drive
Motor Mounted on Pedestal

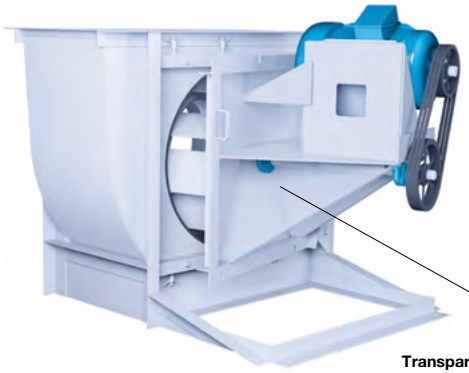
Arrangement 9F
Belt Drive
Extended Structural **F**rame to Mount Motor
Not suitable for spring isolators

Slide Base

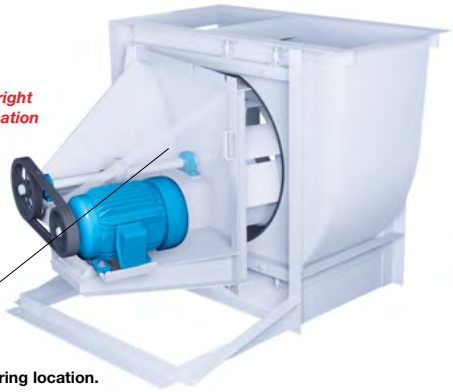


Pivot Base

Arrangement 9H
Belt Drive
Motor Mounted **H**orizontally on Side of Pedestal



Door can swing left or right depending on the application



Transparency view for showing bearing location.

Arrangement 9ST
Belt Drive - **S**wingout Construction
Slide Base **T**op Mounted Motor

Arrangement 9SS
Belt Drive - **S**wingout Construction
Pivot Base **S**ide Mounted Motor

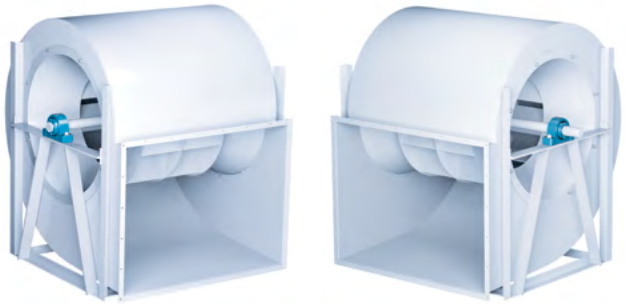
Sizes 122-365 (Vent Sets)
Motor Mounted on Bottom of
Pedestal (Adjustable Plate)

Sizes 402+ Motor Mounted
on Side of Pedestal Frame
(Slide Base)

Arrangement 10
Belt Drive
Motor Mounted Inside of Pedestal

ARRANGEMENTS
Centrifugal Fans

Double Width, Double Inlet (DWDI)

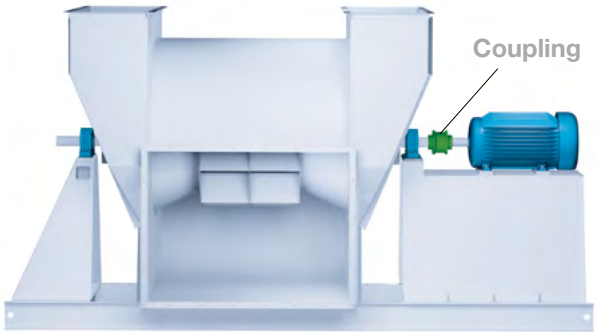


Arrangement 3
Belt Drive or Direct Drive
Motor Mounted on Floor or Fan Base

Arrangement 3DI
Direct Drive or Belt Drive
Double Width Fan with **I**ntegral
(attached) Inlet Boxes
(independent bearing pedestal)

Arrangement 3F
Belt Drive
Extended Structural **F**rame to Mount Motor

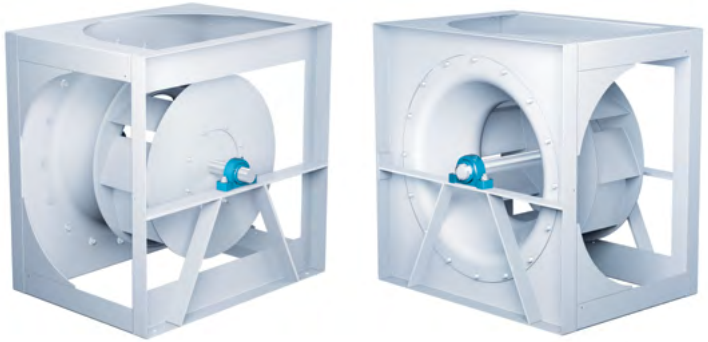
Arrangement 7
Direct Drive
Motor Coupled to Fan Shaft
(Similar to Arr. 3 but with Motor Pedestal)



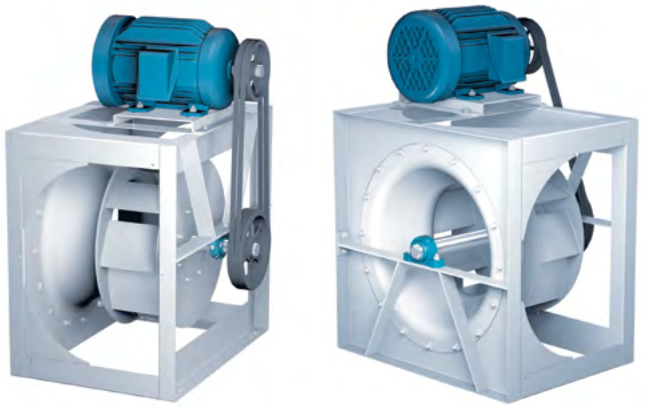
Arrangement 7DI
Direct Drive – **D**ouble Width Fan
Integral (attached) Inlet Box
Motor Coupled to Fan Shaft
Common Fan Base included

ARRANGEMENTS
Plenum Fans

Arrangement 1
Belt Drive - Horizontal Motor
Mounted on Floor or Fan Base



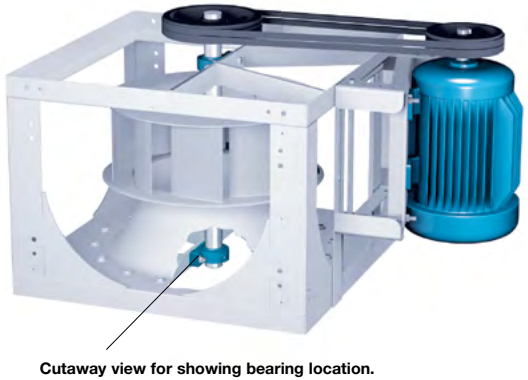
Arrangement 3
Belt Drive - Horizontal
Motor Mounted on Floor or Fan Base



Arrangement 3HS
Belt Drive - **H**orizontal with Top Mounted Motor
with **S**lide Base Motor Mount

Arrangement 3HA
Belt Drive - **H**orizontal with Top Mounted Motor
with **A**djustable Motor Base

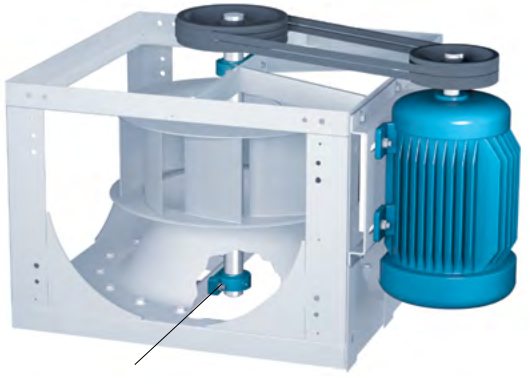
Arrangement 3SM
Belt Drive - Horizontal With **S**ide **M**ounted Motor
with Slide Base Motor Mount



Cutaway view for showing bearing location.

Arrangement 3VA

Belt Drive - Vertical with Adjustable Motor Base



Cutaway view for showing bearing location.

Arrangement 3VS

Belt Drive - Vertical with Slide Base Motor Mount

Arrangement 4

Direct Drive - Horizontal
Wheel Mounted to Motor Shaft

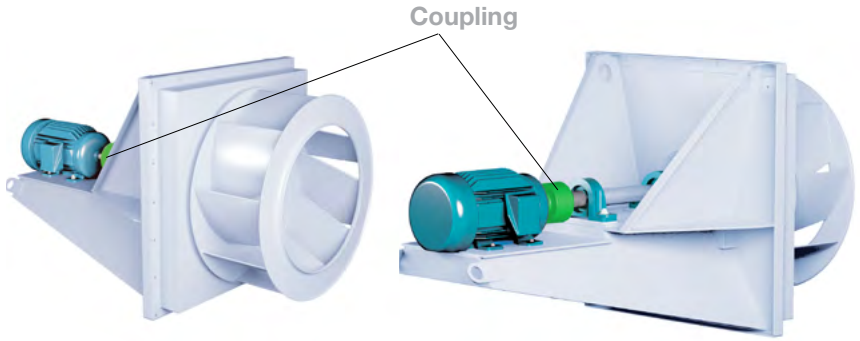
Arrangement 4V

Direct Drive - Vertical
Wheel Mounted to Motor Shaft

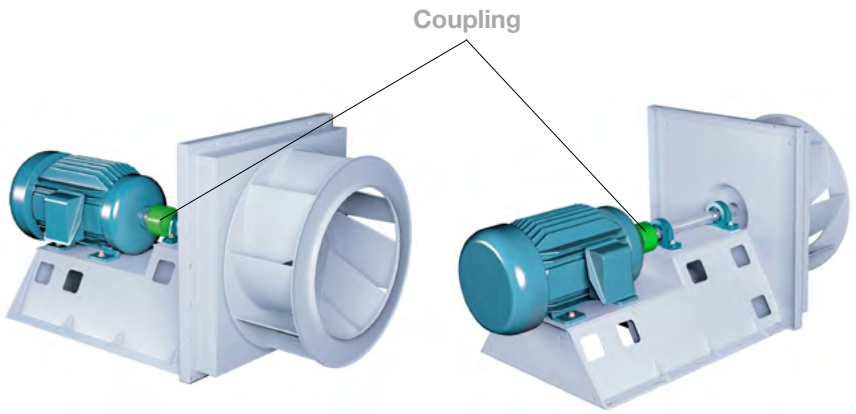
Arrangement 1P
Belt Drive - Pedestal Plug
Motor Mounted on Floor or Fan Base
Fan is floor mounted

Arrangement 4
Direct Drive
Wheel Mounted to Motor Shaft
Fan is wall mounted

Arrangement 4P
Direct Drive - Pedestal Plug
Wheel Mounted to Motor Shaft
Fan is floor mounted



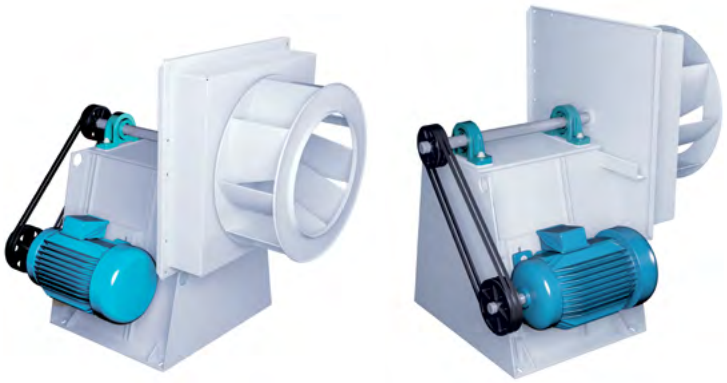
Arrangement 8
Direct Drive
Motor Coupled to Fan Shaft
Fan is wall mounted



Arrangement 8P
Direct Drive - Pedestal Plug
Motor Coupled to Fan Shaft
Fan is floor mounted

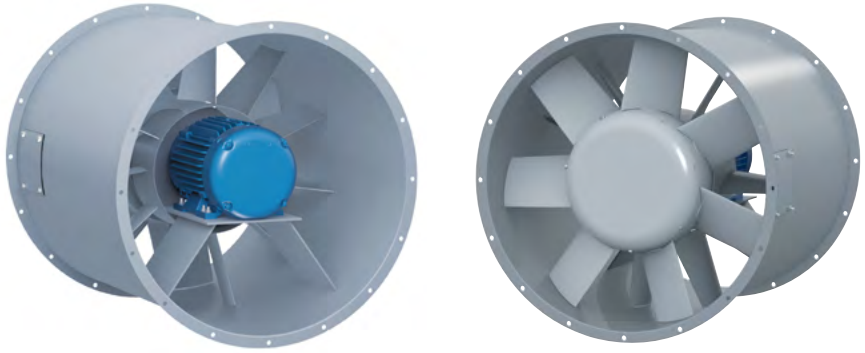
ARRANGEMENTS
Plug Fans

Arrangement 9
Belt Drive
Fan is wall mounted

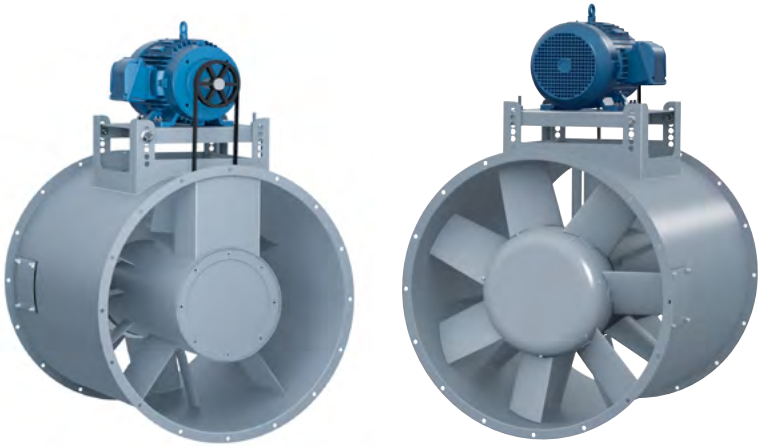


Arrangement 9P
Belt Drive - **P**edestal Plug
Motor Mounted on Pedestal
Fan is floor mounted

ARRANGEMENTS
Axial Fans



Arrangement 4
Direct Drive
Propeller is Mounted to Motor Shaft

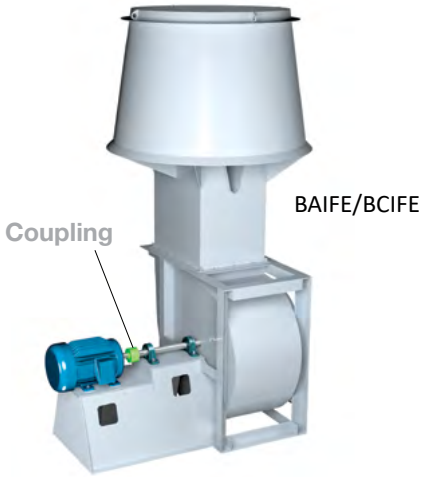


Arrangement 9
Belt Drive

ARRANGEMENTS
Fume Exhaust Fans

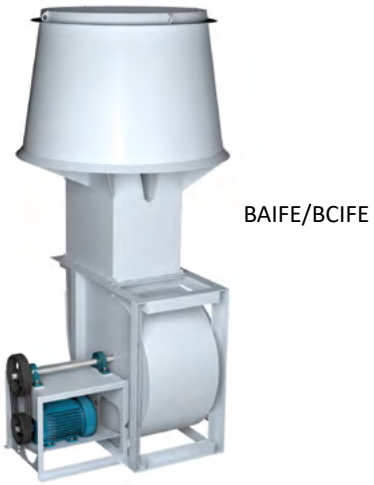
Arrangement 1
Belt Driven

Arrangement 4
Direct Drive



Arrangement 8
Direct Drive

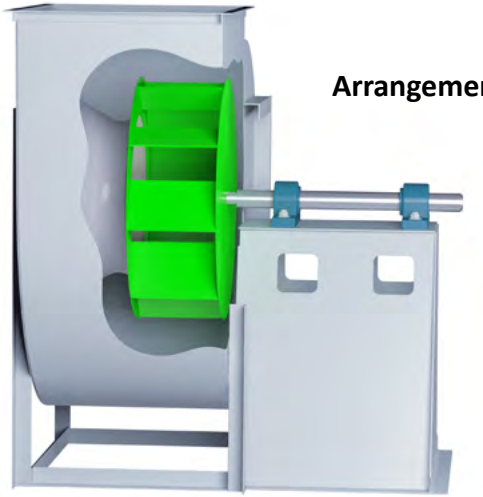
Arrangement 9
Belt Driven



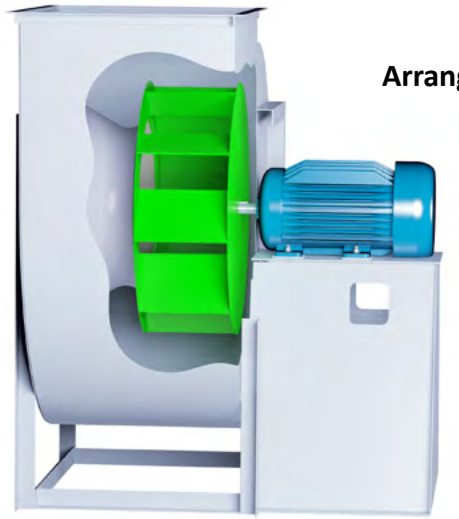
Arrangement 10
Belt Driven

WHEEL ORIENTATION
Centrifugal Fans

Overhung Wheel
(wheel overhung on shaft)

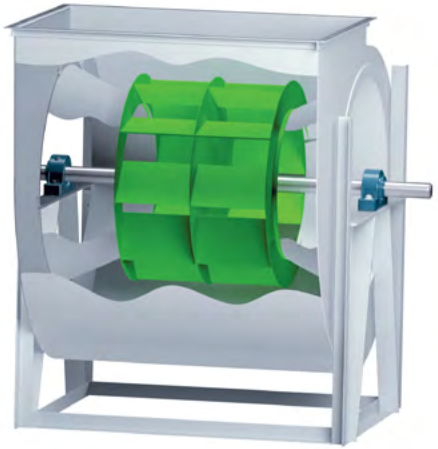


Arrangements 1, 8, 9, 10

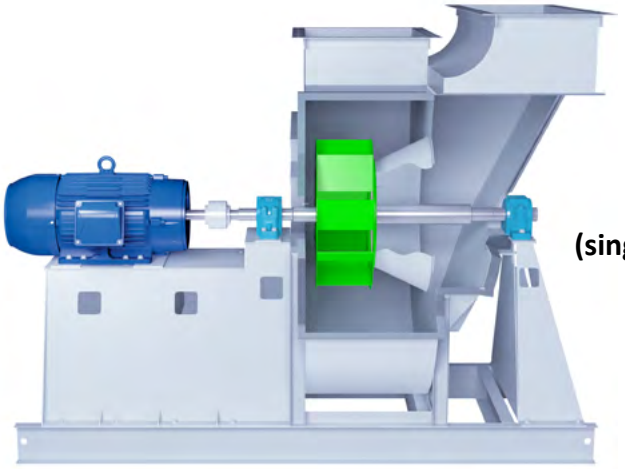


Arrangement 4

Center Hung Wheel
(wheel between the bearings)

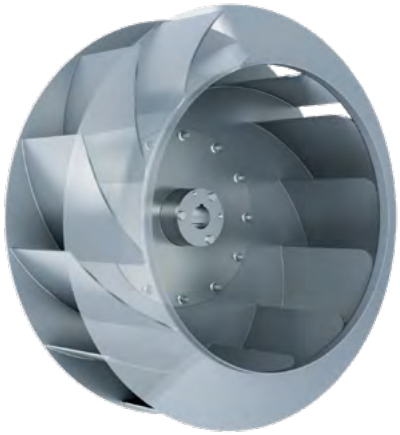


Arrangement 3
(single & double width)

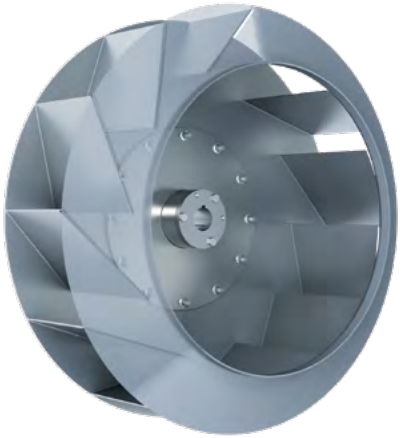


Arrangement 7
(single & double width)

WHEEL TYPES
Industrial Centrifugal Fans



Backward Curved



Backward Inclined

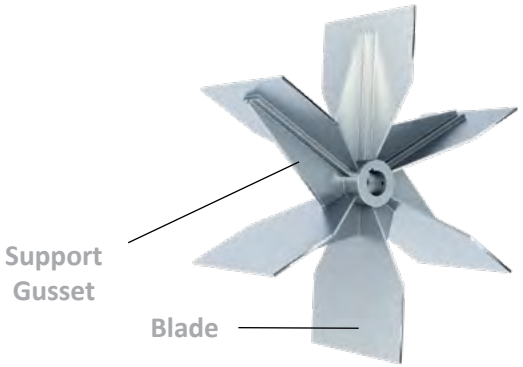
Airfoil

Radial Tipped

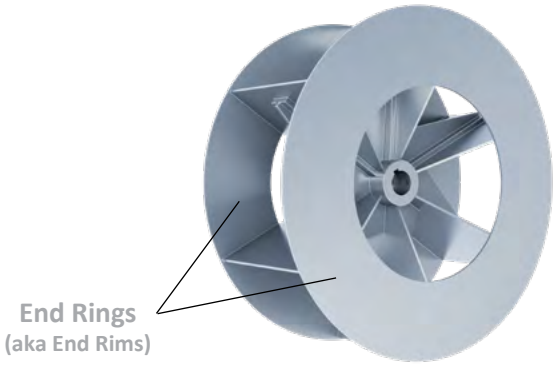
Forward Curved

See Wheel Rotations & Discharges Section

WHEEL TYPES
Industrial Centrifugal Fans

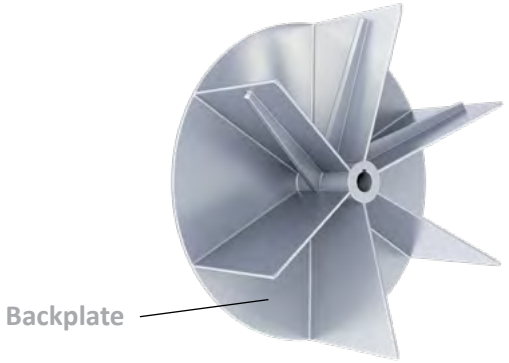


Radial Bladed
Paddle Wheel (Open Type)



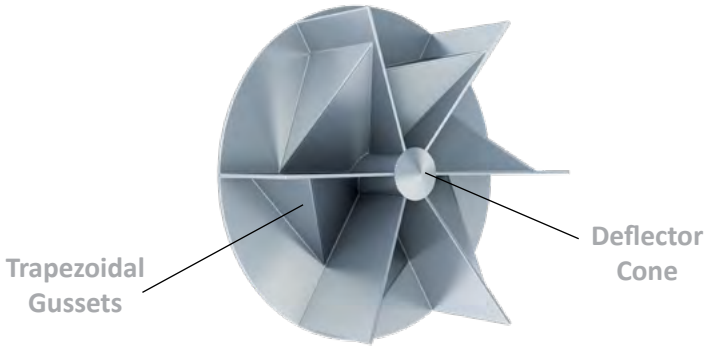
Radial Bladed
Paddle Wheel

Similar to the open type radial wheel design but with the addition of front and back end rings.



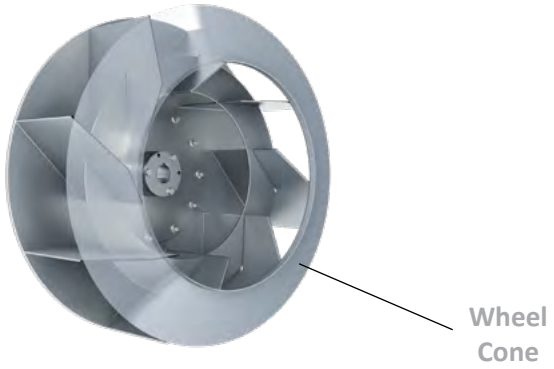
Radial Bladed
Material Handling Wheel (Wool Wheel)

Similar to the open type radial wheel design but with a full backplate.



Radial Bladed
Paper Handling Wheel

Constructed with full backplate gussets for extra rugged durability



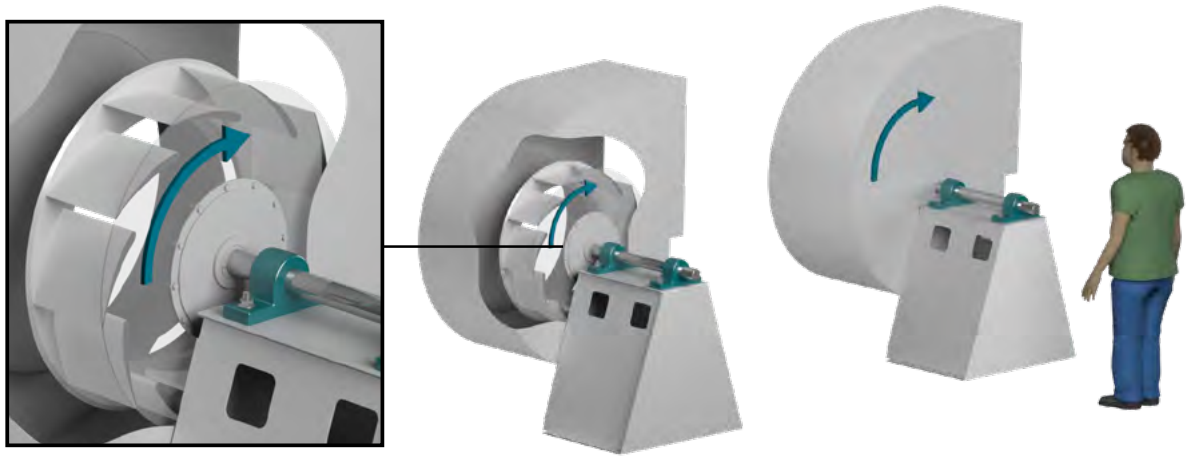
Radial Bladed
Air Handling Wheel

Constructed with heavy-gauge blades welded to both backplate and wheel cone.

See Wheel Rotations & Discharges Section

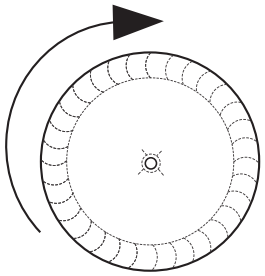
WHEEL ROTATION, & DISCHARGES

SWSI CENTRIFUGAL FANS

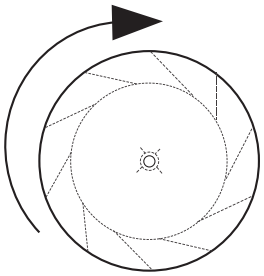


CLOCKWISE (CW)

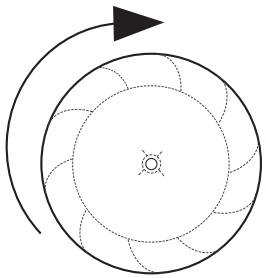
ROTATION VIEW **FROM DRIVE SIDE**



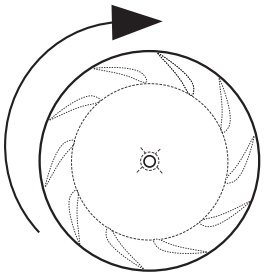
Forward Curved



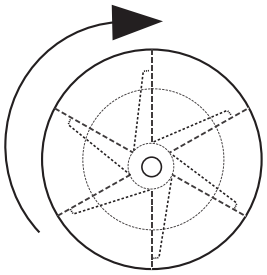
Backward Inclined



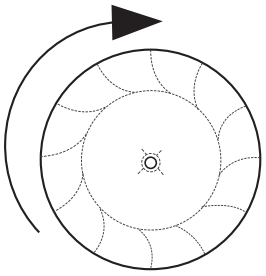
Backward Curved



Airfoil



Radial Bladed



Radial Tip

UBD
Upblast
CW 360

Also Know As
- Clockwise 360°

TAU
Top Angular Up
CW 45

Also Know As
- Clockwise 45°

THD
Top Horizontal
CW 90

Also Know As
- Clockwise 90°

TAD
Top Angular Down
CW 135

Also Know As
- Clockwise 135°

DBD
Downblast
CW 180

Also Know As
- Clockwise 180°

BAD
Bottom Angular Down
CW 225

Also Know As
- Clockwise 225°

BHD
Bottom Horizontal
CW 270

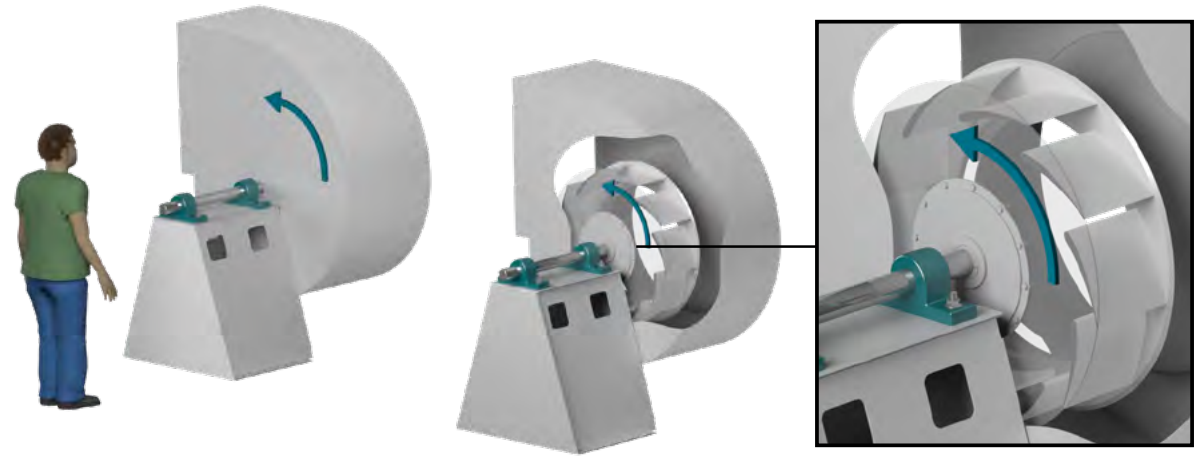
Also Know As
- Clockwise 270°

BAU
Bottom Angular Up
CW 315

Also Know As
- Clockwise 315°

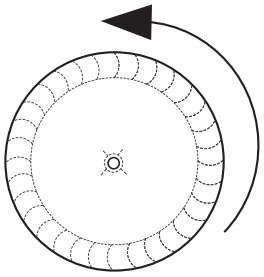
WHEEL ROTATION, & DISCHARGES

SWSI CENTRIFUGAL FANS

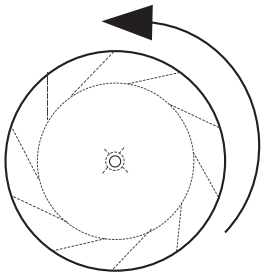


COUNTERCLOCKWISE (CCW)

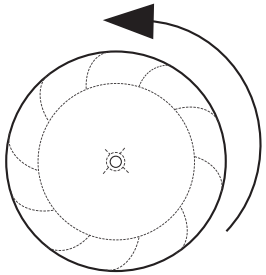
ROTATION VIEW **FROM DRIVE SIDE**



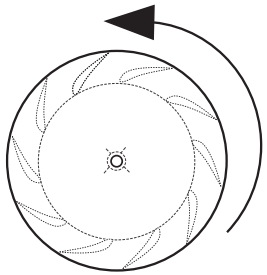
Forward Curved



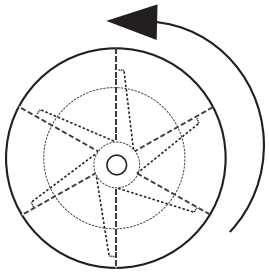
Backward Inclined



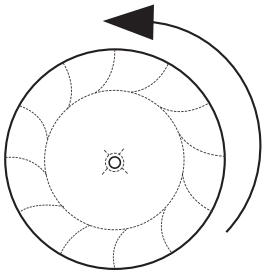
Backward Curved



Airfoil



Radial Bladed



Radial Tip

UBD
Upblast
CCW 360

Also Know As
- Counterclockwise 360°

TAU
Top Angular Up
CCW 45

Also Know As
- Counterclockwise 45°

THD
Top Horizontal
CCW 90

Also Know As
- Counterclockwise 90°

TAD
Top Angular Down
CCW 135

Also Know As
- Counterclockwise 135°

DBD
Downblast
CCW 180

Also Know As
- Counterclockwise 80°

BAD
Bottom Angular Down
CCW 225

Also Know As
- Counterclockwise 225°

BHD
Bottom Horizontal
CCW 270

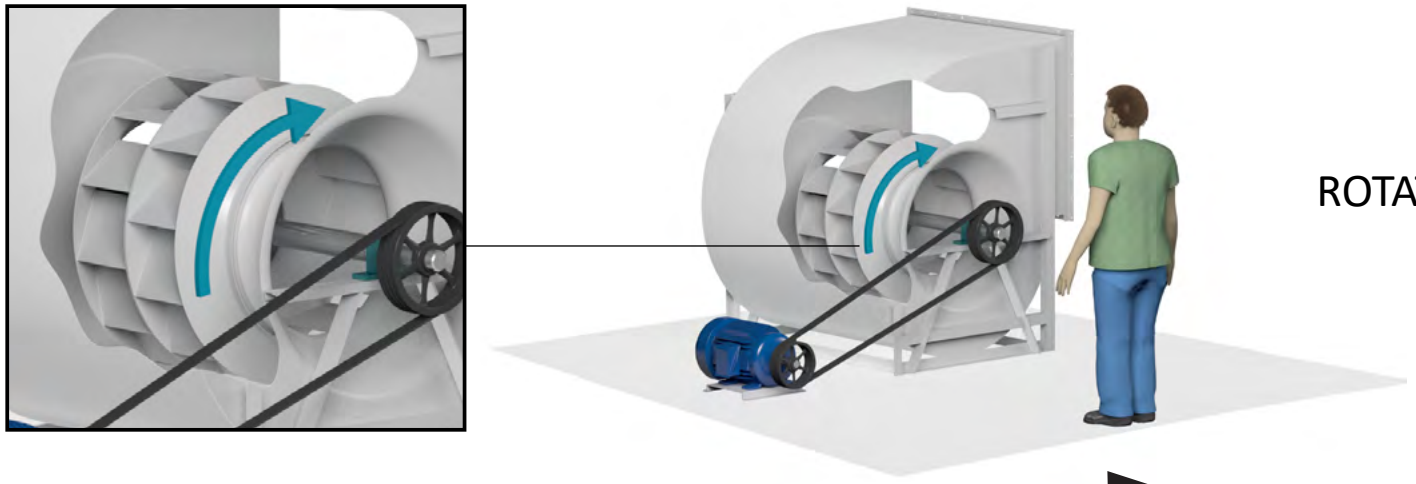
Also Know As
- Counterclockwise 270°

BAU
Bottom Angular Up
CCW 315

Also Know As
- Counterclockwise 315°

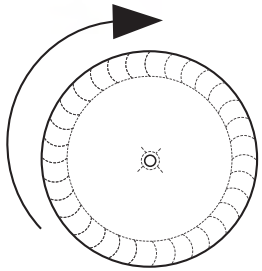
WHEEL ROTATION, & DISCHARGES

DWDI CENTRIFUGAL FANS

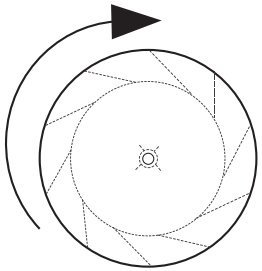


CLOCKWISE (CW)

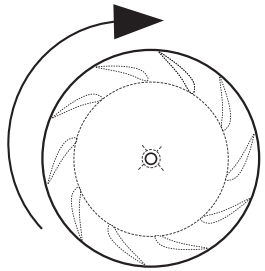
ROTATION VIEW **FROM DRIVE SIDE**



Forward Curved



Backward Inclined



Airfoil

UBD
Upblast
CW 360

Also Know As
- Clockwise 360°

TAU
Top Angular Up
CW 45

Also Know As
- Clockwise 45°

THD
Top Horizontal
CW 90

Also Know As
- Clockwise 90°

TAD
Top Angular Down
CW 135

Also Know As
- Clockwise 135°

DBD
Downblast
CW 180

Also Know As
- Clockwise 180°

BHD
Bottom Horizontal
CW 270

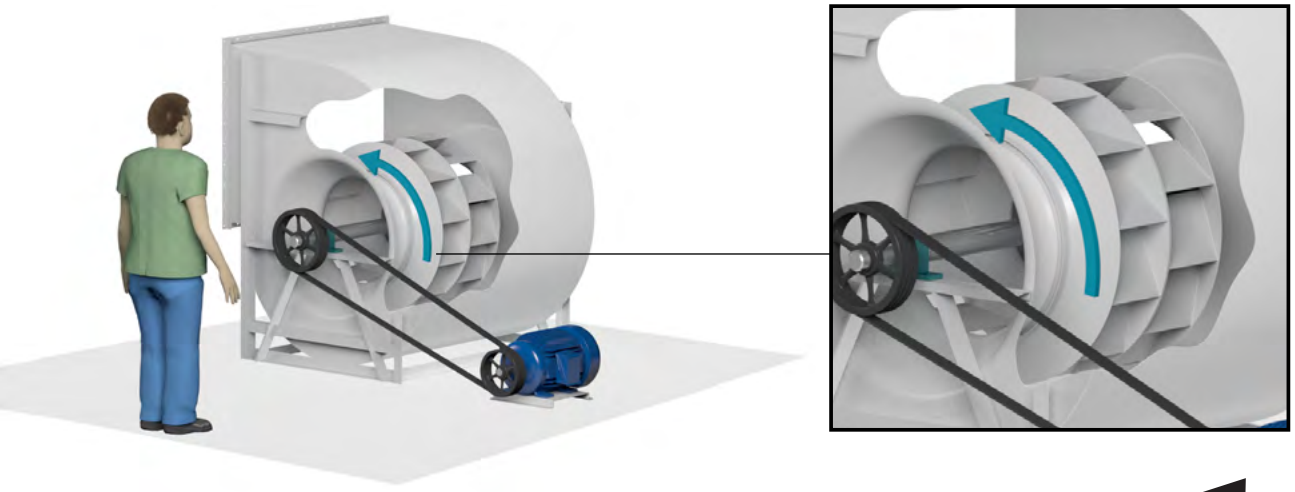
Also Know As
- Clockwise 270°

BAU
Bottom Angular Up
CW 315

Also Know As
- Clockwise 315°

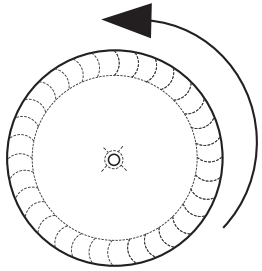
WHEEL ROTATION, & DISCHARGES

DWDI CENTRIFUGAL FANS

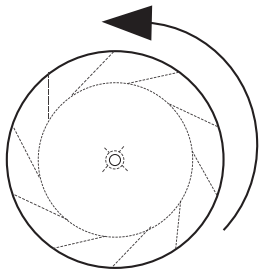


COUNTERCLOCKWISE (CCW)

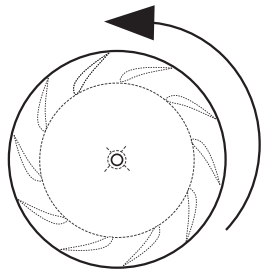
ROTATION VIEW **FROM DRIVE SIDE**



Forward Curved



Backward Inclined



Airfoil

UBD
Upblast
CCW 360

Also Know As
- Counterclockwise 360°

TAU
Top Angular Up
CCW 45

Also Know As
- Counterclockwise 45°

THD
Top Horizontal
CCW 90

Also Know As
- Counterclockwise 90°

TAD
Top Angular Down
CCW 135

Also Know As
- Counterclockwise 135°

DBD
Downblast
CCW 180

Also Know As
- Counterclockwise 80°

BHD
Bottom Horizontal
CCW 270

Also Know As
- Counterclockwise 270°

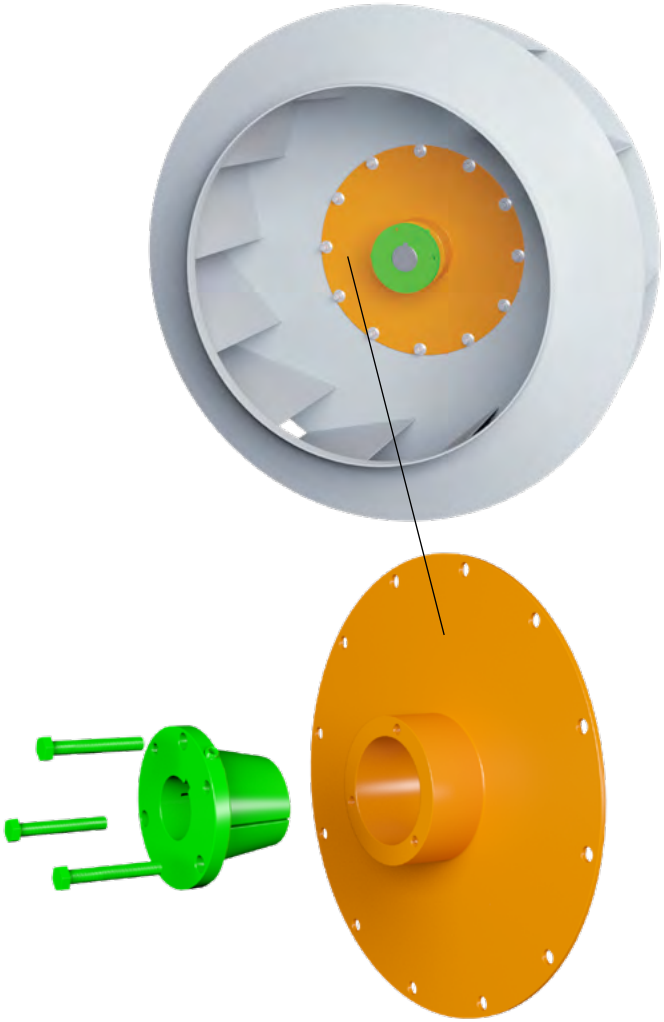
BAU
Bottom Angular Up
CCW 315

Also Know As
- Counterclockwise 315°

HUB CONFIGURATIONS

STRAIGHT BORE HUB
(WITH SET SCREWS)

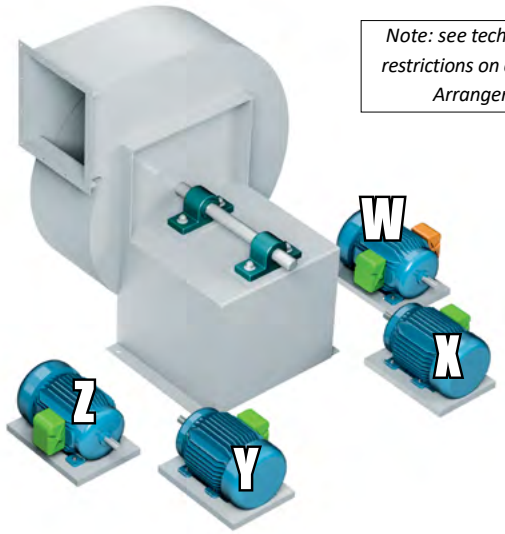
TAPER LOCK HUB
(WITH BUSHING)



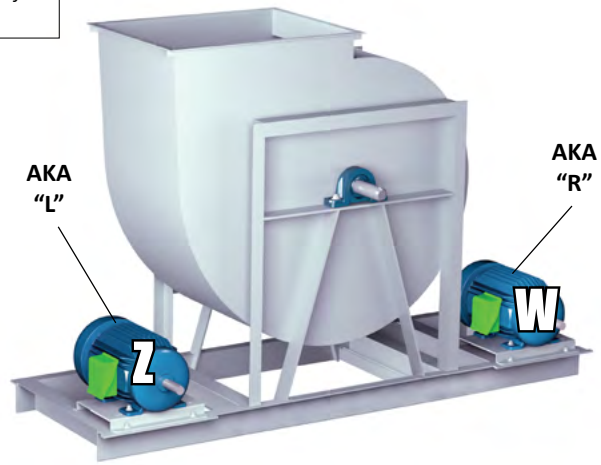
MOTOR POSITIONS FOR BELT DRIVEN FANS

CENTRIFUGAL FANS

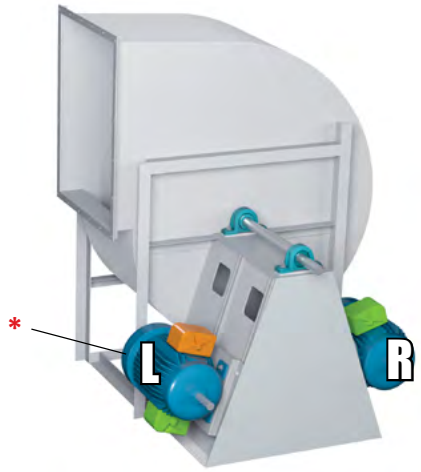
Note: see technical descriptions for restrictions on certain discharges for Arrangements 1, 3 & 3F



Arrangements 1 & 3



Arrangement 3F



Arrangement 9

Standard Motor Position: CW (L) / CCW (R)

* Motor Position (L) is normally ordered with F1 Conduit Box.
Select F2 if clearance issues.

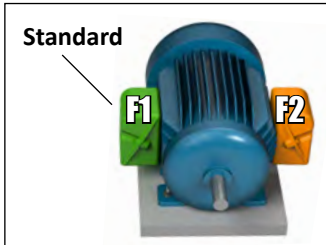
Arrangement 9F

Standard Motor Position: CW (L) / CCW (R)

Sizes 122-365 (Vent Sets) Motor Mounted on Bottom of Pedestal (Adjustable Plate)

Sizes 402+ Motor Mounted on Side of Pedestal Frame (Slide Base)

Arrangement 10

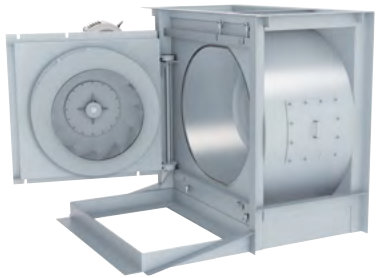


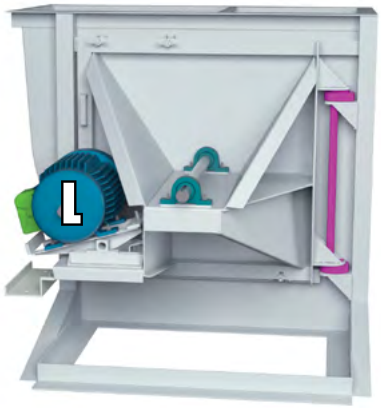
Conduit Boxes
viewed from drive side of motor (looking at motor shaft)

TCF Twin City Fan

MOTOR POSITIONS FOR BELT DRIVEN FANS

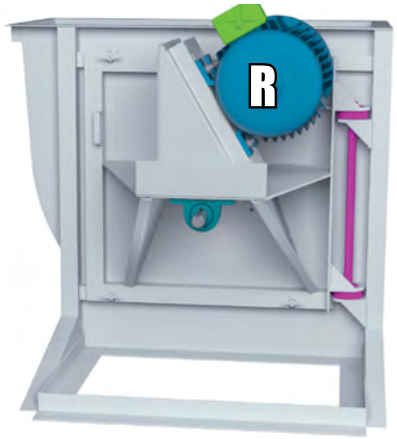
CENTRIFUGAL SWINGOUT FANS





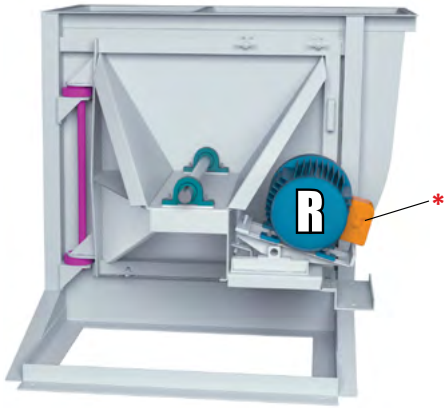
Arrangement 9SS (Right Swing)

CW Rotation & (L) Motor Position Only
Belt Drive - **S**wingout Construction
Pivot Base **S**ide Mounted Motor



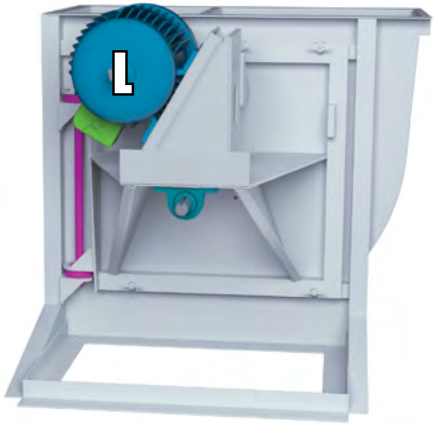
Arrangement 9ST (Right Swing)

Standard Motor Position: (R)
Belt Drive - **S**wingout Construction
Slide Base **T**op Mounted Motor



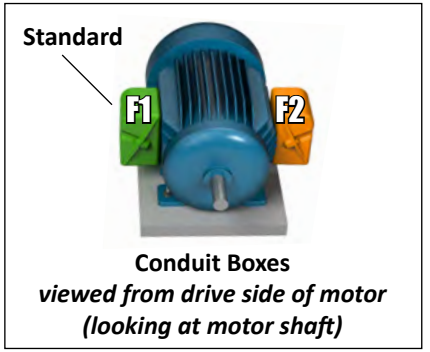
Arrangement 9SS (Left Swing)

CCW Rotation & (R) Motor Position Only
Belt Drive - **S**wingout Construction
Pivot Base **S**ide Mounted Motor
* must have F2 Conduit Box for this orientation



Arrangement 9ST (Left Swing)

Standard Motor Position: (L)
Belt Drive - **S**wingout Construction
Slide Base **T**op Mounted Motor



Conduit Boxes
viewed from drive side of motor (looking at motor shaft)

MOTOR POSITIONS FOR BELT DRIVEN FANS

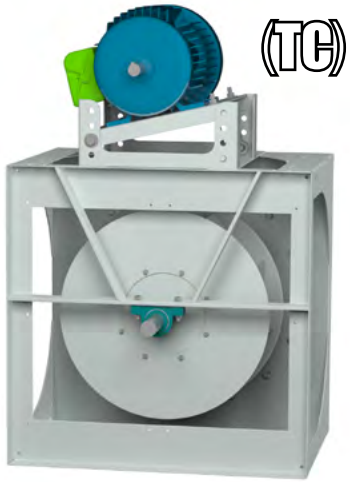
PLENUM FANS

Optional (O) Standard (S)

Arrangement 3HS

Belt Drive - **H**orizontal with Top Mounted Motor with **S**lide Base Motor Mount

(TC) Top Center



Arrangement 3HA

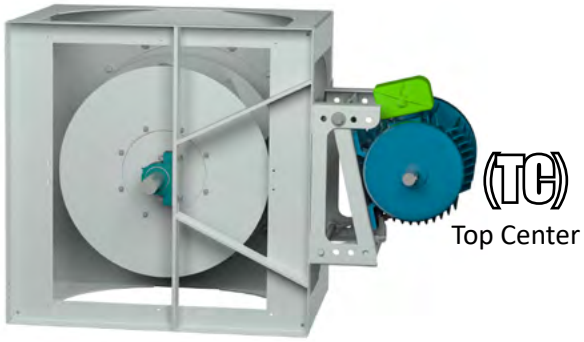
Belt Drive - **H**orizontal with Top Mounted Motor with **A**djustable Motor Base

Arrangement 3SM

Belt Drive - Horizontal With **S**ide **M**ounted Motor with Slide Base Motor Mount

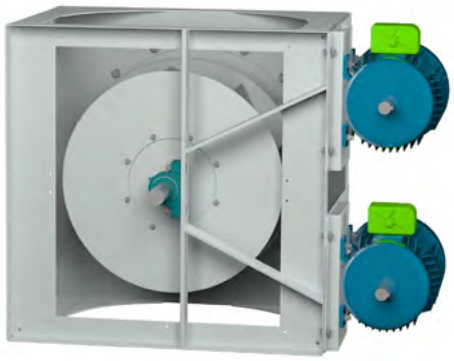
Standard: Motor Position (R)

* Motor Position (L) is normally ordered with F1 Conduit Box. *Select F2 if clearance issues.*



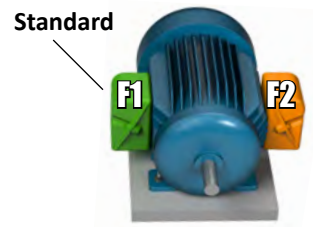
Arrangement 3VA

Belt Drive - **V**ertical with **A**djustable Motor Base



Arrangement 3VS

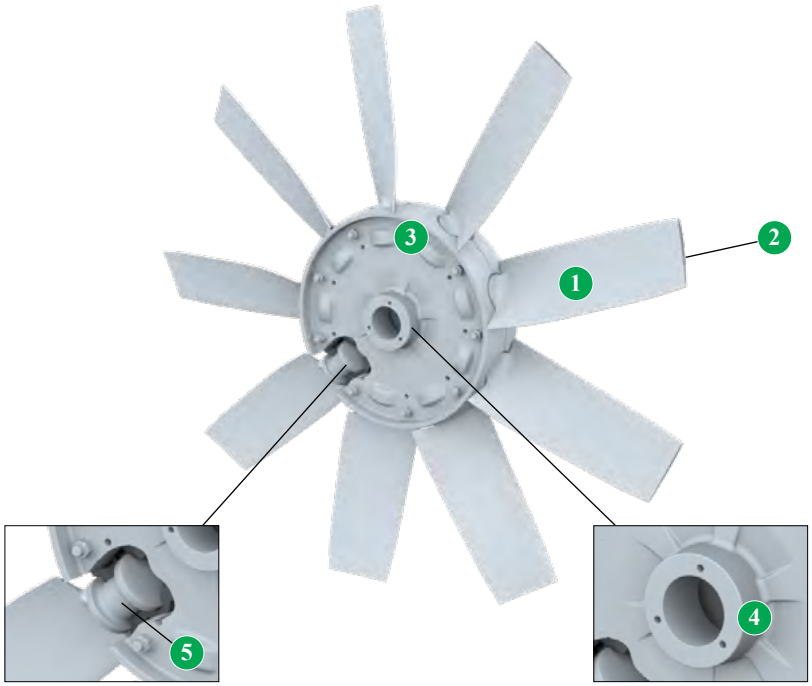
Belt Drive - **V**ertical with **S**lide Base Motor Mount



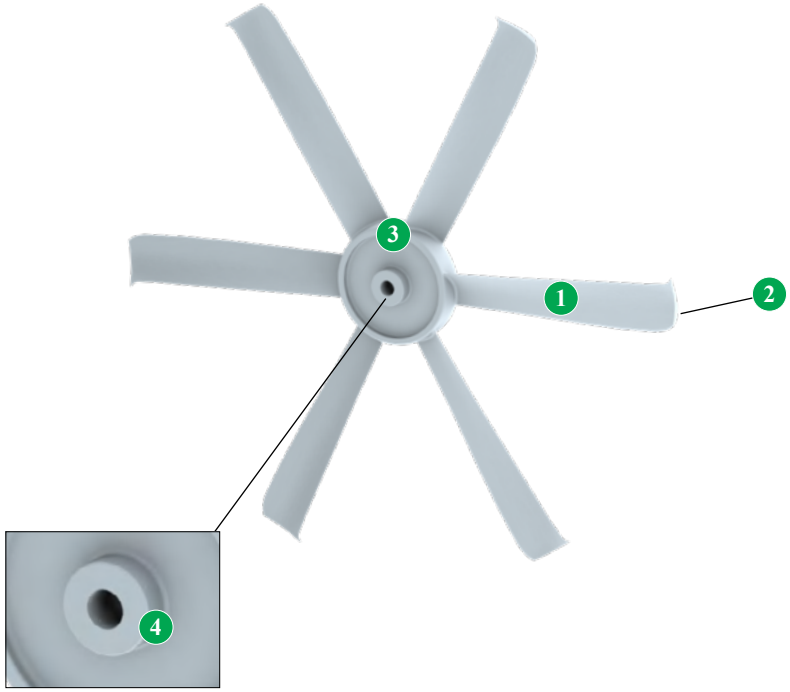
Conduit Boxes
viewed from drive side of motor (looking at motor shaft)

PROPELLERS
OVERVIEW

1 BLADE 2 BLADE TIP 3 HUB 4 HUB BOSS 5 SHANK



Adjustable Pitch Propellers

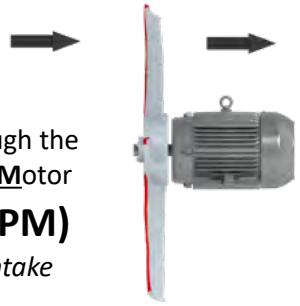


Fixed Pitch Propellers (Cast or Fabricated)

Steps for configuring an axial fan

Step #1
Select the model/propeller type

Step #2
What direction do you want the air to flow?

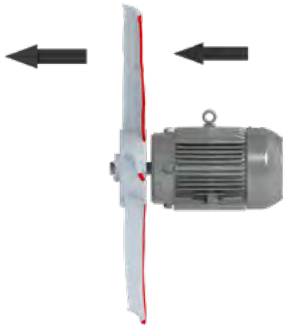


air passing through the **P**rop then over **M**otor

(Airflow = PM)

aka: Hub on Intake

or

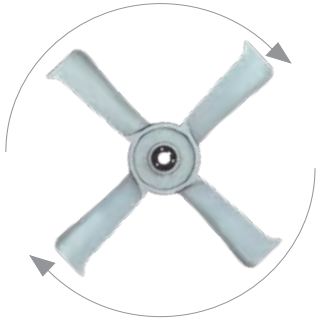


air passing over **M**otor then through the **P**rop

(Airflow = MP)

aka: Hub on Discharge

Step #3
Which direction does the propeller need to rotate to achieve the desired airflow direction?



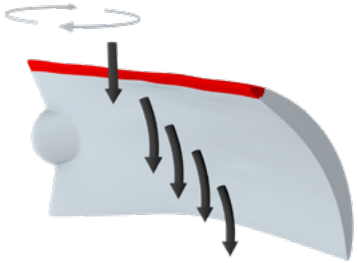
See following pages for addition information on propeller types by model, airflow direction and propeller rotation.

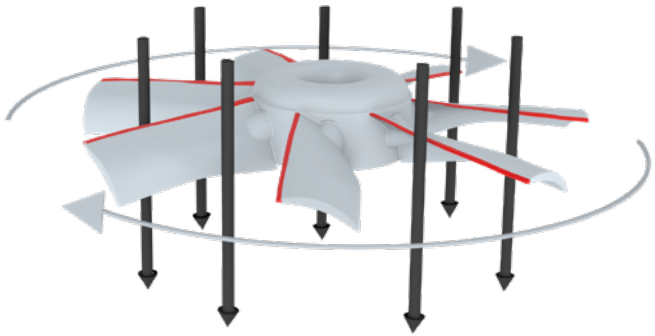
ADJUSTABLE PITCH PROPELLERS *(AIRFLOW = PM)*

Airflow Direction

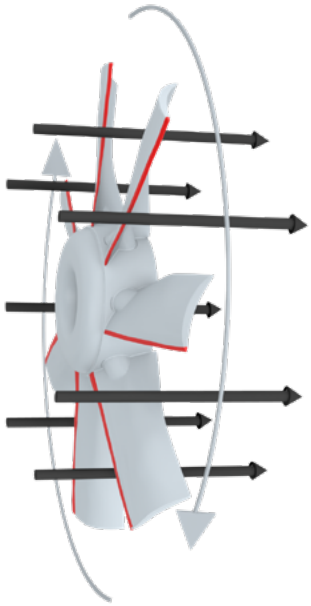
Leading Edge of Blade

- Air is drawn through the propeller from the leading edge of the blades.
- The concave side of the blade cups the air and pushes it away from the prop





LH Rotation



NOTE 1: Airflow direction and rotation must be correct in order for the fan to operate at 100% performance.

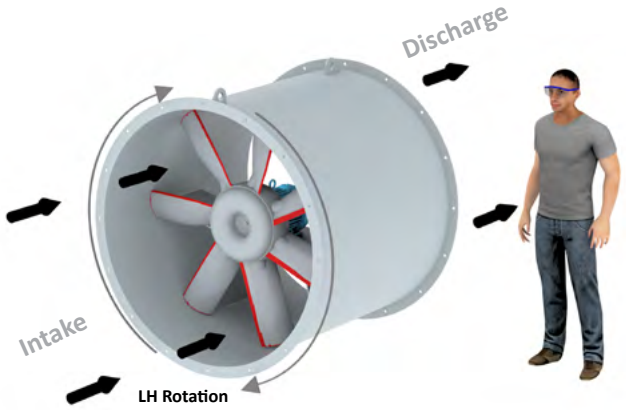
NOTE 2: **If the propeller rotates in the wrong direction, <u>you will not get any airflow at all in the proper direction.</u>**

<u>AIRFLOW = PM (AIR THROUGH PROP THEN MOTOR)</u>

Rotation is determined by viewing the propeller from the discharge side of the fan.

Intake Side

<u>Airflow Direction</u>
air passes through
<u>P</u>rop then over **<u>M</u>**otor
(Airflow = PM)
aka: Hub on Intake

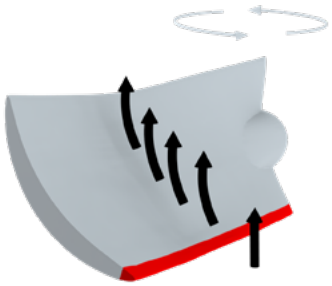


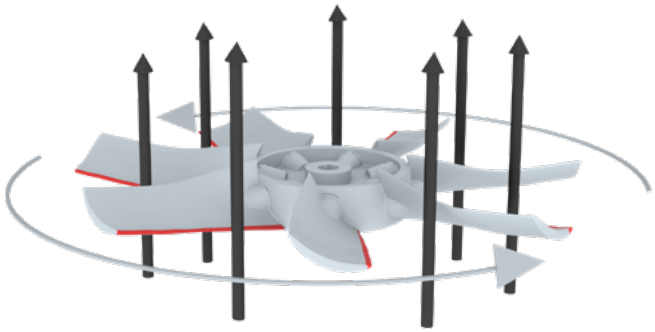
ADJUSTABLE PITCH PROPELLERS *(AIRFLOW = MP)*

Airflow Direction

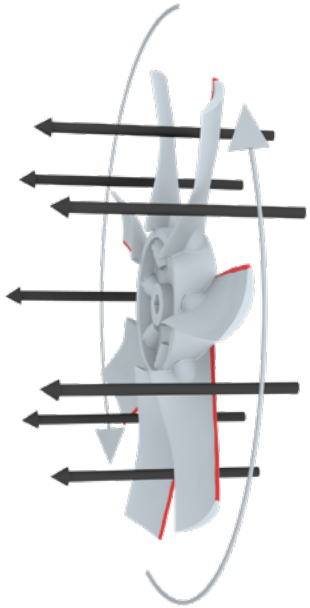
Leading Edge of Blade

- Air is drawn through the propeller from the leading edge of the blades.
- The concave side of the blade cups the air and pushes it away from the prop





LH Rotation

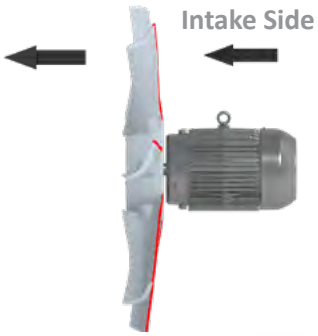


NOTE 1: Airflow direction and rotation must be correct in order for the fan to operate at 100% performance.

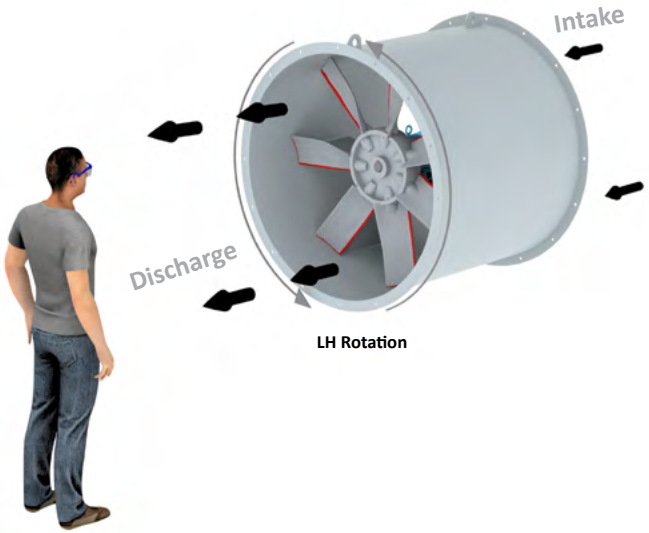
NOTE 2: **If the propeller rotates in the wrong direction, <u>you will not get any airflow at all in the proper direction.</u>**

<u>AIRFLOW = MP (AIR OVER MOTOR THEN PROP)</u>

Rotation is determined by viewing the propeller from the discharge side of the fan.



<u>Airflow Direction</u>
air passes over **<u>M</u>**otor
then through **<u>P</u>**rop
(Airflow = MP)
aka: Hub on Discharge



LH Rotation

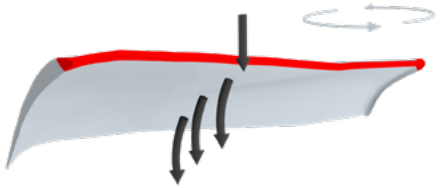
TCF Twin City Fan

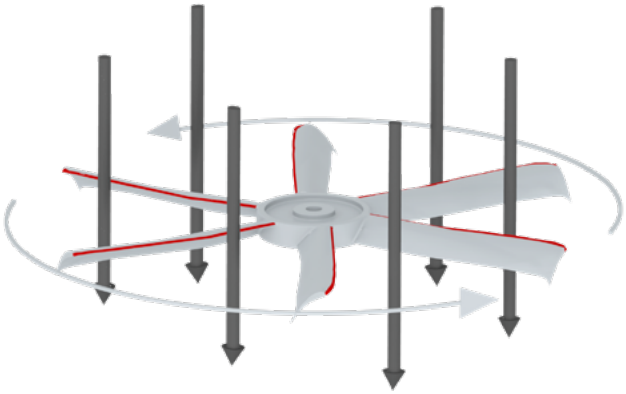
FIXED PITCH PROPELLERS - Cast/Fabricated *(AIRFLOW = PM)*

Airflow Direction

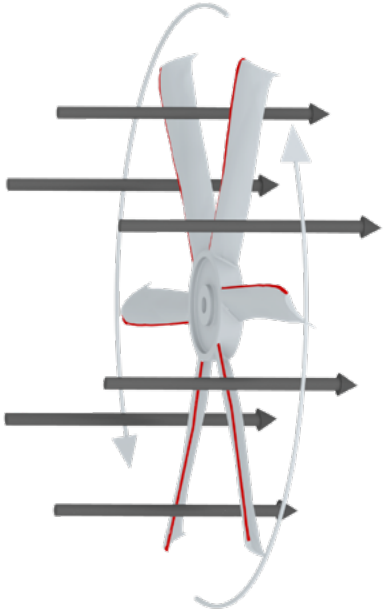
Leading Edge of Blade

- Air is drawn through the propeller from the leading edge of the blades.
- The concave side of the blade cups the air and pushes it away from the prop





RH Rotation



NOTE 1: Airflow direction and rotation must be correct in order for the fan to operate at 100% performance.

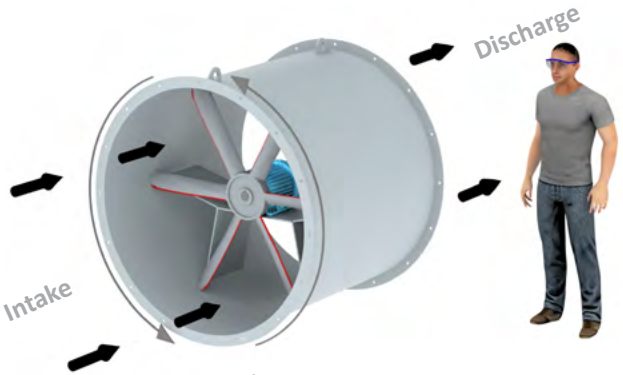
NOTE 2: **If the propeller rotates in the wrong direction, you will not get any airflow at all in the proper direction.**

AIRFLOW = PM (AIR THROUGH PROP THEN MOTOR)

Rotation is determined by viewing the propeller from the discharge side of the fan.

Intake Side

Airflow Direction
air passes through
Prop then over **M**otor
(Airflow = PM)
aka: Hub on Intake



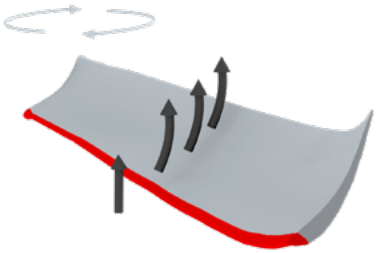
RH Rotation

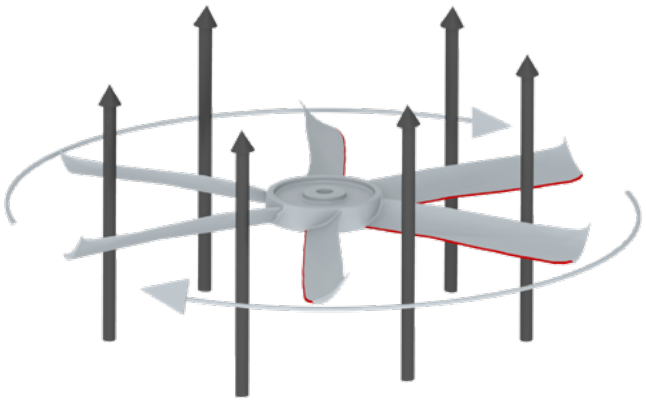
FIXED PITCH PROPELLERS - Cast/Fabricated *(AIRFLOW = MP)*

Airflow Direction

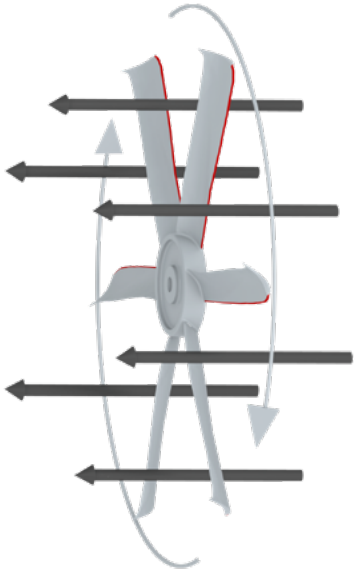
Leading Edge of Blade

- Air is drawn through the propeller from the leading edge of the blades.
- The concave side of the blade cups the air and pushes it away from the prop





RH Rotation



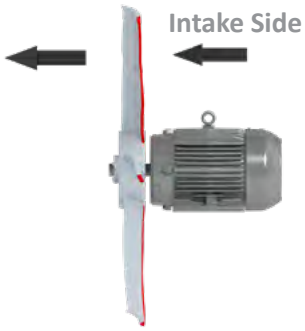
NOTE 1: Airflow direction and rotation must be correct in order for the fan to operate at 100% performance.

NOTE 2: **If the propeller rotates in the wrong direction, <u>you will not get any airflow at all in the proper direction.</u>**

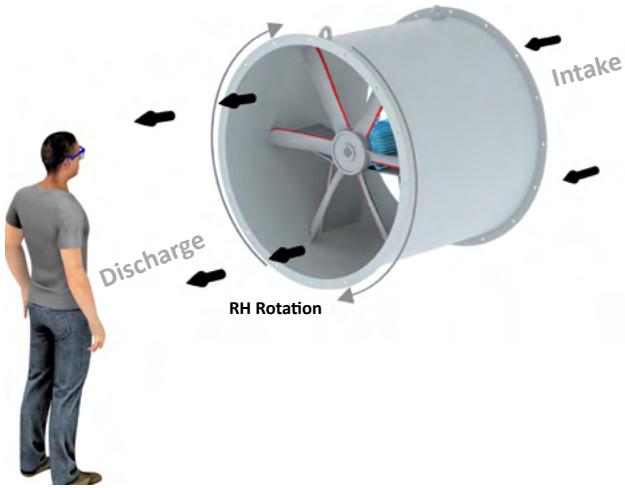
<u>AIRFLOW = MP (AIR OVER MOTOR THEN PROP)</u>

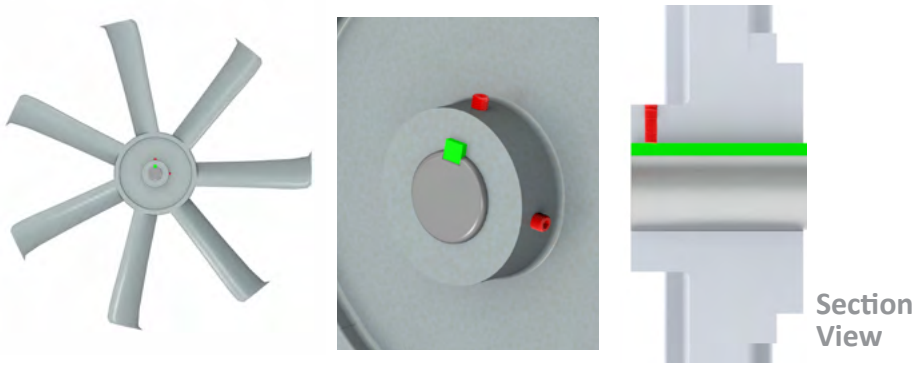
AIRFLOW DIRECTION

Rotation is determined by viewing the propeller from the discharge side of the fan.

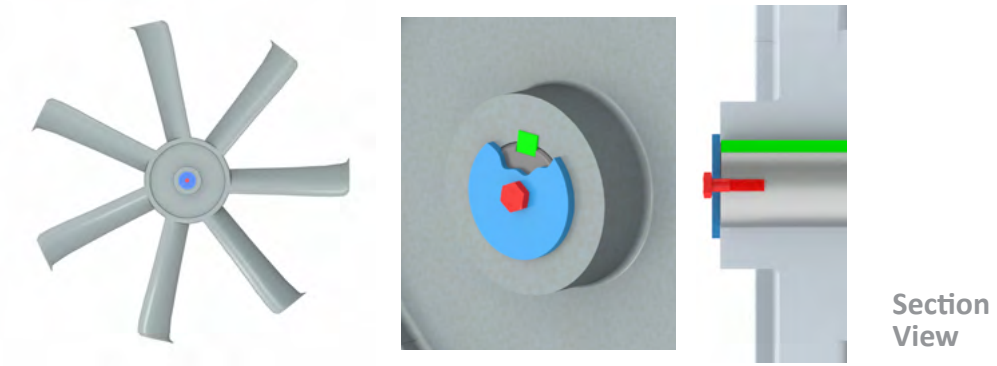


<u>Airflow Direction</u>
air passes over **<u>M</u>**otor
then through **<u>P</u>**rop
(Airflow = MP)
aka: Hub on Discharge

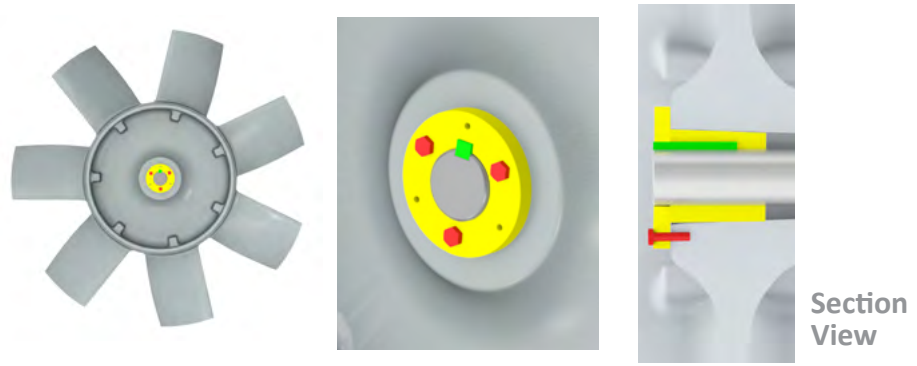




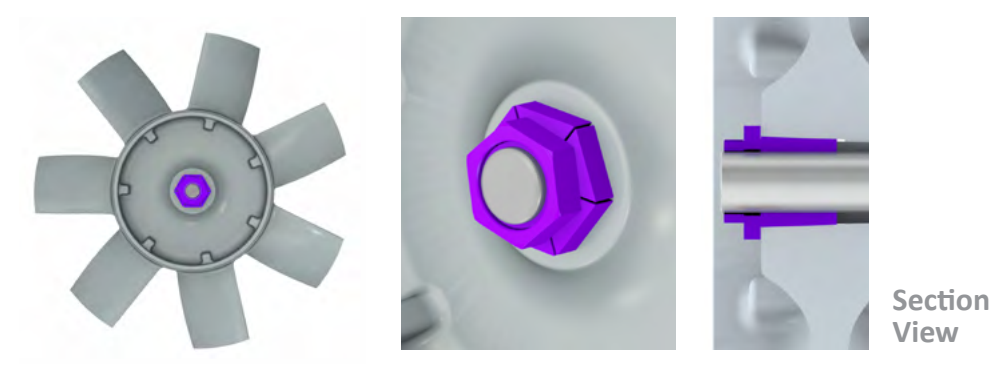
Straight Bore Hub
With Key & Set Screws



Straight Bore Hub
With Key, Retaining Washer & Bolt



Taper Lock Hub/Bushing
With Key & Hardware

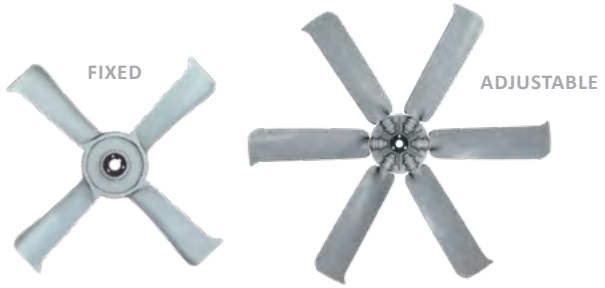


Trantorque Hub/Bushing

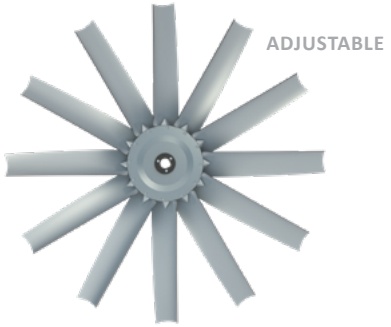
Key | Retaining Washer | Hardware | Taper Lock Bushing | Trantorque Bushing

PROPELLERS
PROPELLER TYPES

"C Series" Propeller

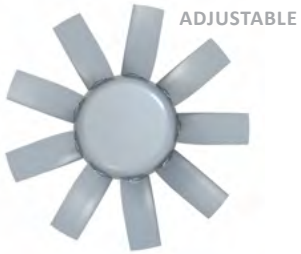


"TCWP" Propeller



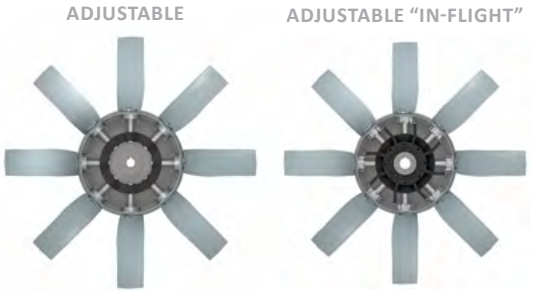
"B Series" (Backswept) Propeller

"E Series" Propeller



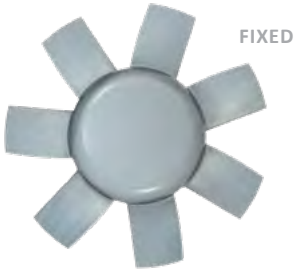
"TCVX" Propeller

"A" Propeller



"AXICO" Propeller

"TCTS" Propeller



"TCTA" Propeller

"Z Series" Propeller

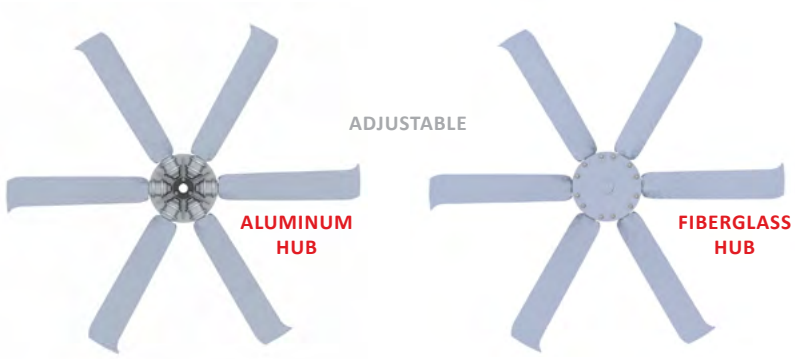
"L Series" Propeller

"TCPE" Propeller

FIBERGLASS PROPELLERS

"TF" Propeller - TCF

"FG7" Propeller - TCF

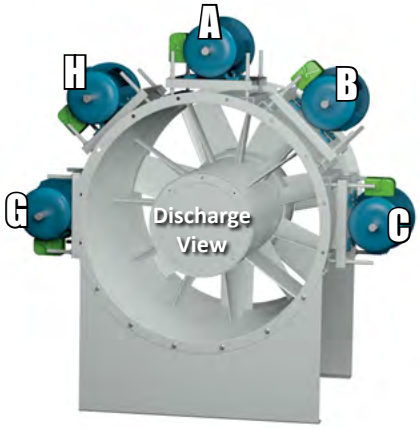


"F6" (Aluminum Hub) & "FG6" (Fiberglass Hub) Propellers - Propeller - TCF

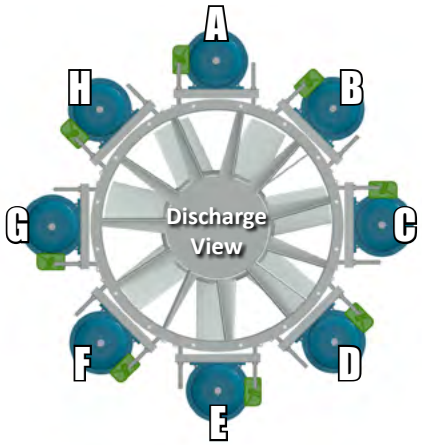
Horizontal Configurations

INLINE CENTRIFUGAL | MIXED FLOW | AXIAL

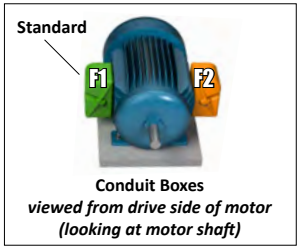
Motor Positions (Arrangement 9 Only)



Floor Mounted

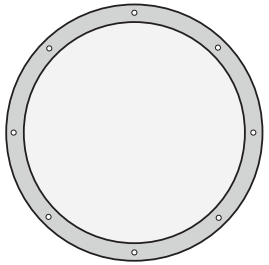


Duct or Ceiling Mounted

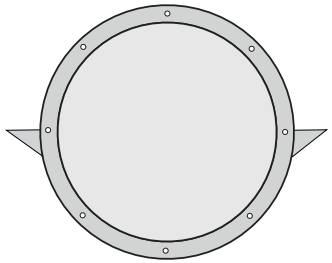


Conduit Boxes
viewed from drive side of motor (looking at motor shaft)

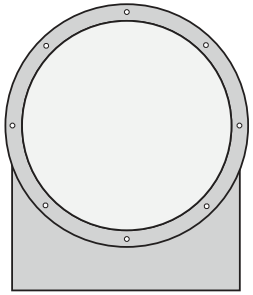
Discharges (Arrangements 4 & 9)



(HOR)
Horizontal
No Brackets



(HCH)
Horizontal
Ceiling Hung



(HBM)
Horizontal
Base Mount

Vertical Configurations

INLINE CENTRIFUGAL | MIXED FLOW | AXIAL

Motor Positions (Arrangement 9 Only)

Roof Mounted

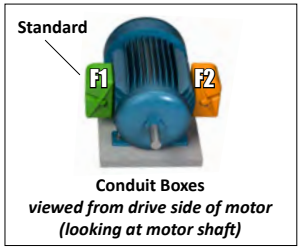
No specified motor position for this configuration. Motor is centered on curb cap as shown.

Floor Mount

Ceiling Mount

Duct Mount
(no support Brackets)

No specified motor position for this configuration. Motor is centered between support brackets as shown.

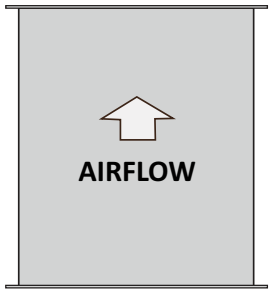


Conduit Boxes
viewed from drive side of motor (looking at motor shaft)

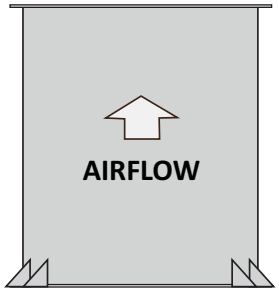
Vertical Configurations

INLINE CENTRIFUGAL | MIXED FLOW | AXIAL

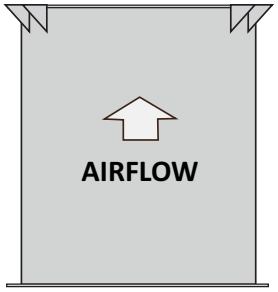
Discharges (Arrangements 4 & 9)



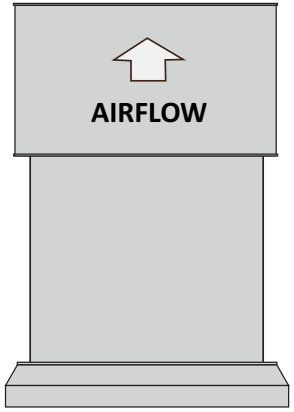
(VUN)
Vertical Up
No Brackets



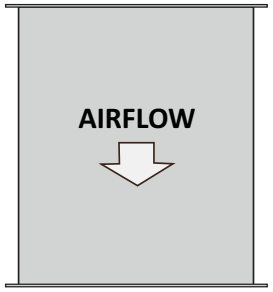
(VUI)
Vertical Up
Floor Mount Brackets On Inlet



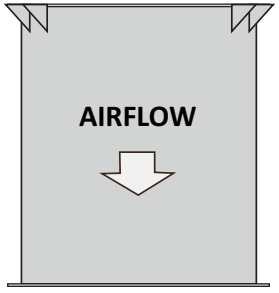
(VUO)
Vertical Up
Ceiling Hung Brackets On Outlet



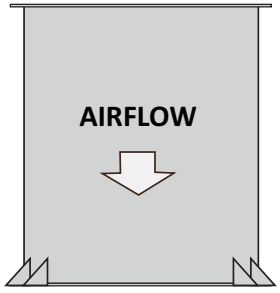
(VRM)
Vertical Roof Mount



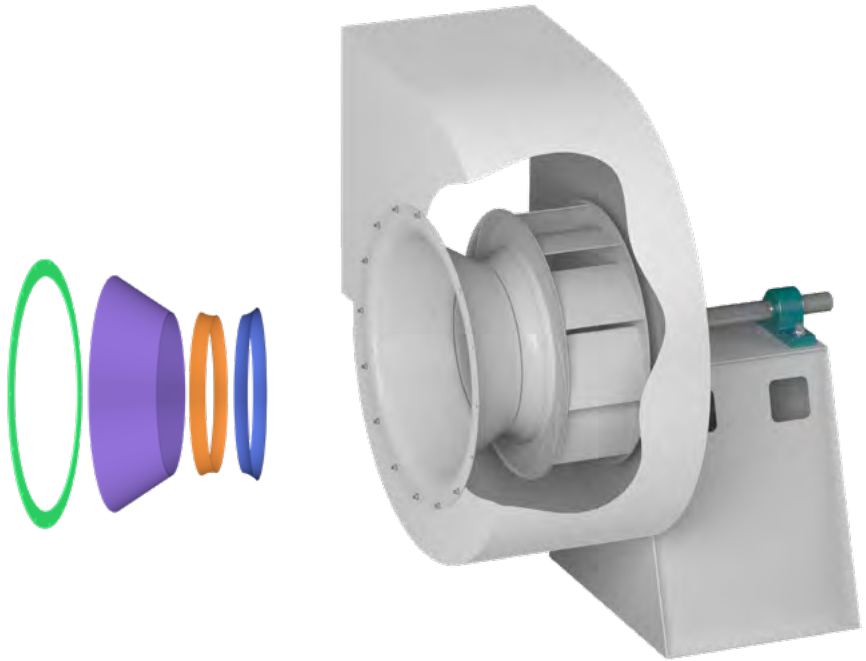
(VDN)
Vertical Down
No Brackets



(VDI)
Vertical Down
Ceiling Hung Brackets On Inlet



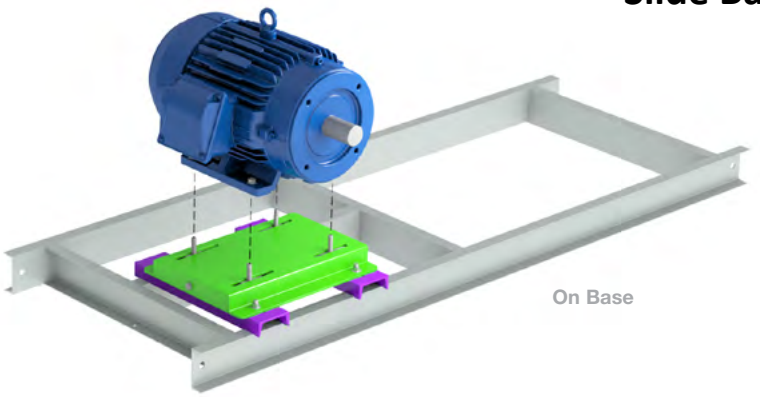
(VDO)
Vertical Down
Floor Mount Brackets On Outlet



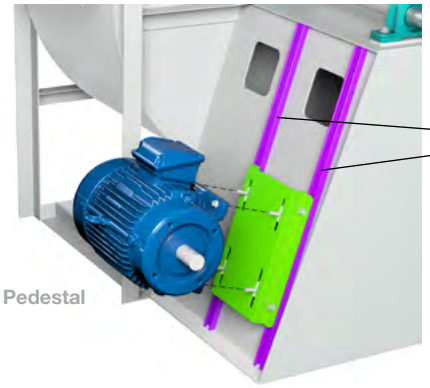
FAN COMPONENTS

MOTOR BASES
Slide Bases/Rails

Slide Bases



On Base



On Pedestal

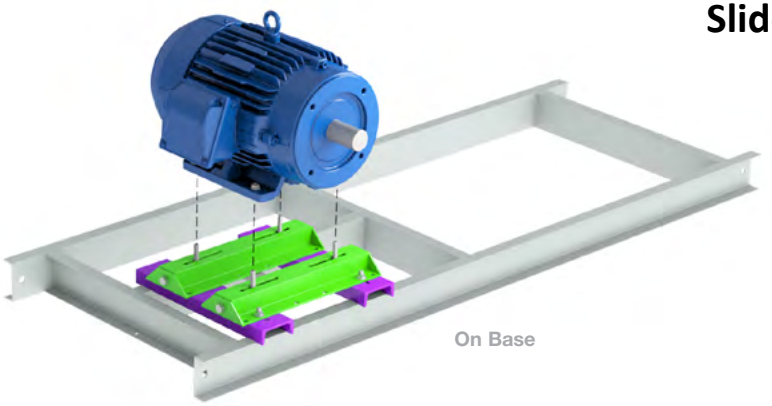
UniStrut Channels used on some fans for additional adjustment of the slide base

NEMA Type Slide Base
Used on small to large motors - 48 to 445 frame

Typical Mounting
- Arr. 1 or 3 (Floor mounted or on Fan Base)
- Arr. 9, 9F, 9H, 9ST
- Plenum Fans – Arr. 1, 3, 3HS, 3VS, 3SM
- Pedestal Plug Fans – Arr. 1P, 9P

Green = Motor Base/Rails
Purple = Motor Mount Support

Slide Rails



On Base

On Pedestal
(Arr. 9H only)

Heavy Duty Slide Rails (two rails per motor)
- Used on large to very large motors
(frame size series 440, 500 & 5000)

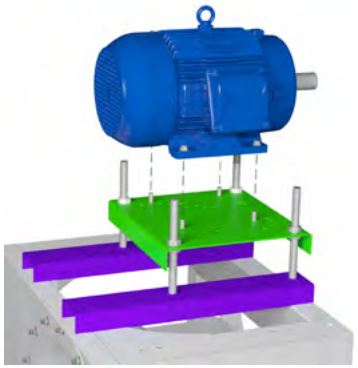
TCF Twin City Fan

MOTOR BASES
Adjustable Type

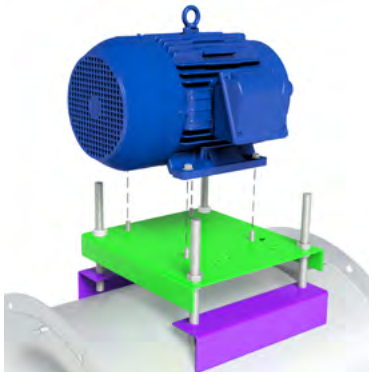
Adjustable Bases

Typical Mounting
- Tubular Fans – Centrifugal & Axial (Arr. 9)
- Plenum Fans – Arr. 3HA, 3VA
- Plug Fans – Arr. 9

Green = Motor Base
Purple = Motor Mount Support

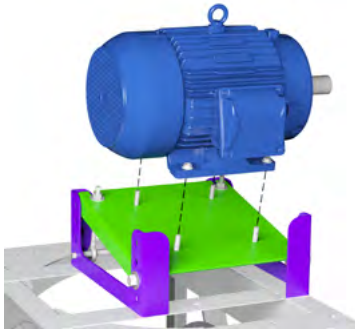


Flat Mount

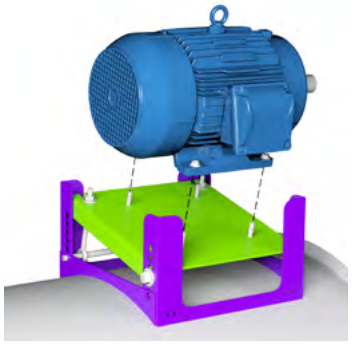


Saddle Mount

Standard Post Mount
- Used on small motors - 48 to 215 frame
- Saddle Mount or Flat Mount



Flat Mount

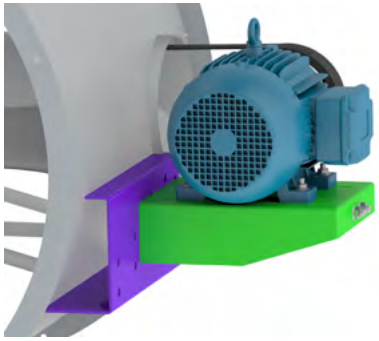


Saddle Mount

Pivot / Bolted Design
- Used on larger motors - 254 to 445 frame
- Saddle Mount or Flat mount

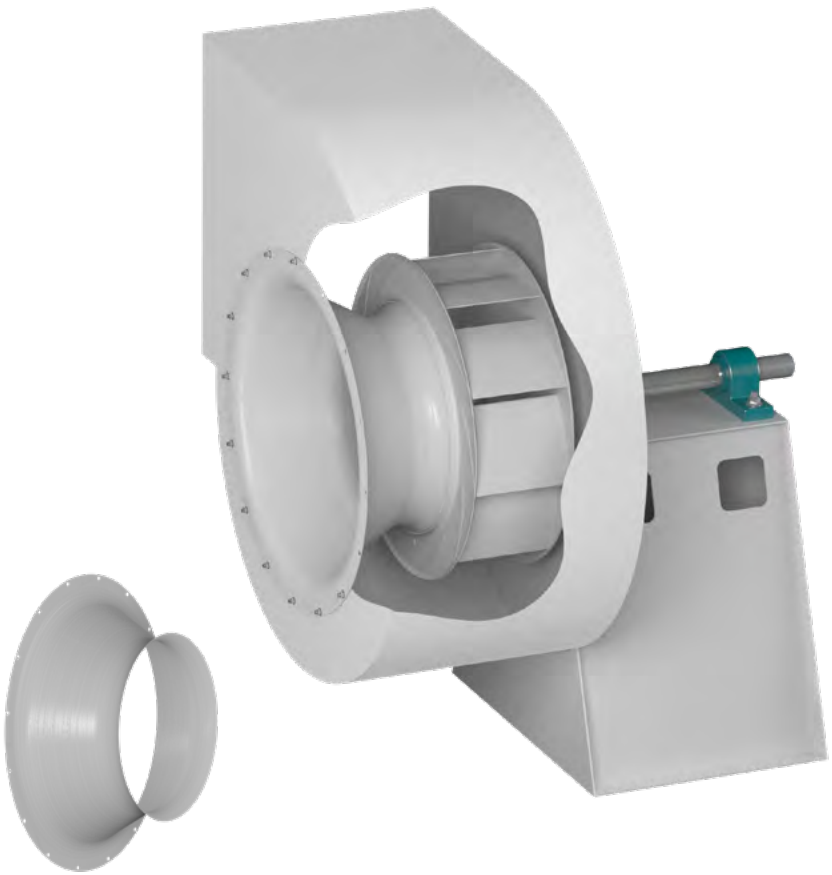
Typical Mounting
- Tubeaxial, Vaneaxial,
& Centaxial Fans (Arr. 9)

Green = Motor Base
Purple = Motor Mount Support



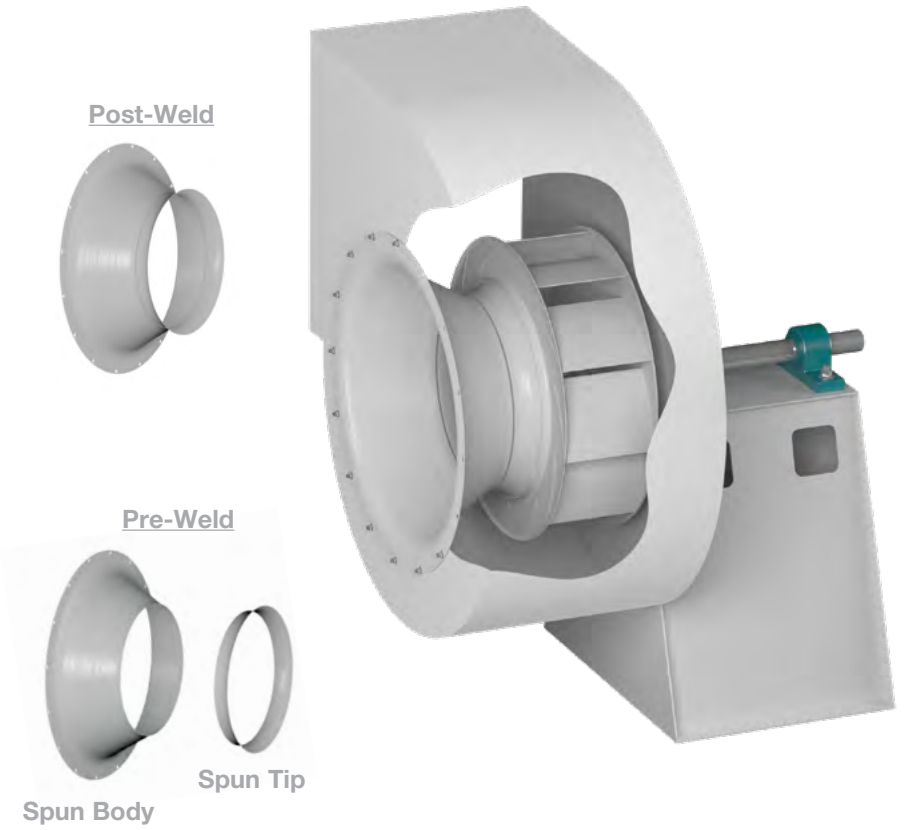
Bolt On Mount
- Used on small motors - 48 to 286 frame
- Saddle Mount

INLET FUNNELS / VENTURIS



INLET FUNNEL
SOLID SPUN

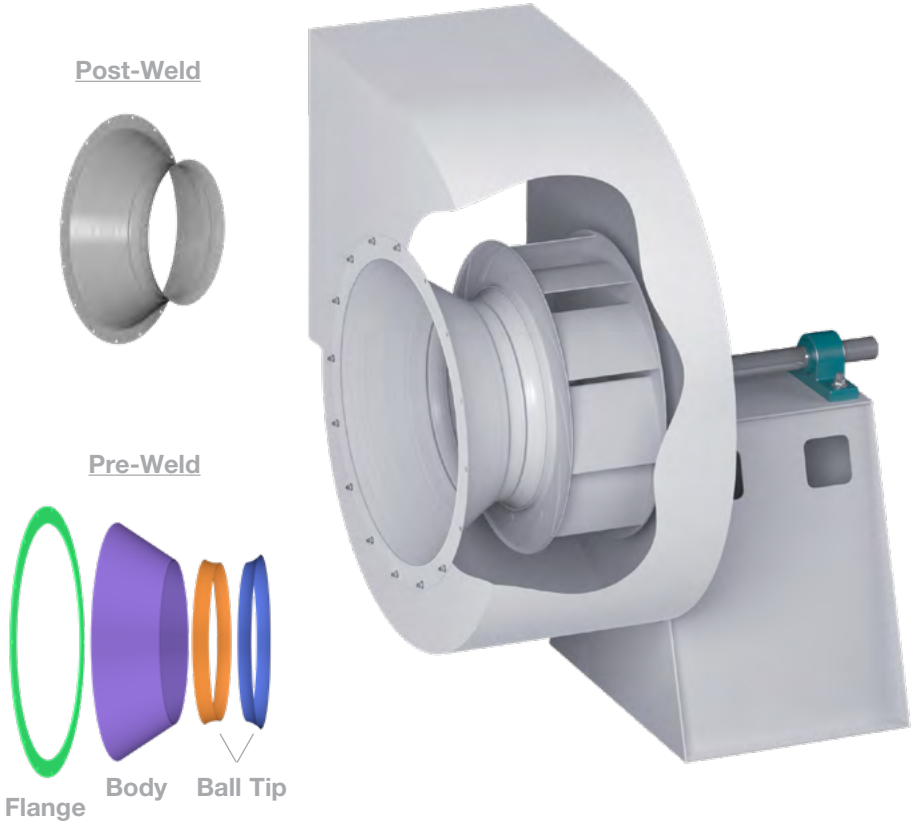
Also Known As:
- Inlet Cone
- Funnel
- Inlet Bell



INLET FUNNEL
SPUN BODY, SPUN TIP

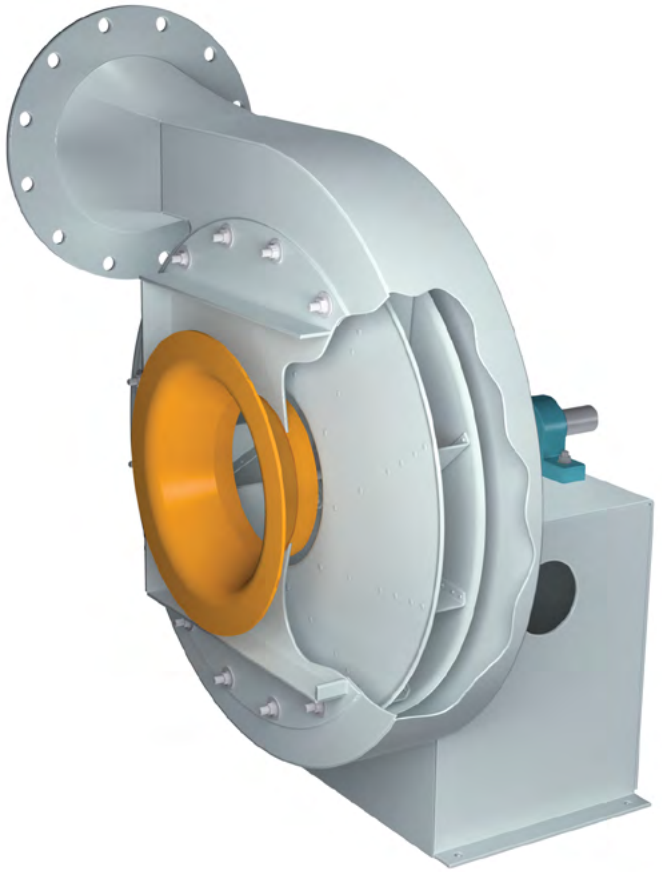
Also Known As:
- Inlet Cone
- Funnel
- Inlet Bell

INLET FUNNELS / VENTURIS



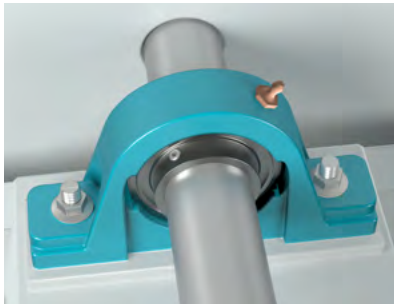
INLET FUNNEL
FABRICATED BODY, BALL ROLLED TIP

Also Known As:
- Inlet Cone
- Funnel
- Inlet Bell

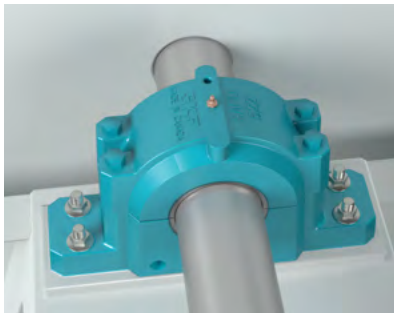


INLET VENTURI

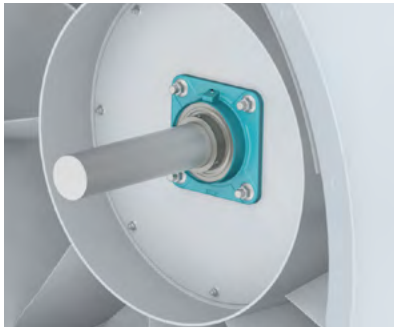
Also Known As:
- Inlet Cone
- Funnel
- Inlet Bell



SOLID PILLOW BLOCK BEARING



SPLIT PILLOW BLOCK BEARING



FLANGE MOUNT BEARING

BEARING LIFE

Under laboratory conditions with controlled loads and proper lubrication, bearings fail due to fatigue. Bearing life is a statistical calculation of when a percentage of a population of bearings will fail based on bearing geometry, bearing load, and speed. All bearings have a finite life and will eventually fail.

L-10 LIFE

A statistical estimate of hours that 10% of a population of bearings at a given speed and loading condition will fail.

L-50 LIFE OR AVERAGE LIFE

- Occasionally, the term “average life” or L-50 is used. A statistical estimate of hours 50% of a population of bearings at a given speed and loading condition will fail.
- It is calculated by multiplying the L-10 life by five. For example, a bearing with an L-10 life of 40,000 hours has an L-50 life of 200,000 hours.

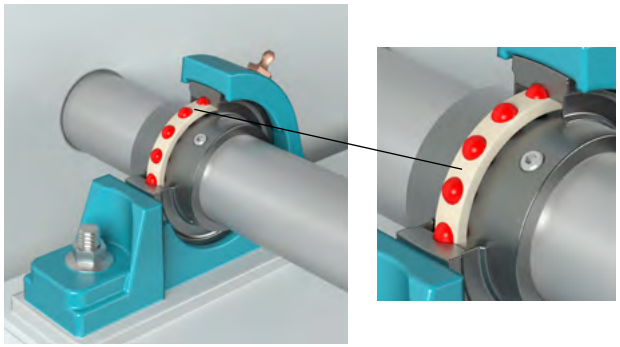
TCF BEARING LIFE STANDARDS (The examples below depict life in years based on these calculations)

- Most TCF fan models offer a bearing life of L10–40,000 hours.
- Some models are offered at L10-20,000, L10–40,000, L10–60,000, L10–80,000 & L10–100,000 hours.
- *See the product catalogs for the bearing life specifications by model.*

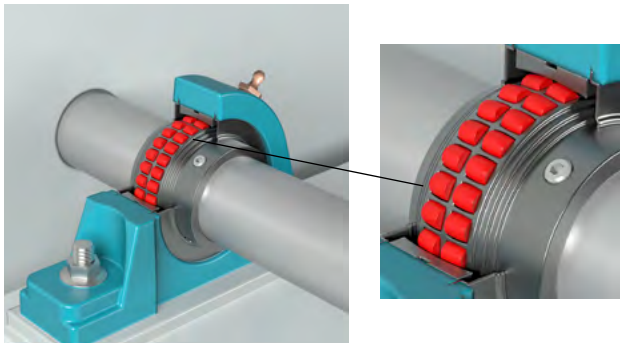
Example 1		24 / Day 7 Days / Week	24 Hours / Day 5 Days / Week	16 Hours / Day 5 Days / Week	8 Hours / Day 5 Days / Week	2 Hours / Day 5 Days / Week
L10	40,000 Hours	4.6 years	6.4 years	9.6 years	19 years	77 years
L50	200,000 Hours	22.8 years	32 years	48 years	96 years	385 years

Example 2		24 / Day 7 Days / Week	24 Hours / Day 5 Days / Week	16 Hours / Day 5 Days / Week	8 Hours / Day 5 Days / Week	2 Hours / Day 5 Days / Week
L10	20,000 Hours	2.3 years	3.2 years	4.8 years	9.6 years	39 years
L50	100,000 Hours	11.5 years	16 years	24 years	48 years	193 years

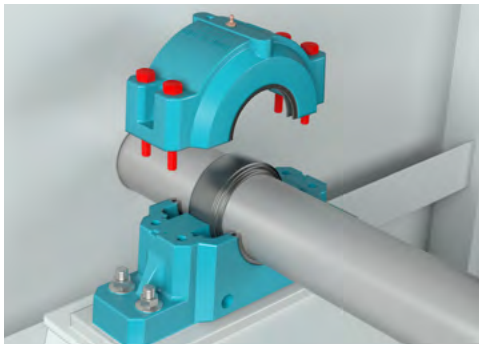
PILLOWBLOCK BEARINGS



SOLID PILLOW BLOCK BEARING
ROLLING ELEMENT: BALL TYPE

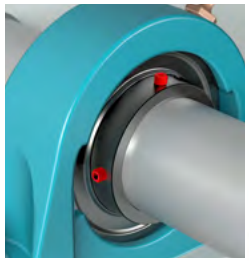


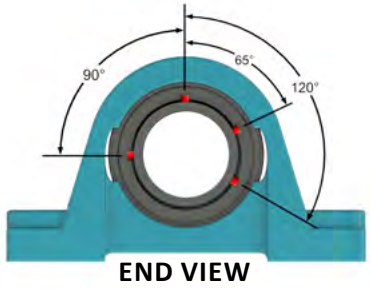
SOLID PILLOW BLOCK BEARING
ROLLING ELEMENT: SPHERICAL ROLLER TYPE



SPLIT PILLOW BLOCK BEARING
ROLLING ELEMENT: OFFERED IN BALL TYPE & SPHERICAL ROLLER TYPE

HOW BEARINGS CONNECT TO SHAFT

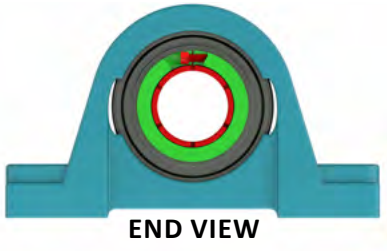




END VIEW

SET SCREW MOUNT

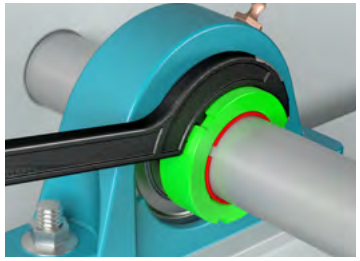
- 2 set screws required
- Spacing varies by manufacturer
  Dodge – 65°
  Linkbelt – 90°
  Sealmaster/Linkbelt – 120°



END VIEW

D-LOK / SKEWZLOC
(CONCENTRIC MOUNT)

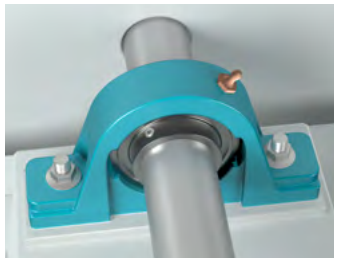
- Tightens to shaft using a partially segmented inner ring
- Tighten split locking collar with Cap Screw



ADAPTER MOUNT
(CONCENTRIC MOUNT)

- Tightens to shaft using a partially segmented inner ring
- Tighten locking collar with Spanner Wrench. Use for both Solid & Split Pillow Block Bearings.

HOW BEARINGS CONNECT TO PEDESTAL



2 HOLE MOUNT

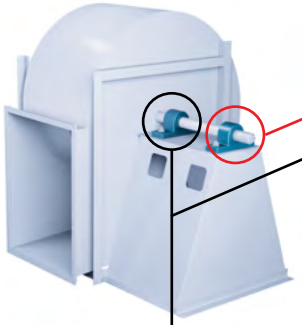
TCF Standard 2 hole mount:
Fan shafts 2-15/16 dia & below

4 HOLE MOUNT

TCF Standard 4 hole mount:
Fan shafts 3-7/16 dia & above

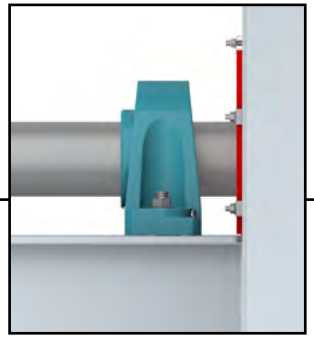
NOTE: Some manufacturers can offer only 2 hole or 4 hole mount beyond these ranges.

BEARING LOCATIONS (CENTRIFUGAL FANS W/ PEDESTAL)

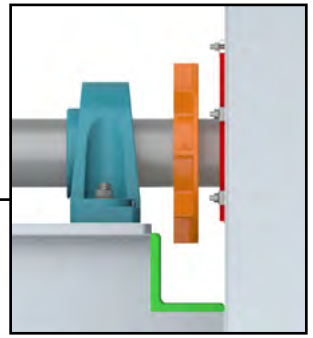


NOTE: Drive end "Outboard" bearing is set 3/4" in from end of pedestal top plate
NOTE: Non-Drive End bearing is also referred to as an "Inboard" bearing

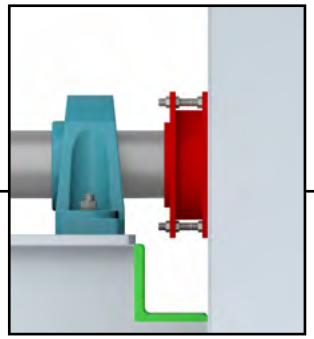
Shaft Seal **Bearing** **Shaft Cooler** **High Temp Angle**
AKA: Heat Angle, Inverted Angle, Spacer Angle



Standard Temp Style Pedestal with Standard Shaft Seal

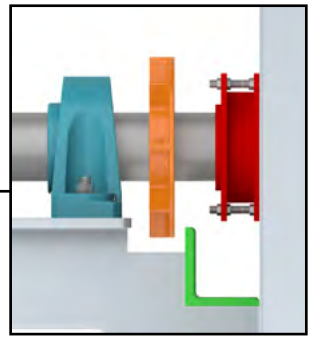


High Temp Style Pedestal with Standard Shaft Seal & Cooler



High Temp Style Pedestal Stuffing Box or Mechanical Shaft Seals

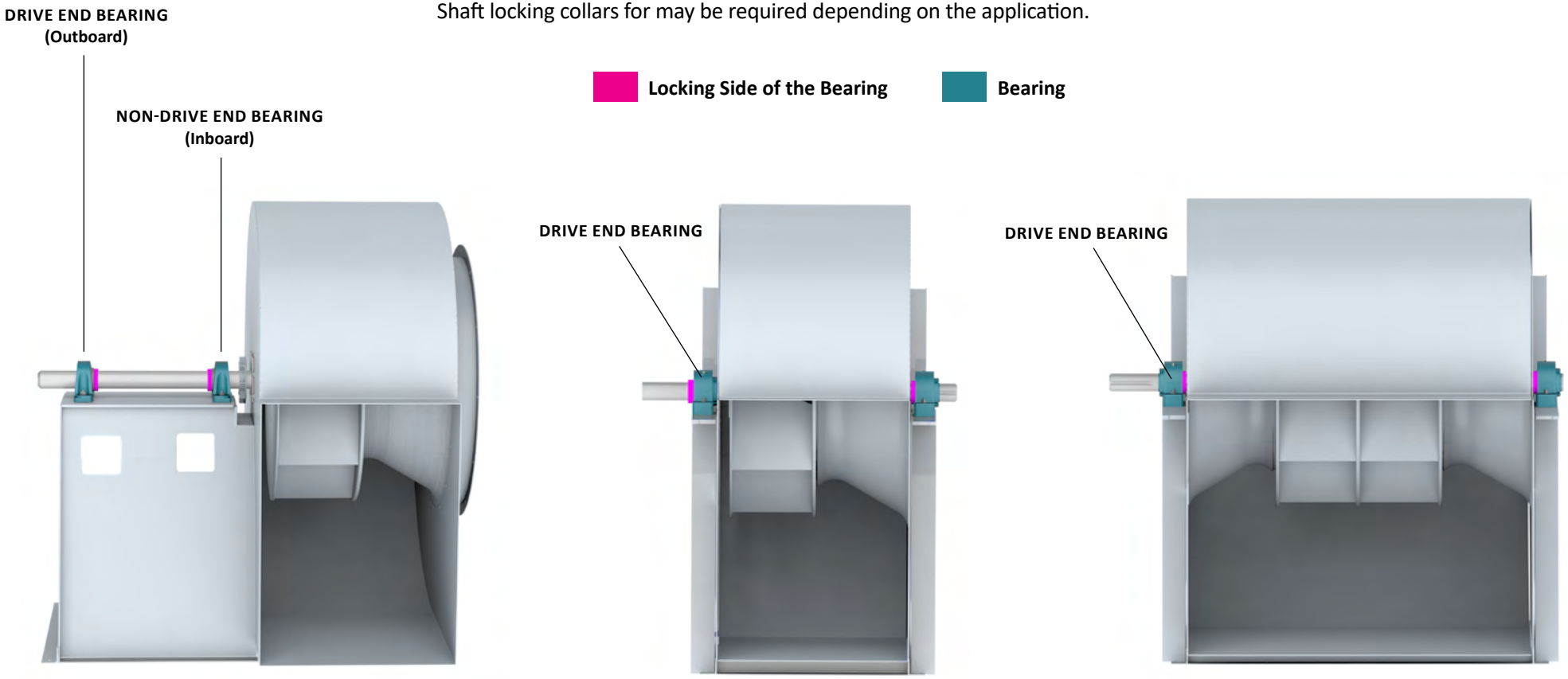
NOTE: Used for low temp applications



High Temp Style Pedestal With Shaft Cooler & Stuffing Box or Mechanical Shaft Seals

LOCKING COLLAR ORIENTATION / DRIVE END LOCATIONS

Shaft locking collars for may be required depending on the application.



SWSI Arrangements
1, 8, 9, 9F, 10

SWSI Arrangements
3*, 3SI, 7, 7SI

DWDI Arrangements
3, 3DI, 7, 7DI

**on Arr. 3 inlet driven fans, the drive end bearing is located on the inlet side of the fan*

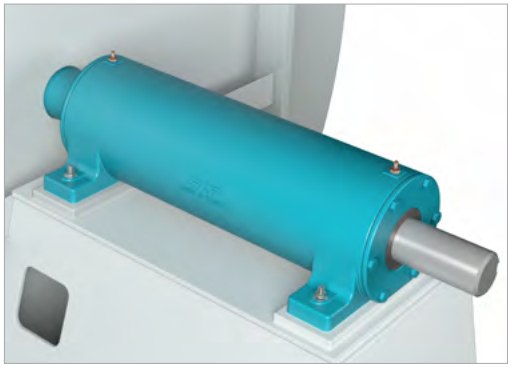
NOTE: Includes all Plenum Fan arrangements

BEARINGS
SPECIALTY BEARINGS

NOTE: SPECIALTY BEARING ARE USED ON SPECIAL APPLICATIONS ONLY

TOTALLY SPLIT ROLLER BEARING

- All internal bearing parts split into TWO HALVES
- Pillowblock housing is split
- Allows removal of internal bearing parts without totally removing the shaft

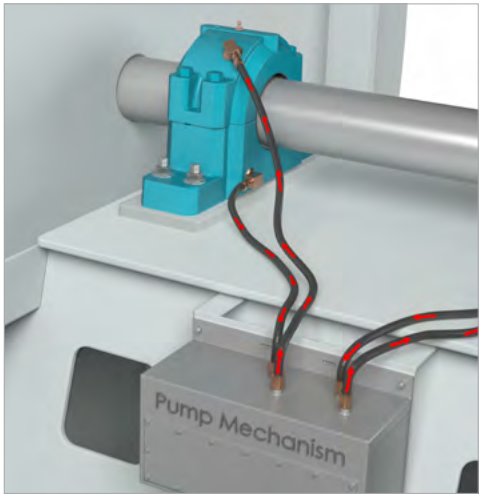


TWO BEARING HOUSING
Also Known As: Monoblock Bearings

- Pillowblock bearings built inside a common housing
- Special shaft required per application
- Preserves precise alignment of bearings

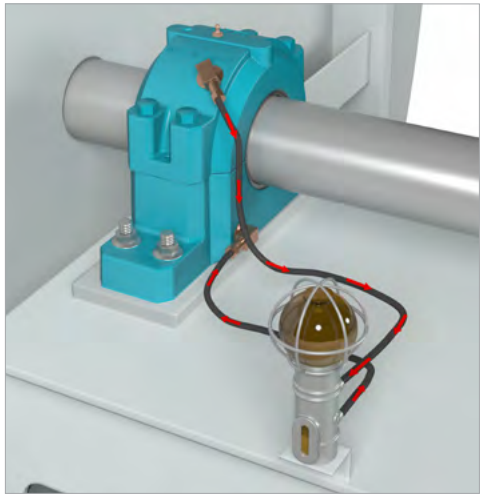
BEARINGS
OIL LUBRICATED BEARINGS

NOTE: OIL LUBRICATED BEARINGS SYSTEMS ARE USED ON SPECIAL APPLICATIONS ONLY.



OIL MIST LUBRICATION SYSTEM

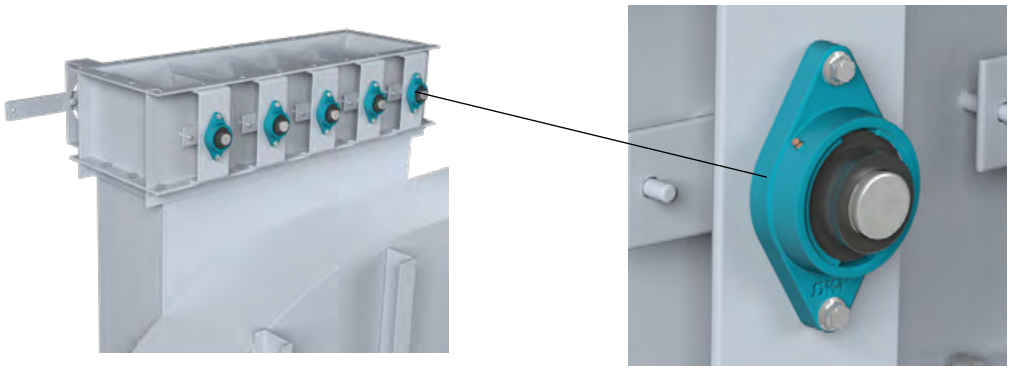
- One pump unit for both bearings
- Inlet line on top of each bearing delivers an oil mist
- Outlet line on bottom recirculates liquid oil back to the pump unit



STATIC OIL LUBRICATION SYSTEM (TRICO OILER)

- Separate TRICO Oiler unit for each bearing
- Inlet line on bottom
- Requires either a Pressure Relief Line routed back to oiler or a Breather Tube/Vent on top of the bearing

DAMPER LINKAGE RELATED



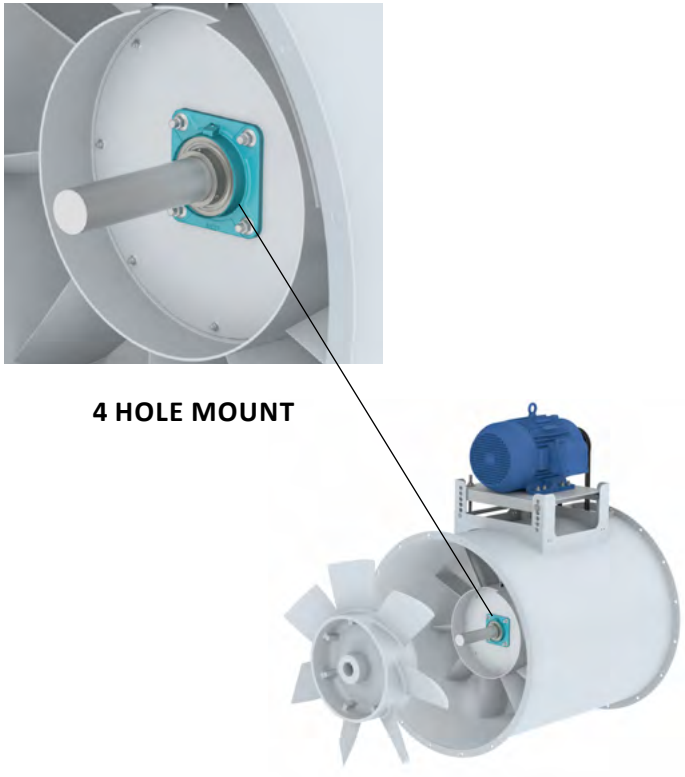
FLANGE BEARING 2 HOLE MOUNT

Used for the following:
- Dampers w/ Bearing Bridges (shown above)
- Directly Mounted to a Damper w/o Bearing Bridges
- Control Linkage Rod support for Inlet Vanes

RULON BEARINGS, BRONZE BEARINGS & NEEDLE BEARINGS
- Used to support Blade Rods in Nested and External Inlet Vanes
- Materials of Construction
  > Needle: Stainless Steel
  > Rulon: Teflon
  > Bronze: Bronze Alloys

BUSHING TYPE BEARINGS
- Flange Style
  > Used to support Blade Rods in Outlet Dampers
  > Control Linkage for Quadrants for Inlet Vanes and various styles of Dampers

FAN SHAFT RELATED



4 HOLE MOUNT

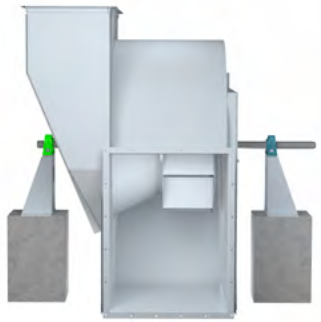
- Flange bearings available w/ Ball Type elements or Spherical Roller Type elements
  (See Pillowblock section of book for definition of Rolling Elements)

- Used mostly in some Axial fans and special fan applications

SINGLE WIDTH CENTRIFUGAL (HORIZONTAL MOUNT)

Arrangements
1, 8, 9, 9F, 9ST, 9SS, 10

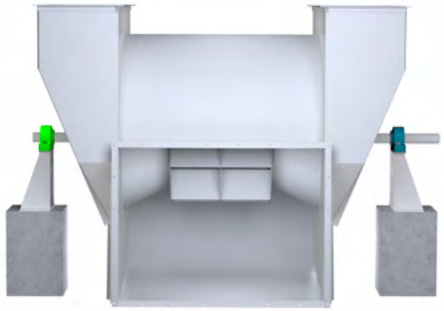
Arrangements
3 & 7



Arrangements
3SI* & 7SI*

DOUBLE WIDTH CENTRIFUGAL (HORIZONTAL MOUNT)

Arrangements
3, 3F, & 7



Arrangements
3DI* & 7DI*

*Ball Type Bearings 300°F and below may require one fixed and one floating bearing

OVERVIEW

Two bearings support and locate a shaft axially and radially in relation to the housing, which is stationary. There is "fixed" side and a "floating" side. The fixed side controls the shaft axially. The floating side has more freedom of movement (floating) to help compensate for thermal expansion or contraction of shaft.

Guidelines for use

300°F and below

Ball Type – Use 2 fixed
Roller Type – (1) fixed; (1) floating
Split Roller Type - (1) fixed; (1) floating

301°F and above

All Types – (1) fixed; (1) floating

FIXED BEARING

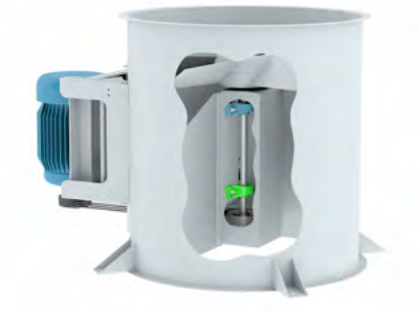
Also Know As:
Non Expansion Bearing

FLOATING BEARING

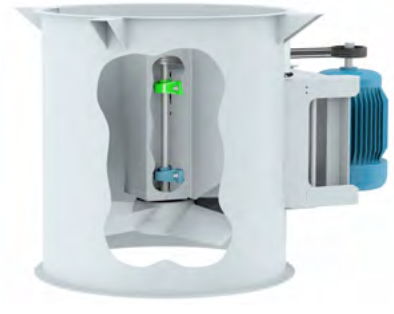
Also Know As:
Expansion Bearing
Non-Locating Bearing

BEARINGS
FIXED & FLOATING BEARINGS

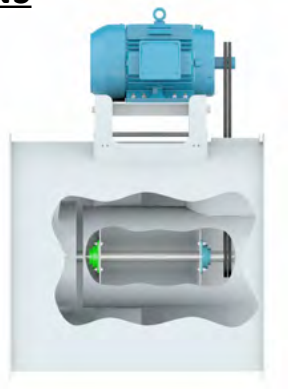
AXIAL, MIXED FLOW, TUBULAR CENTRIFUGAL FANS



Arrangement 9
Axial / Mixed Flow
(Vertical Floor Mount)



Arrangement 9
Axial / Mixed Flow
(Vertical Ceiling Mount)



Arrangement 9
Axial / Mixed Flow
(Horizontal Mount)

PLUG FANS

Arrangement 1P, 8, 8P, 9P
Plug Fan
(Horizontal Mount)

(Horizontal Mount)

(Vertical Up Mount)

(Vertical Down Mount)

Arrangement 9
Plug Fan

OVERVIEW

Two bearings support and locate a shaft axially and radially in relation to the housing, which is stationary. There is "fixed" side and a "floating" side. The fixed side controls the shaft axially. The floating side has more freedom of movement (floating) to help compensate for thermal expansion or contraction of shaft.

Guidelines for use

300°F and below

Ball Type – Use 2 fixed
Roller Type – (1) fixed; (1) floating
Split Roller Type - (1) fixed; (1) floating

301°F and above

All Types – (1) fixed; (1) floating

FIXED BEARING

Also Know As:
Non Expansion Bearing

FLOATING BEARING

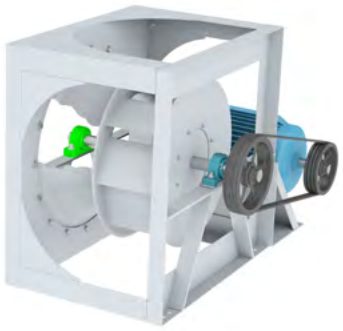
Also Know As:
Expansion Bearing
Non-Locating Bearing

PLENUM FANS

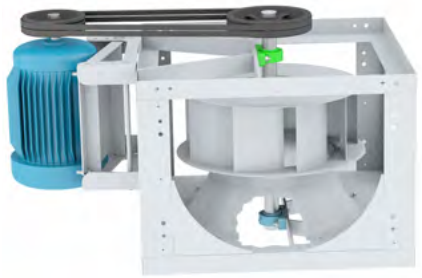
Arrangement 1
(Horizontal Mount)

Arrangement 3
(Horizontal Mount)

Arrangements 3HA / 3HS
(Horizontal Mount)



Arrangements 3SM
(Horizontal Mount)



(Vertical Up Mount)

(Vertical Down Mount)

Arrangement 3VA / 3VS

OVERVIEW

Two bearings support and locate a shaft axially and radially in relation to the housing, which is stationary. There is "fixed" side and a "floating" side. The fixed side controls the shaft axially. The floating side has more freedom of movement (floating) to help compensate for thermal expansion or contraction of shaft.

Guidelines for use

300°F and below

Ball Type – Use 2 fixed
Roller Type – (1) fixed; (1) floating
Split Roller Type - (1) fixed; (1) floating

301°F and above

All Types – (1) fixed; (1) floating

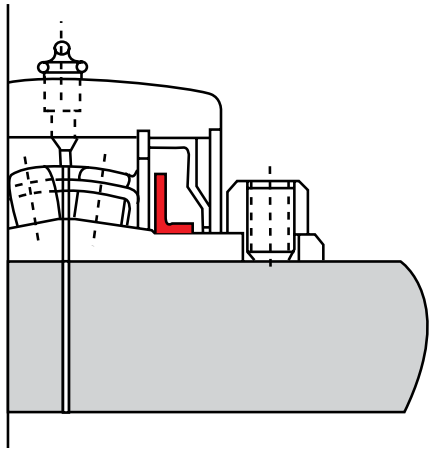
FIXED BEARING

Also Know As:
Non Expansion Bearing

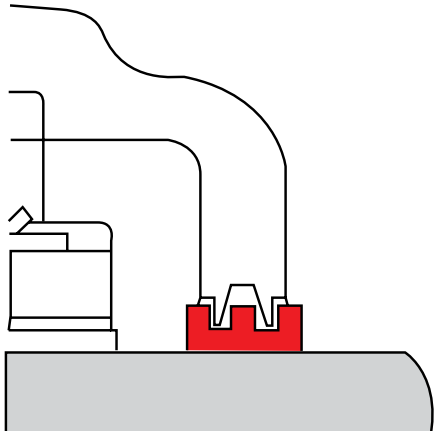
FLOATING BEARING

Also Know As:
Expansion Bearing
Non-Locating Bearing

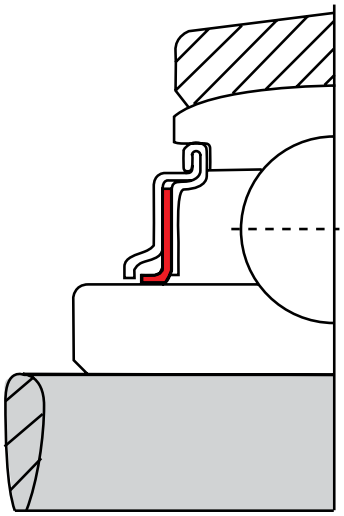
Seal Material Shaft



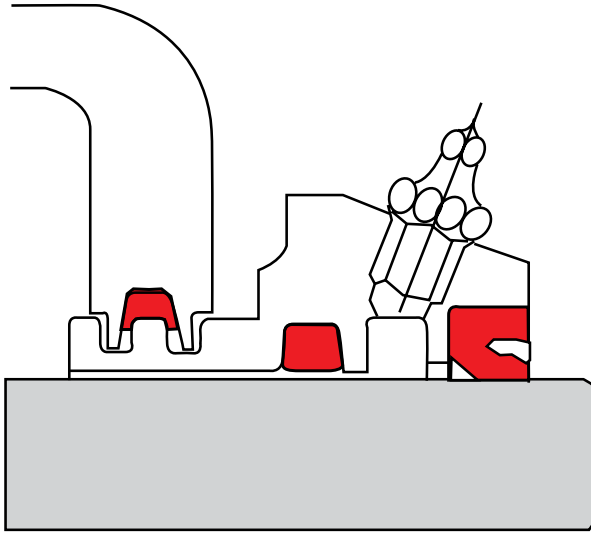
Labyrinth Seal



Labyrinth Seal



Lip Seal



Taconite Seal

GENERAL INFORMATION

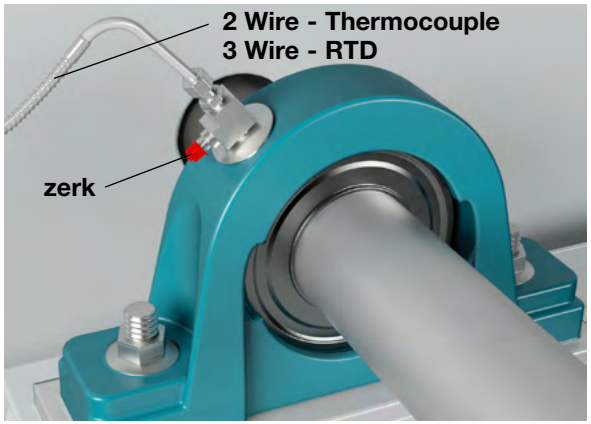
- Bearing seals prevent foreign material from entering the bearing
- Exact seal construction & material varies by bearing manufacturer
- Seal type dictates speed limits on operation (Max RPM)

COMMON BEARING SEALS

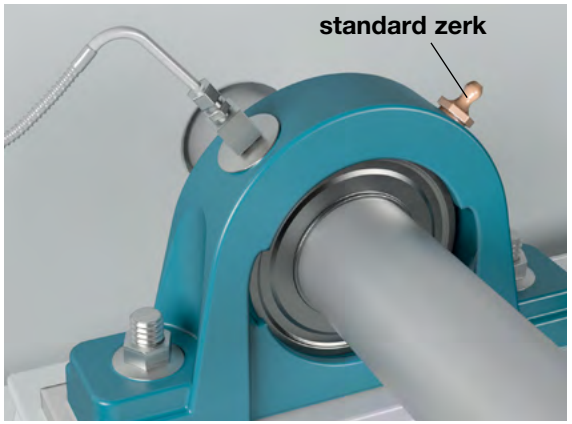
- Labyrinth Seal (aka Non-Contact Seal)
> Used for higher speed applications
> Used on Spherical Roller Bearings (Solid & Split Pillow-block)

- Lip Seal (aka Contact Seal)
> Used for low to moderate shaft surface speeds
> Used on Ball Bearings

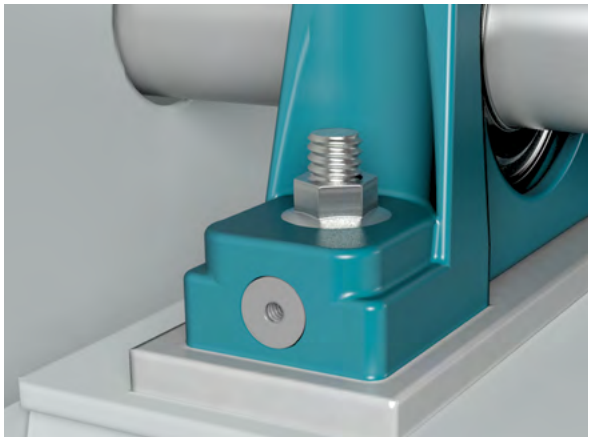
- Taconite Seal
> Designed for dirty or abrasive environments
> Used on Split Pillowblock Spherical Roller Bearings
> Standard Type Taconite Seal: speed limits are lower than standard labyrinth seals
> Canadian Type Taconite Seals (aka Non Contact) are available for higher speed limits
> Taconite Seals can increase the width of the bearing
- Requires longer shaft
- May require repositioning of the bearing on the pedestal and/or a larger bearing support structure (i.e. bearing bar)



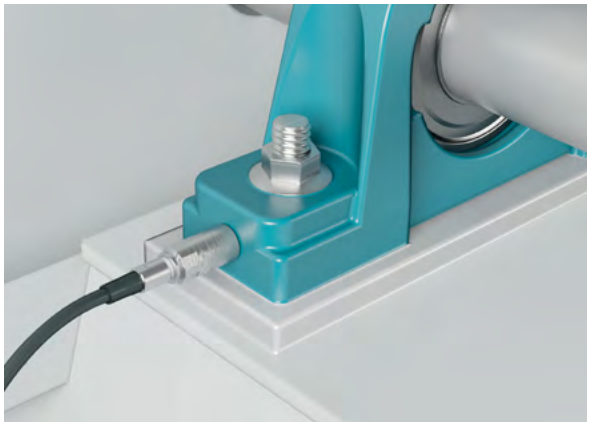
BEARING RTD / THERMOCOUPLE (TYPE K)
T-Fitting through existing zerk



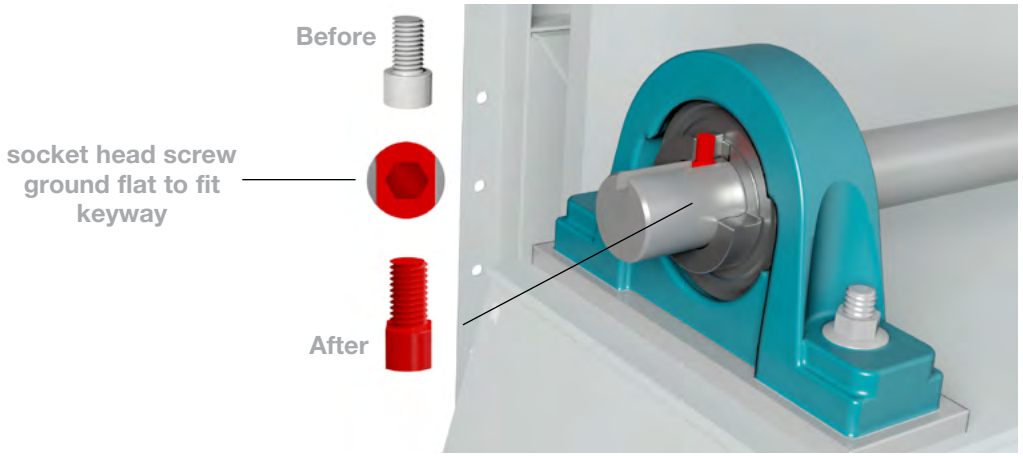
BEARING RTD / THERMOCOUPLE (TYPE K)
Drilled & Tapped



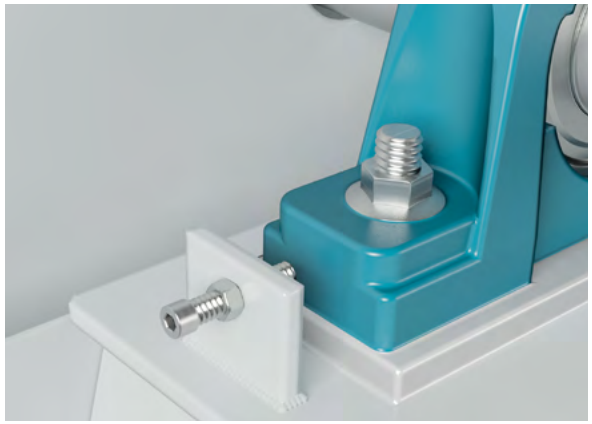
ACCELEROMETER HOLES
Drill & Tap: 1/4”- 28UNF with 1” Spot Face
Optional: Drill & Tap: 1/4”- 18NPT with 1” Spot Face



BEARING VIBRATION SENSOR
Standard 1/4”-28 UNF with 1” spot face
(sensor cord supplied by others)

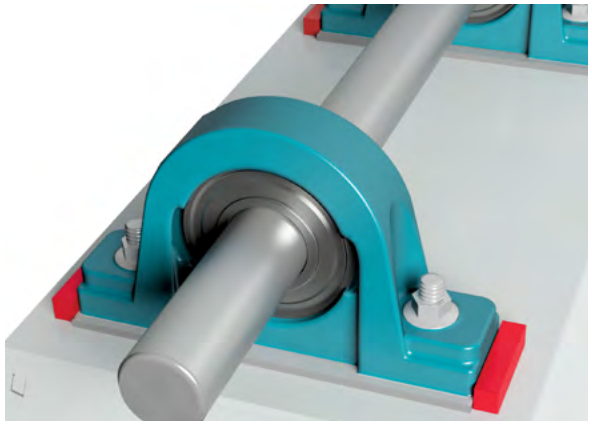


HIGH EXPANSION BEARING & SHAFT MODIFICATION (for Air Kits Only)

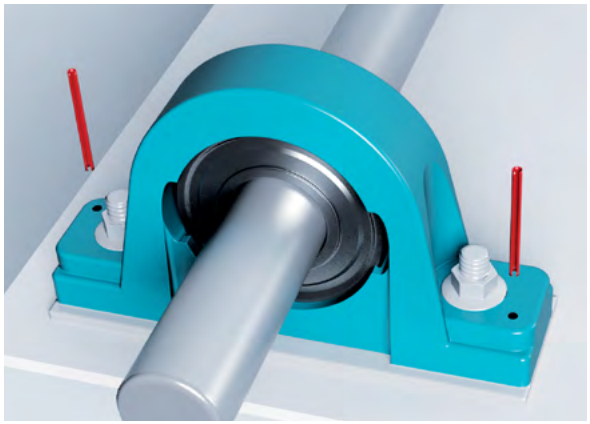


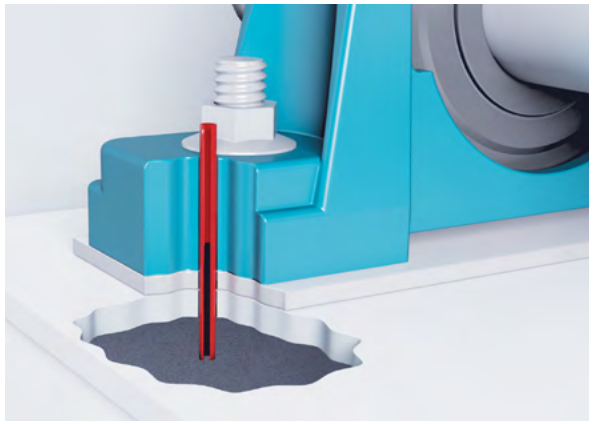
BEARING POSITIONERS

Also Known As:
- Bearing Alignment Jacking Screws

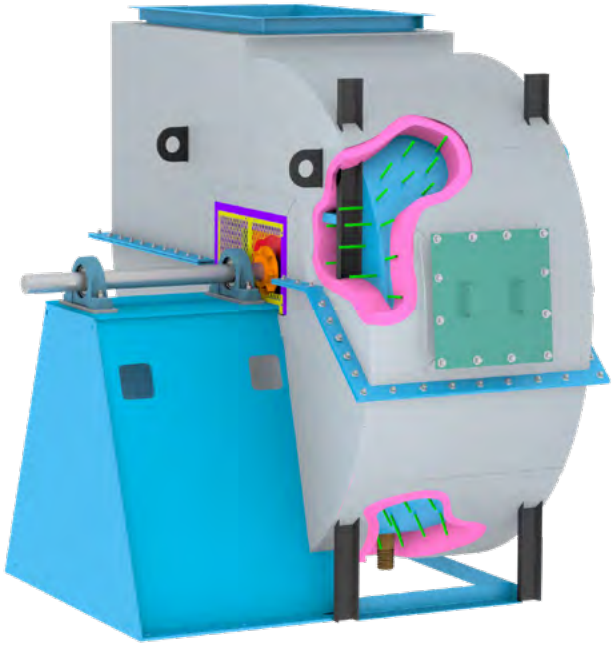


BEARING STOP BLOCKS (RESTRAINED BEARINGS)





BEARING DOWEL PINS (RESTRAINED BEARINGS)

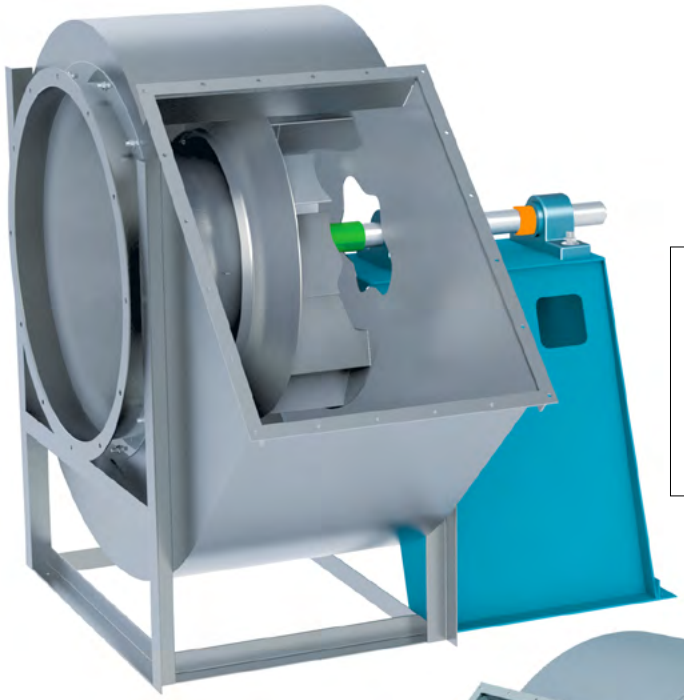


SPECIAL CONSTRUCTION

SPARK RESISTANT CONSTRUCTION

CENTRIFUGAL FANS

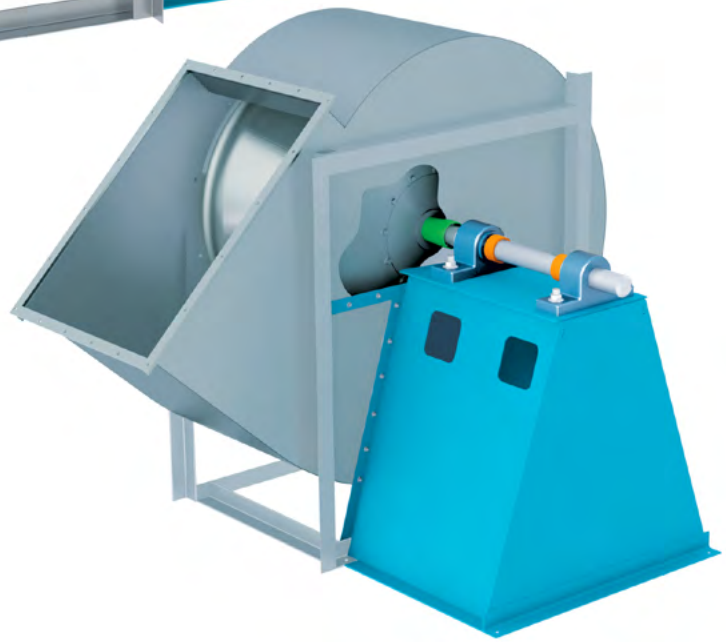
AMCA Type A



Typical Non Ferrous Materials
-Aluminum
-Aluminum/Nickel/Bronze
-Monel
-Copper
-Brass
-Bronze

Bearing Dowel Pins
(first choice)

Bearing Stop Blocks



OVERVIEW

Type A provides the highest degree of spark resistance, requiring that all fan components in the airstream be constructed of a non-ferrous material and that they be assembled in a manner such as to reduce the possibility of contact between any stationary and rotating component.

NON-FERROUS AIRSTREAM CONSTRUCTION

- HOUSINGS / FRAMES
- WHEEL / IMPELLER (WELDED HUB)
- INLET FUNNEL
- SLEEVE (AS SHOWN)
- INTERIOR FASTENERS

(HUB SET SCREWS TO BE STAINLESS STEEL - FLUSH WITH HUB)

STEEL CONSTRUCTION

- PEDESTAL (BOLTED ON)
- SHAFT
- SHAFT LOCKING COLLARS

FAN MODIFICATIONS

- RESTRAINED BEARINGS

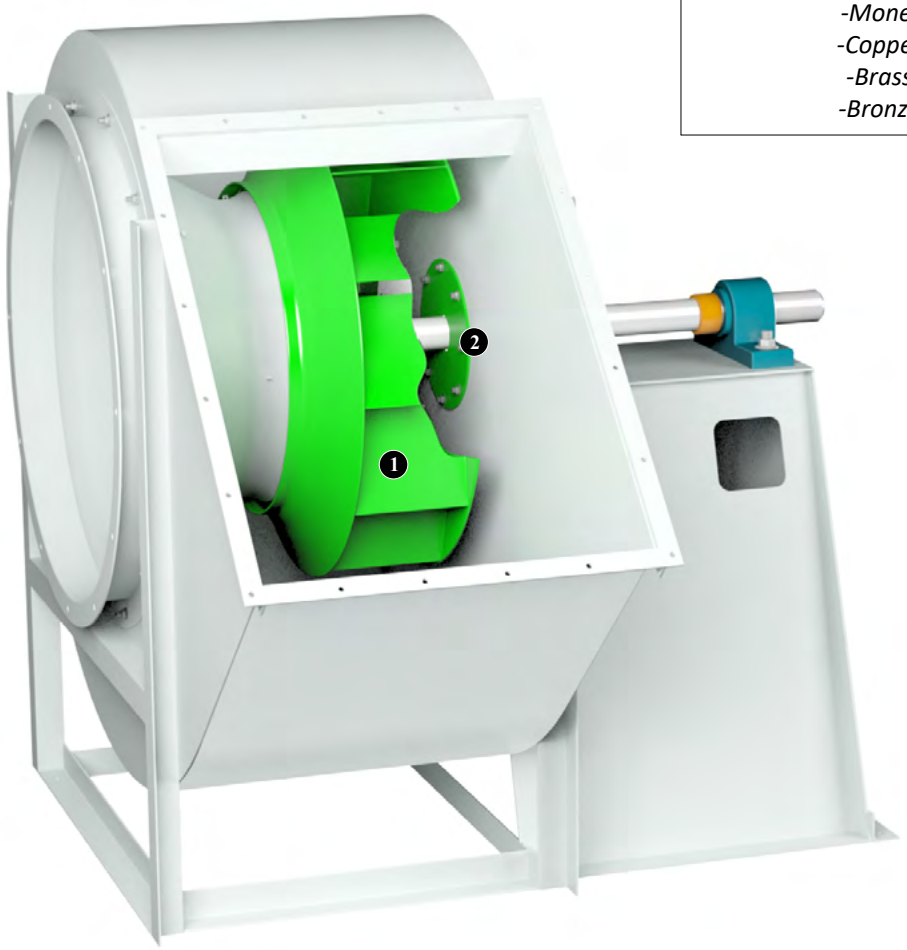
(BEARING DOWEL PINS OR BEARING STOP BLOCKS)

NOTE: BEARINGS NOT ALLOWED IN AIRSTREAM

Construction varies by model.

SPARK RESISTANT CONSTRUCTION

CENTRIFUGAL FANS



Typical Non Ferrous Materials
-Aluminum
-Aluminum/Nickel/Bronze
-Monel
-Copper
-Brass
-Bronze

AMCA Type B

OVERVIEW

Type B requires that the impeller be constructed of non-ferrous materials, and that the fan components in the airstream be assembled in a manner that reduces the possibility of contact between any stationary and rotating component. Typically, this is satisfied with the use of an aluminum wheel and an aluminum rub ring. If there is a mechanical failure of the fan, the aluminum wheel will contact a steel inlet cone.

NON-FERROUS CONSTRUCTION

❶ **WHEEL/IMPELLER (WELDED HUB)**

❷ **RUB PLATE**

rub plate also know as

STRIKER PLATE, SPARK PLATE

***NOTE: IF FAN HAS AN OUTSIDE PROTRUDING HUB A RUB PLATE IS NOT REQUIRED**

STEEL CONSTRUCTION

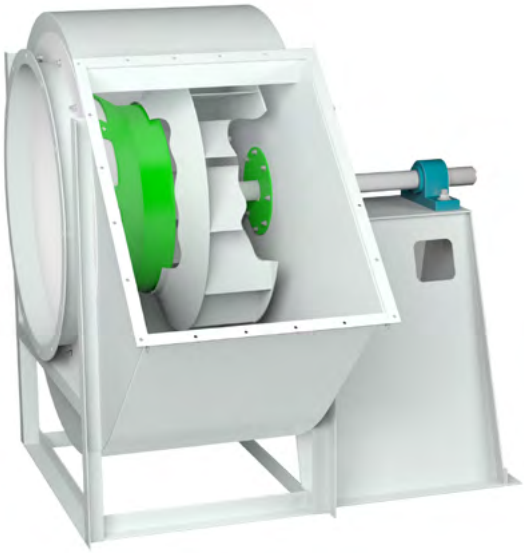
- **HOUSINGS / FRAME**
- **FASTENERS**
- **PEDESTAL**
- **INLET FUNNEL**
- **SHAFT**
- **SHAFT LOCKING COLLARS**

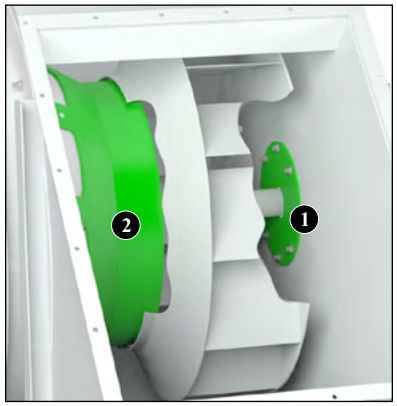
NOTE: BEARINGS NOT ALLOWED IN AIRSTREAM

Construction varies by model.

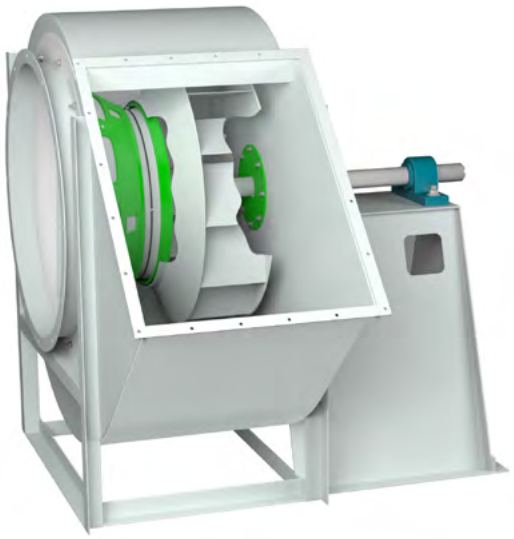
SPARK RESISTANT CONSTRUCTION

CENTRIFUGAL FANS





Type C



Type C
(With Piezometer Ring)

Construction varies by model.

AMCA Type C

Type C offers a minimal level of spark resistance and only requires that possible contact between stationary and rotating components be reduced. Typically, this construction includes the use of an aluminum inlet cone and an aluminum rub ring. The aluminum inlet cone will be the first point of fan wheel contact if there is a mechanical failure. The aluminum rub ring placed at the opening of the housing where the shaft passes, protects against contact of the steel fan shaft and steel fan housing.

NON-FERROUS CONSTRUCTION
- INLET FUNNEL (MATERIAL VARIES)
- ❶ RUB PLATE
  rub plate also know as
  STRIKER PLATE, SPARK PLATE
- ❷ RUBBING BAND (RIVETED)
- ❸ RUB RING

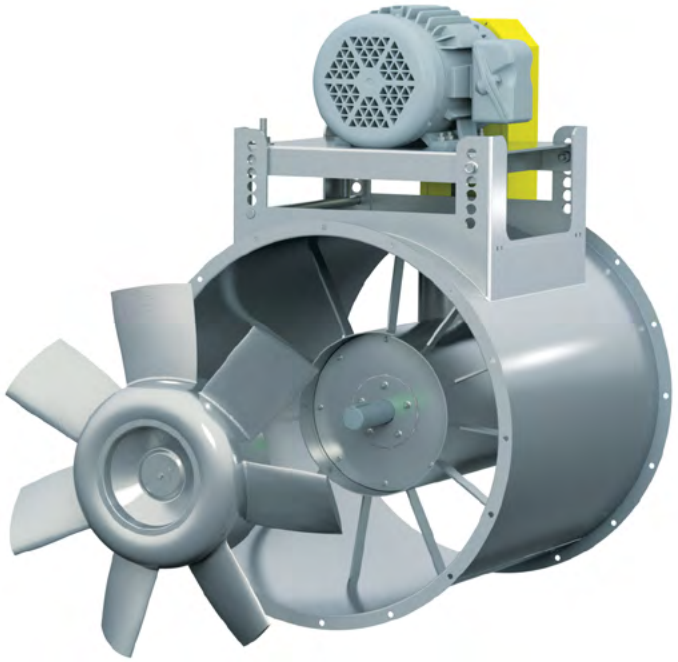
STEEL CONSTRUCTION
- HOUSINGS / FRAME
- FASTENERS
- PEDESTAL
- WHEEL / IMPELLER
- SHAFT

NOTE: BEARINGS NOT ALLOWED IN AIRSTREAM

Typical Non Ferrous Materials
-Aluminum
-Aluminum/Nickel/Bronze
-Monel
-Copper
-Brass
-Bronze

SPARK RESISTANT CONSTRUCTION

AXIAL FANS



AMCA Type A

NON-FERROUS CONSTRUCTION
- HOUSINGS
- PROPELLER/IMPELLER
- FASTENERS
- SLEEVE

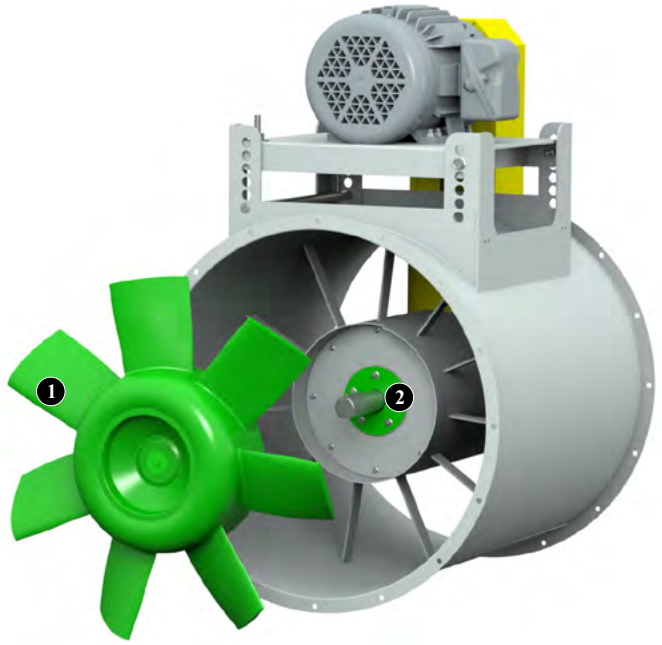
OTHER CONSTRUCTION
- STAINLESS STEEL SHAFT
- MILD STEEL MOTOR MOUNT PLATE, WEATHER COVER & BELT GUARD

Note: Type A uses restrained bearings (Slotted Steel Spring Pins or Bearing Stop Blocks)

Typical Non Ferrous Materials
-Aluminum
-Aluminum/Nickel/Bronze
-Monel
-Copper
-Brass
-Bronze

Construction varies by model.

NOTE: BEARINGS NOT ALLOWED IN AIRSTREAM FOR TYPE A, B, C



AMCA Type B & C

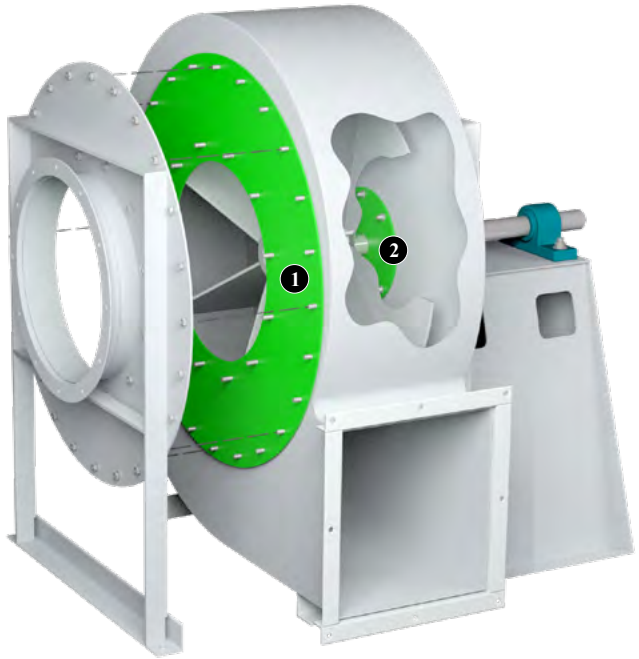
NON-FERROUS CONSTRUCTION
❶ PROPELLER/IMPELLER (Type B)
❷ RUB PLATE (Type C)
(FOR NON FERROUS PROPS, USE TYPE B)

STEEL CONSTRUCTION
- HOUSINGS
- FASTENERS
- SHAFT

Note: Type B uses restrained bearings (Slotted Steel Spring Pins or Bearing Stop Blocks)

SPARK RESISTANT CONSTRUCTION

RADIAL BLADED FANS



Typical Non Ferrous Materials
-Aluminum
-Aluminum/Nickel/Bronze
-Monel
-Copper
-Brass
-Bronze

Construction varies by model.

AMCA Type C

Type C offers a minimal level of spark resistance and only requires that possible contact between stationary and rotating components be reduced. Typically, this construction includes the use of an aluminum inlet cone and an aluminum rub ring. The aluminum inlet cone will be the first point of fan wheel contact if there is a mechanical failure. The aluminum rub ring placed at the opening of the housing where the shaft passes, protects against contact of the steel fan shaft and steel fan housing.

NON-FERROUS CONSTRUCTION

1. **INLET PLATE**
2. **RUB PLATE**

rub plate also know as

STRIKER PLATE, SPARK PLATE

3. **INNER DRIVE PLATE**
4. **RUB RING**

STEEL CONSTRUCTION

- **HOUSINGS / FRAME**
- **WHEEL / IMPELLER**
- **FASTENERS**
- **PEDESTAL**
- **SHAFT**

NOTE #1: BEARINGS NOT ALLOWED IN AIRSTREAM

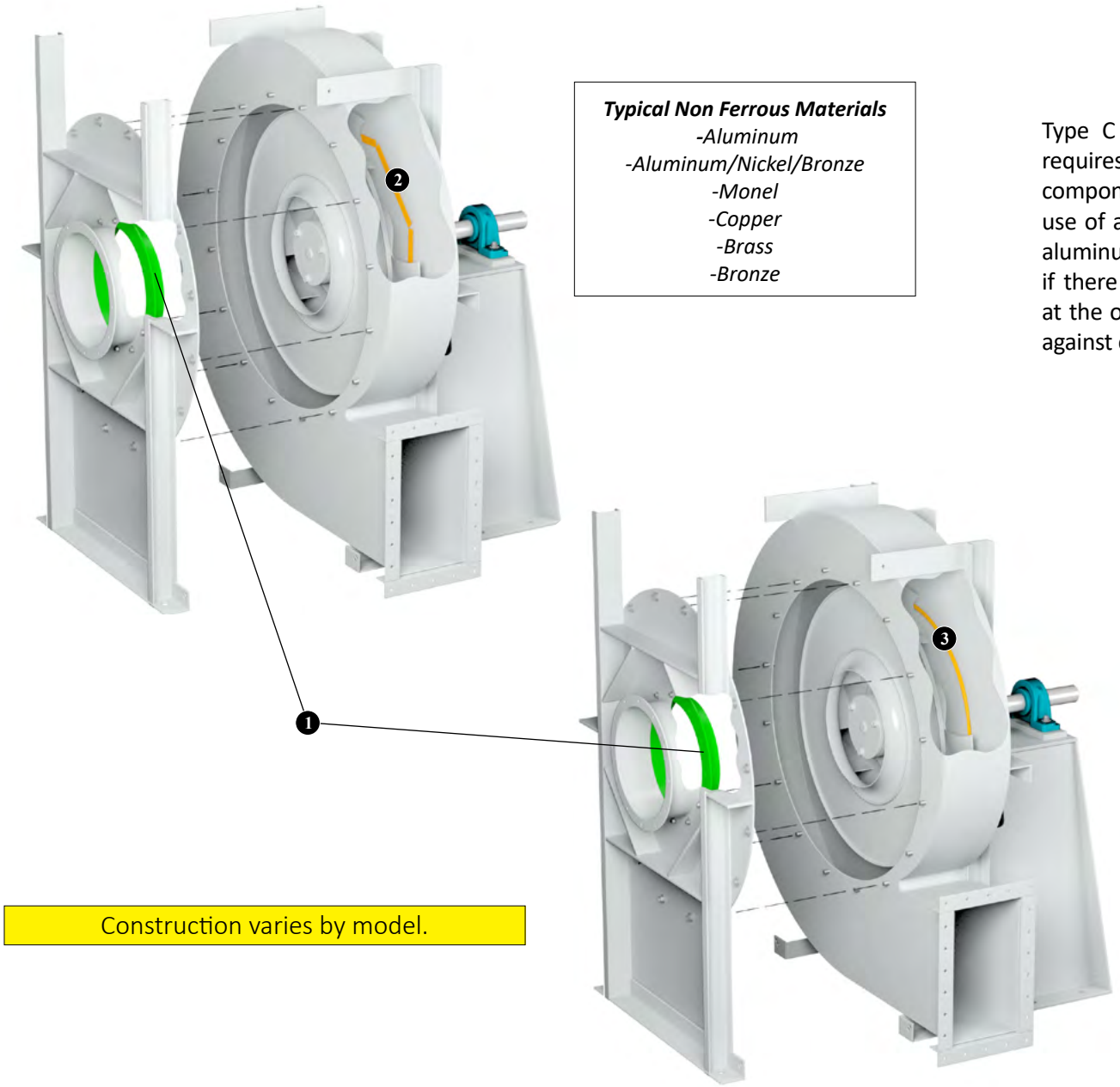
NOTE #2: IF FAN HAS A NON FERROUS WHEEL AS STANDARD, USE TYPE B

SPARK RESISTANT CONSTRUCTION

PRESSURE BLOWERS

AMCA Type C

Type C offers a minimal level of spark resistance and only requires that possible contact between stationary and rotating components be reduced. Typically, this construction includes the use of an aluminum inlet cone and an aluminum rub ring. The aluminum inlet cone will be the first point of fan wheel contact if there is a mechanical failure. The aluminum rub ring placed at the opening of the housing where the shaft passes, protects against contact of the steel fan shaft and steel fan housing.



Typical Non Ferrous Materials
-Aluminum
-Aluminum/Nickel/Bronze
-Monel
-Copper
-Brass
-Bronze

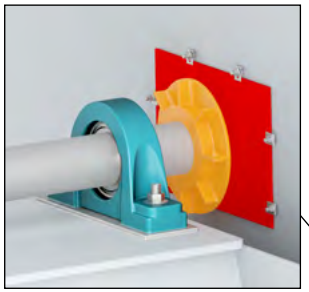
NON-FERROUS CONSTRUCTION
1. INLET RUB RING
2. RUB STRIP
3. RUB RING

STEEL CONSTRUCTION
- HOUSINGS / FRAME
- WHEEL / IMPELLER
- FASTENERS
- PEDESTAL
- STEEL

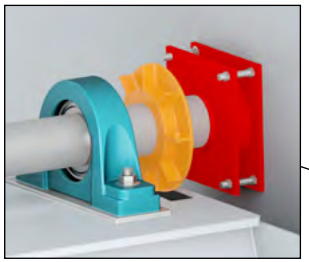
NOTE #1: BEARINGS NOT ALLOWED IN AIRSTREAM

NOTE #2: IF FAN HAS A NON FERROUS WHEEL AS STANDARD, USE TYPE B

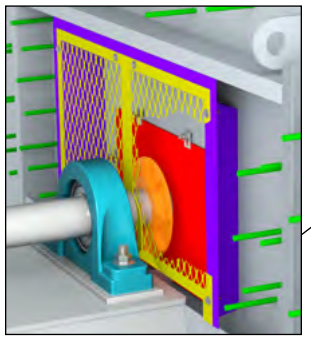
Construction varies by model.



High Temp Style Pedestal with Standard Shaft Seal & Cooler



High Temp Style Pedestal With Shaft Cooler & Stuffing Box or Mechanical Shaft Seals



High Temp Style Pedestal with Cooler Box.

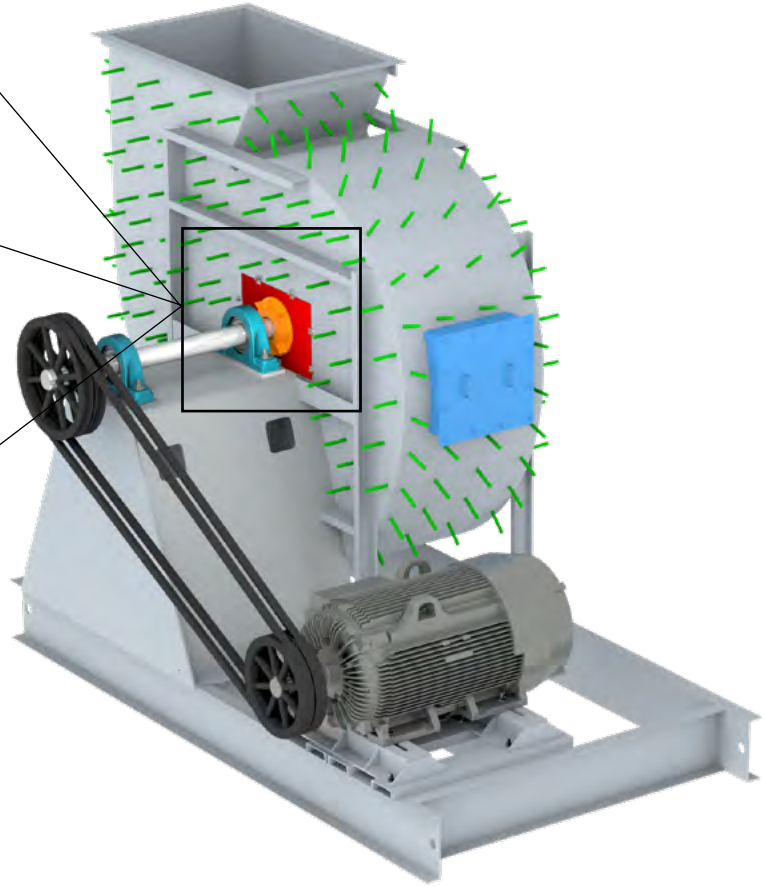
NOTE: Cooler Box provides uninsulated open area around the shaft cooler for dissipation of heat. Standard on fans with aluminum clad insulation & housing with insulation pins.

CENTRIFUGAL FANS (General Construction)

Arrangements 1, 8, 9, 9F, 10

Shaft Seal | **Shaft Cooler** | **Insulation Pins (Optional)**

Safety Screen | **Cooler Box** | **Raised Access Door (Optional)**



GENERAL INFORMATION

Industrial processes often require high heat fans that can withstand operating airstream temperatures ranging from 276°F to 1,000+ °F.

High temperature fans are commonly used for:

- Re-circulating air in high temperature equipment such as kilns, dryers, industrial ovens and furnaces
- Exhausting gases and fumes from industrial processes
- Supplying air for heating and drying systems

TCF packages:

- 301°F - 500°F
- 501°F - 600°F
- 601°F - 800°F
- 801°F - 1,000°F
- 1,001°F & over (requires Engineering review)

High Temp Materials

- Mild Steel & Corten
- Stainless Steel

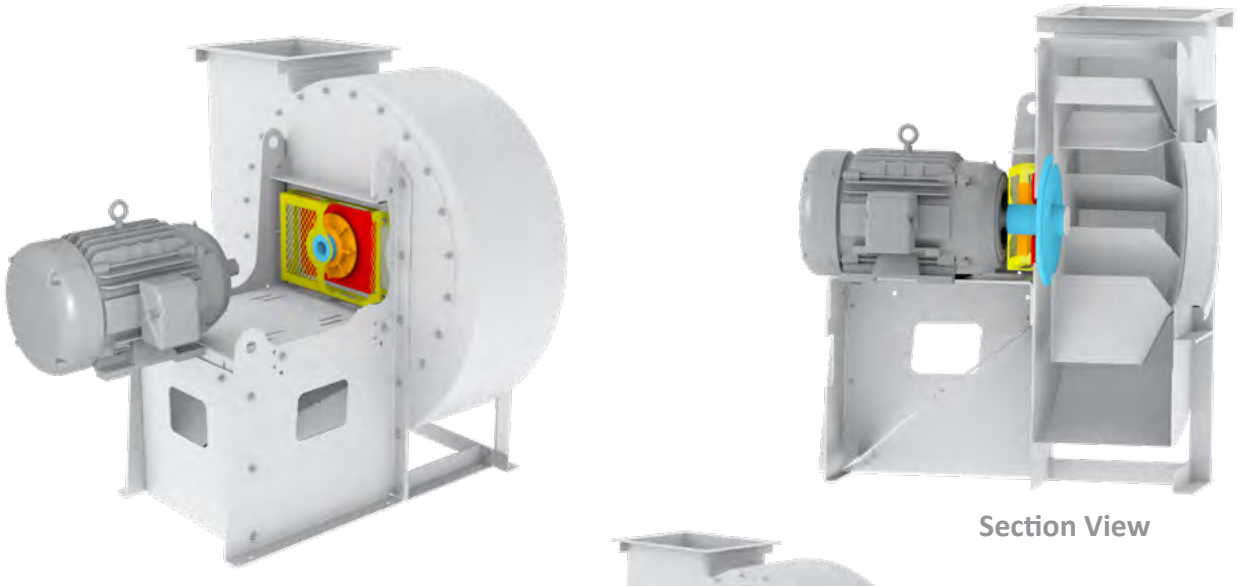
Bearing Requirements

- Use High Temp Grease
- Use Fixed & Floating Bearings
  > Refer to bearing basics section

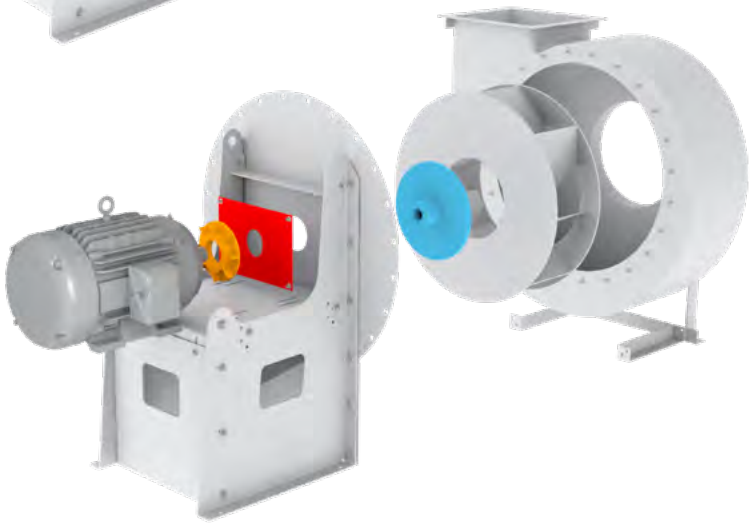
CENTRIFUGAL FANS (General Construction)

Arrangement 4

Shaft Seal **Shaft Cooler** **Cooler Guard** **Hub**



Section View



GENERAL INFORMATION

Industrial processes often require high heat fans that can withstand operating airstream temperatures ranging from 181°F to 1,000+ °F.

High temperature fans are commonly used for:

- Re-circulating air in high temperature equipment such as kilns, dryers, industrial ovens and furnaces
- Exhausting gases and fumes from industrial processes
- Supplying air for heating and drying systems

TCF packages:

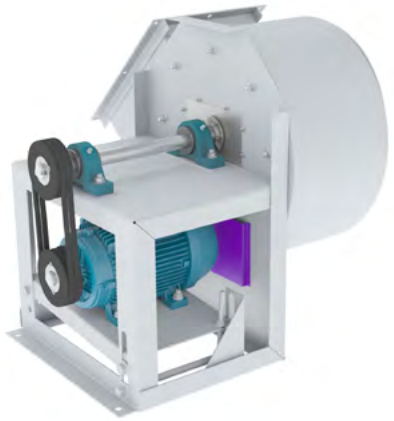
- 181°F - 300°F
- 301°F & over (requires Engineering review)

High Temp Materials

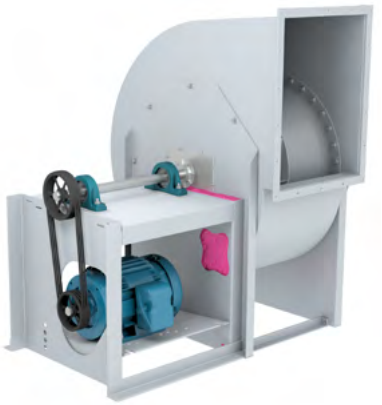
- Aluminum (rotating parts up to 250°F)
- Mild Steel & Corten
- Stainless Steel

CENTRIFUGAL FANS (Pedestal Types)

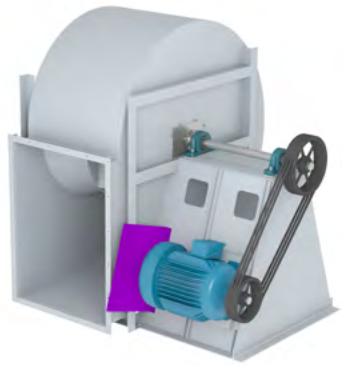
Motor Heat Shield **Insulation** **Insulation Pins** **Pedestal Spacer**



Pedestal w/Motor Heat Shield
Arrangement 10 (up to 600°F)



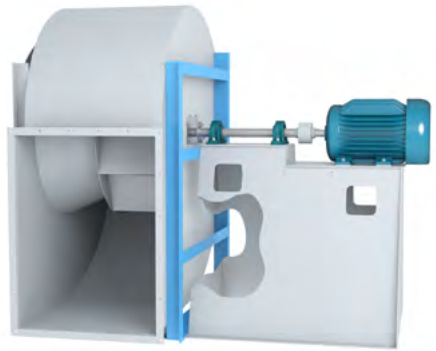
Pedestal w/Insulated Panel
Arrangement 10 (up to 600°F)



Pedestal w/Motor Heat Shield
Arrangement 9* (up to 600°F)

*multiple variations of arr. 9

Pedestal w/Insulated Back
Arrangements 1, 8, 9F (601°F to 800°F)



Separated Pedestal Design
Arrangement 1 & 8 (801°F and above)

NOTE: Provides up to a 3" gap between the housing and pedestal

GENERAL INFORMATION

Industrial processes often require high heat fans that can withstand operating airstream temperatures ranging from 276°F to 1,000+ °F.

High temperature fans are commonly used for:

- Re-circulating air in high temperature equipment such as kilns, dryers, industrial ovens and furnaces
- Exhausting gases and fumes from industrial processes
- Supplying air for heating and drying systems

TCF packages:

- 301°F - 500°F
- 501°F - 600°F
- 601°F - 800°F
- 801°F - 1,000°F
- 1,001°F & over (requires Engineering review)

High Temp Materials

- Mild Steel & Corten
- Stainless Steel

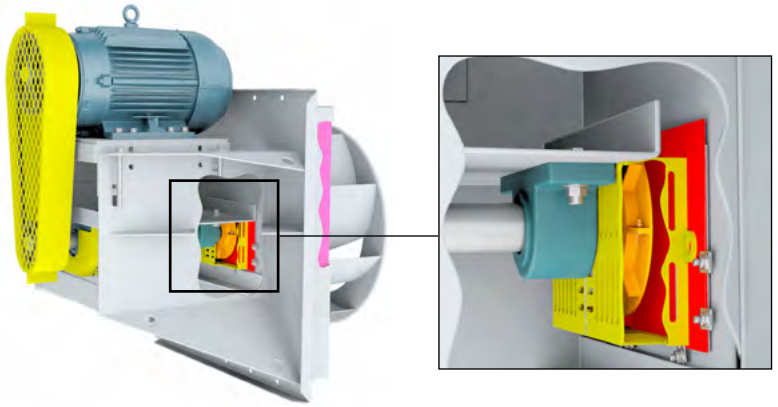
Bearing Requirements

- Use High Temp Grease
- Use Fixed & Floating Bearings
  > Refer to bearing basics section

ARR. 9 PLUG FANS (Centrifugal Fans)

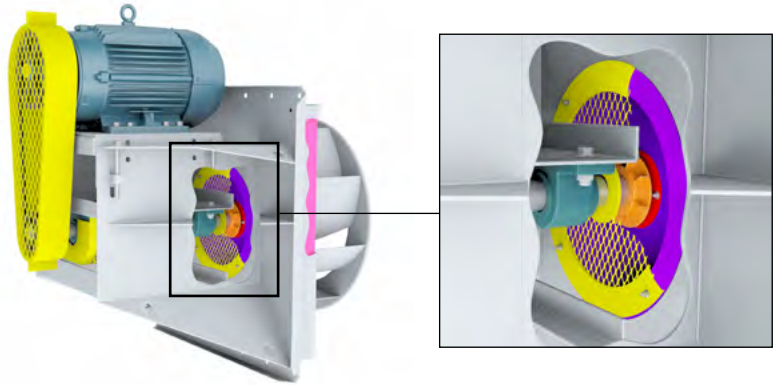
Shaft Seal | Shaft Cooler | Recess Cone (AKA Drive Cone) | Insulation (inside plug) | Cooler Guard

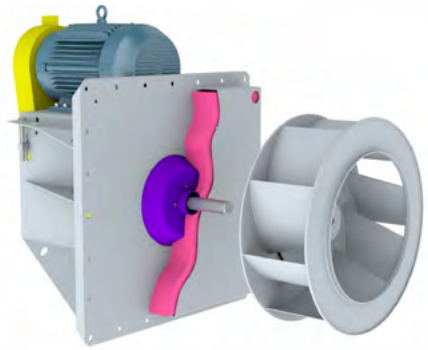
Design #1 - With Gap for Shaft Cooler



Insulated Plug
- Optional up to 500°F
- Required for 501°F and above

Design #2 - With Recess Cone for Shaft Cooler





Insulated Plug
- Optional up to 500°F
- Required for 501°F and above

GENERAL INFORMATION

Industrial processes often require high heat fans that can withstand operating airstream temperatures ranging from 276°F to 1,000+ °F.

High temperature fans are commonly used for:
- Re-circulating air in high temperature equipment such as kilns, dryers, industrial ovens and furnaces
- Exhausting gases and fumes from industrial processes
- Supplying air for heating and drying systems

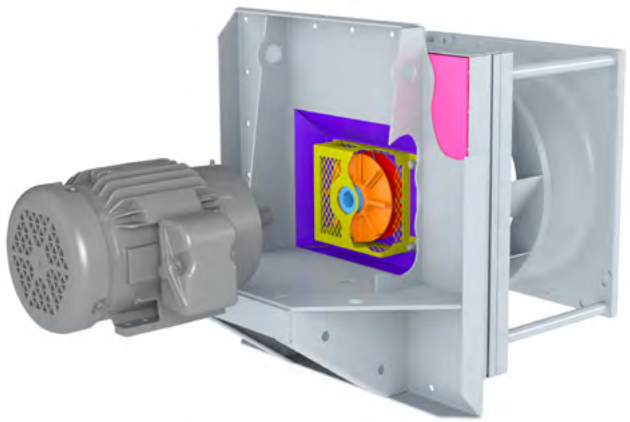
TCF packages:
- 301°F - 500°F
- 501°F - 600°F
- 601°F - 800°F
- 801°F - 1,000°F
- 1,001°F & over (requires Engineering review)

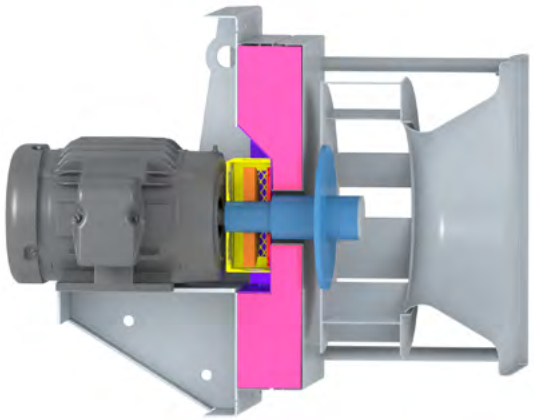
High Temp Materials
- Mild Steel & Corten
- Stainless Steel

Bearing Requirements
- Use High Temp Grease
- Use Fixed & Floating Bearings
  > Refer to bearing basics section

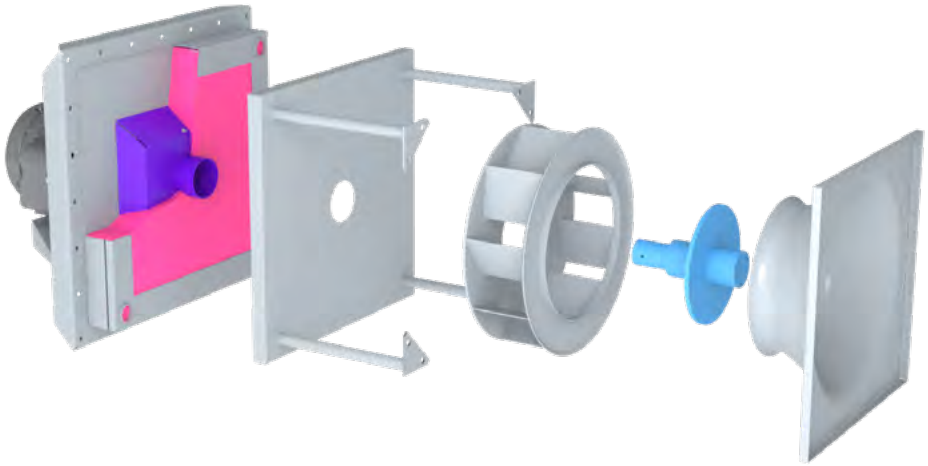
ARR. 4 PLUG FANS (Centrifugal Fans)

Shaft Seal | Shaft Cooler | Recess Cavity | Insulation | Cooler Guard | Hub





Section View



GENERAL INFORMATION

Industrial processes often require high heat fans that can withstand operating airstream temperatures ranging from 181°F to 1,000+ °F.

High temperature fans are commonly used for:

- Re-circulating air in high temperature equipment such as kilns, dryers, industrial ovens and furnaces
- Exhausting gases and fumes from industrial processes
- Supplying air for heating and drying systems

TCF packages:

- 181°F - 300°F (select models)
- 301°F & over (requires Engineering review)

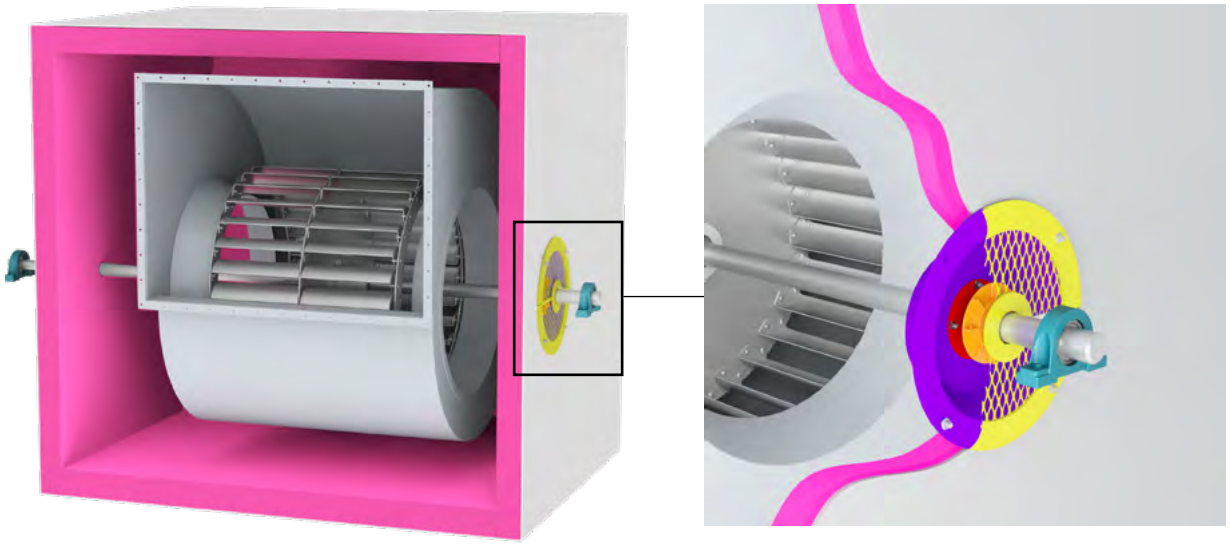
High Temp Materials

- Aluminum (rotating parts up to 250°F)
- Mild Steel & Corten
- Stainless Steel

AIR KITS

Arrangement 3

Shaft Seal **Shaft Cooler** **Recess Cone** (AKA Drive Cone) **Insulation** **Cooler Guard**



Enclosure & Insulation provided by others in the field

GENERAL INFORMATION

Industrial processes often require high heat fans that can withstand operating airstream temperatures ranging from 301°F to 1,000+ °F.

High temperature fans are commonly used for:

- Re-circulating air in high temperature equipment such as kilns, dryers, industrial ovens and furnaces
- Exhausting gases and fumes from industrial processes
- Supplying air for heating and drying systems

TCF packages:

- 301°F - 500°F
- 501°F - 600°F
- 601°F - 800°F
- 801°F - 1,000°F
- 1,001°F & over (requires Engineering review)

High Temp Materials

- Aluminum (non-rotating parts)
- Mild Steel & Corten
- Stainless Steel

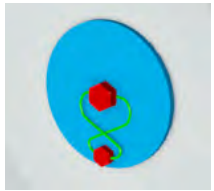
Bearing Requirements

- Use High Temp Grease
- Use Fixed & Floating Bearings
  > Refer to bearing basics section
- High heat modified bearings (optional)

AXIAL FANS

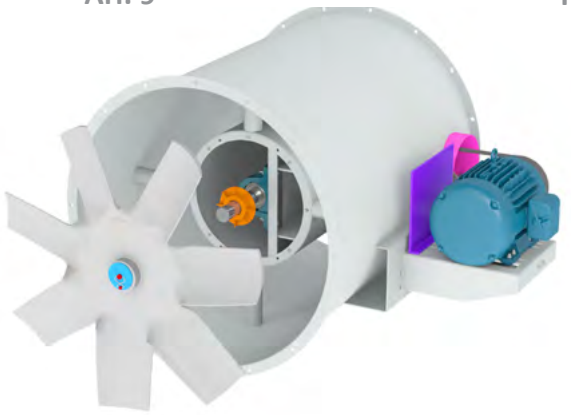
Arr. 4

TCF packages:
- 106°F to 150°F
- 151°F to 195°F
  (Requires Eng Review)
- 196°F to 240°F
  (Requires Eng Review)

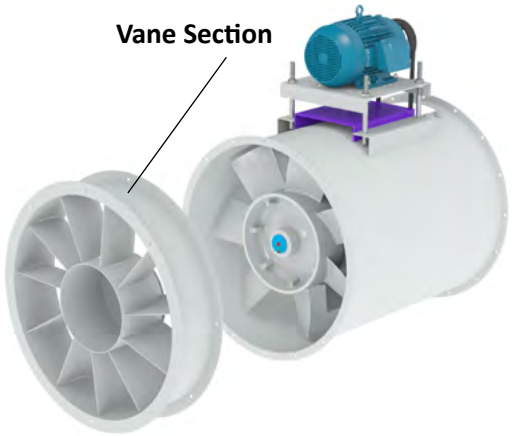


Retaining Washer Detail

Arr. 9



TCF packages:
- 201°F to 250°F
- 201°F to 300°F



GENERAL INFORMATION

Industrial processes often require high heat fans that can withstand operating airstream temperatures ranging from 106°F to 600°F.

High Temp Materials
- Standard Aluminum (Prop) – Up to 275°F
- A240 Aluminum – 276°F to 600°F
- Mild Steel & Stainless Steel

Bearing Requirements
- Use High Temp Grease
- Use Fixed & Floating Bearings
  > Refer to bearing basics section
- Metal lube lines

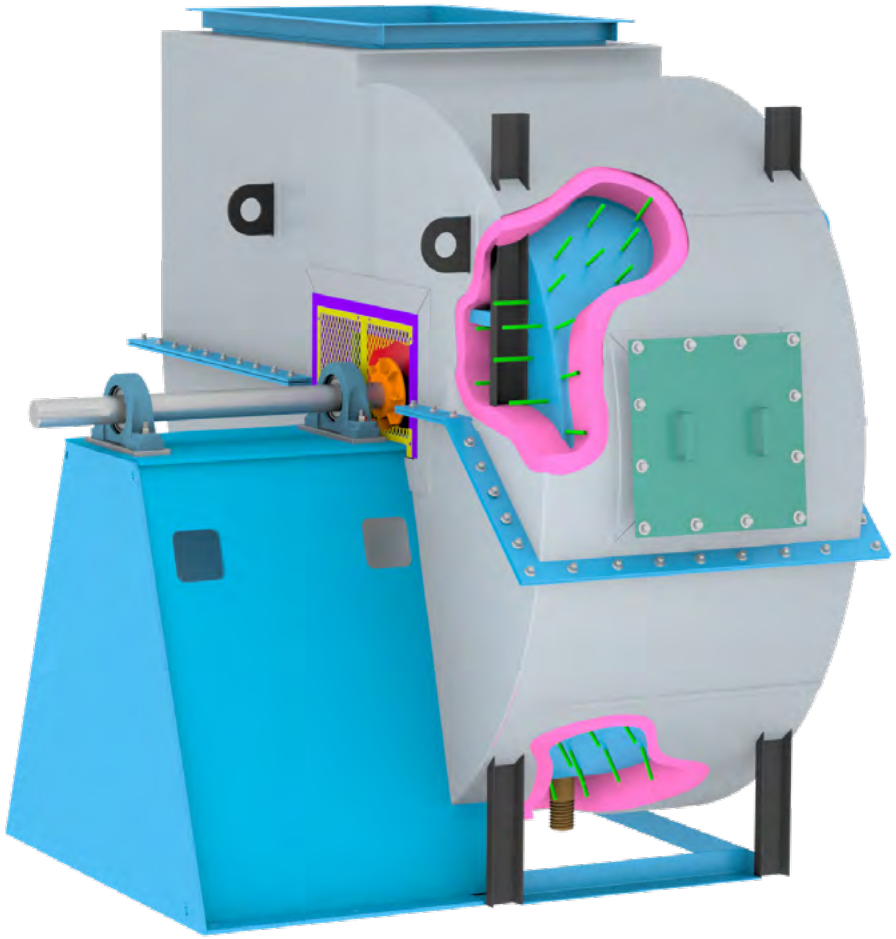
Other Requirements
- Prop on outlet end of housing (outer shell)
  > Some models require Vane Section
- Fixed Prop required over 250°F

NOTE: Arr. 9 – Cool air is pulled into the bearing housing through the belt tube

(Select Fan Models)

Retaining Washer **Safety Wire** **Hardware** **Shaft Cooler** (Select Arr. 9 Fans) **Heat Shield** (Arr. 9 only) **Belt Tube**

CENTRIFUGAL FANS
Aluminum Clad Construction



GENERAL INFORMATION

Purpose: Insulate fan surface from high temperature, condensation or sound.

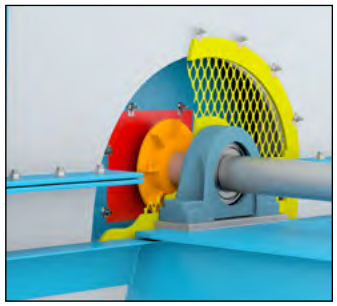
Overview

- Insulation thickness per customer request & Aerovent guidelines
- Exterior cladding material is 0.040" (minimum) thick stucco-embossed aluminum
- Insulation type (provided by vendor): 3# density fiberglass or mineral wool unless otherwise specified
- Raised Access Door (usually raised 2" above insulation)
- Housing Drain – Normally extends out inlet end of housing (shown on bottom in photo)
- Inlet & Outlet of fan extended if required
- Fan centerline height increased if required
- Housing Split (if specified) to have split bars protruding out 2" past insulation for access to mounting holes
- Cooler box on high temperature applications

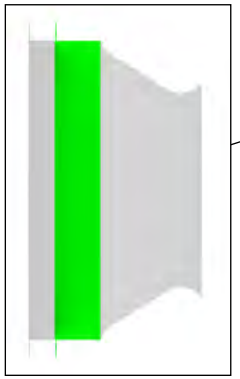
Shaft Seal **Shaft Cooler** **Cooler Box** **Cooler Guard** **Insulation** **Insulation Pins**

Access Door **Lifting Lugs/Extended Frame** **Extended Drain** **Aluminum Clad Housing**

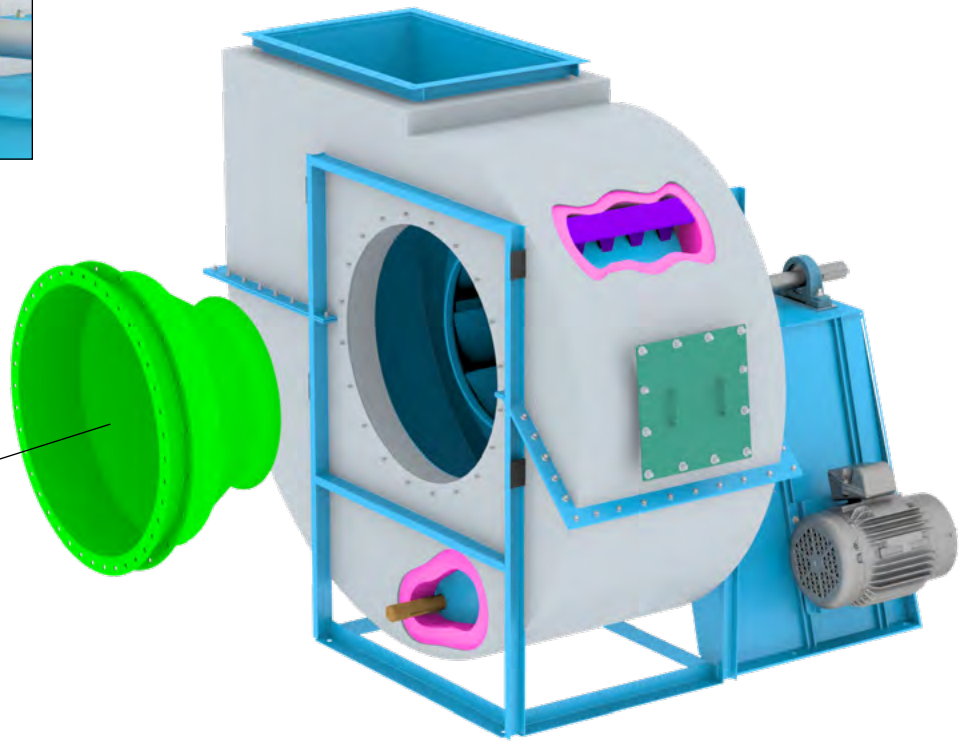
CENTRIFUGAL FANS
Steel/Double Wall Construction



Recessed Cavity for the Shaft Cooler/Shaft Seal



"Green" Section is Added To Extend The Inlet Funnel



GENERAL INFORMATION

Purpose: Insulate fan surface from high temperature, condensation or sound.

Overview

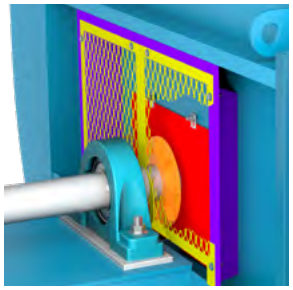
- Insulation thickness per customer request & TCF guidelines
- TCF builds a second structural outer housing (outer shell) around the inner housing
- Insulation type: Fiberglass or mineral wool unless otherwise specified.
- Structural fabricated angle between inner & outer housings help to hold insulation in place
- Raised Access Door (usually raised 2" above insulation)
- Housing Drain – Normally extends out inlet end of housing
- Inlet & Outlet of fan extended if required
- Shaft Cooler housing imbedded into insulation cavity
- Housing Split (if specified) to have split bars protruding out 2" past insulation for access to mounting holes
- Inlet funnel modified to extend through insulation

Shaft Seal **Shaft Cooler** **Scalloped Angle** **Cooler Guard** **Insulation** **Extended Inlet Funnel**

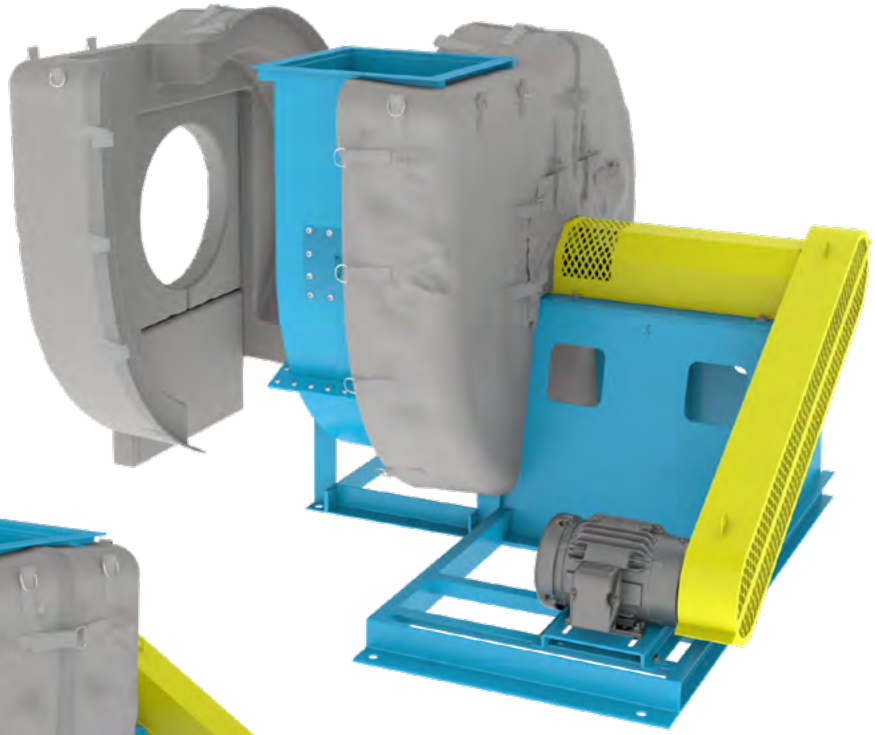
Access Door **Lifting Lugs/Extended Frame** **Extended Drain** **Steel Wall Housing (Outer Shell)**

CENTRIFUGAL FANS

Insulated Jackets



High Temp Applications use a Cooler Box. Insulated Jacket wraps around cooler box.



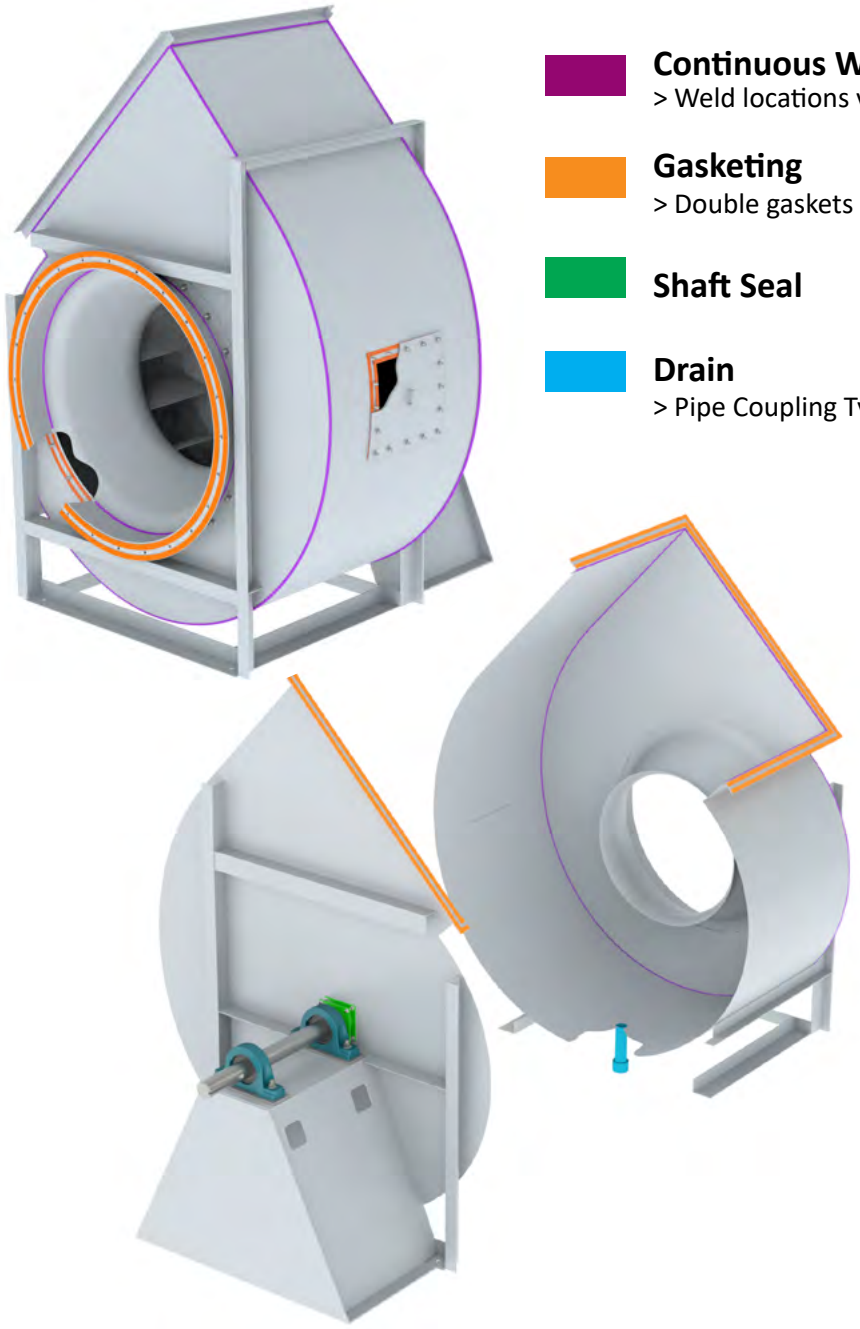
GENERAL INFORMATION

Purpose: Insulate fan surface from high temperature, condensation or sound. It also can be used as a safety device to protect personnel from injury.

Construction

- 2" thick jacket around entire fan housing including housing surface inside the pedestal
- Insulation type: Type "E" & Low Density Fiberglass - alone or in combination depending on application
- Jacket removed in pieces and labeled accordingly for shipment
- Jacket to be easily opened or removed to gain access to various fan accessories: access doors, drains, housing splits, lifting lugs, shaft and bearing guards, pedestals, inlet boxes, frame angles, shaft seals.

SPECIAL CONSTRUCTION
NOMINALLY LEAK-TIGHT



Continuous Weld
> Weld locations vary by model

Gasketing
> Double gaskets required

Shaft Seal

Drain
> Pipe Coupling Type with Plug

GENERAL INFORMATION

A fan generally cannot be constructed to be totally leak tight. Hence the term "Nominally Leak Tight" is used. This type of construction is used to reduce leakage to within acceptable levels decided upon with the customer. *Fans are tested at the shop with a Soap Bubble Test to check for leaks.*

Fan leakage refers to air (or other gas mixture) either leaking into the fan housing or out of the fan housing. Leakage in or out depends on air pressure. When the air (or gas mixture) mixes with hazardous contaminants, excessive leakage can be dangerous. Excessive leakage can waste energy, be an environmental or safety hazard, damage fan bearings or create excessive noise.

- Fan Construction
> Arrangements 1, 8 and 9 only
> Solid drive side on housing (no drive plates)
> Not recommended for applications over 600°F
> Split housings not recommended
> Bolted connections must have close centered hole patterns (3" to 4" centers) Includes: inlet and outlet flanges, access doors, cover plates, inlet funnels, split housings, etc.

- Gasketing
> Use on all connections: inlet/outlet flanges, funnel, inlet plate, access doors, split housing, etc.
> Split housings require centering plate to seal open areas by shaft seals and inlet funnel or plate

- Shaft Seals (Fan Shaft - do not use shaft sleeve & cap)
> Lip type
> Stuffing Box (Graphoil) type
> Double Ring Mechanical type (Double Carbon Ring)

SPECIAL CONSTRUCTION
REGENERATIVE THERMAL OXIDIZER (RTO)

Continuous Weld
> Weld locations vary
> See engineering standard E1-14

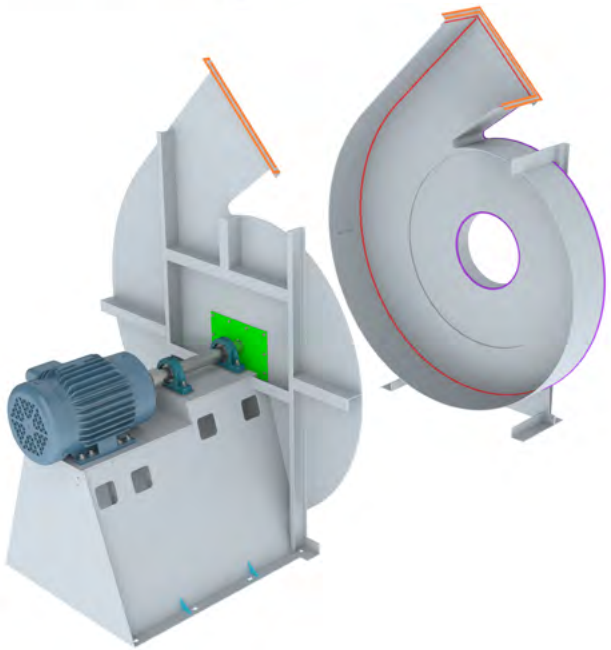
Seal Weld
> Weld locations vary
> See engineering standard E1-14

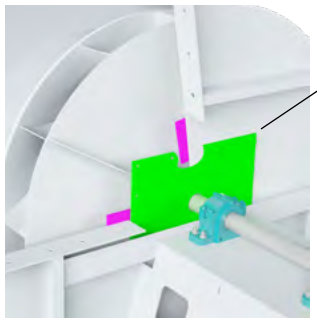
Gasketing
> Double gaskets required

Shaft Seal

Pedestal Foot Gussets

Centering Plates





GENERAL INFORMATION

A regenerative thermal oxidizer (RTO) is an industrial process that destroys air pollutants emitted from process exhaust. These gas streams are usually produced by industrial process ventilation, i.e. paint booths, printing, and paper mills. *Fans are tested at the shop with a Soap Bubble Test to check for leaks.*

- Fan Construction
> Solid drive side on housing (no drive plates)
> Bolted connections must have close centered hole patterns (3" to 4" centers) Includes: inlet and outlet flanges, access doors, cover plates, inlet funnels, split housings, etc.
> Not recommended for applications over 600°F
> Dampers (if required) must have stuffing boxes

- Gasketing
> Use silicone sponge & silicone caulk
> Use on all connections: inlet/outlet flanges, funnel, inlet plate, access doors, split housing, etc.
> If constructed with a split housing, centering plates are required to seal open areas by shaft seals and inlet funnel or inlet plate

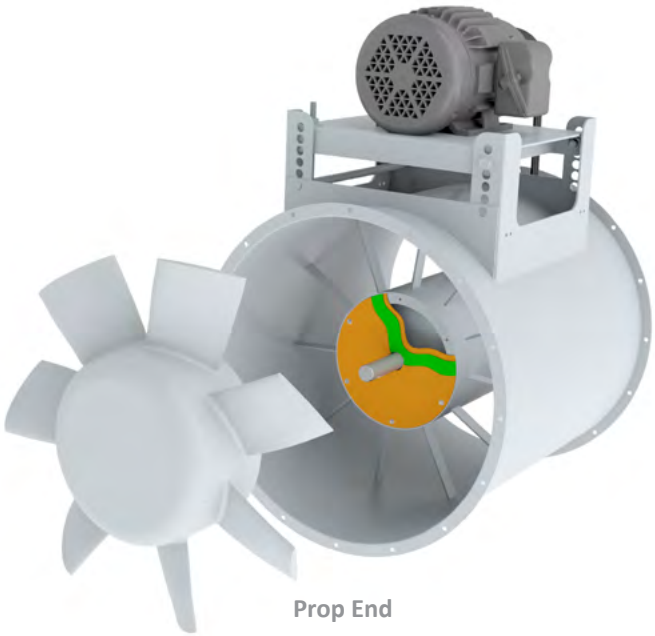
- Shaft Seals
> Friction type
> Single Carbon Ring type
> Commercially available carbon ring or others seal

- Special Requirements (sales to specify)
> Pedestal – Concrete requirements
> Fan Base – Construction based on how fan will be mounted in field
> Fan Operation (VFD, Cycling, Bake Out conditions)

GENERAL INFORMATION

High Moisture Modification Construction is used on applications where steam or condensation may collect in the fan housing.

Used on Arrangement 9 Axial Fans Only.



Prop End

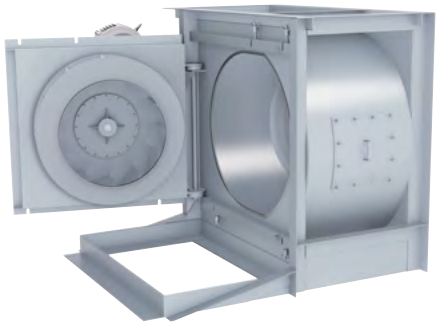
Drive End

Shaft Seal / Seal Material **Coverplate** **Shaft Seal Cover Plates**

Note: High Moisture construction cannot be used in conjunction with Hi-Temp Construction.

SWINGOUT FANS

Swingout fans are designed for frequent cleaning and provide full access to the wheel and inner casing of the fan. The entire wheel/shaft/bearing assembly is mounted on a large swingout door. Swingout construction is available for centrifugal, inline centrifugal, and axial fans.



Centrifugal Swingout Fans
Arrangements 4S, 9ST, 9SS

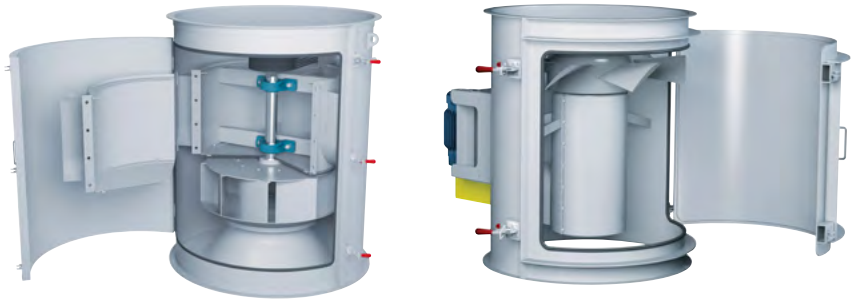
Axial Swingout Fans
Arrangements 4, 9

Inline Centrifugal Swingout Fans
Arrangements 4, 9

CLAMSHELL FANS

Clamshell fans are designed to provide complete access to the interior of the fan for maintenance or cleaning without removal of ductwork. Clamshell construction is available for inline centrifugal and axial fans and is typically used in vertical mount applications. For the double door configuration, one of the two access doors is wide enough for wheel removal.

Axial & Inline Centrifugal
Double Door Clamshell Fans
Arrangements 4 & 9

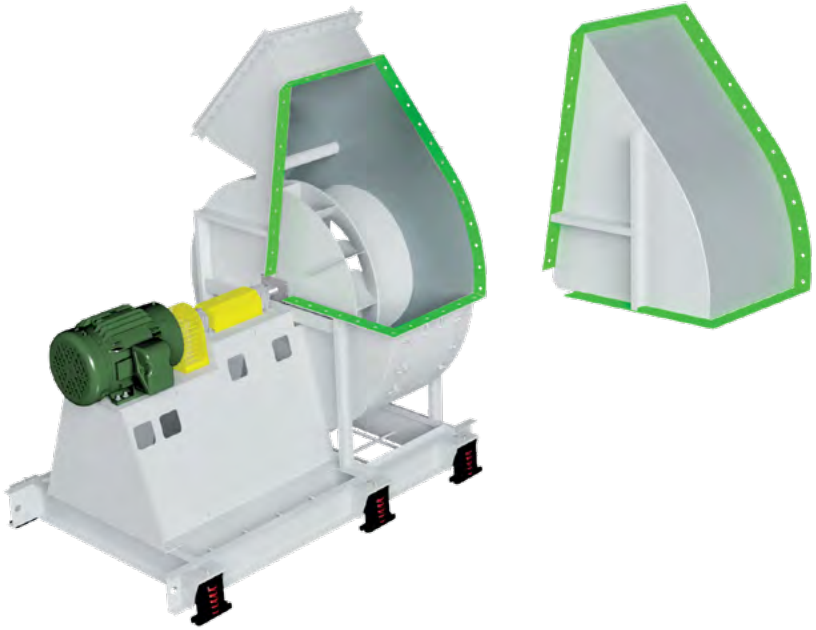


Axial & Inline Centrifugal
Single Door Clamshell Fans
Arrangements 4 & 9

PIE SPLIT HOUSINGS

Typical for wheel removal

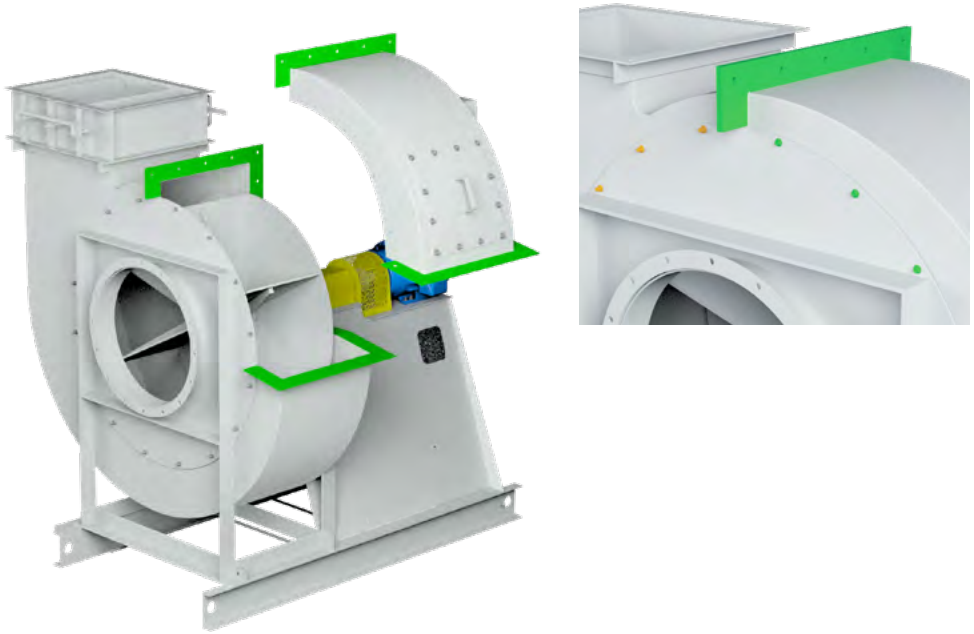
Housings are split at angles 90 degrees or greater to facilitate wheel removal without disturbing inlet or outlet.



"Mohawk" (newer style)

Mohawk (newer style) - Splits between scroll and inlet housing side. Inlet side of housing does not have a split.

Not used on Double Width fans or fans with attached inlet boxes



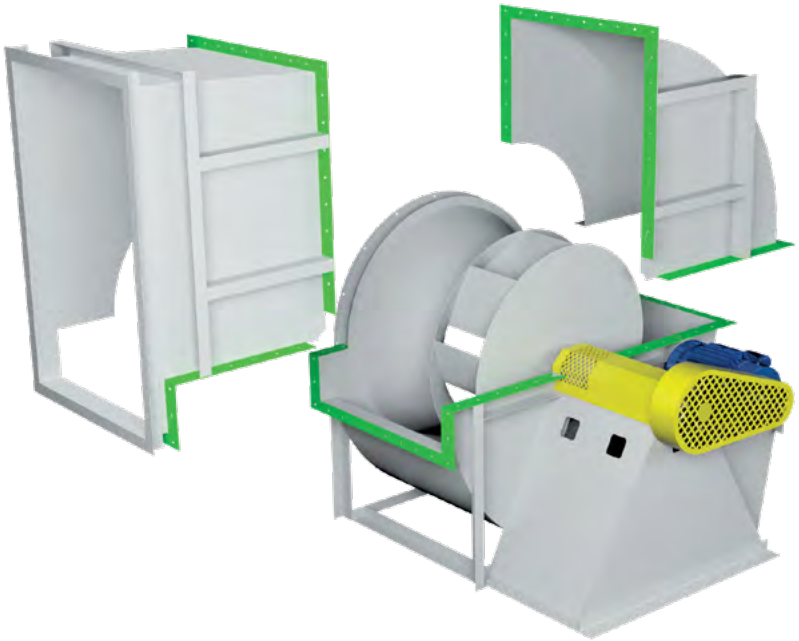
Standard (older style)

Splits all the way down to the funnel or Inlet Plate.

Weld Nuts are welded on the inside of the split and bolt from outside the housing.

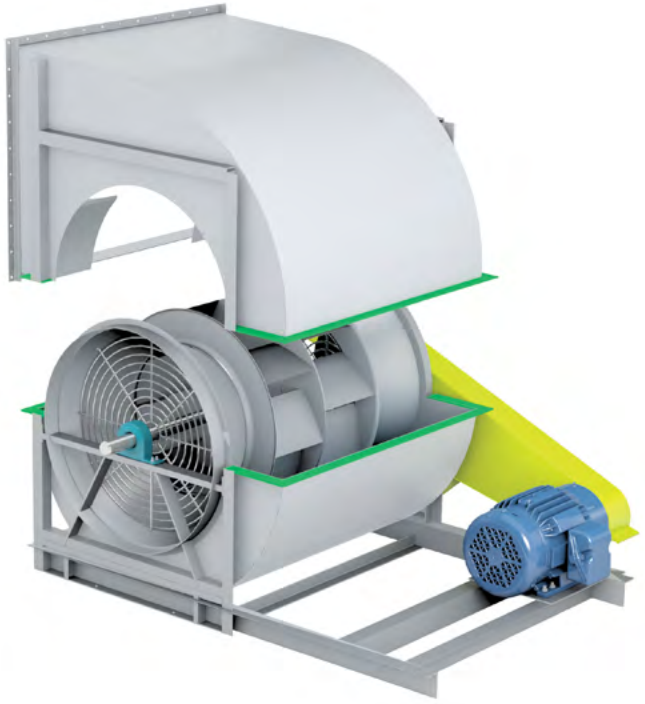
Studs are welded to the outside of the housing.

SPLIT HOUSINGS
Centrifugal Fans



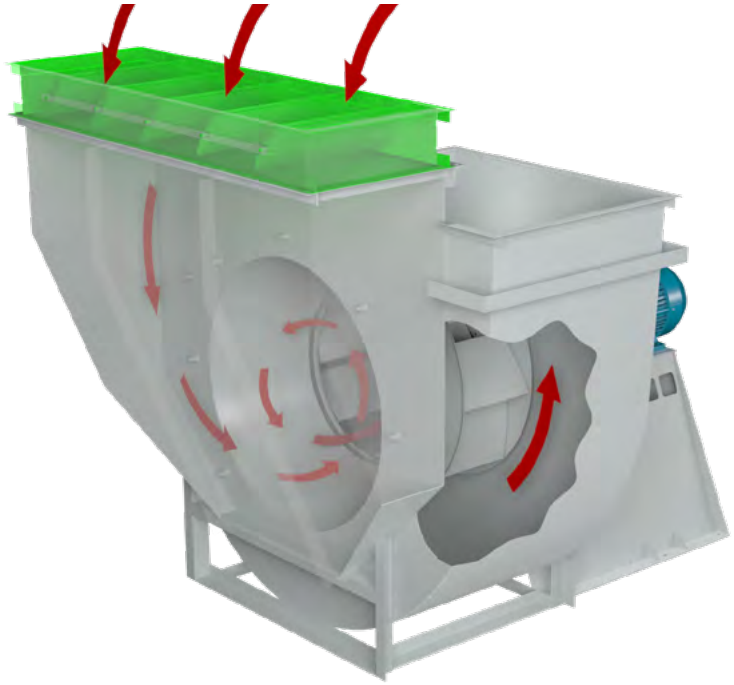
3-WAY SPLIT HOUSING

The housing is split into three sections up to 180 degrees. This split normally required either for shipping or to enable fan to enter a specific sized opening.



HORIZONTAL SPLIT HOUSING

Standard split along the horizontal centerline. Size 807 and above may be split by the shop for shipping purposes.



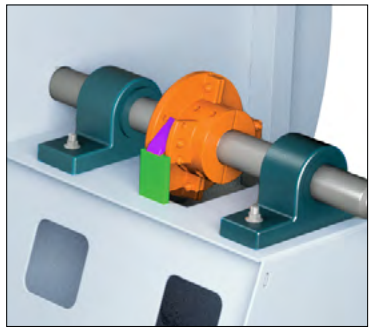
ACCESSORIES

COMMON ACCESSORIES

BOLTED ACCESS DOOR

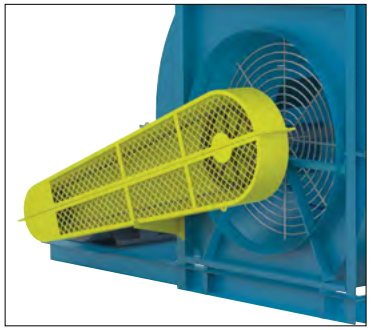
RAISED ACCESS DOOR

QUICK OPEN ACCESS DOOR

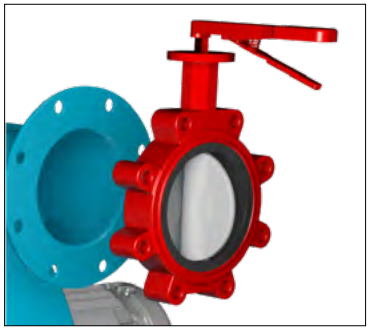


ANTI-ROTATION DEVICE

Also Known As:
- Anti-Rotation Clutch
- Anti-Backspin Device

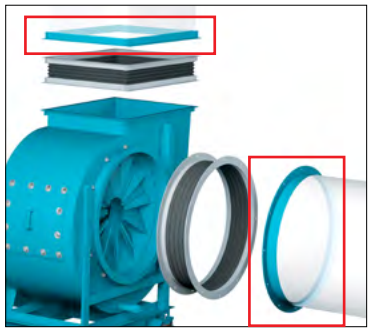


BELT GUARD

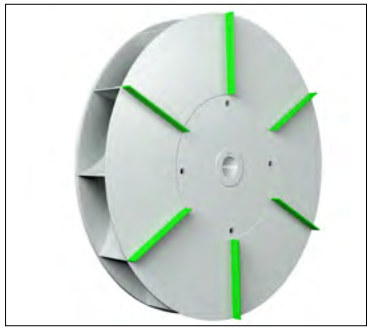


BLAST GATE
Blast Gate & Flange Bolt Pattern - 125# ASA Pipe Flange

Also Known As:
- Waffle Damper
- Wafer-Type Butterfly Valve
- Butterfly Damper



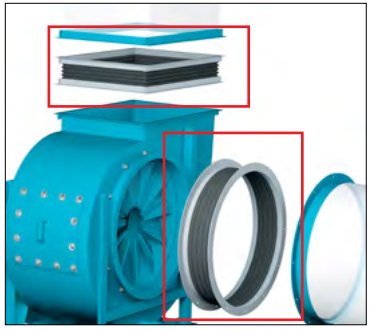
COMPANION FLANGES
(Round & Rectangular)



FINS ON WHEEL BACKPLATE

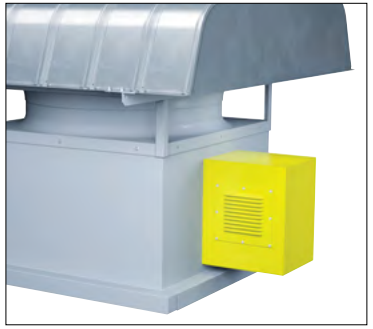
Also Known As:
- Thrust Fins
- Thrust Vanes/Anti-Thrust Vanes
- Backplate Fins
- Back Pressure Fins
- Cooling Fins

COMMON ACCESSORIES

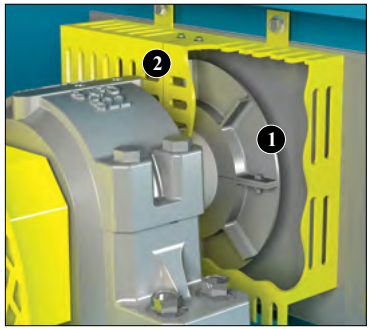


INLET/OUTLET FLEX CONNECTORS
(Round & Rectangular)

Also Known As:
- Expansion Joint

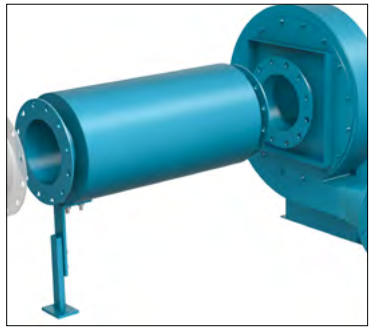


MOTOR COVER

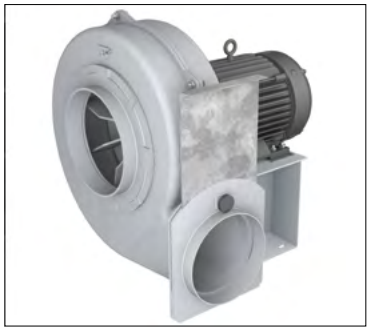


❶ SHAFT COOLER & ❷ COOLER GUARD

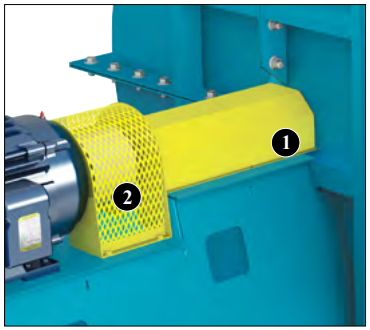
Shaft Cooler Also Known As:
- Heat Flinger
- Heat Slinger
- Cooling Wheel



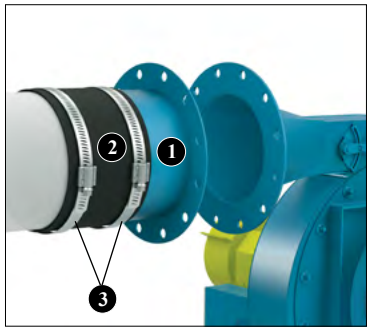
SILENCER
(with support legs)
Silencers are available for both the inlet and outlet of fans



SLIDE GATE DAMPER
(Cast Aluminum Pressure Blowers)

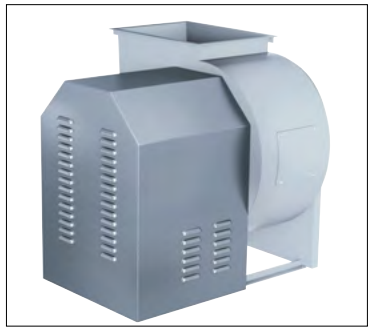


❶ SHAFT/BEARING GUARD ❷ COUPLING GUARD



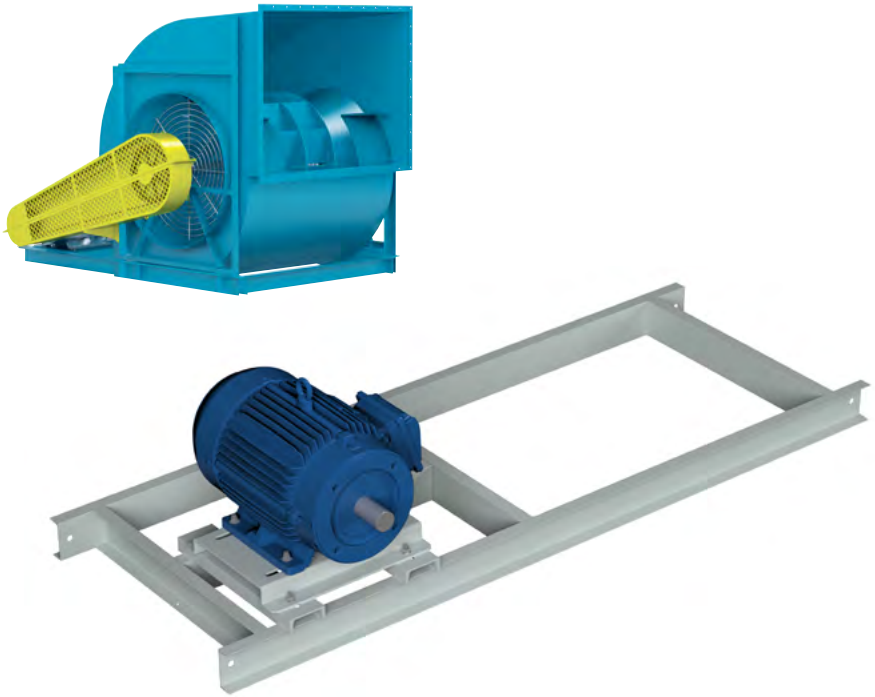
❶ TUBE ADAPTER & ❷ RUBBER SLEEVE ❸ w/CLAMPS
Flange Bolt Patterns - 125# ASA
Pipe Flange

Also Known As:
- Flanged Adapter w/ Rubber Sleeve & Clamps
- Flange w/Boot
- Mounting Flange w/Boot
- Flex Connector



WEATHER COVER

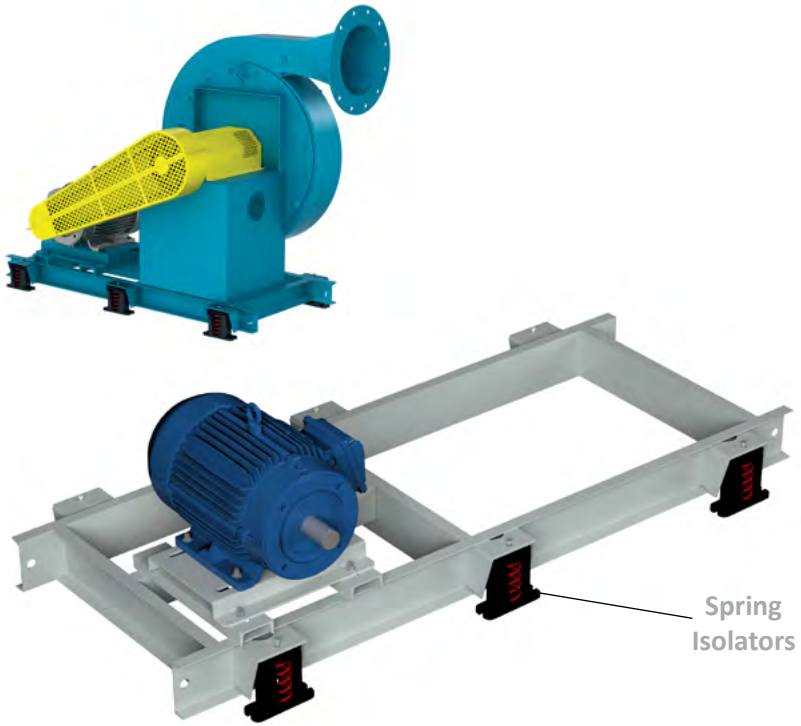
BASE TYPES
Centrifugal Fans



UNITARY BASE

Also Known As:
- Channel base

Unitary bases utilize structural channel to support the fan assembly and are designed for use without isolators.



ISOLATION BASE

Spring Isolators or rubber in shear (RIS) Isolators

Isolation bases provide a common support to fan, motor and drive including guards and utilize heavy duty structural channel. Vibration isolation bases require spring or rubber-in-shear type isolators that are designed to limit forces transmitted to the support structure of an operating fan. Flexible connectors at inlet and outlet are also required.

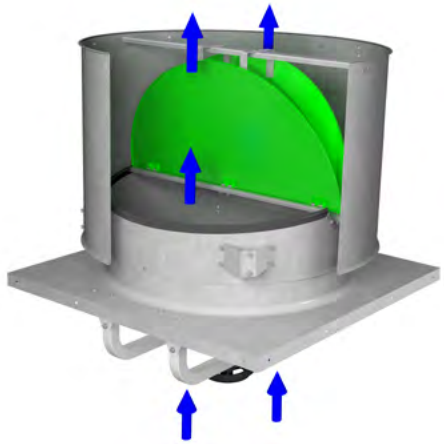
BASE TYPES
Centrifugal Fans

INERTIA BASE

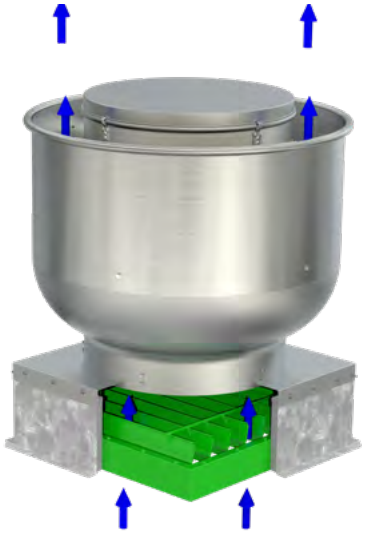
(isolation base with rebar - filled with concrete by customer)

Inertia bases provide a common support to fan, motor and drive including guards and utilize heavy duty structural channel with spring isolators. Inertia bases incorporate reinforcing rods (rebar) and require customer supplied concrete. Inertia bases are typically used on longer, direct drive fans to mitigate assembly deflection, maintaining proper alignment between the motor, coupling, shaft and bearings. Flexible connectors at inlet and outlet are required. Shown with optional bottom pan to allow for easier filling of concrete in the field.

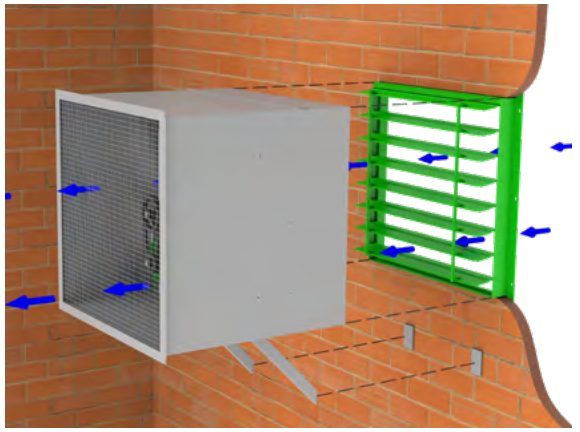
DAMPER OVERVIEW
COMMERCIAL GRADE



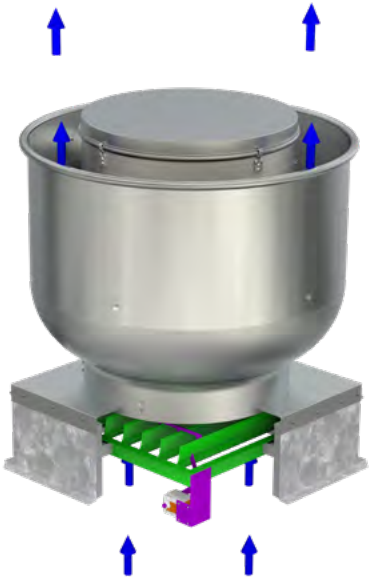
Butterfly Gravity Damper

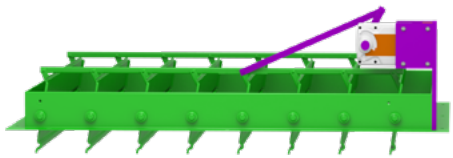


Gravity Damper
(Ceiling Type)

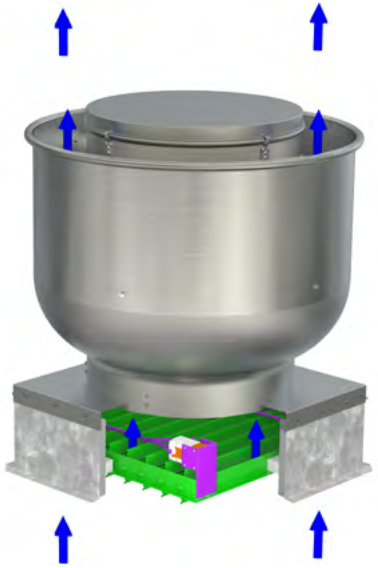


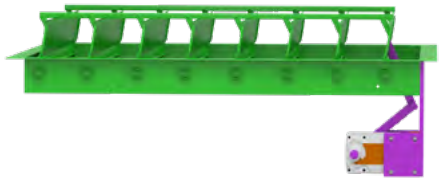
Gravity Damper
(Wall Type)





Motorized Backdraft Damper
(Actuator with Center Pivot)

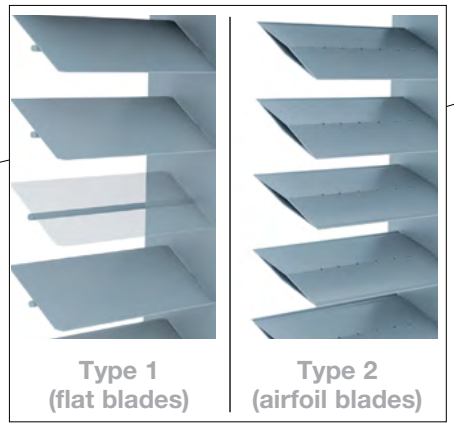




Motorized Backdraft Damper
(Actuator with End Pivot)

DAMPER OVERVIEW
INDUSTRIAL GRADE

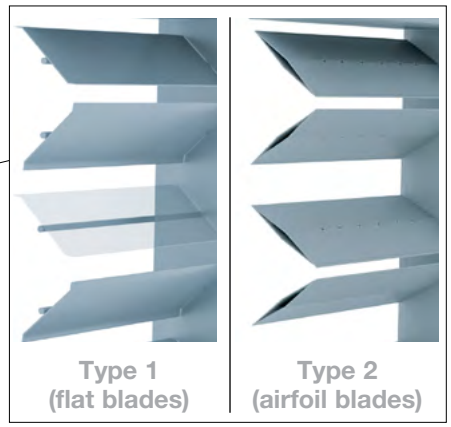
PARALLEL BLADE OUTLET DAMPER
(Type 1 & Type 2)



PARALLEL BLADE INLET BOX DAMPER
(Type 2 Only)

Also Known As:
- Prespin Parallel Blade Inlet Box Damper

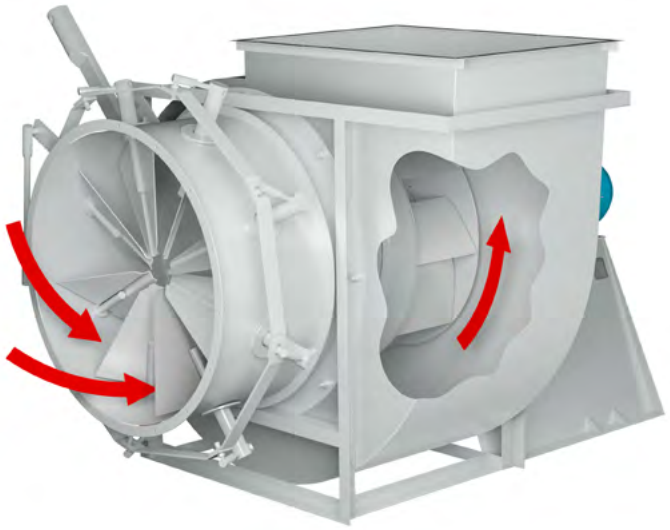
OPPOSED BLADE OUTLET DAMPER
(Type 1 & Type 2)



Manual Outlet Damper

Outlet Damper With Actuator

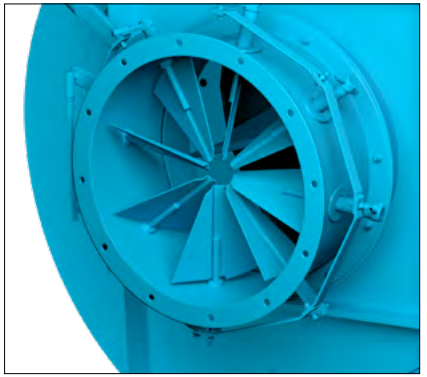
TCF Twin City Fan

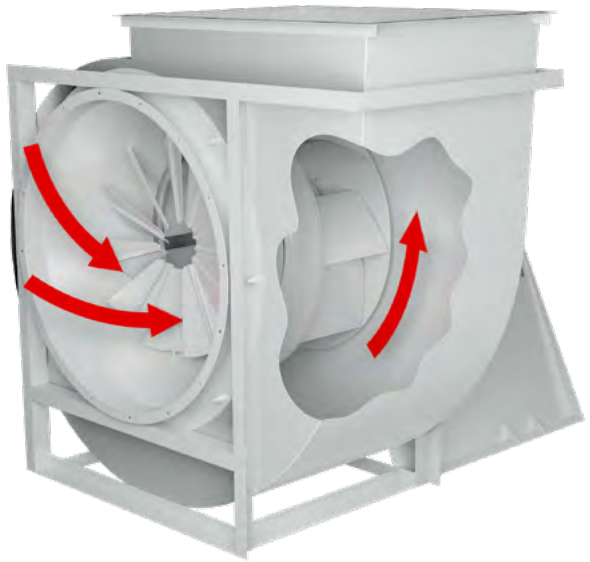


EXTERNAL INLET VANE

Also Known As:
- Vortex Damper
- Inlet Damper
- Variable Inlet Vanes
- Inlet Guide Vanes
- Radial Inlet Damper

Application: Used for contaminated airstreams or for high temperature airstreams up to 600°F. Radial vanes at the fan inlet pre-spin the air entering the fan to control the flow. Vanes come standard with a manual handle, but can be provided with an actuator. External vanes have a housing and are bolted to the fan inlet.

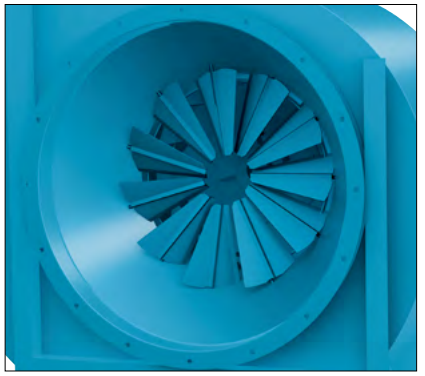




NESTED INLET VANE

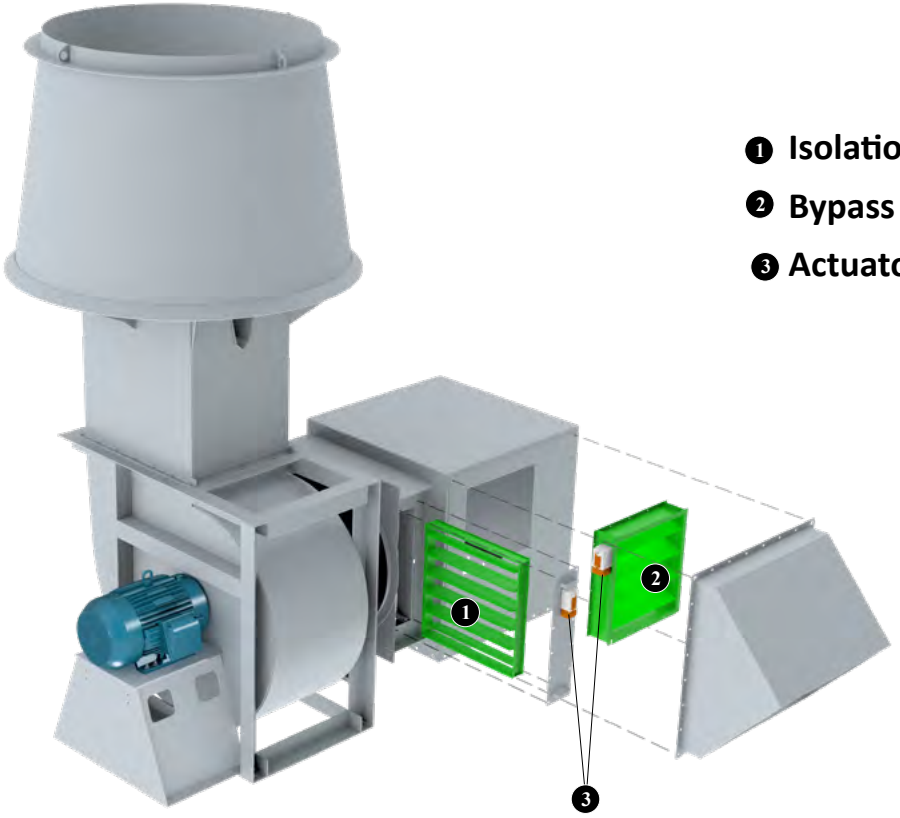
Also Known As:
- Vortex Damper
- Inlet Damper
- Variable Inlet Vanes
- Inlet Guide Vanes
- Radial Inlet Damper

Application: Used for clean airstreams up to 600°F. Same function as the external inlet vane, but the vanes are nested within the inlet funnel. Replacing the vanes require the inlet funnel assembly to be replaced. Vanes come standard with a manual handle, but can be provided with an actuator.

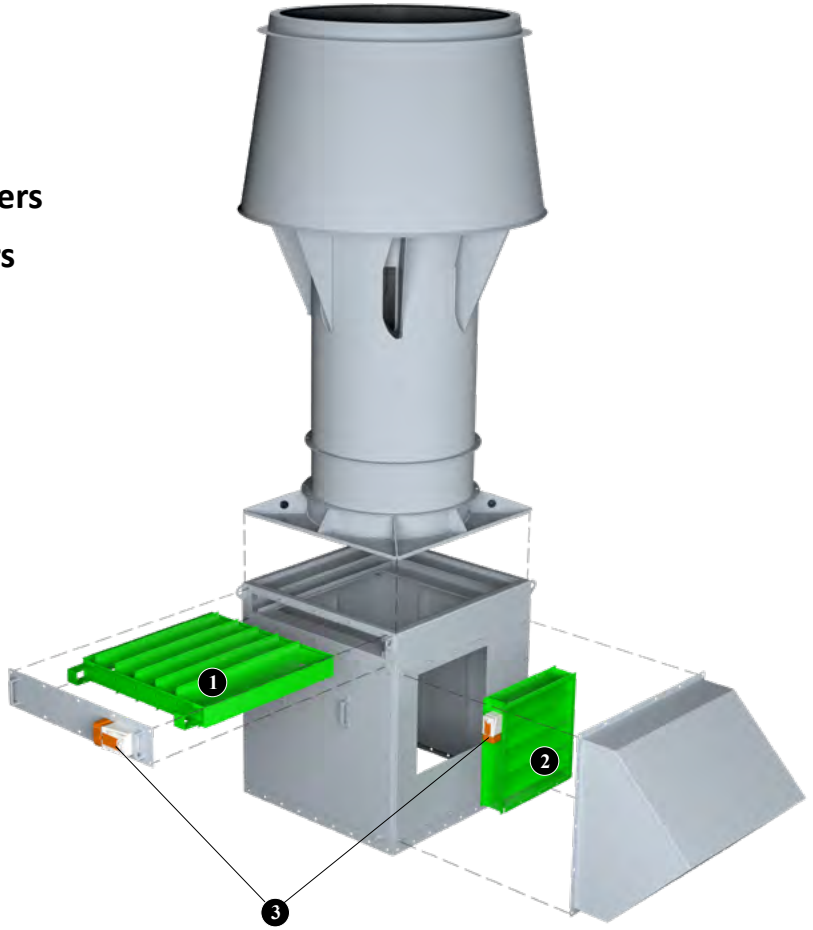


DAMPERS
Lab Exhaust Fans

❶ Isolation Dampers
❷ Bypass Dampers
❸ Actuators



Models BCIFE, BAIFE



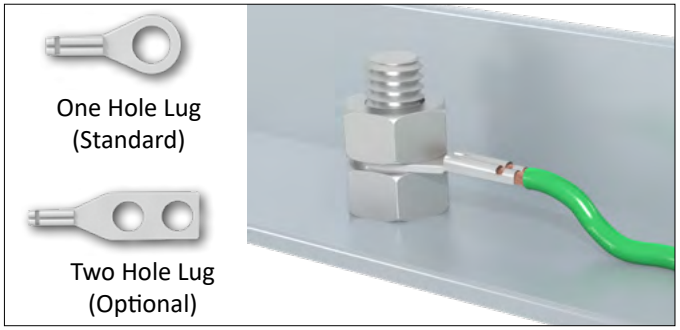
Models TVIFE, QIFE, QFE, TFE

GROUNDING DEVICES (FANS)
All Materials (Excluding Fiberglass)

STANDARD 3/8"GROUNDING STUD (Stainless Steel Stud Standard)

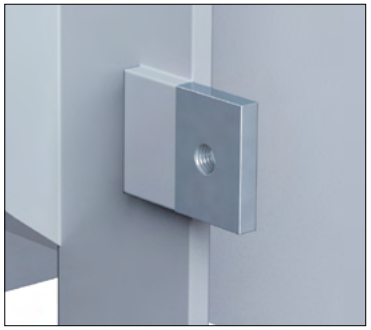
Also Known As:
- Lug (commonly mistaken for grounding stud)

Lugs shown in photo on the right



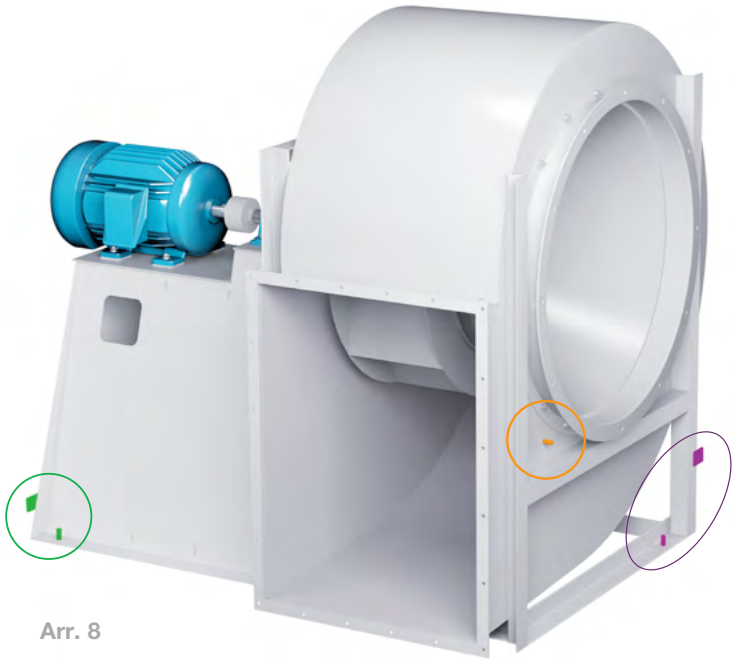
STANDARD 3/8" GROUNDING STUD WITH LUG

Stainless Steel Stud & Nuts (Standard)
Aluminum Lugs (Standard)



STANDARD GROUNDING PAD WITH CLEARANCE HOLE (STAINLESS STEEL STANDARD)

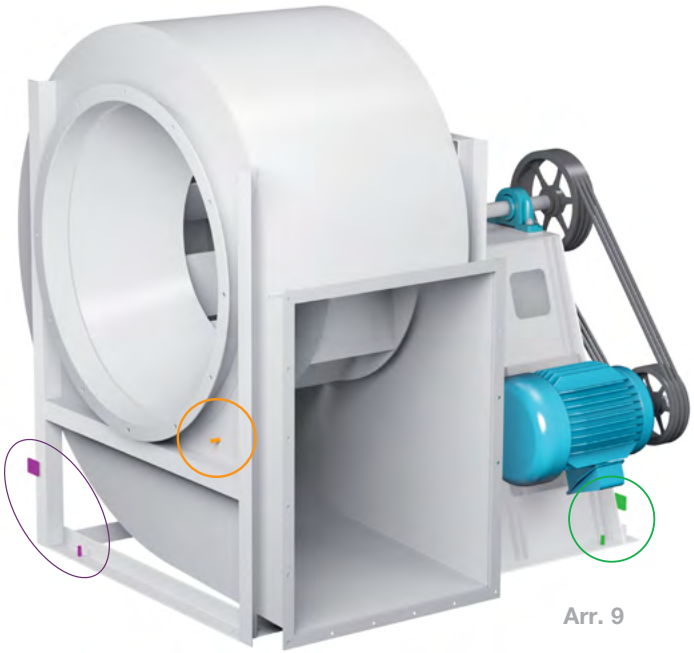
Options
- Threaded Hole
- With Stud
- Copper
- Two Hole



Arr. 8

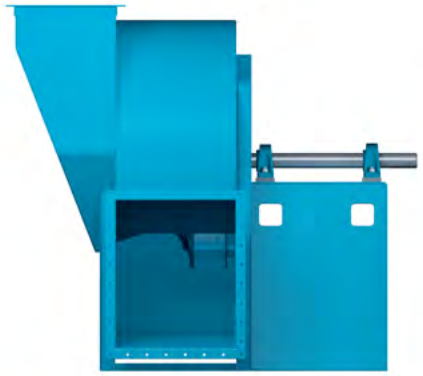
Fan Grounding Stud
Standard Location (Drive Side)
Standard Location (Inlet Side)
Optional Location (Inlet Side)

Fan Grounding Pad
Standard Location (Drive Side)
Standard Location (Inlet Side)



Arr. 9

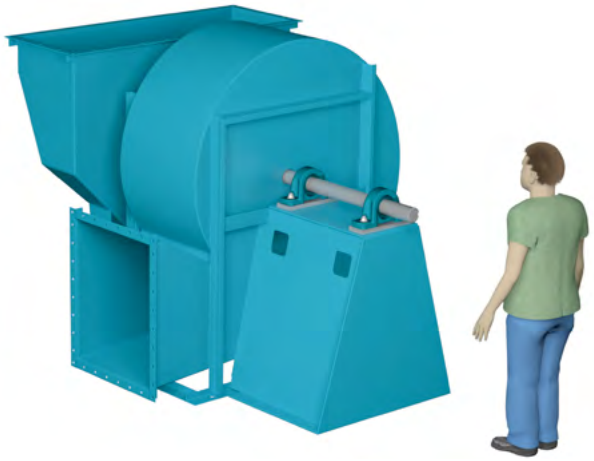
TCF Twin City Fan

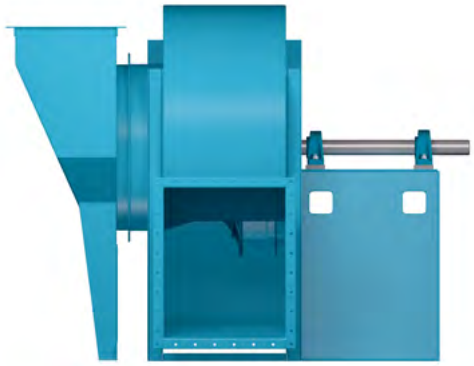


INTEGRAL INLET BOX

Also Known As: Attached Inlet Box

Inlet boxes are used when the installation does not allow for a straight run of duct into the fan. The inlet box is designed to minimize the system effect of a 90 degree turn into the fan. Attached inlet boxes are integrated into the inlet side of the fan housing. The Inlet box is supported by the fan.

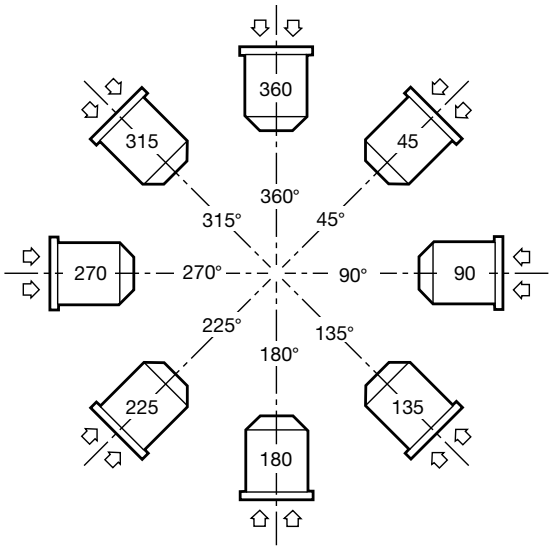


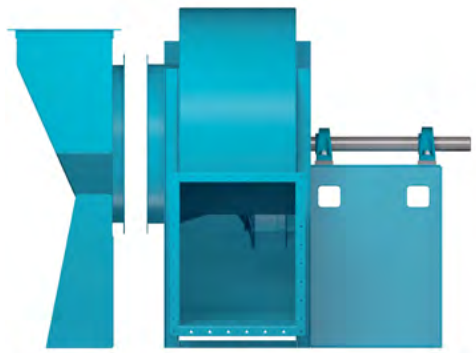


DETACHED INLET BOX (BOLT ON)

Inlet boxes are used when the installation does not allow for a straight run of duct into the fan. The inlet box is designed to minimize the system effect of a 90 degree turn into the fan. The Bolt On design is bolted directly to the inlet flange of the fan.

Inlet Box Positions Determined
FROM DRIVE SIDE

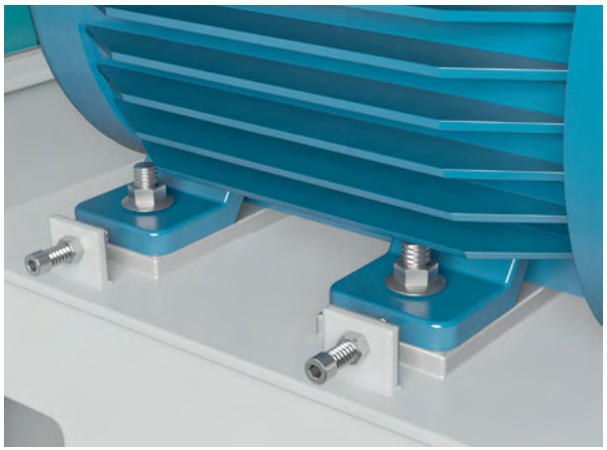




DETACHED INLET BOX (FREE STANDING)

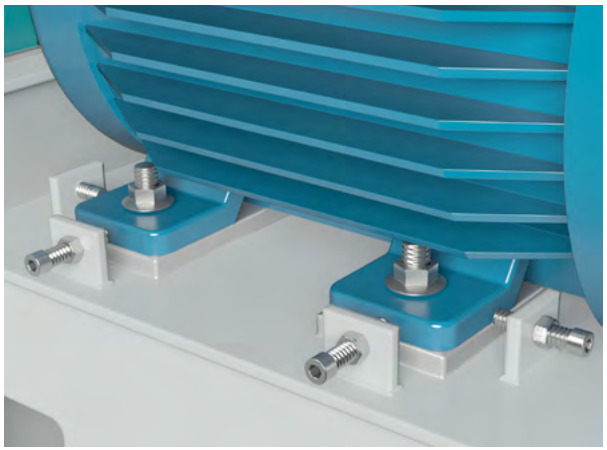
This is the same concept as the detached inlet box except it can be mounted separate from the fan and is fully supported at the floor.

MOTOR POSITIONERS



MOTOR POSITIONERS

Also Known As:
- Motor Alignment Jacking Screws



BI-DIRECTIONAL MOTOR POSITIONERS

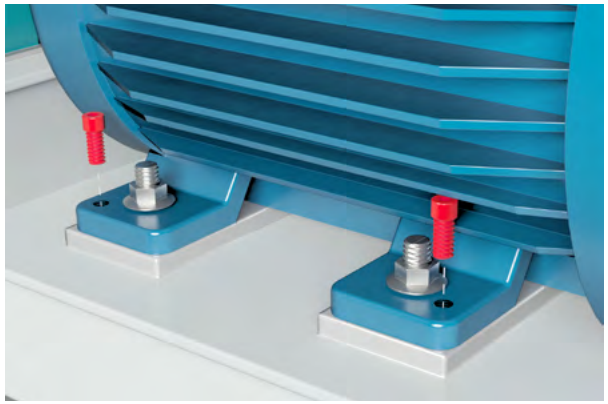
Also Known As:
- Motor Alignment Jacking Screws

TRI-DIRECTIONAL MOTOR POSITIONERS

(Motor Feet Drilled & Tapped by Vendor)

Vertical jack screws (red) are removed after the motor is shimmed

Also Known As:
- Motor Alignment Jacking Screws

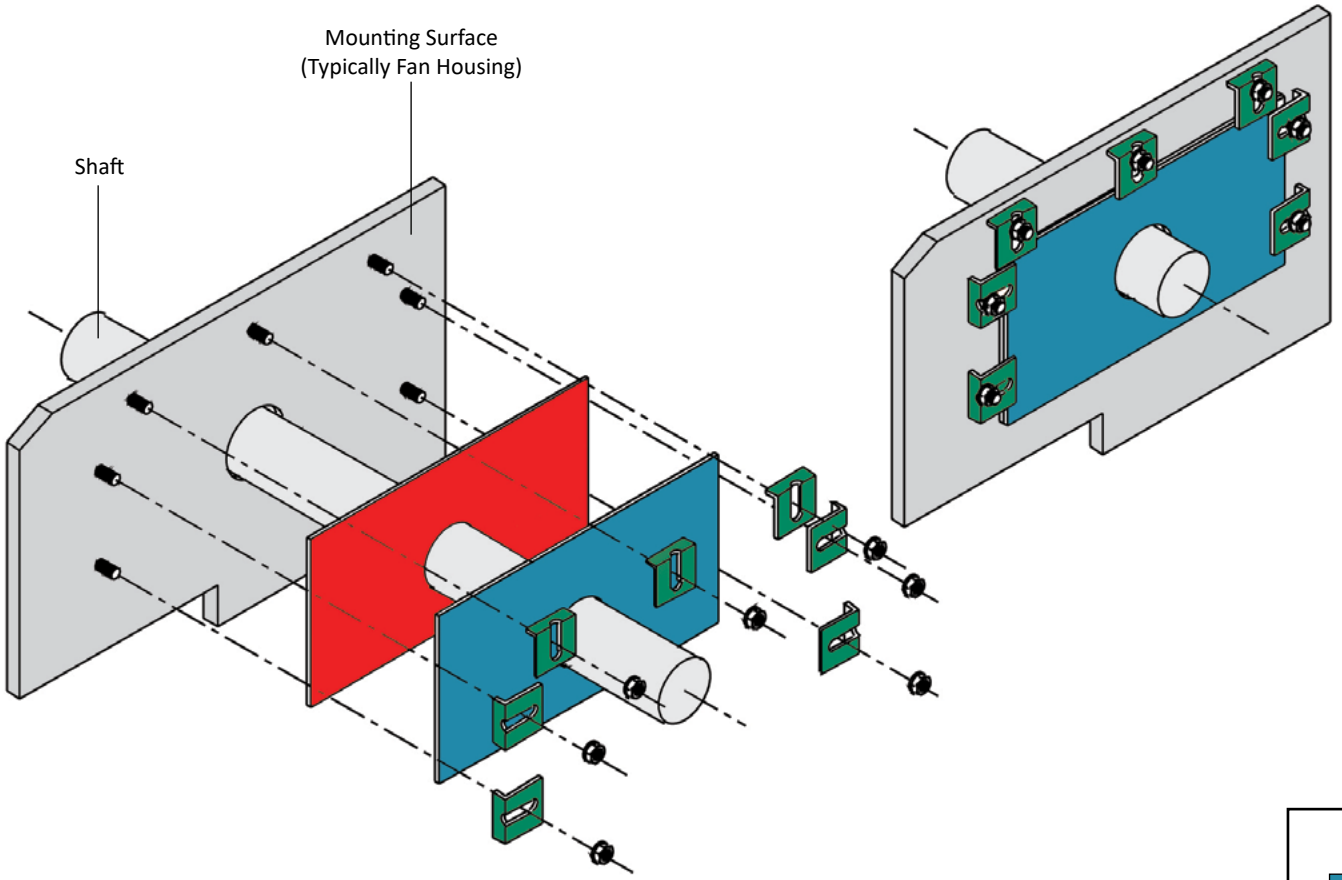


VERTICAL JACK SCREWS

(Motor Feet Drilled & Tapped by Vendor)

Vertical jack screws (red) are removed after the motor is shimmed

SHAFT SEALS



Friction Shaft Seal

Also Known As:
- Shaft Seal (Standard Type)
- Tacky Cloth Seal

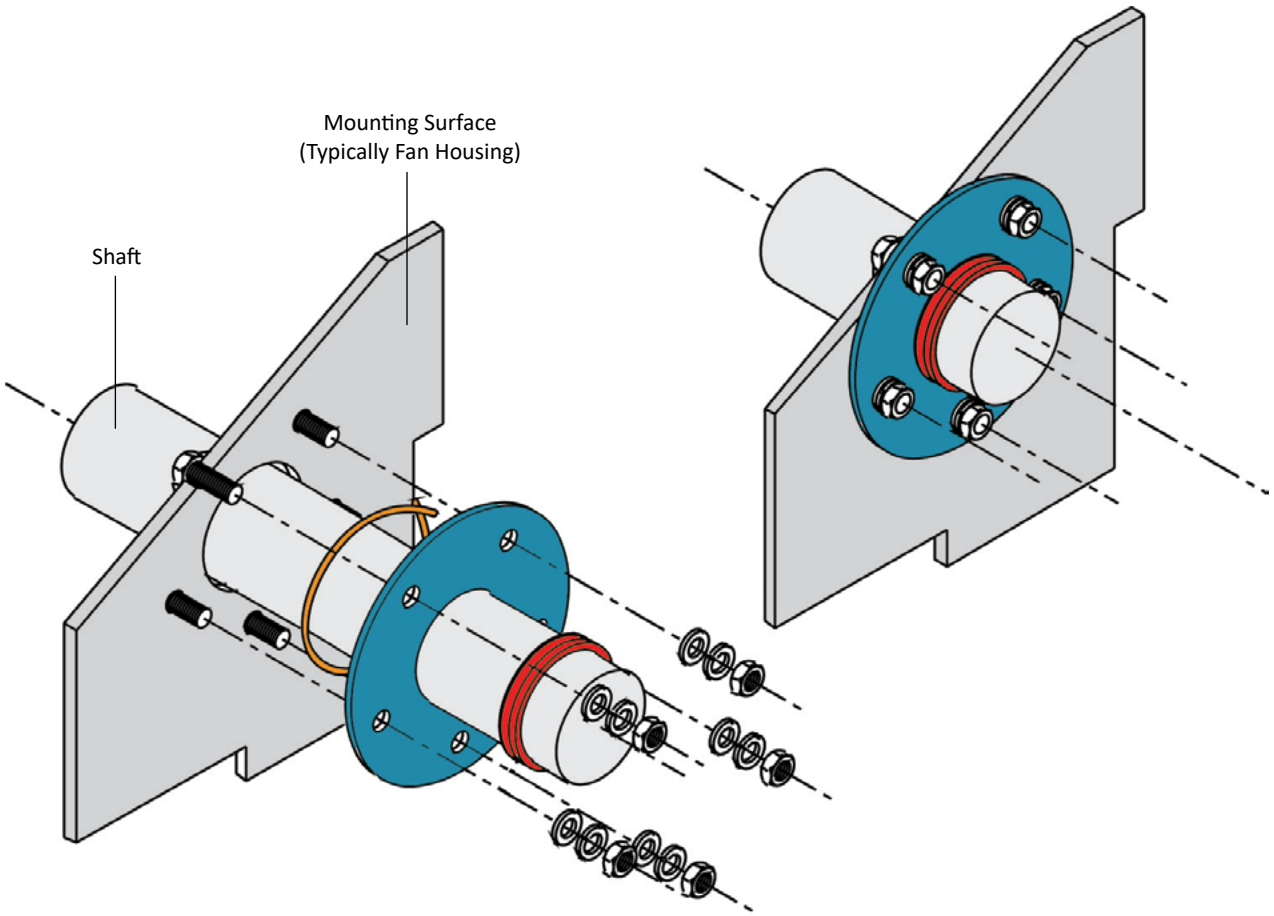
Typical Seal Materials
- Tacky Cloth
- Teflon
- Viton
- Nomex Mineral Wool
- Silicone Sheet
- Fiber Frax (Ceramic Felt)

Mounting Hardware
Mounting Studs, Clips, Nuts

Coverplate (Typically Aluminum)

Seal Material - See Above

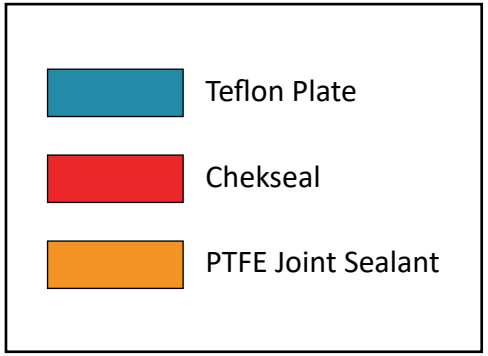
Clips



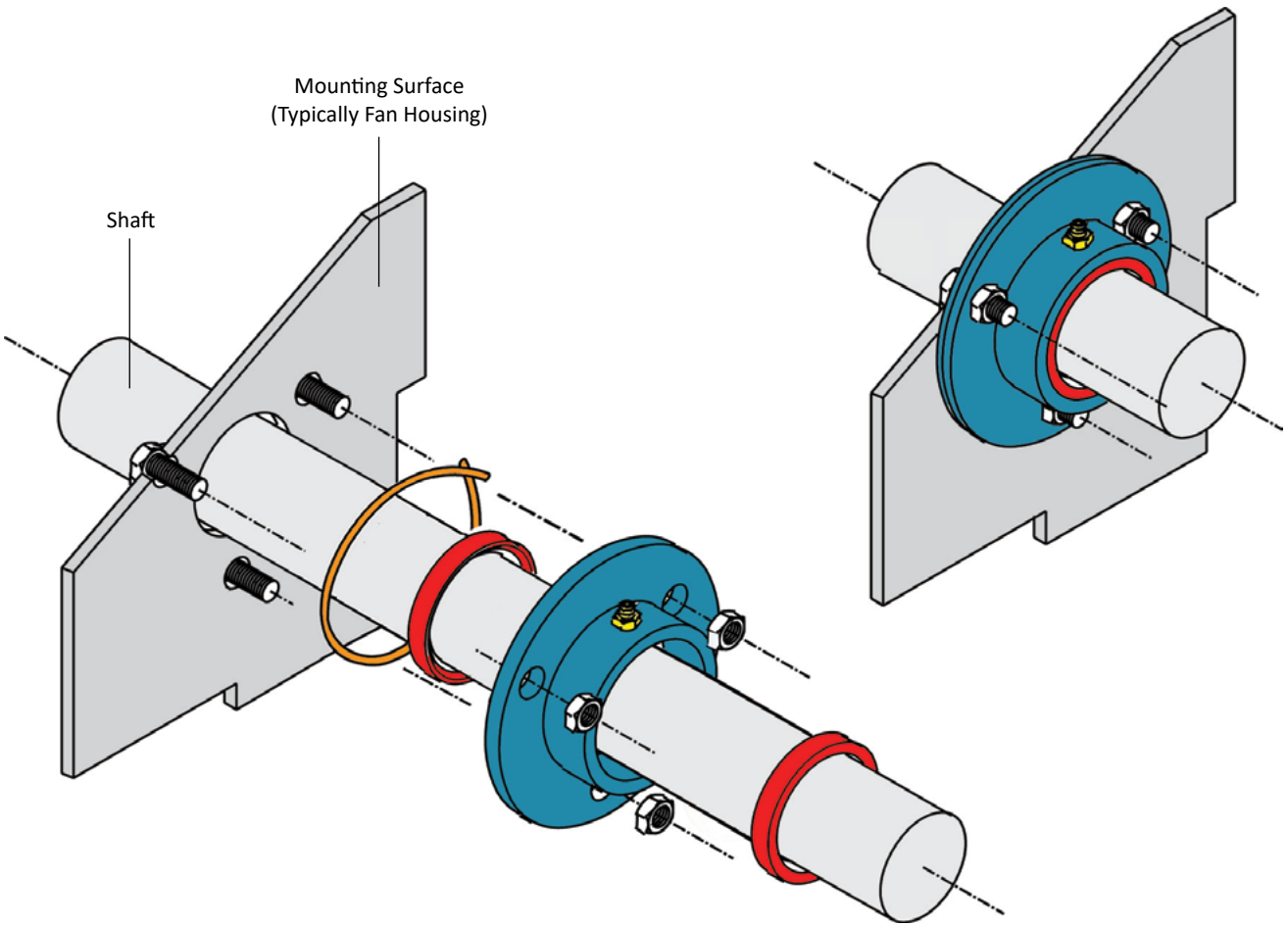
V-Ring Type Shaft Seal

Also Known As:
- Axial Shaft Seal
- Teflon Shaft Seal / Teflon Style

Mounting Hardware
Mounting Studs (bolts welded inside housing), Washers, Nuts



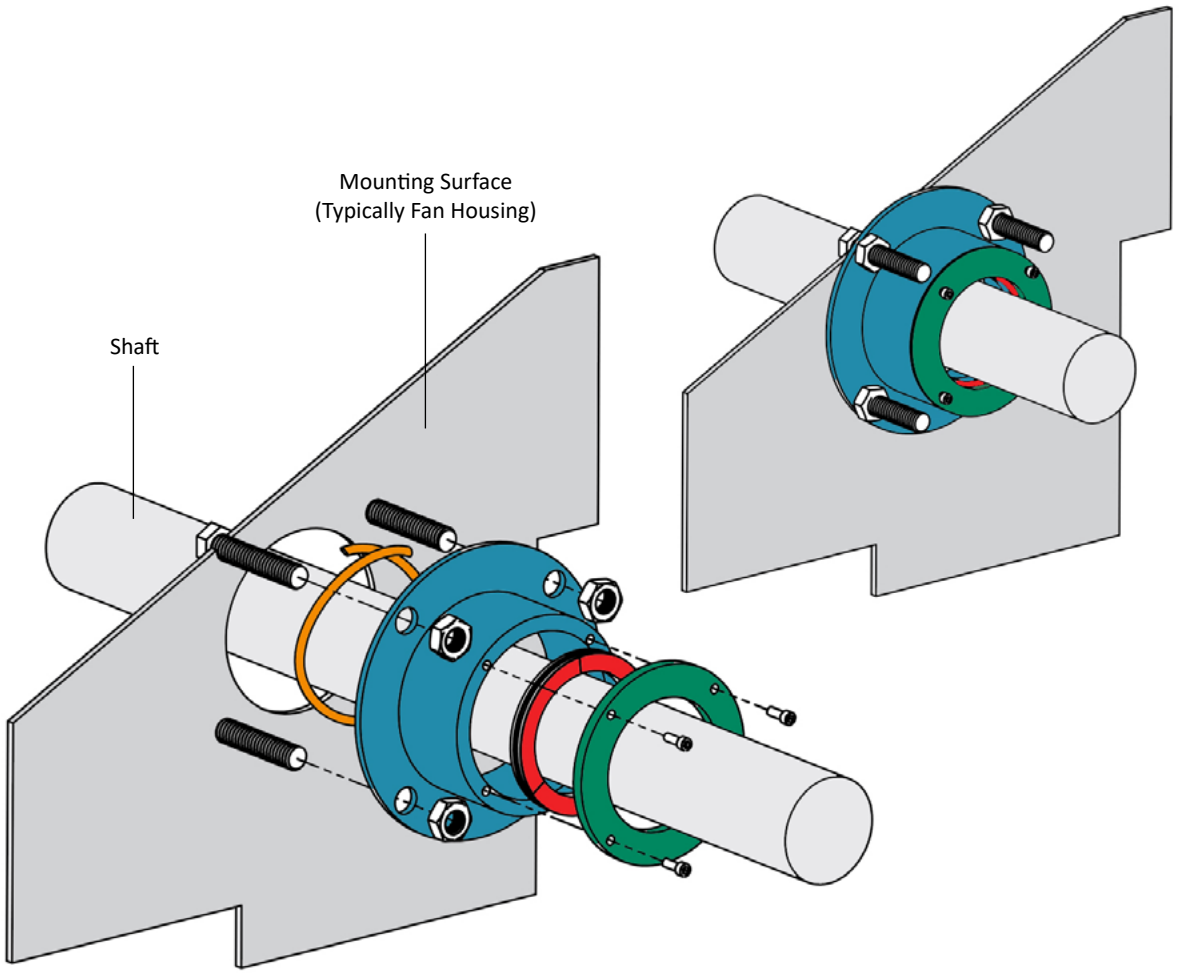
SHAFT SEALS



Lip Type Shaft Seal

Also Known As:
- Grease Seal / Grease Purge
- Viton Seal
- Shaft Seal - Buna Rubber (lip type)
- Shaft Seal - Viton (lip type) - Special
- Double Lip Seal

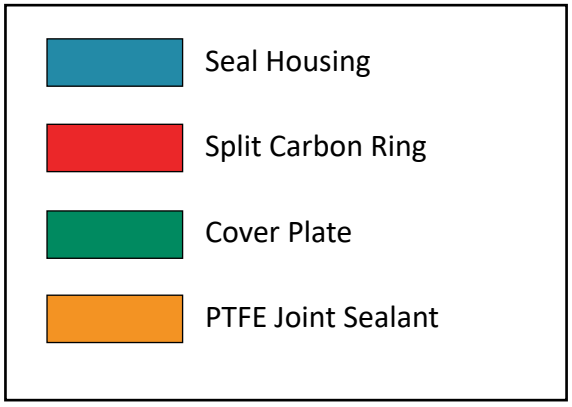
Mounting Hardware
Mounting Studs (bolts welded inside housing), Nuts

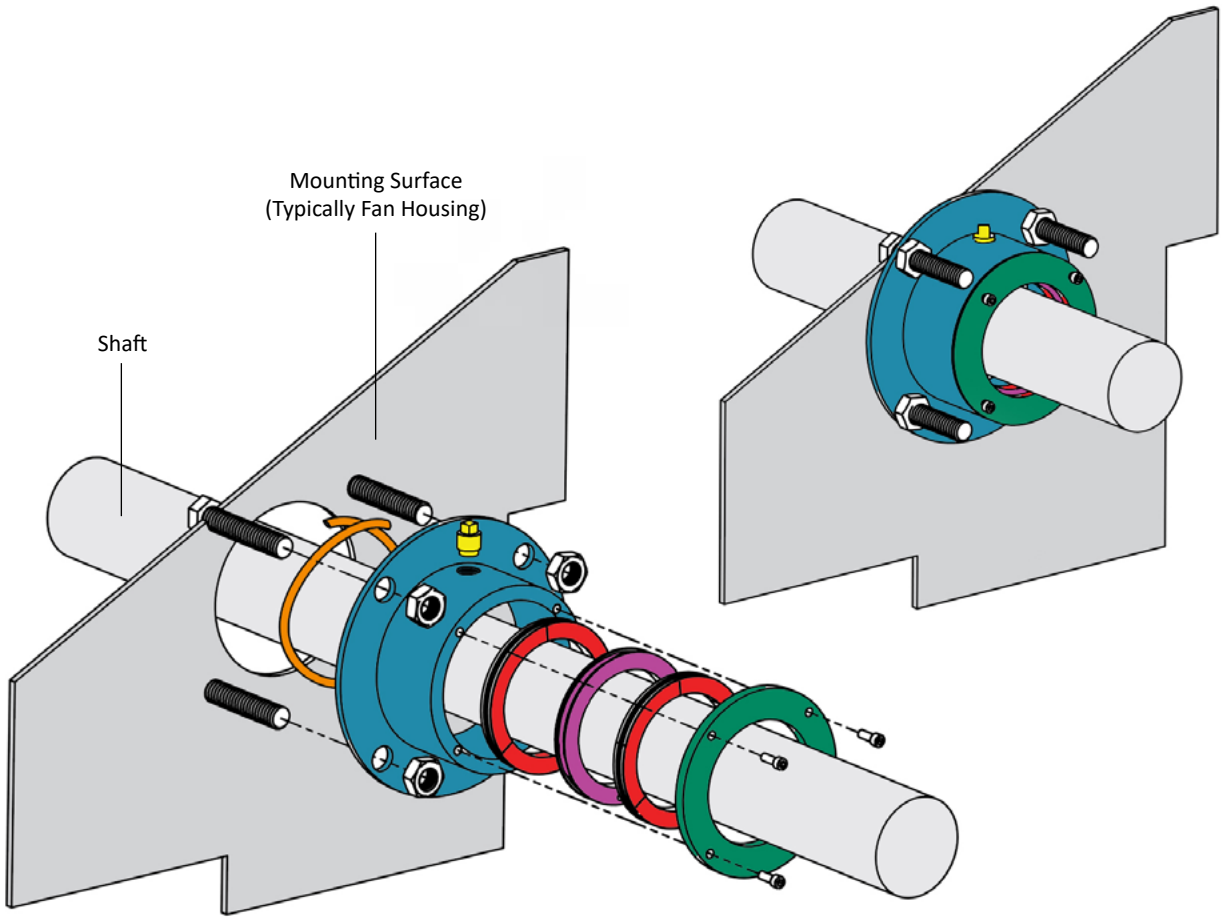


Single Ring Mechanical Shaft Seal
(Vendor Supplied)

Also Known As:
- Single Carbon Ring
- Floating Circumferential Carbon Ring Seal
- Labyrinth Shaft Seal
- John Crane
- Flow Serve
- Eagle Burgmann

Mounting Hardware
Mounting Studs (bolts welded inside housing), Nuts, Cap Screws



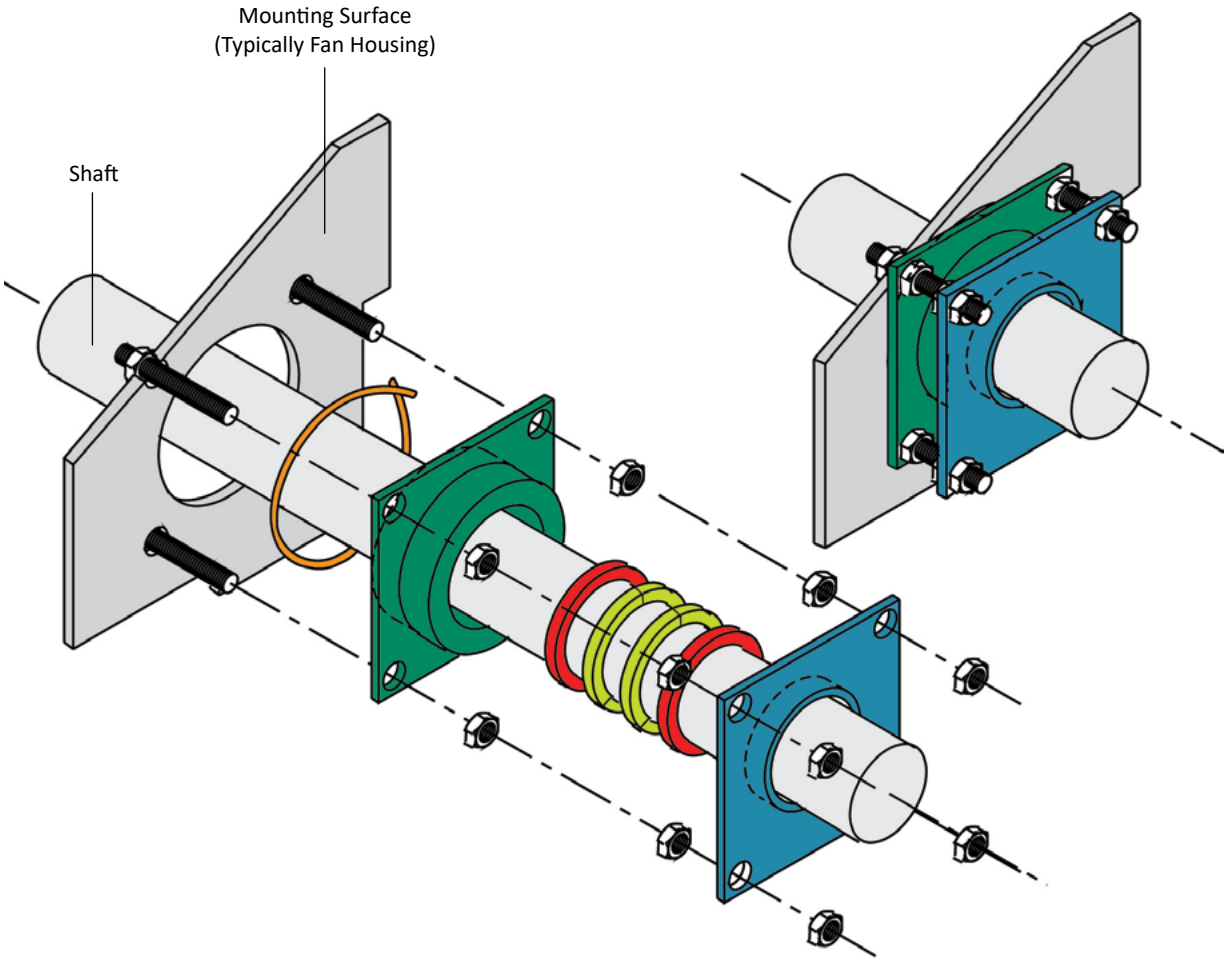


Double Ring Mechanical Shaft Seal
(Vendor Supplied)

Also Known As:
- Double Carbon Ring
- Floating Circumferential Carbon Ring Seal
- Labyrinth Shaft Seal
- John Crane
- Flow Serve
- Eagle Burgmann

Mounting Hardware
Mounting Studs (bolts welded inside housing), Nuts, Cap Screws

- Seal Housing
- Purge
- Split Carbon Rings
- Lantern Ring (located at purge hole)
- Cover Plate
- PTFE Joint Sealant

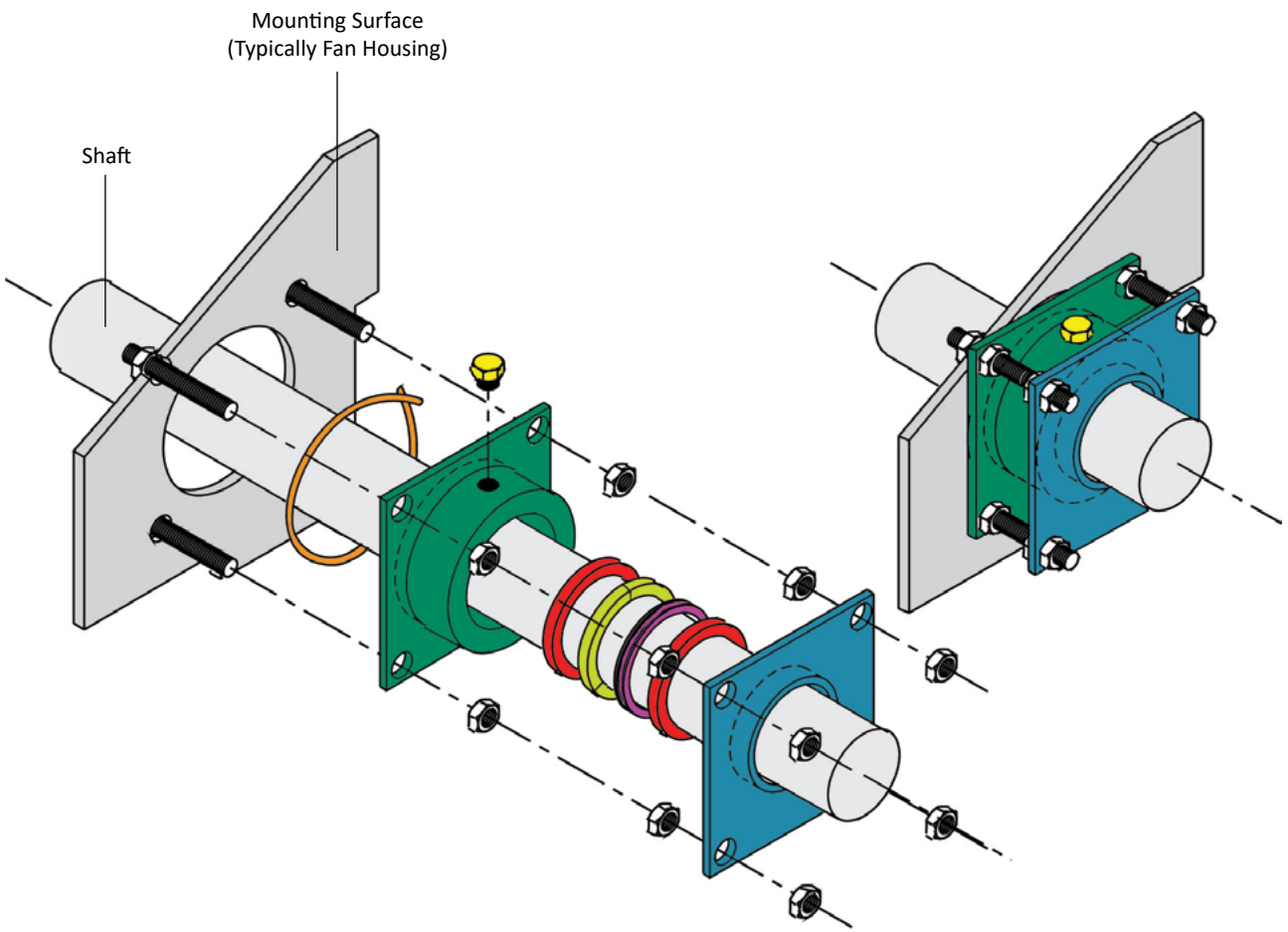


Stuffing Box Type Shaft Seal

Also Known As:
- Grafoil Seal
- Packing Gland Seal
- Shaft Seal - Graphoil (Stuffing Box)
- Shaft Seal - Stuffing Box Type

Mounting Hardware
Threaded Mounting Rod w/ Nut Welded to Inside Housing, Nuts

- Outside Plate w/ Retaining Ring
- Outer Rings - Carbon Yarn Packing
- Inner Rings - Graphoil Split Rings
- Inside Plate w/ Seal Housing
- PTFE Joint Sealant



Stuffing Box Type Shaft Seal With Gas Purge

Also Known As:
- Grafoil Seal with Purge
- Packing Gland Seal with Purge
- Shaft Seal - Graphoil (Stuffing Box With Purge)
- Shaft Seal - Stuffing Box Type With Purge

Mounting Hardware
Threaded Mounting Rod w/ Nut Welded to Inside Housing, Nuts

- Outside Plate w/ Retaining Ring
- Outer Rings - Carbon Yarn Packing
- Lantern Ring - Teflon (located at purge hole)
- Graphoil Split Ring
- Inside Plate w/ Seal Housing
- 1/8” NPT Pipe Plug for Purge Hole
  Replaced in field with customer supplied purge line
- PTFE Joint Sealant

FANPEDIA
BY TWIN CITY FAN

TCF
TWIN CITY FAN

TECHNICAL DESCRIPTIONS

Anti-backspin devices
Prevent the rotor from freewheeling in reverse when not in operation. They are typically mounted between the bearings on overhung wheel designs and on a shaft extension on the non-drive end of center hung wheel designs.

Arrangement 1 SWSI — Single Width, Single Inlet (Centrifugal)
Arrangement 1 is usually belt driven. The wheel is overhung on the shaft, i.e., mounted at the end of the shaft. The two fan bearings are mounted on the bearing pedestal, out of the airstream, which makes them ideal for high temperature or contaminated air applications. Belt driven configurations offer performance flexibility. The motor can be mounted in any of the four AMCA standard motor positions, W, X, Y, or Z.

Motor Position restrictions based on Discharge
BHD discharge (motor interferes with outlet opening of housing)
- CW rotation: Motor position "Z" NOT ALLOWED
- CCW rotation: Motor position "W" NOT ALLOWED

TAD discharge (motor interferes with outlet opening of housing)
- CW rotation: Motor position "W" NOT ALLOWED
- CCW rotation: Motor position "Z" NOT ALLOWED

THD discharge (Height restriction – motor may not fit below the discharge)
- CW rotation: Motor position "W"
- CCW rotation: Motor position "Z"

*On Arrangement 1 fan the motor will fit if pedestal is lengthened to accommodate motor.

Arrangement 3 SWSI — Single Width, Single Inlet (Centrifugal)

Arrangement 3 is usually belt driven and is configured with the wheel center hung on the shaft, i.e., mounted between the bearings making it structurally sound and compact. The arrangement 3 has one bearing located in the airstream. The motor can be mounted in any of the four AMCA standard motor positions, W, X, Y, or Z.

Motor Position restrictions based on Discharge

BHD discharge (motor interferes with outlet opening of housing)

- CW rotation: Motor position "Z" NOT ALLOWED
- CCW rotation: Motor position "W" NOT ALLOWED

TAD discharge (motor interferes with outlet opening of housing)

- CW rotation: Motor position "W" NOT ALLOWED
- CCW rotation: Motor position "Z" NOT ALLOWED

THD discharge (Height restriction – motor may not fit below the discharge)

- CW rotation: Motor position "W"
- CCW rotation: Motor position "Z"

Arrangement 3F SWSI — Single Width, Single Inlet (Centrifugal)

Arrangement 3F is an Arrangement 3 with extended angle frame to mount the motor and horizontal slide base as an assembly. Arrangement 3F is typically not suitable for mounting vibration isolators directly under the fan.

Motor Position restrictions based on Discharge

BHD discharge (motor interferes with outlet opening of housing)

- CW rotation: Motor position "Z" NOT ALLOWED
- CCW rotation: Motor position "W" NOT ALLOWED

TAD discharge (motor interferes with outlet opening of housing)

- CW rotation: Motor position "W" NOT ALLOWED
- CCW rotation: Motor position "Z" NOT ALLOWED

THD discharge (Height restriction – motor may not fit below the discharge)

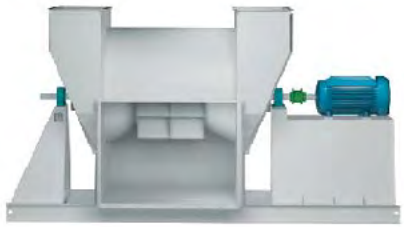
- CW rotation: Motor position "W"
- CCW rotation: Motor position "Z"

	**Arrangement 3SI SWSI — Single Width, Single Inlet (Centrifugal)** Arrangement 3SI is usually direct drive. Like the Arrangement 3, the wheel is mounted between the bearings. The Arrangement 3SI utilizes an attached inlet box to locate the bearing outside of the airstream on independent bearing pedestals which allows for elevated operating temperatures and relatively clean air. The Arrangement 3SI includes a pie split housing for easy wheel removal. The motor is located by the customer off the fan assembly and direct coupled to the shaft opposite of the inlet box side.
	**Arrangement 4 SWSI — Single Width, Single Inlet (Centrifugal)** Arrangement 4 is a direct drive fan. The wheel is mounted directly to the motor shaft with the motor mounted to a pedestal. Arrangement 4 offers low maintenance since there are no fan bearings, fan shaft or drive parts to maintain. Arrangement 4 fans are typically limited up to size 365.
	**Arrangement 4S (Swingout Construction) SWSI — Single Width, Single Inlet (Centrifugal)** Arrangement 4S is a modified Arrangement 4 fan intended for easy access to the wheel and housing interior. The motor and wheel assembly is mounted to reinforced framework to support the opened housing.
	**Arrangement 4VI (Vertical) SWSI — Single Width, Single Inlet (Centrifugal)** Arrangement 4VI is a modified Arrangement 4 fan designed to mount directly on the inlet of the fan. The Arrangement 4VI and features reinforced inlets and removable motor side to allow the rotating assemblies to be removed without removing the housing from the mounting structure. Arrangement 4VI fans utilize a vertical airflow into the fan (vertical motor shaft).

	**Arrangement 4HI (Horizontal) SWSI — Single Width, Single Inlet (Centrifugal)** Arrangement 4HI is a modified Arrangement 4 fan designed to mount directly on the inlet of the fan. The Arrangement 4HI fans features reinforced inlets and removable motor side to allow the rotating assemblies to be removed without removing the housing from the mounting structure. Arrangement 4HI fans employ horizontal airflow into the fan (horizontal motor shaft).
	**Arrangement 7SI SWSI — Single Width, Single Inlet (Centrifugal)** Arrangement 7SI is direct drive. Like the Arrangement 3SI, the wheel is mounted between the bearings. The Arrangement 7SI includes an integrated inlet box to locate the bearing outside of the airstream. The pedestal is designed to accommodate the motor, flexible coupling and one bearing. A pie split housing is provided for easy wheel removal. The fan assembly is then mounted on a unitary base as standard. An inertia base is an available option.
	**Arrangement 8 SWSI — Single Width, Single Inlet (Centrifugal)** Arrangement 8 is a modified version of Arrangement 1 used for direct drive. The Arrangement 1 bearing pedestal is extended to accommodate the motor. A flexible coupling connects the fan and motor shaft.
	**Arrangement 9 SWSI — Single Width, Single Inlet (Centrifugal)** Arrangement 9 is available as belt driven only. A motor slide base is mounted on the side of the bearing pedestal. This arrangement permits the unit to ship as a complete assembly with the motor and drive mounted. Typically, the motor is mounted on the left side of the pedestal for CW rotation fans and on the right side for CCW rotation fans.

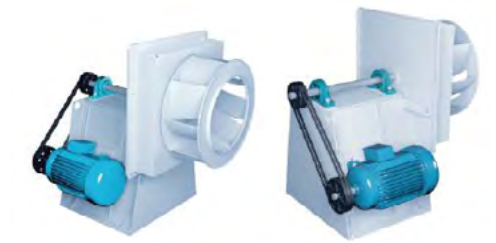
	**Arrangement 9F SWSI — Single Width, Single Inlet (Centrifugal)** Arrangement 9F is available when an Arrangement 9 requires a motor which is too large to mount on the bearing pedestal. The fan frame is extended to accommodate the motor, for horizontal mounting, similar to an Arrangement 1 fan. Arrangement 9F is not suitable for mounting vibration isolators directly under the fan. *If isolators are required, use and arrangement 1 fan with a separate isolation base.*
	**Arrangement 9H SWSI — Single Width, Single Inlet (Centrifugal)** Arrangement 9H is available for motor mounting on the side of the bearing pedestal when horizontal motor adjustment is preferred. The pedestal is extended on one side to accommodate the motor for horizontal mounting. Typically, the motor is mounted on the left side of the pedestal for CW rotation fans and on the right side for CCW rotation fans.
	**Arrangement 9ST (Swingout) SWSI — Single Width, Single Inlet (Centrifugal)** Arrangement 9ST is a modified Arrangement 9 fan intended for easy access to the wheel and housing interior. The motor and wheel assembly is mounted to reinforced framework to support the opened housing. Arrangement 9ST mounts the motor above the bearing pedestal. Motor mounted with a NEMA type slide base only.
	**Arrangement 9SS (Swingout) SWSI — Single Width, Single Inlet (Centrifugal)** Arrangement 9SS is a modified Arrangement 9 fan intended for easy access to the wheel and housing interior. The motor and wheel assembly is mounted to reinforced framework to support the opened housing. The Arrangement 9SS mounts the motor on the side of the bearing pedestal. Motor location is restricted based on the fan's rotation. CW Rotation & (L) motor position or CCW Rotation & (R) motor position. Motor mounted with an automotive pivot base only.

	**Arrangement 10 SWSI — Single Width, Single Inlet (Centrifugal)** Arrangement 10 is available as belt driven only. For Class I and II fans, sizes 122 through 365, Arrangement 10 units are commonly referred to as Ventilating Sets. (Refer to Catalog 600 for more details.) Arrangement 10 units have adjustable motor bases mounted inside the bearing pedestal. This arrangement offers a more compact design than the Arrangement 9 and is suitable for roof or outdoor installations when supplied with the optional weather cover.
	**Arrangement 3 DWDI — Double Width, Double Inlet (Centrifugal)** DWDI fans are generally supplied in Arr. 3 for V-belt drive. The wheel is mounted between the bearings and supported by the fan housing. Since both bearings are located in the airstream, standard DWDI fans should be used for clean air applications with air temperatures limited to 130°F. The motor can be mounted in any of the four standard motor positions: W, X, Y or Z.
	**Arrangement 3DI DWDI — Double Width, Double Inlet (Centrifugal)** Arrangement 3DI is direct drive. Like the Arrangement 3, the wheel is mounted between the bearings. The Arrangement 3DI utilizes integrated inlet boxes to locate the bearings outside of the airstream on independent bearing pedestals which allows for elevated operating temperatures and relatively clean air. The Arrangement 3SI includes a pie split housing for easy wheel removal. The motor is located by the customer off the fan assembly and direct coupled to the shaft.
	**Arrangement 3F DWDI — Double Width, Double Inlet (Centrifugal)** Arrangement 3F offers an integral extended base to accommodate the motor. The base has brackets to accept vibration isolators. Arr. 3F is available to Size 660 and for motor positions W and Z as standard. For motor positions X and Y, consult factory.

	**Arrangement 7 DWDI — Double Width, Double Inlet (Centrifugal)** Arrangement 7 is direct drive. Like the Arrangement 3, the wheel is mounted between the bearings, but the 7 incorporates a pedestal designed to accommodate the motor, flexible coupling and one bearing. An inertia base is an available option.
	**Arrangement 7DI DWDI — Double Width, Double Inlet (Centrifugal)** Arrangement 7DI is direct drive. Like the Arrangement 3DI, the wheel is mounted between the bearings, but the 7DI incorporates a pedestal designed to accommodate the motor, flexible coupling and one bearing. The Arrangement 7DI utilizes integrated inlet boxes to locate the bearings outside of the airstream allowing for elevated operating temperatures and relatively clean air. A pie split housing is provided for easy wheel removal. The Arrangement 7DI fan assembly is then mounted on a unitary base as standard. An inertia base is an available option.
	**Arrangement 1 (Plenum Fans)** Arrangement 1 features an overhung wheel design suitable for V-belt drive and requires mounting of motor independent of the fan.
	**Arrangement 3 – Horizontal (Plenum Fans)** This is the most common plenum fan arrangement is frequently used in OEM and site-built air handlers. Arrangement 3 is suitable for V-belt drive and requires mounting of the motor independently of the fan.

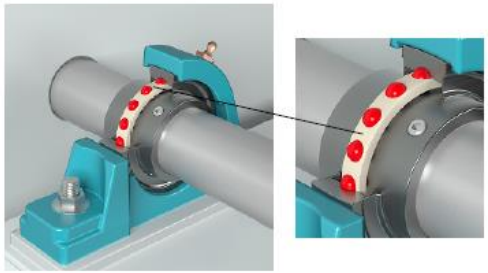
	**Arrangement 3HS – Horizontal with Top Mounted Motor with Slide Base (Plenum Fans)** Arrangement 3HS provides a means for mounting the motor on top of the unit. This design is often desirable when floor space is limited. Arrangement 3HS provides a slide base type motor mounting option. Due to limited belt center range, NEMA “slide base” option is available on sizes 182 and larger only.
	**Arrangement 3HA – Horizontal with Top Mounted Motor with Adjustable Motor Base (Plenum Fans)** Arrangement 3HA provides a means for mounting the motor on top of the unit. This design is often desirable when floor space is limited. Arrangement 3HA provides an adjustable motor base motor mounting option.
	**Arrangement 3SM – Horizontal With Side Mounted Motor With Slide Base (Plenum Fans)** Arrangement 3SM is designed to provide an economical and space-saving means to supply plenum fans with motors mounted to the side of the fan frame. A motor slide base allows for quick and easy belt adjustments.
	**Arrangement 3VA – Vertical with Side Mounted Motor (Plenum Fans)** Arrangement 3VA provides an adjustable motor base motor mounting option.
	**Arrangement 3VS – Vertical with Side Mounted Motor (Plenum Fans)** Arrangement 3VS provides a slide base type motor mounting option. Due to limited belt center range, NEMA “slide base” option is available on sizes 182 and larger only.

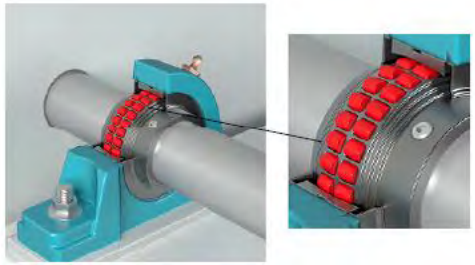
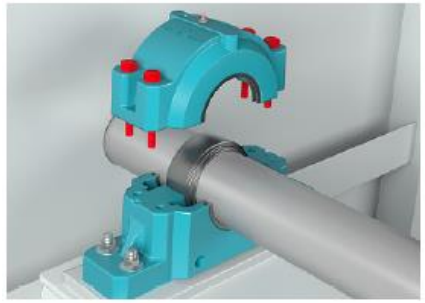
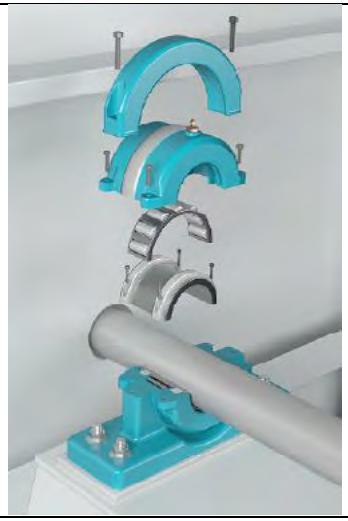
	**Arrangement 4 – Horizontal (Plenum Fans)** Direct drive Arrangement 4 mounts the fan wheel directly onto the motor shaft. This arrangement provides a compact fan/motor unit which eliminates belt residue and requires less maintenance than other arrangements. For these reasons, Arrangement 4 plenum fans are widely used in cleanroom, pharmaceutical, and other critical applications. Fans can be selected with varying wheel widths to provide desired performance at direct drive motor speeds. Performance changes in the field are usually achieved by means of variable inlet vanes or VFD.
	**Arrangement 4V – Vertical (Plenum Fans)** Vertical Arrangement 4 is available for mounting with either vertical up airflow (inlet under the motor) or vertical down airflow (inlet above the motor).
	**Arrangement 1P (Plug Fans)** A belt drive arrangement where the fan is mounted to grade and the motor is mounted separate from the fan. Typically used on larger fans and/or larger HP motors where the customer's wall may not be sufficient by itself. Mounting to the foundation also makes it better for meeting lower vibration requirements. Mounting panel is optional on arr. 1P.
	**Arrangement 4 (Plug Fans)** Direct drive arrangement where the wheel is mounted to the motor shaft. The design is more compact and requires less maintenance due to not having fan shaft, bearings or belts. High airstream temperatures may limit the use of this arrangement.
	**Arrangement 4P (Plug Fans)** Same as the arr. 4 fan except the fan is mounted to grade. Typically used where the customer's wall may not be sufficient by itself. Mounting to the foundation also makes it better for meeting lower vibration requirements. Mounting panel is optional on arr. 4P.

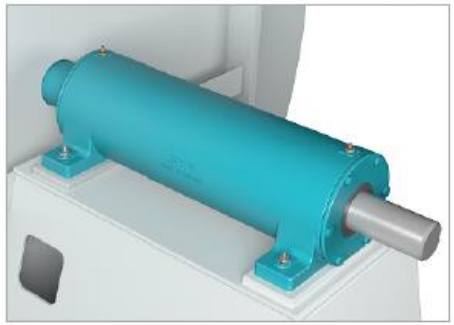
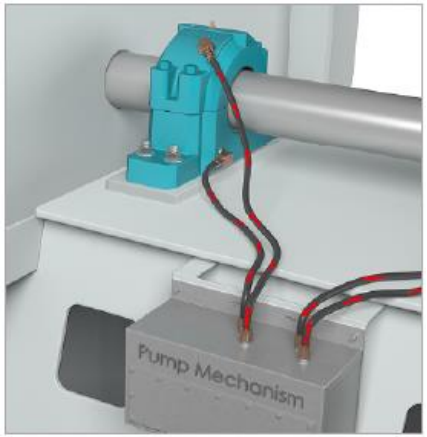
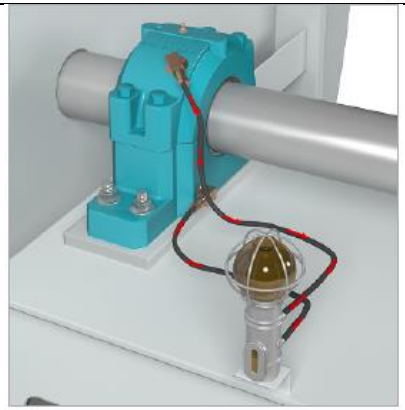
	**Arrangement 8 (Plug Fans)** Arr. 8 is a direct drive arrangement where the motor shaft is coupled to the fan shaft. The entire assembly is mounted to the customer's wall. This is the least common plug fan arrangement due to the length of the assembly.
	**Arrangement 8P (Plug Fans)** Same as the arr. 8 fan except the fan is mounted to grade. Typically used on larger fans and/or larger HP motors where the customer's wall may not be sufficient by itself. Mounting to the foundation also makes it better for meeting lower vibration requirements. Mounting panel is optional on arr. 8P.
	**Arrangement 9 (Plug Fans)** Arr. 9 is the most common plug fan arrangement. It is fully supported by the customer's wall. Plug fans are housed in the customer's enclosure in applications where the system plenum acts as the fan housing. Unlike the plenum fan, motor, shaft and bearings are outside of the process airstream.
	**Arrangement 9P (Plug Fans)** Same as the arr. 9 fan except the fan is mounted to grade. Typically used on larger fans and/or larger HP motors where the customer's wall may not be sufficient by itself. Mounting to the foundation also makes it better for meeting lower vibration requirements. Mounting panel is optional on arr. 9P.
	**Arrangement 4 (Axial)** The direct drive Arrangement 4 is the logical choice when space is at a premium or a simple, dependable fan with minimum maintenance is required. The fan wheel is mounted directly on the fan motor shaft in this arrangement for a smaller overall size. Where exact performance of the system is required, the user can adjust the blade angle to fine-tune the system and obtain the necessary flow.

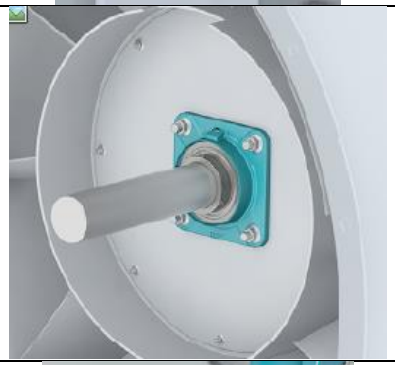
	**Arrangement 9 (Axial)** The belt driven Arrangement 9 is the perfect choice for applications which require the motor to be out of the airstream. Driven by either a fixed or adjustable V-belt drive system, the exact point of rating can be easily achieved. Any future change in rating can be accomplished through a simple sheave change or blade angle adjustment.
	**Arrangement 1 — Lab Exhaust Fans** Arrangement 1 is belt driven. The wheel is overhung on the shaft, i.e., mounted at the end of the shaft. The two fan bearings are mounted on the bearing pedestal, out of the airstream, which makes them ideal for high temperature or contaminated air applications. Belt driven configurations offer performance flexibility. The motor can be mounted in any of the four AMCA standard motor positions, W, X, Y, or Z.
	**Arrangement 4 — Lab Exhaust Fans** Arrangement 4 is a direct drive fan. The wheel is mounted directly to the motor shaft with the motor mounted to a pedestal (BAIFE and BCIFE) or motor drive plate (TVIFE). Arrangement 4 offers low maintenance since there are no fan bearings, fan shaft or drive parts to maintain.

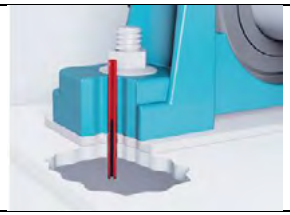
	**Arrangement 8 — Lab Exhaust Fans** Arrangement 8 is a modified version of Arrangement 1 used for direct drive. The Arrangement 1 bearing pedestal is extended to accommodate the motor. A flexible coupling connects the fan and motor shaft.
	**Arrangement 9 — Lab Exhaust Fans** Arrangement 9 is available as belt driven only. The wheel is overhung on the shaft, i.e., mounted at the end of the shaft. A motor slide base is mounted on the side of the bearing pedestal for BAIFE and BCIFE fans. An adjustable motor base is mounted on the exterior of the housing for inline lab exhaust fans (excluding TVIFE). This arrangement permits the unit to ship as a complete assembly with the motor and drive mounted. Typically, the motor is mounted on the left side of the pedestal for CW rotation fans and on the right side for CCW rotation fans.
	**Arrangement 10 — Lab Exhaust Fans** Arrangement 10 is available as a belt driven, scroll-type centrifugal only. The wheel is overhung on the shaft, i.e., mounted at the end of the shaft. Arrangement 10 units have adjustable motor bases (sizes 365 and smaller) or NEMA slide bases sizes 402 and larger) mounted inside the bearing pedestal. This arrangement offers a more compact design than the Arrangement 9 and is suitable for roof or outdoor installations when supplied with the optional weather cover.

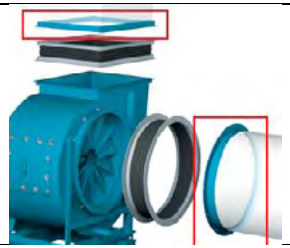
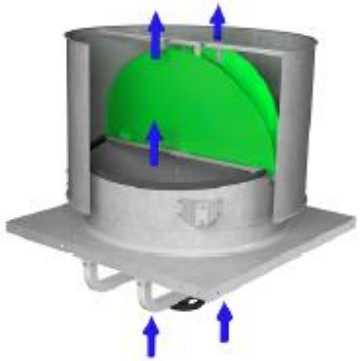
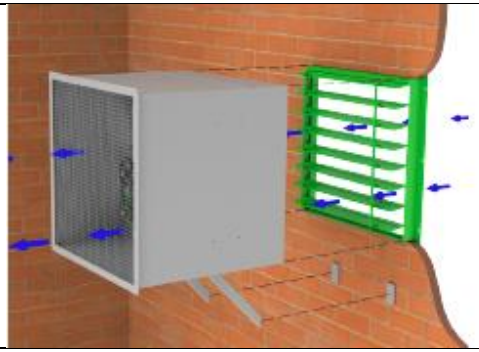
	**Bases – Inertia Base (Concrete Filled)** Provides a common support to fan, motor and drive including guards and utilize heavy duty structural channel with spring isolators. Inertia bases incorporate reinforcing rods (rebar) and require customer supplied concrete. Inertia bases are typically used on longer, direct drive fans to mitigate assembly deflection, maintaining proper alignment between the motor, coupling, shaft and bearings. Flexible connectors at inlet and outlet are required. Shown with optional bottom pan to allow for easier filling of concrete in the field.
	**Bases – Isolation Base** Provides a common support to fan, motor and drive including guards and utilize heavy duty structural channel. Vibration isolation bases require spring or rubber-in-shear type isolators that are designed to limit forces transmitted to the support structure of an operating fan. Flexible connectors at inlet and outlet are also required.
	**Bases – Unitary Base** Utilizes structural channel to support the fan assembly and are designed for use without isolators.
	**Bearings: Solid Pillow Block Bearing (Ball Type Rolling Element)** Pillow block bearings are designed to provide shaft support where the mounting surface is parallel to the shaft axis. The bolt holes are usually slotted for adjustment during mounting. Ball Type Pillow Block Bearings have a ball as the rolling element. They are used to provide smooth, low friction motion in rotary applications.

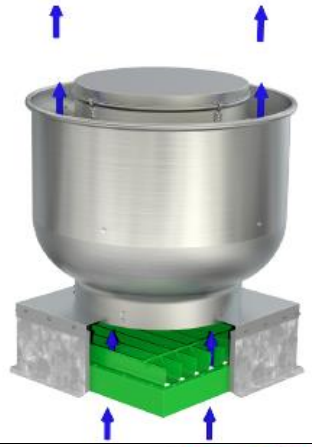
	**Bearings: Solid Pillow Block Bearing (Spherical Roller Element)** Pillow block bearings are designed to provide shaft support where the mounting surface is parallel to the shaft axis. The bolt holes are usually slotted for adjustment during mounting. The rolling element in these pillow block bearings has a crowned or spherical shape. Spherical-roller pillow block bearings are superior when dealing with high loads and loads that require tolerance to shock; however, they have limited speed capabilities.
	**Bearings: Split Pillow Block Bearing (Ball Type Element or Spherical Roller Element)** Also known as bearings with split pillow block housings, the pillow block housing is split for easy bearing replacement and inspection.
	**Bearings: Totally Split Roller Bearing** Totally split roller bearings are completely split to the shaft. All internal bearing parts split into TWO HALVES, allowing for easy removal of internal bearing parts without totally removing the shaft.

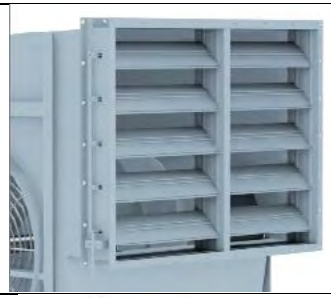
	**Bearings: Two Bearing Housing (Also Known As: Monoblock Bearings)** - Pillowblock bearings built inside a common housing - Special shaft required per application - Preserves precise alignment of bearings
	**Bearings: Oil Mist Lubrication System** In oil+air lubrication, a quantity of oil metered volumetrically by a pump or distributor is pulled apart by a continuous air flow in a tube and carried along the tube wall in the direction of compressed-air flow. The quantity of oil is fed into the air flow in pulses at a mixing point (mixing valve). A nearly continuous flow of oil is produced that leaves the outlet nozzle as fine drops and is fed to the rolling bearing without contact. This means that the bearing housing is under a slight overpressure, which keeps dirt away from the sensitive bearings. The carrier air leaves the bearing nearly free of oil. - One pump unit for both bearings - Inlet line on top of each bearing delivers an oil mist - Outlet line on bottom recirculates liquid oil back to the pump unit
	**Bearings: Static Oil Lubrication System (Trico Oiler)** Static oiler lubrication systems are designed to maintain a predetermined oil level in a sump. If the oil level drops below a certain point, the depleted oil automatically self levels based on the lubricators volume. This adds the right amount of lubricant, increasing efficiencies in the equipment. - Separate TRICO Oiler unit for each bearing - Inlet line on bottom - Requires either a Pressure Relief Line routed back to oiler or a Breather Tube/Vent on top of the bearing

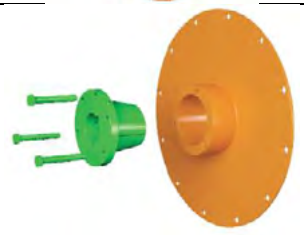
	**Bearings: Flange Bearing (Damper Related)** Bearings that are mounted within a flanged housing are used when the bearing mounting surface is perpendicular to a shaft axis and are used for the following TCF products: - Dampers w/ Bearing Bridges (shown above) - Directly mounted to a Damper w/o Bearing Bridges - Control Linkage Rod support for Inlet Vanes
	**Bearings: Flange Bearing (Fan Shaft Related)** Bearings that are mounted within a flanged housing are used when the bearing mounting surface is perpendicular to a shaft axis and are used for the following TCF products: - Flange bearings available w/ Ball Type elements or Spherical Roller Type elements - Used mostly in some Axial fans and special fan applications
	**Bearing Positioner** A bearing positioner is a threaded bolt mounted to a bracket on each side of the fan bearings. Used for fine adjustments of the fan's bearing location.
	**Bearing Stop Blocks** A welded bracket or key stock next to each side of the bearing welded to the pedestal. Used to confirm bearing location.

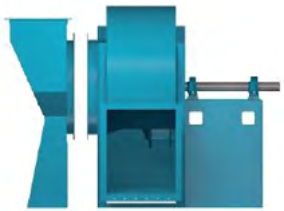
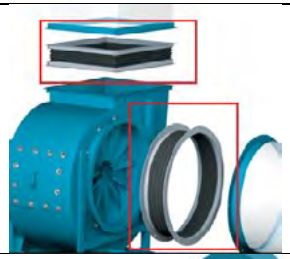
	**Bearing Dowel Pins** Bearing dowel pins hold the position of the bearing to confirm proper alignment. A rod is fixed to the pedestal for mounting through a hole on the bearings.
	**Bearing Vibration Sensor** Sensors are used for monitoring vibration levels at the fan bearings. The bearing housing is drilled and tapped. Sensors are typically shipped loose for field mounting as damage could occur in transit. Other mounting methods could include a bracket mounted through the bearing bolt or epoxy mounting to the housing.
	**Blast Gate** A wafer-type butterfly valve for mounting to outlet flange allows controlling flow to full shutoff. Available for automatic control. Maximum temperature 250°F. The Blast Gate & flange bolt pattern match 125# ASA Pipe Flange.
	**Clamshell Fans – Axial Fans (Single & Double Door)** Clamshell fans are available designed to provide complete access to the interior of the fan for maintenance or cleaning without removal of ductwork. Clamshell construction is available for inline centrifugal and axial fans and is typically used in vertical mount applications. For the double door configuration, one of the two access doors is wide enough for wheel removal.

	**Companion Flanges (Round and Rectangular)** Companion flanges are connected to the connecting ductwork in the field and ensure a matching connection to the fan. They are shipped loose for field mounting.
	**Damper: Butterfly Damper** Back Draft dampers are commonly installed in fan exhaust systems to prevent a back draft of outside air when the fan is off. The damper is either a Spring Return type for both horizontal and vertical mounting or Gravity Return used in vertical venting only.
	**Damper: Gravity Damper (Wall Type)** Wall Type Gravity Dampers are designed to open automatically when the fan is energized and to close by gravity when power is turned off, these parallel blade, end pivoted dampers provide a mechanism which prevents the air from back flowing through the system while also serving to exclude outside elements such as rain and snow.

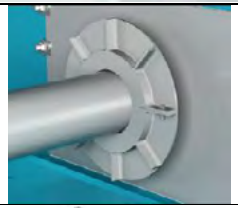
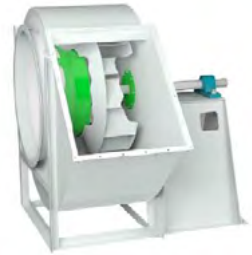
	**Damper: Gravity Damper (Ceiling Type)** Ceiling Type Gravity Dampers are designed to open automatically when the fan is energized and to close by gravity when power is turned off. These parallel blade, end pivoted dampers provide a mechanism which prevents the air from back flowing through the system while also serving to exclude outside elements such as rain and snow.
	**Damper: Manually Operated Dampers** Outlet dampers are available in both “parallel” or “opposed” blade configurations and are manually controlled. Manual dampers are typically used to balance a system.
	**Damper: Motorized Dampers** Motorized Dampers are usually furnished with an actuator that powers the blades open rather than relying on the velocity pressure of the airflow. This is of particular importance in low flow conditions that might otherwise only partially open the automatic damper blades creating blade flutter and potentially more noise.

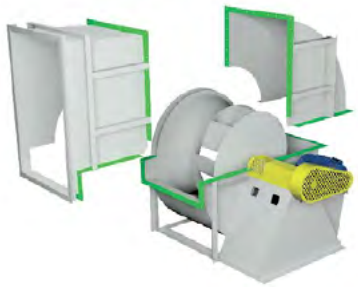
	**Damper - Opposed Blade Outlet Damper** Outlet dampers add resistance to the fan by shifting the operating point to the left of the rating point. The horsepower savings depends on the relative position on the fan curve and is usually much less than other methods. Outlet dampers are typically the least expensive option and should be considered when infrequent operation at lesser capacity is desired or when handling hot, humid or particulate laden air. Opposed blade dampers cost about 10% more and are recommended for systems where volume is modulated over the entire range. Opposed blades reduce air volume in a closer relationship to the control arm movement. Available to 750°F construction.
	**Damper - Parallel Blade Outlet Damper** Outlet dampers add resistance to the fan by shifting the operating point to the left of the rating point. The horsepower savings depends on the relative position on the fan curve and is usually much less than other methods. Outlet dampers are typically the least expensive option and should be considered when infrequent operation at lesser capacity is desired or when handling hot, humid or particulate laden air. Parallel blade dampers are recommended for systems where air volume is modulated between full-open to about 75% of open. Available to 750°F construction.
	**Damper - Parallel Blade Inlet Box Damper** When partially closed the inlet box damper pre-spins the air in the direction of wheel rotation, resulting in a savings in horsepower at reduced loads.
	**Fins on Wheel Backplate** Fins on backplate reduce the thrust load on the bearings. Fins can create a negative pressure behind the wheel to draw air into the fan through the shaft hole in the housing. Helps reduce the possibility of leakage of the airstream to atmosphere.

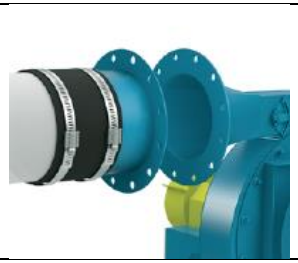
	**Grounding Devices - Standard Grounding Pad with Clearance Hole (Stainless Steel Standard)** Used for electrically grounding the fan. Includes a threaded hole for attaching the customer supplied, field installed ground cable.
	**Grounding Devices - Grounding Stud – 3/8" (Stainless Steel Stud Standard)** Used for electrically grounding the fan. Includes a stud welded to the pedestal foot for attaching the customer supplied, field installed ground cable.
	**Grounding Devices - Grounding Stud with Lug – 3/8" Stainless Steel Stud & Nuts (Standard), Aluminum Lugs (Standard)**
	**Hubs - Straight Bore Hub** The bore of the hub is straight through. Shafts are keyed and mounted to the hub.
	**Hubs - Taper Lock Hub** The hub bore is tapered with respect to the fan shaft. The hub is locked to the shaft using a tapered bushing.

	**INLET BOX – INTEGRAL (ATTACHED) INLET BOX** Inlet boxes are used when the installation does not allow for a straight run of duct into the fan. The inlet box is designed to minimize the system effect of a 90 degree turn into the fan. Attached inlet boxes are integrated into the inlet side of the fan housing. The Inlet box is supported by the fan.
	**INLET BOX – DETACHED INLET BOX (BOLT ON)** Inlet boxes are used when the installation does not allow for a straight run of duct into the fan. The inlet box is designed to minimize the system effect of a 90 degree turn into the fan. The Bolt On design is bolted directly to the inlet flange of the fan.
	**INLET BOX – DETACHED INLET BOX (FREE STANDING)** This is the same concept as the detached inlet box except it can be mounted separate from the fan and is fully supported at the floor.
	**Inlet/Outlet Flex Connectors (Round and Rectangular)** Flex connectors reduce vibration transmission to/from connecting ductwork and allow for some misalignment in the installation. Flex connectors are required on all isolated fans and can be provided by TCF or the customer. Flex connectors are shipped loose for field mounting.
	**Inlet Silencer (with Support Leg)** Constructed of welded steel with acoustical absorption material to reduce noise emanating from fan inlet. Flanged connection is suggested for mounting to the inlet of the fan. The opposite end of the silencer can be furnished with an inlet venturi, inlet flange, or inlet pipe assembly. Unless otherwise specified, the silencer will be furnished with flanges (punched) at both ends.

	**Inlet Vanes – External Inlet Vane** Radial vanes at the fan inlet pre-spin the air entering the fan to control the flow. Vanes come standards with a manual handle operator, but can be provided with an actuator. External vanes have a housing and are bolted to the fan inlet.
	**Inlet Vanes – Nested Inlet Vane** Same function as the external inlet vane, but the vanes are nested within the inlet funnel. Replacing the vanes require the inlet funnel assembly to be replaced.
	**Motor Positioners** Used for horizontal adjustment of the motor position in one direction.
	**Motor Positioners – Bi-Directional** Used for horizontal adjustment of the motor position in both direction of the horizontal plane.
	**Motor Positioners – Tri-Directional** (Motor feet are drilled & tapped) Vertical jack screws (red) are removed after the motor is shimmed.

	**Motor Positioners – Vertical Jack Screws** (Motor feet are drilled & tapped) Vertical jack screws (red) are removed after the motor is shimmed.
	**Shaft Cooler** Cast aluminum shaft coolers dissipate the heat transferred to the shaft from the airstream protecting the fan bearings. Recommended for applications over 300°F. Bore size is needed if ordered as just a stand-alone part.
	**Slide Gate Damper (Cast Aluminum Pressure Blowers)** Dampers feature cast aluminum frame with galvanized steel gate. Available on inlet or outlet. Slide gate type dampers provide manual adjustment of airflow and flexibility to meet any application.
	**Spark Resistant Construction – Type B**
	**Spark Resistant Construction – Type C** Type C offers a minimal level of spark resistance and only requires that possible contact between stationary and rotating components be reduced. Typically, this construction includes the use of an aluminum inlet cone and an aluminum rub ring. The aluminum inlet cone will be the first point of fan wheel contact if there is a mechanical failure. The aluminum rub ring placed at the opening of the housing where the shaft passes, protects against contact of the steel fan shaft and steel fan housing.

	**Split Housings - Horizontal Split Housing** Standard split along the horizontal centerline. Size 807 and above may be split by the shop for shipping purposes.
	**Split Housings - Pie Split Housing** The housing is split at angles 90 degrees or greater to facilitate wheel removal without disturbing inlet or outlet. Typical for wheel removal. • **Mohawk (newer style)** - Splits between scroll and inlet housing side. Inlet side of housing does not have a split. *Not used on Double Width fans or fans with attached inlet boxes* **Standard (older style)** - Splits all the way down to the funnel or Inlet Plate.
	**Split Housing - 3-Way Split Housing** The housing is split into three sections up to 180 degrees. This split normally required either for shipping or to enable fan to enter a specific sized opening. • Additional drafting and engineering time is required for 3-way splits.
	**Swingout Fans – Centrifugal & Axial Fans** Swingout fans are designed for frequent cleaning and provide full access to the wheel and inner casing of the fan. The entire wheel/prop, shaft, and bearing assembly is mounted on a large swingout door. Swingout construction is available for centrifugal, inline centrifugal, and axial fans.



Tube Adapter & Rubber Sleeve w/ Clamps

This consists of a 4" long metal collar and flange which bolts to the blower discharge. A 6" long, 2-ply molded rubber slip-type connector with two hose clamps connects the adapter to the pipe line and helps to isolate vibration and noise transmission to the rest of the system. The connector is rated for pressures up to 5 psi and 180°F. Flange bolt patterns match 125# ASA Pipe Flange.