



# CLASS 20000 FANS

Installation Instructions

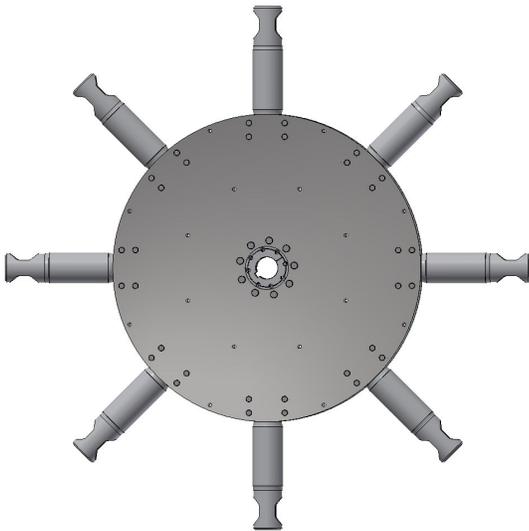
## 1.0 INSTALLATION

### 1.1 UNCRATE HUB

The hub can be crated ready to install on a shaft, with the rod ends / blocks pivoted, or with rod ends / blocks removed. Depending on the size of the hub, blade quantity, and box size.

See options A, B, and C below.

A



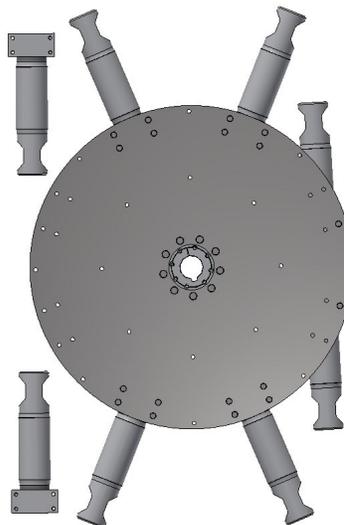
The hub is ready to install on a shaft.  
Go to section 1.4

B



The hub requires rod ends / blocks pivoted into place.  
Go to section 1.3

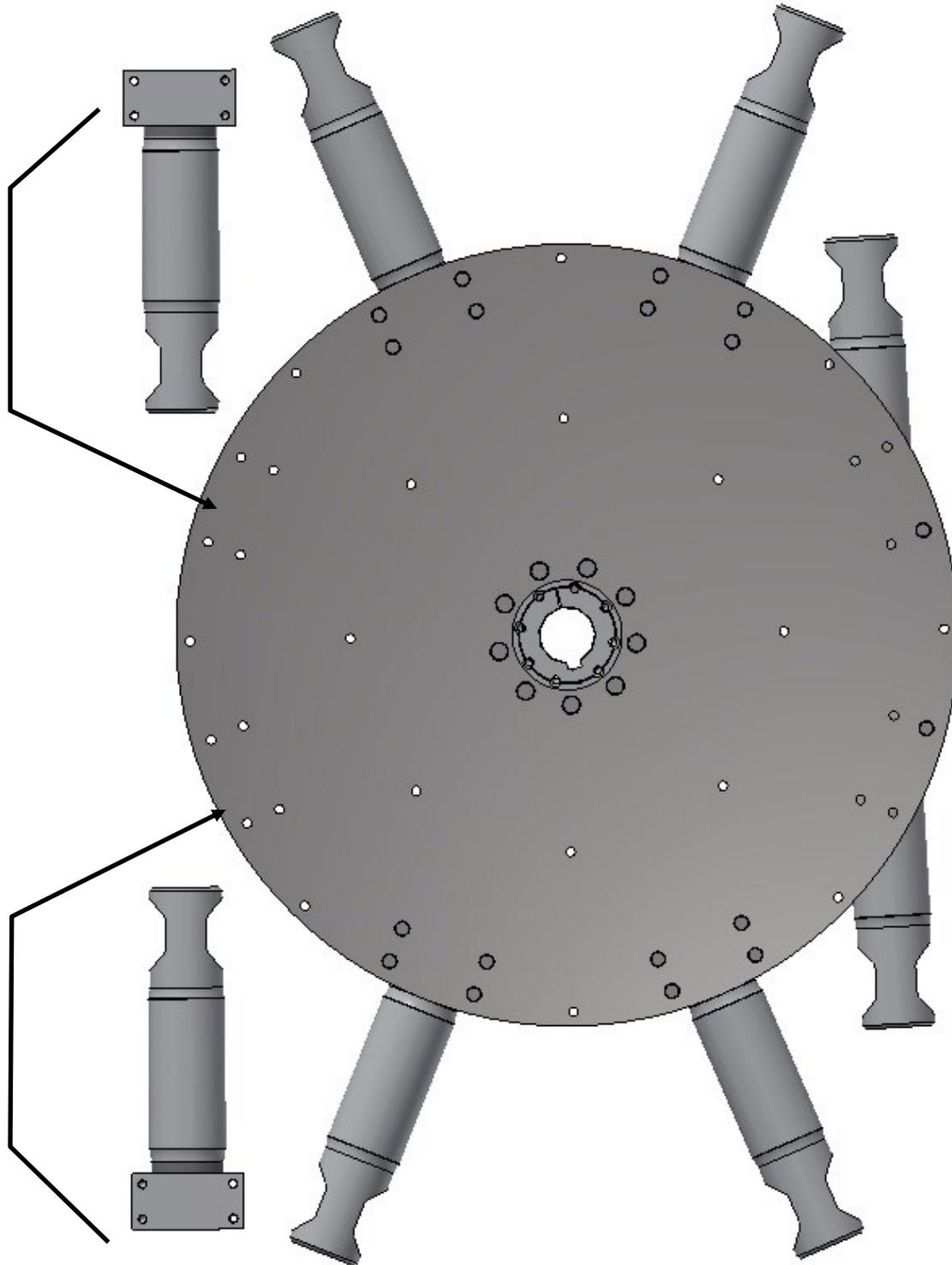
C



The hub requires rod ends / blocks installed.  
Go to section 1.2

## 1.2 HUB ASSY, INSTALL ROD END / BLOCKS

Place match marked rod end / block into place. Be careful not to thread rod end into or out of rod end block.  
Use hardware from bag according to section 1.7. Prior to fan operation, set / verify blade angle at tip per section 1.6.2.  
Torque the rod end block bolts to **85 FT-LBS**.  
Recheck each blade angle after tightening.



See section 1.3 if needed.

### 1.3 HUB ASSY. PIVOT ROD END / BLOCKS

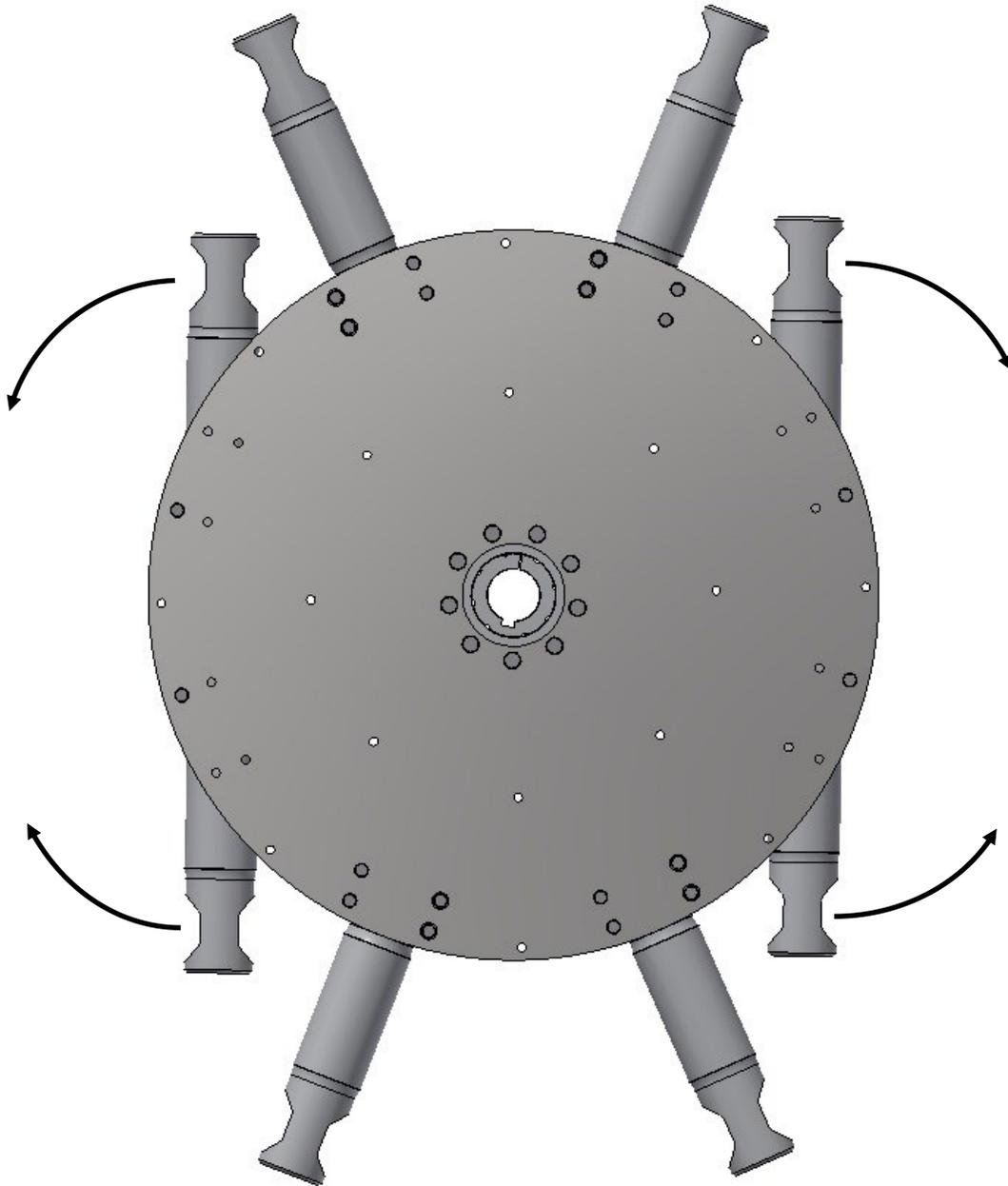
Loosen bolts on rod end / blocks that need pivoted.

Pivot rod end / block into place. Be careful not to thread rod end into or out of rod end block.

Use hardware from bag according to section 1.7. Prior to fan operation, set / verify blade angle at tip per section 1.6.2.

Torque the rod end block bolts to **85 FT-LBS.**

Recheck each blade angle after tightening.



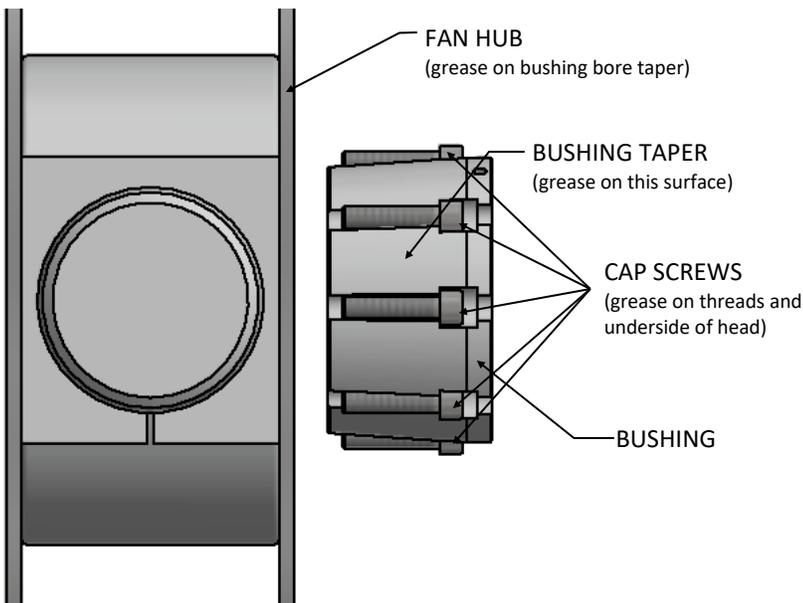
## 1.4 INSTALL HUB

### Hub installation instructions:

The aluminum bushing is lubricated and pre-installed in the hub at the factory, no further lubrication is required prior to installation. **DO NOT apply lubricant between the bushing bore and the shaft.** Leave slight play between the bushing and hub to facilitate installation on the shaft. Place the hub/bushing on the shaft. Insert the key, and tighten the set screw to secure the hub and key to the shaft. Now begin sequentially tightening the socket head cap screws (approximately 2-3 turns per cap screw initially) to firmly engage the bushing in the hub and seat the bushing on the shaft. Once the bushing/hub is firmly seated on the shaft, continue tightening the cap screws sequentially until the specified torque of **100 FT-LBS** is reached.

DO NOT over-tighten cap screws as this could cause damage to the hub.

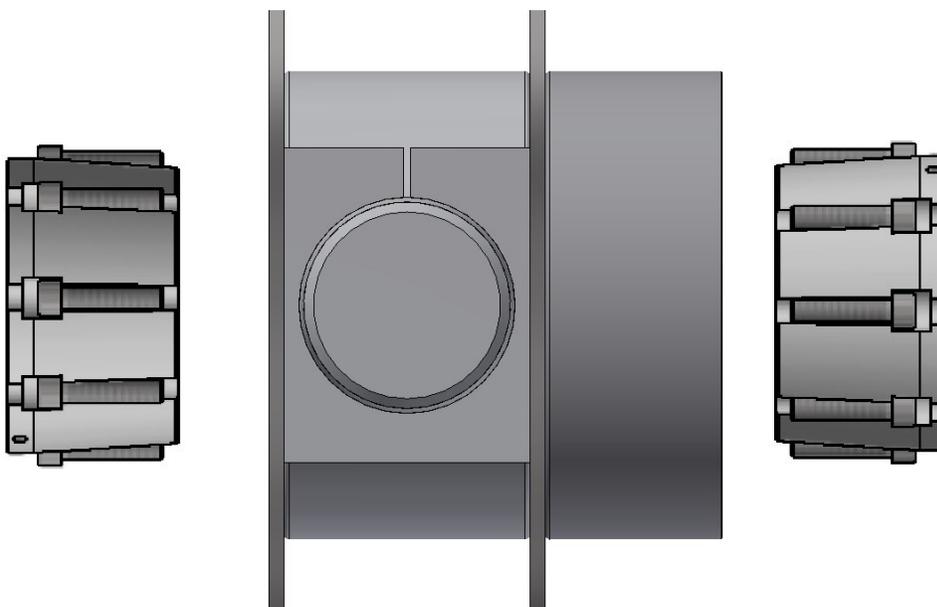
### STANDARD HUB



#### Caution:

If bushing is expected to see frequent oscillating loads (Greater than 50% of nominal expected Static Torque), Fan should be operated for approximately 15 minutes and then re-torque bushing cap screws.

### EXTENDED HUB

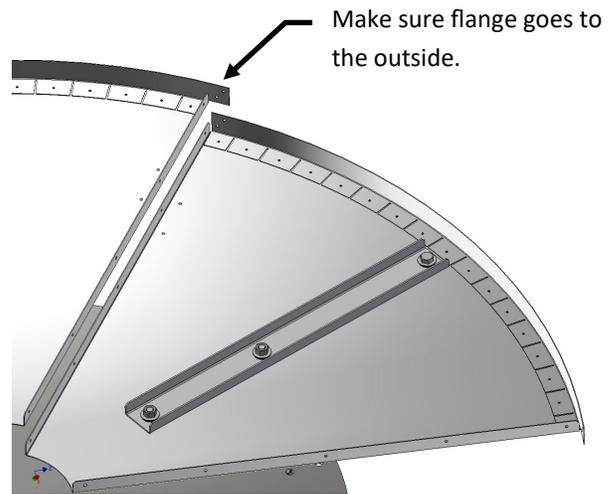
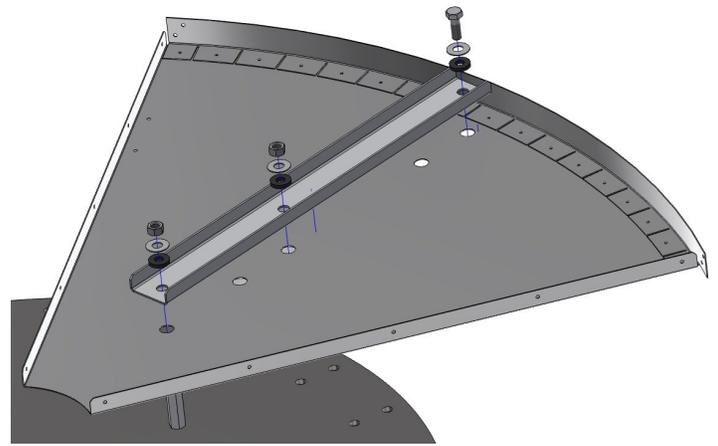


Depending on design specification, bushing may go in from either of these directions.

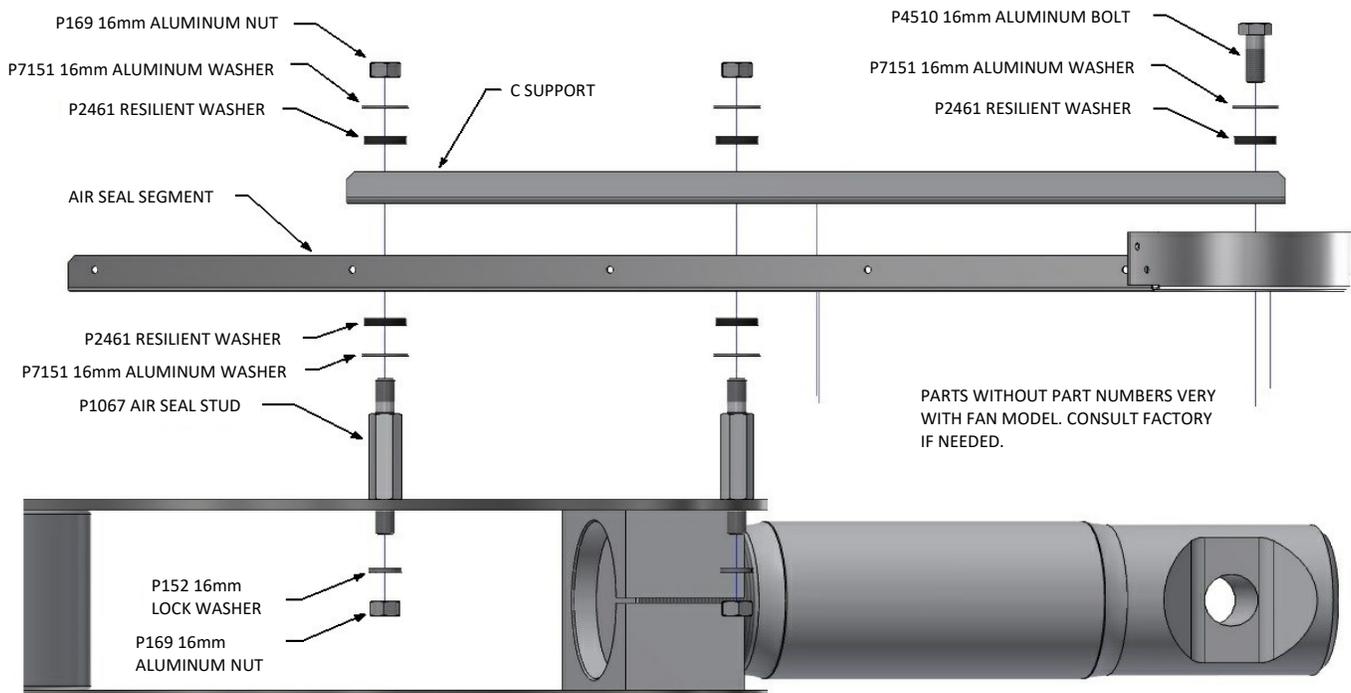
## 1.5 INSTALL AIR SEAL SEGMENT

### To install an air seal segment:

- Locate the air seal installation hardware in the plastic bags taped to the rod ends.
- Install the air seal studs on the appropriate side of the hub (air seal may be installed on either side of hub).
- Place one lock washer followed by one aluminum nut on each stud to secure stud to the hub.
- Torque aluminum nut to 50 FT-LBS. Only the nut fastening the air seal stud to the hub gets torqued to this.
- Place one aluminum washer followed by one resilient washer on each stud as shown in the drawing below.
- Place the air seal segment onto the studs, followed by the C Support, resilient washer, aluminum washer, and aluminum nut as shown in the drawing below. Leave the aluminum nut loose to allow the segment to move.
- Put an aluminum washer and resilient washer on the aluminum bolt.
- Put the aluminum bolt with washers through the C Support and Air Seal Segment.
- Put the next air seal segment on the airseal studs. Verify that the flange is on the outside of the mating air seal segment, as shown in the drawing on the right.
- Repeat this process with every segment going around the air seal.
- Put all of the air seal segments on the hub.

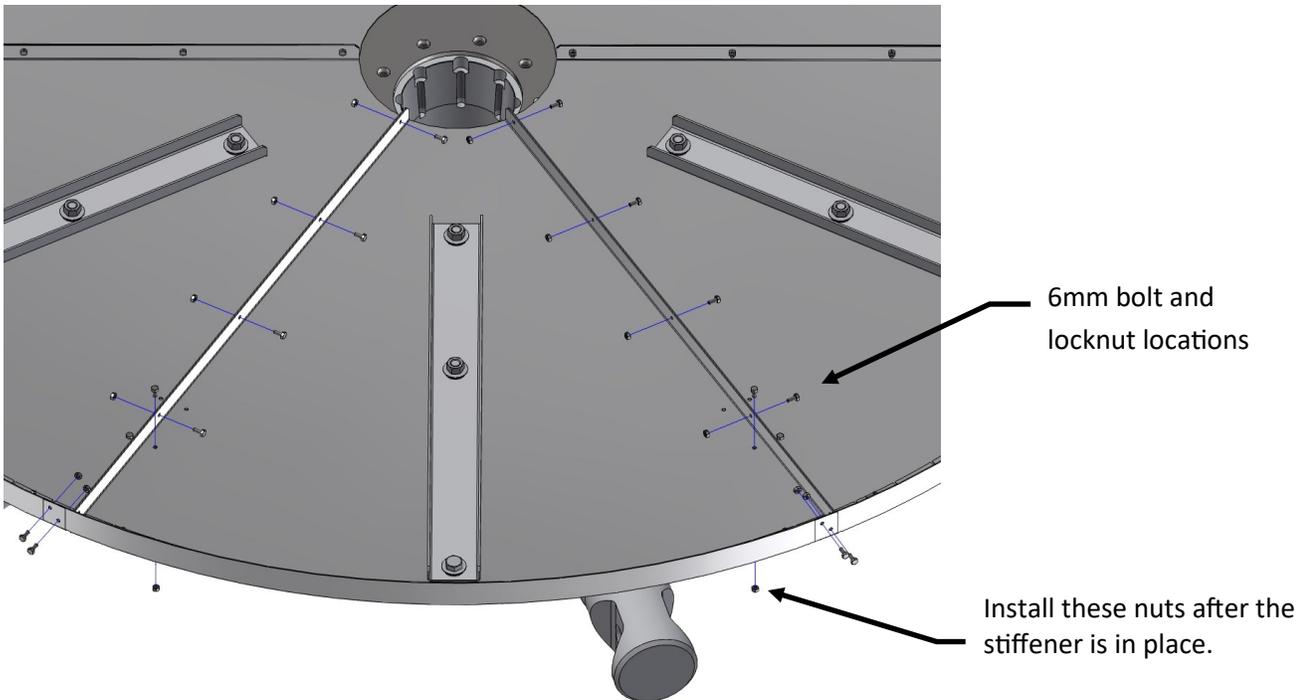


Note: Some air seals and hubs are provided with more mounting holes than may be required. This is done intentionally to make the air seals more interchangeable between units.

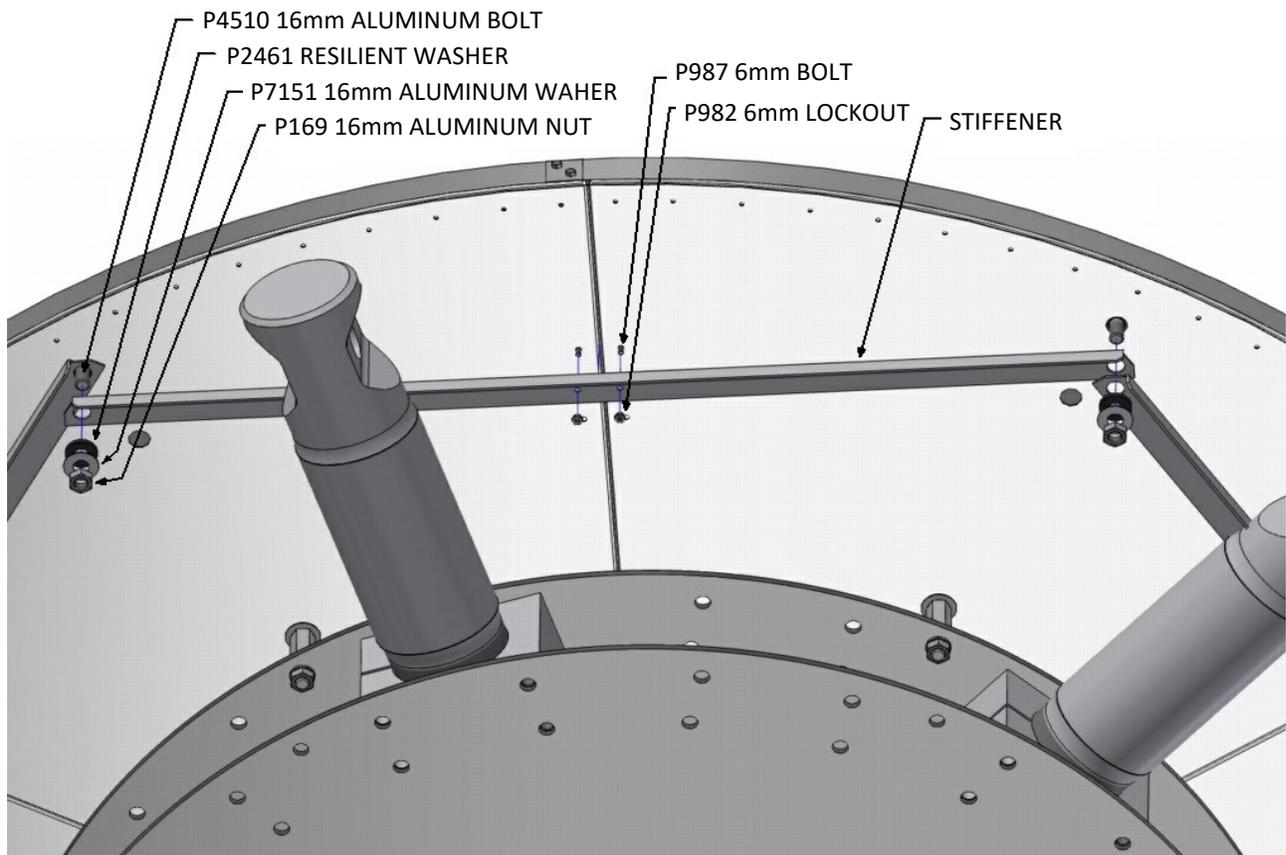


## 1.5 INSTALL AIR SEAL (CONTINUED)

- Install the 6mm bolts through the holes in the airseal segments, then loosely attach the 6mm locknut. Don't tighten anything yet.



- On the opposite side of the air seal place a stiffener on over the end of the aluminum bolts.
- Install the 6mm bolts and nuts loosely through the stiffener to hold it in place.
- Go around the airseal in a circle putting on the rest of the stiffeners. The stiffener overlap gap doesn't matter, you can go clockwise, or counter-clockwise.
- After you have 2 stiffeners per aluminum bolt, loosely put on a resilient washer, aluminum washer, and aluminum nut as shown in the drawing below.

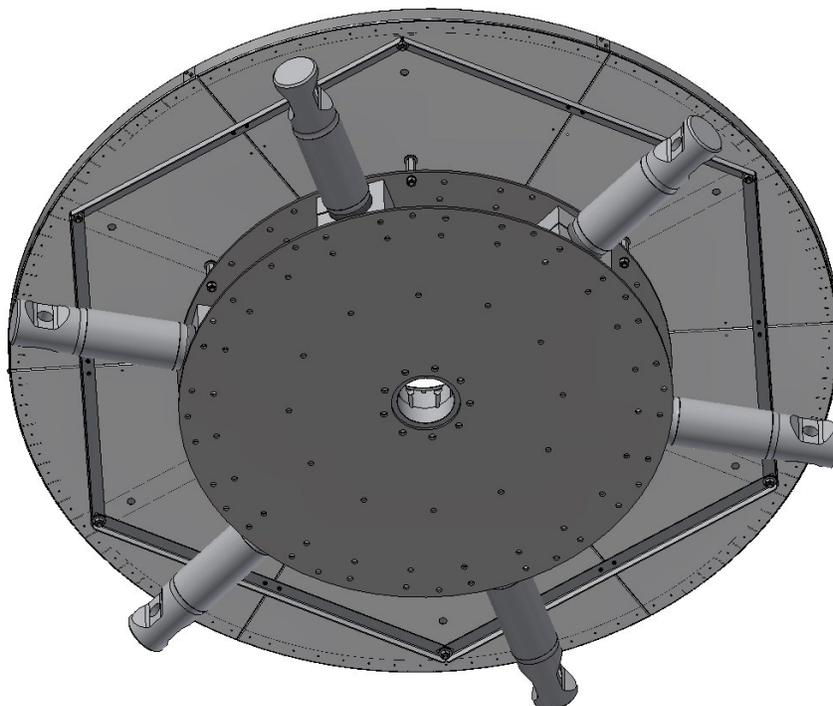
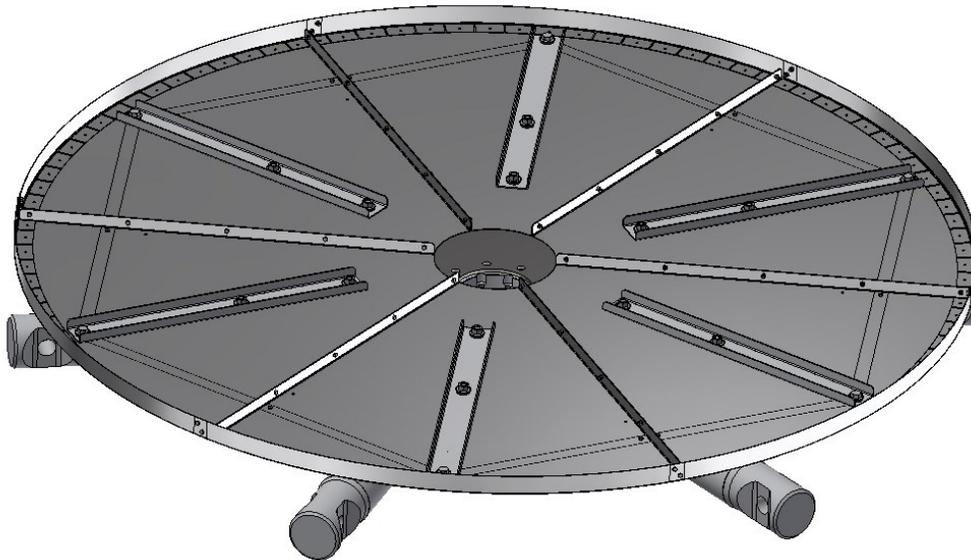
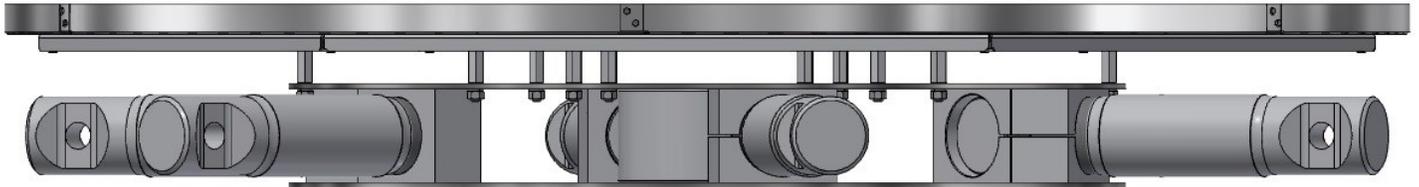


## 1.5 INSTALL AIR SEAL (CONTINUED)

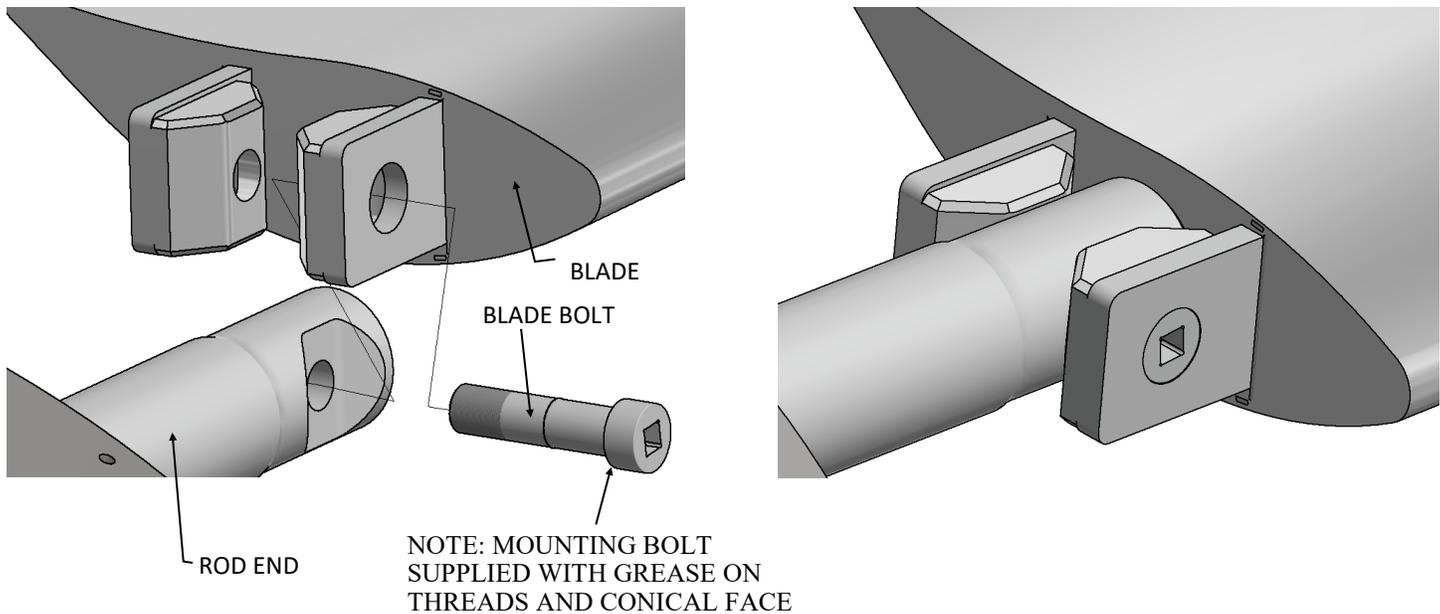
### Tighten air seal fasteners:

- Make sure all bolts are in place.
- Torque 6mm bolts to 7ft lbs (1m-kg)
- Tighten aluminum nuts. Note that the diameter of the resilient washers, before they are compressed, are slightly less than the diameter of the aluminum washer. Tighten each nut until the resilient washer's diameter is the same as the aluminum washer. Do not overtighten. Overtightness exists when the resilient washer has expanded in diameter larger than the diameter of the aluminum washer.

Air Seal Installed on Hub



## 1.6 INSTALL AND ADJUST BLADES



### **BEFORE INSTALLING BLADES. . .**

Check to see that the hub is level. If the drive shaft is not truly vertical, causing the hub to be cocked, it will be difficult to adjust blade angles accurately. Eccentric rotation of the fan can also cause serious vibration problems. If misalignment, vibration or unbalance in the system is present, it will be more easily identified and corrected at this time.

Moore fan blades are carefully balanced to the same moment at the factory.

**Proper installation, with particular attention to tightening nuts to the specified torque, is essential to maintain the design integrity of these units.**

Install one blade: Clean any dirt or grease from the rod end and the surfaces of the mounts. Align the rod end hole with the holes in the mounts and insert the blade mounting bolt first through the mount with the recess to accept the bolt head, then through the rod end hole and screw the bolt into the second mount lightly. The blade mounting bolt is supplied from the factory with grease on the threads and conical face. **Do NOT clean the grease from the bolt.**

**Complete the installation of one blade by holding the blade so that the blade extends straight out from the rod end. Holding the blade in this position, tighten the bolt using a torque wrench set to 680 ft-lb making sure the rod end and the mounts seat.**

After installing the first blade, manually rotate the fan to be sure the blade clears the ring or throat at all points. When the blade is held in alignment with the blade tube (that is, straight outward from the hub), it should clear the fan ring by a distance adequate to provide for any relative motion between the fan wheel and the ring. Excess clearance between the blade tips and the ring, however, should be avoided to prevent backflow which seriously reduces fan efficiency. If clearance is excessive, the diameter may be adjusted at this time.

Install the remaining blades so that they are identical with the first blade. **Torque all bolts to 680 ft-lbs.**

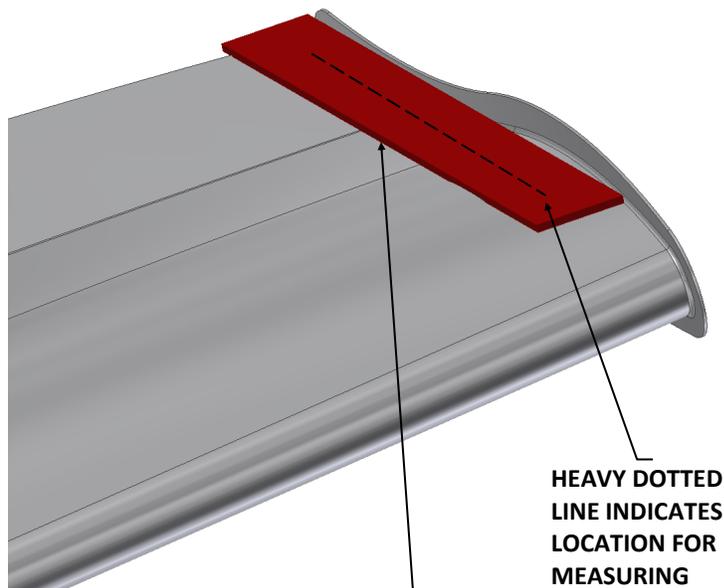
## 1.6.2 CHECK AND ADJUST BLADE ANGLE

Prior to fan operation, check that all blades are set to the design angle. (Contact equipment supplier or factory for design angle.) Hubs are shipped from the factory with the rod end set for the blade angle indicated by the design performance. A change in blade angle is sometimes necessary, however, to adjust to actual site conditions. Failure to adjust the blade angle when required may result in blade or motor overload.

To adjust, loosen the Clamp Bolts just enough to allow the blade to be turned. Place an inclinometer on the flat surface of the straight edge as shown in the illustration at right. Turn the blade until the desired angle is achieved. Make a permanent record of the final angle selected and take care that all blades on the fan are set at the same angle. A typical adjustment may be +/- 3° from design angle (+/- .5° blade to blade). **The maximum recommended blade angle is 20°.** Please consult the factory if it is desired to go above this.

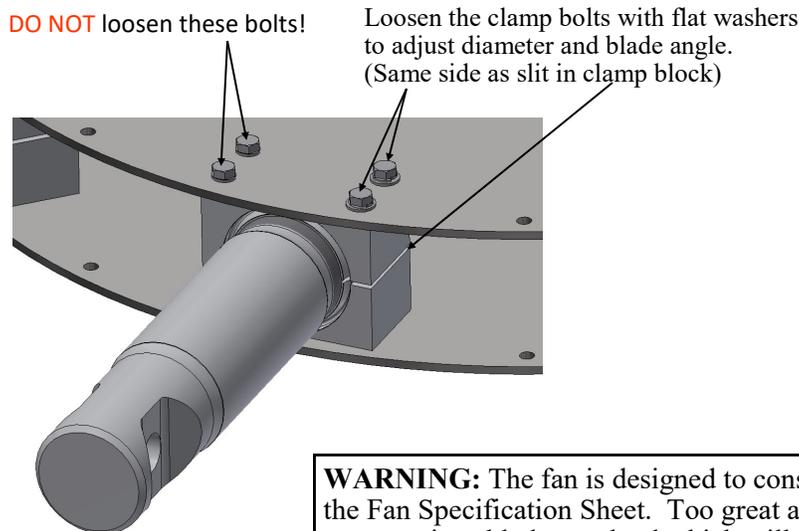
**Retighten the Clamp Bolts To 85 FT-LBS.**

Recheck each blade angle after tightening.



HEAVY DOTTED LINE INDICATES LOCATION FOR MEASURING BLADE ANGLE

REST FLAT EDGE ACROSS TOP OF BLADE FOR MEASURING BLADE ANGLE ON



**DO NOT** loosen these bolts!

Loosen the clamp bolts with flat washers to adjust diameter and blade angle. (Same side as slit in clamp block)

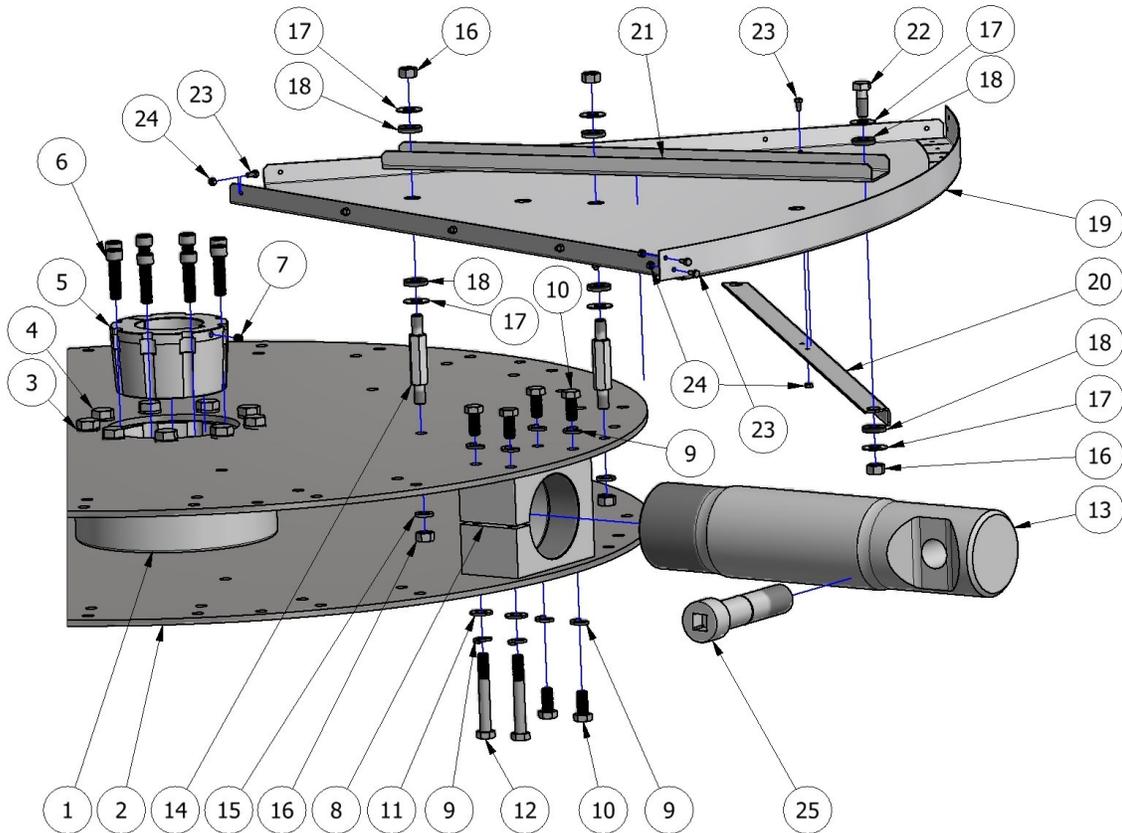
**WARNING:** The fan is designed to consume the horsepower stated on the Fan Specification Sheet. Too great an increase in blade angle can cause serious blade overload which will stall the blades. In this condition, the fan will actually deliver less air and blade life may be shortened.

## 1.6.3 ADJUST DIAMETER IF REQUIRED

At times it may be necessary to adjust the fan diameter to suit a particular ring. To do so, loosen the clamp bolts (bolts with flat washer) so that the rod end can be rotated in the clamp block. One complete revolution will increase or decrease the radius of the fan by 3 mm (.12"). Take care that the blade is returned to exactly the factory-set angle unless it is intended that the blade loading be

changed as discussed in the previous section. A match mark may be made at a point on the threads and the clamp block before turning to assure that exactly one revolution is made. Tighten the clamp bolts to 85 FT-LBS. Maximum adjustment possible is about +/- 0.75" (19mm) radially (1.5" on diameter). At least 2.0" (51 mm) of rod end threads must remain in the clamp block (Rod end threads must fully engage clamp block threads).

## 1.7 PARTS LIST



PARTS LIST				
ITEM	QTY	PER	PART #	DESCRIPTION
1	1	FAN	P1062	INNER HUB
2	2	FAN		HUB PLATE
3	18	FAN	P57	SS M20 SPLIT LOCK WASHER
4	18	FAN	P2360	SS HEX HEAD CAP SCREW M20 X 2.5 45MM
5	1	FAN	P4542	Z BUSHING
6	8	FAN	P4159	SS M16 X 2.0 60MM SOCKET HEAD CAP SCREW
7	1	FAN	P4597	SS M10 X 1.5 X12MM SET SCREW
8	1	BLADE	P1059	ROD END CLAMP
9	8	BLADE	P1501	SS M16 SPLIT LOCK WASHER
10	6	BLADE	P1500	SS HEX HEAD CAP SCREW M16 X 2.0 X 35MM
11	2	BLADE	P2506	SS FLAT WASHER
12	2	BLADE	P2368	SS HEX HEAD CAP SCREW M16 X 2.0 X 120 MM
13	1	BLADE		ROD END
14	2	AIR SEAL SEGMENT	P1067	AIR SEAL STUD
15	2	AIR SEAL SEGMENT	P1501	SS M16 SPLIT LCOK WASHER
16	5	AIR SEAL SEGMENT	P169	M16 X 2.0 ALUMINUM NUT
17	6	AIR SEAL SEGMENT	P7151	ALUMINUM AIR SEAL WASHER
18	6	AIR SEAL SEGMENT	P2461	RUBBER WASHER
19	1	AIR SEAL SEGMENT		AIR SEAL SEGMENT
20	1	AIR SEAL SEGMENT		SEGMENTED AIR SEAL STIFFENER
21	1	AIR SEAL SEGMENT		C SUPPORT
22	1	AIR SEAL SEGMENT	P4510	HEX HEAD M16 X 2.0 X 43MM ALUMINUM BOLT
23	VARIES	AIR SEAL SEGMENT	P987	HEX HEAD CAP SCREW M6 X 1 X 14MM
24	VARIES	AIR SEAL SEGMENT	P982	M6 X 1 LOCKNUT
25	1	BLADE	P1047	BLADE BOLT