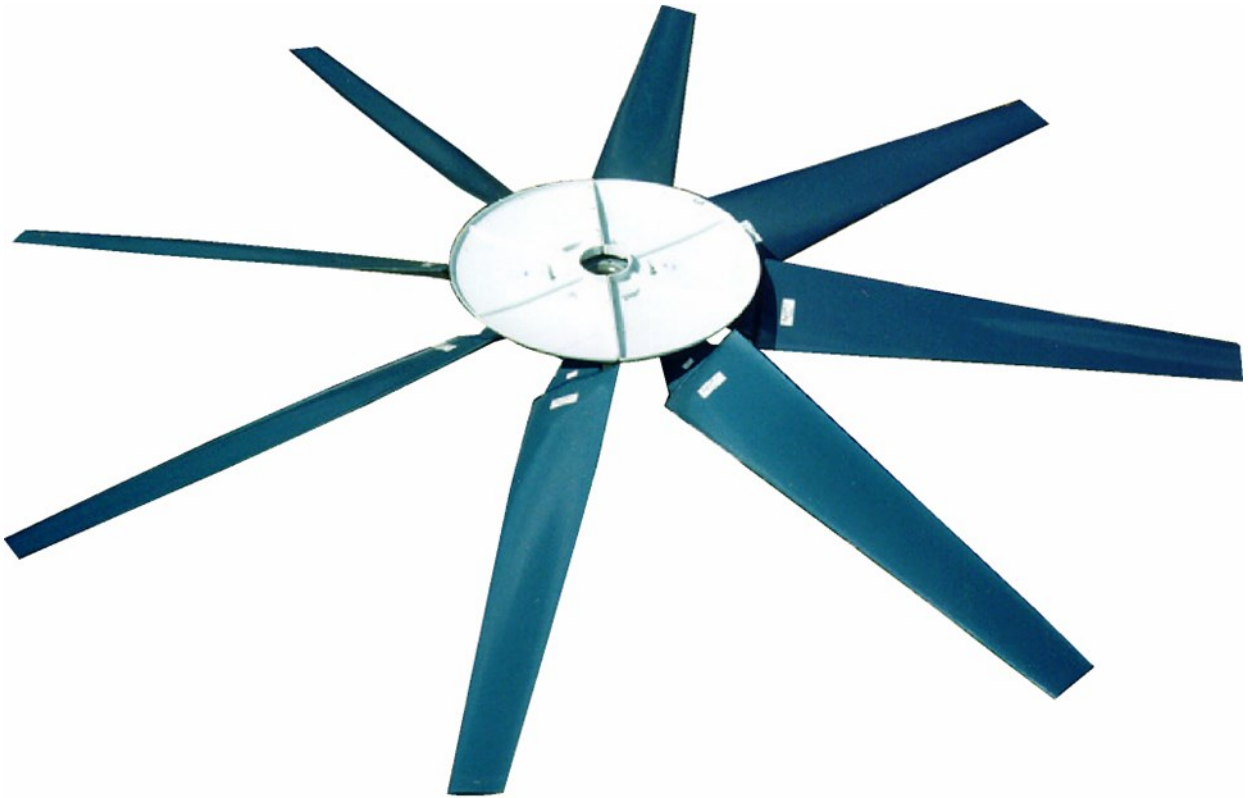

INSTALLATION MANUAL



Adjustable Pitch Fan Assembly 34' & 36' Diameter

Hudson Tuf-Lite II® fan blades

Hudson Tuf-Lite II® (white, prev. blue***) fan blades are made from fiberglass reinforced vinyl-ester resin having a very high strength-to-weight ratio and superior ultra-violet and corrosion resistance. An elastomeric blade/holder joint cover (not shown) prevents moisture from entering the blade (shown above).

The individually balanced blades can be replaced independently - matched sets are not required.

RECOMMENDED TOOLS

- Long T-Handle Allen Wrench Set (3/16" to 3/8")
- Medium Size Flat Head Screw Driver
- Brass Ball Peen Hammer
- Flat Bastard File
- 240 Grit Sand Paper
- Anti-Seize Lubricant
- WD-40
- 12" Crescent Wrench
- Shop Towels
- Exact-A-Pitch® Digital Protractor (P/N 62375)
- 25 ft. Measuring Tape
- Pencil or Marker
- Open/Box End Wrench Set (1/2" - 1-5/8")
- Socket Set for 1/2" Drive (1/2" - 1-5/8")
- Torque Wrench(s) Rated for 0-300 ft-lb.

INSTALLATION PROCEDURES

ASSEMBLY WITH BUSHING

Clean all mating surfaces between hub, bushing and shaft. If there is no shoulder on shaft to prevent bushing from sliding down shaft, slide spacer/sleeve (not provided) on shaft before bushing. Slide bushing and key onto shaft until flush with end of shaft. Lock W-2 bushing on shaft by tightening set screw in flange with 1/4" Allen Wrench. (Note: set screw is not present on all bushings) Line up key and set hub on bushing. Engage the four (4) 3/4" cap screws in flange of bushing into hub spool. Using a torque wrench with a 1-1/8" socket, tighten evenly to recommended standard of 250 ft-lb (dry).

ASSEMBLY WITH STRAIGHT SHAFT (NO BUSHING)

Clean all mating surfaces between the hub and the shaft. If there is no shoulder on shaft to prevent hub from sliding down shaft, slide spacer/sleeve (not provided) on shaft before hub or use a thrust retainer (optional equipment) on top of hub. Install key in shaft. Line up key and keyway and set hub on shaft. Tighten two (2) set screws in hub.

ASSEMBLY WITH TAPERED SHAFT (NO BUSHING REQUIRED)

Clean all mating surfaces between hub and shaft. Coat all mating surfaces with an anti-seize or lubricating compound.

Align keyways and set hub onto shaft. Install retainer plate and cap screw(s) with lock washer(s). Shaft size determines what size cap screw is necessary. Using a torque wrench with a socket, evenly tighten cap screw to recommended standard per table below.

Cap Screw Size	Socket Size	Torque Value (ft-lb)	
		Lubricated	Dry
5/8" NC	15/16"	100	110
3/4" NC	1-1/8"	125	130
1" NC	1-1/2"	150	160

NOTE: Retaining arrangement varies with gear shaft design.

ASSEMBLE BLADE CLAMP ON BLADE NECK

Remove blade clamp studs, lock washers, and blade clamp halves from hub. Assemble blade clamp halves over groove in blade neck, with thick leading edge to left and thin trailing edge to right as you stand at end of blade. Use a spiral hose clamp or heavy duty plastic wire tie to hold the two blade clamp halves in position on the blade for installation in the hub body (See Figure 1).



Figure 1

INSTALL BLADE INTO HUB

Hoist the blade into position. (Blade and clamp halves weight about 300 lbs.) Slide blade clamp into hub plate. If necessary, use bottle jack to separate hub plates just sufficient for clamp entry, and install four (4) blade studs, eight (8) lock washers and eight (8) nuts (See Figure 2). Tighten lightly.



Figure 2

Clamp Bolt Torque Values

Cap Screw Size	Socket Size	Torque Value (ft-lb)	
		Lubricated	Dry
1" NC	1-5/8"	280	300



Figure 3

SET PITCH AND TRACK

Use Hudson EXACT-A-PITCH® digital protractor (Shown in Figure 3) or a bubble protractor to set blade pitch. Mount protractor on a flat bar as a base and place it approximately 1" from tip of blade. Note pitch on protractor. Rotate fan 360°, noting high and low pitch readings. Locate place where pitch reading is a mid-point between high and low readings, and set pitch at that point.

Rotate blade in clamp until digital protractor shows specified pitch angle to within $\pm 0.2^\circ$. (*Fan pitch angle is shown on fan specification sheet for design duty.*)

After desired pitch angle is set, raise and lower end of fan blade and find mid-point of blade travel. Hold blade at the mid-point. Pull blade back so neck flange sits against blade clamp.

Use torque wrench to tighten clamp bolts to recommended standard of 280 ft-lb (lubricated) or 300 ft-lb (dry). Re-check pitch setting. Blade must be set within $\pm 0.2^\circ$ of desired pitch angle. Tighten clamp bolts evenly. **DO NOT OVER-TORQUE CLAMP BOLTS.**

When bolts are tightened, hold a pencil against top end of blade and mark the level onto a fixed object, such as a shop gauge or the fan stack or ring.

Install remaining blades at same position relative to stack or ring as first blade, following procedures above. After tightening bolts, mark top end of each blade in same place first blade was marked. If marks differ by 1-1/2" or more, adjust blade.

CHECK TRACK

After fan is installed in fan ring or stack, outline top end of each blade onto fan ring with a marker. The difference between levels of highest and lowest outlines should be within $\pm 2.5"$. Correct blade track by loosening clamp bolts and adjusting blade to match track of other blades. Re-tighten bolts and re-check track (See Figure 4) and pitch angle setting. Pull blade back so neck flange sits against blade clamp. Re-tighten blade clamp bolts to recommended standard of 280 ft-lb (lubricated) or 300 ft-lb (dry) torque.



Figure 4

CHECK SWEEP

Measure the distance from trailing edge at blade tip of one blade to trailing edge at blade tip of the adjacent blade (See Figure 4a). This distance should be within 1-1/4" of each other for all successive blades. Correct blade sweep by loosening clamp bolts and adjusting blade to match sweep of other blades. Re-tighten bolts and re-check sweep and pitch angle setting. Re-tighten blade clamp bolts to recommended standard of 280 ft-lb (lubricated) or 300 ft-lb (dry) torque.

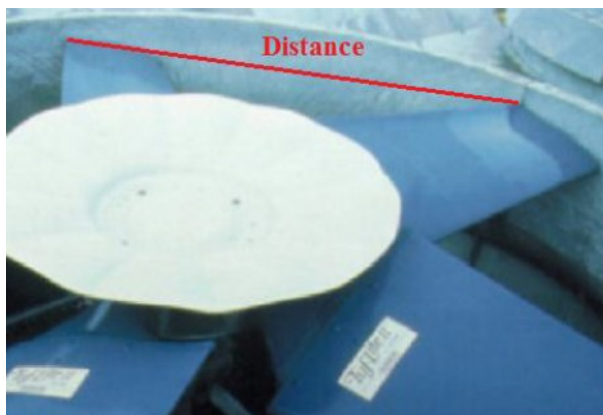


Figure 4a



Figure 5



Figure 6

SEAL DISC ASSEMBLY & INSTALLATION

Install self-adhesive rubber gaskets on both flanges of mating seal disc sections. Bolt each pair of sections of seal disc together, using 3/8" NC bolts, flat washer, and lock washer. Torque to 15 ft-lb (lubricated) and 20 ft-lb (dry). (See figure 5 & 6)

If the seal disc adapter ring assembly B7083-n (previously B7053 or B7075/B7054) is provided, install according to figure 7B below.

Position seal disc on top of hub or adapter plate and fasten with six (6) 3/8" cap screws, as shown in figure 7A or 7B. Tighten to recommended standard of 15 ft-lb (lubricated) or 20 ft-lb (dry).

NOTE: The purpose of the seal disc is to prevent hot air from recirculating back down through the hub, increasing efficiency.

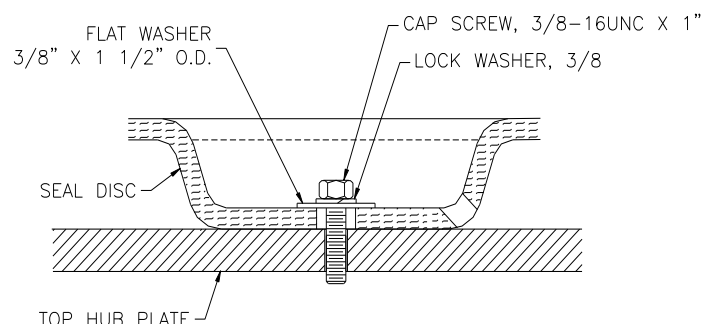
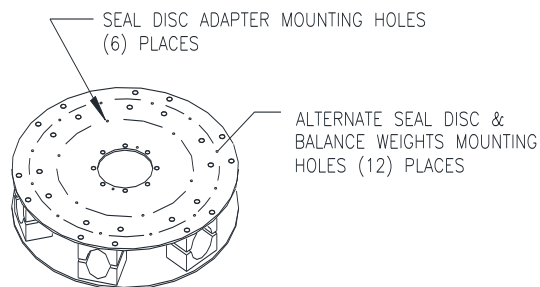


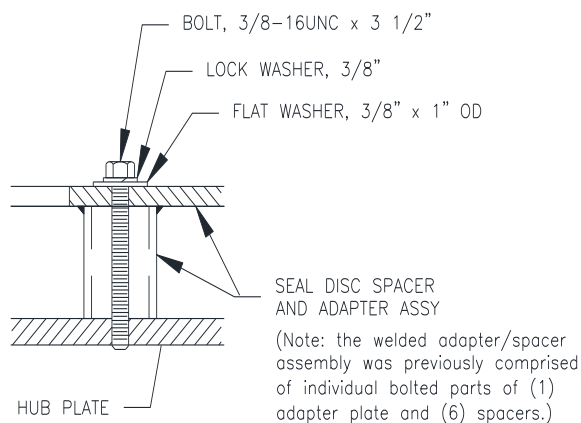
Figure 7

A. For Models without Seal Disc Adapter

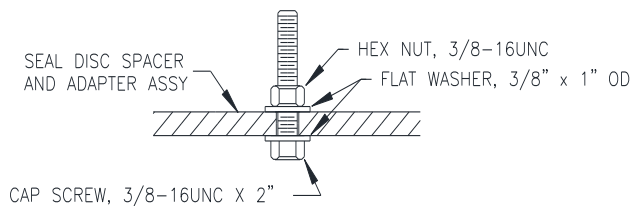
Figure 7 (Continued)
B. For Seal Disc Adapter and Spacer Installation



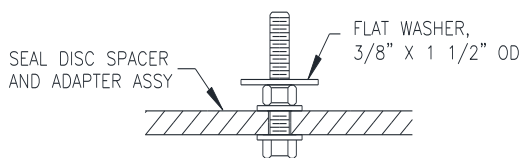
1. Locate (6) various mounting holes.



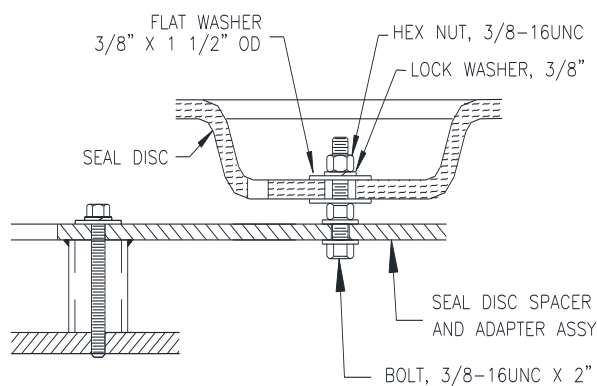
2. Install seal disc spacer and adapter assy as shown in above figure at each of the seal disc mounting holes. Torque all bolts to 20-25 ft-lb.



3. Install 3/8-16UNC X 2" cap screw, flat washers and nut in each of (6) mounting holes as shown above. Torque all bolts to 20-25 ft-lb.



4. Install 1 1/2" OD flat washer on each cap screw.



5. Align seal disc with each cap screw. Fasten with flat washers, lock washers and nuts as shown above. Torque all bolts to 20-25 ft-lb.

CHECK TIP CLEARANCE

Rotate fan in position inside fan ring or fan stack to check tip clearance. Check for spots where fan blade clearance is less than 3/4" or greater than 1-1/2" from fan ring (See Figure 8). If necessary adjust fan ring or fan stack by shimming to obtain proper clearance. Note that different cooling towers may have different ways (See Figure 9) to adjust the fan ring or fan stack. As the fan is rotated, check for adequate clearance underneath blade in entire fan swept area.



Figure 8

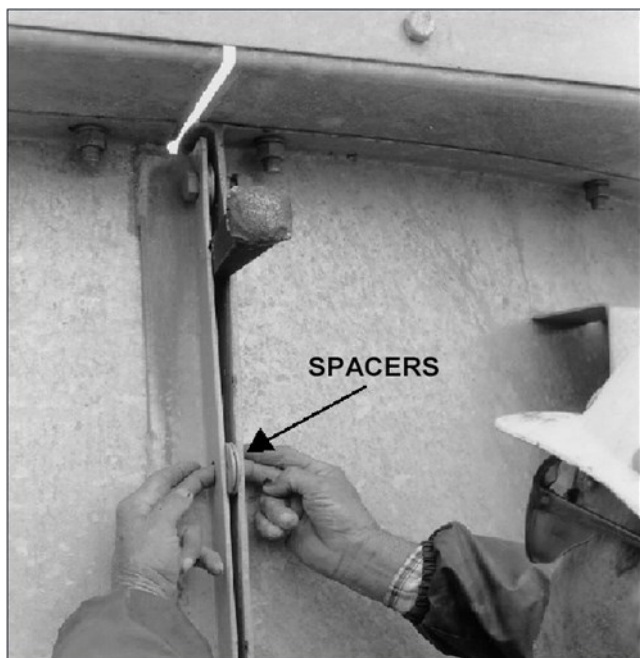


Figure 9

OPERATING INSTRUCTIONS

Initially toggle motor and check fan rotation. Viewed from top, fan blades should rotate clockwise.

Hudson recommends to re-verify the blade clamp torque after the initial 10-15 minutes of cold operation (i.e., the fan doesn't need to be exposed to the working temperature of the process). This will ensure that the blades are settled within the clamps after the centrifugal forces have acted.

Check motor power consumption to be sure fan is pulling desired load. *CAUTION: If positive pitch is set in summer to use all available motor amps (nameplate rating), motor could be overloaded in winter.* Design pitch angles usually do not use all of the available motor horsepower. This ensures that the motors will not be overloaded at low winter temperatures.

For the fans that have remained idle (such as a shut-down or turn-around), it is highly recommended to re-verify the torque on the blade clamps before putting it back into operation.

PART LIST
HUDSON PRODUCTS CORPORATION
7000 Series Hub - Adjustable Pitch Fan Assembly 34' and 36' Diameter

ITEM	DESCRIPTION	PART NO.	ITEM QUANTITY PER HUB ASSEMBLY													
			Fan Size	No. of Blade	6	7	8	9	10	11	12	13	14	15	16	17
	Up to 7.44 Dia. Shaft (W-2 Type)	34H7 36H7	34H7 36H7	Hub Assy Part No.	7906 D7126	7907 D7127	7908 D7128	7909 D7129	7910 D7130	7911 D7131	7912 D7132	7913 D7133	7914 D7134	7915 D7235	7916 D7236	7917 D7237
1	Hub Plate (W-2 Type) (2 Per Hub)	34H7 36H7	34H7 36H7	Part No.	D7116 D7036	D7117 D7037	D7118 D7038	D7119 D7039	D7120 D7040	D7121 D7041	D7222 D7042	D7123 D7043	D7124 D7044	D7045 D7046	D7047 D7048	D7049 D7050
2	Seal Disc Assy Kit*	34H7 36H7	34H7 36H7	Part No.	81126S D6022	81126S D6022	81126S D6022	81126S D6022	81126S D6022	81126S D6022	81126S D6022	81126S D6022	81126S D6022	81126S D6022	81126S D6022	81126S D6022
3	Seal Disc Joint Gasket* (2 Per Seal Disc)	34H7 36H7	34H7 36H7	Part No.	73030 73045	73030 73045	73030 73045	73030 73045	73030 73045	73030 73045	73030 73045	73030 73045	73030 73045	73030 73045	73030 73045	73030 73045
4	SD Adapter/Spacer Assembly** (1 per hub)	34H7 36H7	34H7 36H7	Part No.	B7083-1 B7083-3	B7083-1 B7083-3	B7083-1 B7083-3	B7083-1 B7083-3	B7083-1 B7083-3	B7083-1 B7083-3	B7083-1 B7083-3	B7083-1 B7083-3	B7083-1 B7083-3	B7083-1 B7083-3	B7083-1 B7083-3	B7083-1 B7083-3
5	SD Spacer Bolt, 3/8"-16 x 3-1/2" w/ nut (316 SS)	34H7 36H7	34H7 36H7	66216	6	6	6	6	6	6	6	6	6	6	6	6
6	SD Spacer Lock Washer 3/8" (316 SS)	34H7 36H7	34H7 36H7	73722	6	6	6	6	6	6	6	6	6	6	6	6
7	SD Spacer Flat Washer 3/8" x 1" OD (316 SS)	34H7 36H7	34H7 36H7	73623	6	6	6	6	6	6	6	6	6	6	6	6
8	Stiffener Ring (1 per hub)	34H7 36H7	34H7 36H7	Part No.	N/A D7071	N/A D7071	N/A D7071	N/A D7071	N/A D7071	N/A D7071	N/A D7071	N/A D7071	N/A D7071	N/A D7071	N/A D7071	N/A D7071
9	Stiff. Ring Bolt, 5/8"-11 X 2" w/nut (HDG)	34H7 36H7	34H7 36H7	15349	16	16	16	16	16	16	16	16	16	16	16	16
10	Stiff. Ring Lock Washer 5/8" (HDG)	34H7 36H7	34H7 36H7	73730	0	0	0	0	0	0	0	0	0	0	0	0
11	Stiff. Ring Flat Washer 5/8" (316 SS.)	34H7 36H7	34H7 36H7	73719	32	32	32	32	32	32	32	32	32	32	32	32
12	Tuf-Lite I ⁰ Fan Blade (White) ***	34H7 36H7	34H7 36H7	Part No.	84734-1 84040	84734-1 84040	84734-1 84040	84734-1 84040	84734-1 84040	84734-1 84040	84734-1 84040	84734-1 84040	84734-1 84040	84734-1 84040	84734-1 84040	84734-1 84040
13	Hub Spool (W-2 Type)			D7737C	1	1	1	1	1	1	1	1	1	1	1	1
14	Bushing (W-2 Type)			Specify Bore	1	1	1	1	1	1	1	1	1	1	1	1
15	Blade Clamp Half Standard: Powder Epoxy Coated Gray Cast Iron Optional: Customer Specified Coating of Gray Cast Iron			65018 (Varies)	12	14	16	18	20	22	24	26	28	30	32	34
16	Blade Clamp Stud W/ 2 Nuts 1"-8 x 14 1/2" (HDG)			70643	24	28	32	36	40	44	48	52	56	60	64	68
17	1" Flat washer (HDG)			57402	48	56	64	72	80	88	96	104	112	120	128	136
18	1" Lock washer (HDG)			73742	48	56	64	72	80	88	96	104	112	120	128	136
19	Hub Spool Cap Screw 3/4"-10 x 2 1/2" (316 SS)			57027	16	16	16	16	16	16	16	16	16	16	16	16
20	3/4" Flat washer (316 SS)			73720	16	16	16	16	16	16	16	16	16	16	16	16
21	3/4" Lock washer (316 SS)			73739	16	16	16	16	16	16	16	16	16	16	16	16
22	Eye Bolt W/ Nut 3/4"-10 x 2" (HDG)			59547	3	3	3	3	3	3	3	3	3	3	3	3
23	3/4" Flat Washer (HDG)			16716	6	6	6	6	6	6	6	6	6	6	6	6
24	3/4" Lock Washer (HDG)			73738	3	3	3	3	3	3	3	3	3	3	3	3

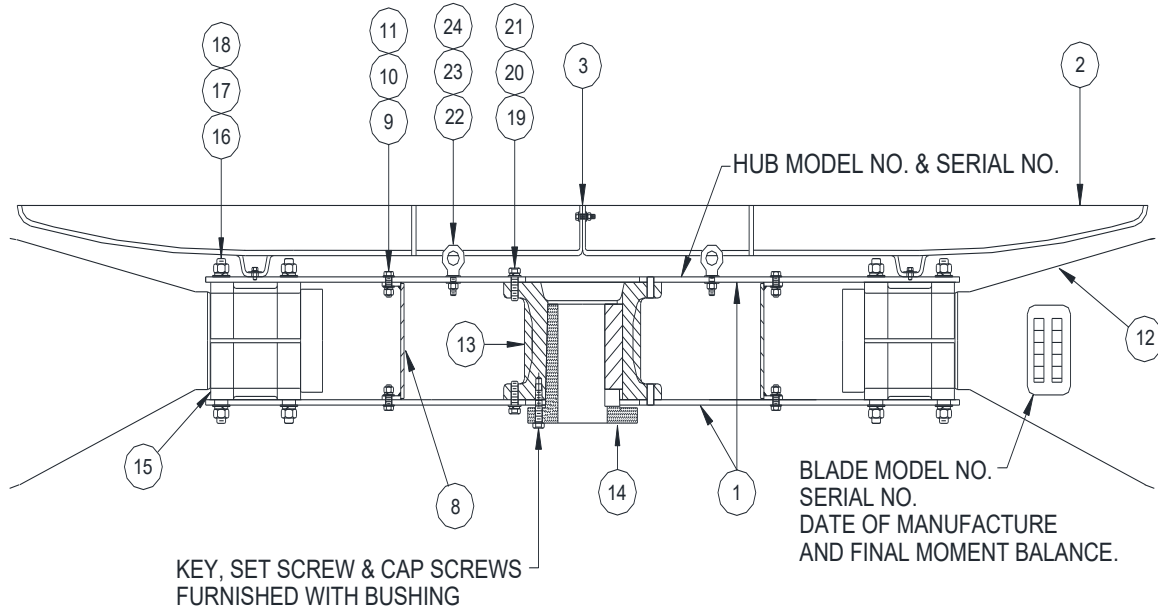
* Seal Disc Assy Kit includes Gaskets and all hardware (316 SS) to assembly and mount.

** The welded assemblies B7083-1, -2 & -3 were previously comprised of individual bolted parts of one B7073, B7075 or B7070 ring and six B7054 spacers.

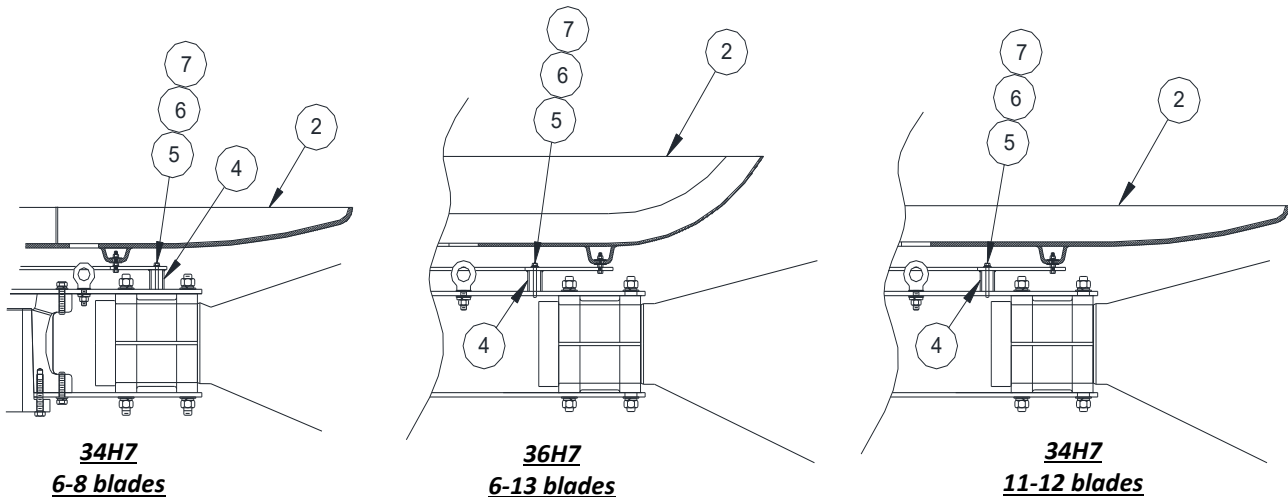
*** Blade color was blue prior to March 2006.

HUDSON PRODUCTS CORPORATION

Series 7000 HUB - Adjustable Pitch Fan Assembly 34' and 36' Diameter



34H7, 9-10 & 13-17 Blades and 36H7, 14-17 Blades



STANDARD MATERIALS & FINISHES

Blades: Fiberglass reinforced vinyl ester
Hub Spool: Ductile Iron, Coal Tar Epoxy coating
Plates: Coal Tar Epoxy coated steel
Bushing: Malleable Iron
Seal Disc: Fiberglass Reinforced Polyester

Blade Clamps:
 Powder Epoxy Coated Ductile Iron Standard
Fasteners:
 Steel, HDG & 316 SS Opt.
 Complete Fan with 316 SS (Option 1)
 Complete Fan with K500 Monel (Option 2)

WHEN ORDERING, SPECIFY FAN DIAMETER, TYPE & NUMBER OF BLADES & SHAFT DIAMETER

EXAMPLE:	<div style="border: 1px solid black; padding: 5px; display: inline-block;">APT</div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;">34H7</div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;">10</div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;">6 1/2" BORE</div>
	Fan Model Adjustable Pitch	Fan Diameter & Blade Type (Specify "H7" for Tuf-Lite II® Blades 7000 Series)	Number of Blades	Shaft Diameter

HUDSON

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