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GlasLock OptiFoil® Agitator Blade Installation & Removal Procedure Up to 4,000 Gallon

Definition of Potential Hazards

The following definitions are provided to explain the degrees of hazard that De Dietrich Process Systems Inc. recognizes to be associated with the installation and operation of De Dietrich Process System products. These terms are used throughout the De Dietrich Process Systems Instruction Bulletins to enable the user to identify the potential degree of hazard.

DANGER: IDENTIFIES HAZARDS WHICH COULD
RESULT IN SEVERE PERSONAL INJURY OR DEATH

WARNING: Identifies hazards which could result in
personal injury

CAUTION: *Identifies hazards which could result in damage to
equipment or property*

NOTE: Alerts users to pertinent facts and conditions



Installation, Replacement or Blade Angle Change of GlasLock OptiFoil Agitator Blade

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Read all instructions carefully before beginning procedure. In case of questions check with your supervisor or contact De Dietrich Process Systems, Inc. at 908-317-2585

1.0 Caution and Notes

- 1.1 The temperature of the blades must be 25 °F to 75 °F cooler than the temperature of the hub during installation.
- 1.2 If more than one blade is being installed, replaced, or repositioned, remove all of the blades and install in accordance to Section 3.0.

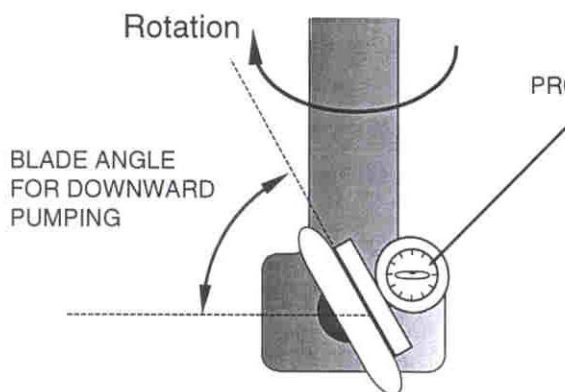
WARNING: The tapered joints between hub and blades are essentially tight, but due to surface finish some leakage may be possible. This condition may result in a small amount of product behind the blades. Product will then be released when blades are removed. Take necessary precautions for personal safety and, if the product is flammable, be sure to ventilate reactor before spark testing.

- 1.3 Obtain and record blade angle information prior to installation. Angle will be determined by process needs.

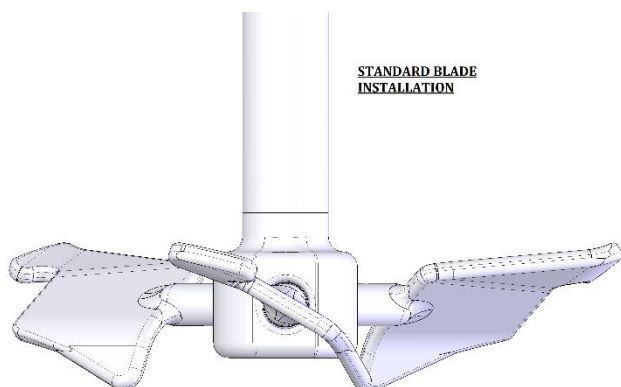
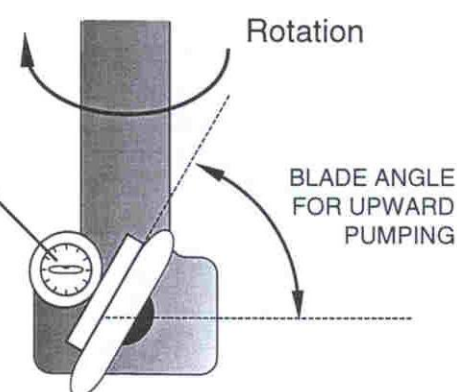
In case of question, contact De Dietrich Process Systems, Inc.

- Standard: 45°
- Option, dependent on process requirement: 30°

Standard Arrangement



Special Requirement

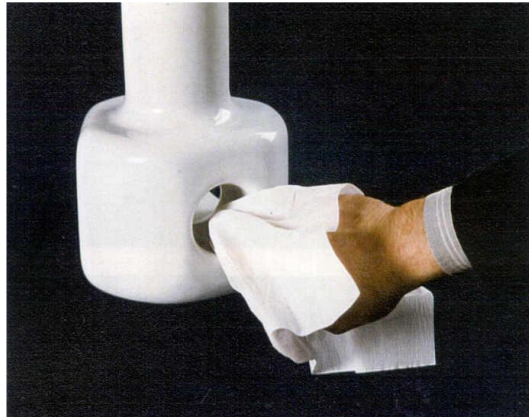


2.0 Preparation of Vessel

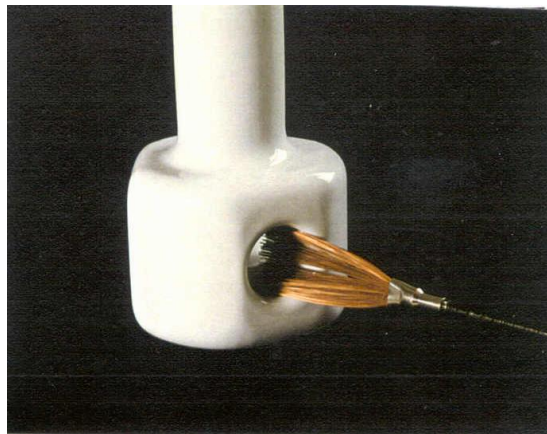
- 2.1 Preform all OSHA Confined Space Entry regulations and company safety procedures, including but not limited to electrical lockout tagout procedures, draining and cleaning vessel.
- 2.2 Place clean felt, foam or rubber padding on bottom of vessel.
- 2.3 Use only wooden rung rope or wood/fiberglass rigid ladders inside vessel for personnel entry. Remove all metal objects prior to entering vessel.

3.0 Preparation of Blades Hub for Installation

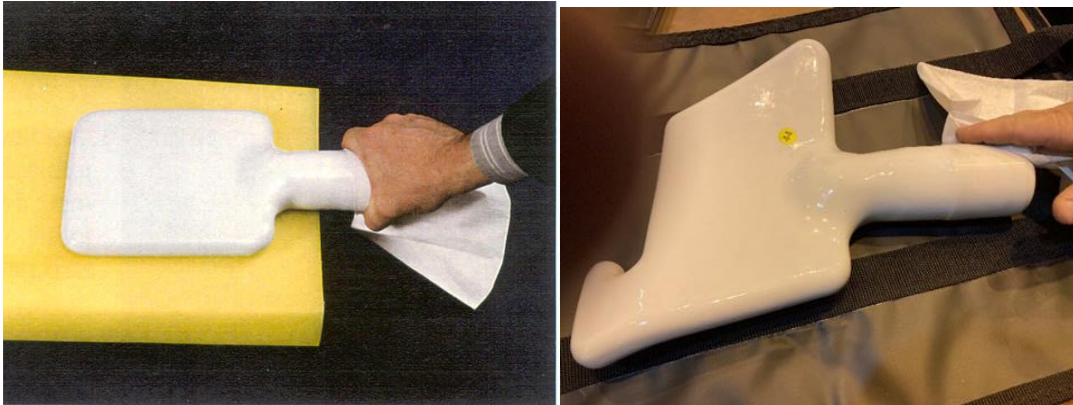
- 3.1 Clean tapered bores in the hub with ethyl or isopropyl alcohol and a lint free cloth.



- 3.2 Spark test tapered bores using 6000 volts A.C.



- 3.3 Clean blade tapers with ethyl or isopropyl alcohol and lint free cloth outside vessel.
Do not put sealant on blade tapers.



- 3.4 Spark test blades with 6000 volts A.C. only.
D.C. spark testers cannot be used because the steel substrate cannot be grounded.



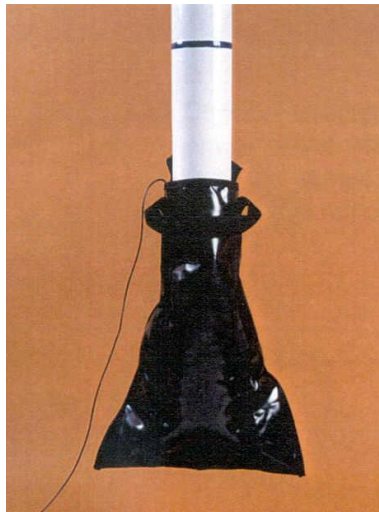
- 3.5 Measure and record temperature of the hub.



3.6 Install heater bag with heating coil installed.



3.7 Cover hub with insulation or supplied bag in tool kit.



3.8 Measure and record temperatures of blades to be installed.



3.9 Connect special heating coil to 100v outlet. Heat hub to 75 °F higher than the temperature of the prepared blades for 300 to 2000 gallon vessels. For 3000 and 4000 gallon vessels 50 °F higher.



3.10 While the agitator hub is heating up, prepare the tools for installation of the blades.



4.0 Tool Preparation

4.1 Assemble blade insertion tools as follows:

- 4.1.1 Determine the configuration of the cable/extensions and roller placement required for the side blade you are installing.

Reactor Size (gallons)	OptiFoil Kit	Strap Assembly
300 and 500	Yes	Short Strap and 4" Bolt
750 and 1000	Yes	Short Strap and 7.25" Bolt
1500 and 2000	Yes	Long 35" Strap and 4" Bolt
3000 and 4000	Yes	Long 35" Strap and 9.5" Bolt

- 4.2 Select correct bolt and strap (see table above). Place one set of bevel washers with mating set of curved surfaces in contact with each other on each bolt. Thread bolts into coupler nuts on ends of strap.



- 4.3 Lubricate bolts with an anti-seize compound, and bevel washer areas as shown.



- 4.4 There is no nylon roller in this installation.



- 4.5 Using a non-metallic container, lower blade insertion tool, bevel protractor, torque wrench/socket, special sealant supplied in tool kit, alcohol and several lint free cloths carefully into vessel.



- 4.6 Place one blade in the cloth bag. Then carefully lower the blade into the vessel.



- 4.7 Set the first blade aside on a pad in the vessel. Lower the other two blades into the vessel and set them aside as space safety allows.



- 4.8 Check the temperature of the hub every 10 minutes while it is being heated with a contact pyrometer or non-contact pyrometer.



- 4.9 When the hub is heated to the correct temperature, unplug the heater. Remove the insulation/bag, special heater coil and the thermocouple.



4.10 Give the blade(s) a final wipe with a clean cloth.



5.0 Blade Installation

5.1 Insert the first blade no more than 1" into the hub.



- 5.2 While holding the blade, put the preset bevel protractor on the blade and rotate the blade to the predetermined blade angle with respect to the horizontal plane.



- 5.3 Slowly and carefully push the blade into the hub at the correct angle.



- 5.4 As quickly and safely as possible, install the cap, holding it in place until the clamping screw is set.



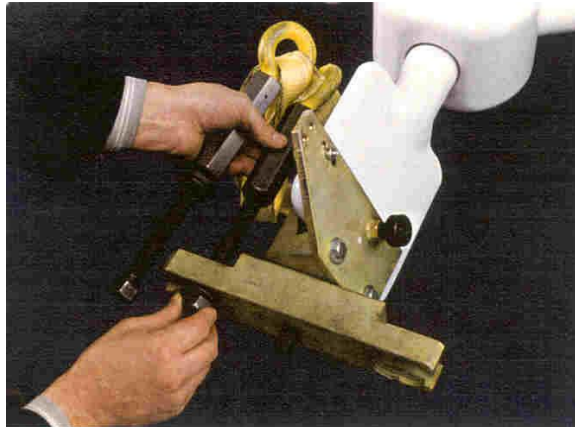
- 5.5 Tighten large thumb screw (300 thru 4000 gallon) to clamp the cap to the blade.



- 5.6 Set the beam to a horizontal position and tighten the center nut.



- 5.7 Slide one bolt into the slot in the beam positioning the bevel washers into the correct position. (Inside for 300 through 2000 gallon blades; outside for 3000 and 4000 gallon blades).



- 5.8 Wrap the strap around the hub and insert the other threaded rod into the other side of the tool.



- 5.9 If one or more blades are already installed, straddle each blade with the strap before inserting the threaded rods into the beam.



5.10 This is how it should look with two blades already installed.



5.11 Double check blade angle at this time.



5.12 Tighten both bolts by hand to remove all slack from the strap.



- 5.13 Set torque wrench to the specified torque, if not already set. Alternately, torque the two bolts until the required torque is reached on both sides with the preset torque wrench.



CAUTION: Do not torque unevenly, see table on page 18.

Vessel Size (gallons)	Torque (ft. - lbs)
300 to 2000	60
3000 and 4000	80

- 5.14 Loosen bolts quickly and carefully remove the strap.
5.15 Remove the cap.

NOTE: If more blades are to be installed, rotate the agitator until the next hub bore faces you.

- 5.16 Repeat steps 5.1 through 5.15 for second and third blades.

NOTE: The hub will be cooling off during the installation of the three blades. Do not reheat the hub unless the temperature of the hub falls to a level that would make it less than 50 °F, 30 °F higher for 4000 to 8000 vessels than the blades (ΔT 50 °F). If the temperature drops to this level, (ΔT less than 50 °F) greater than 50 °F, before inserting the last blade.

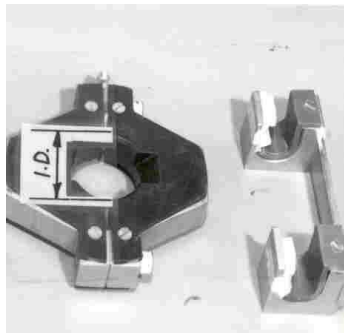
- 5.17 Remove all tools and padding from vessel, and exit vessel. Unlock electrical controls and remove all other safety precautions. Vessel can now be returned to service.

6.0 Blade Removal

- 6.1 Measure desired blade angle if blade is to be replaced at the same angle.



- 6.2 The removal tool consists of two parts, a hub plate with jack bolts (left) and a blade saddle (right).



- 6.3 Install correct inset on the removal tool plate according to table.

Vessel Size	I.D. of Insert	Color of Insert
300 to 2000	2 - 7/16"	Black
3000 and 4000	2 - 15/16"	Green

- 6.4 Carefully lower the blade removal tool, the torque wrench and grows foot into the vessel in a non-metallic container.

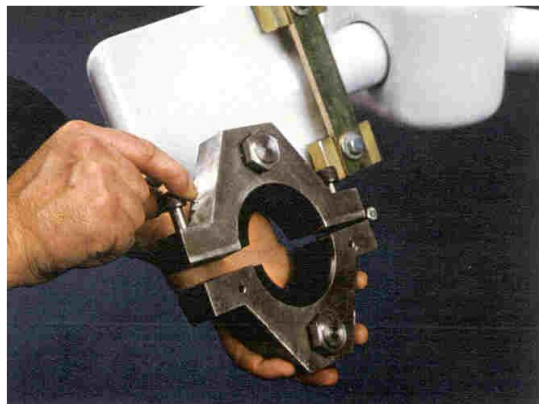
- 6.5 Install blade saddle on blade as shown.



- 6.6 Confirm that two jack bolts are screwed all the way into the hub plate.



- 6.7 Unscrew captive bolts until they disengage from one side.



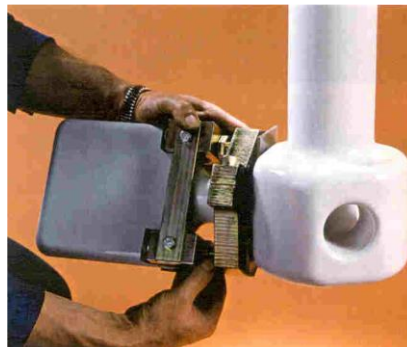
- 6.8 Open the hub plate and install on the blade arm with the plastic insert facing the hub as shown.



- 6.9 Tighten captive bolts using an Allen key.



- 6.10 Rotate hub plate and line up jack bolts with counterbores in blade saddle and unscrew bolts until they are hand tight with the protrusions of the bolts mating with the counterbores.

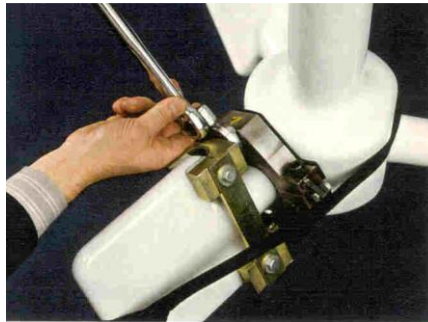


- 6.11 Install safety strap at this time.



CAUTION: *The strap is used at disassembly to prevent the possibility of the blade falling when it is jacked away from the hub.*

- 6.12 Set the torque wrench to 120 ft.-lbs. and attach crowfoot. Turn jack bolts out alternately $\frac{1}{4}$ turn at a time until blade disengages with a “pop”. If the jack bolt disengages from the hub plate, remove the hub plate and install longer jack bolts provided.



- 6.13 If the blade does not “pop” after reaching 120 ft.-lbs. impact the blade with a plastic faced hammer as shown. Then repeat torque on jack bolts to 120 ft.-lbs.



- 6.14 Repeat 6.12 and 6.13 until the blade becomes loose.

- 6.15 If the blade cannot be loosened after repeating steps 6.12 and 6.13, a minimum of ten times, go to steps 6.15.1 and 6.15.2.
 - 6.15.1 Carefully pack the blade in water, ice or dry ice and allow setting for a minimum of one hour.
 - 6.15.2 Remove the ice and repeat steps 6.12 and 6.13 until the blade is loosened.
- 6.16 After the blade is loosened, remove the strap.
- 6.17 Screw the jack bolts back into the hub plate.
- 6.18 Remove the hub plate and the blade saddle.
- 6.19 Remove the blade.

7.0 Blade Angle Change

- 7.1 Remove all blades as per Section 6.0
- 7.2 Install blades at the desired angles per Sections 3.0, 4.0 and 5.0.

8.0 Preventive Maintenance Checks

- 8.1 Prior to start-up of a new vessel, or if the tank must be entered for any other reason, it is strongly recommended that the following preventative maintenance checks be made.
 - 8.1.1 Check the blade angle.
 - 8.1.2 Install the insertion tool on each blade and apply the correct torque as per steps 5.4 through 5.17.
 - 8.1.3 If no blade movement is noted and no audible click is heard, and the blades are at the correct angle, then the blades are held firmly in the hub and it may be used "as is".
 - 8.1.4 If any blade has changed pitch angle, moves or makes a clicking noise when torque is applied on the tool, all blades should be removed as per Section 6.0 and re-installed as per Sections 3.0, 4.0 and 5.0.

STANDARD OPTIFOIL® BLADE INSTALLATION

