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Removal and Replacement of the OptiSeal Mechanical Seal Cartridge

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

Removal and Replacement of Mechanical Seal Cartridge

Seal: Double De Dietrich Process Systems OptiSeal

Drive: De Dietrich Series 60

Agitator: One-piece or GlasLock ® Separable-Blade

NOTE: Numbers in ( ) refer to item numbers on drawings.

	Dry Running Seal Assembly Drawing Number
61Q06	D-9950-A
62Q08	D-9951-A
63Q10	
63Q12	
64Q16	
64Q24	

1.0 Lock out electrical controls. Depressurize vessel. For lubricated seal only, depressurize lubricator. Then remove hoses from lubricator and drain lubricator and hoses into a bucket. If your lubricator is equipped with quick disconnect fittings, disconnect hoses at lubricator and drain hoses and seal into a bucket. If the oil is contaminated, drain oil from lubricator. For dry running seal only, depressurize mechanical seal housing (138).

1.1 Remove coupling guard (24).

1.2 Remove tubing connected to seal housing (138).

See Figure 1.

Figure 1

1.3 Remove socket head cap screws (133).

See Figure 2.

Figure 2

1.4 Remove clamp ring halves.

See Figure 3.

Figure 3

1.5 Loosen socket head cap screws (150).

See Figure 4.

Figure 4

1.6 Separate split collar (145) to release it from the agitator shaft.

See Figure 5.

Figure 5

1.7 Install centering clips with cap screws. See Figure 6.

Figure 6

1.8 Before removing service clamp (63) and installing it under the seal housing check to make sure the service clamp pad is properly installed with plastic screws. Be sure that no screws are protruding from the bottom. If the pad is not bolted to the service clamp at this time.

See Figure 7.

Figure 7

Figure 8

Figure 11

1.9 Remove service clamp (63) from agitator where it is stored. See Figure 8 Next lift seal housing (138) and service cartridge together and install service clamp with pad (63) on agitator shaft (2) beneath them in the groove provided. See Figure 9 and 10. Tighten socket head cap screw (62) to hold it in place.

Figure 9

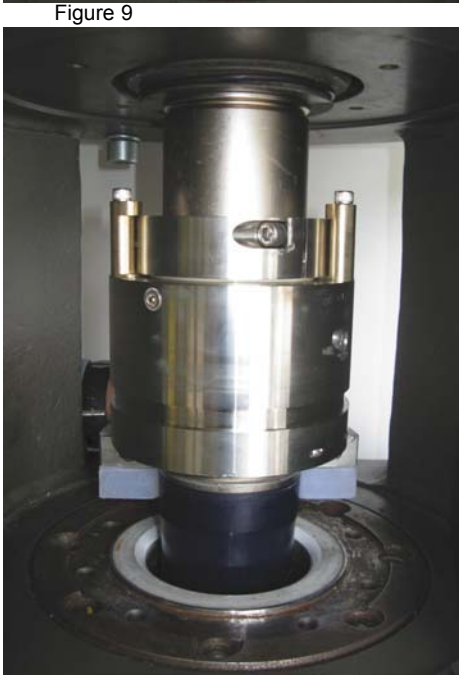


Figure 10

NOTE: If seal housing cannot be lifted by hand it can be pried up as shown above with a pry bar or screwdriver placed in the slot on the seal housing.

See Figure 11.

DO NOT PUT PRY BAR AGAINST AGITATOR PLATE.

1.10 Remove hex head cap screws (19) on all unites except for the 61Q06.

See Figure 12.

NOTE: If the vessel contains a retreat curve agitator and a flush bottom outlet valve make sure bottom outlet valve is closed before proceeding.

1.11 Remove all socket head cap screws (16) on the thrust plate (15) but do not remove socket head cap screw (1) at center.

See Figure 13.

NOTE: The 61Q06 has only two socket head cap screws (16) no center bolt (socket head cap screw (1)). Loosen two socket head cap screws (16) but do not remove

Figure 12

Figure 13

1.12 Turn thrust plate (15) 45° on all units except the 61Q06.

See Figure 14.

1.13 Re-install hex head cap screws (19) on all units except for the 61Q06.

See Figure 15.

Figure 14

Figure 15

1.14 Remove ⅝" square head thrust screws (66) from the storage bracket located on the drive pedestal. The square-ness gauge (64) is also stored on this bracket.

See Figure 16.

Figure 16

1.15 Coat thrust screws (66) with anti-seize compound (Never-Seez™ or equivalent) and install thrust screws (66) in thrust plate (15).

See Figure 17.

Figure 17

1.16 Jack agitator (2) down by alternately and progressively tightening thrust screws (66) ½ turn at a time (a ¾" twelve-point socket is needed). **Do not remove socket head cap screw (1) at center.** While jacking the agitator (2) down, loosen socket head cap screw (1) ¼" at a time when it bottoms on thrust plate (15).

NOTE: For the 61Q06 drive, do not remove two thrust screws (16). Unscrew them ¼" at a time when they bottom on the thrust plate (15).

1.17 When the agitator (2) is released from the quill coupling (13) it will be supported by socket head cap screw (1). Remove thrust screws (66) and return them to their holder. As socket head cap screw (1) is removed, the agitator (2) will move down until is supported by the service clamp (63).

NOTE: For the 61Q06 drive, the agitator will be supported by two socket head cap screws (16). As they are removed the agitator (2) will move down until it is supported by the service clamp (63).

1.18 Remove socket head cap screw (1), hex head cap screws (19) and thrust plate (15).

NOTE: For the 61Q06 drive, remove two socket head cap screws (16) and thrust plate (15).

1.19 Remove shaft shield.

See Figure 18.

Figure 18

1.20 Remove hex head cap screws (20) and remove quill coupling (13). Two eyebolts are located on the thrust screw storage bracket to aid in removal.

See Figure 19.

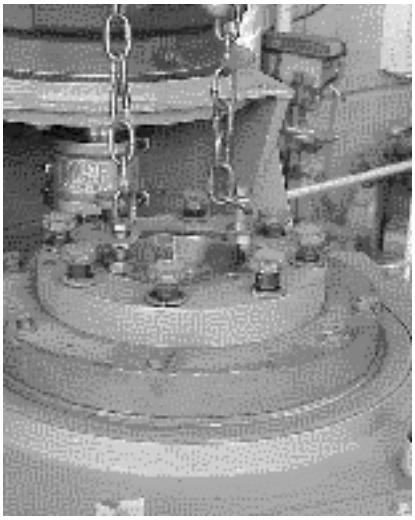


Figure 19

1.21 Remove O-ring (18) from thrust ring (11). Remove thrust ring (11).

See Figures 20 and 21.

Figure 20

Figure 21

1.22 Install draw rod (121) and slide seal cartridge and thrust ring O-ring up through drive and out.

See Figures 22 and 23.

1.23 See Section 2 of this bulletin for re-assembly of seal cartridge and housing.

Figure 22

Figure 23

NOTE: If replacing a standard seal with a OptiSeal the following steps must be followed.

A.1 Install service clamp pad onto service clamp (63) with bolts provided by De Dietrich Process Systems. Make sure bolt heads are not protruding from the bottom of the pad.

See Figure 24.

CAUTION: *The service clamp pad must be installed to avoid breakage of the glass.*

A.2 The existing base ring (5) must be removed before installing the OptiSeal. The base ring can be removed by lifting the drive and the pedestal from the vessel or having it cut off by a De Dietrich Process Systems Technician.

Figure 24

Procedure for Installing Seal Cartridge and Housing

2.0 Before installing a new seal clean the agitator (2) making sure all Never-Seez™ is removed.

2.1 Loosen socket hand cap screw (146) on top of centering clip (142). Do not remove the clips.

See Figure 25

Figure 25

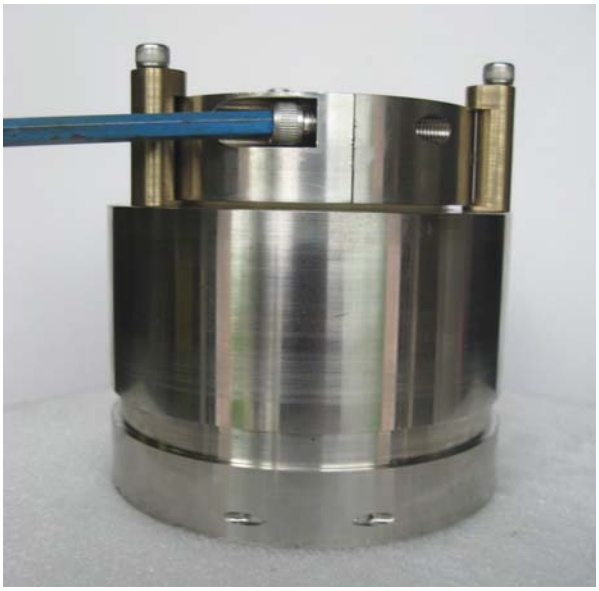


Figure 26

2.2 Loosen socket head cap screw (150) on split collar assembly (145).

See Figure 26.

2.3 Spread the collar halves apart as far as they will travel. Approximately 1/8” with a screw driver.

See Figure 27

2.4 Retighten socket head cap screws (146) leaving a cap in the collar halves.

See Figure 28

Figure 27

Figure 28

2.5 Inspect for any foreign matter, nicks or burns on machine or O-ring surfaces. Confirm that O-rings are not cut or nicked. Apply G30SXCF (FDA compliant O-ring lubricant) to O-rings on ceramic I.D.

2.6 Slide seal cartridge assembly (138) over agitator shaft (2) and down through the drive until it comes to rest. Use draw rods (121) if needed.

See Figure 29

Figure 29

2.7 Lower the seal until it rests on the service clamp then remove the draw poles.

See Figure 30

Figure 30

2.8 Slide thrust ring O-ring (18) through the drive over the agitator (2).

See Figure 31

Figure 31

2.9 Coat thrust ring (11) with anti-seize compound (Never-Seez™ or equal) and install in groove of agitator shaft (2). Install O-ring (18) on thrust ring (11) groove to hold thrust ring in place while the agitator shaft (2) is supported by the service clamp (63).

See Figure 32

Figure 32

2.10 Put anti-seize compound (Never-Seez™ or equal) on two raised areas of agitator shaft (2) which contact the quill coupling (13) and all tapped holes in the end of the shaft (12) and on the keyway.

See Figures 33 and 34

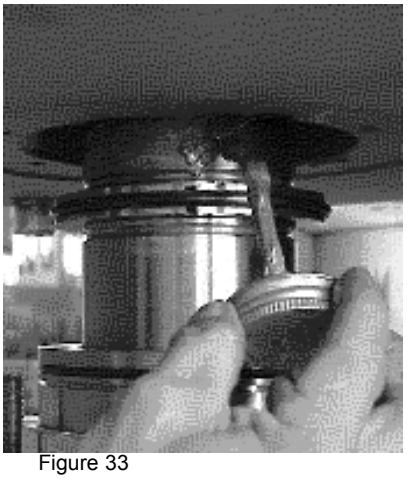


Figure 33

Figure 34

2.11 Place quill coupling (13) over agitator shaft on top of drive making sure to align quill key (33) (bolted to quill) with key-way on agitator.

See Figure 35

Figure 35

2.13 Bolt quill-coupling (13) to coupling seat (6) using hex head cap screws (20) tightening to 65 ft-lbs.

See Figure 37

Figure 37

2.12 Put shaft shield (8) on top of agitator shaft (2).

See Figure 36

Figure 36

2.14 Install thrust plate (15) and socket head cap screw (1) (center bolt). Tighten socket head cap screw (1) to pull agitator (2) up until torque increases sharply. Turn center bolt (1) ½ turn counter clockwise.

See Figures 38 and 39

NOTE: For the 61Q06 unit go to step 2.10.

Figure 38

Figure 39

2.15 Install socket head cap screws (16) with Belleville washers (17) finger tight.

NOTE: The 61Q06 unit has two socket head cap screws (16) and no center bolt (1).

2.16 Install hex head cap screws (19) finger tight.

2.17 Tighten socket head cap screws (16) alternately and progressively to the specified torque to pull agitator (2) into quill coupling (13). Socket head cap screw (1) will be loose at this time.

See Figure 40

Unit	Torque
61Q06	70 ft-lbs
62Q08	70 ft-lbs
63Q10 or 12	90 ft-lbs
64Q16	140 ft-lbs
64Q24	170 ft-lbs

2.18 Tighten socket head cap screws (19) to:

See Figure 41

Drive	Bolt Size	Torque
61Q06	5/16”	15ft-lbs
62Q08, 10, 12	3/8”	27 ft-lbs
64Q16, 24	1/2”	65 ft-lbs

Figure 40

Figure 41

2.19 Install square-ness gage (64) located under coupling guard (24) as shown in Figure 1 on service clamp (63). Rotate agitator shaft by turning motor coupling by hand. Take clearance readings with feeling gauge between the pointer and top surface of base ring (5), at various points approximately 30° apart.

See Figure 42

Figure 42

2.20 If the difference between the maximum and minimum clearance does not exceed 0.005”, no further adjustment is required. If higher than 0.005”, tighten nozzle flange bolts (29) as required to pull base ring (5) into alignment. Do not exceed maximum wrench torque given in Bulletin No. 501, for respective nozzle size. If square-ness cannot be obtained with the maximum torque having been used, call De Dietrich Process System technical department.

2.21 Using a dial indicator to check the agitator shaft run out above the seal housing (3). If the T.I.R. is less than or equal to 0.010” go to step 2.17. If T.I.R. is greater than 0.010” call De Dietrich Process Systems factory.

See Figure 43

Figure 43

2.22 Remove service clamp pad (63).

See Figure 44

Figure 44

2.23 Slide seal down until it bottoms on adaptor plate (35) install clamp ring (128).

See Figures 45 and 46.

Figure 45

Figure 46

2.24 Install bolts (133).

See Figure 47

Figure 47

2.25 Tighten the socket head cap screws (150) to clamp the shaft.

See Figure 48

Figure 48

2.26 Remove centering clips (146).

See Figure 49

Figure 49

2.27 Install service clamp (63) back on the shaft under the drive.

See Figure 50

Figure 50

2.28 For a dry seal remove one port plug (149) and connect nitrogen supply line There are two 1/8 NPT port plugs located 180° apart at the top of the seal housing.

See Figures 51 and 52

NOTE: Be sure that all Nitrogen Supply Lines and any In-line Filters are cleaned before attaching Nitrogen Supply Line to new OptiSeal.

Port Plug

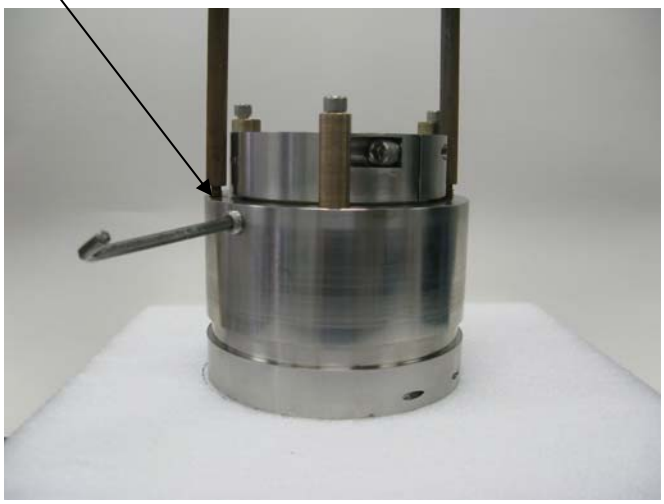


Figure 51

Figure 52

Nitrogen Supply

Anti-rotation pin

Figure 53

NOTE: Do not remove anti-rotation pin by mistake.

See Figure 53

2.29 Pressurize seal housing with nitrogen to 10 to 15 PSI higher then vessel pressure.

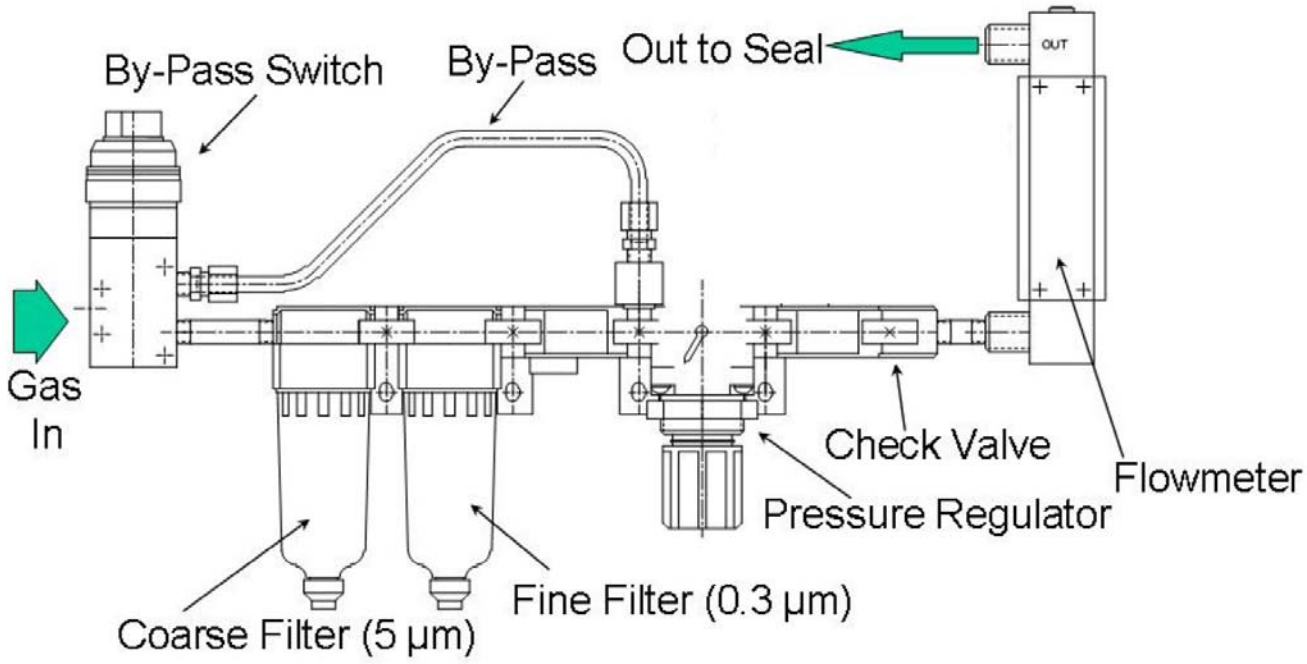
2.30 The allowable leakage rate for the seal is 0.02 standard cubic feet per hour per inch of shaft diameter.

2.31 If the drive onto which the seal is installed is not operated for a long period of time (several days) or is ran intermittently, then the seal may exhibit leakage which is out of specification.

If this phenomena occurs, the seal must be operated for a short period of time before the leakage rate returns to specification.

NOTE: Even if the seal is leaking out of specification it does not mean that the seal has failed and needs to be replaced immediately. The seal can be operated for an indefinite amount of time as long as the leakage is internal to the vessel and the process can tolerate the gas leakage.

PRE-PACKAGED GAS PANEL SYSTEMS FOR USE WITH DRY-RUNNING OPTISEAL



150 psig/10 bar Control panel mounted on enamel coated carbon steel plate. Panel componentry consisting of: Bypass valve, Coarse colescing filter, fine coalescing filter, bypass line, check valve, pressure regulator & flow meter.

For additional information and to purchase a OptiSeal rebuild kit please contact:

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