

	Doc or ECO #:	ECO-CS-KIT-BL-001	Date:	6/14/19	Author:	JK
	Rev. #:	A				
Engineering Change Order (ECO)	Engineering Approval:	aeg	Date:	6/14/19	Quality Approval	DO

P/N #:	CS-KIT-BL	Effective Date:	June 14, 2019
Title:	Pro 4 Cartridge Seal O-ring Switch		

1.0 Purpose / Summary

Pro 4 cartridge seals are held in place by o-ring friction, this friction can at times be inadequate to prevent the seal from popping out against the propeller collet and spinning with the propeller.

This leads to failure of the o-ring and flooding of the sub.

This ECO increases the static friction the oring provides by including a work instruction step which wipes excess grease and oil from the oring and increases the oring cross section by about 10%.

2.0 Parts Affected

Part Number	Notes	Removed	Added	Modified	REV
CS-KIT-BL	Update o-ring	☐	☐	☒	3.02.00
OR-014	Remove from assembly	☒	☐	☐	
72132	Add to assembly, new o-ring (O-Ring 2mm x 10mm, Buna N, 70A)	☐	☒	☐	A

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3.0 Detail

After the flooding of a pro 4 sub due to a longer vertical thruster shaft and the popping out of a cartridge seal it was determined that the static friction on some cartridge seals was very low.

Correspondence with support showed a significant uptick of loose/spun cartridge seals.

Further investigation showed that generous amount of moly grease decreased static seal friction along with movement of the seal. Pressure resistance required to prevent popping was evaluated and verified using the hot box.

The cartridge seal oring cross section was increased to increase static friction above the threshold required for air shipment (6.4 psi) and for hot working environments (3 psi) . This will also improve the torsional reaction force developed by the oring in the event the cartridge seal does pop out and contact the propeller collet. Static test verified to 10psi, dynamic thruster spinning verified to 4-5 psi.

The production work instruction was updated. A new separate work instruction detailing the REWORK was drafted.

4.0 Disposition of Material

All rev 3.01.000 CS-KIT-BL should be removed from inventory and quarantined.

This includes in cartridge seal sales kits, in tool kits, and in ROVs.

Seals can be returned to stock after rework.

Customer repairs should get the seals reworked per this ECO.

5.0 Action Items

Action	Department	Acknowledgement Initials
Update revision in Epicor	Engineering	RN
Transfer all Rev 3.01.00 inventory to quarantine for rework	Inventory Control	SL
Rework all Rev 3.01.00 to Rev 3.02.00	Production	KK
Note S/N of initial modified PRO4 ROV in ECO master list	Quality	DO

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6.0 Modified / Referenced Documents:

Document	Current Revision
WI-CS-KIT-BL	C
WI-CS-KIT-BL-REWORK	A

7.0 Revision History

Date Revised (mm-dd-yyyy)	Location of Change (section, paragraph no., step no., etc.)	Description of Change Made	Name of Person making the Change
6/14/2019	-	Initial Draft	JK