

# INSPECTION REPORT



GRN No.	23209-1	Customer: [REDACTED]
Your ref.	[REDACTED]	End User: (if different from above)

Seal Type	BWIP GU 3437/3250
Size	3.437/3250"
Material	Sil/Sil/Vit/Inc/316-Sap/Car/Vit
Nash P/No.	BWA/GU/0873/Q3Q3VGG-XBV/OR2398X
Cust. Ref.	[REDACTED]
Equipment	[REDACTED] Booster Pump [REDACTED] (DE or NDE?)
Duty	HC Condensate/36.4°C/7.46-11 bar a/ 3600rpm

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Part	Material	Description Of Condition	Replace	Reuse
SSR (prod)	SiC/Gr	Face very lightly worn/scored. Some light edge chipping on ID and OD of the seal face and also around the front edge of the bore.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
O-Ring	Viton	Set.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
RSR (prod)	SiC/Gr	Face very lightly worn. One drive slot chipped on driven surface/edge.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
O-Ring	Viton	Set.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
RSR Body	316	Drive dogs worn. Clogged with scale.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Lock Ring	316	Good. Clogged with scale.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
U-Cup	Viton	Worn. Clogged.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Spring Holder (prod)	316	Bore worn by spring/abrasion. Drive slots worn. Clogged with scale.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Spring (prod)	316	OD worn. Clogged with scale.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Seal Drive	316	Good.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Drive Key	316	Worn.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Shaft Sleeve	316/WC	Very light wear on the OD.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
O-Ring	Viton	Set.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
SSR (atmos)	Carbon (Res)	WOorn and scored. Clogged with solid black coke.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
O-Ring	Viton	Set.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
RSR (atmos)	316/CrOX	Light face wear. Clogged with hard coke.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
O-Ring	Viton	Set.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Spring Holder (atm)	316	Coated in oil tar and coke.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Dyn.O-ring	Viton	Set.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
HDP Set Screws	Alloy 20	Good condition.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
CP Set Screws	Alloy 20	Good condition.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Springs (atm)	Alloy C-276	Clogged with oil tar.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Adapter Ring	316	Good condition.	<input type="checkbox"/>	<input type="checkbox"/>
O-Ring	Viton	Good condition.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Seal Flange	316	Good condition.	<input type="checkbox"/>	<input type="checkbox"/>
O-Ring	Viton	Good condition.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
HX HD Set Screw	ALLOY STEEL	Good condition.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Setting Pieces	316	Good condition.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
HX HD Screws	18-8	Head wear.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Drive Collar	316	Good condition.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
CP Set Screws	Alloy Steel	Rusty. Head wear.	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Repair Level 1  2  3  4

## Background

This seal was one of a pair of pump [REDACTED], which were removed for repair after the DE and NDE seals were seen to have a slight leak. It is unclear which seal is which because both seals were stamped with DE and had no other ID. The seal was originally supplied to [REDACTED] as repairs with inboard seal face upgrades in June 2007 and were fitted shortly after. The seals ran for more than 2 years.

## Key Observations

- The inboard seal faces were in excellent condition after two years operation.
- The inboard spring holder and rotary seal ring holder were heavily clogged with scale.
- The drive keys and drive slots were significantly worn by third particle abrasion.
- The outboard seal was significantly contaminated with hard coke and oil tar.

# INSPECTION REPORT

## Conclusion

1. The primary seal ring material upgrade has proved to make a significant improvement in seal performance. After more than two years operation the seal faces showed only very light wear (compared to often total failure of seal rings in the previous materials after relative short operating periods)
2. The mechanical seal leaked excessively due to hang up of the inboard rotary seal ring due to:
  - A heavy build up of compacted scale inside the spring holder and seal ring holder.
  - Worn drive keys and slots preventing smooth axial movement of the rotary assembly.
3. Seal ring edge and slot chipping was caused by intermittent edge contact due to hang up.

## Recommendations

1. Seal life could be improved further if the amount of scale and sand entering the stuffing box is reduced i.e. improve cyclone and scale inhibitor performance.

Originator	██████████	Date	██████████
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Fig. 1 Seal assembly as received showing atmosphere end.



Fig. 2 Seal assembly as received showing product end.



Fig. 3 Outboard rotary seal ring in-situ showing heavy oil tar build up.



Fig. 4 Outboard stationary seal ring in-situ showing heavy coke deposits and oil tar.

# INSPECTION REPORT



Fig. 5 Spring holder showing heavy scale build up clogging the spring coils.



Fig.6 Close up of scale in spring coils.



Fig. 7 Inboard stationary seal ring showing very light face wear.



Fig. 8 Inboard rotary seal ring showing very light face wear.