# SVR™ AERO SYSTEM FOR JET LUBRICANTS

## OPTIMAL LUBRICANT MAINTENANCE FOR AERO-DERIVATIVE TURBINES TO PREVENT COKING, MINIMIZE OXIDATION AND EXTEND OIL LIFE

### Overview

Polyol ester jet lubricants (MIL-23699) are high-quality synthetic lubricants used in aero-derivative gas turbines because of the high oxidative stability and unique viscosity requirements. In this application, lubricant maintenance practices have historically been limited to particulate filtration, which limits lubricant operating life to 1 – 3 years despite the high makeup volume.

As the polyol ester lubricant oxidizes under normal operating conditions, acids and dissolved breakdown products are produced. These breakdown products accumulate until the lubricant is saturated, at which point they fall out of solution and form oil deposits on mechanical surfaces – a process called coking.

In most cases, polyol ester lubricants are replaced in aero-derivative turbine applications when the Acid Number reaches a value of 1.5 mg KOH/g. The deposit forming tendencies of the lubricant increase in relation to the Acid Number, which is an overall sign of the accumulated oxidation that has occurred. It is on this basis that the oil is normally condemned despite the fact that the other oil properties are acceptable.

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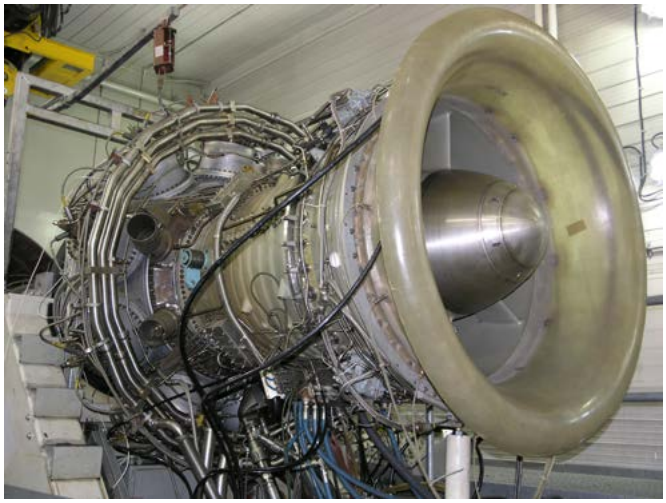
4772 - 50 AVE SE, Calgary AB T2B 3R4, Canada **T** 403.246.3044 **E** sales@cleanoil.com



Rolls Royce RB211-G

Currently used in off-shore platforms

## SVR™ Aero System

EPT's approach represents a step-change in the maintenance of lubricants in aero-derivative gas turbine applications. Unlike existing maintenance approaches, which allow for breakdown products to accumulate until they form varnish-like coke deposits, EPT's soluble varnish removal (SVR™) Aero system removes them in their native dissolved form. By preventing the accumulation of this material, the SVR™ Aero system stops the deposit forming pathway. SVR™ Aero reduces and manages Acid Number so that the lubricant is no longer condemned on this basis potentially doubling lubricant life.

## Key Benefits of SVR™ Aero Systems

- Protects hydraulic variable geometric control systems from sticking
  - Resolves known issues when speed changes occur
- Protects against compressor surges and catastrophic engine failure
- Prevents fail-to-start symptoms protecting production streams
- Quickly reduces Acid Number, extending lubricant replacement interval
- Significantly reduces ISO particle counts and water
- Features EPT's ion charge bonding (ICB™) filter to remove soluble contaminants including acids and coking precursors

## SVR™ Aero System Specifications

| SVR SYSTEM SIZE | SVR 150 Aero | SVR 300 Aero | SVR 600 Aero | SVR 1200 Aero |
|---|---|---|---|---|
| Dimensions LxWxH (cm/in.) | 122 x 81 x 185/ 48 x 32 x 73 | 122 x 81 x 185/ 48 x 32 x 73 | 122 x 69 x 188/ 48 x 27 x 74 | 122 x 69 x 239/ 48 x 27 x 94 |
| Weight (kg/lb) | 159/350 | 181/400 | 201/550 | 273/600 |
| Connections: Inlet/Outlet FNPT (in.) | 1.0/1.0 | 1.0/1.0 | 1.5/1.0 | 1.5/1.0 |
| Electrical Options | 120 VAC 1P, 230/ 380/ 475/ 575/ VAC 3P 50/60 Hz. Standard unit is general purpose. Class 1 Div. 1 and Div. 2 options are available. | | | |
| Current | 12.8 Amps | | | |
| Oil Temperature | 38-70°C/100-158°F. Heater and cooler options are available. | | | |
| Certifications | ASME Certified Vessels @ 150 psi / UL, CUL, CSA | | | |

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## SVR™ Aero System Sizing for Aero-Derivative Turbine Lubricant Maintenance

For normal aero derivative turbine oil maintenance, the desirable flow rate is to exchange the fluid reservoir volume 4x per day with sufficient acid removal capacity for a given reservoir volume. For recovery projects where higher Acid Numbers are present, larger equipment may be desired. The filter format used in the SVR 600 Aero and SVR 1200 Aero model are more cost effective for these situations.

| SVR SYSTEM SIZE | SVR 150 Aero | SVR 300 Aero | SVR 600 Aero | SVR 1200 Aero |
|---|---|---|---|---|
| Reservoir Volume (L/gal) | 570/150 | 1135/300 | 2270/600 | 3785/1000 |
| Flow Rate (LPM/GPM) | 2/0.5 | 4/1 | 8/2 | 16/4 |
| Reservoir Exchange Rate per 24 hr | 4.8x | 4.8x | 4.8x | 5.7x |
| Estimated Acid Reduction Capacity Per Set of Filters | 0.4 | 0.4 | 0.4 | 0.4 |
| **CONSUMABLES** Depends on oil condition, but normally 2 sets for restoration and 1 set per year for maintenance. | | | | |
| Particulate Filter | 1x 601844 | 1x 601844 | 1x 601844 | 1x 601844 |
| Acid/Varnish/Coking Filter | 1x 600503J | 2x 600503J | 1x 600524J | 2x 600524J |
| Acid Removal Capacity Per Set at System Sizing | 0.30 | 0.30 | 0.36 | 0.44 |

## Recommended Water and Oxygen Removal System

Aside from operating temperature, the rate of lubricant breakdown/oxidation is related to the amount of water, oxygen and metals the lubricant is exposed to. Combined with the optional TMR™ $N_2$ water and oxygen removal system, SVR™ Aero offers the dual capability of both cleaning and protecting aero-derivative turbine lubricants, minimizing the rate of lubricant breakdown and extending oil life.

With the recommended TMR™ $N_2$ system option, the system will remove water and oxygen in the reservoir, limiting oxidation and protecting the lubricant during standby periods. See TMR™ $N_2$ system specification sheet for complete details.

| SVR SYSTEM SIZE | SVR 150 Aero | SVR 300 Aero | SVR 600 Aero | SVR 1200 Aero |
|---|---|---|---|---|
| TMR™ N2 PART NUMBER | 601902 | 601902 | 601902 | 601903 |
| N2 Output – Manual Control with Flow Meter (LPM/SCFH) | 0-25/0-50 | 0-25/0-50 | 0-25/0-50 | 0-50/0-100 |
| Pre-set Flow Rate (LPM/SCFH) | 14/30 | 14/30 | 14/30 | 21/45 |
| % N2 at Pre-set Flow Rate at 0.69 MPa/100 psi, Air Temp. of 21°C/70°F | 97% | 97% | 97% | >97% |

## Additional Resources

1. Combined Cycle Journal: Lubricant Varnishing and Mitigation Strategies
2. Modern Power Systems: Turbine Lubricant Maintenance for Varnish Free Operation
3. MPC Varnish Potential Testing (ASTM 7843) White Paper
4. ICB™ filters for SVR™ systems: ICB 600503, ICB 600524



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