Technical Data Sheet

AeroShell **Turbine** *Oil 390*

Synthetic lubricating oil for aircraft turbine engines

AeroShell Turbine Oil 390 is a 3 mm^2/s synthetic diester oil incorporating a carefully selected and balanced combination of additives to improve thermal and oxidation stability and to increase the load carrying ability of the base oil.

DESIGNED TO MEET CHALLENGES

Main Applications

- AeroShell Turbine Oil 390 was developed primarily as an improved 3 mm^2/s oil for British turbo-jet engines. AeroShell Turbine Oil 390 is fully approved for a wide range of turbine engines.
- More recently, because of the low temperature characteristics of AeroShell Turbine Oil 390, there is interest in using this oil in auxiliary power units (APU) in order to overcome the effects of cold soak. Normal practice is to shut down the APU during cruise, the APU then experiences cold soak, often prolonged, and when the unit is started there is considerable difficulty resulting in the unit not coming up to speed in the given time, thus causing a hung start.
- In such cases where the APU is subject to a long cold soak the viscosity of standard 5 mm^2/s oils used in the APU will increase from 5 mm^2/s at 100^{0}C to typically 10,000 mm^2/s at –40^{0}C. At this much higher viscosity the oil cannot flow easily leading to a large viscous drag within the APU, thereby contributing to the difficulty in starting. AeroShell Turbine Oil 390 on the other hand experiences a much smaller viscosity increase (typically 2000 mm^2/s at –40^{0}C) with a reduction in viscous drag which is often sufficient to overcome hung start problems.
- All experience to date shows a considerable improvement in cold reliability of the APU when AeroShell Turbine Oil 390 is used.

Specifications, Approvals & Recommendations

- DEF STAN 91-94
- Russia: analogue to IPM -10, VNII NP 50-1 4f and 4u, and 36Ku-A
- Joint Service Designation OX-7

APUs:

- Honeywell: All APUs for 3cSt oils
- Pratt & Whitney: APS Series for 3cSt oils, PW901, PW980

Industrial Gas Turbines & Marine:

- Rolls Royce: Spey & Tay

For a full listing of equipment approvals and recommendations, please consult your local Shell Technical Helpdesk.

Typical Physical Characteristics

Properties			Method	DEF STAN 91-94	Typical
Oil type				-	Synthetic ester
Density	@15^{0}C	kg/m^3	ISO 12185	Report	924
Kinematic Viscosity	@40^{0}C	mm^2/s	ASTM D445	16.0 max	12.9
Kinematic Viscosity	@100^{0}C	mm^2/s	ASTM D445	4.0 max	3.4
Kinematic Viscosity	@-54^{0}C	mm^2/s	ISO 3104	13 000 max	<13 000
Total Acidity		mg KOH/g	SAE-ARP-5088	Report	Passes

Properties		Method	DEF STAN 91-94	Typical
Foaming Characteristics Sequences I,II,III Tendency/Stability	ml/ml	ASTM D892	Must pass	Passes
Trace metal content	ppm	ASTM D4951	Must pass	Passes
Elastomer compatibility, % weight change after 24/120 hours Nitrile		Def Stan 05-50 (Part 61) Method 22	Report	Passes
Elastomer compatibility, % weight change after 24/120 hours Fluorocarbon		Def Stan 05-50 (Part 61) Method 22	Report	Passes
Elastomer compatibility, % weight change after 24/120 hours LCS Fluorocarbon		Def Stan 05-50 (Part 61) Method 22	Report	Passes
Elastomer compatibility, % weight change after 24/120 hours Silicone		Def Stan 05-50 (Part 61) Method 22	Report	Passes
Corrosivity		Def Stan 05-50 (Part 61) Method 3	Must pass	Passes
High temperature oxidative stability		Def Stan 05-50 (Part 61) Method 9	Must pass	Passes
Load carrying ability		IP 166	Report	Passes

These characteristics are typical of current production. Whilst future production will conform to Shell's specification, variations in these characteristics may occur.

Health, Safety & Environment

- **Health and Safety**

  This product is unlikely to present any significant health or safety hazard when properly used in the recommended application and good standards of personal hygiene are maintained.

  Avoid contact with skin. Use impervious gloves with used oil. After skin contact, wash immediately with soap and water.

  Guidance on Health and Safety is available on the appropriate Safety Data Sheet, which can be obtained from https://www.epc.shell.com

- **Protect the Environment**

  Take used oil to an authorised collection point. Do not discharge into drains, soil or water.

Additional Information

- **Advice**

  Advice on applications not covered here may be obtained from your Shell representative.