



# AeroShell Turbine Oil 560

AeroShell Turbine Oil 560 is a third generation, high performance, low coking 5 mm<sup>2</sup>/s synthetic hindered ester oil incorporating a carefully selected and finely balanced combination of additives to improve thermal and oxidation stability.

## DESIGNED TO MEET CHALLENGES

### Main Applications

- Changes which have taken place over the last twenty years in engine performance (in terms of improved fuel consumption, higher operating temperatures and pressures) and maintenance practices have resulted in increased severity in lubricant operating conditions.
- AeroShell Turbine Oil 560 was developed to withstand the hostile environments of today's high powered, high compression engines in which the older generation of oils can be stressed up to and beyond their thermal limits, as evidenced by oil coking in the high temperature bearing areas.
- By overcoming the problems associated with using old technology oils in new technology engines, AeroShell Turbine Oil 560:
- maintains a cleaner engine
- provides improved load carrying capacity
- reduces maintenance costs
- prolongs bearing life
- in both new and existing engines.
- In order for military authorities to take advantage of this better performance in military engines the specification MIL-PRF-23699 was re-written to include a "High Thermal Stability" (HTS) grade as well as the Standard (STD) and Corrosion Inhibited (C/I) grades. AeroShell Turbine Oil 560 is fully approved as an HTS oil. With the advent of the new civil turbine oil specification, SAE AS5780, which has more stringent requirements than the military specification, AeroShell Turbine Oil 560 was approved as a SPC (Standard Performance Capability) oil.
- With effect from January 1st 2002, AeroShell Turbine Oil 560 has been manufactured with an improved formulation to further enhance its anti-coking performance.

- AeroShell Turbine Oil 560 contains a synthetic ester oil and should not be used in contact with incompatible seal materials and it also affects some paints and plastics.

### Specifications, Approvals & Recommendations

- Approved MIL - PRF -23699G Grade HTS (US) Approved SAE AS5780B Grade SPC
- Equivalent DEF STAN 91-101 (British)
- Equivalent DCSEA 299/A (French)
- Analogue to VNII NP 50-1-4F, B3V, LZ-240, VNII NP 50-1-4U and 36/Ku-A (Russian)
- NATO Code O-154
- Joint Service Designation : Equivalent OX-27
- Pratt & Whitney : Approved 521C Type II
- General Electric : Approved D-50 TF1
- Allison : Approved EMS-53 (Obsolete)
- COMAC Approved to QPL-CMS-OL-202
- **AeroShell Turbine Oil 560 is approved for use in all models of the following engines:**
- Honeywell : TFE 731, TPE 331, APUs (majority of models), LTS 101, LTP 101, ALF 502, LF 507, AS907, AS977, GTCP 30, 36, 85, 331, 660, RE220
- Allison (Rolls-Royce) : 250 Series
- BMW - Rolls-Royce : BR710, BR715
- CFM International : CFM 56 (all models)
- CFE 738
- Engine Alliance: GP7200
- GE 90, CF6 (all models), CJ610, CF700, CT34, GEnX
- IAE : V2500 Series
- IHI : FJR 710
- Hamilton Sundstrand : APS 500, 1000, 2000, 3000

- Pratt & Whitney : JT3D, JT8D, JT9D, PW4000 Series (cleared for flight evaluation in PW2000 engines)
- Pratt & Whitney Canada : PT6T, PT6A (some models only), PW120,121 Series, JT15D, PW200 Series, PW300 Series, PW500 Series, PW901A APU
- Rolls-Royce : Spey, Tay RB183, Adour, RB199
- Turbomeca : Arriel, Arrius, Makila, RTM 322, TM 319, TM 333, TP 319, MTR 390, various models of Astazou and Artouste engines
- Full details of the approval status of AeroShell Turbine Oil 560 in APU's and other engines/accessories is available.
- For a full listing of equipment approvals and recommendations, please consult your local Shell Technical Help Desk.

### Typical Physical Characteristics

Properties			MIL-PRF-23699G Grade HTS	Typical
Oil type			Synthetic ester	Synthetic ester
Kinematic viscosity	@100°C	mm <sup>2</sup> /s	4.90 to 5.40	5.24
Kinematic viscosity	@40°C	mm <sup>2</sup> /s	23.0 min	26.71
Kinematic viscosity	@-40°C	mm <sup>2</sup> /s	13000 max	9351
Flashpoint Cleveland Open Cup		°C	246 min	268
Pourpoint		°C	-54 max	-60
Total Acidity		mgKOH/g	1 max	0.20
Evaporation Loss 6.5 hrs	@204°C	% m	10.0 max	2.0
Foaming			Must pass	Passes
Swelling of Standard Synthetic Rubber - SAE-AMS 3217/4, 72 hrs	@204°C	swell %	5 to 25	12.9
Elastomer compatibility, % weight change after 24/120 hours: Fluorocarbon	@200°C		10/15 max.	7.5/9.0
LCS Fluorocarbon	@200°C		10/20 max.	6.5/8.5 max.
Nitrile	@130°C		Report	6.5/6.0
Silicone	@175°C		Report	14.5/13.5
Perfluoroelastomer	@200°C		N/A	0.5/0.5
Thermal Stability / Corrosivity 96 hrs - Metal weight change	@274°C	mg/cm <sup>2</sup>	4 max	0.23
Thermal Stability / Corrosivity 96 hrs - Viscosity change @37.8°C		%	5 max	0.3
Thermal Stability / Corrosivity 96 hrs - Total acid number change		mgKOH/g	6 max	1.5
Corrosion & Oxidation Stability 72 hrs	@175°C		Must pass	Passes
Corrosion & Oxidation Stability 72 hrs	@204°C		Must pass	Passes
Corrosion & Oxidation Stability 72 hrs	@218°C		Must pass	Passes
HLPS dynamic coking @20hrs	@375°C	Deposit mg		
Ryder gear test, relative rating Hercules A		%	102	112
Bearing test rig (100 hrs), Type 1 1/2 conditions - Overall deposit demerit rating			80 max	21

Properties		MIL-PRF-23699G Grade HTS	Typical
Bearing test rig (100 hrs), Type 1 1/2 conditions - Viscosity change at 40°C	%	-5 to +30	24
Bearing test rig (100 hrs), Type 1 1/2 conditions - Total Acid Number change	mgKOH/g	2.0 max	0.81
Bearing test rig (200hrs), Type 1 1/2 conditions - filter deposits	g	3 max	0.55
Sonic shear stability - viscosity change @40°C	%	4 max	0.3
Trace metal content		Must pass	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**

Guidance on Health and Safety is available on the appropriate Material Safety Data Sheet, which can be obtained from <http://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

- AeroShell Turbine Oil 560 is also approved for use in the industrial and marine versions of the Rolls-Royce RB211-22, Avon, Spey, Olympus and Tyne engines, Pratt & Whitney GG3/FT3, GG4/FT4, GG12/FT12, GG8/FT8 engines, all General Electric LM Series of units, some Honeywell and Turbomeca industrial engines and certain Solar gas turbine engines.

- **Advice**

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