



# AeroShell Ascender

## *Synthetic lubricating oil for aircraft turbine engines*

AeroShell Ascender is a “fourth generation” turbine engine oil developed with a high performance, low coking, 5 mm<sup>2</sup>/s synthetic hindered ester basestock combined with a state of the art additive system, to both improve thermal and oxidation stability and provide superior elastomer compatibility.

### DESIGNED TO MEET CHALLENGES

#### Performance, Features & Benefits

The value of AeroShell Ascender lies in its ability to deliver both low coking and elastomer compatibility/seal integrity. Until recently, it had been commonly accepted that the two are mutually exclusive, so that improving the oil's properties in one regard meant compromising the other.

For airline operators, this problem can be expensive in terms of prematurely degraded seals. With AeroShell Ascender, Shell Aviation has developed a product that now deals with this problem so operators no longer have to choose between coking performance and elastomer compatibility.

- **Excellent elastomer seal compatibility**

Reduced chance of seal swell or degradation leading to high oil consumption and cost of changing the seals

- **Low coking performance**

Less chance of oil coke build-up in bearing chambers and service pipes resulting in lower maintenance and cleaning costs

- **Improved oxidation and thermal stability**

Extended oil life during arduous engine conditions

- **Excellent compatibility with other approved oils**

No issues or concerns when changing from one approved oil to AeroShell Ascender

- **A 'High Performance Capability' grade oil**

Improved performance over traditional 'standard' grade oils can help reduce maintenance costs and extend engine life

#### Main Applications

AeroShell Ascender was developed for the latest generation of gas turbine engines as a low-coking, high compatibility product. Its improved thermal and oxidative stability will ensure negligible coke formation in engines, so any traditional engine problems associated with coke should never occur. It has also been tested extensively for elastomer compatibility, which is a known service problem. AeroShell Ascender therefore offers the customer the balance of low coking performance with excellent elastomer compatibility.

AeroShell Ascender will also deliver performance benefits in today's existing 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.

#### Specifications, Approvals & Recommendations

- SAE AS5780D Grade HPC
- MIL-PRF-23699G Grade HTS
- DEF STAN 91-101 (British) equivalent
- DCSEA 299/A (French) equivalent
- NATO Code O-154
- Joint Service Designation OX-27 equivalent
- Pratt & Whitney 521C Type II
- General Electric D-50 TF 1

For the latest approval, please confirm with the equipment manufacturer.

AeroShell Ascender is approved for use in the following engines:

- CFM: CFM56 and LEAP for in-service evaluation
- General Electric: GENx, Passport, GE9X, Catalyst and GE90 (for in-service evaluation)
- GE Honda: HF120 series
- Pratt & Whitney, Canada: PW307
- Rolls-Royce: RB211, Trent series, BR700 series

APU:

- Pratt & Whitney: APS Series for 5cSt oils
- Industrial Gas Turbines:
- Siemens: SGT 05 and 65

### Typical Physical Characteristics

Properties	Method	SAE AS5780D Grade HPC	Typical
<b>Oil Type</b>		Synthetic ester	Synthetic ester
<b>Kinematic viscosity</b> @ 100°C mm <sup>2</sup> /s	ASTM D445	4.90 to 5.40	5.02
<b>Kinematic viscosity</b> @ 40°C mm <sup>2</sup> /s	ASTM D445	23.0 min	25.77
<b>Kinematic viscosity</b> @ -40°C mm <sup>2</sup> /s	ASTM D2532	13 000 max	<12 000
<b>Flashpoint (COC)</b> °C	ASTM D92	246 min	266
<b>Pourpoint</b> °C	ASTM D97	-54 max	<-54
<b>Total Acidity</b> mgKOH/g	SAE-ARP-5088	1.0 max	0.26
<b>Evaporation loss 6.5 hrs</b> @ 204°C %m	ASTM D972	10 max	2.0
<b>Foaming tendency</b>	ASTM D892	Must pass	Passes
<b>Swelling of standard synthetic rubber SAE-AMS 3217/4, 72 hrs</b> @ 204°C swell %	FED-STD-791 M.3604	5 to 25	16.24
<b>Elastomer compatibility, % weight change after 24/120 hrs: Fluorocarbon</b> @ 200°C	DEF STAN 05-50 M.22	11/15 max	Passes
<b>Elastomer compatibility, % weight change after 24/120 hrs: LCS Fluorocarbon</b> @ 200°C	DEF STAN 05-50 M.22	12/20 max	Passes
<b>Elastomer compatibility, % weight change after 24/120 hrs: Nitrile</b> @ 130°C	DEF STAN 05-50 M.22	19/19.5 max	Passes
<b>Elastomer compatibility, % weight change after 24/120 hrs: Silicone</b> @ 175°C	DEF STAN 05-50 M.22	14.5/14.5 max	Passes
<b>Elastomer compatibility, % weight change after 24/120 hrs: Perfluoroelastomer</b> @ 200°C	DEF STAN 05-50 M.22	2/2 max	Passes
<b>Thermal Stability / Corrosivity 96 hrs - metal weight change</b> mg/cm <sup>2</sup>	FED-STD-791 M.3411	±4.0 max	Passes
<b>Thermal Stability / Corrosivity 96 hrs - viscosity change</b> %	FED-STD-791 M.3411	±5.0 max	0.2
<b>Thermal Stability / Corrosivity 96 hrs - Total Acid Number Change</b> mgKOH/g	FED-STD-791 M.3411	6.0 max	1.4
<b>Corrosion and oxidation stability, 72 hrs</b> @ 175°C	ASTM D4636 - Alternate Proc.2	Must pass	Passes

Properties		Method	SAE AS5780D Grade HPC	Typical
Corrosion and oxidation stability, 72 hrs	@ 204°C	ASTM D4636 - Alternate Proc.2	Must pass	Passes
Corrosion and oxidation stability, 72 hrs	@ 218°C	ASTM D4636 - Alternate Proc.2	Must pass	Passes
Ryder gear test, relative rating Hercules A	%	FED-STD791 M.6508	102 min	Passes
Bearing test rig Type 1 ½ conditions, Overall deposit demerit rating	200 hrs	FED-STD791 M.3410	40 max	Passes
Bearing test rig Type 1 ½ conditions, Viscosity change	@ 40°C %	FED-STD791 M.3410	0 to +35	Passes
Bearing test rig Type 1 ½ conditions, Total acid number change	mgKOH/g	FED-STD791 M.3410	2.0 max	Passes
Bearing test rig Type 1 ½ conditions, Filter deposits	g	FED-STD791 M.3410	1.5 max	Passes
HLPS dynamic coking @ 20hrs	@ 375°C Deposit mg	SAE-ARP-5996	0.4 max	0.15
HLPS dynamic coking @ 40hrs	@ 375°C Deposit mg	SAE-ARP5996	0.6 max	0.32
Sonic Shear stability - viscosity change	@ 40°C %	ASTM D 2603	4 max	0
Trace metal content		ASTM D5185 or D6595	Must pass	Passes
Sediment	mg/l	FED-STD 791 M.3010	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

AeroShell Ascender 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.