
**Shell Aviation**
Shell Centre, York Road
London SE1 7NA
UK

www.shell.com/aviation

# TURBINE ENGINE OIL.
# RE-INVENTED.

AeroShell
Ascender
SCIENCE IN FLIGHT

# A new benchmark -

# for high performance turbine engine oils

**For many years the world's finest aviation scientists struggled with a problem that seemed almost impossible to solve.**

**The challenge was to produce a High Performance Capability (HPC) oil that could deliver the optimum balance between low coking and elastomer integrity.**

In the past, no HPC oil had managed to achieve this, because improving the oil's low coking properties always meant that engine elastomer seals deteriorated faster.

It meant that some of the benefits of using a higher performing oil were instantly neutralised, and airline operators still faced the same problems of aircraft downtime and reduced profitability.

No oil formulation, it seemed, could capture the ideal balance - until now...

...enter AeroShell Ascender.

**Coke deposit comparison tests on bearing housings**

**AEROSHELL ASCENDER**
COKE DEPOSITS ON BEARING HOUSINGS WERE MINIMAL AFTER TESTING.

**COMPETITOR**
COKE DEPOSITS WERE VISIBLY MUCH HEAVIER AFTER THE SAME TEST.

**What makes AeroShell Ascender so different?**

AeroShell Ascender takes turbine engine oils to a completely new dimension. It has been specifically developed to provide the optimum balance between low coking and elastomer compatibility. It's also designed to cope comfortably with the new generation of jet engines – where conditions are hotter and maintenance intervals are longer.

**Back to basics - to meet demanding specifications**

In formulating AeroShell Ascender, our scientists went right back to basics, effectively reinventing the oil's DNA.

Over ten years of exhaustive research and development, we listened to customers, OEMs and engine specialists. We tested our prototype oil more rigorously than any other AeroShell product in Shell Aviation's history, with the goal of delivering a formulation with the optimum balance.

**The results**

AeroShell Ascender became the first new formulation to fly through the new civil turbine oil specification SAE AS5780A approval process, setting a new benchmark for high performance turbine oils. For us, it's a significant achievement.

**For you, it means less coking, more protection, greater seal integrity.**

**Extended component life and a cleaner, more reliable engine through our technologically advanced formulation.**

**Examples of the differences between the performance of Standard and High Performance Capability oils according to SAE AS5780A**

| Oxidation & Corrosion Stability, 72 hours @ 204 °C | Standard | HPC |
|---|---|---|
| Viscosity Change, % | -5 to +25 | 0 to +22.5 |
| TAN Change, mg KOH/g | 3.0 max | 2.0 max |
| Sediment, mg/100 mL | 50 max | 25 max |

# Shell Aviation's most tested lubricant

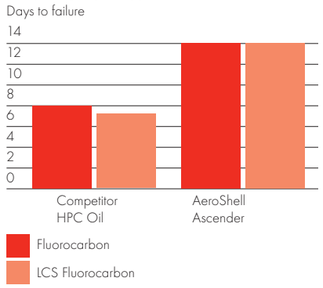
**AeroShell Ascender has been in development for a decade. During that time, we've conducted extensive discussions with customers and engine manufacturers to get to the heart of their needs.**

We asked them what they were looking for in a new generation turbine oil. The answers were simple...

- Low coking propensity
- High resistance to oxidation
- Exceptional elastomer compatibility
- To meet the needs of the engines of today and tomorrow
- Unmatched compatibility with other turbine engine oils

These were demanding requirements that called for an unprecedented degree of testing.

**Embrittlement Test**




**ELASTOMER COMPATIBILITY TEST (EMBRITTLEMENT), DEF STAN 05-50, PART 61, METHOD 22**
AEROSHELL ASCENDER LASTED ALMOST TWICE AS LONG AS A COMPETITOR HPC OIL IN TESTS WITH FLUOROCARBON ELASTOMERS

**AEROSHELL ASCENDER**
AFTER EIGHT DAYS THE O-RINGS WERE FULLY INTACT - **PASS**

**COMPETITOR HPC OIL**
AFTER EIGHT DAYS THE O-RINGS SHOWED EXCESSIVE DEGRADATION - **FAIL**

**Good enough is not enough**

Over the last ten years, AeroShell Ascender has been subjected to more tests than any other product in the history of Shell Aviation.

Our customers didn't want an oil that was just adequate - they demanded a new, innovative product to match the exacting requirements of today's turbine engines.

So our dedicated team developed our prototype oil and put it through an exhaustive programme of tests. And the results were ground-breaking: AeroShell Ascender sailed through the toughest tests in a manner that's almost unprecedented.

For example, in the industry-standard Elastomer Test, AeroShell Ascender lasted almost twice as long as other competitors' oils in tests with fluorocarbon elastomers.

AeroShell Ascender also passed every other test comfortably: coke deposits were considerably reduced and engine seals lasted longer.

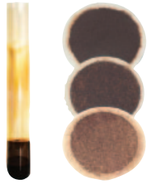
Developed and tested without compromise, we believe that AeroShell Ascender represents **a new benchmark for High Performance Turbine Oils.**

**Oxidation/Corrosion Test**

**THE OXIDATION/CORROSION TEST - FTM-791C METHOD 5308 (MOD)**
AFTER 72 HOURS @ 218°C COMPETITOR SPC OIL - BELOW RIGHT - REQUIRED 3X FILTERS TO CAPTURE THE SLUDGE. AEROSHELL ASCENDER - BELOW LEFT - BARELY DISCOLOURED SINGLE FILTER

**AEROSHELL ASCENDER**

**COMPETITOR SPC OIL**



## Specifications

| | |
|---|---|
| SAE | Approved AS5780A |
| U.S. | Approved MIL-PRF-23699F HTS Grade |

## Properties

| Property | HPC Spec Limits | AeroShell Ascender | Competitor HPC | Competitor SPC |
|---|---|---|---|---|
| Kinematic Viscocity @ 40°C | Min 23.0mm²/s | 25.00 | 26.49 | 25.28 |
| Kinematic Viscocity @ 100°C | Min 4.9mm²/s | 4.928 | 5.167 | 4.991 |
| Kinematic Viscocity @ -40°C | Max 13,000mm²/s | 11,450 | 11,870 | 10,640 |
| Viscocity @ 200°C | Report mm²/s | 1.35 | 1.43 | 1.38 |
| Viscocity Stability @ -40°C | Max 6% | 0.00% | 0.2% | -0.3% |
| Density @15°C | Report | 991.7 | 996.6 | 1.0001 |
| Pour Point | Max -54°C | -57°C | -60°C | -60°C |
| Flash Point (COC) | Min 246°C | 260°C | 250°C | 252°C |
| **Foaming Characteristics - tendency/stability (1 min)** | | | | |
| Sequence I | 25mls/Nil | 10/Nil | Nil/Nil | 10/Nil |
| Sequence II | 25mls/Nil | Nil/Nil | Nil/Nil | 10/Nil |
| Sequence III | 25mls/Nil | 10/Nil | Nil/Nil | 10/Nil |
| **Total Acid Number (TAN)** | | | | |
| Fully formulated oil | 1.0mgKOH/g Max | 0.23 | 0.38 | 0.06 |

# AeroShell Ascender

## The oil your engines have been waiting for

**But AeroShell Ascender hasn't just set a new standard for HPC oils - it can also help take your business to a new level.**

### How?

It's quite simple.

**The advantages of AeroShell Ascender's advanced formulation translate into:**

- Minimal downtime
- Greater reliability
- Reduced maintenance costs
- Better performance – in the air and on the balance sheet

Greater balance and protection, less coking, improved engine stability, increased mechanical confidence: these all add up to a solution that will keep both engineers and financial controllers happy.

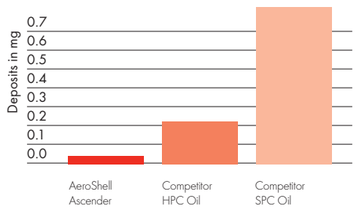
**Oil compatibility change-over procedure**

When changing from one approved oil to another, the recommended method is to change by 'top off' during normal servicing of the engines, and is the method preferred by the majority of engine manufacturers. Field experience and laboratory testing have demonstrated that this method has the least impact on the engine and helps maintain the equilibrium of the oil system.

However operators should always refer to the engine maintenance manuals or service bulletins to confirm that the 'top-off' method is acceptable for their specific engine type.

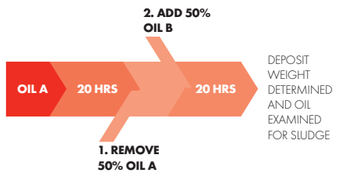
**The next generation of aircraft is on the runway. And so is the next generation of High Performance Turbine Oil.**

**Hot Liquid Process Simulator (2 phase modified)**
(HLPS)




**HLPS TEST**
HLPS – SINGLE PHASE - DESIGNED TO REPLICATE OIL FEED PIPE SCENARIOS.
HLPS – TWO PHASE – INTRODUCES HOT TURBULENT AIR TO SIMULATE A BEARING CHAMBER/OIL SCAVENGE PIPE ENVIRONMENT.

**Oil compatibility**
Test procedure




**COMPATIBILITY WITH OTHER OILS**
IN A MODIFIED HLPS TEST SPECIFICALLY DEVELOPED TO VALIDATE THE CHANGE-OVER PROCESS, RESULTS SHOW NO UNEXPECTED SIDE EFFECTS OF TOPPING UP AEROSHELL ASCENDER WITH ANY OF THE OTHER SHELL OR COMPETITOR OIL GRADES.