Aviation Q & A's

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Q: I fly only 50 hours a year, live in a relatively humid climate, and my oil temp is below 160 F.

A: No. But some companies would like you to believe their products will protect your engine under all conditions. In reality, oils with anti-rusting properties, like AeroShell Oil W 15W-50 and AeroShell Oil W 100 Plus need to be part of a good maintenance and flying program.

Q: What is the best way to judge aviation oil?

A: Over the years, a number of oils have come and gone. Most new products perform great in one bench test or another, or even in a short-term engine test. But laboratory conditions may not duplicate real world conditions. The best way to judge oil is to see how it performs in actual service, under real world conditions. Some of these conditions may include sitting for weeks at a time, starting in less than ideal conditions, and flying on days that your mother would have told you to stay home. Oils with a proven track record, like AeroShell oils, can be counted on to deliver top performance year after year.

Q: I like to use multi-grade oil for better cold starts, but like protection of single grade oil?

A: The old adage that one should never change oil types was based on problems with some oils with very "unusual" technology that were in the marketplace over 50 years ago. Present oils are compatible. So many pilots use AeroShell Oil W 15W-50 multi-grade in the winter months and then switch to AeroShell Oil W 100 or AeroShell Oil W 100 PLUS single grade in the summer months. You may see small changes in oil temperature or oil consumption with this change, but it will not hurt your engine.

Q: Are AeroShell multi-grade and AeroShell single grade oils compatible?

A: The compatibility question covers two issues: mixing one grade of AeroShell oil with another; and the effects on the engine of changing from one AeroShell grade to the other. If you typically run on AeroShell multi-grade, and you find yourself in a place where only AeroShell single grades are available, you can safely add the AeroShell single grade to your engine. They are completely compatible. If you run on an AeroShell single grade during the summer, but want to switch over to AeroShell Oil W 15W-50 Multi-grade for the winter, you can safely replace the straight weight with the multi-grade at your regular drain interval. The idea that you have to stick with the type of oil you started with comes from the days of unusual chemistry when the resulting oils were incompatible. All approved SAE J-1899 (former MIL-L-22851) and SAE J-1966 (former MIL-L-6082) AeroShell oils are compatible. For example, if you have a high-time engine run on ashless dispersant oils and need to replace a cylinder, you can switch to a mineral oil for 50 hours or so to break in the new cylinder. The only time Shell recommends against switching is in a high-time engine run exclusively on straight mineral oil. Here, a switch to ashless dispersant oil can loosen deposits left behind by the mineral oil.

Q: Will my oil temperature be higher or lower with a multi-grade?

A: In most cases, the multi-grade oil will run cooler. For a hot-running engine, like turbocharged, high performance or aerobatic aircraft engines, this is good, but for a cool-running engine it can be a disadvantage. If the engine runs too cool, it can't boil off excess moisture and unburned fuel, so there can be a tendency to form acid buildup. For cooler-running engines, pilots should use a winterizing kit, or check with their mechanics on how to keep oil temperature up.

Q: When I drain my oil, should the engine be hot?

A: Yes. This can be very difficult on some aircraft, but it is recommended. The reason for changing oil when the engine is hot is to avoid the settling of dirt and water in a cold engine. When the engine is fully warmed, then drained, a higher percentage of contaminants are drained away with the old oil. When the engine is drained cold, more of these contaminants remain in the oil in the bottom of the pan, which results in more contaminants mixing with the new oil.

Q: Does an oil change just include draining the hot oil, changing and inspecting the filter, & refill?

A: No. The pilot or mechanic should always review the manual for proper procedures. For example, on most engines an inspection of the oil pan's suction screen is recommended at each oil change. Although one may rarely find anything during a maintenance check, it's not worth taking the risk.

Q: Why does oil turn black between oil changes, and why does the time it takes to change color vary?

A: When a straight mineral oil turns dark or black, it usually means that the oil is starting to oxidize and needs to be changed. Because mineral oil doesn't absorb much of the dirt and sludge in your engine, the oil stays clean and the inside of your engine gets dirty. Ashless dispersant oils, on the other hand, are designed to get dirty so that the engine will stay clean. Just how quickly the oil turns black depends on a number of factors, including the condition of the engine, the dirt load, the oil temperature, the normal air/fuel mixture, the type of fuel, the time since the last service, and the frequency and duration of your flights. Basically, the important thing to remember is to change your ashless dispersant oil on calendar and engine time, not according to its color. Also, oil analysis can help ensure that the oil is still in good condition even though it may have turned black.

Q: What can I do to ensure the accuracy and value of an oil analysis?

A: Oil analyses can help you discover engine problems before they turn into major failures. But the analysis information gained is only as good as the sampling procedure. Also, a single test is not enough to reveal trends and significant changes and can only tell you if there is already a serious problem like a scuffed piston. Take oil samples properly. For best results, take the sample about midway through the draining of hot oil from your sump. A sample pulled off at the beginning or end of the oil change may appear dirtier than it really is. Sample the oil the same way every time. An improperly taken sample can lead to some seriously inaccurate conclusions about engine malfunctions. Rely on a series of consistent tests over time. You're looking for significant changes or trends over time, not absolute values.

People want to label the results of a single test as good or bad, but the system doesn't usually work that way. Say you're buying a used aircraft. Don't rely on just one very good result of just one report – it

could have come from a 5- or 10-hour sample. Relatively constant numbers from the last six oil changes are a far better indicator that the engine is in good condition. Your record of regular oil changes and analyses is also helpful when selling an aircraft. Be consistent. If you change your oil at 50 hours, and then at 25 hours the next time, the first sample may show twice the wear metals. (Expect higher wear metals during break-in or following some maintenance procedures such as a cylinder replacement.) Finally, always remember that oil analysis should be part of a good maintenance program, not a replacement for one.

Q: Can I switch from a straight AeroShell mineral oil to a single grade ashless dispersant oil?

A: All AeroShell oils are compatible and can be mixed with each other. Many single grade customers try AeroShell Oil W 15W-50 during the colder part of the year, and then convert to using it year round. Others, however, choose to alternate between single grade and multi-grade depending on the time of year. Either system works well because AeroShell oils are entirely compatible and can be interchanged as desired. In addition, if you need to replace a cylinder on a mid-time engine, you can switch from AeroShell Oil W single grade or AeroShell Oil W 15W-50 to a straight AeroShell mineral oil for one or two changes to break in the new cylinder. Then you can switch back to the ashless dispersant oil after the rings are properly seated. If you have a mid-time engine that has been run exclusively on a straight mineral oil and wish to try ashless dispersant oil, use caution. The introduction of ashless dispersant oil into your engine could loosen up some of the carbon deposits. So check your oil screens and filters often to ensure against oil starvation and/or oil screen collapse.

Q: Will oil temperature affect the oil pressure in an aircraft engine?

A: Yes. The thickness, or viscosity, of oil is directly affected by the temperature. Therefore, if an engine's oil temperature is increased, there will be a small, but proportional, drop in the oil pressure as well.

Q: How can I determine which oil is qualified for my aircraft engine?

A: Both Lycoming and Continental recommend oils qualified under the following specifications for use in their engines:

- SAE J-1899 former MIL-L-22851 (for ashless dispersant oils)
- SAE J-1966 former MIL-L-6082 (for straight mineral oils, intended primarily for break-in)

Military and SAE specifications are the same except for some additional packaging requirements for the military. In the future, the military specification may be dropped, although oil containers will still probably refer to the former military specification. AeroShell® straight mineral oils, AeroShell Oil W single grades and AeroShell Oil W multi-grade oils all qualify under their respective specifications. The oil requirements for other aircraft engines such as Pratt & Whitney are less defined. All AeroShell and AeroShell Oil W oils are qualified for use in P&W radial piston engines. The oils for engines no longer in production may be listed by military specification or by product name. For more information, talk to an overhaul or repair shop that specializes in a particular engine, or call the Shell Technical Information Center at 1-800-231-6950. The selection of proper grease is clearly defined. For each grease point on a certified aircraft, the military specification or the qualified product is listed. AeroShell® greases are qualified under the following specifications:

- AeroShell GREASE 5 former MIL-G-3545-C
- AeroShell GREASE 6 MIL-G-24139A, former MIL-G-7711A
- AeroShell GREASE 7 MIL-PRF-23827C, TYPE II
- AeroShell GREASE 14 MIL-G-25537C
- AeroShell GREASE 16 former MIL-G-25760A, BMS-3-24A
- AeroShell GREASE 17 MIL-G-21164D
- AeroShell GREASE 22 MIL-PRF-81322F, Grade 2 DOD-G-24508A
- AeroShell GREASE 33 MIL-PRF-23827, TYPE I BMS-3-33A

Q: My oil temperature seems to be running low. Is this a problem?

A: Yes, low oil temperature can lead to excessive rusting and corrosion of critical engine parts. When an aircraft sits on the ramp or in a hangar, the engine heats up during the day and cools again at night. While the engine is cooling, some of the moisture in the air condenses on the engine walls and drops into the oil. This can form rust on internal engine components. The moisture can also react with by-products of combustion in the oil, forming acids which can lead to corrosion. The best way to remove this water is for the engine to boil it off during flight. Studies have shown that the temperature of your engine oil increases about 50°F as it circulates through the engine. Therefore, unless the oil temperature reaches 170°F to 180°F during flight, the engine will not boil off the water that has accumulated in the crankcase. The result: rust and corrosion. Note that an excessively high oil temperature will also cause problems. Here are some tips to help avoid oil temperature problems:

~ Check your oil temperature gauge for accuracy. It should read about 212°F when the sensor is placed in boiling water.

~ Monitor the oil temperature during flight. It should be about 180°F even in winter. If it is lower, you may need a winterization kit. Otherwise, check with your mechanic to see what is causing the excessively low oil temperature.

~ The unique additive feature in anticorrosion/antiwear AeroShell® Oil W 15W-50 can also help control problems caused by rust and corrosion.

Q: Will the synthetic portion of semi-synthetic AeroShell Oil W 15W-50 harm an aircraft engine?

A: A number of pilots have asked this question. The answer is a definite no. When Shell first started evaluating multi-grade aviation piston-engine oils over 25 years ago, testing proved that multi-grades formulated only with mineral base oils did not have adequate base oil viscosity (thickness) to properly lubricate all high load points in the engine. Then we tested and flight evaluated a formulation made with all-synthetic base oils.

This formulation had excellent antiwear characteristics in all tests run. However, in the flight evaluations, some engines would reach 600 to 900 hours, and then lose oil consumption control and/or compression. When the engines were disassembled, we found that the piston rings were covered with a gray tacky substance that was primarily made up of the lead by-products of combustion (from the use of leaded aviation gasoline). Although synthetics are excellent lubricants with good high temperature stability and very good low temperature flow characteristics, they are relatively poor solvents.

In an aircraft engine, the lead by-products of combustion must be dissolved by the base oil so they can

be carried away from the ring belt area and removed from the engine when the oil is changed. Anticorrosion, antiwear AeroShell Oil W 15W-50 is formulated with 50% synthetic base oils to give it the excellent low temperature flow needed for quick lubrication during cold starting.

The synthetic base oils, along with the unique antiwear additive system, give it antiwear protection unequaled by any other product on the market. In addition, its mineral base oils provide lead absorbency to guard against ring sticking and excessive sludge. The bottom line: The synthetic component of AeroShell Oil W 15W-50 will not harm your engine. Instead, it gives you the best of both oils.

Q: How can I safely dissipate a static charge generated when refueling?

A: Whenever fuel is poured, pumped or moved from one container to another, a static charge is generated. The same principle is in effect when you walk across a carpet in the winter and get a shock from a doorknob. The charge level and the distance that can be jumped or arced depends on several factors—pump rate, temperature, humidity and containers.

Static electricity is the reason why a ground wire is always connected to commercial airliners and transport trucks whenever fuel is being transferred. When you transfer fuel into your car or light aircraft, the hose has a built-in ground wire that acts as an electrical path to dissipate any static charge. As an added precaution, there is usually an excessively rich air/fuel ratio in the fill pipe which will not burn. There are two primary areas where a pilot should exercise caution when transferring fuel.

First is draining an aircraft tank. For example, if you're draining a wing tank, you should always connect a jumper cable from the plane to the fuel container. This will dissipate the charge and eliminate the chance of a spark jumping from plane to container, causing a fire. Remember, when you're draining fuel, there can be enough air circulation so that the air/fuel ratio is in the burnable range.

The second area of concern is the filling process. Many FBOs use a ground wire when filling an aircraft. But in some cases, fuel is transferred from a drum or can into an aircraft. Here, a jumper wire is a good safety precaution to ensure that the charge is dissipated. If you use a metal funnel with metal cans, make sure that the can, funnel and plane are always touching during transfer.

With metal containers, the electrical charge is dissipated to the conductive container where it can be discharged by a ground wire or contact. In plastic containers, there is no good electrically-conductive path to dissipate the charge. Although some people put metal strips into the plastic container, I would recommend the use of metal containers with a good jumper wire. It's the safer way to go.

Q: Do straight mineral oils have the same low temperature flow as straight ashless oils?

A: No. Due to the additive technology in ashless dispersant lubricants like AeroShell W Oils, the flow characteristics of each grade are roughly equivalent to the next higher grade straight mineral oil. For example, AeroShell Oil W 100 will flow at low temperatures about the same as AeroShell 80.

Q: What is "breaking in" of engine?

A: First, if you're "breaking in" your engine on mineral oil during the winter, always take extra precautions to ensure that the engine is properly preheated prior to flight. For example, if your service bulletins recommend preheating the engine whenever the temperature is below 20°F, you may want to increase that to 30-35°F when using straight mineral oil.

Another concern is that mineral oil is more prone to oil cooler plugging at low temperatures. This is especially critical on aircraft used for high altitude flight where temperatures are even lower. If an aircraft is going to be broken in during the winter or at high altitudes, you should consider using a winterization kit. The kit will reduce airflow through the oil cooler and reduce the chance of oil cooler freeze-up. (However, be sure to remove the winterization kit when it's no longer needed.)

During winter break-in and high altitude flight, pilots should also be especially observant of their oil temperature and pressure. If the oil pressure or oil temperature moves significantly up or down in flight, you may be experiencing oil cooler plugging or bypassing. If this occurs, you should take appropriate action.

Q: If my aircraft engine has a Supplemental Type Certificate for automotive gasoline, can I break in?

A: No. Most of the metallurgy in the valve train of aircraft engines was designed to be operated on leaded fuels. Even 80/87 engines were designed for fuels with 0.5 gram per gallon lead. Experience has shown that the lead level in aviation gasoline is especially critical during break-in. So, if you're breaking in a new or an overhauled engine, make sure you use a leaded 80/87 or 100/130 low lead aviation gasoline for at least the first 50 hours of operation. Some fuel suppliers sell an unleaded 80/87, so make sure you're getting leaded gasoline for breaking in your engine.

Q: Do all AeroShell oils meet SAE specifications?

A: Yes. AeroShell straight mineral oils meet the SAE J-1966 former MIL-L-6082 specification. AeroShell Oil W single grade and antiwear, anticorrosion AeroShell Oil W 15W-50 meet the SAE J-1899 former MIL-L-22851 specification. The AeroShell containers are labelled with both the new SAE specifications and the "former" military specifications.

Q: What is the recommended oil consumption rate for my aircraft?

A: This is a question that doesn't have a definitive answer. Oil can be consumed or lost by three different routes in an engine: the rings, leaks and valve guides. In a good, tight engine, there should be very little oil consumption or loss by the guides and none through the leaks. That leaves the rings as your primary concern. The amount of oil going by the rings will vary depending on cylinder type and break-in process.

Assuming that the cylinders were broken in properly, oil consumption can still vary depending on the type of service and how the aircraft is flown. Even two identical engines (like on a twin), operated the same way, may have different oil consumption rates. So what's right? Engine manufacturers state that oil consumption of up to a quart an hour is acceptable on some models. (Some manuals for large radials say that anything over six gallons an hour is excessive.)

The best answer is that oil consumption will be at a certain level for each engine. Consumption changes shouldn't be compared to an absolute level, but rather to the level that your engine sets historically.

Q: Do AeroShell Oil W 15W-50 and AeroShell Oil W 100 perform the same in an engine?

A: The oils are similar, but there are some differences. The biggest difference is in cold flow characteristics. AeroShell Oil W 100 is up to 10 times thicker at cold temperatures than AeroShell Oil W 15W-50. However, at normal operating temperatures (around 200°F), both oils will have the same thickness or viscosity. Another major difference is that AeroShell Oil W 15W-50 and AeroShell Oil W 100 Plus have an antiwear additive which is not in AeroShell Oil W 100. This additive, along with the semisynthetic base oils, helps reduce friction and improve flow in AeroShell Oil W 15W-50.

These additives improve lubrication and reduce oil consumption past the oil rings. Conversely, the improved flow can increase oil loss through leaks or loose intake valve guides. So your oil consumption may go up or down if you switch from AeroShell Oil W 100 to AeroShell Oil W 15W-50. The improved flow and reduced friction characteristics of AeroShell® Oil W 15W-50 will also help reduce oil temperatures as opposed to using AeroShell Oil W 100. This is particularly important in engines that run hot, like turbocharged, high performance or aerobatic aircraft engines. Pilots should always remember to monitor oil temps to ensure that they're not too hot.

In cold weather, you should also make sure that the engine temperature is high enough to boil off the water that naturally accumulates in the crankcase. Temperatures in the 180° to 200°F range are recommended for most applications. Finally, if you have a marginal or slipping starter clutch, the antiwear additive in AeroShell Oil W 15W-50 may cause it to slip more than AeroShell Oil W 100. Understanding these differences can help you select the grade of AeroShell that's right for your plane.

Q: Does the W in AeroShell Oil W stand for winter?

A: No. The W is just a model designator to differentiate between AeroShell ashless dispersant oils (Oil W) and straight mineral AeroShell oils which have no letter designator.

Q: How often should I change my oil?

A: A good rule of thumb for changing piston engine oil is to change it every four months. Of course for every rule, there are at least two exceptions.

Exception #1: If you're able to fly frequently with proper oil temperature, you should adjust the four-month rule accordingly. Change out your oil after 50 hours if you've flown the hours in less than four months. If your engine doesn't have an oil filter, change it after 25 hours. Always remember: the four-month rule is the most critical.

Exception #2: In recent years, the annual flight hours of many private planes have decreased.

And where there's an idle plane, there's rust. When an airplane engine sits too long (especially in humid climates or if there is excess moisture in the oil because the oil temperature is too low), rust will form on many of the parts such as cams, lifters and cylinders. Then, once the plane has been started, the iron oxide will run through the entire engine oil system. While some of the larger pieces will filter out, many

of the smaller pieces will remain in the oil and can act as grit on critical wear surfaces. If you don't plan on flying your aircraft for four months or more, be sure to use a storage or preservative oil to protect your engine.

Q: How can I make sure my oil temperature is accurate and identify the correct oil temperature range?

A: Placing a permanent reference mark at 180°F on the green band of your oil gauge is a good way to get accurate readings. To do this, simply place your sending unit and an accurate, referenced thermometer in a steel container filled with oil, and slowly heat it to 180°F with a hot plate. You may not be able to hold 180°F constant, so first mark your gauge with a pencil as the oil temperature passes 180°F. Then let the oil cool back to 180°F. Repeat the process to ensure accuracy.

And be extra careful with the hot oil. In a naturally aspirated aircraft engine, a cruise oil temperature significantly below 170°-180°F will not ensure that the moisture in the oil is boiled off, especially during short flights. As oil goes through the engine, the highest instantaneous temperature will be about 50°F higher than the oil sump temperature. So, if you have an oil temperature of only 150°-160°F, the oil will not get above the 212°F necessary to boil off the water that can accumulate from condensation. The result is increased moisture and acid buildup in the crankcase, which will probably lead to rust and corrosion.

Knowing this is especially critical if your aircraft is not flown regularly and sits in a humid climate for weeks at a time. If your oil runs well below the 180°F mark, have your mechanic check your oil cooler system and vernatherm. Also, ask about a winterization kit.

Conversely, the concern with the typical turbocharged piston engine is excessive heat. In many of these engines, instantaneous oil temperature can increase 70°F or more at its hottest point versus sump temperature. These high temperatures can cause deposit buildup and increased wear due to improperly cooled components or low oil viscosity. (All oils, especially single grade oils, thin out as the temperature increases.) If your cruise oil temperature is well above 180°F (especially if it is significantly above 200°-210°F), have your baffles and seals checked.

Keep a close eye on your CHT, EGT, leaning procedure and other operating conditions. The oil you choose is as important to your plane's performance as regular maintenance. AeroShell® Oil W 15W-50 offers anticorrosion and antiwear protection for all kinds of aircraft engines

Q: How important is preheating my engine?

A: Preheating your engine makes a world of difference. This procedure heats the oil so it’s thin enough to flow through the engine and properly lubricate all critical wear surfaces. Preheating also heats the metal parts in the engine. That’s important because aluminum crankcases have a higher coefficient of thermal expansion than iron crankshafts.

This means as your engine cools down, the clearance is reduced. And as a result, you may not have sufficient oil film thickness for proper hydrodynamic lubrication at very cold temperatures. In other words, the wear rate is going up. If you’re using a pan type heater, make sure it’s a system that heats

the whole engine, not just the oil. Also, some “oil pan” heaters can raise the oil pan surface temperatures to over 300°F which, over time, can decrease the performance of the oil.

One final note of caution on heaters: Do not plug in a heater and leave it on for extended periods of time. If you have moisture in your oil, the heater will increase vaporization, which will condense on the cool, nonheated engine parts and increase rusting.

Airplane air/oil separators are also worthy of discussion. Separators are designed to remove the oil from the blow-by gas and return it to the crankcase. This reduces oil consumption and keeps the belly of the airplane clean. Properly installed, separators work well. However, if the system is installed with parts in a cool area under the engine cowling, it can condense all of the water evaporated from the oil and return it to the crankcase.

If you have a separator, make sure it’s properly installed with the exit tube in a low pressure area which will evacuate the water vapor and not force it back into the crankcase. While preheating and the proper air/oil separator are essential to long engine life, they are no more essential than the oil you use. AeroShell® Oil W 15W-50 offers unsurpassed anticorrosion and antiwear protection for all kinds.

Q: How important are baffles and seals to cylinder temperature?

A: Baffles and seals are critical to keeping an engine cool, yet they’re often overlooked. When you’re flying, air enters the cowling and creates static pressure above the engine. This pressure then forces cool air down through your cylinders and oil cooler to the lower pressure areas below and behind the engine. From there, the air travels out through the flaps or other flaring openings.

What’s important to consider is that there is only a given amount of air coming in through the cowling at any given time. If your baffles are broken or misshaped, the amount of air going past a particular cylinder or area will increase. And if you increase airflow in one area, then airflow past other cylinders and the oil cooler will decrease, leading to higher temperatures in some parts of the engine than others.

Seals can create similar problems. If your seals aren’t in good condition or aren’t properly adjusted, they’ll allow air to bleed out. This can reduce static pressure and cooling. So what can you do? Whenever you install a new engine, always have the baffles checked. Also, as part of your periodic inspections, check all the seals for fit and condition.

If the seals aren’t soft and pliable, replace them. Do this if your oil or cylinder temperatures seem abnormally high as well. Also check how the seals fit against the cowling. If there are noticeable gaps, adjust the seals to reduce air leakage. And be sure to inspect the holes at the rear of the cowling for excessive leakage. If your cylinder heads still run hot, it may be necessary for you or your mechanic to check the static air pressure above the engine during flight. The spec should be available from your airframe manufacturer.

Q: Do I need more than one grease for my plane?

A: For most aircraft, yes. It’s easy to think that all greases are the same. But using the wrong grease in the wrong application can cause serious problems. In fact, the correct selection and application of grease to the airframe is one of the most important choices a pilot, owner or mechanic can make.

Grease is vital in preventing metal to metal contact so that mechanisms resist wear and operate smoothly.

Grease also provides excellent protection against corrosion, one of the aviation industry's biggest concerns. And grease is truly unique as a lubricant because unlike oil, it stays where it is put. It seals against dust and dirt, and enables additives to be evenly held in dispersion. Generally, grease is composed of a base oil, thickeners and performance additives. Each of the ingredients lends its own inherent properties, and precise consistencies are necessary for the specific operating conditions in which the grease will be used. Never mix greases together.

It is also not advisable to substitute one type of grease for another. Just any grease may not satisfy the high/low temperature demands of icy wings and hot landings or meet seal compatibility or high load carrying requirements. Applying inappropriate grease to an operation can cause softening of the seals, grease leakage or ingestion of dirt and water into the bearings. How do you determine the proper grease for a given application? Become informed. Read the guides, air worthiness manuals and service bulletins put out by manufacturers.

Remember that the grease recommended by the manufacturer is the only product approved by the FAA for use in that application. For older aircraft, it may be necessary to consult the original airframe manufacturer for specific product recommendations. If the manufacturer is no longer in business, check the rebuilder, the supplier or call the Shell Technical Information Center at +1 800 231 6950.

Q: What is the correct procedure and the ideal environment for applying AeroShell Flight Jacket Plexico

A: Apply AeroShell Flight Jacket Plexicoat in a straight, overlapping motion to the window in the same direction as the airflow and allow it to dry to a haze. It doesn't take a lot of product to clean and protect the windscreen, so be cautious not to use too much, as it may cause a light film to form on the windscreen that will need to be wiped clean a second time.

AeroShell Flight Jacket Plexicoat is best applied in warm temperatures between 65ºF and 85ºF. If applied in direct sunlight or severe heat, be certain to apply it in smaller sections by dividing the windscreen into quarters and repeating every step for each quarter of the windscreen.