

system capabilities such as cargo fire suppression. The FAA believes equivalent cargo fire suppression capabilities should exist among the entire fleet of airplanes conducting ETOPS. The proposed regulation would require the modification of those airplanes. The FAA recognizes that a transition period to gain full compliance with the proposed rule is necessary for the industry. The FAA finds that these modifications can be accomplished within the scheduled maintenance D check cycle (6 years) based on ARAC recommendations. This proposal would grant the operator sufficient time to adequately plan for and incorporate necessary modifications in the 6-year time frame proposed.

The FAA recognizes this proposal would allow three and four engine airplanes to continue to operate on routes with diversion times up to and including 180 minutes without having to update time-limited system capabilities. The FAA seeks comment on how it should address this discrepancy in the future.

Proposed New Section 121.646 Fuel Supply Required Following Depressurization

We propose to add a new rule, section 121.646, to specify the fuel supply required following depressurization. Current regulations contain no requirement for a fuel supply sufficient to reach an en route diversion airport.

Explanation

ICAO Annex 6, Part I, section 4.3.6.4(d) requires consideration of additional fuel in the event of loss of pressurization. Fuel consumption increases considerably at the lower altitudes flown following a loss of pressurization. Although section 121.329 requires descent following cabin depressurization "to an altitude that will allow successful termination of the flight," there is no explicit requirement in part 121 for a fuel supply in the event of cabin depressurization to assure a safe landing. It should be noted that an interpretation can be made that fuel to provide for cabin pressurization is required because of the requirement of section 121.329.

Both AC 120-42 and 120-42A considered the fuel supply required at the most critical point in the ETOPS area of operation in the event of the cabin depressurization, and also considered the possibility of a simultaneous failure of an engine. As the probability of depressurization is comparable between two, three, and four-engine airplanes, the proposed

section 121.646 would retain the AC conditions for fuel supply to an ETOPS alternate in the event of cabin depressurization for all ETOPS operations.

For airplanes with more than two engines the section 121.329 implied fuel supply requirement becomes a proposed regulatory requirement. Paragraph 121.646(a) applies to operations more than 90 minutes (with all engines operating at cruising power) and less than 180 minutes (at the approved one engine inoperative cruise speed) from an adequate airport, while the requirements in paragraph 121.646(b) apply for operations greater than 180 minutes (at the approved one engine inoperative cruise speed) from an adequate airport.

Further, the AC required consideration of fuel for icing at the cabin depressurization cruise altitude and consideration of errors in wind forecasting. Studies done by the Atmospheric Environment Service of Canada with the assistance of airplane manufacturers under the second Canadian Atlantic Storms Program (CASP II) confirm that the probability of a continuous or repetitive significant icing encounter is very small on a long flight segment. The airspeeds associated with cruise at cabin depressurization altitude are not conducive to ice build-up. Moreover, pilots can avoid icing with minor changes in altitude or by changing the cruise speed, either of which can have a large effect on ice accretion. Based on the CASP II study, considering the probability of encountering depressurization at the critical point and icing on the same flight, an argument was made that fuel for icing in addition to fuel for depressurization is not deemed necessary. However, as a conservative measure, paragraph 121.646(b)(C)(iv) requires fuel to compensate for the greater of the effect of airframe icing (including the fuel used by engine and wing anti-ice during this period) during 10 percent of the time for which icing is forecast, or a combination of fuel for engine anti-ice, and for some models of airplanes based on their characteristics and the manufacturer's recommended procedures fuel for wing anti-ice for the time during which icing is forecast.

Based on the weather forecasting techniques of the early 1980s, the AC required a five percent fuel pad to account for wind forecast errors. However, winds aloft forecasting has improved dramatically in the last twenty years as a result of the following:

- The sophistication of wind forecast models have experienced a quantum improvement. These models provide

forecasts based on a wider range of inputs and more accurate extrapolation throughout the altitude profile.

- Wind forecasting responsibilities have been assigned to computers with vastly increased capacity, capability, and speed.

- The flow of input data has significantly increased; largely as a result of systems that automatically downlink weather information at much more frequent intervals. Additionally, weather is measured on a worldwide grid of collection points. This grid has nearly four times the collection points compared to the grid used previously.

- Information gleaned from satellite downlinks and satellite depictions of air mass movement are added to the data stream, not only to fine tune forecasting at frequently flown altitudes, but also to provide more accurate forecasts at lower altitudes (10,000 to 15,000 feet) where the decompression profiles are flown.

This information is collected, analyzed, and distributed worldwide by the World Area Forecast System (WAFS). This centralized distribution of weather information provides for a consistent level of accuracy that can eliminate the assignment of arbitrary penalties, provided that individual airlines subscribe to the service and make use of this level of information.

Therefore, given the documented improvements in forecasting accuracy when using WAFS, a more accurate means of determining the fuel used during a decompression profile involves adding a pad to the actual forecast winds in making the fuel calculation rather than adding an arbitrary fuel penalty. The addition of a five-percent wind error pad provides an accurate case-by-case adjustment as compared with a five-percent fuel penalty, while preserving the necessary level of safety. However, if a certificate holder elects not to use such accurate winds in the computation of decompression fuel, then the proposed rule will require the operator to continue applying the five percent fuel pad to account for wind forecast errors.

Section 121.646 requires accounting for any airplane performance degradation on the fuel requirement. In addition, if APU is a required power source, then its fuel consumption also must be accounted for.

Proposed New Paragraph 121.687(a)(6) Dispatch Release: Flag and Domestic Operations

We propose to add new paragraph 121.687(a)(6), which would add the ETOPS approval basis to the content of the dispatch release under which the flight is being dispatched.