European Union Aviation Safety Agency

FAQ n.19384

FAQs:

Classification of changes (non-avionics), General Aviation

Question:

What might lead to an "acoustical change"?

Answer:

A light propeller driven aircraft's certificated noise level is dependant on two factors, the aircraft's noise at source and the aircraft's take-off performance as defined the AFM. An adverse change to either could lead to a finding of an "acoustical change".

Factors that might adversely affect an aircraft's noise at source

The two principle sources of noise are the propeller and the engine.

Propeller noise is highly dependent on the propeller helical tip Mach number. Other factors that influence propeller noise include the number of blades, blade tip shape, blade thickness and the inflow angle of air flowing into the propeller. Any change that could affect any of these factors is potentially an acoustical change.

Such changes would include:

1. An increase in take-off rpm ("red line"), or highest rpm in the normal operating range ("top of green arc");
2. A change leading to an increase in the best rate of climb speed (Vy);
3. An increase in propeller diameter;
4. A change to the propeller tip shape;
5. An increase in the propeller blade thickness;
6. A change in the number of propeller blades;
7. The installation of a variable pitch propeller in place of a fixed pitch propeller;
8. Any change in the propeller inflow angle.

Engine noise is directly related to engine power. Many engines are fitted with noise suppression devices. Any change that increases engine power or modifies in any way the engine exhaust or the performance of the mufflers, if fitted, is potentially an acoustical change and should be referred to C.1.6.

Factors that might adversely affect an aircraft's take-off performance

The noise certification reference take-off procedures are defined in terms of the approved take-off distance (D15), rate of climb (ROC) and best rate of climb speed (Vy). Any change that causes an increase in D15, a decrease in ROC or a change in Vy will potentially mean the aircraft is lower when it overflies the microphone and therefore noisier.

Such changes would include:

1. An increase in take-off weight;
2. A decrease in engine power;
3. In the case of an aircraft where take-off power/rpm is time limited a change in the period over which take-off power/rpm may be applied;
4. A change that increases the aircraft's drag (e.g. the installation of external cargo pods, external fuel tanks, larger tyres to a fixed undercarriage, floats etc.).

Other factors to be taken into account

Aerodynamic noise, although potentially a significant source of noise for large aircraft, is not generally a significant source for light propeller driven aircraft. Modifications such as the fitting of vortex generators, drooped leading edges or gloves, and extensions or re-profiling of the wing tips would not themselves be considered to be acoustical changes.

However such modifications are often associated with an increase in take-off weight and may therefore be considered as "acoustical changes". A modification to an aircraft that involves the removal of such devices might also be considered to be an "acoustical change" since their removal may lead to a deterioration in the aircraft's performance.

In addition such changes may affect the aircraft incidence during climb-out and potentially change the propeller inflow angle which might itself constitute an "acoustical change".

Last updated:

02/12/2013

Link:

https://www.easa.europa.eu/en/faq/19384