- TSO Approval and PMA -

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Every item installed on an aircraft, engine and propeller, to obtain a type certificate (TC) or a supplemental type certificate (STC), has to be approved by the airworthiness authority (FAA, in the United States, EASA, in Europe, and ANAC, in Brazil).

The most common type of approval is called "TSO Approval" or TSOA (Technical Standard Order Approval). Another common type is the PMA (Parts Manufacturer Approval).

These types of approval are the most common, but they are not the only ones.

TSO is an acronym for Technical Standard Order. In Brazil, the corresponding document is known as *Ordem Técnica Padrão (OTP).*

A Technical Standard Order (TSO) is a minimum performance standard issued by the United States Federal Aviation Administration (FAA) for specified items (materials, parts, processes, and appliances used on civil aircraft). Items with TSO design approval are eligible for use on certificated products.

The procedures for the TSOA are in the FAA documents in 14 CFR Part 21 Subpart O (Ref. 2).

TSOs are grouped into categories and specify the necessary tests, covering a wide range of environmental conditions, such as heat, vibration, temperature, altitude, etc., in which items can be, when installed in an aircraft.

There are many types of TSOs[1] for items applied to airplanes, such as engines, landing gear parts, environmental system components, and for a wide variety of avionics equipment.

The TSOA refers to an approval of a item design and approval for its production.

Typically, an item TSOA has a nameplate fixed on its exterior similar to the figure below:

TSO 37B BAFAAAX Class II

This plate has de following signification:

TSO C37B	B	A	F	A	A	A	X	CLASS II
Class								
Temp-Altitude								
Humidity								
Vibration								
Audio Freq. Susceptibility								
Radio Freq. Susceptibility								
Spurious Energy								
Explosion								
Electrical Performance								

A TSOA ensures that the item will perform its function in accordance with the specification contained in the document, but it is not enough to ensure that the item to be installed go to operate well in the aircraft, i.e. does not guarantee, for example, that the item will not produce interference in other items, and that also it will not suffer interference from other items on board. In summary, the TSOA is a necessary condition for installation, but not an enough condition.

For example, an avionic item TSOA must necessarily pass through usual ground tests, as suggested by the Advisory Circulars 23.1309-1E and 25.1309-1A, to verify its susceptibility to the aircraft environment and its possible adverse influence on other items

Another example would be a specified altimeter limited to 40,000 ft. Of course, it

[1] You can see theTSOs in the following Internet address:
http://rgl.faa.gov/Regulatory_and_Guidance_Library/rgTSO.nsf/MainFrame?OpenFrameSet

could not be installed in an aircraft with a maximum operating altitude of 50,000 ft.

Now, let's talk a little about the PMA.

Normally, manufacturers want to develop their items according to a certain TSO (or even second more than a TSO), but sometimes there is not a specific TSO for your design. This, however, does not mean that the item cannot be installed in an aircraft. In such cases, manufacturers may obtain an approval via PMA, for installation in that specific type of aircraft. The item so can be installed in that type of aircraft, via a TC or STC.

If an applicant wants to use the item in another type of aircraft, perhaps it will be necessary to produce an specific documentation and test plan to that aircraft in order to get another PMA.

Finally, we add that if it is not possible to get one of the mentioned types of approval, the Authority can adopt another option.

In our next MSC we will talk about environmental tests for items used in civil and military areas.

We strongly suggest that the reader consult the references listed, especially the second from FAA.

See you.

References:

(1) FERRARA, John M. Avionics: A Practical User's and Buyer's Guide to Avionics – Volume 1. USA: Air and Space Co., 1989. 275p.

(2) FAA: CFR 14 Part 21 Subpart O: Certification Procedures for Products and Parts, USA.