



# Policy Statement

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**Subject:** Approval of Instruments in  
14 CFR Part 31 Balloons, Hot Air Only

**Date:** March 15,  
2016

**Policy No:**  
PS-ACE-31-01

**Initiated By:**  
ACE-112

## Summary

This policy statement establishes certification compliance processes for hot air balloon flight instrumentation as required by 14 CFR 31.85, Required basic equipment. It specifically addresses the certification requirements for the flight equipment required by the following regulations:

- 14 CFR 31.85(a)(2) An altimeter
- 14 CFR 31.85(a)(3) A rate of climb indicator [or variometer]
- 14 CFR 31.85(b)(2) An envelope temperature indicator [hot air balloons only]

## Definition of Key Terms

Attachment 1 explains the specific meanings of the terms “must,” “should,” or “recommend” used in this policy statement.

## Current Regulatory and Advisory Material

The regulations applicable to the subject are §§ 31.85(a)(2), 31.85(a)(3), and 31.85(b)(2). These regulations are part of the required basic equipment requirements for balloons. When balloon regulations were originally issued in 1964, no policy was issued regarding the certification of equipment specifically used for balloons. The available equipment and technology at the time was adapted from small airplanes. To date, no balloon specific certification policy has been issued except in project letters by various Federal Aviation Administration (FAA) certification offices.

## Relevant Past Practice

In the past, the technology and compliance methods regarding subject Code of Federal Regulations (CFR) parts were generally borrowed from small airplane practices. This led to equipment qualified according to airplane standards being used on balloons. As the available equipment for many years has been conventional (non-electronic) instrumentation, there was

little initiative to consider balloon specific equipment. However, in recent years, acquisition and maintenance costs, as well as parts availability for older instruments has become problematic for balloon manufacturers, owners, and maintainers.

Since 2000, the FAA has administered Supplemental Type Certificate (STC) applications to approve electronic instruments that provide the basic parameters for balloon operations. Such equipment typically has much greater capabilities than the basic parameters. Use of such equipment is now commonplace in the balloon community. The circumstances lead the FAA to issue policy that will allow approved incorporation of such equipment into hot air balloons without the need to comply to requirements that are not appropriate for balloon equipment. If not, it may inhibit adoption of technology that has positive benefits while incorporating desirable but non-required features. Considering that balloons are generally (except long-range gas balloons) operated in visual flight rules conditions, it is considered sufficient to approve equipment that will indicate the required parameters and replace extensive approval efforts that may be required to obtain approval via the Technical Standard Order requirements.

## **Policy**

Equipment intended to display the parameters required by §§ 31.85(a)(2), 31.85(a)(3), and 31.85(b)(2) may be approved in the following manner:

1. The altitude displaying or altimeter function will be shown to meet 14 CFR part 43 Appendix E, Table 1.
2. The variometer (rate of climb/descent function) will be shown to meet SAE Aerospace Standard AS8016 Rev A, Vertical Velocity Instrument (Rate-of-Climb), paragraph 4.2.1 (including table 1 of this paragraph.)
3. The temperature indication will meet SAE Aerospace Standard AS8005, Minimum Performance Standard for Temperature Instruments, Paragraph 3.1, at the accuracy of a Class I or Class II instrument.
4. Environmental testing will be accomplished. This will be done within the operational flight envelope and approved environment as established for the balloon itself. The appropriate testing can be accomplished in accordance with RTCA DO-160E, or later version, Environmental Conditions and Test Procedures for Airborne Equipment.

The requirements from the mentioned standards that apply are only those that are specifically called out previously in items 1, 2 and 3. Verification that the equipment meets the requirements will be substantiated by test results.

The previous items, 1 through 4, will be part of the compliance showing for § 31.31, General [Design Construction], which states the following:

“The suitability of each design detail or part that bears on safety must be established by tests or analysis.”

In addition, § 31.71, Function and installation, states the following:

“(a) Each item of installed equipment must—

- (1) Be of a kind and design appropriate to its intended function;
  - (2) Be permanently and legibly marked or, if the item is too small to mark, tagged as to its identification, function, or operating limitations, or any applicable combination of those factors;
  - (3) Be installed according to limitations specified for that equipment; and
  - (4) Function properly when installed.
- (b) No item of installed equipment, when performing its function, may affect the function of any other equipment so as to create an unsafe condition.
- (c) The equipment, systems, and installations must be designed to prevent hazards to the balloon in the event of a probable malfunction or failure.”

The applicant should accomplish the following to show compliance to § 31.71:

1. The applicant should identify the installation limitations for the equipment and assure (by design, test and/or limitations) that it is installed in accordance with those limitations. Any limitations defined by the equipment manufacturer would still apply.
2. The applicant should show by test and/or analysis that the equipment functions properly when installed.
3. The applicant should show by test and/or analysis that the equipment will not affect any other equipment functions when installed.
4. The applicant should show by test and/or analysis that in the case of a failure, the equipment will not create a hazard to the balloon. This includes an analysis of normal or failure modes where misleading information might be presented (with respect to the required parameters). This includes an evaluation of any possible electromagnetic interference with the wireless parts of the systems (if wireless technology is utilized). If interference is identified, the applicant should mitigate the risk or provide appropriate instructions that explain what will cause misleading displays and how to respond to resolve it to mitigate the risk.
5. The applicable Balloon Flight Manuals will incorporate (or be supplemented by) the appropriate equipment operating instructions.

In addition, the equipment must comply with these regulations:

- 14 CFR 31.41, Inspection provisions
- 14 CFR 31.49, Control systems

- 14 CFR 31.82, Instructions for Continued Airworthiness

Note: Instructions for Continued Airworthiness should be developed or revised to include maintenance actions, inspections, and intervals as required.

- 14 CFR 31.81, Operating Limitations and Information, General.

Manufacturing Requirements. The applicant is required to control both the design and quality of the instruments. To control the quality means that the STC holder (or type certificate holder) *must build the article in accordance with its approved design, or must have a quality system that is capable of assuring that the instruments will meet compliance requirements of this policy.* This means that if the applicant does not have a supplier control system, and does not control the manufacture or design of the component, it must still assure that the instruments comply with the certification requirement, and that any changes made to the instruments still comply with the certification requirements, and also that documentation is updated accordingly.

### **Effect of Policy**

The general policy stated in this document does not constitute a new regulation. Agency employees and their designees and delegations must not depart from this policy statement without appropriate justification and concurrence from the FAA management that issued this policy statement. The authority to deviate from this policy statement is delegated to the Small Airplane Standards Office Manager (ACE-110). Applicants may continue to install Technical Standard Order Authorization items using existing STC processes. This policy is an alternative to existing processes.

### **Implementation**

This policy discusses compliance methods that should be applied to type certificate, amended type certificate, STC, and amended supplemental type certification programs. The compliance methods apply to those programs with an application date that is on or after the effective date of the final policy. If the date of application precedes the effective date of the final policy, and the methods of compliance have already been coordinated with and approved by the FAA or its designee, the applicant may choose to either follow the previously acceptable methods of compliance or follow the guidance contained in this policy.

### **Conclusion**

As explained herein, equipment that does not have an approval for use in certificated balloons can be approved as part of the type design of a type certificate or an STC based upon compliance to the requirements of this policy.

//SIGNED//

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Attachment

**Terms**

Table A-1 defines the use of key terms in this policy statement and the associated functional impact.

Table A-1 Definition of Key Terms

<b>Subject</b>	<b>Regulatory Requirements</b>	<b>Acceptable Methods of Compliance (MOC)</b>	<b>Recommendations</b>
<b>Language</b>	Must	Should	Recommend
<b>Meaning</b>	Refers to a regulatory requirement that is mandatory for design approval	Refers to instructions for a particular MOC	Refers to a recommended practice that is optional
<b>Functional Impact</b>	No Design Approval if not met	Alternative MOC has to be approved by issue paper.	None, because it is optional