



AEROSPACE STANDARD

AS437™**REV. B**

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Stabilized 2020-12

Superseding AS437A

Maximum-Allowable-Airspeed Instruments (Turbine Powered Subsonic Aircraft)

RATIONALE

This standard contains no changes from the previous revision, other than the addition of a stabilization notice page. This document has been determined to contain stable technical information which is not dynamic in nature.

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FOREWORD

Changes in the revision are format/editorial only.

1. SCOPE:

This SAE Aerospace Standard (AS) covers one type of maximum-allowable-airspeed instrument which gives a continuous indication of both indicated airspeed and maximum allowable airspeed not exceeding 650 knots.

1.1 Purpose:

This Aerospace Standard establishes the essential minimum safe performance standards for pitot-static type of maximum-allowable-airspeed instruments primarily for use with turbine powered subsonic transport aircraft, the operation of which may subject the instruments to the environmental conditions specified in Section 3.3.

2. APPLICABLE DOCUMENTS:

The following publications form a part of this document to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order. In the event of conflict between the text of this document and references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

2.1 NTIS Publications:

Available from NTIS, Springfield, VA 22161.

NACA Report 1235

3. GENERAL REQUIREMENTS:

3.1 Materials and Workmanship:

3.1.1 Materials: Materials shall be of a quality which experience and/or tests have demonstrated to be suitable and dependable for use in aircraft instruments.

3.1.2 Workmanship: Workmanship shall be consistent with high grade aircraft instrument manufacturing practice.

3.2 Identification:

The following information shall be legibly and permanently marked on the instrument or attached thereto.

- a. Name of instrument.
- b. SAE AS437.
- c. Manufacturer's part number.
- d. Manufacturer's serial number or date of manufacture.
- e. Manufacturer's name and/or trademark.

3.3 Environmental Conditions:

The following conditions have been established as minimum design requirements. Tests shall be conducted as specified in sections 5, 6, and 7.

3.3.1 Temperature: When installed in accordance with the instrument manufacturer's instructions, the instrument shall function over the range of ambient temperature shown in column A below and shall not be adversely affected by exposure to the range of ambient temperature shown in column B below.

TABLE 1

Instrument Location	A	B
Pressurized Areas	-30 to 70 °C	-65 to 70 °C

- 3.3.2 Altitude: When installed in accordance with the instrument manufacturer's instructions, the instrument shall function from sea level up to the altitudes and temperatures listed below. Altitude pressure values are per NACA Report 1235. The instrument shall withstand an external case pressure of 50 inches Hg absolute when installed properly and vented to an atmospheric pressure of approximately 29.92 inches Hg absolute.

TABLE 2

Instrument Location	Altitude	Temperature
Pressurized Area	15,000 feet	50 °C

- 3.3.3 Vibration: When installed in accordance with the instrument manufacturer's instructions, the instrument shall function and not be adversely affected when subjected to vibrations of the following characteristics.

TABLE 3

Instrument Location	Frequency Cycles Per Second	Maximum Double Amplitude Inches	Maximum Acceleration
Instrument panel	5 - 30	0.020	0.25 g
	30 - 1000	--	

- 3.3.4 Humidity: The instrument shall function and shall not be adversely affected following exposure to any relative humidity in the range from 0 to 95% at a temperature of approximately 70 °C.
- 3.3.5 Magnetic Effect: The magnetic effect of the instrument shall not adversely affect the performance of other instruments installed in the same aircraft.

4. DETAIL REQUIREMENTS:

4.1 Display Markings:

- 4.1.1 Finish: Unless otherwise specified by the user, matte white material shall be applied to all graduations, numerals and indicating means.

Non-functional surfaces and markings shall be durable dull black.

- 4.1.2 Graduations: The graduations shall be arranged to provide the maximum of readability consistent with the accuracy of the instrument.

- 4.1.3 Numerals: The display shall include sufficient numerals to permit quick and positive identification of each graduation. Numerals shall distinctly indicate the graduation to which each applies.
- 4.1.4 Instrument Title: The instrument title (airspeed) shall be of the same approximate size but no larger than the numerals. The title may be of the same finish as the numerals. The units of measure (Knots) shall appear on the dial in lettering noticeably smaller than either the numerals or title.
- 4.1.5 Visibility: The indicating means and all markings shall be visible from any point within the frustum of a cone the side of which makes an angle of at least 30 degrees with the perpendicular to the dial and the small diameter of which is the aperture of the instrument case. The distance between the dial and the cover glass shall be a practical minimum.
- 4.1.6 Indicating Means: Indicated airspeed and maximum-allowable-airspeed shall be displayed in such a manner that the numerical values on the scale(s) shall increase in a clockwise, left to right, or bottom to top direction.
- 4.2 Calibration:
- 4.2.1 Airspeed Pointer: The indicated airspeed pointer shall indicate airspeed in accordance with the following equation:

$$V_i = C_{so} \sqrt{\frac{2}{\gamma - 1} \left[1 + \frac{q_c}{P_o} \right]^{\frac{\gamma - 1}{\gamma}} - 1} \quad (\text{Eq.1})$$

where:

- V_i = Indicated airspeed in Knots
 C_{so} = Sea level speed of sound = 661.48 Knots
 P_o = Pressure at sea level - 29.92126 inches Hg
 q_c = Impact pressure in inch Hg = Total pressure - Static Pressure
 γ = Ratio of specific heats = 1.40 for air

Values shown in Table 4 are in accordance with the above.