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Superseding AS793

**Total Temperature Measuring Instruments
(Turbine powered Subsonic Aircraft)**

FOREWORD

Changes in this Revision are format/editorial only.

1. SCOPE:

This standard covers three basic types of total-temperature-measuring instruments used as a means of determining the total temperature developed by adiabatic heating of the air due to motion of the aircraft through the air.

Type I - Flush-type total-temperature sensor

Type II - Probe-type total-temperature sensor (electrically heated)

Type III - probe-type total-temperature sensor (unheated)

1.1 Purpose:

This standard establishes essential minimum safe performance requirements for total temperature measuring instruments, primarily for use with turbine-powered subsonic transport aircraft, the operation of which may subject the instruments to the environmental conditions specified in paragraph 3.4 et seq.

2. REFERENCES:

NACA Report 1235
MIL-I-6181

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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 nameplate attached thereto:

- a. Name of instrument
- b. SAE AS793A
- c. Manufacturer's part number
- d. Manufacturer's serial number or date of manufacture
- e. Manufacturer's name and/or trademark
- f. Range
- g. Rating (Electrical, etc.)
- h. Explosion category
- i. Aircraft identification

3.3 Compatibility of Components:

If components are individually acceptable, but require matching for proper operation, they shall be specified accordingly.

3.4 Environmental Conditions:

The following conditions have been established as minimum design requirements. Tests shall be conducted as specified in Sections 5, 6, 7 and 8 to insure compliance with this standard.

- 3.4.1 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 following exposure to the range of temperature shown in column B below.

3.4.2

TABLE 1

<u>Instrument Location</u>	<u>A</u>	<u>B</u>
Nonpressurized or external areas	-70 to +150 °C	-70 to +150 °C

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 not be adversely affected following exposure to extremes in ambient pressure of 50 and 2 in Hg abs, respectively.

TABLE 2

<u>Instrument Location</u>	<u>Altitude</u>	<u>Temperature</u>
External areas	50,000 ft	-2 °C

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

TABLE 3

<u>Instrument Location</u>	<u>Frequency (CPS)</u>	<u>Maximum Double Amplitude (Inches)</u>	<u>Maximum Acceleration (g)</u>
Nacelle, nacelle mounts, wings, empennage and wheel wells	5 - 1000	0.036	10
Fuselage			
Forward of spar area	5 - 500	0.036	2
Center of spar area	5 - 1000	0.036	4
Aft of spar area	5 - 500	0.036	7
	500 - 1000	-	5

- 3.4.4 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.

3.5 Explosion Category:

The instrument component, when intended for installation either in uninhabited areas of nonpressurized aircraft or in nonpressurized areas of pressurized aircraft, shall not cause an explosion when operated in an explosive atmosphere. The component shall meet the requirements applicable to the explosion category below. Specifically, any instrument component which can be an ignition source and is intended for installation in an area in which combustible fluid or vapor may result from abnormal conditions (e.g., fuel line leakage) shall meet the requirements of category I. If the intended location is an area where combustible fluid or vapor can occur during normal operation (e.g., fuel tank) the instrument component shall meet the requirements of category II.

TABLE 4

<u>Category</u>	<u>Definition</u>	<u>Requirement</u>
I	Explosion proofed: case not designed to preclude flame or explosion propagation	Paragraph 7.10.1
II	Explosion proofed: case designed to preclude flame or explosion propagation	Paragraph 7.10.2
III	Hermetically sealed	Paragraph 6.2
IV	Instrument not capable of causing an explosion	Shall not be capable of producing a spark of more than 1.0 millijoule of energy and shall not have a short circuit current of more than 100 milliamperes

3.6 Fire Hazard:

The instrument shall be so designed to safeguard against hazards to the aircraft in the event of malfunction or failure, and the maximum operating temperature of surfaces of any instrument component contacted by combustible fuel or vapor shall not exceed 200 °C due to self-heating.

All material should be noncombustible and shall not liberate gases or fumes which will result in such corrosion as to cause malfunction of equipment or discoloration of dials or indicia, nor shall toxic gases or fumes that are detrimental to performance of the aircraft or health of personnel be liberated under the operating conditions specified herein.