

AEROSPACE RECOMMENDED PRACTICE

SAE ARP433

REV.
A

Issued 1958-07
Revised 2001-09
Reaffirmed 2008-02

Superseding ARP433

Liquid Oxygen Quantity Instruments

FOREWORD

Changes in this Revision are format/editorial only.

1. SCOPE:

This Aeronautical Recommended Practice covers Liquid Oxygen Quantity Indicators for use with associated Liquid Oxygen converters.

1.1 Purpose:

To recommend requirements for electrical Liquid Oxygen Quantity Instruments for use in aircraft, the operation of which may subject the instruments to the environmental conditions specified in Paragraph 3.3.

2. REFERENCES:

NACA Report 1235

3. GENERAL REQUIREMENTS:

3.1 Materials and Workmanship:

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

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

SAE Technical Standards Board Rules provide that: "This report is published by SAE to advance the state of technical and engineering sciences. The use of this report is entirely voluntary, and its applicability and suitability for any particular use, including any patent infringement arising therefrom, is the sole responsibility of the user."

SAE reviews each technical report at least every five years at which time it may be reaffirmed, revised, or cancelled. SAE invites your written comments and suggestions.

Copyright © 2008 SAE International

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of SAE.

TO PLACE A DOCUMENT ORDER: Tel: 877-606-7323 (inside USA and Canada)
Tel: 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
http://www.sae.org

SAE WEB ADDRESS:

3.2 Identification:

The following information should be legibly and permanently marked on the instrument or attached thereto:

- a. Name of instrument - Liquid Oxygen Quantity Instrument
- b. SAE Aeronautical Recommended Practice ARP433A
- 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

3.3 Environmental Conditions:

The following conditions have been established as design requirements only. Tests should 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 should function over a range of ambient temperature from -55 °C to 70 °C. It should not be adversely affected by exposure to temperatures of -65 °C to 80 °C.
- 3.3.2 Humidity: The instrument should function and not be adversely affected when exposed to any relative humidity in the range of 0 to 95% at any temperature up to 70 °C.
- 3.3.3 Vibration: When installed in accordance with the instrument manufacturer's instructions, the instrument should function and should not be adversely affected when subjected to vibrations of the following characteristics:

TABLE 1

<u>Type of Mounting</u>	<u>Cycles per Second</u>	<u>Maximum Double Amplitude (Inches)</u>	<u>Maximum Acceleration</u>
Fuselage Forward of Spar Area	5 to 500	.036	2 G
Panel or Rack (with shockmounts)	5 to 500	0.020	2 G

3.3.4 Altitude: The instrument should function and should not be adversely affected when subjected to a pressure and temperature range equivalent to -1000 to 50,000 feet standard altitude, per NACA Report 1235 except as limited by application of Paragraph 3.3.1. The instrument should not be adversely affected when subjected to a pressure of 50 inches Hg absolute.

3.4 Fire Hazard:

The electrical circuit should be so designed that the potentials should not create a fire hazard in the aircraft. The design of the circuit should be such that the current in the leads to the converter sensing element should in no case exceed 0.2 amperes.

3.5 Radio Interference:

The instrument should not be the source of objectionable interference, under operating conditions at any frequencies used on aircraft, either by radiation or feedback, in radio equipment installed in the same aircraft as the instruments.

3.6 Magnetic Effect:

The magnetic effect of the indicator should not adversely affect the operation of other instruments installed in the same aircraft.

3.7 Converter Capacitance:

The instrument assembly should be designed for operation from the following input capacitances:

- a. Capacitance for various size empty converters is in accordance with the linear relationship shown in Table 2.

TABLE 2

Converter Capacitor (liters)	Capacitance of Empty Converter (uuf)
5	63.5
10	123.5
25	303.5

- b. Capacitance for converters containing liquid oxygen should be calculated as follows:

$$C = C_e + 5.796V$$

C = Total capacitance (uuf)

C_e = Capacitance of empty converter (uuf)

V = Volume of liquid oxygen in converter (liters)