# AERONAUTICAL MATERIAL SPECIFICATION

Society of Automotive Engineers, Inc.
29 West 39th Street
New York City

**AMS3004 A**

Issued 11-1-48
Revised 6-1-51

## ALCOHOL, METHYL

1. ACKNOWLEDGMENT: A vendor shall mention this specification number and its revision letter in all quotations and when acknowledging purchase orders.

2. APPLICATION: Primarily as an additive to prevent freezing of water used in aircraft power plant injection systems.

3. COMPOSITION:

3.1 The alcohol shall have the following composition:

| | | |
|---|---|---|
| Methyl Alcohol, % | 99.0 | min |
| Aldehydes and Ketones (as acetaldehyde), (3.2), % | 0.05 | max |
| Sulfur and Sulfur Compounds (as S), % | 0.03 | max |
| Acetone, % | 0.015 | max |
| Acidity (as acetic acid), % | 0.01 | max |
| Non-Volatile Residue, mg/100 ml | 5.0 | max |
| Esters (as methyl acetate), % | 1.0 | max |

3.2 To determine the percentage, the following reagent, apparatus, and procedure are recommended.

3.2.1 Reagent: 0.5N hydroxylamine hydrochloride containing no free hydrochloric acid. Dissolve 35 g of cp $NH_2OH.HCl$ in water, add sufficient 0.5N sodium hydroxide to neutralize any free hydrochloric acid, and dilute to one liter. (The amount of sodium hydroxide needed may be calculated from the amount needed to render a sample of the hydroxylamine hydrochloride neutral to bromphenol blue.) The pH of the finished solution should be 3.05 ± 0.005.

3.2.2 Apparatus: An electrical pH meter with standard glass electrode and standard calomel electrode. The meter should be standardized against a standard buffer having a pH in or near the working range of the analysis (pH 2, 3 or 4).

3.2.3 Procedure: Add 1 ml of 0.5N $NH_2OH.HCl$ to 10 ml of distilled water in a 50 ml beaker. Adjust the pH meter to the temperature of the resulting solution and determine the pH. This should be within the range 3.65 - 3.80. Add 10 ml of the alcohol to be tested and mix thoroughly. The temperature of the solution will rise to approximately 95 F and, with continued stirring, drop to approximately 85 F in the 5-minute period which should be allowed for reaction. At the end of this time, adjust the pH meter to the temperature of the solution and determine the pH. The percentage of aldehydes plus ketones is determined from a curve of change in pH vs concentration. The curve may be plotted from the following:

| Aldehydes + Ketones (as acetaldehyde) % | Decrease in pH |
|---|---|
| 0.0000 | 0.00 |
| 0.0125 | 0.63 |
| 0.0250 | 0.89 |
| 0.0375 | 1.04 |
| 0.0500 | 1.14 |

4. TECHNICAL REQUIREMENTS:

4.1 Specific Gravity: Shall be 0.7958 - 0.7986 at 15/4 C.

4.2 Distillation Range: The product shall be completely distilled between 147 F and 153 F.

4.3 Alcohol shall be clear and free from suspended matter, and shall be colorless unless otherwise required by government regulations.

4.4 Miscibility: Alcohol shall be miscible with distilled water in all proportions.

4.5 Corrosion: There shall be no evidence of pitting or black stain on the dish when 100 ml of alcohol is evaporated to dryness in a freshly polished, 3.5-in. diameter hemispherical copper dish by heating on a steam bath; a slight amount of brown stain shall not be cause for rejection.

4.6 Odor: Shall be characteristic; there shall be no residual odor after evaporation of alcohol from filter paper saturated with the alcohol.

5. REPORTS: Unless otherwise specified, the vendor shall furnish with each shipment three copies of a report of the composition and the quantitative results of tests conducted on the batch of alcohol from which the order was filled. This report shall include the purchase order number, material specification number, batch number, and quantity.

6. IDENTIFICATION: Each container shall be marked to show this specification number, manufacturer's identification, batch number, and quantity and, in addition, the following safety precautions:

"POISON

CONTAINS OVER 90% METHANOL
CANNOT BE MADE NON-POISONOUS
AVOID PROLONGED BREATHING OF VAPOR

Methanol (calculated 200 proof) is a violent poison. It is unlawful to use this fluid in any article of food, beverage, or medicinal or toilet preparation for human use. If taken internally will induce blindness and general physical decay ultimately resulting in death. It should not be applied externally.

Antidote: - 1. Give emetic of mustard. 2. Induce free sweating. Administer large quantities of alkalized water (sodium bicarbonate)."