Society of Automotive Engineers, Inc.
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AERONAUTICAL RECOMMENDED PRACTICE

ARP 86

HEATER, AIRPLANE, EXHAUST HOT AIR TYPE

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Revised

I. INTRODUCTION: These specifications are to be considered as being currently applicable and necessarily subject to revision from time to time, due to rapid development of the aircraft industry. The following recommendations are based on practical engineering requirements for such exhaust type heaters as are now used on airplanes and for such as may be developed to meet later requirements.

The SAE does not recommend, approve, or endorse any specific design of exhaust type heater and does not intend to limit the manufacturer's right to choose any design and type of construction so long as the equipment conforms to the requirements herein set forth.

II. SCOPE: These specifications are written to cover the subject of exhaust hot air type heaters under three classifications, namely:

A. EXHAUST HOT AIR TYPE HEATERS - GENERAL - Dealing with features applicable to all makes and users.

B. EXHAUST HOT AIR TYPE HEATERS - MILITARY AND COMMERCIAL - Covering features applicable to military and commercial aircraft.

C. DESIRABLE DESIGN FEATURES - General information for use of those concerned with meeting requirements contained herein.

III. EXHAUST HOT AIR TYPE HEATER - GENERAL:

A. DEFINITION

1. An exhaust hot air type heater as used for airplane heating is one that utilizes, by means of a heat exchanger, the heat of the exhaust gases from the engine for the purpose of heating the air being supplied to the airplane.

2. It includes one or all of the following:

a. Direct Air Type Heat Exchanger.

b. By-Pass Valve.

c. Instruments.

B. GENERAL REQUIREMENTS

1. Component parts of this type of equipment shall be so constructed as to comply with existing Government requirements or others which may apply. Equipment shall be constructed throughout of materials which are considered acceptable for the particular use intended and shall be made and furnished with a degree, uniformity, and grade of workmanship generally accepted in the aircraft industry and satisfactory to the user.

2. Carbon Monoxide

Design of exhaust hot air type heater shall be such as to preclude the possibility of carbon monoxide concentration in excess of one part in 20,000 or .005 of 1%. For method of determination, refer to U. S. Army Airplane Designers Hand Book, Section II, Part III, "Flight Test".

C. RATING AND TEST REQUIREMENTS

1. Heaters shall meet the requirements specified in SAE Aeronautical Recommended Practice No. 85, Heating and Ventilating Equipment, Section III, Part C - Paragraphs 1, 2, and 3a.

2. Adequate temperature measurements shall be made on heat exchanger surfaces to assure that the temperature does not exceed established safe limits for material involved at any point.

IV. EXHAUST TYPE HEATER - MILITARY AND COMMERCIAL REQUIREMENTS:

A. DIRECT AIR TYPE EXHAUST HEAT EXCHANGER

1. This type heater may utilize any of the following:

a. Hot Air (Intensifier) Tube.

b. Muff.

c. Shroud.

2. Material:

a. The heater should be fabricated from a corrosion and heat resistant material in accordance with SAE Aeronautical Material Specification, AMS 5540, or equivalent when acceptable to user. The minimum allowable thickness of metal exposed to exhaust gases shall be .035".

3. Temperature Rise:

a. The temperature rise of heated air above outside air temperature shall be such as to stay within limits as covered under ARP 85, Parts IV and V.

4. Pressure Differential:

a. The heated air space static pressure shall be a minimum of 2" of water above exhaust gas static pressure at all points, for all conditions except take-off.