SAE International

SURFACE VEHICLE STANDARD

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Fuel-Fired Heaters - Air Heating - for Construction and Industrial Machinery

RATIONALE

The standard covers technology which is mature and not likely to change in the foreseeable future. There is no support within Con Ag to revise this document, but some users wish to maintain it as stabilized for limited use.

STABILIZED NOTICE

This document has been declared "Stabilized" by the SAE Common Tests Technical Steering Committee and will no longer be subjected to periodic reviews for currency. Users are responsible for verifying references and continued suitability of technical requirements. Newer technology may exist.

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1. ***Scope***—This standard covers off-road, self-propelled work machines as categorized in SAE J1116.

This standard outlines requirements that must be met in order for the heating equipment to perform satisfactorily on construction and industrial machinery.

1.1 **Purpose**—This standard describes a general set of parameters covering fuel-fired heaters for heating and defrosting cabs on construction and industrial machinery.

2. ***References***

2.1 **Applicable Publications**—The following publications form a part of the specification to the extent specified herein. Unless otherwise indicated the latest revision of SAE publications shall apply.

2.1.1 SAE PUBLICATIONS—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J551 OCT85—Performance Levels and Methods of Measurement of Electromagnetic Radiation from Vehicles and Devices (30-1000 MHZ)
SAE J1116 JUN86—Categories of Off-Road, Self-Propelled Work Machines

3. ***Design Requirements***

3.1 **Performance**

3.1.1 CAPACITY—Heat output requirements cover a range of 15 000–60 000 Btu/h (4395–17 584 W).

3.1.2 ENVIRONMENTAL OPERATING CONDITIONS—The heater shall be designed to operate in the following environment:

a. Temperature: –60 to +60°F (–51 to + 16°C).
b. Altitude: 0–10 000 ft (0–3048 m).
c. Wind: 0–60 mph (0–97 km/h).

3.1.3 FUELS—The heater shall operate from the same fuel used to power the equipment it is installed on.

3.1.4 POWER SUPPLY—Batteries and the charging system shall be of sufficient size to include heater operation as well as other machine electrical components.

3.1.4.1 Heater operating voltage:

a. 12 V system: 10–15 V.
b. 24 V system: 20–30 V.

3.1.4.2 The heaters should be able to ignite and operate at the minimum voltages in an emergency.

3.1.4.3 Best practice is to start the machine engine first, then start the heater. The heater should not be operated for any great length of time after the engine is stopped.

3.1.5 OPERATING LIFE—The operating life of all major components (for example, burner, heat exchanger) should be a minimum of 2000 h. The blower motor brushes may have to be replaced and other minor components may require replacement or adjustment as recommended by the manufacturer at specified time intervals.

3.1.6 EASE OF MAINTENANCE—The heater should be designed to permit accessibility for servicing, maintenance, and repair with common tools. Replacement of the igniter or adjustment of any control should be possible without removal of the heater.

Any special tools required for "on machine" maintenance or adjustment shall be provided and stored in or near the heater compartment.

3.1.7 ELECTROMAGNETIC INTERFERENCE—Where required, the heater shall be radio-suppressed to meet the requirements of the machine it is installed on. The Heaters should be radio-suppressed within the limits described in SAE J551.

3.2 Safety Requirements—Adequate safety features shall be provided, some of which are listed below:

3.2.1 Fail-safe devices shall be built in or added to the heating system to assure shutdown of the heater in the event of overheating or loss of flame or failure to ignite for any reason.

3.2.2 The heater shall be installed with clearances to combustible materials, and to prevent contact burns to operators.

3.2.3 The fuel shall not be supplied to the heater by gravity. The fuel supply system shall be arranged so that in the event of the machine overturning, the fuel to the burner will be shut off.

3.2.4 The heaters shall be provided with a remote fuse or circuit breaker to shut down the heater in the event of a short circuit or overload.

3.2.5 All heaters shall be equipped with a "tell-tale" light to indicate to the operator that the heater is operating properly.

3.2.6 The heater controls shall be located to permit the operator to operate them without taking attention from the road or work area.

3.2.7 All combustion air shall be drawn in via a separate duct from outside the machine. All products of combustion shall be exhausted outside the machine to open air in such a manner that they cannot reenter.

3.2.8 Circulating fresh air may be drawn from inside or outside the machine, but any fresh air duct which passes through the engine compartment shall be sealed so that no fumes may enter the circulating air.

3.2.9 Electrical components and wiring shall meet all environmental requirements and shall be sized in accordance with SAE Recommended Practices. Wire and insulation shall be flexible to –60 °F (–51 °C).