

NATIONAL AEROSPACE STANDARD

AEROSPACE INDUSTRIES ASSOCIATION OF AMERICA, INC., 1725 DE SALES STREET, N. W., WASHINGTON, D. C. 20036

1.0 SCOPE

- 1.1 **Purpose:** This specification provides a standard for the manufacture, performance, inspection and procurement of mechanically operated soldering equipment used in the fabrication of printed circuit board assemblies.
- 1.2 **Classification:** This specification will cover automatically controlled mechanically operated wave type flow solder machines, including fluxing, pre-heating, soldering, cleaning and post cooling equipment.
- 1.3 **Intended Use:** The machine described by this specification is intended for use in the Aerospace Manufacturing Industry and provides for the uniform and highest degree of soldering reliability in the production of electronic printed circuit board assemblies within the limits specified.

2.0 APPLICABLE SPECIFICATIONS, CODES AND STANDARDS:

The latest revision of the following specifications, codes and standards are included as a portion of this specification. Detail requirements of the specification shall preclude any contradictory portions of the following specifications, codes and standards.

- 2.1 The National Machine Tool Builders Association's (NMTBA) Electrical Standards.
- 2.2 The Joint Industries Conference (JIC) Hydraulics Standards for Industrial Equipment.
- 2.3 State and Local Electrical and Safety Codes.
- 2.4 The American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section VIII.

- ① INACTIVE FOR DESIGN AFTER 15 SEPT. 1975.
NO SUPERSEDING STANDARD

LIST OF CURRENT SHEETS

NO.	REV.	NO.	REV.
1	1	7	1
2	1	8	1
3	1	9	1
4	1	10	1
5	1	11	1
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CUSTODIAN: MANUFACTURING COMMITTEE

PROCUREMENT SPECIFICATION	TITLE PRINTED CIRCUIT BOARD SOLDERING MACHINE AUTOMATICALLY CONTROLLED	CLASSIFICATION
		SPECIFICATION

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3.0 REQUIREMENTS:

- 3.1 Responsibilities: An overall responsibility shall be accepted by the manufacturer for the design, manufacture, performance, reliability and packaging of the Control system and the controlled equipment as defined in the specification. This responsibility shall provide for technical direction during installation and for maintenance during the warranty period.
- 3.1.1 The manufacturer will in turn hold sub-contractors responsible for the performance of the control sub-systems and components.
- 3.1.2 The manufacturer will be responsible for the inspection, acceptance and warranty of the control system, controlled equipment and all sub-systems. The warranty period shall be for one (1) year from final machine acceptance during which time the manufacturer is responsible for replacement of all defective materials, workmanship and engineering and in turn will assure compliance of his suppliers and sub-contractors to the warranty. Exceptions may be made on low cost perishable components which preventive maintenance procedures as specified at the time of purchase by the manufacturer, may provide for more frequent replacements than one (1) year.
- 3.1.3 At the customers option the manufacturer will be responsible for the instruction and indoctrination of the former's personnel. The period and extent of the training may vary according to the complexity of the system and the prior training of the user's employees. Basic and advanced training in system trouble shooting and diagnostic procedures are to be available by the manufacturer prior to and/or during the installation and checkout of the equipment.
- 3.2 Design: The dimensions and capacities shall be as shown in Section 3.3. The general shape and arrangement of Control Console, controlled equipment and associated components shall combine necessary functions with accessibility, minimum space and neatness. The manufacturer has the choice of configuration and functional operations of the machine except where specifically stated in the specification.
- 3.3 Type, Size, Class: See Table I for all data.
- 3.4 Construction: The machine shall be constructed to comply with the requirements of Section 3.0, inspection and acceptance tests of Section 4.0 and other specifications as noted in Section 2.0.

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AIA AND ITS COMMITTEES WILL NOT INVESTIGATE THE APPLICABILITY OF PATENTS TO THE SUBJECT MATTER OF NAS STANDARDS AND IN RESPECT THEREOF DO NOT ASSUME ANY LIABILITY TO PATENT OWNERS OR TO PROSPECTIVE USERS.

THIS DRAWING SUPERSEDES ALL ANTECEDENT STANDARD DRAWINGS FOR THE SAME PRODUCT AND SHALL BECOME EFFECTIVE NO LATER THAN SIX MONTHS FROM THE LAST DATE OF APPROVAL SHOWN HEREON

TABLE I

CLASS DESCRIPTION	AUTOMATICALLY CONTROLLED, WAVE TYPE
WORK PIECE CAPACITY	MAX. BOARDWIDTH - 12 INCHES
NOZZLE WIDTH	13 INCHES MINIMUM
WAVE HEIGHT	1/2" TO 1" ADJUSTABLE WITHIN $\pm 1/32$"
SOLDER POT INSIDE DIMENSION	20" LONG X 16 WIDE X 12" DEEP
SOLDER POT CAPACITY	500 TO 600 LBS.
PUMP TYPE	IMPELLER, WITH VARIABLE SPEED DRIVE
OPERATING CURRENT	220/440 VOLTS, 3 PHASE, 60 CYCLE
OPERATING TEMPERATURE RANGE	300°F. (148.9°C.) MIN., 600°F. (315°C.) MAX. (THERMOSTATICALLY CONTROLLED)
SOLDER POT ELECT. REQMTS	6 K.W. MIN.
WORK PIECE PRE-HEATING ELECT. REQUIREMENTS	(1) BANK - 1.6 K.W., (2) BANKS 3.2 K.W.
CONVEYOR	CONTINUOUS CHAIN, VARIABLE SPEED DRIVE, 0-78 INCHES MINIMUM

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- 3.4.1 Special Features: The machines shall be of rugged and substantial construction in accordance with the applicable specification, codes and standards as referred to in Paragraph 2.0. The construction material will be of the best quality and the workmanship of the highest caliber, so as to provide the required degree of end product reliability.
- 3.4.2 The machine shall be capable of continuous operation at solder temperatures from 300°F (148.9°C) to 600°F (315.5°C) and maintain selected bath temperatures constant within ±3.6°F (±2°C) by thermostatic control devices.
- 3.4.3 The molten solder shall be forced by means of a pump from a point deep with in the bath through an elongated nozzle on the surface of the bath to form an oxide free, smooth standing laminar wave in such a manner that will provide an adequate contact with the board.
- 3.4.3.1 The pump shall be situated in a non-hazardous and accessible area so as to allow ease of replacement and/or repairs.
- 3.4.4 Incorporated into the solder pump motor circuit shall be an adjustable thermal relay, which will prevent the pump from operating until temperature of molten metal bath has reached a point which is 27°F (15°C) above the liquidus point of the solder.
- 3.4.5 In operation, the circuit boards shall be transported across the standing wave at an adjustable entrance angle of 0° to 10° on pallets mounted on conveyors and adjustable to accommodate any size board width up to 12 inches wide. The pallets to be conveyed through the machine by a continuous chain drive system.
- 3.4.6 An automatic solder feed system shall be provided to maintain constant solder level in the tank at all times.
- 3.4.7 In case of a malfunction of the conveyor system, an adequate signalling or warning device shall be automatically activated.
- 3.4.8 Solder tank shall have provisions for draining and must be capable of being readily removed from machine for cleaning purposes.
- 3.4.9 System shall be of the conveyor type, and included in the automatic cycling of the machine shall be stations for (a) fluxing, (b) pre-heating, (c) soldering, (d) post cooling of the circuit boards, and (e) cleaning or washing.
- 3.4.9.1 Fluxing mechanism shall accommodate either rosin, water-soluble or other types of non-corrosive fluxes.

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