

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 a filament winding machine, horizontal spindle.
- 1.2 **Classification:** This equipment shall be classified as Filament Winding Machine, Horizontal Spindle.
- 1.3 **Intended Use:** The machine described by this specification is intended for use in the aerospace manufacturing industry and provides adequate capacity to perform filament winding within the limits specified.

2.0 APPLICABLE SPECIFICATIONS

The latest revision of the following specifications, codes and standards are included as a portion of this specification. Detail requirements of this 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) Hydraulic and Pneumatic Standards.
- 2.3 The American Standard Association (ASA) for small tools and machine tool elements, numbers B5.1 and B5.16.
- 2.4 The National Aerospace Standard (NAS) 938, Machine Axis and Motion Nomenclature.
- 2.5 The National Aerospace Standard 943, Interchangeable Perforated Tape Standards - Variable block format for positioning and straight cut numerically controlled equipment.
- 2.6 The National Aerospace Standard 953, Numerical Control Systems (standard practice).
- 2.7 The National Aerospace Standard 955, Interchangeable Tape Standards - Variable block format, contouring and contouring/positioning, numerically controlled equipment.
- 2.8 All state and local safety codes.

3.0 REQUIREMENTS

The manufacturer's contractual obligations for the design and function of the machine shall be specified in this section.

- 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 maintenance during the warranty period.
- 3.1.1 The manufacturer will in turn hold subcontractors responsible for the performance of the control sub-systems and components.

LIST OF CURRENT SHEETS

NO.	REV.	NO.	REV.
1	2	5	2
2	2	6	2
3	2	7	2
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② INACTIVE FOR DESIGN AFTER
15 APRIL 1978. NO SUPERSEDING
SPECIFICATION.

②

CUSTODIAN: MANUFACTURING COMMITTEE

PROCUREMENT
SPECIFICATION

TITLE

FILAMENT WINDING MACHINE, HORIZONTAL,
NUMERICALLY CONTROLLEDCLASSIFICATION
SPECIFICATION

Documents
NAS 952
SHEET 1 OF 8

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

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APPROVAL DATE June 1962 REVISION ① 31 Dec. 1963 ② 15 April 1976

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- 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 subcontractors to the warranty. Exceptions may be made on low cost perishable components which preventive maintenance procedures may provide for more frequent replacements than one (1) year.
- 3.1.3 At the customer's option the manufacturer will be responsible for instructions and indoctrination of the customer's personnel. The period and extent of training may vary according to the complexity of the system, and the prior training of the customer's employees. Basic and advance training in system trouble shooting and diagnostic procedures are to be made available by the manufacturer prior to and/or during the installation and checkout of the equipment.
- 3.2 Design: The dimensions and capacities for the respective types and sizes shall be as shown in Section 3.3. The manufacturer has the choice of configuration and the functional operation of the machine, except where specifically stated in this specification.
- 3.2.1 The type of filament winding materials used shall be specified by the customer to enable the machine tool builder to provide the necessary safety and protective features.
- 3.2.2 The capacity for the respective types and sizes shall be as shown in Table I, paragraph 3.3.
- 3.3 Type: Horizontal Spindle
Sizes: Small, Medium, Large
Class: Filament Winding Machine, Numerically Controlled

TABLE I

	Small	Medium	Large
Diameters to be wound	0 - 6'	6' - 9'	9' - 15'
Center distances	15'	20'	30'
Maximum weight to be supported - 1500 lbs/linear foot, supported at both ends with weight equally distributed between the tail stock and head stock	22,500#	30,000#	45,000#
Feeder carriage longitudinal travel distance	240"	360"	480"
Cross slide (transverse) travel distance	42"	66"	108"
Feeder carriage and cross slide speeds in inches per minute	0-1200	0-1200	0-2000
Spindle speed range in revolutions per minute at maximum weight	0-20	0-15	0-10
Spindle speed range in revolutions per minute (manufacturer provides information on allowable loads at various speed ranges)	0-100	0-40	0-25

- 3.4 Construction: The machine shall be constructed to comply with the requirements of this specification.

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- 3.4.1 The manufacturer shall anticipate in the design of the machine provisions for a manual control system. (customer's option)
- 3.4.2 This machine shall consist of each of the three following independent components: headstock, tailstock ways and feeder carriage way structure.
- 3.4.3 Each component shall be mounted on a common base (i.e., reinforced concrete) supplied by the customer.
- 3.4.4 Choice of configuration and actual moving elements shall be the prerogative of the manufacturer, unless otherwise specified.
- 3.5 Spindle Head, Feeder Carriage and Tailstock Assemblies:
- 3.5.1 Spindle Head Assembly
- 3.5.1.1 The spindle speed shall be infinitely variable within the limits specified by the customer.
- 3.5.1.2 Equipment shall be provided to indicate spindle speed in revolutions per minute.
- 3.5.1.3 The spindle shall be reversible.
- 3.5.1.4 The design of the spindle and spindle nose shall be the option of the manufacturer and/or customer but this design must include an ASA 50 taper and an ASA 60 flange.
- 3.5.2 Feeder Carriage Assembly (Includes Carriage and Cross Slide)
- 3.5.2.1 It must be easily accessible. Its specific location shall be the option of the customer.
- 3.5.2.2 It shall be able to traverse longitudinally and reverse from any position on longitudinal bed rails.
- 3.5.2.3 The slide shall be of the roller type.
- 3.5.2.4 The feeder carriage on the medium and large capacity machines shall be provided with an area to accommodate the operator during setup and be equipped with a duplicate set of controls unless otherwise specified.
- 3.5.2.5 It shall be provided with an area to mount filament application devices. These devices may include resin impregnation heated pot type, guide mechanism, filament pool tensioning systems and all others as specified by the customer.
- 3.5.2.6 The support frame for the feeder carriage assembly shall be constructed to maintain proper alignment and vibration free operation. The ways shall be of a replaceable type.
- 3.5.3 Tailstock Assembly
- 3.5.3.1 It shall be able to traverse longitudinally, located and locked, in any location on the tailstock ways.
- 3.6 Control Systems:
- 3.6.1 Numerically Controlled Machines - The system shall be AIA - Class IV - continuous path. The one rotational and the two linear motions shall be the main control functions. The following auxiliary functions shall be provided: Automatic start and stop; programmed stops; end of program; planned stops and a cycle counting function. The control system shall be capable of programmed spindle rotation offset up to 360°.
- 3.6.1.1 A programmed motion for control of the delivery head shall be at customer's option.
- 3.6.2 Manually Controlled Machines - See paragraph 3.4.1.
- 3.7 Operator's Controls: All operating control switches or levers shall be located convenient to the operator when he is in the normal and established operating positions. A spindle horsepower indicator is required.

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NAB Documents
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