



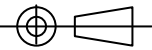
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FED. SUPPLY CLASS

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NAS380.

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FORM 09-01	THIRD ANGLE PROJECTION		CUSTODIAN ENGINEERING MANAGEMENT COMMITTEE	REVISION 5
	PROCUREMENT SPECIFICATION NONE		TITLE MACHINE GAS METAL ARC FUSION WELDING EQUIPMENT	CLASSIFICATION SPECIFICATION NAS964 SHEET 1 OF 18



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1.0 SCOPE

1.1 Purpose

This specification provides a standard for manufacture, performance, inspection, reliability and procurement of a machine for gas metal arc welding systems, exclusive of weld positioners, weld manipulators, and other mechanical tooling devices. This standard lists minimum requirements and is not to limit design advances.

1.2 Classification

The welding systems shall be of the following types, sizes and class.

1.2.1 Type

- I - Constant Potential
- II - Combination Constant Potential/Constant Current
- III - Shorting Arc
- IV - Pulsed Current

1.2.2 Size

- A - 200 Amp
- B - 250 Amp
- C - 300 Amp
- D - 400 Amp
- E - 600 Amp

1.2.3 Class

Mechanized Gas Metal Arc (N/C Optional)

LIST OF CURRENT SHEETS

NO.	REV.	NO.	REV.	NO.	REV.	NO.	REV.
1	4	5	3	9	3	13	3
2	3	6	3	10	3	14	3
3	3	7	3	11	3	15	NEW
4	3	8	3	12	3	16	NEW
						17	NEW

④

CUSTODIAN: MANUFACTURING COMMITTEE

PROCUREMENT
SPECIFICATION

NONE

TITLE

MACHINE GAS METAL ARC FUSION WELDING EQUIPMENT

CLASSIFICATION
SPECIFICATION

NAS 964
SHEET 1 OF 17

NATIONAL AEROSPACE STANDARD

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

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1.3 Intended Use

The welding systems described by this specification are intended for use in the aerospace manufacturing industry and provide performance criteria for a machine for gas metal arc welding of ferrous and non-ferrous alloys.

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 this specification shall preclude any contradictory portions of the following specifications, codes and standards.

- 2.1 Weld Certification MIL-T-5021 (ASG)
- 2.2 Electronic Industries Association Standards for Electronic Wiring and Components. RS 281.
- 2.3 Federal, State and Local Safety Codes.
- 2.4 FCC Regulations pertaining to Radio Interference.
- 2.5 National Aerospace Standards, 955 - Interchangeable Perforated Tape Standards - Variable Block Format, Numerically Controlled Equipment.
- 2.6 National Aerospace Standards 938, Machine Axis and Motion Nomenclature.
- 2.7 National Aerospace Standards 953, Numerical Control Systems (standard practice).
- 2.8 American Welding Society's Standard A3.0-69.
- 2.9 Joint Industrial Council (JIC) Electrical Standards for General Purpose Machine Tools, EGP.1.1967, when requirements are not defined in specifications noted 2.3, and 2.4 above.
- 2.10 National Electrical Manufacturer's Association (NEMA) EW1-1970.
- 2.11 Occupational Safety & Health Standard Part 1910 of Chapter XVII of Title 29 of the Code of Federal Regulations (Occupational Safety & Health Act (OSHA) - 1970).

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NAS Documents
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3.0 REQUIREMENTS

3.1 Design

The capacities for the respective types and sizes shall be as shown in Section 3.2. The manufacturer has the choice of configuration and the functional operation of the machine, except where specifically stated in this specification.

3.2 Types, Sizes, Class (GMA)

TABLE I

	SIZE				
	A	B	C	D	E
Maximum Rated Current Output	200	250	300	400	600
at 100% duty cycle					
Maximum Rated Load voltage, volts	28	30	32	36	44
Output Current Range, Amps	20-240	25-300	30-360	40-480	60-720
Output Voltage Range, Volts					
Type I & II	--	--	15-60	15-60	15-60
Type III	10-40	10-40	--	--	--
Type IV	--	--	30-70	--	--
			peak		
			10-35		
			base		
Maximum Open Circuit Voltage, Volts					
Type I, II & IV	--	--	60	60	60
Type III	45	45	--	--	--
Output Voltage Regulation	±1% for ± 10% line variation				
Response to load variation, sec.					
Type I, II	--	--	.120	.120	.120
Type III	.00005	.00005	--	--	--
Type IV	--	--	.004	--	--
Input Voltage Requirements	240/480 volts - 3 phase - 60 hertz				
Input Current Requirements	Max. noted by Mfg.				

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NAS Documents
SHEET 3

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TABLE I (Continued)
SIZE

	A	B	C	D	E
Power Factor	Not less than 75% of max. rated output				
Auxiliary Power	115 volt AC receptacle energized with main power switch (10 Amp)				
Polarity Switch					
Type I	--	--	Optional	Optional	Optional
Type II	--	--	Provided	Provided	Provided
Type III	Optional	Optional	--	--	--
Type IV	--	--	Optional	--	--
Thermal Overload Protection	Provided				
Slope Control (for varying static volt-ampere characteristics)					
Type I, II & III	Variable/fixed	Variable/fixed	Variable	Variable	Variable
Type IV	--	--	Fixed	--	--
Secondary Inductance/Reactance					
Type I & II			fixed	fixed	fixed
Type III & IV	Variable/fixed	Variable/fixed	Variable	--	--
Pulse Repetition Rate, Tape IV	60/120				

3.3 Machine Sub-Assemblies

3.3.1 Welding Head

3.3.1.1 Welding Torch

3.3.1.1.1 Capacity - 300 to 600 Amperes continuous duty.

3.3.1.1.2 Capacity - .020 to .093 diameter (hardwire).

3.3.1.1.3 Capacity - .030 to .093 diameter (softwire).

3.3.1.1.4 The welding torch shall have provisions for liquid cooling.

3.3.1.1.5 Inert gas lines shall be flexible and of a type to prevent contamination by osmotic aspiration.

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- 3.3.1.1.6 Permanent leak proof partitions shall be used between water and gas passages in the torch. "O" rings shall not be used to separate the gas and water passages.
- 3.3.1.1.7 Provisions shall be made for an inert gas atmosphere around the wire feed guide tube.
- 3.3.1.2 Filler Wire Feeder
- 3.3.1.2.1 Filler wire feed rate - infinitely variable over a range of 100 to 1000 ipm.
- 3.3.1.2.2 Filler wire feed rate accuracy - $\pm 1\%$ of preset rate, regardless of $\pm 10\%$ line voltage variation.
- 3.3.1.2.3 Filler wire size range - .020 to .093 (hardwire).
- 3.3.1.2.4 Filler wire size range - .030 to .093 (software).
- 3.3.1.2.5 A filler wire feed rate control dial shall read directly in ipm and shall provide wire at $\pm 1\%$ of the preset rate regardless of a $\pm 10\%$ voltage variation.
- 3.3.1.2.6 Filler wire feed design shall incorporate straightening, non-knurling, and non-galling features.
- 3.3.1.2.7 Filler wire reel (spool containers) shall have provisions for internal purge with inert gas.
- 3.3.1.2.8 Filler wire feeder rolls shall be located so as to minimize friction and to insure constant wire feed.
- 3.3.1.2.9 Filler wire feed drive mechanisms shall provide for maximum acceleration or deceleration through any 50% of feed speed range within 100 milliseconds.
- 3.3.1.2.10 Filler wire feeder design shall provide for pressure adjustment on feed rolls.
- 3.3.1.2.11 Provisions shall be made to prevent excessive unspooling of filler wire.
- 3.3.1.2.12 A separate set of wire feeder rolls shall be provided for soft and for hard wire.
- 3.3.1.3 Head Mounting and Motion Provisions
- 3.3.1.3.1 Head mounting design shall provide for manual adjustment of electrode tip within a conical angle of 15° measuring from electrode center line. Entire head assembly shall be adjustable to a $\pm 1/8"$ in a transverse direction to the weld joint.

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