

INCH-POUND

A-A-59756

8 November 2004

COMMERCIAL ITEM DESCRIPTION

AC VOLTAGE STANDARD

The General Services Administration has authorized the use of this Commercial Item Description (CID) for all federal agencies.

1. **SCOPE.** This Commercial Item Description (CID) describes an autoranging AC Measurement Standard with an AC voltage measurement voltage range of 700 μ V to 1000V over a frequency range of 10 Hz to 1 MHz and a wideband measurement voltage range of 700 μ V to 7V over a frequency range of 10 Hz to 30 MHz. Additionally, this instrument may be operated as a volt meter, an AC or DC voltage transfer standard, and an AC or DC current transfer standard. This purchase description lists the minimum performance, design, functional environmental, reliability requirements and quality assurance provisions for this AC Voltage Standard.

2. **CLASSIFICATION.** Equipment covered by this CID may be commercially available equipment modified to the extent necessary to meet the following description. The equipment shall be Class 3 in accordance with MIL-PRF-28800, except as specified herein.

3. **SALIENT CHARACTERISTICS.** The equipment shall be capable of operation and bid sample testing, if so requested, within the accuracies, limits, and specifications herein.

3.1 **Safety and Environmental.** The equipment shall meet all safety and environmental requirements as specified in MIL-PRF-28800 for the classification as stated herein.

3.1.1 **Temperature Operating.** The equipment shall conform to its specified performance and accuracy while being operated as a volt meter in a temperature range of 0 °C to 50 °C.

3.1.2 **Temperature Calibrating.** The equipment shall conform to its specified performance and accuracy while being operated as a calibration standard in a temperature range of 15 °C to 35 °C.

3.1.3 **Temperature Non-Operating.** The equipment shall conform to its specified performance and accuracy after being stored in an environment in the temperature range of -40 °C to 71 °C.

Beneficial comments, recommendations, additions, deletions, clarifications, etc. and any data that may improve this document should be sent to: WR-ALC/LEEC, 295 Byron Street, Robins AFB, GA 31098-1611

FSC 6625

A-A-59756

3.1.4 Humidity Range Operating. The equipment shall conform to its specified performance and accuracy while being operated in a non-condensing humidity range of 5% to 95% \pm 5% RH from 0 °C to 30 °C and 75% \pm 5% RH 30 °C to 40 °C and 45% \pm 5% RH above 40 °C.

3.1.5 Warm Up Time. This shall be \leq 30 minutes.

3.2 Electrical Power Sources. The equipment shall operate from nominal single-phase commercial, military, and shipboard power sources of 120 volts AC (\pm 10%) or 240 volts AC (\pm 10%) at line frequencies of 47.5 Hz to 52.5 Hz and 57 Hz to 63 Hz. Transient state conditions shall meet MIL-PRF-28800 requirements for the classification specified herein. The equipment shall also have a power consumption equal to or less than 400 Volt-Amperes.

3.3 Reliability. The design of the equipment shall be such that under normal use and operation the equipment does not fail within 4,000 hours of operation with a statistical certainty of 95%.

3.4 Calibration and Maintenance Adjustments. The design of the system shall provide for readily accessible calibration and maintenance adjustments. These adjustments shall be provided by variable value components, which are adjustable, by the use of simple means. The calibration by substitution of selected components or parts is unacceptable unless specifically approved. The calibration adjustments, wherever possible, shall be accessible without removal of the instrument case or modules. The calibration interval shall be a period of one year or greater, based on an operating time of 2000 hours per year.

3.5 Performance Requirements. The instrument shall meet all requirements specified herein, after the warm-up period specified in MIL-PRF-28800, under all combinations of input power conditions, output signal conditions, and operating service condition as specified in MIL-PRF-28800.

3.5.1 AC Measurement Uncertainty. The instrument shall meet or exceed the following AC measurement uncertainty specifications.

Voltage Range	4. Frequency Range			
	40 Hz-20 KHz	20 KHz-50 KHz	50 KHz-0.1 MHz	0.1 MHz-1.0 MHz
0.7 mV-10 mV	0.008% +5 μ V			
0.01V-0.1V	0.007% +5 μ V			
0.1-5V	0.007%	0.01%	0.015%	0.06%
5-100V	0.004%	0.008%	0.013%	0.06%
100V-1000V	0.007%	0.01%		

A-A-59756

3.5.2 Absolute Uncertainty Specifications. The instrument shall meet or exceed the following one year Absolute Uncertainty Specifications:

Voltage Range	Frequency Range Hz	Absolute Uncertainty AC/DC Transfer Mode			Temperature Coefficient (add to uncertainty when operated more than 5 °C from calibration temp)	
		$\pm 5^{\circ}\text{C}$ of T_{cal}			10 °C to 40 °C	0 °C to 10 °C
		2 years	1 year			40 °C to 50 °C
		\pm ppm of Reading	\pm ppm Reading + μV		PPM/°C	
2.2 mV	10-20		1700 + 1.3		50.0	50.0
	20-40		740 + 1.3		50.0	50.0
	40-20k		80 + 5.0		50.0	50.0
	20k-50k		810 + 2.0		50.0	50.0
	50k-100k		1200 + 2.5		75.0	75.0
	100k-300k		2300 + 4.0		100.0	100.0
	300k-500k		2400 + 8.0		150.0	150.0
	500k-1M		3500 + 8.0		200.0	200.0
7 mV	10-20		850 + 1.3		15.0	15.0
	20-40		370 + 1.3		15.0	15.0
	40-20k		80 + 5.0		15.0	15.0
	20k-50k		400 + 2.0		15.0	15.0
	50k-100k		600 + 2.5		25.0	25.0
	100k-300k		1200 + 4.0		60.0	60.0
	300k-500k		1300 + 8.0		80.0	80.0
	500k-1M		2300 + 8.0		125.0	125.0
22 mV	10-20		290 + 1.3		5.0	5.0
	20-40		190 + 1.3		5.0	5.0
	40-20k		70 + 5.0		5.0	5.0
	20k-50k		210 + 2.0		5.0	5.0
	50k-100k		310 + 2.5		8.0	8.0
	100k-300k		810 + 4.0		10.0	10.0
	300k-500k		890 + 8.0		40.0	40.0
	500k-1M		1700 + 8.0		100.0	100.0
70 mV	10-20		240 + 1.5		5.0	5.0
	20-40		120 + 1.5		5.0	5.0
	40-20k		70 + 5.0		5.0	5.0
	20k-50k		130 + 2.0		5.0	5.0
	50k-100k		260 + 2.5		8.0	8.0
	100k-300k		510 + 4.0		10.0	10.0
	300k-500k		670 + 8.0		30.0	30.0
	500k-1M		1100 + 8.0		75.0	75.0
220 mV	10-20	210	210 + 1.5		1.5	3.0
	20-40	82	85 + 1.5		1.5	3.0
	40-20k	50	70 + 0.0		1.5	3.0
	20k-50k	70	100 + 0.0		2.0	3.0

A-A-59756

Voltage Range	Frequency Range Hz	Absolute Uncertainty AC/DC Transfer Mode		Temperature Coefficient (add to uncertainty when operated more than 5 °C from calibration temp)	
		$\pm 5^{\circ}\text{C}$ of T_{cal}		10 °C to 40 °C	0 °C to 10 °C
		2 years	1 year		40 °C to 50 °C
		\pm ppm of Reading	\pm ppm Reading + μV	PPM/°C	
	50k-100k	120	160 + 2.5	5.0	8.0
	100k-300k	500	250 + 4.0	10.0	10.0
	300k-500k	500	380 + 8.0	20.0	20.0
	500k-1M	500	1000 + 8.0	50.0	50.0
700 mV	10-20	210	210 + 1.5	1.5	3.0
	20-40	73	76 + 1.5	1.5	3.0
	40-20k	50	70 + 0.0	1.5	3.0
	20k-50k	70	100 + 0.0	2.0	3.0
	50k-100k	120	79 + 2.5	5.0	8.0
	100k-300k	500	180 + 4.0	10.0	10.0
	300k-500k	500	300 + 8.0	20.0	20.0
	500k-1M	500	960 + 8.0	50.0	50.0
			\pm ppm Reading		
2.2 V	10-20	200	200	1.5	3.0
	20-40	63	66	1.5	3.0
	40-20k	50	70	1.5	3.0
	20k-50k	70	100	2.0	3.0
	50k-100k	120	150	5.0	8.0
	100k-300k	500	600	10.0	10.0
	300k-500k	500	600	20.0	20.0
	500k-1M	500	900	50.0	50.0
7 V	10-20	200	200	1.5	3.0
	20-40	63	67	1.5	3.0
	40-20k	30	40	1.5	3.0
	20k-50k	60	80	2.0	3.0
	50k-100k	100	130	5.0	8.0
	100k-300k	500	600	15.0	15.0
	300k-500k	500	600	30.0	30.0
	500k-1M	500	1200	65.0	65.0
22 V	10-20	200	200	1.5	3.0
	20-40	63	67	1.5	3.0
	40-20k	30	40	1.5	3.0
	20k-50k	60	80	2.0	3.0
	50k-100k	100	130	5.0	8.0
	100k-300k	500	600	15.0	15.0
	300k-500k	500	600	30.0	30.0
	500k-1M	500	1200	65.0	65.0
			\pm ppm Reading		

A-A-59756

Voltage Range	Frequency Range Hz	Absolute Uncertainty AC/DC Transfer Mode		Temperature Coefficient (add to uncertainty when operated more than 5 °C from calibration temp)	
		$\pm 5^{\circ}\text{C}$ of T_{cal}		10 °C to 40 °C	0 °C to 10 °C
		2 years	1 year		40 °C to 50 °C
		\pm ppm of Reading	\pm ppm Reading + μV	PPM/°C	
70 V	10-20	200	200	1.5	3.0
	20-40	63	68	1.5	3.0
	40-20k	30	40	1.5	3.0
	20k-50k	60	80	2.0	3.0
	50k-100k	100	130	5.0	8.0
	100k-300k	500	600	15.0	15.0
	300k-500k	500	600	40.0	40.0
	500k-1M	500	1200	75.0	75.0
220 V	10-20	200	200	1.5	3.0
	20-40	63	68	1.5	3.0
	40-20k	50	70	1.5	3.0
	20k-50k	80	100	2.0	3.0
	50k-100k		98	5.0	8.0
	100k-300k		210	15.0	15.0
	300k-500k		500	40.0	40.0
700 V	10-20	200	200	1.5	4.0
	20-40	92	99	1.5	4.0
	40-20k	50	70	1.5	4.0
	20k-50k	80	100	5.0	7.0
	50k-100k		500	15.0	15.0
1000 V	10-20	200	200	1.5	4.0
	20-40	92	99	1.5	4.0
	40-20k	50	70	1.5	4.0
	20k-50k	80	100	5.0	7.0
	50k-100k		500	15.0	15.0

A-A-59756

3.5.3 Wide Band Absolute Uncertainty Specifications. The instrument shall meet or exceed the following Wide Band Measurement Absolute Uncertainty Specifications:

Voltage Range (Range limits same as INPUT 1 or INPUT 2)	Frequency Range Hz		Absolute Uncertainty				Flatness
		Flatness	0 °C to 50 °C				Temperature Coefficient
		1 years, ±3 °C of T _{cal}	90 days	1 year	2 years	PPM/°C	
		±(% Reading + μV) Relative to 1 kHz, for 2-year spec. multiply by 1.5	±(% Reading + μV) At input connector				Add to flatness specifications when more than 3 °C from calibration temperature.
2.2 mV	10-30	0.10 + 0	0.5 + 1.2	0.6 + 1.5	0.8 + 2	75	
	30-120	0.05 + 0	0.5 + 1.2	0.6 + 1.5	0.8 + 2	75	
	120-1.2k	0.05 + 0	0.5 + 1.2	0.6 + 1.5	0.8 + 2	75	
	1.2k-120k	0.05 + 0	0.5 + 1.2	0.6 + 1.5	0.8 + 2	75	
	120k-500k	0.07 + 1	0.5 + 1.2	0.6 1.5	0.8 2	75	
	500k-1.2M	0.07 + 1				75	
	1.2M-2M	0.07 + 1				100	
	2M-10M	0.17 + 1				200	
	10M-20M	0.30 + 1				200	
	20M-30M	0.70 + 2				400	
7 mV	10-30	0.10 + 0	0.4 + 5	0.5 + 7	0.7 + 8	75	
	30-120	0.05 + 0	0.4 + 5	0.5 + 7	0.7 + 8	75	
	120-1.2k	0.05 + 0	0.4 + 5	0.5 + 7	0.7 + 8	75	
	1.2k-120k	0.05 + 0	0.4 + 5	0.5 + 7	0.7 + 8	75	
	120k-500k	0.07 + 1	0.4 + 5	0.5 + 7	0.7 + 8	75	
	500k-1.2M	0.07 + 1				75	
	1.2M-2M	0.07 + 1				100	
	2M-10M	0.10 + 1				200	
	10M-20M	0.17 + 1				200	
	20M-30M	0.37 + 1				300	
		±% Reading					
22 mV	10-30	0.10	0.4 + 10	0.5 + 13	0.7 + 16	75	
	30-120	0.05	0.4 + 10	0.5 + 13	0.7 + 16	75	
	120-1.2k	0.05	0.4 + 10	0.5 + 13	0.7 + 16	75	
	1.2k-120k	0.05	0.4 + 10	0.5 + 13	0.7 + 16	75	
	120k-500k	0.07	0.4 + 10	0.5 + 13	0.7 + 16	75	
	500k-1.2M	0.07				75	
	1.2M-2M	0.07				75	
	2M-10M	0.10				100	
	10M-20M	0.17				100	
	20M-30M	0.37				200	
70 mV	10-30	0.10	0.4 + 20	0.5 + 30	0.6 + 40	40	
	30-120	0.05	0.4 + 20	0.5 + 30	0.6 + 40	40	
	120-1.2k	0.05	0.4 + 20	0.5 + 30	0.6 + 40	40	
	1.2k-120k	0.05	0.4 + 20	0.5 + 30	0.6 + 40	40	

A-A-59756

Voltage Range (Range limits same as INPUT 1 or INPUT 2)	Frequency Range Hz		Absolute Uncertainty			Flatness Temperature Coefficient PPM/°C Add to flatness specifications when more than 3 °C from calibration temperature.			
		Flatness	0 °C to 50 °C						
		1 years, ±3 °C of T _{cal}	90 days	1 year	2 years				
		±(% Reading + μV) Relative to 1 kHz, for 2-year spec. multiply by 1.5	±(% Reading + μV) At input connector						
		±% Reading							
	120k-500k	0.05	0.4	+ 20	0.5	+ 30	0.6	+ 40	40
	500k-1.2M	0.05							40
	1.2M-2M	0.05							75
	2M-10M	0.10							100
	10M-20M	0.15							100
	20M-30M	0.35							200
220 mV	10-30	0.10	0.3	+ 60	0.4	+ 80	0.5	+ 100	40
	30-120	0.04	0.3	+ 60	0.4	+ 80	0.5	+ 100	40
	120-1.2k	0.04	0.3	+ 60	0.4	+ 80	0.5	+ 100	40
	1.2k-120k	0.04	0.3	+ 60	0.4	+ 80	0.5	+ 100	40
	120k-500k	0.04	0.3	+ 60	0.4	+ 80	0.5	+ 100	40
	500k-1.2M	0.05							40
	1.2M-2M	0.05							75
	2M-10M	0.10							100
	10M-20M	0.15							100
	20M-30M	0.35							200
700 mV	10-30	0.10	0.3	+ 200	0.4	+ 300	0.5	+ 400	40
	30-120	0.03	0.3	+ 200	0.4	+ 300	0.5	+ 400	40
	120-1.2k	0.03	0.3	+ 200	0.4	+ 300	0.5	+ 400	40
	1.2k-120k	0.03	0.3	+ 200	0.4	+ 300	0.5	+ 400	40
	120k-500k	0.03	0.3	+ 200	0.4	+ 300	0.5	+ 400	40
	500k-1.2M	0.05							40
	1.2M-2M	0.05							75
	2M-10M	0.10							100
	10M-20M	0.15							100
	20M-30M	0.35							200
2.2 V	10-30	0.10	0.3	+ 300	0.35	+ 400	0.4	+ 500	40
	30-120	0.03	0.3	+ 300	0.35	+ 400	0.4	+ 500	40
	120-1.2k	0.03	0.3	+ 300	0.35	+ 400	0.4	+ 500	40
	1.2k-120k	0.03	0.3	+ 300	0.35	+ 400	0.4	+ 500	40
	120k-500k	0.03	0.3	+ 300	0.35	+ 400	0.4	+ 500	40
	500k-1.2M	0.05							40
	1.2M-2M	0.05							75
	2M-10M	0.10							100
	10M-20M	0.15							100
	20M-30M	0.35							200
7 V	10-30	0.10	0.3	+ 500	0.35	+ 800	0.4	+ 1000	40
	30-120	0.03	0.3	+ 500	0.35	+ 800	0.4	+ 1000	40
		±% Reading							

A-A-59756

Voltage Range (Range limits same as INPUT 1 or INPUT 2)	Frequency Range Hz		Absolute Uncertainty			Flatness Temperature Coefficient PPM/°C Add to flatness specifications when more than 3 °C from calibration temperature.
		Flatness	0 °C to 50 °C			
		1 years, ±3 °C of T _{cal}	90 days	1 year	2 years	
		±(% Reading + μV) Relative to 1 kHz, for 2-year spec. multiply by 1.5	±(% Reading + μV) At input connector			
	120-1.2k	0.03	0.3 + 500	0.35 + 800	0.4 + 1000	40
	1.2k-120k	0.03	0.3 + 500	0.35 + 800	0.4 + 1000	40
	120k-500k	0.03	0.3 + 500	0.35 + 800	0.4 + 1000	40
	500k-1.2M	0.05				40
	1.2M-2M	0.05				75
	2M-10M	0.10				100
	10M-20M	0.15				100
	20M-30M	0.35				200

3.5.4 Current Measurement. The instrument shall provide current transfer measurement capability. The current transfer specifications shall be with the above absolute uncertainty specifications.

3.5.5 Additional Cables. The instrument shall include all cables necessary for full and complete operation.

3.5.6 Remote interface. The instrument shall provide a GPIB/IEEE-488 and an RS-232C interface.

3.5.7 Input Connections. The instrument shall provide Type-N connectors and five-way binding posts. The connectors shall be able to cover all operational modes of the instrument.

3.5.8 Dimensions. The width and depth of the equipment shall be compatible with mounting in an ANSI/EIA-310-D standard equipment rack. The height shall be compatible with four standard height units, 4U. One unit or "U" is defined by ANSI/EIA-310-D to be 1.75 inches or 44.45 mm.

3.5.9 Weight. The total weight of the equipment, excluding accessories and manuals, shall not exceed a two-person lift of 74 pounds, (33.6 kilograms).

3.5.10 Rack Mount. The analyzer shall be capable of being rack-mounted in a standard ANSI/EIA-310-D equipment rack and include a rack-mount conversion kit if needed.

3.5.11 Manuals. The equipment shall be delivered with operator, maintenance, calibration, and illustrated parts manuals. Format and quantity shall be as specified in the contract or order. Level of maintenance philosophy, as defined in MIL-PRF-28800, shall be as specified in the contract or order.

A-A-59756

4. **REGULATORY REQUIREMENTS.** The offeror/contractor is encouraged to use recovered materials to the maximum extent practicable, in accordance with paragraph 23.403 of the Federal Acquisition Regulation (FAR).

5. **PRODUCT CONFORMANCE PROVISIONS.**

5.1 Product Conformance. The products provided shall meet the salient characteristics of this CID, conform to the producer's own drawings, specifications, standards and quality assurance practices, and be the same product offered for sale in the commercial market. The government reserves the right to require proof of such conformance.

5.2 Metric Products. Products manufactured to metric dimensions will be considered on an equal basis with those manufactured using inch-pound units, provided they fall within the specified tolerances using conversion tables contained in the latest revision of Federal Standard No. 376, and all other requirements of this CID are met. If a product manufactured to metric dimensions exceeds the tolerances specified in the inch/pound units, a request should be made to the contracting officer to determine if the product is acceptable.

5.3 The contracting officer has the option of accepting or rejecting the product.

6. **PACKAGING.**

6.1 Preservation, Packing, and Marking. Preservation, packing, and marking shall be as specified in the contract or order.

7. **NOTES.**

7.1 Sources of documents.

7.1.1 Military Specifications, Standards, and Handbooks referenced herein may be obtained from the Standardization Documents Order Desk, 700 Robbins Ave., Bldg 4, Section D, Philadelphia, PA 19111-5094.

7.1.2 The Code of Federal Regulations, (CFR), may be obtained from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC, 20402.

7.1.3 Electronics Industry Alliance (EIA). Hardcopy of EIA standards and technical publications are available from Global Engineering Documents, the exclusive distributor of EIA standards. Web site: global.ihs.com. Phone number: 800-854-7179.

A-A-59756

MILITARY INTEREST

Custodian:
Air Force – 99

Preparing activity:
Air Force - 84

Agent:
Air Force - 99

(Project 6625-F100)

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