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MIL-A-62048B(AT)  
6 April 1989  
SUPERSEDING  
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## MILITARY SPECIFICATION

### AIR CLEANERS, AUTOMOTIVE: HEAVY DUTY, DRY-TYPE (FOR INTERNAL COMBUSTION ENGINES)

This specification is approved for use by the US Army Tank-Automotive Command, Department of the Army, and is available for use by all Departments and Agencies of the Department of Defense.

#### 1. SCOPE

1.1 Scope. This specification covers heavy duty, dry-type, air cleaners with a replaceable filter element for use in automotive applications.

#### 2. APPLICABLE DOCUMENTS

##### 2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: US Army Tank-Automotive Command, ATTN: AMSTA-GDS, Warren, MI 48397-5000, by using the self-addressed Standardization Document Improvement Proposal (DD-Form 1426) appearing at the end of this document or by letter.
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## SPECIFICATIONS

## MILITARY

- MIL-C-46168 - Coating, Aliphatic Polyurethane, Chemical Agent Resistant.
- MIL-F-46736 - Filter Element, Intake Air Cleaner: Dry-Type.
- MIL-C-53039 - Coating, Aliphatic Polyurethane, Single Component, Chemical Agent Resistant.
- MIL-B-62284 - Blower Assembly, Air Cleaner.

## STANDARDS

## FEDERAL

- FED-STD-595 - Colors.

## MILITARY

- MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.
- MIL-STD-130 - Identification Marking of US Military Property.
- MIL-STD-193 - Painting Procedures and Marking for Vehicles, Construction Equipment and Material Handling Equipment.
- MIL-STD-45662 - Calibration Systems Requirements.

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Naval Publications and Forms Center, (ATTN: NPODS), 5801 Tabor Avenue, Philadelphia, PA 19120-5099.)

2.2 Non-Government publications. The following document forms a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted are those listed in the issue of the DODISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS are the issues of the documents cited in the solicitation (see 6.2).

## AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

- ASTM C800 - Glass Fiber Blanket Insulation (Aircraft Type).

(Application for copies should be addressed to American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

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(Nongovernment standards and other publications are normally available from the organizations that prepare or distribute the documents. These documents also may be available in or through libraries or other informational services.)

2.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein, the text of this specification shall take precedence. Nothing in this specification, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

### 3. REQUIREMENTS

3.1 First article. When specified (see 6.2), samples shall be subjected to first article inspection (see 6.3) in accordance with 4.4.

3.2 Materials. Materials shall conform to the applicable requirements as specified herein, and in the referenced specifications, standards, and drawings. Materials shall be free from defects which adversely affect performance or serviceability of the finished product (see 4.8.1).

3.2.1 Sheet metal parts. Sheet metal parts shall be free of pipes, laminations, stringers, tears and excessive metal thinning at drawn sections (see 4.8.2).

3.2.2 Recycled, virgin and reclaimed materials. There are no requirements for the exclusive use of virgin materials. The use of recycled or reclaimed (recovered) materials is acceptable provided that all other requirements of this specification are met (see 6.4.1).

3.3 Design and construction. The air cleaner shall be fabricated as specified herein and in accordance with the applicable drawing or MS standard (see 4.8.1, 4.8.2, and 6.2).

3.3.1 Dimension and rated airflow. Unless otherwise specified (see 6.2), dimensions and rated airflow shall be in accordance with the applicable drawing or MS standard (see 4.8.1 and 4.8.2).

3.3.2 Filter element. The filter element shall comply with MIL-F-46736. The filter element shall be firmly positioned in the housing but easily removable for servicing (see 4.8.1 and 4.8.2).

3.3.3 Air filter blowers. Air filter blowers, if used, shall comply with MIL-B-62284 (see 4.8.1).

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3.3.4 Tubular joints. Air cleaner tubular joints shall have externally beaded ends of sufficient strength to withstand external pressure caused by hose clamps or other fastening devices (see 4.8.2).

3.3.5 Flanged joints. Flanged joints shall have smooth faces suitable for use with gaskets, and when assembled shall provide airtight joints under all conditions of service. There shall be no holes in flanges opening into the clean-air passage (see 4.8.2).

3.3.6 Servicing. Servicing, cleaning, and reassembly shall be accomplished without the use of special tools and without disturbing the clean air connections to the engine. The number of parts required to be removed for servicing shall be held to a minimum and shall be so designed as to prevent improper reassembly (see 4.8.2).

3.4 Performance. Except as otherwise specified herein, performance requirements shall be met under the following conditions (see 4.8.3):

- a. Temperature - 70.16 to 89.96 degrees Fahrenheit ( $^{\circ}$ F)  
[21.2 to 32.2 degrees Celsius ( $^{\circ}$ C)].
- b. Humidity - 35  $\pm$  5 percent (%).
- c. Density of air - 1.2 kilogram per cubic meters at 26.7 $^{\circ}$ C and  
76 centimeters of mercury (cm Hg).
- d. Pressure - 76  $\pm$  2.5 cm Hg.
- e. Dust - Chemical analysis of the test dust shall be  
as shown in table I. Particle size  
distribution shall be as shown in table II.
- f. Dust feed rate - 0.883  $\pm$  .176 gram per cubic meters  
(g/m $^3$ ) of air.

TABLE I. Chemical analysis of test dust.

Substance	Percent by weight
Silicon dioxide (SiO $_2$ )	67 to 69
Ferric oxide (Fe $_2$ O $_3$ )	3 to 5
Aluminum oxide (Al $_2$ O $_3$ )	15 to 17
Calcium oxide (CaO)	2 to 4
Magnesium oxide (MgO)	0.5 to 1.5
Total alkalis as sodium oxide (Na $_2$ O)	3 to 5
Ignition loss	2 to 3

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TABLE II. Particle size distribution.

Particle size (microns)	Percent of total weight	
	Coarse grade	Fine grade
0 - 5	12 ± 2	39 ± 2
5 - 10	12 ± 3	18 ± 3
10 - 20	14 ± 3	16 ± 3
20 - 40	23 ± 3	18 ± 3
40 - 80	30 ± 3	9 ± 3
80 - 200	9 ± 3	---

3.4.1 Air leakage resistance. The air cleaner shall not leak more than .3 cubic feet per minute (cfm) [.5 cubic meters per hour (m<sup>3</sup>/hr)] at a vacuum of 50 inches (in) of water [12.5 kilopascals (kPa)] and shall show no evidence of internal or external physical damage (see 4.8.3.1).

3.4.2 Airflow restriction. The initial airflow restriction of the air cleaner shall not exceed 9 in (23 cm) of water at rated airflow (see 4.8.3.2).

3.4.3 Efficiency. The efficiency of the air cleaner at rated airflow shall be not less than 99.5% after being fed fine grade dust for 30 minutes or until 110 grams of dust has been fed, whichever results in a greater quantity of dust, or 60 minutes if the rated airflow face velocity of the air cleaner is 183 cm per minute or less (see 4.8.3.3).

3.4.4 Service life. After documenting the initial airflow restriction at rated airflow (restriction limit not to exceed 9 in (23 cm) of water at rated airflow), the air cleaner shall be capable of operation to an airflow restriction of 20 in (51 cm) of water while being fed coarse grade dust at the variable air flows specified in figure 1. The time for the air cleaner to reach the restriction of 51 cm of water shall be not less than 20 hours (see 4.8.3.4).

3.4.5 Post service airflow restriction. The air cleaner shall not exceed its original restriction by more than 1 in (2.5 cm) of water at rated airflow after servicing (see 4.8.3.5).

#### 3.4.6 Environmental.

3.4.6.1 Vibration. The air cleaner shall be capable of meeting the performance requirements of 3.4.1 and 3.4.3 after withstanding simple harmonic motion having a double amplitude of 0.08 cm for 12 hours in the vertical direction and 12 hours in the horizontal direction while the frequency is varied between 10 and 55 hertz. Without cleaning the element, vibration resistance testing shall be conducted using elements loaded to dust capacity per 3.4.3 (see 4.8.3.6.1).

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3.5 Painting. Unless otherwise specified (see 6.2), the preparation, conditioning, and painting of the air cleaner shall be in accordance with applicable provisions of MIL-STD-193. However, all surfaces requiring a paint topcoat shall be painted with a chemical resistant coating conforming to MIL-C-46168 or MIL-C-53039 (see 4.8.2).

3.5.1 Color. The exterior color shall be in accordance with the applicable color chip number of FED-STD-595 (see 4.8.2 and 6.2).

3.6 Identification marking. Unless otherwise specified (see 6.2), identification marking shall be in accordance with MIL-STD-130 and shall include the maximum rated airflow capacity (see 4.8.2).

3.7 Workmanship. Workmanship shall be such that the air cleaners shall be free of burrs, sharp edges, surfaces out of alignment or out of contour (visually apparent), loose metal particles or other foreign materials. Sheet metal parts shall be free of pipes, laminations, stringers, tears, and excessive metal thinning at drawn sections (see 4.8.2).

#### 4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements (examinations and tests) as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items shall meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of ensuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection, as part of manufacturing operations, is an acceptable practice to ascertain conformance to requirements, however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material.

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4.1.2 Special test equipment.

4.1.2.1 Setup for tests requiring airflow. The test setup for all tests requiring airflow shall be as specified in figure 2 for air cleaners without scavenging blowers and as specified in figure 3 for air cleaners with scavenging blowers.

4.1.2.2 Piezometer tubes transition ducts adapter, manometer and flowmeter. Piezometer tubes conforming to figure 4 and equal to or the next size larger (maximum of 1.27 cm larger) than the air cleaner inlet shall be installed at the inlet and outlet of the air cleaner. If required, transition ducts shall be installed from the flanges of the air cleaner inlet and outlet to the piezometer tubes. The transition ducts and any adapter installed after the outlet piezometer tube shall have sides at angles not greater than 7 degrees as measured from the centerline of the transition duct. A smooth approach (see figure 5) shall be installed at the front of the inlet piezometer tube. A water type manometer shall be installed between the two piezometer tubes (see figures 2 and 3) and a flowmeter shall be connected to the outlet of the adapter.

4.1.2.3 Master filter. The master filter, consisting of one layer of .5 in (1.27 cm) fiberglass batting conforming to ASTM C800, shall be installed in a suitable housing with the nap side of the batting facing upstream. The master filter batting shall be of sufficient size to prevent excessive restriction. The face velocity of air against the master filter batting shall not exceed 6096 cm per minute. A new master filter batting shall be installed if, during the service life test, the air pressure drop across the master filter increases 10 in (25 cm) of water above its original restriction. A manometer shall be located in the test setup to measure the pressure drop across the master filter. The filter housing shall be electrically grounded during testing.

4.1.2.3.1 Preparation of master filter. The fiberglass batting shall be hung in an air oven and dried for six hours at a temperature of 93 to 115°C and then weighed to the nearest 0.01 gram. This drying time may be reduced, and the batting considered as completely dry, if there is no change in oven weighings of the batting over two consecutive 10-minute intervals. This drying and weighing procedure shall be observed before and after each test involving dust feeding.

4.1.2.4 Scavenge air. In all tests of air cleaners equipped with scavenging blowers in which airflow through the air cleaner is required, scavenging flow shall be provided by the electric blower. Blower voltage and amperage readings shall be taken and recorded whenever readings specified in the particular test are recorded. In all tests, the electrical leads to the blower shall be connected to a suitable direct current power supply with a minimum of 300 watts output for each blower connected to it at any one time. The voltage input to the blower shall be set at  $26 \pm 0.2$  volts direct current (V dc) when the air cleaner is operating at rated flow. During any test, the

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voltage setting shall be adjusted only when the air cleaner is operating at rated airflow. In tests where dust is fed to the air cleaner, suitable means (see figure 3) shall be provided to carry away the air and dust discharged from the blower. Atmospheric pressure around the blower discharge shall not be changed by the method used to carry off discharged air and dust. In all tests of air cleaners equipped with scavenge air aspirators or to other methods of ejecting dust, the air cleaner test setup shall duplicate the vehicle installation.

4.1.2.5 Dust feeder. The dust feeder (see figure 6) shall be of a type that will deliver dust to the air cleaner neither breaking down the particles nor creating conglomerates. The dust feeder shall deliver dust uniformly throughout the test, with the dust having the same particle distribution at the end of testing as at the beginning of testing.

4.2 Classification of inspection:

- a. First article inspection (see 4.4).
  1. Preproduction inspection (see 4.4.1).
- b. Quality conformance inspections (see 4.5).
  1. Examination (see 4.5.2).
  2. Tests (see 4.5.3).
- c. Control tests (see 4.6).

4.3 Inspection conditions. Unless otherwise specified, all inspections shall be performed in accordance with the performance conditions specified in 3.4.

4.4 First article inspection. When first article is required (see 3.1), first article inspections shall be performed on preproduction samples as specified herein. Approval of the first article sample by the Government shall not relieve the contractor of the obligation to supply air cleaners that are fully representative of those inspected as a first article sample. Any changes or deviation of the production units from the first article sample shall be subject to the approval of the contracting officer.

4.4.1 Preproduction inspection. When specified (see 6.2), the preproduction sample shall consist of three air cleaners. Preproduction inspection shall consist of inspections as specified in table III.



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TABLE III. Classification of inspections.

Title	Requirement	Inspection	First article	Quality conformance		Control
				Examination	Tests	
Materials and construction	3.2 and 3.3 thru 3.3.3	4.8.1	X			
Defects (see table V)	3.3 thru 3.3.2, 3.3.4 thru 3.3.6, 3.5 thru 3.7	4.8.2	X	X		
Performance	3.4	4.8.3	X1/			X1/
Air leakage resistance	3.4.1	4.8.3.1	X		X	X
Airflow restriction	3.4.2	4.8.3.2	X		X	X
Efficiency	3.4.3	4.8.3.3	X		X	X
Service life	3.4.4	4.8.3.4	X			X
Post-service airflow restriction	3.4.5	4.8.3.5	X			X
Vibration resistance	3.4.6.1	4.8.3.6.1	X			

1/ See table IV for sequence of tests.

TABLE IV. Sequence of tests.

Title	Inspection	First Article	Control
Air leakage resistance	4.8.3.1	X	X
Airflow restriction	4.8.3.2	X	X
Efficiency	4.8.3.3	X	X
Vibration resistance	4.8.3.6.1	X	
Service life	4.8.3.4	X1/	X1/
Post-service airflow restriction	4.8.3.5	X	X

1/ Insert a new filter element prior to performing the service life test.

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4.5 Quality conformance inspection.4.5.1 Sampling.

4.5.1.1 Lot formation. An inspection lot shall consist of all the air cleaners of one part number, from an identifiable production period, from one manufacturer, submitted at one time for acceptance.

4.5.1.2 Sampling for examination. Samples for quality conformance examination shall be selected in accordance with general inspection level II of MIL-STD-105.

4.5.1.3 Sampling for tests. Samples for tests shall be selected in accordance with level S-3 of MIL-STD-105 from each lot that has passed the examination specified in 4.5.2.

4.5.2 Examination.

4.5.2.1 Acceptable quality level (AQL). Each sample selected in accordance with 4.5.1.2 shall be examined to determine conformance to the following AQL's.

<u>Classification</u>	<u>AQL</u>
Major	1.0
Minor	2.5

4.5.2.2 Classification of defects. For examination purposes, defects shall be classified as listed in table V.

TABLE V. Classification of defects.

Category	Defect	Method of examination
Critical	None	
Major	<u>AQL 1.0% Defective</u>	
101	Incorrect dimensions affecting interchangeability, out of tolerance (see 3.3 and 3.3.1).	SIE 1/
102	Nonconformance in design and construction (see 3.3, 3.3.1 and 3.3.4 thru 3.3.6).	Visual
103	Welding or brazing not as specified (see 3.3.2).	Visual
104	Filter element not secure (see 3.3.2).	Visual

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TABLE V. Classification of defects - Continued.

Category	Defect	Method of examination
105	Disassembly and assembly difficult or not possible (see 3.3.2 and 3.3.6).	Visual
106	Bent or defective tubular or flanged joints (see 3.3.4 and 3.3.5).	Visual
107	Faulty workmanship affecting performance (see 3.7).	Visual
<u>Minor</u>	<u>AQL 2.5% Defective</u>	
201	Incorrect dimensions not affecting interchangeability, out of tolerance (see 3.3 and 3.3.1).	SIE
202	Incorrect paint application or color (see 3.5 and 3.5.1).	Visual
203	Illegible, improper, or missing marking (see 3.6).	Visual
204	Faulty workmanship affecting appearance (see 3.7).	Visual

1/ SIE = Standard Inspection Equipment.

4.5.3 Test. Samples selected in accordance with 4.5.1.3 shall be subjected to the quality conformance tests specified in table III, in the order specified therein and shall conform to an AQL of 6.5.

4.6 Control tests. Control tests shall be conducted on two air cleaners from each lot of 100 units consecutively produced, except that not more than four or less than two air cleaners may be tested in any 30-day period. The air cleaners shall be subjected to the control tests specified in table III. Samples shall be selected from a lot that has passed quality conformance inspection.

4.7 Failure. Failure of any air cleaner assembly to pass any of the specified tests shall be cause for the Government to refuse acceptance of the production quantity represented, until action taken by the contractor to correct defects and prevent recurrence has been approved by the Government.

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4.8 Methods of inspection.

4.8.1 Materials and construction. Conformance to 3.2 and 3.3 through 3.3.3 shall be determined by inspection of contractor records providing proof or certification that design, construction, processing, and materials conform to requirements. Applicable records shall include drawings, specifications, design data, receiving inspection records, processing and quality control standards, vendor catalogs and certifications, industry standards, test reports, and rating data.

4.8.2 Defects. Conformance to 3.3 through 3.3.2, 3.3.4 through 3.3.6, and 3.5 through 3.7 shall be determined by examination for the defects listed in table V. Examination shall be visual, tactile, or by measurement with standard inspection equipment.

4.8.3 Performance. Except as otherwise specified herein, test conditions shall be in accordance with 3.4 and the following:

- a. The test setup for all tests requiring airflow shall be as specified in 4.1.2.1.
- b. Dust feed rates shall be averaged over 10-minute intervals.
- c. Measured airflow restriction values shall be corrected to the specified air density (see 3.4c) to an accuracy of .25 cm of water.
- d. Actual airflow values shall be corrected to standard conditions (see 3.4c) and shall be within  $\pm 2\%$  of specified values.
- e. The assembly shall be mounted in its normal operating attitude and shall be electrically grounded.
- f. For first article testing, and control testing, two filter elements shall be used for each assembly tested. The second filter element shall be inserted prior to the service life test.

4.8.3.1 Air leakage resistance. To determine conformance to 3.4.1, the following air leakage test shall be conducted: Connect the air cleaner outlet to a flowmeter and suction pump and the inlet to a vacuum indicator. Seal all air cleaner openings except for the suction line. The flowmeter shall be sized and accurate to measure flowrates of .3 cfm (0.5 m<sup>3</sup>/hr) to  $\pm 2\%$  accuracy. The vacuum indicator (manometer or gauge) shall read to 50 in (12.5 kPa) of water with an accuracy of  $\pm .2$  in (.05 kPa) of water. Pump down the system to a vacuum of 50 in (12.5 kPa) of water at the air cleaner inlet and hold for five minutes. The flowmeter shall indicate an airflow rate of not more than .3 cfm (0.5 m<sup>3</sup>/hr) while the vacuum is held at 50 in (12.5 kPa) of water.

4.8.3.2 Airflow restrictions. To determine conformance to 3.4.2, the air cleaner shall be set up in accordance with figure 2, and subjected to a dust free airflow through a new filter element. Determine airflow restriction at rated flow.

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4.8.3.3 Efficiency. To determine conformance to 3.4.3, the air cleaner shall be set up in accordance with figures 2 or 3, and the air adjusted to rated flow. Feed fine dust at  $0.883 \pm 0.176$  gram per cubic meters ( $g/m^3$ ) air until 110 grams have been fed or until 30 minutes have been reached, whichever result in a greater quantity of dust. In air cleaners where the rated airflow face velocity through the filter element media is 183 cm per minute or less, the dust shall be fed for 60 minutes. The restriction at the start of the test, and at 10-minute intervals throughout the test shall be recorded. The master filter and conductors shall be removed from the test setup taking care to retain all the entrapped dust, and reweighed. All dust and master filter weighings shall be accurate to 0.01 gram. Other weighings shall be accurate to 0.1 gram wherever possible but never less accurate than 0.01 gram. The efficiency shall be computed using the following formula:

$$\text{Dust Efficiency (\%)} = \frac{W_1 - (W_2 - W_3)}{W_1} \times 100$$

Where:  $W_1$  = Weight of dust fed.

$W_2$  = Weight of master filter and entrapped dust.

$W_3$  = Weight of master filter before test.

4.8.3.4 Service life. To determine conformance to 3.4.4 the air cleaner, with a new element installed, shall set up as shown in figures 2 or 3, and the air to the rated airflow. The restriction at the start of testing, and at 10-minute intervals throughout the test, shall be recorded. After obtaining the initial restriction at rated airflow, vary the airflow (see figure 1). The average actual airflow for this cycle is 60% of rated flow. Coarse dust shall be fed at  $.0083 g/m^3$  of actual airflow. The dust capacity test shall be terminated when the airflow restriction reaches 51 cm of water. Verify that the operational time was at least 20 hours. At completion of test or whenever the test setup is required to be shutdown, the filter element shall be viewed through the assembly outlet for visual signs of dust tracking on the clean side of the seal or the filter element media. Any visual signs of dust tracking shall be cause for rejection.

4.8.3.5 Post-service airflow restriction. To determine conformance to 3.4.5, the element or filter pack assembly shall be removed from the air cleaner after the service life test. In filter pack type cleaners, the element shall be disassembled from the basket and spacers. The filter element shall be compressed air cleaned. Line air pressure shall be  $700 \pm 70$  kPa, and the air hose nozzle inside diameter shall be a nominal 1/8 in (.32 cm). The air hose nozzle shall be inserted into each element pocket and the deposited dust shall be blown from the filter element using a back and forth motion. The element shall be first blown in a direction opposite to normal to airflow and then in a direction normal to airflow, using care to remove dust from edges and seams. After thorough cleaning, the filter element shall be reassembled in the air cleaner. Airflow shall be adjusted to rated flow and the restriction determined.

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4.8.3.6 Environmental.

4.8.3.6.1 Vibration resistance. To determine conformance to 3.4.6.1, vibration resistance testing shall be performed on elements loaded to capacity per 4.8.3.3 and not cleaned. Mount and support air cleaner on a vibration machine. The air cleaner shall be subjected to a simple harmonic motion having a double amplitude of 0.08 cm, the frequency being varied uniformly between the approximate limits of 10 and 55 hertz (Hz). The entire frequency range, from 10 to 55 Hz and return to 10 Hz, shall be traversed in approximately 1 minute. This motion shall be applied for a duration of 12 hours in a vertical direction and 12 hours in the horizontal direction. The vibration duration in the horizontal direction shall be half parallel to one axis and half parallel to the other axis. Subsequently, the air cleaner shall pass the tests of 4.8.3.1 and 4.8.3.3.

## 5. PACKAGING

5.1 Preservation, packaging, packing, and marking. Preservation, packaging, packing, and marking for the desired level shall be in accordance with the applicable packaging requirements specified by the contracting authority (see 6.2).

## 6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. The air cleaners covered by this specification are intended for use with internal combustion engines for automotive applications.

6.2 Ordering data. Acquisition documents should specify the following:

- a. Title, number, and date of this specification.
- b. Issue of DODISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1.1 and 2.2).
- c. If first article inspection is required (see 3.1).
- d. Title, number, and date of applicable drawing or MS standard (see 3.3).
- e. If rated airflow and dimensions should be other than as specified (see 3.3.1).
- f. If preparation, conditioning, and painting should be other than as specified (see 3.5).
- g. Applicable color chip number of FED-STD-595 for exterior paint (see 3.5.1).
- h. If identification marking should be other than as specified (see 3.6).

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- i. If preproduction inspection is required (see 4.4.1).
- j. If preproduction sample size should be other than as specified (see 4.4.1).
- k. Selection of applicable level and applicable packaging requirements (see 5.1).

6.3 First article. When first article inspection is required, the contracting officer should provide specific guidance to offerers on: whether the sample(s) should be a preproduction sample, a first article sample, an initial production sample, a first production item or a standard production item from the contractor's current inventory; the number of samples to be inspected as specified in 4.4; and (when applicable) the specific tests to be performed on each sample. The contracting officer should also include specific instructions in acquisition documents regarding arrangements for examinations, approval of first article test results, and disposition of first articles. Invitations for bids should provide that the Government reserves the right to waive the requirement for samples for first article inspection to those bidders offering a product which has been previously acquired or tested by the Government, and that bidders offering such products, who wish to rely on such production or test, must furnish evidence with the bid that prior Government approval is presently appropriate for the pending contract. Bidders should not submit alternate bids unless specifically requested to do so in the solicitation.

6.4 Definitions.

6.4.1 Recovered materials. "Recovered materials" means materials that have been collected or recovered from solid waste (see 6.4.2).

6.4.2 Solid waste. "Solid waste" means (a) any garbage, refuse, or sludge from a waste treatment plant, water supply treatment plant, or air pollution control facility; and (b) other discarded material, including solid, liquid, semisolid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations, and from community activities. It does not include solid or dissolved material in domestic sewage, or solid or dissolved material in irrigation return flows or industrial discharges which are point sources subject to permits under section 402 of the Clean Water Act, (33 U.S.C. 1342 et seq.), or source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 U.S.C. 2011 et seq.) (Source: Federal Acquisition Regulations, section 23.402).

6.5 Subject term (key word) listing.

Air filtration, Engine (for internal-combustion engines).  
Engine air cleaners (for internal-combustion engines).

6.6 Changes from previous issue. Asterisks (or vertical lines) are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

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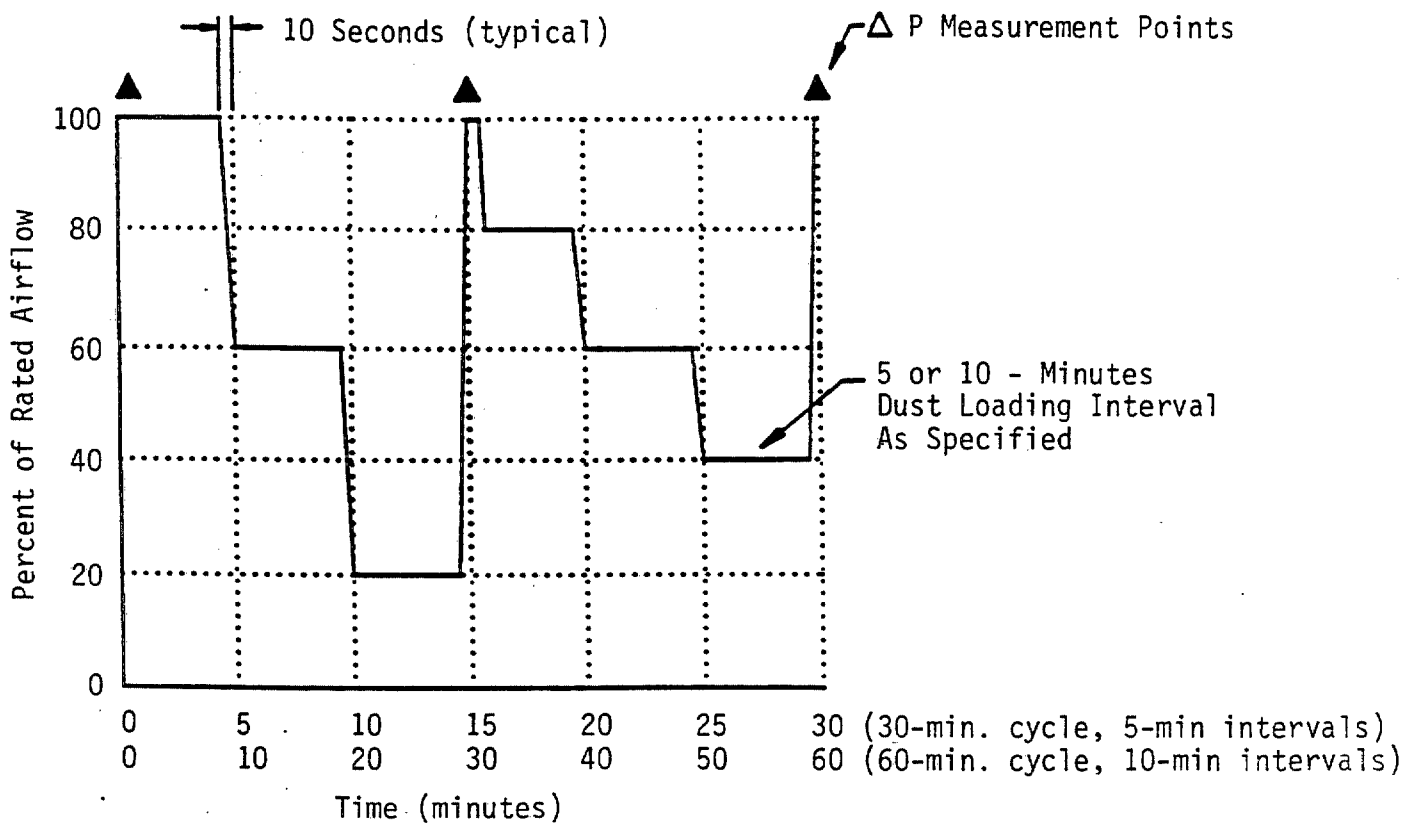
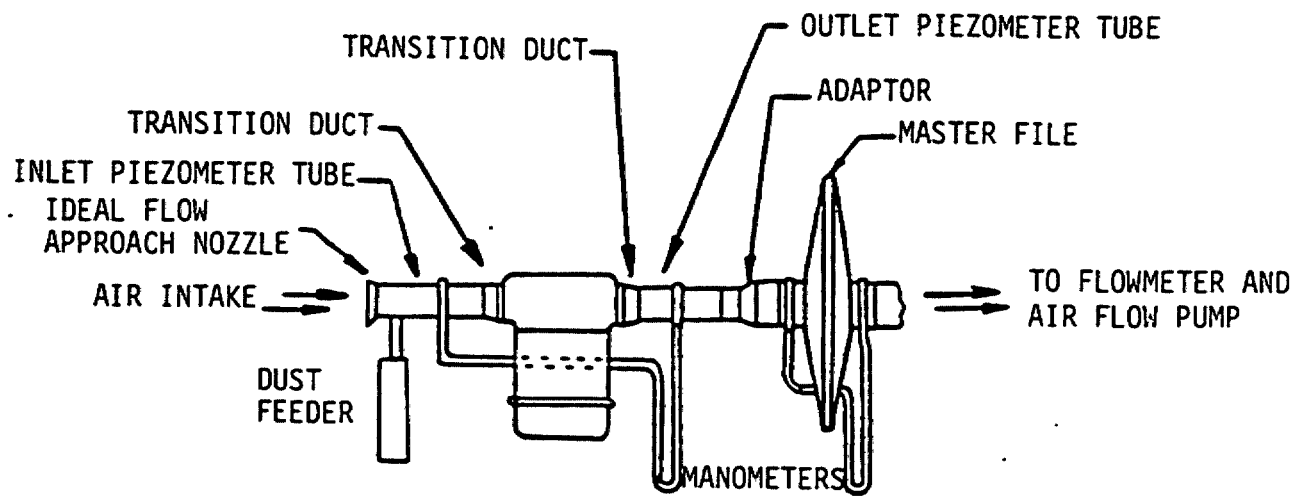


FIGURE 1. Variable airflow cycle.



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TUBULAR INLET AIR CLEANER

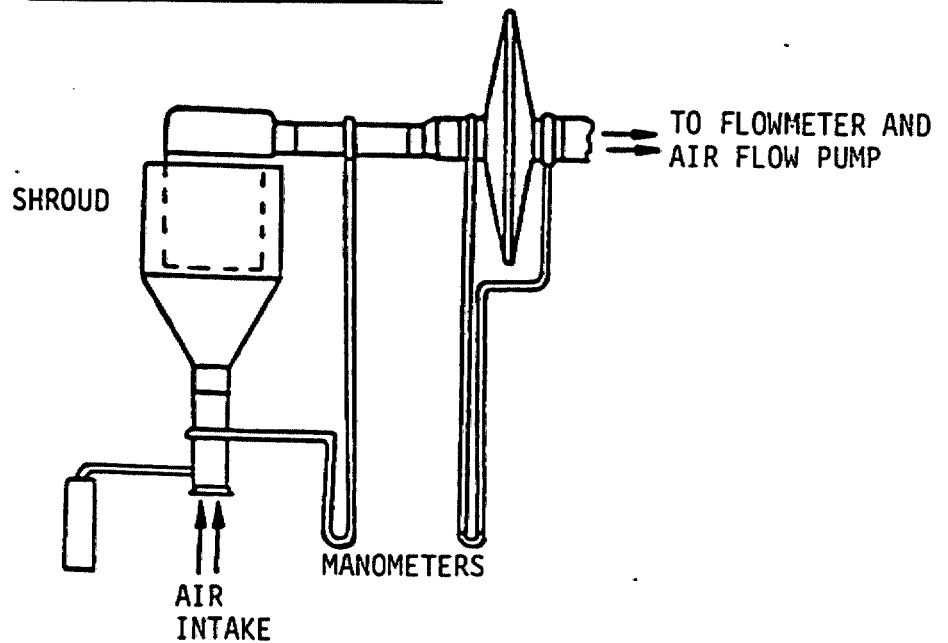
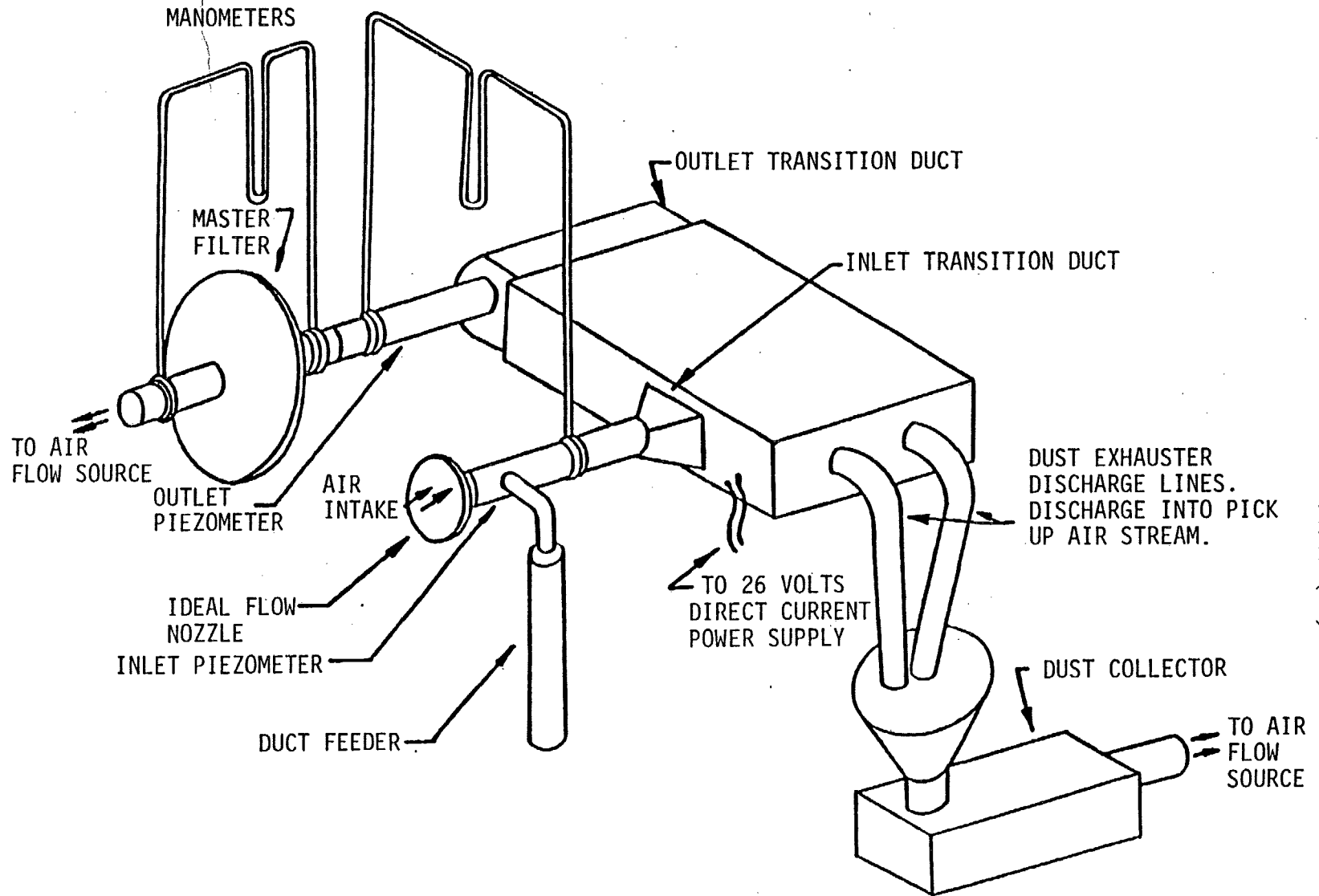


FIGURE 2. Test setup for air cleaners without scavenging blowers.

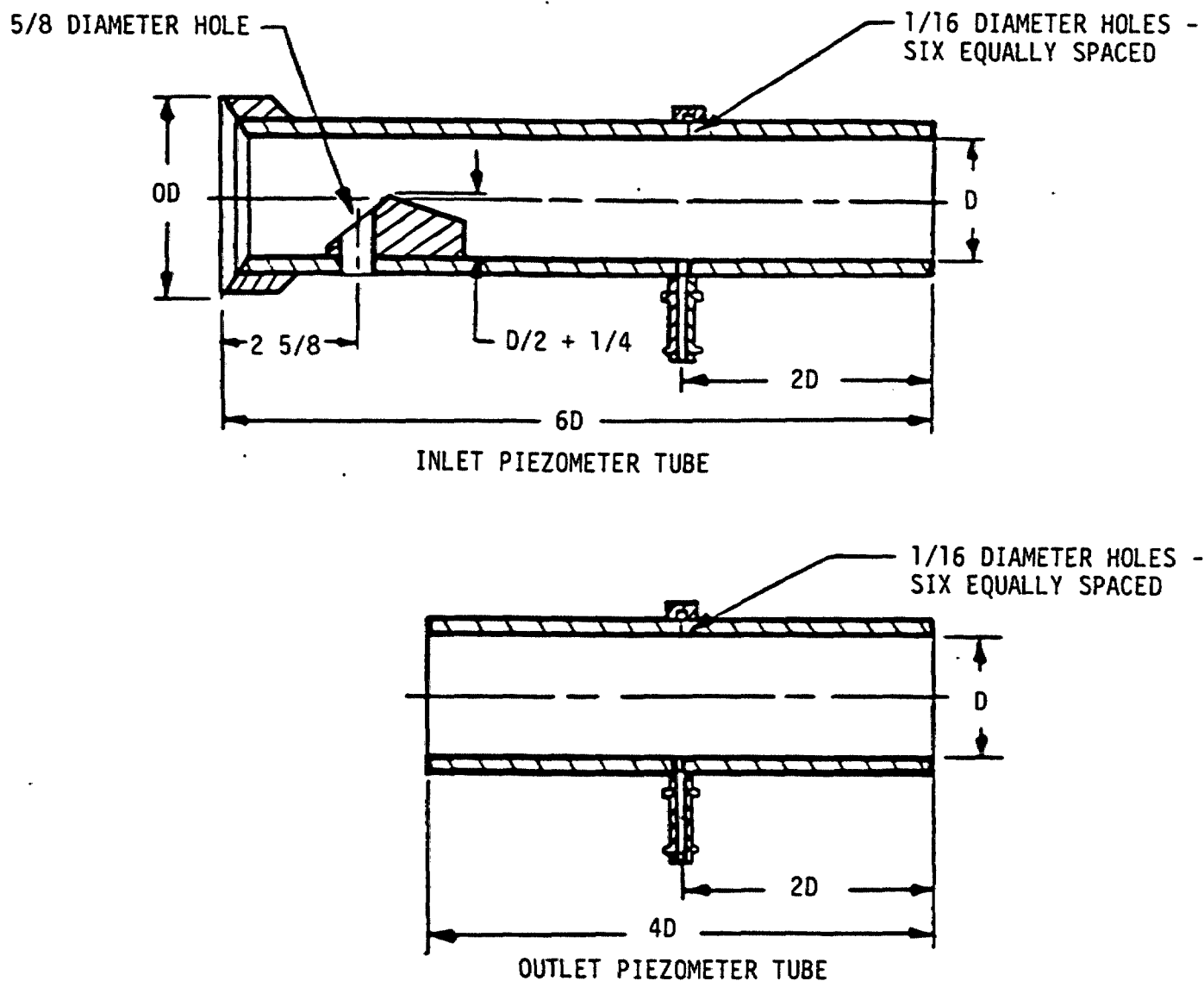
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FIGURE 3. Test setup for air cleaners with scavenging blowers.

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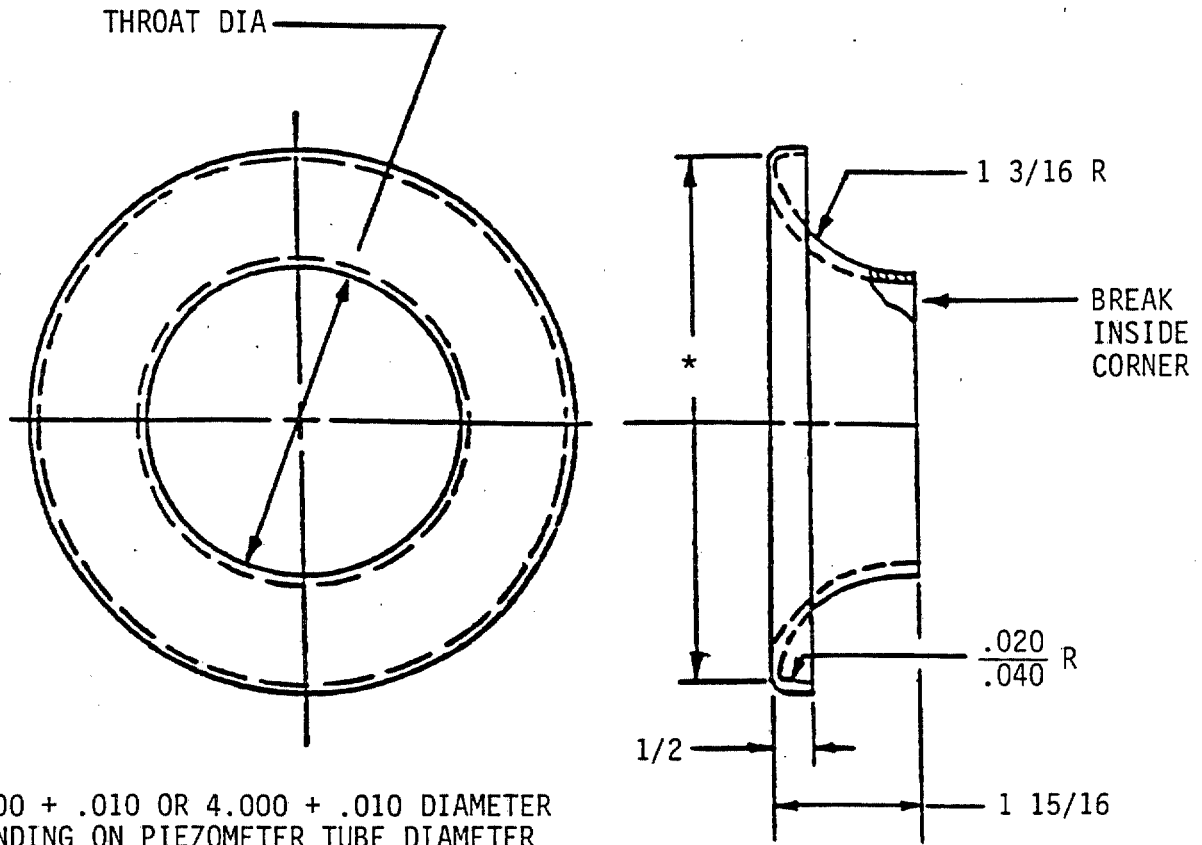


## NOTES:

1. All dimensions are in inches.
2. Diameter (D), inside diameter (ID) and outside diameter (OD).
3. The OD shall be 7 1/2 for piezometer tubes 3 1/4 and larger ID;  
4 for piezometer tubes smaller than 3 1/4 ID.

FIGURE 4. Piezometer tubes.

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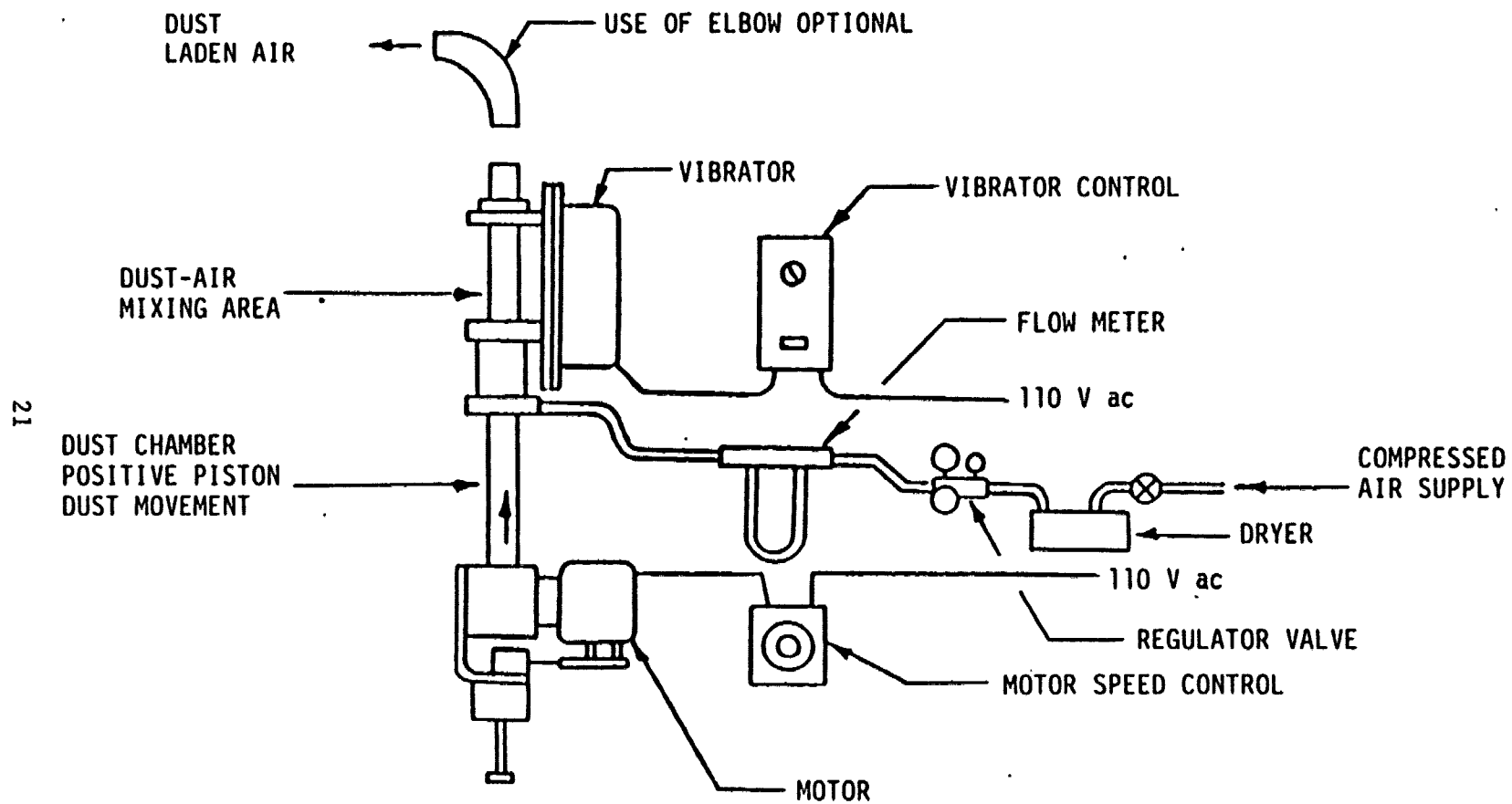


\*7.500 + .010 OR 4.000 + .010 DIAMETER  
DEPENDING ON PIEZOMETER TUBE DIAMETER

THROAT DIAMETER	CFM	THROAT DIAMETER	CFM
6 5/16	2000	3 1/2	700
6 1/8	1900	3 3/8	600
6.0	1800	3 1/8	500
5 13/16	1700	2 3/4	400
5 5/8	1600	2 3/8	300
5 7/16	1500	1 15/16	200
5 1/4	1400	1 3/4	165
5.0	1300	1 1/2	120
4 13/16	1200	1 3/8	100
4 5/8	1100	1 1/4	85
4 3/8	1000	1.0	55
4 1/8	900	13/16	35
3 3/4	800	5/8	20
		7/16	10

ALL DIMENSIONS IN INCHES

FIGURE 5. Ideal flow nozzle.



NOTE: Volt (V), alternating current (ac).

FIGURE 6. Dust feeder.

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Heavy Duty, Dry-Type (For Internal Combustion Engines)

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